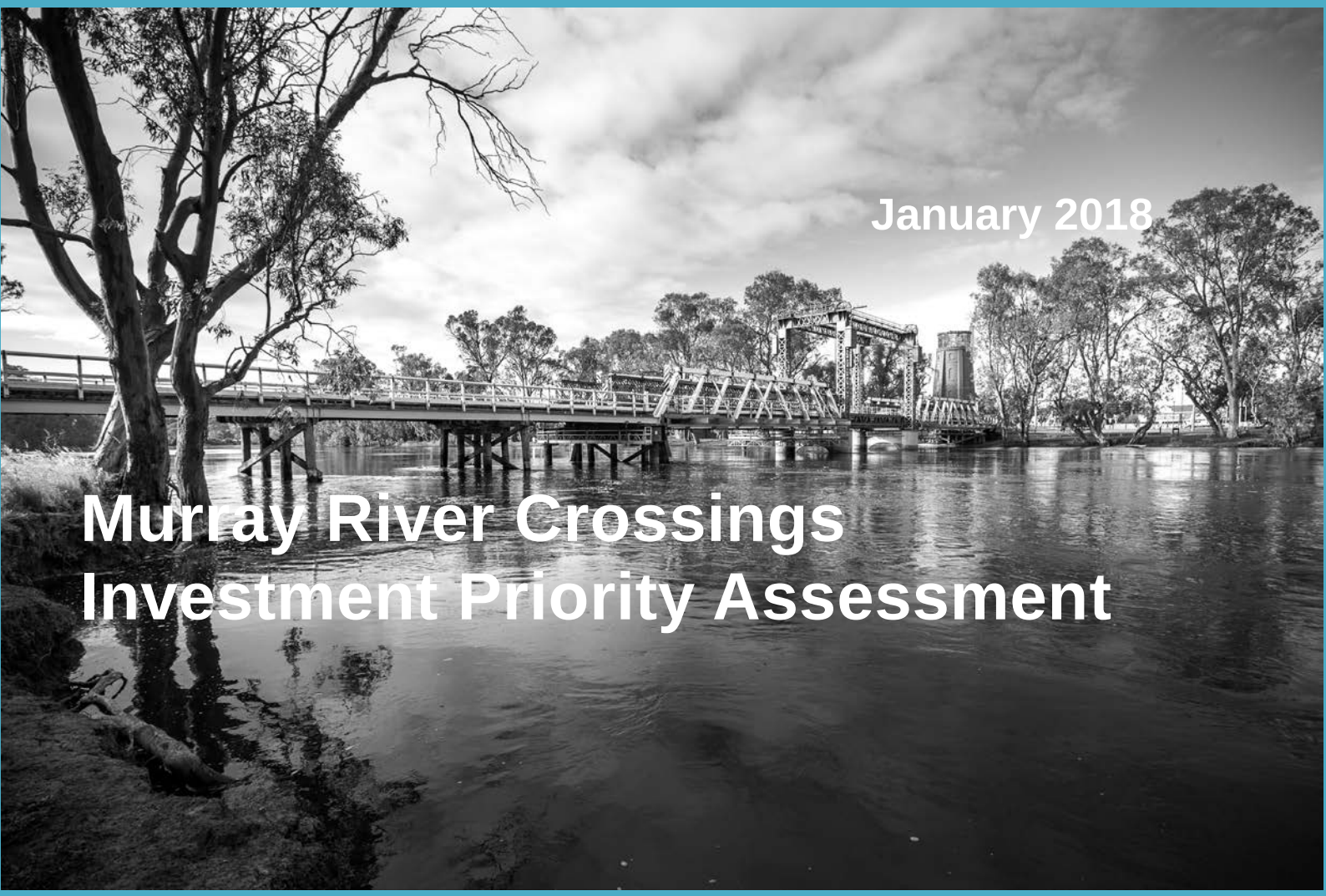

January 2018

Murray River Crossings Investment Priority Assessment

NSW GOVERNMENT

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Contents

Executive summary

1.1 Purpose

The Murray River Crossings Investment Priority Assessment (the Assessment) is a joint project between NSW's Roads and Maritime Services (Roads and Maritime) and Victoria's VicRoads and is an objective review of the 32 bridge and ferry assets that provide essential crossings of the Murray River between the two states. The results of this Assessment will help to inform and prioritise the future investment decisions for the Murray River Crossings (the Crossings) according to each asset's relative ranking.

1.2 Stakeholder engagement

Roads and Maritime and VicRoads engaged consultancy firms Deloitte and SMEC to provide stakeholder engagement services. Key stakeholders from Roads and Maritime, VicRoads, local government, industry groups and community representatives worked together to develop the Assessment's scope and objectives. A Governmental Steering Committee was also formed, to oversee the project and included representatives from Transport for NSW; Department of Economic Development, Jobs, Transport and Resources in Victoria; Roads and Maritime and VicRoads.

1.3 Methodology

The Assessment was guided by the *National Guidelines for Transport System Management in Australia* (2006 and 2015 revisions). A multi-criteria analysis was used to generate a score for each Crossing against the set of objectives determined by key stakeholders to rank each crossing and determine future investment needs.

The objectives considered the following criteria: Higher Mass Limit (HML) connectivity, road safety performance and asset reliability, condition of the bridge, proximity to nearest alternate crossing, dedicated facilities for pedestrians and cyclists (for twin towns). The criteria used in the assessment consider the outcomes of projects underway, such as Echuca – Moama and Barham - Koondrook.

A rating scale of one to five was used to weight the objectives within their categories, with one being very low and five being very high in importance.

Fact sheets were compiled for each bridge based on asset information, network maps, traffic data and geographic context. Based on this information, a preliminary technical assessment was completed for each crossing and a score given in order to understand how well the crossing met each of the objectives.

Threshold scores were then set to categorise each crossing into short (five years), medium (five to 10 years) and long-term (10 years +) priorities for likely future investment.

1.4 Key findings

Prioritisations were determined by scoring each crossing as a function of its technical scores with the corresponding objective weighing (outlined in **Table 5**). The crossings with the lowest combined score have been ranked as having the greatest priority for investment.

Table 11 summarises the crossings that do not meet a combination of the objective criteria.

Sensitivity analysis was applied to test how the Crossings are ranked for the volume of heavy vehicles. Under this additional criterion, the top 9 crossings remain the same; however, the order of priority differs.

In summary the top short term priorities for investment in decreasing order of priority are:

1. Swan Hill Bridge
2. Tooleybuc Bridge
3. Abbotsford Bridge
4. John Foord Bridge
5. Gonn Crossing/ Murrabit Bridge
6. Towong Bridge

The three medium term priorities are:

1. George Chaffey Bridge
2. Yarrawonga-Mulwala Bridge
3. Bethanga Bridge

1.5 Conclusions

The outcomes of this assessment are as follows:

1. The short-term priority investment area is primarily located in the western length of the Murray River. This includes a section of over 400 km by road between Tocumwal and Euston-Robinvale, where there are no B-Double HML crossings between NSW and Victoria.
2. The other two short-term priorities are John Foord Bridge and Towong Bridge located on the middle and upper Murray River respectively.
3. Planning and development work has commenced on Swan Hill Bridge and Tooleybuc Bridge, assessed as the first two short-term priorities.

This process has highlighted the crossings that do not meet the objective criteria and has not focussed on specific crossing solutions. The next steps will be to identify and prioritise solutions for the short, medium and longer-term.

2 Introduction

2.1 Purpose

Roads and Maritime and VicRoads developed the Murray River Crossings Investment Priority Assessment (the Assessment) to objectively review and prioritise the investment needs of the 32 Crossings, comprising 30 bridges and two ferries, over the Murray River for the short, medium and long-term.

The Assessment provides a shortlist of bridges and ferries to be considered by government for future investment and budget inclusion.

2.2 Regional overview

The 32 Crossings reviewed in the Assessment are located along the Murray River, with 100,000 road vehicles per day and 20 million tonnes of freight crossing the river each year. A map illustrating the region and the Crossings is shown in **Figure 1**.

The Crossings are an integral element of this corridor's connectivity. In order to make road and maritime transport more efficient, reliable, safer and more integrated with the overall transport systems of both NSW and Victoria, the strategic functionality of the Crossings is to:

- Provide safe crossings
- Support the unimpeded movement of freight between the two states
- Allow unrestricted river navigation (protected under the Australian Constitution)
- Provide reliable and available connections for all users (e.g. freight, vehicles, pedestrians, cyclists and mobility scooters)
- Provide connectivity between NSW and Victorian communities to access healthcare, education and the main industries of the region.

Eight towns on the Murray River are twin towns with community populations and essential services located on both sides of the river.

Agriculture is a major economic sector located in, and connected by, this corridor and includes produce for both domestic and export markets such as wool, cotton, wheat, sheep, cattle, dairy, rice, oil-seed, wine, fruit and vegetables.

Since the time of Federation, Roads and Maritime and VicRoads and their predecessors have been responsible for the maintenance and improvement of the Crossings. During this time, the NSW and Victorian governments have carried out the maintenance, upgrade, and in some cases replacement, of crossings across the Murray River. However, many crossings now have a performance deficiency. These deficiencies include the limited ability to handle higher volumes of traffic; heavier loads; larger heavy vehicles and farm machinery increasingly used in the freight and farming industries; and lack of pedestrian infrastructure. A number of bridges are considered performance-deficient due to their age and condition, which is partly a result of the unreliability and high-maintenance needs associated with timber truss bridges.

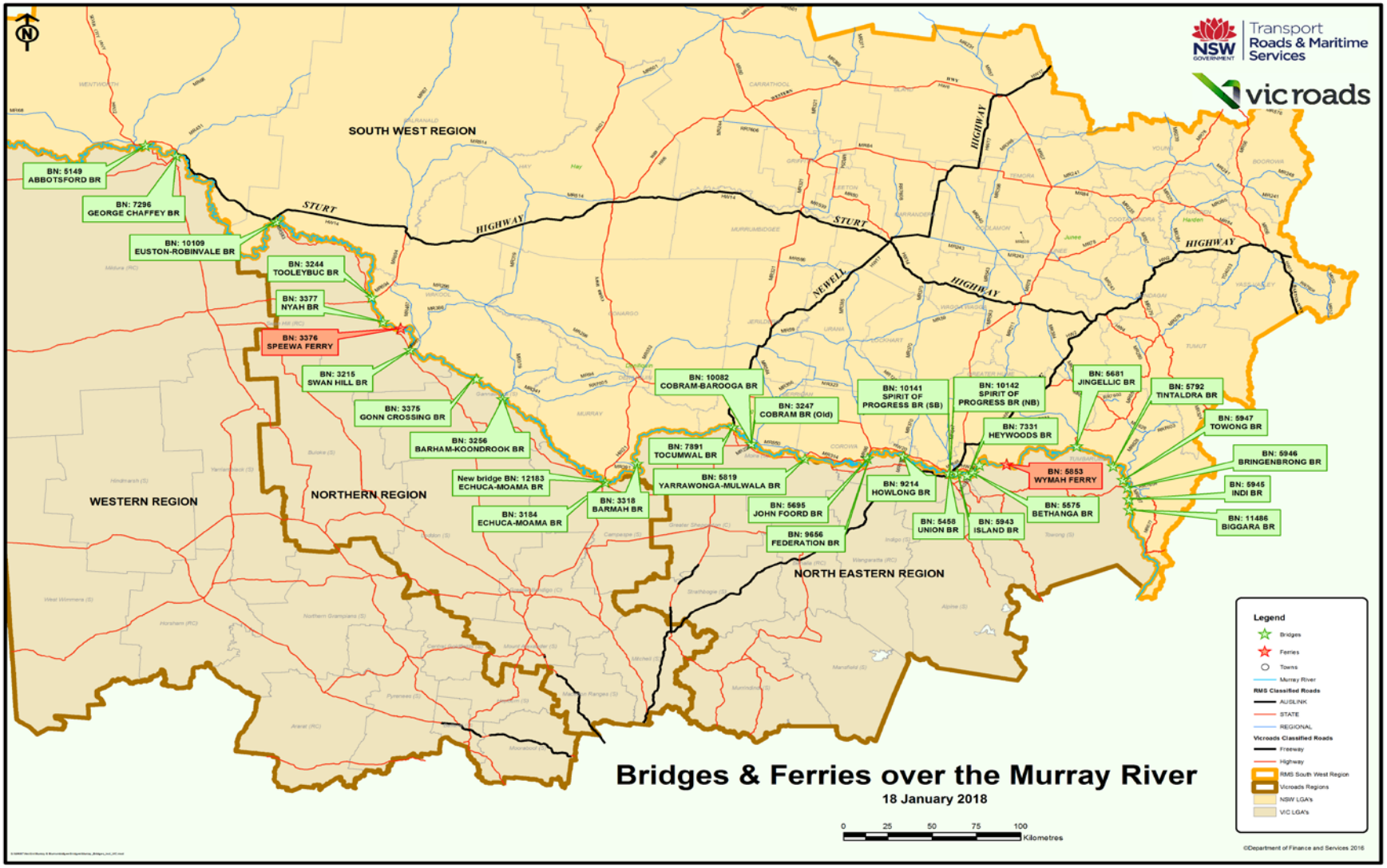
Since the 1936 Murray River Crossings Agreement, also known as the Moiety Agreement, the river crossings have been managed and maintained by Roads and Maritime and equally funded by Roads and Maritime and VicRoads. Under the agreement, Roads and Maritime has been responsible for developing and implementing the rolling program of work on the Crossings, including regular and ongoing routine maintenance and rebuilding. This program of work is escalating given the age and deterioration of the older timber bridges.

Without the requisite funding to properly manage the Moiety Agreement, further deterioration of the bridges and ferries, and increased risk to public safety and economic growth of the communities

located in, and connected by, this corridor will occur. If this were to continue, load and/or width restrictions may need to be placed on some of the Crossings, which will have direct economic and community impacts.

The challenge lies in maintaining the current level of service, as a minimum, while balancing the immediate maintenance requirements of the Crossings and the timeframes associated with investment in new or replacement crossings.

Figure 1: Murray River crossings



Source: Roads and Maritime Services

2.3 Scope

The Assessment details the process used to prioritise the future investment requirements for the Crossings. The list of 32 Crossings shown in **Table 1** is ordered from upstream to downstream. This list includes the new Echuca-Moama Bridge currently under construction, the restored Barham-Koondrook Bridge and the following crossings in the planning phase for duplication, or replacement, namely the Swan Hill Bridge, Tooleybuc Bridge and the Yarrawonga-Mulwala Bridge. Rail crossings were excluded from consideration.

The state heritage listed former road bridge at Cobram-Barooga was not considered in the Assessment process. The bridge is a crossing that does not meet any of the investment criteria; however, it is included in the Crossings lists for completeness.

The Crossings have been categorised into short (five years), medium (five to 10 years) and long-term (10 years +) priorities for future investment based on their relative merits. The timeframes chosen are representative only and do not reflect any limits associated with asset condition or capacity.

Four heritage timber truss bridges cross the Murray River, namely at Cobram and Barham (de Burgh truss bridges), and at Swan Hill and Tooleybuc (Allan truss bridges). These four bridges are included in the Roads and Maritime Timber Truss Bridge Conservation Strategy. Twenty-two of the 32 Crossings are heritage listed on the s170 Heritage Register, seven of which are listed as state significant. The Assessment does not take into consideration the impact of heritage on investment priority of the Crossings.

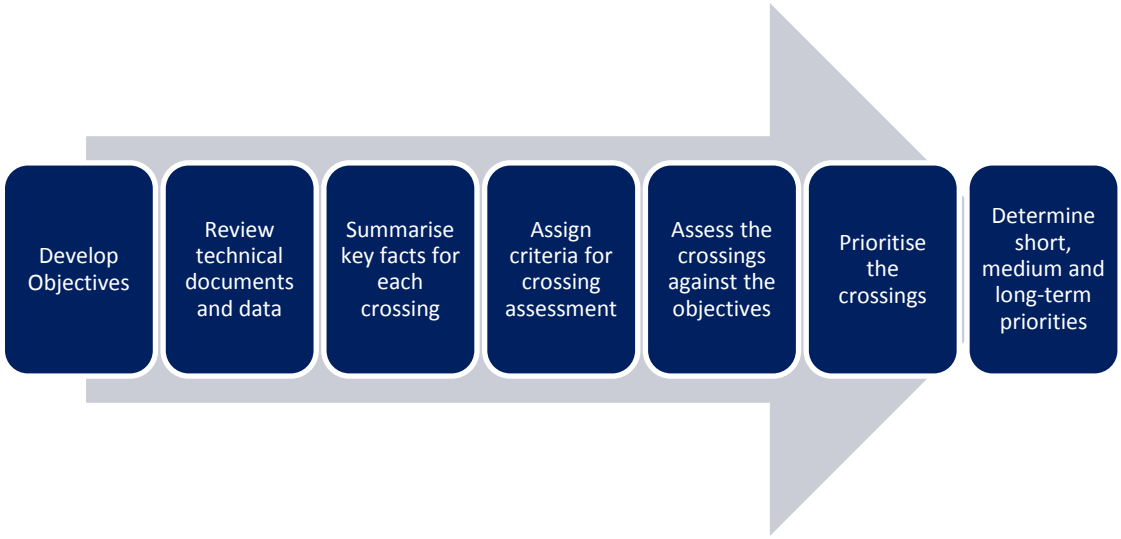
Table 1: Murray River crossings listed in order from upstream to downstream

ID	Crossing	ID	Crossing
1	Biggara Bridge (Mabey)	17	Yarrawonga-Mulwala Bridge
2	Indi Bridge	18	Cobram-Barooga Bridge (new bridge)
3	Bringenbrong Bridge	19	Cobram-Barooga Bridge (old bridge)
4	Towong Bridge	20	Edward Hillson Bridge Tocumwal
5	Tintaldra Bridge	21	Barmah Bridge
6	Jingellic Bridge	22.1	Echuca-Moama Bridge (old bridge)
7	Wymah Ferry	22.2	Echuca-Moama Bridge (new bridge under construction)
8	Bethanga Bridge	23	Barham-Koondrook Bridge
9	Heywoods Bridge	24	Gonn Crossing/Murrabit Bridge
10	Bonegilla Island Bridge	25	Swan Hill Bridge
11	Spirit of Progress Bridge Southbound	26	Speewa Ferry
12	Spirit of Progress Bridge Northbound	27	Nyah Bridge
13	Union Bridge	28	Tooleybuc Bridge
14	Howlong Bridge	29	Euston-Robinvale Bridge
15	Federation Bridge	30	George Chaffey Bridge
16	John Foord Bridge	31	Abbotsford Bridge

2.4 Overview of assessment process

An overview of the assessment process is represented in **Figure 2**.

Figure 2: Seven-stage assessment process



The seven stages were designed to ensure a rigorous prioritisation process and ranking system that was well-informed by the existing literature and incorporated the needs and knowledge of key stakeholders.

An overview of each stage is outlined below:

1. **Development of objectives**

A set of objectives was developed to reflect the desired achievements for each crossing. A scoring system was used to determine the level of importance of each objective for each crossing.

2. **Technical assessment and gap analysis of data sets**

Information on each crossing and its use was collated with data gaps identified. Sources and assumptions were also identified and agreed.

Fact sheets were prepared for each crossing and included a brief description of the bridge or ferry. A complete set of the fact sheets is included in **Appendix C**.

3. **Defining criteria metrics**

Appropriate criteria were identified with metrics or measures developed for each objective to assess the current condition and performance of each crossing. Refer to **Section 4** for further details.

4. **Assessment against the objectives**

Logic trees were developed to support the preliminary evaluation of the performance of each crossing. Through application of the logic tree, it was determined how each crossing would score against each objective in the technical assessment. Detailed logic trees are included in **Appendix B.**

5. **Prioritisation**

The weighted score for each crossing was derived by multiplying the raw score by the weighting for each objective. These scores provided the relative ranking of each crossing.

6. **Timing**

Threshold scores were nominated by stakeholders to categorise the rankings into short, medium and long-term priorities. The threshold scores reflected breaks in the ranking rather than a technical analysis of appropriate investment timing.

2.5 Stakeholder engagement

Deloitte and SMEC were engaged to develop a stakeholder engagement plan, outlining the consultation process and identifying key stakeholders. Consultations were conducted via workshops, email, online survey and phone calls to understand constraints and how crossing improvements could improve freight logistics and regional productivity.

Draft and final fact sheets were presented to the group as the basis for informing and assessing the performance of each crossing against the objectives.

2.6 Key messages and governance

To support and guide the development of the crossing objectives, a set of key messages were developed from regional programs related to the Murray River. The key messages align with overarching government messaging and were tested with the stakeholder group. There was general consensus that the key messages would reflect the desire by all parties to:

- Drive economic growth in the region by improving crossing conditions for heavy vehicles and provide better conditions for oversize and over mass vehicles crossing the Murray River
- Reinforce the need to improve traffic movement for local communities.

The development of the Assessment was guided by a Governmental Steering Committee which included representatives from Transport for NSW; Department of Economic Development, Jobs, Transport and Resources in Victoria; NSW Roads and Maritime Services; and VicRoads. The role of the Governmental Steering Committee included reviewing the progress of the Assessment in accordance with the Terms of Reference and providing guidance as required.

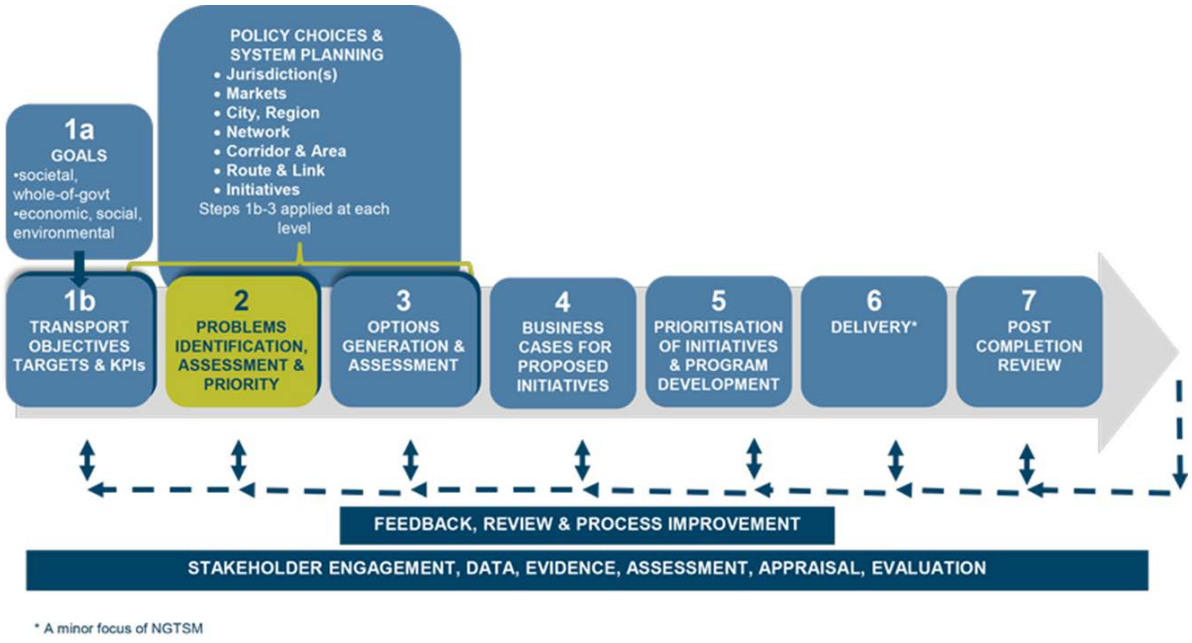
3 Prioritisation approach

3.1 Overview

A prioritisation process was developed to support the Assessment. This process enabled an organised approach to prioritise the Crossings along the Murray River and was designed to reflect the objectives of Roads and Maritime, VicRoads and other key stakeholders.

This identification, assessment and priority process was guided by the *National Guidelines for Transport System Management in Australia* (2006 and 2015 revisions), see **Figure 3**.

Figure 3: National transport systems guidelines, problem identification and assessment



3.2 Stakeholder input

3.2.1 Stakeholder engagement

Consultation with key stakeholder groups, particularly community representatives, was used to gain insight and feedback on how changes to the Crossings may impact the communities and local industries.

The engagement approach with key stakeholders included face-to-face workshops and direct engagement, primarily via email and phone calls. An online survey was also used to gauge direct feedback and input to the objective setting and scoring.

3.2.2 Workshops

Two workshops were held with assistance from Deloitte and SMEC to develop the Assessment.

The workshops involved facilitated group discussions, giving stakeholders the opportunity to provide feedback and participate in the weighting of objectives and final evaluation of the Crossings.

The first workshop was followed up by consultation with a wider group of stakeholders in order to better understand existing crossing conditions, issues and any development proposals or strategic land use planning that may alter the current use or function.

The second workshop also reviewed the results of the weighting and scoring submitted via the online survey. Participants used the multi-criteria analysis method to test the preliminary results, sensitivities and refine the results.

4 Objectives and evaluation criteria

4.1 Objectives

Defining objectives was the first step in setting priorities for the Crossings. The identified objectives and corresponding evaluation criteria were designed to provide an organised and transparent approach to assess how the Crossings met their operational and community expectations.

4.1.1 Objective setting process

A draft set of objectives was developed by Deloitte and SMEC in collaboration with Roads and Maritime and VicRoads. The objectives were based on research and a review of current government strategies and announced commitments by both the NSW and Victorian governments. This preliminary list of objectives was tabled at the first workshop. During facilitated breakout groups, workshop participants were tasked with refining the objectives and determining those deemed most important; resulting in consolidation of the list. Participants also ranked the objectives in order to identify those deemed most important.

This process resulted in four objectives identified as more important in the context of future investment priorities, with two viewed as slightly less important. A high priority (and associated higher weighting) was placed on objectives that improve freight productivity, provide a reliable crossing, balance whole of life cost and enable twin town connectivity for all users.

The four most important were assigned to a primary category with the remaining two forming the secondary category.

Feedback from the objective setting process indicated that both Roads and Maritime and VicRoads core business is building and operating safe roads in NSW and Victoria and is a prime driver behind crossing development or maintenance.

Table 2 details the final set of objectives.

Table 2: Primary and secondary objectives

Primary objectives
1. Improve freight productivity by improving bridges on strategic freight routes between NSW and Victoria. Cater for oversize and over mass freight vehicles crossing the Murray River
2. Provide a reliable bridge connection for all users crossing the Murray River
3. Provide a minimum standard replacement, balanced against whole of life cycle cost
4. Improve twin town connectivity for all bridge users in order to support connections for hospitals, schools and regional industries. Provide acceptable alternate routes in the event of planned or unplanned bridge closures
Secondary objectives
1. Enable continued water activities and operations on the Murray River by preserving bridge height clearance requirements
2. Ensure a safe crossing of the Murray River for all users by addressing bridge safety concerns.

4.1.2 Weighting objectives

A numerical scoring system was developed to rate the importance of the objectives. A rating scale of one to five was used, with one being very low and five being very high in importance. The level of importance and associated score is summarised in **Table 3**.

Table 3: Objective scoring

Importance of objective	Score
Very Low	1
Low	2
Medium	3
High	4
Very High	5

Individual objective weighting

An online survey was distributed to stakeholders after the first workshop, calling for them to rate the level of importance of each objective using the scoring scale in **Table 3**

Table 4 summarises the online survey results. The overall importance of each objective was determined by the importance-level category (very low, low, medium, and high) with the greatest number of votes.

Table 4: Primary and secondary objectives importance based on stakeholder voting

	Primary Objectives	Votes	Overall Importance
P1	Improve freight productivity by improving bridges on strategic freight routes between NSW and Victoria. Cater for oversize and over-mass freight vehicles crossing the Murray River	0	Very Low
		0	Low
		3	Medium
		1	High
		16	**Very High**
P2	Provide a reliable bridge connection for all users crossing the Murray River	0	Very Low
		0	Low
		0	Medium
		10	High
		10	**Very High**
P3	Provide a minimum standard replacement, balanced against whole of life cycle cost	0	Very Low
		1	Low
		4	Medium
		11	**High**
		4	Very High
P4	Improve twin town connectivity for all bridge users in order to support connections for hospitals, schools and regional industries. Provide acceptable alternate routes in the event of planned or unplanned bridge closures	0	Very Low
		0	Low
		2	Medium
		4	High
		14	**Very High**
	Secondary Objectives		**Overall Importance**
S1	Enable continued water activities and operations on the Murray River by preserving bridge height clearance requirements	0	Very Low
		2	Low
		7	Medium
		8	**High**
		3	Very High
S2	Ensure a safe crossing of the Murray River for all users by addressing bridge safety concerns	0	Very Low
		0	Low
		1	Medium
		8	High
		11	**Very High**

Primary v secondary objectives

Weighting was applied to the primary and secondary categories to reflect the relative importance of each. Preliminary weightings of 60-40% were used for primary and secondary objectives respectively.

These preliminary weightings were presented and subject to feedback during the second workshop. Different weightings between primary and secondary objectives were discussed with the suggestion that a weighting of 70-30% may be more appropriate. This was tested according to the multi-criteria analysis model, resulting in negligible impact on the final rankings. The 60-40% weightings were used throughout the Assessment.

Table 5 details the calculation process for the overall weightings.

Table 5: Weightings for primary and secondary objectives

Primary objectives	Priority	Raw score	Weighted score	Overall weighting
Improve freight productivity by improving bridges on strategic freight routes between NSW and Victoria. Cater for oversize and over mass freight vehicles crossing the Murray River	Very high	5	7.5	20.0%
Provide a reliable bridge connection for all users crossing the Murray River	Very high	5	7.5	20.0%
Provide a minimum standard replacement, balanced against whole of life cycle cost	High	4	6	16.0%
Improve twin town connectivity for all bridge users in order to support connections for hospitals, schools and regional industries. Provide acceptable alternate routes in the event of planned or unplanned bridge closures	Very high	5	7.5	20.0%
Secondary objectives	**Priority**	**Raw score**	**Weighted score**	**Overall weighting**
Enable continued water activities and operations on the Murray River by preserving bridge height clearance requirements	High	4	4	10.7%
Ensure a safe crossing of the Murray River for all users by addressing bridge safety concerns	Very high	5	5	13.3%
Total			37.5	100%

4.1.3 Objective 1: Improve freight productivity

Improve freight productivity by improving bridges that are on strategic freight routes between NSW and Victoria and cater for oversize and over mass freight vehicles crossing the Murray River.

Freight movements across the Murray River are dominated by[1]:

1. **Sydney interstate freight:** Trade between Melbourne and Sydney is the dominant cross-Murray freight task, with relatively balanced volumes north and south (approximately 6.5 million tonnes annually southbound and 7.0 million tonnes annually northbound). No single commodity dominates the freight task, with a large variety of goods transported between the two cities. The dominant route for this freight across the Murray is the Hume Freeway at Albury/Wodonga.

   For trade between Sydney and Adelaide the dominant route is the Sturt Highway, with the crossing point of the Murray River being George Chaffey Bridge at Mildura.

[1] Information provided by Bureau of Statistics and Analytics, Freight Strategy and Planning, Transport for NSW, 13 November 2015.

Tooleybuc Bridge is on a strategic freight route, the Mallee Highway, connecting Victoria to NSW. The Mallee Highway is also used as a route between NSW and South Australia as an alternative to the Sturt Highway route through Mildura and Renmark.

2. **The Riverina and South Western NSW:** Geographically closer to Port of Melbourne than Port Botany (Sydney), much of the produce from the area is exported through the Port of Melbourne, generating cross-Murray travel. This task is only slightly smaller than the interstate task to Sydney (approximately 6.5 million tonnes annually southbound and 5.5 million tonnes annually northbound). Key commodities being transported include wine and other food products, grains and general freight (containers and pallets). Given the size of the Riverina and South Western NSW, a number of possible Crossings of the Murray are valid, with the likely dominant routes being the Hume Highway, the Newell Highway, the Cobb Highway, the Sturt Highway and in the west, the Silver City Highway linking to the Calder Highway.
3. **Queensland interstate freight:** Trade between Queensland and Victoria represents a significant although smaller task (approximately 2.5 million tonnes annually in each direction). The dominant commodity transported is food products and represents the majority of freight use. Given the distances involved, more opportunity for route selection would potentially be viable. Even so, the dominant routes used across the Murray are likely to be the Hume Highway and the Newell Highway.
4. **ACT and South-Eastern NSW:** This region is home to significant timber product manufacturing (including paper manufacturing). Significant quantities of logs travel across the border from eastern Victoria to Tumut, Tumbarumba, or to Port of Eden for export. Dominant routes are the Princes Highway, Monaro Highway and a number of smaller routes to the immediate south of Tumbarumba. These routes are east of the Murray River Crossings study area.

The main crossings impacted by these movements are summarised in **Table 6**.

Table 6: Strategic freight routes for Murray River Crossings

Highway	Murray River Crossing	Strategic freight route		
		Sydney interstate freight	The Riverina and South Western NSW	Queensland interstate freight
Cobb Highway	Echuca-Moama Bridge		✓	
Newell Highway	Edward Hillson Bridge (Tocumwal)		✓	✓
Hume Highway	Spirit of Progress Bridges	✓	✓	✓
Sturt Highway	George Chaffey Bridge (Mildura)	✓		✓
Silver City Highway and Calder Highway	Abbotsford Bridge		✓	
Mallee Highway	Tooleybuc Bridge	✓	✓	✓

Appendix A, *Objective 1 Improve freight productivity technical appraisal results*, indicates two crossings partially meet Objective 1.

The Tooleybuc Bridge on the Mallee Highway and Abbotsford Bridge on the junction of the Silver City Highway and the Calder Highway; are on strategic freight routes and are Over Size Over Mass restricted structures.

4.1.4 Objective 2: Provide a more reliable crossing

Provide a more reliable crossing for all users crossing the Murray River.

The results of the technical appraisal for Objective 2 are set out in in **Appendix A**, *Objective 2: Provide a more reliable crossing technical appraisal results.*

From **Table 7**, it can be seen the following 12 bridge crossings did not meet the reliability score.

Table 7: Crossings "partially meeting" objective 2

ID	Crossing	Twin town	One lane crossing	Opening bridges
23	Barham-Koondrook Bridge	✓	✓	✓
25	Swan Hill Bridge	✓	✓	✓
16	John Foord Bridge	✓	✓	×
17	Yarrawonga-Mulwala Bridge	✓	×	×
24	Gonn Crossing/Murrabit Bridge	×	✓	✓
27	Nyah Bridge	×	✓	✓
28	Tooleybuc Bridge	×	✓	✓
31	Abbotsford Bridge	×	✓	✓
1	Biggara Bridge (Mabey)	×	✓	×
2	Indi Bridge	×	✓	×
4	Towong Bridge	×	✓	×
10	Bonegilla Island Bridge	×	✓	×

Swan Hill Bridge, Barham-Koondrook Bridge and John Foord Bridge are single lane contra-flow crossings in twin towns.

Yarrawonga-Mulwala Bridge is in a twin town with narrow lane widths on the bridge truss spans. The local weir crossing is due to close after 2020, so the combined weir and bridge traffic volumes have been used in the assessment.

The remaining eight bridges operate as a single lane crossing.

4.1.5 Objective 3: Asset condition

Provide a minimum standard of replacement, balancing against whole-of-lifecycle costs.

The results of the technical appraisal for Objective 3 are set out in **Appendix A** *Objective 3: Asset condition technical appraisal results.*

Five crossings (excluding the old Cobram-Barooga Bridge) did not meet the asset condition objectives, namely:

1. Towong Bridge
2. John Foord Bridge
3. Gonn Crossing/Murrabit Bridge
4. Swan Hill Bridge
5. Tooleybuc Bridge.

All of the five crossings are currently in poor condition and are included in the 10 Year Forward Works Program.

These crossings are amongst the oldest on the Murray River (built between 1893 and 1926) and are heritage listed structures on the s170 Heritage Register.

4.1.6 Objective 4: Improve connectivity

Improve twin town connectivity for all bridge users in order to support connections for hospitals, schools and the regional towns' main industries. Provide acceptable routes in the event of bridge closures resulting from planned and unplanned incidents.

The results of the technical appraisal for Objective 4 are set out in **Appendix A**, *Objective 4: Improve connectivity technical appraisal results*.

Two crossings did not meet the Objective 4 criteria. Bethanga Bridge and Euston-Robinvale Bridge all have freight re-routing distances greater than those set by the criteria.

Yarrawonga-Mulwala Bridge currently relies on a local weir crossing in the event of a bridge closure. However, the weir crossing is due to close post 2020, resulting in increased re-routing distances of over 30 km.

Barham-Koondrook and Swan Hill bridges have re-routing options between 30 km and 60 km.

The relationships between neighbouring crossings for incident management re-routing, with distinct groupings and pairs of crossings is:

- Abbotsford to Barham-Koondrook group of bridges in the west
- Tocumwal and Cobram-Barooga pair of bridges centrally
- John Foord to Howlong group of bridges centrally
- Union to Bringenbrong group of bridges in the east.

The results of this objective appraisal depend largely on whether or not a Crossing is in a twin town and/or on a strategic freight route (and correspondingly has higher expectations for lesser diversion distances).

4.1.7 Objective 5: Support water activity

Enable continued water activities and operations on the Murray River by preserving bridge height clearance requirements.

This objective assessed whether or not the Crossings physically enabled vessels to pass underneath or if a lift span was provided. The height for these activities was based on a paddle

steamer being able to move down river from Echuca-Moama on high water flow. No height restriction was assumed upstream of Echuca-Moama and the width of bridge spans was not examined.

Based on these assumptions, and the lack of contradicting advice from stakeholders throughout the study, all of the Crossings were deemed to support water activities.

4.1.8 Objective 6: Ensure a safe crossing

Ensure a safe crossing of the Murray River for all users by addressing bridge safety concerns.

In the absence of safety audits for each crossing, it was assumed that all the Crossings met the criteria.

This assumption was supported by examining accident crash data, including casualty and tow away crashes, for the last five years at each crossing. There was a single accident at five crossings, three accidents on the old Echuca-Moama Bridge and five accidents on the Spirit of Progress Bridge. These last two data sets correlate with the higher traffic volumes at Echuca-Moama and Spirit of Progress Bridges.

It was noted that the age of the Crossings varies considerably, with the oldest crossing built at Echuca-Moama in 1879. Safety standards, both material and geometric, have changed considerably during this time, resulting in a wide range of traffic lane widths, site distances and facilities for pedestrians and cyclists.

All of the Crossings were assumed to meet the safety objective.

4.1.9 Combined technical results

The combined results of the above technical appraisals raw scores are presented in **Appendix A**.

Based on the technical appraisal raw combined scores there are 8 crossings with negative scores (deemed to not meeting the Assessment's objectives). See **Table 11**.

Not surprisingly, the highest positively scored crossings were also the newest.

4.2 Crossing evaluation

The scoring scale in **Table 8** was guided by rankings suggested by *the Australian Transport Council – National Guidelines for Transport System Management*. A score between -3 and +3 was assigned for each objective where the extremes represent a Crossing "not meeting the objectives" or "fully exceeding the objectives respectively".

A score of zero was assigned if the crossing met the objective in question.

Table 8: Assessment scores used for the objectives

Assessment rating	Description	Symbol	Raw score
Strongly negative	Does not meet objective measure		-3
Slightly negative	Partially meets objective measure		-1
Neutral	Meets objective measure		0
Slightly positive	Partially exceeds objective measure		+1
Strongly positive	Substantially exceeds objective measure		+3

4.2.1 Timeframes

The following indicative timeframes were agreed by stakeholders to assign a short, medium or long-term timeframe for the prioritisation of any future investment to the list of crossings. One of three timeframes was assigned to each crossing based on the combined score. **Table 9** provides a description and recommended timing for each category.

Table 9: Weighted scores used to assign indicative timeframes for each crossing

Timeframe	Recommended timing	Crossing's weighted combined score
Short-term	Considered high priority and identified for immediate attention. Investment may be required to address shortcomings on these crossings within the next five years	Less than -0.25
Medium-term	Investment in these crossings aimed at planning for growth and likely to be required within the next five to 10 years	Between -0.25 and 0.25
Long-term	These crossings currently meet or exceed most of the objectives. Based on the current assessment these crossings may not require investment within the next 10 years. Future investment may be required within a 10 to 20 year window or beyond 20 years depending on future levels of growth and demand.	Greater than 0.25

Table 10: Measures and assumptions used for primary and secondary objectives

Objective	Measure	Assumptions
1. Improve freight productivity by improving bridges on strategic freight routes between NSW and Victoria and cater for oversize and over mass freight vehicles crossing the Murray River	Is the crossing on a strategic freight network? Does it enable access for B-double, higher mass limit (HML) and oversized over mass (OSOM) vehicles?	• The strategic freight network was sourced from the Transport Infrastructure Council summary of NSW and Victorian Strategic Freight Routes • Both VicRoads and Roads and Maritime network conditions were reviewed • Where a crossing is restricted in one jurisdiction, but not the other, the overall rating is considered to be restricted • 26m B-double vehicles were adopted as most restrictive
2. Provide a more reliable bridge connection for all users crossing the Murray River	For vehicular traffic, reliability has been assessed based on road geometry, lane widths and estimated peak hour volume capacity. For pedestrians and cyclists, reliability has been assessed based on whether or not a facility is required and provided and the traffic speed environment	• Road geometry targets for rural roads was sourced from Roads and Maritime's *Network Performance Measures and Planning Targets* guideline (2010) as they influence road capacity, comfort and safety. • Peak hour volumes were estimated to be 10% of Average Annual Daily Traffic (AADT) volumes. • A peak hour volume capacity threshold of 1200 vehicles/lane/hour was assumed. For one lane bridges a capacity of 600 vehicles/hour was assumed.
3. Provide a minimum standard replacement, balanced against whole-of-lifecycle cost	What is the Bridge Health Index (BHI) condition rating? Is funding for the crossing allocated in the Ten Year Forward Works Program?	• The BHI is produced by Roads and Maritime and summarises if a crossing is in a 'good', 'fair' or 'poor' condition • The Ten Year Forward Works Program (February 2016) considers the BHI, as well as the VicRoads Strengthening Priority Classifications and Roads and Maritime's Routine Maintenance Action Scores • A crossing in 'fair' or better condition is considered to meet the objective measure • A crossing in 'poor' condition but still open is considered to partially meet the objective • A crossing in 'good' condition and not included for funding in the Ten Year Forward Works Program is considered to fully exceed the objective

Objective	Measure	Assumptions
4. Improve twin town connectivity for all bridge users in order to support connections for hospitals, schools and regional industries. Provide acceptable alternate routes in the event of planned or unplanned bridge closures	Is a crossing in a twin town? If there is an incident how far do people and freight have to re-route and is this considered acceptable?	• A twin town is defined by having a population centre 5 km of the crossing on either side of the river • Local traffic is generated by users accessing services in a twin town should be able to re-route in 10 km or less • Long distance through traffic should be able to re-route in an hour or less (ie 60 km at a posted 60 km/h speed limit) • Long distance freight is more likely to be in articulated or greater size vehicles and have the same re-routing options as long distance through traffic ie 60 km or less is acceptable • Local freight movements are more likely to be rigid vehicles but have fewer re-routing options than long distance freight. As such 30 minutes re-routing is considered acceptable (ie 30 km at a posted 60 km/h speed limit) • Freight movements not on a strategic freight network should be able to re-route
5. Enable continued water activities and operations on the Murray River by preserving bridge height clearance requirements	Is the bridge clearance height sufficient for water activities?	• Bridges downstream from Echuca-Moama should have a liftspan or be high enough to allow a paddle steamer to pass underneath (even in times of high water flow) • Paddle steamer operations are halted at a defined river height
6. Ensure a safe crossing of the Murray River for all users by addressing bridge safety concerns	Is the clearance and site distances sufficient for safe movements? Are the barriers and safety infrastructure in good condition?	• Based on safety performance history.

5 Results

5.1 Overview

To produce this Investment Priority Assessment of the Murray River Crossings, the technical appraisal score for each objective and crossing presented in **Section 4** was multiplied by the overall weighting of the corresponding objective to reflect a combined score.

The scores have taken into account the feedback and validation received from Roads and Maritime, VicRoads and the stakeholders consulted during the development of the Assessment.

5.2 Technical appraisal results

A set of appraisal results for each objective has been compiled based on the criteria and assumptions outlined in **Section 4**. These have then been used to rank the crossings that do not meet the objective criteria. The results include a number of changes to the preliminary assessment that were made after the stakeholders' review of input information. The changes include:

- Updates and corrections to the fact sheets
- A list of revised strategic freight routes
- A list of revised twin towns
- The inclusion of the new Echuca – Moama Bridge, currently under construction along with corresponding adjustments to the assessment of the existing Echuca – Moama Bridge
- Assessment of the Barham – Koondrook Bridge following current restoration works

5.3 Combined results

A prioritisation score was assigned based on the criteria. The scores were combined by multiplying the Crossings' technical appraisal scores against the objectives with the corresponding objective weighting outlined in **Table 5**.

The crossings with the lowest combined scores have ranked highest in priority, reflecting – in most instances – their low score in the technical appraisal against objectives that were considered most important.

As previously stated, a primary objective and secondary objective weighting of 70-30%, respectively, was tested within the multi-criteria analysis model at the second workshop and had no impact on the final ranking. As the relative importance of the objectives remained unchanged, the 60-40% weighting was used throughout the analysis.

Table 11 summarises the top 9 ranked crossings. Many of the crossings have equal weighted scores due to the combination of the objective weightings and the technical appraisal scores.

Table 11: Crossings assessed as not meeting the objectives and ranked by weighted score

ID	Crossing	Rank	Combined objectives technical appraisal score	Weighted score	Recommended timing
28	Tooleybuc Bridge	1	-5	-0.88	Short Term Priority
25	Swan Hill Bridge	2	-4	-0.68	Short Term Priority
16	John Foord Bridge	3	-3	-0.48	Short Term Priority
4	Towong Bridge	3	-3	-0.48	Short Term Priority
31	Abbotsford Bridge	4	-2	-0.40	Short Term Priority
24	Gonn Crossing/ Murrabit Bridge	5	-2	-0.28	Short Term Priority
30	George Chaffey Bridge	6	-1	-0.20	Medium Term Priority
17	Yarrawonga-Mulwala Bridge	6	-1	-0.20	Medium Term Priority
8	Bethanga Bridge	7	0	-0.12	Medium Term Priority

5.4 Sensitivity analysis

A key theme consistent throughout stakeholder feedback was the ability of the Crossings to allow for the movement of current and future freight needs of the road network. As a result, a sensitivity analysis was applied by multiplying the overall score of each crossing by the volume of heavy vehicle use. This sensitivity analysis sought to test whether the relative priority for investment in the Crossings would change substantially if the traffic levels, particularly heavy vehicles, were factored into the sensitivity analysis.

Appendix A summarises the ranking results for the Crossings with the heavy vehicle volume applied as a sensitivity test.

This sensitivity test does not change the membership of the top 9 Crossings, only the order.

Appendix A

Table 12: Crossings ranked by combined weighted score and heavy vehicle volumes

ID	Crossing	Rank	Combined weighted score	HV daily volume	Total score
25	Swan Hill Bridge	1	-0.68	336	-228
30	George Chaffey Bridge	2	-0.20	1140	-228
28	Tooleybuc Bridge	3	-0.88	238	-209
17	Yarrawonga-Mulwala Bridge	4	-0.20	450	-90
31	Abbotsford Bridge	5	-0.40	167	-67
16	John Foord Bridge	6	-0.48	83	-40
24	Gonn Crossing/ Murrabit Bridge	7	-0.28	33	-9
4	Towong Bridge	8	-0.48	18	-9
8	Bethanga Bridge	9	-0.12	63	-8
3	Bonegilla Island Bridge	10	0.00	41	0
10	Bringenbrong Bridge	11	0.48	0	0
7	Wymah Ferry	12	0.20	1	0
2	Indi Bridge	13	0.40	1	0
26	Speewa Ferry	14	0.20	2	0
27	Nyah Bridge	15	0.28	7	2
1	Biggara Bridge	16	0.40	5	2
5	Tintaldra Bridge	17	0.20	28	6
6	Jingellic Bridge	18	0.20	94	19
21	Barmah Bridge	19	0.20	136	27
9	Heywoods Bridge	20	0.48	67	32
23	Barham-Koondrook Bridge	21	0.28	405	113
22.1	Echuca-Moama Bridge (old bridge)	22	0.40	320	128
14	Howlong Bridge	23	0.88	171	150
29	Euston-Robinvale Bridge	24	0.48	441	212
13	Union Bridge	25	0.40	638	255
18	Cobram-Barooga Bridge (new bridge)	26	1.08	303	327
15	Federation Bridge	27	1.28	428	548
20	Edward Hillson Bridge Tocumwal	28	1.08	630	681
22.2	Echuca-Moama Bridge (new bridge)	29	1.08	720	778
11	Spirit of Progress Bridge	30	0.48	2152	1033
12	Spirit of Progress Bridge	31	0.48	2153	1033
19	Cobram-Barooga Bridge (old bridge)	32	-	-	-

.

Table 13: Objective 1 "Improve freight productivity" scores

ID	Crossing	Strategic freight route	NSW/Victoria road	NSW 25/26m, B-double route	Vic approved B-double route	NSW OSOM approved route	Vic OSOM approved route	Objective 1 technical appraisal score
1	Biggara Bridge (Mabey)	×	Local road	×	×	×	×	0
2	Indi Bridge	×	Local road	×	×	×	×	0
3	Bringenbrong Bridge	×	MR627/B400 Murray Valley Highway	✓	✓	✓	×	1
4	Towong Bridge	×	Local road	×	×	×	×	0
5	Tintaldra Bridge	×	Local road	×	×	×	×	0
6	Jingellic Bridge	×	MR85/local road & Murray Valley Highway	✓	✓	✓	×	1
7	Wymah Ferry	×	Local road					0
8	Bethanga Bridge	×	MR20/C542	×	✓	×	×	0
9	Heywoods Bridge	×	MR355/C541	×	✓	×	×	1
10	Bonegilla Island Bridge	×	Local road					0
11	Spirit of Progress Bridge Southbound	✓	HW2/Hume Freeway National Highway	✓	✓	✓	✓	0
12	Spirit of Progress Bridge Northbound	✓	HW2/Hume Freeway National Highway	✓	✓	✓	✓	0
13	Union Bridge	×	MR688/B400 Lincoln Causeway	✓	✓	×	×	1
14	Howlong Bridge	×	MR197/C381	✓	✓	×	×	1

ID	Crossing	Strategic freight route	NSW/Victoria road	NSW 25/26m, B-double route	Vic approved B-double route	NSW OSOM approved route	Vic OSOM approved route	Objective 1 technical appraisal score
15	Federation Bridge	×	HW86/C375	✓	✓	✓	✓	3
16	John Foord Bridge	×	Local road					0
17	Yarrawonga-Mulwala Bridge	×	HW314/C373	✓	✓	✓ Bridge is OSOM restricted structure	✓	1
18	Cobram-Barooga Bridge (new bridge)	×	Local road	✓	✓	×	×	1
19	Cobram-Barooga Bridge (old bridge)	×	Pedestrian only					
20	Edward Hillson Bridge Tocumwal	✓	HW17 National Highway	✓	✓	✓	✓	0
21	Barmah Bridge	×	MR391/C358	✓	✓	× HML semi only	✓	1
22.1	Echuca-Moama Bridge (old bridge)	×	Becomes a local road	✓	✓	× Bridge is OSOM restricted structure	×	1
22.2	Echuca-Moama Bridge (new bridge)	✓	HW21 Cobb Highway /B75	✓	✓	✓	✓	3
23	Barham-Koondrook Bridge	×	MR319/C264	✓	✓	× Bridge is OSOM restricted structure	✓	1

ID	Crossing	Strategic freight route	NSW/Victoria road	NSW 25/26m, B-double route	Vic approved B-double route	NSW OSOM approved route	Vic OSOM approved route	Objective 1 technical appraisal score
24	Gonn Crossing/ Murrabit Bridge	×	Local road	✓ Travel conditions	✓	× Bridge is OSOM restricted structure	×	1
25	Swan Hill Bridge	×	Local road	✓	✓	× Bridge is OSOM restricted structure Road Train Route	✓ Road Train Route	1
26	Speewa Ferry	×	Local road					0
27	Nyah Bridge	×	Local road	✓	✓	× Bridge is OSOM restricted structure	✓	1
28	Tooleybuc Bridge	✓	MR694/B12	✓	✓	✓ Bridge is OSOM restricted structure	✓	-1
29	Euston-Robinvale Bridge	×	MR694/B400 Murray Valley Highway	✓	✓	✓ Road Train Route	✓ Road Train Route	3
30	George Chaffey Bridge	✓	HW14/A20 Sturt Highway – National Highway	✓	✓	✓ Road Train Route	✓ Road Train Route	0
31	Abbotsford Bridge	✓	HW22 Silver City Highway/A79 Calder Highway	✓	✓	✓ Bridge is OSOM restricted structure Road Train Route	✓ Road Train Route	-1

Table 14: Objective 2 "Provide more reliable crossing" scores

ID	Crossing	Twin town	Twin towns	One lane crossing	AADT	VCR = 10% AADT	Objective 2 technical appraisal score
1	Biggara Bridge (Mabey)	×		✓	20	2	-1
2	Indi Bridge	×		✓	20	2	-1
3	Bringenbrong Bridge	×		×	273	27	0
4	Towong Bridge	×		✓	161	16	-1
5	Tintaldra Bridge	×		×	145	15	0
6	Jingellic Bridge	×		×	361	36	0
7	Wymah Ferry	×			50	5	0
8	Bethanga Bridge	×		×	1566	157	0
9	Heywoods Bridge	×		×	1334	133	0
10	Bonegilla Island Bridge	×		✓	30	3	-1
11	Spirit of Progress Bridge Southbound	✓	Albury/Wodonga	×	17930	2152	0
12	Spirit of Progress Bridge Northbound	✓	Albury/Wodonga	×	17940	2123	0
13	Union Bridge	✓	Albury/Wodonga	×	16800	1680	0
14	Howlong Bridge	×		×	1705	171	0
15	Federation Bridge	×		×	2140	214	0

ID	Crossing	Twin town	Twin towns	One lane crossing	AADT	VCR = 10% AADT	Objective 2 technical appraisal score
16	John Foord Bridge	✓	Corowa/Wahgunyah	✓	4148	415	-1
17	Yarrawonga-Mulwala Bridge	✓	Mulwala/Yarrawonga	×	9773	977	-1
18	Cobram-Barooga Bridge (new)	×		×	6054	605	3
19	Cobram-Barooga Bridge (old)	×		×			
20	Edward Hillson Bridge Tocumwal	×		×	3151	315	3
21	Barmah Bridge	×		×	907	91	0
22.1	Echuca-Moama Bridge (old)	✓	Echuca/Moama	×	8000	800	0
22.2	Echuca-Moama Bridge (new)	✓	Echuca/Moama	×	18000	1800	0
23	Barham-Koondrook Bridge	✓	Barham/Koondrook	✓	3685	369	-1
24	Gonn Crossing/Murrabit Bridge	×		✓	183	18	-1
25	Swan Hill Bridge	✓	Swan Hill/Murray Downs	✓	3051	305	-1
26	Speewa Ferry	×			80	8	0
27	Nyah Bridge	×		✓	650	65	-1
28	Tooleybuc Bridge	×		✓	792	79	-1
29	Euston-Robinvale Bridge	✓	Euston/Robinvale	×	3151	315	0
30	George Chaffey Bridge	✓	Buronga/Mildura	×	11400	1140	0
31	Abbotsford Bridge	×		✓	2380	238	-1

Table 15: Objective 3 "Asset condition" scores

ID	Crossing	BHI	On forward program	Objective 3 technical appraisal score
1	Biggara Bridge (Mabey)	🟢	✓	0
2	Indi Bridge	🟠	×	0
3	Bringenbrong Bridge	🟠	×	0
4	Towong Bridge	🔴	✓	-3
5	Tintaldra Bridge	🟠	✓	0
6	Jingellic Bridge	🟠	✓	0
7	Wymah Ferry	🟢	✓	0
8	Bethanga Bridge	🟢	×	3
9	Heywoods Bridge	🟢	×	3
10	Bonegilla Island Bridge	🟢	×	3
11	Spirit of Progress Bridge Southbound	🟢	×	3
12	Spirit of Progress Bridge Northbound	🟢	×	3
13	Union Bridge	🟠	×	0
14	Howlong Bridge	🟢	×	3
15	Federation Bridge	🟢	×	3
16	John Foord Bridge	🔴	✓	-3
17	Yarrawonga-Mulwala Bridge	🟠	✓	0
18	Cobram-Barooga Bridge (new bridge)	🟢	×	3
19	Cobram-Barooga Bridge (old bridge)	🔴	✓	
20	Edward Hillson Bridge Tocumwal	🟢	×	3
21	Barmah Bridge	🟠	×	0
22.1	Echuca-Moama Bridge (old bridge)	🟠	✓	0
22.2	Echuca-Moama Bridge (new bridge)	🟢	×	3
23	Barham-Koondrook Bridge	🟢	×	3
24	Gonn Crossing/ Murrabit Bridge	🔴	✓	-3

ID	Crossing	BHI	On forward program	Objective 3 technical appraisal score
25	Swan Hill Bridge	🔴	✓	-3
26	Speewa Ferry	🟢	✓	0
27	Nyah Bridge	🟢	×	3
28	Tooleybuc Bridge	🔴	✓	-3
29	Euston-Robinvale Bridge	🟢	×	3
30	George Chaffey Bridge	🟢	✓	0

Table 16: Objective 4 "Improve connectivity" scores

ID	Crossing	Strategic freight route	Twin town	Detour via	Objective 4 technical appraisal score
1	Biggara Bridge (Mabey)	×	×	Indi Bridge	3
2	Indi Bridge	×	×	Bringenbrong	3
3	Bringenbrong Bridge	×	×	Jingellic Bridge (51km)	-1
4	Towong Bridge	×	×	Bringenbrong	1
5	Tintaldra Bridge	×	×	Towong	1
6	Jingellic Bridge	×	×	Bringenbrong & Spirit of Progress/Tintaldra	0
7	Wymah Ferry	×	×	Bethanga or Jingellic	1
8	Bethanga Bridge	×	×	Heywoods (100km)	-3
9	Heywoods Bridge	×	×	Spirit of Progress (20km)	-1
10	Bonegilla Island Bridge	×	×	Island only - no alternative route	1
11	Spirit of Progress Bridge Southbound	✓	✓	Union Bridge	0
12	Spirit of Progress Bridge Northbound	✓	✓	Union Bridge	0
13	Union Bridge	×	✓	Spirit of Progress	1
14	Howlong Bridge	×	×	Federation	1
15	Federation Bridge	×	×	Howlong/John Foord	1
16	John Foord Bridge	×	✓	Federation	1
17	Yarrawonga-Mulwala Bridge	×	✓	Federation (55km)	-1

ID	Crossing	Strategic freight route	Twin town	Detour via	Objective 4 technical appraisal score
18	Cobram-Barooga Bridge (new bridge)	×	×	Tocumwal (20km)	-1
19	Cobram-Barooga Bridge (old bridge)	×	×		
20	Edward Hillson Bridge Tocumwal	✓	×	Cobram	0
21	Barmah Bridge	×	×	Echuca	0
22.1	Echuca-Moama Bridge (old bridge)	×	✓	Echuca	1
22.2	Echuca-Moama Bridge (new bridge)	✓	✓	Echuca	0
23	Barham-Koondrook Bridge	×	✓	Gonn (35km)	-1
24	Gonn Crossing/Murrabit Bridge	×	×	Barham	1
25	Swan Hill Bridge	×	✓	Nyah (39km)	-1
26	Speewa Ferry	×	×	Nyah	1
27	Nyah Bridge	×	×	Tooleybuc (21km)	-1
28	Tooleybuc Bridge	✓	×	Nyah	0
29	Euston-Robinvale Bridge	×	✓	Tooleybuc (133km)	-3
30	George Chaffey Bridge	✓	✓	Abbotsford (34km)	-1
31	Abbotsford Bridge	✓	×	George Chaffey	0

Table 17: Murray River Crossings ranked by weighted scores

ID	Crossing	Rank	Objective raw score							Objective weighted score							Investment timeframe
			Primary				Secondary		Total	Primary				Secondary		Total	
			1	2	3	4	1	2		1	2	3	4	1	2		
28	Tooleybuc Bridge	1	-1	-1	-3	0	0	0	-5	-0.20	-0.20	-0.48	0.00	0	0	-0.88	Short Term Priority
25	Swan Hill Bridge	2	1	-1	-3	-1	0	0	-4	0.20	-0.20	-0.48	-0.20	0	0	-0.68	Short Term Priority
16	John Foord Bridge	3	0	-1	-3	1	0	0	-3	0.00	-0.20	-0.48	0.20	0	0	-0.48	Short Term Priority
4	Towong Bridge	3	0	-1	-3	1	0	0	-3	0.00	-0.20	-0.48	0.20	0	0	-0.48	Short Term Priority
31	Abbotsford Bridge	5	-1	-1	0	0	0	0	-2	-0.20	-0.20	0.00	0.00	0	0	-0.40	Short Term Priority
24	Gonn Crossing/ Murrabit Bridge	5	1	-1	-3	1	0	0	-2	0.20	-0.20	-0.48	0.20	0	0	-0.28	Short Term Priority
30	George Chaffey Bridge	7	0	0	0	-1	0	0	-1	0.00	0.00	0.00	-0.20	0	0	-0.20	Medium Term Priority
17	Yarrawonga-Mulwala Bridge	8	1	-1	0	-1	0	0	-1	0.20	-0.20	0.00	-0.20	0	0	-0.20	Medium Term Priority
8	Bethanga Bridge	9	0	0	3	-3	0	0	0	0.00	0.00	0.48	-0.60	0	0	-0.12	Medium Term Priority
3	Bringenbrong Bridge	9	1	0	0	-1	0	0	0	0.20	0.00	0.00	-0.20	0	0	0.00	Medium Term Priority
7	Wymah Ferry	11	0	0	0	1	0	0	1	0.00	0.00	0.00	0.20	0	0	0.20	Medium Term Priority
26	Speewa Ferry	12	0	0	0	1	0	0	1	0.00	0.00	0.00	0.20	0	0	0.20	Medium Term Priority
5	Tintaldra Bridge	13	0	0	0	1	0	0	1	0.00	0.00	0.00	0.20	0	0	0.20	Medium Term Priority
6	Jingellic Bridge	13	1	0	0	0	0	0	1	0.20	0.00	0.00	0.00	0	0	0.20	Medium Term Priority
21	Barmah Bridge	13	1	0	0	0	0	0	1	0.20	0.00	0.00	0.00	0	0	0.20	Medium Term Priority
27	Nyah Bridge	13	1	-1	3	-1	0	0	2	0.20	-0.20	0.48	-0.20	0	0	0.28	Longer Term Priority
23	Barham-Koondrook Bridge	13	1	-1	3	-1	0	0	2	0.20	-0.20	0.48	-0.20	0	0	0.28	Longer Term Priority
22.1	Echuca-Moama Bridge (old bridge)	18	1	0	0	1	0	0	2	0.20	0.00	0.00	0.20	0	0	0.40	Longer Term Priority
13	Union Bridge	19	1	0	0	1	0	0	2	0.20	0.00	0.00	0.20	0	0	0.40	Longer Term Priority
2	Indi Bridge	19	0	-1	0	3	0	0	2	0.00	-0.20	0.00	0.60	0	0	0.40	Longer Term Priority
1	Biggara Bridge	19	0	-1	0	3	0	0	2	0.00	-0.20	0.00	0.60	0	0	0.40	Longer Term Priority

ID	Crossing	Rank	Objective raw score							Objective weighted score							Investment timeframe
			Primary				Secondary		Total	Primary				Secondary		Total	
			1	2	3	4	1	2		1	2	3	4	1	2		
9	Heywoods Bridge	22	1	0	3	-1	0	0	3	0.20	0.00	0.48	-0.20	0	0	0.48	Longer Term Priority
10	Bonegilla Island Bridge	22	0	-1	3	1	0	0	3	0.00	-0.20	0.48	0.20	0	0	0.48	Longer Term Priority
29	Euston-Robinvale Bridge	22	3	0	3	-3	0	0	3	0.60	0.00	0.48	-0.60	0	0	0.48	Longer Term Priority
11	Spirit of Progress Bridge	22	0	0	3	0	0	0	3	0.00	0.00	0.48	0.00	0	0	0.48	Longer Term Priority
12	Spirit of Progress Bridge	22	0	0	3	0	0	0	3	0.00	0.00	0.48	0.00	0	0	0.48	Longer Term Priority
14	Howlong Bridge	27	1	0	3	1	0	0	5	0.20	0.00	0.48	0.20	0	0	0.88	Longer Term Priority
18	Cobram-Barooga Bridge (new bridge)	28	1	3	3	-1	0	0	6	0.20	0.60	0.48	-0.20	0	0	1.08	Longer Term Priority
20	Edward Hillson Bridge Tocumwal	28	0	3	3	0	0	0	6	0.00	0.60	0.48	0.00	0	0	1.08	Longer Term Priority
22.2	Echuca-Moama Bridge (new bridge)		3	0	3	0	0	0	6	0.60	0.00	0.48	0.00	0	0	1.08	Longer Term Priority
15	Federation Bridge	30	3	0	3	1	0	0	7	0.60	0.00	0.48	0.20	0	0	1.28	Longer Term Priority

Appendix B

Appraisal logic diagrams (logic trees)

Objective 1 (primary): Support productivity

Improve freight productivity by improving bridges on strategic freight routes between NSW and Victoria. Cater for oversize and over mass freight vehicles crossing the Murray River.

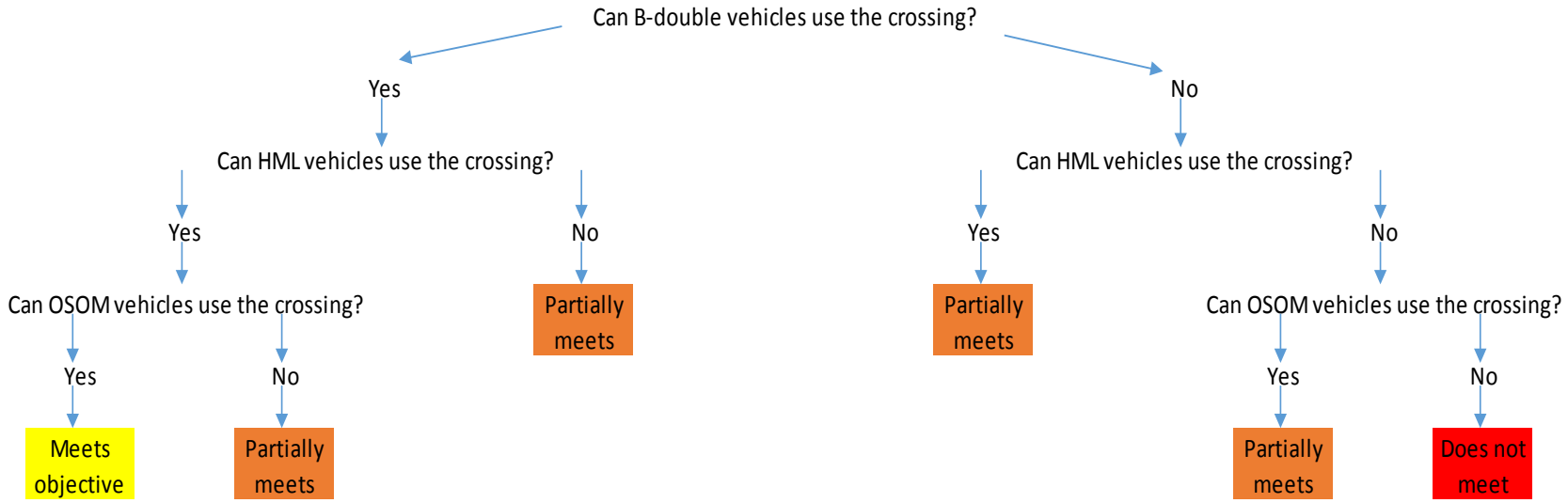
Assessment logic:

B-Double, and Oversize and Over Mass (OSOM) routes are not always consistent either side of the Murray River. Where a crossing is 'restricted' in one jurisdiction, but not the other, the overall rating is considered to be 'restricted'.

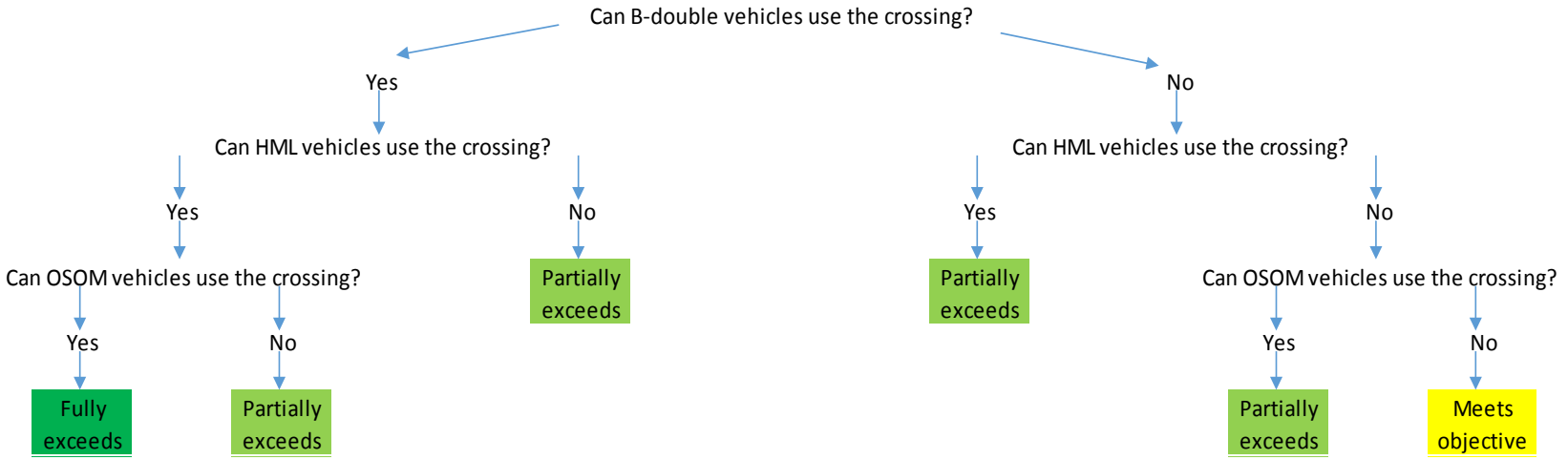
Higher Mass Limit (HML) approvals are based on Roads and Maritime Bridge Information (BIS).

The most restrictive level of B-double approval (ie for 26m vehicles) has been assumed.

For a crossing on a Strategic Freight Route:



For a crossing not on a Strategic Freight Route:



Objective 2 (primary): Movement reliability

Provide a reliable bridge connection for all users crossing the Murray River.

Assessment logic:

For vehicular traffic, reliability was assessed based on road geometry, lane widths and estimated peak hour volume capacity. Lane widths influence road capacity, comfort and safety. Wider lane widths also increase clearance between opposing vehicles and have the potential to reduce conflicting movements as well as 'head-on' and 'run-off' safety incidents. Roads and Maritime's Network Performance Measures and Planning Targets guideline recommend minimum lane widths for all rural class roads as shown in **Table 18** below:

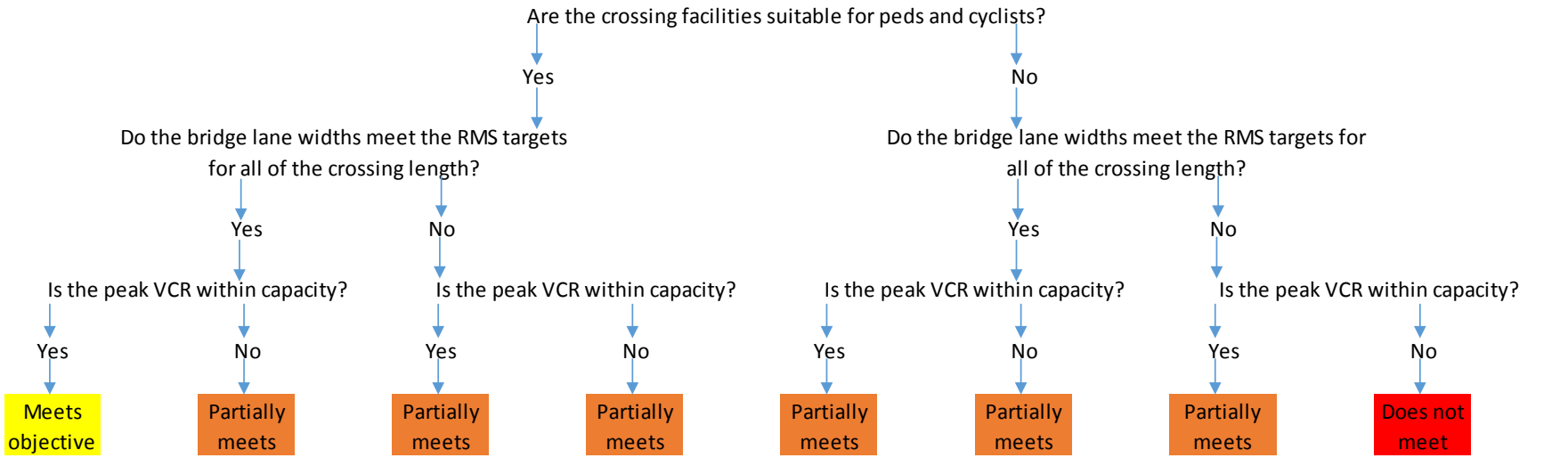
Table 18: Recommended minimum lane widths

Hierarchy class	Sections	Target lane width (m)
6R, 5R & 4R (State)	All	3.50
3R	AADT>1000 or >=PDS3A area	3.50
(Regional)	AADT<1000	3.25
2R & 1R	AADT>1000 or >=PDS3A area	3.50
(Local)	AADT 500 - 1000	3.25
	AADT < 500	3.00

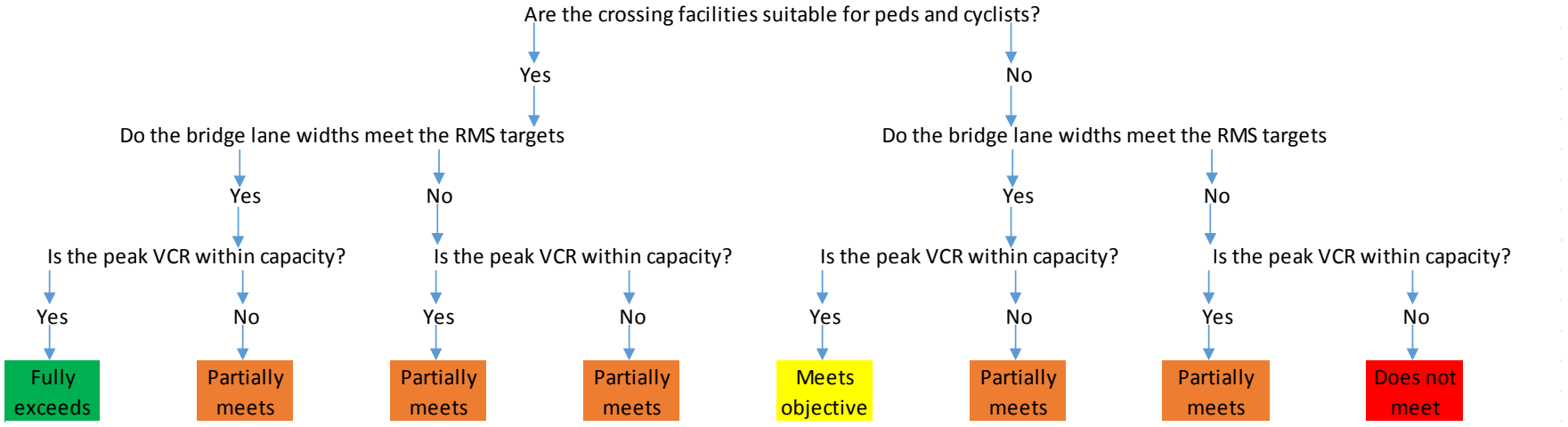
One-lane bridges were assessed on the basis that they do not meet the Roads and Maritime lane width targets for the crossing.

Based on a review of *AustRoads Traffic Guidelines Chapter 6A*, a crossing was expected to provide for cyclists and pedestrians if it was anticipated there would be a significant number of people crossing during peak hour (approximately 50 or more people). The town populations of twin town crossings and the crossing speed environment (greater than 40 km/h) were considered in making a professional judgement of whether or not facilities should be provided.

For a crossing in a 'twin town':



For a crossing not in a 'twin town':



Objective 3 (primary): Asset condition

Provide a minimum standard replacement, balanced against whole of life cycle cost.

Assessment logic:

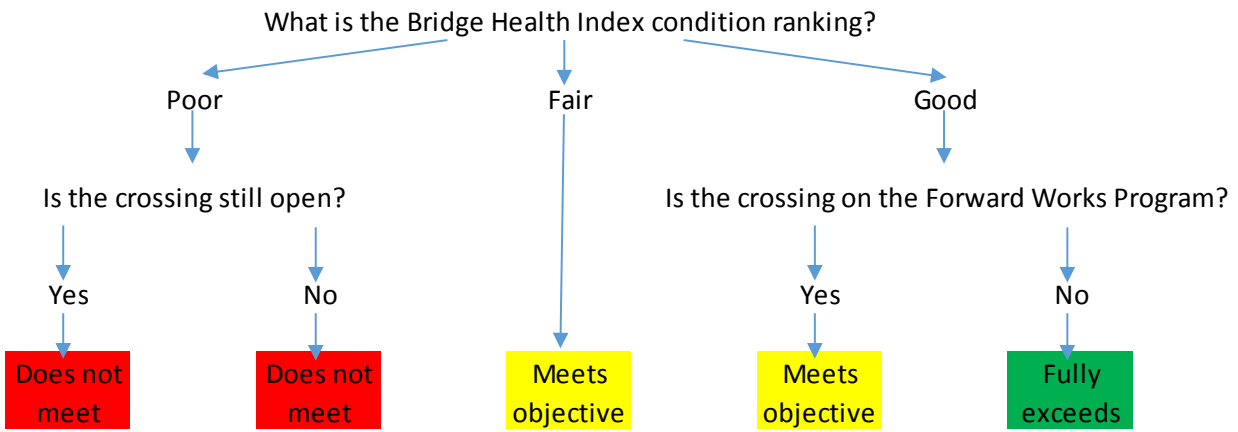
The Crossings are equally funded by Roads and Maritime and VicRoads under the Murray River Crossings Agreement 2001 (Moiety Agreement). Roads and Maritime manages and maintains the Crossings including the preparation and implementation of the Forward Works Program (works program).

The latest 10 year works program was produced in February 2016. The program focuses on the asset maintenance works required to maintain a serviceable condition of the Crossings. Inclusion in the works program is based on each crossing's:

- Current condition assessment and rating
- Risk assessment and mitigation
- Key milestones and deliverables
- Assumed dates for the opening of replacement crossings
- Program allocations, including funding for replacement crossings.

The scope does not cover the wider strategic needs of the crossings, such as the freight task, but does make assumptions regarding replacement and upgrades at certain crossings. These crossings replacement assumptions will need to be reviewed as an iterative process to the findings of the investment priority framework and future funding decisions.

The works program considers the Roads and Maritime Bridge Health Index (BHI) findings and incorporates the VicRoads Strengthening Priority Classifications (SPC) and Roads and Maritime's Routine Maintenance Action (RMA) scores. The BHI produces a condition value for each crossing of 'poor', 'fair' or 'good/as built'. Once the SPC and RMA considerations have also been made, a 'good/as built' asset may still be included in the 10 year works program. Similarly, a 'poor' asset may not be included in the forward works program because the crossing has been closed, or will be replaced or renewed within the works program timeframe.


What is the Bridge Health Index condition ranking?
Poor
Fair
Good
Is the crossing still open?
Is the crossing on the Forward Works Program?
Yes
No
Yes
No
Does not meet
Does not meet
Meets objective
Meets objective
Fully exceeds

Objective 4 (primary): Local connectivity

Improve twin town connectivity for all bridge users in order to support connections for hospitals, schools and regional industries. Provide acceptable alternate routes in the event of planned or unplanned bridge closures.

Assessment logic:

Twin towns have been listed in Table 14 in Appendix A.

Heavy vehicle movements on a strategic freight route would be expected to re-route in less than 30 minutes (30 km distance at a posted speed limit of 60 km/h). Freight movements on a non-strategic route would be expected to re-route in less than 60 minutes (60 km at a posted speed limit of 60 km/h) the same applies for general traffic. Local traffic refers to users accessing services in a twin town and may include some commuter walkers and cyclists. The acceptable re-routing distance for local traffic is assumed to be less than 10 km.

Based on the above assumptions, the acceptable length for incident management routes for each user group is defined in Table 19 below:

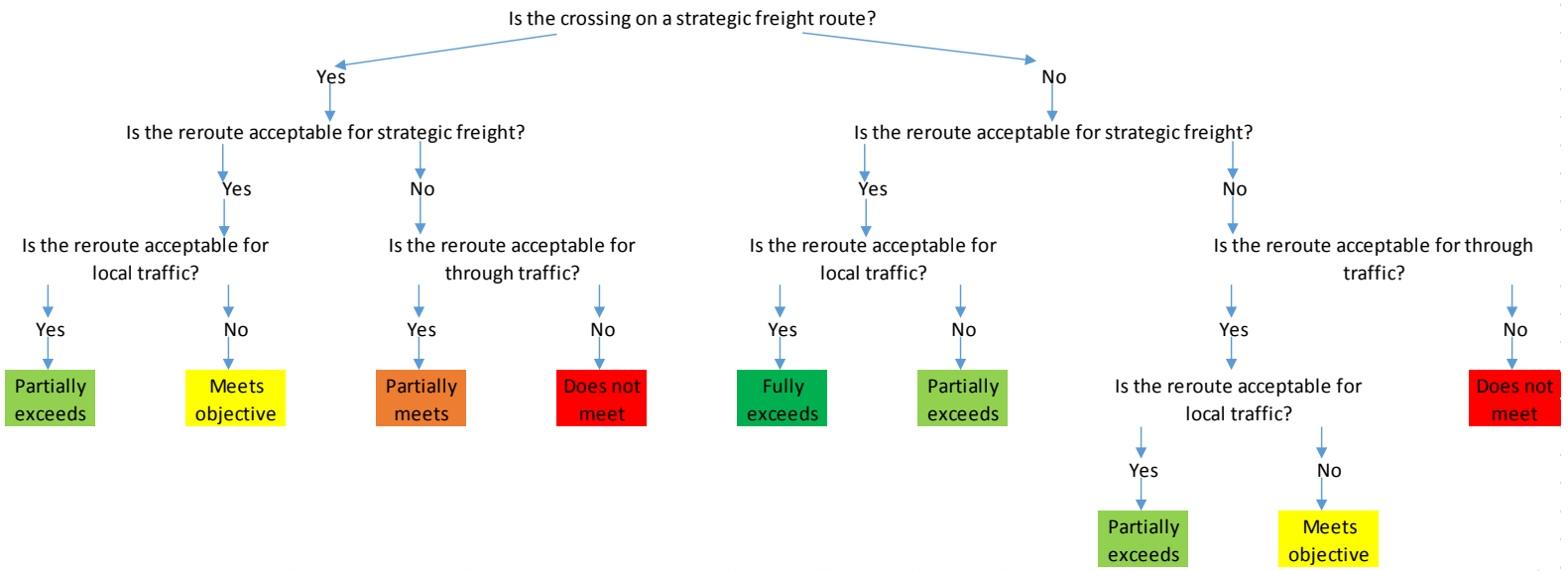
Table 19: Acceptable rerouting distances

[2]

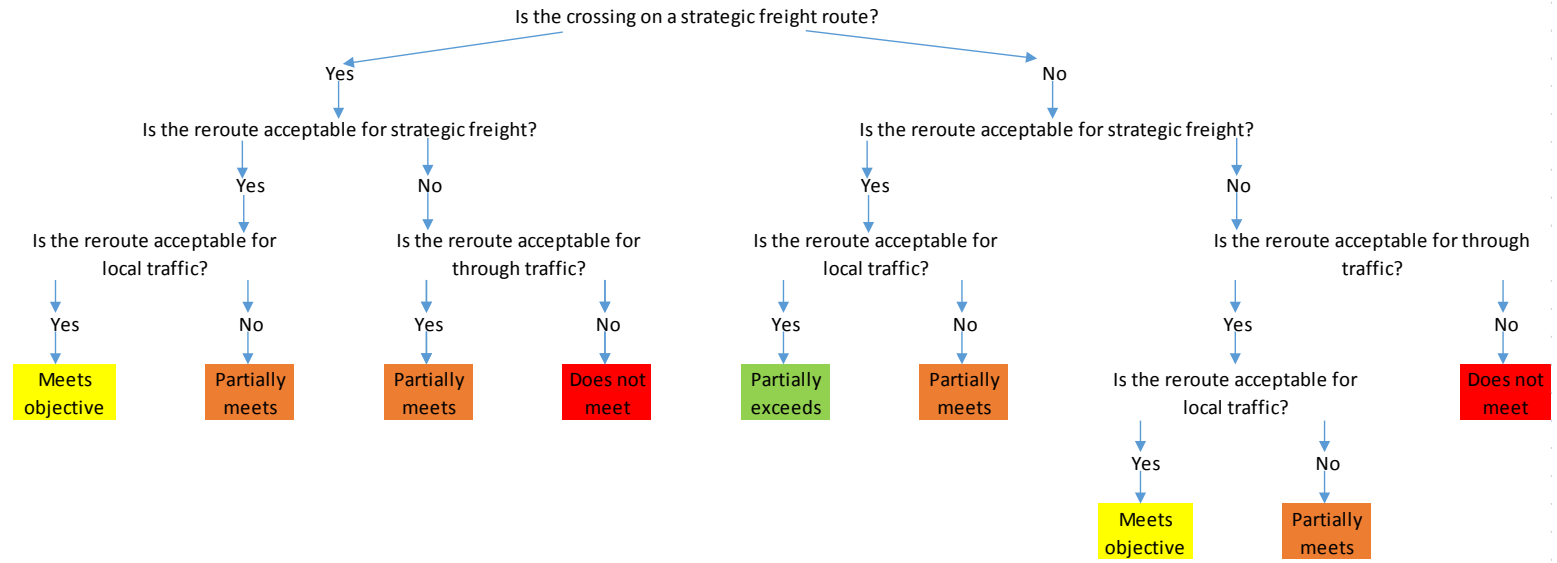
User group	Acceptable re-routing distance
Local traffic	<10 km
Through traffic	<60 km
Heavy vehicles not on a strategic freight route	<60 km
Heavy vehicles on a strategic freight route	<30 km

[2] Based on SME feedback and are not standards within any existing guideline

For a crossing not in a 'twin town':



For a crossing in a 'twin town':



Objective 5 (secondary): Enable water activities

Enable continued water activities and operations on the Murray River by preserving bridge height clearance requirements.

Assessment logic:

The bridge clearance height needs to be enough for water vehicles to pass underneath, or a liftspan is provided. Bridges downstream for Echuca-Moama should have a liftspan or be high enough to enable a paddle steamer to pass underneath (including times of high water flow).

Objective 6 (secondary): Safety

Ensure a safe crossing of the Murray River for all users by addressing bridge safety concerns.

Assessment logic:

The clearance and sight distances should be enough to enable safe movement. The barriers and safety infrastructure should be in good condition.

Based on the number of accidents in the last five years as a proportion of daily vehicle movements.

Appendix C

Fact sheets

Biggara Bridge (Mabey)

RMS Bridge No.: 11486

Local Government Areas: Snowy Valleys Shire (NSW), Shire of Khancoban (VIC)

Roads: Indi Rd (NSW), Upper Murray Rd (VIC)

Town: Indi (NSW), Biggara (VIC)

Population (2011): 454 (NSW), 258 (VIC)

Bridge Description

Bridge Type: Mabey

Materials: Steel

Construction Year: 2012

Bridge length: 39m

Load limit: GML

Age: 3 years

Asset Maintenance Plan

Condition: Good

Maintenance plan: Routine

Network Performance

RMS Road Classification: Local Road

VicRoads Classification: Local Road

Height clearance: N/A

Carriage width: 4.2 m

B-double capacity: No

Higher Mass Load (HML): Not approved

Oversize, Over-mass (OSOM): Not approved

Cross-section Profile

Traffic lanes and direction: Single lane, two-way

Pedestrian/Bicycle paths: No

Safety & Traffic

2010-2015: 0 (tow away or casualties)

Average Daily Volume (2010): 20 (25 % HV)

Strategy & Planning

Nearest crossing/s:

- Northbound traffic to Indi Bridge (8km)
- Southbound traffic to Indi Bridge (7km)

Heritage significance:

Programs and plans: -

Additional Info

- Annual population growth rate of +0.6%.

NSW GOVERNMENT

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Indi Bridge

RMS Bridge No.: 5945

Local Government Areas: Snowy Valleys Shire (NSW), Shire of Towong (VIC)

Roads: Indi Road (NSW), Upper Murray Road (VIC)

Town: Indi (NSW), Towong Upper (VIC)

Population (2011): 454 (NSW), 1,440 (VIC)

Bridge Description

Bridge Type: Steel girder

Materials: Steel, concrete

Construction Year: 1961

Bridge length: 36m

Load limit: HML

Age: 54 years

Asset Maintenance Plan

Condition: Fair

Maintenance plan: Routine

Network Performance

RMS Road Classification: Local Road

VicRoads Classification: Local Road

Height clearance: -

Carriage width: 3.65 - 4.8 m

B-double capacity: No

Higher Mass Load (HML): Approved

Oversize, Over-mass (OSOM): Not approved

Cross-section Profile

Traffic lanes and direction: Single lane, two-way

Pedestrian/Bicycle paths: No

Safety & Traffic

2010-2015: 0 (tow away or casualties)

Average Daily Volume (2010): 20 (3% HV)

Strategy & Planning

Nearest crossing/s:

- Northbound & southbound traffic to Bringenbrong Bridge (8km)

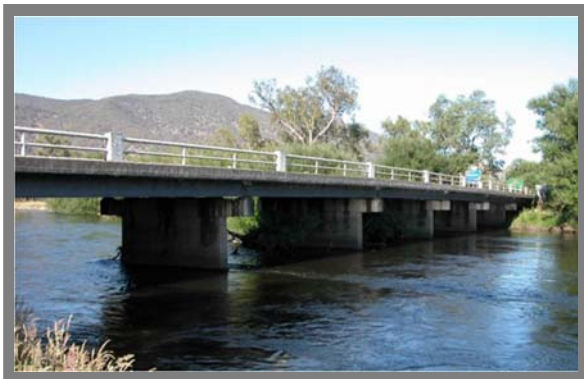
Heritage significance: Local

Programs and plans: -

Additional Info

NSW GOVERNMENT

vicroads



Bringenbrong Bridge

RMS Bridge No.: 5946

Local Government Areas: Snowy Valleys Shire (NSW), Shire of Towong (VIC)

Roads: MR627 Alpine Way (NSW), Murray Valley Highway (VIC)

Town: Bringenbrong (NSW), Towong Upper (VIC)

Population (2011): 454 (NSW), 1,440 (VIC)

Bridge Description

Bridge Type: Steel girder

Materials: Steel, concrete

Construction Year: 1961

Bridge length: 61m

Load limit: HML

Age: 54 years

Asset Maintenance Plan

Condition: Fair

Maintenance plan: -

Network Performance

RMS Road Classification: Regional Road

VicRoads Classification: B Route

Height clearance: N/A

Carriage width: 7.31 m

B-double capacity: Yes

Higher Mass Load (HML): Approved

Oversize, Over-mass (OSOM): Not approved

Cross-section Profile

Traffic lanes and direction: Two lane, two-way

Pedestrian/Bicycle paths: No

Safety & Traffic

2010-2015: 0 (tow away or casualties)

Average Daily Volume (2010): 273 (15% HV)

Strategy & Planning

Nearest crossing/s:

B-doubles:

- Southbound traffic to Jingellic Bridge (51km)
- Northbound traffic to Indi Bridge (14km)

Non B-doubles:

- Southbound traffic to Towong Bridge (13km)
- Northbound traffic to Towong Bridge (14km)

Additional Info

- Annual population growth rate of -0.3%.
- Between 2001 and 2010, 10% decrease in vehicles per day and 80% increase in heavy vehicle movements.

NSW GOVERNMENT

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Towong Bridge

RMS Bridge No.: 5947

Local Government Areas: Snowy Valleys Shire (NSW), Shire of Towong (VIC)

Roads: Brooke Street (NSW), Towong Road (VIC)

Town: Bringenbrong (NSW), Towong (VIC)

Population (2011): 336 (NSW), 413 (VIC)

Bridge Description

Bridge Type: Timber girder

Materials: Steel, timber

Construction Year: 1938

Bridge length: 61m

Load limit: GML (Closed until January 2017)

Age: 77 years

Asset Maintenance Plan

Condition: Poor

Maintenance plan: Temporary propping to strengthen timber piers on river spans

Network Performance

RMS Road Classification: Local Road

VicRoads Classification: Local Road

Height clearance: -

Carriage width: 4.87 m

B-double capacity: No

Higher Mass Load (HML): Not approved

Oversize, Over-mass (OSOM): Not approved

Cross-section Profile

Traffic lanes and direction: Single lane, two-way (Give way operation)

Pedestrian/Bicycle paths: No

Safety & Traffic

2010-2015: 0 crashes (tow away or casualties)

Average Daily Volume (2010): 161 (11% HV)

Strategy & Planning

Nearest crossing/s:

- Northbound traffic to Bringenbrong Bridge (12km)
- Southbound traffic to Bringenbrong Bridge (14km)

Heritage significance: Local

Programs and plans: -

Additional Info

- Annual population growth rate of -0.3%.
- Between 2001 and 2010, 8% increase in vehicles per day and 17% increase in heavy vehicle movements.

NSW GOVERNMENT

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Tintaldra Bridge

RMS Bridge No.: 5792

Local Government Areas: Snowy Valleys Shire (NSW), Shire of Towong (VIC)

Roads: Tintaldra Road (NSW), Main Street (VIC)

Town: Welaregang (NSW), Tintaldra (VIC)

Population (2011): 336 (NSW), 413 (VIC)

Bridge Description

Bridge Type: Steel truss

Bridge length: 188m

Materials: Steel

Load limit: GML

Construction Year: 1959

Age: 56 years

Asset Maintenance Plan

Condition: Fair

Maintenance plan: Minor repainting works to maintain and protect the structural elements.

Network Performance

RMS Road Classification: Local Road

VicRoads Classification: Local Road

Height clearance: 4.96 m

Carriage width: 6.7 m

B-double capacity: No

Higher Mass Load (HML): Not approved

Oversize, Over-mass (OSOM): Not approved

Cross-section Profile

Traffic lanes and direction: Two lane, two-way

Pedestrian/Bicycle paths: No

Safety & Traffic

2010-2015: 0 (tow away or casualties)

Average Daily Volume (2010): 145 (19% HV)

Strategy & Planning

Nearest crossing/s:

- Northbound traffic to Towong Bridge (12km)
- Southbound traffic to Towong Bridge (23km)

Heritage significance: Local

Programs and plans: -

Additional Info

- Annual population growth rate of -0.3%.
- Between 2001 and 2010, 22% increase in vehicles per day and 33% increase in heavy vehicle movements.

NSW GOVERNMENT

vicroads

Jingellic Bridge

RMS Bridge No.: 5681

Local Government Areas: Snowy Valleys Shire (NSW), Shire of Towong (VIC)

Roads: Jingellic Road (NSW), Murray River Road (VIC)

Town: Jingellic (NSW), Walwa (VIC)

Population (2011): 24 (NSW), 302 (VIC)

Bridge Description

Bridge Type: Steel truss

Materials: Steel

Construction Year: 1959

Bridge length: 157m

Load limit: HML

Age: 56 years

Asset Maintenance Plan

Condition: Fair

Maintenance plan: Minor re-painting works to maintain and protect the structural elements.

Network Performance

RMS Road Classification: State Road

VicRoads Classification: Local Road

Height clearance: 4.96 m

Carriage width: 6.7 m

B-double capacity: Yes

Higher Mass Load (HML): Approved

Oversize, Over-mass (OSOM): Restricted

Cross-section Profile

Traffic lanes and direction: Two lane, two-way

Pedestrian/Bicycle paths: No

Safety & Traffic

2010-2015: 0 (tow away or casualty)

Average Daily Volume (2010): 361 (26% HV)

Strategy & Planning

Nearest crossing/s:

B-doubles:

- Northbound traffic to Spirit of Progress Bridge (117km)
- Southbound traffic to Bringengbrong Bridge (51km)

Non b-doubles:

- Northbound traffic to Tintaldra Bridge (29km)
- Southbound traffic to Tintaldra Bridge (97km)

Heritage significance: Local

Programs and plans: -

Additional Info

- Annual population growth rate of +0.6%.

NSW GOVERNMENT

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Wymah Ferry

RMS Bridge No.: 11414

Local Government Areas: Greater Hume Shire (NSW), Shire of Towong (VIC)

Roads: Wymah Ferry Road (NSW), Murray River Road (VIC)

Town: Wymah (NSW), Granya (VIC)

Population (2011): 320 (NSW), 215 (VIC)

Bridge/Ferry Description

Ferry Type: Cable ferry

Ferry length: 27.7m

Materials: Steel

Load limit: 30 tonnes

Construction Year: 2013

Age: 2 years

Asset Maintenance Plan

Condition: Good

Maintenance plan: Routine

Network Performance

RMS Road Classification: -

VicRoads Classification: -

Height clearance: N/A

Carriage width: 3.3 m

B-double capacity: No

Higher Mass Load (HML): Not approved

Oversize, Over-mass (OSOM): Not approved

Cross-section Profile

Traffic lanes and direction: Single lane, two-way

Pedestrian/Bicycle paths: Able to transport pedestrians and cyclists

Safety & Traffic

2010-2015: -

Average Daily Volume (2010): 50 (2% HV)

Strategy & Planning

Nearest crossing/s:

- Northbound traffic to Bethanga Bridge (119km)
- Southbound traffic to Jingellic Bridge (24km)

Heritage significance: Local

Programs and plans: -

Additional Info

- Annual population growth rate of +0.6%.

NSW GOVERNMENT

vicroads

Bethanga Bridge

RMS Bridge No.: 5575

Local Government Areas: Albury City Council (NSW), Shire of Towong (VIC)

Roads: Riverina Highway (NSW), Murray River Road (VIC)

Town: Lake Hume Village (NSW), Bellbridge (VIC)

Population (2011): 398 (NSW), 832 (VIC)

Bridge Description

Bridge Type: Steel truss

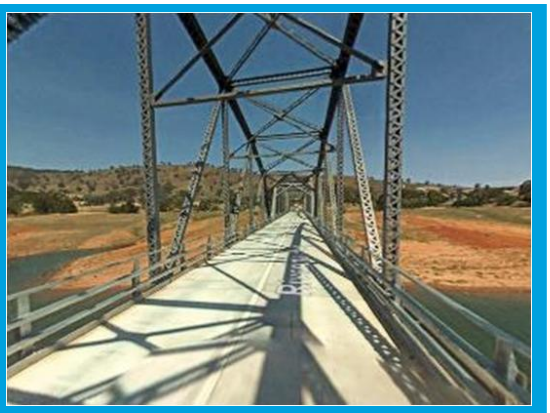
Materials: Steel

Construction Year: 1930

Bridge length: 750m

Load limit: 30 tonne (Gross)

Age: 85 years



Asset Maintenance Plan

Condition: Good

Maintenance plan: Routine

Network Performance

RMS Road Classification: State Road

VicRoads Classification: C Route

Height clearance: 4.14 m

Carriage width: 6.09 m

B-double capacity: No

Higher Mass Load (HML): Not approved

Oversize, Over-mass (OSOM): Not approved

Cross-section Profile

Traffic lanes and direction: Two lane, two-way

Pedestrian/Bicycle paths: No

Safety & Traffic

2010-2015: 0 crashes (tow away or casualty)

Average Daily Volume (2010): 1,566 (4% HV)

Strategy & Planning

Nearest crossing/s:

- Northbound traffic to Heywoods Bridge (100km)
- Southbound traffic to Heywoods Bridge (4km)

Heritage significance:

NSW State Register, VIC State Register

Programs and plans: -

Additional Info

- Annual population growth rate of +0.6%.
- Between 2001 and 2010, 7% increase in vehicles per day and 9% increase in heavy vehicle movements.

NSW GOVERNMENT

vicroads

Heywoods Bridge

RMS Bridge No.: 7331

Local Government Areas: Albury City Council (NSW), Wodonga City Council (VIC)

Roads: Hume Weir Road (NSW & VIC)

Town: Wirlinga (NSW), Bonegilla (VIC)

Population (2011): 398 (NSW), 294 (VIC)

Bridge Description

Bridge Type: Prestressed concrete plank

Materials: Concrete

Construction Year: 1984

Bridge length: 96m

Load limit: HML

Age: 31 years

Asset Maintenance Plan

Condition: Good

Maintenance plan: Routine

Network Performance

RMS Road Classification: Local Road

VicRoads Classification: Local Road

Height clearance: N/A

Carriage width: 8 m

B-double capacity: Yes, not approved route NSW

Higher Mass Load (HML): Approved

Oversize, over-mass (OSOM): Not restricted, not approved route

Cross-section Profile

Traffic lanes and direction: Two lane, two-way

Pedestrian/Bicycle paths: No

Safety & Traffic

2010-2015: 1 crash (tow away or casualty)

Average Daily Volume (2010): 1,334 (5% HV)

Strategy & Planning

Nearest crossing/s:

- Northbound traffic to Spirit of Progress Bridge (20km)
- Southbound traffic to Spirit of Progress Bridge (18km)

Heritage significance: No

Programs and plans: -

Additional Info

- Annual population growth rate of +0.8%.
- Between 2001 and 2010, 26% decrease in vehicles per day and 23% increase in heavy vehicle movements.

NSW GOVERNMENT

vicroads

Bonegilla Island Bridge

RMS Bridge No.: 5943

Local Government Areas: Albury City Council (NSW), Wodonga City Council (VIC)

Roads: Boundary Road (Water Works Road) (NSW), Island Road (VIC)

Town: East Albury (NSW), Bonegilla (VIC)

Population (2011): 398 (NSW), 294 (VIC)

Bridge Description

Bridge Type: Steel girder

Materials: Steel, timber

Construction Year: 1941

Bridge length: 96 m

Load limit: 20 tonnes (Gross)

Age: 74 years

Asset Maintenance Plan

Condition: Poor

Maintenance plan: Routine

Network Performance

RMS Road Classification: Local Road

VicRoads Classification: Local Road

Height clearance: N/A

Carriage width: 3.04 m

B-double capacity: No

Higher Mass Load (HML): Not approved

Oversize, Over-mass (OSOM): Not approved

Cross-section Profile

Traffic lanes and direction: Single lane, two-way

Pedestrian/Bicycle paths: No

Safety & Traffic

2010-2015: -

Average Daily Volume (2010): 30 (0% HV)

Strategy & Planning

Nearest crossing/s:

- Bonegilla Island Bridge (only access to island)

Heritage significance: No

Programs and plans: -

Additional Info

- Annual population growth rate of +0.8%.

NSW GOVERNMENT

vicroads

Spirit of Progress Bridges

RMS Bridge No.: 10141/10142 (Northbound/southbound)

Local Government Areas: Albury City Council (NSW), Wodonga City Council (VIC)

Roads: Hume Highway (NSW & VIC)

Town: South Albury (NSW), Gateway Island (VIC)

Population (2011): 1,368 (NSW), 16,487 (VIC)

Bridge Description

Bridge Type: Prestressed concrete box girder

Bridge length: 205m

Materials: Concrete

Load limit: HML

Construction Year: 2007

Age: 8 years

Asset Maintenance Plan

Condition: Good

Maintenance plan: -

Network Performance

RMS Road Classification: National Highway

VicRoads Classification: National Highway

Height clearance: N/A

Carriage width: 10.0 m

B-double capacity: Yes

Higher Mass Load (HML): Approved

Oversize, Over-mass (OSOM): Approved

Cross-section Profile

Traffic lanes and direction: Two lane, two-way (twin bridges)

Pedestrian/Bicycle paths: No

Safety & Traffic

2010-2015: 5 crashes (tow away or casualties)

Average Daily Volume (2013): 35,870 (12% HV)

Strategy & Planning

Nearest crossing/s:

- Northbound & southbound traffic to Union Bridge (4km)

Heritage significance: No

Programs and plans: -

Additional Info

- Annual population growth rate of +0.8%.

NSW GOVERNMENT

vicroads

Union Bridge

RMS Bridge No.: 5458

Local Government Areas: Albury City Council (NSW), Wodonga City Council (VIC)

Roads: MR688 Wodonga Place (NSW), B400 Lincoln Causeway (VIC)

Town: South Albury (NSW), Gateway Island (VIC)

Population (2011): 1,368 (NSW), 16,487 (VIC)

Bridge Description

Bridge Type: Prestressed concrete girder

Materials: Concrete

Construction Year: 1961

Bridge length: 100m

Load limit: GML

Age: 54 years

Asset Maintenance Plan

Condition: Fair

Maintenance plan: -

Network Performance

RMS Road Classification: Regional

VicRoads Classification: B Route

Height clearance: N/A

Carriage width: 8.1 m

B-double capacity: Yes

Higher Mass Load (HML): Semi Trailer Only

Oversize, Over-mass (OSOM): Not restricted, not approved route

Cross-section Profile

Traffic lanes and direction: Four lane, two-way

Pedestrian/Bicycle paths: Yes

Safety & Traffic

2010-2015: 0 crashes (tow away or casualties)

Average Daily Volume (2010): 16,800 (4% HV)

Strategy & Planning

Nearest crossing/s:

- Northbound and southbound traffic to Spirit of Progress Bridge (4km)

Heritage significance: Local

Programs and plans: -

Additional Info

- Bridge was widened in 1990
- Annual population growth rate of +0.8%.

NSW GOVERNMENT

vicroads

Howlong Bridge

RMS Bridge No.: 9214

Local Government Areas: Federation Shire (NSW), Indigo Shire (VIC)

Roads: Chiltern-Howlong Road (NSW), Sturt Street (VIC)

Town: Howlong (NSW), Gooramadda (VIC)

Population (2011): 2,551 (NSW), 2,479(VIC)

Bridge Description

Bridge Type: Prestressed concrete broad flange girder

Bridge length: 145m

Materials: Concrete

Load limit: HML

Construction Year: 2001

Age: 14 years

Asset Maintenance Plan

Condition: Good

Maintenance plan: -

Network Performance

RMS Road Classification: Regional Road

VicRoads Classification: C Route

Height clearance: N/A

Carriage width: 9.28 m

B-double capacity: Yes

Higher Mass Load (HML): Approved

Oversize, Over-mass (OSOM): Not restricted, not approved route

Cross-section Profile

Traffic lanes and direction: Two lane, two-way

Pedestrian/Bicycle paths: No

Safety & Traffic

2010-2015: 0 (tow away or casualties)

Average Daily Volume (2010): 1,705 (10% HV)

Strategy & Planning

Nearest crossing/s:

- Northbound traffic to Federation Bridge (32km)
- Southbound traffic to Federation Bridge (26km)

Heritage significance: No

Programs and plans: -

Additional Info

- Annual population growth rate of +0.6%.
- Between 2001 and 2010, 26% increase in vehicles per day and 75% decrease in heavy vehicle movements.

NSW GOVERNMENT

vicroads

Federation Bridge

RMS Bridge No.: 9656

Local Government Areas: Federation Shire (NSW), Indigo Shire (VIC)

Roads: Federation Way (NSW & VIC)

Town: Corowa (NSW), Wahgunyah (VIC)

Population (2011): 5,605 (NSW), 891 (VIC)

Bridge Description

Bridge Type: Prestressed concrete box girder

Bridge length: 198m

Materials: Concrete

Load limit: HML

Construction Year: 2004

Age: 11 years

Asset Maintenance Plan

Condition: Good

Maintenance plan: Routine

Network Performance

RMS Road Classification: State Road

VicRoads Classification: C Route

Height clearance: N/A

Carriage width: 11.0 m

B-double capacity: Yes

Higher Mass Load (HML): Approved

Oversize, Over-mass (OSOM): Approved

Cross-section Profile

Traffic lanes and direction: Two lane, two-way

Pedestrian/Bicycle paths: No

Safety & Traffic

2010-2015: 0 crashes (tow away or casualty)

Average Daily Volume (2010): 2,140 (20% HV)

Strategy & Planning

Nearest crossing/s:

Vehicles < 12 tonne:

- Northbound traffic to John Foord Bridge (6km)
- Southbound traffic to John Foord Bridge (4km)

Vehicles > 12 tonne:

- Northbound traffic to Howlong Bridge (26 km)
- Southbound traffic to Howlong Bridge (33 km)

Heritage significance: No

Programs and plans: -

Additional Info

- Annual population growth rate of +0.9%.

NSW GOVERNMENT

vicroads

John Foord Bridge

RMS Bridge No.: 5695

Local Government Areas: Federation Shire (NSW), Indigo Shire (VIC)

Roads: Bridge Road (NSW & VIC)

Town: Corowa (NSW), Wahgunyah (VIC)

Population (2011): 5,605 (NSW), 891 (VIC)

Bridge Description

Bridge Type: Steel truss

Materials: Timber, steel, iron

Construction Year: 1893

Bridge length: 152m

Load limit: 12 tonne (Gross)

Age: 122 years

Asset Maintenance Plan

Condition: Poor

Maintenance plan: Repainting of the steel lattice span. Replace NSW timber approach spans and timber piers

Network Performance

RMS Road Classification: Local Road

VicRoads Classification: Local Road

Height clearance: N/A

Carriage width: 5.48 - 9.90 m

B-double capacity: No

Higher Mass Load (HML): Not approved

Oversize, Over-mass: Not approved

Cross-section Profile

Traffic lanes and direction: Single lane, two-way (signal controlled)

Pedestrian/Bicycle paths: Yes, however cyclist must dismount before using path

Safety & Traffic

2010-2015: 1 crash (tow away or casualty)

Average Daily Volume (2010): 4,148 (2% HV)

Strategy & Planning

Nearest crossing/s:

- Northbound traffic to Federation Bridge (6km)
- Southbound traffic to Federation Bridge (4km)

Heritage significance: NSW State Significant, VIC State Register

Programs and plans: -

Additional Info

- Retained for local traffic use
- Annual population growth rate of +0.6%.
- Between 2001 and 2010, 24% decrease in vehicles per day and 59% decrease in heavy vehicle movements.

NSW GOVERNMENT

vicroads

Yarrawonga-Mulwala Bridge

RMS Bridge No.: 5819

Local Government Areas: Federation Shire (NSW), Moira Shire (VIC)

Roads: Melbourne Street (NSW & VIC)

Town: Mulwala (NSW), Yarrawonga (VIC)

Population (2011): 1,904 (NSW), 7,057 (VIC)

Bridge Description

Bridge Type: Steel truss

Materials: Steel, concrete

Construction Year: 1918

Bridge length: 485m

Load limit: GML

Age: 97 years

Asset Maintenance Plan

Condition: Fair

Maintenance plan: Concrete patching , joint repair and deck resurfacing.

Network Performance

RMS Road Classification: State Road

VicRoads Classification: B Route

Height clearance: 4.99 m

Carriage width: 5.48-6.27 m

B-double capacity: Yes

Higher Mass Load (HML): Not approved

Oversize, Over-mass (OSOM): Not approved

Cross-section Profile

Traffic lanes and direction: Two lane, two-way

Pedestrian/Bicycle paths: Yes

Safety & Traffic

2010-2015: 0 crashes (tow away or casualty)

Average Daily volume (2010):

- **Bridge** 8,207 (4% HV)
- **Weir** 1,566 (7.5% HV)
- **Combined bridge & weir** 9,773 (4.6% HV)

Strategy & Planning

Nearest crossing/s assuming that Yarrawonga Weir is closed to traffic post 2020:

- Northbound traffic to Federation Bridge (55km)
- Southbound traffic to Federation Bridge (44km)

It is noted that Yarrawonga Weir is not a B-double approved route.

Heritage significance: Local

Programs and plans: Major scheme development for the weir bridge prepared.

Additional Info

- The Yarrawonga Weir bridge is to be closed post 2020
- Annual population growth rate of +0.9%
- Between 2001 and 2010, 30% increase in vehicles per day and 5% decrease in heavy vehicle movements.

NSW GOVERNMENT

vicroads

Cobram-Barooga Bridge (new bridge)

RMS Bridge No.: 10082

Local Government Areas: Berrigan Shire (NSW), Moira Shire (VIC)

Roads: Vermont Street (NSW & VIC)

Town: Barooga (NSW), Cobram (VIC)

Population (2011): 1,497 (NSW), 6,018 (VIC)

Bridge Description

Bridge Type: Prestressed concrete trough girder

Bridge length: 189.7m

Materials: Concrete

Load limit: HML

Construction Year: 2006

Age: 9 years

Asset Maintenance Plan

Condition: Good

Maintenance plan: -

Network Performance

RMS Road Classification: Regional Road

VicRoads Classification: Local Road

Height clearance: N/A

Carriage width: 9 m

B-double capacity: Yes

Higher Mass Load (HML): Approved

Oversize, Over-mass (OSOM): Not restricted, not approved route

Cross-section Profile

Traffic lanes and direction: Two lane, two-way

Pedestrian/Bicycle paths: Yes

Safety & Traffic

2010-2015: 0 crash (tow away or casualty)

Average Daily Volume (2010): 6,054 (5% HV)

Strategy & Planning

Nearest crossing/s:

- Northbound traffic to Tocumwal Bridge (20km)
- Southbound traffic to Tocumwal Bridge (20km)

Heritage significance: No

Programs and plans: -

Additional Info

- Annual population growth rate of +0.6%
- Between 2001 and 2010, 22% increase in vehicles per day and 27% decrease in heavy vehicle movements.

NSW GOVERNMENT

vicroads

Cobram-Barooga Bridge (old bridge)

RMS Bridge No.: 3247

Local Government Areas: Berrigan Shire (NSW), Moira Shire (VIC)

Roads: Vermont Street (NSW & VIC)

Town: Barooga (NSW), Cobram (VIC)

Population (2011): 1,497 (NSW), 6,018 (VIC)

Bridge Description

Bridge Type: Truss, lift-span

Materials: Timber, concrete, steel, iron

Construction Year: 1902

Bridge length: 195.8m

Load limit: Limited to Pedestrian and bicycle access

Age: 113 years

Asset Maintenance Plan

Condition: Poor

Maintenance plan: Replace most timber elements in next 5-10 years.

Network Performance

RMS Road Classification: De gazetted

VicRoads Classification: -

Height clearance: -

Carriage width: -

B-double capacity: N/A

Higher Mass Load (HML): N/A

Oversize, Over-mass (OSOM): N/A

Cross-section Profile

Traffic lanes and direction: -

Pedestrian/Bicycle paths: Yes (limited access)

Safety

2010-2015: 0 crash

Average Daily Volume: Pedestrians only

Strategy & Planning

Nearest crossing/s:

- New bridge just upstream

Heritage significance: NSW State Register, VIC State Register

Programs and plans: Timber Truss Strategy

Additional Info

- DeBurgh timber truss, lift-span bridge
- Bridge no longer in use by vehicle traffic, retained as a pedestrian and bicycle connection
- Bridge retained for historic value.

NSW GOVERNMENT

vicroads

Edward Hillson Bridge Tocumwal

RMS Bridge No.: 7891

Local Government Areas: Berrigan Shire (NSW), Moira Shire (VIC)

Roads: A39 Goulburn Valley Highway (NSW & VIC)

Town: Tocumwal (NSW), Koonoomoo (VIC)

Population (2011): 2,383 (NSW), 255 (VIC)

Bridge Description

Bridge Type: Prestressed concrete box girder **Bridge length:** 212m

Materials: Concrete **Load limit:** HML

Construction Year: 1987 **Age**: 28 years

Asset Maintenance Plan

Condition: Good

Maintenance plan: Routine

Network Performance

RMS Road Classification: National Highway

VicRoads Classification: A Route

Height clearance: N/A

Carriage width: 9.55 m

B-double capacity: Yes

Higher Mass Load (HML): Approved

Oversize, Over-mass (OSOM): Approved

Cross-section Profile

Traffic lanes and direction: Two lane, two-way

Pedestrian/Bicycle paths: Yes

Safety

2010-2015: 0 crash (tow away or casualty)

Average Daily Volume (2010): 3,151 (20% HV)

Strategy & Planning

Nearest crossing/s:

- Southbound traffic to Cobram-Barooga Bridge (20 km)
- Northbound traffic to Cobram-Barooga Bridge (20 km)

Heritage significance: Local

Programs and plans: -

Additional Info

- Annual population growth rate of +0.6%.
- Between 2001 and 2010, 2% decrease in vehicles per day and 12% decrease in heavy vehicle movements.

NSW GOVERNMENT

vicroads

Barmah Bridge

RMS Bridge No.: 3318

Local Government Areas: Murray River Shire (NSW), Moira Shire (VIC)

Roads: Barmah Road (NSW & VIC)

Town: Moama (NSW), Barmah (VIC)

Population (2011): 5,560 (NSW), 181 (VIC)

Bridge Description

Bridge Type: Prestressed concrete girder

Materials: Concrete, steel

Construction Year: 1966

Bridge length: 168m

Load limit: GML

Age: 49 years

Asset Maintenance Plan

Condition: Fair

Maintenance plan: -

Network Performance

RMS Road Classification: Regional

VicRoads Classification: C Route

Height clearance: N/A

Carriage width: 7.31 m

B-double capacity: Yes

Higher Mass Load (HML): Semi only not B-Double

Oversize, Over-mass (OSOM): Not approved route

Cross-section Profile

Traffic lanes and direction: Two lane, two-way

Pedestrian/Bicycle paths: No

Safety & Traffic

2010-2015: 0 crashes (tow away or casualty)

Average Daily Volume (2010): 907 (15% HV)

Strategy & Planning

Nearest crossing/s:

- Northbound traffic to Echuca-Moama Bridge (78km)
- Southbound traffic to Echuca-Moama Bridge (30km)

Heritage significance: Local

Programs and plans: -

Additional Info

- Bridge originally replaced a ferry service
- Annual population growth rate of +2.6%
- Between 2001 and 2010, 16% increase in vehicles per day and 10% increase in heavy vehicle movements.

NSW GOVERNMENT

vicroads

Echuca-Moama Bridge

RMS Bridge No.: 3184

Local Government Areas: Murray River Shire (NSW), Campaspe Shire (VIC)

Roads: Cobb Hwy, Meninya St (NSW), Northern Hwy, Annesley St (VIC)

Towns: Moama (NSW), Echuca (VIC)

Population (2011): 5,559 (NSW), 13,708 (VIC)

Bridge Description

Bridge Type: Steel girder

Materials: Cast iron, steel

Construction Year: 1879

Bridge length: 444 m

Load limit: GML

Age: 136 years

Asset Maintenance Plan

Condition: Fair

Maintenance plan: Routine

Network Performance

RMS Road Classification: State Road

VicRoads Classification: B Route

Height clearance: 5.2 m

Carriage width: 7.3 m

B-double capacity: Yes

Higher Mass Load (HML): Not approved

Oversize, Over-mass (OSOM): Not approved

Cross-section Profile

Traffic lanes and direction: Two lane, two-way

Pedestrian/Bicycle paths: Yes

Safety & Traffic

2010-2015: 3 crashes (tow away and causalities)

Average Daily Volume (2010): 21,027 (4% HV)

Strategy & Planning

Nearest crossing/s:

- Northbound traffic to new Echuca Bridge (5km)
- Southbound traffic to new Echuca Bridge (5km)

Heritage significance:

NSW State Register, National Trust

Programs and plans: Extensive planning investigations by VicRoads and RMS for Bridge Replacement Program are underway.

Additional Info

- Seasonal general traffic variations due to tourism and water-skiing activities in the summer
- Grain and tomato harvest season increases HV volumes during November to February and February to April
- Annual population growth rate of +2.6%
- Second bridge under construction

NSW GOVERNMENT

vicroads

Echuca-Moama Bridge (New)

RMS Bridge No.: 12183

Local Government Areas: Murray River Shire (NSW), Campaspe Shire (VIC)

Roads: Cobb Hwy, Meninya St (NSW), Northern Hwy, Annesley St (VIC) **Towns:** Moama (NSW), Echuca (VIC)

Population (2011): 5,559 (NSW), 13,708 (VIC)

Bridge Description

Bridge Type: Prestressed Concrete

Materials: Concrete

Construction Year: 2018 /20

Bridge length: 444 m

Load limit: HML

Age: 1 year

Asset Maintenance Plan

Condition: Good

Maintenance plan: Routine

Network Performance

RMS Road Classification: State Road

VicRoads Classification: B Route

Height clearance:

Carriage width:

B-double capacity: Yes

Higher Mass Load (HML): Approved

Oversize, Over-mass (OSOM): Approved

Cross-section Profile

Traffic lanes and direction: Two lane, two-way

Pedestrian/Bicycle paths: Yes

Strategy & Planning

Nearest crossing/s:

- Northbound traffic to old Echuca Bridge (5km)
- Southbound traffic to old Echuca Bridge (5km)

Heritage significance: No

Programs and plans:

Additional Info

- Annual population growth rate of +2.6%

NSW GOVERNMENT

vicroads

Barham-Koondrook Bridge

RMS Bridge No.: 3256

Local Government Areas: Murray River Shire (NSW), Gannawarra Shire (VIC)

Roads: Thule Street (NSW), Grigg Street (VIC)

Town: Barham (NSW), Koondrook (VIC)

Population (2011): 1,567 (NSW), 1,094 (VIC)

Bridge Description

Bridge Type: Timber truss, lift-span

Bridge length: 99m

Materials: Timber, steel

Load limit: GML

Construction Year: 1904

Age: 111 years

Asset Maintenance Plan

Condition: Poor

Maintenance plan: Bridge renewed in 2018, periodic ongoing maintenance

Network Performance

RMS Road Classification: Regional

VicRoads Classification: C Route

Height clearance: 9.5 m

Carriage width: 6.09 m

B-double capacity: Yes

Higher Mass Load (HML): Not approved

Oversize, Over-mass (OSOM): Restricted

Cross-section Profile

Traffic lanes and direction: Single lane, two-way (approaches are two lane, two-way)

Pedestrian/Bicycle paths: No

Safety & Traffic

2010-2015: 0 crashes (tow away or casualty)

Average Daily Volume (2010): 3,685 (11% HV)

Strategy & Planning

Nearest crossing/s:

- Southbound traffic to Gonn Crossing Bridge (35km)
- Northbound traffic to Gonn Crossing Bridge (21km)

Heritage significance:

NSW State Register, VIC State Register

Programs and plans: Timber Truss Strategy

Additional Info

- Bridge listed as National Trust heritage item
- Annual population growth rate of -0.8%
- Between 2001 and 2010, 13% increase in vehicles per day and 33% decrease in heavy vehicle movements.

NSW GOVERNMENT

vicroads

Gonn Crossing/ Murrabit Bridge

RMS Bridge No.: 3375

Local Government Areas: Murray River Shire (NSW), Gannawarra Shire (VIC)

Roads: Murrabit Road (NSW & VIC)

Town: Gonn (NSW), Murrabit (VIC)

Population (2011): 471 (NSW), 330 (VIC)

Bridge Description

Bridge Type: Steel girder, lift-span

Materials: Steel

Construction Year: 1926

Bridge length: 104 m

Load limit: GML

Age: 89 years

Asset Maintenance Plan

Condition: Poor

Maintenance plan: Lift span upgrade. Renewal of timber abutment and land piers in NSW & VIC.

Network Performance

RMS Road Classification: Local Road

VicRoads Classification: Local Road

Height clearance: 7.5 m

Carriage width: 5.48 m

B-double capacity: Yes

Higher Mass Load (HML): Not approved

Oversize, Over-mass (OSOM): Not approved

Cross-section Profile

Traffic lanes and direction: Single lane, two-way (approaches are two lane, two-way)

Pedestrian/ Bicycle paths: No

Safety & Traffic

2010-2015: 1 crash (tow away or casualty)

Average Daily Volume (2010): 183 (18% HV)

Strategy & Planning

Nearest crossing/s:

- Southbound traffic to Barham-Koondrook Bridge (33km)
- Northbound traffic to Barham-Koondrook Bridge (24km)

Heritage significance: Local

Programs and plans: -

Additional Info

- Annual population growth rate of -0.8%.
- Between 2001 and 2010, 30% increase in vehicles per day and 183% increase in heavy vehicle movements.

NSW GOVERNMENT

vicroads

Swan Hill Bridge

RMS Bridge No.: 3215

Local Government Areas: Murray River Shire (NSW), Swan Hill Rural City Council (VIC)

Roads: Moulamein Road (NSW), C246 McCallum Street (VIC)

Town: Murray Downs (NSW), Swan Hill (VIC)

Population (2011): 374 (NSW), 10,431 (VIC)

Bridge Description

Bridge Type: Allan-truss, lift-span

Materials: Timber, steel

Construction Year: 1896

Bridge length: 116m

Load limit: GML

Age: 119 years

Asset Maintenance Plan

Condition: Poor

Maintenance plan: Temporary truss & pier support system.

Network Performance

RMS Road Classification: Regional

VicRoads Classification: C Route

Height clearance: 9.1 m

Carriage width: 4.27 - 6.68 m

B-double capacity: Yes

Higher Mass Load (HML): Not approved

Oversize, Over-mass (OSOM): Not approved

Cross-section Profile

Traffic lanes and direction: Single lane, two-way

Pedestrian/Bicycle paths: No

Safety & Traffic

2010-2015: 0 crashes (tow away or casualty)

Average Daily Volume (2010): 3,051 (11% HV)

Strategy & Planning

Nearest crossing/s:

B-doubles:

- Northbound traffic to Tooleybuc Bridge (45km)
- Southbound traffic to Tooleybuc Bridge (57km)

Non B-doubles:

- Northbound traffic to Nyah Bridge (27km)
- Southbound traffic to Nyah Bridge (39km)

Heritage significance:

NSW State Register, VIC State Register

Programs and plans: Timber truss strategy

Additional Info

- Bridge is one of only two surviving Murray River bridges with Allan truss spans (the other is Tooleybuc Bridge)
- Annual population growth rate of -0.8%
- Between 2001 and 2010, 1% decrease in vehicles per day and 11% increase in heavy vehicle movements

NSW GOVERNMENT

vicroads

Speewa Ferry

RMS Bridge No.: 3376

Local Government Areas: Murray River Shire (NSW), Rural City of Swan Hill (VIC)

Roads: Speewa Ferry Road (NSW, Speewa Punt Road (VIC)

Town: Speewa (NSW), Beverford (VIC)

Population (2011): 374 (NSW), 372 (VIC)

Bridge Description

Bridge Type: Vehicle ferry

Bridge length: 15.8 m

Materials: Timber

Load limit: 8 tonne, 3 car capacity

Construction Year: 1979

Age: 36 years

Asset Maintenance Plan

Condition: Good

Maintenance plan: Routine

Network Performance

RMS Road Classification: Local Road

VicRoads Classification: Local Road

Height clearance: N/A

Carriage width: 2.8 m

B-double capacity: No

Higher Mass Load (HML): Not approved

Oversize, Over-mass (OSOM): Not approved

Cross-section Profile

Traffic lanes and direction: Single lane, two-way

Pedestrian/Bicycle paths: No

Safety & Traffic

2010-2015: 0 crashes (tow away or casualties)

Average Daily Volume (2010): 80 (2% HV)

Strategy & Planning

Nearest crossing/s:

- Northbound traffic to Nyah Bridge (23km)
- Southbound traffic to Nyah Bridge (16km)

Heritage significance: Local

Programs and plans: -

Additional Info

- General freight activities not permitted, but mail services, school buses and maintenance vehicles (eg. Telstra) use ferry. Restricted hours of operation
- Upstream is a private ferry to Beveridge Island (part of Victoria); it crosses a Little Murray anabranch, and is now the main navigable channel
- Annual population growth rate of -0.8%.

NSW GOVERNMENT

vicroads

Nyah Bridge

RMS Bridge No.: 3377

Local Government Areas: Murray River Shire (NSW), Swan Hill Rural City (VIC)

Roads: Speewa Road (NSW & VIC)

Town: Koraleigh (NSW), Nyah (VIC)

Population (2011): 277 (NSW), 483 (VIC)

Bridge Description

Bridge Type: Steel beam, central lift-span

Materials: Steel, concrete

Construction Year: 1941

Bridge length: 104m

Load limit: GML

Age: 74 years

Asset Maintenance Plan

Condition: Good

Maintenance plan: Routine

Network Performance

RMS Road Classification: Local Road

VicRoads Classification: Local Road

Height clearance: 4.1 m

Carriage width: 6.09 m

B-double capacity: Yes

Higher Mass Load (HML): Not approved

Oversize, Over-mass (OSOM): Restricted

Cross-section Profile

Traffic lanes and direction: Single lane, two-way (approaches are two lane, two-way)

Pedestrian/Bicycle paths: No

Safety & Traffic

2010-2015: 0 crashes (tow away and casualties)

Average Daily Volume (2010): 650 (1% HV)

Strategy & Planning

Nearest crossing/s:

- Northbound traffic to Tooleybuc Bridge (19km)
- Southbound traffic to Tooleybuc Bridge (21km)

Heritage significance: Local

Programs and plans: -

Additional Info

- Vehicle width restriction of 4.0m on bridge
- Annual population growth rate of -0.8%.

NSW GOVERNMENT

vicroads

Tooleybuc Bridge

RMS Bridge No.: 3244

Local Government Areas: Murray River Shire (NSW), Swan Hill Rural City Council (VIC)

Roads: Mallee Highway (NSW & VIC)

Town: Tooleybuc (NSW), Piangil (VIC)

Population (2011): 176 (NSW), 333 (VIC)

Bridge Description

Bridge Type: Allan timber truss, lift-span **Bridge length:** 89.3m

Materials: Steel, concrete, timber **Load limit:** GML

Construction Year: 1925 **Age**: 90 years

Asset Maintenance Plan

Condition: Poor

Maintenance plan: Temporary truss support system

Network Performance

RMS Road Classification: Regional

VicRoads Classification: C Route

Height clearance: 9.2 m

Carriage width: 3.7 m (Due to temporary support structure)

B-double capacity: Yes

Higher Mass Load (HML): Not approved

Oversize, Over-mass (OSOM): Restricted

Cross-section Profile

Traffic lanes and direction: Single lane, two-way (approaches are two lane, two way)

Pedestrian/Bicycle paths: No

Safety & Traffic

2010-2015: 0 crashes (tow away or casualties)

Average Daily Volume (2010): 792 (30% HV)

Strategy & Planning

Nearest crossing/s:

- Northbound traffic to Nyah Bridge (19km)
- Southbound traffic to Nyah Bridge (21km)

Heritage significance:

NSW State Register, VIC State Register

Programs and plans: Timber truss strategy . Preferred option 9a.

Additional Info

- One of only two Allan timber truss structures on the Murray River, Swan Hill being the other
- Annual population growth rate of -0.8%.
- Between 2001 and 2010, 37% decrease in vehicles per day and 27% decrease in heavy vehicle movements
- Bridge is located on alternative interstate route between Sydney and Adelaide.

NSW GOVERNMENT

vicroads

Euston-Robinvale Bridge

RMS Bridge No.: 10109

Local Government Areas: Balranald Shire (NSW), Swan Hill Rural City (VIC)

Roads: B400 Murray Valley Highway, B400 Murray Valley Highway

Town: Euston (NSW), Robinvale (VIC)

Population (2011): 795 (NSW), 2,134 (VIC)

Bridge Description

Bridge Type: Prestressed concrete box-girder

Materials: Concrete

Construction Year: 2006

Bridge length: 670m

Load limit: HML

Age: 9 years

Asset Maintenance Plan

Condition: Good

Maintenance plan: Routine

Network Performance

RMS Road Classification: State Road

VicRoads Classification: B Route

Height clearance: N/A

Carriage width: 12.5 m

B-double capacity: Yes

Higher Mass Load (HML): Approved

Oversize, Over-mass (OSOM): Approved & roadtrain route

Cross-section Profile

Traffic lanes and direction: Two lane, two-way

Pedestrian/Bicycle paths: Yes

Safety & Traffic

2010-2015: 1 crash (tow away or casualties)

Average Daily volume (2010): 3,151 (14% HV)

Strategy & Planning

Nearest crossing/s:

- Northbound traffic to Tooleybuc Bridge (114km)
- Southbound traffic to Tooleybuc Bridge (133km)

Heritage significance: No

Programs and plans: -

Additional Info

- Replaced a lift span bridge that was built as part of abandoned railway extension in 1924
- Annual population growth rate of -1.4%
- Between 2001 and 2010, 19% increase in vehicles per day.

NSW GOVERNMENT

vicroads

George Chaffey Bridge

RMS Bridge No.: 7296

Local Government Areas: Wentworth Shire (NSW) Mildura Rural City (VIC)

Roads: A20 Sturt Highway (NSW & VIC)

Towns: Buronga (NSW), Mildura (VIC)

Population (2011): 2,071 (NSW), 31,361 (VIC)

Bridge Description

Bridge Type: Prestressed concrete box-girder **Bridge length:** 331m

Materials: Concrete **Load limit:** HML

Construction Year: 1985 **Age**: 30 year

Asset Maintenance Plan

Condition: Good

Maintenance plan: Routine

Network Performance

RMS Road Classification: National Road

VicRoads Classification: A Route

Height clearance: N/A

Carriage width: **9.8m**

B-double capacity: Yes

Higher Mass Load (HML): Approved

Oversize, Over-mass (OSOM): Approved & roadtrain route

Cross-section Profile

Traffic lanes and direction: Two lane, two-way

Pedestrian/Bicycle paths: Yes

Safety & Traffic

2010-2015: 1 crash (tow away or casualties)

Average Daily volume (2010): 11,400 (10% HV)

Strategy & Planning

Nearest crossing/s:

- Northbound traffic to old Abbotsford Bridge (32km)
- Southbound traffic to old Abbotsford Bridge (25km)

Heritage significance: Local

Programs and plans:

Additional Info

- Annual population growth rate of +0.2%
- Between 2001 and 2010, 24% increase in vehicles per day and 41% in heavy vehicle movements
- Bridge is the on the main Sydney to Adelaide freight route

NSW GOVERNMENT

vicroads

Abbotsford Bridge

RMS Bridge No.: 5149

Local Government Areas: Wentworth Shire (NSW), Rural City of Mildura (VIC)

Roads: B79 Silver City Highway (NSW), A79 Calder Highway (VIC)

Town: Curlwaa (NSW), Yelta (VIC)

Population (2011): 413 (NSW), 281 (VIC)

Bridge Description

Bridge Type: Truss, lift-span

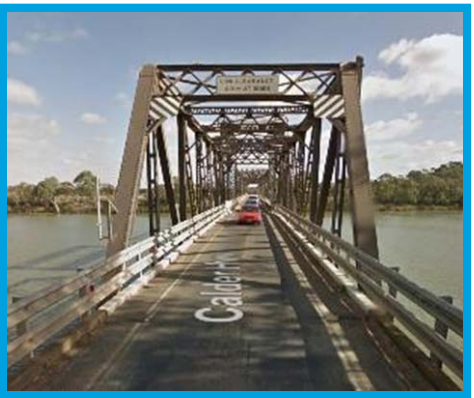
Bridge length: 235m

Materials: Steel

Load limit: HML

Construction Year: 1928

Age: 87 years



Asset Maintenance Plan

Condition: Fair

Maintenance plan: Routine

Network Performance

RMS Road Classification: State Road

VicRoads Classification: State Road

Height clearance: 4.27 m (4.0m at sides)

Carriage width: 4.26m - 5.45m

B-double capacity: Yes

Higher Mass Load (HML): Approved

Oversize, Over-mass (OSOM): Restricted

Cross-section Profile

Traffic lanes and direction: Single lane, two-way(operated by traffic signals)

Pedestrian/Bicycle paths: No

Safety & Traffic

2010-2015: 0 crashes (tow away or casualties)

Average Daily volume (2010): 2,380 (7% HV)

Strategy & Planning

Nearest crossing/s:

- Northbound traffic to George Chaffey Bridge (34km)
- Southbound traffic to George Chaffey Bridge (25km)

Heritage significance: Local

Programs and plans: -

Additional Info

- Annual population growth rate of +0.2%.
- Between 2001 and 2010, 5% decrease in vehicles per day and 16% decrease in heavy vehicle movements
- Lift span is operated by Wentworth Shire council and lifts an average three times per week for river vessels
- Failure of traffic signal operations occur on hot days due to overheating of signal control box.

NSW GOVERNMENT

vicroads

rms.nsw.gov.au

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