



Tooleybuc Bridge Replacement

Preferred Option Report

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Executive summary

Tooleybuc is on the NSW/Victorian border in far south western NSW, around 730km from Sydney and around 350km from Melbourne. The current bridge over the Murray River includes timber beam approach spans, two timber truss spans and a steel lift span all of which have increasing maintenance needs at a cost to both state Governments. The bridge is on a freight route connecting NSW to Victoria and is also an alternative freight route between NSW and South Australia.

A replacement Tooleybuc Bridge is included in the NSW Government's Bridges for the Bush Program which aims to reduce maintenance costs and improve freight efficiency.

Three strategic options (see Appendix B and C) have been developed for a replacement bridge:

- Purple lift span bridge
- Blue lift span bridge
- Yellow high level bridge

Options assessment has compared how well the options meet project objectives. Option assessment has taken road alignment, future maintenance costs, environmental factors and local community feedback into account.

Project objectives include providing a reliable connection across the river and providing for Higher Mass Limit vehicles. Each option meets these objectives equally.

The Yellow Option best meets the project objective to reduce ongoing maintenance costs. This option is the only option without a lift span. A large portion of project benefits comes from maintenance savings and installing a new lift span greatly reduces these savings. Lift span bridges require far more inspections and routine maintenance activities than fixed span bridges do.

The Yellow Option also best meets the project objective to improve the road alignment. The Blue and Purple options keep the existing road alignment through town, including a right angle bend. The yellow option removes this bend and provides a consistent 60 km/h alignment past town. This also improves road safety by removing through traffic from Tooleybuc's main street.

From an environmental perspective, there is no clear preference from the specialist studies. Noise, Socio-economic and urban design studies recommend the Yellow Option as preferred based on overall net positive benefit to town. A hydrology assessment does not recommend a preferred option as it expects no option to cause flooding impacts.

Both the Biodiversity and Aboriginal Heritage studies recommend the Blue Option as preferred. In both cases, this is not due to specific impacts but is due to this option having the overall smallest footprint. Both studies also note that there is no specific restriction or impact from any option.

Close consultation with the Tooleybuc Community has continued throughout the process, including almost half the town attending public information sessions. Overall, the community favours the Yellow Option as it provides opportunities for improving the main street to encourage more passing tourists and removing the trucks through town.

This report recommends the Yellow Option as the preferred option.

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Background

Tooleybuc is found on the NSW/Victoria border in far south west NSW around 730km south west of Sydney and around 350 km north-west of Melbourne (Attachment A).

The current bridge is a timber Pratt Truss lift span bridge. It includes two timber truss spans, three timber beam approach spans and a steel lift span. Opening in 1925, the current bridge requires high levels of ongoing maintenance to keep it functioning. It currently has a temporary bailey structure in place to support the bridge until major repair work is completed. Maintenance requirements are increasing and suitable materials are becoming harder to find resulting in an increasing cost to the NSW and Victorian Governments.

As a cross border connection, the current bridge is a key road freight link between NSW and Victoria. It is also an alternative route between NSW and South Australia, by avoiding travel through Mildura and Renmark. The bridge is on a gazetted B-Double Route however is limited to General Mass Limit vehicles by the bridge's current condition.

For both of the above reasons, Tooleybuc Bridge was included in the NSW Government's Bridges for the Bush Program to both reduce ongoing maintenance costs and to provide for freight efficiency.

This report assesses each replacement option against the following project objectives:

1. Provide improved road alignment and road width for the Murray River crossing
2. Provide reliable access over the Murray river to accommodate Higher Mass Limit (HML) and Over-Dimension Loads
3. Provide a reliable connection and minimise interruptions at the river crossing
4. Provide a replacement bridge that minimises ongoing maintenance costs
5. Minimise environmental impacts and maximise the quality of urban and landscape design outcomes.

Additionally, project outcomes include removing the current bridge after building a replacement bridge.

Options review

No-build option

A no-build option at Tooleybuc would require continuing to maintain the current bridge. This would include completing major repairs to extend the current bridge's serviceable life.

A no-build option is therefore not a no-cost option (see Economic analysis), with ongoing repairs and maintenance averaging around \$500,000 per year.

Strategic options

Road designers have developed strategic options following ongoing community consultation. After initially seeking feedback on a general location, then seeking further feedback on preliminary designs, the project team considered three options to be viable for preferred option assessment (Appendix B). All three options' designs connect the Balranald-Tooleybuc Road to the Mallee Highway in Victoria as close to the existing alignment as practical as community feedback was clear that a bypass was not acceptable to the community. Connecting to the existing alignment in Victoria also reduces the work funded by VicRoads. The three options are:

- Purple Option:

Located around 100m upstream from the current bridge, this option includes a lift span bridge and connects to Murray Street at Grant Street. This option uses the existing alignment in NSW from Murray Street to the Balranald-Tooleybuc Road.

- Blue Option:

Located next to and upstream from the current bridge, this option is the closest possible to simply providing a replacement bridge next to the current one. Using mostly the existing alignment in both states, this option provides a lift span bridge connecting directly to Murray Street.

- Yellow Option:

This option diverts from the Mallee Highway in Victoria and continues downstream until crossing the Murray River over a high level bridge around 250m downstream from the current bridge. The new road would then continue through private property to connect to the Balranald-Tooleybuc Road at the Lockhart Road intersection. This option maintains a direct connection back to Murray Street while providing a straighter alignment for through traffic.

Option comparison

Assessing how each option performs against project objectives has been a key activity in identifying a preferred option.

The Yellow option best meets the first objective to improve the road alignment and road width for the Murray River crossing. All three alignments include a two lane bridge so there is no difference between options on that aspect. The yellow option's road alignment is far preferable to the blue and purple options as it avoids the right angle bends through town by having a consistent 60km/h alignment across the proposed new bridge.

Each option equally meets the second objective to improve HML and over-dimension load capacity across the bridge as this achieved by all three options.

The Yellow option also best meets the third objective to provide a reliable connection and minimise interruptions at the river crossing. Interruptions at the river crossing currently occur with a lift span bridge by delaying road traffic. Reducing this delay is possible with a modern lift span which has a shorter time to raise and lower the structure. A high level fixed span bridge would remove this disruption completely. The yellow option is the only option without a lift span.

The fourth objective, and a key one given the Bridges for the Bush program goal, is to minimise ongoing maintenance costs. Apart from routine maintenance such as cleaning and inspections, most of the current bridge's maintenance requirements are in timber truss repair or replacement, or in lift span mechanism maintenance. All three replacement bridge options would be concrete and/or steel bridges. This eliminates ongoing timber truss maintenance costs, with further maintenance savings achieved by not having a lift span mechanism needing ongoing mechanical maintenance. The Yellow Option best meets this objective as it does not have a lift span when both the blue and purple options do.

The final objective relates to environmental impacts from the new bridge. The yellow option is favoured overall with environmental specialist studies recommending yellow or not stating a strong preference. In the biodiversity and Aboriginal heritage reports, the yellow option was not favoured based on total area of impact as both blue and purple options have a smaller total footprint. See below for more detail on environmental reports.

In addition to assessing against the project objectives, the project team held a value management workshop with attendees including all government stakeholders, community representatives, landowners and business representatives. Those attending the Value Management Workshop unanimously considered the Yellow Option as preferred.

Preferred option

The project team recommends the yellow option as the preferred option. Improvements to the initial Yellow Option following the display to the community (Appendix C) strengthen its case as a preferred option and include:

- Reducing the embankment height in NSW. The initial strategic design allowed for full width navigation clearance over the river. Refining navigation clearances to be over the river channel was possible after identifying the channel location. This allowed a lower structure over the remaining river width. The channel is on the Victorian side allowing a lower bridge in NSW but not on the Victorian side (see Appendix C).
- There is now an opportunity to purchase the property on the Victorian side and therefore at VicRoads request, the design has been refined to improve:
 - Curve alignment at the connection to the current road. An improved alignment here provides a safer radius and allows for construction advantages including being away from the existing road.
 - Curve alignment over the bridge. Achieving a larger radius curve over the bridge is possible by not avoiding the house. This allows for a safer alignment and a simpler bridge construction.

Considerations

Property

The Blue Option needs no private property acquisition as it mostly uses the existing road reserve. It only needs a small area of Council/crown land on both sides of the river to tie into the existing alignment.

The purple option would need a similar amount of land to the blue option, but would have greater impact on Council land south of the current bridge.

The yellow option would need the most property acquisition. This option would certainly need to acquire a holiday villa complex, currently owned by the Tooleybuc Sports Club. These are de-mountable buildings are leased as self contained holiday units. The Club has indicated that they would be willing to sell or relocate these units.

The yellow option would also either directly impact or indirectly impact (by changing the only access) one residential property on the NSW side. The property owner has indicated a willingness to sell as a new bridge would improve his fruit business efficiency.

The yellow option would also require moving a Rural Fire Service shed built on existing road reserve, as well as likely requiring a relocated boat ramp.

The yellow option would directly impact one house in Victoria. As highlighted above, there is now an opportunity to purchase this whole property.

For temporary construction land, it is likely that a main building site office would be in the Victorian property's paddock, with further clearing around the preferred alignment needed for bridge works. Leasing all temporary property is likely, except for in Victoria. Acquiring the whole Victorian side property and re-selling after construction is complete would be most likely.

Traffic

Traffic volumes counted in February 2014 show around 1000 vehicles crossing the current bridge. Of these, around 60% travel up Lockhart Road to access Tooleybuc Sports Club and Tooleybuc Central School. The remaining 40% continue up towards Balranald and the Sturt Highway.

Heavy vehicles make up around 18 percent of bridge traffic yet around 27 percent of Balranald Road traffic, reflecting the high light vehicle proportion accessing the school and club.

Traffic is likely to grow substantially if a proposed mineral sands mine at Balranald goes ahead. Predicted traffic growth almost doubles heavy vehicle traffic over the ten year mine life. Traffic growth is also likely when NSW-Adelaide heavy vehicle traffic is able to carry heavier loads across the new Tooleybuc Bridge.

Road safety

The project site has not had a recorded crash in the five years from July 2009 to June 2014. The nearest crashes in that time period are around three kilometres to the east, or at the Murray Valley Highway intersection in Victoria. Reducing the crash risk rather than addressing a crash history provides safety benefits for each option.

A completed strategic road safety audit covers all three options. The audit raised a total of 29 safety issues across all three options, however many of these applied separately to each option which increased the total number.

The report recommended addressing eleven (11) corrective actions. Of these, two related to the existing environment (the right angle bend and heavy vehicles using the parking lane to turn) which are not relevant to comparing each new bridge option. Five related to intersection design issues which further concept development for the preferred option would address. Concept design

development would also address the remaining four issues relating to pedestrian connectivity or safety.

Utilities

A dial before you dig enquiry covers all project options. Results indicate no major utility constraints affected by any option.

There are power poles along the existing road network and private property connections need relocating for any option. The only power infrastructure in Victoria is a private property service.

Underground telephone cables (including an optical fibre cable) cross the river. All options impact telephone cables to some degree but the Yellow Option impacts a cable crossing the river. Cables may not need moving as most of the project is in fill. The project team will consult further with utility authorities.

Physical constraints

For any option, the main physical constraint is the relationship between the Murray River itself and the main street (Murray St) in Tooleybuc. Community feedback has been clear that residents and businesses do not want the town bypassed. With a span of around 80m, the Murray River needs a long bridge with approaches connecting back to ground level and Murray St.

Vertical clearance for river traffic is a main physical consideration for any bridge design. Designs factor in the current bridge opening level with the underside of a new high level bridge matching the height to which the current bridge opens. This clearance, combined with the river span, creates longer approaches for any high level bridge.

Environmental

Detail environmental investigations cover all three strategic options. Each individual specialist report recommends a preferred option from their particular specialist perspective.

Noise and Vibration

A noise and vibration report recommends the yellow option as its preferred option. Assessment considered both NSW and Victorian guidelines, with the more conservative approach taken. Across all options there were minimal noise impacts predicted which would be above relevant thresholds.

For the blue option, there would be no noise receivers affected during operation. For the purple option, only one motel (assessed conservatively in NSW under Victorian guidelines) would need architectural treatment.

The yellow option would increase noise for the single residence close to the alignment in NSW. Acquiring this property is possible for the yellow option given potential project impacts. Should the property stay architectural treatments would mitigate noise. Construction noise would also greatly impact this property.

In Victoria, the single residence would not have noise levels above the relevant criteria when the road is open to traffic, but would be considerably above limits during construction. Acquiring this residence is required for the yellow option.

The report predicts noise receiver impacts during construction are limited to residential properties close to Murray Street in NSW. Construction would be during the day with no night time work proposed. Normal construction noise mitigation measures would apply.

Socio-economic

The socio-economic specialist held a series of stakeholder interviews with residents and businesses throughout Tooleybuc and Piangil, as well as with Swan Hill, Wakool and Balranald

Councils. Interviews asked how each option would impact the social and economic aspects of the community.

Key outcomes from the interviews were that Mensforth Park is a vital asset for the community as it attracts people travelling through to stay in Tooleybuc. Given it's location around 5 hours drive from Adelaide it is popular with tourists visiting NSW from South Australia. The park also encourages short term visitors to stop and use the facilities, including buying food at the general store.

Having a reliable bridge connection to Victoria is also important as the community considers Swan Hill as their main centre for shopping and community services.

The socio-economic report recommends the yellow option as its preferred option as the overall positive impacts for the community outweigh any negative impacts.

Landscape and Visual (Urban Design)

A Tooleybuc Urban Design Study assesses how each option would impact the visual landscape within and surrounding Tooleybuc. The surrounding area was categorised according to different landscape features.

After assessing each option's visual impact from a series of viewpoints, the report found the yellow option to be the best option from an urban design and landscape and visual impacts perspective.

The report also provided an urban design and landscape strategy to be included as the project designs are progressed. This strategy suggests measures for incorporating the road and bridge into the existing environment including embankment planting and roadside vegetation.

Hydrology

Upstream factors impact Murray River flooding behaviour at Tooleybuc. Flood volumes are lower at Tooleybuc as a bypass river system via the Edward/Wakool/Neimur Rivers takes much of any increased Murray River flow.

As well as receiving reduced flood flows, flooding in Tooleybuc is limited as the Mallee Highway connecting to the Murray Valley highway in Victoria is across the flood plain. This results in excess flood waters reaching Tooleybuc spilling over the flood plain rather than creating any impacts to Tooleybuc itself.

A hydrology report assessed each bridge option according to what flooding impacts each would cause for Tooleybuc. Overall, apart from some minor and easily addressed localised increases, the hydrology report found that none of the three options caused any adverse flooding impacts.

The hydrology report could not identify a preferred option as all three were rated equally with all considered viable from a flooding perspective.

Biodiversity

Flora and Fauna surveys covering both states targeted species identified from earlier Environmental Constraints Analysis. Field surveys targeted 90 different fauna species and 75 different flora species. Of these, the survey found eleven threatened (under Victorian, NSW or Commonwealth law) flora and fauna species that were either present or could be present in the study area. The remaining species were not threatened.

A biodiversity assessment also looked at vegetation impacts in both states. It especially looked at the number of hollow bearing trees potentially impacted by the project, finding 157 throughout the study area.

The report also looked at aquatic flora and fauna including assessing impacts to the Murray River endangered ecological community.

The report recommended the Blue Option as the preferred option from a biodiversity perspective. This recommendation comes from the relative lower impact to biodiversity from the Blue Option compared to the Purple and Yellow Options. The report notes that none of the three options would

cause a significant impact requiring a Species Impact Statement or Commonwealth referral. The report considered any of the three options as acceptable.

Heritage (Non-Aboriginal and Aboriginal)

A non-Aboriginal Heritage report was included in earlier Environmental Constraints Analysis work done to identify viable options. That report noted the Bridge Keeper's cottage, punt gates and a series of plaques near the cottage as having heritage significance. Proposed options would not impact these items.

The current bridge is NSW State Heritage Register listed. In 2012, NSW Office of Environment and Heritage endorsed Roads and Maritime's Timber Truss Conservation Strategy. The strategy recommended that Tooleybuc Bridge would be de-listed given Swan Hill Bridge nearby was the same type and a better example.

Once Roads and Maritime has built a new bridge, the intention is to remove the current bridge. Roads and Maritime is currently working through the de-listing process for the current bridge.

Assessing Aboriginal heritage was through an Aboriginal Cultural Heritage Assessment Report (CHAR). This report included two main phases of assessment. Firstly, a walk through was held with Aboriginal representatives. The walk through covered all three options and was to identify any archaeological or cultural impacts from the proposal. Following this walk through, the Aboriginal heritage specialists considered that there were no impacts to surface artefacts from any option. During the walk through however, the representatives raised the possibility that Aboriginal fish traps were in the river near the yellow option.

To confirm the presence of the fish traps, a second assessment phase was completed to talk to nominated Aboriginal knowledge holders (who were not present during the walk through) about the fish traps and their cultural significance. Knowledge holders confirmed that fish traps were present and thought to be within the river channel under the yellow option. In discussion however, bridging over the top of the traps without directly impacting them (eg via a pier) would be acceptable.

Further investigation including a bathymetric survey to accurately identify where the fish traps are located, and sub-surface testing to identify any buried artefacts are to progress for the preferred option.

Constructability

The project team held a constructability workshop in September 2014 and included representatives from Roads and Maritime Asset, Delivery, Development, Safety and WHS sections. The workshop discussed more general constructability issues relevant to all options rather than specific issues for each option.

The workshop identified broad construction requirements following workshop discussions and previous experience. These requirements were included in environmental assessments to reduce any later environmental assessment and reduce the project time line.

Requirements identified include site compound location, maintenance access and craning/piling pads. Further concept design development would address most general construction issues. This option selection stage does not identify any specific constructability constraints.

Risks

A risk management workshop held in February 2014 covered risks at the project's strategic stage. A further risk assessment review would be completed soon after a confirming a preferred option.

At the February risk workshop, higher value risks identified and treatments carried out during option selection to address them include:

- Risk: Not including Victorian requirements in option selection process.
Treatment: Involving VicRoads throughout option selection.

- Risk: Community not in favour of proposed options.
Treatment: The project team has had ongoing communication with the community since the beginning.
- Risk: Proposed options don't meet objectives.
Treatment: Designing all options with project objectives in mind.
- Risk: Compromising safety by building proposed options.
Treatment: Road Safety Audits carried out to highlight safety concerns in concept designs.

Any delays to de-listing the current bridge and thus delaying its removal poses an additional risk to the overall project. This risk is common to all options. Without a de-listing, the risk is that the government would be responsible for two bridges. Roads and Maritime is organising the de-listing process with NSW Office of Environment and Heritage. Managing this process carefully would ensure the de-listing occurs before committing to building the new bridge.

Safety in Design

The project team carried out a safety in design audit in November 2014. This included reviewing design documentation to ensure the project team accurately records safety risks. The audit raised no specific safety in design issues for each option with general process recommendations making up the three observations.

Safety in design is a key part of risk and constructability workshops and issues raised from each option addressed by further developing concept designs.

The project team considers that the yellow option provides minor safety in design benefit over other options as it does not have ongoing maintenance issues with a lift span.

Economic analysis

An economic analysis completed for the project factors total project costs and benefits over a thirty year timeframe. Project costs include building the bridge, planning activities and ongoing maintenance. The bulk of benefits are from freight efficiency savings or from ongoing maintenance savings from a new bridge compared to the current bridge.

Maintenance cost savings use a predicted maintenance programme over 30 years. As a timber truss lift span bridge, predicted ongoing maintenance includes routine maintenance and major renewal work needed to keep the bridge up to standard. There are also costs involved with lift span operation. By comparison, predicted new bridge maintenance is only a fraction of current bridge maintenance over the same period through routine inspections and cleaning.

Freight efficiency benefits factor in heavy vehicles currently mass constrained and not allowed to cross the existing bridge at Higher Mass Limits. The closest HML diversion via Robinvale is around 34 minutes longer and so allowing HML across Tooleybuc would save this travel time.

As Tooleybuc is also a known alternative NSW-South Australia route, calculations assume some Sturt Highway heavy vehicles would prefer to use a new Tooleybuc Bridge to travelling via Mildura. This would save each truck around 20 minutes to Adelaide.

Other benefits include travel time savings, vehicle operating costs and crash savings.

Conclusion

Based on all the specialist environmental studies alone, there is no clear preference for a preferred option. Environmental reports (Aboriginal Heritage and Biodiversity) preferring a Blue Option are balanced by other environmental reports (eg Urban Design and Socio Economic) preferring yellow. However all options are acceptable from the environmental perspective.

A value management workshop held in November 2014 considered all three options. All major stakeholders attended the independently facilitated workshop. Workshop participants unanimously recommended the yellow option as the one to take forward.

How each option meets project objectives forms the basis for a preferred option recommendation. In terms of maintenance savings and providing an improved road alignment by removing right angle bends, the Yellow Option is clearly preferred. Environmentally, although not preferred by the Aboriginal Heritage and Biodiversity reports, neither pose any specific restrictions with that preference based on total impact area.

An overall assessment against each objective, with minimising environmental impacts separated into specialist areas, is included below. A tick represents which option best meets that objective. Note an asterisk on Biodiversity and Aboriginal Heritage is to note that these reports base a preference for Blue/Purple on overall area of impact and not specific impacts.

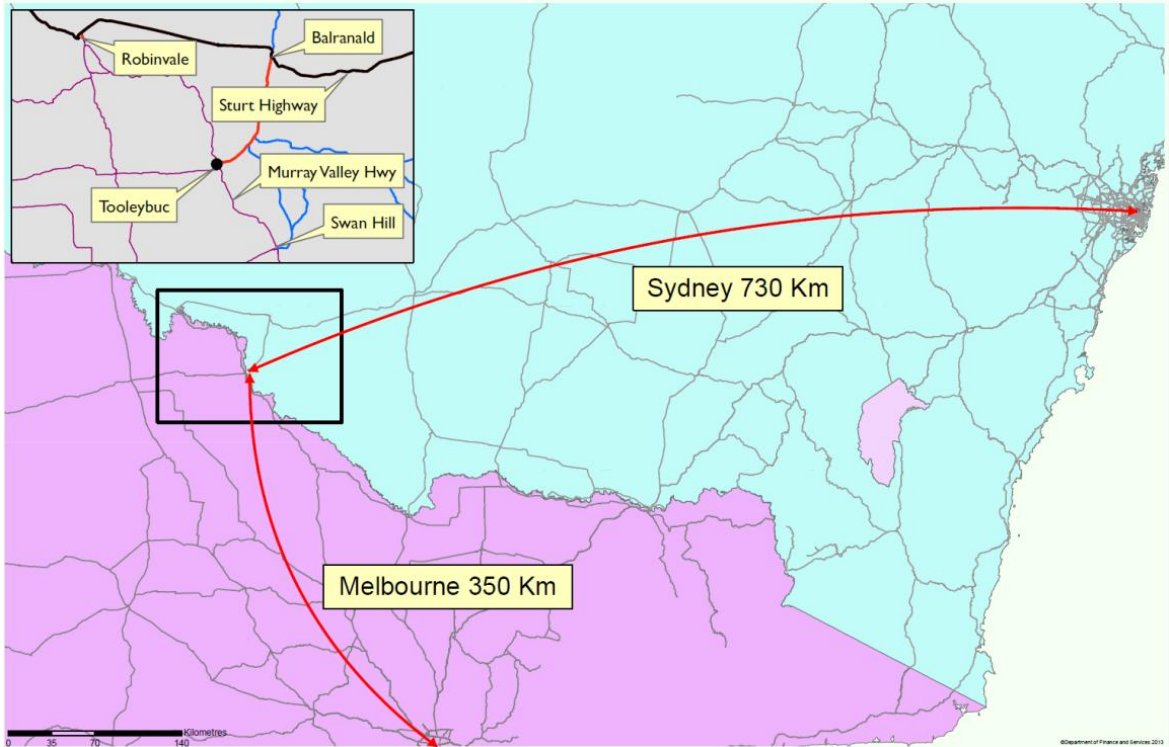
Objective	Yellow	Blue	Purple
Improved alignment	✓		
HML and OD access	✓	✓	✓
Road/River traffic interruptions	✓		
Reduce maintenance	✓		
Environmental – Noise	✓		
Environmental – Socioeconomic	✓		
Environmental – Hydrology	✓	✓	✓
Environmental – Biodiversity*		✓	
Environmental – Aboriginal heritage*		✓	✓
Environmental – Urban design	✓		

Both the VicRoads Project Review Committee (PRC) and Roads and Maritime Major Project Review Committee (MPRC) have endorsed the yellow option as preferred. The PRC endorsed three recommendations:

1. That VicRoads continues to assist RMS in the planning and investigation for a replacement bridge at Tooleybuc.
2. That following confirmation that no known Aboriginal artefacts are to be disturbed that VicRoads endorse RMS's proposal to proceed to the detailed design of the revised Yellow option.
3. That VicRoads seeks project funding to meet its share of the projects' funding commitment in accordance with the 2001 Murray River Crossings Agreement and 2004 Variation to the Agreement.

The MPRC endorsed the yellow option as preferred and also endorsed displaying the preferred option to the community subject to VicRoads PRC endorsement.

Appendix A - Tooleybuc location



Tooleybuc location

Appendix B - Original option strategic alignments

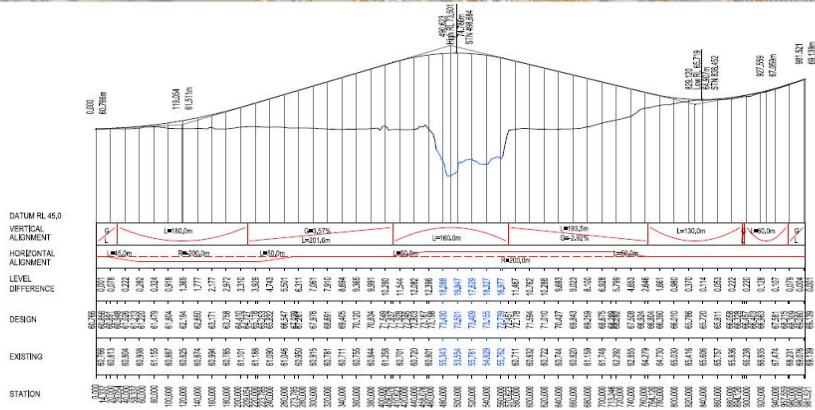


Strategic alignment options.

Appendix C - Preferred option



Initial yellow option (red/green) and improved yellow option.



Yellow option long section



rms.nsw.gov.au/projects/south-western/tooleybuc-bridge/index.html



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September 2015
RMS 15.333
ISBN: 978-1-925421-06-4