

# **KAPOOKA BRIDGE**

## Preferred option report

DECEMBER 2011

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# 1.0 Background

The Olympic Highway in south western NSW is an important road freight transport route. It connects Albury on the NSW/Victoria border to the Central West region of NSW, and is also used as a link for interstate freight transport between Melbourne and Brisbane as it allows a straight line connection from Albury to the Newell Highway at Wyalong.

As the highway passes through Wagga Wagga it also carries growing numbers of commuter traffic from towns to the south including Uranquinty, The Rock and Yerong Creek.

Kapooka is a small village to the south west of Wagga Wagga. The majority of the town is located within, and its residents closely tied to, the Kapooka Army Base. The Kapooka Army Base is involved with the basic training of new Army recruits. It is an important facility to the Wagga Wagga area by providing employment and business for the town.

The remainder of Kapooka's surrounding area is largely made up of rural-residential and agricultural properties fronting the Olympic Highway. A disused fuel depot is found south of the existing bridge and a quarry accesses the Olympic Highway about one kilometre south of the existing bridge.

## The existing bridge

The existing Kapooka Bridge provides for the Olympic Highway to cross the main Sydney to Melbourne railway line at Kapooka. The bridge was built in 1880 and is well known to the local Wagga Wagga community as being a safety risk. The bridge approaches comprise twin 90 degree corners which are not suitable for a 100km/h speed zone and the bridge structure is too narrow for two heavy vehicles to pass. As a result of these two safety risks, the bridge abutments are commonly struck by a heavy vehicle, causing traffic delays for this important highway and presenting a risk of debris or a vehicle falling onto the railway line below the bridge.

Camp Access Road, the main access road to the Kapooka Army Base, is found immediately to the west of the existing bridge. This intersection location increases the safety risks for the travelling public. Pedestrians and cyclists wishing to access the army base from both sides of the existing bridge are particularly vulnerable under the current conditions.

The bridge is also a constraint for heavy vehicles as it is not suitable for Higher Mass Limit (HML) loads. It is the only such restriction on the Olympic Highway. As the Olympic Highway is used as a diversion route from the Hume Highway between Albury and Gundagai, this HML restriction has economic and efficiency impacts for road freight vehicles.

The *Albury to Cowra Corridor Strategy* (RTA 2010) identifies improving the existing Kapooka Bridge as a short term (2010-2015) priority. The strategy highlights the HML restrictions and road safety history as leading reasons to replace the bridge.

Efficiency for railway operations is also restricted by the existing bridge. Currently, the bridge allows for a single track to pass underneath, with a vertical clearance of around 4.5 metres. As the railway is the main Sydney to Melbourne rail link, there is increasing demand on the line. Along the track, including south of Kapooka, a series of passing loops have been constructed to improve efficiency. This is not currently possible at Kapooka. Longer term, double stacking of rail freight containers is a possibility and the existing bridge does not support this height clearance.

## Traffic volumes

Traffic counts were taken over a one week period in July 2010 to gain an understanding of the traffic volumes travelling over the bridge and along Camp Access Road. In rounded figures, the traffic volumes were counted as:

From	To	Total daily vehicles	Heavy vehicles
Wagga Wagga	Camp Access Road	1100	5 %
Wagga Wagga	Across the bridge	2100	16 %
Camp Access Road	Wagga Wagga	1100	5 %
Camp Access Road	Across the bridge	100	8 %
Across the bridge	Camp Access Road	100	11 %
Across the bridge	Wagga Wagga	2200	17 %

In total, traffic figures add up to around 4300 vehicles in both directions across the existing bridge, around 2400 vehicles in both directions on Camp Access Road, and around 6500 vehicles in both directions between Camp Access Road and Wagga Wagga.

## **1.1 Project objectives**

This project would achieve the following objectives:

- Improve road safety for all traffic on the Olympic Highway by improving curve alignments, bridge lane widths and the intersection with Camp Access Road.
- Improve road freight efficiency by removing the restriction to higher mass limit vehicles.
- Improve rail safety and efficiency by removing the risk of a vehicle or bridge debris falling onto the Sydney to Melbourne railway line and by increasing the vertical and horizontal clearances from the rail line.
- Improve travel times between Wagga Wagga and Olympic Highway towns to the south, including Albury, by removing the low speed (25km/h advisory speed) environment.
- Improve road safety for pedestrians and cyclists, particularly accessing the Kapooka Army Base.
- Minimise impacts on the local community.
- Reduce the ongoing maintenance costs to the NSW government by removing traffic from the existing bridge. The existing bridge will become redundant following the construction of a new bridge.

## 2.0 Review of options

By the end of 2010, four alignment options had been identified for the project. These options were developed within a preliminary road design, environmental constraints and project objective context. Initial consultation was also held throughout the option development process with:

- Country Rail Infrastructure Authority (CRIA) as owners of the existing bridge.
- Australian Rail Track Corporation (ARTC) as leaseholders of the railway line.
- Wagga Wagga City Council.
- Kapooka Army Base as the area's major land use and traffic generator.

The design criteria used in the development of preliminary options has been based on the RTA's *Network Performance Measures and Network Planning Targets* document and include:

Design element	Recommended criteria
Design speed	<ul style="list-style-type: none"> <li>• Vertical and horizontal alignment suitable for a posted speed zone of 100 km/h on the Olympic Highway</li> <li>• Vertical and horizontal alignment suitable for a posted speed zone of 60 km/h on Camp Access Road.</li> </ul>
Intersection sight distance	<ul style="list-style-type: none"> <li>• Suitable for a driver of a vehicle stopped at the Camp Access Road intersection to see for a sufficient and safe distance in all directions.</li> </ul>
Grade	<ul style="list-style-type: none"> <li>• Maximum grade percentage of 6 per cent. The current Olympic Highway grade north of the existing bridge is around 8.5 per cent.</li> </ul>
Cross section	<ul style="list-style-type: none"> <li>• Basic configuration of a single carriageway with one lane in either direction.</li> <li>• Traffic lane width of 3.5 metres.</li> <li>• Sealed shoulder width of a minimum 2 metres.</li> </ul>
Intersection design	<ul style="list-style-type: none"> <li>• Minimum of a channelised right turn intersection – comprising a dedicated turning lane for vehicles turning right into Camp Access Road.</li> </ul>
Cuttings / embankments	<ul style="list-style-type: none"> <li>• Batter slopes designed to a 2:1 ratio.</li> </ul>

### 2.1 Exhibited options

Options developed using the above criteria were exhibited from the end of December 2010 until the end of February 2011. The four options exhibited were:

- A light blue North Bridge option consisting of a new road-over-rail bridge to the north of the existing bridge with a revised intersection and realigned Camp Access Road to north of the existing intersection.
- A red South Bridge option consisting of a new road-over-rail bridge to the south of the existing bridge with a revised intersection with Camp Access Road south of the existing intersection.
- A dark blue Two Bridge option consisting of a new road-over-rail bridge to the north of the existing bridge and a second road-over-rail bridge to the south of the existing bridge to provide dedicated access to the Kapooka Army Base.
- A green Underpass option consisting of a realigned Olympic Highway south of Camp Access Road to continue underneath the railway to the south of the existing bridge.

The light blue North Bridge option was identified as the RTA's favoured option as it was considered to have the least noise and visual impact on the Kapooka residential area within the army base, required minimal property acquisition and was considered to be comparatively easy to construct.

As a result of community feedback (see section 3.1) and further analysis, the red South Bridge and green Underpass options were no longer considered to be viable options.

The red South Bridge option was dismissed due to:

- Noise and visual impact on Kapooka residents.
- The large number of trees needing to be removed.
- The difference in road levels would pose considerable construction difficulties.

The green Underpass option was dismissed as it:

- Required acquisition of a large area of agricultural land.
- Resulted in significant amounts of cut material to be disposed of.
- Needed significant infrastructure to enable efficient drainage from the underpass.
- Needed improvements to the design to allow for safe sight distance.

## 2.2 Revised options

Further investigations (see below) including Aboriginal cultural heritage investigations, environmental constraints analysis, utility location and other investigations were completed following the community consultation period.

As a result of these investigations revisions and amendments to the light blue North Bridge and dark blue Two Bridge options were developed. A revised four options were then presented in a Value Management Option Selection Workshop (VM Workshop) to all major stakeholders in May 2011. The four options presented to the VM Workshop participants were:

- Option 1: A variation to the light blue North Bridge option with the Camp Access Road intersection relocated further north. This option would have a reduced depth of cut on Camp Access Road creating a simpler construction and reduced ongoing maintenance costs.
- Option 2: A variation to the light blue North Bridge option with the Camp Access Road intersection swapped to the eastern side of the new Olympic Highway alignment. Camp Access Road would then continue underneath a new bridge and Olympic Highway alignment. This option would have removed the right turn for vehicles travelling from Wagga Wagga to Camp Access Road.
- Option 3: A variation to the dark blue Two Bridge option with the new Olympic Highway alignment joining the existing alignment east of the existing bridge before diverting east to allow for the Camp Access Road bridge approach. This option would have mostly avoided passing through the former fuel depot while still allowing for a second bridge to access the Kapooka Army Base.
- Option 4: A variation to the light blue North Bridge option with the Camp Access Road intersection north of the new bridge. This option would include a three-lane bridge with a southbound acceleration lane to allow vehicles turning right to gain speed before merging with through traffic.

An Option 2B was included in the VM Workshop on the day. This option included a slip lane for vehicles travelling from Camp Access Road to Wagga Wagga. This inclusion would remove the right turn across traffic to improve safety for traffic travelling to Wagga Wagga.

As a result of the VM Workshop, Option 2B and Option 4 above were collectively agreed as the options to proceed. Option 1 and Option 3 were not considered by the VM Workshop participants as meeting the project objectives and were agreed to be unlikely to proceed.

For further information on the VM Workshop, see the *Kapooka Bridge Value Management Option Selection Workshop* document.

Preliminary concept bridge designs were developed and further investigations and design refinements were progressed with the two favoured options from the VM Workshop. An improved option 2B was considered by the RTA to be less favourable compared to an improved option 4 due to:

- Linking in with the existing highway to the east of the current bridge poses a number of constraints, including:
  - This alignment does not fix the poor crest to the south of the existing bridge unless a diversion of the route to the east was included.

- o Constructing along the current highway alignment would create significant traffic delays. There is insufficient room to create temporary side-tracks and as a result traffic would likely be restricted to one lane during construction.
  - o A main objective of this project is to allow for a second railway track. Building an improved highway alignment, particularly with an improvement to the crest, would restrict the possibility of a second track being built. For construction of a second track, the railway cutting would need to be widened on the eastern side which would take it very close to the highway alignment.
  - o Infrastructure associated with the former fuel depot is found close to the boundary and extends under the road corridor. Construction along the existing corridor would impact on this infrastructure.
- The intersection proposed under Option 2B had minimal safe intersection sight distance.
  - In order to build Option 2B, a minimum five span bridge on a curved alignment would be required to allow enough room for the railway corridor and for Camp Access Road to pass underneath. High retaining walls would also need to be installed along the embankment to separate the new Olympic Highway alignment from the off-load ramp. A larger bridge and retaining walls considerably increase the construction and ongoing maintenance costs.
  - To construct the northbound Camp Access Road slip-lane for vehicles travelling from Kapooka to Wagga Wagga, a long cutting up to around five metres deep would be needed which further adds to construction and maintenance costs.
  - Although removing the turn across traffic, the introduction of a grade separated off-load ramp for vehicles travelling from Wagga Wagga to Kapooka, it introduces further risk. The road would pass very close to bridge piers and abutments creating a narrow corridor with minimal sight distance. Adding a bridge overhead creates restrictions for oversized vehicles needing to access the Army Base.
  - Option 2B would cause significant impact to the southern end of the well established Silvalite Reserve. Large, 140 metre long drainage culverts would be required and the vegetation would need to be removed.

The preferred option for the project is closely based on Option 4 from the VM Workshop.

## 2.3 Preferred option

The preferred option includes a new Olympic Highway alignment to the east of the current alignment, a new four lane bridge, an improved Camp Access Road intersection and retention of the existing southbound overtaking lane.

Travelling in a northbound direction, the new highway alignment would divert to the east about 400 metres north of the quarry access road. The alignment would continue to travel up hill at a grade of less than 3.5 per cent through the rear corner of the former fuel depot before entering a large cut at the top of the hill. This cut would be about 16.5 metres deep and be the crest of the hill on the new alignment. Continuing down hill at less than 3 per cent, the alignment would be over an embankment about 13.5 metres high before crossing a new bridge and steepening to a grade of around 5 per cent. The alignment would rejoin the existing highway as the grade begins to flatten, and continue until the end of the 2.7 kilometre project.

The new bridge would be built on a straight alignment and have four lanes including two through lanes, a deceleration lane for northbound vehicles turning left into Camp Access Road and an acceleration lane for vehicles turning right (southbound) from Camp Access Road. The acceleration lane would continue to form an overtaking lane extending to the top of the hill.

Vehicles travelling from Wagga Wagga to Kapooka would have a protected turn lane to turn right into Camp Access Road. Drivers would have ample sight distance up the hill to see oncoming traffic and wait for a gap. Vehicles travelling from Camp Access Road would come to a T intersection and turn into their own lane for both left and right turns.

Pedestrians and cyclists would be catered for in the preferred option. A protected path would be included on the northern side of the new bridge and a cycle path connecting underneath the new bridge would be provided. Designs for the cycle and pedestrian path are still being developed.

### Potential staged construction

Construction will potentially involve three stages:

1. Widen the existing highway alignment on the inside of the corner north of the existing bridge. Once complete, traffic would move to the new pavement to allow room for construction of stage two.
2. Construct a side track to the west of the existing highway alignment north of the bridge. Once complete, traffic would be diverted onto this road and continue to use the existing bridge. This will allow the remainder of the project, including the bridge construction, to be completed free of traffic.

3. Complete the remainder of the project and bridge. Once complete, and traffic has been diverted onto the new alignment, finalisation works could be completed under traffic control. The temporary side track constructed in stage two may be used as a slip lane for vehicles travelling from Camp Access Road towards Wagga Wagga.



## 3.0 Considerations

A series of investigations have been completed to determine the preferred alignment. Many factors have been considered in the development of the concept designs including community consultation, environmental considerations and economic analysis.

### 3.1 Community consultation

Four preliminary alignment options were presented for public comment at the end of December 2010. The period for comment extended until the end of February 2011. A community update was distributed and a static display was provided at the offices of both Wagga Wagga City Council and the RTA South West Region was available for viewing. The update was advertised in local media including the newspaper and on local radio and television. The community update was also distributed to residents of the Kapooka Army Base and nearby San Isidore.

At the end of the consultation period, a total of 13 submissions were received. Submissions were received from local land owners, other government agencies, road freight groups, council and other interested people.

A summary of the main issues from submissions and the project response to them is found in the table below.

Issue	Project response
The crest south of the existing bridge should be removed, not just improved.	The preferred alignment avoids the crest completely.
The project must cater for the longer term freight growth.	This is a main project objective and has been a key consideration throughout option development.
Impacts to the environment by going through the biodiversity certified and environmental protection zone to the east of the existing bridge.	Given other project constraints, passing through this land is unavoidable. A detail design criterion is to minimise the disturbance to this area. Consultation with the Office of Environment and Heritage and Council will continue to ensure appropriate management strategies are in place.
Removing trees and wildlife connectivity across the highway.	The number of trees to be removed will be minimised. Tree replacement and wildlife connectivity will be designed in consultation with environmental specialists.
Block off Camp Access Road and send all traffic to the Sturt Highway via Kapooka Road.	Closing Camp Access Road is not considered appropriate as it would create significantly higher traffic volumes within San Isidore and require an upgrade to the Kapooka Road and Sturt Highway intersection.
The right turn from Wagga Wagga to Kapooka must be long enough for peak traffic volumes.	This has been considered in the preparation of designs. The right turn lane length is appropriate for the traffic volumes and will provide a safe turning movement.
Vehicles exiting Camp Access Road need to be allowed room to accelerate to speed to avoid conflicts with heavy vehicles travelling at highway speeds.	The project designs have incorporated acceleration lanes for both directions. These have been designed to allow merging traffic to gain speed prior to merging.
The proposed Camp Access Road alignment and cut would be costly and difficult to construct.	The Camp Access Road alignment has been amended and has a much reduced cut along Camp Access Road.

Noise impacts of truck braking.	The new alignment will remove the slow corners and steep hill. Engine braking of trucks will likely not be needed. The alignment is moving away from most residential areas to further reduce this noise impact.
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Major stakeholders including other government agencies, council, trucking groups and local landholders were further kept involved in the development of options at the VM Workshop. See section 2.2 above for details.

Consultation with major stakeholders will continue through the project's development. A further opportunity for the wider community to comment on the preferred alignment will be during the exhibition of the environmental assessment in 2012.

**3.2 Property**

Property landholdings in the surrounding area are mainly large rural blocks and the number of properties needing to be affected is reduced. The road corridor is also fairly wide, particularly to the north of the existing bridge. For the preferred option, property would be acquired from six land holdings:

- A small corner of the property north of the quarry access road.
- The front portion of the property south of the former fuel depot.
- The rear corner of the former fuel depot.
- The proposed corridor within the property north of the former fuel depot.
- Front portions of both sides of the property to the west of the proposed intersection.
- A narrow strip of the property just to the north of the proposed intersection.

The accesses of the latter two properties are proposed to be combined to allow a safe driveway access. The only other property access to be affected is the property south of the former fuel depot which will likely have its access moved to the cut/fill line of the new alignment.

**3.3 Public Utilities**

The project would impact on utilities found in the local area. Consultation with utility authorities is ongoing and will continue throughout the project's development.

Gas

A secondary high pressure gas line is currently found on the eastern side of the existing highway alignment. This line provides gas for towns south of Wagga Wagga and also connects to the Uranquinty gas power station. Although an important gas line, it is able to be shut down in order to be moved.

The preferred alignment crosses the gas line in four locations. In discussions with the gas line operators, it is suitable for the line to be moved to the far east of the project, away from any construction.

Optical Fibre

A Customer Access Network (CAN) optical fibre line is found to the east of the railway line. The preferred option will fill over the line to a depth of about eight metres. Discussions have been held with the optical fibre contractors and it is confirmed that the line is able to be concrete encased.

Water

A water main is found to the west of the railway line. The line is a major connection to the south and is under high pressure. The main is able to be moved, however without sharp turns given the pressure in the line. Early discussions have been held with Riverina Water and they have suggested relocating the mains to be underneath the new bridge.

Electricity

Given the bridge is largely within a rural area, only six power poles would need to be moved by the preferred option. There are no underground electricity services in the area.

## Railway Signalling

Only minor railway signalling infrastructure is found within the railway corridor where the new bridge would be constructed. The majority of bridge works will be away from the existing railway line. It is not expected that there will be any impact on railway signalling infrastructure.

### **3.4 Physical constraints**

The project is located within a natural gully with steep hills on both sides. Any deviation to the east or west would encounter a steep hill and result in a deep cut. A cut on the eastern side of the project is unavoidable and the project has been designed to balance the quantities of cut and fill material as much as possible.

The current highway alignment includes a hill of about 8.5 per cent north of the existing bridge and the bridge is at the top of the hill. A main project objective is to allow for increased railway clearances and this has required a substantial increase in the level of the highway. To meet design criteria the preferred alignment will raise the highway north and south of the bridge to reduce the grade.

### **3.5 Environmental constraints**

An environmental constraints analysis was completed at the same time as the community consultation period in early 2011. A consultant was engaged to prepare environmental constraints mapping report for the four options displayed to the community. The preferred alignment deviates to the east of this scope but is located within the scope of the study area. The key constraints identified by the report and other investigations include:

- Biodiversity certified land.
- Contaminated land.
- Noise impacts.
- Aboriginal cultural heritage.
- European heritage.

#### Biodiversity certified land

The area to the north and east of the existing bridge is zoned for environmental conservation under the Wagga Wagga Local Environmental Plan 2010 (Wagga Wagga LEP). Additionally, the area through which the project will pass has been included in a voluntary planning agreement to become a public reserve managed by a formal management plan.

Both of the above reasons have been used by council to offset land development elsewhere within the Wagga Wagga urban area. These offsets have been granted biodiversity certification by the (then) Minister for Environment and Climate Change. For every hectare of land cleared for urban development, ten hectares within the environmental conservation zone has been protected from future development.

The area has high environmental conservation value as it includes a Box-Gum Grassy Woodland Endangered Ecological Community (EEC). The area is also listed as habitat for squirrel gliders which are a threatened species under the Threatened Species Conservation Act.

The RTA will minimise the impacts on this area as far as possible and include connectivity measures where appropriate. Throughout the project's further development, the RTA will continue consultation and negotiation with the Office of Environment and Heritage to manage any further offset requirements.

#### Contaminated land

The former fuel depot to the east of the existing highway alignment operated from World War Two until the early 1980s. The site was used as a fuel storage depot as well as a distribution point. A series of underground tanks, pipes and other infrastructure is found within the site.

As a result of the former site operations, the front and north of the site has been found to be contaminated. Should the project pass through the centre of the site, the costs of remediation are likely to be significant and pose a threat to the project's viability. The preferred alignment avoids the bulk of the site is proposed to pass through the rear corner only.

In this corner, the new alignment would be up to around nine metres above natural ground surface. Preliminary soil testing has been conducted within the site and negligible contaminants were detected to a depth of up to three metres. The project is not likely to be impacted by the portion of the former fuel depot.

## Noise

A preliminary noise assessment was included in the constraints mapping report. Two of the four options were assessed, including the alignment furthest to the east and west. Noise impacts on the western (red South Bridge option) alignment were considered to be higher than the existing whereas on the eastern alignment (dark blue Two Bridge option) only three residents would be impacted by increased noise.

The preferred alignment travels further to the east than the dark blue Two Bridge option assessed. Noise impacts on the majority of the surrounding area will be further minimised by the option. Further noise assessment will be conducted during the environmental assessment for the preferred option but it is expected that only two residences may be subject to increased noise impacts. If required, these residences would have noise treatments to reduce the impacts.

## Aboriginal cultural heritage

Aboriginal cultural heritage investigations were conducted separately to the environmental constraints mapping. A specialist archaeologist was engaged to prepare an analysis of the potential impact on areas of Aboriginal cultural significance. The archaeologist and the RTA consulted closely with the local Aboriginal community throughout the investigations.

Investigations included background research as well as field inspections. Sites had previously been identified near the project location however results of the project's investigations have confirmed that the preferred alignment would not impact any sites or artefacts of Aboriginal significance.

## European heritage

The existing bridge is listed as a heritage item on the Wagga Wagga LEP and is the only heritage item in the project area. The project does not include the removal of the existing bridge. However, once the new alignment and new bridge are completed, the existing bridge would be blocked off and made completely redundant.

### **3.6 Geotechnical requirements**

Geotechnical investigations for the project will be conducted in October and November 2011. The surrounding area includes a quarry and the railway line is within a cutting. A preliminary geotechnical site inspection has been conducted and it is not expected that there will be any major geotechnical constraints to the project.

### **3.7 Economic analysis**

Preliminary estimates were prepared for the four options presented to the VM Workshop. These estimates included high contingencies as there were many unknown factors. The four option estimates were:

- Option 1 - \$51 million.
- Option 2 - \$49 million.
- Option 2B (estimated on the day) - \$50 million
- Option 3 - \$46 million.
- Option 4 - \$43 million.

As the project progressed, designs improved and further information was available the project cost estimates were improved and cost contingencies were reduced. Concept estimates for two options were prepared, including contingencies. The two options were on the same alignment as the preferred option but included two intersection treatments north of the new bridge:

- A Camp Access Road off-load ramp for vehicles travelling from Wagga Wagga to Kapooka.
- The preferred option of a right turn lane for the same traffic movement.

The two options were estimated as costing from \$45 to \$50 million for the off-load ramp option and from \$35 to \$40 million for the preferred option.

Benefits for both options are similar and it is considered that the off-load ramp option cannot be justified for the cost difference.

## 4.0 Conclusion

The development of options to replace the existing Kapooka Bridge has been complex with the project including many constraints which have been outlined above. Following community feedback and preliminary investigations into a range of options, the preferred option is considered by the RTA to best meet the project objectives and be the best value to the community.

Environmental assessment and detailed design development will continue with a view to having a project ready to construct once funding becomes available. The project is a high priority for the RTA South West Region.