2 Need and options considered

This chapter describes the need for the proposal in terms of its strategic setting and operational need. It provides a discussion of the options considered and the selection of the preferred option for the proposal.

2.1 Strategic need for the proposal

The existing two lane bridge over the Sydney to Melbourne Rail Line at Kapooka was built in 1880. The existing bridge does not meet current network safety and design standards, and poses a number of restrictions to traffic on the Olympic Highway and nearby Camp Access Road, including:

- The existing bridge is narrow with a full deck width of less than 10 metres. As a result, larger heavy vehicles, such as B-Doubles, cannot pass each other so one must give way to the other at the bridge approach.
- The existing bridge is not suitable for higher mass limit vehicles and this location is the only such restriction on the Olympic Highway.
- The 90 degree corners at the existing bridge approaches present a safety risk to motorists, particularly for heavy vehicles.
- The close proximity of the existing bridge to the intersection between the Olympic Highway and Camp Access Road causes traffic conflicts. Camp Access Road is a local road providing the main access to the Kapooka Military Area. The Kapooka Military Area is a basic training facility for the Army and is an important economic asset for the Wagga Wagga area.

The proposal is required to meet current network safety and design standards, remove restrictions to traffic and improve road safety.

In future, a second rail line may be constructed on the Sydney to Melbourne Rail Line at Kapooka. As well, double stacking of train freight containers will be required. The existing bridge does not provide sufficient clearance for a second track, or for double stacking of freight containers.

A new bridge across the Sydney to Melbourne Rail Line would provide increased clearances for trains to facilitate the future construction of a second rail line and double stacking of freight containers. Increased clearances for trains on the Sydney to Melbourne Rail Line at Kapooka would be subject to the removal of the existing bridge, which is not assessed in this REF.

2.1.1 Relevant plans and strategies

NSW 2021: A Plan to Make NSW No 1

NSW 2021: A Plan to Make NSW No 1 (Department of Premier and Cabinet 2011) is a 10 year plan that provides goals and targets to rebuild the economy, provide quality services, renovate infrastructure, restore government accountability, and strengthen the local environment and communities. It is the NSW Government's strategic business plan, setting priorities for action and guiding resource allocation.

NSW 2021: A plan to Make NSW No 1 lists a number of goals relevant to the proposal, including:

- Reduce travel time.
- Improve road safety.

- Invest in critical infrastructure.
- Protect our natural environment.

The proposal would assist in meeting these goals by removing the restrictions imposed by the existing bridge at Kapooka. This would reduce travel time and improve road safety.

The proposal would remove native vegetation and would therefore negatively impact the natural environment. Roads and Maritime is working closely with the Office of Environment and Heritage (OEH) and DoE to develop an offset strategy that will suitably compensate the loss of habitat for flora and fauna. As well, safeguards detailed in this REF would be implemented to minimise impacts on the natural environment.

The proposal is therefore considered to be consistent with *NSW 2021: A Plan to Make NSW No 1*.

NSW State Infrastructure Strategy 2012-2032

The *State Infrastructure Strategy 2012-2032* includes details of priority infrastructure to be developed in NSW over the next 20 years and provides recommendations on how this will be achieved.

The strategy includes the following recommended actions:

- Freight pinch point program for key road and rail links.
- Bridges for the Bush Program to improve freight productivity.

The proposal will assist in achieving these actions by providing a new road bridge over the rail line that will be suitable for use by higher mass limit vehicles. This will result in the entire Olympic Highway being suitable for higher mass limit vehicles and the potential for improvements in road freight productivity.

Roads and Maritime 2012-2016 Corporate Strategy

The Roads and Maritime Corporate Strategy outlines what Roads and Maritime will strive to deliver over the next four years. The community results in the strategy are:

- Customer: the customer is at the heart of everything we do.
- Travel: the door to door movement of people and goods is efficient and reliable.
- Asset: traffic infrastructure meets acceptable standards.
- Safety: the safety and security of the transport system is maximised.
- Environment: the impact of transport on the environment is minimised.

The proposal will assist in meeting these results by increasing the capacity of the Olympic Highway at Kapooka to more safely and efficiently service traffic between Wagga Wagga and Albury, particularly for heavy vehicles. Although there will be environmental impacts associated with the proposal, these have been minimised as far as possible and will be appropriately managed through the safeguards and offset measures described in this REF. The proposal has been influenced by stakeholder and community input throughout development and this input will continue when seeking comments on this REF and into construction should the proposal proceed.

Albury to Cowra Corridor Strategy

The *Albury to Cowra Corridor Strategy* (RTA 2010b) adopts a 25 year management framework for the corridor, which includes the Olympic Highway and 18 kilometres of the Hume Highway north of Albury. The strategy incorporates road safety, transport efficiency and asset maintenance.

The corridor includes 14 rail crossings. Some of these present safety risks due to poor road alignment on the approaches and narrow bridge widths. This is a challenge particularly in relation to increased demand for higher productivity vehicles and their suitability to existing road conditions.

The strategy identifies the limitations of the existing bridge at Kapooka (curve alignment, intersection location and the heavy vehicle mass limit) as one of the challenges in the Albury to Corowa corridor to be addressed.

The existing bridge at Kapooka is the only location on the Albury to Cowra corridor where higher mass limit vehicles are not permitted. As the Olympic Highway serves as a detour route for major traffic diversions from the Hume Highway, the strategy states that the removal of this restriction would offer a traffic management benefit and a freight efficiency benefit.

The strategy notes that the existing bridge at Kapooka has a poor accident history, with 10 accidents including four injury crashes at the bridge in the five years from 2004 to 2008 inclusive.

One of the short-term priorities identified by the strategy is to work with industry partners, stakeholders and rail asset owners in prioritising road and bridge upgrades for higher mass limit vehicles. The strategy identifies the need to commence planning for the preferred alignment of a new rail crossing at Kapooka, especially in relation to higher mass limit vehicles.

The proposed construction of a replacement road-over-rail bridge at Kapooka would satisfy the objectives of the strategy for the long-term improvement of the road/rail interface at Kapooka.

Wagga Wagga Bicycle Plan 2011

The primary focus of the Wagga Wagga Bicycle Plan (Wagga Wagga City Council 2011a) is to set the bicycle network development priorities and standards for the period 2011 to 2016. The Kapooka army base is listed as being a key bicycle trip generator in Wagga Wagga.

The proposal would ensure continued access to Wagga Wagga's bicycle network through the provision of an off-road shared bicycle and pedestrian pathway traversing the proposed bridge. The shared pathway would provide access to the Wiradjuri Walking Track from the Kapooka Military Area.

2.1.2 Future traffic growth

Table 2.1 below indicates the current and future anticipated daily traffic volumes for the existing bridge at Kapooka, Camp Access Road and the Olympic Highway north of Camp Access Road, including expected overall traffic and heavy vehicle growth. Heavy vehicles are defined as those vehicles within classes 3 to 12 of the Austroads vehicle classification system.

Table 2.1: Existing and expected future daily traffic volumes

Location	Existing traffic volume (July 2010)	Existing heavy vehicle volume (July 2010)	Expected future traffic volume (2021)	Expected future heavy vehicle volume	% traffic growth (2010 2021)	% heavy vehicle growth (2010 2021)
Existing bridge at Kapooka	4500	750	5500	900	22%	20%
Camp Access Road	2200	100	3000	150	36%	50%
Olympic Highway (north of Camp Access Road)	6400	850	8000	1100	25%	29%

Notes:

1. *Data provided by Roads and Maritime.*
2. *Traffic volumes and percentage growth figures are rounded.*

The proposal concept design would accommodate the predicted increased traffic volume and would provide safer driving conditions for vehicles using the road.

2.1.3 Crash history

The two approaches to the existing bridge at Kapooka have 90 degree corners. A number of crashes have occurred, including collisions with the bridge and/or guard rails and heavy vehicle rollovers. The sharp turns on the existing approaches present a hazard for motorists and are difficult for heavy vehicles to negotiate.

In September 2007, a heavy vehicle crashed through the parapet on the bridge to the rail line below (Figure 2.1). The bridge has been repaired numerous times as a result of crashes.

The existing bridge at Kapooka and its approaches pose the following safety risks, which have the potential to cause injury or loss of life:

- Vehicles losing control on the approach from Albury or Wagga Wagga, resulting in vehicles rolling over or leaving the road.
- Collisions between vehicles, including heavy vehicles and light vehicles.
- Vehicle impact with the existing bridge.
- Debris on the rail line, potentially leading to train derailment.

A summary of major crashes on the existing bridge since 2004 is provided in Table 2.2.

Table 2.2: Summary of major crashes on the existing bridge at Kapooka since 2004

Date of crash	Type of crash	Injuries	Length of time road was closed
13/01/04*	Unknown vehicle damaged bridge	Not known	Not known
23/06/04*	Unknown truck damaged bridge	Not known	Not known

Date of crash	Type of crash	Injuries	Length of time road was closed
23/12/04*	Heavy vehicle rolled over on bridge	Not known	Not known
30/09/05*	Vehicle damaged bridge	Not known	Not known
4/10/05*	Unknown vehicle damaged bridge	Not known	Not known
18/10/05	Heavy vehicle rollover – both lanes blocked	One injured	Eight hours partial / five hours total
1/02/06*	Unknown vehicle damaged bridge	Not known	Not known
11/08/06*	Vehicle damaged bridge	Not known	2.4 hours (repairs to bridge)
4/06/07	Small truck damaged guardrail	0	Not known
2/09/07	Heavy vehicle crashed into bridge – rear trailer came to rest on embankment near rail line (Figure 2.1).	One injured	8.5 hours partial road closure plus rail closure until vehicle and loose parapet removed.
9/06/09	Single vehicle crash	One injured	Two hours partial closure
6/07/09	Rigid truck rolled over damaging guardrail	0	N/A
23/11/10	Unknown vehicle damaged bridge parapet	0	Minor delays

**Information supplied by Australian Rail Track Corporation – no information on injuries or road closures.*

Regular minor incidents have also occurred where vehicles have struck the bridge parapet or guard fence. In some instances, bricks have been dislodged and have fallen onto the rail line below, posing a risk to rail traffic.

The proposal is needed to remove the conflicts and hazards posed by the existing bridge at Kapooka and its approaches. The proposal would reduce the potential for crashes, improving road and rail safety.

Figure 2.1: Heavy vehicle rollover from the existing bridge at Kapooka to the rail line

2.2 Existing roads and infrastructure

The Olympic Highway forms National Route 41, and NSW Main Road 78, connecting Albury and Cowra, NSW, over a distance of about 318 kilometres. It is the main route between Wagga Wagga and Albury. The Olympic Highway serves as the major access between Victoria and the NSW Central West, as well as forming part of the Melbourne to Brisbane (Hume Highway to Newell Highway) corridor. The Olympic Highway also serves as a major detour route when closures occur on the Hume Highway.

The existing roads and bridge in the vicinity of the proposal are shown in Figure 1.1 and Figure 1.2 and described below.

The existing bridge at Kapooka

The existing bridge at Kapooka (Figure 2.2) was built in 1880 and is listed as a heritage item under Schedule 5, Part 1 of the Wagga Wagga LEP. It is a brick arch overbridge. The bridge is about 20 metres long and 10 metres wide. It has a single span of about five metres. The vertical clearance of the bridge above the rail line is between 4.1 metres and 4.6 metres. The bridge has parapets about one metre high on either side of the road. Steel barriers have been constructed between the parapets and the edges of the road.

Figure 2.2: Existing bridge at Kapooka

Olympic Highway

South of the existing bridge the Olympic Highway is a single carriageway. For a distance of 850 metres north of the bridge the highway has one northbound lane and two southbound lanes. The southbound lane adjacent to the centre line is an overtaking lane. At 850 metres north of the existing bridge the highway returns to having two lanes. The traffic lanes are 3.5 metres wide, with sealed shoulders between 1.5 metres and three metres wide. On the approaches to the existing bridge the traffic lanes are up to eight metres wide, with sealed shoulders up to 3.5 metres

wide.

The Olympic Highway has a 100 kilometre per hour posted speed limit at this location. In the vicinity of the existing bridge and approaches there is a low speed environment (25 kilometres per hour advisory speed).

Camp Access Road

Camp Access Road provides access between the Kapooka Military Area and the Olympic Highway. It has two lanes (one in each direction), each about three metres wide and unsealed shoulders each about one metre wide. The road has a posted speed limit of 60 kilometres per hour.

Olympic Highway/Camp Access Road intersection

Immediately west of the existing bridge is the intersection of the Olympic Highway and Camp Access Road. Traffic on Camp Access Road is required to give way to traffic on the Olympic Highway before entering the highway. There are three street lights in the vicinity of the intersection: one on the intersection; one on Camp Access Road about 30 metres south of the intersection; and one on the Olympic Highway about 30 metres north of the intersection.

Wiradjuri Walking Track

The Wiradjuri Walking Track travels from north to south, east of the proposal. The track provides a shared path for cyclists and walkers for a distance of about 30 kilometres around Wagga Wagga. The track is used by cyclists for access between the Kapooka Military Area and Wagga Wagga. A culvert underneath the Sydney to Melbourne Rail Line provides access to the Wiradjuri Walking Track from Camp Access Road. The culvert has a height of about 1.2 metres.

2.3 Proposal objectives

The primary objectives of the proposal are to:

- Improve road safety for all users including road traffic, pedestrians and cyclists.
- Improve road safety by upgrading the road geometry and alignment of the Olympic Highway.
- Improve road freight efficiency by upgrading the alignment of the Olympic Highway and removing the restriction to higher mass limit vehicles at the existing bridge at Kapooka.
- Improve travel times on the Olympic Highway by removing the constraints posed by the existing bridge and approaches.

In delivering the proposal Roads and Maritime seeks to meet the following delivery objectives.

- Improve rail safety by removing the risk of a vehicle or bridge debris falling onto the Sydney to Melbourne Rail Line.
- Minimise impacts on environmentally sensitive areas and the local community.
- Reduce maintenance costs.
- Provide increased clearance to permit possible future construction of second track and double stacking, subject to removal of the existing bridge (not assessed in this REF).

2.4 Alternatives and options considered

2.4.1 Methodology for selection of preferred option

Roads and Maritime has investigated the replacement of the existing bridge at Kapooka for more than a decade, with a previous design and review of environmental factors completed in 1999 (RTA Technology 1999). This proposal was not progressed.

The process of selecting the preferred option was documented in a preferred option report (RTA 2011f). This is summarised below:

- Development of feasible upgrade options based on investigation of environmental, technical, economic and other constraints and requirements.
- Public display of options and consideration of feedback.
- Preliminary design and environmental investigations.
- Refinement of exhibited options based on feedback from public exhibition and key issue investigations.
- Assessment and shortlisting of options at a value management workshop.
- Further detailing and investigation of shortlisted options including development of concept bridge designs.
- Selection of preferred option.

Four initial options (described in Section 2.4.2) were displayed for public comment between December 2010 and February 2011 and 13 submissions were received. The issues raised are detailed in Table 5.1 in Section 5.1.2.

The submissions were considered and the options reviewed. Two of the options were selected for further development. These options were refined into five new options (options 1 to 5 in Section 2.4.2 below).

Environmental and technical investigations were carried out to inform the design, including heritage, noise, air, visual, biodiversity, contamination and utilities.

Aboriginal community consultation was undertaken to assess the likely impacts of each of the four options assessed. This included a site inspection attended by nine Aboriginal community representatives on 15 February 2011 (see Aboriginal heritage assessment in Appendix H).

A Value Management Option Selection Workshop (value management workshop) was conducted by the then RTA in May 2011 (RTA 2011g). At the workshop, options 1 to 5 were assessed against a list of assessment criteria that were agreed to by attendees at the workshop. The options were assessed using a weighted criteria approach (described in Section 2.4.3). The assessment criteria used were:

- Safe access into and out of Camp Access Road.
- Road user costs and whole of life costs.
- Safety and utility for road traffic using the Olympic Highway.
- Extent of property acquisition.
- Impact on property usage and residents, including noise, land use, visual, individual environmental amenity and safety of access.
- Safety and convenience for cyclists and pedestrians.

- Environmental impacts including short and long term impacts.
- Impacts to Aboriginal and non-Aboriginal cultural heritage.
- Risks and costs associated with disturbance of contaminated land and public utility adjustments required.

Preliminary concept bridge designs were developed and further investigations and design refinements progressed for options 3 and 5.

2.4.2 Identified options

1999 option

In 1999 a new road-over-rail bridge was designed for the Olympic Highway at Kapooka. The design included construction of a new bridge about 500 metres north-east of the existing bridge. The design also included realignment of about 950 metres of the Olympic Highway north of the existing bridge and construction of new road along the existing highway alignment for about 700 metres south of the existing bridge.

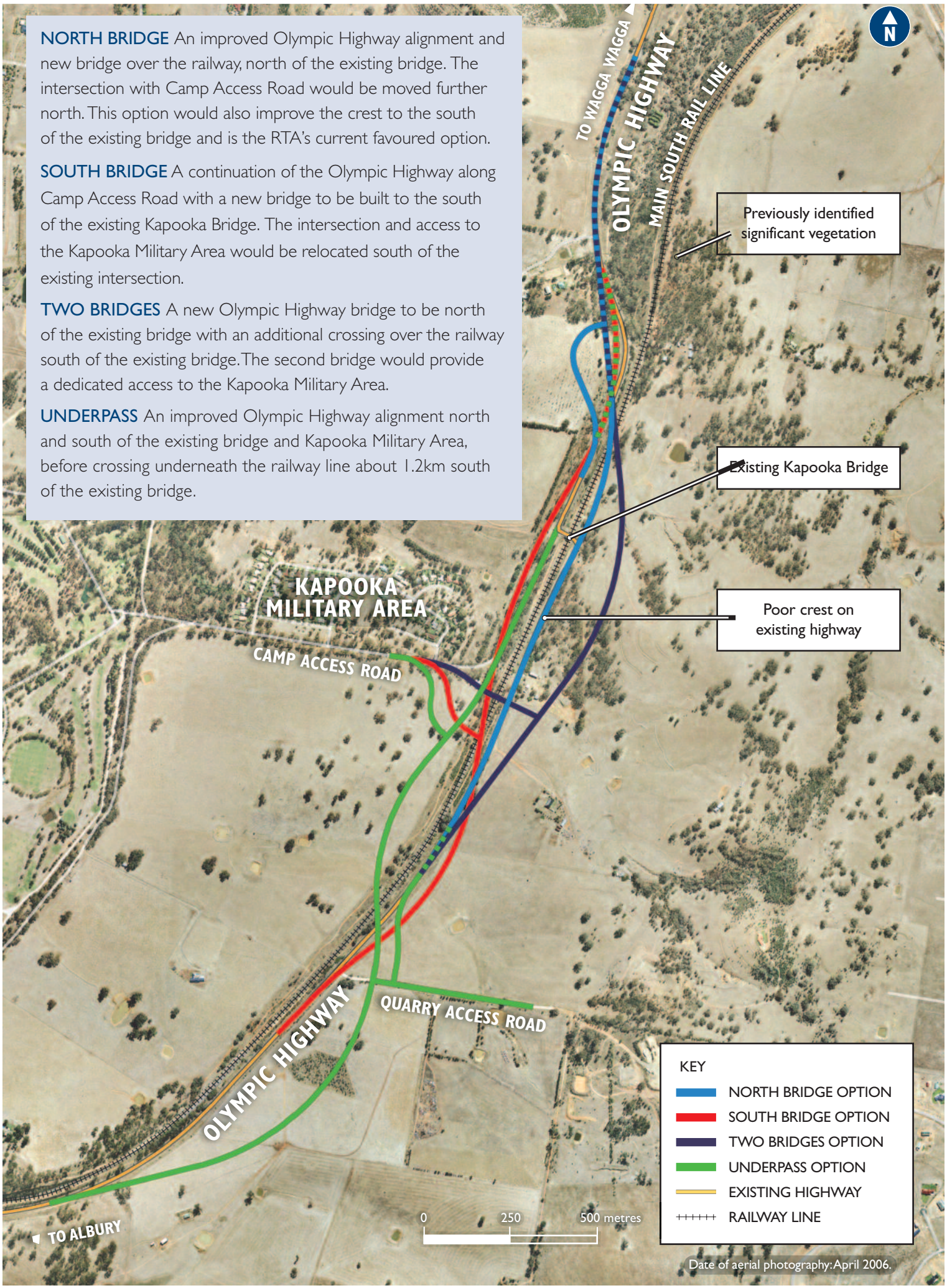
Funding for the project was redirected to other higher priority projects. This option was not progressed primarily because the long-term rail line clearance requirements could not be met. As well, the intersection treatments and the vertical curve (crest) on the road north of the bridge were sub-standard.

Initial options identified for public display

Four options were displayed for public comment from December 2010 to February 2011 (see Figure 2.3), including:

- North Bridge option, comprising:
  - New road-over-rail bridge north of the existing bridge.
  - Revised intersection and realigned Camp Access Road north of the existing intersection.
- South Bridge option, comprising:
  - New road-over-rail bridge south of the existing bridge.
  - Revised intersection with Camp Access Road south of the existing intersection.
- Two Bridges option, comprising:
  - New road-over-rail bridge north of the existing bridge.
  - Second road-over-rail bridge south of the existing bridge to provide dedicated access to the Kapooka Military Area.
- Underpass option, comprising:
  - Realigned Olympic Highway south of Camp Access Road.
  - Rail line underpass south of the existing bridge.

Figure 2.3: Four options displayed for public comment from December 2010 to February 2011



As a result of community feedback and further analysis, the South Bridge and Underpass options were no longer considered to be viable options.

The South Bridge option was discounted due to:

- Noise and visual impacts on the Kapooka Military Area residential area.
- The construction difficulties posed by the difference between the existing road level and the proposed road.
- The large number of trees that would be removed from the existing Olympic Highway and Camp Access Road reserves.

The Underpass option was discounted for the following reasons:

- Of the four options, this option had the greatest impact on private property as it would require substantial acquisition of productive grazing land.
- The proposed alignment involved substantial amounts of excess cut material which would need to be disposed of at high cost.
- Drainage from the low point of the underpass was considered difficult to implement without substantial infrastructure.
- Further road safety improvements were considered necessary to improve the sight distance for vehicles travelling under the rail line.

The North Bridge option and the Two Bridges option formed the basis for five new options. These five options, as well as the option of doing nothing, were considered during the value management workshop and subsequent analysis of options. These options are detailed below and are shown in Figure 2.4.

Do nothing

The do nothing option involves not undertaking the proposal, continuing maintenance and repair activities as needed, and retaining the existing bridge and approaches.

Option 1 – North Bridge option 1

This option would include construction of a new road-over-rail bridge about 400 metres north of the existing bridge, with a revised intersection and realigned Camp Access Road north of the existing intersection. This option would also include the following features:

- Access to Kapooka west of the Olympic Highway.
- Camp Access Road intersection relocated further north and west of highway.
- Reduced depth of cut on Camp Access Road.

Option 2 – North Bridge option 2

As for option 1, this option would include construction of a new road-over-rail bridge about 400 metres north of the existing bridge, with a revised intersection and realigned Camp Access Road north of the existing intersection. Option 2 would differ from option 1 in having the following features:

- Access to Kapooka east of the Olympic Highway.
- Camp Access Road intersection moved to the eastern side of the new Olympic Highway alignment.
- Continuation of Camp Access Road underneath a new bridge and Olympic Highway alignment.

- Removal of the right turn for vehicles travelling from Wagga Wagga to Camp Access Road.

Option 3 – North Bridge option 2B

As for option 2, this option would include construction of a new road-over-rail bridge about 400 metres north of the existing bridge, with a revised intersection and realigned Camp Access Road north of the existing intersection. Access to Kapooka would be east of the Olympic Highway. Option 3 would differ from option 2 in having a slip lane merging with the new Olympic Highway alignment for vehicles travelling from Camp Access Road to Wagga Wagga.

Option 4 – Revised Two Bridge option

In this option the Olympic Highway would cross the rail line about 400 metres north of the existing bridge. Camp Access Road would cross the rail line on a second bridge about 600 metres south of the existing bridge. The new Olympic Highway alignment would join the existing alignment east of the existing bridge before diverting east to allow for the Camp Access Road bridge approach.

Option 5 – North Bridge option 4

This option would include construction of a single bridge over the rail line, with the Olympic Highway diverting further to the east around the rear of the former fuel depot site. This option would also include the following features:

- Camp Access Road intersection on the western side of the highway and north of the new bridge with Wagga Wagga to Kapooka traffic turning right.
- A single four-lane bridge with a southbound acceleration lane to allow vehicles turning right to gain speed before merging with through traffic.

Option 1 North Bridge option 1

- New road-over-rail bridge about 400 metres north of the existing bridge.
- Access to Kapooka west of the Olympic Highway.
- Camp Access Road intersection relocated further north and west of highway.
- Reduced depth of cut on Camp Access Road.

Option 2 North Bridge option 2

- New road-over-rail bridge about 400 metres north of the existing bridge.
- Access to Kapooka east of the Olympic Highway.
- Camp Access Road intersection moved to the eastern side of the new Olympic Highway alignment.
- Continuation of Camp Access Road underneath a new bridge and Olympic Highway alignment.
- Removal of the right turn for vehicles travelling from Wagga Wagga to Camp Access Road.

Option 3 North Bridge option 2B

- New road-over-rail bridge about 400 metres north of the existing bridge.
- Access to Kapooka would be east of the Olympic Highway.
- Camp Access Road intersection moved north of the existing intersection.
- Slip lane merging with the new Olympic Highway alignment for vehicles travelling from Camp Access Road to Wagga Wagga.

Option 4 Revised Two Bridge option

- New road-over-rail bridge about 400 metres north of the existing bridge.
- Camp Access Road would cross the railway on a second bridge about 600 metres south of the existing bridge.
- The new Olympic Highway alignment would join the existing alignment east of the existing bridge.

Option 5 North Bridge option 4

- Olympic Highway diverted further to the east around the rear of the former fuel depot site.
- Camp Access Road intersection on the western side of the highway and north of the new bridge with Wagga Wagga to Kapooka traffic turning right.
- A single four-lane bridge with a southbound acceleration lane to allow vehicles turning right to gain speed before merging with through traffic.

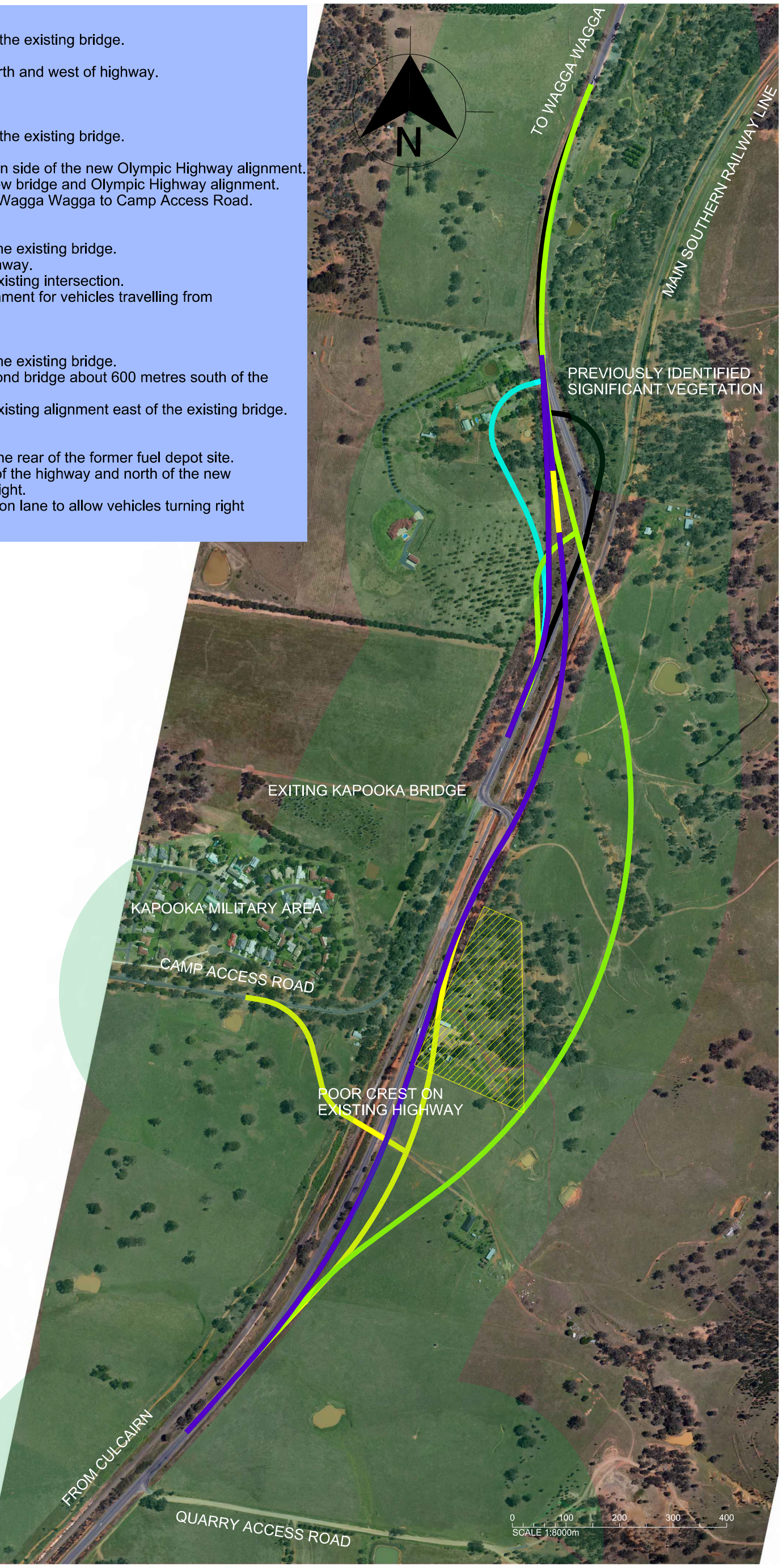


Figure 2.4: Five options assessed by Roads and Maritime in the value management workshop

2.4.3 Analysis of options during the value management workshop

Assessment of options against weighted criteria

During the value management workshop, options 1 to 5 were assessed against the assessment criteria detailed in Section 2.4.1 and in Table 2.3.

Each assessment criterion was given a weighting that reflected the relative importance placed on the criterion by the attendees of the workshop.

The options were then rated qualitatively based on how each option met each criterion on a scale of 5 through to 1. The best performing option was generally given the highest rating and the other options were given a rating based on their performance against that criterion. The rating was multiplied by the weighting of the assessment criterion to give a weighted score.

The total weighted score for each option was calculated. To incorporate the cost of each option in the assessment, the total weighted score for each option was divided by a preliminary estimate of the capital cost. This gave an overall score, incorporating the entire assessment of each option.

The ratings and scores for each option are provided in Table 2.3.

Table 2.3: Assessment of options against weighted assessment criteria

Assessment criteria	Weighting	Option 1		Option 2		Option 3		Option 4		Option 5	
		Rating	Weighted score	Rating	Weighted score	Rating	Weighted score	Rating	Weighted score	Rating	Weighted score
Safe ingress and egress for road traffic to Camp Access Road.	26	1	26	3	78	4	104	2	52	2	52
Minimise road user costs and whole of life costs.	0	2	0	1	0	1	0	1	0	3	0
Safety and utility for road traffic using the Olympic Highway.	24	2	48	2	48	2	48	2	48	4	96
Minimise the extent of impacts of property acquisition.	6	1	6	5	30	4	24	2	12	2	12
Minimise the impact on property and residents, including noise, land use, visual, individual environmental amenity and provide safe access.	8	1	8	4	32	4	32	2	16	2	16
Safety and convenience for cyclists and pedestrians.	20	3	60	3	60	5	100	3	60	3	60
Minimise environmental impacts including ongoing impacts.	9	2	18	2	18	1	9	4	36	2	18
Minimise impacts to Aboriginal and non-Aboriginal cultural heritage.	4	4	16	4	16	4	16	2	8	4	16
Minimise the risks and costs associated with the disturbance of the contaminated land and public utility adjustments required.	3	2	6	2	6	2	6	1	3	3	9
Total weighted score			**188**						**235**		**279**
Estimated capital cost ($ million)			**51**		**49**		**50**				**43**
Overall score (total weighted score / estimated capital cost)			**3.7**		**5.9**		**6.8**		**5.1**		**6.5**

288 **339**

Outcomes of the assessment

The conclusions drawn from the assessment of options 1 to 5 during the value management workshop, as well as an assessment of the do nothing option, are provided below.

Do nothing

The do nothing option would not meet the proposal objectives and would not result in any improvement to the road geometry which is currently a hazard to motorists. The do nothing option was therefore discounted.

Option 1 – North Bridge option 1

Option 1 was allocated the lowest overall score of all the options. The option was discounted from further consideration for the following reasons:

- The option received the lowest weighted score for road traffic safety at the Olympic Highway/Camp Access Road intersection.
- High environmental impact on private property and residents, including the removal of a residential dwelling.
- The option would have the lowest overall amenity, particularly for Camp Access Road traffic, due to the length of high cut on both sides of the road.

Option 2 – North Bridge option 2

Option 2 received the third highest overall score of all the options. The advantages of this option include:

- A comparatively high level of road traffic safety at the Olympic Highway/Camp Access Road intersection.
- It requires the least property acquisition.
- Low environmental impact on property and residents.

Option 2 was however discounted from further consideration for the following reasons:

- Uncertainty regarding whether the option enhancement of providing a slip lane is technically possible, and whether it is less costly.
- A safety hazard associated with the Kapooka to Wagga cross traffic movement. Option 3 (below) was developed to eliminate the Kapooka to Wagga cross traffic movement.

Option 3 – North Bridge option 2B

Option 3 received the highest overall score of all the options, despite being assessed as having the greatest environmental impacts. The high score was primarily due to:

- A substantial safety advantage in relation to vehicle turning movements as it would eliminate the cross highway movement for Kapooka to Wagga traffic.
- Safe access for cyclists is improved with the addition of a slip lane, as cyclists would use the shoulder without crossing traffic.
- Low environmental impact on property and residents.

No significant disadvantages relating to option 3 were identified during the workshop.

It was therefore identified for further assessment.

Option 4 –Revised Two Bridge option

Option 4 received the second lowest overall score of all the options, despite being assessed as having the lowest environmental impacts. The advantage of the option is that it would avoid most of the decommissioned fuel depot, while still allowing for a second bridge to access the Kapooka Army Base.

The disadvantages of this option include:

- Substantial property acquisition.
- Impacts to Aboriginal cultural heritage.
- Ongoing maintenance costs of two bridges over the rail line.
- Relatively low scores for most assessment criteria.

Option 4 was discounted from further consideration due to the disadvantages identified and its relatively low overall score.

Option 5 – North Bridge option 4

Option 5 received the second highest overall score of all the options. The high score was primarily due to:

- A high score in relation to safety and utility for road traffic using the Olympic Highway. The wider highway alignment would have better outcomes in terms of sight distance and grade in comparison to joining the existing highway alignment.
- Providing a good overall level of performance when compared to the estimated capital cost. The option has the lowest cost of all the options assessed.

No significant disadvantages relating to option 5 were identified during the workshop. It was therefore identified for further assessment.

2.4.4 Further analysis of options 3 and 5

Following further investigation and assessment by the then RTA, option 3 was determined to be less favourable than option 5 for the following reasons:

- Constructing the tie-in of Camp Access Road with the existing highway 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 is included.
  - Constructing along the existing highway alignment would create substantial 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.
  - An objective of this proposal is to allow for a second rail 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 rail line cutting would need to be widened on the eastern side which would take it very close to the highway alignment.
  - 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 in option 3 would have minimal sight distance.
- In order to build option 3, a minimum five span bridge on a curved alignment would be required to allow sufficient room for the rail line 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 with a depth of up to about five metres 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 introduces additional 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 Kapooka Military Area.
- Option 3 would cause substantial impact to the southern end of Silvalite Reserve. Large drainage culverts 140 metres in length would be required and vegetation would need to be removed.

2.5 Preferred option

The preferred option is option 5 which is considered to best achieve the proposal objectives. It meets the objectives of improving road safety, road freight efficiency and travel times on the Olympic Highway. It improves rail safety and provides increased clearance for trains on the Sydney to Melbourne Rail Line.

Negative impacts associated with option 5 include the construction of the proposal through Planning Agreement Areas and potential impacts associated with passing close to three residences including noise, visual impacts and air quality impacts.

The option received the highest score for traffic safety of all the options assessed during the value management workshop, and during the subsequent comparison of options 3 and 5. Option 5 has the lowest cost of all the options assessed during the value management workshop.

The preferred option has been selected with reference to the 'integration principle' of ecologically sustainable development, which states that decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations. The preferred option has been selected to achieve social benefits (through improved public safety); and economic benefits (through improved road freight efficiency and minimisation of construction costs). The proposal would minimise impacts on the environment as much as possible, with long-term strategies put in place to offset the ecological impacts of the proposal. Safeguards to minimise impacts on the local community and environment are provided in this review of environmental factors.

2.6 Design refinements

As the design of option 5 progressed, two options were assessed for the Olympic Highway/Camp Access Road intersection:

- Option 5A: would provide an off-load ramp at Camp Access Road for vehicles

travelling from Wagga Wagga to Kapooka.

- Option 5B: would provide a right turn lane at Camp Access Road for vehicles travelling from Wagga Wagga to Kapooka.

Option 5A was estimated as costing about $10 million more than option 5B.

Benefits for both options would be similar and it was considered that option 5A could not be justified for the cost difference. Option 5B was therefore selected as the preferred option for the Olympic Highway/Camp Access Road intersection.