Olympic Highway intersection upgrades

Preferred options report

July 2020

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Executive summary

Wagga Wagga's northern suburbs are booming, with residential development continuing in areas including Gobbagombalin, Estella and Boorooma estates.

Wagga Wagga City Council predicts residential growth to continue over coming decades to significantly increase travel demand to and from central Wagga Wagga across the Murrumbidgee River. Recent daily traffic growth across Gobbagombalin Bridge (2015-2018) was about seven per cent per year with growth in the morning and evening peak hours exceeding 11 per cent.

This growth is reflected in issues experienced at the Olympic Highway intersections at Travers Street and Old Narrandera Road.

Vehicles turning right into Travers Street can delay Olympic Highway southbound traffic in the morning. The same high volumes prevent traffic exiting Travers Street in the afternoon.

The current Old Narrandera Road intersection layout allows vehicles exiting Old Narrandera Road and travelling southbound to enter a merge slip lane on the Olympic Highway. High southbound Olympic Highway traffic volumes cause delays for traffic turning right out of Old Narrandera Road as there are few opportunities to merge, particularly in the morning.

The NSW Government has committed funding for upgrading both intersections within an overall road and bridge improvement package announced in August 2018. The package includes funding for upgrades to Marshall's Creek Bridge on the Sturt Highway, which is not covered in this report.

Project objectives to improve both intersections include:

- improving road safety
- improving access between the northern growth areas and services in Wagga Wagga
- improving travel time and reducing delays for commuters and freight travelling on this section of the Olympic Highway
- supporting future residential growth in the Wagga Wagga area.

Initially, two-dimensional designs were prepared for a range of strategic options to upgrade each intersection and included the following options:

- doing the minimum
- relocating intersections
- changing intersection types (roundabout, traffic lights etc)
- changing access arrangements
- linking to Gardiner Street as a North Wagga alternate route

Intersection modelling carried out in 2019 predicts traffic growth will result in the current Travers Street roundabout reaching an unacceptable level of service for the southbound Gobbagombalin Bridge approach by 2026. Modelling also predicts the Old Narrandera Road merge intersection is expected to reach an unacceptable level of service on the Old Narrandera Road approach during peak periods before 2026.

A strategic analysis was carried out for each intersection to determine a preferred option (Section 2) and considered results from the following:

- project objectives
- traffic modelling investigations (EMME model)
- intersection modelling (Sidra)
- road safety audit findings

- Value Management (VM), Health and Safety in Design, Constructability and Risk workshops
- community feedback
- desktop investigations (environment and utility searches)
- strategic estimates
- benefit-cost ratio calculations.

Options refinement workshops were carried out during strategic assessment to narrow the number of options and allow more detailed analysis. The options that best met project objectives and were preferred after reviewing the traffic modelling results were:

Old Narrandera Road Options

- traffic signals with additional lane capacity - VM Workshop Option A
- roundabout with highway southbound bypass lane - VM Workshop Option B
- three-leg standard roundabout - VM Workshop Option C
- elevated right turn - VM Workshop Option D

Travers Street Options

- traffic signals with intersection relocated south - VM Workshop Option A
- large radius roundabout with two lanes - VM Workshop Option B
- priority controlled with no right turn from Travers Street - VM Workshop Option C

The Value Management workshop findings showed:

- traffic signals and an elevated right turn at Old Narrandera Road are assessed as having similar value
- traffic signals at Travers Street provides the best value and should progress as the preferred option for Travers Street intersection upgrade.

Strategic estimates were prepared for:

- Old Narrandera Road traffic signals, three-leg roundabout and elevated right turn options
- Travers Street large radius roundabout, traffic signals and priority controlled options

Estimates showed a three-leg roundabout at Old Narrandera Road was the cheapest option, with traffic signals being marginally more expensive and an elevated right turn costing about 2.5 times traffic signals. A roundabout may also negatively impact traffic on the Olympic Highway and prevent future upgrades at this location.

The cost estimate for a priority controlled intersection at Travers Street was significantly lower than other estimates because it uses the existing road and is a simple arrangement. A large radius roundabout is marginally more expensive than traffic signals.

The recommended preferred option for each intersection upgrade is:

- upgrade Old Narrandera Road intersection to traffic signals with additional lane capacity
- upgrade Travers Street intersection to three-leg traffic signals south of existing location; left-in left-out at Moorong Street.

Contents

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1. Background

Wagga Wagga's northern suburbs are growing, with residential development continuing in urban release areas including Gobbagombalin, Estella and Boorooma estates. Wagga Wagga City Council predicts residential growth to continue over coming decades to significantly increase travel demand to and from central Wagga Wagga across the Murrumbidgee River. Recent daily traffic growth across Gobbagombalin Bridge (2015-2018) was about seven per cent per year with growth in the morning and evening peak hours exceeding 11 per cent.

This growth is reflected in the issues experienced at the intersections between the Olympic Highway and Travers Street and Olympic Highway and Old Narrandera Road. Vehicles turning right into Travers Street can delay Olympic Highway traffic travelling southbound over Gobbagombalin Bridge in the morning. The same high volumes prevent traffic exiting Travers Street in the afternoon. The current Old Narrandera Road intersection layout includes a merge slip lane, or "seagull" intersection. High southbound Olympic Highway traffic volumes cause delays for traffic turning right out of Old Narrandera Road as there are few gaps for the merge particularly in the morning.

Intersection modelling carried out in 2019 predicts traffic growth will result in the current Travers Street roundabout reaching a Level of Service (LoS) F for the southbound Gobbagombalin Bridge approach by 2026. Modelling also predicts the Old Narrandera Road intersection is expected to reach a LoS F on the Old Narrandera Road approach during peak periods before 2026.

With few viable alternative routes, traffic flow across Gobbagombalin Bridge is also impacted when incidents occur on the bridge or at the intersections at either end of the bridge.

The Old Narrandera Road intersection also recorded one serious injury crash and one moderate injury crash in the last five years. A recent draft Transport for NSW Technical Direction advises seagull intersections should not be used in speed zones above 80km/h for safety reasons. Travers Street intersection also has a poor recent crash history at the existing roundabout.

The NSW Government has committed funding for upgrading both intersections within an overall road and bridge improvement package announced in August 2018. The package includes funding for upgrades to Marshall's Creek Bridge on the Sturt Highway which is not covered in this report.

1.1 Project objectives

Project objectives to improve both intersections include:

- improving road safety
- improving access between the northern growth areas and services in Wagga Wagga
- improving travel time and reduce delays for commuters and freight travelling on this section of the Olympic Highway
- supporting future residential growth in the Wagga Wagga area.

2. Review of options

Preliminary two-dimensional designs were developed for each intersection, and included a wide range of arrangements at each intersection. See Attachment A for all preliminary options.

2.1 Preliminary Old Narrandera Road Intersection options

- Three different three-leg traffic signals options
- Three different three-leg roundabout options
- A four-leg (including Gardiner Street connection) traffic signals option
- A four-leg (including Gardiner Street connection) roundabout option
- Four different grade-separated options with connection to Gardiner Street* options
- Two different local road network changes to manage intersection demand options
- An elevated right turn* without Gardiner Street connection option.

*Grade-separated options were considered with Old Narrandera Road crossing over the highway.

Grade separation with Old Narrandera Road crossing under the highway through the existing service underpass was not considered due to:

- likely issues with providing vertical clearance for all vehicles
- extensive earthworks and impacts to existing highway during construction
- relationship with Wagga Wagga City Council's active transport plan proposing to extend a cycle route through the underpass
- likely impact to underground utilities
- likely impacts to Dukes Creek from road drainage and excavation required.

2.2 Travers Street Intersection

- Four access-controlled intersection options
- Two improved roundabout options
- Six different traffic signals options, including both at the current intersection and relocated.

3. Considerations

3.1 Traffic

3.1.1 Network analysis

Wagga Wagga has an existing network model which has been developed in partnership with Wagga Wagga City Council and Transport for NSW. This model has accounted for predicted land use changes, including in Wagga's northern growth areas.

Transport for NSW contracted the traffic modeller to hold a workshop to assess broader network changes. The primary workshop goal was to consider how traffic would change across the wider network, including travel across the river, through intersection improvements.

Wider network impacts were considered for options including a grade-separated connection from Old Narrandera Road to Gardiner Street, and various access restrictions at Travers Street. Analysis in this preferred options report focusses on the morning peak for Old Narrandera Road analysis and the afternoon peak for Travers Street analysis, reflecting the dominant commuter peak movement.

Network modelling predicts traffic crossing southbound over Gobbagombalin Bridge in the morning peak is expected to grow to around 1600 vehicles/hour in 2026, around 1800 vehicles/hour in 2036, and around 2400 total vehicles/hour by 2046. EMME modelling results predicted fairly low volumes would divert from crossing Gobbagombalin Bridge via an alternative river crossing route through North Wagga. Figure 1 below shows predicted traffic volume changes if a grade-separated connection from Old Narrandera Road to Gardiner Street was built.

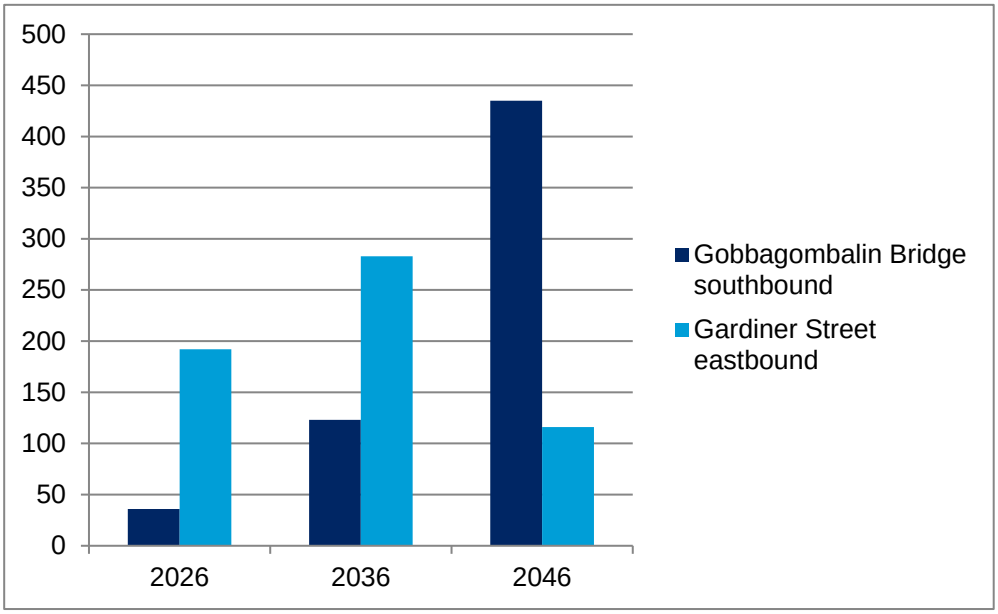

Figure 1 Predicted volume changes from Gardiner Street Connection (morning peak)

Even by 2036, network modelling predicts only 123 vehicles will divert from crossing the Gobbagombalin Bridge with a Gardiner Street connection in place. This is less than 10 per cent of total predicted traffic. By 2046, 435 vehicles are expected to divert, or around 18 per cent of total predicted traffic.

With a direct link from Old Narrandera Road, network modelling predicts Gardiner Street will increase traffic by up to 283 vehicles by 2036 compared to the base, noting this includes Boorooma Street traffic. This difference reduces to only 116 vehicles in 2046, with motorists diverting to other routes such as Hampden Avenue to avoid congestion on the Olympic Highway.

Predicted traffic volumes using the alternative route through North Wagga are considered too low to justify a grade-separated connection to Old Narrandera Road in the foreseeable future, discounting these options.

Traffic signal options were also tested at Old Narrandera Road, but did not have major network benefits. Local road connections had minor network impacts in northern suburbs, but traffic was not predicted to divert to alternative river crossing routes. Network modelling is not well suited to intersection analysis, and so predicted network volume changes were not considered great enough to discount traffic signal options.

At Travers Street, traffic signals were not predicted to result in much traffic diverting to other river crossing routes by 2046. Afternoon traffic previously turning right out of Travers Street was predicted to divert to use the local road network within Wagga and access the Olympic Highway via Kincaid Street or the Sturt Highway rather than cross the river via North Wagga. Network modelling did not predict any wider network impacts large enough to discount any Travers Street options.

Generally, network modelling showed a majority of the vehicles travelling across the Gobbagombalin Bridge access southern and western areas of Wagga Wagga. Major employment areas are located in this general direction including Kapooka Army Base, industrial areas around Dobney Avenue and the hospital precinct around Bourke Street.

Although traffic delays are currently experienced at both intersections, network modelling shows a wider network infrastructure solution will have fairly minor overall traffic benefits. A solution to reduce current and predicted future traffic delays at both intersections should therefore be to manage the traffic at each intersection, not build infrastructure to divert it across other river crossing routes.

Modelling analysis discounted a Gardiner Street grade-separated connection from Old Narrandera Road from further analysis however an intersection solution at Old Narrandera Road should not discount a future connection. This has therefore been considered in the Value Management Workshop when considering shortlisted options.

3.1.2 Intersection analysis

Sidra intersection modelling

Sidra modelling considered five different Old Narrandera Road intersection options and seven Travers Street intersection options. Intersection modelling uses a measure called Level of Service (LoS), measured by comparing average intersection delays. LoS A represents free-flow conditions with little or no delays for users and LoS F the worst including frequent stoppages.

Modelled intersection results are based on predicted future year volumes. Results will vary if traffic volumes differ from predicted growth. Strategic intersection modelling results analysed below are therefore compared on proportional modelled delays compared to a base, do nothing model.

Detailed modelling is proposed to be carried out in concept phase for preferred intersection options to improve intersection operation in a wider context.

Sidra analysis results for Old Narrandera Road intersection options show overall morning peak improvement for all options tested. Figure 2 below shows proportional savings compared to the 2046 base year, with improvements ranging from 48 per cent

to 96 per cent. All three traffic signal options tested showed strong overall travel time savings, with signals which include extra lane capacity performing best.

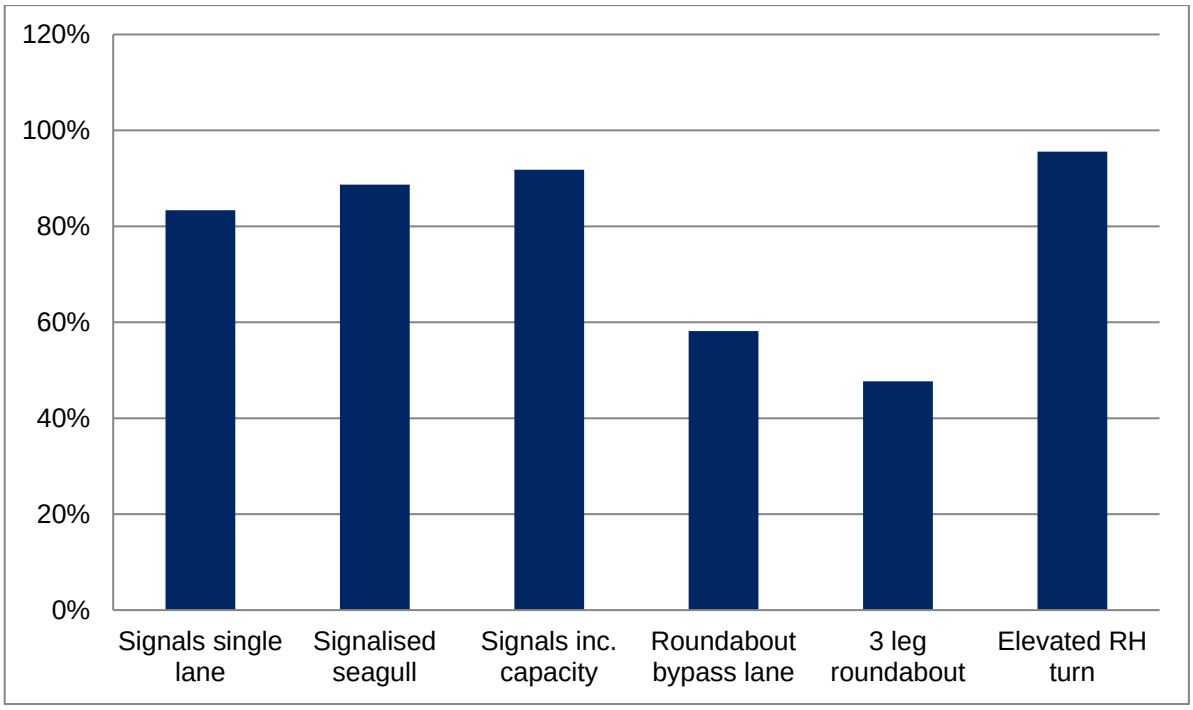

Figure 1 - Old Narrandera Road 2046 delays, % saved from base, morning peak

The elevated right turn performed best, reducing intersection delays by 96 per cent. Sidra's accuracy with grade-separated intersections is low and may be over-predicting the benefits.

It is also noted all options other than the elevated right turn are predicted to operate at LoS F in both 2026 and 2036. Therefore, further intersection capacity improvements are needed in concept design to develop an intersection to provide for predicted future traffic volumes.

For Travers Street, Figure 3 shows overall option results. A roundabout with bypass lane and a four-leg traffic signals option are predicted to generate more intersection delay (negative savings) compared to base in 2046, almost doubling delays compared to base. A left-in, left-out (LILO) option is predicted to show minor improvements over base with around 23 per cent reduced delay. A two-lane roundabout is predicted to generate about 49 per cent reduced delays.

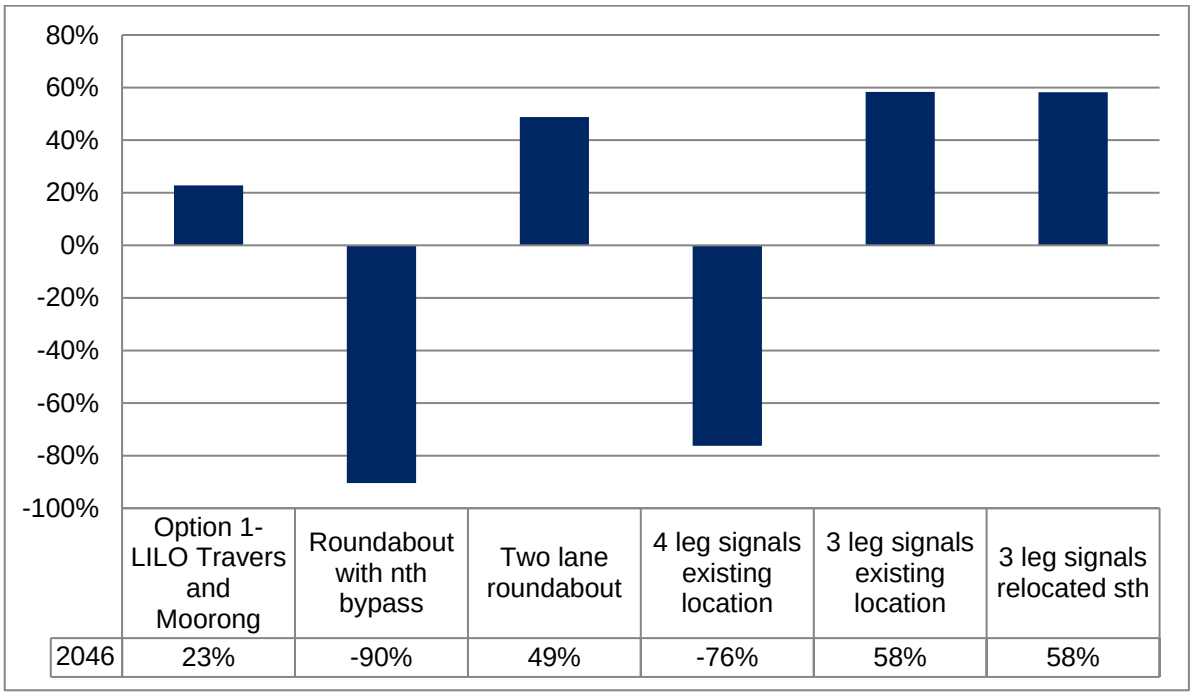

Figure 2 - Travers Street 2046 delays, % saved from base, afternoon peak

Although proposing different intersection treatments, both three-leg traffic signals options show very similar improvements generating about 58 per cent reduced delay compared to base. Both are recommended as preferred within a traffic context.

A four-leg priority controlled option was also modelled, however 2046 delays were predicted to be exponentially higher than base, increasing by over 650%. This is mostly due to southbound highway traffic volumes preventing safe gaps for traffic turning right into Travers Street, causing significant delays.

Despite all Travers Street options predicted to operate at LoS F in 2046, both a three-leg roundabout with bypass lane and a priority controlled intersection operate no worse than LoS D in 2026 and 2036. This suggests these intersection options may work with lower volumes but cause significant issues once volumes are above intersection capacity. The two-lane roundabout in particular represents a major capital investment as it is a large radius roundabout with a limited lifespan.

Both intersections were modelled in the current layout with a reduced 60km/h speed zone at current year and in 2026. Only marginal improvement was predicted in both years at both intersections. LoS did not change compared to base, and so infrastructure improvements are needed to generate reduced delays.

Gobbagombalin Bridge capacity

Intersection modelling notes traffic capacity restrictions from a single traffic lane crossing Gobbagombalin Bridge is an issue for both intersections. This capacity restriction is also independently noted in strategic Road Safety Audit reports for both intersections (see below). Single lane capacity for the Gobbagombalin Bridge is between 1600 and 1800 vehicles/lane/hour for acceptable operation. This is achieved, based on current growth, between 2026 and 2036.

Bridge capacity improvements are not included in this project's scope. Therefore, preferred intersection options need to consider future growth including allowing for additional intersection lane capacity and connections to other network links. This was explored further in the Value Management Workshop when assessing shortlisted

options, with a common theme suggesting traffic signals provide greater control over increasing traffic volumes and are a preferred solution for future upgrading.

3.1.3 Freight industry

The Olympic Highway is a PBS 2B route through Wagga Wagga with heavy vehicles accounting for about 4 per cent of daily traffic.

Currently Bomen Business Park generates a number of heavy vehicles that use this section of the Olympic Highway. Bomen is also a strategic industrial zone being developed as a Special Activations Precinct (SAP) by the State Government. This industrial zone is located north of the Wagga Wagga CBD with the Olympic Highway being the principal access route.

Transport for NSW will work with Wagga Wagga City Council and the freight industry when considering any future upgrades.

3.2 Community and stakeholder consultation

Community feedback

Transport for NSW sought feedback from the local community on the issues with both intersections. Consultation was carried out via email, post and an online mapping tool where community members could place a pin on a map and outline their issues. Overall, almost 400 responses were received from the consultation between 3 June 2019 and 28 June 2019.

Feedback outlined issues at both intersections, as well as broader network issues and included:

Old Narrandera Road:

- experience of current road conditions
- road safety issues
- traffic congestion
- local road issues.

Travers Street:

- road safety issues
- congestion during peak times.

Broader network issues:

- local road safety issues
- pedestrian and cyclist safety issues
- suggestions for alternative solutions.

Option Refinement Workshop

After final community comments were collated, an internal option refinement workshop was held to consider how each option met project objectives. The workshop aimed to reduce the number of options, and included discussion over how options compare with each other in scope.

Out of the three Old Narrandera Road Traffic Signal options reviewed, two were discounted after the workshop as they were considered similar to the traffic signals with additional lane capacity option, but the latter performed better overall.

Two different roundabout with bypass lane options were considered to be the same for strategic assessment, and so one was discounted.

Of the two Gardiner Street at-grade connection options, the four-leg traffic signals option was considered to meet objectives better than roundabout option, however only the three-leg traffic signal option was found suitable to be considered at the Value Management Workshop.

Grade-separated options connecting Gardiner Street were considered to cost well above the proposed funding allocation and were not considered further. An additional elevated right turn option was proposed to be developed further.

Travers Street left-in, left-out and closing Travers Street options were not considered to meet network needs with access restrictions at Travers Street and were discounted.

Roundabout with northbound bypass lane option was considered not to meet objectives, while three-leg traffic signal options were discounted based on closing Moorong Street access.

Options for three-leg signals relocated to the south were considered to be the same with the options discounted as the Travers Street left slip lane was an unlikely inclusion.

Although the left-in, left-out with right turn into Travers Street option was considered to poorly meet objectives, it was not discounted as it only restricts one movement (right out of Travers Street). It was therefore considered suitable for broader consideration in the Value Management Workshop. The left-in, left-out option that closes Moorong Street was not considered to meet project objectives and was discounted.

The workshop identified potential low-value options with minimal infrastructure work at Travers Street, including speed limit restriction and line marking changes.

Council feedback

Wagga Wagga City Council was involved in the Value Management Workshop (see Section 3.3) held on 10 September 2019 that assessed shortlisted options against a set of criteria for both intersections.

Council requested that Transport for NSW incorporate any modelling for the SAP planning. Council is particularly interested in any impacts on freight interacting with growing residential commuters in this area.

Transport for NSW will continue to liaise with council through the development of this project.

3.3 Value Management Workshop findings

Transport for NSW carried out a Value Management Workshop in September 2019. presented at the Value Management Workshop were decided based on the internal workshop outlined in Section 3.2 and Sidra traffic modelling results detailed in Section 3.1.2.

Following option analysis, the following options were discussed:

Old Narrandera Road

- Traffic signals with additional lane capacity – VM Workshop option A
- Roundabout with highway southbound bypass lane – VM Workshop option B
- Three-leg standard roundabout – VM Workshop option C
- Elevated right turn – VM Workshop option D

Note: Option D was included based on limited information in earlier analysis available before the workshop.

Travers Street

- Traffic signals with intersection relocated south – VM Workshop option A
- Large radius roundabout with two lanes – VM Workshop option B
- Priority controlled with no right turn from Travers Street – VM Workshop option C.

Workshop participants included Transport for NSW, customer representatives, technical specialists and Wagga Wagga City Council representatives.

Participants assessed each option on how it met key criteria, including:

- enhancing road safety
- minimising risk to workers during construction and maintenance
- improving traffic efficiency for local commuters
- improving travel efficiency for highway through-traffic
- allowing for future upgrades
- minimising impacts to the local environment
- providing pedestrian and cyclist access.

According to Old Narrandera Road assessment weighting, workshop participants agreed:

- there was no real consensus as to which option should be viewed as the preferred option
- options A and D, on balance, are assessed as having similar value
- option A, however, represents a better value for money solution than option D
- both Travers Street and Old Narrandera Road need to be funded from the same funding allocation.

According to Travers Street assessment weighting, workshop participants agreed:

- there was a general preference for Option A being a traffic signal T-intersection offset from the bridge
- option A should proceed as the preferred option subject to confirming project estimates are within available funding
- pedestrian movements will need to be considered in concept design.

Although the above assessments do not consider cost, cost is included as sensitivity to results before a consensus is reached. The VM workshop was held before cost estimates were available and so high level relative costs for each option were assumed.

At Old Narrandera Road, option A is the lowest cost with option D being around 2.5 times more expensive. Despite both options scoring similar value scores, once cost is considered, option A is best value for money.

Travers Street intersection option C was the lowest cost, with option B the most expensive at around two times the cost. Option A, although being a higher cost than

option C (and lower than option B), was confirmed as a preferred option based on overall intersection agreed value.

3.4 Road safety

Between July 2013 and June 2018 (the most recent five-year record period), 12 total crashes have been recorded at both intersections combined. This includes two injury crashes at Old Narrandera Road and 10 crashes (four injury crashes) at Travers Street.

At Travers Street, half of all crashes were rear end crashes, with most of these being southbound. This reflects community concerns gathered during the feedback period about traffic coming straight off the single lane bridge to a roundabout intersection, where they have to either give way or slow down at short notice to negotiate the corners.

Both intersections have long crash histories. At Old Narrandera Road over the 20 years from 1998 to 2018, 31 total crashes were recorded, with one fatality and 23 injuries. Most crashes involved a crash between a vehicle turning right out of Old Narrandera Road and a northbound highway vehicle.

At Travers Street, 36 crashes occurred over 20 years with 26 injuries. Most crashes involved intersection crashes such as rear end or cross traffic movements.

Over 20 years, an average 3.4 crashes have occurred at one intersection or the other, with an average 2.5 injuries each year.

3.5 Utilities

3.5.1 Old Narrandera Road intersection

Dial Before You Dig (DBYD) searches have been carried out and have found that there are a number of utilities at Old Narrandera Road intersection that may be impacted.

The following utilities were identified:

- fibre optic and telecommunication cables
- high pressure gas transmission pipeline
- overhead and underground electricity.

It was identified that the high pressure gas pipeline was a restriction for this intersection, options should avoid impact to this utility.

3.5.2 Travers Street intersection

DBYD searches were carried out identified the following utilities that may be impacted by an upgrade at this intersection:

- fibre optic cables
- high pressure gas pipeline
- overhead and underground electricity
- NBN

All utilities except for NBN are located under the existing intersection. The utilities will be positively identified and located during the concept phase.

3.6 Physical constraints

3.6.1 Old Narrandera Road intersection

Upgrades at this intersection are constrained by:

- allowance for council's future cyclists and pedestrian access route that uses the Gardiner Street underpass
- nearby current and future residential dwellings
- intersection location relative to the Gobbagombalin Bridge
- nearby Boorooma Street onramp (north of the intersection)
- existing road widening for a large building footprint potentially impacting flood liable land (to the east).

3.6.2 Travers Street intersection

Upgrades at this intersection are constrained by:

- current intersection is close to the bridge abutment
- providing for horses to safely cross the highway needs to be maintained
- offline options have may potentially impact local cycle path and turf club overflow parking.

3.7 Environmental

Travers Street

Land surrounding this intersection comprises a highly disturbed environment. The northern area includes scattered River Red Gum trees (*Eucalyptus camaldulensis*) and traverses Gobbagombalin Bridge over the Murrumbidgee River. The surrounding area comprises mowed grasses with little vegetation connectivity. No aquatic habitat would be impacted upon by any of the proposed options. Council has completed a tree audit around the area with a number of "good" trees evident along Moorong Street and Travers Street. No threatened fauna or flora have been recorded within 200 metres of Travers Street intersection. It is unlikely that Travers Street intersection constitutes White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland EEC, however, further environmental assessment would need to be carried out.

Flood mapping carried out by council indicates Travers Street intersection is within a flood zone. Further flood study investigations may be required during detailed design.

A variety of recorded Aboriginal heritage items exist along the Murrumbidgee River including scar trees, artefacts and cultural sites. There were no recorded Aboriginal heritage items within a 200-metre radius of Travers Street intersection. However, the area from Wiradjuri Reserve to Gobba Beach is an Aboriginal Place. This Aboriginal Place is located about 500 metres upstream of Gobbagombalin Bridge.

Background searches revealed no Non Aboriginal Heritage within close proximity to Travers Street intersection.

Two property owners are located in close proximity to Travers Street intersection. One property owner is located off Moorong Street, with their dwelling about 300 metres

west of the intersection. The other property owner is located along Travers Street, about 200 metres east of the intersection. Access to these two properties may be impacted as a result of the proposed options. A number of local businesses located along Moorong Street may also be impacted as a result of the proposed options.

It is likely that noise and socio-economic will be the main environmental impacts as a result of this intersection upgrade. The current intersection allows for safe passage of horses underneath the Olympic Highway to the turf club. Jockeys and horses also cross Travers Street near the property access. Provisions to maintain the safe access across the highway and Travers Street will need to be considered during all options. It is likely that operational noise impacts will increase as a result of signalised intersection options. Noise impacts cannot be quantified at this stage, but further investigations would be required during concept design and preparation of the environmental assessment.

Searches of the NSW EPA contaminated land register revealed no contaminated land present at the Travers Street intersection area. There is potential for unrecorded contamination as a result of illegal dumping, road construction and historic road accidents. It is likely that standard management practices would adequately address any contamination identified.

Old Narrandera Road

Old Narrandera Road intersection is surrounded by agricultural and cropping land. To the north, residential dwellings dominate the landscape. Dukes Creek runs parallel to the Olympic Highway near Old Narrandera Road intersection, providing some fauna movement habitat for mobile fauna species. The creek also provides sporadic habitat for aquatic fauna species, and flows into the Murrumbidgee River, located south of the intersection. Four threatened fish species were recorded within the Murrumbidgee River, however current proposed options pose no impacts on the river or Dukes Creek. No threatened fauna or flora have been recorded within 200 metres of Old Narrandera Road intersection. It is unlikely that Old Narrandera Road intersection constitutes White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland EEC, however, further environmental assessment would need to be carried out.

Flood mapping carried out by council indicates the Old Narrandera Road intersection is within flooding area. Further flood study investigations may be required during detailed design.

A variety of recorded Aboriginal heritage items existing along the Murrumbidgee River including scar trees, artefacts and cultural sites. There were no recorded Aboriginal heritage items within a 200-metre radius of Travers Street intersection. However, Wiradjuri Reserve around to Gobba Beach is an Aboriginal Place. This Aboriginal Place is located about 500 metres upstream of Gobbagombalin Bridge.

Background searches relating to Non Aboriginal Heritage revealed three dwellings listed on the Wagga Wagga LEP. These include 32 Hampden Avenue, 21 Gardiner Street and 96 Gardiner Street. It is unlikely that these dwellings would be impacted upon. However, if a Gardiner Street connection was proposed, noise, vibration and potential access issues to these dwellings may need to be considered.

It is unlikely that any property accesses would be impacted on by any of the proposed options. Access to River Road may be hindered if traffic is delayed and backed up.

It is likely that noise and socio-economic will be the main environmental impacts as a result of this intersection upgrade. Operational noise impacts will likely increase as a result of signalised intersection options. Deceleration, and slowing down along the Olympic Highway may result in compression braking of heavy vehicles and this may impact on the property owners located north of Old Narrandera Road. Noise impacts cannot be quantified at this stage, but further investigations would be required during detailed design and preparation of the environmental assessment. Traffic delays may also increase for residents in northern Wagga at Estella, Gobbagombalin, and further afield at Coolamon and Junee, having to stop at an additional two intersections when commuting to get to Wagga CBD.

Potential property impacts at both intersction will be assessed during concept design if required.

Searches of the NSW EPA contaminated land register revealed no contaminated land present at the Old Narrandera Road intersection area. There is potential for unrecorded contamination as a result of illegal dumping, road construction and historic road accidents. It is likely that standard management practices would adequately address any contamination identified.

3.8 Constructability and HSiD workshop

A strategic level Constructability and Health and Safety in Design (HSiD) workshop was held in August 2019. This workshop considered options presented to the VM workshop. The constructability workshop section aimed to identify any major issues to face when building both intersections. The HSiD workshop section aimed to identify any broader safety issues when building or maintaining the improved intersections. Any issues raised were discussed and solutions suggested for further investigation in concept design.

Key items identified at the workshops included:

- Travers Street intersection impacting the current horse underpass for both traffic signal and roundabout options. Relocating or mitigating this impact is to be considered in concept design
- Travers Street roundabout option requiring high earthworks quantities and resulting impacts to the existing flood levee and bike bath. The roundabout is not considered a preferred option (see below)
- impact to the current eastern embankment at Old Narrandera Road. Proposed solution to be investigated further in concept design is to move the highway centreline west and reduce any impact to the embankment
- significant staging and temporary roadworks would be required for the elevated right turn Old Narrandera Road option. Compounded with impacts to the current eastern embankment, this option is not a preferred option (see below)
- ongoing median landscaping maintenance at Travers Street intersection as ongoing safety issues. Landscaping requirements to be confirmed in concept design and will consider ongoing maintenance.

3.9 Economic analysis

Economic analysis compares costs and benefits of a preferred option against a “do nothing” base case scenario based on available data.

As a way of assessing assessment finding robustness, a sensitivity analysis for changes in key calculation assumptions was also completed.

3.9.1 Cost comparison

Strategic deterministic estimates were carried out from the short-listed options that were assessed at the Value Management Workshop. These estimates are based on a two-dimensional design of each option and include high contingency rates to account for the strategic nature of estimates.

3.9.2 Value of benefits

The project is likely to generate substantial benefits to both local and regional road users, particularly through improved travel times. As part of this economic analysis, perceived benefits were evaluated against a “do nothing” scenario. Benefits quantified include:

- vehicle travel time savings (VTTS)
- vehicle operating cost savings (VOC)
- crash costs reduction
- externalities.

In total, this project is expected to generate benefits worth around $58.2 million to the community compared to a do-nothing approach.

3.9.3 Intangible economic benefits:

The following benefits are likely to occur as a result of the project, but have not been monetised:

- reduced driver frustration levels through not being able to find suitable gaps in traffic to negotiate intersections, particularly at Old Narrandera Road
- improved social value by providing improved connectivity between northern growth areas and central Wagga
- increased property values for northern Wagga growth areas, with improved access eliminating a discouraging factor to buy in the area.

As such, the economic evaluation of the project is conservative economically viable.

4. Conclusion

Transport for NSW investigated a wide variety of different options for improvements to Old Narrandera Road and Travers Street intersections. After preliminary analysis, four different options were focused on for Old Narrandera Road intersection and three different options for Travers Street intersection.

Old Narrandera Road intersection options included:

- traffic signals with additional lane capacity – VM Workshop option A
- roundabout with highway southbound bypass lane – VM Workshop option B
- three-leg standard roundabout – VM Workshop option C
- elevated right turn – VM Workshop option D.

Travers Street intersection options included:

- traffic signals with intersection relocated south – VM Workshop option A
- large radius roundabout with two lanes – VM Workshop option B
- priority controlled with no right turn from Travers Street – VM Workshop option C.

Other options were not considered further due to them not performing well in intersection traffic modelling, were considered too expensive for the allowable project budget, or had other impacts not considered acceptable.

The main goal when upgrading these objectives is to improve traffic conditions and safety for those wanting to travel into central Wagga from the growing northern suburbs. Based on analysis and considerations outlined in this report, the recommended preferred option involves upgrading both Old Narrandera Road intersection and Travers Street intersections to traffic lights. Additional capacity will be provided as well as regulating traffic flow giving all directions time to get through the intersection.

At Old Narrandera Road intersection, the preferred option will include building a second right turn lane for traffic exiting Old Narrandera Road, and building two southbound through lanes merging south of the intersection. This allows for vehicles using the existing Boorooma Street onramp to remain in their own lane until after the Old Narrandera Road intersection. The existing right turn lane into Old Narrandera Road will be retained. A strategic intersection layout is shown at Figure 4 below.

Figure 2 Proposed Old Narrandera Road intersection upgrade – strategic design only, subject to change

Old Narrandera Road intersection improvements such as additional northbound capacity to improve overall intersection performance and other potential optimisations will be explored in concept.

At Travers Street intersection, the proposed upgrade will relocate the intersection further south to allow for two southbound lanes providing increased intersection capacity.

Figure 5 shows the proposed intersection layout. Moorong Street is proposed to be reduced to a left-in, left-out arrangement. Highway northbound traffic is proposed to merge into a single lane before the intersection, with a right turning lane for vehicles turning into Travers Street. The existing Travers Street connection is proposed to be removed.

Figure 3 Proposed Travers Street intersection upgrade – strategic design only, subject to change

Potential improvements to be explored in concept include additional lane capacity for northbound traffic, an improved southbound left slip lane into Travers Street, and exploring a turnaround facility allowing Moorong Street traffic to return safely to Kincaid Street to turn south.