

Transport for NSW

Picton Road and M31 Hume Motorway interchange

Preferred Option Report

October 2022



Australian Government



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Executive summary

Transport for NSW (Transport) is investigating options to upgrade Picton Road between the Nepean River and the M1 Princes Motorway, including the interchanges at the M31 Hume Motorway and the M1 Princes Motorway.

Picton Road is an important transport corridor linking the Illawarra region with Sydney and the Greater Macarthur Growth Area and is one of two major east-west links between the M31 Hume Motorway and the M1 Princes Motorway.

The Picton Road upgrade western section comprises the upgrade of Picton Road between the Nepean River and Almond Street, Wilton including the Picton Road and M31 Hume Motorway interchange.

The purpose of this report is to summarise how the preferred option to upgrade the Picton Road and the M31 Hume Motorway interchange at Wilton was selected. The report describes the strategic options considered and the criteria used to select the preferred option.

The existing interchange consists of an overpass over the M31 Hume Motorway with signalised right hand turns and free flow left hand turns onto the M31 Hume Motorway. The interchange is frequently congested, resulting in:

- high traffic volumes during peak times leading to congestion and delays in accessing the M31 Hume Motorway
- poor intersection performance

Traffic has increased at the Picton Road and M31 Hume Motorway interchange and will continue to increase as the area's population grows and new homes are built at Wilton and in Greater Macarthur.

Thirteen different options for the interchange were assessed as part of the development process. Options considered included double roundabouts, grade separated roundabouts, a four-way signalised intersection with and without a second bridge, grade separated ramps, loop interchanges and continuous interchanges with loops.

These options were assessed against:

- road safety
- safety for construction and maintenance workers
- traffic efficiency and capacity
- pedestrian and cyclist connectivity
- potential environmental impacts on existing habitats, ecological communities and biodiversity connectivity
- protection of Aboriginal cultural heritage
- property and community needs
- construction and design benefits
- resource and energy use for construction and operation
- constructability, including impacts to traffic, complexity to construct and extent of utility relocations or associated works.

Transport identified a Diverging Diamond Interchange (DDI) as the preferred option for the upgrade of the interchange. The DDI had the best outcomes for the area when compared with other options.

A technical assessment of the design, standards, and specifications of DDIs across Australia and around the world was carried out as part of the selection and design development process.

Compared to the other options assessed, a DDI at this location would:

- improve safety and capacity
- improve connectivity to residential, recreational, employment and new growth areas in Wilton
- improve traffic flow and performance
- save travel time for all transport customers, particularly during peak traffic times and holiday periods
- improve travel times and reliability for freight operators and customers
- reduce congestion at key entry and exit points

Timing and funding for construction of the interchange is yet to be confirmed.

Transport is seeking feedback on the preferred option to help refine the design and prepare a Review of Environmental Factors (REF).

Abbreviation

Abbreviations	Definition
AHIMS	Aboriginal Heritage Information Management System
DDI	Diverging Diamond Interchange
LoS	Levels of service
PACHCI	Procedure for Aboriginal Cultural Heritage Consultation and Investigation
PAD	Potential archaeological deposit
REF	Review of Environmental Factors
PEI	Preliminary Environmental Investigation
SME	Subject matter expert
Transport	Transport for NSW

1 Context

1.1 Background

Picton Road is an important transport corridor linking the Illawarra Region with Sydney and the Greater Macarthur Growth Area and is one of two major east-west links between the M31 Hume Motorway and the M1 Princes Motorway.

Picton Road experiences high traffic volumes, with around 22,000 vehicles per day utilising the road. A very high proportion of this traffic (around 23%) comprises heavy vehicles. High traffic volumes during peak times lead to congestion and delays on Picton Road and poor intersection performance.

Picton Road has a poor safety record. During the five year period 2016-2020 there were 97 crashes recorded on Picton Road, between the Nepean River and the M1 Princes Motorway. These crashes resulted in seven people being killed and 83 people being injured, including 35 seriously injured. Seventeen of the 97 crashes (18%) involved a heavy vehicle.

Identified as a National Key Freight Route by the federal Department of Infrastructure, Transport, Regional Development, Communications and the Arts, Picton Road provides an important connection from Port Kembla and the Illawarra Region to the rapidly expanding Western Sydney industrial precincts and Moorebank Intermodal Terminal.

Picton Road is recognised in the NSW Freight and Ports Plan 2018-2023 as an important link in providing greater capacity and performance to meet increasing freight demands over the next 20 years.

Picton Road needs to cater for future growth associated with developments around the Wilton Growth Area, which will see the region surrounding the interchange transforming from predominately rural land use to a medium density residential area delivering 15,000 new homes (40,000 new residents) over the next 20-30 years.

An upgrade of Picton Road would support growing communities and businesses across Western Sydney, including the rapidly evolving Western Sydney Aerotropolis and Parklands and the Illawarra-Shoalhaven, by providing improved access to jobs, services, education and suppliers between the neighbouring regions.

In November 2020, the NSW Government announced a \$44 million to plan for an upgrade of Picton Road between the Nepean River and the M1 Princes Motorway. In March 2022, the Australian Federal Government announced an additional \$95.6 million in funding for further planning of the Picton bypass and safety upgrades to Picton Road.

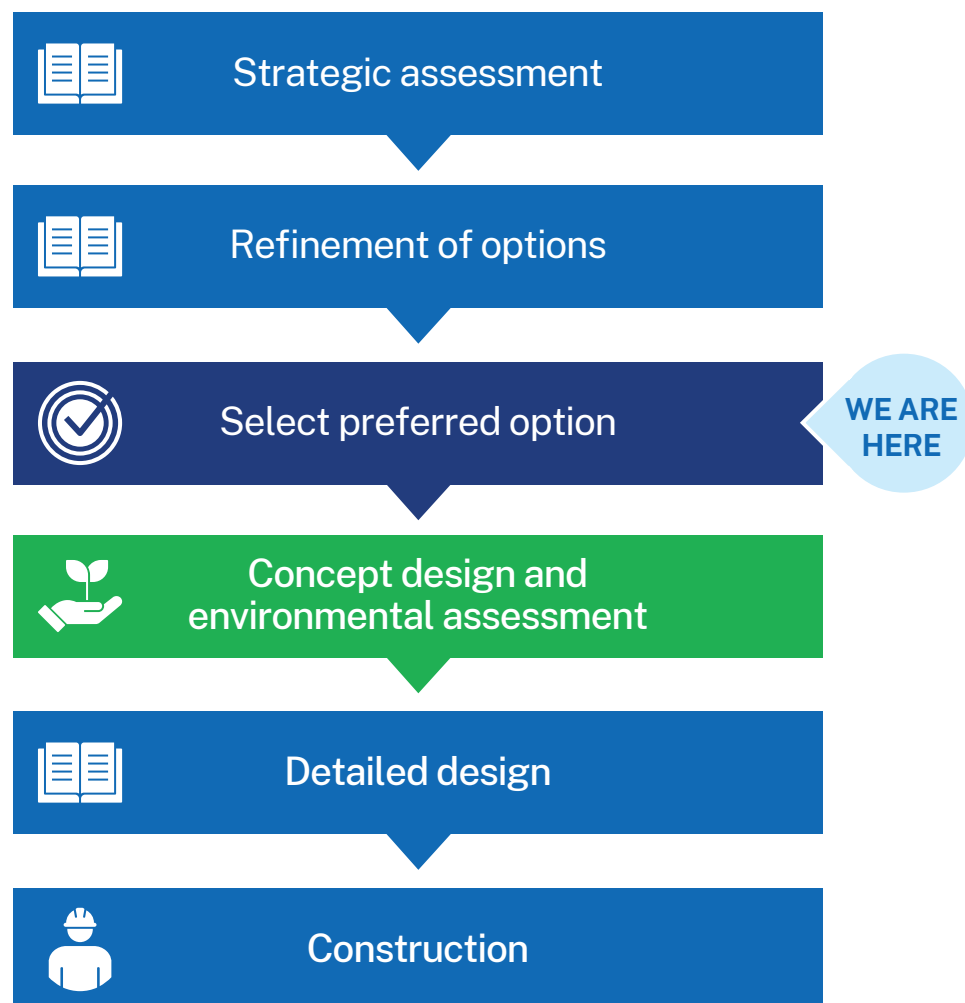
Transport is investigating options to upgrade Picton Road between the Nepean River and the M1 Princes Motorway, including the interchanges at the M31 Hume Motorway and the M1 Princes Motorway. Planning for the upgrade has been divided into three sections, as shown in Figure 1.

The western section of the Picton Road upgrade, between Nepean River and Almond Street, Wilton (the project) includes the Picton Road and the M31 Hume Motorway interchange (the interchange).

Currently, the interchange consists of an overpass over the M31 Hume Motorway with signalised right hand turns and free flow left hand turns onto the M31 Hume Motorway from Picton Road. The interchange experiences heavy traffic flows on all movements during the morning and afternoon peak periods. This results in congestion and delays in accessing the M31 Hume Motorway and poor intersection traffic performance.

The figure below highlights the current project stage.

Project development process



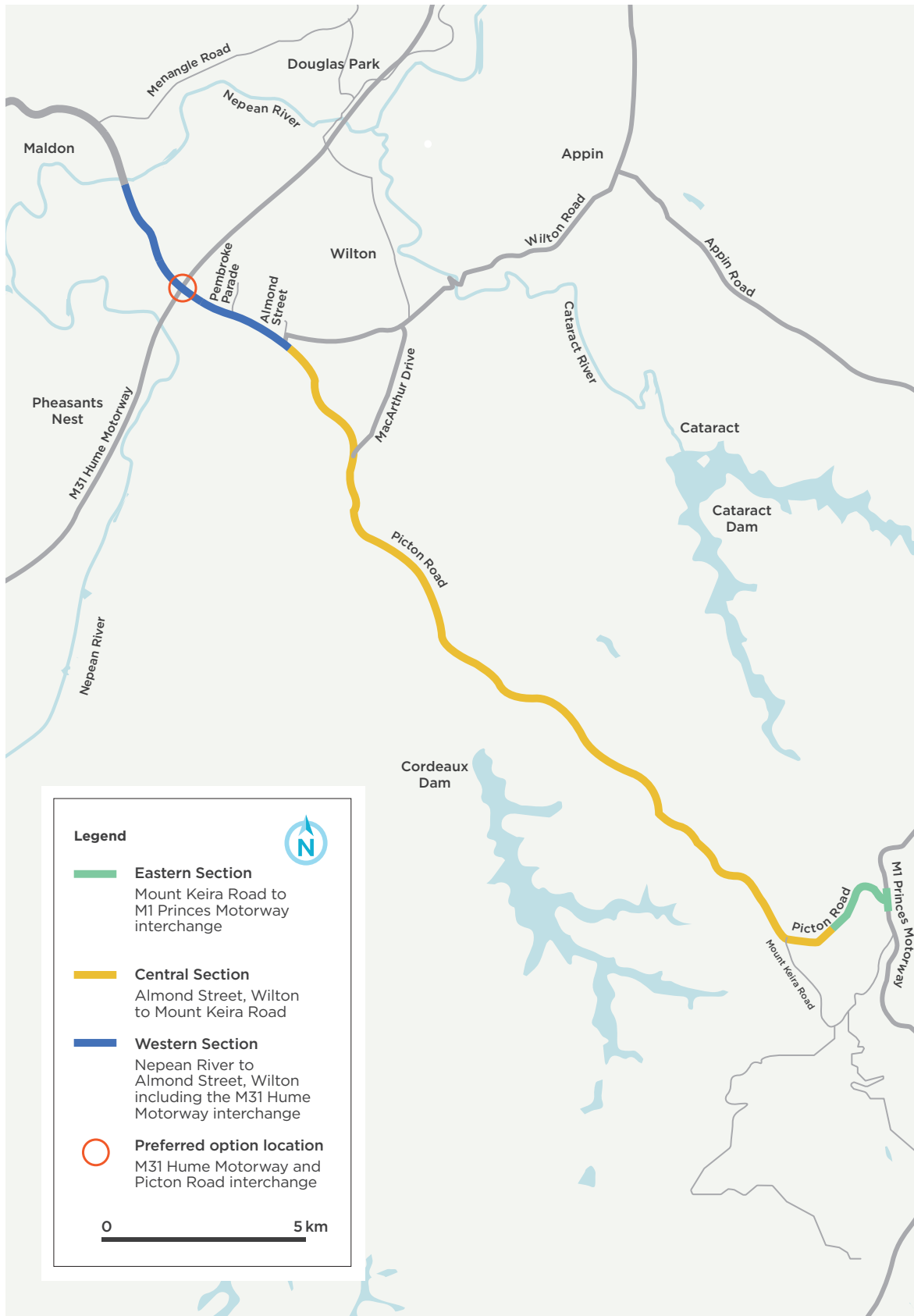


Figure 1 Picton Road upgrade

1.2 Need for the project



Supporting planned growth

- Wilton Growth Area expected to grow by 15,000 new homes (40,000 new residents) over the next 20-30 years
- Greater Macarthur Growth Area is expected to grow by 58,000 new homes and 40,000 additional jobs over the next 20-30 years
- There will be an increase in freight demand between Port Kembla, Illawarra-Shoalhaven, Western Sydney and wider networks.



Road safety

- Higher crash rate when compared to similar roads
- During the five-year period from 2016 to 2020 there have been 27 crashes along Picton Road between the Nepean River and Almond Street, Wilton, resulting in 25 people being injured, including eight seriously injured.



Traffic

- The current M31 Hume Motorway interchange will reach capacity in near future
- High proportion of heavy vehicles contributes to lower average journey trip times.



Freight

- Forecast increase in freight tasks at an annual rate of 1.4 per cent per annum over the next 40 years to reach around 62 million tonnes by 2056
- Forecast to carry almost 70% of the total road freight task associated with the region by 2056
- Forecast average corridor travel speed to drop from 80km/h to less than 65km/h in some peak periods, generating additional operating costs for freight.



Resilience

- Full or partial closures due to traffic incidents and planned activities require traffic control or detours
- Delays at the M31 Hume Motorway interchange worsening over time with increased traffic volumes
- Few alternate routes available if road is closed or congested, Some not suitable for all vehicles.

Figure 2 Figure showing need for project

1.3 Project objectives

The upgrade objectives have shaped the development of options and designs.

The primary objectives of the project will be to:

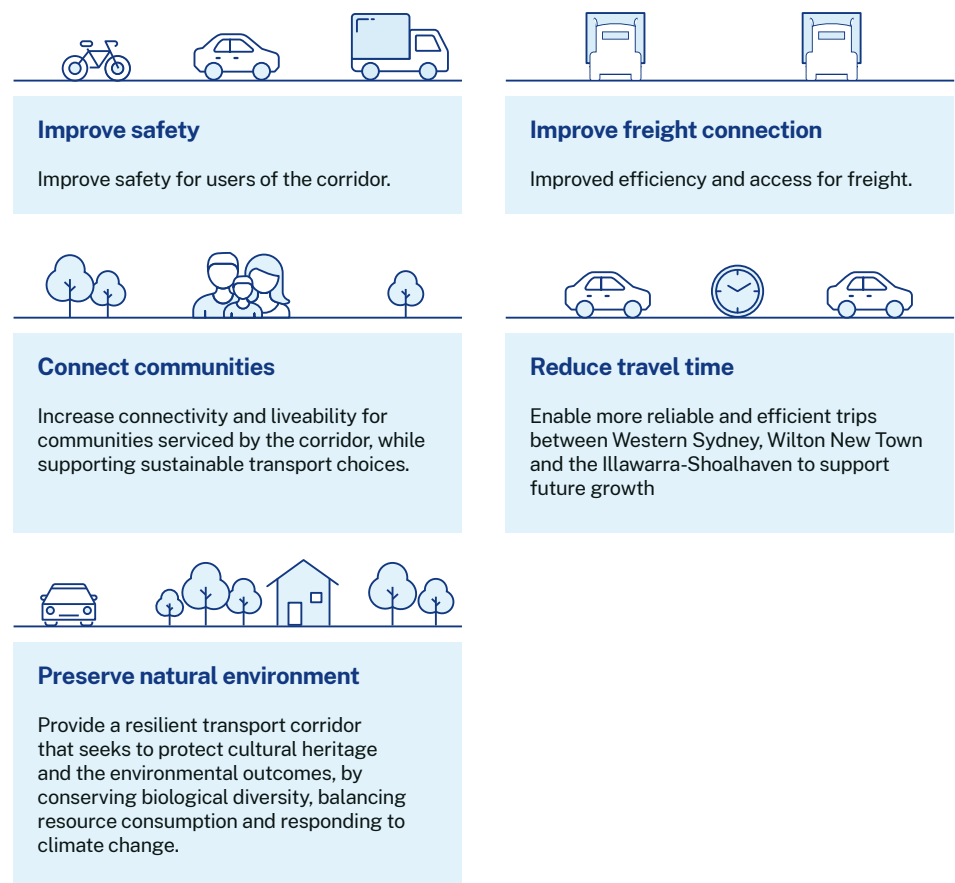


Figure 3 Figure showing project objectives

1.4 Purpose of this report

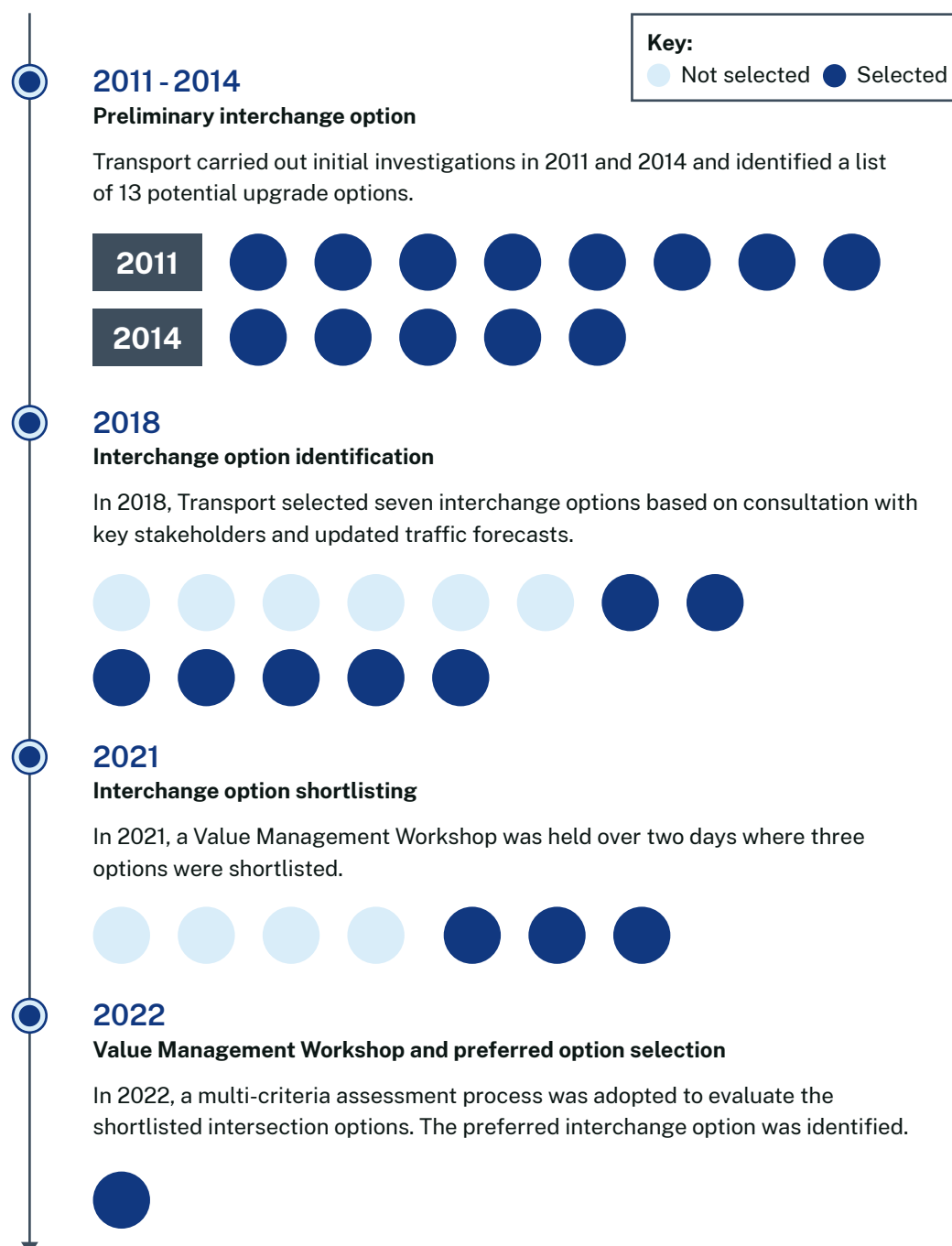
The purpose of this report is to summarise how the preferred option to upgrade the Picton Road and the M31 Hume Motorway interchange at Wilton was selected. This report describes the strategic options considered and the criteria used to select the preferred option.

This report:

- summarises consultation activities carried out to date
- identifies options for interchange upgrades
- assesses each of the options based on key criteria
- identifies a preferred option based on its alignment with key criteria.

2 Interchange options identification and assessment

Transport carried out a comprehensive options identification and assessment process to determine the preferred option for the interchange. Between 2011 and 2014, 13 potential options were identified. The options were reviewed and refined until a preferred interchange option was selected, as outlined in the figure below.



2.1 Preliminary interchange option identification

The options generally included the following features:

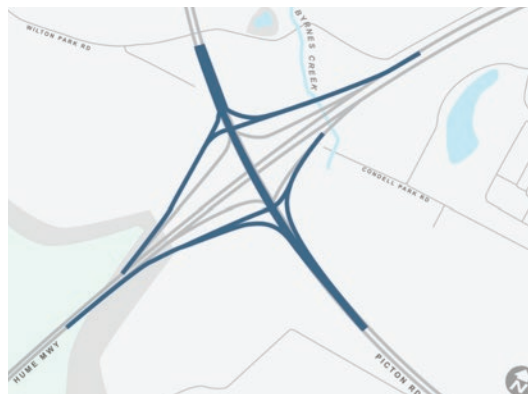
- minimisation of traffic movements controlled by traffic lights to allow 'free-flow' movement
- removal of right turn traffic movements across traffic coming in the opposite direction
- providing additional lanes to increase capacity.

2.2 Interchange option identification

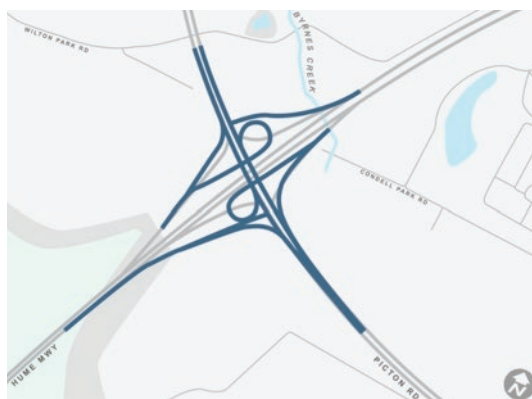
In December 2018, Transport selected seven potential options to upgrade the interchange. These options were confirmed in consultation with Transport stakeholders and subject matter experts as well as key stakeholders from Wollondilly Shire Council and the NSW Department of Planning, Industry and Environment (now Department of Planning and Environment), together with updated traffic forecast information.



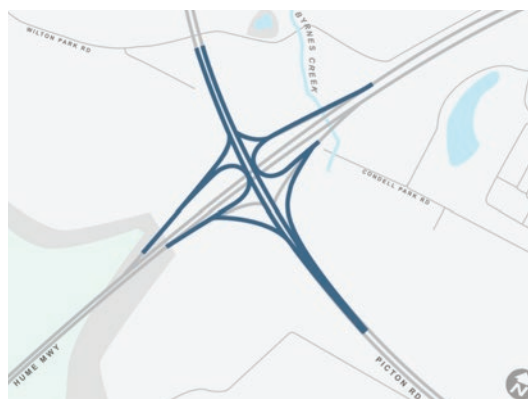
Option 1 – Signalised trumpets



Option 2 – Signalised double point diamond



Option 3 – Free flow trumpets



Option 4 – Single point fast diamond



Option 5 – Diverging Diamond Interchange



Option 6 – Signalised double point diamond with flyover



Option 7 – Staged signalised double point diamond with flyover

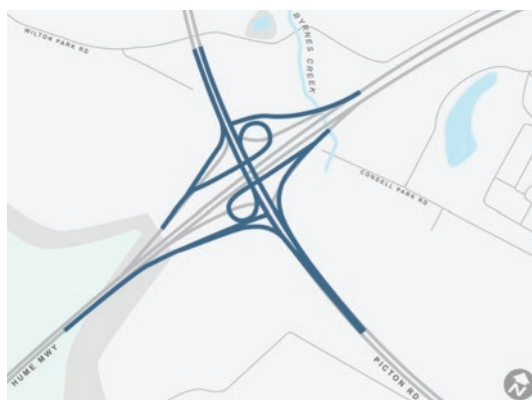
Figure 4 Options shortlisted for Value Management Workshop held in 2021

2.3 Interchange option shortlisting

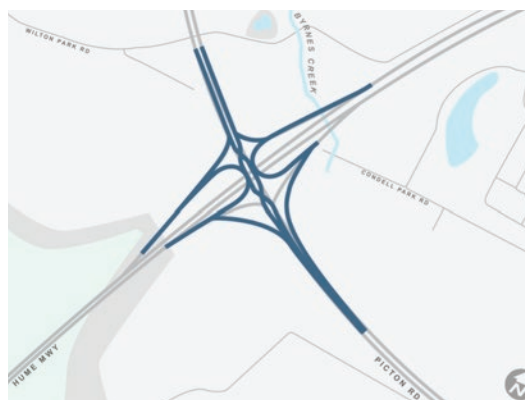
In 2021, a Value Management Workshop was held over two days:

- Day 1 –develop options selection process
- Day 2 –score, rank and shortlist options

Through this process, three options were shortlisted:



Option 3 –Free flow trumpets



Option 5 –Diverging Diamond Interchange



Option 6 –Signalised double point diamond with flyover

Figure 5 Options shortlisted in Value Management Workshop held in 2021

3 Consultation activities

Transport sought feedback about the proposed upgrade of Picton Road between the Nepean River and the M1 Princes Motorway between 16 August and 13 September 2021.

The consultation aimed to identify current issues and concerns using and accessing Picton Road, as well as seeking suggestions for the future upgrade. Feedback was taken into consideration for the options assessment completed in 2022.

A summary of community engagement is included in the table below.

Consultation tools	Engagement
Webpage	Details of the project, including Frequently Asked Questions, were provided on the Picton Road upgrade webpage
Online interactive map	The interactive map invited community members to submit comments onto a project area map
Online survey	The online survey invited community members to respond to survey questions
Social Media	Facebook posts were shared throughout the consultation period with links to the webpage, online survey and interactive map
Briefings and interviews	Project briefings and interviews were offered to key stakeholders
Radio, print and digital advertising	Print, digital and radio advertisements were carried out for the duration of the consultation
1800 telephone number and email	The community was encouraged to contact the project team via a 1800 telephone number and dedicated project email address pictonroad@transport.nsw.gov.au
Project update	A project update was published to the webpage and 1,450 copies were distributed to local businesses and residents on and near Picton Road
QR codes at rest stops	QR codes linking to project information were placed at rest stops on Picton Road between the Nepean River and the M1 Princes Motorway, including the Pheasants Nest Service Centres and Frank Partridge Rest Area
Email	Emails were sent to 725 project subscribers

Table 1 Consultation tools used during the engagement program

3.1 Community feedback

During the consultation, participants were asked to share their experiences and concerns when using and accessing Picton Road. Submissions were received from a combination of commuters, residents, business owners/operators, students, freight/heavy vehicle operators, community organisations and government and non-government agency representatives.

Feedback was provided through:

- 324 surveys
- 113 comments on the online interactive map
- 44 emails (feedback and formal submissions)
- 292 comments (plus 896 reactions and 106 shares) via Facebook

Of these responses listed above, the project team received 29 comments (26%) on the interactive map that related to the interchange. These comments referred to the speed of oncoming traffic, signalised intersections, turning across lanes of traffic, inadequate length of merging lanes, lack of overtaking lanes, and absence of median barriers.

For further information and to view community feedback on the wider Picton Road upgrade, refer to the Transport for NSW Picton Road upgrade Community Consultation Report on the project website nswroadworks/pictonupgrade

3.2 Ongoing consultation

Transport is seeking feedback on the preferred option to help develop the project. We will respond to your comments in a report following the display of the Review of Environmental Factors (REF) in 2023. Timing and funding for construction of the interchange is not yet confirmed.

Feedback on the preferred option can be provided at pictonroad@transport.nsw.gov.au or 1800 290 613.

4 Interchange options assessment

4.1 Assessment approach: multi-criteria assessment

4.1.1 Option assessment criteria

A multi-criteria assessment approach was adopted to evaluate the shortlisted interchange options.

A set of assessment criteria was developed to support the project objectives and help differentiate the options. Workshop attendees discussed and agreed upon the criteria.

The final criteria adopted in the multi-criteria assessment is outlined in the table below.

Criteria	Sub-criteria	Key question
Safety	Operational safety for all road users	How safe is the option for drivers, passengers, trucks, cyclists and pedestrians?
	Safety for construction workers	How easy is the option to construct safely?
	Safety for maintenance workers	How easy is the option to maintain safety?
Transport and performance	Intersection performance	How much delay are road users expected to experience 10 years after construction is completed?
	Resilience	How robust is the option to a major traffic incident occurring and how much additional traffic capacity does it have for traffic growth into the future?
	Active transport access	How easily can walking and cycling travel paths be incorporated into the option?
	Freight efficiency	How effectively can freight move through the option?

Criteria	Sub-criteria	Key question
Environment and sustainability	Biodiversity impacts	What is the potential impact on existing flora and fauna habitat, ecological communities and biodiversity connectivity?
	Protection of Aboriginal cultural heritage	How easily can potential impacts to Aboriginal heritage sites be avoided or minimised?
	Minimisation of amenity impact to surrounding community	How significant are potential noise and visual impacts to the surrounding community?
	Resource use and energy efficiency of construction and operation	How much existing infrastructure can be repurposed and how much new infrastructure is needed?
Constructability	Complexity of construction	How difficult would the construction be, considering constructability, engineering constraints and safety?
	Impact to traffic during construction and duration	How much disruption to road users is likely during construction?

Table 2 Adopted assessment criteria

4.1.2 Interchange option considerations

The three shortlisted interchange options were assessed against the four key assessment criteria: safety, transport and performance, environment and sustainability and constructability. Outcomes from this assessment were presented to stakeholders as part of a Value Management Workshop to confirm the preferred option for the interchange.

4.1.2.1 Road user

Road user delays currently experienced at the interchange are expected to worsen over time with increased traffic volumes. It is expected the existing interchange will reach capacity in the coming decade due to the forecast increase in population and traffic demand.

All options were reviewed against the latest available traffic data and land use forecast to understand their performance at an interim design horizon of 2036 and future design horizon of 2056. Depending on the results, the shortlisted options were given a level of service rating from A (best) where road users experience minor to no delay during peak hour, to F (worst) where road users experience significant delays.

Level of service provides an indication of potential delays that a road user may experience in peak traffic conditions. A level of service of C or greater is considered acceptable. Scoring for Option 5 considered that the LoS results for the DDI can be substantially improved through design changes while this was not the case for Options 3 and 6.

Level of service	2036 morning peak	2036 evening peak	2056 morning peak	2056 evening peak
Option 3	B	B	F	B
Option 5	B	C	E	C
Option 6	B	B	C	C

Table 3 Assessed level of service in 2036 and 2056 peak periods

4.1.2.2 Environment and Biodiversity

A Preliminary Environmental Investigation (PEI) was carried out to identify the key environmental constraints in the interchange area at the time of the workshop. The key constraints identified were:

- fauna connectivity issues and history of fauna vehicle strike
- potential presence of threatened ecological communities, including:
 - critically endangered Cumberland Plain Woodland (Cumberland Dry Sclerophyll Forests) in the Sydney Basin Bioregion (Biodiversity Conservation Act 2016 and Environment Protection and Biodiversity Conservation Act 1999)
 - critically endangered Shale Sandstone Transition Forest (Coastal Valley Grassy Woodlands) in the Sydney Basin Bioregion (Biodiversity Conservation Act 2016 and Environment Protection and Biodiversity Conservation Act 1999)
- potential presence of threatened flora and fauna species and migratory species (or their habitats).

4.1.2.3 Heritage

There are Aboriginal heritage sites registered on the Aboriginal Heritage Information Management System (AHIMS) in the vicinity of the Picton Road upgrade area. An AHIMS-listed scar tree is located close to the interchange.

Several areas identified as potential archaeological deposits (PADs) are also located near the interchange. Land that is less disturbed by infrastructure and urban development, or close to waterways, is likely to have a higher archaeological potential.

During the next phase of project development, further assessment of Aboriginal cultural heritage and consultation with Aboriginal stakeholders will be carried out in accordance with the Transport Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHCI) (Roads and Maritime Services, 2011).

4.1.2.4 Property and land use

Most work for the project would be completed within the existing road reserve. However, potential impacts on property that may result in acquisition were considered, as it was recognised these would be different for each option.

The shortlisted options were ranked based on the level of potential impact on property and land uses. Option 6 had the highest potential impacts to property, followed by option 3. Option 5 had the lowest potential impacts on property and land use.

4.1.3 Future proofing and resilience

Land use changes planned at both Wilton and Greater Macarthur Growth Areas are expected to deliver 15,000 and 58,000 homes respectively over the next 20 to 30 years.

Traffic volumes have grown historically at 4% to 5% per year and are expected to continue growing along the corridor at a similar or higher rate in the future as a result of population growth, development in Western Sydney and growth at Port Kembla. All options were reviewed to understand how constrained they may be in the 2056 future scenario.

4.2 Assessment outcomes

A Value Management Workshop was held in June 2022 and involved the following:

- a review of available information
- agreement of assessment criteria
- assessment of three options using a qualitative multi-criteria assessment

Consistent with previous consultation, attendees included Transport stakeholders and subject matter experts as well as a representative from Wollondilly Shire Council.

The purpose of this workshop was to assess and compare the three shortlisted options and identify a preferred option.

The multi-criteria assessment was conducted in which all participants confirmed the assessment criteria and applied a rating from one to four for each option against the criteria.

The workshop attendees collectively rated each shortlisted option against the agreed assessment criteria with the results shown below in Table 5.

Based on the results of the multi-criteria assessment, Option 5 (DDI) was identified as the preferred option.

Sub criteria	Option 3	Option 5	Option 6
Operational safety for all road users	●	●	●
Safety for maintenance workers	●	●	●
Safety for construction workers	●	●	●
Intersection performance	●	●	●
Resilience	●	●	●
Active transport access	●	●	●
Freight efficiency	●	●	●
Biodiversity impacts	●	●	●
Protection of Aboriginal cultural heritage	●	●	●
Minimisation of amenity impact to surrounding community	●	●	●
Resource use and energy efficiency of construction and operation	●	●	●
Complexity of construction	●	●	●
Impact to traffic during construction and duration	●	●	●
Ranking	3	1	2

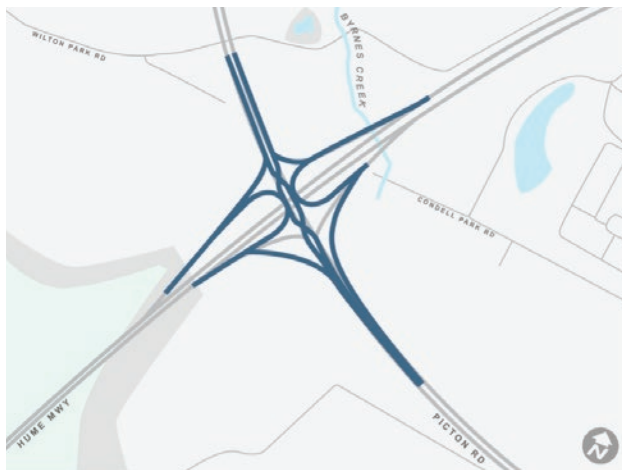
Key:

- Best fit
- Good fit
- Acceptable fit
- Poor fit

Table 4 Comparative multi-criteria assessment results

5 Preferred option

Based on the results of the multi-criteria assessment, Option 5 (DDI) was identified as the preferred option.



Option 5 (preferred) – Diverging Diamond Interchange (DDI)

5.1 What is a Diverging Diamond Interchange?

A Diverging Diamond Interchange (DDI) design is unique, in that traffic navigates through the interchange via a crossover arrangement. The crossover of traffic is done under the safety of signalised intersections, which increases traffic efficiency and removes conflicts with opposing vehicles.

The design allows traffic movements to be controlled by traffic lights, with simplified traffic light phasing, providing increased green time within the interchange. The layout also provides an improvement in safety, since right turn movements no longer need to wait for a safe gap or opposing through traffic in order to clear.

The design would improve the efficiency of the interchange. By grouping traffic approaches together, there is a significant reduction of signal phases when compared with conventional interchange layouts, reducing the wait time for traffic. Whilst this design is new to NSW drivers, it will be easy and safe to navigate.

Key benefits of a Diverging Diamond Interchange at this location are:

- improved connectivity to residential, recreational, employment and new growth areas in Wilton
- improved traffic flow and performance
- improved travel times for all transport customers, particularly during peak traffic times and holiday periods
- improved travel times and reliability for freight operators and customers
- improved safety and capacity
- improved environmental and visual amenity
- reduced congestion at entry and exit

The Picton Road and M31 Hume Motorway DDI is the second to be proposed in NSW, with one currently proposed at Australia Avenue, Homebush.

There are three DDIs in Queensland; Caloundra Road and Bruce Highway; the M1 Pacific Motorway, Varsity Lakes to Burleigh; and Gympie Arterial Road and Strathpine Road.

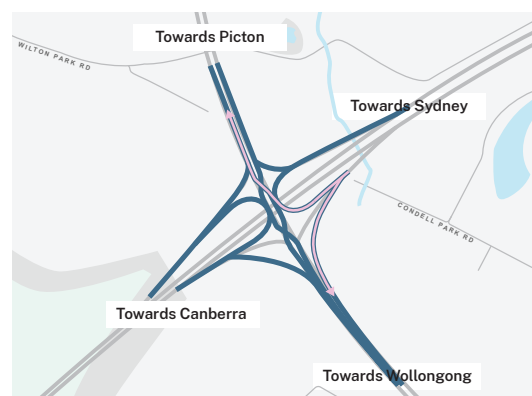
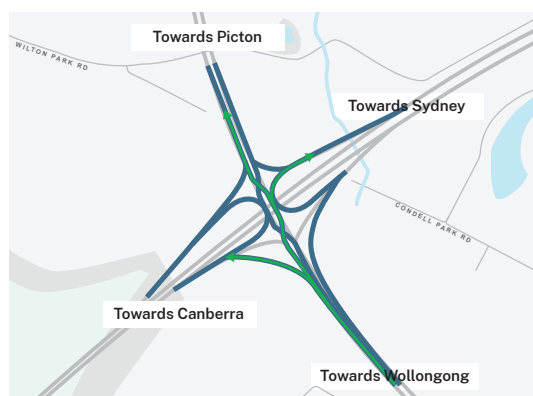
The DDI was found to have the least impact to the surrounding area while improving safety, reliability and efficient travel when compared to other options. Specifically, the benefits include:

Less disruption to traffic: Superior traffic performance and adaptability into the future as traffic increases.

Reduced environmental impacts: Smallest project footprint of the shortlisted options.

Safer journeys: Less conflicts for all four existing right-hand turn movements.

Freight: Improved freight efficiency now and into the future as traffic increases.

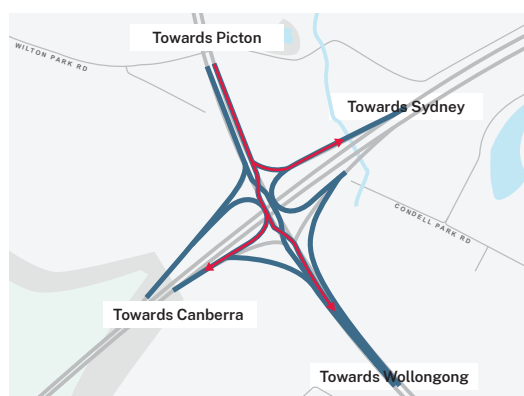
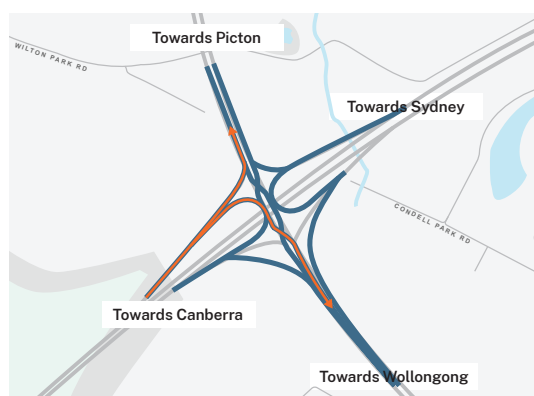


Construction impacts: The majority of construction occurs away from live traffic, providing the safest outcome of all shortlisted options for road users, construction and maintenance workers.

Construction impacts: Simple construction staging, with less traffic stages and minimal interfaces with the M31 Hume Motorway.

Community impacts: Less conflicts with the removal of all four existing right-hand turn movements.

Active transport: The shortest path for active transport access.



6 Next steps

6.1 Concept design and environmental assessment

Transport has engaged GHD Pty Ltd to develop the concept design of the interchange. This work has started and will be completed in 2023.

A concept design will be created and further environmental studies will be carried out. The Review of Environmental Factors (REF) for the project will be placed on display in 2023.

Transport will carry out detailed cost estimates of the project to ensure appropriate budget planning into the future.

Feedback on the Picton Road upgrade, including the preferred option for the Picton Road and M31 Hume Motorway interchange, can be provided via pictonroad@transport.nsw.gov.au or the project line 1800 219 630.



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