Picton Road upgrade between Nepean River and Almond Street, Wilton

Review of Environmental Factors

Appendix D

Traffic and Transport Impact Assessment

D

Transport for NSW

Picton Road upgrade between Nepean River and Almond Street, Wilton

Traffic and Transport Impact Assessment

Transport for NSW

January 2024

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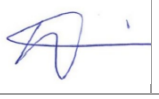
S4	Final for exhibition	M Aranas M Petrusma	D Nealon		K O'Brien		22/1/2024

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Executive summary

Transport for NSW (Transport) is proposing to upgrade Picton Road between the Nepean River and Almond Street in Wilton, NSW (the proposal). The proposal includes upgrading the Picton Road interchange with the M31 Hume Motorway. The proposal is subject to assessment in the form of a review of environmental factors (REF) in accordance with Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

Assessment overview

Purpose and approach

This Traffic and Transport Impact Assessment (TTIA) has been prepared on behalf of Transport as part of the REF. The report has been prepared to document the potential impacts of constructing and operating the proposal on traffic and transport.

The TTIA has been undertaken having regard to relevant guidelines, including the *Guide to Traffic Generating Developments* (Roads and Maritime Services (RMS), 2002), *Traffic Modelling Guidelines* (RMS, 2013) and *Guide to Traffic Management Part 3: Traffic Studies and Analysis* (Austroads, 2017).

Key features of the existing environment

The TTIA focuses on the section of Picton Road between about 1.3 kilometres east of the Nepean River (to the west of the interchange with the M31 Hume Motorway) and Almond Street in Wilton (to the east of the interchange) (the study area). The M31 Hume Motorway is a motorway of national significance, providing a key road connection between Sydney and Melbourne, and serving as the primary north–south link between Victoria and NSW.

Picton Road is an arterial road and a national key freight route that connects Western Sydney and Wollongong. Picton Road plays a significant role in the movement of supplies from key industries including manufacturing, construction, mining and logistics from the region to Melbourne, Canberra, Sydney and broader areas of Western NSW. It also provides access to major centres in Greater Sydney and will play a key role in opening up substantial employment and business opportunities in the future.

Currently through the proposal site, Picton Road has a posted speed limit between 80 kilometres per hour and 100 kilometres per hour with one to two traffic lanes in each direction and has variable width road shoulders, which heavy vehicles and light vehicles have been observed to use as rest/parking areas. There are no public transport services that stop along Picton Road, with no bus stops provided. However, bus services between Goulburn and Campbelltown pass through the area along the M31 Hume Motorway.

Cycling facilities are currently limited to road shoulders, which do not provide cyclists protection from motorised vehicles. There are no pedestrian facilities.

Picton Road currently operates with generally good traffic flow and limited congestion, with the exception of sections near the interchange with the M31 Hume Motorway. Access to the interchange, which is currently controlled by traffic signals, has been observed to experience congestion during peak traffic periods in the morning and in the afternoon on weekdays. This congestion causes noticeable delays and affects both private car users and freight trucks.

Future context

The study area is located within the Wilton Growth Area. The Department of Planning and Environment (DPE) and Wollondilly Council are planning for Wilton to become a new town, providing about 15,000 homes (40,000 new residents) and 15,000 jobs across six precincts over the next 20 to 30 years. There are also plans for a new town centre (the Wilton Town Centre) adjoining the north-western side of the interchange.

Traffic has noticeably increased at the Picton Road/M31 Hume Motorway interchange in recent years and will continue to increase as the area's population grows and new homes are built. Picton Road needs to cater for future growth associated with developments around the Wilton Growth Area as well as the wider Wollondilly and Wollongong regions, which are forecast to increase their populations by about 82 per cent and 19 per cent over the next 20 years, respectively. It is estimated that peak hour traffic demand could increase by about 20 per cent between 2021 and 2031 and by about 70 per cent between 2021 and 2046. Growth in freight demand is also expected along Picton Road, which serves as a key connection between the Illawarra and Western Sydney, including the future Western Sydney Airport and Aerotropolis.

Picton Road will play a key role in fostering and supporting connectivity and great places to live. An upgrade of Picton Road would improve accessibility and connectivity for transport customers and residents in new and emerging housing developments to diverse employment opportunities, retail, health and education facilities. Improvements to Picton Road would enable heavy vehicle operators and local workers to travel safely and efficiently to business hubs, industries and key assets such as Port Kembla.

While the current configuration of the Picton Road/M31 Hume Motorway interchange is able to accommodate existing traffic demands, future traffic growth due to development in the area will put additional strain on the road network, and the Picton Road/M31 Hume Motorway interchange are considered key constraints in the capacity of the broader road network.

Assessment conclusions and recommendations

Construction impact

Key findings

Construction of proposal is anticipated to be carried out in stages, beginning in 2026 and taking about three years to complete. An assessment of the potential impact of construction on the performance of key intersections within the study area was undertaken using SIDRA Intersection modelling software version 9.1 ('SIDRA'), with traffic models developed for Construction Stages 1 to 3 of the construction works, reflecting different traffic management arrangements for each stage. A first-principles assessment of road capacity on M31 Hume Motorway was also conducted to determine the potential impacts of temporary lane closures and contraflow arrangements during bridge construction. Although construction is anticipated to take place between 2026 to 2029, traffic volume forecasts for the 2031 horizon year were utilised for model input demands, superimposed with the maximum anticipated construction traffic volumes during the construction peak, to obtain a conservative assessment.

A summary of the traffic performance outcomes for the construction stage of the proposal is as follows:

– The worst potential intersection performance has been predicted to be experienced during Stage 1 of construction, which is generally consistent with existing road conditions operating under temporary traffic control. During Stage 1, the Picton Road/M31 Hume Motorway interchange is predicted to perform at a level of service (LoS) of F. However, it is noted that this performance is comparable to the 2031 modelling results without the proposal (2031 Business as Usual (BAU) scenario) and Stage 1 construction arrangements are not predicted to worsen the performance of the existing interchange.
– All intersections within the study area are predicted to operate at a satisfactory LoS during Stages 2 and 3, with performance improving as new pavements become operational over the course of the construction program, including at the Picton Road/M31 Hume Motorway interchange.
– Construction is not likely to directly impact public transport and heavy vehicle (freight) facilities or operations, and these modes are predicted to experience similar traffic performance impacts as general traffic.
– No existing walking and cycling facilities are available along Picton Road that would be impacted by construction. However, cyclists using the carriageway would potentially benefit from the reduced vehicle speeds. New walking and cycling paths fully separated from traffic would also be constructed in Stage 2, providing safer environments for these users.

– Changes to speed zones and temporary lane closures are not likely to negatively impact traffic performance within the proposal site. However, changes to the road environment would have the potential to affect the day-to-day experience of other road users, particularly local traffic (residents, businesses and through traffic). Potential impacts to other road users in terms of safety and access would be mitigated by implementing traffic management measures, which would be developed in consultation with relevant stakeholders and in accordance with regulatory requirements.
– Existing users of Janderra Lane may experience additional temporary disruption due to proposed left-in and left-out restrictions at Janderra Lane and Picton Road until the Janderra Lane overpass is operational. Right turns into and out of Wilton Park Road, Aerodrome Road and Almond Street may be maintained using temporary traffic signals. Future traffic along the M31 Hume Motorway can be accommodated during temporary lane closure and contraflow arrangements on the motorway during bridge construction. Impacts would be minimised by scheduling these temporary traffic arrangements outside of peak traffic periods, between 9pm and 6am.

The assessment concludes that construction would have the potential for minor impacts on the wider road network, and the performance of the road network would be comparable to, or better than, the forecast 2031 BAU conditions.

Recommended approach to mitigation and management

The potential impacts of construction on traffic and transport would be managed by implementing the Construction Traffic Management Plan (CTMP), which would be prepared by the construction contractor prior to the commencement of works. The CTMP would identify guidelines, general requirements, and specific procedures to be used for activities that may have an impact on traffic and transport operation. The CTMP would also include processes to monitor the effectiveness and suitability of management measures on an ongoing basis throughout construction, suitable additional traffic management measures to adapt to site-specific or activity-specific conditions.

The CTMP would include:

– Logistics management to minimise the number of vehicle trips that would be generated by the construction activities.
– Access management to facilitate safe and continuous movement of vehicles to, from, and around work sites. This would also aim to minimise conflict points and potential delays to other road users.
– Pedestrian and cyclist management to protect vulnerable road users in and around the site.
– Details of temporary traffic control arrangements per stage, including temporary roadwork speed limits, lane/shoulder closures, and contraflow arrangements (if needed).
– Stakeholder engagement and communication in relation to changes to traffic, transport and access.

Operational impact

Key findings

The operational impact assessment was undertaken primarily using Aimsun traffic modelling software (Aimsun Next Version 22, or simply ‘Aimsun’) to determine the performance of the road network for the 2031 and 2046 horizon years under the BAU (i.e. without proposal) and ‘Proposal Case’ scenarios. A comparison between these scenarios has been undertaken to identify the potential overall impact of the proposal.

If the proposal is not constructed, the BAU modelling results indicate that the Picton Road/M31 Hume Motorway interchange would be operating over capacity by 2046, with delays of up to 420 seconds or about 7 minutes. Queuing and congestion would also be predicted to extend up to one kilometre along the southbound lane of the M31 Hume Motorway, and several kilometres along the westbound lane of Picton Road.

The ‘Proposal Case’ traffic modelling shows up to a four per cent increase in vehicle-kilometres travelled (VKT) and a reduction of up to 11 per cent in vehicle hours travelled (VHT) in 2031, compared to the BAU scenarios indicating substantial general improvement in overall traffic network performance. This is reflected in a reduction in vehicle delays experienced and an increase in average vehicle speeds across the network. The anticipated benefit is even more significant for the 2046 horizon year.

A summary of the traffic performance outcomes for the operational stage of the proposal is as follows:

– Generally good network operating conditions with low vehicle density on most roads.
– Substantially improved travel times along the Picton Road corridor compared to the BAU scenarios, with improvements of about one to three minutes for the 2031 horizon year and improvements of about three to 12 minutes for the 2046 horizon year AM peak and up to 33 minutes for the 2046 horizon year PM peak.
– Improved travel time reliability with relatively consistent travel times in both directions along the corridor in the AM and PM peak and under both the 2031 and 2046 traffic demand scenarios.
– Intersection Level of Service (LoS) significantly improved compared to the BAU scenarios with intersections typically operating at LoS A or LoS B along the Picton Road corridor, with the exception of Picton Road/Pembroke Parade, which would operate at LoS C.

The assessment indicates that, together with other committed improvements in the road network, the proposal would be critical to facilitate future growth in regional movements (between the M31 Hume Motorway and Picton Road) and the growth in local traffic from various access points to developments along Picton Road.

It is noted that while the 2046 BAU and 'Proposal Case' scenarios include assumed widening of the M31 Hume Motorway north of the interchange, sensitivity testing indicates that it does not significantly impact on the performance of Picton Road if this future motorway widening is not in place by 2046.

In addition to the traffic performance outcomes, the proposal is anticipated to have benefits to other road users including:

– Improved walking and cycling connections through the construction of shared user paths alongside Picton Road, providing physical separation between path users and general traffic on the road.
– Improvements to public transport travel times and travel time reliability for future bus services that might use Picton Road to service the Wilton Growth Area.
– General improvements to road safety through the provision of new road and path infrastructure. This is supported by findings of a separate rapid safe system assessment that was conducted for the proposal design.
– Increased resilience of the road corridor with greater operational flexibility to respond to planned and unplanned incidents.
– Improved freight accessibility including over size and over mass (OSOM) movements due to improved road geometry and carriageway widths.

Some local users may experience disruption to access depending on the timing of privately funded intersection works due to left-in and left-out (LILO) only arrangements at Wilton Park Road, Aerodrome Road and Janderra Lane. These impacts would be temporary and only in place until permanent intersection upgrades are completed. Further assessment may be required to determine whether additional U-turn facilities are required on Picton Road in that interim period.

Recommended approach to mitigation and management

The outcomes of traffic modelling for the future year scenarios have informed the development of the concept design for the proposal. The traffic modelling has assisted in determining the optimal configuration of roads, including the number of lanes and intersection layouts required to support future traffic demands.

It is anticipated that the proposal would have a significant benefit on traffic performance and road safety once operational, compared to the existing road network configuration. To safeguard against any potential impact that may arise while the proposal is operating, further traffic modelling would be undertaken to inform the detailed design using the latest land use forecasts and timing of other network upgrades.

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Appendices

Appendix A Strategic land use and transport context
Appendix B Construction traffic modelling scenarios

1. Introduction

1.1 The proposal

Transport proposes to upgrade Picton Road between the Nepean River and Almond Street in Wilton, NSW (the proposal). The proposal includes upgrading the section of Picton Road from about 1.3 kilometres east of the bridge over the Nepean River to about 200 metres east of Almond Street, including the M31 Hume Motorway interchange.

The proposal forms the western section of the broader Picton Road upgrade, which involves upgrading about 30 kilometres of Picton Road between the Nepean River and the M1 Princes Motorway.

The proposal is subject to assessment by an REF in accordance with Division 5.1 of *Environmental Planning and Assessment Act 1979* (EP&A Act). For the purposes of these works, Transport is the proponent and the determining authority under Division 5.1 of the EP&A Act.

1.1.1 Proposal location

The proposal is located in Wilton, in the Wollondilly local government area (LGA). The proposal site, shown in Figure 1.1 and Figure 1.2, comprises the area that would be required to construct and operate the proposal, including ancillary facilities and operational infrastructure.

1.1.2 Key features of the proposal

Key features of the proposal include:

– widening and upgrading Picton Road for a distance of about five kilometres between the Nepean River and Almond Street to provide:
  - a minimum of two 3.5 metre-wide traffic lanes in each direction with a central median, increasing to three traffic lanes in each direction approximately between the Wilton Park Road and Aerodrome Drive intersection and the Pembroke Parade and Greenway Parade intersection
  - three-metre-wide shoulders on the left lane side in each direction
– upgrading the existing Picton Road and M31 Hume Motorway interchange into a diverging diamond layout, including:
  - removing the existing Picton Road bridge and constructing two new bridges over the M31 Hume Motorway
  - upgrading and realigning on and off ramp connections with the M31 Hume Motorway to suit the new interchange layout and to allow free flow of traffic between Picton Road and the M31 Hume Motorway
  - providing a new four-metre-wide shared user path along the southern bridge
  - removing the existing traffic signals on Picton Road and installing new traffic signals with more efficient phasing and more traffic capacity
– new and upgraded shared paths on Picton Road, including underpasses under the southbound on ramp connections to the M31 Hume Motorway and an overpass of the northbound off ramp connection from the M31 Hume Motorway, located:
  - adjacent to the westbound slow lane of the proposal from the western extent to around 420 metres west of Almond Street to connect with planned active transport infrastructure to be delivered as part of the South East Wilton development
  - adjacent to the eastbound slow lane between Aerodrome Drive and the western extent of the proposal and between Pembroke Parade and Almond Street

– reconfiguring the existing Picton Road intersections with Wilton Park Road, Aerodrome Drive, Janderra Lane and Almond Street into left in, left out only (the timing of delivery of the reconfigured Almond Street intersection is subject to confirmation of timeframes for delivery of other road works planned at the intersection as outlined in section 1.1.3 and chapter 3 of the REF)
– integration with new traffic signals and widening roadworks constructed in 2023 at the intersection of Picton Road and Pembroke Parade and Greenway Parade
– adjusting the posted speed from the western extent of the proposal, through the interchange and to the east of Pembroke Parade to 60 kilometres per hour (km/h).

Ancillary work and construction activities associated with the proposal includes:

– property works including acquisition, and adjustment to existing accesses and fencing
– civil earthworks and drainage works
– construction and adjustment of retaining walls, road pavement, and water quality devices
– tie-in work to adjoining sections of Picton Road, M31 Hume Motorway and other local roads
– installing and adjusting roadside furniture and delineation, such as safety barriers, kerb and gutter, fencing, lighting, signage, noise treatment and pavement markings
– installing new intelligent transport systems including, but not limited to, closed circuit television and variable message signs
– protecting, adjusting and relocating existing utilities and associated structures
– landscaping and rehabilitation of disturbed areas
– adjustment and provision of noise treatments, including at-property works and noise mounds, as required
– establishment of temporary ancillary facilities to support construction including compound sites, site offices, stockpiles, access tracks, turning bays, median crossovers on the M31 Hume Motorway, and laydown areas
– site preparation works, including vegetation clearing and grubbing, site fencing, temporary drainage measures, traffic management, and implementation of environmental management measures.

An overview of the proposal is provided in Figure 1.2. Further information is provided in section 5 of this TTIA and chapter 3 of the REF.

1.2 Purpose and structure of the report

This Traffic and Transport Impact Assessment (TTIA) has been prepared by GHD Pty Ltd (GHD) on behalf of Transport as part of the REF. The report has been prepared to document the results of the assessment of the potential traffic and transport impacts of constructing and operating the proposal. The report:

– defines existing and proposed traffic, transport and access conditions surrounding the proposal site
– assesses the potential impacts of constructing and operating the proposal on the surrounding traffic, transport and access network, which includes active and public transport (pedestrians and cyclists), and light and heavy vehicle (including freight) traffic
– recommends measures to enhance the potential benefits and reduce or avoid the potential negative impacts of the proposal.

The report has been structured as outlined below:

– **Section 2 Methodology** outlines the process by which the TTIA was undertaken, including defining the study area, existing data collection, and traffic modelling and forecasting.
– **Section 3 Existing environment** describes the existing transport environment and traffic conditions currently experienced by road users.
– **Section 4 Future traffic conditions** provides an assessment of the likely traffic conditions that would be experienced by users in the design years (2031 and 2046) without the proposal.
– **Section 5 The proposal** describes the key features of the proposal in the context of the transport environment.
– **Section 6 Summary of construction activities** provides an overview of the construction program and staging, traffic management arrangements during construction, and site access.

- **Section 7 Construction impact assessment** provides a summary of potential construction traffic impacts, including construction traffic generation, traffic performance during construction, and potential impacts on road users.
- **Section 8 Operational impact assessment** provides a comparison of road network performance under the proposal scenario compared to the 'Business as Usual' (BAU) scenario (without proposal) and an assessment of the potential impacts on other road users.
- **Section 9 Recommended safeguards and management measures** recommends safeguards and management measures to avoid or minimise the potential impacts identified.
- **Section 10 Conclusion** summarises the findings of the TTIA.
- **Section 11 References** provides a list of key standards, guidelines and other documents and data sources referred to during the preparation of this report.
- **Section 12 Glossary of terms and abbreviations** includes a list of commonly used terms and abbreviations used in this report.

1.3 Limitations

This report has been prepared by GHD for Transport for NSW and may only be used and relied on by Transport for NSW for the purpose agreed between GHD and Transport for NSW as set out in section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than Transport for NSW arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this document are based on conditions encountered and information identified in the references at the date of preparation of the report. GHD has no responsibility or obligation to update this document to account for events or changes occurring subsequent to the date that the report was prepared.

GHD has prepared this document on the basis of information provided by Transport for NSW and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

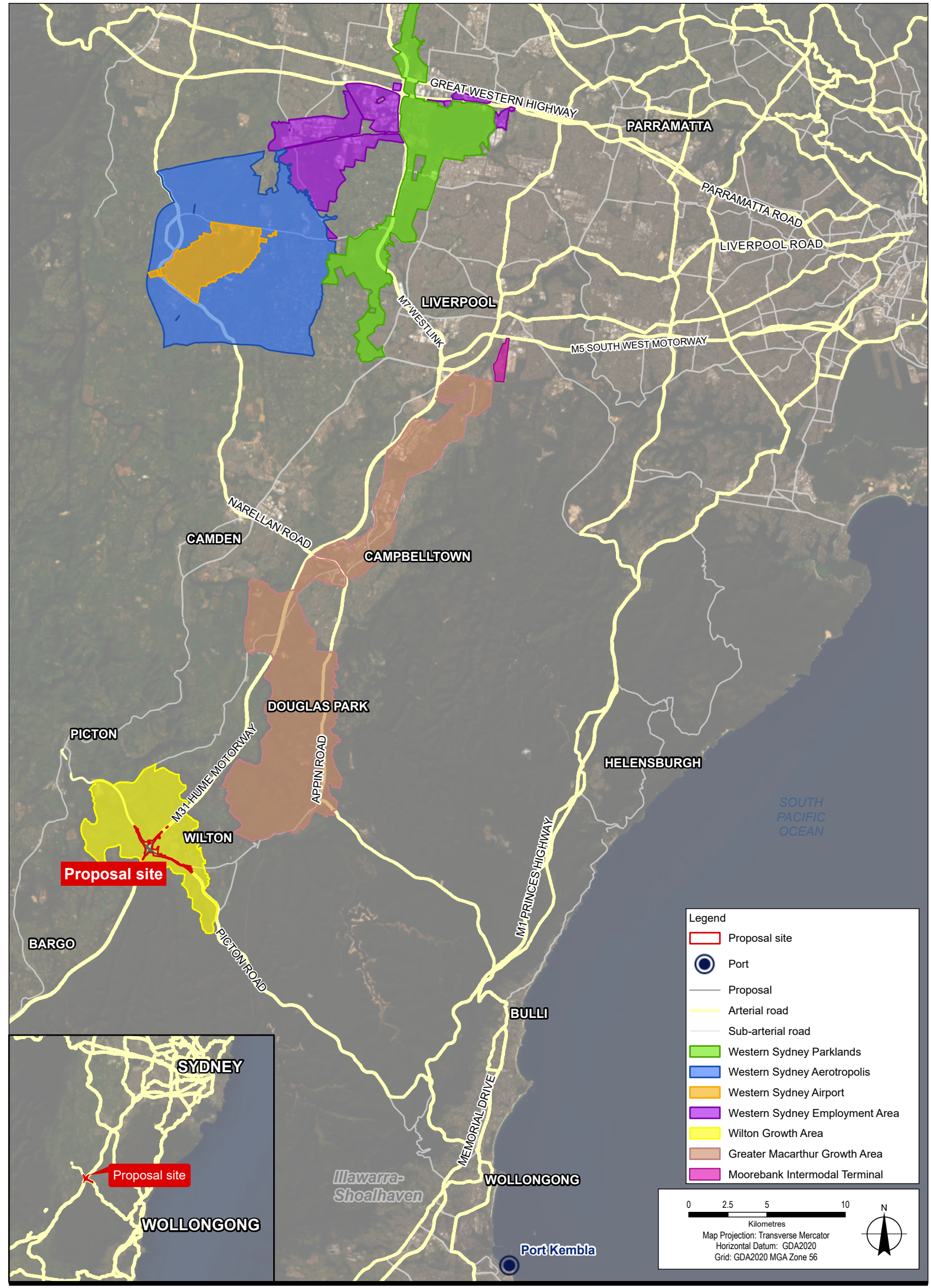


Figure 1-1 - Location of the proposal

Data source: Earthstar GeographicsNSW SS-SDS, Topographic base data, 2023; Transport network - TfNSW, 2023. Created by:akildea N:\AU\Wollongong\Projects\23\12560200\GIS\Maps\12560200_PictonRoad_Stage1_ConceptDesign\12560200_REF_B.aprx12560200_REFX001_ProposalLocation_A4P. Print date: 25 Oct

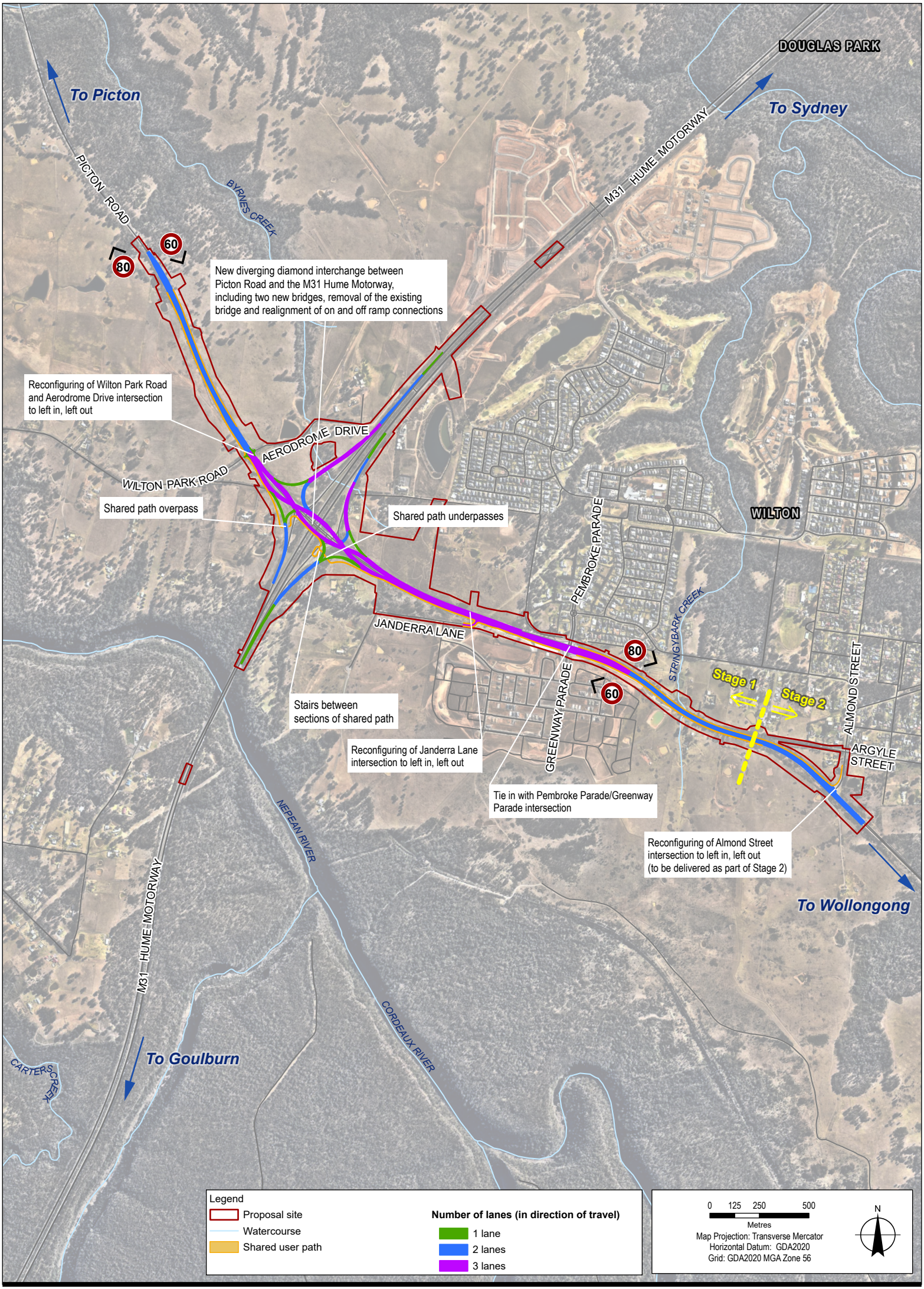


Figure 1-2 - The proposal

Data source: Nearmap WMS Server; NSW SS-SDS, Topographic base data, 2023. Created by:akildea
N:\AU\Wollongong\Projects\23\12560200\GIS\Maps\12560200_PictonRoad_Stage1_ConceptDesign\12560200_REF_B.aprx
12560200_REFX017_TheProposal_A4P. Print date: 12 Dec

2. Methodology

This section outlines the process by which the TTIA was undertaken, including defining the study area for the assessment, existing data collection and traffic modelling and forecasting.

2.1 Study area

The study area for the TTIA includes the roads and key intersections that have the potential to be directly or indirectly affected by the construction and operation of the proposal. The extent of the study area is shown in Figure 2.1.

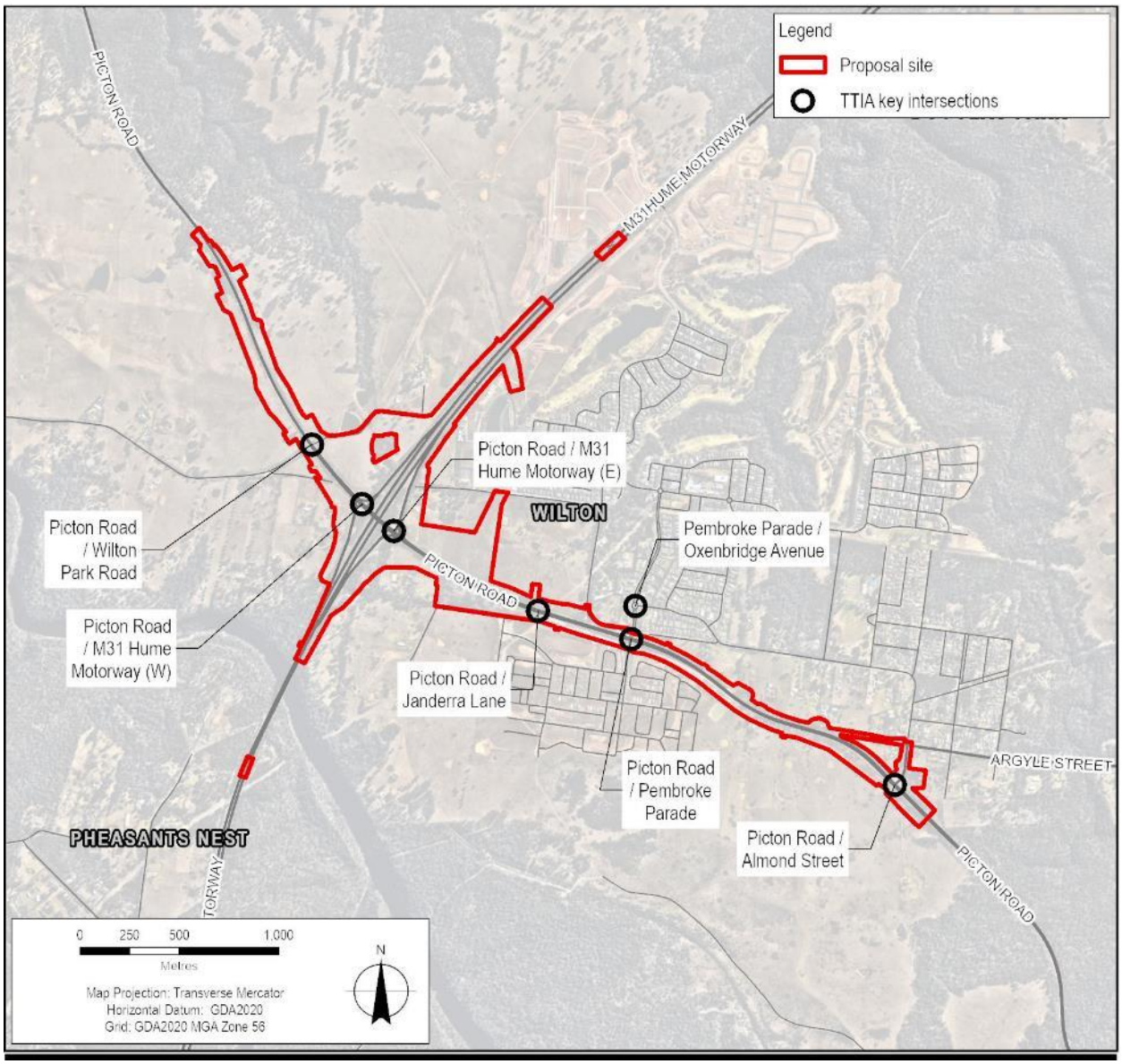


Figure 2.1 Study area and intersections of interest

The road network being investigated as part of the TTIA comprises a mix of roundabouts and intersections with traffic signals (signalised intersections) and those without traffic signals (priority-controlled intersections). Table 2.1 provides a summary of the intersections that have been included and their existing control.

Table 2.1 Key intersections

Intersection	Intersection control
Picton Road/Wilton Park Road	Priority
Picton Road/M31 Hume Motorway (W)[1]	Signalised
Picton Road/M31 Hume Motorway (E)[2]	Signalised
Picton Road/Janderra Lane	Priority
Pembroke Parade/Oxenbridge Avenue	Roundabout
Picton Road/Pembroke Parade/Greenway Parade	Priority
Picton Road/Almond Street	Priority

Notes: 1. The intersection of Picton Road and the northbound on- and off- ramps of the M31 Hume Motorway (i.e. ramps located west of the M31 Hume Motorway)
2. The intersection of Picton Road and the southbound on- and off- ramps of the M31 Hume Motorway (i.e. ramps located east of the M31 Hume Motorway)

It is noted that the extent of the study area for the traffic modelling analysis (shown in Figure 2.6) covered a larger area than that the study area for the TTIA (shown in Figure 2.1), including a larger extent of the M31 Hume Motorway as well as roads within Wilton. The inclusion of the surrounding area in traffic modelling ensure that the traffic demands and traffic distribution patterns of future development are considered in the assessment.

2.2 Existing data collection

2.2.1 Review of existing conditions

The traffic survey data (described in section 2.2.2) was supplemented by a desktop review of existing information and a site visit to understand the existing traffic and transport conditions in the study area. The desktop review involved collecting and reviewing information from the following data sources:

– aerial photography from Google Maps/NSW SIX Maps
– street view images from Google Maps
– public transport routes and schedules from Transport Trip Planner
– active transport facilities from Transport Cycleway Finder website
– crash data published by Transport Centre for Road Safety and provided by Transport.

A review of previous traffic reports, models, and data was also undertaken to set up the existing baseline conditions of the study area. The need for additional data collection was identified based on a gap analysis that was conducted following the data review.

2.2.2 Traffic survey data

Traffic data from primary and secondary sources were used to inform the development of the base traffic model. Data from the following traffic surveys were used to complete data gaps identified in the desktop assessment.

Classified intersection count data

Traffic count surveys were conducted for 13 intersections in and around the TTIA study area. The surveys collected turning movement counts categorised into the following vehicle classes:

– cars (Austroads class 1-2)
– trucks (Austroads class 3-5)
– heavy trucks (Austroads class 6-12).

Surveys were conducted during weekdays, with data collected at 15-minute intervals for the following periods:

– Picton Road/M31 Hume Motorway interchange – all day (24 hours)
– all other sites:
  - AM survey period (5.30am to 9.30am)
  - PM survey period (3pm to 6pm).

Table 2.2 provides information on the location and date of data collection for the 13 traffic count sites. The location of the count sites with respect to the proposal is shown in Figure 2.3.

The following peak hours were identified based on the collected intersection traffic count data:

– weekday AM peak hour - 7.15 to 8.15am
– weekday PM peak hour - 4.30 to 5.30pm.

Table 2.2 Intersection count locations and date of data collection

ID	Location	Day	Date
1	Picton Road/Almond Street	Wednesday	3 November 2021
2	Picton Road/Pembroke Parade	Wednesday	3 November 2021
3	Picton Road/M31 Hume Motorway (Eastbound/Westbound)[1]	Friday and Tuesday	4 March 2022 6 September 2022
4	Picton Road/M31 Hume Motorway (Southbound/Northbound)[1]	Friday and Tuesday	4 March 2022 6 September 2022
5	Picton Road/Wilton Park Road	Wednesday	3 November 2021
6	Picton Road/Menangle Road	Wednesday	3 November 2021
7	Fairway Drive/Kirkwood Chase/Stirling Drive	Thursday and Tuesday	1 and 6 September 2022
8	Greenbridge Drive/Pembroke Parade	Thursday and Tuesday	1 and 6 September 2022
9	Beatty Street/Greenbridge Drive	Thursday and Tuesday	1 and 6 September 2022
10	Pembroke Parade/Oxenbridge Avenue	Thursday and Tuesday	1 and 6 September 2022
11	Almond Street/Argyle Street	Wednesday	3 November 2021
12	Picton Road/MacArthur Drive	Wednesday	3 November 2021
13	Douglas Park Drive/Wilton Road	Wednesday	3 November 2021

Note: 1. 24-hour classified traffic count data was collected for the intersection of Picton Road and the M31 Hume Motorway.

Although not all counts were undertaken on the same day, the data is considered adequate for the purposes of the TTIA. To mitigate the risk of significant differences between traffic counts collected in 2021 and 2022, a control count at the Picton Road/M31 Hume Motorway interchange was undertaken to enable a comparison to be undertaken. The results (shown in Figure 2.2) indicate that the difference falls within seven to 10 per cent during the morning and the afternoon survey periods respectively. The largest difference (97 vehicles during the afternoon survey period) was identified at the M31 Hume Motorway left turn from southbound off ramp to Picton Road.

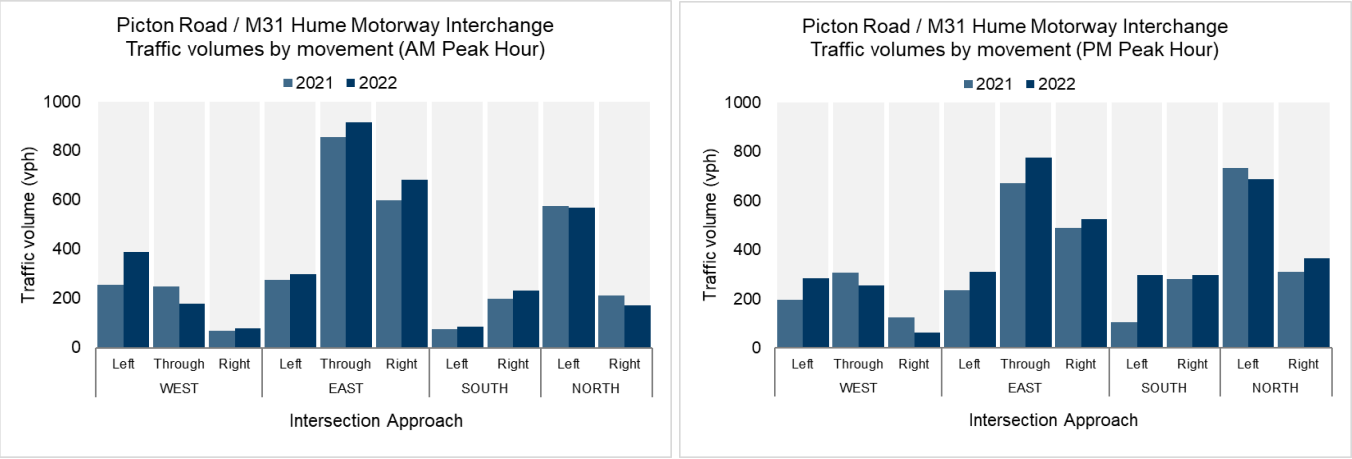


Figure 2.2 Comparison of intersection counts at the Picton Road / M31 Hume Motorway interchange (2021 vs. 2022)

These variations have been taken into account in the development and calibration of base traffic models. For the purposes of the TTIA, traffic counts for both survey years 2021 and 2022 have been used to calibrate the base model, hereinafter referred to collectively as '2022' data for brevity.

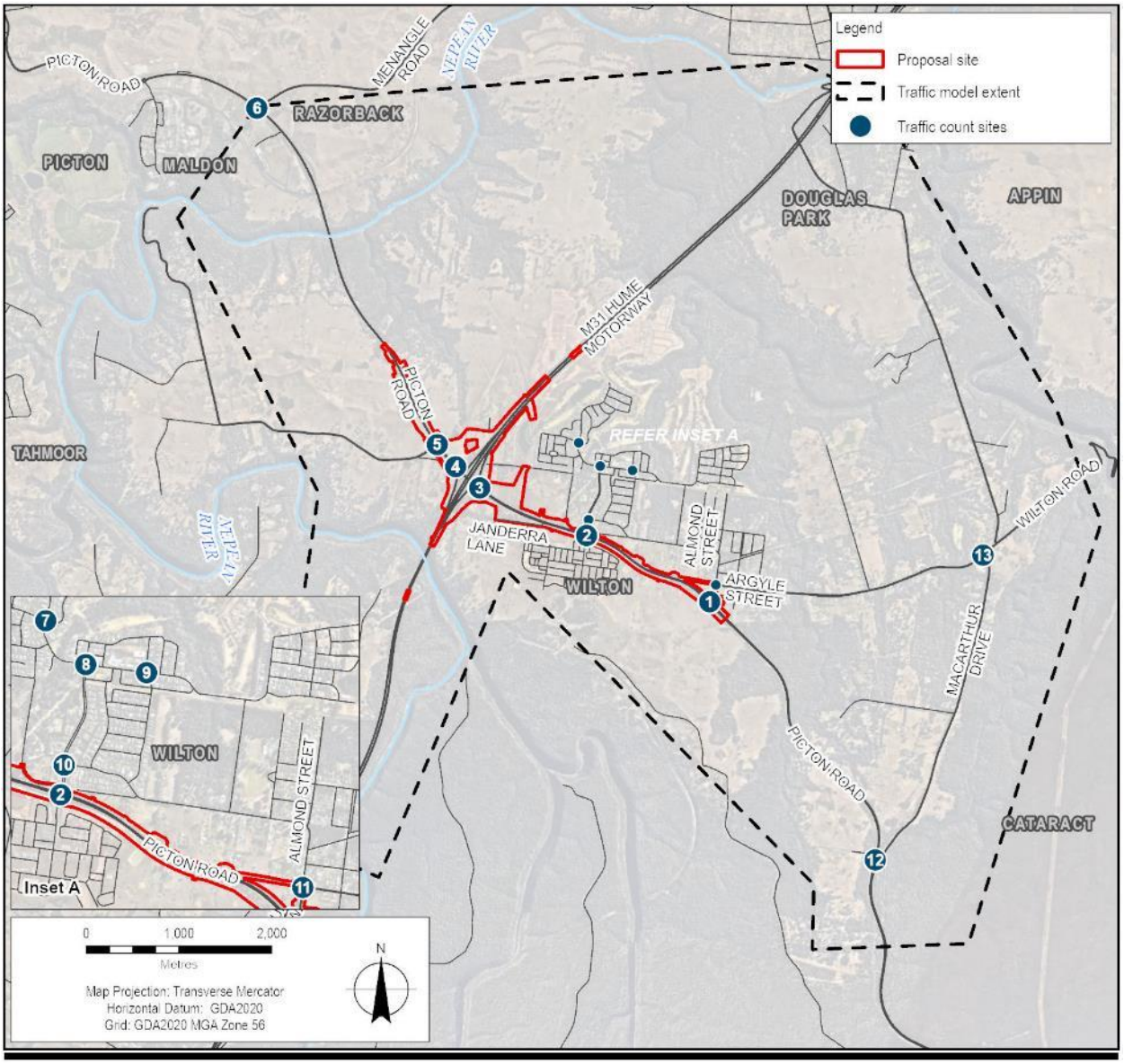


Figure 2.3 Traffic count sites

Queue length survey data

Queue length data was collected for the 13 traffic count sites shown in Figure 2.3. Table 2.3 summarises the queue length data that has been collected for the TTIA. Data was collected for the following survey periods:

– weekday AM survey period – 5.30 to 9.30am
– weekday PM survey period – 3.00 to 6.00pm.

Queue length survey data was used in the network model calibration.

Table 2.3 Queue length data

ID	Location	Day	Date
1	Picton Road/Almond Street	Wednesday	3 November 2021
2	Picton Road/Pembroke Parade	Wednesday	3 November 2021
3	Picton Road/M31 Hume Motorway (Southbound on and off ramp)	Wednesday	3 November 2021
4	Picton Road/M31 Hume Motorway (Northbound on and off ramp)	Wednesday	3 November 2021
5	Picton Road/Wilton Park Road	Wednesday	3 November 2021
6	Picton Road/Menangle Road	Wednesday	3 November 2021
7	Fairway Drive/Kirkwood Chase/Stirling Drive	Tuesday	6 September 2022
8	Greenbridge Drive/Pembroke Parade	Tuesday	6 September 2022
9	Beatty Street/Greenbridge Drive	Tuesday	6 September 2022
10	Pembroke Parade/Oxenbridge Avenue	Tuesday	6 September 2022
11	Almond Street/Argyle Street	Wednesday	3 November 2021
12	Picton Road/MacArthur Drive	Wednesday	3 November 2021
13	Douglas Park Drive/Wilton Road	Wednesday	3 November 2021

Travel time survey data

Bi-directional travel time data was collected for the 33 kilometre long section of Picton Road between Menangle Road and Clive Bissel Drive.

For the purposes of the TTIA, only data for the 11 kilometre long section of Picton Road within the vicinity of the study area between Menangle Road and MacArthur Drive was used. Travel time data collected between 5.30-9.30am and 3.00-6.00pm on 3 November 2021 (Wednesday) was used for the TTIA. Travel time data was segmented based on the checkpoints described in Table 2.4 and shown in Figure 2.4. Travel time data was used in the network model calibration.

Table 2.4 Travel time survey segments (starting from west to east)

Travel time checkpoint (starting from west to east)	**Cumulative distance (km)**
Picton Road and Menangle Road	0.000 (Starting point)
Picton Road and Allied Mills Access	0.371
Speed Change – north of Nepean River Bridge	0.920
Nepean River Bridge	1.631
Speed Change – North of Wilton Park Road	3.894
Picton Road and Wilton Park Road	4.183
Picton Road and Hume Motorway northern ramp	4.587
Picton Road and Hume Motorway southern ramp	4.752
Picton Road and Janderra Lane	5.630
Picton Road and Pembroke Parade	6.107

Travel time checkpoint (starting from west to east)	Cumulative distance (km)
Picton Road and Almond Street	7.365
Speed Change – South of Almond Street	7.886
Picton Road and MacArthur Drive	11.061

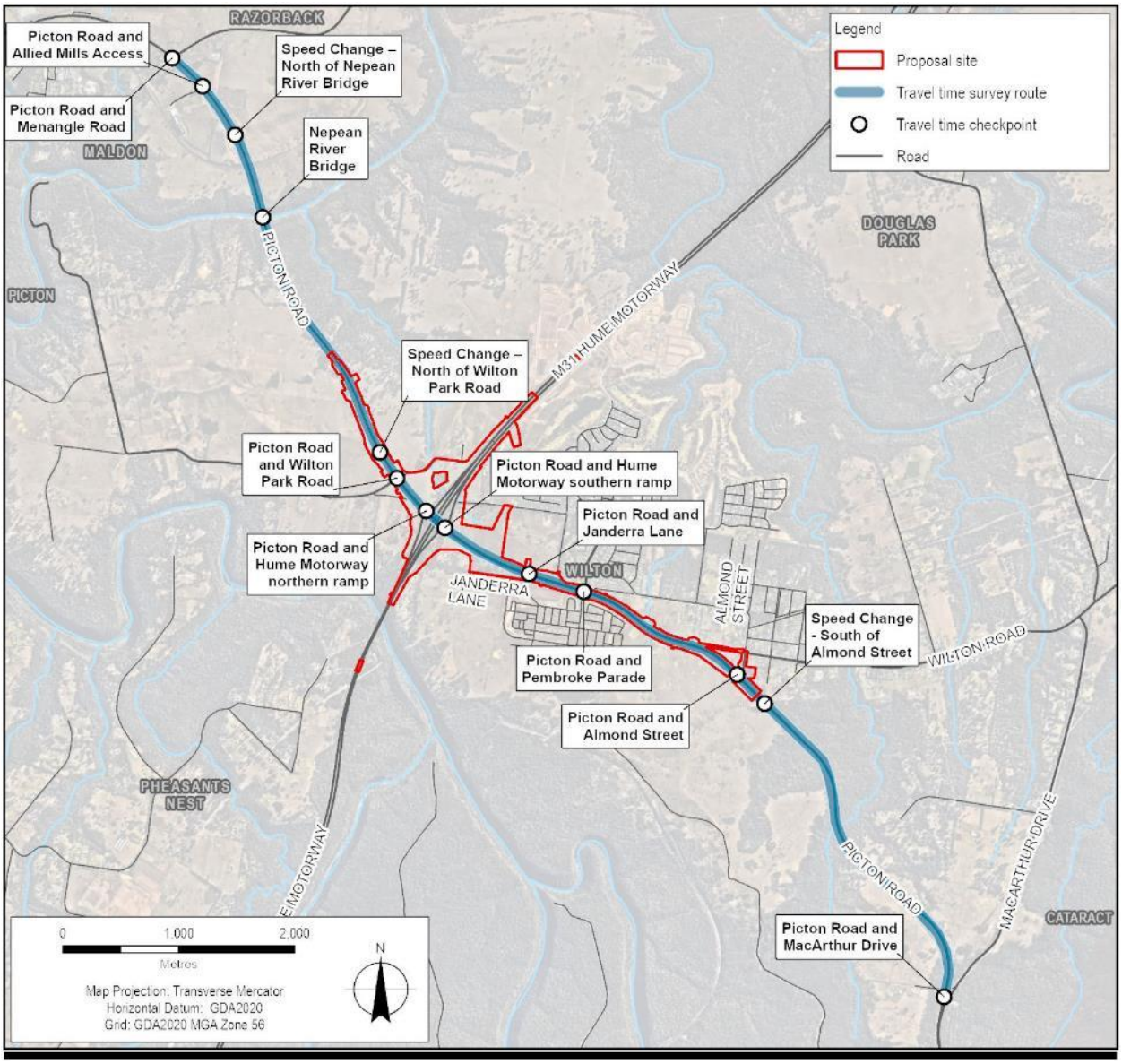


Figure 2.4 Travel time survey route segmentation

Automatic tube count (ATC) data

Table 2.5 details the ATC data that was used for the TTIA.

Table 2.5 ATC data

Location	Time period	Date
Picton Road west of the M31 Hume Motorway	2 weeks	31 October - 13 November 2021
Picton Road east of Almond Street	2 weeks	31 October - 13 November 2021
M31 Hume Motorway north of Picton Road (northbound)	~2 weeks	30 October - 10 November 2021
M31 Hume Motorway north of Picton Road (southbound)	~2 weeks	30 October - 10 November 2021

Although the through traffic on the M31 Hume Motorway does not impact the traffic operations on Picton Road, ATC data was used to estimate the volume of through traffic along the M31 Hume Motorway (bypassing the Picton Road/M31 Hume Motorway interchange). The data was taken to:

– reflect the arrival pattern of off ramp traffic from the M31 Hume Motorway to Picton Road
– enable a realistic merging behaviour of on ramp traffic from Picton Road to the M31 Hume Motorway.

Other data sources

In addition to the traffic surveys that were undertaken as described in previous sections above, existing intersection traffic signal data was supplied by Transport.

2.2.3 Impact of COVID-19 pandemic on traffic data collection

It is acknowledged that some of the traffic surveys used to inform the traffic modelling were undertaken in November 2021 soon after travel restrictions related to COVID-19 had been lifted in NSW. Repeated surveys undertaken in 2022 indicate that there is about a seven to 10 per cent overall difference in traffic volume between the 2021 and 2022 traffic surveys (refer section 2.2.2). These differences have been accounted for in the development and calibration of the base traffic models.

It is noted that strategic traffic modelling used to generate future demands in 2031 and 2046 includes consideration of future transport patterns that have arisen following the COVID-19 pandemic (including remote working).

2.3 Assessment methodology

2.3.1 Understanding future context

Land use assumptions used to inform traffic growth estimates were adopted from preliminary 2022 population trends to assist in calculating future travel patterns for the study area. Key datasets that informed these assumptions include but are not limited to:

– NSW Common Planning Assumptions Population Projections (DPE)
– Sydney Housing Supply Forecasts (DPE)
– Victoria University Employment Projections
– Future Employment Development Database.

The Sydney Strategic Traffic Forecasting Model (STFM) uses these inputs to predict traffic demand for each horizon year, and was then used to develop a detailed traffic model and test prospective road designs.

A review of strategic planning documents was also conducted to understand the future growth context for the study area. This review identified the planned transport infrastructure changes in the surrounding transport network as well as planned changes in land use that would impact travel demand in the area. Further details of the future context review are provided in Appendix A. The future traffic demand has been sourced from the STFM, which contains the peak hour demand matrices and assigns trips to the current and future networks. STFM assumptions on future population and employment estimates in the study area have been informed by TZP19 Hybrid (Travel Zone Projections 2019 Hybrid), an interim land use projection.

Future traffic estimates were developed for the following two design years based on the above model outputs:

– **2031**: the assumed opening year of the proposal
– **2046**: about 15 years after opening, considered to be the ‘ultimate design year’, which corresponds to the period when future growth in Wilton and the surrounding region is anticipated to be realised.

These design years were adopted for the purpose of traffic modelling and estimating future traffic performance under the BAU scenario and the proposal scenario.

After competition of the traffic modelling, the TZP22 land use projection was finalised and made available for sensitivity modelling. Generally, the TZP22 forecasts have similar demand forecasts to TZP19 Hybrid, with some locations showing an increased demand. To ensure the proposed design is robust, a sensitivity analysis of the design model using the TZP22 land use projection has been conducted for the 2046 design horizon. The results of this sensitivity analysis are discussed in section 8.1.5 of this report.

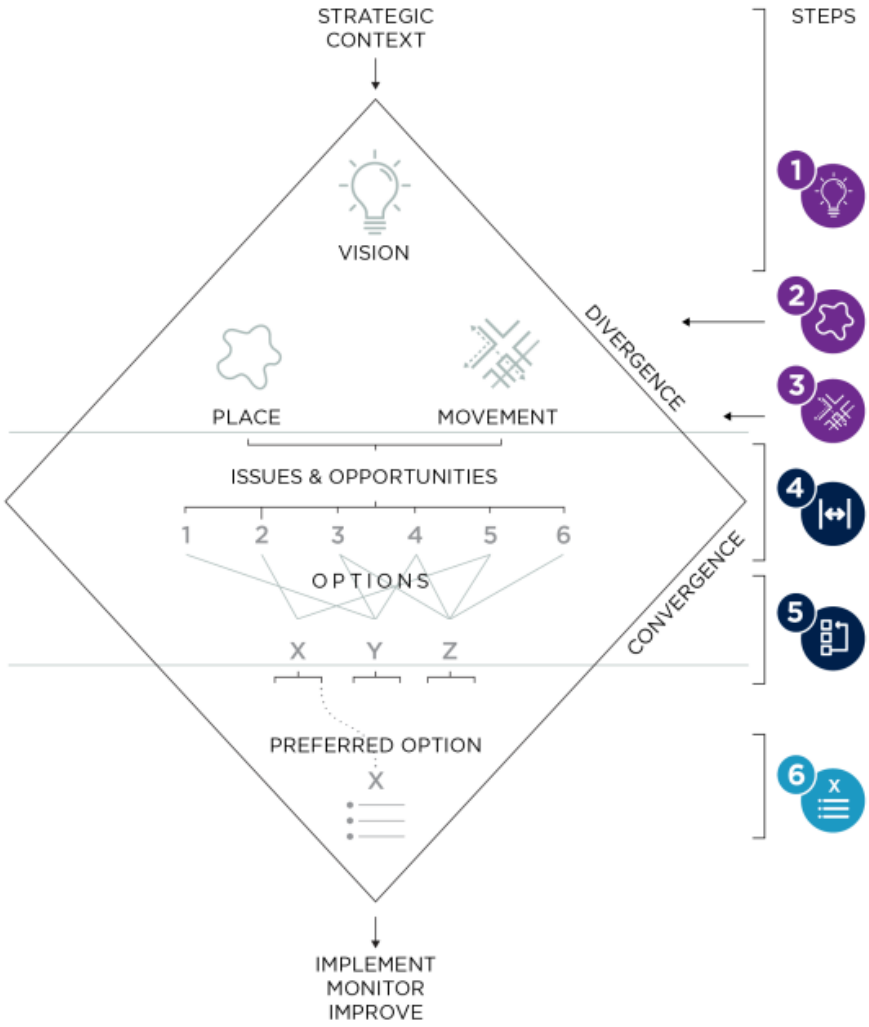
2.3.2 Movement and Place assessment

A desktop Movement and Place assessment has been undertaken, generally in accordance with the *Practitioner's Guide to Movement and Place* (Transport for NSW, 2023). The Movement and Place assessment was based on a high-level analysis, leveraging the structure and planning for the Wilton Growth Area, as identified in *Wilton 2040: A plan for the Wilton Growth Area* (DPE, 2018) (Wilton 2040). It has been undertaken specifically to document the function of Picton Road in the context of Wilton 2040. No stakeholder engagement was undertaken as part of this analysis.

The Movement and Place assessment broadly involved the steps illustrated in Figure 2.5 and outlined below:

– Step 1: Vision and evaluation criteria
– Step 2: Understand place
– Step 3: Understand movement
– Step 4: Issues and opportunities
– Step 5: Develop options
– Step 6: Preferred option.

Refer to Appendix A for more detail regarding the future land use and transport context and the Movement and Place assessment.



Source: Practitioner's Guide to Movement and Place website (Transport for NSW, March 2023)

Figure 2.5 Movement and Place six-step process

2.3.3 Traffic modelling performance measures

The traffic modelling results are presented at three levels of detail, namely:

- **Network:** a series of results indicating the level of road network congestion, including Vehicle Travel Time (Hours Travelled) (VHT), and Vehicle Speeds in order to compare scenarios globally
- **Corridor**: considers travel time on Picton Road through the proposal site from Nepean River bridge to MacArthur Drive
- **Intersection**: considers the detailed operational performance at key intersections, such as average delay and level of service.

Network performance

Table 2.6 summarises the network-level statistics that the Aimsun traffic model generates for each model run. The results are presented for the second hour of each modelled peak to represent the worst-performing hour of each peak period.

Table 2.6 Aimsun network-level statistics

Indicator	Unit	Description
Traffic demand	vehicles (veh)	Total hourly traffic input into the model
Vehicle kilometres travelled (VKT)	kilometres (km)	Total distance travelled by vehicles within each evaluation hour
Vehicle hours travelled (VHT)	hours (h)	Total travel time travelled by vehicles within each hour
Average vehicle delay	seconds (sec)	The total delay experienced by all vehicles divided by the number of vehicles
Latent demand	number of vehicles (no.)	The total number of vehicles that could not (yet) enter the network due to congestion at the end of each evaluation hour
Average network travel speed	km/h	The average vehicle speed in the network

Density plots

The traffic modelling outputs from Aimsun are visualised as density plots. The density plots provide a visual indication of congestion points in the road network. Vehicle density, measured in vehicles per kilometre (veh/km), shows how closely spaced vehicles are in a particular road section:

– Low densities indicate that vehicles are spaced further apart and have more freedom to move, which generally indicates higher or more stable travel speeds and higher vehicle flows.
– High densities indicate locations of higher traffic congestion, which generally indicates lower average speeds and lower traffic flows).

The range of densities are represented by a spectrum of colours from green (low density) to red (high density) and are shown spatially in a map of the road network. It is important to note that density plots do not provide information on the length of vehicle queues.

Travel time

Average travel times were extracted from the Aimsun traffic model for travel along Picton Road, between the northern end of the Nepean River Bridge and the intersection at MacArthur Drive, in both directions. Travel times are inclusive of all sources of delay, including congestion along Picton Road and time spent waiting at intersections and the interchange.

Level of Service

A qualitative measure called level of service (LoS) is used to describe the operational performance of a road facility. LoS uses a set of letters from A to F to denote different levels of congestion of a corridor or network, with ‘A’ representing the best performance (i.e., free flow) and ‘F’ representing the worst (i.e., forced or breakdown flow). LoS ‘D’ is generally adopted as the acceptable lower-limit threshold for major traffic-carrying roads.

The LoS of intersections are determined based on average delay reported by the traffic model. For signalised intersections, the volume-weighted average LoS is reported. For priority-controlled intersections (e.g. give-way or stop control), the LoS of the worst performing movement is reported. LoS criteria based on the *Guide to Traffic Generating Developments* (RMS, 2002) is summarised in Table 2.7.

Table 2.7 LoS criteria for intersections and average delay threshold

LoS	Average delay per vehicle (sec/veh)	Intersection control	
		Traffic signals, roundabouts	Give way, stop sign
A	<14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity, at signals, incidents will cause excessive delays, roundabouts require other control modes	At capacity, requires other control mode
F	>70	Over capacity, unstable operation	Over capacity; unstable operation

Source: Guide to Traffic Generating Developments (RMS, 2002)

2.3.4 Construction traffic impact assessment

The assessment of the potential impacts of the proposal during the construction phase was undertaken based on current construction and staging assumptions. The assessment included a series of intersection models prepared using SIDRA Intersection modelling software version 9.1 ('SIDRA') to determine the impact of construction activities on the M31 Hume Motorway, Picton Road and the key intersections within the proposal site. The key tasks undertaken for the construction impact assessment are described below.

Construction staging

The proposal is anticipated to be constructed over about three years in five stages (see section 6.1), which would require varying traffic management arrangements. The proposed staging of works was reviewed to understand the local traffic conditions along Picton Road and at the interchange with the M31 Hume Motorway for each stage, including likely construction activities, road and lane closures, and intersection controls for adoption in modelling scenarios.

Construction traffic generation

The proposal would generate light and heavy vehicle traffic throughout the construction period. Construction traffic estimates were provided for:

– Construction traffic, including waste and spoil vehicles, comprising heavy vehicles operating regularly throughout the construction period, with movements occurring between 7am and 6pm.
– Deliveries including light and heavy commercial vehicles (i.e. rigid trucks). It is noted that these deliveries would occur typically between 10am and 3pm, outside of the peak period of traffic on Picton Road and the M31 Hume Motorway.
– Construction workforce travel, which is predominantly cars and other light vehicle trips at the beginning and end of each work day and parking at the site compounds.

The peak hourly traffic generation due to construction activities was included in traffic modelling for the construction stages.

Construction site access

The proposed arrangements for site access during the construction period were reviewed to understand key haulage routes in the external network, including the origin of construction materials, as well as local access routes for construction traffic entering and exiting site compounds and work areas. Details of the proposed construction compound access and parking locations are provided at section 6.4.

Construction traffic performance assessment

Traffic modelling was undertaken to determine the performance of key intersections along Picton Road during the various construction stages. The approach taken to construction traffic modelling differs from the operational assessment (described in section 2.3.4) as it was undertaken using SIDRA, which considers peak hour performance of individual intersections, rather than Aimsun, which is capable of modelling entire road networks. This is due to the localised impact of construction works on specific intersections along Picton Road.

Intersection performance in SIDRA is represented through the following key parameters:

– average delay, in seconds per vehicle
– LoS, based on average delay as described in section 2.3.3
– queue length, 95th percentile queue length in metres
– degree of saturation (DoS), the ratio of traffic demand to capacity.

The intersections modelled are listed in Table 2.8. It is noted that some intersections modelled are subject to developer funded works.

Table 2.8 List of modelled intersections

Intersection name	Modelled as	Subject to developer funded works
Picton Road/Western Developer Road	Individual intersection	Yes
Picton Road/Wilton Park Road	Individual intersection	Yes
Picton Road/M31 Hume Motorway (W)	Networked intersections	No
Picton Road/M31 Hume Motorway (E)	Networked intersections	No
Picton Road/Janderra Lane	Individual intersection	No
Pembroke Parade/Oxenbridge Avenue	Networked intersections	No
Picton Road/Pembroke Parade/Greenway Parade	Networked intersections	Yes
Picton Road/Almond Street	Individual intersection	No

The proposed intersection layouts modelled using SIDRA for each construction stage are documented in Appendix B.

Different stages of construction are anticipated to generate varying levels of traffic activity. For a conservative assessment of the potential impacts of the proposed construction works, the key intersections were assessed based on the maximum anticipated construction traffic activity, superimposed onto 2031 forecast traffic volumes for the Picton Road/M31 Hume Motorway interchange.

Assessment of construction impacts on road users

The assessment of construction impacts on road users, including impact on private vehicle traffic, impact on public transport and impact on heavy vehicles, was undertaken primarily based on the outcomes of the traffic performance assessment. In addition, a qualitative assessment of the potential impact on walking and cycling, impact on local traffic access, impact on road safety and impact on parking was also undertaken and is documented in this report.

Assessment of construction impacts on the M31 Hume Motorway

The construction impacts on the M31 Hume Motorway was determined using a first-principles assessment of the road/lane capacity.

Future hourly traffic volumes along the M31 Hume Motorway were estimated by applying a multiplier to the 2022 traffic counts. The estimated 2031 hourly traffic volumes were then used to check the capacity of the M31 Hume Motorway during construction.

The Highway Capacity Manual, as referenced in *Austroads Guide to Traffic Management Part 3* (AGTM Part 3, 2020) indicates a motorway capacity of 1,700 passenger car units (pcu) per hour per lane. With potential speed

limit reductions during construction, a lane capacity of 1,000 pcu per hour per lane was adopted for the assessment. To account for the different impacts of light and heavy vehicles in the traffic mix, traffic volumes were converted from 'vehicle units' to 'passenger car units' (pcu) using multipliers called passenger car equivalent (PCE) factors. This allows for the assessment of traffic volume using one homogenised unit for all vehicles. The following PCE factors were applied for the purposes of this assessment:

– 1 pcu per vehicle – Light Vehicles (Austroads vehicle classes 1 and 2)
– 2 pcu per vehicle – Heavy Vehicles (Austroads vehicle classes 3, 4 and 5)
– 3 pcu per vehicle – Large Heavy Vehicles (Austroads vehicle classes 6 to 12).

2.3.5 Operational traffic impact assessment

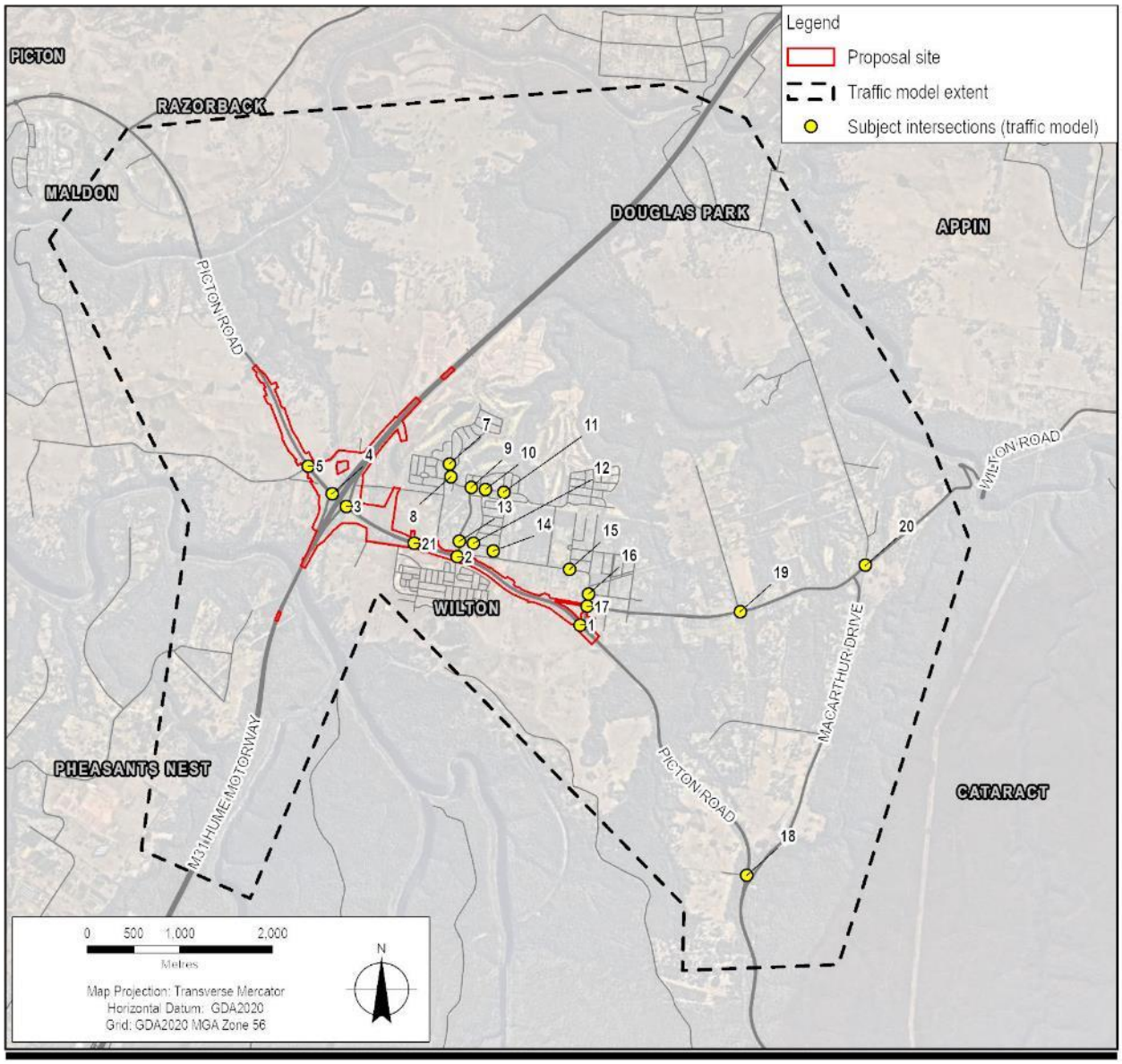
A microsimulation traffic model was developed to determine the performance of the road network under different future scenarios. This traffic model was prepared using Aimsun and was calibrated and validated based on existing conditions as observed in 2022 (referred to as the 'base' model scenario) in accordance with the *Traffic Modelling Guidelines* (RMS, 2013).

Traffic model extents

The microsimulation model covered an area comprising the:

– northern and southern boundary of the M31 Hume Motorway
– western extension of Picton Road, from the M31 Hume Motorway up to about 1.5 kilometres to the west of the Nepean River
– eastern extension of Picton Road, from the M31 Hume Motorway up to about 900 metres south of the intersection of Picton Road and MacArthur Drive.

Figure 2.6 shows the traffic model network extents and the intersections included in the model. The intersections included in the traffic modelling analysis are listed in Table 2.9.



Note: the subject intersection for traffic modelling comprises of the greater road network surrounding the study area of the TTIA. The intersection names and intersection IDs for the traffic modelling network described in this figure are different from the TTIA key intersections as described in Table 2.1.

Figure 2.6 2022 existing traffic model network coverage

Table 2.9 Intersections in the model study area

ID	Intersection name	Intersection control
1	Picton Road/Almond Street	Priority
2	Picton Road/Pembroke Parade/Greenway Parade	Priority
3	Picton Road/M31 Hume Motorway (southbound on and off ramp)	Signalised
4	Picton Road/M31 Hume Motorway (northbound on and off ramp)	Signalised
5	Picton Road/Wilton Park Road	Priority
6	Not used	Not used
7	Fairway Drive/Kirkwood Chase/Stirling Drive	Roundabout
8	Sutton Crescent/Kirkwood Chase	Priority
9	Greenbridge Drive/Pembroke Parade	Roundabout
10	Greenbridge Drive/White Street	Priority

ID	Intersection name	Intersection control
11	Beatty Street/Greenbridge Drive	Priority
12	Chisolm Street/Oxenbridge Avenue	Priority
13	Pembroke Parade/Oxenbridge Avenue	Roundabout
14	Hornby Street/Beatty Street	Priority
15	Hornby Street/Broughton Street	Priority
16	Almond Street/Fitzroy Street	Priority
17	Almond Street/Argyle Street	Priority
18	Picton Road/MacArthur Drive	Priority
19	Ashwood Road/Wilton Road	Priority
20	Douglas Park Drive/Wilton Road	Priority
21	Picton Road/Janderra Lane	Priority

Note: The intersections for the traffic modelling network are different from the TTIA key intersections as described in section 2.2.2.

Traffic model development

The Picton Road base model was developed as a new, stand-alone model and developed having regard to the following:

– existing road alignment and intersection configurations
– available surveyed traffic counts at key intersections and surveyed travel time along the key corridors as described in section 2.2
– separate traffic demand inputs for light vehicles, rigid trucks, and articulated trucks
– existing posted speed limits and school zone speed limits within the Picton Road study area
– existing bus routes based on current timetables
– intersection operation and delays, including vehicle give-way behaviour/gap acceptance and incorporating traffic signal settings based on Sydney Coordinated Adaptive Traffic System (SCATS) phase plans and offset plans (where signalised)
– modelled traffic performance calibrated against observed queue lengths and travel times for the peak weekday network conditions in accordance with the *Traffic Modelling Guidelines* (RMS, 2013).

The models were developed to represent two-hour peaks in both the AM and PM peak traffic periods:

– weekday AM peak period - 6.15 to 8.15am
– weekday PM peak period - 3.30 to 5.30pm.

Traffic modelling assumptions

The traffic assessment documented within this report has been undertaken based on the following assumptions:

– Supplied traffic adequately reflect existing conditions and forecasts, which includes the following:
  - intersection turning count data
  - SCATS signal data
  - surveyed travel time data
  - surveyed queue length data
  - surveyed tube count data.
– STFM outputs provided by Transport for future years 2031 and 2046 are deemed to reflect all future year traffic demand sources within the modelled area. This includes forecast traffic demands for the Wilton Growth Area (refer Appendix A, section A-1) along with background traffic growth for roads within the study area.
– 80 per cent concept design drawings were considered as the reference for future year traffic model geometry coding for key intersections along Picton Road corridor as well as within the wider road network covered in the traffic model extents.

– Detailed design drawings for Picton Road and Pembroke Parade intersection were used to develop the traffic model at these intersections.

The traffic modelling analysis undertaken for the operational traffic impact assessment has also assumed that the M31 Hume Motorway would be widened in the future to three lanes in each direction to the north of the Picton Road/M31 Hume Motorway interchange. The timing of motorway widening works would be subject to further investigation and planning proposals. In addition, there are other network upgrades required to be delivered as part of the Wilton 2040 growth plan, which have been incorporated in the traffic assessment. Refer to Appendix A-2 for details of the future network upgrades.

The future widening of the M31 Hume Motorway has been assumed to be provided in the 2046 BAU and Proposal Case scenarios (see below) for the purpose of traffic modelling. Sensitivity runs have been undertaken to consider a scenario that the widening of the M31 Hume Motorway does not occur in this timeframe.

Modelled scenarios

Microsimulation models were prepared for the following scenarios:

– The **Base Case scenario** was developed to represent current conditions experienced on the road network using available surveyed traffic counts at key intersections and travel time along key corridors in accordance with the criteria stated in the *Traffic Modelling Guidelines* (RMS, 2013).
– The **BAU 2031** and **BAU 2046 scenarios** include the committed local network upgrades within the model study area, including road upgrades anticipated in the Wilton Growth Area. The scenarios provide an assessment of the future traffic network performance when no major interventions are introduced on Picton Road and the Picton Road/M31 Hume Motorway interchange. These scenarios are intended to represent the future transport network without the proposal.
– The **Proposal Case 2031** and **Proposal Case 2046 scenarios** consider the proposed upgrade, including the new Picton Road/M31 Hume Motorway diverging diamond interchange (DDI) and Picton Road widening and carriageway upgrades, in addition to the committed local network upgrades which are included in the BAU scenarios.

Further detail on the inclusions in the both the BAU and Proposal Case models are provided in Appendix A (section A-2-1) and in section 5 respectively.

Speed reduction along Picton Road

The 2031 and 2046 Proposal Case scenarios assume a speed limit reduction along Picton Road, between Pembroke Parade and the future western developer intersection (refer to Table A.1), from the existing 80 kilometres per hour to 60 kilometres per hour. This is intended to facilitate safe movements on the proposed DDI, and to reduce safety risks, particularly with increased urbanisation of the road environment and in anticipation of the future land use changes surrounding the proposal site.

2.3.6 Assessment of other potential impacts

Public transport, walking and cycling

The availability and coverage of public transport services and walking and cycling networks were reviewed as part of the desktop assessment. Availability and access to public transport services and facilities were checked based on the following catchment distances:

– 400 metres, representing the approximate average distance covered by a five-minute walk
– 800 metres, representing the approximate average distance covered by a 10-minute walk
– 1,200 metres, representing the approximate average distance covered by a 15-minute walk.

The availability and connectivity of walking and cycling facilities were reviewed using publicly available maps of the networks obtained from the following sources:

– Built environment indicators web map (Transport for NSW)
– Cycleway Finder (Transport for NSW)

– Google Maps / Google Street View
– Trip Planner (Transport for NSW).

The potential impacts on public transport, pedestrians and bicycle riders were determined by assessing how the traffic generated by the proposal would potentially interact with existing and future facilities.

Heavy vehicles

An understanding of heavy vehicle movements along Picton Road was obtained by reviewing the traffic volume data collected between 2021 and 2022, and secondary data (freight data) as published on Transport's website and Open Data portal.

Suitable heavy vehicle access routes were identified using Transport's Combined Higher Mass Limits (HML) and Restricted Access Vehicle (RAV) Map, which identifies roads and routes that are approved to carry heavy vehicles of varying mass and size.

Road safety

An assessment of road safety was undertaken by analysing historical road crash data in the proposal site. The assessment was based on crash data from 2018 to 2022 as published by the NSW Centre for Road Safety and as provided by Transport. The assessment inspected the degree of crash and location of crashes and the type of movements involved in the crashes.

Resilience

The impact of the proposal on network resilience for planned and unplanned events has been undertaken based on a first principles basis, based on the increase in traffic lane capacity and intersection performance based on the traffic modelling analysis.

3. Existing environment

This section describes the existing transport environment and traffic conditions currently experienced by road users.

3.1 Land use

The existing land uses surrounding the proposal include low density residential to the north-east of the Picton Road/M31 Hume Motorway interchange, and generally rural areas to the west and south. The area is subject to significant future development as part of the Wilton Growth Area. Further information about existing and future land uses is provided in section 6.11 of the REF.

3.2 Road network

3.2.1 Road hierarchy

Roads within NSW are categorised in the following two ways:

– by legal classification (ownership)
– by the function that they perform (administrative classification).

Legal classification

Roads, as defined by the *Roads Act 1993*, are classified based on their importance to the movement of people and goods within NSW (as a primary means of communication). The legal classification of a road allows Transport to exercise authority of all or part of the road and to provide financial assistance to councils.

Road classifications are instituted by order of the Minister as published in the NSW Government Gazette and can fall under any of these categories: main roads, highways, freeways, controlled access roads, secondary roads, tourist roads, tollways, transitways, and state works.

Administrative classification

Management responsibility and funding allocation for roads are based on a different system called administrative classification. These classes are:

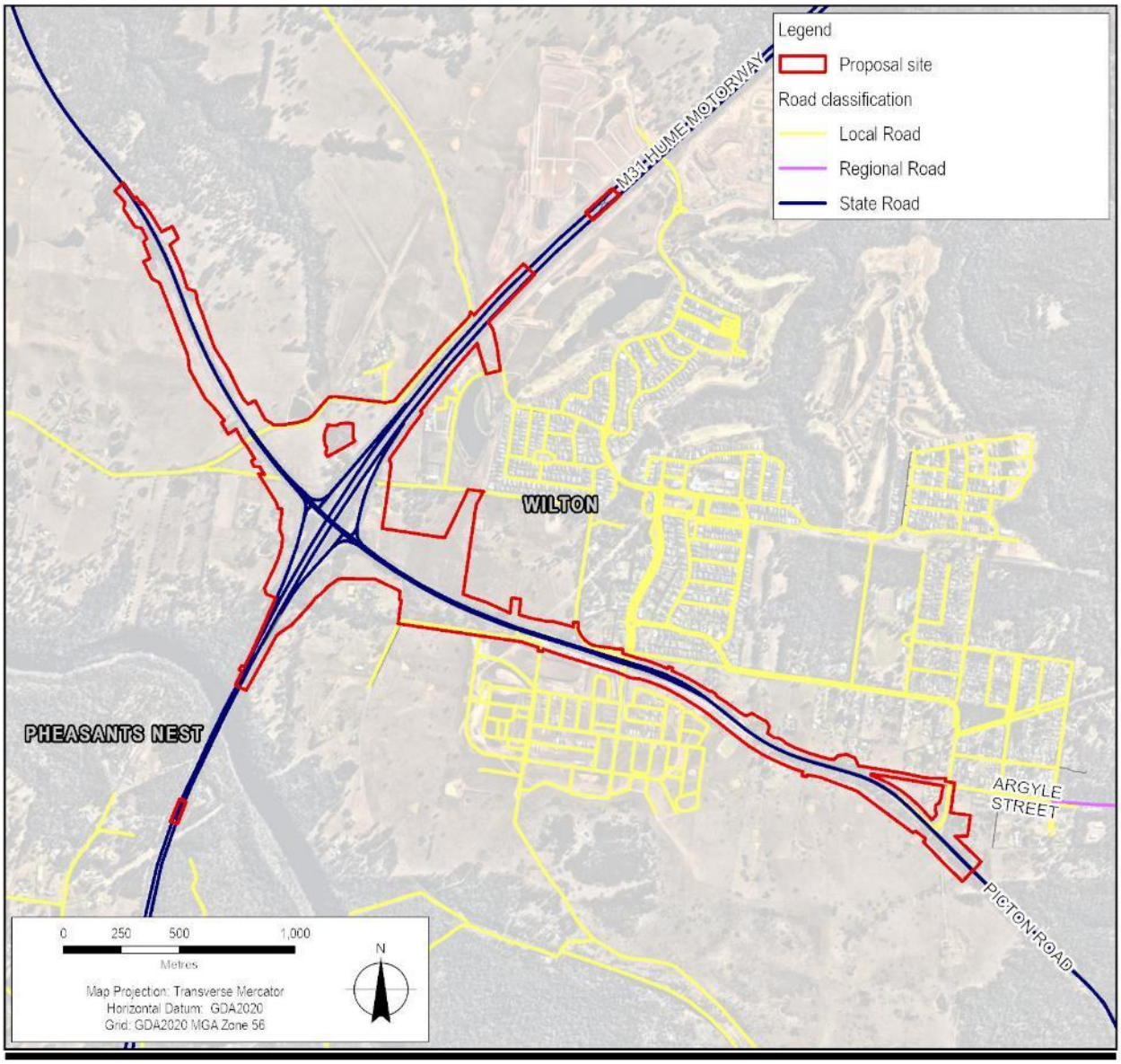
– **State roads** are major arterial links through NSW and within major urban areas. They are the principal traffic-carrying roads and fully controlled and maintained by Transport. State roads include all tollways, freeways and transitways; and all or part of a main road, tourist road or state highway.
– **Regional roads** are roads of secondary importance between state roads and local roads. Along with state roads, regional roads provide the main connections to and between smaller towns and perform a sub-arterial function in major urban areas. Regional roads are typically the responsibility of councils for maintenance funding. Traffic management on regional roads is controlled under the delegations to local government from Transport. Regional roads may form all or part of a main road, secondary road, tourist road, or other roads as determined by Transport.
– **Local roads** form the remainder of the council-controlled roads. Local roads are the responsibility of councils for maintenance funding, although Transport may fund some maintenance and improvements based on specific programs (e.g. urban bus routes, road safety programs). Traffic management on local roads is controlled under the delegations to local government from Transport.

Functional hierarchy

Functional road classification involves the relative balance of the mobility and access functions. Transport defines four levels in a typical functional road hierarchy, ranking from high mobility and low accessibility, to high accessibility and low mobility. These road classes are:

- **Arterial roads** – generally controlled by Transport, they typically have no limit in flow and are designed to carry vehicles long distance between regional centres.
- **Sub-arterial roads** – can be managed by either Transport or local council. Typically, their operating capacity ranges between 10,000 and 20,000 vehicles per day, and their aim is to carry through traffic between specific areas in a sub region or provide connectivity from arterial road routes (regional links).
- **Collector roads** – provide connectivity between local roads and the arterial road network and typically carry between 2000 and 10,000 vehicles per day.
- **Local roads** – provide direct access to properties and the collector road system and typically carry between 500 and 4000 vehicles per day.

Figure 3.1 shows a map of the administrative classification of roads within and around the study area.



Source: NSW Road Network Classifications Map and Schedule of Classified Roads (Transport for NSW) (information current as of September 2023)

Figure 3.1 Road classification within and around the study area

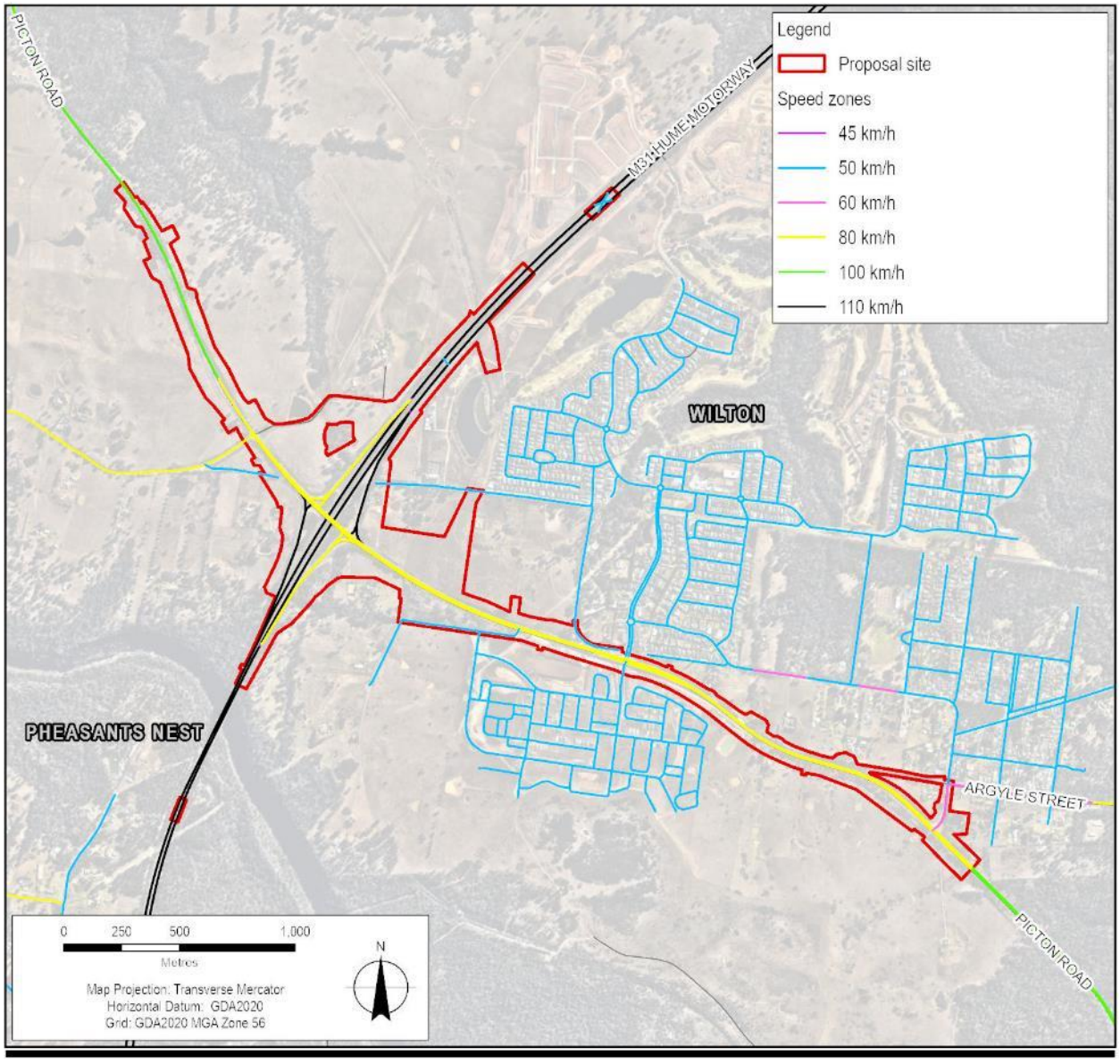
3.2.2 Speed limits

Speed management is a process where vehicle speeds are influenced to improve road safety and residential amenity. Speed management is generally achieved through the combination of engineering, education, and enforcement strategies.

Speed limits are the maximum legally permissible driving speed along a specific section of a road, as defined by the *NSW Road Rules* and the *Road Transport (Safety and Traffic Management) Act 1999*. Travelling within prescribed speeds allows the driver the opportunity to safely process and respond to potential risks in the road environment. This minimises the likelihood of road crashes, or greatly reduces their impact (i.e., injury or death) when they do occur. Figure 3.2 shows the speed limits of the different roads in the study area.

Speed limits in NSW are prescribed based on the following system:

– Default speed limits, which apply when there are no signposted limits. This is 50 kilometres per hour for urban (built-up areas), and 100 kilometres per hour for rural areas.
– Speed restrictions, which are based on vehicle or licence class.
– Speed zoning, where specific signposted limits are imposed based on several factors such as road use and characteristics, vehicle and pedestrian volumes.



Source: Speed zone data (Transport for NSW Open Data Portal, updated 2021). Information current as of September 2023, verified at site visits and desktop reviews.

Figure 3.2 Existing road speed limits

Speed limits within the study area are generally set at 80 kilometres per hour for Picton Road within the proposal site, and 110 kilometres per hour for the M31 Hume Motorway. West of Wilton Park Road/Aerodrome Drive and east of the proposal site, Picton Road has an existing speed limit of 100 kilometres per hour. The 100 kilometres per hour speed zone west of the proposal is planned to be reduced to 80 kilometres per hour prior to the opening year of the proposal to meet the updated NSW Speed Zoning Standards.

Speed advisory signage to reduce speeds to 45 to 65 kilometres per hour are implemented at the interchange ramps to maintain the safe movement of turning vehicles onto and off the M31 Hume Motorway. Other local roads in the vicinity of the study area typically have speed limits between 50 and 60 kilometres per hour.

3.2.3 Movement and Place classification

The existing Movement and Place classification for roads within the study area are described in Table 3.1. The assessment of Movement and Place is detailed in Appendix A (section A-3).

Table 3.1 Movement and Place classifications – existing

Road name	Movement function						Predominant movement type	Place intensity		
	W	C	PT	F	GT	Overall		Key places	Int	Street environment
Picton Road [W]	1	1	1	5	5	5	Through	-	A	Main Road
Picton Road [E]	1	1	1	5	5	5	Through	-	A	Main Road
M31 Hume Motorway	1	1	1	5	5	5	Through	-	A	Main Road
Wilton Park Road [W]	1	1	1	1	1	1	To/From	-	A	Local Street
Wilton Park Road [E]	1	1	1	1	1	1	To/From	-	A	Local Street
Janderra Lane	1	1	1	1	1	1	To/From	-	A	Local Street
Pembroke Parade	2	2	1	1	2	2	To/From	Wilton, Bingara Gorge	B	Local Street
Greenway Parade	1	1	1	1	1	1	To/From	Wilton Greens	A	Local Street
Almond Street	1	1	1	1	3	3	To/From	-	A	Local Street

Notes: Transport user group: W = Walking; C = Cycling; PT = Public Transport; F= Freight; GT = General Traffic
Movement Function: 1 – low movement function 5 – high movement function
Place Intensity: A – low place intensity E – high place intensity

The assessed roads generally have low existing place intensity, owing to the predominantly rural land uses and low activity surrounding the study area. Picton Road and the M31 Hume Motorway have high 'through' movement functions, with no direct access to places of interest or activity generators. As arterial roads, the primary function of both roads is to provide efficient movement of large volumes of traffic across long distances.

3.3 Road characteristics

3.3.1 State roads

M31 Hume Motorway

The M31 Hume Motorway is a significant highway, providing a key road connection between Sydney and Melbourne. It has a length of about 840 kilometres across NSW and Victoria and serves as the primary north–south link between the two states, whilst also providing a connection to Canberra. Over the decades, the M31 Hume Motorway has undergone several upgrades to respond to the needs of the growing population and economy. Today, the M31 Hume Motorway generally provides four traffic lanes.

The section of the M31 Hume Motorway in the vicinity of the study area has a total of four traffic lanes and carries about 36,000 vehicles per day for both directions of travel combined. As a major road freight corridor, it is used by about 6,000 heavy vehicles per day, which is about 17 per cent of the average total daily traffic.

Based on traffic counts conducted, traffic volumes generally begin building up at 4am in the vicinity of the study area, with no identified peak. There are generally high traffic volumes from around midday until about 4pm. Historical daily traffic volume data also show fairly consistent traffic variation throughout the week, with a prominent weekly peak on a Friday (about 18 per cent higher than the average weekday traffic volumes between Monday to Thursday) and a higher daily traffic volumes on a Sunday (about 17 per cent higher[1]).

The key characteristics of the M31 Hume Motorway are outlined in Table 3.2. Figure 3.3 shows the M31 Hume Motorway near the study area.

Table 3.2 M31 Hume Motorway key characteristics

Feature	Description
Carriageway	Two-lanes are provided in each direction separated by a wide median. Each carriageway has a travel width of about eight metres (four-metre-wide lanes). Road shoulders between two to three metres wide are provided on both sides of each carriageway.
Speed limit	110km/h in both directions within the study area.
Parking	No parking is provided within the study area.
Pedestrian facilities	No pedestrian facilities are provided along the M31 Hume Motorway near the study area.
Bicycle facilities	No dedicated bicycle facilities are provided, but the road allows for cyclists to ride along the shoulder.
Public transport	Four bus services run along the M31 Hume Motorway as described in section 3.5. There are no bus stops within the study area.

Image source: Google Street View (2022 imagery) | viewed from the Picton Road overbridge, facing south

Figure 3.3 M31 Hume Motorway

[1] Compared to average daily traffic volumes between Mondays and Thursdays.[2] Wilton 2040 (DPE, 2018)

Picton Road

Picton Road (shown in Figure 3.5) is an arterial road that spans about 35 kilometres across the LGAs of Wollondilly and Wollongong. It provides an important connection between the east coast and the growth areas of Wilton and Greater MacArthur by linking the M31 Hume Motorway and M1 Princes Motorway (another major arterial road running along the south-east coast of NSW). Picton Road is identified as a National Key Freight Route, and provides an important connection between Port Kembla and the Illawarra Shoalhaven region, and the rapidly expanding Western Sydney industrial precincts and Moorebank Intermodal Terminal. Picton Road carries about 22,000 vehicles a day, with about 23 per cent heavy vehicles.

As the road characteristics of Picton Road vary along its length, it has been divided into five assessment segments as follows (shown in Figure 3.4):

– Picton Road, west of Wilton Park Road
– Picton Road, east of Wilton Park Road and West of the M31 Hume Motorway
– Picton Road/M31 Hume Motorway interchange
– Picton Road, east of the M31 Hume Motorway and west of Pembroke Parade
– Picton Road, west of Almond Street.

The key road characteristics of Picton Road are summarised in Table 3.3. It should be noted that the Pembroke Parade intersection has recently been upgraded to a signalised intersection with three through lanes on the Picton Road east and west approaches.

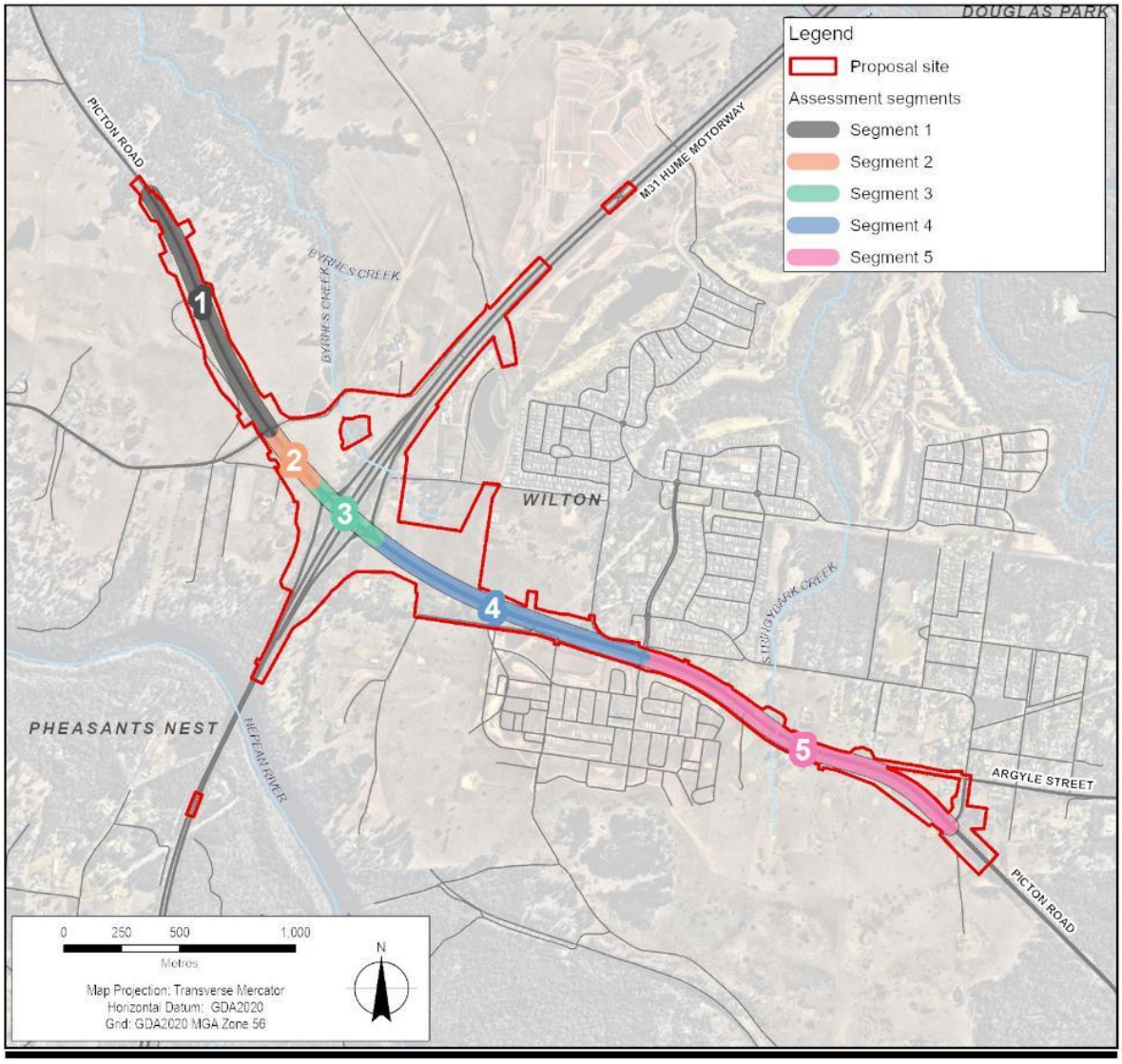


Figure 3.4 Picton Road segmentation

Table 3.3 Picton Road key characteristics

Feature			Description				
			SEGMENT 1	SEGMENT 2	SEGMENT 3	SEGMENT 4	SEGMENT 5
Carriageway[1]	East bound	Shoulder width	1.2m	1.3m	< 1.0m	3.3m	3.1m
		Travel lanes	3.5m x 2 lanes	3.5m x 2 lanes	3.7m x 2 lanes	3.7m x 2 lanes	3.7m x 1 lane
	West bound	Travel lanes	3.8m x 1 lane	3.8m x 1 lane	3.7m x 2 lanes	3.7m x 2 lanes	3.7m x 1 lane
		Shoulder width	2.5m	2.7m	1.0m	3.3m	3.1m
	Total width		14.5m	14.8m	15.8m	21.4m	13.6m
	Segment length		1,200m	380m	220m	1,320m	1,540m
Speed limit			100 km/h	80km/h for segments 2 to 5			
Parking			No parking is provided within the study area. Light and heavy vehicles have been observed to use road shoulders for parking.				
Pedestrian facilities			No pedestrian facilities are provided along the length of Picton Road within the study area.				
Bicycle facilities			No dedicated bicycle facilities are provided, but the road allows for cyclists to ride along the road shoulder.				
Public transport			There are no bus services or bus stops on Picton Road within the study area.				

Note: 1. Carriageway measurements indicate approximate widths based on desktop review. No detailed site measurements and road inventory have been conducted.

Image source: Site photos, September 2022 | (L) viewed facing east towards intersection with M31 Hume Motorway [Segment 1]; (R) viewed facing east/south east towards intersection with Almond Streeet [Segment 5]

Figure 3.5 Picton Road

3.3.2 Regional roads

Two regional roads run through the study area:

– **MacArthur Drive** is a single-carriageway road that connects Picton Road and Wilton Road. It runs an approximate north–south direction and serves as an alternative road to/from Douglas Park and Appin.
– **Wilton Road/Argyle Street** serves as the primary link between Wilton and Appin. This corridor begins at the intersection with Almond Street in Wilton and runs along an approximate northeast alignment to Appin, where it continues as Appin Road near the local town centre.

These roads typically provide one travel lane in each direction separated by double solid white lines. Road characteristics of the two roads are summarised in Table 3.4.

Table 3.4 Road characteristics – regional roads

Road name	Carriageway	Travel width	Posted speed limit	On-street parking on road shoulders	Walking and cycling facilities
MacArthur Drive	Single-carriageway road	7m (3.5m per direction)	80km/h	Not allowed	No facilities
Wilton Road/ Argyle Street	Single-carriageway road	7m (3.5m per direction)	80km/h	Not allowed	No facilities

3.3.3 Local roads

All other roads within the study area are classified as local roads and typically have two-lane carriageways catering to two-way traffic (one lane per direction). No public transport services run along these roads.

Road characteristics of the sections of the roads relevant to the TTIA are summarised in Table 3.5.

Table 3.5 Road characteristics – local roads

Road name	Carriageway	Travel width	Posted speed limit	On-street parking on road shoulders	Walking and cycling facilities
Wilton Park Road	Single-carriageway road	7m (3.5m per direction)	80km/h	Not allowed	No facilities
Pembroke Parade, north of Oxenbridge Avenue roundabout	Median-separated carriageway	3.2m per direction	50km/h	Allowed in both directions (~2.5m width)	Shared user path on both sides of the road
Pembroke Parade, south of Oxenbridge Avenue roundabout)	Median-separated carriageway	6m northbound and 3.2m southbound	50km/h	Allowed in southbound direction only	Shared user path on both sides of the road
Oxenbridge Avenue	Single-carriageway road	7m (3.5m per direction)	50km/h	Allowed in both directions (~2.5m width)	Shared user path on the northern side of the road
Almond Street, north of Wilton Road	Single-carriageway road	7m (3.5m per direction)	50km/h	Not allowed	No facilities
Almond Street, south of Wilton Road	Single-carriageway road	7m (3.5m per direction)	60km/h	Not allowed	No facilities

3.4 Heavy vehicle routes

The National Heavy Vehicle Regulator is responsible for administering the Heavy Vehicle National Law across Australia. The Heavy Vehicle National Law regulates the use of heavy vehicles on our roads to make sure that roads remain safe for all road users, to protect our road infrastructure, and to make sure that goods and passengers are being transported efficiently. To do this, heavy vehicles are classified depending on their mass, size, configuration, or a combination of the three. Vehicle classifications relevant to the TTIA are described in the following subsections.

3.4.1 General access heavy vehicles

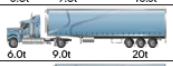
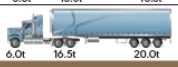
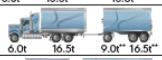
Under the national mass and loading arrangements, these are vehicles with unrestricted access to the road system, except where a road or bridge is signposted otherwise. Provided these vehicles have current registration appropriate to the vehicle configuration, no specific access restrictions apply, and no additional permits are required. Vehicles which fall within the limits described in Table 3.6 and Table 3.7 do not exceed prescribed mass and dimension limits and are therefore considered as general access heavy vehicles.

Table 3.6 General access vehicles – prescribed dimension limits

Vehicle type	Dimension limits (metres)		
	Length	Height	Width
Truck	12.5	4.3 (all vehicles)	2.5 (all vehicles)
Bus	12.5		
Truck and trailer	19.0		
Articulated vehicle	19.0		

Source: General access heavy vehicles, Transport for NSW website (information current as of September 2023)

Table 3.7 General access vehicles – prescribed mass limits

	Description	Maximum Length (metres)	Maximum Regulatory Mass under GML (tonnes)
1. COMMON RIGID TRUCKS - GENERAL ACCESS			
(a)	 2 Axle Rigid Truck	≤ 12.5	15.0
(b)	 3 Axle Rigid Truck	≤ 12.5	22.5
(c)	 4 Axle Rigid Truck	≤ 12.5	26.0
(d)	 4 Axle Twinsteer Rigid Truck	≤ 12.5	26.5
(e)	 5 Axle Twinsteer Rigid Truck	≤ 12.5	30.0
2. COMMON SEMITRAILER COMBINATIONS - GENERAL ACCESS			
(a)	 3 Axle Semitrailer	≤ 19.0	24.0
(b)	 4 Axle Semitrailer	≤ 19.0	31.5
(c)	 5 Axle Semitrailer	≤ 19.0	35.0
(d)	 5 Axle Semitrailer	≤ 19.0	39.0
(e)	 6 Axle Semitrailer	≤ 19.0	42.5
3. COMMON RIGID TRUCK AND TRAILER COMBINATIONS (General access when complying with prescribed mass and dimension requirements)			
(a)	 2 Axle Truck and 2 Axle Dog Trailer	≤ 19.0	30.0
(b)	 2 Axle Truck and 2 Axle Pig Trailer	≤ 19.0	30.0
(c)	 3 Axle Truck and 2 Axle Dog Trailer	≤ 19.0	40.5
(d)	 3 Axle Truck and 2 Axle Pig Trailer	≤ 19.0	37.5
(e)	 3 Axle Truck and 3 Axle Dog Trailer	≤ 19.0	42.5
(f)	 3 Axle Truck and 3 Axle Pig Trailer	≤ 19.0	40.5
(g)	 3 Axle Truck and 4 Axle Dog Trailer	≤ 19.0	42.5
(h)	 4 Axle Truck and 3 Axle Dog Trailer	≤ 19.0	42.5
(i)	 4 Axle Truck and 4 Axle Dog Trailer	≤ 19.0	42.5

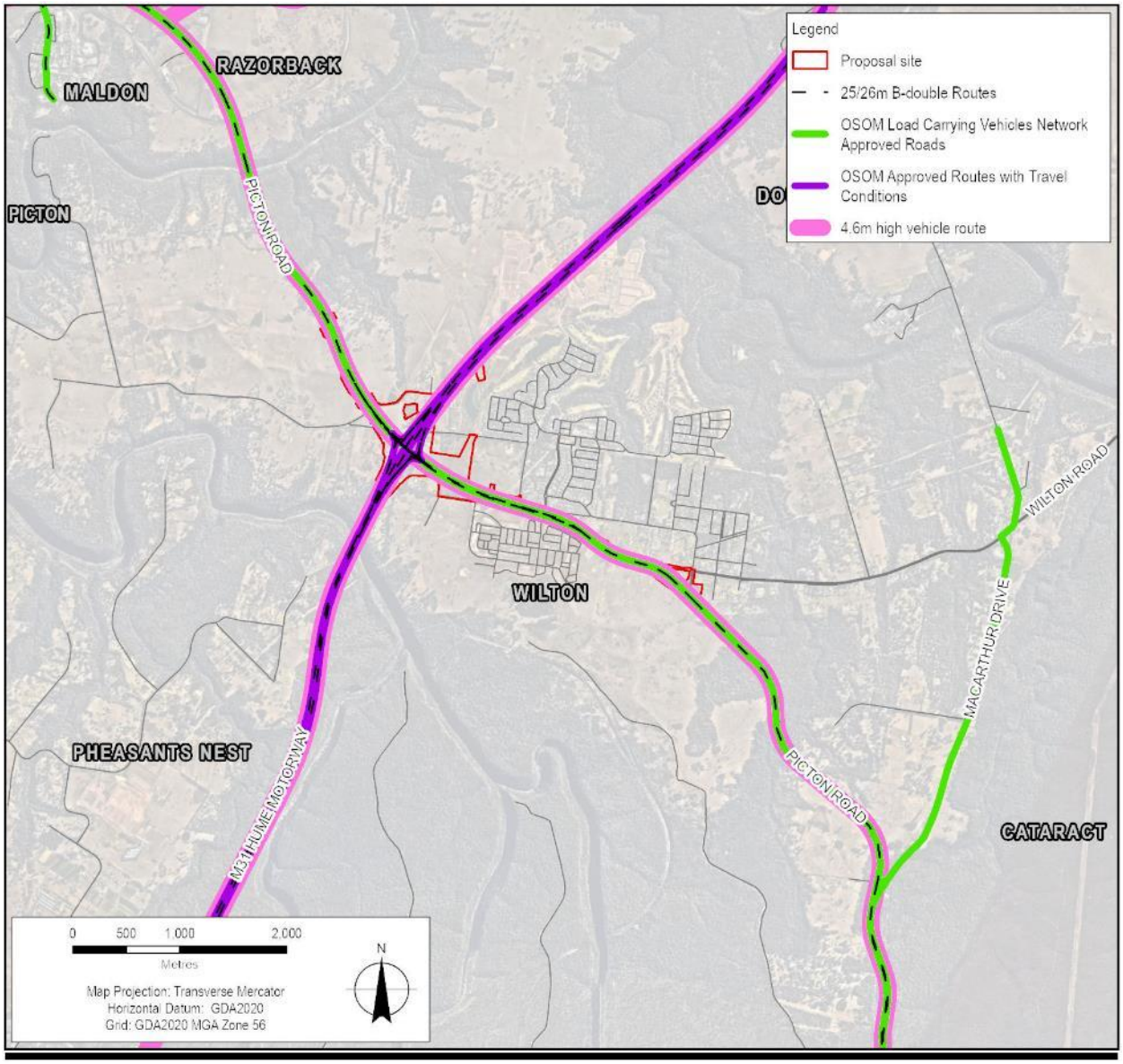
Source: Excerpt from the NHVR Common Heavy Freight Vehicle Configurations Chart (NHVR, 2017)

3.4.2 Restricted access heavy vehicles

Any single motor vehicle or combination with a combined load that exceeds the general access overall dimensions as defined in the Heavy Vehicle National Regulation is considered to be a RAV. Transport's interactive RAV map identifies the network of roads that are approved to be used by heavy vehicles of various sizes.

Figure 3.6 shows that, within the study area, the M31 Hume Motorway and Picton Road are key freight routes approved to carry up to 26-metre B-doubles and 4.6-metre high vehicles. Both roads also form part of the network of approved routes for Oversize and/or Overmass (OSOM) load carrying vehicles; however, the following travel conditions apply on the M31 Hume Motorway near the proposal site:

– OSOM vehicles are not permitted after 4.00pm on Sundays or state-wide public holidays (applicable to M31 Hume Motorway between the M5/M7 interchange at Prestons and Picton Road [north of the interchange])
– OSOM vehicles or combinations exceeding 3.5 metres wide, or 25 metres long are not permitted to travel between 8:30am and sunset on weekends or state-wide public holidays.



Source: **NSW Combined HML and RAV Map (Transport for NSW)** (information current as at September 2023)

Figure 3.6 Approved heavy vehicle routes for 26-metre B-doubles, 4.6m high vehicles, and OSOM vehicles

3.5 Public transport

Picton Station is the closest train station to the study area, located about nine kilometres to the north-west. Picton Station is located along the Southern Highlands Line of the NSW Intercity Trains Network, which connects Goulburn in the south with Campbelltown in the north.

A summary of the train services from Picton Station is provided in Table 3.8.

Table 3.8 Train services – Southern Highlands Line, operated by NSW TrainLink

Direction	Route	Day	Frequency		
			Daily	Morning peak (6-10am) [1]	Afternoon peak (3-7pm) [1]
Northbound	Goulburn to Campbelltown	Monday to Friday	22	Up to 6 trips	Up to 4 trips
		Weekends and public holidays	12	Up to 3 trips	Up to 1 trip
Southbound	Campbelltown to Goulburn	Monday to Friday	22	Up to 6 trips	Up to 5 trips
		Weekends and public holidays	14	Up to 2 trips	Up to 2 trips

Source: **Southern Highlands Line Timetable**, Transport; information current as at September 2023
Note 1: Train service peak hours, based on the **periods described on the Transport website** for the calculation of peak and off-peak fares.

Bus services (coaches) of the Regional Trains and Coaches Network run through the M31 Hume Motorway but do not stop within the study area. These services also link the cities of Campbelltown and Goulburn, with no stops between the destinations. The schedule of coach services varies from day to day, with the maximum number of trips provided in Table 3.9.

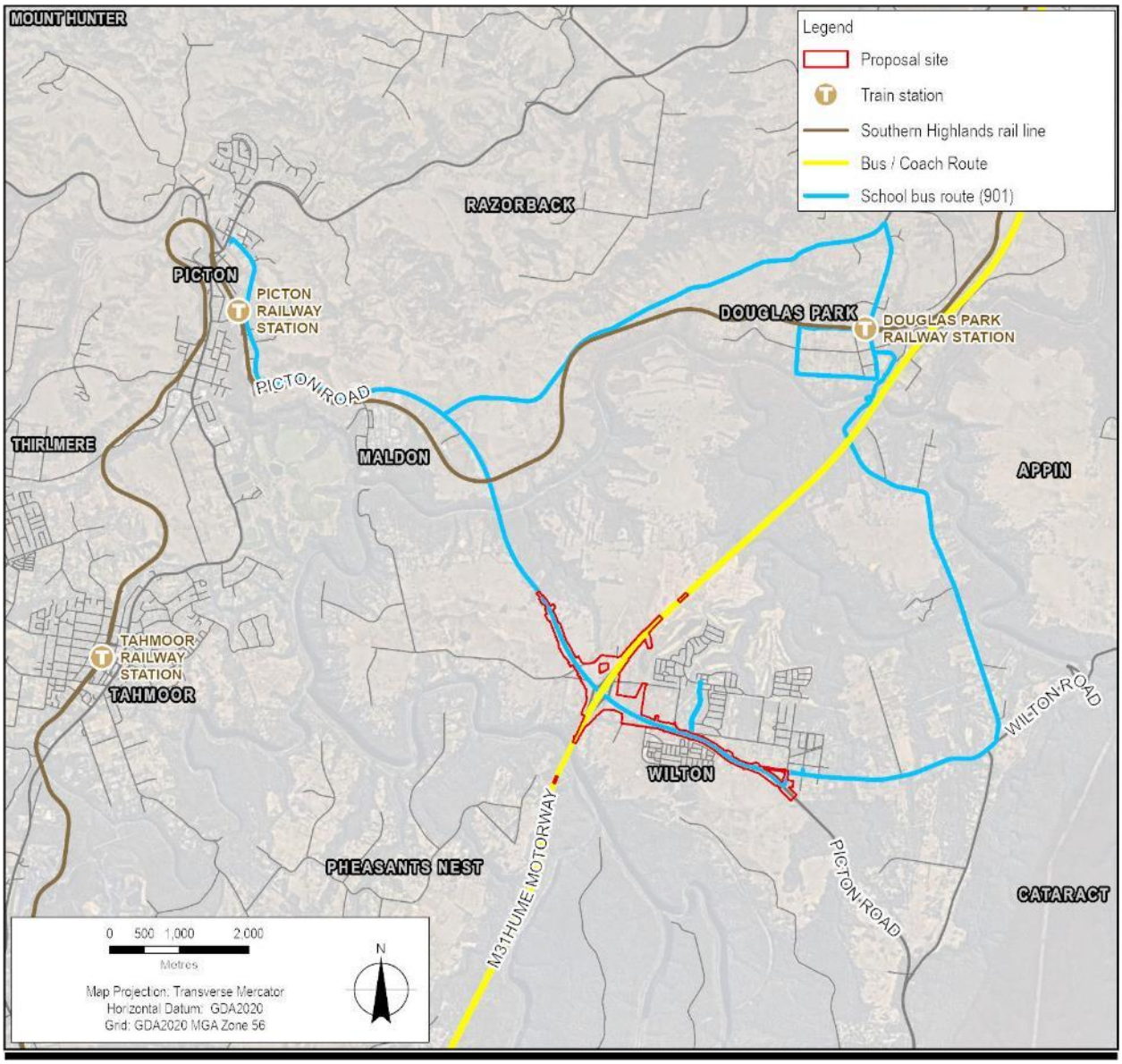
Table 3.9 Coach services – Regional Trains and Coaches Network, operated by NSW TrainLink

Route Number	Direction	Route	AM frequency	PM frequency
777	Southbound	Campbelltown to Goulburn	1 service	No services
778	Northbound	Goulburn to Campbelltown	1 service	No services
779	Southbound	Campbelltown to Goulburn	No services	1 service
780	Northbound	Goulburn to Campbelltown	No services	1 service

Source: NSW TrainLink bookings, information current as at September 2023

In addition to the public bus services listed above, there is one school bus service (route 901) operating in the Wilton area, provided by Picton Buslines for local students. This service runs from Douglas Park to Picton via Wilton. While this route uses Picton Road, it does not stop on Picton Road within the study area, rather it stops on Pembroke Parade near Bingara Estate.

A map of the existing train and coach service routes in relation to the study area is shown in Figure 3.7.



Data Source: Transport for NSW Trip Planner (information current as at September 2023)

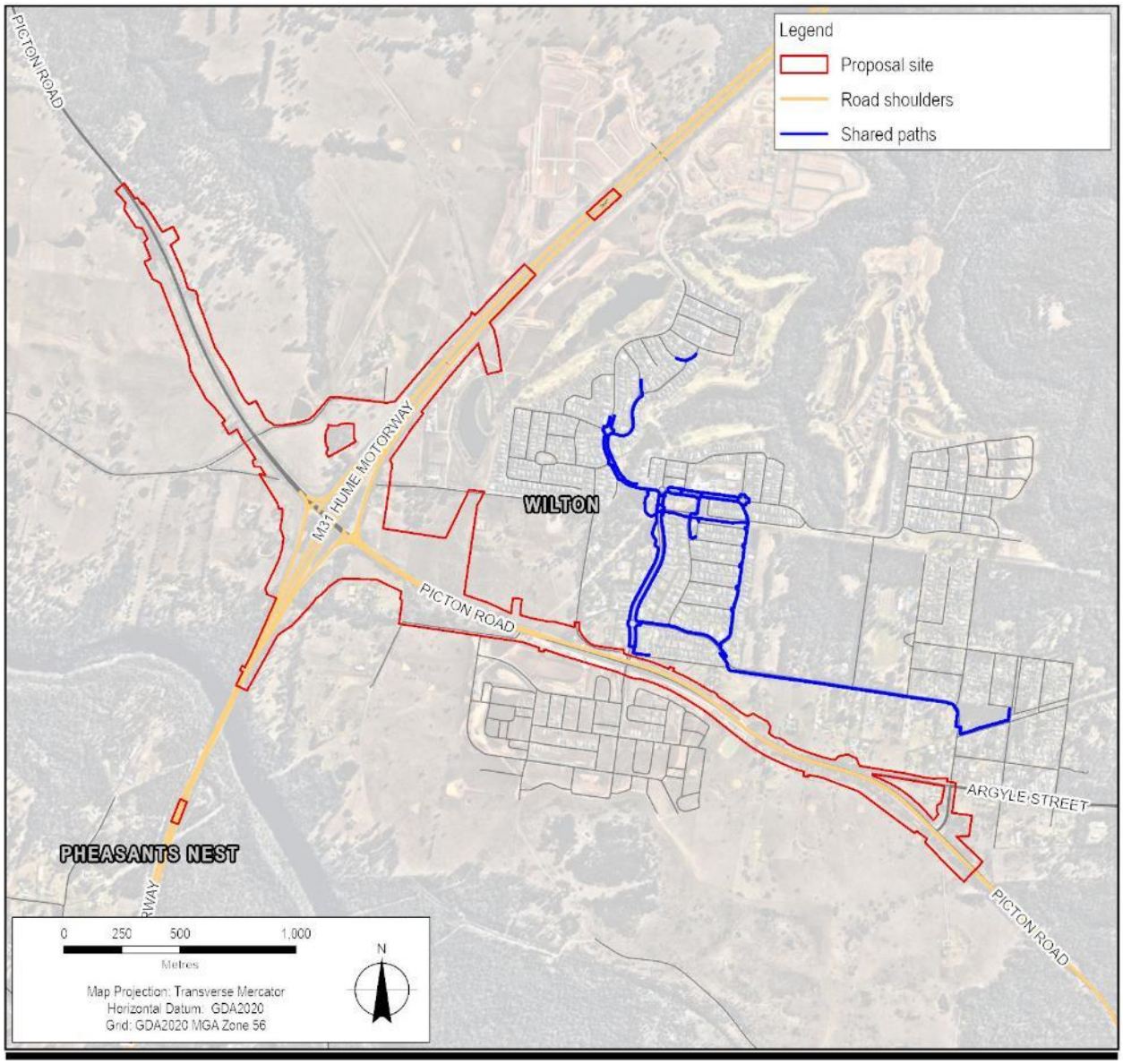
Figure 3.7 Existing public transport routes and stops

3.6 Walking and cycling

– Existing pedestrian and cycle facilities within the study area are limited due to the required travel distances, topography, and road barriers.

– There are no pedestrian facilities provided along Picton Road and the M31 Hume Motorway. The existing walking and cycling network in the study area includes footpaths and shared user paths that connect the Wilton and Bingara Gorge residential areas. These facilities are more prominent in the newer developments located in Bingara Gorge. Although no dedicated cycling facilities provided along Picton Road or the M31 Hume Motorway, cyclists are permitted to ride along the road shoulders.

Existing shared paths are shown in Figure 3.8.



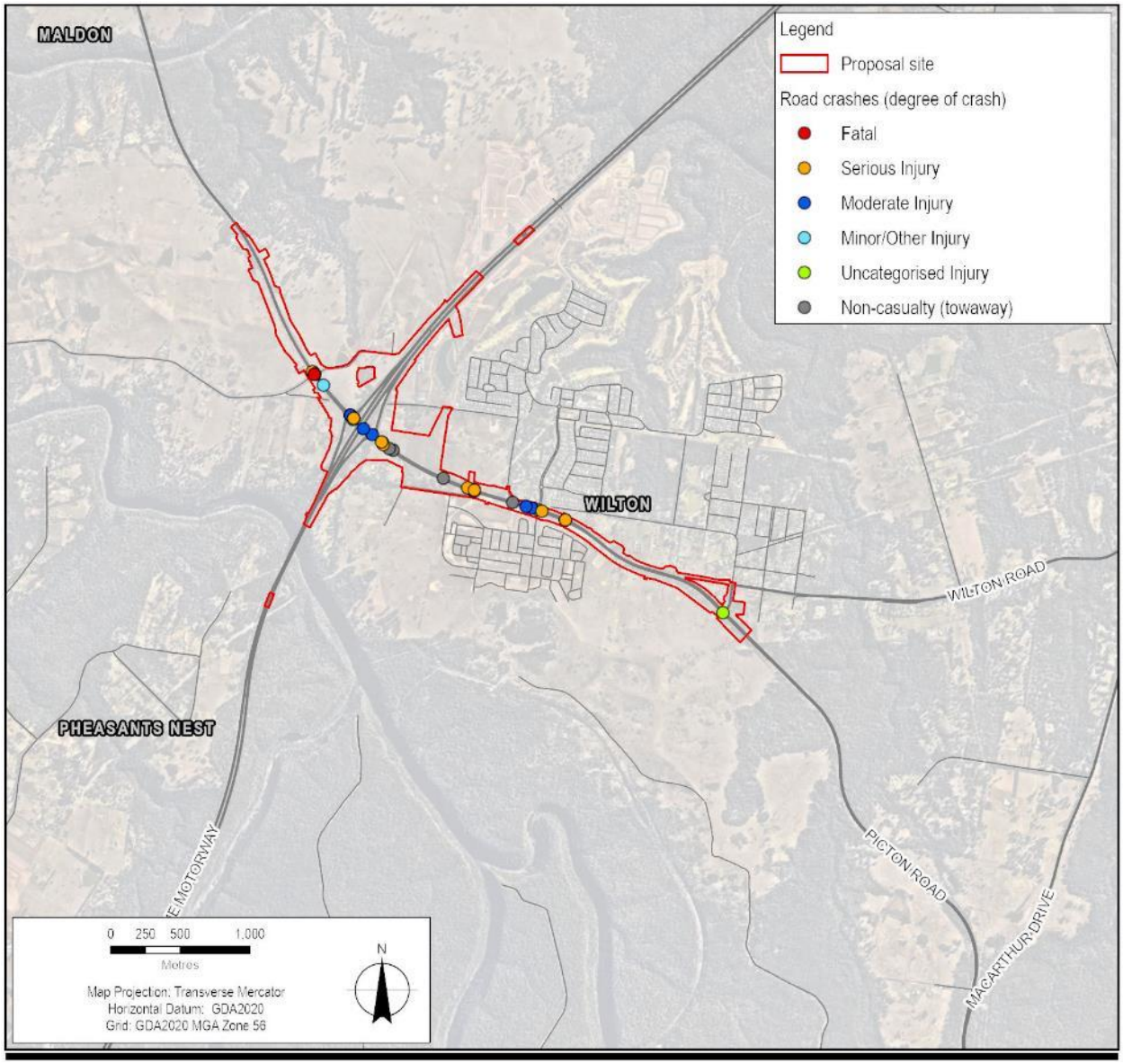
Data Source: Transport for NSW Cycleway Finder (information current as of August 2023)

Figure 3.8 Existing walking and cycling network

3.7 Road safety

Crash incident data was collected from road crash statistics published by the NSW Centre for Road Safety and from data provided by Transport. The location of these crashes and the corresponding crash severity per crash site is shown in Figure 3.9.

The section of Picton Road between Nepean River and Almond Street accounted for 33 crashes between 2018 and 2022 inclusive, resulting in an average of about 6.6 crashes per year. Twenty-three of the incidents (70 per cent) resulted in injuries, including 11 serious injuries. One fatality was also reported in 2021.



Data source: NSW Road Crash Data 2018-2022 (Transport for NSW)

Figure 3.9 Crash location within proposal site (2018-2022)

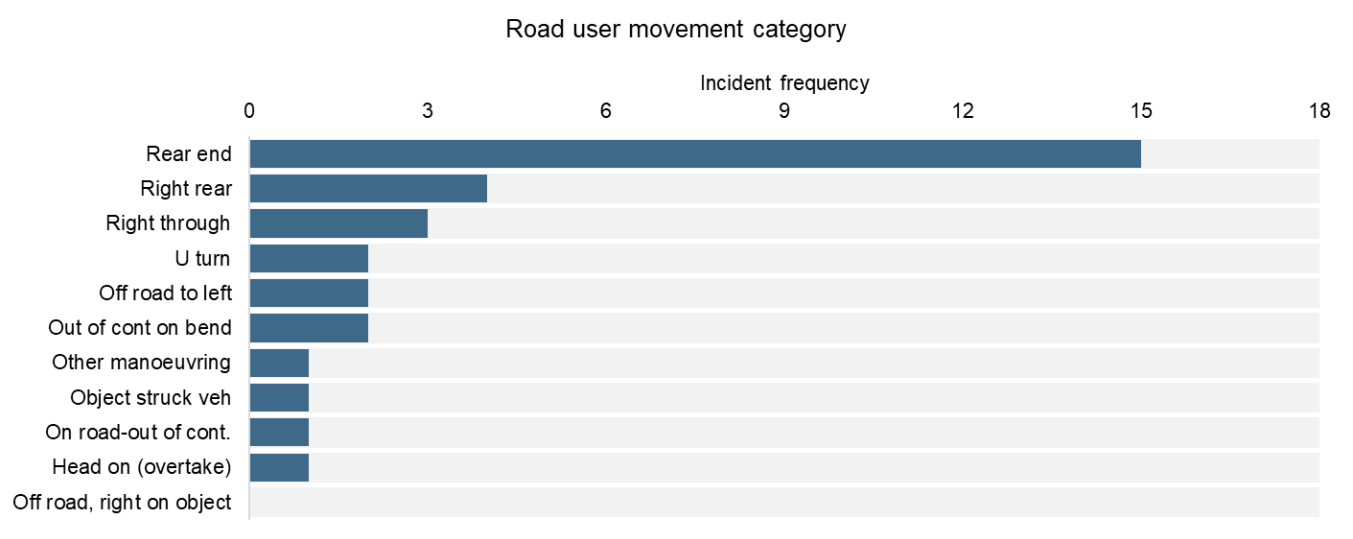
A summary of the crash data is presented in Table 3.10.

Table 3.10 Road crash incidents on Picton Road within the proposal site

Year	Degree of crash					Total
	Non-casualty (towaway)	Minor / other / uncategorised injury	Moderate injury	Serious injury	Fatal	
2018	3	2	0	2	-	7
2019	-	-	3	1	-	4
2020	1	-	3	1	-	5
2021	2	-	-	2	1	5
2022	3	2	2	5	-	12
Total	**9**	**4**	**8**	**11**	**1**	**33**

Data source: NSW Road Crash Data 2018-2022 (Transport for NSW)

Further analysis of the crash data indicates that rear end crashes make up 72 per cent of these crashes, with 19 recorded incidents (including right rear crashes). A summary of the road crash categories is provided in Figure 3.10.



Data source: NSW Road Crash Data 2018-2022 (Transport for NSW)

Figure 3.10 Incident frequency per road crash category (2018-2022)

A safe system assessment of the section of Picton Road within the proposal site identified the following key factors that impact road safety in the corridor:

– The Picton Road/M31 Hume Motorway interchange has a posted speed of 80 kilometres per hour, providing errant vehicles little opportunity to correct their movements to avoid crashes.
– The intersection has very little refuge for occupants of broken-down vehicles.
– This section of road features no pedestrian facilities such as footpaths or crossings.

3.8 Parking

No formal parking is provided along the roads in the study area, although light and heavy vehicles have been observed to park along Picton Road's shoulders on the approaches to the interchange. Secondary data from stopping duration surveys undertaken between 27 October to 8 November 2021 (12 days) indicate that, on average, about 96 vehicles stop along the road shoulders per day, which is equivalent to about 0.82 per cent of the total number of passing vehicles.

The data indicate that, on average:

– 60 per cent of the parked vehicles were light vehicles, which stayed an average of about eight minutes
– 40 per cent of the parked vehicles were heavy vehicles, which stayed and average of about 10 minutes.

The stopping duration surveys collected information on the number of stopped vehicles and the duration of stay along the road shoulder along the northern side of Picton Road, as shown in Figure 3.11. This segment of Picton Road is noted to be the widest, with road shoulders of about 3.3 metres in each direction. Only one or two vehicles were observed to stop for extended periods, de-coupling and leaving the trailer on the shoulder for a number of hours.

Stakeholders also noted two other areas that are being used for car parking in the local study area. The first is near Wilton Park Road and Aerodrome Drive, where light vehicles have been observed to remain for extended periods. This has been observed in Wilton Park Road and on the shoulder and the verge between Aerodrome Drive and the Picton Road/M31 Hume Motorway interchange. The second area is along the road shoulder on Picton Road adjacent to Almond Street, which is used by trucks travelling from Dombarton.

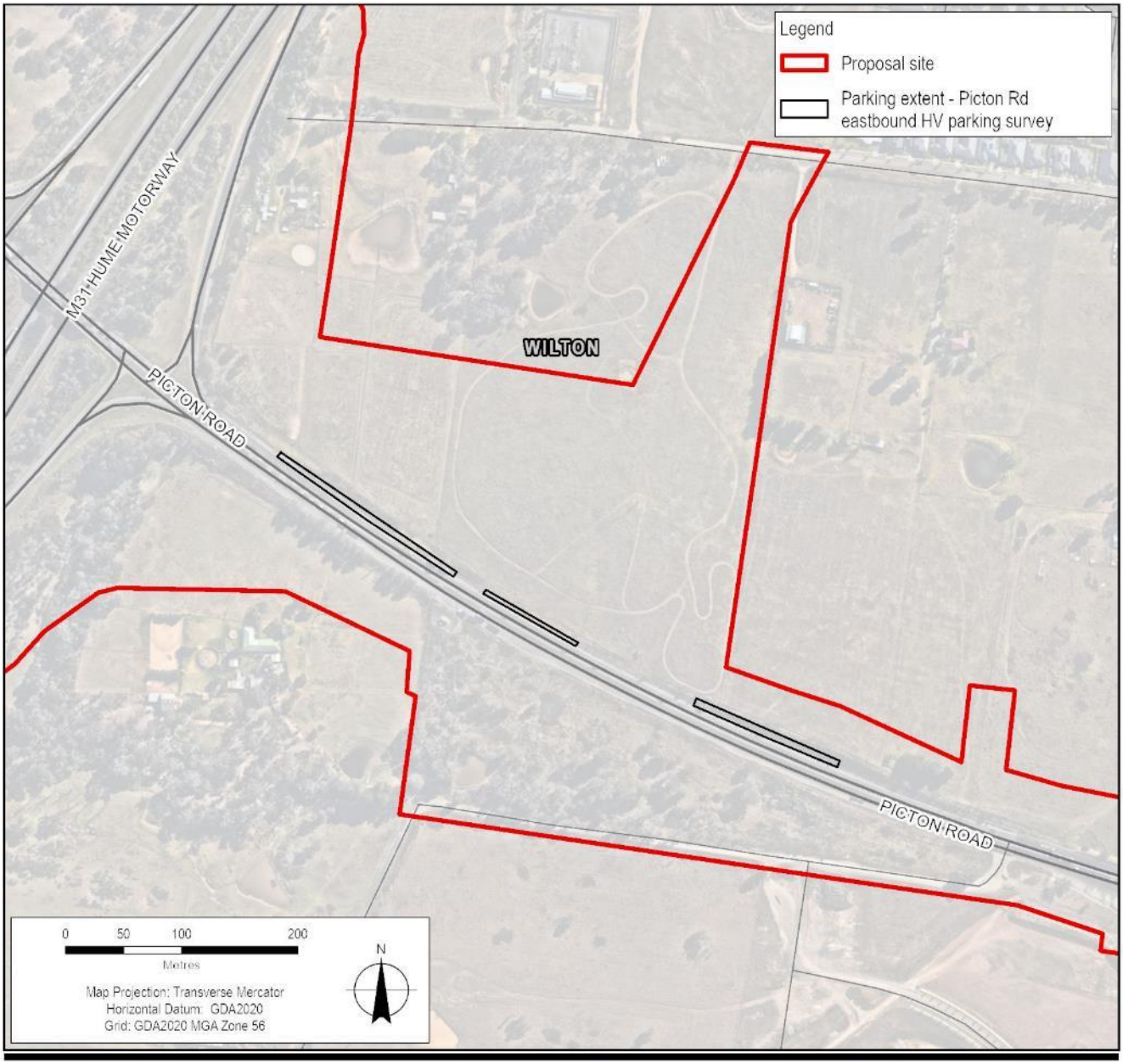


Figure 3.11 Road parking survey locations at Picton Road eastbound lane (27 October to 8 November 2021 Survey)

While addressing driver fatigue is an important component of managing vehicle road safety (particularly for heavy vehicles), parking along road shoulders can obstruct views and limit drivers' line of sight, making road users more susceptible to crashes. The presence of vehicles stopping within the road shoulders also renders the shoulders unavailable for use as emergency access and has the potential to increase crash severity and serious injuries in case of out-of-control vehicles on the carriageway.

Existing rest areas are available at the following locations:

– on the M31 Hume Motorway, about four kilometres north of the proposal site
– on the M31 Hume Motorway at Pheasants Nest, about 6.5 kilometres south of the proposal site
– on Picton Road, about six kilometres south-east of the proposal site.

3.9 Existing road network performance

3.9.1 Base traffic model

A microsimulation traffic model, representing 2022 traffic conditions, was developed using Aimsun to establish the existing (also referred to as 'base') traffic conditions. The extent of the traffic model and the list of included intersections is described in section 2.3.5. The traffic model was developed to replicate existing 2022 conditions for the following peak hour periods:

– 7.15 to 8.15am (AM peak hour)
– 4.30 to 5.30pm (PM peak hour).

Traffic performance outputs for the base model are presented in the following sections. A description and explanation of traffic modelling performance measures is provided in section 2.3.3.

3.9.2 Network performance

Table 3.11 provides a summary of the network AM peak and PM peak period 2022 base model performance. These values indicate the average network performance of the entire road network within the traffic modelling extent as shown in Figure 2.6.

Table 3.11 Base year network performance - 2022

Indicator	Unit	2022 AM peak (7.15-8.15am)	2022 PM peak (4.30-5.30pm)
Traffic demand	vehicles	5,843	5,393
VKT	vehicles	62,115	60,284
VHT	hours	800	762
Average vehicle delay	seconds	8	7
Latent demand	no.	<5	<5
Average network travel speed	km/h	80	82

3.9.3 Density plots

The density plots for the base case (2022, existing) scenario are shown in Figure 3.12. These maps demonstrate the locations of key pinch points in the road network.

It is noted that density plots within the report have been extracted from Aimsun, which only provides 'vehicle/km/lane' as its unit outputs. Manual calculations have been undertaken within the Aimsun model and determined the PCU/vehicle ratio to be about 1.3, which is deemed appropriate to apply to all density plots for the existing network and future network.

Simulated density in PCU/km/lane can be taken to be about 1.3 times the value shown on the plots above

Figure 3.12 2022 Existing performance density plots

3.9.4 Travel time

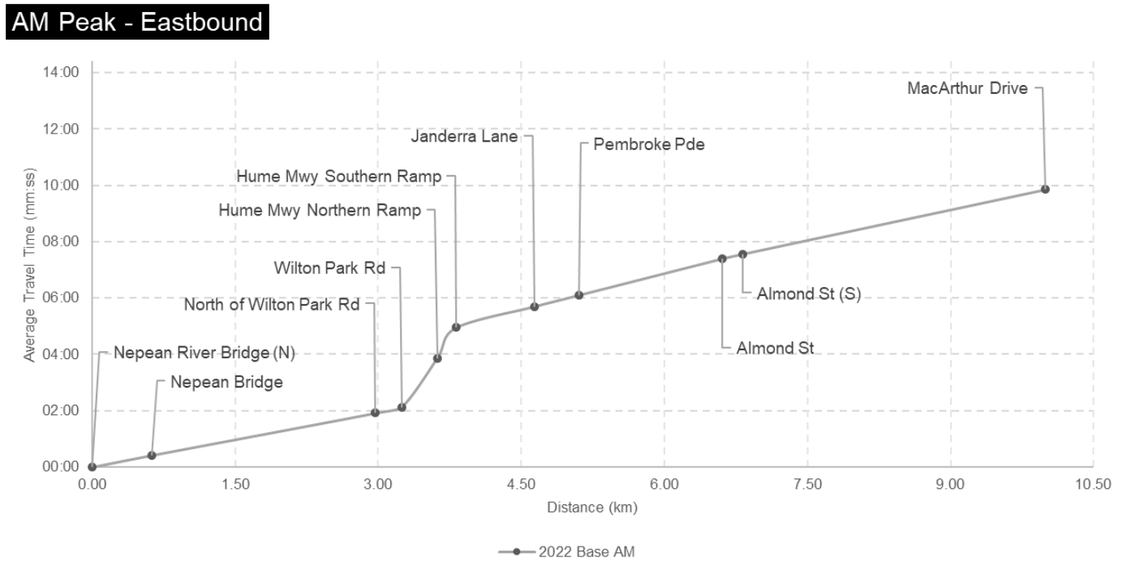
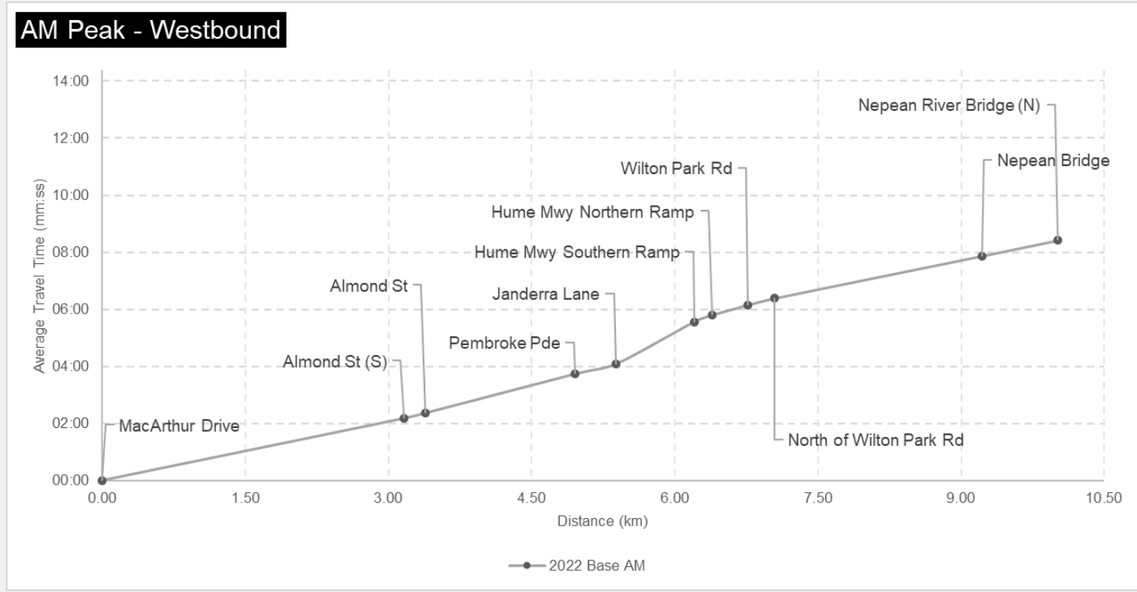
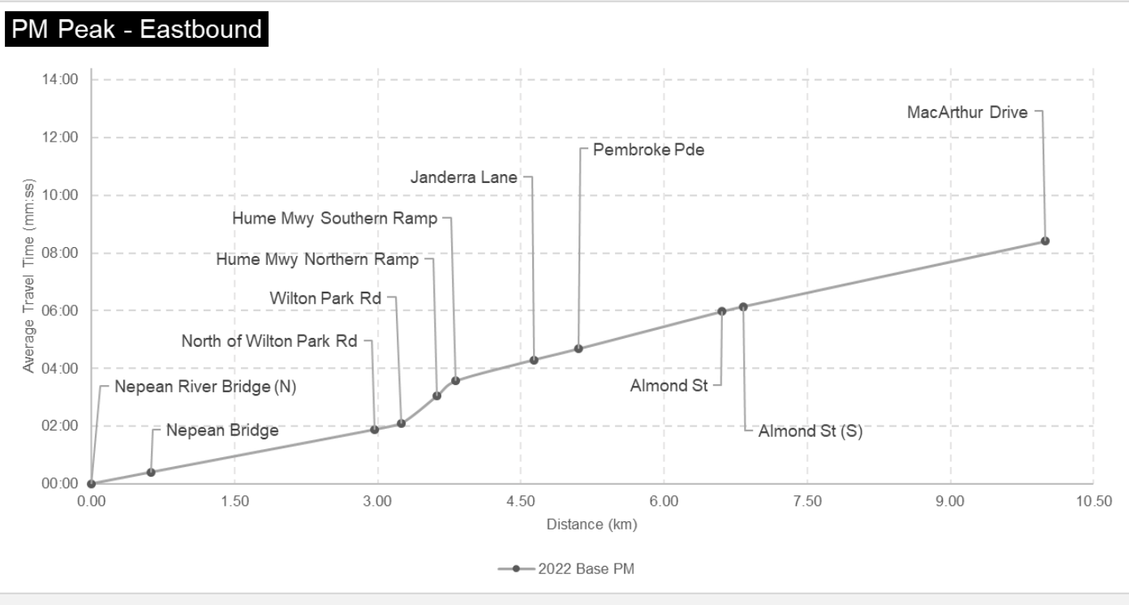
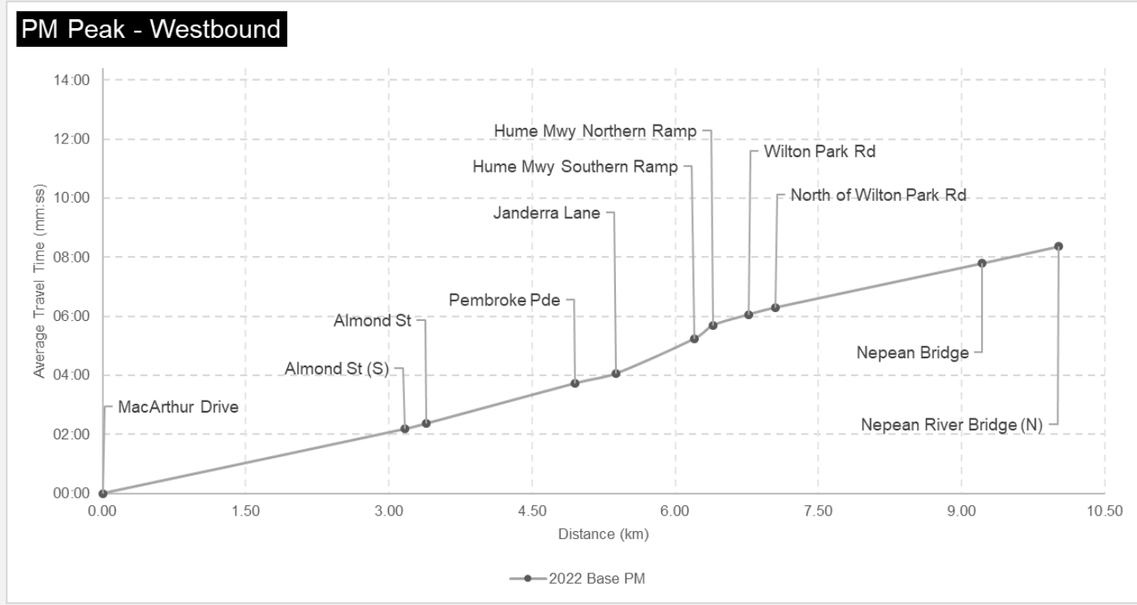
Travel times along the Picton Road corridor between MacArthur Drive and the northern end of the Nepean River Bridge have been extracted from the second peak hour of the calibrated Aimsun base model for both eastbound and westbound directions as outlined below:

– In the AM peak hour (7.15 to 8.15am):
  - an average of 10 minutes to complete the eastbound journey
  - an average of eight minutes to complete the westbound journey.
– In the PM peak hour (4.30 to 5.30pm):
  - an average of eight minutes to complete the eastbound journey
  - an average of eight minutes to complete the westbound journey.

The 2022 base case travel time plots are shown in Table 3.12. A steeper line indicates higher delays experienced by road users. The results show the highest delays along the corridor are associated with the operation of the Picton Road/M31 Hume Motorway interchange in the eastbound direction.

Table 3.12 Picton Road travel time results –2022 Base Case

2022 Base Case

	Eastbound	Westbound
AM PEAK		
PM PEAK		

3.9.5 Intersection level of service

The performance of the existing road network is largely dependent on the operating performance of those intersections which form critical capacity control points. Intersection delay and associated LoS were obtained from the base models. The existing key intersection LoS and average delay during the AM and PM peak periods (for the second hour of the modelled period) are presented in Table 3.13.

Table 3.13 Intersection LoS and average delay results – 2022

Intersection	Intersection control	Average delay (seconds) and LoS	
		AM peak hour	PM peak hour
Picton Road/Wilton Park Road	Priority	2 [A]	3 [A]
Picton Road/M31 Hume Motorway (W)	Signalised	58 [E]	50 [D]
Picton Road/M31 Hume Motorway (E)	Signalised	35 [C]	32 [C]
Picton Road/Janderra Lane	Priority	22 [B]	8 [A]
Pembroke Parade/Oxenbridge Avenue	Roundabout	13 [A]	12 [A]
Picton Road/Pembroke Parade	Priority	13 [A]	7 [A]
Picton Road/Almond Street	Priority	50 [D]	38 [C]

Legend: *LoS A* | *LoS B* | *LoS C* | *LoS D* | *LoS E* | *LoS F*

The Picton Road/M31 Hume Motorway interchange is a key constraint in the road network during both the AM and PM peak hours. Further detail on the performance of the interchange is provided in Figure 3.13 and Figure 3.14, which present the existing traffic volumes and traffic delay at the interchange.

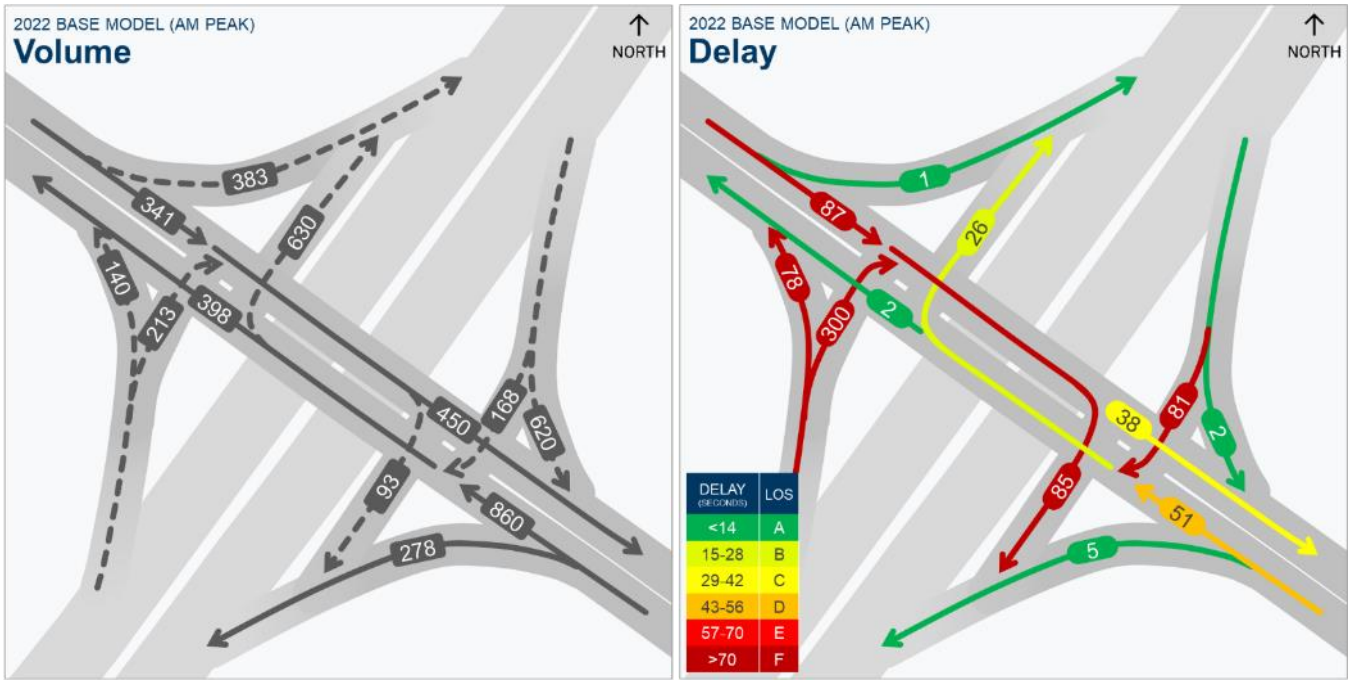


Figure 3.13 2022 AM Base Model traffic volumes and delay results

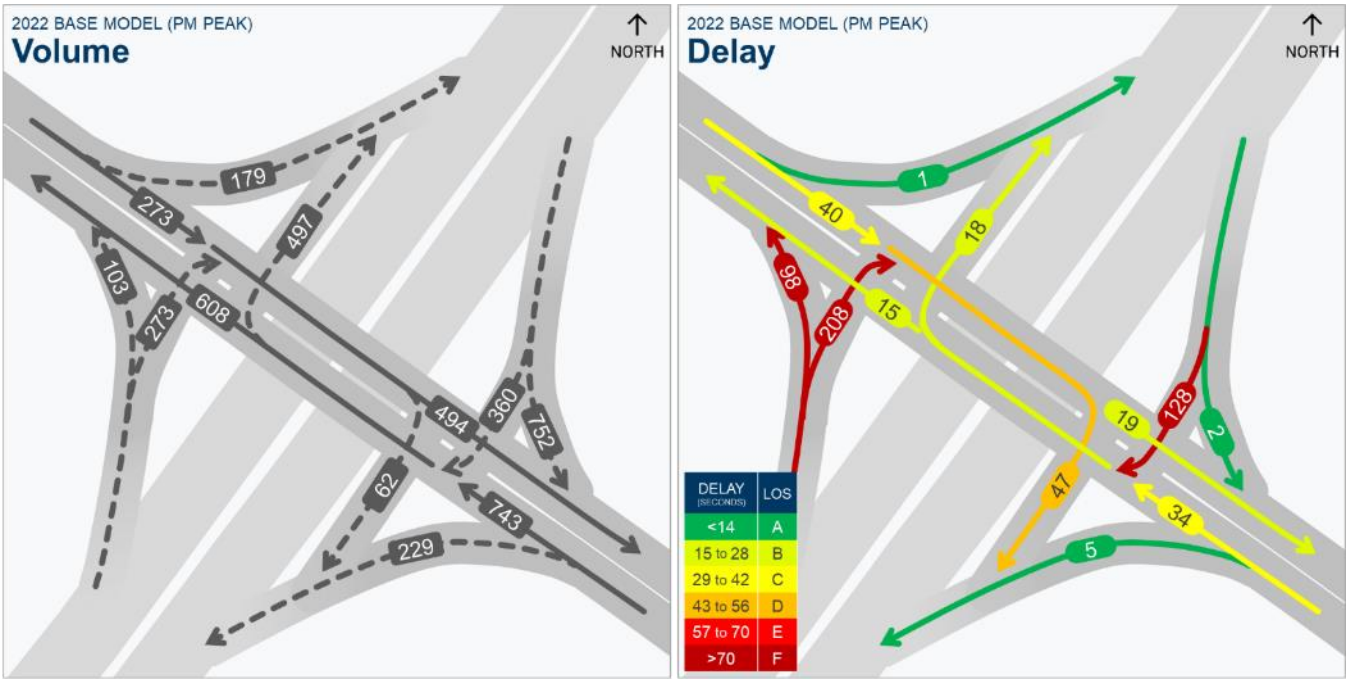


Figure 3.14 2022 PM Base Model traffic volumes and delay results

Analysis of the traffic volume data indicates that the right turn from Picton Road (westbound) to the M31 Hume Motorway (northbound) is a key movement during both peak periods, attracting about 630 vehicles per hour in the AM peak and about 497 vehicles per hour in the PM peak. This high volume movement directly conflicts with a number of other movements, including eastbound traffic on Picton Road, and right turns from the M31 Hume Motorway onto Picton Road in both directions, causing substantial delays for these movements.

4. Future traffic conditions

This section provides an assessment of the likely traffic conditions that would be experienced by users in the design years (2031 and 2046) without the proposal.

4.1 Traffic growth

The analysis undertaken for this study accounts for all contributors to traffic growth and redistribution, including the following:

– general background traffic growth informed by TZP19 Hybrid (refer Section 2.3.5), a land use projection model including future population and employment in the area surrounding the proposal site
– future development trip generation, which includes:
  - Wilton Town Centre and Wilton
  - Wilton North and West Wilton (west of the M31 Hume Motorway)
– impact of induced traffic on Picton Road due to future road widening.
– future network upgrades associated with Wilton Growth Area developer connections to and across the M31 Hume Motorway and Picton Road (refer to Appendix A-2).
– resulting redistribution of key traffic movements, associated with the above changes.

Figure 4.1 shows the forecast total traffic demand (vehicles per hour) during the peak hour periods in the Picton Road microsimulation model network. The chart shows the existing (2022) traffic demand against the future traffic demand for horizon years 2031 and 2046. The per cent growth of traffic demand for each year, compared to 2022 demand, is also indicated.

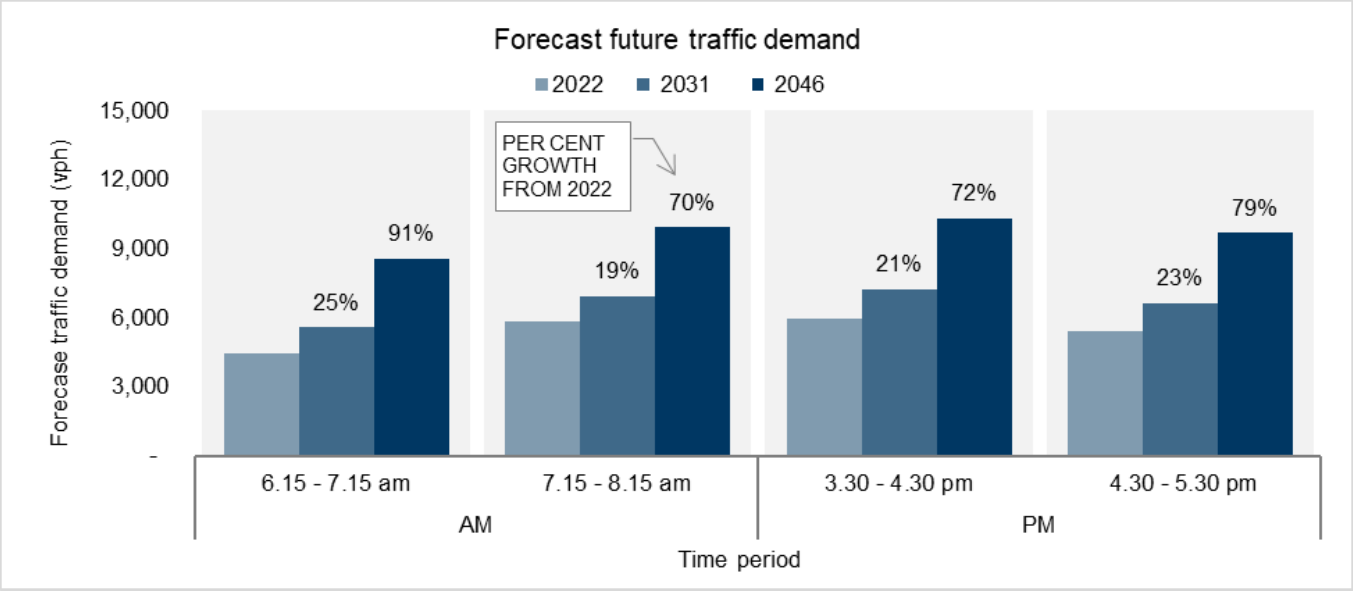


Figure 4.1 Forecast future traffic demands for traffic model

The predicted traffic growth in the modelled road network is substantial, representing about a 20 per cent increase in peak hour traffic between 2022 (existing demand) and the 2031 horizon year, and about a 70 per cent increase in peak hour traffic between 2022 (existing demand) and the 2046 horizon year.

4.2 Future Movement and Place classification

The future Movement and Place classification for roads within the study area are described in Table 4.1. The assessment of Movement and Place is detailed in Appendix A (section A-3).

Table 4.1 Movement and Place Classification (Future)

Road name	Movement function						Predominant movement type	Place intensity		
	W	C	PT	F	GT	Overall		Key places	Int	Street environment
Picton Road [W]	2	2	1	5	5	**5**	Through	-	**A**	**Main Road**
Picton Road [E]	2	2	1	5	5	**5**	Through	-	**A**	**Main Road**
M31 Hume Motorway	1	1	1	5	5	**5**	Through	-	**A**	**Main Road**
Wilton Park Road [W]	3	3	3	1	3	**3**	To/From	South East Precinct	**A**	**Local Street**
Wilton Park Road [E]	2	2	2	1	3	**3**	To/From	Future employment lands, Wilton Town Centre Precinct	**B**	**Local Street**
Janderra Lane	2	2	2	1	2	**2**	To/From	South East Precinct	**A**	**Local Street**
Pembroke Parade	2	2	1	1	2	**2**	To/From	Wilton, Bingara Gorge	**B**	**Local Street**
Greenway Parade	2	2	1	1	2	**2**	To/From	Wilton Greens	**B**	**Local Street**
Almond Street	1	1	1	1	3	**3**	To/From	South East Precinct	**A**	**Local Street**

Notes: Transport user group: W = Walking; C = Cycling; PT = Public Transport; F= Freight; GT = General Traffic
Movement Function: 1 – low movement function 5 – high movement function
Place Intensity: A – low place intensity E – high place intensity

Both Picton Road and the M31 Hume Motorway would remain as corridors for 'though' movement and function as 'Main Roads'. The Place intensity along Picton Road and the M31 Hume Motorway is not anticipated to change and would remain as low.

Notable changes compared to the existing Movement and Place assessment are outlined as follows:

– The importance of roads such as Picton Road, Wilton Park Road and Janderra Lane for walking and cycling would increase over time as the area is developed.
– Similarly, Wilton Park Road and Janderra Lane would take more of a traffic carrying function, providing for general traffic accessing future growth areas.
– There are a number of new key places including the South East Precinct and the future Wilton Town Centre Precinct.

4.3 Future traffic performance

4.3.1 Network performance

Table 4.2 provides a summary of the network-level results for the second hour of each assessed peak period for the BAU scenario.

Table 4.2 Future year network performance – BAU scenario

Indicator	Unit	2022 Base year		2031 BAU		2046 BAU	
		AM	PM	AM	PM	AM	PM
Traffic demand	veh	5,843	5,393	6,977	6,675	9,935	9,681
VKT	km	62,115	60,284	67,784	67,550	84,173	87,835
VHT	hrs	800	762	1,026	1,191	1,615	2,006
Average vehicle delay	sec	8	7	[15]	[24]	[28]	[41]
Latent demand	no.	<5	<5	<5	<5	[74]	[39]
Average network travel speed	km/h	80	82	[71]	[63]	[60]	[57]

Note: Values in highlight/brackets indicate worsening performance compared to the Base year (existing 2022)

Analysis of the results in Table 4.2 indicate that:

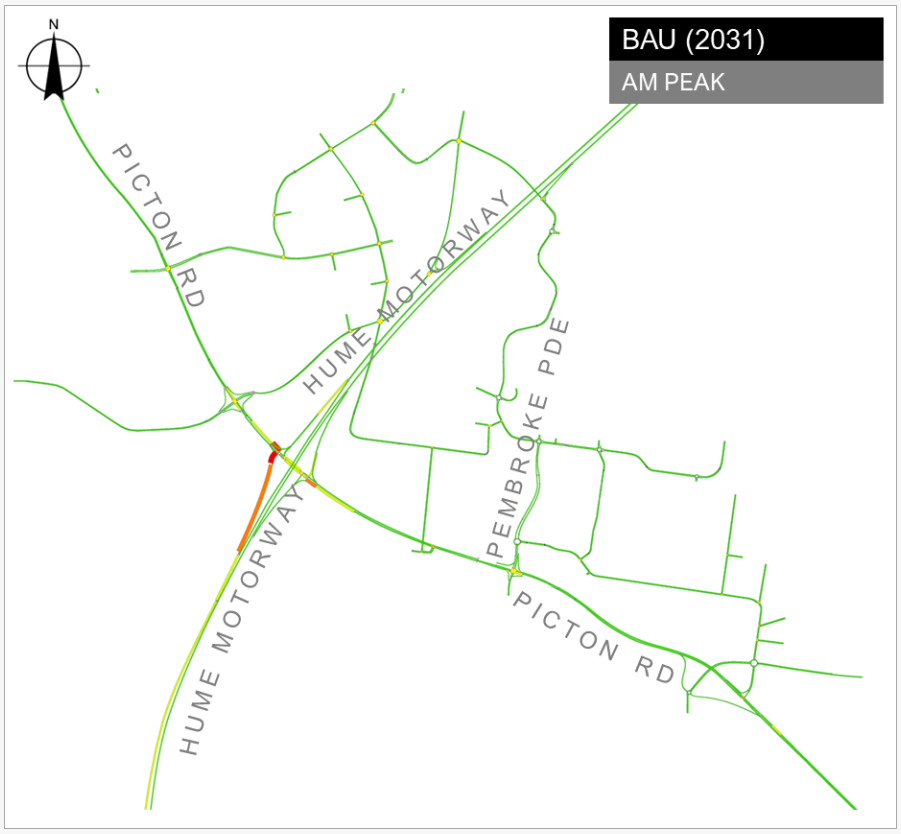
– Compared with the existing performance (base year), there is a noticeable reduction in the average vehicle speed in 2031. Average vehicle delays are predicted to increase to 15 seconds and 24 seconds during the AM and PM peak periods respectively, which indicates an increase in congestion during peak periods.
– In 2046, the existing network is predicted to have significantly higher congestion levels when compared to the base year (2022) and future year 2031.

It is noted that the assessed BAU scenarios include a comprehensive list of road infrastructure upgrades as committed projects, and as listed in Appendix A (section A-2-1). These upgrades contribute to additional network capacity within the study area, particularly with the additional ramps accessing the M31 Hume Motorway and the intersection upgrades along Picton Road.

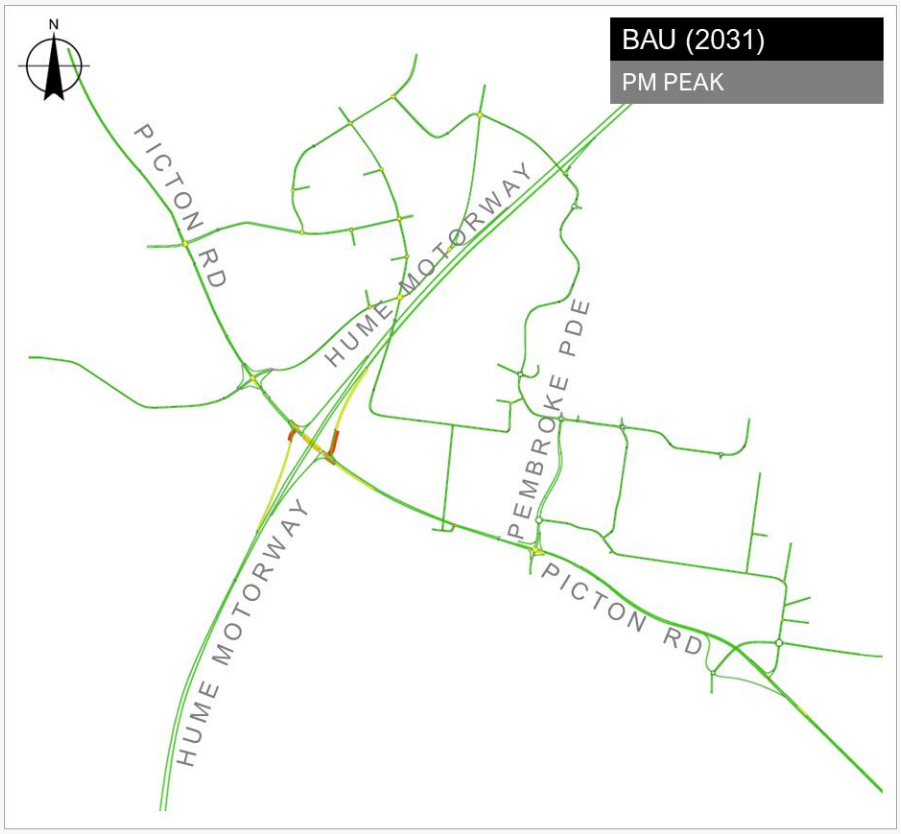
However, the traffic modelling results for the BAU scenario demonstrate that, even with those planned upgrades, the existing layout of the Picton Road/M31 Hume Motorway interchange is anticipated to be a significant road network constraint, resulting in a reduction in network performance across all the key performance metrics.

4.3.2 Density plots

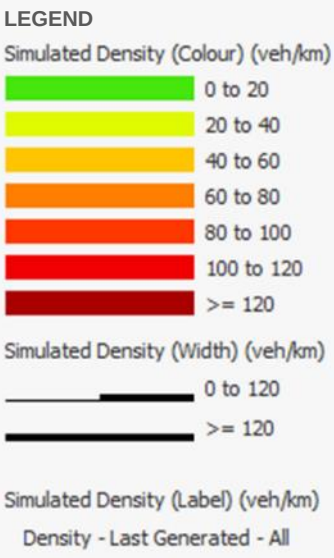
Density plots for 2031 weekday AM and PM peak period BAU scenarios are shown in Figure 4.2.



In the 2031 BAU AM peak period, congestion is predicted on the northbound off ramp and eastbound lanes. This is because most of the signal timing is allocated to the critical westbound right turn movement onto the M31 Hume Motorway, causing a long queue to form along the M31 Hume Motorway mainline.



In the 2031 BAU PM peak period, high density congestion is also predicted on the southbound off ramp due to the high demand for vehicles accessing Picton Road from the M31 Hume Motorway (e.g. from Western Sydney heading towards Wollongong).



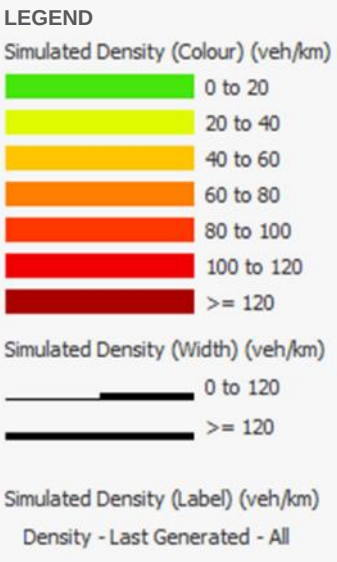
Simulated density in PCU/km/lane can be taken to be about 1.3 times the value shown on the plots above

Figure 4.2 2031 BAU density plots

Density plots for 2046 weekday AM and PM peak period BAU scenarios are shown in Figure 4.3.

In the AM peak period, queuing is predicted on Picton Road in both directions due to heavy traffic demand. Queuing is predicted on Picton Road for both directions due to heavy traffic demand in 2046 BAU AM peak.

In PM peak periods, excessive queue is predicted on Picton Road in the westbound direction due to heavy traffic demand and insufficient capacity. Long queue causing loss green time at Pembroke Parade intersection. The queue is predicted to spill back to almost MacArthur Drive intersection.



Simulated density in PCU/km/lane can be taken to be about 1.3 times the value shown on the plots above

Figure 4.3 2046 BAU density plots

4.3.3 Travel time

Travel time plots of the BAU scenario are shown in Table 4.3 and Table 4.4. A steeper line indicates higher delays experienced by road users. Analysis of the BAU scenario travel time results indicate the following:

– By 2031:
  - Travel times on the Picton Road corridor, between the northern end of the Nepean River Bridge and MacArthur Drive, are predicted to be up to 10 to 13 minutes in the eastbound and westbound directions.
  - On average, drivers are predicted to experience up to three additional minutes of travel time compared to the 2022 Base Case (section 3.9.4).
  - The steep rise in the 2031 BAU eastbound travel time graph (refer to Table 4.3) indicates that the Picton Road/M31 Hume Motorway interchange is predicted to become a pinch point in the future, with high traffic congestion predicted from Wilton Park Road when traveling towards the interchange.
– By 2046:
  - Travel times on the Picton Road corridor (between the Nepean River Bridge and MacArthur Drive) are predicted to increase significantly compared to the 2022 Base Case.
  - In the AM peak:
    – Eastbound travel is predicted to take up to 22 minutes, a 12-minute increase compared to 2022.
    – Westbound travel is predicted to take up to 13 minutes, a five-minute increase compared to 2022.
  - In the PM peak:
    – Eastbound travel is predicted to take up to 14 minutes, a six-minute increase compared to 2022.
    – Westbound travel is predicted to take up to 43 minutes, which is 35 minutes longer than the eight-minute travel time in 2022.
  - For both directions of travel, the steep areas of the line graphs are noticeable near the Picton Road/M31 Hume Motorway interchange ramps.
  - This further demonstrates that, even with the planned local road network upgrades (listed in Appendix A section A-2-1 and included in the BAU model scenario) the Picton Road/M31 Hume Motorway interchange is predicted to remain as a significant capacity constraint over the long term, if not upgraded from the existing layout.

Table 4.3 Picton Road travel time results – 2031 BAU

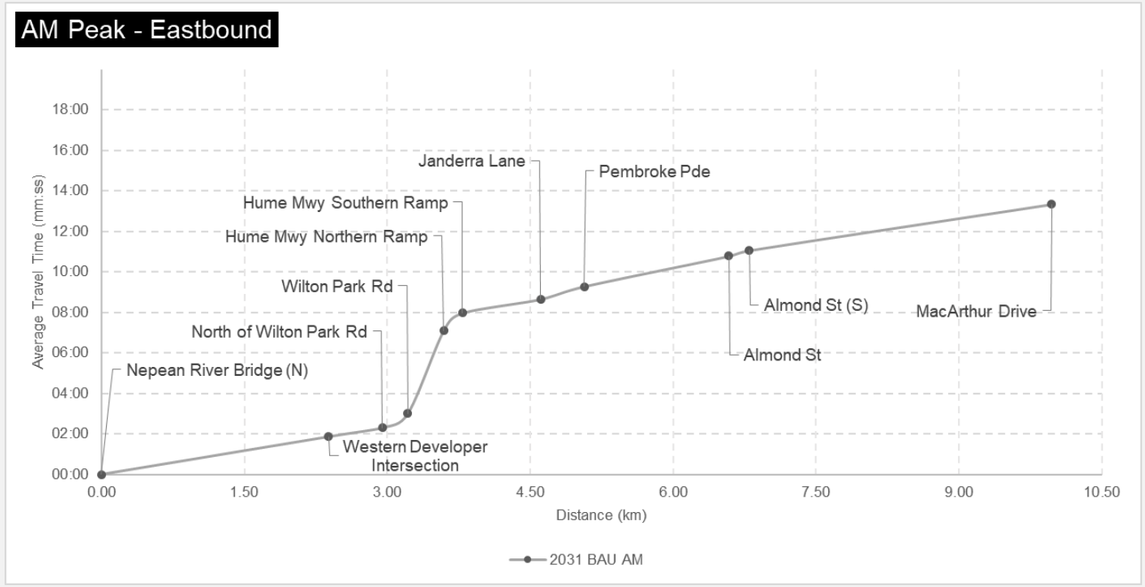
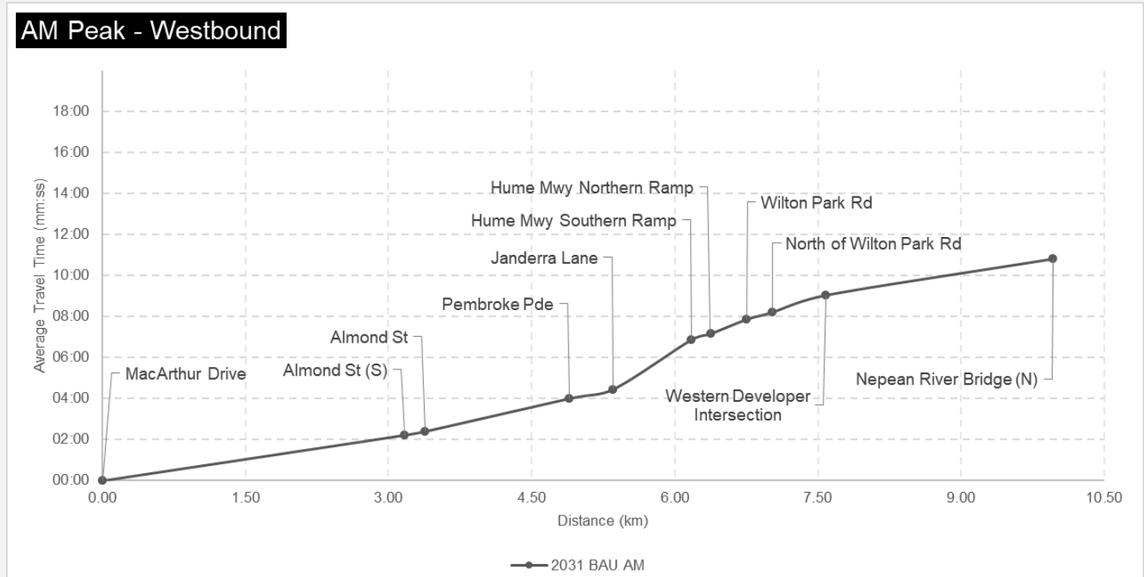
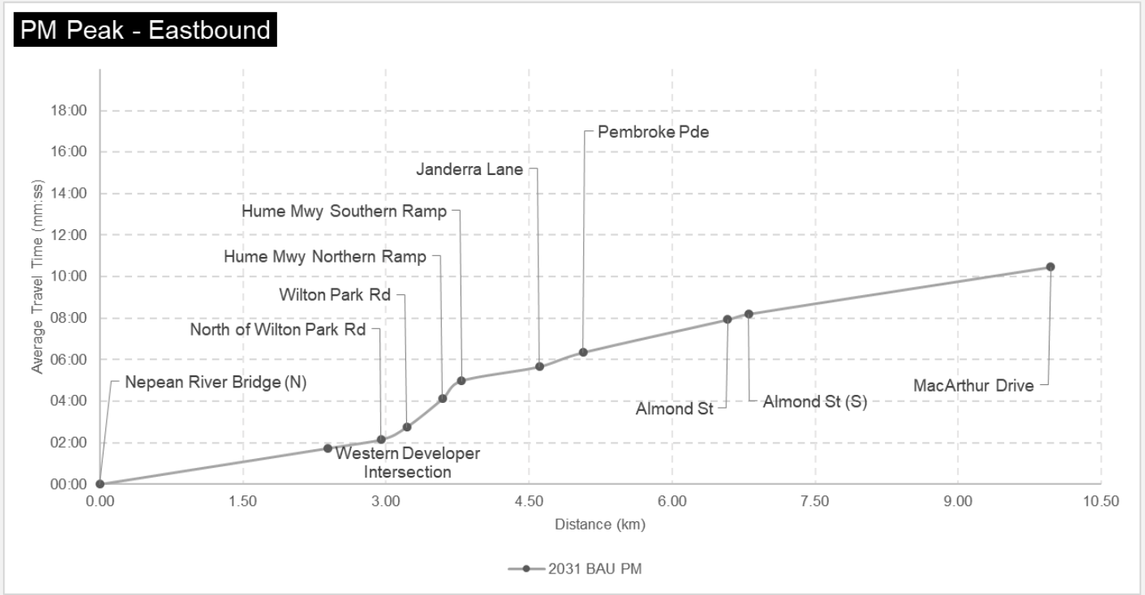
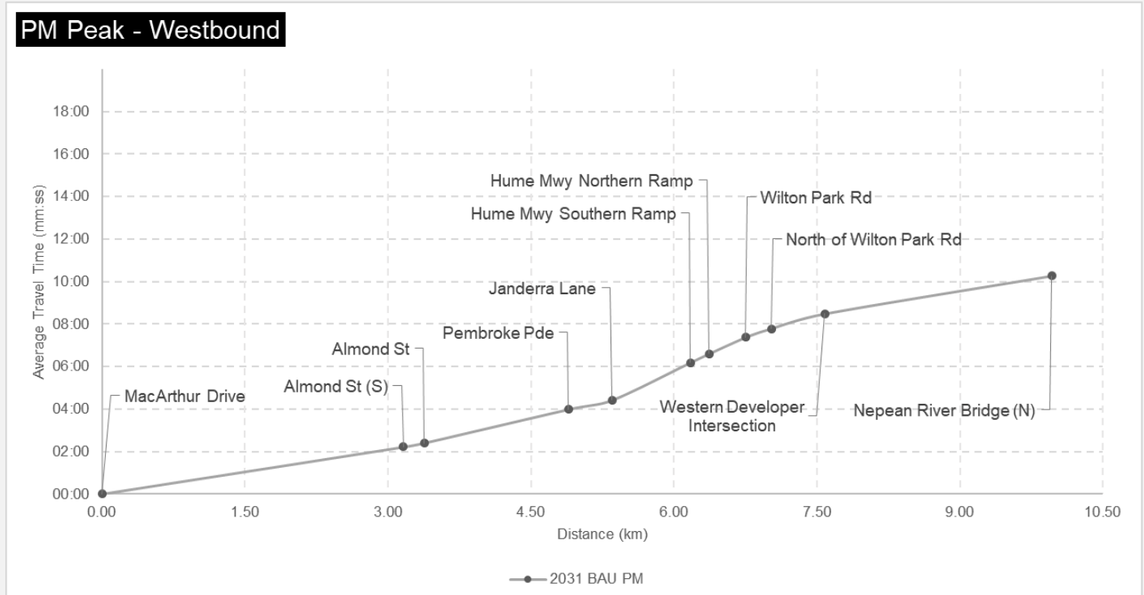
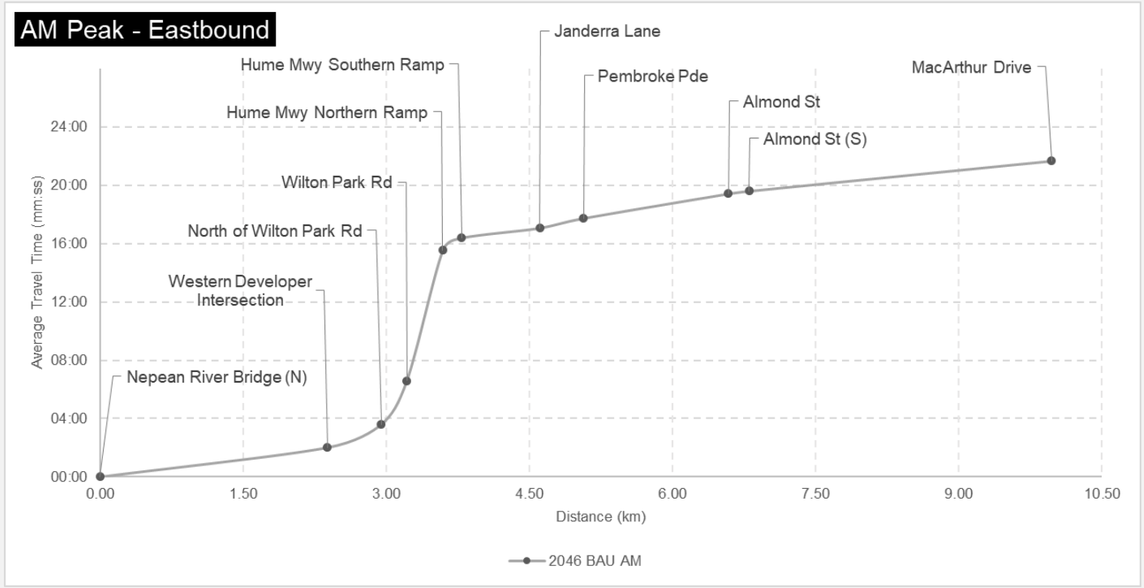
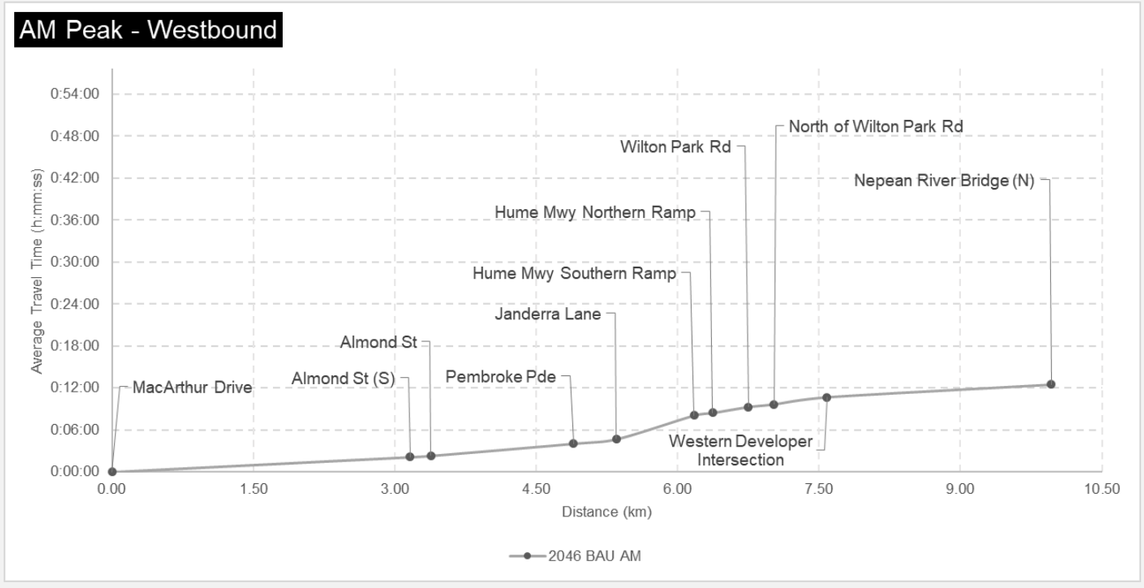
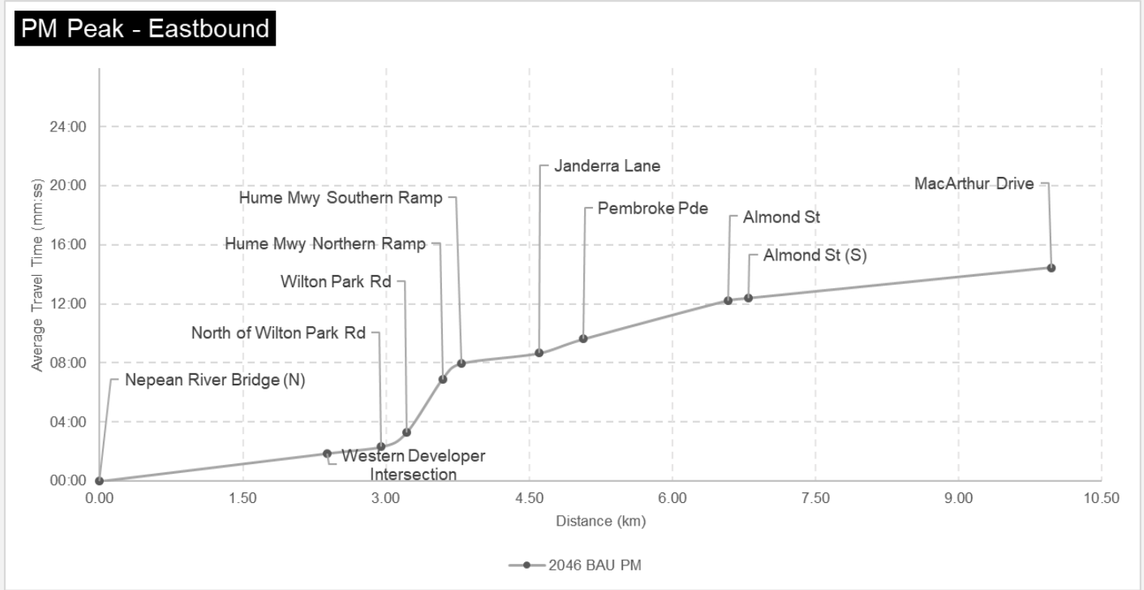
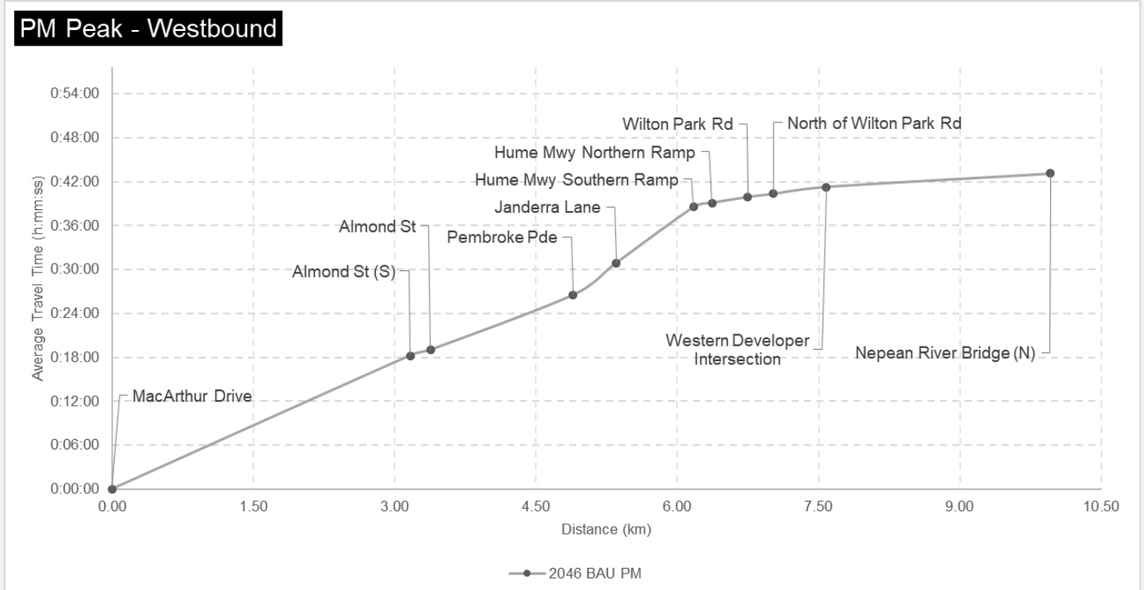
2031 BAU	Eastbound	Westbound
AM PEAK		
PM PEAK		

Table 4.4 Picton Road travel time results – 2046 BAU

2046 BAU	Eastbound	Westbound
AM PEAK		
PM PEAK		

4.3.4 Intersection level of service

Table 4.5 summarises the modelled future year intersection LoS and average delay results for the 2031 and 2046 BAU scenarios.

Table 4.5 Future year intersection LoS and average delay results – 2031 and 2046 BAU scenarios

Intersection name	2022 Base Model		2031 BAU		2046 BAU	
	AM	PM	AM	PM	AM	PM
Picton Road/Wilton Park Road	2 [A]	3 [A]	26 [B]	24 [B]	71 [F]	31 [C]
Picton Road/M31 Hume Motorway (W)	58 [E]	50 [D]	119 [F]	62 [E]	123 [F]	75 [F]
Picton Road/M31 Hume Motorway (E)	35 [C]	32 [C]	58 [E]	64 [E]	91 [F]	155 [F]
Picton Road/Janderra Lane	22 [B]	8 [A]	21 [B]	16 [B]	123 [F]	549 [F]
Pembroke Parade/Oxenbridge Avenue	13 [A]	12 [A]	2 [A]	2 [A]	5 [A]	3 [A]
Picton Road/Pembroke Parade/Greenway Parade	13 [A]	7 [A]	21 [B]	21 [B]	38 [C]	138 [F]
Picton Road/Almond Street	50 [D]	38 [C]	16 [B]	15 [B]	61 [E]	25 [B]

LEGEND LoS A | LoS B | LoS C | LoS D | LoS E | LoS F

Analysis of the intersection performance results indicates that:

– With no upgrades, the Picton Road/M31 Hume Motorway interchange are predicted to operate at LoS E and LoS F, indicating unacceptable delays with future demand by 2031. The performance is anticipated to be worse by 2046 with delays of over two minutes at each approach.

– By 2046, the Picton Road/Pembroke Parade/Greenway Parade intersection is predicted to operate at LoS F in the PM peak period due to queues backing up from the adjacent Picton Road/M31 Hume Motorway interchange.

Figure 4.5 to Figure 4.8 further demonstrate the predicted traffic volumes and delays at the Picton Road/M31 Hume Motorway interchange for both 2031 and 2046 BAU scenarios. This indicates that the following movements are predicted to experience reduced levels of service because the lanes would already be operating above capacity by 2031:

a. Eastbound through and right turn movement.
b. Northbound off ramp movement.
c. Westbound through and right turn movement.
d. Southbound off ramp movement.

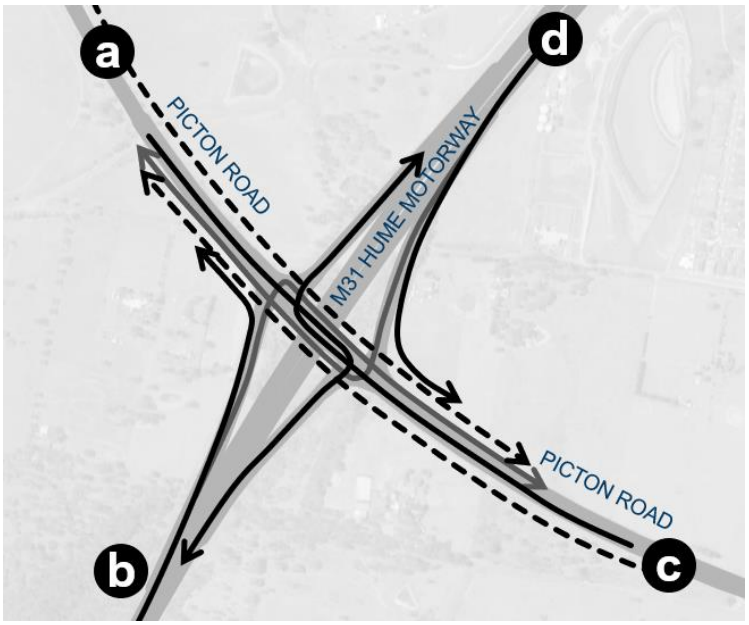


Figure 4.4 Vehicle movements at Picton Road and the M31 Hume motorway intersection

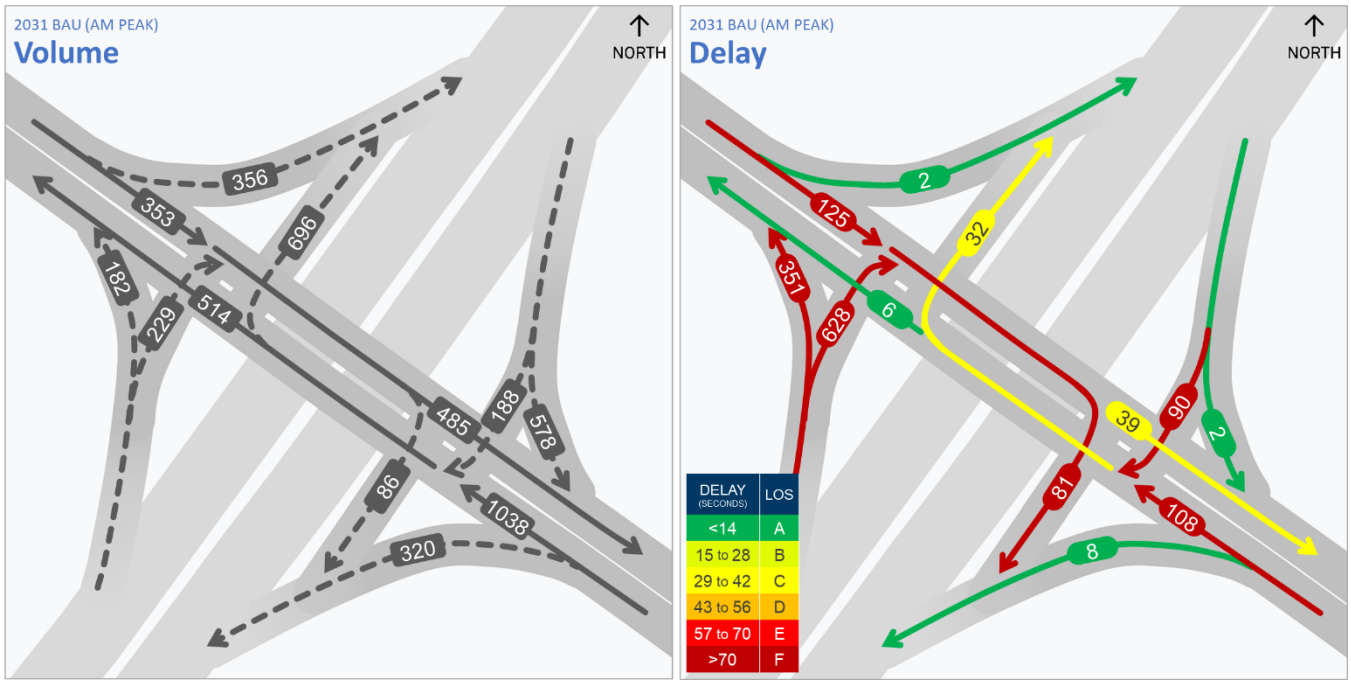


Figure 4.5 2031 BAU detailed AM results

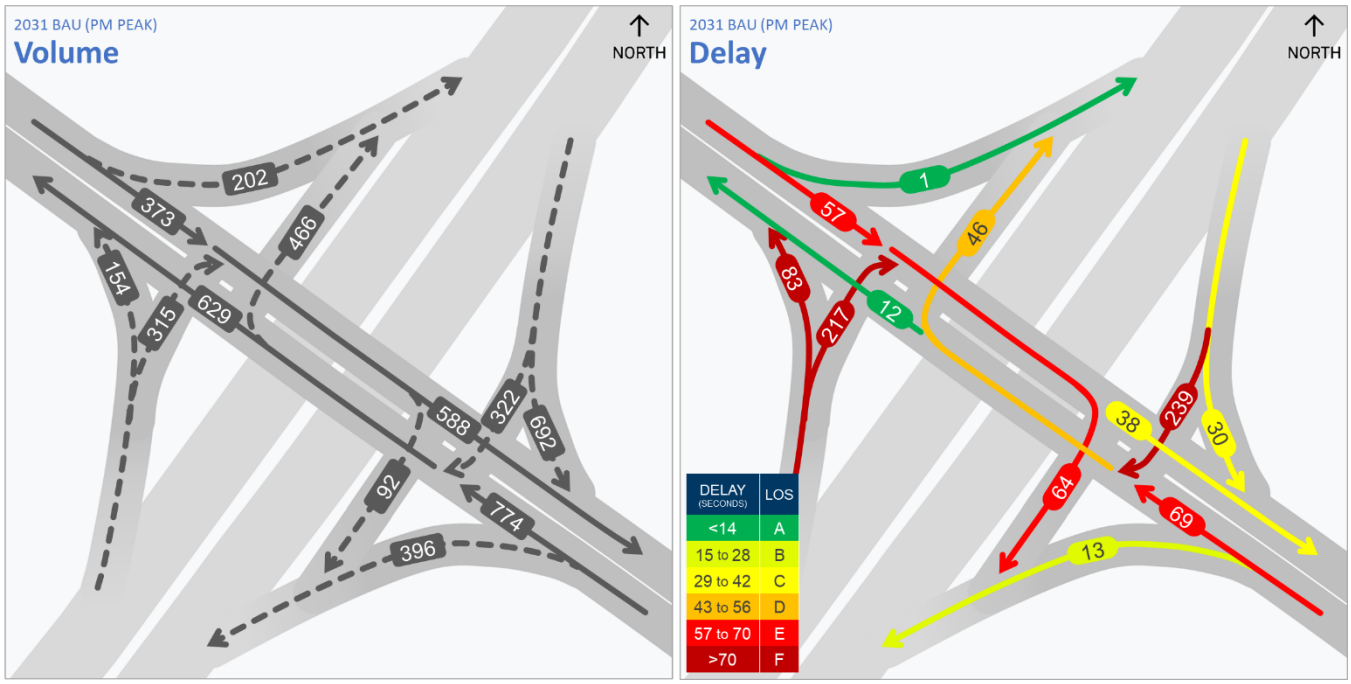


Figure 4.6 2031 BAU detailed PM results

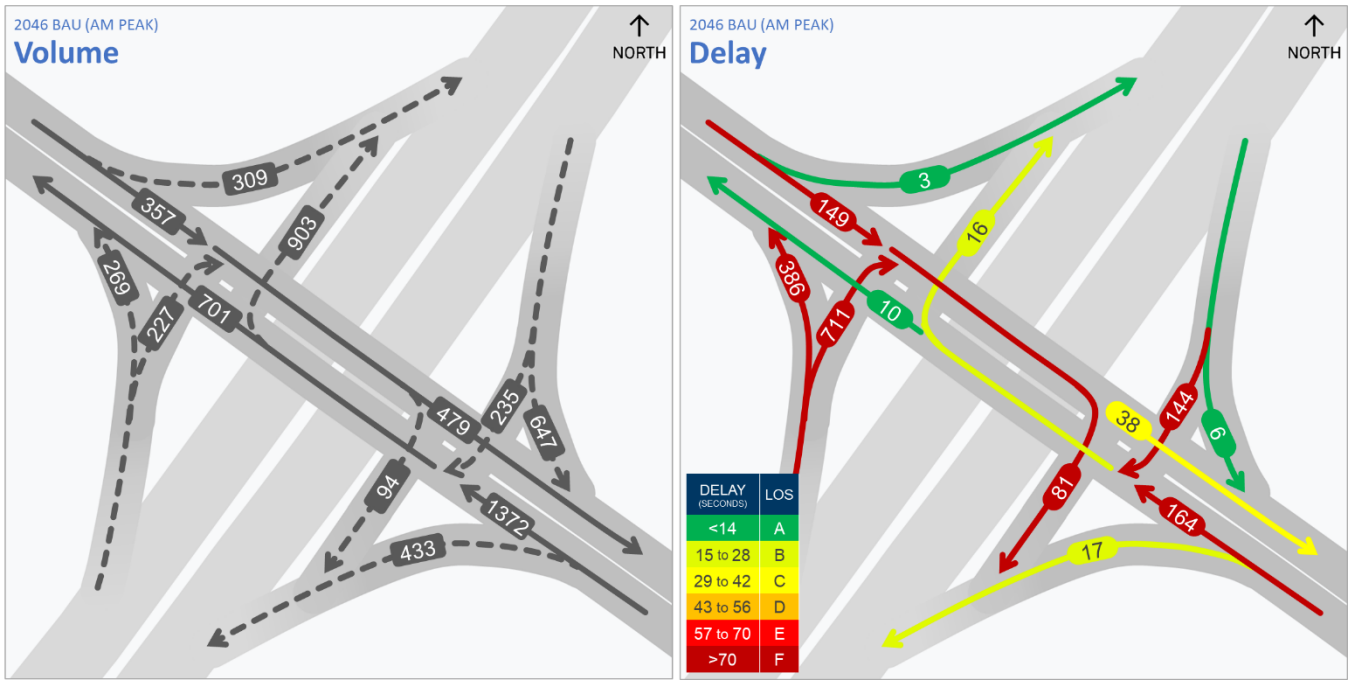


Figure 4.7 2046 BAU detailed AM results

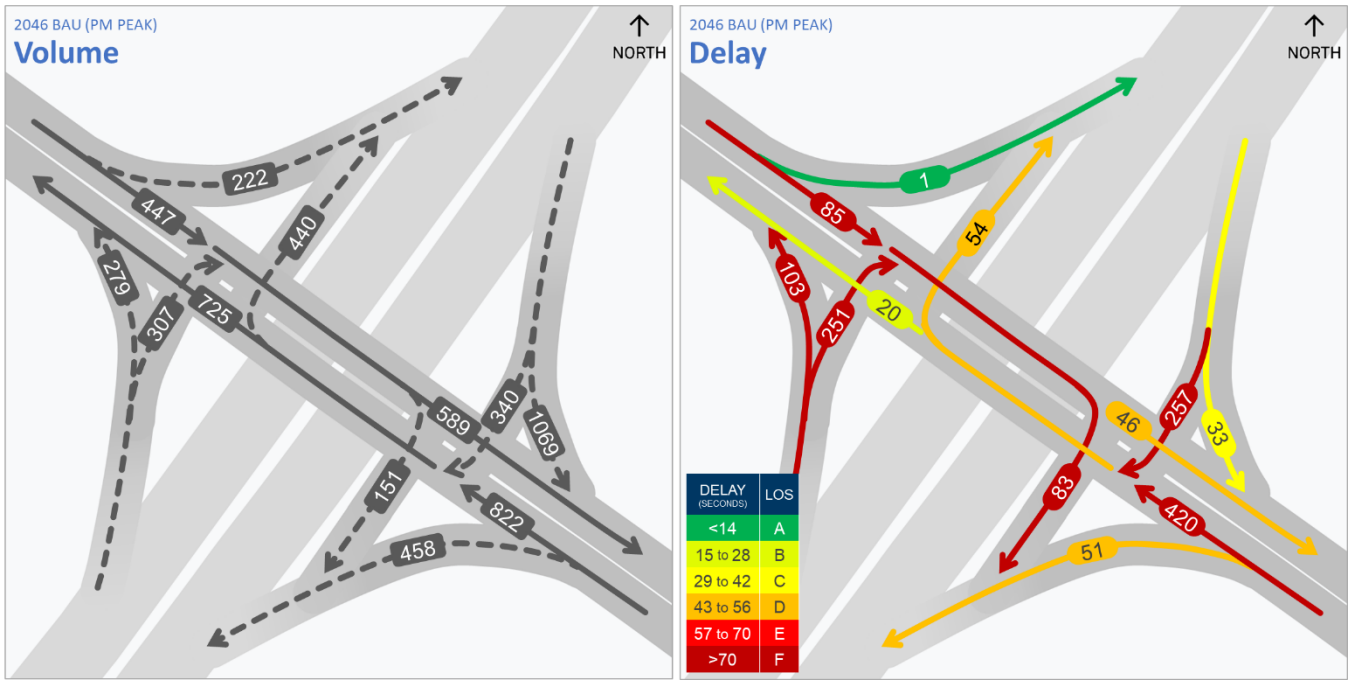


Figure 4.8 2046 BAU detailed PM results

4.4 Summary of BAU traffic conditions

The traffic modelling results for the BAU scenarios indicate that:

– By 2031, with a growth in traffic demand of about 20 per cent during the AM or PM peak hour compared to 2022 volumes:
  - The Picton Road and M31 Hume Motorway interchange is predicted to experience capacity issues with long queues and excessive delays.
  - Additional queueing is predicted on the eastbound approach to the M31 Hume Motorway and Picton Road intersection.
  - Additional queueing is also predicted on the northbound off ramp from the M31 Hume Motorway to Picton Road, with the queues backing onto the mainline of the M31 Hume Motorway.
– By 2046, with a growth in traffic demand of about 70 per cent during the AM or PM peak hour compared to 2022 volumes:
  - The Picton Road and M31 Hume Motorway interchange is predicted to experience severe capacity issue with significantly long queue and massive delay.
  - Excessive queueing is predicted along Picton Road for both directions.
  - Excessive queueing is predicted on the northbound off ramp from the M31 Hume Motorway to Picton Road, which was extending back to the M31 Hume Motorway mainline.

The results of the BAU scenarios indicated that the existing Picton Road and M31 Hume Motorway interchange would not be able to accommodate the anticipated future traffic growth by 2031, even when considering other planned network upgrades assumed to be in place by this time. Traffic operation along Picton Road is predicted to be impacted by this major pinch point, and the impact is predicted to extend to the M31 Hume Motorway mainline traffic lanes from the off ramp.

5. The proposal

5.1 Picton Road widening

As described in section 1.1, the proposal would include widening and upgrading of about five kilometres of Picton Road, between the southern side of the Nepean River and Almond Street. The widened Picton Road would provide:

– up to three 3.5-metre-wide traffic lanes in each direction with a central median
– three-metre-wide left shoulders in each direction.

Table 5.1 provides an overview of Picton Road's typical carriageway characteristics upon operation. Typical cross sections are provided in chapter 3 of the REF.

Table 5.1 Picton Road widening – indicative number of lanes and carriageway widths

Feature			Description				
			Segment 1	Segment 2	Segment 3	Segment 4	Segment 5
Carriageway	East bound	Shoulder width	3.0m	3.0m	3.0m	3.0m	3.0m
		Travel lanes	3.5m x 2 lanes	3.6m x 2 lanes	3.7m x 3 lanes	3.5m x 3 lanes	3.5m x 2 lanes
	West bound	Travel lanes	3.5m x 2 lanes	3.5m x 3 lanes	3.7m x 3 lanes	3.5m x 3 lanes	3.5m x 2 lanes
		Shoulder width	3.0m	3.0m	3.0m	3.0m	3.0m
	Segment length	1,200m	380m	220m	1,320m	1,540m	

Existing and proposed intersection treatments along the Picton Road corridor assumed for the purposes of traffic modelling are outlined in Table 5.2.

Table 5.2 Existing and proposed intersection treatments (traffic modelling assumptions)

Intersection	Intersection control		
	Existing	BAU	Proposed
Picton Road/Wilton Park Road	Priority	Signalised	Signalised
Picton Road/M31 Hume Motorway (W)	Signalised	Signalised	Signalised
Picton Road/M31 Hume Motorway (E)	Signalised	Signalised	Signalised
Picton Road/Janderra Lane	Priority	Priority	Left-in/Left-out
Pembroke Parade/Oxenbridge Avenue	Roundabout	Roundabout	Roundabout
Picton Road/Pembroke Parade/Greenway Parade	Priority	Signalised	Signalised
Picton Road/Almond Street	Priority	Grade–separated	Grade–separated

A reduction in the speed limit is also proposed along Picton Road between Pembroke Parade and northern end of the proposal site, from the existing 80 kilometres per hour to 60 kilometres per hour to facilitate safe movements on the proposed DDI. The speed limit reduction is intended to reduce safety risks arising from the new road environment and road geometry, particularly with increased urbanisation of the road environment and in anticipation of the future land use changes surrounding the proposal site.

The speed reduction for Picton Road as described above has been assumed to be provided in both the 2031 and 2046 Proposal Case scenarios for the purpose of traffic modelling.

Further information on the proposal is provided in chapter 3 of the REF.

5.2 Picton Road/M31 Hume Motorway interchange upgrade

As part of the proposal, the Picton Road and M31 Hume Motorway interchange is proposed to be upgraded into a DDI layout. The upgrade would provide:

– two new bridges over the M31 Hume Motorway and removal of the existing bridge
– upgraded and realigned ramp connections that would allow improved movement between Picton Road and the M31 Hume Motorway
– new traffic signals to replace the old ones, with more efficient signal phasing to provide more traffic capacity.

Compared to a typical interchange, a DDI facilitates a safer and more efficient flow of vehicles by minimising the number of conflict points in an interchange. Fewer conflict points translate to less waiting time to clear other traffic movements, and lower exposure to potential crashes from crossing and merging conflicts.

The remaining conflict points would be managed by traffic signals specifically designed for this interchange type.

Examples of DDI layouts are shown in Figure 5.1. The proposed concept design is shown in Figure 5.2.

General layout of a DDI

Bruce Highway/Caloundra Road DDI in Queensland

Figure 5.1 Examples of DDI layouts

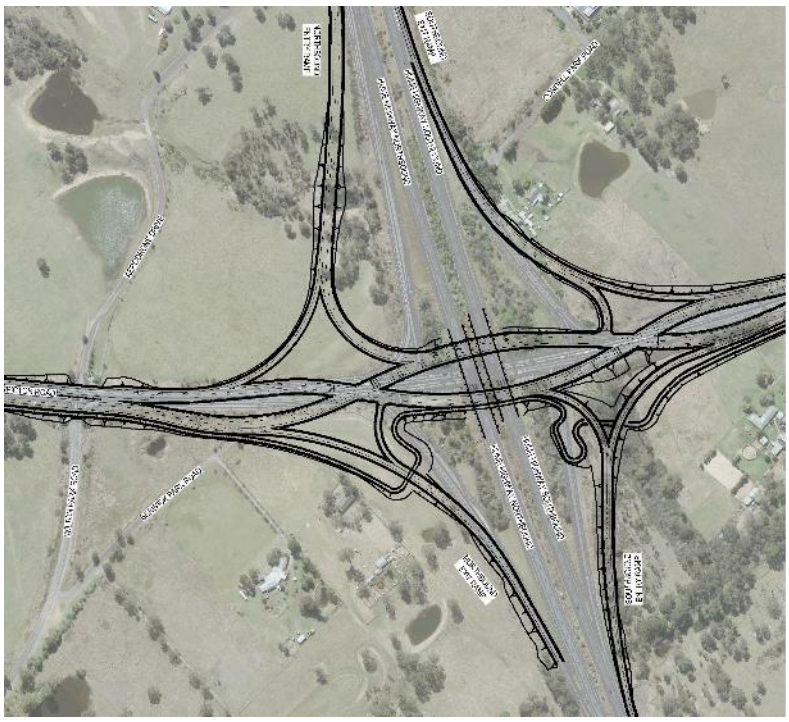


Figure 5.2 Proposed concept design: Picton Road and the M31 Hume Motorway interchange

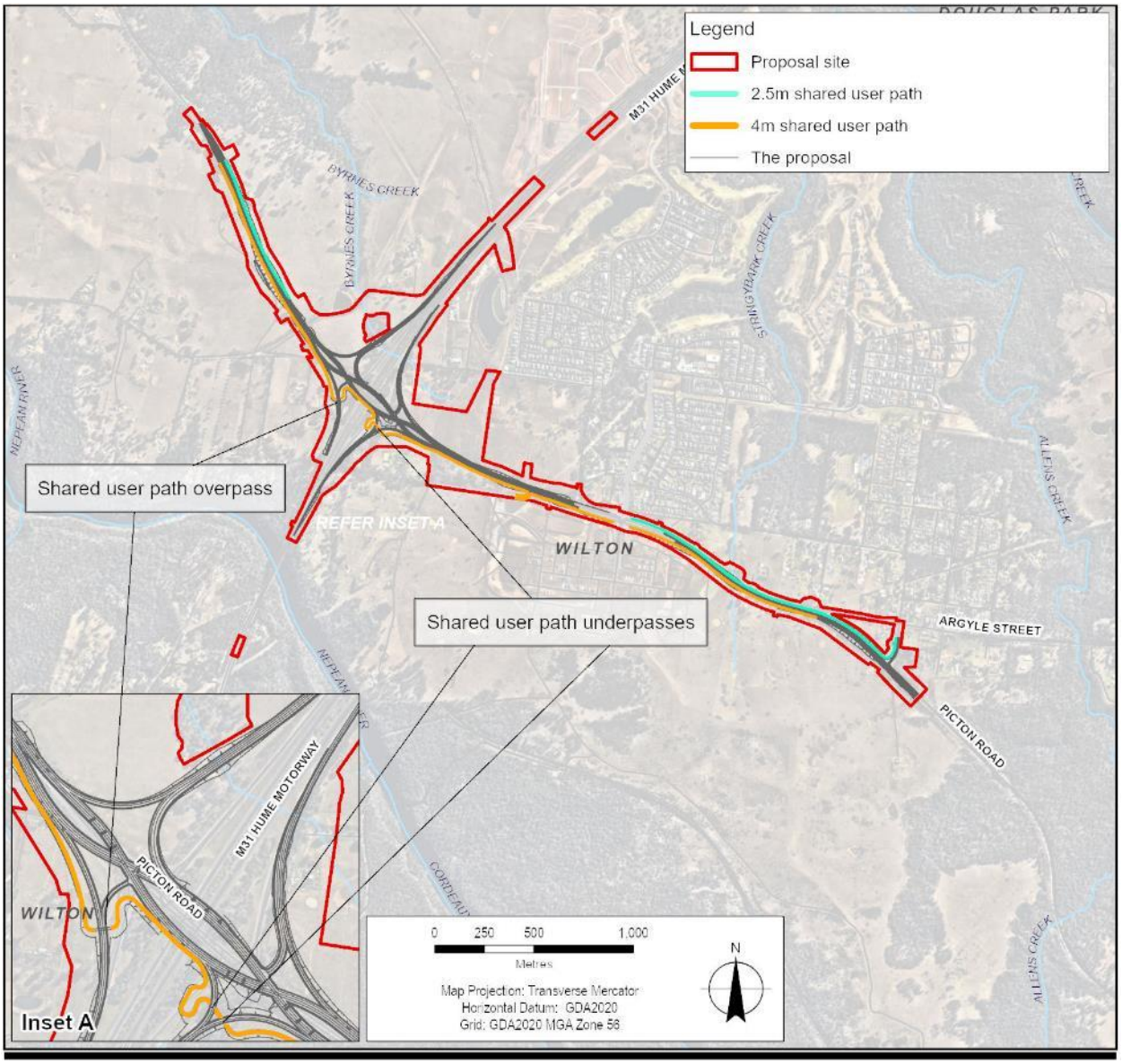
5.3 Active transport infrastructure

The proposal also includes a four-metre-wide shared user path along the southern verge of Picton Road east and west of the Picton Road and M31 Hume Motorway interchange. At the interchange, the shared user path would be grade separated from on and off ramps and the M31 Hume Motorway through provision of the following structures:

– At the eastern end of the interchange, two underpasses travelling beneath the southbound on-ramp from Picton Road to the M31 Hume Motorway.
– Continuing west, the shared user path would ramp up at a comfortable grade to align with the elevation of the new interchange, where the path would be constructed as part of the new eastbound bridge structure.
– At the western end of the interchange, the shared user path would be constructed as an overpass travelling over the northbound off ramp before gradually ramping down to connect with the main Picton Road alignment.

In addition, 2.5 to 3.0-metre shared user paths are anticipated planned to be provided along sections of the northern side of Picton Road to provide inter-precinct connections.

The proposed shared user paths are shown in Figure 5.3.



Source: Picton Road upgrade Nepean River to Almond Street Concept Design, GHD, 2023 (work in progress)

Figure 5.3 Proposed shared user paths

5.4 Changes to local access

The proposal includes changes to access arrangements to and from Picton Road, which would result in changes to traffic circulation and local access around Wilton Park Road/Aerodrome Drive, Janderra Lane and Almond Street.

Some of these changes would be temporary and would change again following completion of planned infrastructure upgrades by private developers.

At Picton Road/Wilton Park Road/Aerodrome Drive:

– The intersection would be reconfigured to a left in left out arrangement as part of the proposal.
– The Wilton Growth Area infrastructure phasing plan includes the relocation and upgrade of the Wilton Park Road/Aerodrome Drive intersection to a signalised arrangement west of its existing location. The left in left out arrangement included in the proposal is considered to be an interim arrangement to maintain access to these local roads until the signalised intersection is built by private developers.

At Picton Road/Janderra Lane:

– The intersection would be reconfigured to a left in left out arrangement as part of the proposal.
– A privately-funded grade-separated vehicular crossing (hereinafter referred to as 'Janderra Lane overbridge') would be provided over Picton Road at Janderra Road for local traffic connecting to the South East Wilton precinct (currently under construction) to the future Town Centre Link Road. The overbridge would not have direct access onto Picton Road.

At Picton Road/Almond Street:

– In the vicinity of Almond Street, the Wilton Growth Area infrastructure phasing plan includes a future local road overpass of Picton Road with connections onto and off Picton Road that facilitate all traffic movements without traffic signals. This arrangement, which is to be implemented by private developers, would replace the existing right in right out movements at Almond Street. The timing of its construction relative to the timing for this proposal is currently unknown.
– The proposal includes the reconfiguration of the intersection at Almond Street to left in left out and removes the existing right in and right out movements. It is intended that this part of the proposal is not constructed until such time as the developer overpass and Picton Road connections are in place at this location. As such, all traffic movements, including right and left turns would be maintained until the overpass and new connections are constructed.

6. Summary of construction activities

6.1 Construction program and staging

Subject to approval and construction funding, it is anticipated works would take about three years to complete. The indicative construction staging is described in the following sections and would indicatively be undertaken in five construction stages as follows:

– Construction Stage 0 – Pre-construction/early works, site establishment, utility works
– Construction Stage 1 – Widening to one side, bridge construction, pavement works
– Construction Stage 2 – Widening to the other side, bridge construction, pavement works
– Construction Stage 3 – Construction of central area
– Construction Stage 4 – Finishing and demobilisation.

The staging and methodology have been prepared to minimise disruption for road users and to ensure that work can be conducted safely. A detailed program of work would be determined by the construction contractor, after completion of the detailed design in consultation with Transport.

Indicative works that would be undertaken during each stage, with a focus on those relevant to the TTIA, are outlined in the following sections.

6.1.1 Stage 0

Early works would be carried out during the first three to six months of the construction program. This would generally involve the mobilisation of plant and equipment, clearing and grubbing works, relocation of some overhead and underground communication and electrical lines, and protection works for critical utilities (e.g. Jemena gas pipelines). Early works would also involve the removal of medians and construction of temporary pavement along Picton Road, between Wilton Park Road and Janderra Lane, as well as the median and island at the intersection of Picton Road and Almond Street. Temporary cross overs would also be established on the M31 Hume Motorway, about two kilometres north and south of the Picton Road/M31 Hume Motorway interchange, to facilitate potential contraflow arrangements during the construction of bridges.

It is anticipated that two construction compounds adjacent to the Picton Road/M31 Hume Motorway interchange, and on the north side of Picton Road, would be established during Stage 0 to support the construction works for the duration of the construction program. An additional compound, to be used for site storage, would also be established at the northern end of the proposal site accessed via the M31 Hume Motorway southbound carriageway.

The indicative locations of the construction compounds are shown in Figure 6.1. The larger compounds adjacent to the interchange (Compound 1 and Compound 2) would include site offices, staff and workforce amenities, stores, stockpiles and laydown areas as well as parking for the workforce. Compound 3 located to the north would provide additional storage and laydown.

Access to the construction compounds would be via temporary access roads that would also be constructed as part of the early works. Details of local site access to the site compounds are provided in section 6.4.1.

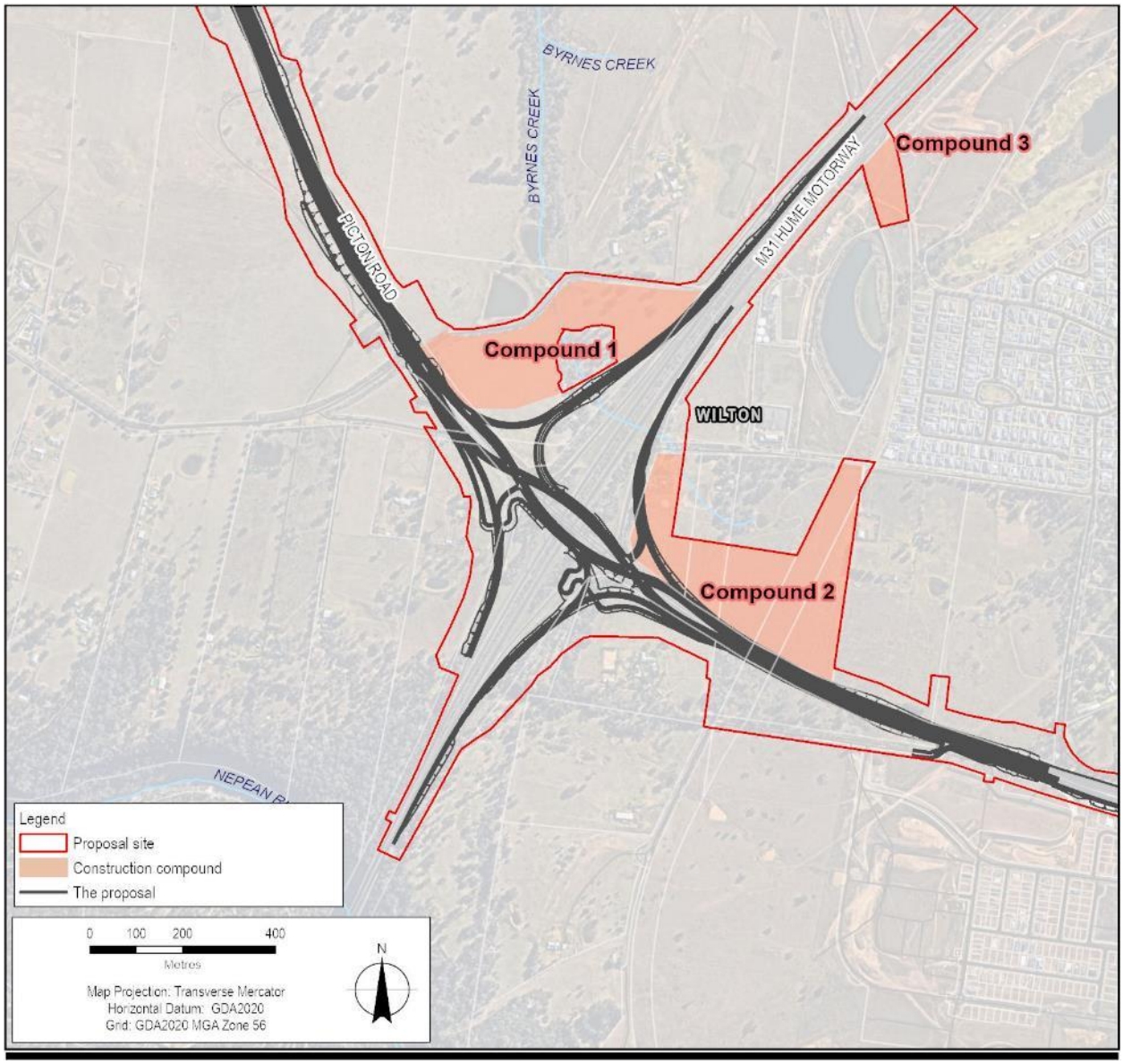


Figure 6.1 Locations of proposed construction compounds

A summary of the indicative construction activities for Stage 0 is provided in Table 6.1.

Table 6.1 Indicative construction activities – Stage 0

Construction stage	Indicative duration	Typical element	Typical activities
Stage 0: Pre-construction/ early works, site establishment, utility works	6 months	Site establishment	– pre-clearing survey and associated activities – establish survey control – road and intersection modifications to create construction access – vegetation clearing works and stockpiling of mulch materials – topsoil stripping and stockpiling – construct temporary access roads (haul routes, site access gates) – building removal works for properties subject to acquisition – remove median along Picton Road and replace with road pavement to facilitate later traffic switches – install temporary construction line marking, signage and lighting – fence construction areas and site compounds – construct access entries and routes for earthworks and construction activities – establish site compounds – relocate fauna fences – progressive construction of erosion and sedimentation controls, including construction of diversion drains and sedimentation basins – temporary traffic management arrangements – property access adjustment works
		Utilities	– protection and relocation of utilities

Traffic would continue to use the existing carriageway during Stage 0 and it is anticipated that existing road and lane configuration, and intersection controls, would generally remain in place. Traffic management measures would typically involve short-term works conducted out of hours to minimise the potential impact on existing traffic while the work sites are being established.

6.1.2 Stage 1

Construction of new road pavement for the future widened configuration of Picton Road would commence in Stage 1, which is anticipated to last for about eight months. Works would be undertaken primarily offline and outside of the existing road, with traffic continuing to use the existing Picton Road carriageway. Construction of preliminary infrastructure for the new bridges and ramps at the interchange location would also be carried out, including temporary pavement to enable traffic to switch to the new ramps in subsequent stages.

A summary of the indicative construction activities for Stage 1 is provided in Table 6.2.

Table 6.2 Indicative construction activities – Stage 1

Construction stage	Indicative duration	Typical element	Typical activities
Stage 1: Widening to one side, bridge construction, pavement works	8 months	Traffic	– traffic control and temporary traffic management arrangements
		Utilities	– complete remaining utility works – install Traffic Control System (TCS), street lighting and intelligent transportation system (ITS) infrastructure
		Drainage and structures	– install cross drainage culverts – install pavement drainage – construct shared user paths, new pedestrian bridge and pedestrian underpass – construct water quality basins
		Bridge construction	– construct the M31 Hume Motorway northbound on ramp and southbound off ramp – commence construction of bridges over the M31 Hume Motorway with central pier works – construct bridge foundations, retaining structures, bridge abutments and piers
		Pavement works	– construct temporary pavements – construct base and sub-base pavement layers – construct pavement drainage, including kerb and gutters as required – construct pavements and wearing course – construct medians and barriers – install construction phase safety barriers

A summary of the traffic management configuration for Stage 1 is provided in Table 6.3 and Appendix B.

Table 6.3 Summary of traffic management configuration – Stage 1

Road network element	Traffic management configuration
Picton Road/M31 Hume Motorway interchange	Existing interchange in operation with existing traffic signals controlling movements. Works to be conducted primarily offline. Shift of Hume Motorway alignment away from the current median.
Picton Road:	
West of interchange	One lane in each direction, increasing to two lanes eastbound near the interchange. Work area located on the south side of Picton Road with traffic on the north side.
East of interchange	Two lanes in each direction as far as Pembroke Parade, then one lane in each direction. Work area located on the north side of Picton Road with traffic on the south side.
Wilton Park Road/Aerodrome Road intersection	Temporary traffic signals (right turns permitted)
Janderra Lane intersection	Left-in and left-out only
Pembroke Parade intersection	Traffic signals (right turns permitted)
Almond Street intersection	Temporary traffic signals (right turns permitted)

Safety barrier systems would be erected to separate traffic from the construction activities. Where direct access to the work areas from Picton Road is required, a left in left out (LILO) arrangement would be implemented, including at site compound gates and access points to minimise conflicting traffic movements and delays. In order to facilitate the LILO arrangement, U-turn facilities would be provided at:

– Picton Road/Maldon Bridge Road roundabout (west)
– Almond Street via temporary pavement (east).

Speed limits near work areas would be reduced to facilitate the safe movement of vehicles along Picton Road, from the existing 80 kilometres per hour to 60 kilometres per hour. This speed reduction would be enforced on Picton Road around the proposal site for Stages 1 to 3 of the construction works, noting that the reduced speed limit of 60 kilometres per hour would be retained for Picton Road west of Pembroke Parade for the extent of future urban development, over the long term. Temporary localised roadworks speed limit reductions may also be implemented for critical areas or activities, in accordance with relevant traffic management standards and guidelines.

6.1.3 Stage 2

Stage 2 would involve bridge construction and pavement upgrades for the remaining portion of the future configuration of the Picton Road carriageway. Stage 2 is anticipated to be completed over about 12 months. Following the completion of new pavements in Stage 1, the existing Picton Road carriageway would be closed and traffic would switch to the other side of the road to use the new pavement while upgrade works on the existing pavement are carried out.

At the interchange, traffic would continue to use the old bridge while the two new bridges are being constructed. Temporary pavement and ramps would be established to provide access to the M31 Hume Motorway, with movement controlled by traffic signals.

A summary of the indicative construction activities for Stage 2 is provided in Table 6.4.

Table 6.4 Indicative construction activities – Stage 2

Construction stage	Indicative duration	Typical element	Typical activities
Stage 2: Widening to the other side, bridge construction, pavement works	12 months	Utilities	– install TCS, street lighting and ITS infrastructure
		Traffic	– traffic control and temporary traffic management arrangements, including traffic switches to new alignment
		Drainage and structures	– construct longitudinal and transverse drainage within cuts and embankments – extend existing cross drainage – construct subsurface drainage – construct road longitudinal and cross drainage including outlets and scour protection – construct open drains and catch drains including scour protection work – continue shared user paths construction
		Bridge construction	– install bridge deck superstructures.
		Pavement works	– construct base and sub-base pavement layers – construct pavement drainage, including kerb and gutters – construct pavements and wearing course – construct medians and barriers

A summary of the traffic management configuration for Stage 2 is provided in Table 6.5 and Appendix B.

Table 6.5 Summary of traffic management configuration – Stage 2

Road network element	Traffic management configuration
Picton Road/M31 Hume Motorway interchange	Traffic shifts to new pavement east and west of the interchange, but still using the existing bridge. Some changes to traffic signal arrangements with new and temporary ramps used for access to the M31 Hume Motorway. Occasional night works involving contraflow traffic arrangements on the M31 Hume Motorway for major bridge lifts for new northern and southern interchange bridge structures.
Picton Road: West of interchange East of interchange	 Two lanes eastbound and one lane westbound. Work area located on the north side of Picton Road with traffic shifted to the south side. Two lanes in each direction as far as Pembroke Parade, then one lane in each direction. Work area located on the south side of Picton Road with traffic shifted to the north side.
Wilton Park Road/Aerodrome Road intersection	Temporary traffic signals (right turns permitted)
Janderra Lane intersection	Left-in and left-out only
Pembroke Parade intersection	Traffic signals (right turns permitted)
Almond Street intersection	Temporary traffic signals (right turns permitted)

6.1.4 Stage 3

Stage 3 would involve completion of the bridge structures and construction of remaining barriers, medians and landscaping. Stage 3 is anticipated to be completed over about eight months. Work areas would be located primarily within the centre of the carriageway, with traffic using the outer portion of the new pavement in both directions. Temporary localised roadworks speed limit reductions would be implemented where necessary to protect road users and workers for the duration of the Stage 3 works.

At the interchange, traffic would utilise the new northern bridge structure to make way for the demolition of the old bridge. Changes to signal arrangements are anticipated during this stage to facilitate the shift to the new bridge. Vehicles accessing the M31 Hume Motorway would continue to use the temporary ramps while bridge works are being completed.

A summary of the indicative construction activities for Stage 3 is provided in Table 6.6.

Table 6.6 Indicative construction activities – Stage 3

Construction stage	Indicative duration	Typical element	Typical activities
Stage 3: Construction of central area	6 months	Traffic	– traffic control and temporary traffic management arrangements, including traffic switches – convert to ultimate phase traffic configuration where possible, maintain two lanes in both directions – traffic to be transferred onto new bridge through the interchange
		Bridge works	– remove and demolish existing bridge structure
		Pavement works	– complete remaining work on pavement between newly constructed areas – install barriers and medians
		Ancillary works	– complete installation of ITS and street lighting – landscaping

A summary of the traffic management configuration for Stage 3 is provided in Table 6.7 and Appendix B.

Table 6.7 Summary of traffic management configuration – Stage 3

Road network element	Traffic management configuration
Picton Road/M31 Hume Motorway interchange	Traffic shifts to new pavement and uses the new bridge on the north side (the future westbound carriageway). Changes to signal arrangements with new and temporary ramps used for access to the M31 Hume Motorway. Occasional night works involving contraflow traffic arrangements on the M31 Hume Motorway to facilitate demolition of the existing interchange bridge structure.
Picton Road: West of interchange East of interchange	 Two lanes eastbound and one lane westbound. Work area located in the centre of the road with traffic running either side of a wide median work area. Two lanes in each direction as far as Almond Street. Work area located in the centre of the road with traffic running either side of a wide median work area.
Wilton Park Road/Aerodrome Road intersection	Temporary traffic signals (right turns permitted)
Janderra Lane intersection	Left-in and left-out only
Pembroke Parade intersection	Traffic signals (right turns permitted)
Almond Street intersection	Temporary traffic signals (right turns permitted)

6.1.5 Stage 4

The final three months of construction works would be primarily for finishing and commissioning works, including demobilisation of plant and equipment. Indicative construction activities for Stage 4 are outlined in Table 6.8.

Table 6.8 Indicative construction activities – Stage 4

Construction stage	Indicative duration	Typical element	Typical activities
Stage 4: Finishing and demobilisation	4 months	General	– final pavement works including wearing course and pavement marking – install street lighting, signposting, intelligent transport systems and traffic signals – install remaining permanent fencing or guardrails – landscaping and tree planting – remove temporary fencing and erosion and sedimentation controls – remove and reinstate site compounds – rehabilitation of disturbed areas – demobilisation

Following completion of bridge and pavement works in Stage 3, all traffic lanes on Picton Road would become available for use in Stage 4. At the interchange, both bridges would be opened to traffic and the new DDI would commence operation, with turning movements controlled by permanent traffic signals.

Potential short-term, localised road closures may be implemented to undertake maintenance and commissioning activities as required (i.e. ad-hoc works). These would be conducted as short term works and planned in accordance with relevant traffic management standards and guidelines.

Local intersections along Picton Road would be in their final configuration (refer to section 5.4), which may include privately funded upgrades depending on the timing of delivery.

Table 6.9 provides a summary of the final traffic management configuration for Picton Road and the Picton Road/M31 Hume Motorway interchange.

Table 6.9 Summary of traffic management configuration – Stage 4

Road network element	Traffic management configuration
Picton Road/M31 Hume Motorway interchange	Traffic shifts to new pavement and new bridges in the final configuration of the interchange
Picton Road: West of interchange East of interchange	 Two lanes in each direction Three lanes in each direction as far as Pembroke Parade, then two lanes in each direction
Wilton Park Road/ Aerodrome Road intersection	Left-in and left-out only or permanent traffic signals (subject to timing of privately funded works)
Janderra Lane intersection	Left-in and left-out only
Pembroke Parade intersection	Traffic signals (right turns permitted)
Almond Street intersection	Left-in and left-out only (subject to timing of privately funded works associated with the Almond Street overpass)

6.2 Traffic management arrangements

Table 6.10 provides a summary of the minimum traffic management arrangements that would be generally implemented for the majority of the construction works. These arrangements would assist in creating a predictable road environment for drivers and provide physical separation between live traffic and the construction works, protecting both workers and road users.

Table 6.10 General traffic management arrangements – Stages 1 to 3

Component	Traffic management arrangements
Traffic lanes	
Physical protection	Safety barriers a minimum of 0.5m from the edge line of the traffic lane
Carriageway	Minimum width of 3m for through lanes with a minimum 0.5m-wide shoulders
Speed limits	
Arterial roads	Picton Road speed limit to be reduced to 60km/hr from 80km/h. The M31 Hume Motorway to remain at 110km/h
Other	Temporary localised roadworks speed limit reduction including 40km/hr, 60km/hr, and 80km/hr as required
Gates / access to compounds	
Circulation	LILO-only at site access gates when accessing from Picton Road.
Turnaround locations	Picton Road/Maldon Bridge Road roundabout (west) Almond Street via temporary pavement
Signage	Gate access/egress to be clearly signposted and line marked to avoid confusion with drivers
Auxiliary lanes	Deceleration and acceleration lane(s) to be provided where site access gates are at high-risk locations
Other special equipment	Temporary traffic signals, portable traffic control devices, illuminated warning devices, attenuator.

6.3 Construction traffic

6.3.1 Workforce

The construction workforce is likely to fluctuate, depending on the stage of construction and associated activities. The workforce would be anticipated to peak at about 100 personnel per day. On either side of this peak period, daily workforce numbers would fluctuate between about 40 and 60 personnel at any given time during the construction period. A total workforce of about 200 personnel is anticipated to be required, including about 120 construction workers. The final number of construction workers would be confirmed by the contractor appointed for the proposal and documented in the CTMP prepared for the proposal.

Depending on skills and availability, the workforce may be sourced locally or regionally. The majority of workers are anticipated to come from areas north and east of the proposal site (e.g. Sydney and Wollongong), with some workers potentially coming from Picton and Maldon in the west.

No workforce accommodation would be established on site and workers would be expected to travel to and from the site daily. Due to the absence of public transport services, and to enable a conservative traffic and transport assessment, it is anticipated that all workers would access the site using private vehicles. These vehicles would be accommodated within designated parking areas provided within Compound 1 and Compound 2.

6.3.2 Delivery times

Heavy vehicle movements associated with material haulage and construction works are anticipated to take place throughout the day within the recommended standard working hours (see section 3.3.3 of the REF), while deliveries using light to medium commercial vehicles are likely to occur typically between 10am and 3pm, outside of the peak period of traffic on the road network.

Light vehicle movements associated with the ingress and egress of site personnel are likely to occur slightly earlier and later than the prescribed work hours (respectively). The majority of workers are likely to arrive before 7am for ingress, and depart shortly after 4pm for egress. These movements are not anticipated to coincide with the peak period of traffic on Picton Road. However, a portion (20 per cent) have been included in peak hour traffic modelling to present a conservative assessment of the traffic impact during construction.

To minimise disruption to daily traffic, and disturbance to surrounding landowners and businesses, it may be necessary to carry out some work outside of the recommended standard working hours, including delivery of some materials and components. Extended working hours would also be considered to reduce the overall construction timeframe of the proposal and to provide relief to the Wilton community.

6.3.3 Source of materials

Where not available onsite due to quantity or quality issues, materials would be sourced from local suppliers and quarries. Due to the close proximity to Wollongong, Picton and south-west Sydney, it is anticipated that all asphalt and concrete would be supplied locally, and no temporary batching plant would be required.

6.3.4 Traffic generation estimate

Heavy vehicles (typically general access vehicles) would be used for the delivery of construction materials to the compounds and work areas, and removal of excess material from the work site to temporary stockpile sites, offsite disposal sites or licenced waste facilities. During normal working days, it is anticipated that there would be an average of about 25 heavy vehicle movements per day (12 to 13 inbound movements and 12 to 13 outbound movements). For the early phases of construction, when bulk earthworks would be carried out, it is anticipated that there may be up to a peak of 116 heavy vehicle movements per day into and out of the site.

In addition to these heavy vehicle movements, there would also be regular deliveries by light to medium rigid trucks. These would occur typically outside of the peak periods of traffic on Picton Road (i.e. between 10am and 3pm). On average, about 12 movements per day (six inbound movements and six outbound movements) are anticipated. However, during peak construction periods, a volume of up to 56 movements per day (28 inbound movements and 28 outbound movements) could be expected.

For the workforce (refer section 6.3.1) each person is assumed to travel to the site by private car and would therefore generate one vehicle entry in the morning and one vehicle exit in the evening. Additionally, it is expected that workers would make other trips to and from the site during off peak periods, for example during lunch breaks. For the purposes of this assessment, it has been assumed these off-peak trips would result in around 30 to 50 trips per day, assuming there would be carpooling.

The estimated construction vehicle movements for large heavy vehicles, heavy vehicles, smaller commercial vehicles and light vehicles are shown in Table 6.11. Note that a movement represents either one entry or one exit so that a round trip is equivalent to two vehicle movements. It is noted that the scheduled arrival and departure of workers and trucks transporting materials and spoil would be reviewed during detailed design for the construction of the proposal and documented as part of the CTMP (see section 9.1).

Table 6.11 Estimated construction vehicle movements – daily

Vehicle type and associated activities	Daily vehicle movements		Typical travel patterns and limitations
	Average	Maximum	
Large heavy vehicles. Construction traffic trucks	8	36	Early evening where possible (6pm to 10pm).
Heavy vehicles. Construction traffic including waste and spoil vehicles	25	116	Regular movements throughout the day (7am to 6pm)
Small commercial vehicles. Deliveries and commercial vehicles	12	56	Outside of peak periods (10am to 3pm). Parking within compound sites.
Light vehicles. Workers' cars and other light vehicles	120	200	Outside of peak periods (generally before 7am and before 4.30pm). Parking within compound sites.

Based on Table 6.11, only some construction traffic movements would be likely to coincide with the peak hour of traffic on Picton Road (from 7.15-8.15am and 4.30-5.30pm). Deliveries using commercial vehicles and the arrival and departure of workers would be likely to occur outside of this period.

Although no construction worker vehicle movements would be likely to occur during the peak hour, a portion (20 per cent) of the maximum anticipated light vehicle movements have been included in the peak hour construction traffic modelling. The estimated peak hour traffic generation adopted for the TTIA is summarised in Table 6.12.

Table 6.12 Estimated construction vehicle movements – peak hours

Vehicle type		Direction	Morning peak	Afternoon peak
Heavy vehicles	Construction traffic including waste and spoil vehicles:	Inbound Outbound	5 5	5 5
Small commercial vehicles	Deliveries and commercial vehicles (outside of peak periods)	Inbound Outbound	0 0	0 0
Light vehicles	Workers' cars and other light vehicles (20% of maximum daily movements)	Inbound Outbound	25 0	0 25

6.4 Construction access routes

6.4.1 Local site access

The three proposed construction compounds would be established as part of Stage 0 early works (refer section 6.1.1) and maintained for the entire construction period to be decommissioned upon completion of the proposal.

The following sections discuss access arrangements to the site compounds. It should be noted that these arrangements are preliminary and have been developed based on existing information and may change subject to the construction methodology proposed by the contractor.

Compound 1 (north-west)

Compound 1 would be established west of the interchange and north of Picton Road, and would include site offices, staff and workforce amenities, stores, stockpiles and laydown areas as well as parking for the construction workforce. Temporary traffic signals would be provided to control right turns into and out of the compound.

Figure 6.2 shows the indicative access arrangements for Compound 1.

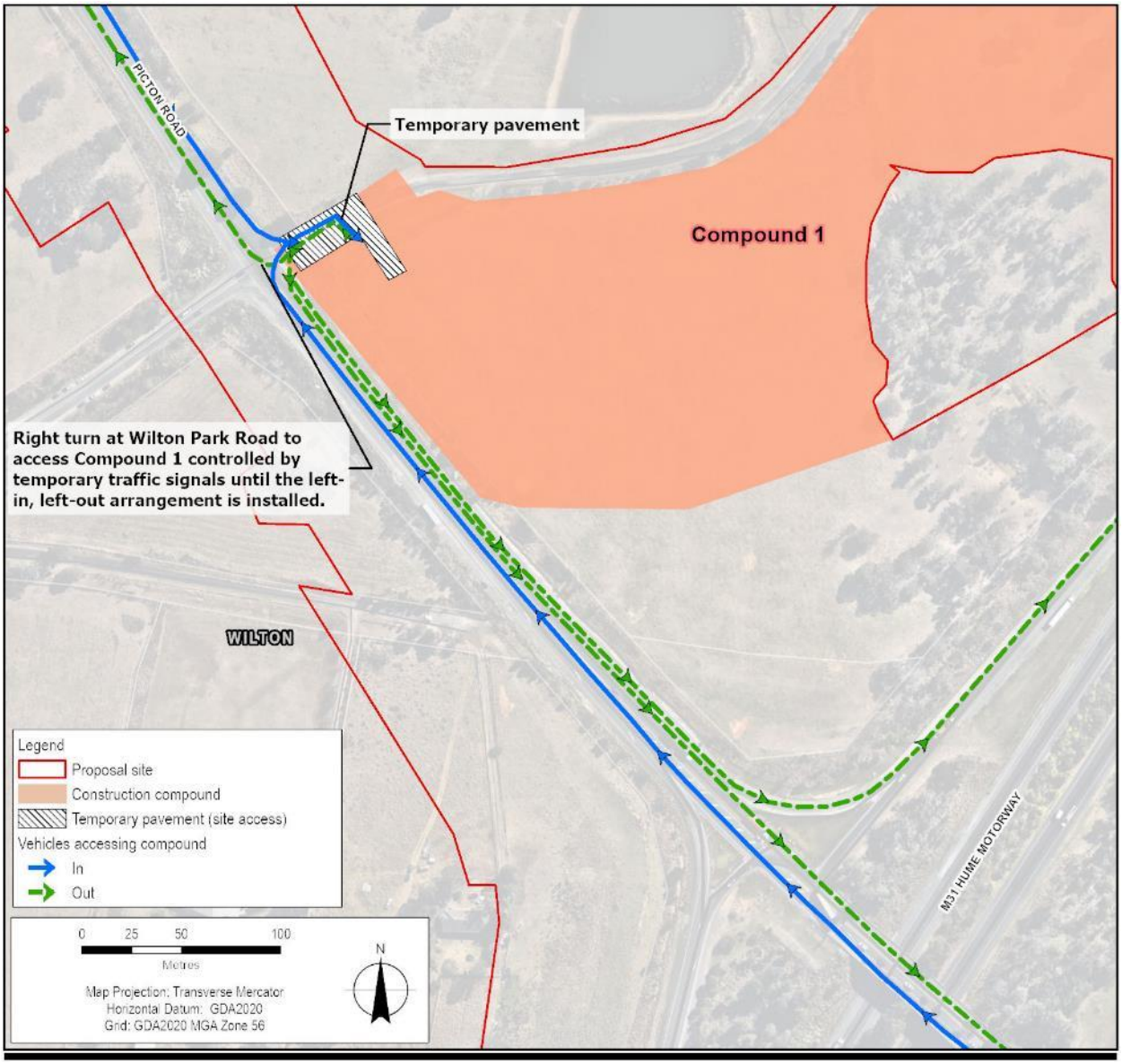


Figure 6.2 Indicative access to Compound 1

Compound 2 (east)

Compound 2 is the larger of the three compounds and would be established east of the interchange and north of Picton Road, adjacent to the M31 Hume Motorway southbound off ramp. It is anticipated that this compound would contain site offices, staff and workforce amenities, stores, stockpiles and laydown areas as well as parking for the construction workforce.

Temporary pavement would be constructed along the Compound 2 frontage to Picton Road to provide an access point to the eastbound lane, as shown in Figure 6.3. Left turn only restrictions would be enforced for construction vehicles entering and leaving the compound to minimise conflict at the access points and to minimise disruption to the existing traffic flow.

The entry point would be located at least 300 metres away from the Picton Road/M31 Hume Motorway interchange southbound off ramp to allow sufficient distance for vehicles approaching from the west to change lanes downstream of the interchange. Egress would be located east of the compound. Temporary localised speed limit reduction may also be implemented, as needed, to facilitate the safe movement of vehicles to, from, and around the site. Truck warning signage would be provided as appropriate.

Figure 6.3 shows the indicative access arrangements for Compound 2.

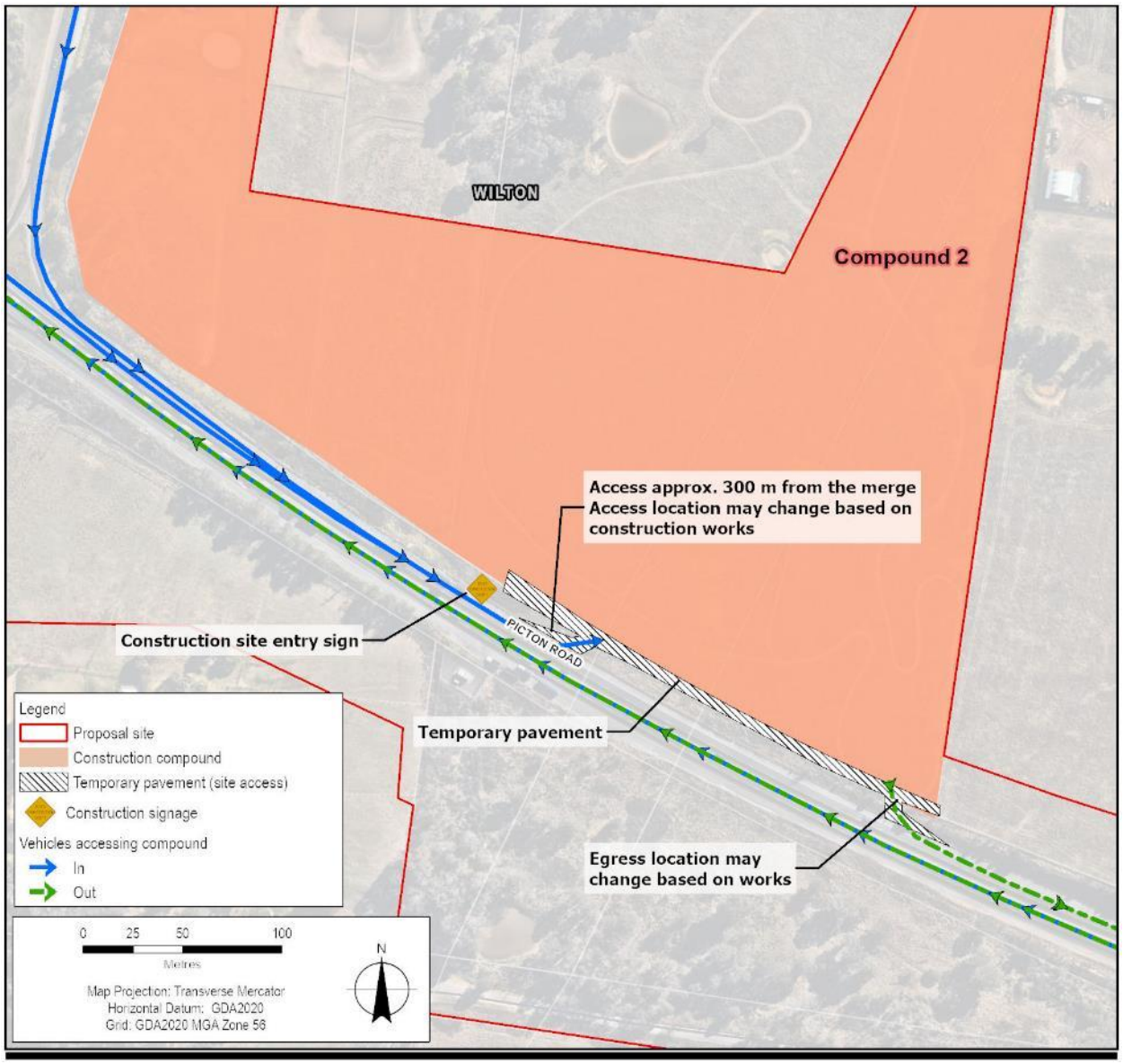


Figure 6.3 Indicative access to compound 2

Compound 3 (north)

A small compound would be established at the northern end of the proposal site, adjacent to the M31 Hume Motorway, to provide additional storage and laydown areas to support the construction of the proposal. This compound would be accessed left-in and left-out only via the M31 Hume Motorway southbound carriageway. Temporary acceleration and deceleration lanes would be provided in accordance with construction traffic management planning to ensure safe site access by light and heavy vehicles.

6.4.2 Access and haulage routes

Designated access routes for construction vehicles would be along the arterial road network wherever possible. Details of all routes used for access and haulage during construction would be developed in consultation with Wollondilly Shire Council and documented in the CTMP. As described in section 6.4.1, Compound 1 would allow both left and right turns. Left turn only access to Compound 2 would be enforced, and construction vehicles would be directed to utilise turnaround areas at the following locations:

– Picton Road/Maldon Bridge Road roundabout
– U-turn at Almond Street (temporary pavement north-west of the intersection of Picton Road/Almond Street).

The indicative haulage routes are shown in Figure 6.4 and Figure 6.5 for compound 1 and compound 2 respectively.

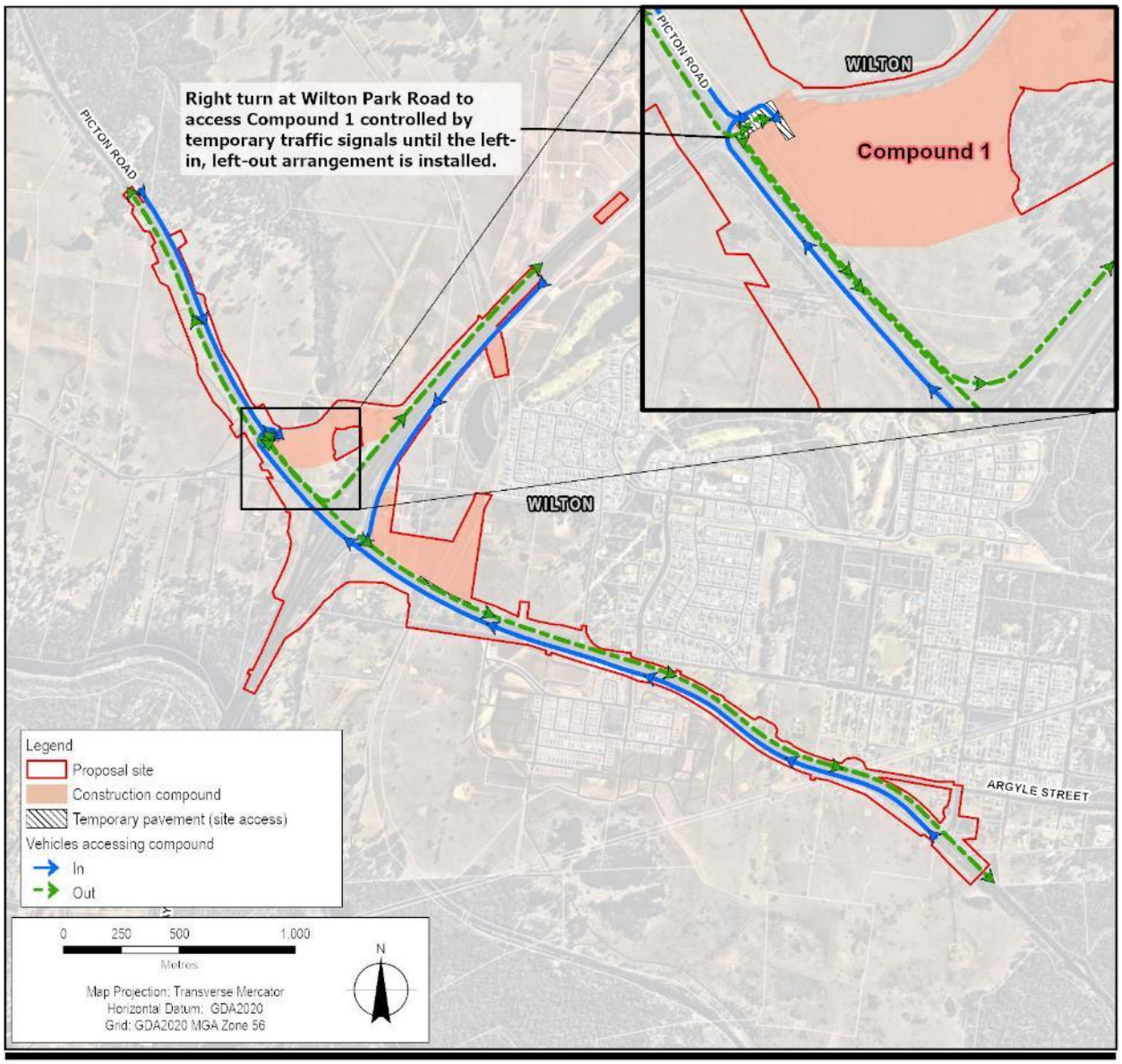


Figure 6.4 Indicative access routes (compound 1)

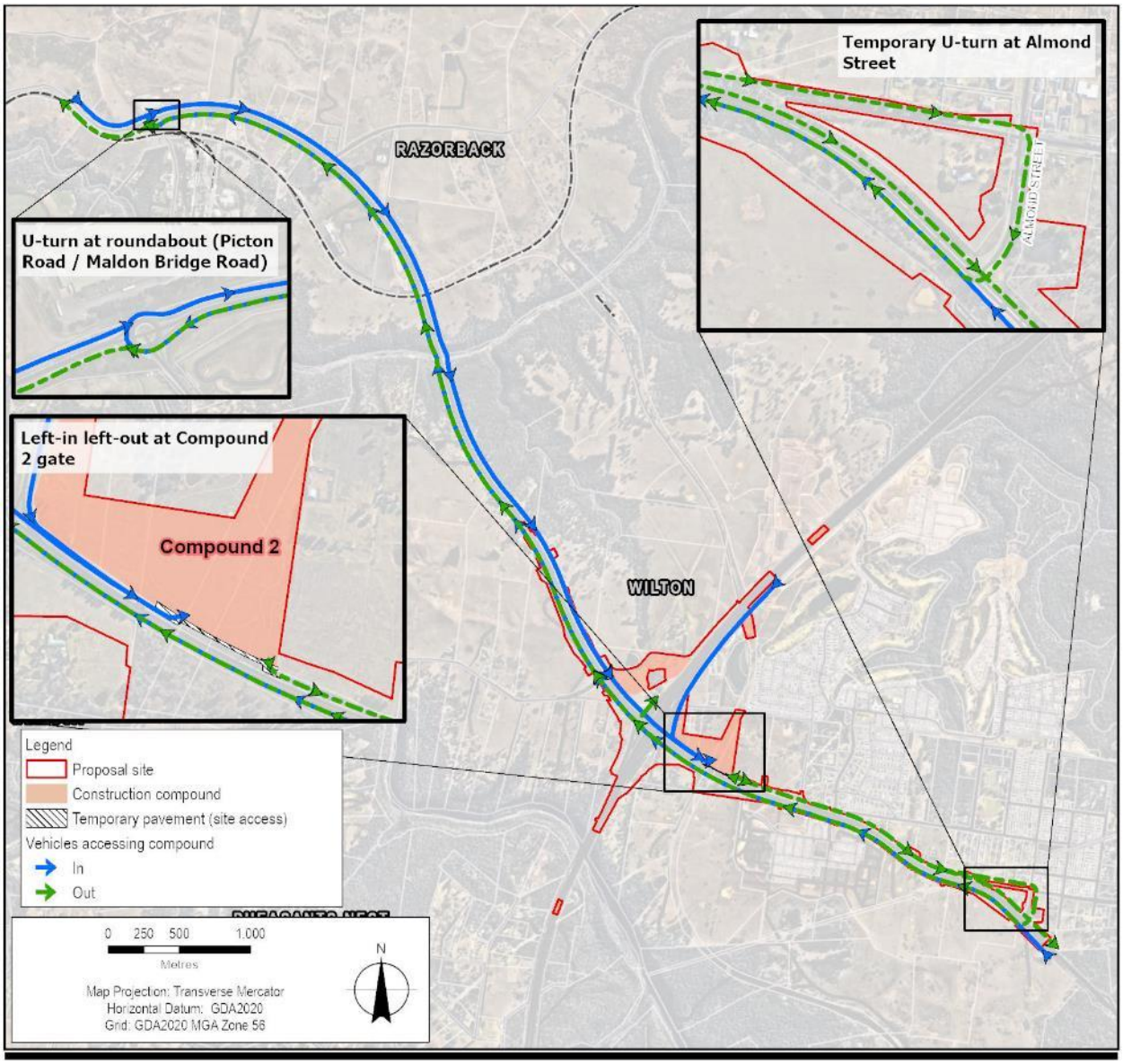


Figure 6.5 Indicative access routes (compound 2)

6.4.3 Construction traffic distribution

The distribution of construction vehicles (both light and heavy vehicles) has been estimated based on the likely location of the source of materials and origins of workers and is outlined as follows:

– 60 per cent accessing to and from the north (Sydney and surrounds)
– 30 per cent accessing to and from the east (Wollongong and surrounds)
– 10 per cent accessing to and from the west (Picton and surrounds).

The above trip distribution, in combination with the traffic generation estimates provided in section 6.3.4, have been used to estimate traffic volumes during construction for the purpose of traffic modelling.

6.5 Parking arrangements

All parking for vehicles associated with the construction activities would be accommodated onsite. Designated workforce car parking areas would be provided within Compound 1 and Compound 2 and would be designed with sufficient capacity to meet the parking demand of the workforce.

7. Construction impact assessment

7.1 Impact on traffic performance

7.1.1 Overview

As described in section 2.3.4, traffic modelling software (SIDRA) was used to model the performance of key intersections within the study area during construction. Traffic volume forecasts for the 2031 horizon year were utilised for model input demands with the maximum anticipated construction traffic volumes superimposed. This represents a conservative scenario given that the construction period is anticipated to be between 2026 and 2029 and includes growth in traffic demand to 2031 in line with the predicted development in Wilton.

For Stage 0 and Stage 4, no significant construction traffic impact is anticipated, with Stage 0 operating effectively as per the BAU scenario documented in section 4.3, and Stage 4 operating effectively as per the ultimate configuration (Proposal Case scenario) documented in section 8.1.

A summary of Stage 1, Stage 2 and Stage 3 LoS outputs for each intersection during the AM peak period and the PM peak period is provided in Table 7.1. Refer to section 2.3.3 for a description of the LoS measures A to F shown in the table.

Table 7.1 Summary of forecast LoS at key intersections

Intersection name	Control	LoS					
		Stage 1		Stage 2		Stage 3	
		AM	PM	AM	PM	AM	PM
Picton Road/Western Developer Road	Traffic signals	A	A	A	A	A	A
Picton Road/Wilton Park Road	Temporary traffic signals	A	A	A	A	A	A
Picton Road/M31 Hume Motorway (W)	Traffic signals	F	C	C	C	C	C
Picton Road/M31 Hume Motorway (E)	Traffic signals	D	F	B	C	B	C
Picton Road/Janderra Lane	Left-in/left-out	B	A	B	A	B	A
Pembroke Parade/Oxenbridge Avenue	Roundabout	B	A	A	A	A	A
Picton Road/Pembroke Parade/Greenway Parade	Traffic signals	D	D	D	D	C	C
Picton Road/Almond Street	Temporary traffic signals	B	A	C	A	A	A

The inclusion of traffic signals at the intersection of Picton Road with the Western Developer Road (privately funded) is a conservative view of traffic performance. If this intersection is not yet constructed prior to the construction of the proposal, then there would be no intersection resulting in zero delays for through traffic along Picton Road at this location.

The potential impact on traffic performance for each stage of construction is discussed in the following sections.

7.1.2 Stage 0 – Traffic performance

Stage 0 would mainly involve pre-construction works and site preparation, as illustrated in section 6.1.1, without significant changes to the road and lane configuration on Picton Road or the Picton Road/M31 Hume Motorway interchange. The intersection geometry and signal phasing at key intersections along Picton Road would remain similar to the existing condition. Therefore, there is only a minor traffic performance impact anticipated during Stage 0 and traffic performance is predicted to be effectively the same as the BAU scenario documented in section 4.3.

7.1.3 Stage 1 – Traffic performance

Stage 1 would involve construction of new pavements on Picton Road, which would be undertaken primarily outside of the existing road, with traffic to continue using the existing Picton Road carriageway. Refer to section 6.1.2 for detail regarding construction activities and associated traffic management configuration during Stage 1.

Temporary signals would be used to control movements at both ends of the Picton Road/M31 Hume Motorway interchange with signal phasing to remain generally the same as the existing conditions, with some optimisation of signal timing. It is noted that Stage 1 traffic management arrangements assume that developer-funded works at the intersections of Picton Road with Pembroke Parade and Western Developer Road have been completed and that these intersections would operate as signalised sites.

The intersection modelling results for Stage 1 are provided in Table 7.2 and Table 7.3 for the AM peak and the PM peak respectively.

Table 7.2 Construction Stage 1 2031 AM peak intersection performance

Intersection name	Control	DoS	Average delay(s)	LoS	95th percentile queue length (m)
Picton Road/Western Developer Road	Traffic signals	0.70	10	A	179 (westbound)
Picton Road/Wilton Park Road	Temporary traffic signals	0.64	9	A	143 (westbound)
Picton Road/M31 Hume Motorway (W)	Traffic signals	1.04	74	F	346 (northbound right)
Picton Road/M31 Hume Motorway (E)	Traffic signals	1.01	51	D	534 (westbound through)
Picton Road/Janderra Lane	Left-in / left-out	0.43	23	B	13 (northbound)
Pembroke Parade/Oxenbridge Avenue	Roundabout	0.43	23	B	13 (northbound)
Picton Road/Pembroke Parade/Greenway Parade	Traffic signals	0.85	44	D	392 (eastbound through)
Picton Road/Almond Street	Temporary traffic signals	0.90	24	B	497 (eastbound)

Table 7.3 Construction Stage 1 2031 PM peak intersection performance

Intersection name	Control	DoS	Average delay(s)	LoS	95th percentile queue length (m)
Picton Road/Western Developer Road	Traffic signals	0.65	8	A	133 (westbound)
Picton Road/Wilton Park Road	Temporary traffic signals	0.68	7	A	150 (westbound)
Picton Road/M31 Hume Motorway (W)	Traffic signals	0.72	32	C	196 (westbound through)
Picton Road/M31 Hume Motorway (E)	Traffic signals	1.13	87	F	391 (westbound through)
Picton Road/Janderra Lane	Left-in / left-out	0.37	10	A	2 (northbound)
Pembroke Parade/Oxenbridge Avenue	Roundabout	0.08	9	A	1 (southbound)
Picton Road/Pembroke Parade/Greenway Parade	Traffic signals	0.89	44	D	234 (eastbound through)
Picton Road/Almond Street	Temporary traffic signals	0.82	13	A	273 (eastbound)

The modelling results demonstrate generally satisfactory performance at most intersections during both the morning and afternoon peak periods. The performance of the Picton Road/M31 Hume Motorway interchange is the exception, which is predicted to operate slightly above capacity, with extensive queuing generated for the northbound off ramp in the morning and for eastbound traffic during both modelled periods.

To determine the potential impact of the Stage 1 construction arrangements at the interchange, the performance of the interchange can be compared to the 2031 BAU scenario documented in section 4.3.4, as outlined in Table 7.4.

Table 7.4 Comparison of Stage 1 against BAU performance (average delay (s) and LoS)

Period	Intersection	2031 BAU performance	2031 Stage 1 performance
AM peak	Picton Road/M31 Hume Motorway (W)	104 [F]	74 [F]
	Picton Road/M31 Hume Motorway (E)	68 [E]	51 [D]
PM peak	Picton Road/M31 Hume Motorway (W)	73 [F]	32 [C]
	Picton Road/M31 Hume Motorway (E)	138 [F]	87 [F]

As demonstrated in Table 7.4, the Stage 1 construction arrangements are predicted to have intersection performance comparable to the BAU scenario at the Picton Road/M31 Hume Motorway interchange with the potential for some efficiencies to be gained through optimisation of traffic signal phasing. It is noted that some differences in performance could also be attributed to different traffic modelling methodologies employed for the operational modelling (including BAU performance) and construction stages.

As shown above, it is anticipated that the traffic performance impact on the road network can be satisfactorily managed using the proposed traffic management and traffic signals at key intersections. Further improvements to forecast traffic performance may be achieved through the optimisation of construction arrangements once a contractor has been appointed. This includes more refined estimates of construction traffic activity which, for the purpose of this assessment, have been overestimated to present a conservative view of the potential impact.

7.1.4 Stage 2 – Traffic performance

Stage 2 would involve bridge construction and pavement upgrades to the remaining portion of the Picton Road carriageway. Following completion of new pavement in Stage 1, the existing Picton Road carriageway would be closed, and traffic would switch the other side of the road to use the new pavement while upgrade works on the existing pavement are being carried out. Refer to section 6.1.3 for detail regarding construction activities and associated traffic management configuration during Stage 2.

As with Stage 1, the traffic performance assessment for Stage 2 assumes that developer-funded works at the intersections of Picton Road with Pembroke Parade and Western Developer Road have been completed and these intersections would operate as signalised sites. Stage 2 also involves changes to the existing traffic signal configuration at either end of the Picton Road/M31 Hume Motorway interchange to suit temporary pavements.

The intersection modelling results for Stage 2 are provided in Table 7.5 and Table 7.6 for the AM peak and the PM peak respectively.

Table 7.5 Construction stage 2 2031 AM peak intersection performance

Intersection name	Control	DoS	Average delay(s)	LoS	95th percentile queue length (m)
Picton Road/Western Developer Road	Traffic signals	0.70	9	A	170 (westbound)
Picton Road/Wilton Park Road	Temporary traffic signals	0.65	9	A	148 (westbound)
Picton Road/M31 Hume Motorway (W)	Traffic signals	0.78	30	C	117 (northbound right)
Picton Road/M31Hume Motorway (E)	Traffic signals	0.77	26	B	140 (westbound through)
Picton Road/Janderra Lane	Left-in/left-out	0.44	23	B	1 (northbound)
Pembroke Parade/Oxenbridge Avenue	Roundabout	0.08	9	A	3 (southbound)
Picton Road/Pembroke Parade/Greenway Parade	Traffic signals	0.83	48	D	298 (eastbound through)
Picton Road/Almond Street	Temporary traffic signals	0.93	31	C	454 (eastbound)

Table 7.6 Construction stage 2 2031 PM peak intersection performance

Intersection name	Control	DoS	Average delay(s)	LoS	95th percentile queue length (m)
Picton Road/Western Developer Road	Traffic signals	0.65	8	A	148 (westbound)
Picton Road/Wilton Park Road	Temporary traffic signals	0.68	8	A	168 (westbound)
Picton Road/M31 Hume Motorway (W)	Traffic signals	0.67	29	C	114 (westbound through)
Picton Road/M31 Hume Motorway (E)	Traffic signals	0.86	34	C	140 (westbound through)
Picton Road/Janderra Lane	Left-in/left-out	0.37	10	A	2 (northbound)
Pembroke Parade/Oxenbridge Avenue	Roundabout	0.08	9	A	2 (southbound)
Picton Road/Pembroke Parade/Greenway Parade	Traffic signals	0.87	48	D	168 (eastbound through)
Picton Road/Almond Street	Temporary traffic signals	0.77	12	A	177 (eastbound)

The modelling results indicate a generally satisfactory performance at all intersections during both the morning and afternoon peak periods. This includes the intersections at either end of the Picton Road/M31 Hume Motorway interchange, which are predicted to operate at LoS B and C during the AM peak and at LoS C during the PM peak. This represents substantially improvement compared to the BAU and Stage 1 arrangements and is reflective of improved signal operations and storage capacities under the temporary traffic management.

The intersection of Picton Road and Pembroke Parade is predicted to operate at LoS D during Stage 2 in both the AM peak and the PM peak, with average delays of about 48 seconds. LoS D is generally adopted as the lower-limit threshold for major traffic-carrying roads and therefore the performance of this intersection is considered acceptable.

7.1.5 Stage 3 – Traffic performance

During Stage 3, work areas would be located primarily within the centre of the carriageway, with traffic using the outer portion of the new pavement in both directions. At the interchange, traffic would utilise the northern bridge of the new interchange to make way for the demolition of the old bridge. Refer to section 6.1.4 for detail regarding construction activities and associated traffic management configuration during Stage 3.

As with Stages 1 and 2, the traffic performance assessment for Stage 3 assumes that developer-funded works at the intersections of Picton Road with Pembroke Parade, Western Developer Road and Wilton Park Road have been completed and these intersections would operate as signalised sites. Stage 3 also involves further changes to the existing traffic signal configuration at either end of the Picton Road/M31 Hume Motorway interchange to suit new and temporary pavements.

The intersection modelling results for Stage 3 are provided in Table 7.7 and Table 7.8 for the AM peak and the PM peak respectively.

Table 7.7 Construction stage 3 2031 AM peak intersection performance

Intersection name	Control	DoS	Average delay(s)	LoS	95th percentile queue length (m)
Picton Road/Western Developer Road	Traffic signals	0.71	9	A	170 (westbound)
Picton Road/Wilton Park Road	Temporary traffic signals	0.65	9	A	148 (westbound)
Picton Road/M31 Hume Motorway (W)	Traffic signals	0.79	30	C	116 (northbound right)
Picton Road/M31 Hume Motorway (E)	Traffic signals	0.77	26	B	147 (westbound through)
Picton Road/Janderra Lane	Left-in/left-out	0.44	23	B	13 (northbound)
Pembroke Parade/Oxenbridge Avenue	Roundabout	0.08	9	A	2 (southbound)
Picton Road/Pembroke Parade/Greenway Parade	Traffic signals	0.84	42	C	133 (eastbound through)
Picton Road/Almond Street	Temporary traffic signals	0.65	12	A	86 (eastbound)

Table 7.8 Construction stage 3 2031 PM peak intersection performance

Intersection name	Control	DoS	Average delay(s)	LoS	95th percentile queue length (m)
Picton Road/Western Developer Road	Traffic signals	0.65	8	A	148 (westbound)
Picton Road/Wilton Park Road	Temporary traffic signals	0.67	8	A	167 (westbound)
Picton Road/M31 Hume Motorway (W)	Traffic signals	0.67	29	C	114 (westbound through)
Picton Road/M31 Hume Motorway (E)	Traffic signals	0.86	34	C	140 (westbound through)
Picton Road/Janderra Lane	Left-in/left-out	0.37	10	A	2 (northbound)
Pembroke Parade/Oxenbridge Avenue	Roundabout	0.08	9	A	2 (southbound)
Picton Road/Pembroke Parade/Greenway Parade	Traffic signals	0.8	38	C	114 (eastbound through)
Picton Road/Almond Street	Temporary traffic signals	0.55	8	A	53 (eastbound)

The modelling results presented above demonstrate generally satisfactory performance at all intersections during both the morning and afternoon peak periods. Notably, the intersection of Picton Road with Pembroke Parade is predicted to perform better in Stage 3 than Stage 2, with average delays improving by about six to 10 seconds during the peak periods.

7.1.6 Stage 4 – Traffic performance

During Stage 4, it is anticipated that all traffic lanes on Picton Road and the newly constructed DDI would be operational such that the traffic performance would be as documented in section 8.1.

7.1.7 Cumulative journey impacts

The provision of temporary traffic signals during the construction stages, along with the speed limit reduction to 60 kilometres per hour along Picton Road could result in increased journey times along the corridor. However, the impacts compared to a BAU Scenario are expected to be minor, given that the existing number of traffic lanes would be maintained throughout the construction period.

Additionally, as detailed in section 7.1.3, Stage 1 is the most critical construction period in terms of traffic performance. The SIDRA modelling results for the Stage 1 construction scenario demonstrated generally satisfactory performance at most intersections during both the morning and afternoon peak periods, with the exception of the Picton Road/M31 Hume Motorway interchange which is predicted to operate slightly above capacity. However, the construction arrangements are predicted to have intersection performance comparable to the BAU scenario at the Picton Road/M31 Hume Motorway interchange.

7.2 Impact on walking and cycling

There are no existing walking facilities along Picton Road that would be affected by road closures during construction.

Construction traffic management arrangements would include safety barriers located a minimum of 0.5 metres from the edge line of the traffic lane, resulting in the removal of existing shoulder that is available for cyclists to use. Cyclists would be required to travel within the general traffic lane when riding east and west along Picton Road. It is noted that observed cycling volumes along Picton Road are relatively low, and a speed limit of 60 kilometres per hour would apply to Picton Road during construction which would improve the general level of safety for cyclists. The CTMP prepared for the proposal would detail arrangements to maximise safety for cyclists during the works.

The shared user path that forms part of the proposal would be completed during Stage 2, when works are on the south side of the road, with the exception of the connection across the M31 Hume Motorway which would be completed during Stage 3. Once completed, this shared user path would be available for both pedestrians and cyclists to use, fully separated from vehicular traffic, which would result in a substantial improvement in safety for these users.

7.3 Impact on public transport

The potential impact of the construction works on public transport services would be minor. It is noted that long-term lane closures are not anticipated to be in place for the M31 Hume Motorway and, if applied, would be limited to short-term works associated with bridge works and the tie-in of new interchange ramps, occurring at night when these public transport services do not currently run.

The potential impact of the proposal on the school bus service would be similar to that for general traffic (refer section 7.1).

It is considered that construction would not have a material impact on existing public transport. It is noted that if new public transport services are added to Picton Road during construction, then these would be subject to a similar impact as for general traffic (refer section 7.1).

7.4 Impact on heavy vehicles

The proposed construction staging arrangements would not impose any specific restrictions for the movement of heavy vehicles, including OSOM vehicles, along the M31 Hume Motorway or along Picton Road in either direction. While heavy vehicles directly associated with the construction would be prohibited from undertaking some movements (refer section 6.4) these restrictions would not apply to other heavy vehicles not associated with the proposal.

Heavy vehicles travelling within the investigation study area would experience a similar traffic performance impact as for general traffic (refer section 7.1).

7.5 Impact on local traffic access

7.5.1 Road and lane closures

The construction staging and methodology have been prepared to minimise disruption to existing road users. Access would be maintained at local roads during construction, and vehicles directly associated with the construction activities would be instructed to follow predetermined routes that would not utilise local roads.

In the case that temporary lane closures are required, these works are to be undertaken as out-of-hours work or scheduled during off-peak periods to minimise disruption and delays to the majority of road users. Should it be necessary to conduct the works during daytime or during hours that fall within peak periods, alternative access arrangements would be undertaken in consultation with Wollondilly Council and affected property and business owners.

It is noted that any local road closures are proposed to be short term, and any impact resulting from these activities, if unavoidable, would be temporary.

7.5.2 Speed zone changes

Changes to speed zones would be implemented around the proposal site to manage traffic risk to both workers and road users. Picton Road speed limits around the proposal site would be reduced from the existing 80 kilometres per hour to 60 kilometres per hour during Stages 1 to 3 of the construction works (about 26 months, noting that the reduced speed limit of 60 kilometres per hour would be retained for Picton Road west of Pembroke Parade for the extent of future urban development, over the long term). The M31 Hume Motorway speed limits would generally be maintained, except during the construction of the bridges.

Subject to Road Occupancy Licence (ROL) and approvals by Transport and other relevant authorities, temporary localised lane closures and contraflow arrangements and traffic speed restrictions may be implemented during periods where workers are exposed to live traffic or other increased safety risks.

Advanced notice to the community and road users would be provided for any planned changes to public speed zones. Variable message signs would also be established to clearly communicate the changes to the road environment in advance of restrictions being implemented (e.g., roadwork speed zones, contraflow arrangements).

Speed zone changes would be implemented at arterial roads and are not likely to impact local roads, which already have lower speed limits (generally 50 kilometres per hour).

7.5.3 Impact on residents and businesses

During construction, access would be maintained for residents, businesses, and through traffic. Where temporary disruption of existing access is unavoidable, alternative access arrangements would be provided in consultation with Wollondilly Shire Council and affected property and business owners. In the case of properties adjoining the road corridor, temporary driveways would be provided if required. The final driveway configuration would be installed as part of pavement construction.

7.5.4 Janderra Lane and Almond Street intersections

Turns into and out of Janderra Lane at Picton Road would be restricted to LILO movements for the duration of the construction period and this arrangement would be maintained during operation of the proposal. This restriction would result in the potential for additional impact to users of Janderra Lane until other routes are completed, including future local roads in the South and South East Wilton Precincts, which would connect Janderra Lane to Pembroke Parade and provide alternative right turn access, as well as the Janderra Lane overpass.

Right turns into and out of Almond Street would be maintained under temporary traffic signal control for the duration of the construction works.

7.6 Impact on road safety

Construction is not likely to have a significant detrimental impact on road safety. Road safety would be maintained by implementing the CTMP, which would contain a range of site-specific mitigation measures for controlling traffic and minimising conflict points (see section 9.1.1).

7.7 Impact on parking

Parking for construction vehicles and worker vehicles would be contained on site within the construction compounds. As such, the parking needs resulting from the additional vehicles generated by the construction activities are not likely to increase the demand on existing parking (including on-street parking) in the vicinity of the proposal site.

The proposed construction traffic management arrangements would include safety barriers located a minimum of 0.5 metres from the edge line of the traffic lane. As a result, road shoulders along Picton Road would not be available for use as observed in the current conditions described in section 3.8. It is noted that existing rest areas are available on the M31 Hume Motorway (about four kilometres north of the proposal site and 6.5 kilometres south of the proposal site) and Picton Road (about six kilometres south-east of the proposal site).

7.8 Impact on the M31 Hume Motorway

Figure 7.1 shows the estimated weekday 2031 hourly traffic volume on the M31 Hume Motorway for the northbound and southbound directions. By 2031, traffic is estimated to peak from midday until around 5pm, with about 1,720 pcu in the northbound direction and about 1,750 pcu in the southbound direction. During other times of the day, traffic volumes along the motorway are expected to be lower.

With temporary localised roadworks speed limit reductions, lane capacity on the motorway would be reduced from about 1,700 pcu per hour per lane to about 1,000 pcu per hour per lane. Should temporary contraflow and lane closures be required, these temporary traffic arrangements would be scheduled during periods of lower traffic activity, typically between 9pm to 6am, to minimise impacts on road users. As shown in Figure 7.1, even with reduced lane capacity at 1,000 pcu per hour, the motorway would have sufficient capacity to accommodate estimated traffic volumes in both directions.

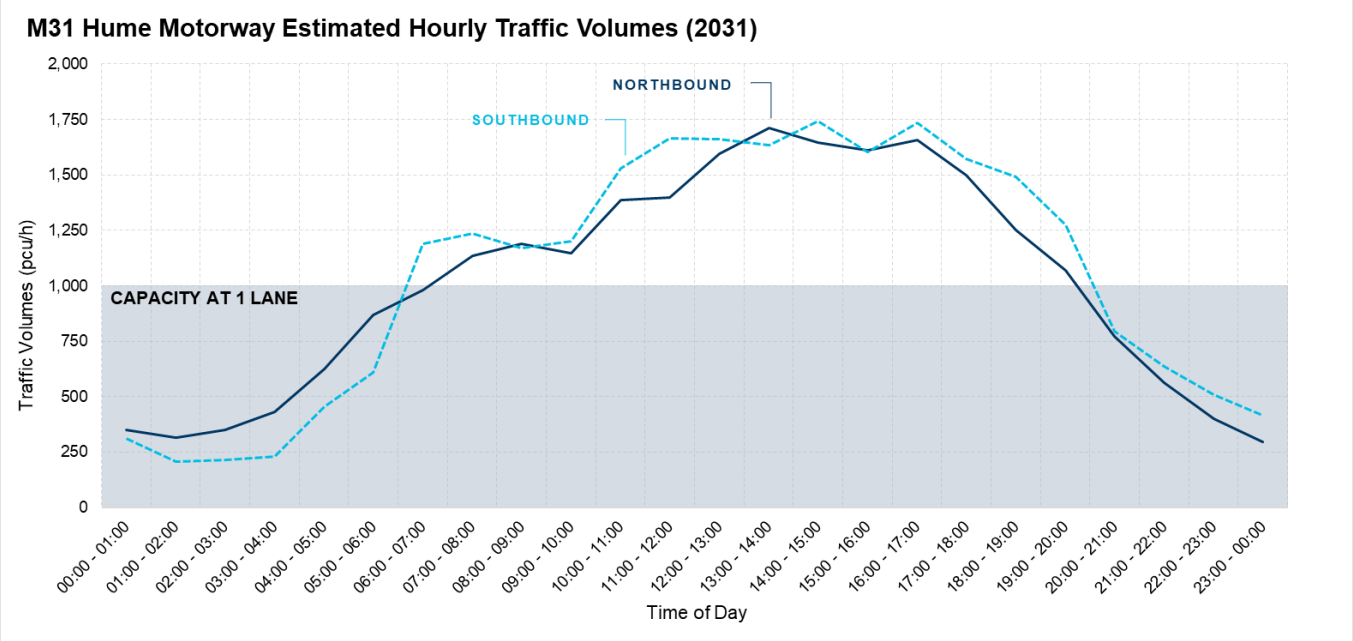


Figure 7.1 M31 Hume Motorway – estimated 2031 hourly traffic volumes (weekday)

7.9 Cumulative impact

The proposal forms part of the Wilton Growth Area's medium-term infrastructure targets to support the development of the future town. The proposal would be constructed in stages over a period of about three years, during which it is anticipated that other developments in the Wilton Growth Area would likely also be constructed. There is currently limited information on the delivery timelines of other developments and infrastructure within the study area; however, it is anticipated that some of the developments would utilise Picton Road and the M31 Hume Motorway, in the absence of alternative access routes in the study area.

Construction of these developments (including the proposal) are anticipated to be carried out in stages and any traffic generated by these activities would fluctuate and be staggered over the construction period of the proposal. The developments in the area would also include conditions of approval requiring coordination of works with Transport in order to manage traffic demand, haul routes and changes to intersections that are likely to affect traffic entering and exiting Picton Road. To minimise the potential for cumulative impacts, coordination with stakeholders associated with other developments, including Wollondilly Shire Council as a planning and road authority for local roads, would be undertaken prior to construction to ensure that construction activities are appropriately scheduled to minimise impacts.

Additionally, as described in section 6, the capacity of Picton Road would be maintained for the duration of construction activities and would not reduce the number of available traffic lanes along Picton Road.

Cumulative impacts arising from construction traffic from any concurrent development activities would be managed by implementing a CTMP that would be prepared by the contractor once the design and construction methodology for the proposal is finalised. Preliminary measures recommended for inclusion the CTMP are proposed in section 9.1.

7.10 Summary of construction impact assessment

The proposal would be constructed in stages, with each stage having varying traffic management arrangements along Picton Road within the study area. The concept construction staging has been developed to accommodate the construction activities while maintaining the existing number of travel lanes along Picton Road to minimise disruption to road users.

Traffic modelling was undertaken using SIDRA to assess the potential impact of the construction activities on the traffic performance of eight key intersections under different traffic management arrangements for Stage 1-3 of the construction works. The traffic performance impact during Stage 0 and Stage 4 were considered to be negligible, with Stage 0 generally operating as per the BAU scenario, and Stage 4 generally operating as per the ultimate (Proposal Case) configuration.

Traffic modelling considered the future traffic volume forecasts for 2031, superimposed with the predicted volume generated by the construction activities. This represents a conservative scenario with construction anticipated to occur from 2026 to 2029. The results of traffic modelling indicated that:

– The worst performance is predicted to be experienced during Stage 1 of construction, with the Picton Road/M31 Hume Motorway interchange predicted to operate at a LoS of F. However, it is noted that this performance is comparable to the 2031 BAU modelling results, and Stage 1 construction arrangements are not predicted to worsen the performance of the existing interchange.
– All intersections within the study area are predicted to operate at a satisfactory LoS during Stages 2 and 3, with performance improving as new pavements become operational over the course of the construction program, including at the Picton Road/M31 Hume Motorway interchange and at the intersection of Picton Road with Pembroke Road.

Changes to speed zones would be implemented around the proposal site to manage traffic risk to both workers and road users. These changes would be implemented at arterial roads, mainly along Picton Road, and would generally not impact other local roads. No existing walking and cycling facilities are available along Picton Road that would be impacted by the construction activities, but cyclists using the carriageway would potentially benefit from the reduced vehicle speeds. New walking and cycling paths fully separated from traffic would also be constructed in Stage 2, providing safer environments for these users.

The construction activities are not likely to have a direct impact on public transport and heavy vehicle movement within the study area. These modes would experience a similar traffic performance impact (minimal delays) as general traffic (refer to sections 7.1, 7.3 and 7.4). Vehicle parking/stopping at road shoulders along Picton Road would become unavailable with the installation of safety barriers for the construction works. Existing parking demand would be redirected to appropriate and suitable parking locations outside of the study area.

Some ad hoc lane closures are anticipated during various stages of construction, likely along arterial roads. It is noted that these closures are proposed to be short term and temporary, and would, as far as practicable, be conducted outside of peak periods of traffic. Changes to the road environment that have the potential to impact day-to-day activities of residents and local businesses would undergo proper consultation and notification. Appropriate advertisement of changes through publications, and temporary signage and wayfinding, would be provided to inform road users of any changes in the road environment in and around the investigation study area.

Based on the above, it is anticipated that construction would have a minor potential impact on traffic and transport, which can be satisfactorily managed through the optimisation of traffic signals at key intersections and temporary traffic management. As described in section 9, a detailed CTMP would be prepared prior to the commencement of construction activities to mitigate any anticipated impacts, outlining site-specific mitigation measures for controlling traffic and minimising conflict points. Section 9.1 outlines proposed mitigation measures for inclusion in the CTMP.

8. Operational impact assessment

This section provides a comparison of road network performance under the Proposal Case scenario compared to the BAU scenario (without proposal, described in section 4) and includes assessment of impact on other road users including impact on walking and cycling, public transport, heavy vehicles, local traffic, road safety and parking.

8.1 Impact on traffic performance

8.1.1 Network performance

Table 8.1 summarises the network-level results for the second hour of each assessed peak period for the future year Proposal Case scenarios. Results of the network performance results for the BAU scenarios are also shown as a reference for comparison.

Table 8.1 Future year network performance – Proposal Case scenarios

Indicator	Unit	BAU		Proposal Case		Difference [1]	
		AM	PM	AM	PM	AM	PM
2031							
Traffic demand	veh	6,977	6,675	6,977	6,675	0	0
VKT	km	67,784	67,550	70,742	68,542	2,958	992
VHT	hrs	1,026	1,191	950	1,053	-76	-138
Average vehicle delay	sec	15	24	9	15	-6	-9
Latent demand	no.	1	1	1	1	0	0
Average network travel speed	km/h	71	63	77	69	5	6
2046							
Traffic demand	veh	9,935	9,681	9,935	9,681	0	0
VKT	km	84,173	87,835	90,947	90,284	6,774	2,449
VHT	hrs	1,615	2,006	1,279	1,266	-336	-740
Average vehicle delay	sec	28	41	10	10	-18	-31
Latent demand	no.	74	39	1	1	-73	-38
Average network travel speed	km/h	60	57	72	72	12	15

Note 1: Difference between Proposal Case and BAU for the specified assessment year

As discussed in section 2.3.3, VKT refers to the total distance travelled by vehicles within each evaluation hour, while VHT refers to the total travel time travelled by vehicles within each hour. Increased VKT and decreased VHT for the Proposal Case (compared to BAU) generally indicates improved performance, reflected in the increased average speeds and decreased delays.

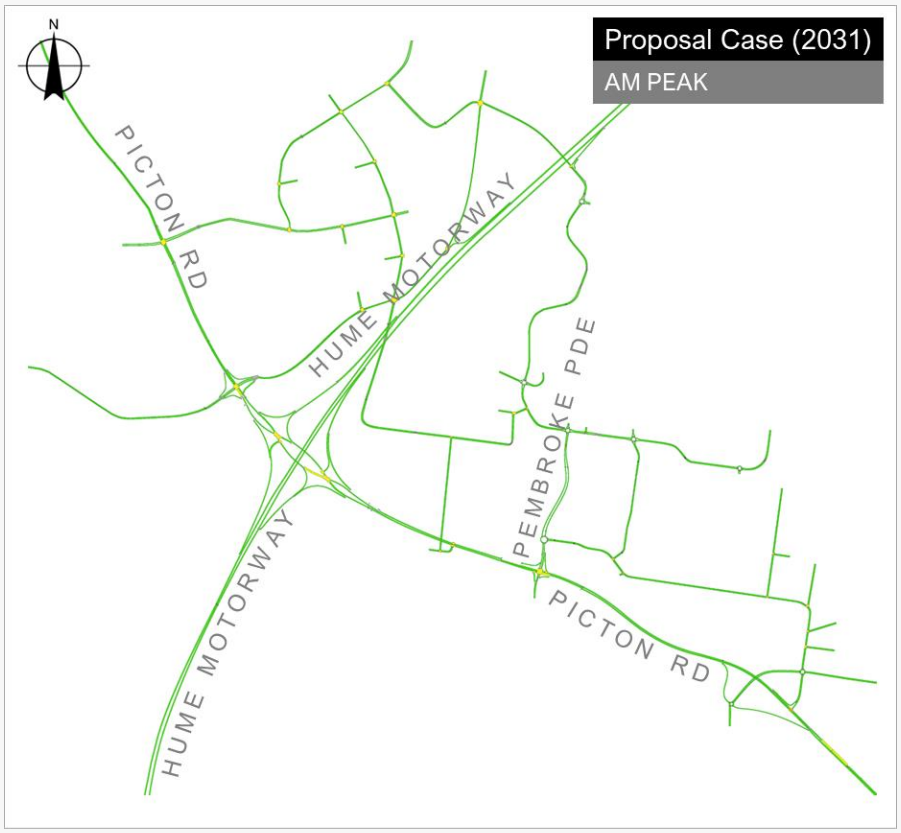
Table 8.2 provides an analysis of the modelling results in Table 8.1.

Table 8.2 Analysis of Proposal Case outcomes

2031 Proposal Case	2046 Proposal Case
Compared to the 2031 BAU scenario: – Average vehicle speed is predicted to increase by up to 5km/h in the AM peak and 6km/h in the PM peak. – Overall, the modelling indicates that upgrading the Picton Road/M31 Hume Motorway interchange to a DDI would increase the capacity of the interchange by addressing the critical movements (e.g., right turn to the M31 Hume Motorway ramps) and would consequently improve the performance of the Picton Road corridor.	Compared to the 2046 BAU scenario: – Average vehicle speed is predicted to increase by up to 12km/h in the AM peak and up to 15km/h in the PM peak period. – Average vehicle delay is predicted to reduce by up to 18 seconds in the AM peak and up to 31 seconds in the PM peak period.

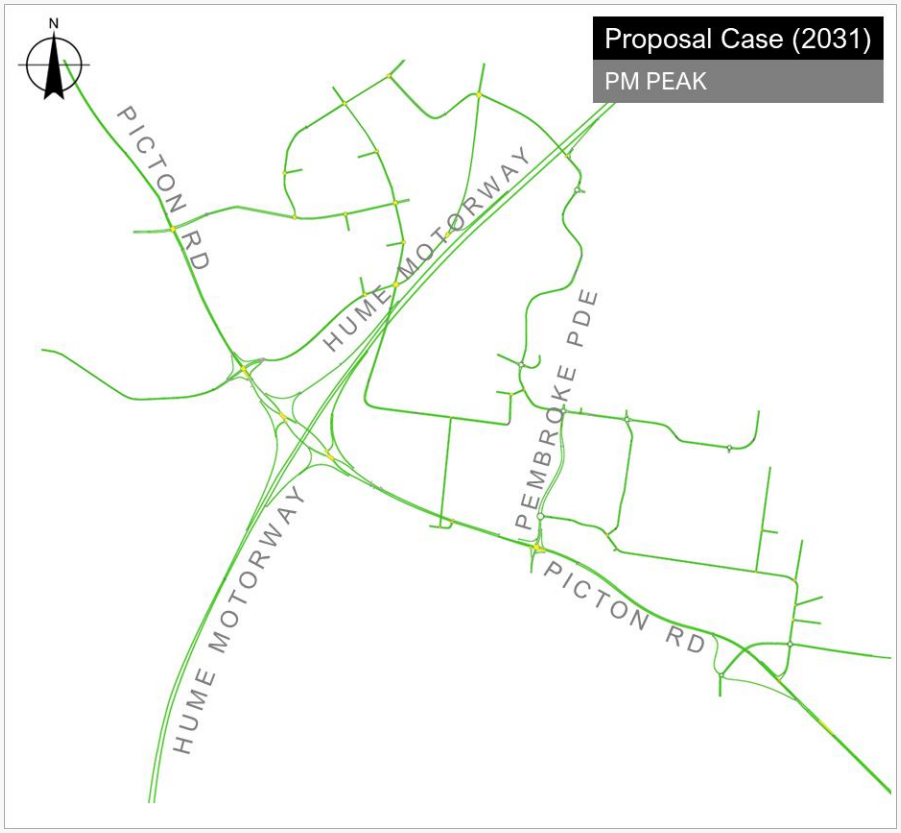
8.1.2 Density plots

Density plots for 2031 and 2046 Proposal Case scenarios are shown in Figure 8.1 and Figure 8.2. These figures demonstrate the location of key pinch points for the future proposal scenarios.



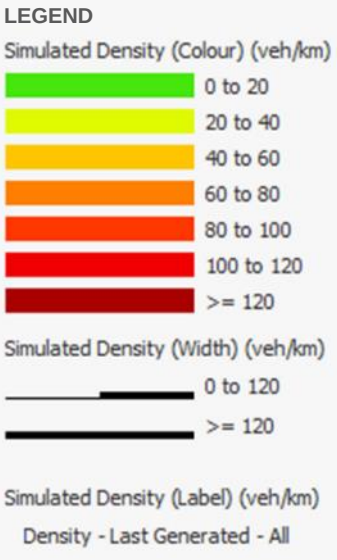
The 2031 Proposal Case results indicate a reduction in vehicle density compared with the BAU Scenario at key locations, including at Hume Motorway / Picton Road and road sections west of Picton Road / Wilton Park Road travelling eastbound.

Notably, no northbound off ramp congestion is predicted in 2031 Proposal Case AM peak.



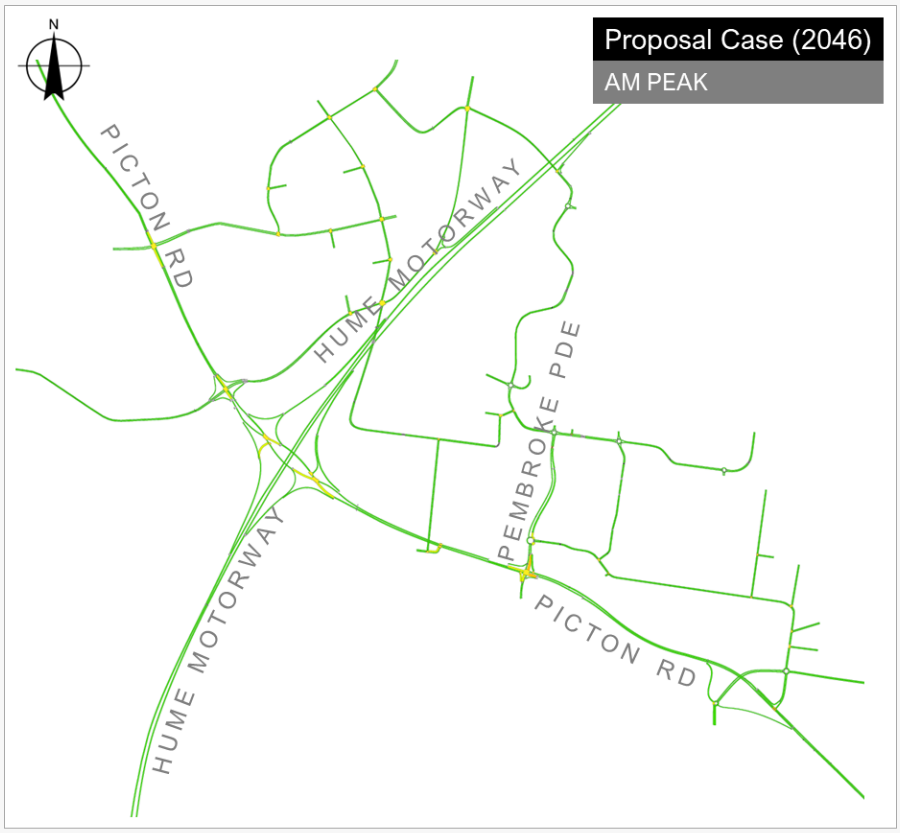
The 2031 Proposal Case results for the PM peak period indicate a reduction in vehicle density is predicted compared to the BAU scenario at the Picton Road/M31 Hume Motorway interchange.

Notably, no southbound off ramp congestion is predicted in 2031 Proposal Case PM peak.



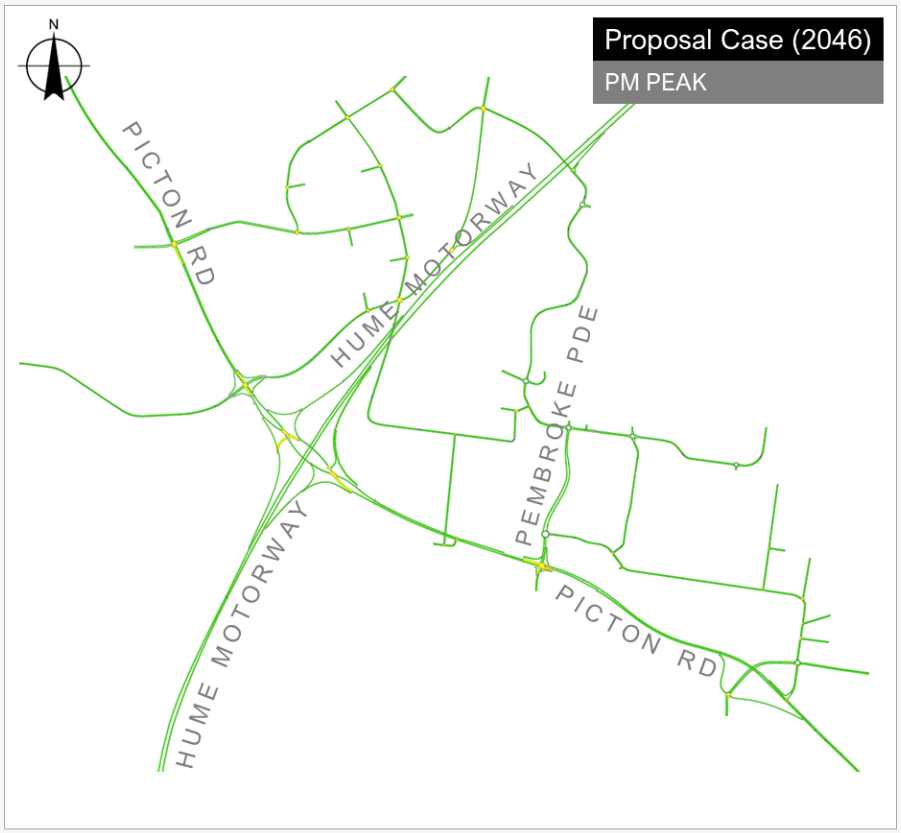
Simulated density in PCU/km/lane can be taken to be about 1.3 times the value shown on the plots above

Figure 8.1 2031 Proposal Case density plot



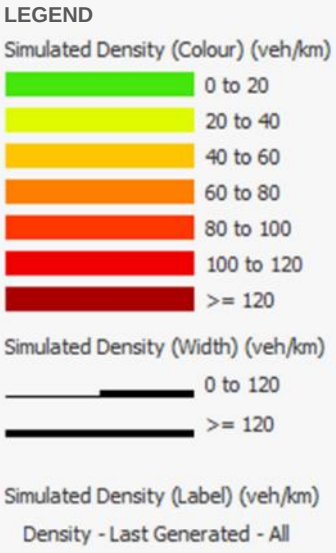
With the Proposal, traffic congestion on Picton Road is predicted to be minimal.

Notably, the southbound off ramp and northbound off ramp congestion is not predicted to extend to the M31 Hume Motorway mainline in either the AM peak.



Similar to the AM peak, with the Proposal, traffic congestion on Picton Road is predicted to be minimal during the PM peak.

Notably, the southbound off ramp congestion present in the 2046 BAU scenario is not predicted to occur in the 2046 Proposal Case PM peak.



Simulated density in PCU/km/lane can be taken to be about 1.3 times the value shown on the plots above

Figure 8.2 2046 Proposal Case density plot

8.1.3 Travel time

An evaluation of the travel times along Picton Road was conducted based on the Aimsun microsimulation modelling outputs. The travel time evaluation covers the length of Picton Road within the study area, as described in section 2.2.2.

A summary of estimated travel times for the Picton Road corridor obtained from traffic modelling, and rounded to the nearest minute, is provided in Table 8.3.

Table 8.3 Estimated travel times (rounded)

Scenario	Eastbound		Westbound	
	AM peak (7.15-8.15am)	**PM peak (4.30-5.30pm)**	**AM peak (7.15-8.15am)**	**PM peak (4.30-5.30pm)**
Existing (2022)	10 minutes	8 minutes	8 minutes	8 minutes
BAU (2031)	13 minutes	10 minutes	11 minutes	11 minutes
Proposal Case (2031)	10 minutes	10 minutes	10 minutes	10 minutes
Proposed improvement (2031)	***-3* minutes**	***<1 minute***	***-1 minutes***	***-1 minute***
BAU (2046)	22 minutes	14 minutes	13 minutes	43 minutes
Proposal Case (2046)	10 minutes	10 minutes	10 minutes	10 minutes
Proposed improvement (2046)	***-12 minutes***	***-4 minutes***	***-3 minutes***	***-33 minutes***

As shown in Table 8.3, the travel times along the Picton Road corridor for the Proposal Case are typically 10 minutes in all periods, independent of traffic volume. This represents an improvement compared to predicted BAU travel times for the 2031 horizon year (about one to three minutes) and a substantial improvement compared to the BAU travel times for the 2046 horizon year (up to 12 minutes for the AM peak hour and up to 33 minutes for the PM peak hour). It is worth noting that a key assumption of the 2031 assessment is that all upgrades to the Wilton Growth Area have been provided and as a result, the BAU scenario is heavily impacted by additional upgrades such as the northern ramps at the Niloc Bridge that take some traffic away from the Picton Road and M31 Hume Motorway interchange. As these upgrade are not directly within Transport's control to deliver, if some of the upgrades are delayed, the benefits of the proposal compared to the BAU would expect to be much greater in 2031.

In addition to providing travel time savings, the relatively consistent travel times that are facilitated by the proposal provide a high degree of travel time reliability along the corridor. This would allow for road users to accurately plan their journey and travel time and would also have significant benefit for future public transport, with bus services able to arrive on-time and with consistent travel time between stops. The improved efficiencies, reliability, and capacity, the proposal would help enable the road network to support and sustain the growth of future communities within, about, and beyond the Wilton Growth Area.

Travel time plots for the Proposal Case and BAU scenario are provided in Table 8.4 and Table 8.5.

Table 8.4 Picton Road travel time results – 2031 BAU vs 2031 Proposal Case scenario

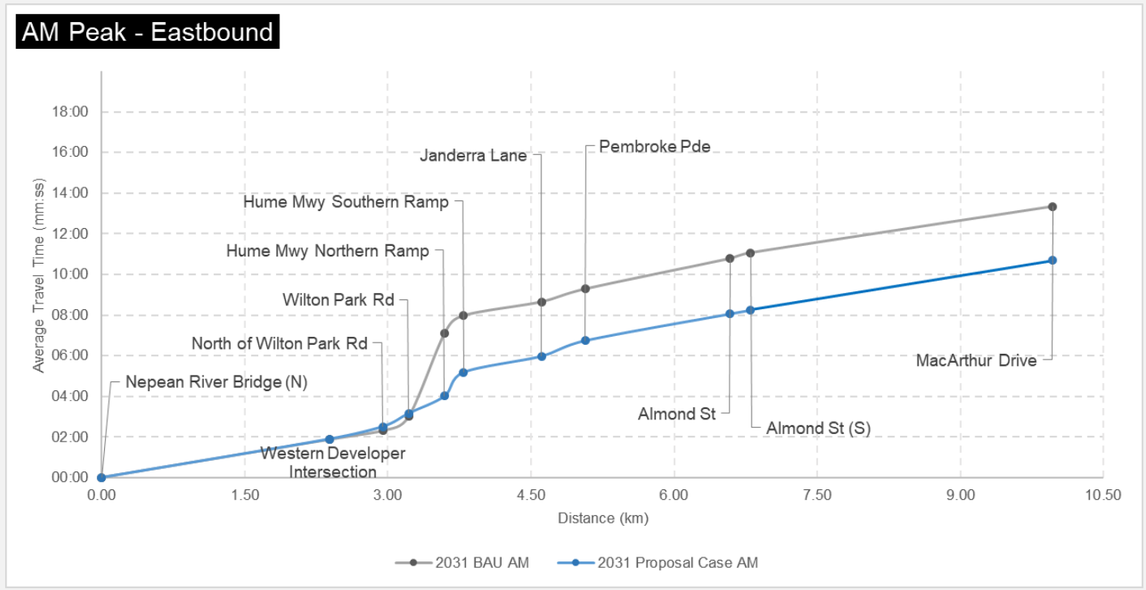
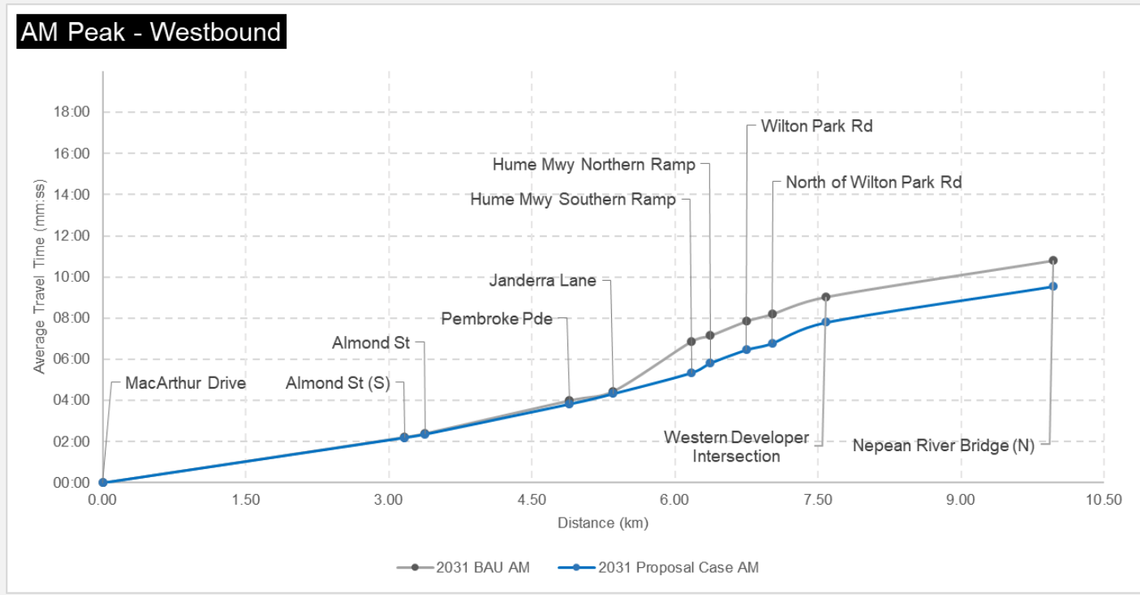
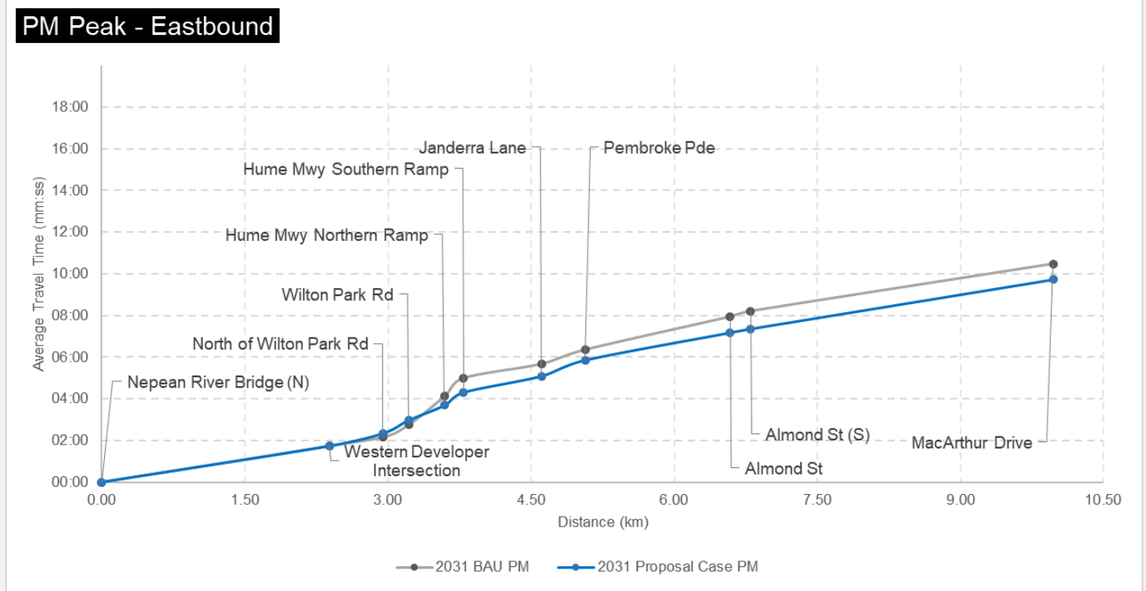
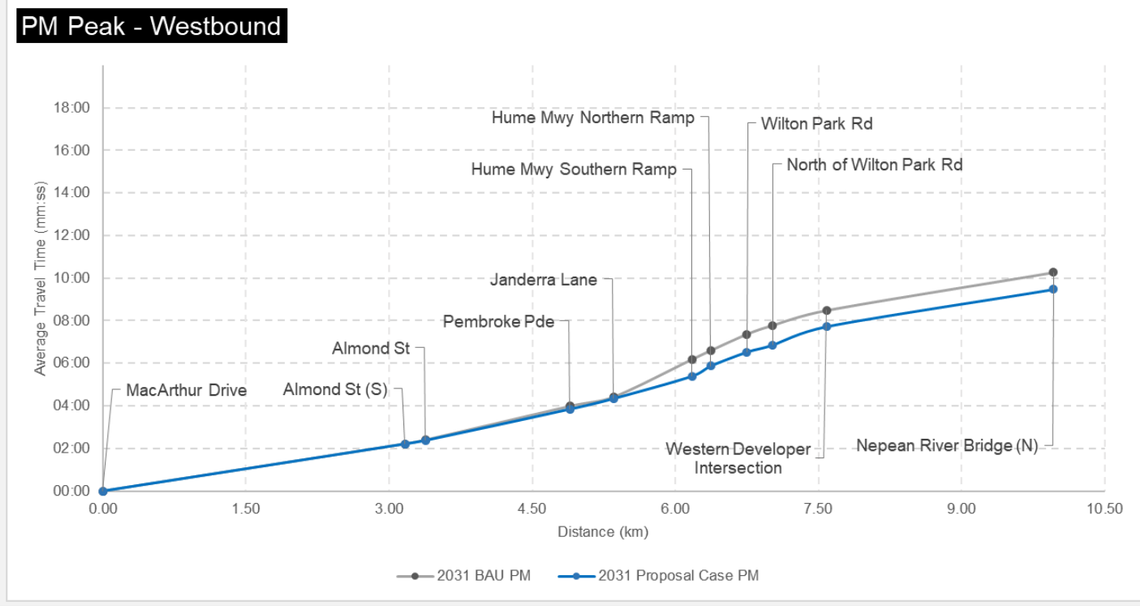
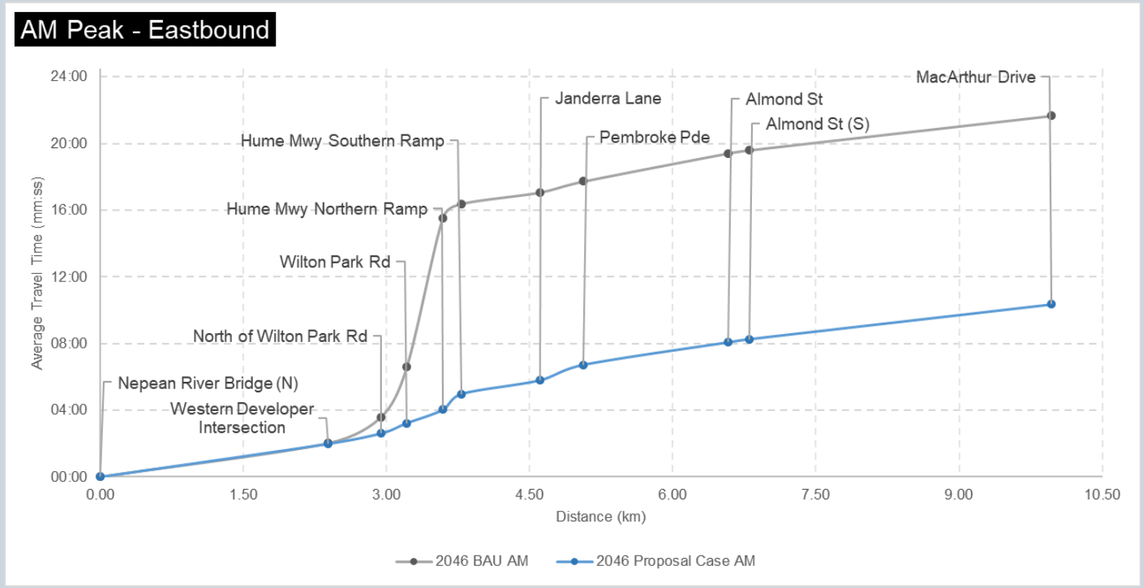
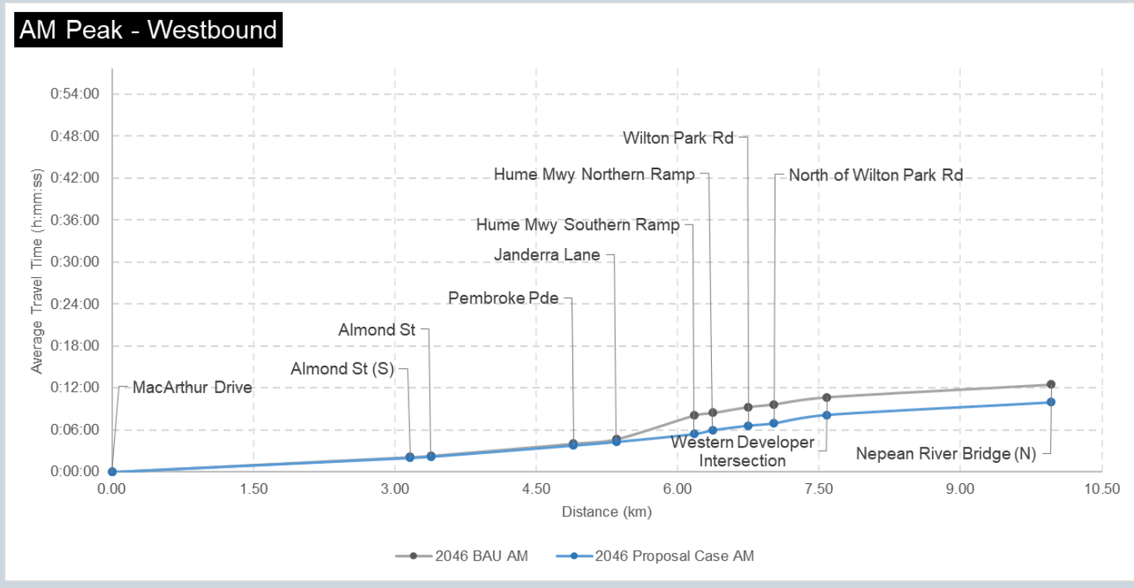
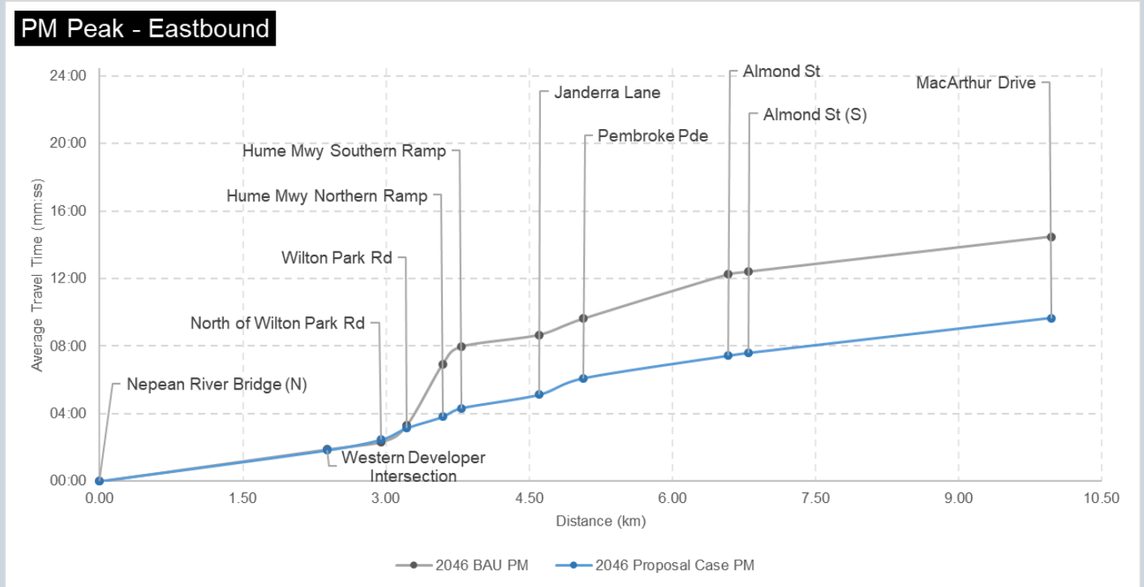
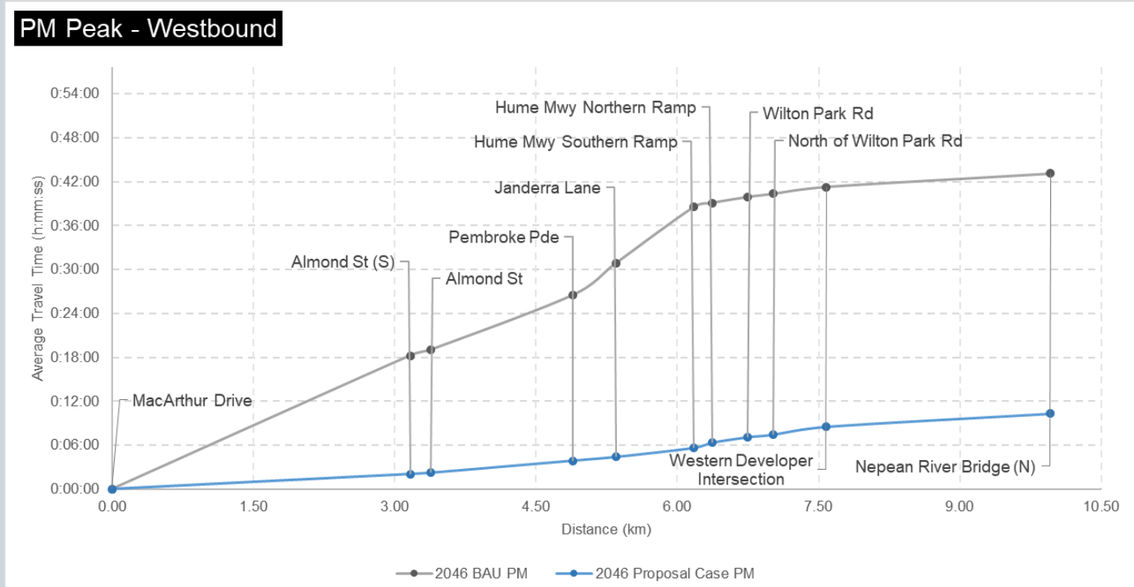
2031 BAU vs Proposal Case	Eastbound	Westbound
AM PEAK		
PM PEAK		

Table 8.5 Picton Road travel time results – 2046 BAU vs 2046 Proposal Case scenario

2046 BAU vs Proposal Case

	Eastbound	Westbound
AM PEAK		
PM PEAK		

8.1.4 Intersection level of service

Table 8.6 summarises the modelled intersection LoS results for the 2031 and 2046 Proposal Case scenarios.

Table 8.6 Future year intersection LoS and average delay results – 2031 and 2046 Proposal Case scenarios

Intersection name	2031				2046			
	BAU		Proposal Case		BAU		Proposal Case	
	AM	PM	AM	PM	AM	PM	AM	PM
Picton Road/Wilton Park Road	26 [B]	24 [B]	21 [B]	20 [B]	71 [E]	31 [C]	20 [B]	25 [B]
Picton Road/M31 Hume Motorway (W)	119 [F]	62 [E]	28 [B]	20 [B]	123 [F]	75 [F]	24 [B]	23 [B]
Picton Road/M31 Hume Motorway (E)	58 [E]	64 [E]	12 [A]	13 [A]	91 [F]	155 [F]	16 [B]	17 [B]
Picton Road/Janderra Lane	21 [B]	16 [B]	1 [A]	1 [A]	123 [F]	549 [F]	26 [B]	14 [A]
Pembroke Parade/Oxenbridge Avenue	2 [A]	2 [A]	2 [A]	4 [A]	5 [A]	3 [A]	14 [A]	3 [A]
Picton Road/Pembroke Parade/Greenway Parade	21 [B]	21 [B]	19 [B]	18 [B]	38 [C]	138 [F]	33 [C]	30 [C]
Picton Road/Almond Street	16 [B]	15 [B]	21 [B]	18 [B]	61 [E]	25 [B]	28 [B]	16 [B]

LEGEND LoS A | LoS B | LoS C | LoS D | LoS E | LoS F

Table 8.7 provides an analysis of the modelling results in Table 8.6.

Table 8.7 Analysis of Proposal Case outcomes

2031 Proposal Case	2046 Proposal Case
– The operation of the Picton Road/M31 Hume Motorway interchange is predicted to be significantly improved (compared to the 2031 BAU scenario), from LoS F to LoS B overall. – The proposal is predicted to result in increased capacity, enabling a greater volume of vehicles to access the network. As a result, the BAU scenario congestion along Picton Road is predicted to be mitigated.	– The operation of the Picton Road/M31 Hume Motorway interchange is predicted to be significantly improved (compared to the 2046 BAU scenario), from LoS F to LoS B overall. – The Picton Road/Pembroke Parade/Greenway Parade intersection is predicted to operate within capacity with the proposal. – Upgrades at Picton Road/Pembroke Parade/Greenway Parade intersection, along with the widening of Picton Road to three lanes in each direction, would be instrumental to provide sufficient capacity.

8.1.5 Sensitivity testing

It should be noted that the widening of the M31 Hume Motorway to three lanes north of the interchange has been assumed to be delivered prior to 2046 in both the BAU and 'Proposal Case' models and is therefore included in the modelling results outlined above. Additional sensitivity testing was undertaken using the traffic model to identify the potential impact if this intervention is not delivered.

The results of sensitivity testing indicate that there may be some additional queuing propagating back from the M31 Hume Motorway northbound on-ramp. However, the sensitivity testing indicates that this queuing would not significantly impact on the operation of Picton Road or the Picton Road/M31 Hume Motorway interchange. Therefore, the delivery of the M31 Hume Motorway widening in 2046 does not have a material impact on the outcomes of traffic modelling for the Proposal Case as provided in this report.

A further sensitivity assessment for the 2046 Project Case scenario using the TZP22 land use projections. The analysis was run for both the AM and PM peak periods utilising the same model structure for the regular assessment. This exercise demonstrated that there is no material change to the performance of the proposal when using the TZP22 projections, compared to the TZP19 Hybrid projections. The design was able to produce satisfactory performance at all locations.

8.2 Impact to walking and cycling

As described in section 5.3 the proposal includes shared use paths along Picton Road including grade separated crossings of the M31 Hume Motorway and interchange ramps.

The Picton Road corridor is identified as a future strategic cycle route (refer to Appendix A section A-2-3), which would connect Wilton with Maldon and Picton in the north-west. The proposed shared user paths would therefore support this future strategic cycle route and is consistent with the future Movement and Place assessment.

The provision of a dedicated paths for walking and cycling that are separate from traffic would improve pedestrian and cyclist connectivity and safety along key routes, including connection to the future Wilton Town Centre. Grade separated crossings of the M31 Hume Motorway and interchange ramps increase safety by eliminating potential interactions with motorists and provide delay free crossings of the M31 Hume Motorway as users are not required to stop at traffic lights.

8.3 Impact on public transport

The proposal is predicted to result in reduced vehicle travel times and congestion generally along the Picton Road corridor, with travel time savings of up to 12 minutes in the AM peak period and up to 62 minutes in the PM peak period. Travel time reliability along Picton Road would be substantially improved, with little variation between periods (AM and PM), directions (eastbound and westbound) and traffic demand scenarios (2031 and 2046). Accordingly, should it be proposed in future, public transport operators would be able to accurately plan timetables and travel time between stops due to the travel time improvements provided by the proposal.

8.4 Impact on heavy vehicles

Heavy vehicles using Picton Road would experience the same travel benefits as other road-based users in terms of delay reduction, improved travel time, and safety benefits as described generally in section 8.1.

The proposal would also improve resilience by providing additional capacity to manage vehicle movements during disruptions. Full or partial road closures due to emergencies, traffic incidents, or planned activities may require traffic control or extensive detours; with limited alternative routes available, having the necessary infrastructure to accommodate critical freight movement during these periods of disruption would ensure that good and services can be delivered on time, safeguarding economic stability.

The proposal would also result in improved accessibility enabling longer combinations of large heavy vehicles and improved OSOM access due to the improved road geometry, especially at the interchange.

8.5 Impact on local traffic access

The delivery timeline of the proposal may coincide with various private developer funded and delivered upgrades to adjacent roads (described in section 3.1 of the REF). The private upgrades do not form part of proposal; however, the future interface and timing has been considered to provide space allowances to assist in the future intersections onto and over Picton Road.

The proposal includes converting the following intersections to LILO only, which would introduce changes to existing traffic circulation, potentially impacting on local traffic access in the area:

– Picton Road and Wilton Park Road/Aerodrome Drive
– Picton Road and Janderra Lane
– Picton Road and Almond Street.

Restricting right turns at priority-controlled side road intersections would improve safety by minimising conflicting traffic movements across the high-speed road, reducing potential collision points. LILO arrangements can also provide better visibility for turning vehicles and allow drivers to make safer turns without the need to watch out for oncoming vehicles from two directions. This arrangement can also help improve traffic flow by removing delays caused by vehicles waiting for gaps in traffic to make a right turn.

Details of the proposal's impact on local traffic access key intersections with Picton Road are provided in the following subsections.

8.5.1 Picton Road/Wilton Park Road/Aerodrome Drive

The Wilton Growth Area infrastructure phasing plan includes the relocation and upgrade of the Wilton Park Road/Aerodrome Drive intersection to a signalised arrangement west of the existing location, to be funded and constructed by private developers. Until such time that this developer-funded upgrade is delivered, a LILO arrangement is proposed at the intersection.

The LILO arrangement would only be imposed as an interim measure prior to the relocation and upgrade of the intersection. In the event the intersection upgrade is delivered prior to the opening year of the proposal, then there would be no requirement for LILO arrangements at this location.

About 60 private properties, which are accessed via Wilton Park Road, would have the potential to be impacted by an interim LILO arrangement. For outbound movements, safe U-turn is available at the Maldon Bridge Road roundabout (about five kilometres north of Wilton Park Road). For inbound movements, U-turns could be undertaken at the signalised intersection of Picton Road and Pembroke Parade (about two kilometres south of Wilton Park Road). Similarly, access to the Wilton Airport via Aerodrome Drive would have the potential to be impacted, with LILO restrictions requiring additional travel distance to suitable U-turn facilities on Picton Road north and south of this location.

In the event that the interim LILO arrangement is required due to the timing of privately funded intersection works, then further assessment would be undertaken to determine whether additional U-turn facilities are required on Picton Road to minimise the potential impact of this change on local users.

8.5.2 Picton Road/Janderra Lane

Janderra Lane provides access to existing dwellings as well as the South East Wilton Stage 1 site (Wilton Greens), which is currently being constructed. There may be temporary impact on existing users due to LILO restrictions until future planned connections are completed, including the connection of the South East Wilton precinct road network as well as the future Janderra Lane overbridge (refer section A-2 of Appendix A). These users would be required to undertake U-turn movements on Picton Road at either the intersection of Picton Road and Pembroke Parade or at the Maldon Bridge Road roundabout, similar to users of Wilton Park Road. About six private properties would have the potential to be impacted under this interim arrangement.

8.5.3 Picton Road/Pembroke Parade/Greenway Parade

No changes to local access are proposed at the intersection of Picton Road and Pembroke Parade.

8.5.4 Picton Road/Almond Street

The proposal includes the reconfiguration of the intersection at Almond Street to LILO. The timing of delivery of the Almond Street intersection upgrade as part of the proposal is intended to be made operational after the developer overpass and Picton Road connections are in place . All traffic movements, including right turns, would be maintained in the existing intersection until the overpass and new connections are constructed.

Under the reconfigured arrangement, the impact of the removed right turns from Picton Road onto Almond Street is minimal, with about 11 vehicles per hour undertaking this movement in the AM peak (two per cent of westbound traffic) and about 20 vehicles per hour undertaking this movement in the PM peak (three per cent of westbound traffic). These volumes can easily be accommodated by alternative routes, including the future Almond Street overbridge.

Westbound vehicles turning right from Almond Street to Picton Road could also use the proposed Almond Street overbridge, as shown in Figure 8.3, or alternatively may exit to Picton Road via the local road network and Pembroke Parade.

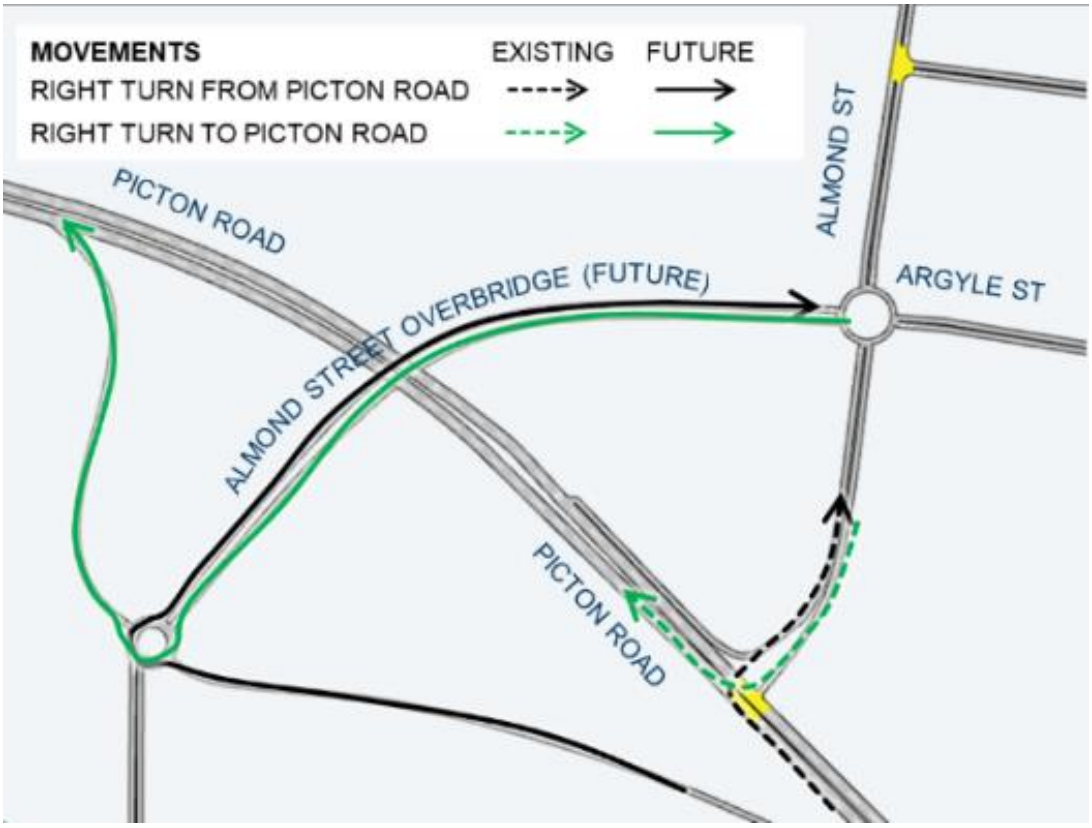


Figure 8.3 Almond Street – redirection of right turn traffic to/from Picton Road

8.6 Impact on road safety

The proposal is anticipated to have a net benefit to road safety in the area generally through the provision of the following road infrastructure and treatments:

- The upgraded interchange at the Picton Road/M31 Hume Motorway, in the form of a DDI, would generally reduce the number of potential conflict points and would improve sight distance and visibility for turning vehicles compared to the existing layout.
- LILO restrictions at side road intersections (Janderra Lane and Almond Street) would also reduce potential conflict points, by eliminating traffic movement across the Picton Road corridor, instead diverting them to signalised intersections (with right turn protection) and/or grade separated roadways.
- Eastbound and westbound movements along Picton Road would be separated by a new median and safety barriers, eliminating the potential for 'head-on' collisions.
- The proposed shared user paths would provide physical separation for cyclists who currently ride along Picton Road within the road shoulders. Crossings at side roads would be designed in accordance with relevant standards and guidelines to ensure clear priority arrangements and visibility for road users.
- Picton Road would be signed as Emergency Stopping Lane Only (R5-58) and the existing stopping/parking activity on road shoulders would not be permitted along Picton Road following implementation of the proposal. This would reduce potential obstructions to sight distance and emergency access. Existing heavy vehicle rest/parking demand would be accommodated by existing rest areas located within a reasonable proximity of the proposal site.
- The proposal includes a reduction in the speed limit on Picton Road, between Pembroke Parade and the northern end of the proposal site, from the existing 80 kilometres per hour to 60 kilometres per hour. The speed limit reduction is intended to mitigate any potential safety risks arising from the new road environment and road geometry, particularly with increased urbanisation of the road environment and in anticipation of the future land use changes surrounding the proposal site.

It is noted that the widening of Picton Road has the potential to introduce additional crash risks, including side swipe collisions due to the provision of additional traffic lanes; however, these risks are relatively low due to the proposed 3.5 metre nominal travel lane width and wide shoulders either side of the carriageway.

A quantitative assessment is provided in a separate safe system assessment that was conducted for the concept design of the proposal. Findings of the safe system assessment confirm that the proposed upgrades to Picton Road as described above would provide an overall improvement to safety. It is considered that the benefits to road safety significantly outweigh the relatively low risks introduced by the road widening works.

8.7 Impact on parking

No formal parking is proposed along Picton Road. However, it is proposed to provide three-metre-wide shoulders in each direction along Picton Road, which can facilitate emergency access and emergency stopping in case of vehicle breakdown and increased vehicle run-off road recovery area.

It would no longer be permitted to utilise the road shoulder along Picton Road for stopping/parking as observed in the current conditions and described in section 3.8. Picton Road would be signed as Emergency Stopping Lane Only (R5-58) due to the safety issues highlighted in section 3.8. It is noted that there are a number of existing rest areas for heavy vehicles, located within a reasonable proximity to the proposal site including on the M31 Hume Motorway (about four kilometres north of the proposal site and about 6.5 kilometres south of the proposal site) as well as on Picton Road (about six kilometres south-east of the proposal site). Safe opportunities for parking for light vehicles are also available within nearby local roads within Wilton.

Based on the above, there would be improvement to parking safety compared to the current situation.

8.8 Impact on resilience

The proposed wider carriageway, additional traffic lanes and intersection improvements would be able to cater for additional traffic capacity along Picton Road. The proposal would therefore improve the road network resilience by providing increased road capacity and contingency for planned maintenance and potential events, such as bushfire evacuation, vehicle breakdown, crashes or other emergency scenarios. Intelligent Transport Systems (ITS) would be utilised to increase response times in emergencies, which may include Variable Message Signs (VMS).

8.9 Cumulative impact

Traffic modelling was undertaken to determine how the road would operate by 2031 and 2046. These scenarios accounted for cumulative traffic demands associated with future growth in the Wilton Growth Area as well as general traffic growth in the region and along the broader Picton Road corridor. Additionally, the traffic modelling analysis assessed planned transport network improvements in the vicinity of the study area.

The proposal would play a key role in addressing existing and future pinch points in the road network and would allow for safer and more efficient travel along the corridor. The proposal would support and maintain Picton Road's predominant movement function as a 'through movement' corridor by

– providing better, continuous, and well-connected infrastructure for pedestrians and cyclists
– improving travel time and minimising delay for all road users, including public transport, private vehicles and freight
– improving safety for all road users.

The above would contribute to achieving the Wilton Growth Area's vision of a connected, liveable, and accessible town. Further detail about how the overall street environment (movement and place) is anticipated to evolve, and how the proposal would support the future objectives, can be found in Appendix A sections A-3-4 to A-3-7.

The proposal is not anticipated to change the function of Picton Road as a 'Place', but the improved 'Movement' function would unlock growth for communities and businesses across Western Sydney and the Illawarra-Shoalhaven through improved access to jobs, services, education and suppliers between the neighbouring regions.

8.10 Summary of operational impact assessment

The operational impact assessment was undertaken primarily using Aimsun to determine the performance of the road network under the 2031 and 2046 horizon years under the BAU (i.e. without proposal) and Proposal Case scenarios. A direct comparison between these scenarios has been undertaken in order to identify the overall impact of the proposal.

A summary of the potential impact on traffic performance is provided as follows:

– If the proposal is not constructed, the BAU modelling results indicate that the Picton Road/M31 Hume Motorway interchange would be operating over capacity, with significant delays, queuing and congestion extending along the Picton Road corridor and along the motorway in 2046.
– Increase in VKT and reduction in VHT, compared to the BAU scenarios indicating general improvement in overall traffic network performance, reflected in a reduction in vehicle delays experienced and an increase in vehicle speeds across the network. The impact is more significant for the 2046 horizon year.
– Generally good network operating conditions. Noticeable reduction in vehicle densities on most roads when compared to BAU scenarios.
– Substantially improved travel times along the Picton Road corridor compared to the BAU scenarios, with improvements of about one to three minutes for the 2031 horizon year, and improvements of about three to 12 minutes for the 2046 horizon year AM peak and up to 33 minutes for the 2046 horizon year PM peak.
– Improved travel time reliability with relatively consistent travel times along the corridor in the AM and PM peak, eastbound and westbound direction and under the 2031 and 2046 traffic demand scenarios.
– Intersection LoS significantly improved compared to the BAU scenarios with intersections typically operating at LoS A or LoS B along the Picton Road corridor, with the exception of Picton Road/Pembroke Parade/Greenway Parade, which would operate at LoS C.

The assessment indicates that, together with other committed improvements in the road network (as described in Appendix A section A-2-1), the proposal would be critical to facilitate future growth in regional movements (between the M31 Hume Motorway and Picton Road) and the local traffic (local access points along Picton Road).

It is noted that while the 2046 BAU and 'Proposal Case' scenarios include widening of the M31 Hume Motorway to the north of the interchange, sensitivity testing indicates that it does not significantly impact on the performance of Picton Road if this does not proceed.

In addition to the traffic performance outcomes, the proposal is anticipated to have the following benefits to other road users:

– improved walking and cycling connections through the construction of shared user paths alongside Picton Road, providing physical separation between path users and general traffic on the road
– improvements to public transport travel times and travel time reliability for future bus services that might use Picton Road to service the Wilton Growth Area
– general improvements to road safety through the provision of new road and path infrastructure.
– increased resilience of the road corridor with greater operational flexibility to respond to planned and unplanned incidents.
– improved freight accessibility including over size and over mass (OSOM) movements due to improved road geometry and carriageway widths.

The proposal involves the conversion of some local road intersections along Picton Road to allow LILO movements only, including at Wilton Park Road and Aerodrome Road, Janderra Lane and Almond Street.

– In the case of Almond Street, it is intended upgrades at this location is not constructed until such time as the developer overpass and Picton Road connections are in place at this location. All traffic movements would be maintained until the overpass and new connections are constructed. Once the overbridge and connections are completed, access from Picton Road would be subject to LILO restrictions.
– For the other intersections, there may be some temporary disruption to existing users who would be required to circulate to appropriate U-turn facilities on Picton Road due to the removal of right turns. The extent of this temporary disruption would be dependent on the timing of developer funded intersection works.

9. Recommended safeguards and management measures

9.1 Construction traffic management measures

Potential construction impacts (described in section 7) would be avoided or minimised by implementing the safeguards and management measures provided in Table 9.1.

Table 9.1 Safeguards and management measures – construction

Impact	Environmental safeguards	Responsibility	Timing	Reference
Traffic and transport	A Construction Traffic Management Plan (CTMP) will be prepared and implemented as part of the Construction Environmental Management Plan (CEMP). The CTMP will be prepared in accordance with Transport for NSW's *Traffic Control at Work Sites Manual* and Transport's *Specification G10 Control of Traffic*. The CTMP will include: – confirmation of haulage routes – measures to maintain access to local roads and properties – where temporary disruption to access cannot be avoided, consultation will be undertaken with the owners, occupants and managers of affected properties and infrastructure, to confirm their access requirements and determine alternative arrangements – site-specific traffic control measures (including signage) to manage and regulate traffic movement – measures to maintain freight access including over size over mass movements – measures to maintain and manage pedestrian and cyclist access – requirements and methods to consult and inform the local community of impacts on the local road network – access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads. – a response plan for any construction traffic incident – consideration of other developments that may be under construction to minimise traffic conflict and congestion that may occur due to the cumulative increase in construction vehicle traffic – measures to manage staging of construction works to ensure that satisfactory capacity and minimum levels of service are maintained – measures to manage high risk over size over mass movements	Contractor	Detailed design/ pre-construction	Section 4.8 of QA *G36 Environment Protection*

Impact	Environmental safeguards	Responsibility	Timing	Reference
	– monitoring, review and amendment mechanisms – Traffic Guidance Schemes updated as the works progress, prepared and implemented by suitably qualified personnel.			
Impact on local roads	Dilapidation surveys will be completed for all local roads used for construction traffic prior to commencement of construction and following completion of works. Further consultation with Wollondilly Shire Council will be undertaken prior to and during construction regarding the use of local roads for construction traffic, including detours and temporary traffic routes detailed in the CTMP.	Contractor/ Transport	Pre-construction/ construction	Additional safeguard
Impact on emergency services	Consultation will be undertaken with emergency services prior to and during construction regarding any access arrangement changes, diversions during construction and other operational road network changes.	Contractor	Pre-construction/ construction	Additional safeguard

9.1.1 Recommended traffic management measures for CTMP

The traffic management measures outlined in the following sections are recommended to be implemented during construction through their inclusion in the CTMP. These measures are commonly used during construction of projects to manage potential traffic impacts. This section provides a non-exhaustive list of traffic management measures, and additional measures may be developed through the construction traffic management planning process.

Site access and parking

The following measures are proposed to minimise the number of traffic movements to and from the site:

– The access point for the site compound north-west of the Picton Road and M31 Hume Motorway interchange (Compound 1) will be accessed via temporary traffic signals to control and separate right turns into and out of the site until the completion of developer funded works at the intersection of Wilton Park Road and Picton Road. After this intersection is completed, site access will be via Wilton Park Road rather than Picton Road.
– The access point for the site compound east of the Picton Road/M31 Hume Motorway interchange (Compound 2) will be on Picton Road, subject to left-in and left-out access only and located as far east of the interchange as possible to maximise the distance available for lane change manoeuvres.
– Logistics management will be controlled by the site supervisor to ensure the efficient movement of equipment and materials and to minimise the number of trips that will need to be taken for all vehicle types. No access to site compounds and work areas will be granted to vehicles that do not have proper authorisation to enter these areas.
– Opportunities for carpooling or coach shuttle services for workers living near one another will be explored and utilised where feasible.
– All vehicles will enter and exit the site compound and works areas in a forward direction. A turnaround facility that can accommodate the largest proposal vehicle will be provided within the compounds/work areas to allow all vehicles to exit in a forward direction.
– All vehicles associated with the proposal will be directed to strictly comply with road traffic rules.
– All parking will be contained within the site compounds. Under no circumstance are workers' vehicles or heavy vehicles allowed to use any portion of public roads for parking, including leaving parked or unattended vehicles.

Heavy vehicle access

The following measures are proposed for the safe and efficient movement of heavy vehicles to, from, and around the site compound and work areas. These measures aim to ensure that heavy vehicles move in a predictable manner to protect both workers and the other road users.

– Truck drivers will be directed to follow the predetermined haulage routes. All drivers will be instructed to observe posted speed limits on adjoining road networks to comply with Australian Road Rules. Drivers are to adjust speeds to suit the road environment and weather conditions appropriately to ensure the safe movement of the vehicles based on the individual vehicle configurations.
– Internal haulage and heavy equipment/vehicle routes will be separated from light vehicle access routes where possible. Vehicle movement and pedestrian paths will be clearly defined using lane markings, road signs, and wayfinding. All vehicles within the site compounds and work areas will remain within their respective authorized areas and adhere to safety protocols.
– Any oversized or over mass load will be transported in accordance with the requirements of the relevant road authority. As necessary, some loads or equipment may be delivered outside of regular working hours to minimise disruption to daily traffic.
– Key stakeholders, including owners/developers of adjacent lands, and emergency service providers, will be notified of any proposed changes to the traffic management arrangements prior to the commencement of works. Coordination and approval with the owners for the access roads (if an external party) will be secured prior to the commencement of works.

Pedestrian and cyclist management

While there are no existing walking or cycling facilities along Picton Road that would be affected by the construction works, the following measures are proposed to protect pedestrians and cyclists moving in or around the proposal site:

– Visibility will be maintained at access points to site compounds/work areas. This will be achieved by the removal of vegetation or, where required, the placement of convex mirrors for areas with limited sight lines.
– Proper signage and advisories will be in place to inform pedestrians and cyclists of any changes to traffic management arrangements and to direct them to appropriate paths.
– All vehicles leaving site compounds or work areas will be directed to come to a complete stop within the site boundary and ensure that the exit is clear of pedestrians and cyclist before proceeding out of the work area. For heavy vehicles, a traffic controller/flagman on the ground will assist with this manoeuvre to ensure that any blind spots are covered.
– Where appropriate, pedestrian paths within site compounds and work areas will be defined with flagging tape and separated from vehicles.
– Pedestrians/workers on site will be directed to utilise designated pedestrian paths.
– Pedestrians/workers will not be permitted enter traffic areas unless the vehicle operator has acknowledged the presence of the pedestrian. Care will be taken by both drivers and pedestrians, particularly with reversing vehicles, where sight visibility may be restricted. All heavy vehicles will have audible vehicle reversing warning.
– Pedestrians/workers on site will be required to wear hi-visibility clothing and must always obey all site safety rules. Members of the general public will not be allowed entry to any part of the site compound or work areas.

Roadwork speed limits

Temporary roadwork speed limits are one of many traffic controls that can be implemented to manage the speed of traffic approaching and passing through or past a work site.

Speed limit reduction near work areas along Picton Road will be proposed to facilitate the safe movement of vehicles, from the existing 80 kilometres per hour to 60 kilometres per hour. This speed reduction will be in place from Stages 1 to 3 of the construction works.

Additional localised roadworks speed reductions on the M31 Hume Motorway and Picton Road will be implemented during critical activities in accordance with relevant traffic management standards and guidelines.

Intersection control

Temporary traffic signals would be provided to control movements at key intersections including at Picton Road's intersections with Wilton Park Road, Almond Street, as well as at the M31 Hume Motorway on and off ramps.

Communication

Deliveries

Time allotment for parking, safe unloading of materials, and departure of vehicles will vary depending on the type of material or equipment being delivered. All material deliveries will be scheduled and coordinated with the site supervisor to maintain the efficient movement of deliveries to and from the site compounds and work areas.

Deliveries will be coordinated via 2-way radio and/or mobile devices, with the Estimated Time of Arrival (ETA) of the delivery trucks confirmed and monitored prior to arrival to minimise conflict between unloading and arriving delivery vehicles. This would also ensure that there is enough space for parking and queuing of vehicles within the site premises.

Affected communities

Consultation with communities and stakeholders will be undertaken prior to the implementation of any changes to the road environment, and proper notification will be provided prior to the commencement of work. Affected communities shall be provided the following information, at minimum:

– Details of proposed works per stage (i.e., nature of work, anticipated duration of program).
– Potential impact (e.g., delays, road closures, contraflows, alternate routes).
– Site contact information.

Notification may be provided by various means including, but not limited to, letterbox distribution, local newspaper, community notification boards, Transport and Council websites, and social media.

Management process tools

Staff induction

All personnel engaged on site (including staff and subcontractors) will be required to undergo site induction. The induction will outline the requirements on the CTMP, including site access routes, environmental and occupational health and safety responsibilities, emergency procedures, potential carpooling opportunities and vehicle height and mass restrictions, among others. Additionally, the site manager will discuss CTMP requirements regularly as a part of regular "toolbox talks".

Occupational Health and Safety

Any worker required to undertake works or traffic control will be suitably trained and hold the required accreditation to carry out works on site and will also be site inducted. All traffic control personnel will be required to hold Transport accreditation in accordance with the Transport's Traffic Control at Worksites manual.

Emergency and incident management

Access for emergency vehicles will be maintained at construction compounds and work areas during the duration of construction works, in accordance with emergency vehicle requirements. The emergency services, including fire, ambulance and police, will be advised of all planned changes to traffic arrangements prior to the commencement of works.

9.2 Operational safeguards and management measures

Based on the results of traffic modelling undertaken for the proposal, it is likely that the proposal would have significant benefit for traffic performance and road safety once operational compared to the existing road network configuration. Notwithstanding this, the safeguards and measures provided in Table 9.2 will be implemented to avoid or minimise potential impacts that may arise during operation.

Table 9.2 Safeguards and management measures – operation

Impact	Environmental safeguards	Responsibility	Timing	Reference
Traffic and transport	Further traffic modelling will be completed to inform detailed design capturing the latest information on demand forecasts and timing of other network upgrades where required.	Transport	Detailed design	Additional safeguard

10. Conclusion

10.1 Construction impact

The construction impact assessment was undertaken primarily using SIDRA to determine the performance of the road network at key intersections. Traffic models were developed for the proposal's indicative construction Stages 1 to 3, reflecting different traffic management arrangements for each stage. While changes to the road environment and traffic operations would be in place during the construction period, which is anticipated to last about three years, the existing number of lanes along Picton Road would generally be maintained, resulting in traffic performance similar to BAU conditions.

A summary of the findings of the construction impact assessment is provided below:

– The worst potential intersection performance has been predicted to be experienced during Stage 1 of construction, with the Picton Road/M31 Hume Motorway interchange operating at a LoS of F. However, it is noted that this performance is comparable to the 2031 BAU modelling results and Stage 1 construction arrangements are not predicted to worsen the performance of the existing interchange.
– All intersections within the study area are predicted to operate at a satisfactory LoS during Stages 2 and 3, with performance improving as new pavements become operational over the course of the construction program including at the Picton Road/M31 Hume Motorway interchange and at the intersection of Picton Road with Pembroke Road.
– Compared to BAU conditions, the impact of the construction traffic on the road network is noted to be minimal. Without the proposal, traffic performance at key intersections is already predicted to deteriorate and approach capacity (refer section 4.3.4). The outcomes of the SIDRA modelling suggest that the implementation of construction traffic management arrangements would provide improvements in the traffic performance due to efficiencies gained through optimisation of traffic signal phasing using temporary signals.
– Construction of the proposal is not likely to directly impact public transport and heavy vehicle (freight) facilities or operations, and these modes would experience a similar traffic performance impact as general traffic.
– No existing walking and cycling facilities are available in the study area that would be impacted by the construction works. Pedestrians and cyclists would benefit from the construction of a new shared user path in Stage 2, which would be fully separated from motorised traffic except at road crossings.
– Changes to speed zones and temporary lane closures are not likely to negatively impact traffic performance on the road network. However, changes to the road environment would impact the day-to-day experience of other road users, particularly local traffic (residents, businesses, through traffic). Impacts on other road users in terms of safety and access would be mitigated through traffic management measures which would be developed in consultation with relevant stakeholders and in accordance with regulatory requirements.
– Existing users of Janderra Lane may experience additional temporary disruption due to proposed left-in and left-out restrictions at Janderra Lane and Picton Road until future connections are completed including South East Wilton and the Janderra Lane overpass. Right turns into and out of Wilton Park Road, Aerodrome Road and Almond Street would be maintained using temporary traffic signals.

The assessment indicates that the construction of the proposal would have minor impacts on the road network, which would be appropriately managed through the preparation and implementation of a CTMP. Proposed measures for inclusion in the CTMP are provided in section 9.

10.2 Operational impact

The operational impact assessment was undertaken primarily using Aimsun to determine the performance of the road network under the 2031 and 2046 horizon years under the BAU (i.e., without proposal) and Proposal Case scenarios. A direct comparison between these scenarios has been undertaken in order to see the overall impact of the proposal.

A summary of the potential impact on traffic performance is provided as follows:

– If the proposal is not constructed, the BAU modelling results predict that the Picton Road and M31 Hume Motorway interchange would be operating over capacity, with significant delays, queuing and congestion extending along the Picton Road corridor and along the motorway in 2046.
– Increase in VKT and reduction in VHT, compared to the BAU scenarios indicating general improvement in overall traffic network performance, reflected in a reduction in vehicle delays experienced and an increase in vehicle speeds across the network. The impact is more significant for the 2046 horizon year.
– Generally good network operating conditions. Noticeable reduction in vehicle densities on most roads when compared to BAU scenarios.
– Substantially improved travel times along the Picton Road corridor compared to the BAU scenarios, with improvements of about one to three minutes for the 2031 horizon year, and improvements of about three to 12 minutes for the 2046 horizon year AM peak and up to 33 minutes for the 2046 horizon year PM peak.
– Improved travel time reliability with relatively consistent travel times along the corridor in the AM and PM peak, eastbound and westbound direction and under the 2031 and 2046 traffic demand scenarios.
– Intersection LoS significantly improved compared to the BAU scenarios with intersections typically operating at LoS A or LoS B along the Picton Road corridor, with the exception of Picton Road/Pembroke Parade/ Greenway Parade, which would operate at LoS C.

The assessment indicates that, together with other committed improvements in the road network (as described in Appendix A section A-2-1), the proposal would be critical to facilitate future growth in regional movements (between the M31 Hume Motorway and Picton Road) and the local traffic (local access points along Picton Road).

It is noted that while the 2046 BAU and 'Proposal Case' scenarios include widening of the M31 Hume Motorway, sensitivity testing indicates that it does not significantly impact on the performance of Picton Road if this does not proceed.

In addition to the traffic performance outcomes, the proposal is anticipated to have benefits to other road users including:

– improved walking and cycling connections through the construction of shared user paths alongside Picton Road, providing physical separation between path users and general traffic on the road
– improvements to public transport travel times and travel time reliability for future bus services that might use Picton Road to service the Wilton Growth Area
– general improvements to road safety through the provision of new road and path infrastructure
– increased resilience of the road corridor with greater operational flexibility to respond to planned and un planned incidents
– improved freight accessibility including over size and over mass (OSOM) movements due to improved road geometry and carriageway widths.

The above would improve Picton Road's function as a 'Through' corridor and contribute to achieving the Wilton Growth Area's vision of a connected, liveable, and accessible town. Refer to Appendix A-3 for further details of the Movement and Place assessment.

Some local users may experience disruption to access depending on the timing of privately funded intersection works due to LILO arrangements at Wilton Park Road, Aerodrome Road and Janderra Lane. This impact would be temporary and further assessment may be required to determine whether additional U-turn facilities are required on Picton Road.

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12. Glossary of terms and abbreviations

Term	Definition
ABS	Australian Bureau of Statistics
AGTM	Austroads Guide to Traffic Management
ATC	automatic tube count
BAU	Business as Usual
CEMP	Construction Environmental Management Plan
Census	Australian Bureau of Statistics Census on Population and Housing
CTMP	Construction Traffic Management Plan
DDI	Diverging Diamond Interchange
DoS	degree of saturation
DPE	NSW Department of Planning and Environment
GMIA	Greater Macarthur Investigation Area
h	hour
HML	Higher Mass Limits
HTS	Transport Household Travel Surveys
HVRS	Heavy Vehicle Rest Stop
ITS	Intelligent Transportation System
JTW	Journey-to-Work
km	kilometres
km/h	kilometres per hour
LGA	local government area
LILO	Left-in left-out
LoS	Level of Service
m	metres
min/s	minute/s
no.	number
OSOM	Oversize and/or Overmass
PCE / PCEF	passenger car equivalent factor
pcu	passenger car units
RAV	Restricted Access Vehicle
REF	review of environmental factors
RMS	Roads and Maritimes Services, now Transport for New South Wales (TfNSW)
ROL	Road Occupancy Licence
SA3	Statistical Area 3
SCATS	Sydney Coordinated Adaptive Traffic System
sec/s	second/s
SIDRA	SIDRA Intersection 9.1 modelling software
STFM	Strategic Traffic Forecasting Model
TCS	Traffic Control System

Term	Definition
Transport	Transport for NSW
TTIA	traffic and transport impact assessment
VCR	volume to capacity ratio
veh	vehicles
VHT	Vehicle Hours Travelled
VKT	Vehicle Kilometres Travelled
vph	vehicles per hour
WGA	Wilton Growth Area

Appendix A

Strategic land use and transport context

A-1 Future Land use

A-1-1 Existing land use

Information on existing land uses is provided in Chapter 6 of the REF.

A-1-2 Future land use

The proposal sits within the Wilton Growth Area which includes several precincts that have been identified to have significant potential for growth.

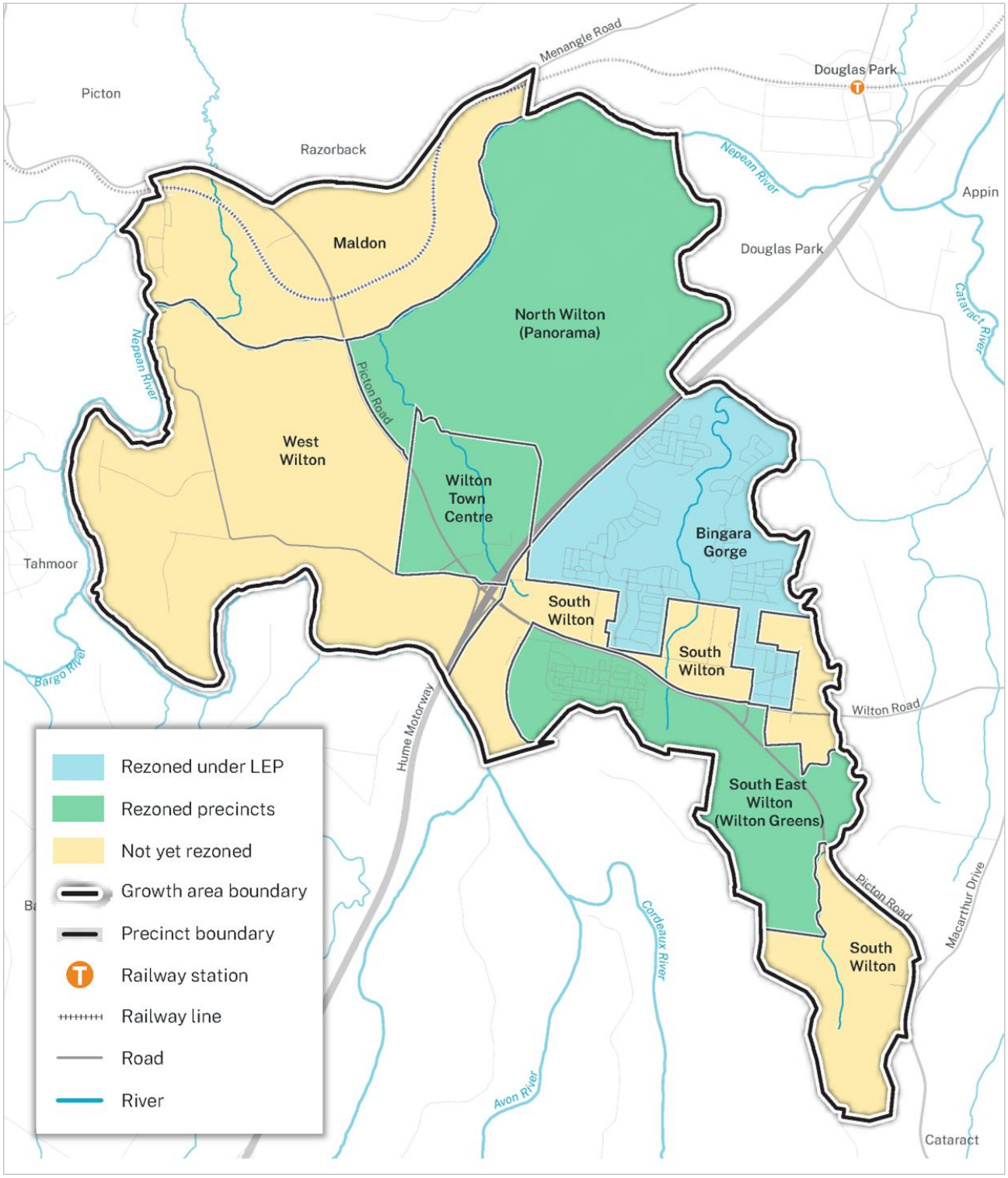
Wilton 2040: A Plan for the Wilton Growth Area (Department of Planning and Environment (DPE), 2018) ('Wilton 2040') sets out the planning direction for the Wilton Growth Area and outlines how it will be developed in the coming years. Wilton 2040 is aligned with the targets and vision identified in the *Greater Sydney Region Plan: A Metropolis of Three Cities* and the *Western City District Plan* and is a key planning focus under the *Wollondilly Shire Local Strategic Planning Statement (LSPS)* (Wollondilly Shire Council, 2020).

The NSW Government's *Western City District Plan* sets a target of 15,000 new homes in the Wilton Growth Area. It would be home to an estimated population of about 40,000 people, with the proposed Wilton Town Centre as the heart of the community. About 15,000 new local jobs would also be generated by the local employment areas and commercial centres. Planning for the growth area will be focused on seven future precincts:

– Bingara Gorge
– Maldon
– South East Wilton
– South Wilton
– West Wilton
– Wilton North
– Wilton Town Centre.

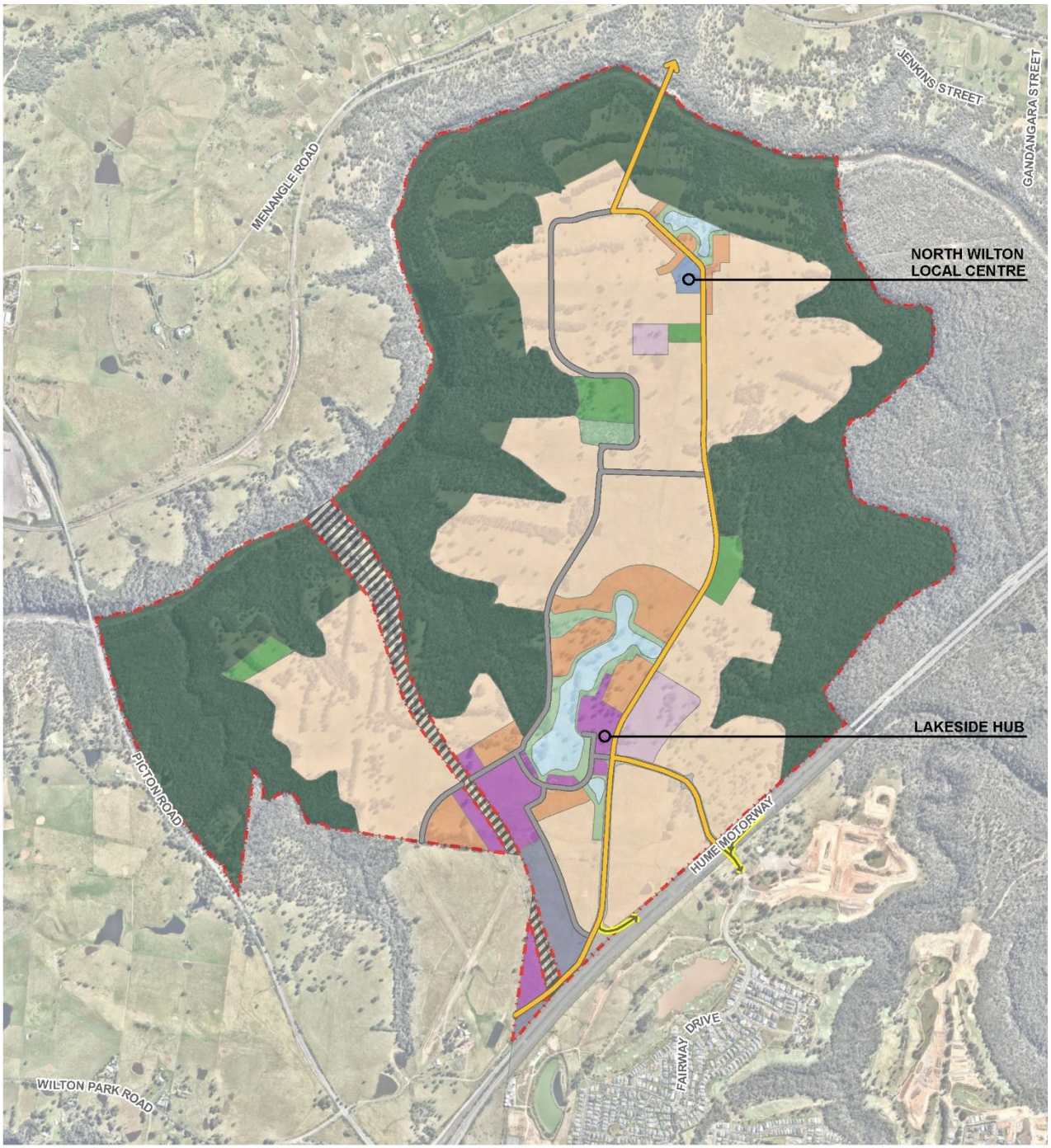
Rezoning for the North Wilton and Wilton Town Centre precincts have already been approved, with the latter coming into effect only recently (June 2023). Works are under way for the rezoning of South East Wilton, while further planning is being done for the potential rezoning of the rest of the precincts. A map of the precinct boundaries and their respective rezoning status is shown in Figure A.1.

Structure plans for the North Wilton and Town Centre precincts are shown in Figure A.2 and Figure A.3, respectively.



Source: Wilton Growth Area Update, DPE (2023), modified by GHD

Figure A.1 Wilton Growth Area precincts and rezoning status (as of 2023 June)



North Wilton Precinct - Structure Plan (1 May 2022)

0 250 500 1,000 m

N

Intended Map Size: A4
Publication Date: 2/05/2022
Coordinate System: GDA 1994 MGA Zone 56

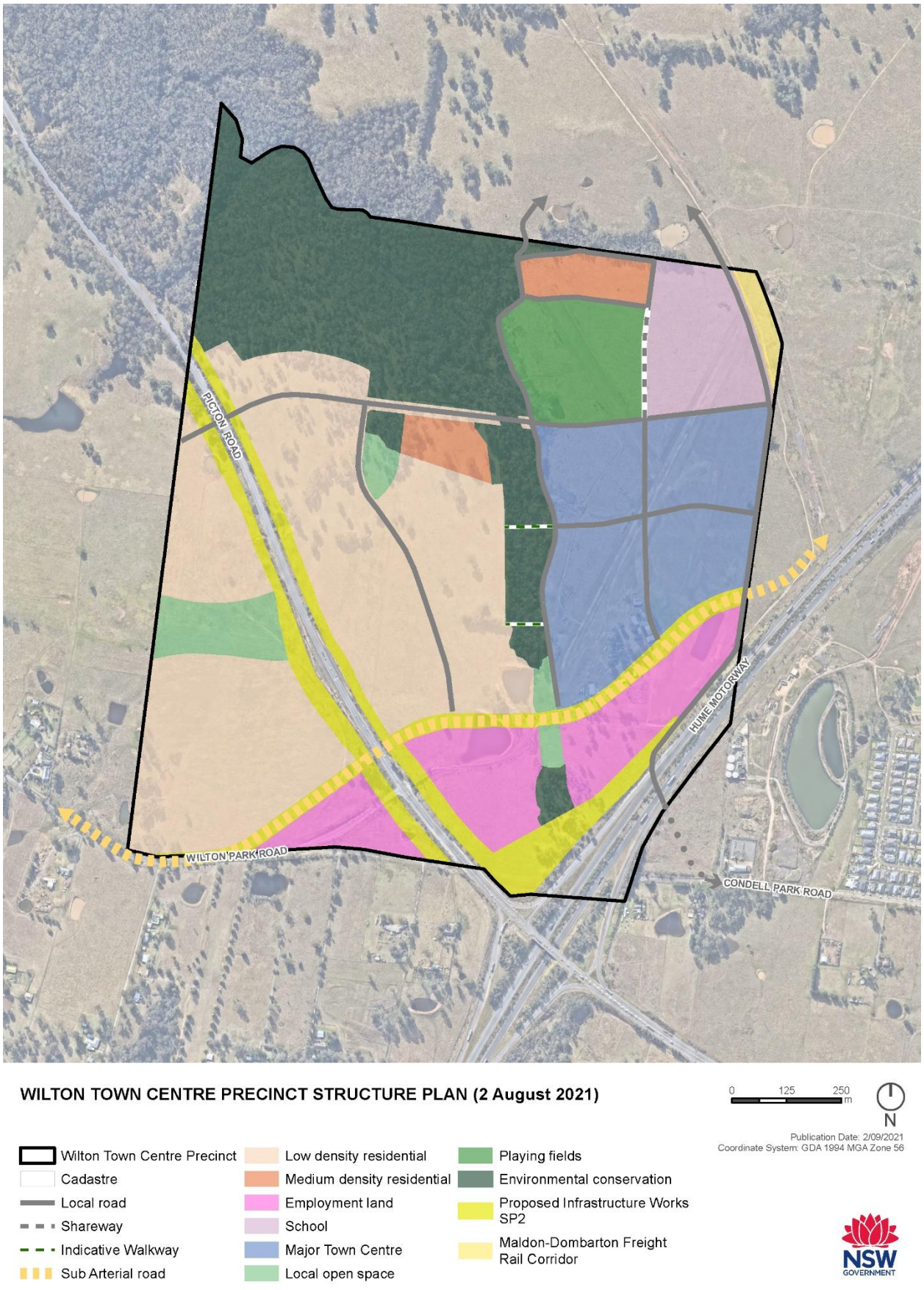
	Maimum Building Height	Maximum Retail Floorpsace	Maximum individual tenancy size
Precinct Boundary			
Local Centre	18m	5,000m²	-
School	18m	-	-
Low Density	9.5m	-	-
Medium Density	18m	-	-
Enterprise/Employment	15m	-	-
Mixed Use	24m	5,000m²	250m²
Playing Fields			
Local Open Space			
Environmental Conservation			
Proposed Lake			
Road Infrastructure			
Maldon-Dombarton Freight Rail Corridor Reservation			

- Local Road
- Sub-Arterial Road
- Hume Highway On and Off Ramp

NSW GOVERNMENT

Source: North Wilton Precinct – Structure Plan

Figure A.2 North Wilton Precinct - Structure Plan



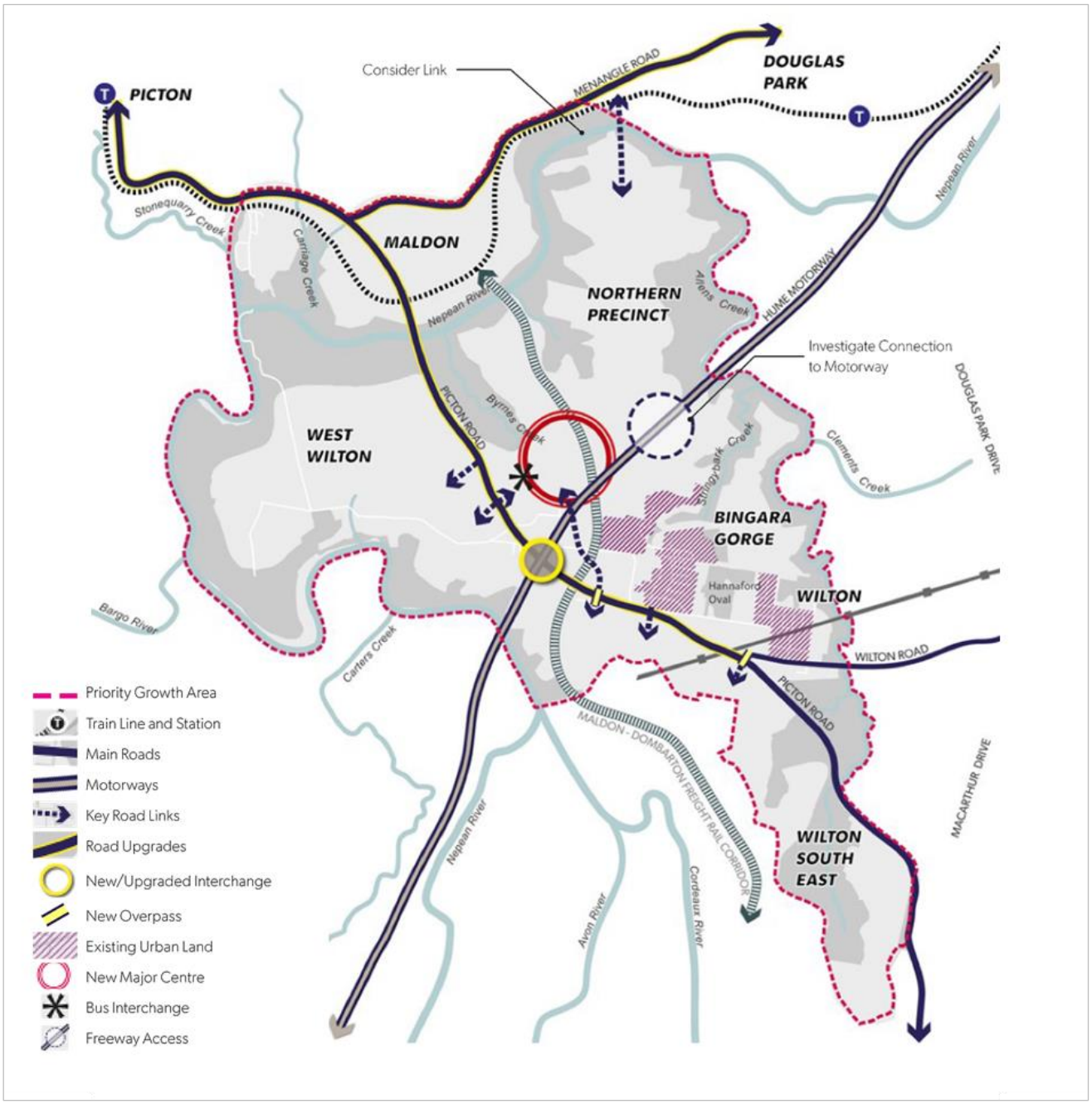
Source: Wilton Town Centre Precinct Structure Plan

Figure A.3 Wilton Town Centre Precinct Structure Plan

A-2 Transport network

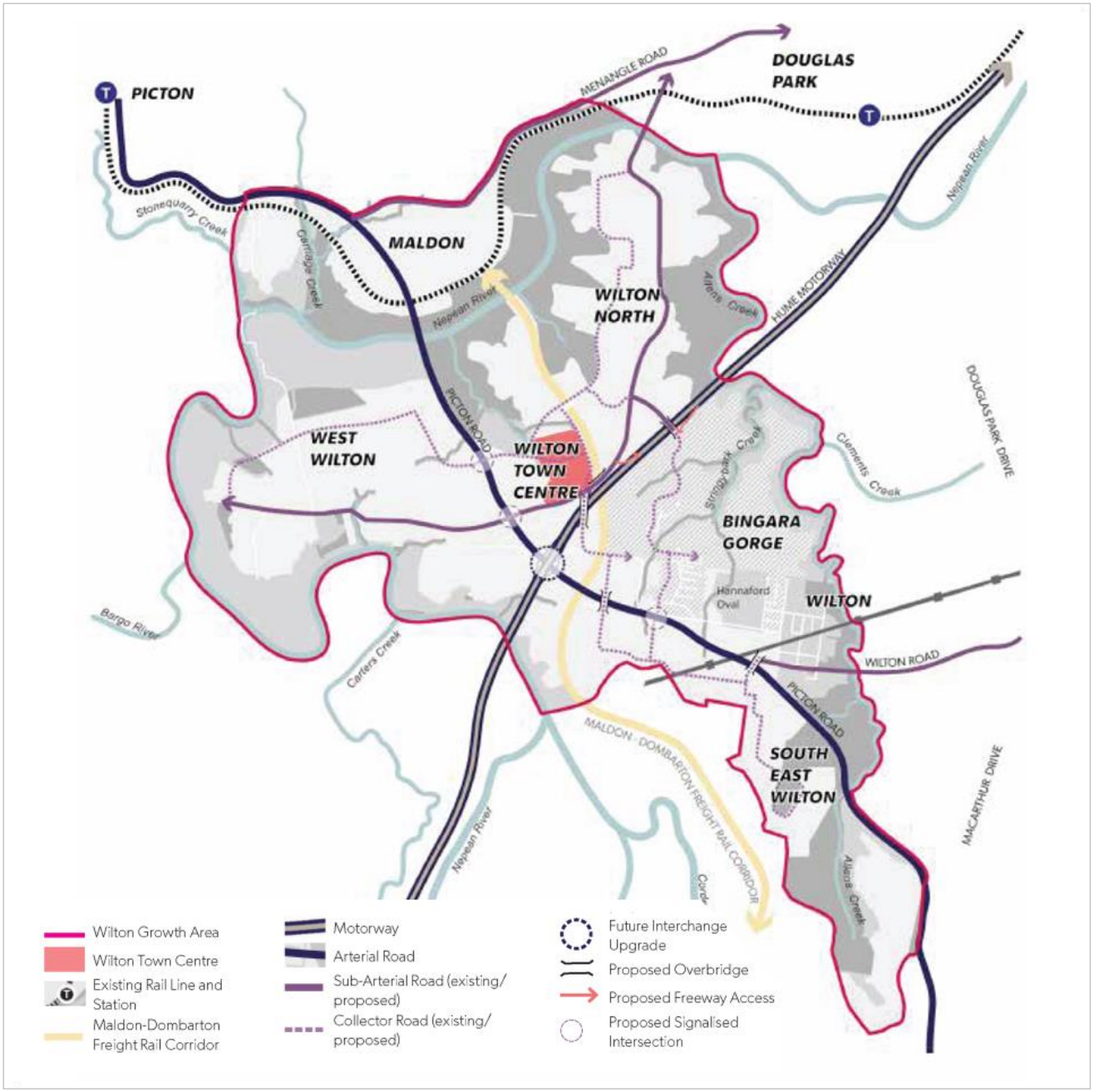
A-2-1 Future road network

Critical to the support the growth of the Wilton Growth Area is the delivery of road and transport infrastructure. Figure A.4 provides a map of the Wilton Growth Area's transport requirements by 2040 as identified in the Wilton Growth Area LUIIP (2017), while Figure A.5 shows the proposed strategic road and rail network as identified in Wilton 2040.



Source: Wilton Priority Growth Area Interim LUIIP, NSW DPE (2017)

Figure A.4 Wilton Growth Area – transport requirements by 2040



Source: Wilton 2040 (DPE, 2018)

Figure A.5 Wilton Growth Area – proposed strategic road and rail network (by 2040)

This future road network is planned to be delivered in stages, and each new potential infrastructure would be subject to further investigation.

For the purposes of traffic modelling for this assessment, projects that are already in the advanced stages of planning (i.e., projects are either approved or 'committed') have been identified. The following road network improvements have been identified by Transport for inclusion in the BAU scenario:

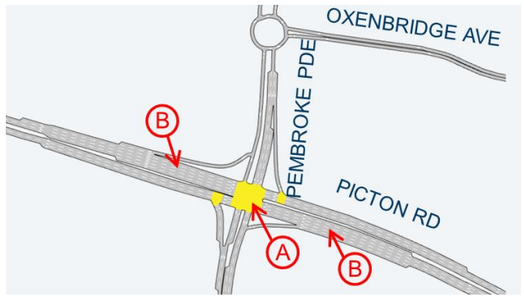
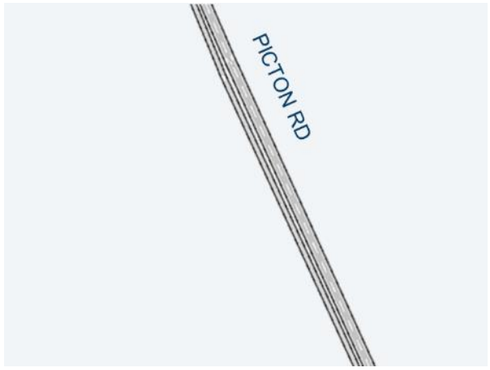
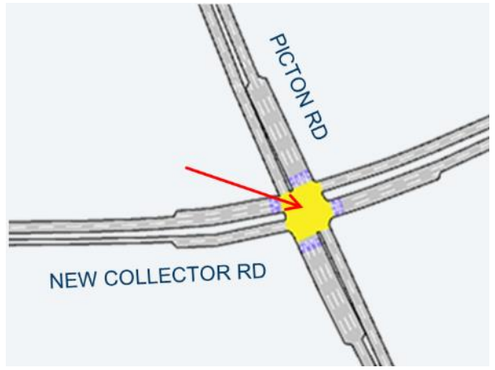
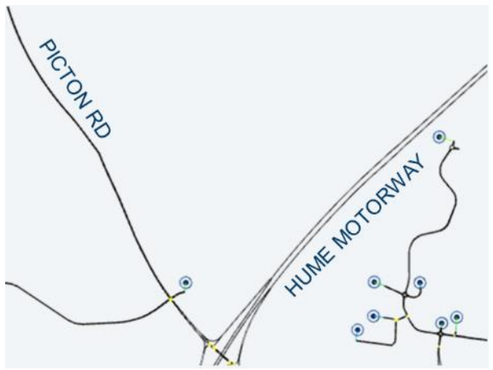
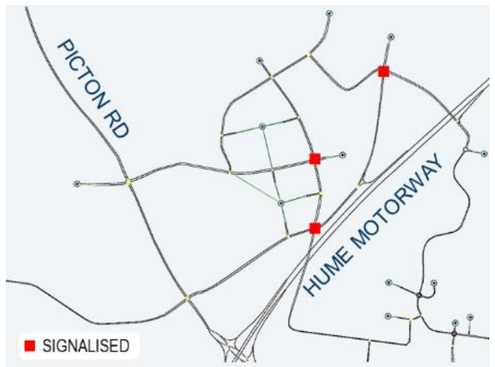
1. Picton Road and Pembroke Parade intersection upgrade
2. New connection to Wilton Town Centre from Picton Road (signalised intersection)
3. Wilton Town centre upgrades with new proposed internal road network
4. Almond Street overbridge and connection to Picton Road
5. Janderra Lane overpass
6. Condell Park Road overpass: Wilton Town Centre access bridge over the M31 Hume Motorway

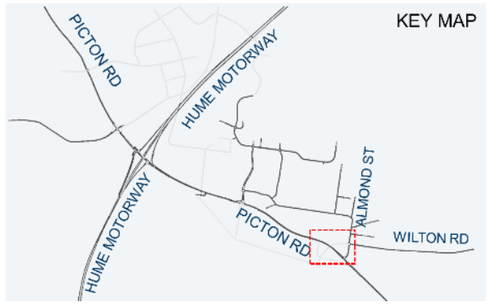
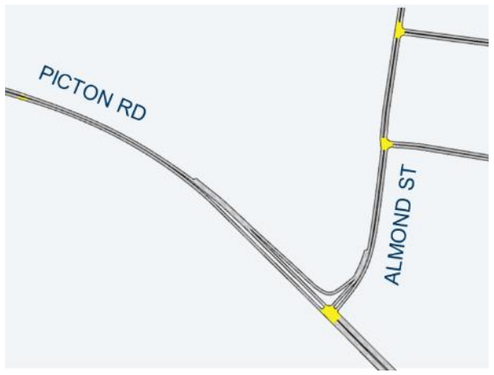
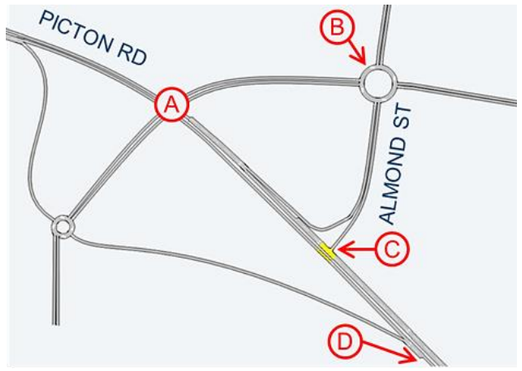
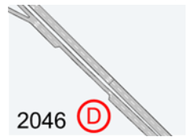
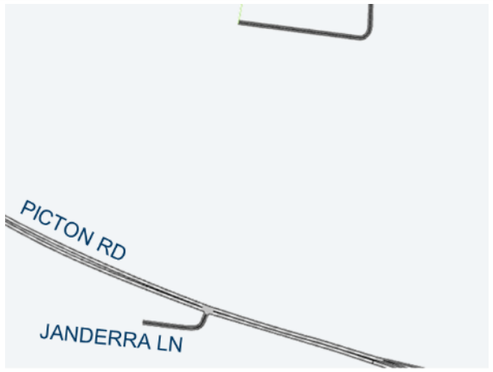
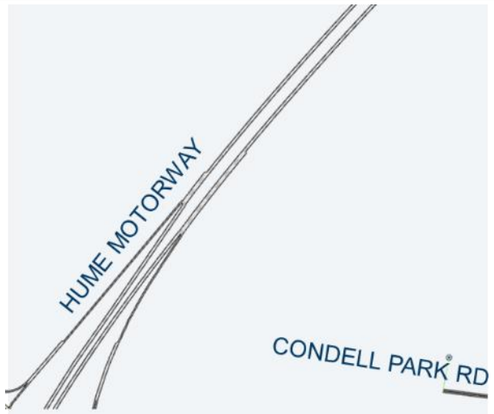
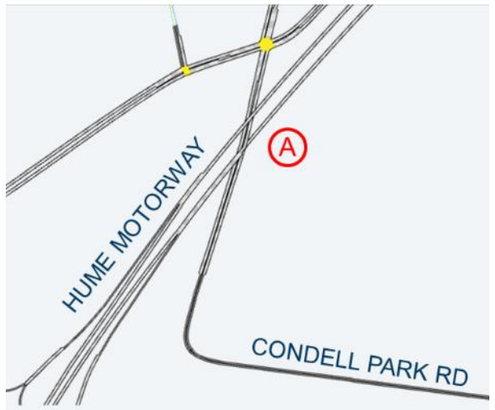
7. Niloc Bridge Link (Southern Ramp)
8. Niloc Bridge (duplication of bridge to include on ramp)
9. Wilton Park Road: Signalised intersection connecting to new sub-arterial between Picton Road and the town centre.

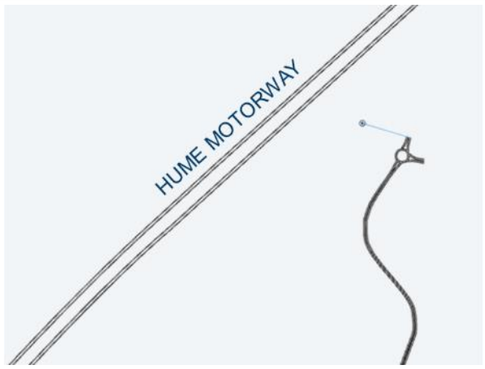
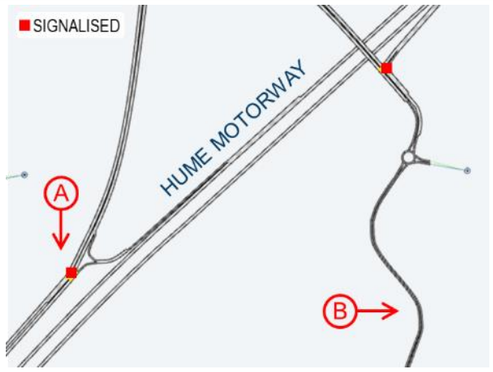
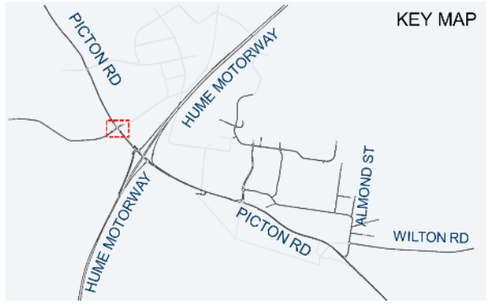
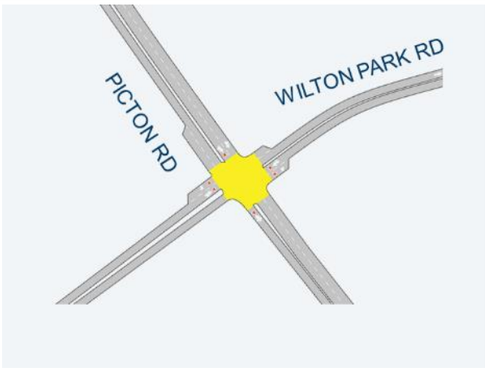
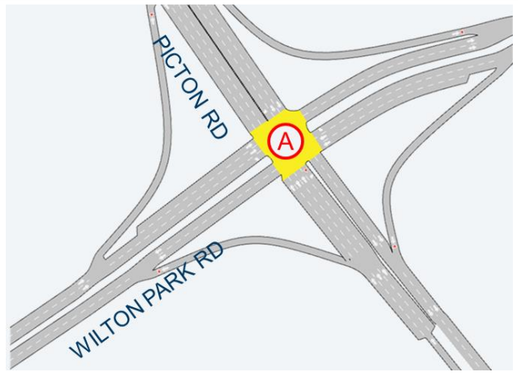
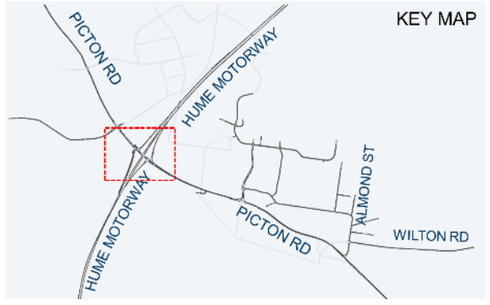
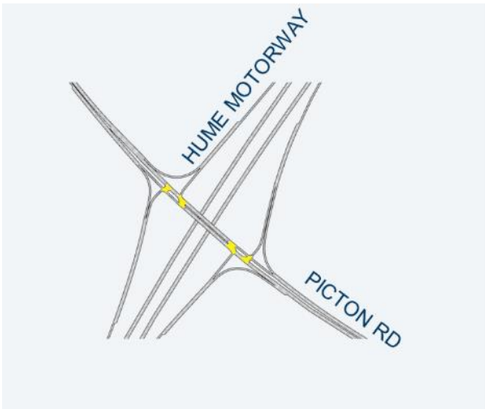
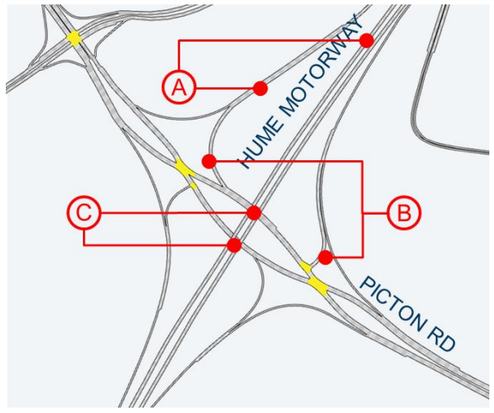
These committed projects, which do not form part of the proposal, have been identified as key network infrastructure improvements that need to be delivered to support the development of the Wilton Growth Area.

Details of each road network improvement are provided in Table A.1.

Table A.1 ***Proposed road network improvements (BAU scenario)***

ID	Modelling scenario	Expected by year	Existing	Description of treatment/upgrades	
				2031	2046
1	Picton Road and Pembroke Parade intersection upgrade 	2031	Priority-controlled t-intersection 	A. Converted from priority intersection to traffic signal B. Additional approach lanes near the intersection. No changes in number of midblock lanes on Picton Road. 	Same layout for 2031 and 2046.
2	New connection to Wilton Town Centre from Picton Road as a signalised intersection. To be delivered by the Western developer (West Wilton). 	Staged	No intersection 	New collector road with signalised intersection 	Same layout for 2031 and 2046.
3	Wilton Town centre upgrades with new proposed internal road network 				Same layout for 2031 and 2046. Future layout for Wilton Town Centre is based on Wilton 2040 (Page 17)

ID	Modelling scenario	Expected by year	Existing	Description of treatment/upgrades	
				2031	2046
4	Almond Street overbridge and connection to Picton Road 	2031			Same layout for 2031 and 2046. A. New overbridge B. Roundabout at intersection with Argyle Street/Wilton Road C. LILO at intersection of Almond Street and Picton Road D. Upgrade Almond Street (east of intersection) from – one lane eastbound (2031) – two lanes eastbound (2046) 
5	Janderra Lane overpass 	2031			Same layout for 2031 and 2046. The layout of the future overpass was refined from the original layout assumed in strategic design report. Assumed and approved by Transport during progress meeting. A. New priority-controlled intersection B. New overpass C. LILO intersection
6	Condell Park Road overpass: Wilton Town Centre access bridge over the M31 Hume Motorway 	2031			Same layout for 2031 and 2046. A. Condell Park Road overpass. Access bridge to Wilton Town Centre over the M31 Hume Motorway

ID	Modelling scenario	Expected by year	Existing	Description of treatment/upgrades	
				2031	2046
7 8	Niloc Bridge Link (Southern Ramp) Niloc Bridge (duplication of bridge to include on ramp) 	2031			Same layout for 2031 and 2046. A. Niloc Bridge Link South Ramp – with new northbound on ramp to the M31 Hume Motorway (signalised) B. Niloc Bridge – Refined from the original layout assumed in strategic design report. Assumed and approved by Transport during progress meeting.
9	Wilton Park Road: Signalised intersection connecting to new sub-arterial between Picton Road and the town centre 	2031			Same layout for 2031 and 2046. A. Converted from priority-controlled intersection to signalised. B. 2 lanes eastbound, one lane westbound between Wilton Park Road and the Picton Road/M31 Hume Motorway interchange
The proposal					
	Picton Road/M31 Hume Motorway interchange 	2031			Same layout for 2031 and 2046. A. Extend to 200m B. Dual right turns C. 3 lanes on Picton Road at the Picton Road/M31 Hume Motorway interchange

Source: BAU scenario Aimsun model (GHD, 2023)

A-2-2 Future freight network

The Maldon-Dombarton Freight Rail Corridor, which runs through the Wilton Growth Area, is being protected to enable future rail freight to Port Kembla. The Maldon-Dombarton Freight Corridor extends along the north-eastern boundary of the Wilton Town Centre Precinct. This freight rail corridor needs to be maintained for future significant State infrastructure to serve the operational capabilities of Port Kembla as identified in the NSW Future Transport strategy.

It is noted that the majority of this freight rail corridor has already been zoned SP2 Infrastructure under the statutory provisions of the North Wilton Precinct. The proposed planning for the Wilton Town Centre maintains the freight corridor within the SP2 – Infrastructure zoning under the statutory Growth Centre SEPP maps. The corridor width has been identified by Transport as the required land area to deliver the freight line.

The location of the Maldon-Dombarton Freight Rail Corridor is shown in Figure A.4 and Figure A.5.

A-2-3 Future walking and cycling network

Wilton 2040 sets out a vision to encourage active transport (walking and cycling) for journeys within five-kilometre catchments. Planning for new communities in the Wilton Growth Area will be designed with pedestrian and cycling facilities in mind. This also aligns with the NSW Future Transport objectives to achieve 15-minute neighbourhoods.

A proposed walking and cycling network is planned to support the development of the Wilton Growth Area, as detailed within a number of documents, including the *Wilton Junction Development TMAP* (Parsons Brinkerhoff, 2014), *Wilton Priority Growth Area Interim LUIIP Background Analysis* (DPE, 2017) and *Wilton 2040* (DPE, 2018).

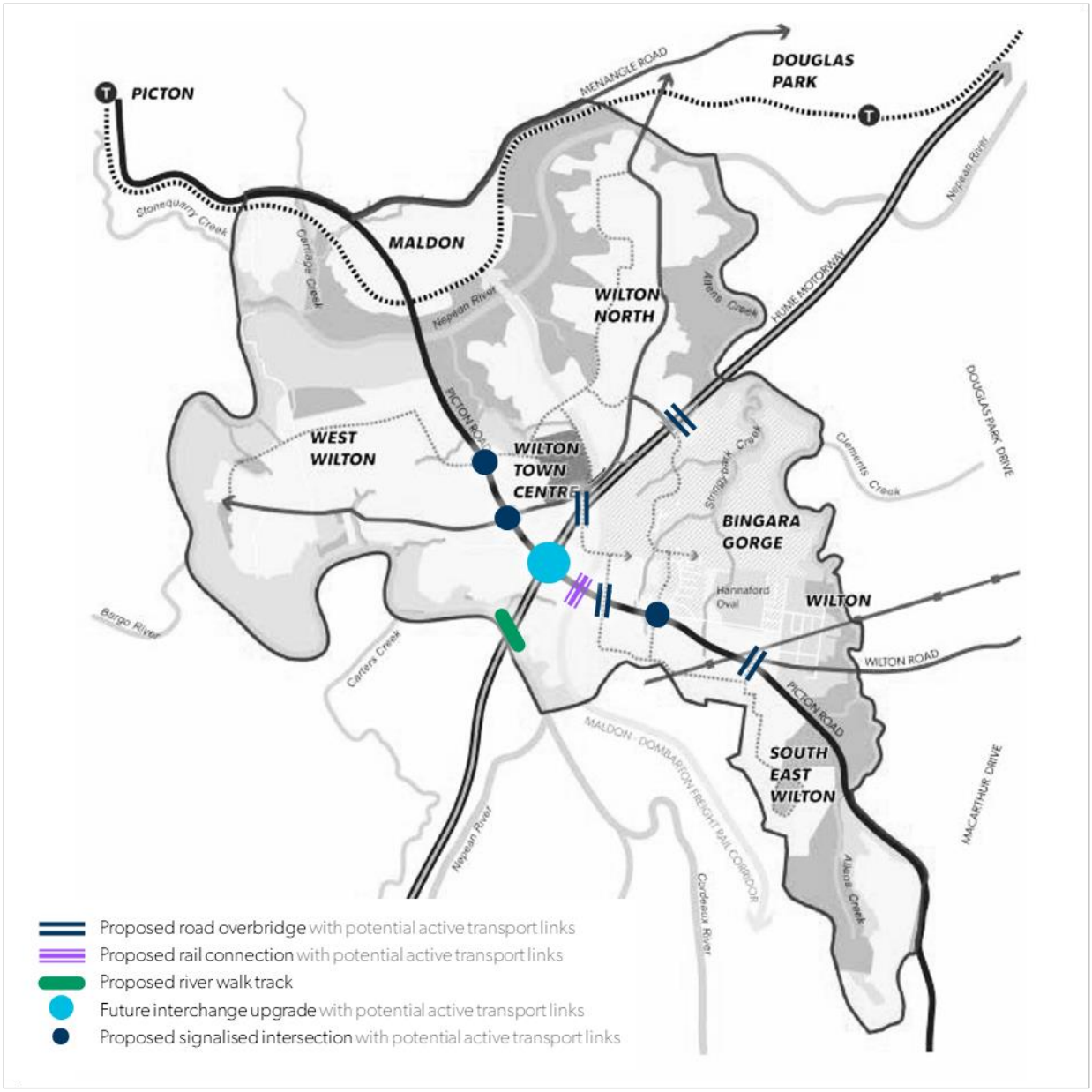
The identified active transport planning principles for precincts within the Wilton Growth Area include[2]:

- Plan for walking and cycling connections and regional links to create movement between employment, commercial and retail land uses, and community and residential neighbourhoods.
- Promote walking and cycling alongside new infrastructure developments to meet the needs of pedestrians and cyclists, by providing or upgrading separated cycleways, shared user paths, footpaths, pedestrian refuges, end-of-trip facilities and appropriate streetscaping.
- Provide direct, safe and easily accessible walking and cycling infrastructure to, from and within proposed interchange areas and centres.
- Adapt cycling infrastructure to suit local needs such as topographic barriers or different land uses.
- Develop walking and cycling infrastructure in partnership with NSW Government agencies, local government, nongovernment organisations and Wilton's current and future community.
- Provide convenient and safe walking and cycling connections throughout the neighbourhood, across major roads, and to open space, schools and centres.
- Include walking and cycling routes, especially alongside areas where many people move to encourage more active modes of travel.
- Encourage walking and cycling within and to and from the Growth Area to other centres in the Western City District.

With development planned on both sides of the M31 Hume Motorway and Picton Road, it is recognised that safe crossing locations for active transport will need to be provided across these major road corridors to connect precincts within the Wilton Growth Area. To support this, pedestrian and cycle facilities are planned to be included in all bridge crossings across the M31 Hume Motorway and Picton Road and will be considered at signalised intersections.

Potential active transport connections across these corridors are outlined in Figure A.6 below.

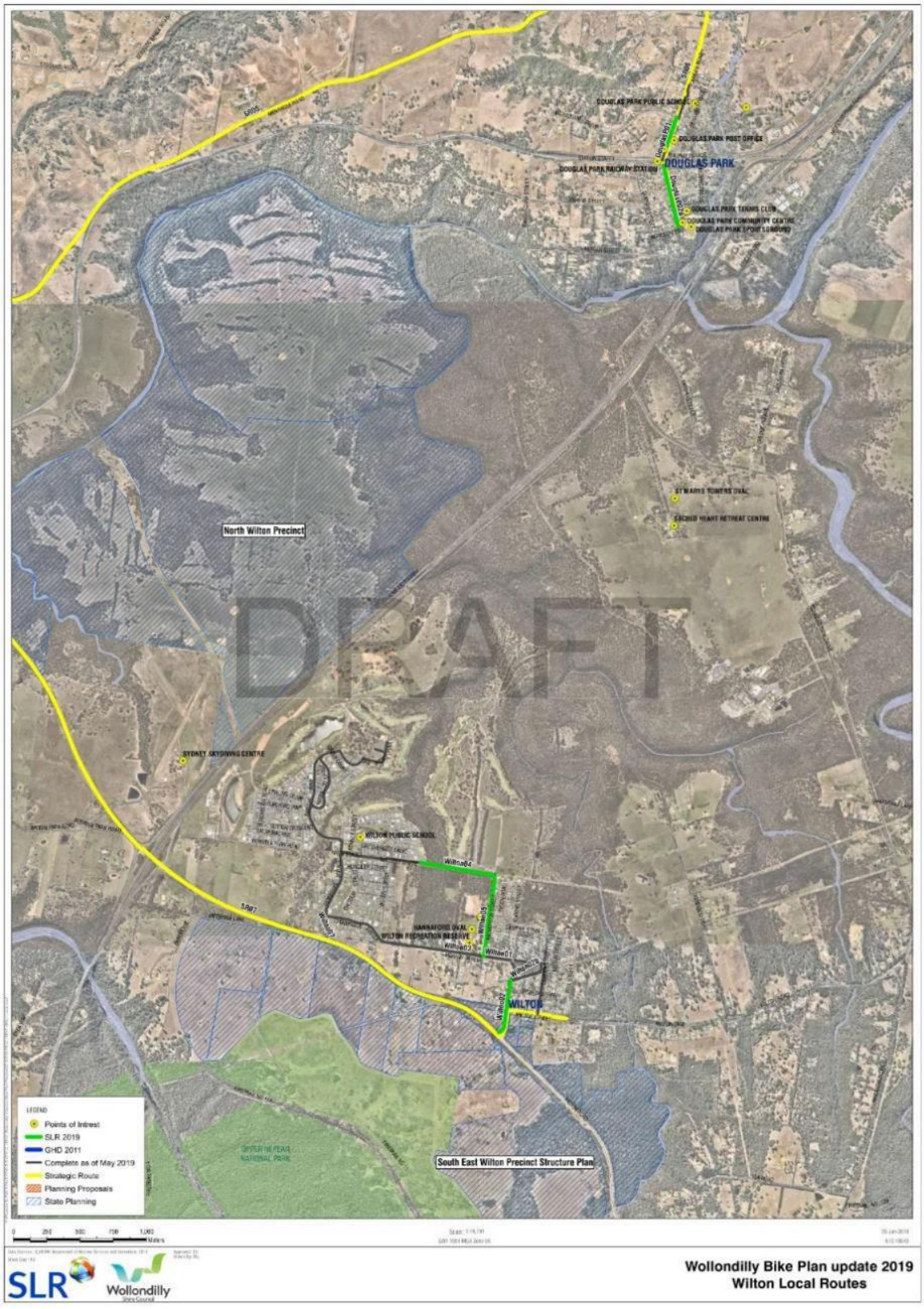
[2] Wilton 2040 (DPE, 2018)



Source: Wilton 2040: A Plan for the Wilton Growth Area, NSW DPE (2018), modified by GHD

Figure A.6 ***Wilton Growth Area potential active transport connections across the M31 Hume Motorway and Picton Road (by 2040)***

Additionally, a draft update to the Wollondilly Shire Council Bike Plan was completed in 2019 and includes a recognition of the developing network in the Wilton Growth Area. The Bike Plan outlines a strategic cycle route along Picton Road from the Almond Street intersection connecting Wilton to the north-west, as shown in Figure A.7.



Source: Wollondilly Bike Plan Update, SLR (2019)

Figure A.7 Wollondilly Bike Plan update 2019 – Wilton local routes

A-2-4 Future public transport network

A key planning principle for the development of the Wilton Growth Area is to ensure that homes are within walking distance of a bus stop and that bus routes provide connectivity to key centres, transport hubs, schools, employment opportunities and residential areas[3].

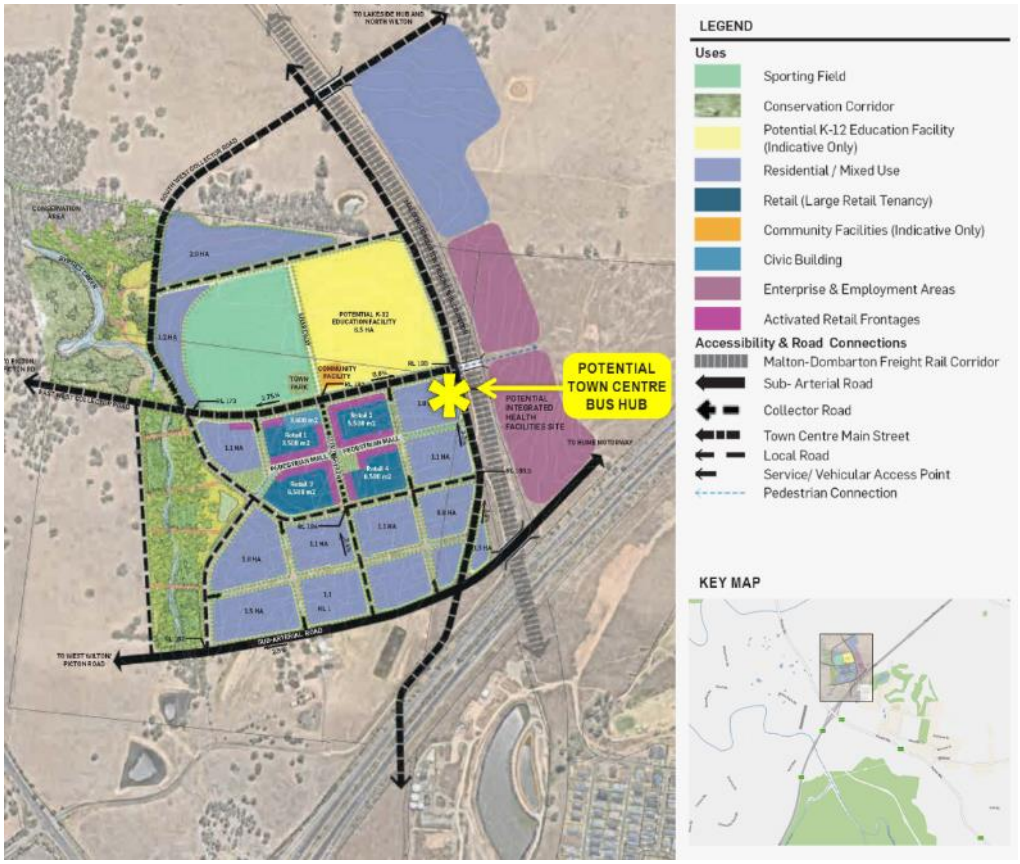
The draft Special Infrastructure Contribution (SIC) plan for the Wilton Growth Area allocates around $5M for bus infrastructure and public transport facilities, including a new bus interchange in the proposed town centre and bus depot to operate bus services from Wilton. This would provide direct access to regional services bus services and link residents to nearby rail services.

The proposed location of the Wilton Town Centre bus interchange is shown in Figure A.8.

Bus services would be provided gradually, starting from the occupation of first homes within Wilton South East. Infrastructure is planned delivered in stages over the next 15 years.

Proposed general targets for the delivery of public transport infrastructure are summarised in Table A.2.

These targets will be refined in consultation with Wollondilly Council and State agencies in the coming years.



Source: Wilton 2040 (DPE, 2018), modified by GHD

Figure A.8 Proposed location of planned Wilton Town Centre bus hub

Table A.2 Infrastructure implementation schedule – public transport

Future public transport	To be delivered by	Timing	Assumptions
Provide bus services between Wilton and key local and regional destinations	Transport	Shuttle bus service required with occupation of first homes to encourage public transport use. This includes the provision of a bus depot for Wilton to operate bus services from Wilton.	Initial services potentially provided by developers with recurrent funding for long-term services by NSW Government
New bus interchange	Developers and Transport	To be developed as district centre establishes	Funded by SIC delivered as works in kind
Picton and Wilton Road bus signals	Transport/Developer	Required in stages	Funded by SIC delivered as works in kind

Source: Wilton Priority Growth Area Interim Land Use and Infrastructure Implementation Plan Background Analysis (LUIIP) Background Analysis (DPE, 2017)

[3] Wilton Priority Growth Area Interim LUIIP Background Analysis (DPE, 2017)

A-3 Movement and place assessment

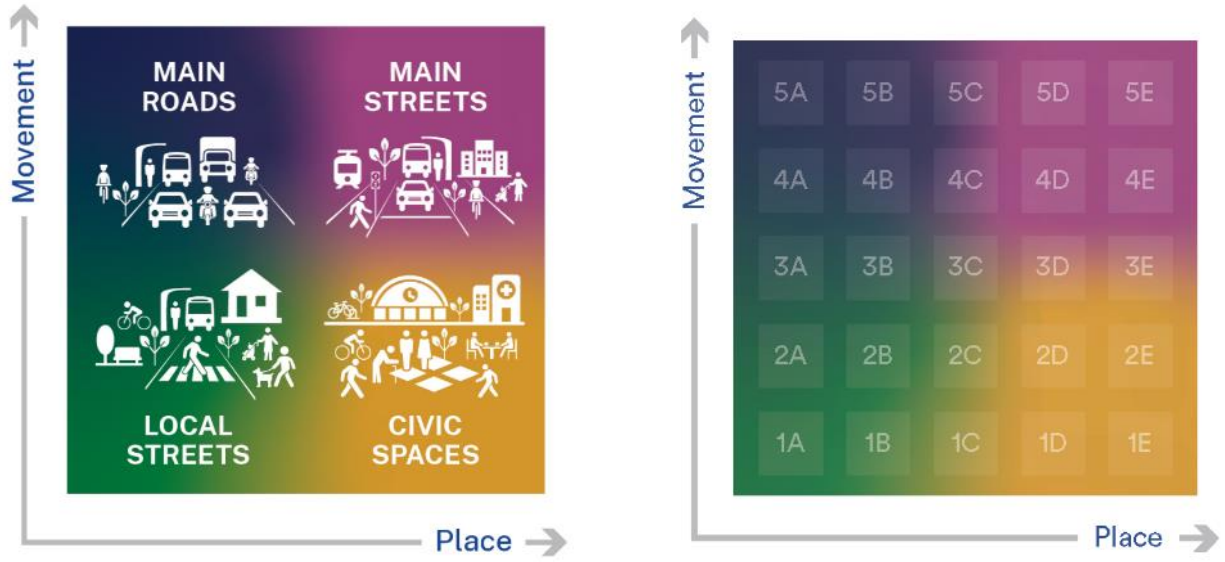
This section provides a Movement and Place assessment for the study area. The assessment has been undertaken at a high level generally in accordance with guidance provided in the NSW Movement and Place framework and the *Practitioner's Guide to Movement and Place* (Transport for NSW, 2023). Note that this is a desktop assessment only and no stakeholder engagement has been conducted as part of this scope. The high-level desktop assessment has been undertaken to document the function of Picton Road in the context of Wilton 2040, and to determine the alignment of the proposal against future network goals.

The Movement and Place assessment considers both the current and future state of the study area based on the available information on the existing and future context discussed in this TTIA.

A-3-1 Classifying street environments

Classifying street environments using the NSW Movement and Place Framework allows for a better consideration of surrounding land use, multi-modal networks, community wellbeing and liveability, economic activity and growth aspirations for the future. The NSW Movement and Place Framework acknowledges the transport network also has a 'Place' function. This means roads and streets are destinations for people as well as providing an efficient transport function.

The two-dimensional street environment classifications, shown in Figure A.9, recognises that shared, integrated planning approaches between transport and land-use planners will result in better outcomes.



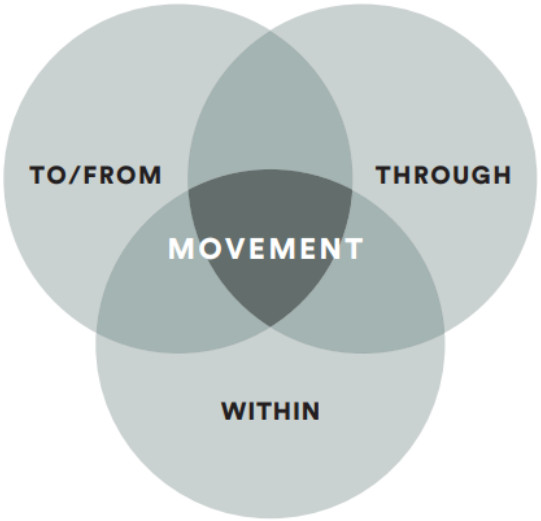
Source: **Road and street types (nsw.gov.au)**

Figure A.9 Four street environments for analysing the combinations of Movement and Place in NSW

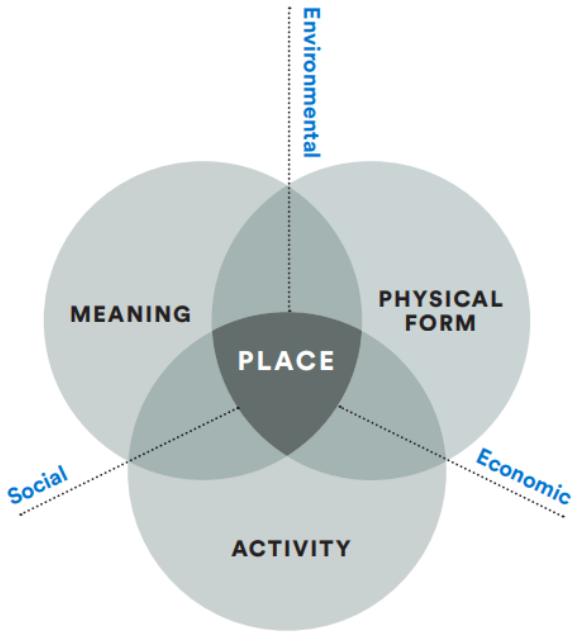
The four street environments shown in Figure A.9 comprise local streets, civic spaces, main roads, and main streets. The numbers and letters in the matrix relate to:

– The Movement vertical axis ranges between low Movement function '1' (local streets or civic spaces) to high Movement function '5' (main roads or main streets).
– The Place horizontal axis ranges from low Place intensity 'A' (local streets or main roads) to high Place intensity 'E' (civic spaces or main streets).

The NSW Movement and Place Framework identifies three types of movement in relation to place, **including through, to/from, within** movements as shown in Figure A.10. In addition, the *Practitioner's Guide to Movement and Place* identifies three measures of Place intensity, including **meaning**, **physical form** and **activity**.



Three types of Movement in relation to place



Places are a synthesis of physical form, activity, and meaning

Source: **NSW Movement and Place** –

Figure A.10 Movement types and Place Intensity measures

The approach to classifying Place intensity and Movement function includes the following:

– Place intensity:
  - Based on considering areas of Place within and around the study area, including a review of the three measures of Place intensity, including **meaning**, **physical form** and **activity.**
  - The assessment has taken account of **adjacent land use** and the role the transport network plays as part of the **wider public realm**.

– Movement function:
  - Based on the network's functional importance for moving people and goods, by any mode, rather than focusing on the volume of vehicles.
  - The framework is multi-modal and includes walking, cycling, public transport, freight and general traffic networks.
  - Looking at each mode in isolation, Movement function captures each mode's interaction with and connection to places based on movement through, to and from, and within them.

The analysis considers both the current function of the network and the desired future function of the network, to allow gaps to be identified and guide investment decision-making.

A-3-2 Vision and objectives

Wilton 2040 outlines the vision for the development of the Wilton Growth Area, as shown in Figure A.11.

Source: Wilton 2040: A Plan for the Wilton Growth Area Objectives (DPE, 2018)

Figure A.11 Wilton 2040 Vision

The proposal is part of a suite of key infrastructure upgrades in the Wilton Growth Area that would help support its sustainable growth and attain this vision.

The **objectives of proposal** are to:

- Improve safety for users of the corridor.
- Improve efficiency and access for freight.
- Increase connectivity and liveability for communities serviced by the corridor, while supporting sustainable transport choices.
- Enable more reliable and efficient trips between Western Sydney, Wilton New Town and the Illawarra-Shoalhaven to support future growth.
- Provide a resilient transport corridor that seeks to protect cultural heritage and the environmental outcomes by conserving biological diversity, balancing resource consumption and responding to climate change.

The above objectives, together with the vision for the Wilton Growth Area, provide a starting point for the Movement and Place assessment (step 1, as shown in Figure 2.5). Table A.3 summarises the objectives along with associated performance indicators to help inform the analysis of the transport network performance.

Table A.3 Proposal – vision and objectives

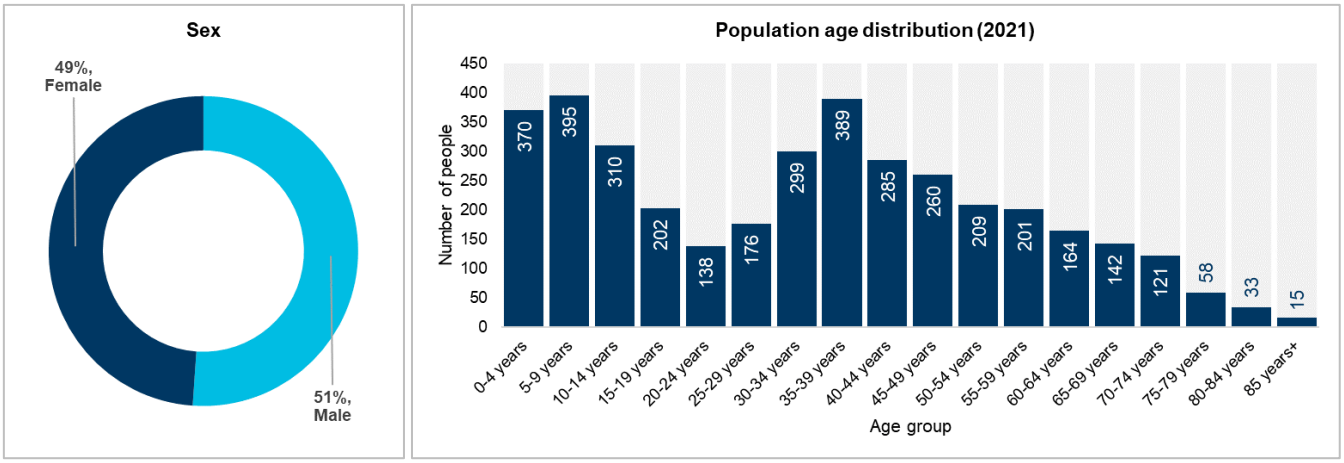
Objective	Performance indicator
Improve safety for users of the corridor	Casualty crash rate (by degree, user, and road type)
	Safe speed environment (85th percentile speed)
Improve efficiency and access for freight Enable more reliable and efficient trips between Western Sydney, Wilton New Town and the Illawarra-Shoalhaven to support future growth	Connectivity to HV network
	Network congestion (average delay)
Increase connectivity and liveability for communities services by the corridor, while supporting sustainable transport choices	Number of road links providing basic connectivity
	Distance to cycling network
	Public transport accessibility level (PTAL)

A-3-3 Customer demographics and travel context

Background information on the existing conditions in the assessment area is provided in section 3. This subsection provides additional context on customer demographics in the study area and their travel characteristics.

Population and population density

Wilton currently has a population of about 3,770 people. According to the Australian Bureau of Statistics (ABS) 2021 Census on Population and Housing ('2021 Census'), residents of the Wilton Growth Area are composed of 51 per cent male and 49 per cent female. The median age for the population is 34 years, which is lower than NSW's median age of 39. An overview of Wilton's population is shown in Figure A.12.



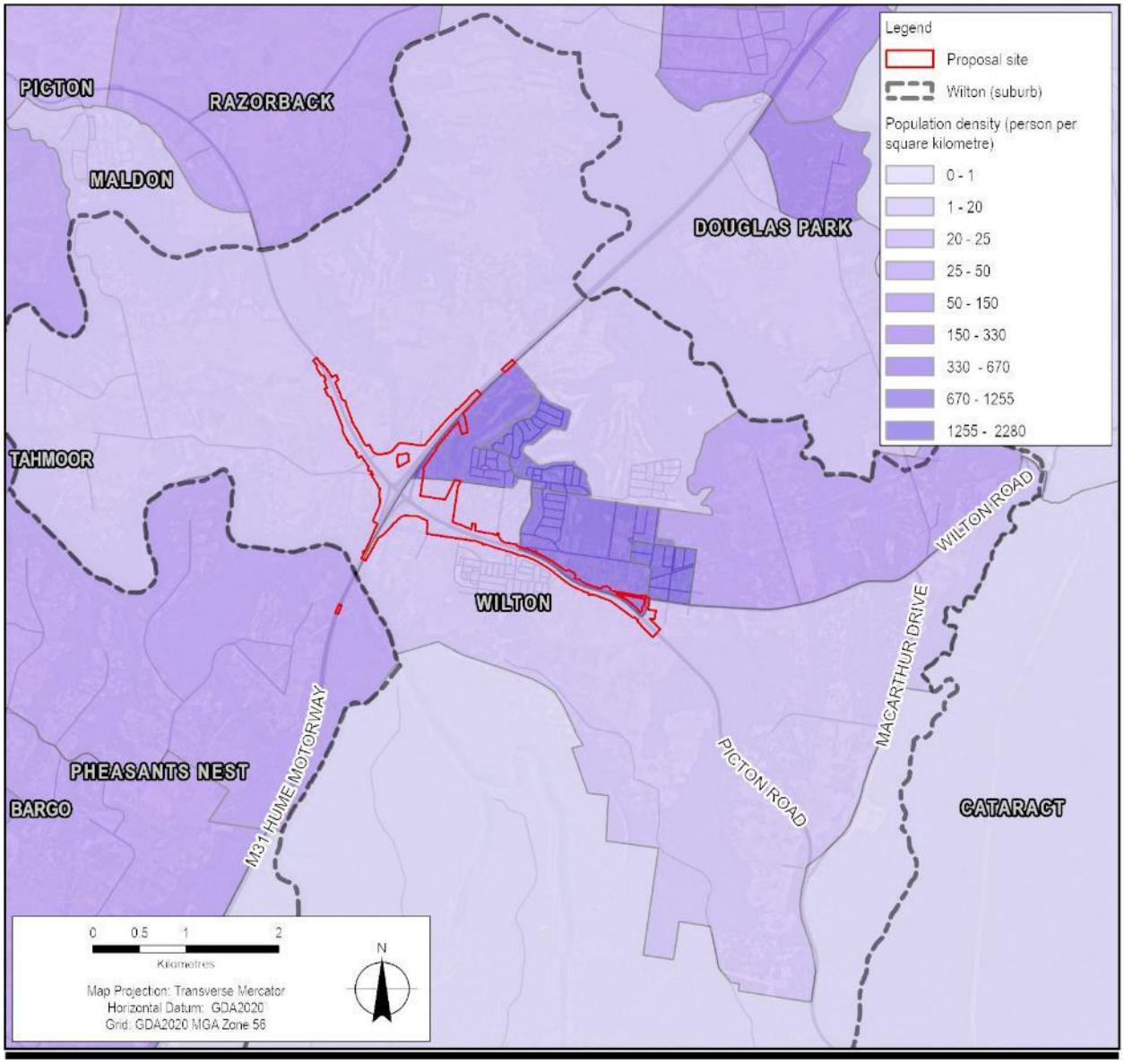
Source: ABS Census of Population and Housing, 2021

Figure A.12 Wilton population composition – gender and profile (2021)

Wilton's population is spread out over an area of about 65 square kilometres (excluding the Illawarra Catchment Reserve). Population data from the 2021 Census indicate generally low existing population in Wilton, which is expected given the surrounding area's rural setting.

As shown in Figure A.13, the majority of the areas within the Wilton Growth Area have low population densities. The majority of the population in the study area is concentrated in the villages of Bingara Gorge and Wilton. Further away, denser population clusters can be found in the towns of Douglas Park in the north-east, Picton in the north-west, and Tahmoor in the west.

Based on estimates from Wilton 2040, population increase in the Wilton Growth Area is expected to be highest in the areas to the north of the proposal, with an expected 5600 additional dwellings in Wilton North and 1600 additional dwellings in the future Wilton Town Centre, as shown in Figure A.1.



Data Source: ABS Census of Population and Housing (2021)

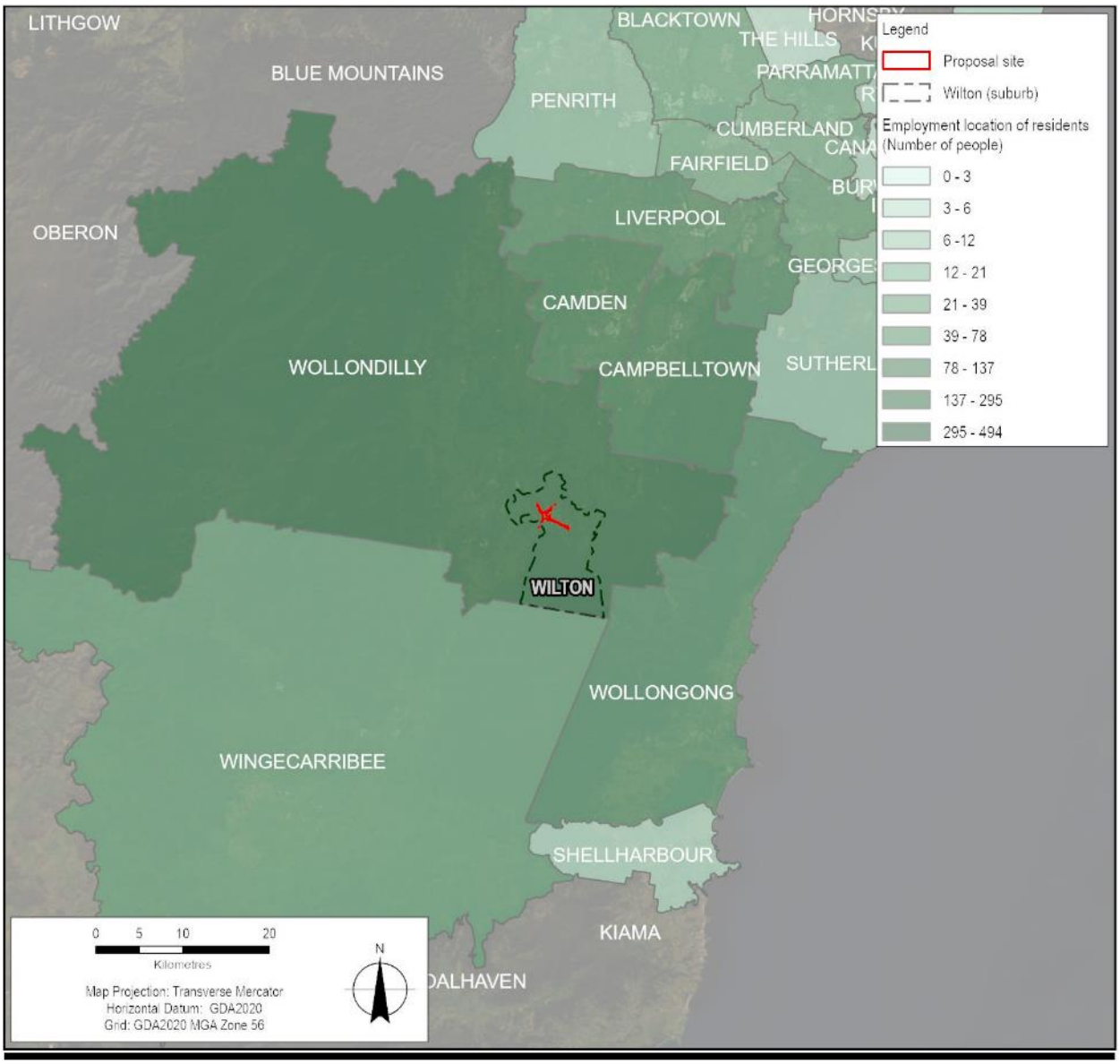
Figure A.13 Wilton population density (2021)

Journey-to-work and Household travel survey data

Journey-to-work data

The 2021 Census Journey-to-Work (JTW) data indicate that only about 26 per cent of Wilton's working population live and work within the Wollondilly Shire LGA. About 69 per cent of residents travel outside the LGA to work, while the remaining five per cent reported to have no fixed place of work.

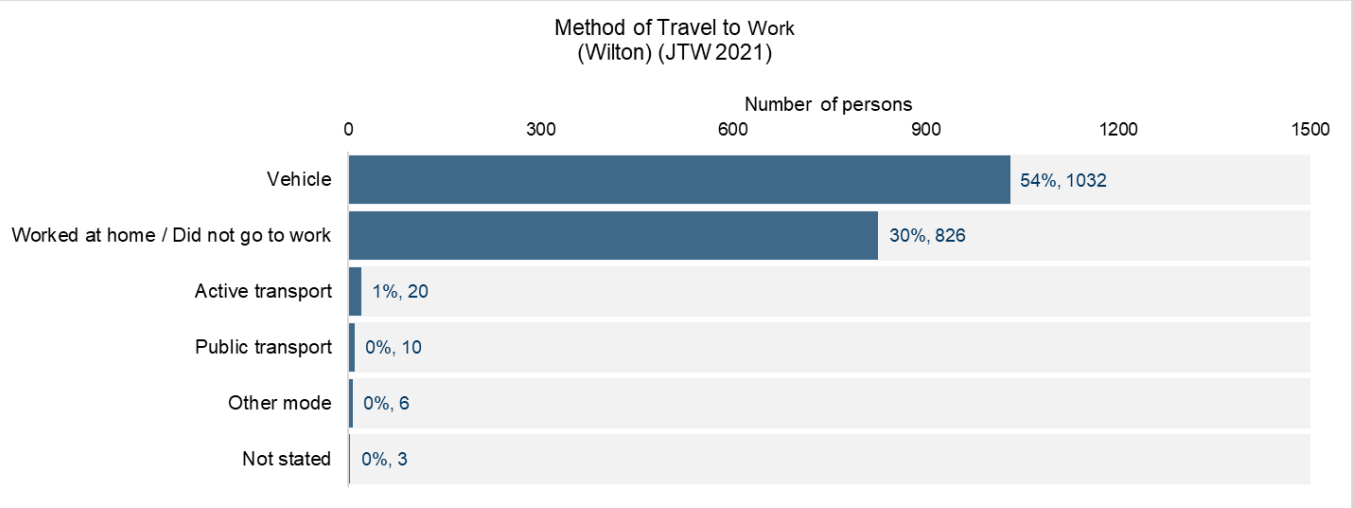
Wilton resident's top reported employment locations outside of the LGA include Campbelltown (16 per cent), Camden (12 per cent), and Liverpool (seven per cent). A map of Wilton resident workers' employment locations is shown in Figure A.14.



Data Source: ABS Census of Population and Housing, 2021

Figure A.14 Employment locations for Wilton residents

A review of the method of travel to work data from the 2021 Census indicates that Wilton residents greatly depend on private vehicles to travel to work. As shown in Figure A.15, about 54 per cent of residents use cars to travel to work. About a third of the surveyed population worked from home or did not go to work (30 per cent), one per cent walk or cycle to work, with less than one per cent using public transport.



Data Source: ABS Census of Population and Housing, 2021 (Usual residence data))

Figure A.15 Method of travel to work

Household travel data

Table A.4 provides a summary of travel patterns for Wollondilly Statistical Area 3 (SA3) based on Transport Household Travel Surveys (HTS) for 2019/20[4]. The data indicates that about 78 per cent of total trips in Wollondilly SA3 were taken via private vehicles (either as driver or passenger). Average travel distances for private vehicle trips ranged from 21 to 24 kilometres, with travel times ranging from about 24 to 30 minutes.

Travel using public transport (buses and trains) make up only about seven per cent of total trips. Both modes have similar average travel times between 26 to 30 minutes. However, average travel distances for bus trips are reported to be lower at 15 kilometres compared 21 kilometres for train trips.

Table A.4 Travel by mode, Wollondilly 2019/20

Travel mode	Number of trips (000s)	Per cent of total trips	Mode share (%)[1]	Trip distance (km, 000s)	Per cent of total distance	Average distance (km)	Average time (mins)
Vehicle Driver	91	53.2	57.5	2,210	65.6	24.3	30
Vehicle Passenger	43	25.3	27.3	908	27.0	21	24
Train	6	3.7	4.0	134	4.0	21.1	26
Bus	7	3.8	4.1	99	2.9	15.1	30
Walk Only	9	5.3	5.8	12	30.0	1.3	19
Walk Linked	13	7.4	NA	6	20.0	0.5	8
Other	2	1.3	1.4	2	10.0	1.1	17

Source: Transport Household Travel Survey 2019/2020– Data by SA3.

Note 1: Mode share is calculated excluding Walk Linked Trips

Based on the HTS survey, the main purposes for travel included *Social/Recreation*, *Commute*, and *Work-related business*, as shown in Table A.5. *Commute* and *Education/Childcare* trips experienced the highest average travel time of almost over 40 minutes, followed by work related business trips at about 35 minutes.

[4] Latest available HTS data for Wollondilly Shire. HTS data releases for 2021/2021 and 2021/2022 does not include all LGAs that constitute the HTS study area due to low sample size for some LGAs.

Table A.5 Travel by purpose, Wollondilly 2019/20

	Number of trips (000s)	Per cent of total trips	Trip distance (km, 000s)	Per cent of total distance	Average distance (km)	Average time (mins)
Commute	27	18.0	902	27.0	33.6	41
Education/childcare	10	6.8	319	9.6	31.6	42
Personal business	14	9.4	291	8.7	20.8	37
Serve passenger	20	13.6	313	9.4	15.5	23
Shopping	9	5.9	76	2.3	8.7	14
Social/recreation	43	29.0	1,066	31.9	24.6	33
Work related business	24	16.1	342	10.2	14.2	18
Other	2	1.2	27	0.8	15.1	25

Source: Transport Household Travel Survey 2019/2020– Data by SA3.

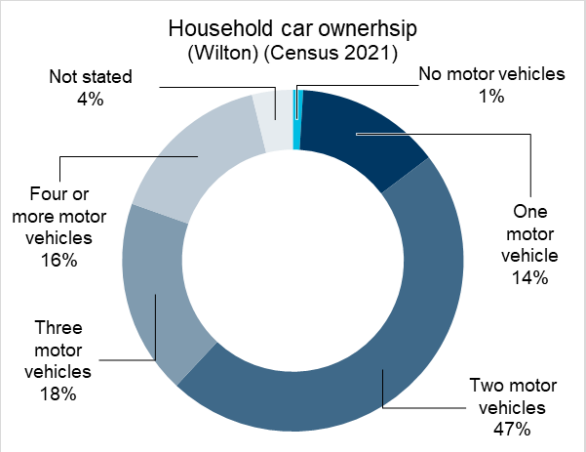
Car ownership

Current travel patterns indicate that residents and workers in Wilton heavily depend on private vehicles to support their mobility.

Based on data from the 2021 census, of about 1,200 households in Wilton, 95 per cent own at least one car. This rate of car ownership is higher than the average for the Greater Sydney Region (84 per cent).

Figure A.16 shows the reported number of vehicles per household based on the 2021 ABS census, while a summary of the car ownership data compared against Greater Sydney percentages is shown in Table A.6.

Only about one per cent (11 households) do not own a motor vehicle and rely on public and active transport modes for travel.



Source: ABS Census of Population and Housing, 2021

Figure A.16 Wilton household car ownership (2021)

Table A.6 Wilton car ownership (2021)

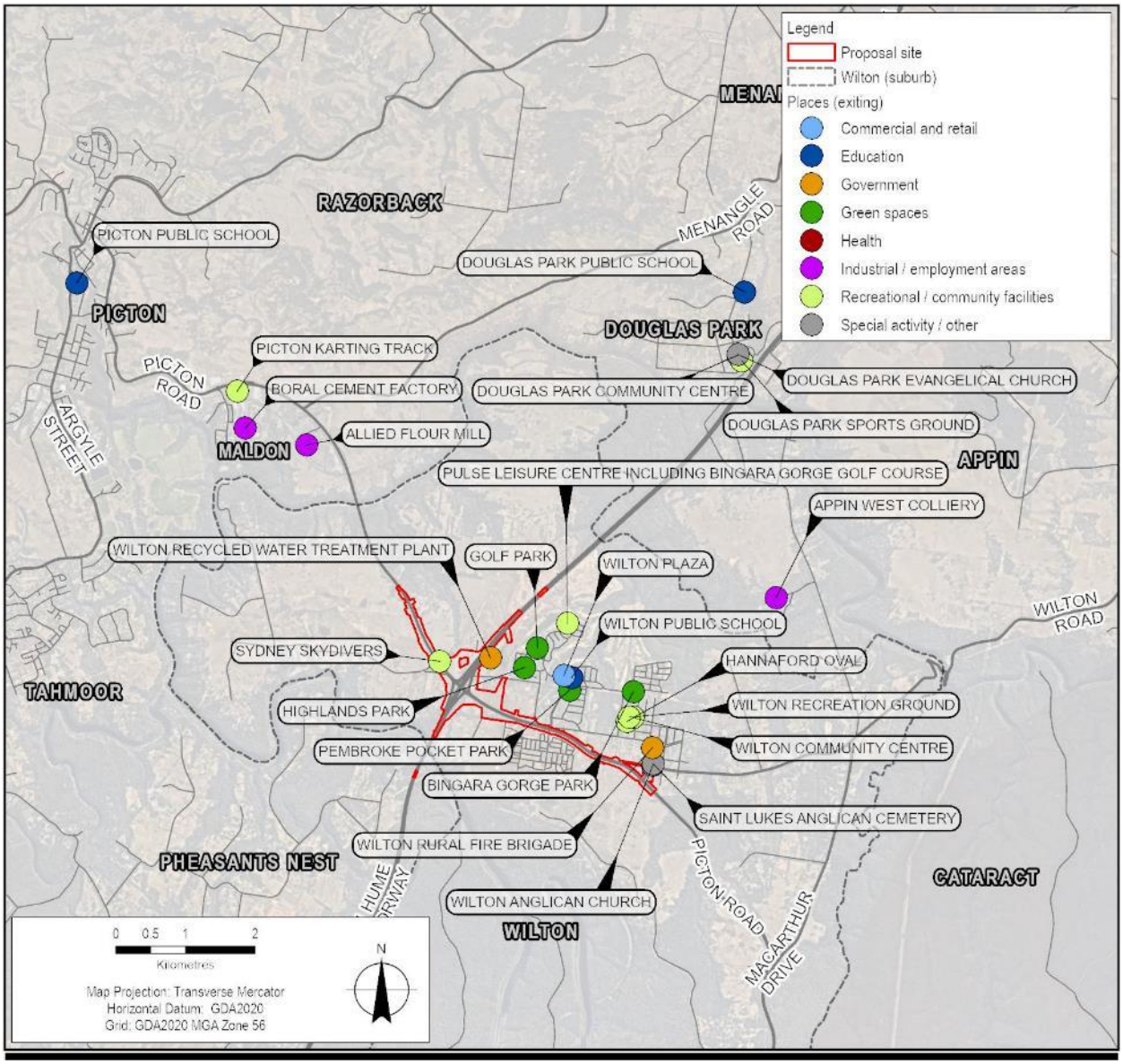
Number of cars	Wilton (2021)		Greater Sydney (%) (2021)
	Number of households	Per cent of householders	
No motor vehicles	11	1	11
1 motor vehicle	156	14	38
2 motor vehicles	538	47	31
3 or more motor vehicles	389	34	15
Not stated	44	4	5
Total	**1,144**	**100**	**100**

Source: ABS Census of Population and Housing, 2021

A-3-4 Place context analysis

Existing Place context

Places around the study area, which may influence movement needs along Picton Road, are shown in Figure A.17 and summarised in Table A.7.



Source: Wilton LUIIP Background Analysis (DPE, 2017); Wollondilly LSPS (Wollondilly Shire Council, 2020); Desktop research

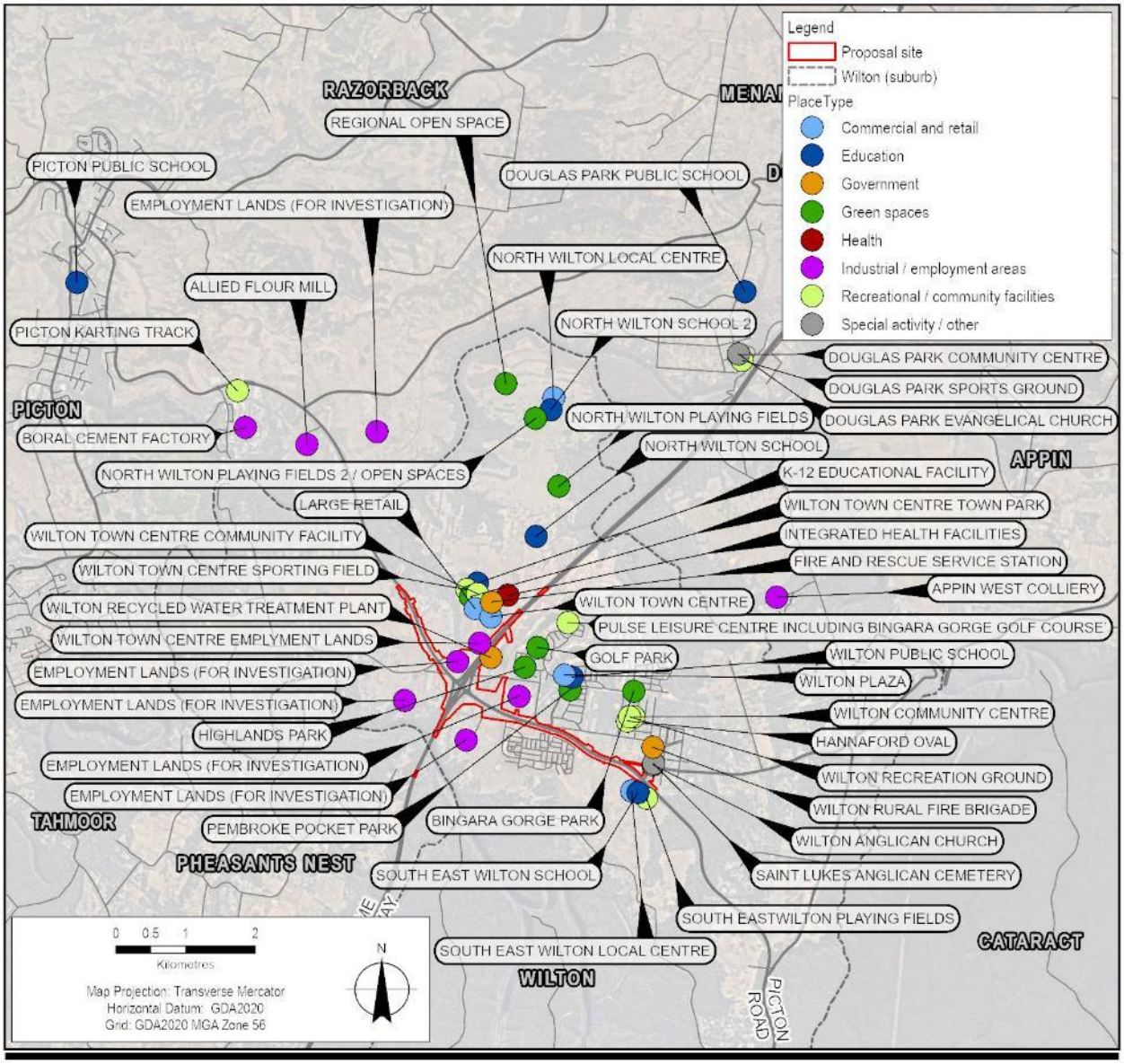
Figure A.17 Places context map (existing)

Table A.7 Existing Place context analysis

Place type	Location	
Education	– Douglas Park Primary School	– Wilton Public School
Recreational/community facilities	– Bingara Gorge Golf Courses – Douglas Park Community Centre – Douglas Park Sports Ground – Hannaford Oval	– Picton Karting Track – Sydney Skydivers – Wilton Community Centre – Wilton Recreation Ground
Green spaces	– Bingara Gorge Park – Golf Park	– Highlands Park – Pembroke Pocket Park
Government	– Bingara Gorge Permanent Recycled Water Plant	– Wilton Rural Fire Brigade
Industrial/employment areas	– Allied Flour Mill – Appin West Colliery	Boral Cement Factory
Health	– N/A	
Commercial and retail	– Wilton Plaza	
Special activity/other	– Douglas Park Evangelical Church – Saint Lukes Anglican Cemetery	– Wilton Anglican Church

Future Place context

As discussed in section A-1-2, major land use changes are expected in the vicinity of the study area. Figure A.18 shows the location of future Places within the future Wilton Growth Area, based on available information from published planning documents and precinct plans.



Source: Wilton 2040 (DPE, 2020); North Wilton Precinct - Structure Plan (NSW Govt, 2022); North Wilton Precinct - Structure Plan (NSW Govt, 2021); South East Wilton Neighbourhood Plan (2022)

Figure A.18 Place context map (future)

Table A.8 lists the future places around the study area. It should be noted that this is not an exhaustive list and additional places are expected to be added following outcomes of further land use investigations.

Table A.8 Future Place context analysis

Place type	Location *(new places highlighted with *)*	
Education	– Douglas Park Primary School – Wilton Public School – K-12 Educational Facility * – Picton Public School *	– North Wilton School 2 * – South Wilton School * – North Wilton School *
Recreational/community facilities	– Bingara Gorge Golf Courses – Douglas Park Community Centre – Douglas Park Sports Ground – Hannaford Oval – Picton Karting Track – ~~Sydney Skydivers~~ (removed)	– Wilton Community Centre – Wilton Recreation Ground – South Wilton Paying Fields * – Wilton Town Centre Community Facility * – Wilton Town Centre Sporting Field *
Green spaces	– Bingara Gorge Park – Golf Park – Highlands Park – Pembroke Pocket Park	– North Wilton Playing Fields * – North Wilton Playing Fields 2 * – Regional open space * – Wilton Town Centre Town Park *
Government	– Bingara Gorge Permanent Recycled Water Plant	– Wilton Rural Fire Brigade – Fire and Rescue Service Station *
Industrial/employment areas	– Allied Flour Mill – Appin West Colliery – Boral Cement Factory	– Employment lands (for investigation) (Five areas around study area) *
Health	– Wilton Town Centre Integrated Health Facilities*	
Commercial and retail	– Wilton Plaza – Large Retail (Wilton Town Centre) * – North Wilton Local Centre *	– South Wilton Local Centre * – Wilton Town Centre *
Special activity/other	– Douglas Park Evangelical Church – Saint Lukes Anglican Cemetery	– Wilton Anglican Church

Note: Asterisks (*) indicate new places in the Future Place context that were not present in the Existing Place context.

A-3-5 Movement context analysis

Existing Movement context

As the existing transport networks are detailed in section 3, this section provides a summary of the movement context analysis, considering the three types of movement identified in Figure A.10.

Walking and cycling network

As shown in Figure 3.8, walking and cycling facilities in the study area are currently limited. There are no dedicated walking or cycling facilities along Picton Road or the M31 Hume Motorway, although cycling is permitted on the shoulders of both carriageways.

Footpaths and shared user paths are provided along local roads that connect the Wilton and Bingara Gorge residential areas. Pedestrian facilities are more prominent within the newer developments located in Bingara Gorge.

Public transport

Section 3.5 provides details on existing public transport routes and frequencies. Public transport within the existing study area is limited. There are no bus, coach or rail services stops within the study area. However, a limited number of coach services use the M31 Hume Motorway for 'Through' movements between Goulburn and Campbelltown.

As a result, the existing area has little significance for public transport, other than being used for 'through' movements for a limited number of coach services along the M31 Hume Motorway.

Freight network

The study area provides significant utility for the movement of goods and acts as a freight corridor supporting the east/westbound movement of import and exports from Port Kembla in Wollongong. As detailed in section 3.4, the M31 Hume Motorway and Picton Road are approved to accommodate larger vehicles, including 26-metre B-double vehicles.

Both Picton Road and the M31 Hume Motorway are key corridors for 'through' freight movements.

General traffic

As detailed in section 3.3, both Picton Road and the M31 Hume Motorway carry significant traffic volumes and are key corridors for 'through' general traffic movements. Other local roads, which connect to Picton Road generally carry 'to/from' movements for general traffic, including to/from the Wilton and Bingara Gorge residential areas and other attractors such as Wilton Public School, Bingara Gorge Golf Club and Sydney Skydivers.

Future movement context

A description of the planned future changes to the transport network is provided in section A-2-10.

Walking and cycling network

Aligned with the Wilton 2040 vision of a well-connected town where people are encouraged to use active transport, the Wilton Growth Area's future precincts are expected to plan for and provide easily accessible walking and cycling infrastructure to support walking and cycling access to the future Places.

The future active transport infrastructure network would link employment/commercial areas and residential neighbourhoods and would be expected to utilise the most direct links between these Places. Figure A.6 shows the following future collector roads links that would potentially provide active transport connections in the Wilton Growth Area:

– Future east–west connections:
  - Condell Park Road overpass, which would connect the future Wilton Town Centre and places to the east of the M31 Hume Motorway.

- Niloc Bridge, which would connect the future Wilton North and Bingara Gorge precincts and provide direct access to Picton Road from North Wilton.

– Future north–south connections:
  - New intersection connecting the future Wilton Town Centre and West Wilton, with at grade signal-controlled pedestrian crossings.
  - Wilton Park Road/Picton Road intersection, connecting the future Wilton Town Centre to areas west of Picton Road, with at grade signal-controlled pedestrian crossings.
  - Janderra Lane overpass, connecting South East Wilton precinct to Bingara Gorge and future Wilton Town Centre.
  - Almond Road intersection and overpass, connecting the future South East Wilton and Wilton precincts.
  - Proposed public transport and active transport overbridge connection across the M31 Hume Motorway, which would link Bingara Gorge and future Wilton Town Centre.

The future local roads and active transport connections identified in Wilton 2040 will provide the missing active transport links, as these roads provide the most direct path between future Places and would likely be designed for lower-traffic speeds, which would provide a better walking and cycling environment. The majority of these links would generally facilitate 'to/from' walking and cycling movements.

Additionally, the proposed shared user path along each side of Picton Road would form part of Wollondilly Shire Council's future strategic cycling route, which would generally provide for 'through' walking and cycling movements, with limited destinations/attractors for pedestrians and cyclists along Picton Road itself. It is expected that the proposed shared user paths along Picton Road would mainly be used for recreational or commuting walking and cycling trips.

Public transport

Planning for future public transport in the Wilton Growth Area aims to provide bus services that would be within walking distances from homes. A transport interchange/bus hub is proposed within the future Wilton Town Centre, which would serve as a focal point for bus services that would provide public transport connectivity within and to/from the Wilton Growth Area.

The exact location of the future transport interchange, bus stops, and details of routes that would be served by the future bus interchange are still in the conceptual planning stages. However, these services are expected to utilise existing and future collector/local roads within the Wilton Growth Area precincts, rather than along the M31 Hume Motorway and Picton Road.

Freight network

The Maldon-Dombarton Freight Rail Corridor, shown in Figure A.4, is being protected to enable future rail freight to Port Kembla. Aside from this, no other major changes to the freight network are expected, although last mile freight, including 'to/from' freight movements, is expected with the future Wilton Town Centre, industrial areas and general growth in residential population.

Staged improvements to the existing road freight network (including the proposal) are planned to improve the safety and efficiency of the road network. However, it is expected that the freight movements along Picton Road and the M31 Hume Motorway would remain generally as 'through' movements.

General traffic

The Wilton Growth Area's structure plan provides a network of new local and collector roads, which would connect the future precincts. These future roads are expected to generally accommodate 'to/from' and 'within' movement functions in the area.

The predominant movement type of the arterial roads, including Picton Road and the M31 Hume Motorway, is expected to be maintained and continue to largely cater to 'through' movement traffic.

A-3-6 Movement and place classification

Existing Movement and Place classification

Movement function (1 to 5) and Place Intensity (A to E) classifications have been determined based on the context analysis, as summarised in Table A.9.

Table A.9 Movement and Place classifications – existing

Road name	Movement Function						Predominant Movement Type	Place Intensity		
	W	C	PT	F	GT	Overall		Key Places	Int	Street environment
Picton Road [W]	1	1	1	5	5	5	Through	-	A	Main Road
Picton Road [E]	1	1	1	5	5	5	Through	-	A	Main Road
M31 Hume Motorway	1	1	1	5	5	5	Through	-	A	Main Road
Wilton Park Road [W]	1	1	1	1	1	1	To/From	-	A	Local Street
Wilton Park Road [E]	1	1	1	1	1	1	To/From	-	A	Local Street
Janderra Lane	1	1	1	1	1	1	To/From	-	A	Local Street
Pembroke Parade	2	2	1	1	2	2	To/From	Wilton, Bingara Gorge	B	Local Street
Greenway Parade	1	1	1	1	1	1	To/From	Wilton Greens	A	Local Street
Almond Street	1	1	1	1	3	3	To/From	-	A	Local Street

Notes: Transport user group: W = Walking; C = Cycling; PT = Public Transport; F= Freight; GT = General Traffic
Movement Function: 1 – low movement function 5 – high movement function
Place Intensity: A – low place intensity E – high place intensity

The assessed roads have low place intensity, owing to the predominantly rural land uses and low activity surrounding the study area. Picton Road and the M31 Hume Motorway have high 'through' movement functions, with no direct access to places of interest or activity generators. As arterial roads, the primary function of both roads is to provide efficient movement of large volumes of traffic across long distances.

A map showing the existing Place intensity and Movement and Place classification is provided in Figure A.19.

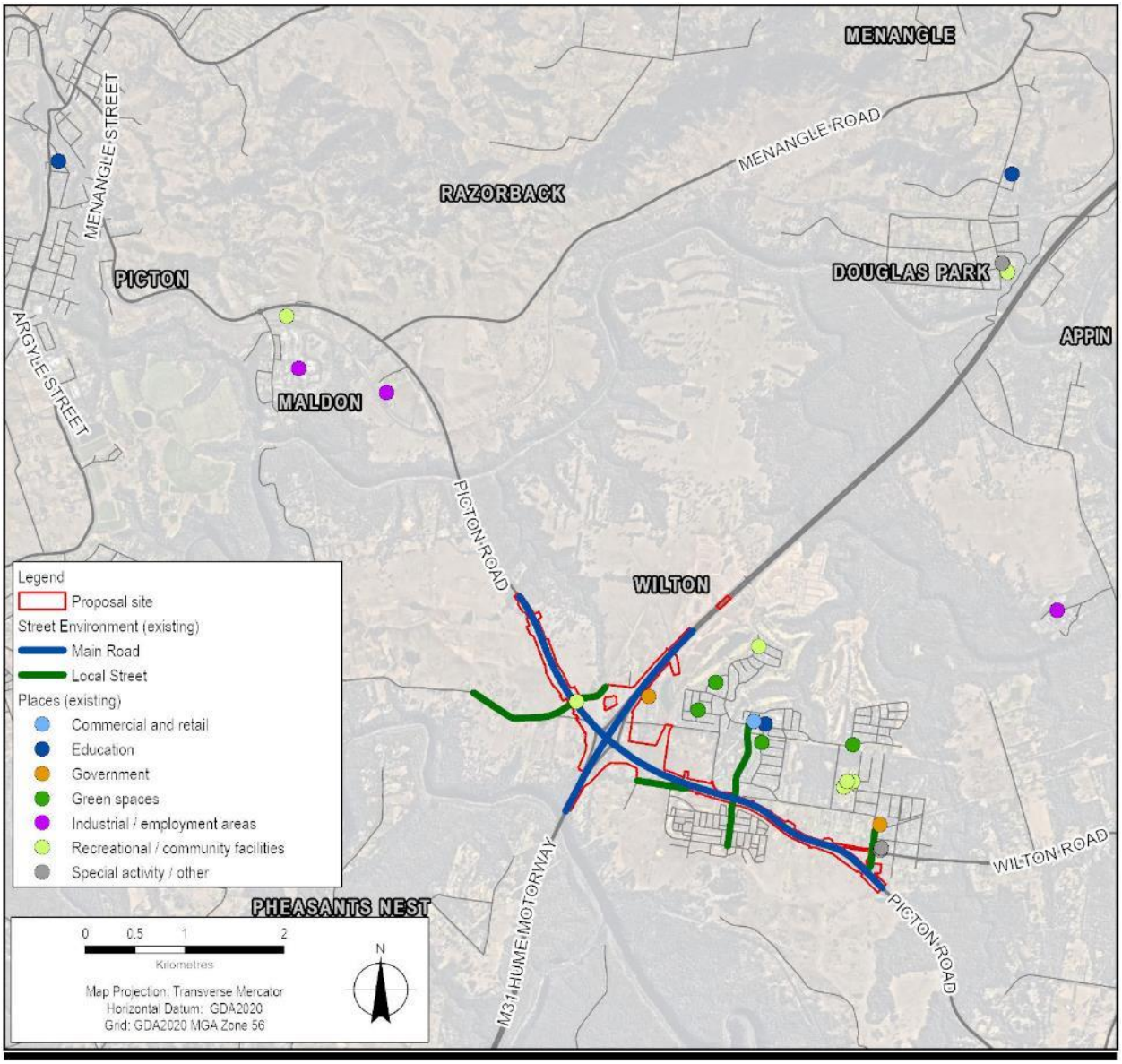


Figure A.19 Movement and Place – Street Environment classification (existing)

Future Movement and Place classification

Future Movement and Place classifications and street environments have been determined based on the context analysis and is summarised in Table A.10.

Table A.10 Movement and Place Classification (Future)

Road name	Movement Function						Predominant Movement Type	Place Intensity		
	W	C	PT	F	GT	Overall		Key Places	Int	Street Environment
Picton Road [W]	2	2	1	5	5	**5**	Through	-	**A**	**Main Road**
Picton Road [E]	2	2	1	5	5	**5**	Through	-	**A**	**Main Road**
M31 Hume Motorway	1	1	1	5	5	**5**	Through	-	**A**	**Main Road**
Wilton Park Road [W]	3	3	3	1	3	**3**	To/From	South East Precinct	**A**	**Local Street**
Wilton Park Road [E]	2	2	2	1	3	**3**	To/From	Future employment lands, Wilton Town Centre Precinct	**B**	**Local Street**
Janderra Lane	2	2	2	1	2	**2**	To/From	South East Precinct	**A**	**Local Street**
Pembroke Parade	2	2	1	1	2	**2**	To/From	Wilton, Bingara Gorge	**B**	**Local Street**
Greenway Parade	2	2	1	1	2	**2**	To/From	Wilton Greens	**B**	**Local Street**
Almond Street	1	1	1	1	3	**3**	To/From	South East Precinct	**A**	**Local Street**

Notes: Transport user group: W = Walking; C = Cycling; PT = Public Transport; F= Freight; GT = General Traffic
Movement Function: 1 – low movement function 5 – high movement function
Place Intensity: A – low place intensity E – high place intensity

A map showing the future Moment and Place street environments is shown in Figure A.20. Both Picton Road and the M31 Hume Motorway would remain as corridors for 'though' movement and function as 'Main Roads'. The Place intensity along Picton Road and the M31 Hume Motorway is not expected to change and would remain as low.

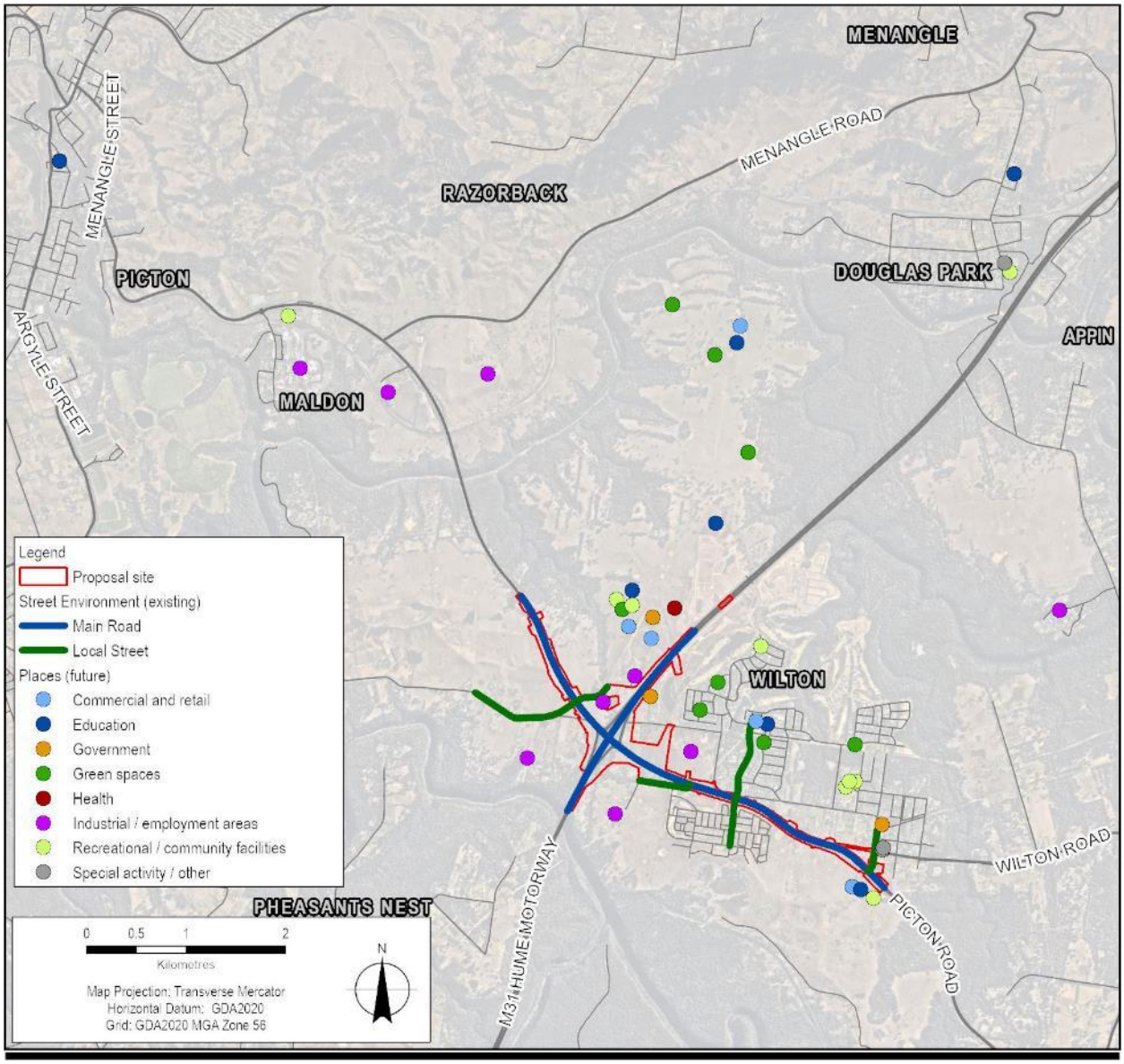


Figure A.20 Movement and Place Classification (future)

A-3-7 Analysis of Movement and Place vision and objectives

A Movement and Place analysis of Picton Road against the identified objectives and associated performance indicators is provided in Table A.11.

Table A.11 Proposal – analysis of Movement and Place vision and objectives

Objective	Performance indicator		
	Metric	**Analysis (Existing)**	**Analysis (Future)**
1. Improve safety for users of the corridor	Casualty crash rate (by degree, user, and road type)	33 total recorded crash incidents with 72% (19 crashes) associated with rear end and right rear crashes	Capacity and design improvements associated with the proposal could lead to an improvement in road safety.
	Safe speed environment (85th percentile speed) [1]	85th percentile speed is lower than the posted speed limit, indicating that vehicles are travelling within the identified safe limits [2]	Speed reductions are proposed along Picton Road near the Picton Road/M31 Hume Motorway interchange, from 80km/h to 60km/h (refer to section 5.1)
2. Improve efficiency and access for freight 3. Enable more reliable and efficient trips between Western Sydney, Wilton New Town and the Illawarra-Shoalhaven to support future growth	Connectivity to the heavy vehicle network	Picton Road is part of the heavy vehicle network (up to 26m B-doubles)	No changes to the heavy vehicle access are proposed.
	Network congestion (average delay).	Delays up to 58 seconds in the AM peak and up to 50 seconds in the PM peak	Without the proposal, delays up to: – 2031: 119 seconds (AM); 64 seconds (PM) – 2046: 123 seconds (AM); 549 seconds (PM) With the proposal, delays are reduced to a maximum of: – 2031: 28 seconds (AM); 20 seconds (PM) – 2046: 33 seconds (AM); 30 seconds (PM)
4. Increase connectivity and liveability for communities serviced by the corridor, while supporting sustainable transport choices	Number of road links providing basic connectivity.	East-west access within Wilton is currently limited to Picton Road. The M31 Hume Motorway limits connectivity across the different precincts.	Future road network improvements are expected to provide missing transport links (road and active transport network) across the Wilton Growth Area (refer to section A-2).
	Distance to walking and cycling network.	Walking and cycling network is currently limited to Bingara Gorge. Distance generally >400m from cycling network.	
	Public transport accessibility level (PTAL).	Not rated. No available public transport services.	A bus transport interchange is planned for the Wilton Town Centre. New bus services would be provided to provide connectivity within and outside of the Wilton Growth Area.

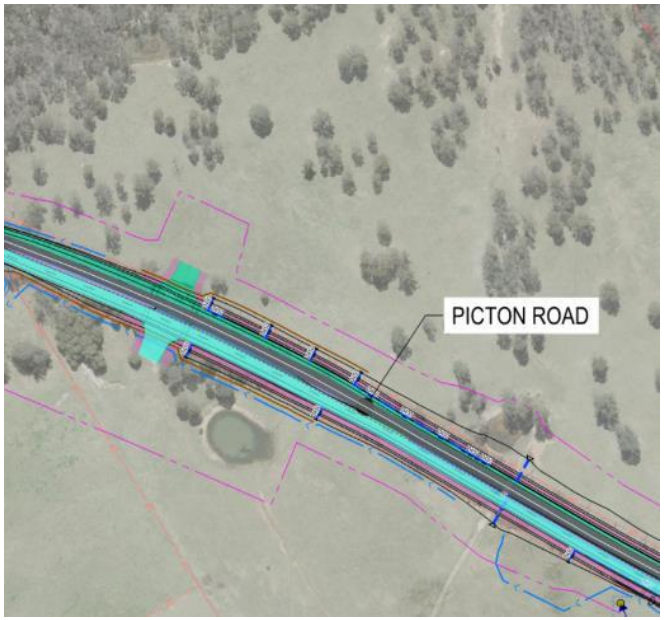
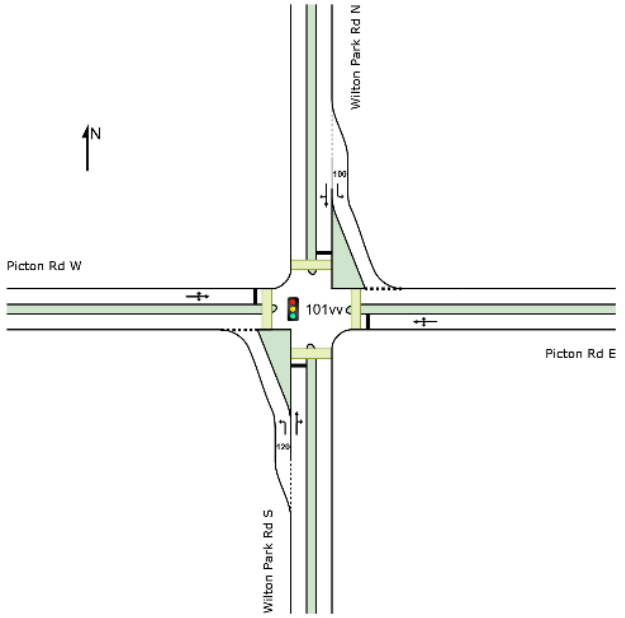
Notes: 1. The 85th percentile speed is the speed **at or below which** 85 percent of all vehicles are observed to travel under free-flowing conditions

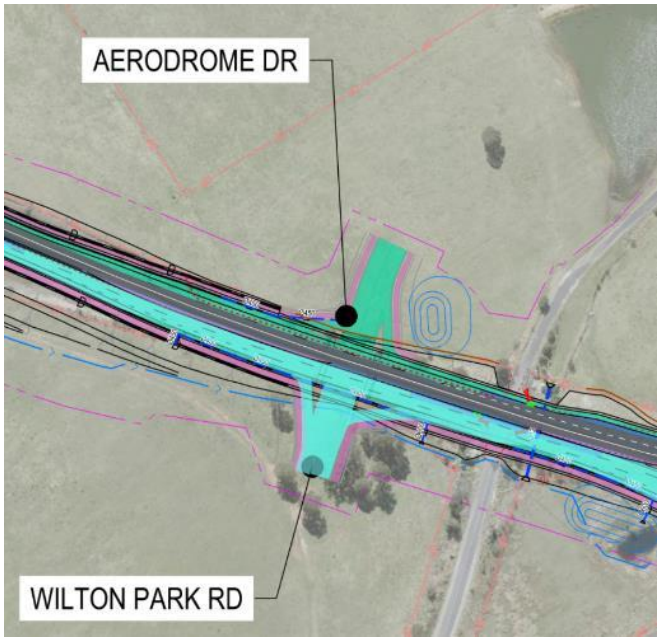
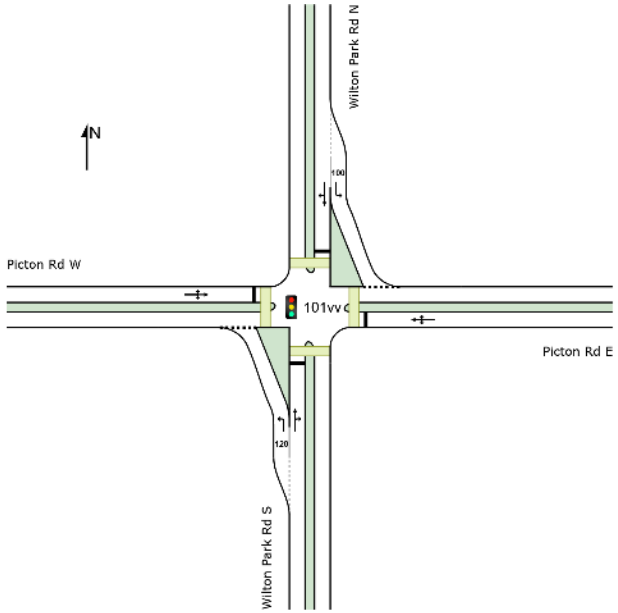
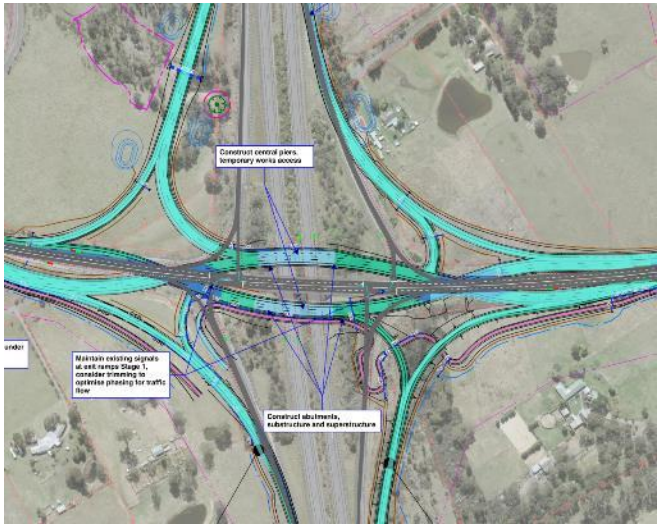
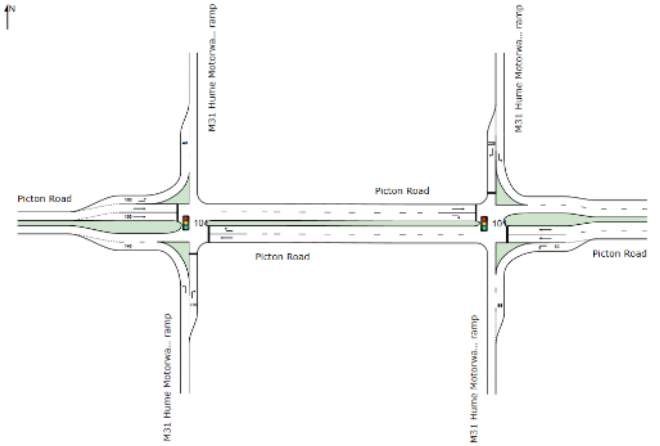
2. Based on information from **NSW Government Built Environment Indicators Web Map**

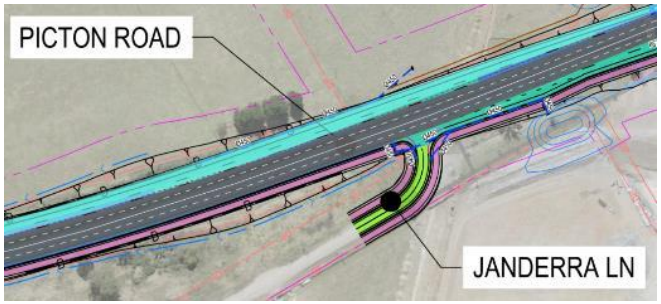
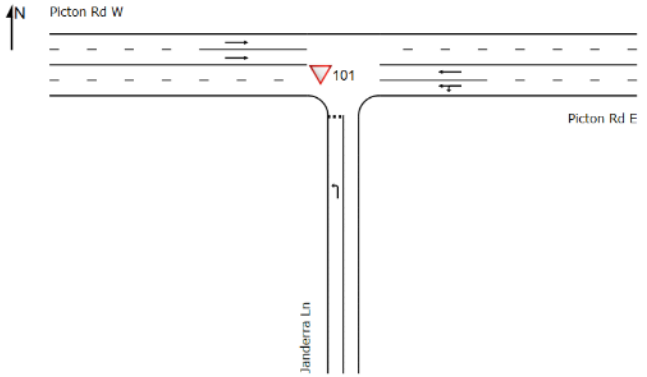
Appendix B

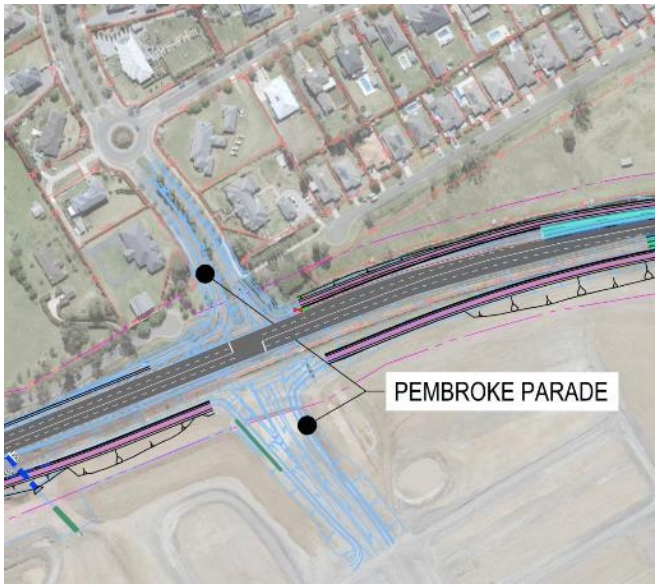
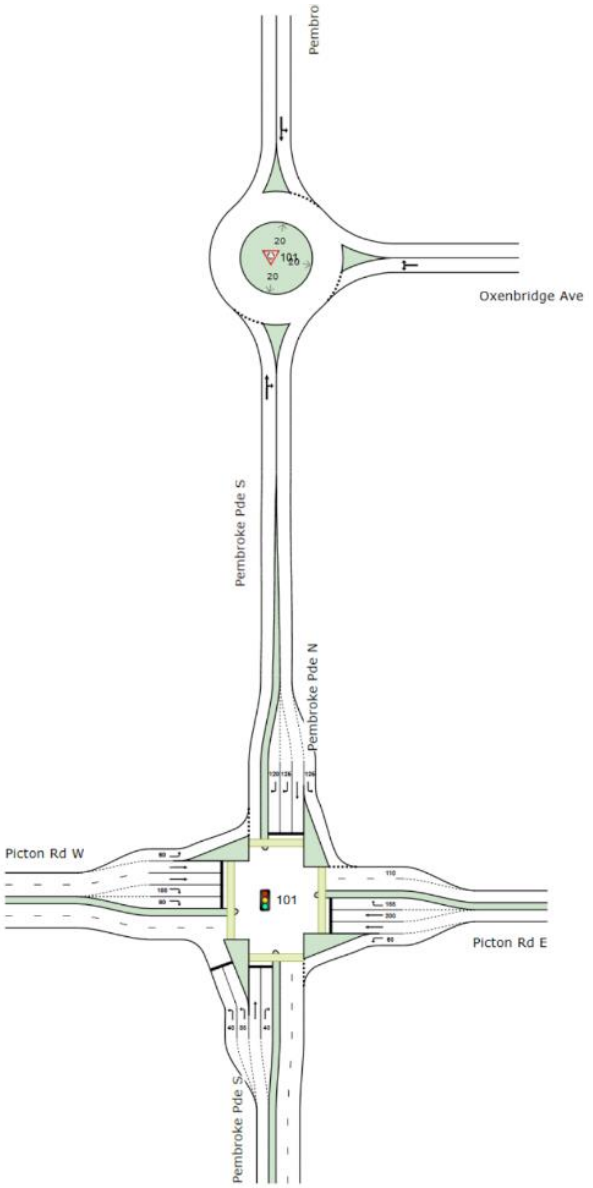
Construction traffic modelling scenarios

Table B.1 Construction Stage 1 SIDRA intersection layout and associated design drawing

Intersection name(s)	Staging plan sketch	Adopted SIDRA model layout
Picton Road/Western Developer Road		

Intersection name(s)	Staging plan sketch	Adopted SIDRA model layout
Picton Road/Wilton Park Road		
Picton Road/M31 Hume Motorway (W) Picton Road/M31 Hume Motorway (E)		

Intersection name(s)	Staging plan sketch	Adopted SIDRA model layout
Picton Road/Janderra Lane		

Intersection name(s)	Staging plan sketch	Adopted SIDRA model layout
Pembroke Parade/Oxenbridge Avenue Picton Road/Pembroke Parade/Greenway Parade		

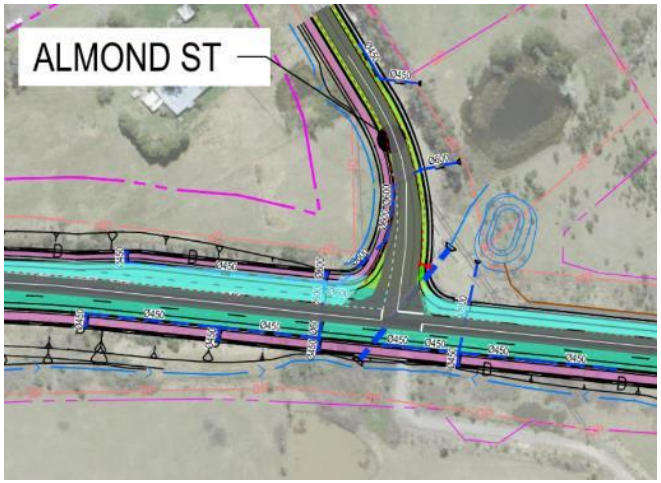
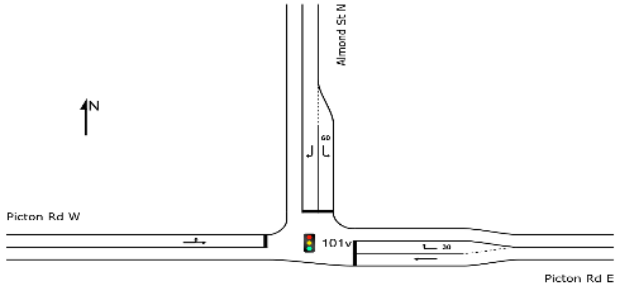
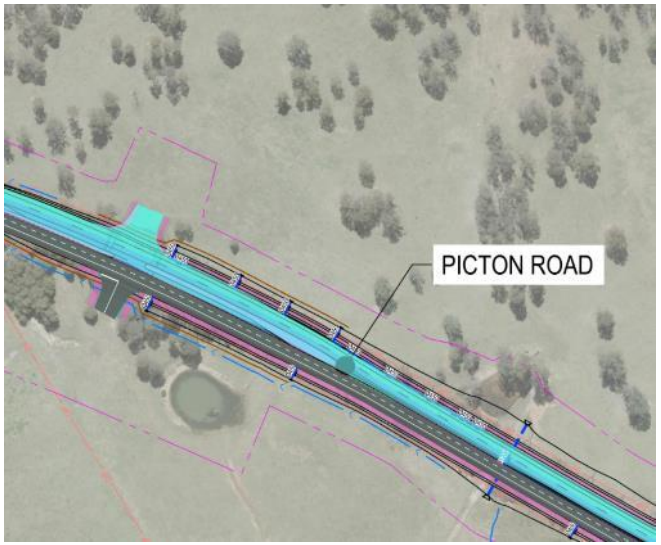
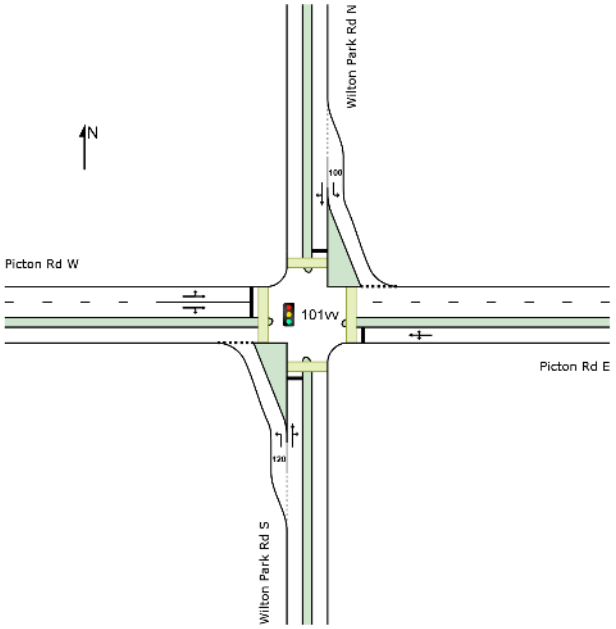
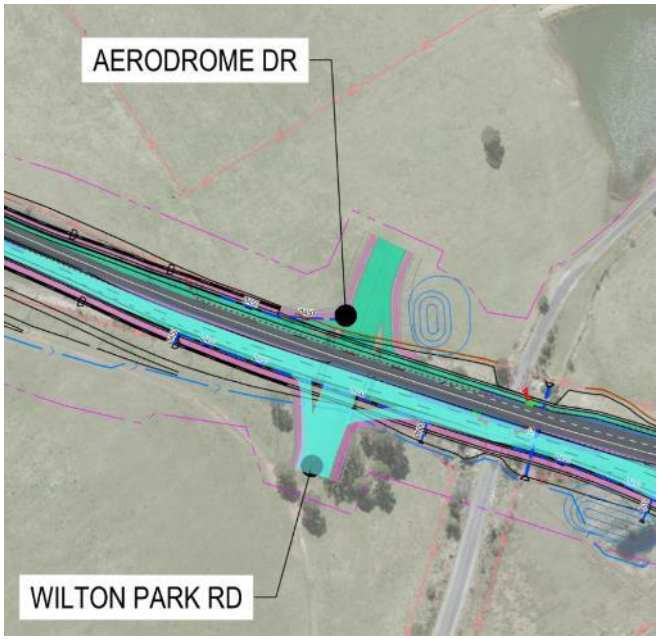
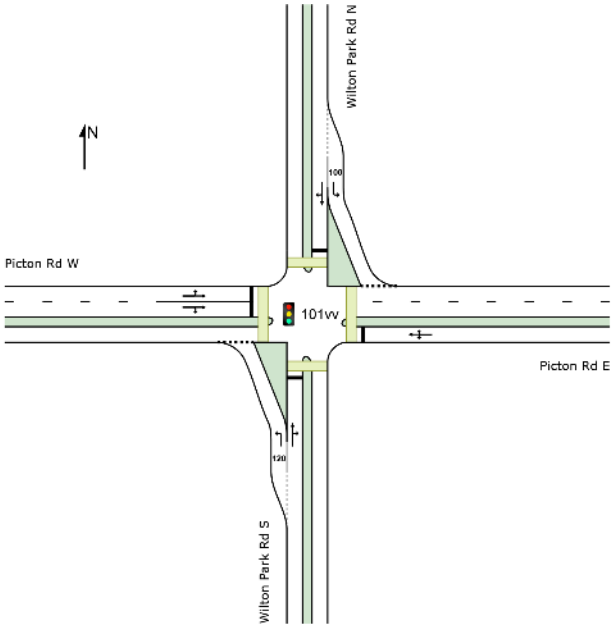
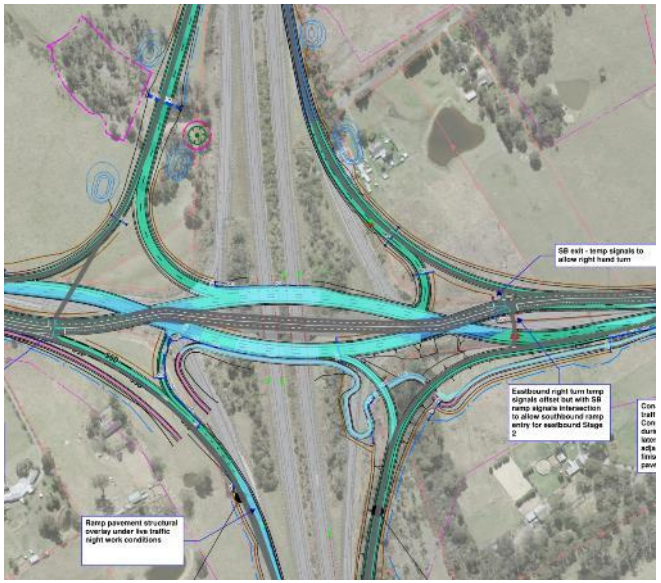
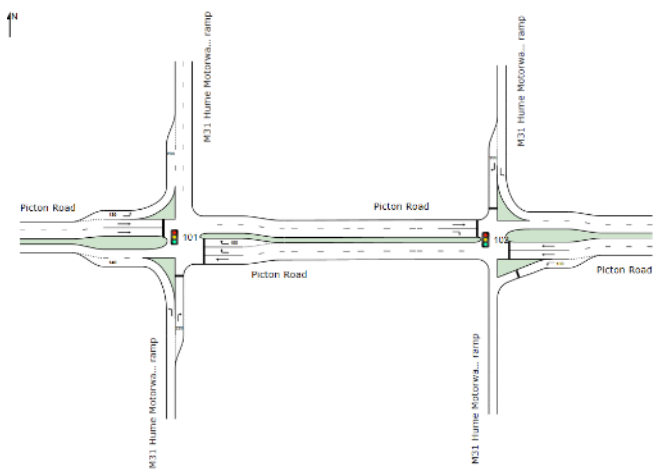
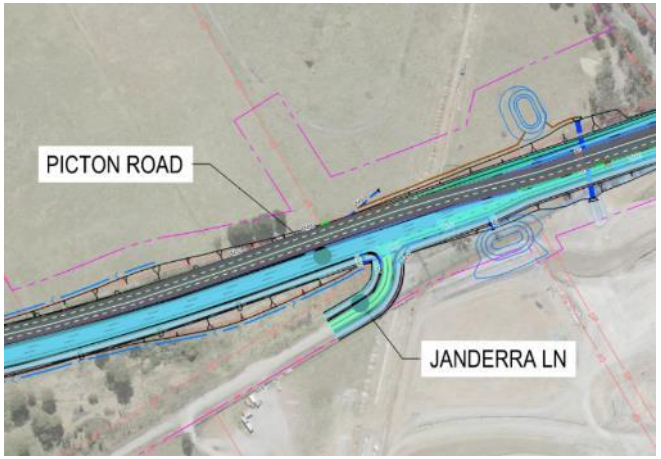
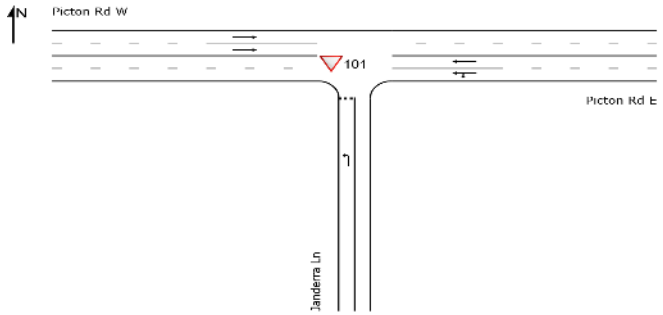
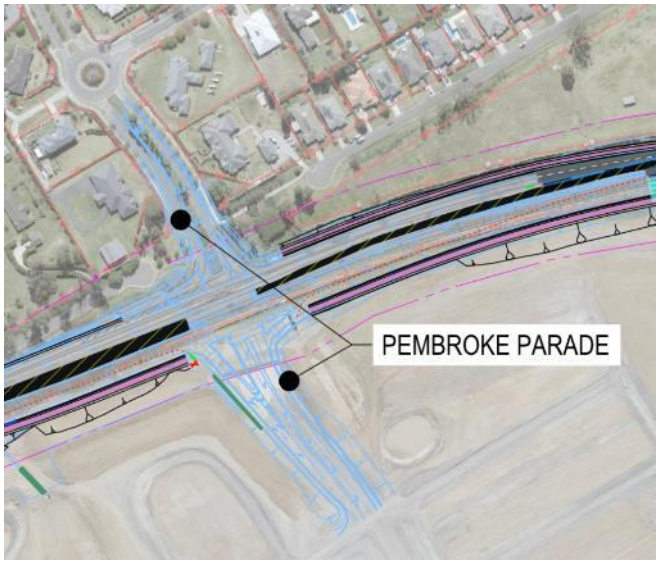
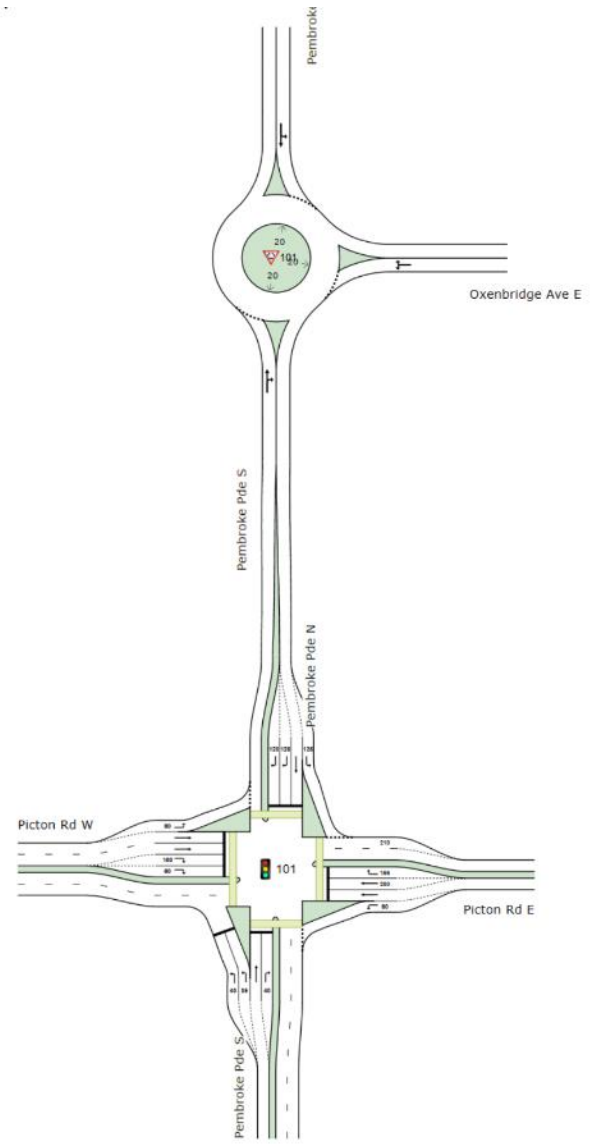
Intersection name(s)	Staging plan sketch	Adopted SIDRA model layout
Picton Road/Almond Street		

Table B.12.1 Construction Stage 2 SIDRA intersection layout and associated design drawing

Intersection name(s)	Staging plan sketch	Adopted SIDRA model layout
Picton Road/Western Developer Road		

Intersection name(s)	Staging plan sketch	Adopted SIDRA model layout
Picton Road/Wilton Park Road		

Intersection name(s)	Staging plan sketch	Adopted SIDRA model layout
Picton Road/M31 Hume Motorway (W) Picton Road/M31 Hume Motorway (E)		
Picton Road/Janderra Lane		

Intersection name(s)	Staging plan sketch	Adopted SIDRA model layout
Pembroke Parade/Oxenbridge Avenue Picton Road/Pembroke Parade/Greenway Parade		

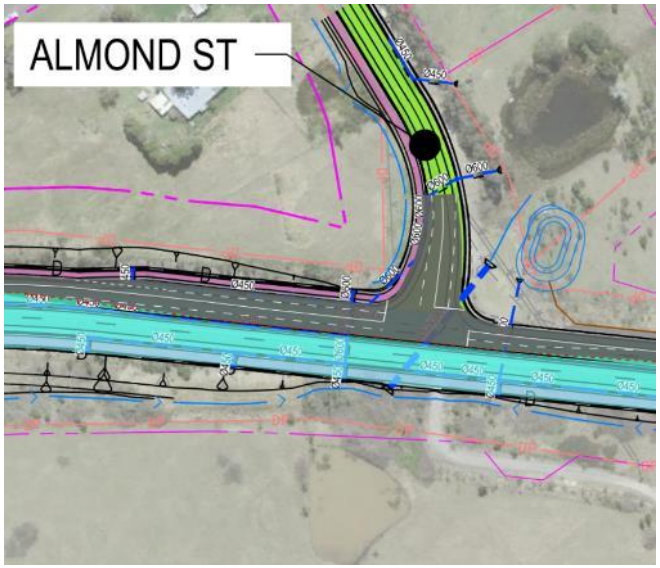
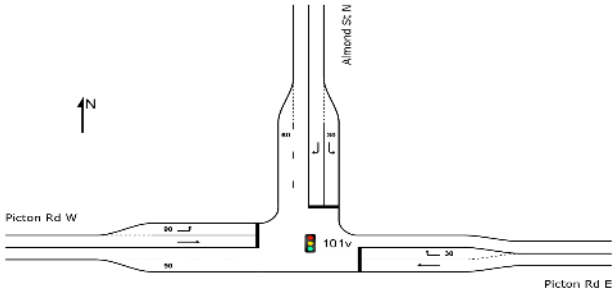
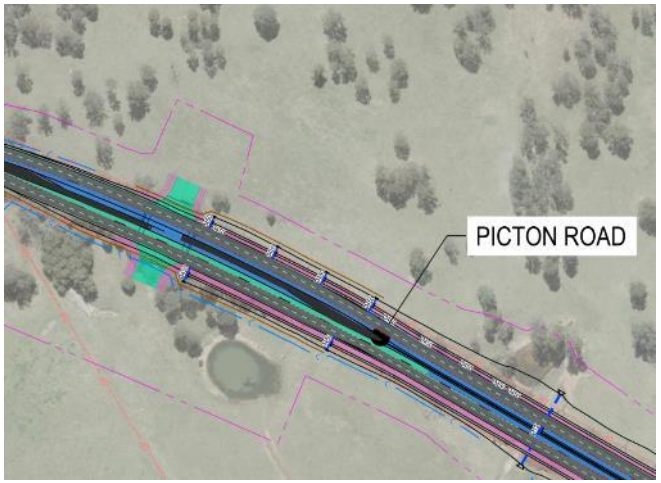
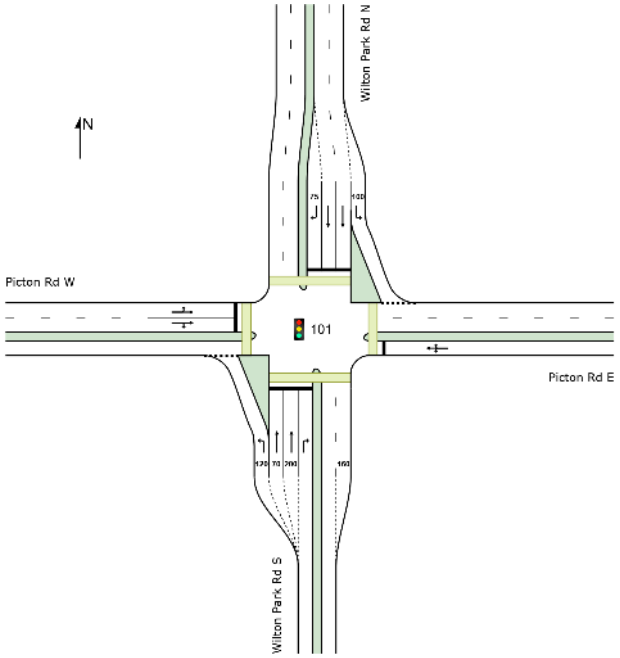
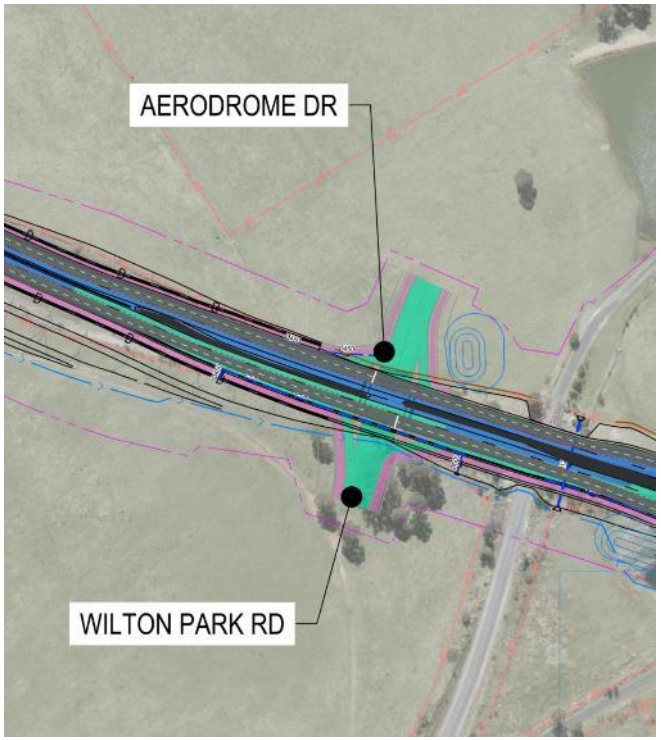
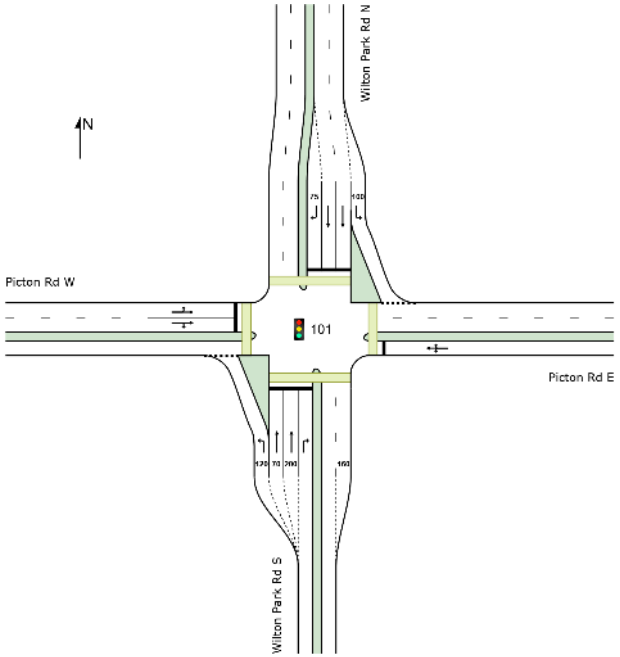
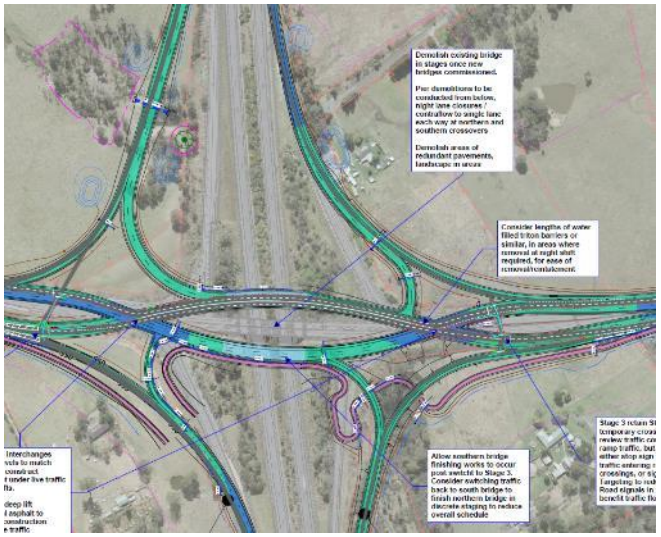
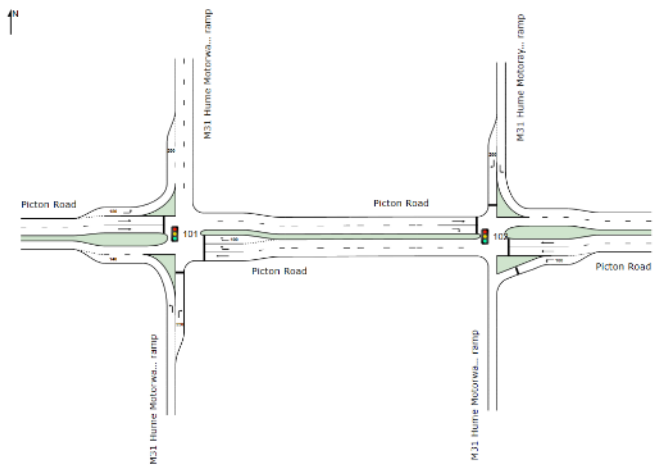
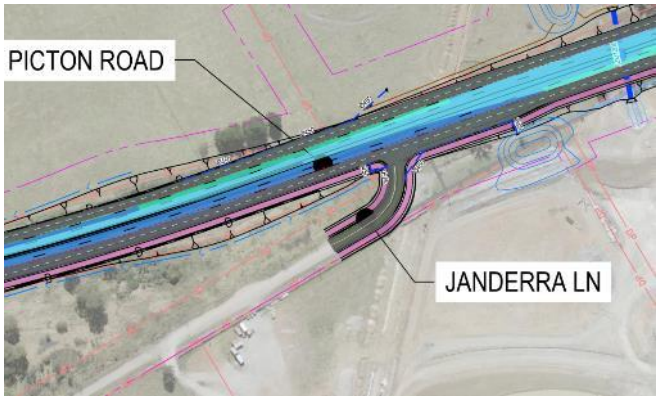
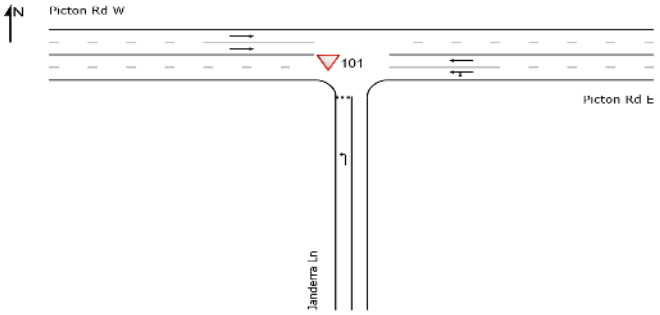
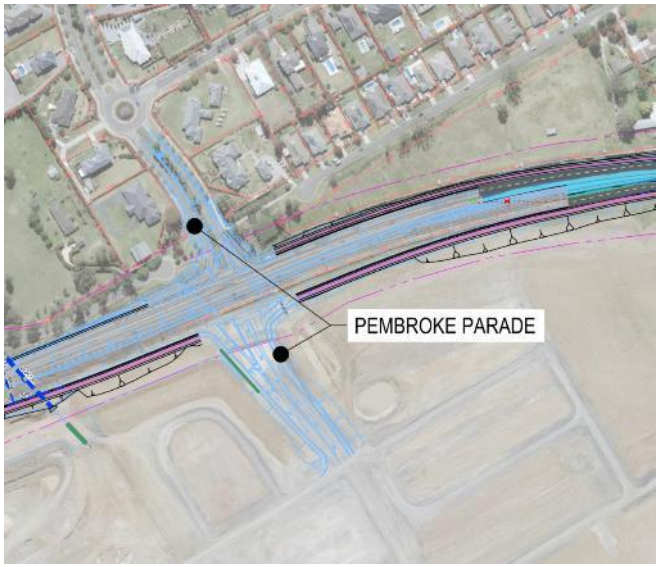
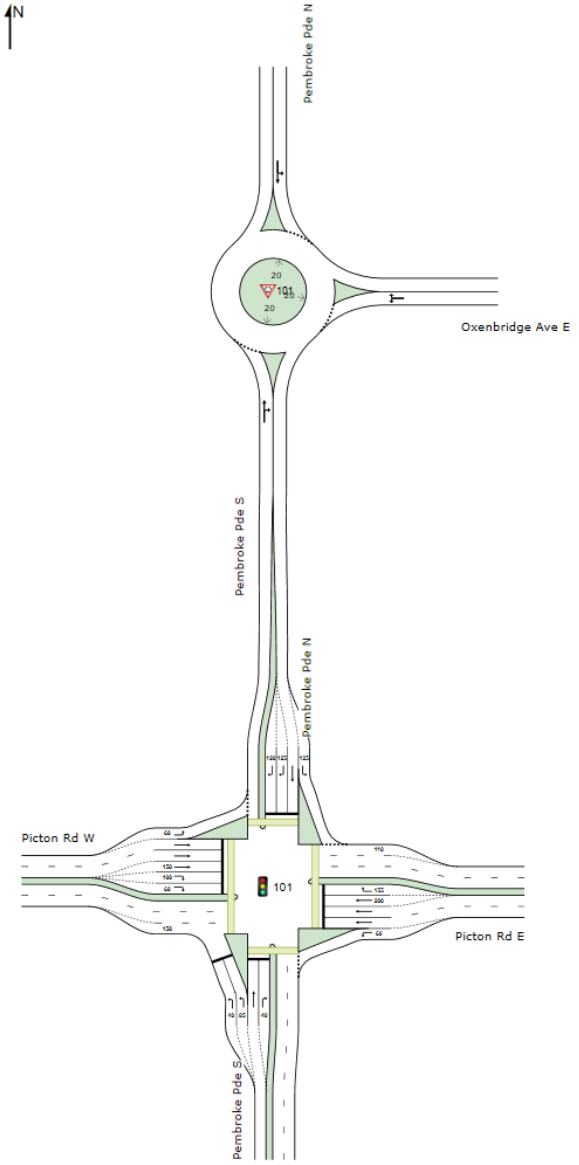
Intersection name(s)	Staging plan sketch	Adopted SIDRA model layout
Picton Road/Almond Street		

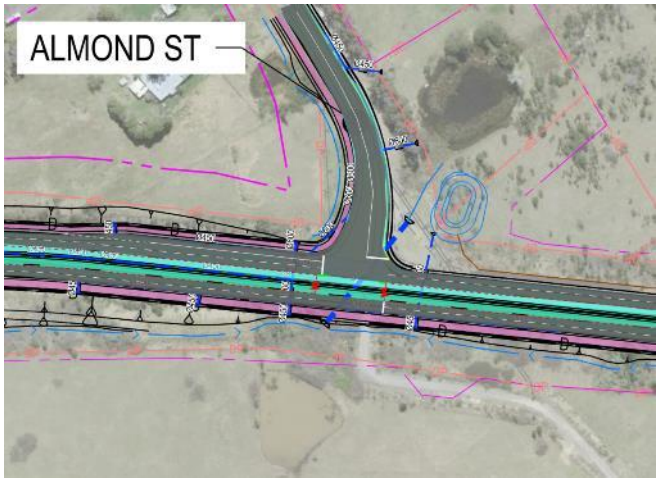
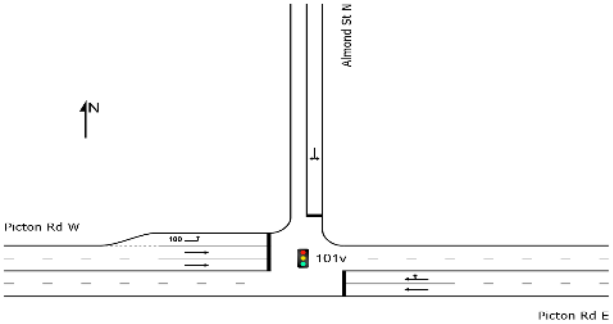
Table B.2 Construction Stage 3 SIDRA intersection layout and associated design drawing

Intersection name(s)	Staging plan sketch	Adopted SIDRA model layout
Picton Road/Western Developer Road		

Intersection name(s)	Staging plan sketch	Adopted SIDRA model layout
Picton Road/Wilton Park Road		

Intersection name(s)	Staging plan sketch	Adopted SIDRA model layout
Picton Road/M31 Hume Motorway (W) Picton Road/M31 Hume Motorway (E)		
Picton Road/Janderra Lane		

Intersection name(s)	Staging plan sketch	Adopted SIDRA model layout
Pembroke Parade/Oxenbridge Avenue Picton Road/Pembroke Parade/Greenway Parade		

Intersection name(s)	Staging plan sketch	Adopted SIDRA model layout
Picton Road/Almond Street		

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