Waterloo Road Active Street Master Plan

Transport Study

Prepared for:

City of Ryde Council

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JMT Consulting

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1 Introduction

1.1 Background

JMT Consulting has been engaged by Hassell on behalf of City of Ryde Council to provide transport advice to inform the development of an active street master plan for the Waterloo Road corridor.

This document provides an overview of the existing transport environment within the study area and issues for consideration in the development of the master plan, including:

- Transport context
- Pedestrian and traffic volumes
- Pedestrian crossing opportunities
- Pedestrian desire lines
- Cycling along the Waterloo Road corridor
- Pedestrian safety issues

1.2 Study context

Macquarie Park historically has been a car dominated environment which restricts pedestrian movements through large block sizes and limited crossing points. Recently however, through the advent of improved public transport and new residential development, there has been a shift away from private car towards public and active transport. The 2016 Census indicated that approximately 40% of workers travelled to Macquarie Park by modes other than private vehicle – meeting Council's mode share target.

To continue to grow as a key strategic centre, further enhancements to the street environment are required to support the movement of pedestrians and cyclists. City of Ryde Council has identified a fine grained street network in their DCP and Draft LSPS which will enhance pedestrian access and permeability to support connections to public transport nodes.

Waterloo Road is currently classified as a 'movement corridor' due to it's wide road reserve, large block sizes and limited pedestrian crossing opportunities. There are a number of impediments to pedestrian movement, including physical barriers at a number of locations.

The aspiration of the Active Street Master Plan is to facilitate the creation of a 'vibrant street' as classified in the NSW Government 'Movement and Place' framework (Figure 1). This will be achieved by creating an environment that encourages active transport as a safe, convenient and attractive alternative to private vehicle, while also supporting access to bus stops and the two metro stations.

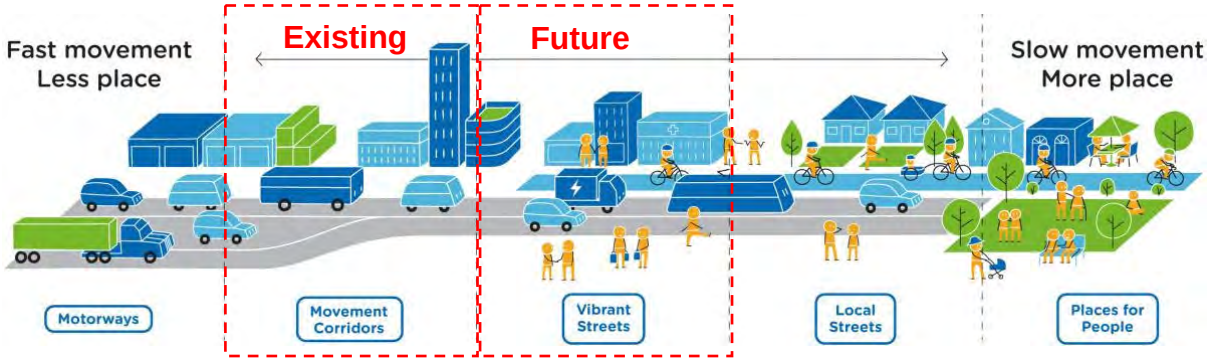


Figure 1 TfNSW movement and place framework

Many of the current issues facing the corridor are a legacy of a car-first design philosophy to traffic and car parking form the early development as a business park. The master plan has been developed which has considered a hierarchy of users as illustrated in Figure 2 below.

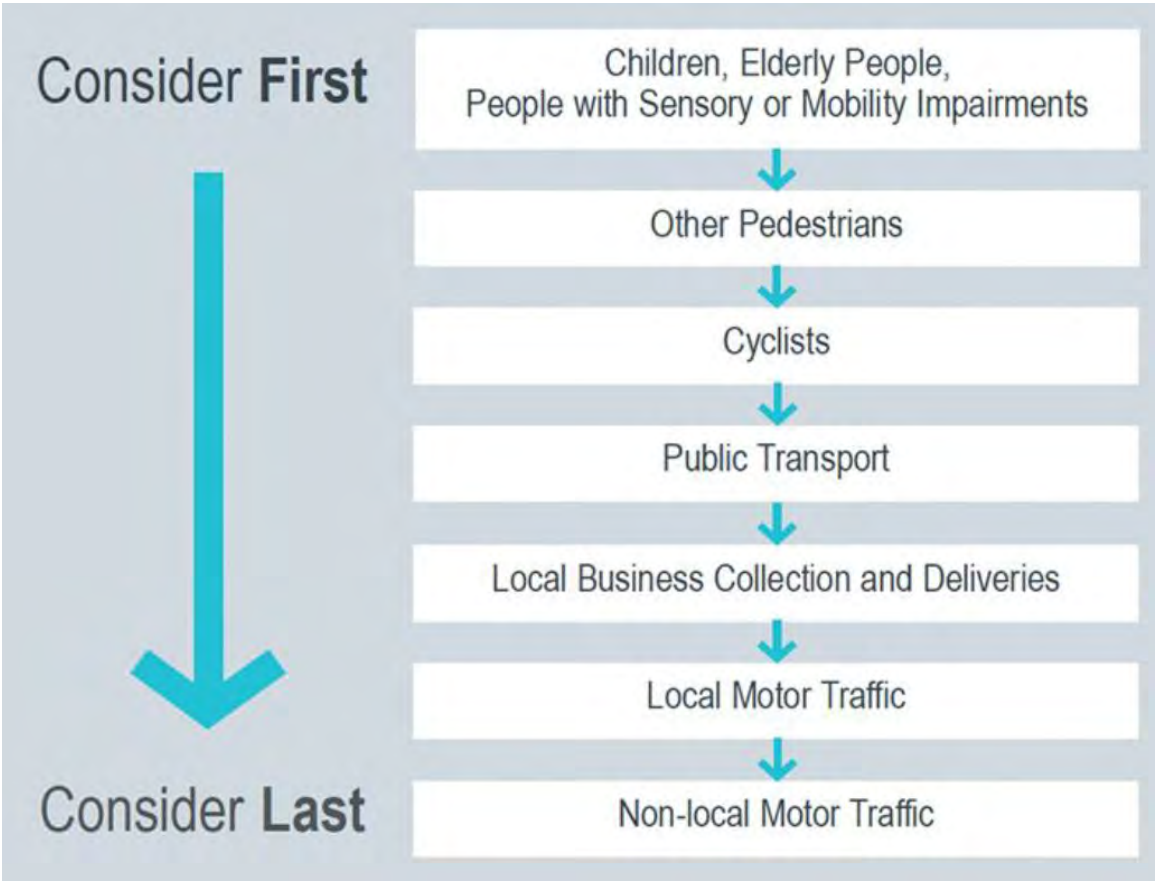


Figure 2 Road user hierarchy

1.3 Study area

The study area considered in the active street master plan is illustrated in Figure 3 and extends from the northern side of Herring Road and terminating at the southern side of Wicks Road. The total length of the corridor is approximately 1.9km with a width of approximately 50m, consisting of:

- Existing road reserve bound by private properties on both sides (approximately 30m wide); and
- 10 metre street setback zone required to be provided by the DCP on both sides of Waterloo Road.

The existing transport environment along the Waterloo Road corridor is presented in Figure 4, showing the location of:

- Intersection controls
- Footpath and shared path alignments
- Metro station entries
- Bus stops

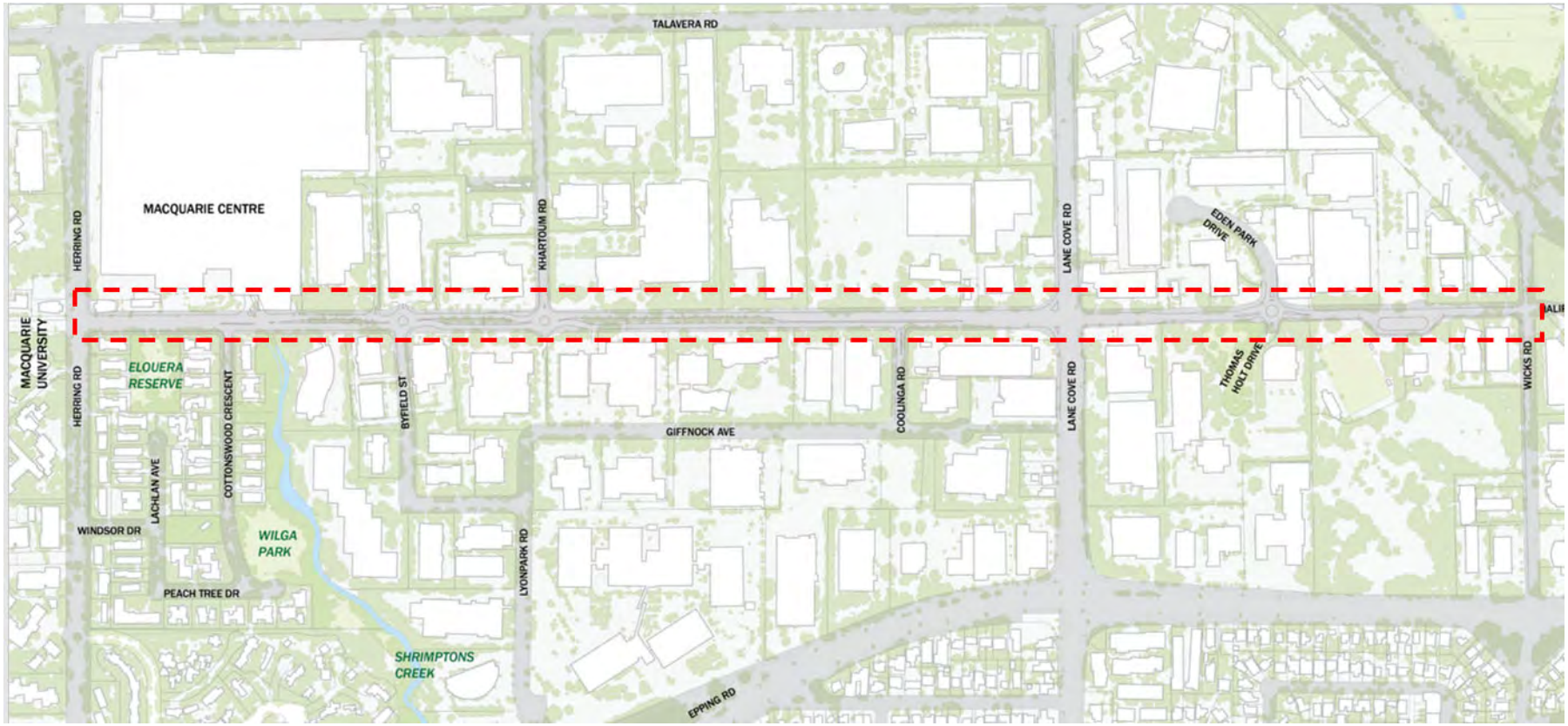


Figure 3 Study area

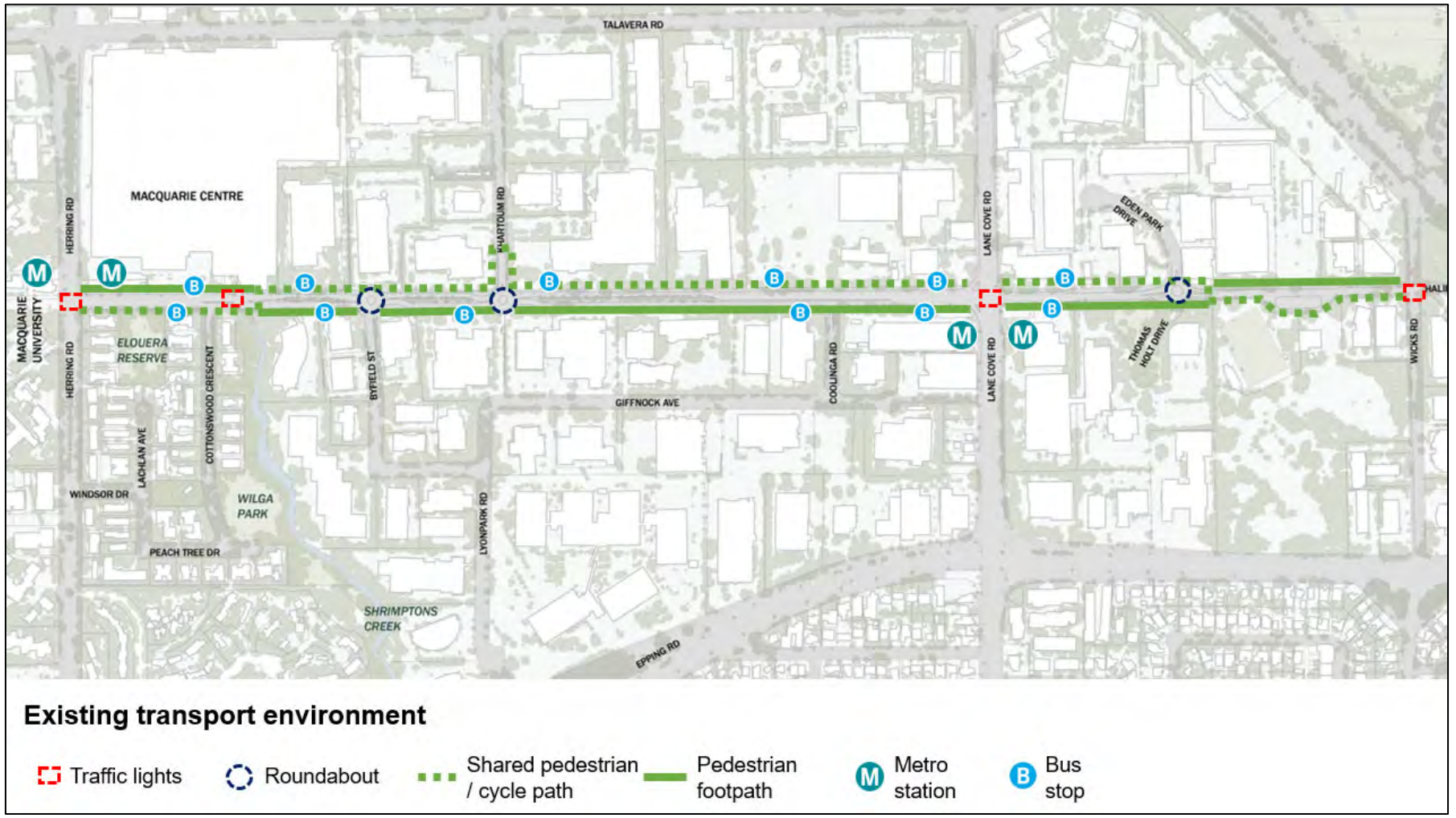


Figure 4 Existing transport environment – Waterloo Road

2 Existing Conditions Assessment

2.1 Pedestrian and traffic volumes

The existing pedestrian and traffic flows along the Waterloo Road corridor are illustrated in Figure 5 and Figure 6 respectively on the following pages. These movements were based on data collected at various locations in 2018 and 2019, prior to the reduction in activity in March 2020 as a result of the Covid-19 pandemic.

The analysis indicates that both pedestrian and traffic movements generally increase along the corridor from the eastern end at Wicks Road towards the western end at Herring Road adjacent to Macquarie University and the Macquarie Centre. This is reflective of the levels of activity and adjacent land uses at these locations. It also indicates a significant east-west pedestrian demand during the lunchtime peak periods, primarily workers in the area walking to/from the Macquarie Centre or the strip of shops along Lane Cove Road.

Although existing pedestrian flows along the corridor are relatively low, particularly away from the Herring Road intersection, the development of Macquarie Park is expected to generate a significant increase in pedestrian movements along Waterloo Road in future years. The Macquarie Park Pedestrian Access and Mobility Plan (PAMP) forecast an **additional 4,000 pedestrians per hour** using the Waterloo Road in the next 10-20 years based on the projected population and employment growth for Macquarie Park.

It is also relevant to note that pedestrian counts at the Khartoum Road intersection were undertaken in 2017, prior to the introduction of the existing pedestrian fencing. These counts indicated a significant demand for north-south crossing movements at this location, which are now not possible due to the barrier created by the fence.

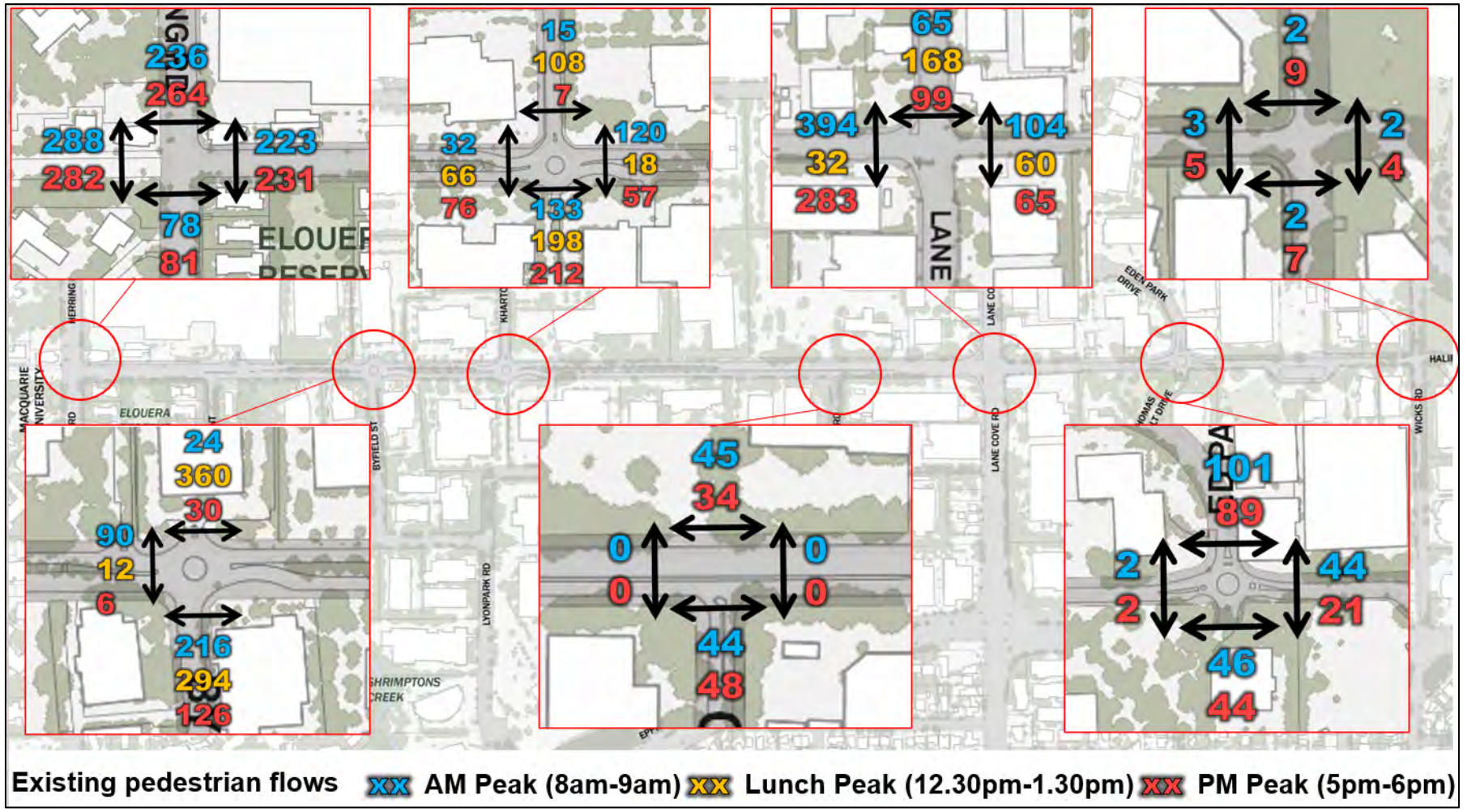


Figure 5 Existing pedestrian flows

Figure 6 Existing traffic flows

2.2 Crossing opportunities and desire lines

2.2.1 North-South crossing movements

One of the key issues the Waterloo Road corridor faces is the lack of safe, consistent and frequent pedestrian crossing opportunities – particularly in a north-south direction across Waterloo Road. While the northern end of the corridor is relatively well serviced through signalised pedestrian crossings at Herring Road and the Macquarie Centre, there is a distance of over 1km to the next signalised pedestrian crossing at Lane Cove Road. The large block sizes of development in Macquarie Park have contributed to these significant distances between intersection crossing. The roundabouts along Waterloo Road facilitate traffic flow but have not been designed with a focus on pedestrian safety and continuity of movement.

At many intersections along the corridor crossing Waterloo Road is not a safe and viable option for most pedestrians, due to the high traffic volumes and lack of any crossing facilities. Even where pedestrian crossings are provided at traffic lights at both the Macquarie Centre and Lane Cove Road, crossing opportunities are missing on one-leg of the intersection. This requires pedestrians to cross up to three separate times to access the desired destination.

Between the Macquarie Centre and Lane Cove Road there are a number of informal crossings through pedestrian refuges, which require pedestrians to cross two lanes of traffic on Waterloo Road to access the centre island before crossing a further two lanes of traffic. Often these pedestrian refuge islands are uninviting treatments (surrounded by pedestrian fencing) or lack basic crossing provisions such as pram ramps – with examples shown in Figure 7 below. The high traffic speeds and constant flow of traffic during peak hours make crossing at these refuges difficult for pedestrians – particularly those vulnerable or less mobile pedestrians

Figure 7 Pedestrian refuges on Waterloo Road

It is noted that TfNSW are proposing traffic lights (with pedestrian crossings) at both Khartoum Road and Byfield Road as part of the BPIP Stage 2 works.

Another issue in relation to north-south crossing opportunities is the pedestrian fencing in place west of Lane Cove Road, which restricts access to bus stops along the corridor.

2.2.2 East-West Crossing movements

Pedestrian crossings in an east-west direction along the corridor are generally more frequent (when compared to north-south crossings) and safer due to the lower traffic volumes on side roads. Two key issues with respect to east-west pedestrian movements however are as follows:

(i) Consistency of crossings

While crossings are generally in place along the corridor there is lack of consistent treatments. Typically pedestrian refuges are provided, however these vary in quality with many not providing protection through u-rails as shown in Figure 8. At other locations zebra crossings across side streets are provided, however at both the Macquarie Centre entry and Lane Cove Road these go across slip lanes where vehicles often travel at high speeds.

Figure 8 East-west pedestrian crossings

(ii) Continuity of crossings

There is no clear and direct pedestrian path along the length of the Waterloo Road corridor. At a number of locations, particularly at Khartoum Road, pedestrians are required to deviate away from the most direct path due to barriers such as pedestrian fencing or other obstructions. Examples of these obstructions are shown in Figure 9.

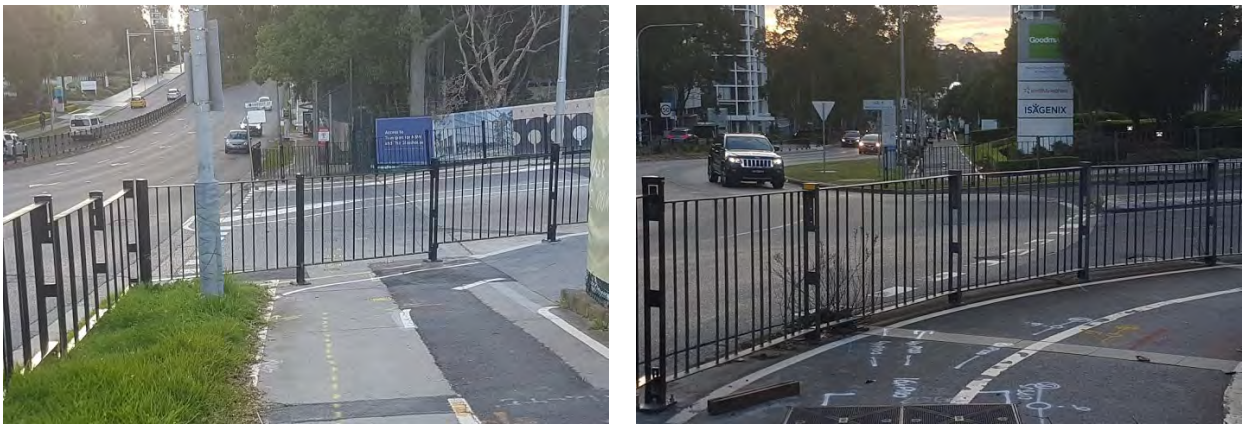


Figure 9 Obstructions to continuity of east-west pedestrian movements

The existing pedestrian crossing opportunities along the Waterloo Road corridor are illustrated in Figure 10 (north-south crossings) and Figure 11 (east-west crossings) on the following pages.

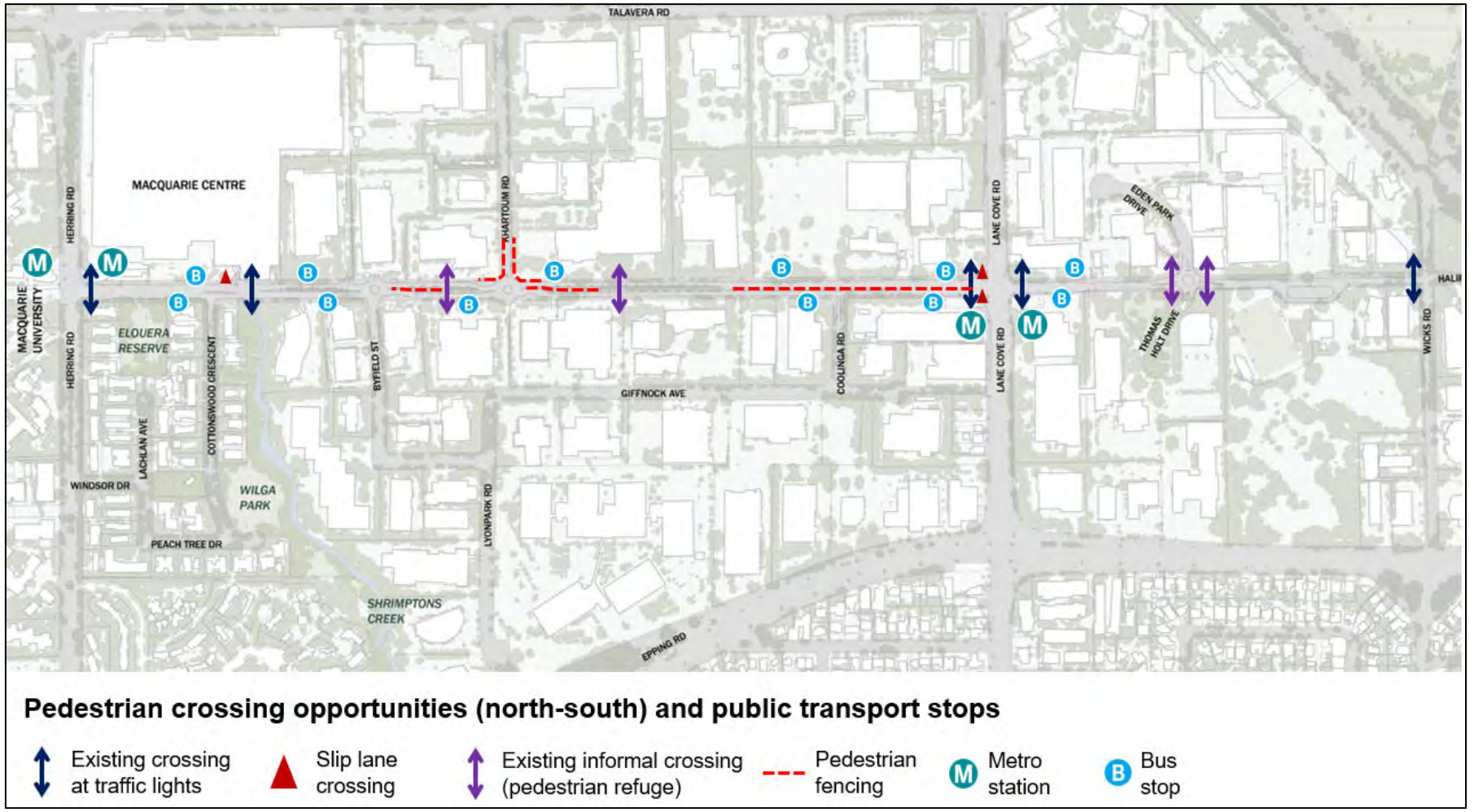


Figure 10 Existing pedestrian crossings (north-south)

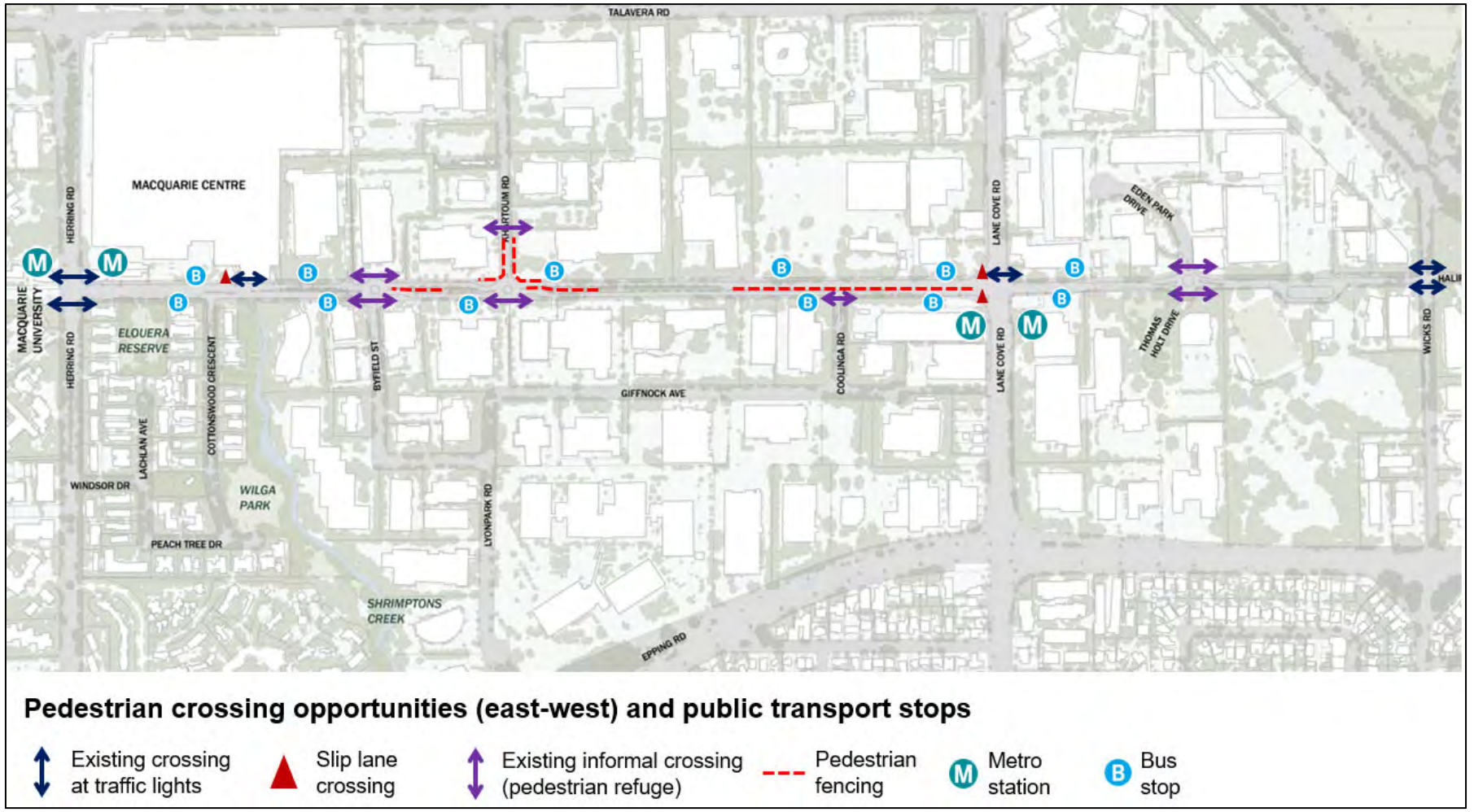


Figure 11 Existing pedestrian crossings (east-west)

The implementation of the fine-grained street network within Macquarie Park (as presented in Figure 12) will provide an opportunity to enhance north-south pedestrian crossings of Waterloo Road. This is particularly the case in the section of Waterloo Road between Lane Cove Road and Khartoum Road, where limited crossing opportunities are currently available.

Generally a 200m street grid is proposed with a more fine grained grid of lanes and pedestrian links connecting into Waterloo Road, partially based on existing roads and the private street network. These future streets also present the opportunity for traffic calming and improving the pedestrian environment in the area.

While these new streets are subject to further analysis and design, it is assumed that at their interface with Waterloo Road they will act as left in – left out connections only, with the exception of Road 26 at Khartoum Road which will integrate with the future traffic lights. This will have the effect of reducing traffic volumes at these streets and providing opportunities for enhanced east-west pedestrian crossing movements.

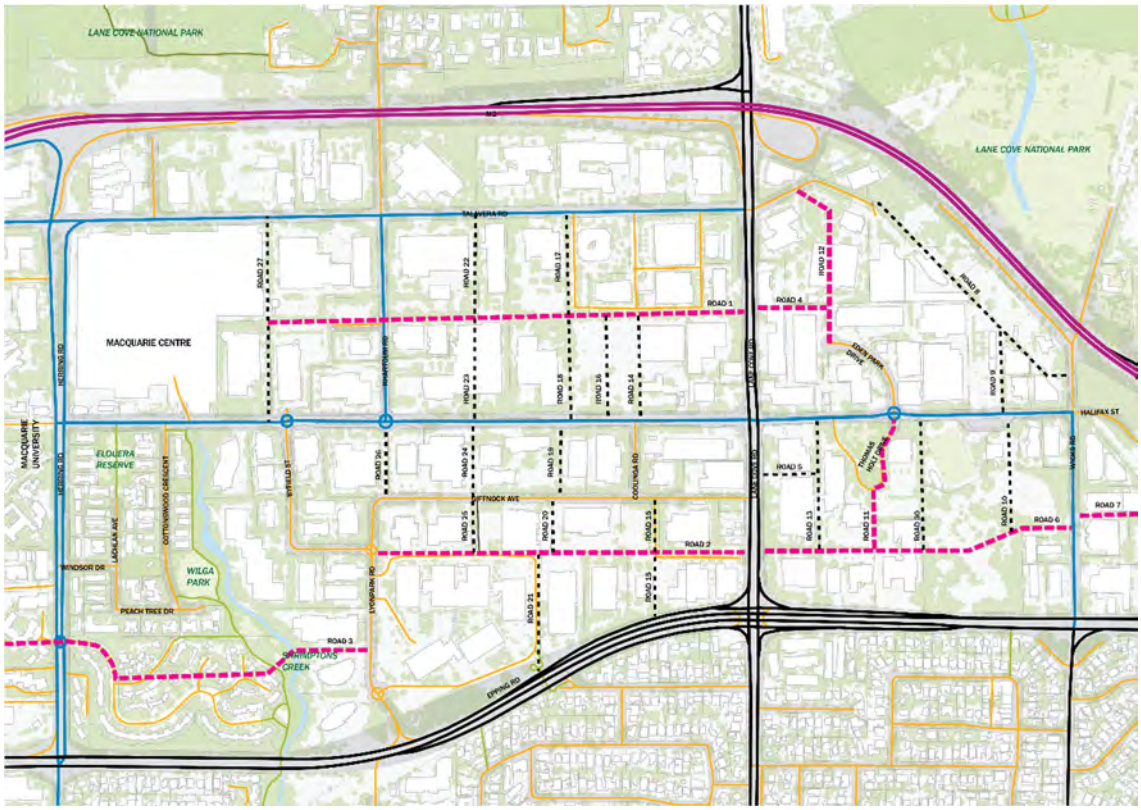


Figure 12 Existing and future street network

Source: Hassell

2.3 Crashes involving pedestrians

There were three crashes involving vehicles and pedestrians along the Waterloo Road corridor in the five year period between 2014 and 2018, with the locations of these crashes shown in Figure 13. Two of the three crashes were at the Lane Cove Road / Waterloo Road intersection, which as previously mentioned has long crossing times and delays for pedestrians. The other crash was on the northern side of Waterloo Road at the driveway entrance to the Macquarie Shopping Centre.

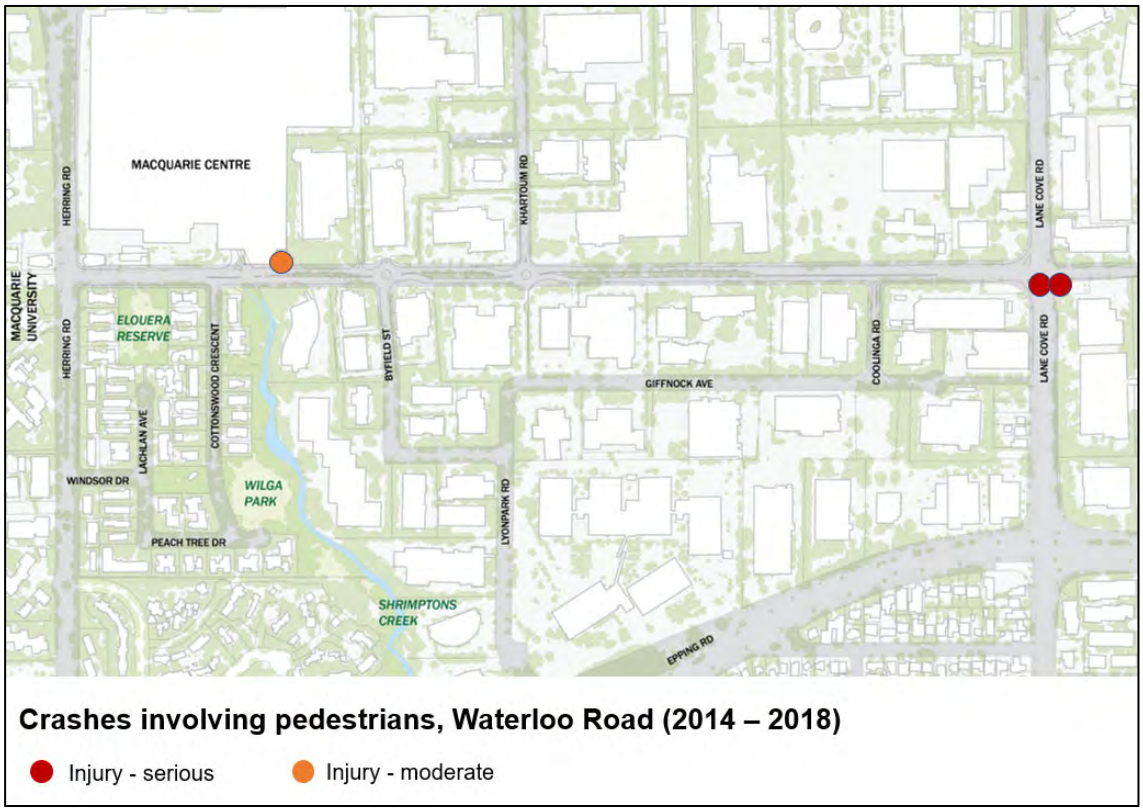


Figure 13 Crashes involving pedestrians (2014 – 2018)

2.4 Desire lines

The key pedestrian desire lines in Macquarie Park, including the Waterloo Road corridor, are illustrated in Figure 14 below – based on the findings of the Macquarie Park Pedestrian Access and Mobility Plan (PAMP). The key generators/attractors of pedestrian movements along Waterloo Road are the two metro stations as well as the Macquarie Shopping Centre and Macquarie University. Desire lines across Waterloo Road are also present as a result of the bus stops located between Lane Cove Road and Khartoum Road, with commuters travelling from these bus stops to their place of employment.

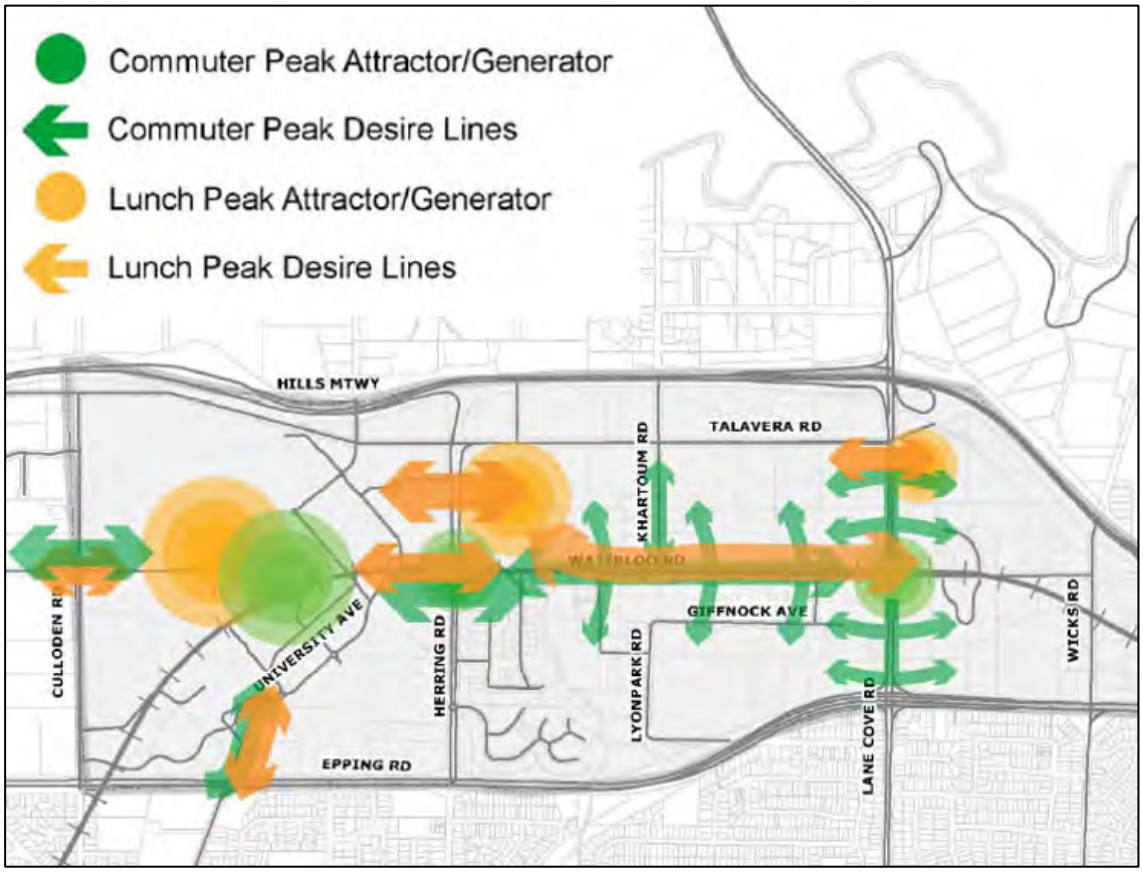


Figure 14 Pedestrian desire lines

Source: Macquarie Park PAMP (Arup, 2013)

2.5 Cycling

Waterloo Road is identified as both a local and regional cycling route in the City of Ryde Bicycle Strategy (2014). A shared user path is provided along Waterloo Road between Wicks Road and Herring Road – providing access to adjoining regional cycling routes such as Khartoum Road, Lane Cove Road and Shrimptons Creek. The width of the shared path varies from approximately 1.8m to 3m along the corridor.

One of the key issues with the shared path is a lack of continuity along the corridor, as indicated in Figure 16 on the following page. Cyclists are required to cross Waterloo Road on two separate occasions if travelling the full length of the corridor. At the Khartoum Road intersections cyclists are required to travel up Khartoum Road for approximately 50m to cross the street due to the pedestrian fencing in place at this location.

Another issue with the shared path is the conflicts between pedestrians and cyclists at certain locations – particularly towards the western end of the corridor near the Macquarie Centre. This issue is exacerbated when the shared path runs alongside bus stops, which reduces the available width and increases the potential for pedestrian / cyclist conflicts given the higher pedestrian flows – with an example shown in Figure 15 below.

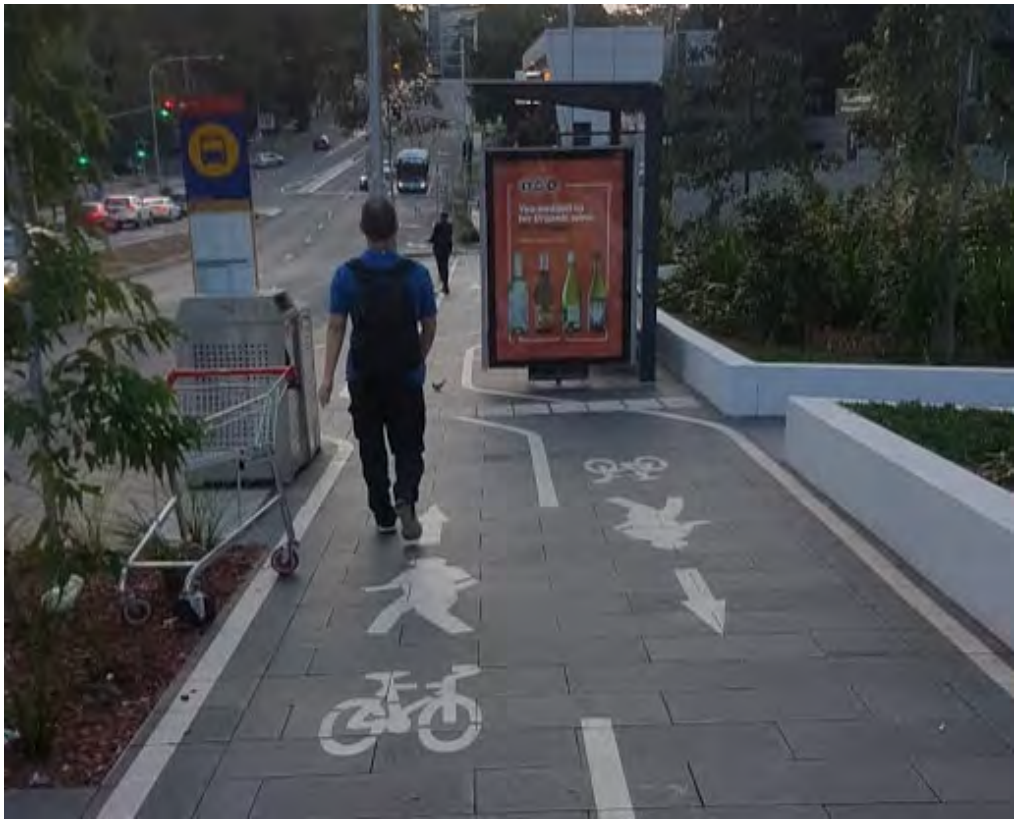


Figure 15 Waterloo Road shared path

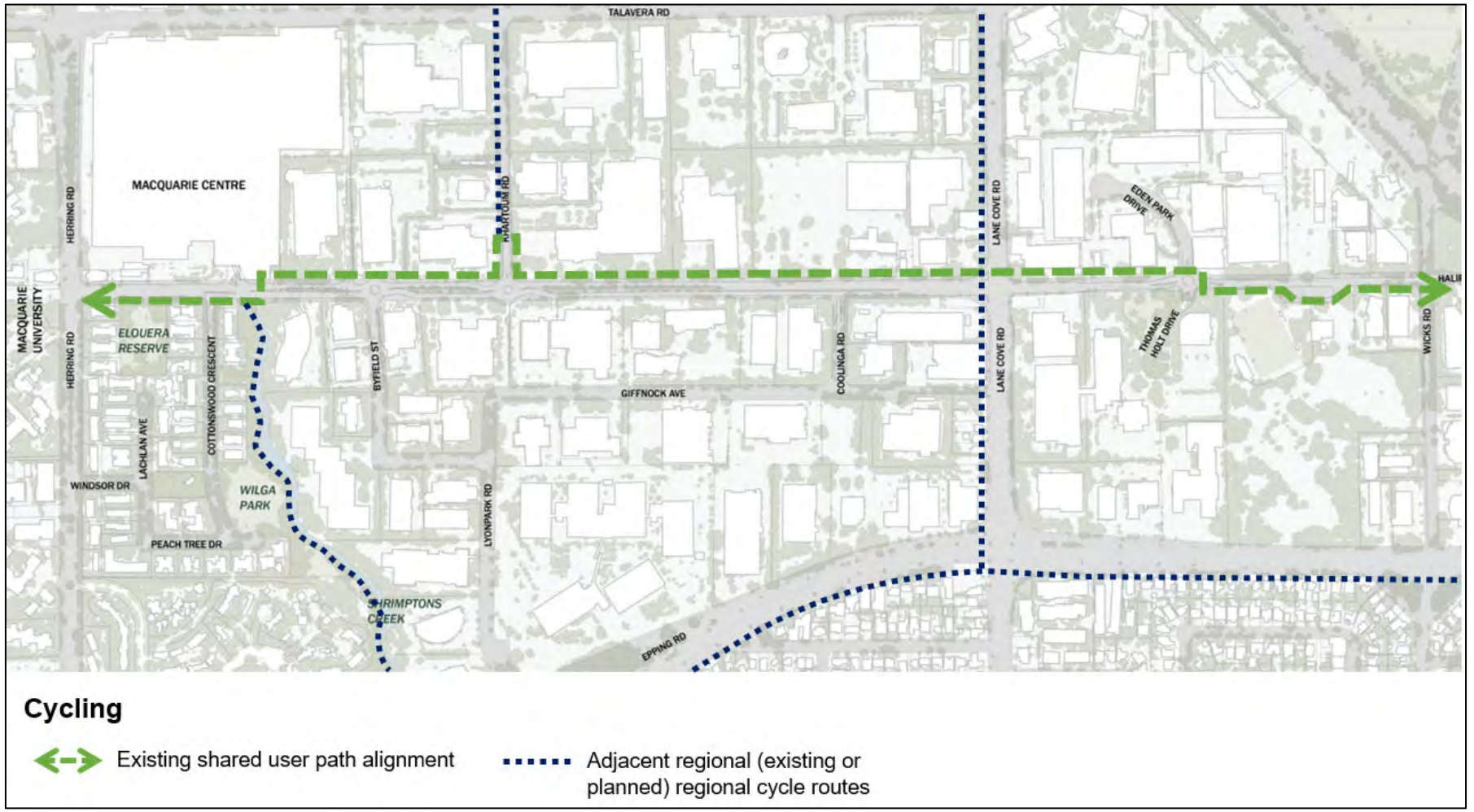


Figure 16 Existing cycling environment

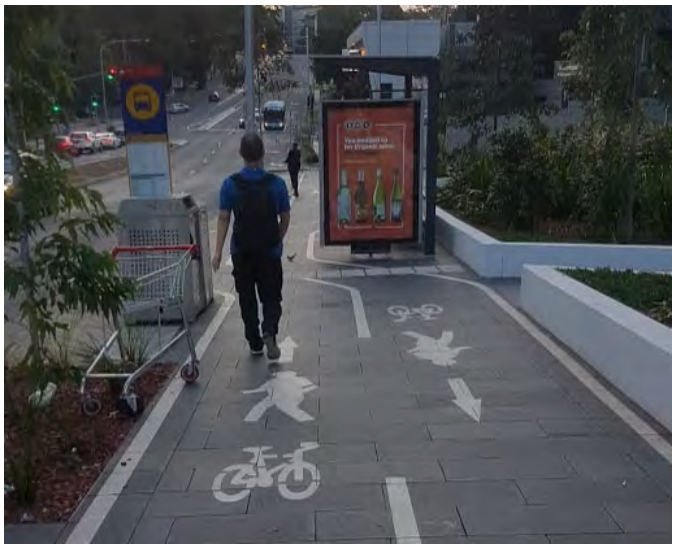
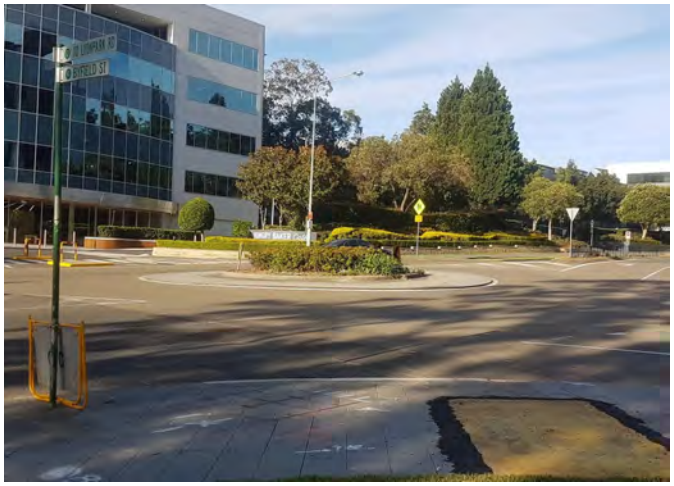
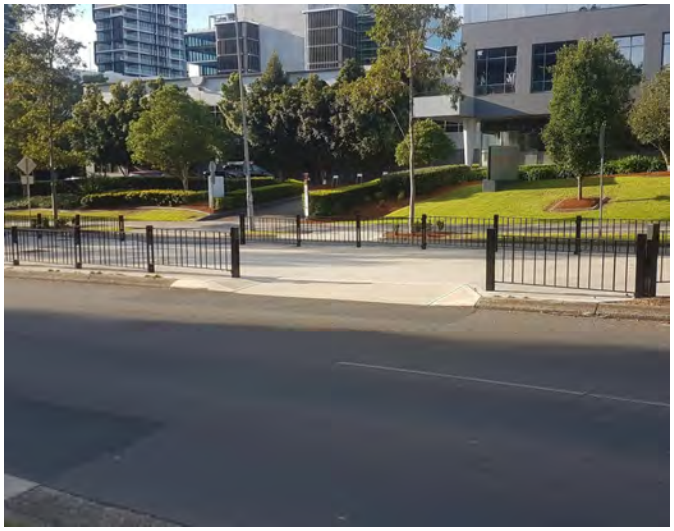
Source: City of Ryde Bicycle Strategy, 2014

2.6 Safety issues

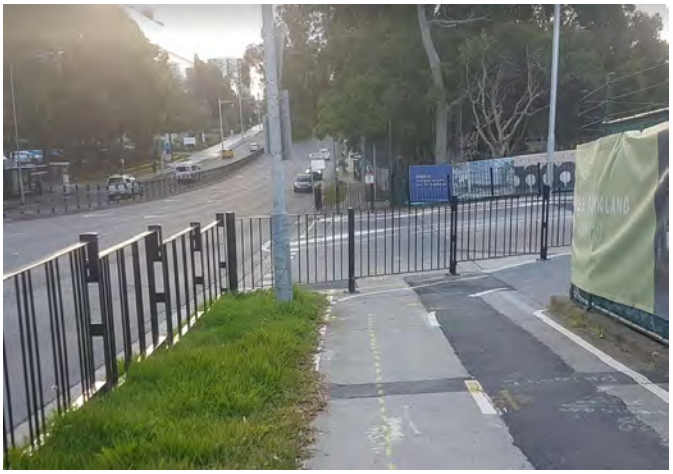
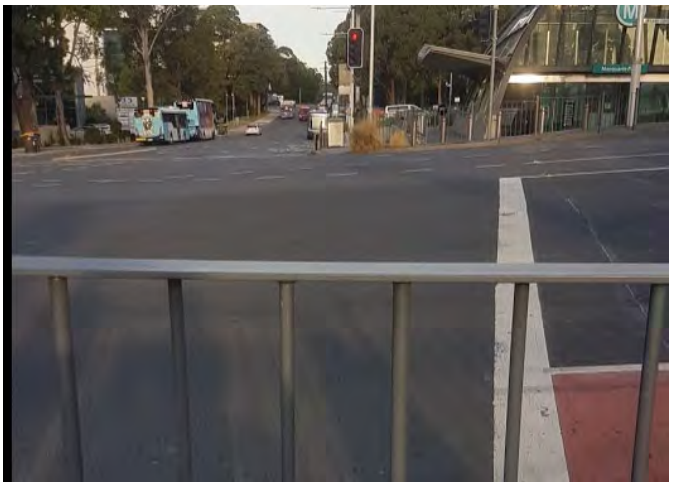
A number of pedestrian safety issues along the Waterloo Road corridor have been identified and are summarised in Table 1. These existing safety issues will inform the master plan development.

Table 1 Safety issues along corridor

Location on Waterloo Road and description of issue	
At Macquarie Centre entry There is no signalised pedestrian crossing on the west arm of the existing traffic signals near Cottonwood Crescent. There is a strong pedestrian desire line from bus stop users on Waterloo Road, north to cross Waterloo Road towards the Macquarie Shopping Centre	
At Macquarie Centre entry A vehicle slip lane into the Macquarie Centre car park entry conflicts with pedestrian movements on Waterloo Road. Although a zebra crossing is in place, the slip lane design allows for vehicles to travel at high speeds into the centre and create safety issues.	

Location on Waterloo Road and description of issue	
Between Macquarie Centre entry and Byfield Road Shared path narrows when passing bus stops / landscape areas and, with the greater levels of pedestrian activity in this area, has the potential to result in conflicts between cyclists and pedestrians.	
At Byfield Road There is a strong pedestrian desire line to cross Waterloo Road near Byfield Road. No crossings or refuges are provided to cross Waterloo Road at this location. TfNSW are proposing traffic lights (with pedestrian crossings) at this location as part of the BPIP Stage 2 works.	
Between Byfield Road & Khartoum Road Pedestrian fencing exists between the Byfield Road and Khartoum Road intersections, broken by a gap in the fencing allowing pedestrian crossing movements. The openings in the fencing do not align with one another and pedestrians are required to cross two lanes of traffic on Waterloo Road to access the centre island.	

Location on Waterloo Road and description of issue	
At Khartoum Road The existing roundabout at Waterloo Road and Khartoum Road intersection presents limited safe crossing opportunities for pedestrians and does not align with desire lines. Pedestrians are forced to walk up Khartoum Road rather than cross along the desire line. TfNSW are proposing traffic lights (with pedestrian crossings) at this location as part of the BPIP Stage 2 works.	
East of Khartoum Road Pedestrian fencing exists east of the Khartoum Road intersection, broken by a gap in the fencing allowing pedestrian crossing movements. The openings in the fencing do not align with one another and pedestrians are required to cross two lanes of traffic on Waterloo Road to access the centre island.	
West of Lane Cove Road Pedestrian fencing is in place west of the Lane Cove Road intersection for approximately 250m, acting as a barrier to pedestrian movements across Waterloo Road. Movement between bus stops on Waterloo Road in particular is impacted by this fencing.	

Location on Waterloo Road and description of issue	
At Harvest Street (45-61 Waterloo Road) The pedestrian fencing at the entry to 45-61 Waterloo Road restricts crossing opportunities for pedestrians and does not align with desire lines. Pedestrians are forced to walk up into the development site rather than cross along the desire line.	
At Lane Cove Road No at-grade pedestrian crossing on the southern side of Waterloo Road. There is a strong desire line created by the metro station entries and the adjacent businesses at this location. Two crashes involving pedestrians have been recorded at this location	
At Lane Cove Road Pedestrians experience long wait times at the Lane Cove Road intersection of over 90 seconds on occasions - sometimes leading to unsafe crossing manoeuvres. This issued is exacerbated by the lack of a pedestrian crossing on the southern intersection approach – making crossing times for pedestrians over three minutes on occasions from one side of Waterloo Road to the other.	

Location on Waterloo Road and description of issue	
Between Lane Cove Road and Wick Road The footpath on the eastern side of the road deviates significantly away from the pedestrian desire line around the bus layover area. Many pedestrians will want to avoid this deviation and continue straight along the footpath, potentially conflicting with buses turning in and out of the layover area	

2.7 Car parking

There is currently only limited on-street kerbside car parking available within the study area, located on the southern side of Waterloo Road between Wicks Road and Thomas Holt Drive as shown in Figure 17. It should also be noted that a number of connecting side streets to Waterloo Road contain kerbside parking, in addition to numerous off-street parking areas within private developments adjacent to the corridor. Bus parking is also located in this section of the corridor, used as layover space prior to buses commencing their service runs.

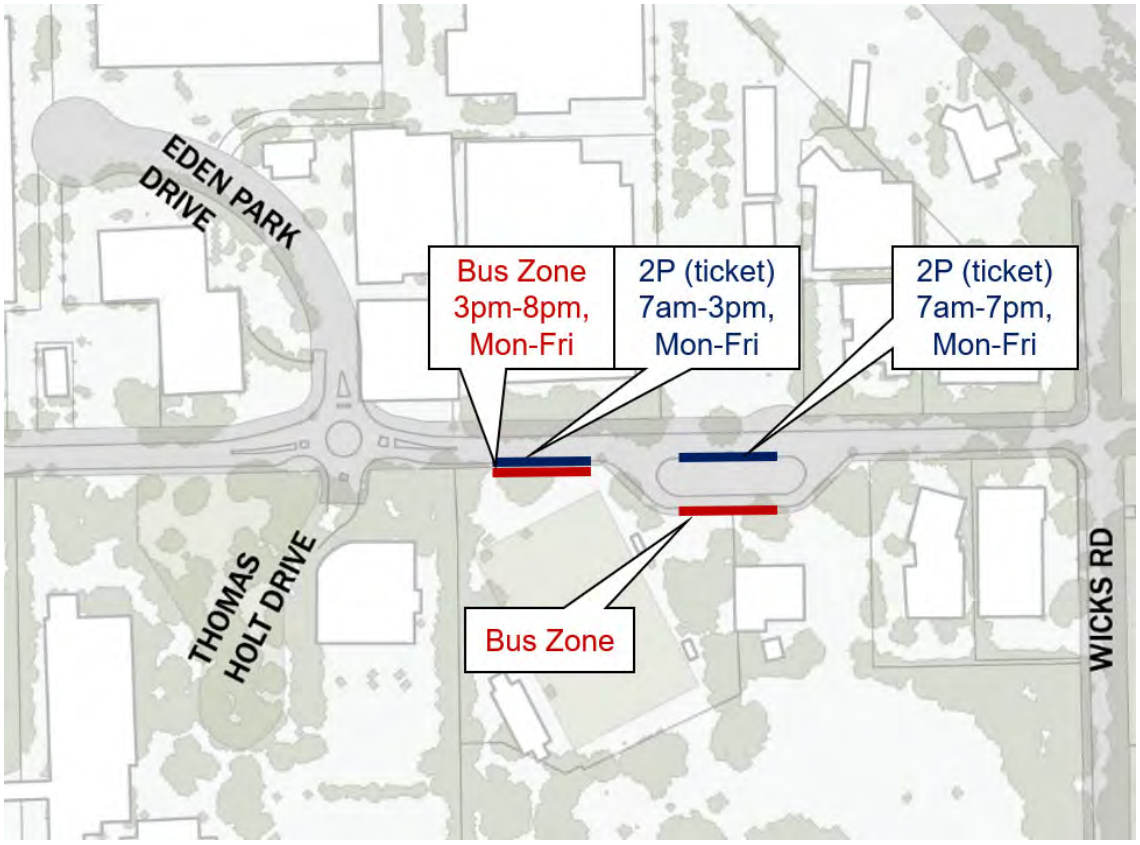


Figure 17 Existing on-street car parking

3 Opportunities

Based on the findings of the existing conditions assessment, a series of opportunities have been developed to enhance the street environment and achieve the objectives of the active street master plan.

3.1 Crossing opportunities

The master plan presents an opportunity to enhance the number and quality of crossing opportunities along the Waterloo Road corridor. These opportunities include both in a north-south and east-west direction.

North-south crossings are critical in achieving the objective of the master plan in creating a vibrant street environment by enhancing pedestrian accessibility and reducing traffic speeds. Formal pedestrian crossings (such as those at traffic lights) require vehicles to give way to pedestrians when they are crossing the road, naturally acting as a traffic calming device. Currently the informal crossings along Waterloo Road always require pedestrians to give way to vehicles and are not effective in reducing vehicle speeds. The proposed north-south crossing opportunities are as follows:

- Signalisation of the Khartoum Road and Byfield Road intersections, including the introduction of dedicated pedestrian crossing facilities on all four approaches
- Introduction of a signalised (mid-block) pedestrian crossing on Waterloo Road immediately west of Coolinga Street
- Providing a north-south pedestrian crossing on the western leg of the Macquarie Centre intersection which is currently unavailable
- Removal of informal crossing points requiring use of existing median zone
- Informal pedestrian crossings located to the east of the future road 23 and opposite the existing bus layover.

In addition to the above, it is important that the consistency and continuity of east-west crossing movements along Waterloo Road is improved to facilitate a linear connection along the length of the corridor. This includes:

- Provision of consistent east-west crossing treatments along the length of the corridor
- Removal of barriers to east-west movements, particularly pedestrian fencing at the Khartoum Road intersection
- New east-west pedestrian crossings adjacent to the bus layover area near Wicks Road to provide a continuous pedestrian path
- Providing an east-west pedestrian crossing on the southern leg of the Lane Cove Road intersection which is currently unavailable

The proposed crossing opportunities are presented in Figure 18 on the following page.

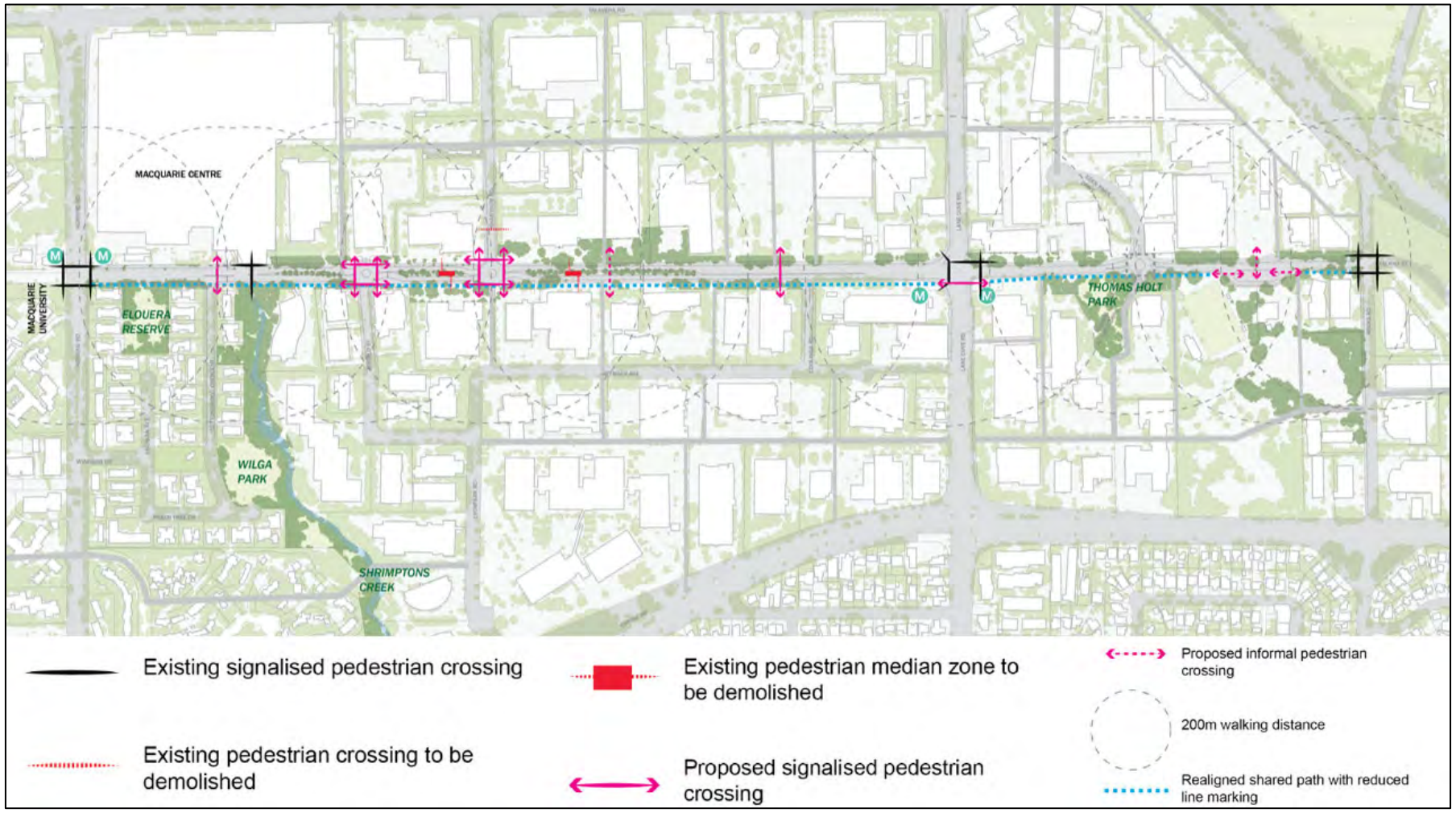


Figure 18 Future crossing opportunities

Source: Hassell

3.2 Cycling

3.2.1 Shared path alignment

The master plan presents an opportunity to provide a more coherent cycle network by locating the shared pathway entirely on the southern side of the road, rather than requiring cyclists to cross Waterloo Road multiple times to travel from one end to the other. The southern side of Waterloo Road has been selected due to the reduced interactions with vehicles on side streets when compared to the northern side of the road, particularly around the Macquarie Centre vehicle access points. The southern side also has a greater number of public domain destinations such as Elouera Reserve, Shrimptons Creek and Thomas Holt Park.

The key constraint however to locating the shared path on the southern side of the road is the lack of an east-west pedestrian crossing on the southern side of the Waterloo Road / Lane Cove Road intersection. Should this crossing not be introduced in future (contrary to the recommendation of this study) then the shared path should be located entirely on the northern side of Waterloo Road.

A minimum 3m wide shared path is recommended along the length of the corridor which aligns with the recommended width of a shared path as outlined in *Austroads Guide to Traffic Management.* A typical plan layout for the shared path is indicated in Figure 19 below.

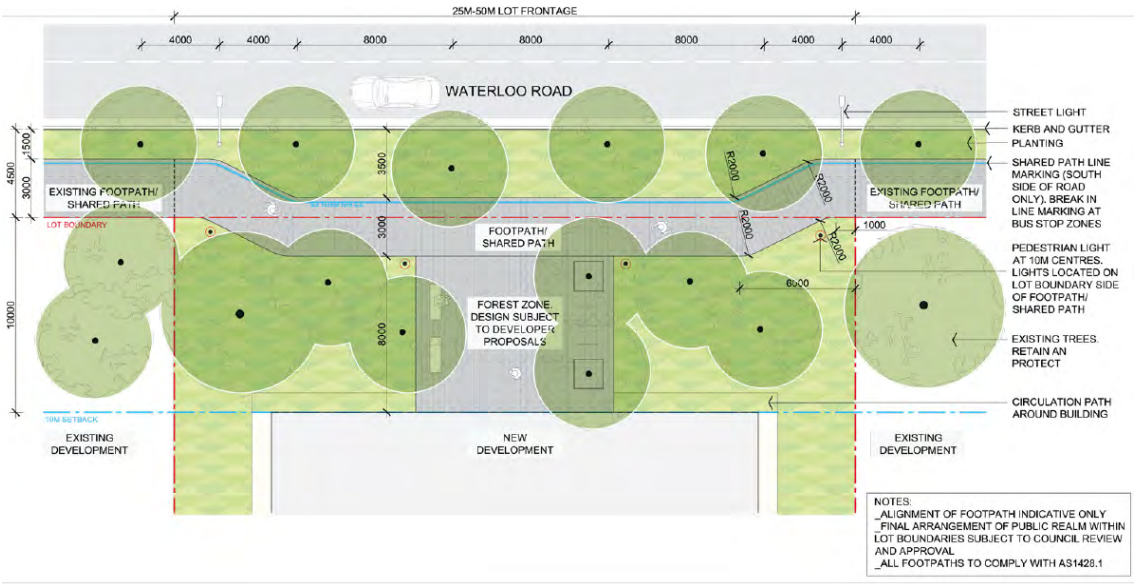


Figure 19 Shared path plans

Source: Hassell

3.2.2 Shared path delineation

The master plan proposes an upgrade in the delineation of the shared path from the current centre-line treatment (which creates pinch points in certain locations and create a road-like environment) to a more simplified approach involving a continuous blue line with advisory pavement markings. Examples of this treatment implemented within the City of Sydney LGA is provided in Figure 20 below.

Figure 20 Example shared path treatment

3.3 Separation of footpath from back of kerb

An opportunity to reduce the impact of traffic movements on pedestrian amenity is to provide greater separation between the back of kerb and footpath. This could take the form of a planting edge or landscape treatments between the back of kerb and edge of the footpath. By increasing the buffer between the vehicle carriageway and footpath pedestrians are less exposed to vehicular traffic and an improved street environment is created. In addition the planting provides for an improved driver experience as well creating the perception of a narrower street which naturally acts to reduce vehicle speeds.

3.4 Traffic calming measures

The primary mechanism for reducing traffic speeds along Waterloo Road will be through the provision of additional north-south crossing opportunities as previously noted in Section 3.1 of this document. Other traffic calming measures for inclusion in the master plan are as follows:

- Introduction of speed humps on the approach to the informal north-south crossing locations adjacent to road 23 and opposite the bus layover area. These speed humps would be similar to those already in place at certain locations on Waterloo Road, with an example shown in Figure 21 below.

Figure 21 Recommended speed hump types

- Enhancement of landscape treatments and buffer, both adjacent to the footpath and within the centre median island, will provide drivers with the perception of a narrower street and naturally reduce vehicle speeds.

3.5 Vehicle speeds

Waterloo Road is currently designated 50km/h. As a major mixed use precinct discussions should be held with TfNSW to introduce 40km/h high pedestrian activity areas – particularly around the two metro stations. This approach would be consistent with that adopted in the Sydney, North Sydney and Parramatta CBDs. In the longer term consideration could be given to introducing 30km/h zones in some sections, which are currently being introduced within Liverpool and Manly town centres.

3.6 Car parking

As previously noted in Section 2.7 of this document there is only a limited number of on-street parking spaces on Waterloo Road, located on the southern side of the road between Wicks Road and Thomas Holt Drive. To facilitate the proposed new pedestrian crossings at the eastern end of the corridor near the current bus layover facility, existing on-street parking will need to be removed as indicated in Figure 22. To enhance the pedestrian environment along Waterloo Road around these new crossings, Council may also consider removing the remaining on-street parking to the east of Thomas Holt Drive.

Opportunities to relocate this existing on-street car parking should be examined within the future Macquarie Park street network – particularly Road 11 or Road 30 which are in close proximity to the current on-street parking spaces. This is similar to the approach of relocating car park entries into private developments away from Waterloo Road to side streets.

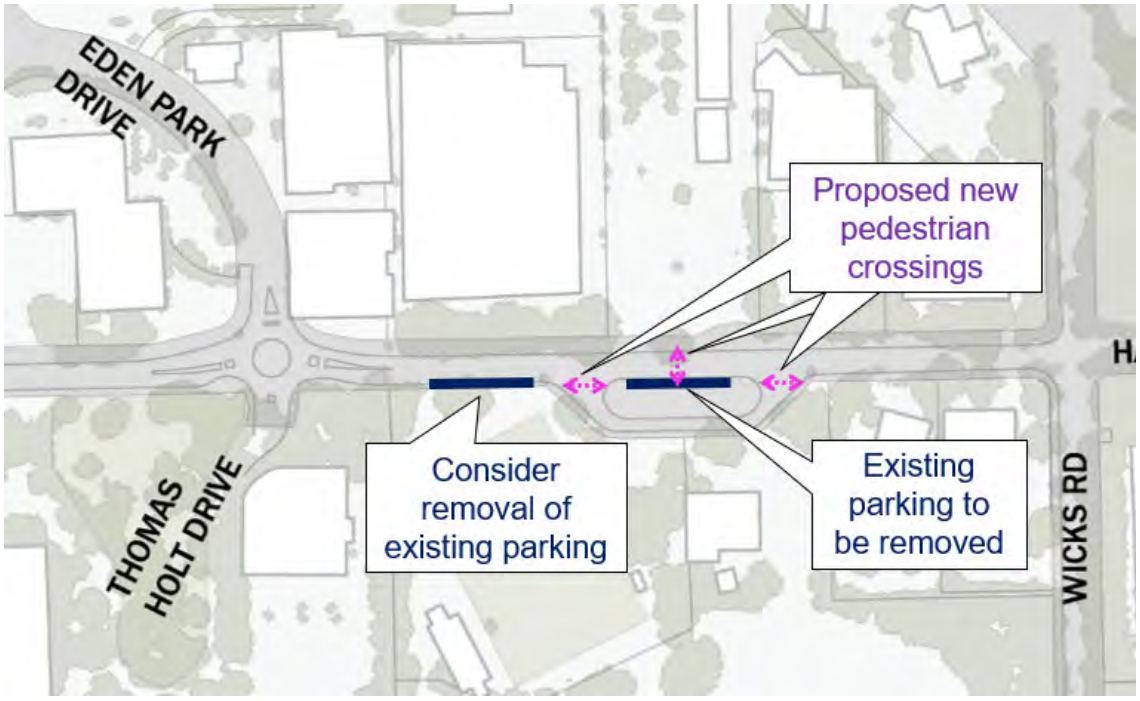


Figure 22 Car parking recommendations

3.7 Bus stops

Recommendations in relation to bus stops as part of the master plan proposal are as follows:

- Provide bus shelters at every bus stop located on the corridor. Generally shelters are already provided at the majority of bus stops, however as shown in Figure 23 there are four stops where bus shelters are not currently provided.
- In discussion with TfNSW, either relocate or remove the bus stop on the northern side of Waterloo Road, immediately west of the vehicle access point to the Macquarie Shopping Centre. This is required to facilitate a new north-south pedestrian crossing which was identified as part of the safety audit undertaken in the initial stage of the project. As illustrated in Figure 24, there are two bus stops within close proximity to the stop proposed to be removed, therefore having only minor impacts to existing users. From a whole of transport perspective this provides an improved outcome by allowing the creation of a new north-south pedestrian crossing which will help achieve the objective of creating a vibrant street environment.
- Relocate the existing bus stop on the southern side of Waterloo Road adjacent to Coolinga Street to the west to facilitate the introduction of the new north-south pedestrian crossing. The extent of this relocation is indicated in Figure 25.
- Provide planting zones immediately east and west of bus stop locations to create a buffer between vehicular traffic and pedestrian movements. The bus stop zones themselves will remain as paved surfaces.
- Provide new east-west pedestrian crossings adjacent to the bus layover area near Wicks Road to provide a continuous pedestrian path. This will create the effect of the bus layover being located in an off-street environment, with the main pedestrian path no longer adjacent to parked buses. This will facilitate improved pedestrian amenity and provide a more direct and continuous path of travel.
- In the longer term, consider opportunities to relocate bus layover away from Waterloo Road onto new streets within Macquarie Park
- Locate bus shelters between footpath zones and back of kerbs rather than behind footpath/shared path zones

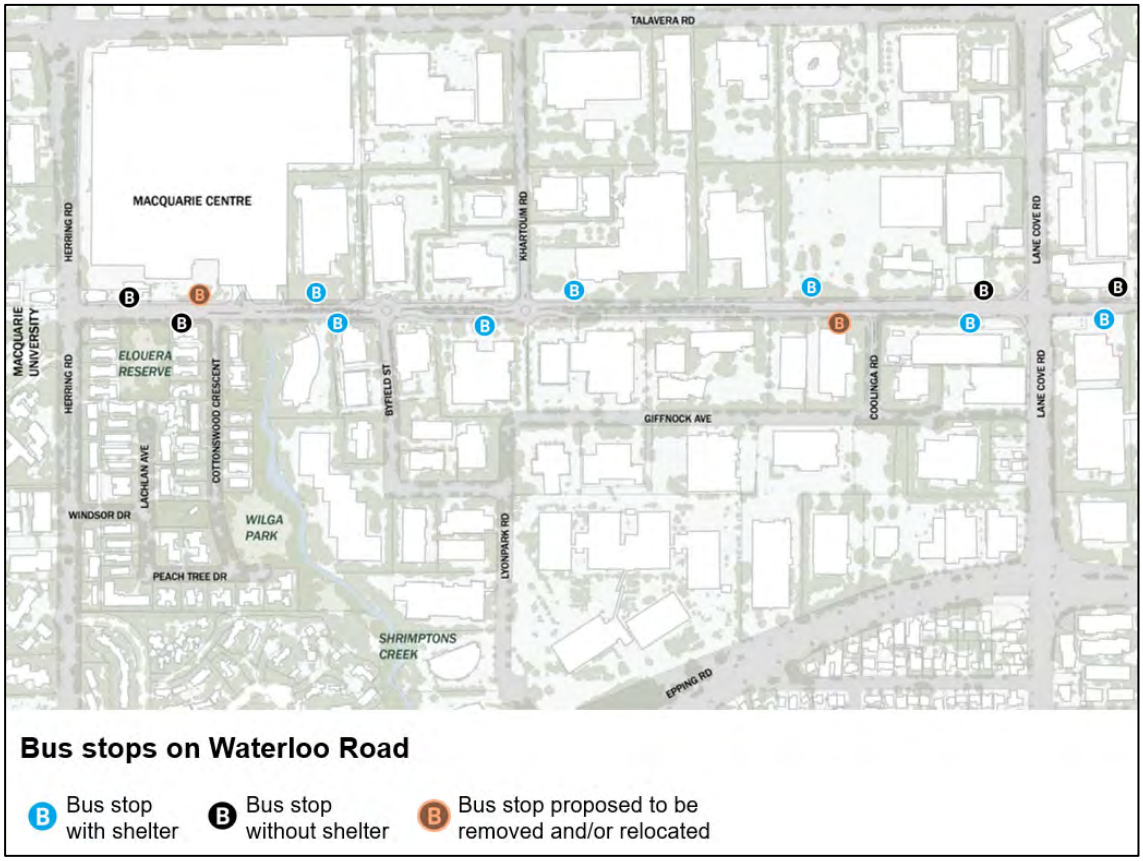


Figure 23 Bus stop recommendations

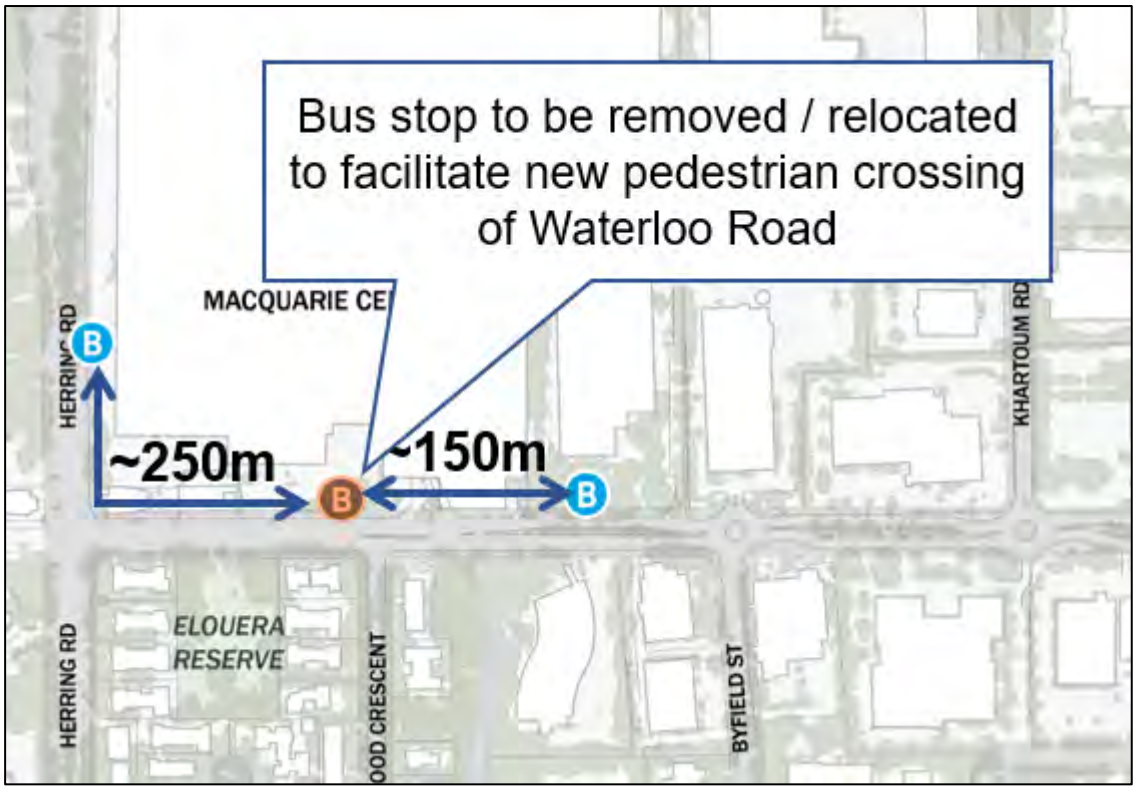


Figure 24 Proposed bus stop relocation or removal adjacent to Macquarie Centre

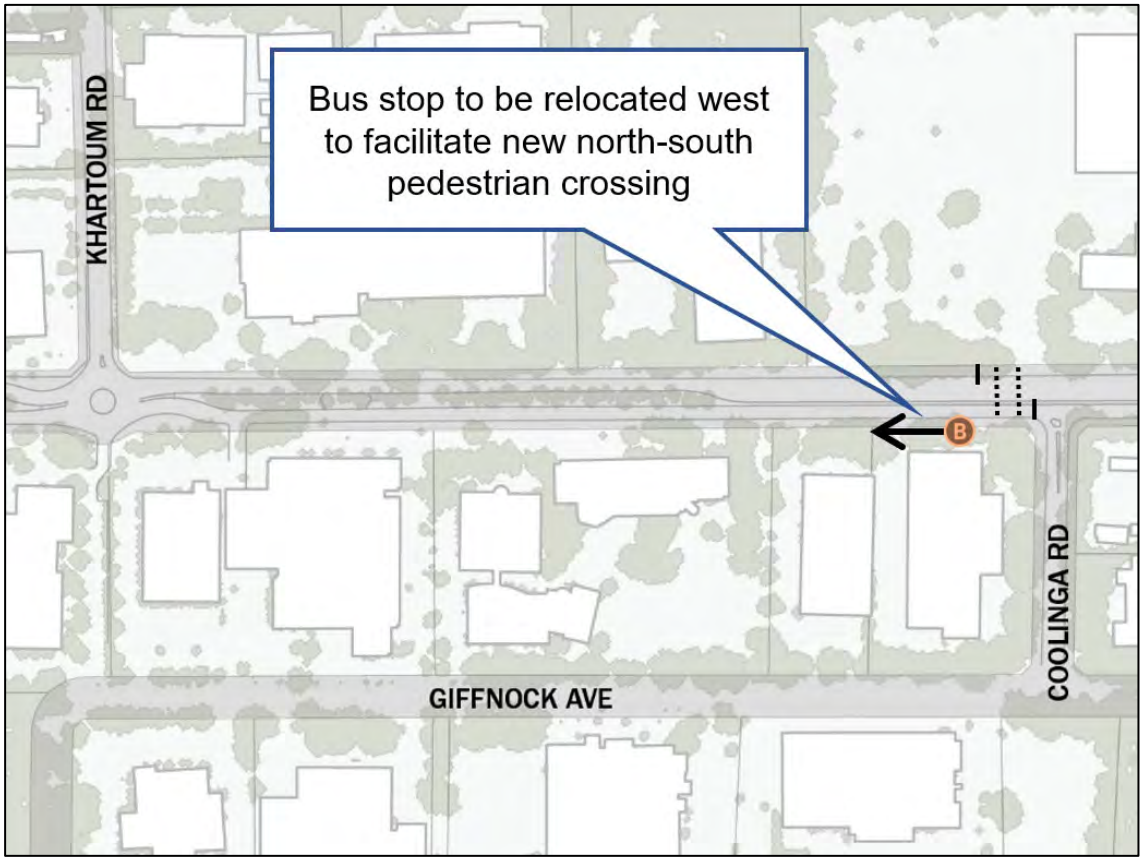


Figure 25 Proposed bus stop relocation adjacent to Coolinga Street

4 Summary

This document has been prepared by JMT Consulting on behalf of City of Ryde Council to inform the development of an active street master plan for the Waterloo Road corridor. The master plan proposal aligns with the study objective of transforming Waterloo Road from a 'movement corridor' to a vibrant street by creating an environment that encourages active transport as a safe, convenient and attractive alternative to private vehicle, while also supporting access to bus stops and the two metro stations. Key aspects of the master plan from a transport perspective include the following:

- Introduction of formal north-south pedestrian crossing points at a number of locations along the corridor, which will contribute to both enhancing pedestrian accessibility and reducing traffic speeds.
- Provision of consistent east-west crossing treatments and removal of barriers to east-west movements - particularly pedestrian fencing.
- A more coherent cycle network by locating the shared pathway entirely on the southern side of the road and an upgrade in the delineation of the shared path to a simplified approach involving a continuous blue line with advisory pavement markings.
- Introduction of speed humps on the approach to the informal north-south crossing locations to reduce traffic speeds.
- Introduction of 40km/h high pedestrian activity areas with a longer term view of 30km/h zones in some sections of the corridor.
- Provision of bus shelters at every bus stop located on the corridor.
- New east-west pedestrian crossings adjacent to the bus layover area near Wicks Road to provide a continuous pedestrian path.

The study provides a framework for the development of the Waterloo Road corridor in future years. Further design refinements will be undertaken at a more detailed level as sites are progressively developed along the corridor.