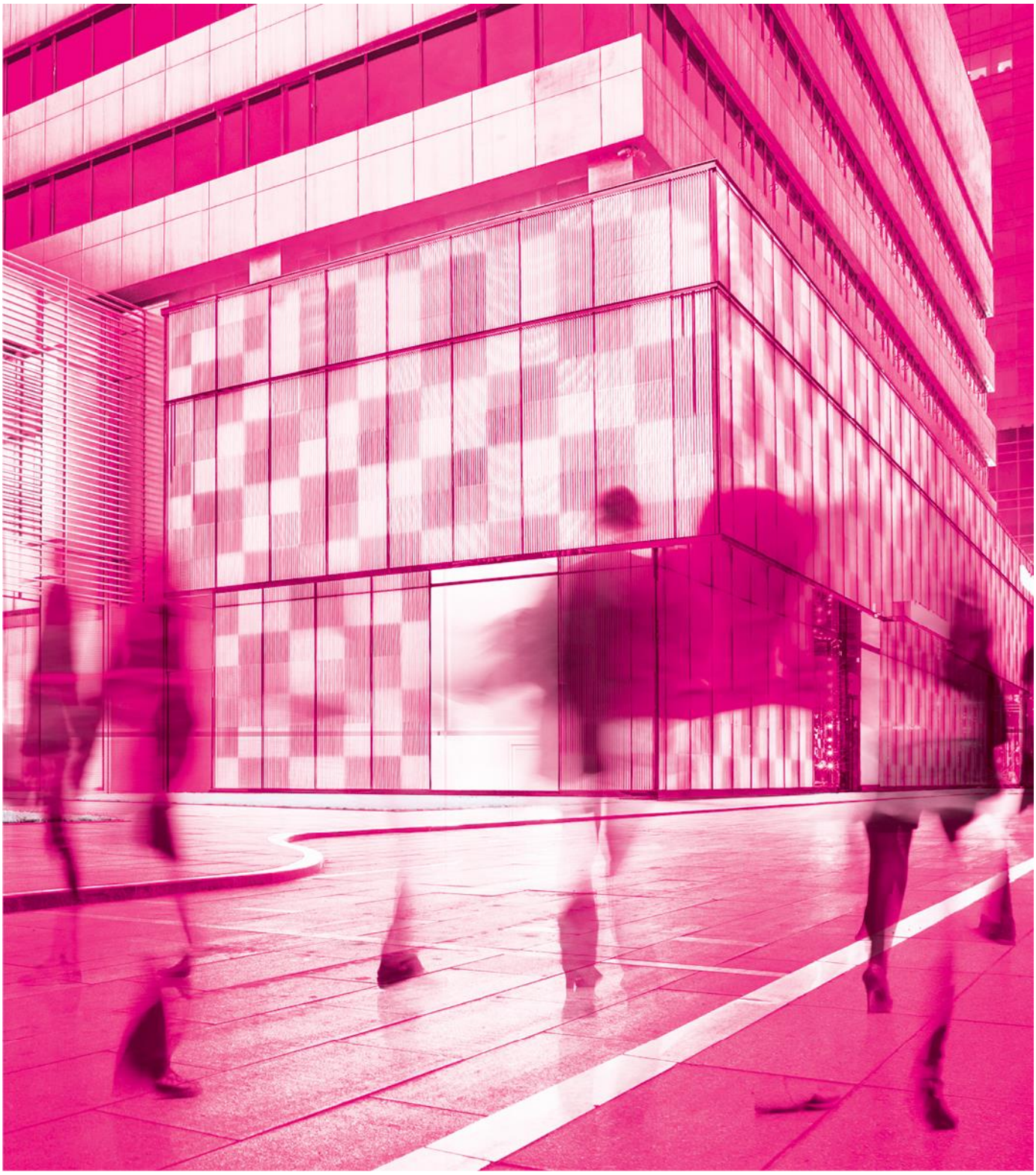

report;

St Leonards Cumulative Transport and Accessibility Study

For Lane Cove Council

28/09/2017

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traffic;
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ptc.

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1. Executive Summary

ptc. has been engaged by Lane Cove Council to undertake a Transport and Accessibility Assessment for pedestrian, bike and public transport demand generated by the planned growth of the St Leonards south and east precinct within Lane Cove LGA. The report satisfies the requirements outlined on the Transport for NSW (TfNSW) letter dated 16 April 2015. A separate cumulative traffic study was undertaken by TEF Consulting. It addressed traffic concerns previously raised by the Roads and Maritime Services (RMS) and Transport for NSW (TfNSW).

The suburb of St Leonards is located at the junction of Lane Cove (south), North Sydney (north and east) and Willoughby (north) Local Government Areas (LGA). An additional 4,500 dwellings and 36,000 m^2 commercial floor space will be developed over the next 10-20 years in the Lane Cove portion of St Leonards which are located on the southern side of Pacific Highway and both sides of the railway line.

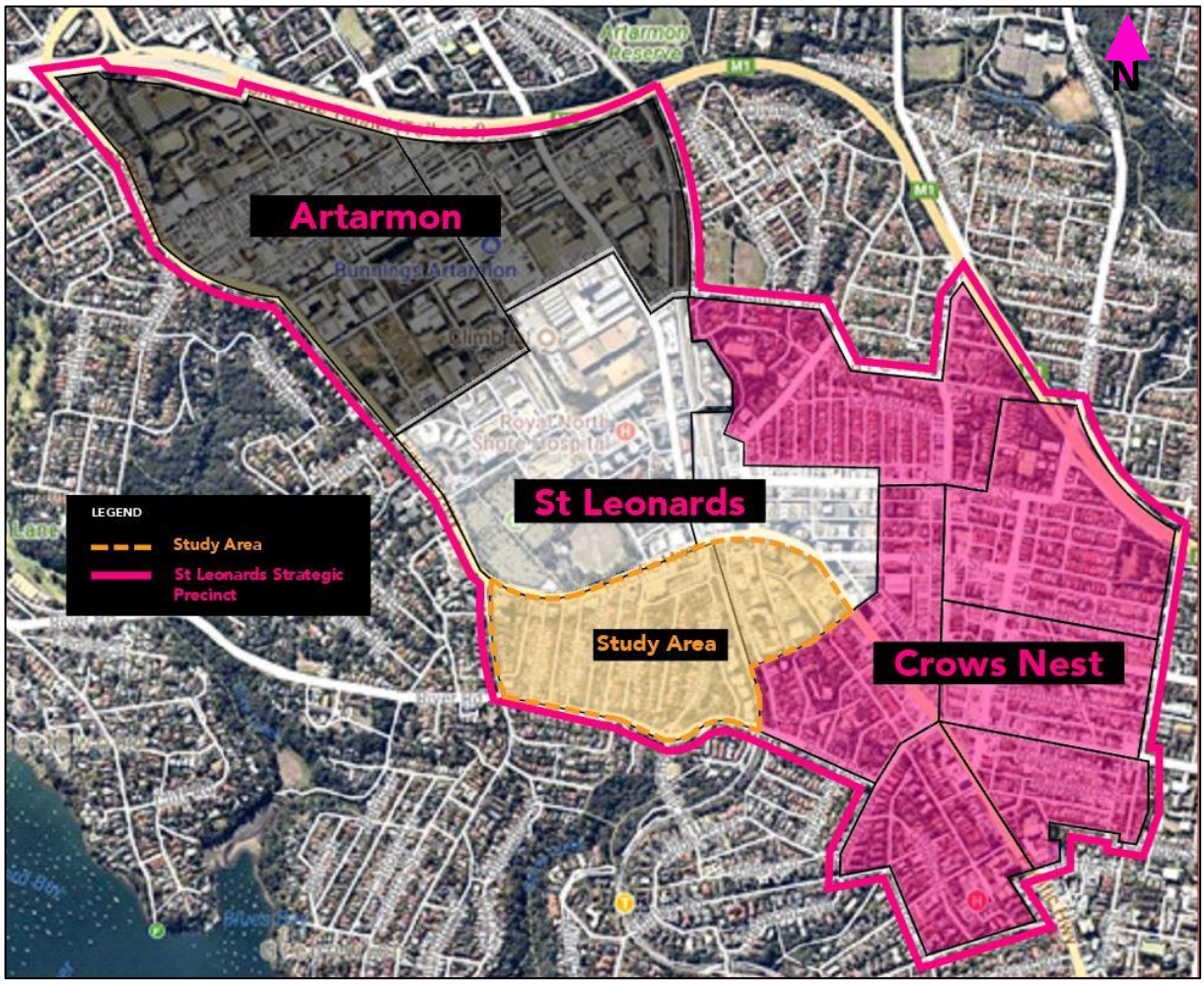


Figure 1: St Leonards Strategic Precinct

There are many gaps and deficiencies on the pedestrian network in both precincts due to all the major transport hubs being located on the northern side of Pacific Highway whereas the two precincts are located on the southern side. In the study area, a number of signalised pedestrian crossings are provided; however, marked foot crossings are not provided in all approaches. Motorised traffic is given priority at the highway whilst the pedestrian experience has low priority throughout the day. In addition, the existing steep

topography in the southern precinct affects the pedestrian travel paths and there is currently no east-west connectivity between the precincts. This results in long detours while walking from one precinct to another.

The planned development in the study area provides an opportunity to improve the pedestrian connectivity and permeability. A well-connected pedestrian network is recommended in section 5.3 of this report.

The current on-road bike network is non-existent and does not provide any local or regional connection. However, a new connected and integrated bike network can be integrated into the redevelopment of these precincts. An appropriate bike network is recommended in section 5.4 of the report.

Currently the North Shore train line, covering St Leonards, is approaching its capacity. The existing train network will not cater for the additional demand generated by the development in the study area. The new Sydney Metro (Crows Nest station) will double the train capacity in this precinct. This will easily cater for the further demand arising from the planned growth in the study area.

The existing bus network at St Leonards has good network coverage. Following the operation of Sydney Metro (2024), the existing bus network could be reviewed and altered as necessary by the State Government. A bus interchange could be incorporated as part of the plaza development.

The proposed over rail plaza and the additional pedestrian underpass across the Pacific Highway would improve the pedestrian connectivity and permeability between the precincts. However, the design of the proposed plaza should provide sufficient east-west bike connectivity.

Based on future mode share assumptions, the planned major developments in the eastern and southern precincts will generate the following total pedestrian, cyclist and public transport demand at St Leonards (inbound & outbound, all day):

- Train & Metro – 6,964 trips
- Bus – 799 trips
- Pedestrian – 2,191 trips
- Other (cyclists) – 656 trips

Assuming each of the peak period trips (6-9.30am & 3-6.30pm) represent approximately 25% of the daily trips, the estimated peak period trips to/ from the study area are likely to be:

- Train & Metro – 3,482 trips
- Bus – 400 trips
- Pedestrian – 1,096 trips
- Other (cyclists) – 328 trips

Overall, this additional demand can easily be accommodated by upgrading the existing infrastructure, as outlined in this report.

2. Introduction

Lane Cove Council has engaged **ptc.** to undertake a Transport and Accessibility Assessment on pedestrian, bicycle and public transport for the planned developments in the south and east precincts in St Leonards, as part of the greater St Leonards Strategic Precinct, the extent of which is outlined in Figure 1. The study area is shown in further detail in Figure 2.

Transport for NSW (TfNSW) requires a 'Transport and Accessibility Assessment' for the precincts due to their predicted growth over the next 10-20 years. A separate cumulative traffic impact assessment regarding the predicted growth in the study area has been completed and submitted to the State Government. This cumulative transport and accessibility assessment satisfies the requirement of other transport components such as pedestrian, bicycle and public transport.

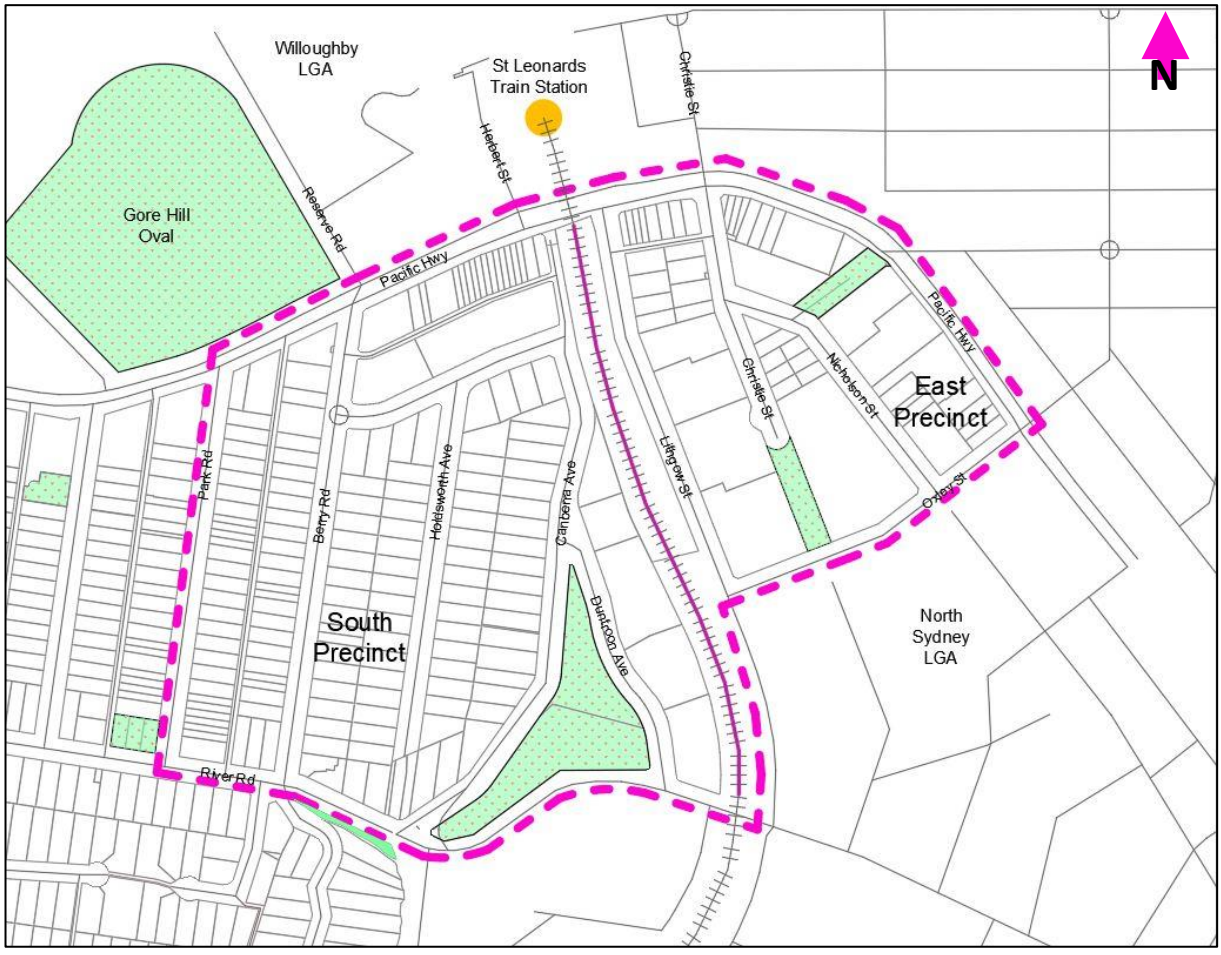


Figure 2: Study Area

2.1 Purpose of the Study

The primary purpose of this study is to address the issues raised by TfNSW in its letter dated 16 April 2015 (Attachment 1) and to satisfy condition (1) (b) of the Gateway Determination for St Leonards South letter dated 2 September 2016 (Attachment 2). The key requirements raised are as follows:

- An estimate of the daily and peak hourly trips generated by the proposal including pedestrian, bicycle and public transport;

- An assessment of the additional public transport trips generated by current and other approved proposals and the impacts on the existing and future public transport infrastructure;
- Details of measures to mitigate public transport and road safety impacts including the need/ associated funding for road improvement works;
- Consideration and assessment measures to promote travel choices that support the achievement of State targets, such as a location-specific sustainable travel plan and sustainable travel initiatives, including the provision of end-of-trip facilities for pedestrians and cyclists. This includes prioritising walking and cycling within a 2km and 5km radius of St Leonards Station respectively as stated within Sydney's Walking Future. The following bicycle and pedestrian facilities are to be considered in the assessment:
    - The proposed additional connections across Pacific Highway including provision of crossings on all legs of signalised intersections. The impacts on the through traffic and public transport services will need to be considered;
    - Provision of bicycle lanterns at signalised crossing locations along bicycle desire lines; and
    - Safe and efficient crossings across River Road (particularly near the intersection of River Road/ Canberra Avenue) to provide pedestrian access to existing bus stops on the southern side of River Road.

This report has addressed the above issues.

2.2 Scope of this study

This study provides:

- An overview of the existing transport conditions present in the St Leonards south and east precincts and a high-level assessment of opportunities and constraints;
- An overall assessment of the current and future developments in the precincts;
- A high-level estimate of the future population and employment growth in the study area due to the planned developments;
- A high-level estimate of the mode share and travel behaviour of the future occupants in these precincts;
- A high-level estimate of the sustainable transport demand (e.g. active and public transport) associated with the future growth in these precincts; and
- Recommendations on sustainable travel plan and sustainable travel initiatives in support of the State Government's targets.

3. Existing Conditions

St Leonards is located at the convergence of three local government areas. This creates complexities in terms of facilitating land use and transport network development in a coordinated approach that considers each development in the context of the whole precinct instead of just one local government area. The NSW Department of Planning & Environment (DP&E) engaged Cardno Consultants to prepare a Strategic Transport Study for the existing transport conditions in St Leonards, Crows Nest and Artarmon which were reviewed as part of this study. Some key points on the existing travel mode at St Leonards outlined in the Cardno report are summarised below:

- A large proportion of residents who live in St Leonards travel to work by train 48%, followed by 15% walking, and 6% travelling by bus;
- The majority of workers at St Leonards precinct commute by private vehicle (53%), where 50% as drivers and the remaining 3% as passengers. Train is the second most popular mode at 32%, followed by bus at 7%.

The above modal statistics show that the train is currently the highest mode of transport by the residents. Walking trips account for15%, which is reasonable compared to other comparable metropolitan centres. However, a high proportion of employees working in St Leonards drive to the precinct (53%).

3.1 Pedestrian Network

The precinct has a diverse range of land uses and the pedestrian facilities vary depending on location and the adjacent land use. Pedestrian facilities are generally best around St Leonards station adjacent to retail and commercial land uses. The key pedestrian desire lines radiate out from St Leonards station and there are strong additional desire lines between Royal North Shore Hospital and Crows Nest activity centre.

There are many constraints in the existing pedestrian network. Signalised pedestrian crossings are provided at the intersections of Pacific Highway and Oxley, Christie & Herbert Streets and Berry Road; however, marked pedestrian crossings are not provided across all approaches at these signalised intersections (Figure 3). The major transport corridors of Pacific Highway (runs east-west) and the T1 railway line (runs north-south) reduce pedestrian permeability throughout the precinct, which results in relatively long-distance walks for a formal crossing opportunity. Throughout the day, pedestrians experience a low priority at intersections. Limited crossing opportunities and high peak hour traffic volumes along the highway cause frustrated and impatient pedestrians crossing roads against the red light or away from the signalised intersections. This has resulted in a number of pedestrian related crashes along the highway[1].

Steep grades in the southern precinct affect all north-south routes. Currently there are low to medium density residential dwellings which lack street lighting, active surveillance and pedestrian activity. Footpath connections are limited along the key north-south streets proceeding towards St Leonards station including Lithgow Street, Canberra Avenue and Christie Street. Footpaths along these streets are smaller in width and are aligned directly adjacent to property boundaries.

An existing underpass between The Forum and Lithgow Street provides an alternative north-south connection across the Pacific Highway, however, the amenity is of poor quality with potential security concerns and it does not provide a direct route between either side of the road (Photograph 1).

[1] Cardno Existing Transport Condition Report

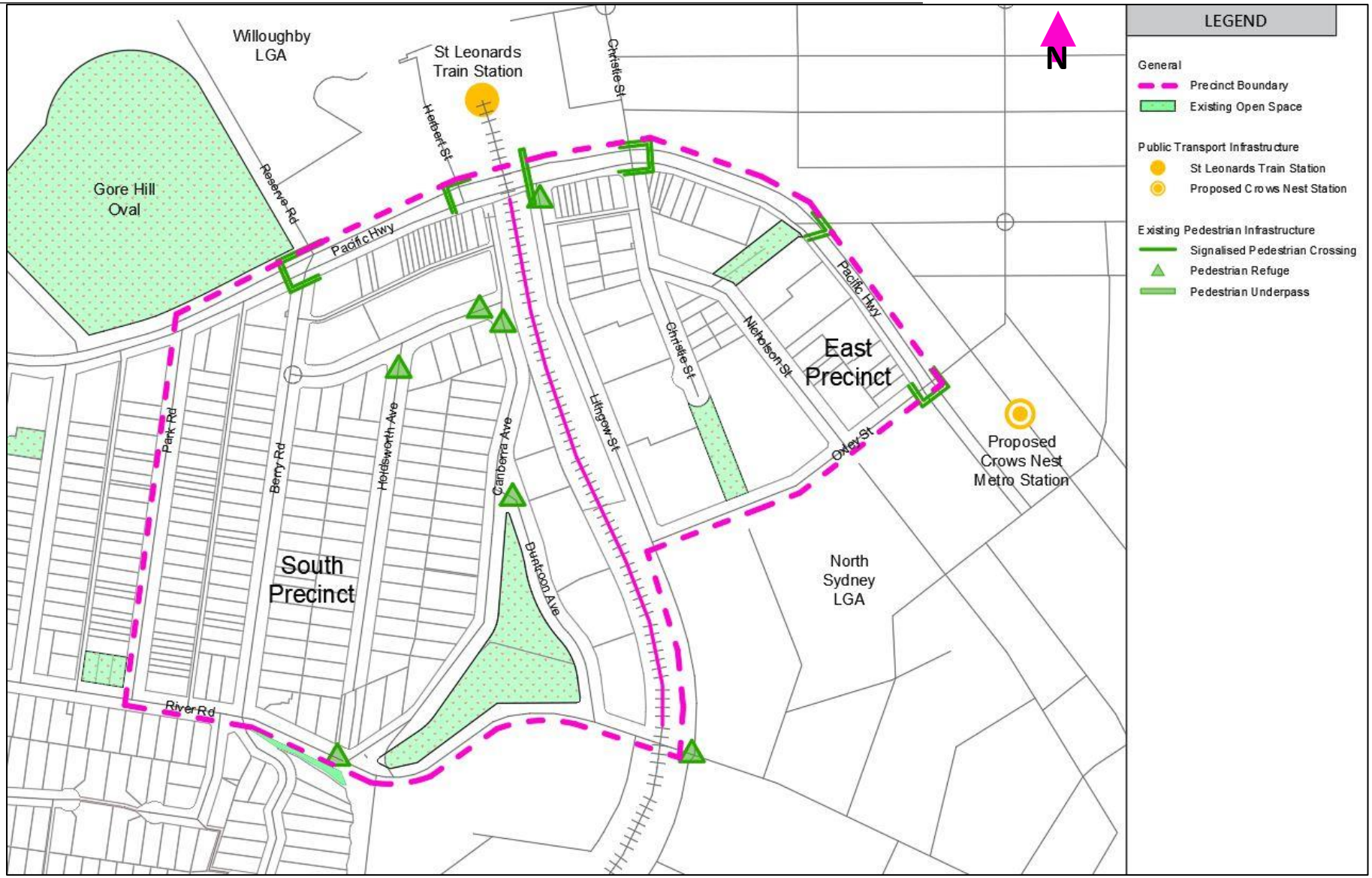


Figure 3: Existing Pedestrian Infrastructure in the Study Area

Photograph 1: Existing pedestrian underpass across the Pacific Highway (looking north)

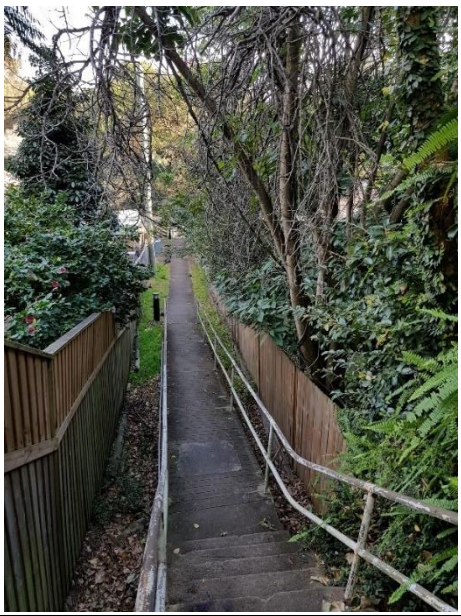
At the Pacific Highway/ Oxley Street intersection, there is no pedestrian crossing facility on the north approach. This intersection will have a strong pedestrian desire line when the Crows Nest Metro station begins operating. There will be pedestrian capacity & cluster issues in the future, which need to be carefully managed.

At Herbert Street southbound, train users have to cross the road twice.

To the south, River Road carries significant volume of regional traffic and lacks a formalised crossing facility within the study area. A substandard refuge island is provided near Canberra Avenue (Photograph 2), however, there is no other designated crossing facility within 400m to the west (at Greenwich Road) or 330m to the east (at Lithgow Street).

Photograph 2: Existing Refuge Island at River Road and Canberra Avenue Intersection

The existing pedestrian connections between Berry Road and Holdsworth Avenue with River Road via ramps and stairs are substandard and have night time security issues due to lighting deficiencies (Photograph 3).

Holdsworth Avenue	Berry Road
	

Photograph 3: Existing pedestrian connection in River Road

The existing pedestrian constraints and opportunities are summarised in Table 1.

Constraints	Opportunities
Pedestrian permeability and safety are compromised due to lack of crossing facilities and significant traffic congestions on Pacific Highway, especially during the peak hours. Motorised traffic on the Pacific Highway is given the priority, which anecdotally results in frustrated pedestrians disobeying the road rules and crossing the road illegally.	The capacity of the Pacific Highway can be reassessed following the operation of Metro services in the area and the completion of NorthConnex motorway. Additional at grade crossing facilities and the proposed pedestrian underpass would improve the pedestrian permeability and safety across the highway.
Most of the pedestrian attractors such as Gore Hill Oval, TAFE NSW, Royal North Shore Hospital, Gore Hill Cemetery, proposed Crows Nest station are located on the northern side of Pacific Highway which results in strong north-south pedestrian desire lines across the highway.	As above.
The current pedestrian underpass beneath the Pacific Highway represents personal security and safety concerns, especially late at night.	A new pedestrian underpass is proposed to be constructed under the Pacific Highway.
Many sections of the precincts lack pedestrian amenities, and if they exist, they are non-compliant, affecting pedestrian comfort and safety.	New footpaths and crossing facilities can be provided with the redevelopment of the eastern and southern precinct. The permeable grid network, shop awnings and active street frontages along the highway would encourage walking trips between the diverse land uses.
The steep grades on the southern precinct reduce the attractiveness of walking for some groups of people including mobility impaired, parents with prams or those carrying shopping.	Consideration could be given for universal accessibility while redesigning the footpath networks in the southern precinct.
At some sections, pedestrian routes are difficult to navigate due to topography and lack of wayfinding signage.	Wayfinding signage could be reviewed and developed upon redevelopment of the eastern and southern precincts.
Pedestrian access appears to be limited around the construction areas.	Safe and unimpeded pedestrian access should be ensured upon issuing Construction Certificates of the future developments in the study area.

Table 1: Constraints and Opportunities for Pedestrian Network at St Leonards

3.2 Bicycle Network

The precinct features challenging topography and the highly motorised roads reduce the attractiveness for cycling as a mode option for many undecided cyclists. The prevalence of kerbside parking further reduces the safety and attractiveness of cycling through the precinct. The limited provision of shared paths and separated cycleways means that cyclists can either share the road or illegally use footpaths.

The December 2013 Lane Cove Council Bicycle Plan provides recommendations based on a review of the 2008 Bike Plan. In the plan, the main north-south connection was recommended via Pacific Highway, Berry Road, Marshall Lane, Canberra Avenue and east-west connection via Pacific Highway (railway overbridge), Lithgow Street, Christie Lane, Christie Street and then Nicholson Street to tie in with the existing route at the intersection of Nicholson and Oxley Streets. The primary aim of this route is to eliminate the missing link in the network on the southern side of the Pacific Highway and to facilitate travel across the LGA boundaries.

In summary, the recommended routes and their existing situation are summarised in Figure 4 and Table 2.

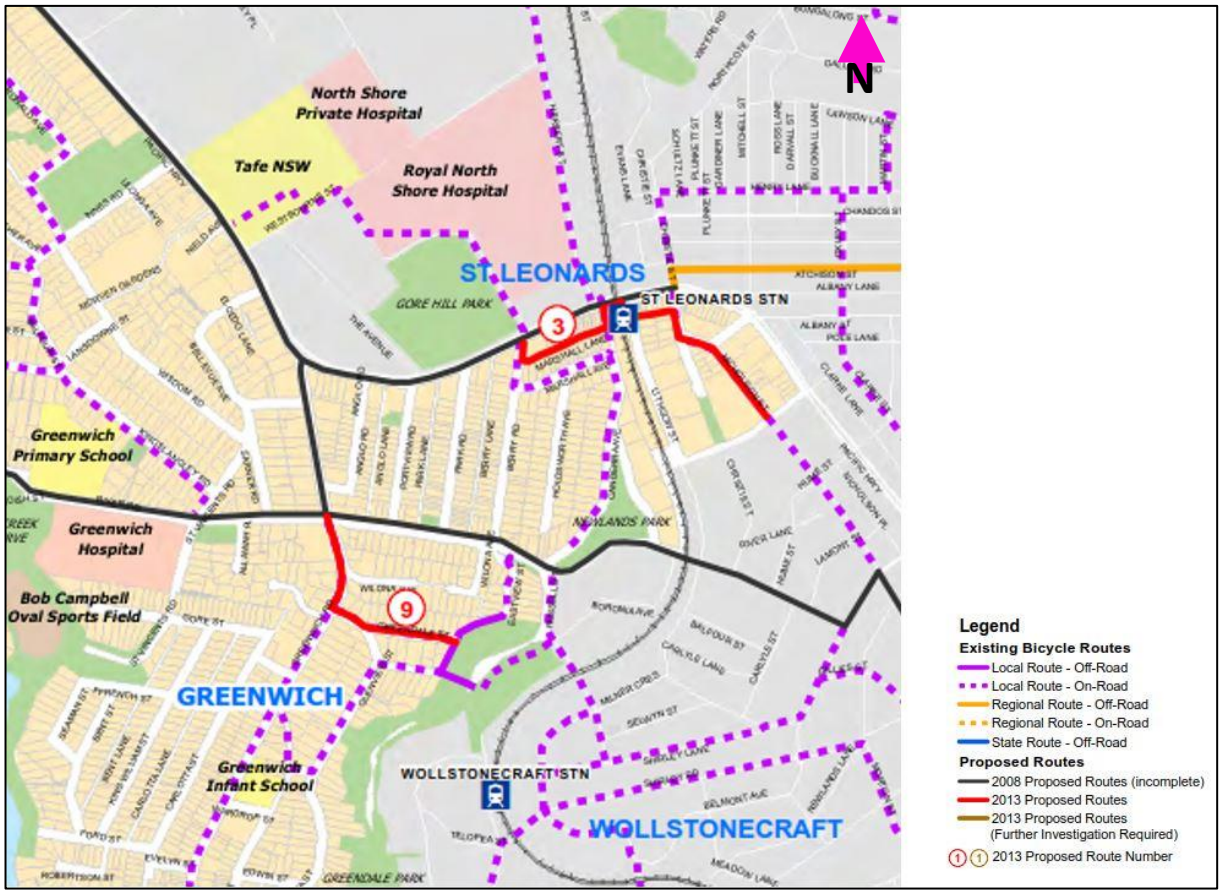


Figure 4: 2013 Lane Cove Bike Plan at St Leonards

Street	From	To	2008/2013 Bike Plan Recommendations	Status
River Rd (northern side)	Greenwich Rd	Shirley Rd	Shared path	Incomplete
Canberra Ave	River Rd	Marshall Ave	On-road local route	Incomplete/ missing
Marshall Ave	Canberra Ave	Berry Rd	On-road local route	Incomplete/ missing
Berry Rd	Marshall Ave	Pacific Hwy	On-road local route	Incomplete/ missing
Marshall Lane	Berry Rd	Canberra Ave	On-road local route	Incomplete/ missing
Nicholson St	Lithgow St	Shirley Rd	On-road local route	Incomplete/ missing

Table 2: Review of Existing Bike Routes in the Study Area

The above Figure 4 shows that there is a general lack of directness and continuity along the existing network routes, as it tries to avoid the Pacific Highway and therefore follows the local and distributor roads. These roads are characterised by lower traffic volumes and speeds, making them more suitable for mixed traffic/cycling facilities.

Table 2 above shows that none of the 2008 or 2013 bike plan recommendation have been implemented. It should be noted that there are existing construction activities along Nicholson Street, which might have resulted in scraping of the existing on-road bike symbols. Overall, in the southern and eastern precincts there is limited dedicated cycling infrastructure, most of which is unmarked and with no accompanying signage and wayfinding. Off-road facilities are very limited, unmarked and disjointed.

Council undertook bike counts on Pacific Highway at the Lithgow Street intersection on Tuesday, 30 June 2015. There were 27 cyclists counted during the AM and PM peak hours. Intersection counts were undertaken concurrently at Nicholson Street/ Christie Street intersection, where 11 and four (4) cyclists were recorded during the AM and PM peak respectively.

The existing bike parking at St Leonards station appears to be inadequate and located away from the station entrance (at the western end of Chandos Street). Although a bike locker is provided, the bike rails are not covered and with limited hardstand areas (Photograph 4).

Eastern side of the car park	Western side of the car park
	

Photograph 4: Existing Bike Parking at St Leonards Station

The existing bike constraints and opportunities are summarised in Table 3.

Constraints	Opportunities
The current cycling network in the eastern and southern precincts is incomplete, disjointed and has many gaps.	On and off-road bike routes could be incorporated in the development of these precincts.
The wayfinding signage for the cyclists is inconsistent across Council boundaries and could contribute to a lack of route legibility.	Wayfinding signs could be considered on a short-term basis.
Pacific Highway acts as a main barrier for the north – south connection. Where a crossing is provided there is no bicycle lantern.	Additional cyclist linkages could be considered on the Pacific Highway. Cyclist lanterns could be incorporated as part of upgrading the traffic lights.
The existing ramps at the crossing points at Pacific Highway are substandard and do not meet the standard.	Non-standard ramps could be upgraded as part of the upgrade of the traffic lights.
The existing bike parking area in St Leonards station is substandard with no weather protection.	Standard bike parking could be provided at a suitable location, closer to the station.

Table 3: Constraints and Opportunities for Bicycle Network at St Leonards

3.3 Public Transport Network

3.3.1 Train

St Leonards station is located on the northern side of Pacific Highway, opposite both the southern and eastern precincts, at The Forum (a commercial and residential development). The station, served by Sydney Trains, operates services along the T1 North Shore and Northern Lines (Figure 5). Passengers can travel to Berowra via Gordon, Hornsby via Macquarie Park (outbound) or Penrith, Epping and Richmond (city bound). They can also interchange at Hornsby Station for intercity services to Newcastle (NSW TrainLink), or at Town Hall for the T2, T3 and T4 lines (Sydney Trains).

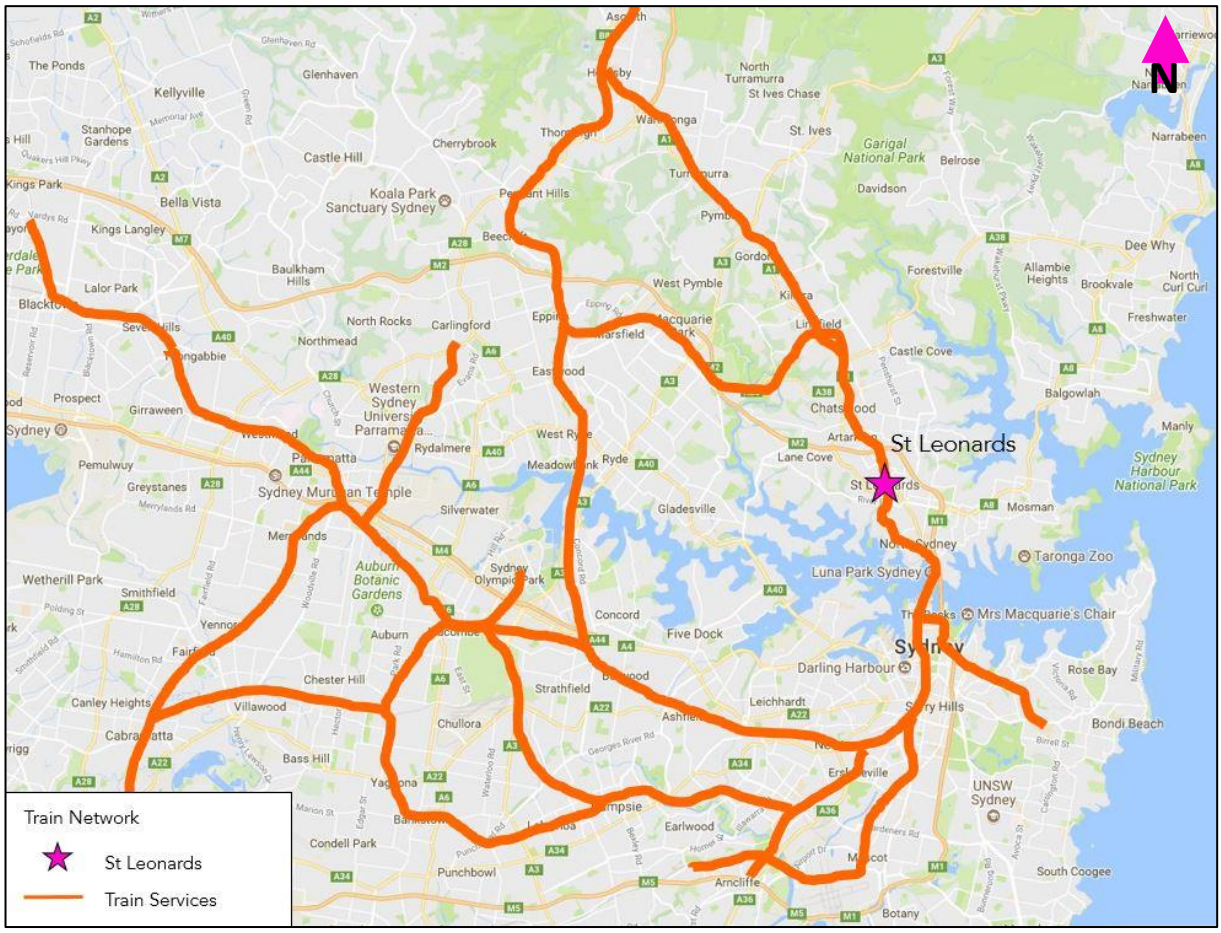


Figure 5: Existing Train Network at St Leonards

On a typical weekday, city bound trains operate between 4:47am and 12:02am and outbound trains operate between 4:44am and 12:55am. During the AM and PM peak hours, 15 trains operate at St Leonards station on the T1 north shore line in both directions and four (4) trains operate in both directions on the T1 Northern Line via Macquarie Park. Outside the peak periods, eight (8) trains per hour operate through the station in both directions, four (4) each along the T1 North Shore and Northern Lines respectively. During the weekend and public holiday periods, four (4) trains per hour operate all day along the T1 North Shore Line via Gordon in both directions and two (2) trains per hour, in both directions along the T1 Northern Line via the Macquarie University.

In 2014 an average of 35,180 passengers used St Leonards station on a daily basis, where during the AM peak hour approximately 18,000 passengers travelled in a city bound direction[2]. Given the assumed suburban rail line capacity of 24,000 trips per hour one-way (20 services x 1,200 capacity per train), the line appears to be nearing capacity. The largest number of commuter trips are OUT in the AM and IN in the PM peaks at this station which represents commuters travelling to the precinct to work making up the dominant movement (Table 4).

Movement	24 Hour	AM Peak (6-9.30am)	PM Peak (3-6.30pm)
Entry to the Station	17,590	3,420	8,780
Exit from the Station	17,590	8,900	3,230

Table 4: In & Out Patronage at St Leonards Station (2014)

The station is wheelchair accessible, with lifts connecting both the platforms from the concourse. Accessible toilet facilities are also provided. Access to the station is provided via Pacific Highway and Sergeants Lane. Further, an accessible path is provided via Herbert Street.

Interchange opportunities are available with bus services departing from the Pacific Highway and non TfNSW bus services on Herbert Street. No dedicated commuter parking is available, however Council and privately-operated parking facilities are only provided on the eastern side of the station. A Kiss & Ride facility is provided on Sergeants Lane (Shared Zone).

3.3.2 Bus

Transport for NSW (TfNSW) bus services operate through the precinct, which provide connections to key regional centres including Chatswood, North Sydney, Manly, Bondi and the Sydney CBD. They also connect with northern residential areas such as Lane Cove, Epping, the Hills District and as far as Dural. Connection is also provided to the Northern Beaches (Manly).

Figure 6 illustrates the bus network diagram to/ from St Leonards area. The map shows that the bus network via St Leonards generally covers the suburbs located diagonally between north-west and south-east. There is currently no bus coverage to the suburbs located in inner west, presumably due to the train coverage via the Sydney CBD. There is currently no bus coverage to the Northern Beaches (e.g. Brookvale, Dee Why, etc.) probably due to the lack of service demand.

At St Leonards, the traffic congestion on the Pacific Highway detrimentally impacts the on-time bus services, particularly with limited bus priority infrastructure along the highway. This impacts bus travel times and the overall customer experience.

Bus stops are provided along both sides of the Pacific Highway in both precincts (Figure 7). However, the majority of bus stops are not Disability Discrimination Act (DDA) compliant. Common deficiencies include insufficient circulation space and lack of designated waiting areas for mobility impaired passengers, non-compliant seating and missing boarding point and tactile ground surface indicators (TGSI). Bus stop infrastructure such as shelters, seating, signage and TGSI is inconsistent across the LGAs.

On the Pacific Highway, the majority of the bus stops are located beneath building awnings, which provide some level of weather protection. However, at some locations, facilities are poorly located and restrict

[2] Cardno Existing Transport Condition Report

pedestrian movements. The St Leonards bus interchange, located on the northern side of Pacific Highway, has poor amenity for waiting passengers.

Bus layover facilities appear to be inadequate at St Leonards, therefore any growth in service frequency would likely require additional layover facilities at this precinct.

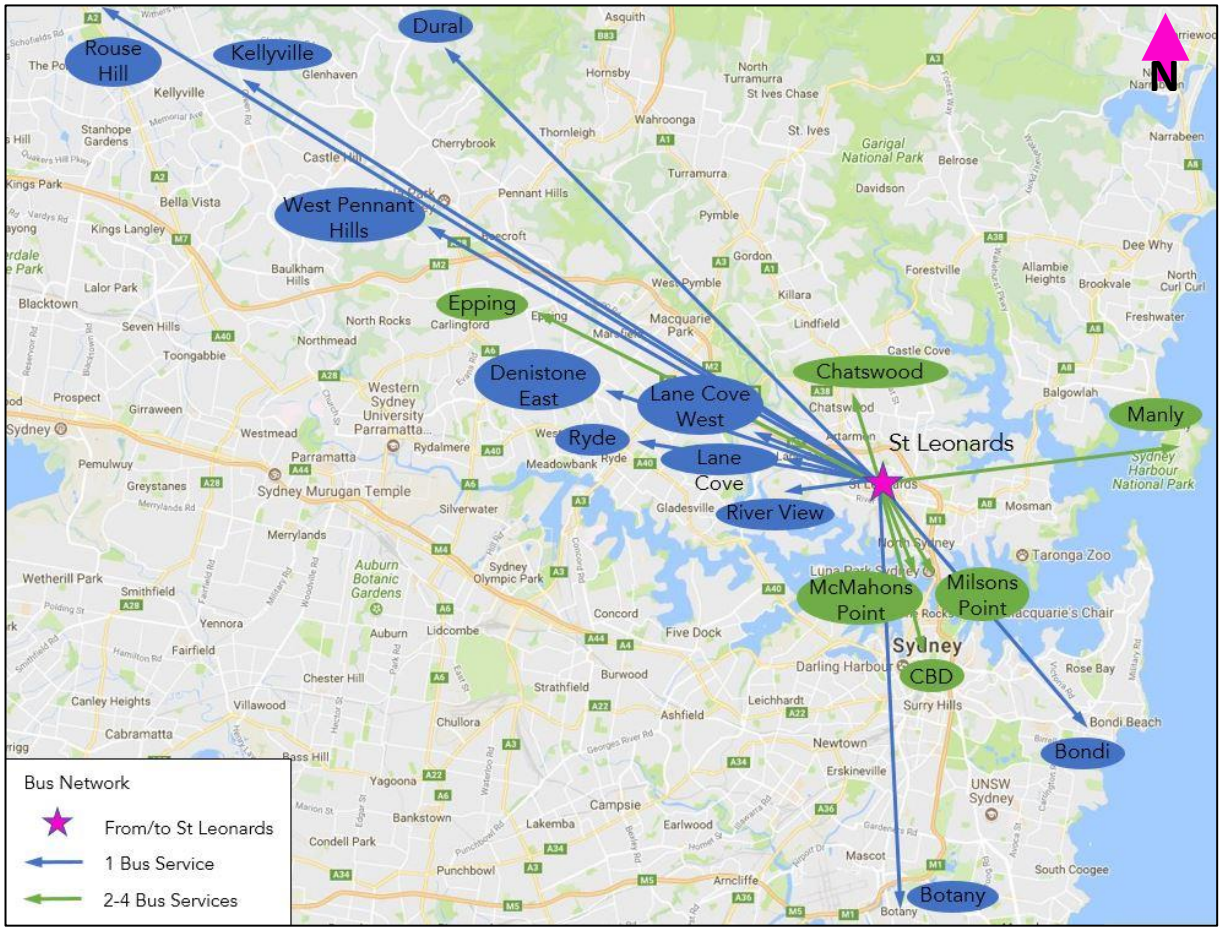


Figure 6: Existing Bus Network Diagram

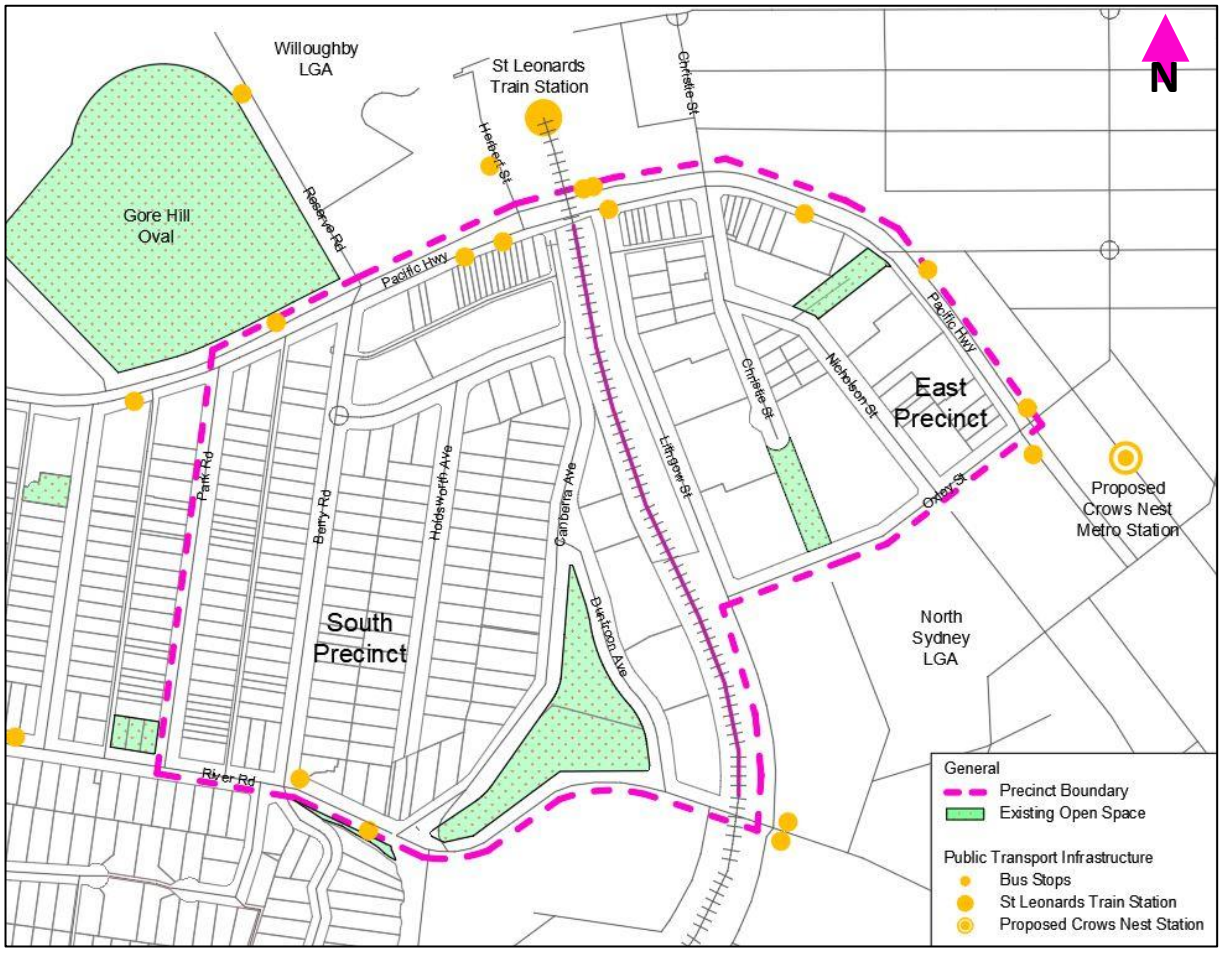


Figure 7: Existing Bus Stops at St Leonards

3.3.3 Taxi

Currently no dedicated taxi rank is provided at the St Leonards bus interchange. An informal taxi pick-up and drop-off occurs outside The Forum on Pacific Highway, which interferes with the buses accessing the bus stops.

There is also no safe location for taxi pick-up or drop-off opposite to the station on the southern side of the Pacific Highway.

The existing public transport constraints and opportunities are summarised in Table 5.

Constraints	Opportunities
The existing T1 North Shore and Northern Line can only accommodate a maximum of 20 trains per hour in each direction. Some services are already at capacity in the AM and PM peaks.	Sydney Metro services are likely to cater for the additional passenger demand.
Bus and train service frequencies are lower during the weekends and late at night which reduces the attractiveness of public transport at these times.	Metro is proposed to operate 24 hours, seven (7) days per week.
Interchange between different transport modes is affected by long walking distance between the outbound buses and the train services. There is also a lack of integration between train and bus timetables, particularly during the non-peak periods.	The bus stops on the southern side of Pacific Highway could be relocated near the proposed plaza. A new pedestrian underpass across the highway would reduce the walking distance for the outbound buses. The Sydney Metro at Crows Nest will extend the public transport catchment, increase capacity and present an opportunity to improve bus and train interchange.
The steep topography of the southern precinct makes pedestrian connections to public transport more difficult.	Pedestrian paths on the southern precincts could be made DDA compliant as part of the redevelopment of this precinct.
There is currently no designated Taxi Zone on any side of the Pacific Highway.	A designated Taxi Zone could be incorporated with the plaza development. Another Taxi Zone near the station (on the northern side of the Pacific Highway) could be investigated.

Table 5: Constraints and Opportunities for Public Transport Network at St Leonards

4. Future Precinct Context

4.1 Planned Development in the Precinct

The following developments are located in the eastern precinct (Figure 8):

- 2 – a proposed 5,000 m^2 plaza over the railway line connecting the eastern and southern precincts;
- 3a (Winten) – a proposed 10 storey high commercial tower with 17,000 m^2 commercial floorspace;
- 3b (Winten) – a proposed new supermarket and retail floor space with a gross floor area of 4,796 m^2 and two 29 & 43 storey towers accommodating 700 dwellings above;
- 4 (New Hope) – a proposed 43 storey tower accommodating 5,628 m^2 commercial space (over 4 to 6 storey) and 495 residential dwellings above; and
- 5 (Mirvac) – an approved 27 & 37 storey towers accommodating 8,263 m^2 commercial space (over 2 to 4 storeys) and 539 residential dwellings above (currently being constructed).

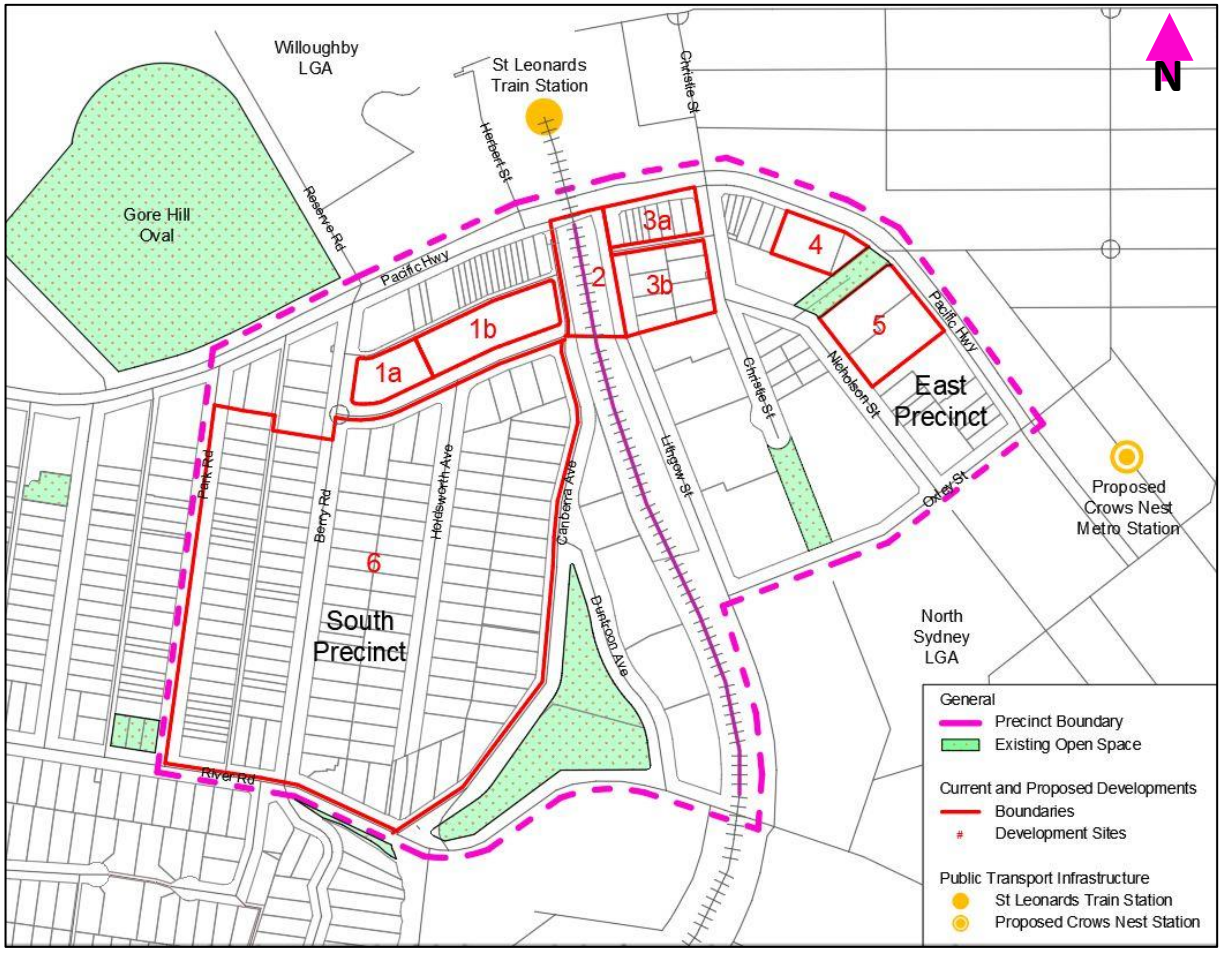


Figure 8: Current and Proposed Developments in the Precinct Boundary

The following developments are located in the southern precinct (Figure 8):

- 1a (Loftex – Stage 1) – a completed 8 storeys tower accommodating 105m^2 retail at the ground level and 66 dwellings above (already built);
- 1b (Loftex – Stage 2) - approved 5 & 29 storey buildings accommodating 290 m^2 commercial space (levels 1 & 3) and 269 dwellings above (currently being constructed); and
- 6 – St Leonards South Rezoning area – Planning Proposal to provide transitional built form which could potentially accommodate 2,400 new dwellings (assuming full development - Figure 9)

Figure 9: Photomontage of the St Leonards South Rezoning Area

In addition to the above, a new pedestrian underpass is proposed across the Pacific Highway linking the proposed plaza and St Leonards station.

To accommodate the proposed over-railway plaza and the development on Lithgow Street the vehicular intersection at Lithgow Street / Pacific Highway will be closed. This will direct the incoming traffic to use Oxley Street from the Pacific Highway. A new laneway will be created to the south of Christie Lane to provide vehicle access from Lithgow Street to Christie Street and subsequently to Nicholson Street.

4.2 Population & Employment Growth

Both southern and eastern precincts currently accommodate 719 dwellings with the southern area containing 533 existing dwellings. Assuming two (2) persons per dwelling, the precincts currently accommodate 1,438 residents.

Based on the figures for each of the current and approved proposals both precincts will accommodate approximately 4,500 new residential dwellings and 36,000 m^2 commercial floor spaces. Assuming two (2) persons per dwellings, the precincts will potentially accommodate 9,000 residents, which is a net increase of approximately 7,500 residents.

In regards to commercial development, they are most likely to be office based (high tech) industries. In accordance with the Building Code of Australia (BCA), each employee takes about 10m^2 of Gross Floor Area (GFA). Therefore, the additional 36,000 m^2 commercial floor space across both precincts will generate an additional 3,600 employees. Furthermore, the proposed supermarket and other small-scale retails will generate approximately 100 new employees. Therefore, the increase of employees in both precincts will be 3,700.

5. Cumulative Transport Assessment

A cumulative pedestrian, bike and public transport demand assessment has been undertaken to take into account the additional population and employment growth in the southern and eastern precincts. it should be noted that due to the future balance of population and employment growth in overall St Leonards, a high proportion of local residents who will live and work here will prefer to walk or cycle, and thus the demand for public transport will reduce. This assumption has been considered in assessing the demand for future public transport to/ from the precincts.

5.1 Stakeholder Consultation

The following three (3) major stakeholders have been consulted and their comments are summarised below:

5.1.1 Lane Cove Bicycle Advisory Committee

- It is imperative to provide an east – west bike connection over the proposed plaza via ramps with suitable gradients;
- A shared user path should be considered in Park & Berry Roads and Holdsworth Avenue;
- An overpass should be investigated in River Road connecting Berry Road and Wilona Avenue which will provide regional pedestrian and bike connections to Wollstonecraft station. It will effectively eliminate any pedestrian and vehicular conflict in River Road;
- If a two-way bicycle lane in Pacific Highway is not feasible by taking one of the trafficable lanes, appropriate setback should be provided on the southern side of Pacific Highway (between Park Road and Oxley Street) to accommodate a separate cycleway path;
- There used to be a pedestrian underpass across the highway linking Canberra Avenue and the existing St Leonards station which was closed as part of The Forum development. Consideration should be given to reopening this pedestrian underpass;
- An east-west pedestrian and cycleway path should be considered over the railway line through the existing dwellings in Duntroon Avenue; and
- A rail-trail should be investigated along the railway line linking St Leonards and Wollstonecraft stations.

5.1.2 Willoughby City Council

- It is essential to achieve an east – west pedestrian and bike connectivity over the plaza;
- Pedestrian crossing at the east approach of Pacific Highway/ Berry Road/ Reserve Road intersection is probably not required as the Gore Hill Oval, TAFE NSW and the cemetery are located on the western side of Reserve Road and Reserve Road provides only local connection;
- To minimise the pedestrian and vehicular conflict and improve connectivity at Pacific Highway/ Berry Road/ Reserve Road intersection, a foot overbridge may be considered as part of the masterplan development of the Royal North Shore Hospital;
- Herbert Street provides a regional bike connectivity within Willoughby LGA. Therefore, Council is supportive of a pedestrian crossing at the east approach of Pacific Highway/ Herbert Street

intersection. Currently pedestrians need to cross twice at these traffic lights to travel between St Leonards station and the southern precinct; and

- Additional pedestrian connectivity is imperative at Pacific Highway/ Christie Street intersection. This can be achieved by a pedestrian underpass across the highway or a pedestrian crossing at the west approach of this intersection.

5.1.3 North Sydney Council

- Supportive to pedestrian crossing facility in all approaches at the signalised intersections along the Pacific Highway. For any connectivity, priority should be given in order to: pedestrians – bikes – public transport – local deliveries & freight – private vehicles;
- The Sydney Metro and NorthConnex motorway would release traffic from the Pacific Highway, which would provide an opportunity to reduce its capacity. There are generally six lanes along the highway which could be converted to one (1) two-way bike lane, two (2) bus lanes and three (3) trafficable lanes (possibly a contra flow operation which will ensure two trafficable lanes in the peak direction during the peak hours);
- Cyclists prefer direct connections. Pacific Highway has the ideal topography for cyclists and the additional capacity achieved by the above should be reserved for the bikes before the capacity is absorbed by the induced traffic;
- Opposed to any grade separated pedestrian and bike connection along the Pacific Highway. Supportive only of at grade connection; however this would result in vehicular delays along the Pacific Highway;
- An east – west pedestrian and bike connection should be considered over the plaza. Provision of stairs only would not establish the bike connectivity. Further, an east-west connection should be considered over the T1 line at Oxley Street;
- Supportive of an at-grade pedestrian and bike connection in River Road. Opposed to any grade separated connection at this location; and
- Due to the proposed Sydney Metro, some bus routes to St Leonards may be obsolete. Therefore, some routes can be redirected to other areas that are not currently connected.

5.2 Mode Share to/ from the Precincts

Current mode share at St Leonards is outlined in the Cardno report[3] , as follows:

Mode Split	Private Veh (driver & Passenger)	Train	Walk Only	Bus	Other
Resident (commuting from the precinct)	29%	48%	15%	6%	2%
Employee (commuting to the precinct)	53%	32%	5%	7%	3%

Table 6: Existing Mode Split at St Leonards

The data in the above table shows that there is a significant proportion of employees currently driving to St Leonards. The arrival of Sydney Metro and future parking restrictions in the nearby residential streets are likely to result in a significant drop in the number of employees driving to the precinct, as well as the residents driving out of the precinct. Therefore, the mode shift is expected to incline heavily onto train/ Metro, and to some extend to walking and other trips (e.g. cycling).

The bus transport to/ from the precinct is not expected to change significantly, unless a significant network adjustment occurs at St Leonards. Based on these assumptions, for the future additional 9,000 residents (net 7,500) and net 3,700 employees in the southern and eastern precincts the likely future mode split is recalculated in Table 7.

In calculating the future modal split in the study area, it is assumed that the use of cars (both employees and residents) will reduce considerably, which will be supplemented by Train and Metro services. As such, it is reasonable to estimate that 15% of the residents and 20% of the employees will drive from/ to the precinct in the future. Trains and the proposed Metro are likely to cater for over 50% of the mode share for both residents and employees given the precinct will develop as a Transit Oriented Development (TOD). The mix of land uses and higher density will also likely increase the modal shift to walking and cycling. Bus services are not expected to change as many of the service will be duplicated by the Metro network.

Mode Split	Private Veh (driver & Passenger)	Train+Metro	Walk Only	Bus	Other
Resident (commuting from the precinct)	15% (1,350)	56% (5,040)	19% (1,710)	6% (540)	4% (360)
Employee (commuting to the precinct)	20% (740)	52% (1,924)	13% (481)	7% (259)	8% (296)
Average (Total)	16.5% (2,090)	54.8% (6,964)	17.2% (2,191)	6.3% (799)	5.2% (656)

Table 7: Likely Future Mode Split at St Leonards

Based on the data in the above Table 7, the planned major developments in the eastern and southern precincts will generate the following pedestrian, cyclists and public transport demand at St Leonards (inbound & outbound, all day):

[3] Cardno Existing Transport Condition Report

- Train & Metro – 6,964 trips
- Bus – 799 trips
- Pedestrian – 2,191 trips
- Other (cyclists) – 656 trips

Given the study area is a section of whole St Leonards precinct, it is difficult to accurately estimate the peak hourly trips. However, it is reasonable to estimate that each of the peak period trips (6-9.30am & 3-6.30pm) represent approximately 25% of the daily trips. Based on this assessment, the peak hourly trips to & from the study area are estimated below:

- Train & Metro – 3,482 trips
- Bus – 400 trips
- Pedestrian – 1,096 trips
- Other (cyclists) – 328 trips

It should however be noted that the above estimate trips are a qualitative assessment and a full trip assessment would require extensive TfNSW data analysis which is beyond the scope of this study.

5.3 Pedestrian Network

Due to the significant population and employment growth in the southern and eastern precincts, the future pedestrian networks should be integrated with the key public transport hubs, as well as the precincts' diverse land uses. Further, pedestrian connectivity and permeability should be established between the two precincts.

In the southern precinct, north-south pedestrian footpath should aim to achieve the maximum pedestrian grade (1:20) where feasible, along with appropriate crossing points to the new pedestrian desire lines.

To accommodate the proposed level of growth, this report recommends the pedestrian infrastructure in the study area as shown in Figure 10.

5.3.1 Footpaths and Pedestrian Network

In the southern precinct, a 2.5m wide shared path is recommended on the eastern side of Park Road as this side of the road will be redeveloped, which provides an opportunity for an upgraded path. This path will connect the future park between Park and Berry Roads. In Holdsworth Avenue, a similar shared path is recommended on the eastern side as it will provide pedestrian and bike connections to the north-east (towards the plaza) which will be one of the major pedestrian desire lines once the plaza is developed.

In Berry Road, a 2.5m wide shared path is recommended on the western side as it will provide a direct connection to Reserve Road via the Pacific Highway. For consistency, a similar shared path is recommended on the western side of Canberra Avenue. On the eastern side of Berry Road and Canberra Avenue, 1.5m wide paths are recommend to minimise any gap or missing pedestrian link within the precinct.

In Marshall Lane, a 1.5m wide footpath is recommended at least on one side of the street. Due to the narrowness of the laneway if a footpath is not feasible, a Shared Zone could be considered in this laneway in the future.

As part of the precinct development, it is likely that a new pedestrian and bike connection between Berry Road and Canberra Avenue will be needed. This path would ideally be connected by stairs, ramps and lifts to ensure the usability and amenity of public and private open spaces.

In the eastern precinct, a 2.5m wide shared path is recommended on the western side of Christie Street which will provide direct connection to the other side of Pacific Highway via the recommended new pedestrian crossing at Pacific Highway/ Christie Street intersection. To the south, this shared path will continue on the eastern side of Christie Street and then on the northern side of Nicholson Street which will eventually connect with Nicholson Street within the North Sydney LGA or continue north-east towards the new Sydney Metro station.

On the southern side of Nicholson Street, a 1.5m wide footpath is recommended. All existing footpaths in this precinct should be retained and be upgraded to at least 1.5m in width along with any new development.

In addition to the footpath connection, refuge islands and wombat crossings are recommended at various locations for pedestrian safety and accessibility (Figure 10). In the detailed design, the recommended footpaths, refuge islands, wombat crossings, pedestrian ramps, blister islands and signage will need to be considered in accordance with the relevant RMS guidelines/ Austroads standards.

Upon development of these precincts, street lighting improvements will be required along with undergrounding of the power lines.

5.3.2 Pedestrian Connection along the Pacific Highway

As stated earlier, pedestrian crossing facilities are not currently provided at the existing signalised intersections along the Pacific Highway, (all approaches). The merit of additional pedestrian crossing facilities is described below:

5.3.2.1. Pacific Highway/ Berry Road/ Reserve Road Intersection

Currently a pedestrian crossing facility is provided at the north, west and south approaches. Another pedestrian crossing at the east approach is not recommended as there is no demand. The Gore Hill Oval/ TAFE is located on the western side of Reserve Road which can be connected by the crossing facility at the west approach. Southbound cyclists, from Reserve Road to Berry Road, will cross Pacific Highway with the vehicular traffic at their designated green light.

It should also be noted that the Pacific Highway/ Berry Road signalised intersection is the only intersection which provides a right turning opportunity from the southern precinct. Therefore, a pedestrian crossing at the east approach will impact the city bound traffic movement from the southern precinct.

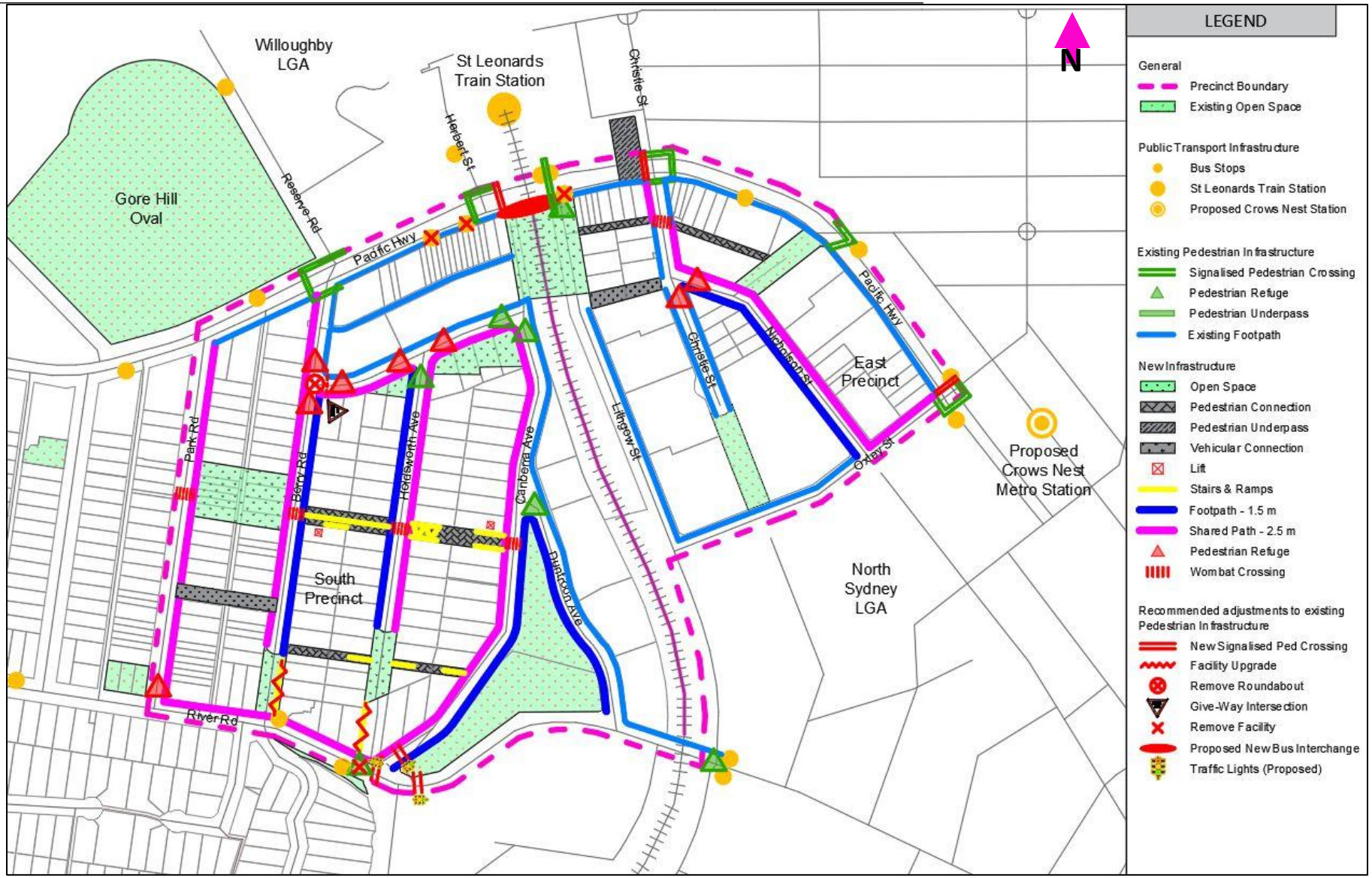


Figure 10: Recommended Pedestrian Network

5.3.2.2. Pacific Highway/ Herbert Street Intersection

At this T-intersection, a pedestrian crossing facility is provided at the west and north approaches. However, the St Leonards station is located at the north-east corner of this intersection. Therefore, pedestrians have to cross two legs of this intersection to travel to/ from the south.

To improve pedestrian connectivity, an additional pedestrian crossing facility is recommended on the east approach of the intersection. Based on our initial Stakeholder Consultation, Willoughby City Council would likely be supportive of this proposal. The existing pedestrian crossing facility at the west approach of this intersection could be retained or removed, subject to discussion with the Roads and Maritime Services (RMS).

5.3.2.3. Pacific Highway/ Christie Street Intersection

Currently a pedestrian crossing facility is provided at the north, east and south approaches. However, the St Leonards station is located at the north-west corner where a direct pedestrian access to the station is provided via Sergeants Lane. To and from the south, pedestrians have to cross two legs at this intersection to access the station. During the site inspection, a strong north-south pedestrian desire line was noted at this intersection throughout the day.

A proposed new pedestrian underpass near this intersection will establish the north-south pedestrian connection to/ from the station. However, to establish the bike connectivity to the north (as Christie Street is a major regional bike route), an at grade crossing facility is recommended at the west approach of this intersection.

5.3.2.4. Pacific Highway/ Oxley Street Intersection

Currently a pedestrian crossing facility is provided at the west, east and south approaches at this intersection. There is no crossing facility at the north approach. It is understood, as part of the Sydney Metro development, a pedestrian crossing facility will be considered as part of this approach.

As Pacific Highway/ Oxley Street intersection is the only access point to the highway from this precinct, a pedestrian crossing facility at the north approach will affect the outbound traffic movement from the east precinct. It is understood that Lane Cove Council, in its submission to Sydney Metro Authority, objected to any at grade pedestrian crossing facility at the north approach of this intersection and requested for a grade separated crossing facility at this location. The outcome of the request is unknown at this stage.

Due to the additional pedestrian trips that will be generated by the Crows Nest metro station, a pedestrian crossing facility will likely be required at the north approach at this intersection. An at grade crossing facility could be considered as an interim basis which will provide both pedestrian and bike connectivity. Any future development along both sides of the highway may provide an opportunity for a grade separated crossing facility at this approach. It should however be noted that based on the stakeholder discussions, North Sydney Council would likely be supportive of an at grade crossing facility (as it will also provide bike connectivity) and opposed to any grade separated crossing facility along the highway.

During the site inspection, it was noted that the existing pedestrian ramps at the above signalised intersections do not conform to RMS standards. Therefore, all pedestrian ramps at these signalised intersections should be reviewed and upgraded in due course.

5.3.3 River Road/ Canberra Avenue Intersection

This intersection is currently left-in/left-out operation to/ from Canberra Avenue. As stated in section 3.1, a substandard refuge island is provided in River Road. Traffic lights are recommended at this intersection which will not only establish the regional pedestrian and bicycle connectivity to North Sydney Council (e.g. Wollstonecraft station) but also provide a secondary vehicular access to/ from the southern precinct, in addition to the Pacific Highway/ Berry Road signalised intersection. Discussion should be held with North Sydney Council for this signalised crossing for incorporating Russell Street.

As an alternative, a signalised pedestrian crossing could be considered in River Road just west of Canberra Avenue.

As part of the development of the southern precinct, the existing pedestrian connection between Berry Road/ Holdsworth Avenue with River Road should be upgraded with appropriate night time lighting. A pedestrian overpass between Berry Road and Wilona Avenue would be beneficial to establish a regional pedestrian and bike connection between the southern precinct and Wollstonecraft station. However, North Sydney Council may object to any grade separated crossing facility.

5.3.4 Sydney Metro

The Crows Nest Metro will generate significant pedestrian trips from all directions. Therefore, a high capacity low delay DDA compliant pedestrian connection will be required from the south. Sufficient footpath width will be required along the Pacific Highway frontage as it will be the primary pedestrian desire line in the future. Shop awnings along the highway will provide weather protection which will be attractive to the pedestrians to/ from the Metro station. Therefore, future development plans along the highway should consider necessary setbacks and pedestrian desire lines.

5.3.5 Plaza Development

The current access to the station from the southern precinct is not ideal as a degree of back-tracking is required due to the current location of signalised crossings from Canberra Avenue. The proposed open space plaza over the railway line at St Leonards will enhance freedom of movement for pedestrians and cyclists across the railway line. It is recommended that an east-west pedestrian and bike connection over the railway line is established to improve amenity and directness between the south and east precincts. Connection by stairs only at Canberra Avenue would not be suitable for bike connectivity.

5.3.6 New Pedestrian Underpass

The proposed new pedestrian underpass, located east to the proposed plaza, will minimise pedestrian and vehicular conflicts and will improve the pedestrian journey time to the station from the eastern and southern precincts.

The existing pedestrian underpass could be retained with minor upgrades on the southern end. Opening of the redundant pedestrian underpass between St Leonards station and Canberra Avenue could be investigated.

5.3.7 Recommendations for Pedestrian Network

The above recommended pedestrian networks are considered to be sufficient to cater the estimated additional daily pedestrian trips (approximately 2,200) generated by the future developments in the eastern and southern precincts.

5.4 Bicycle Network

The future bike network within the southern and eastern precincts should be integrated with the key public transport hubs and its diverse land uses such as residential, commercial, parks, hospital, educational institutions etc. A connected and accessible bicycle facility should also satisfy the needs of specific user groups by providing a common and legible network.

The proposed bicycle network in the study area is shown in Figure 11. The key consideration in developing the bike network is to establish the east-west and north-south connection to the diverse land uses and transport hubs.

Cycling access within the study area is very limited and the current bike network is nearly non-existent. As such a connected bike network is recommended which will establish both the local and regional connections. As stated in section 5.3.1, shared paths are recommended at least one side of the north-south and east-west roads.

Council has recently constructed a shared path on the northern side of River Road between Greenwich Road and the Greenwich Public School. It is therefore recommended to extend the shared path further to the east until Canberra Avenue. This will also provide an alternative bike connection between the southern precinct and Wollstonecraft station via Greenwich Road and Greendale Street.

A grade separated underpass will not ensure the bike connectivity across the Pacific Highway. Therefore, additional at grade crossing facilities are recommended at Pacific Highway at its intersections with Herbert, Christie and Oxley Streets. To the south, an at grade bike connection is recommended in River Road by a signalised crossing facility.

5.4.1 Bicycle Parking & End of Trip Facility

Bicycle lanterns could be installed at all signalised crossing facility in both the precincts. Bicycle parking at the St Leonards station could be upgraded with weather protection. Sufficient bike parking could be provided at the proposed plaza.

As part of the Sydney Metro development, bike parking will be provided at both station entries. The station should be equipped with secure bicycle parking and amenities. More secure bicycle parking along with good network coverage will encourage greater cycling mode share.

Lane Cove Council's DCP (Part R) requires a Green Travel Plan for large scale commercial developments. In accordance with the Council's DCP, all commercial developments should have end of trip facilities (e.g. separate male and female shower facility).

5.4.2 Wayfinding

Both the precincts currently lack wayfinding signage for cyclists and there is an opportunity to improve wayfinding in a more consistent approach between the LGAs. All bicycle routes should be supported by appropriate wayfinding signage, painted bicycle stencils and turning arrows.

Appropriate wayfinding signage could be provided to the future Crows Nest Metro station, St Leonards station, the plaza and other key land uses.

5.4.3 Recommendations for Bicycle Network

The recommended well-connected cycleway network is considered to be sufficient to cater for the additional daily cycling trips (approximately 650) generated by the future developments in the study area.

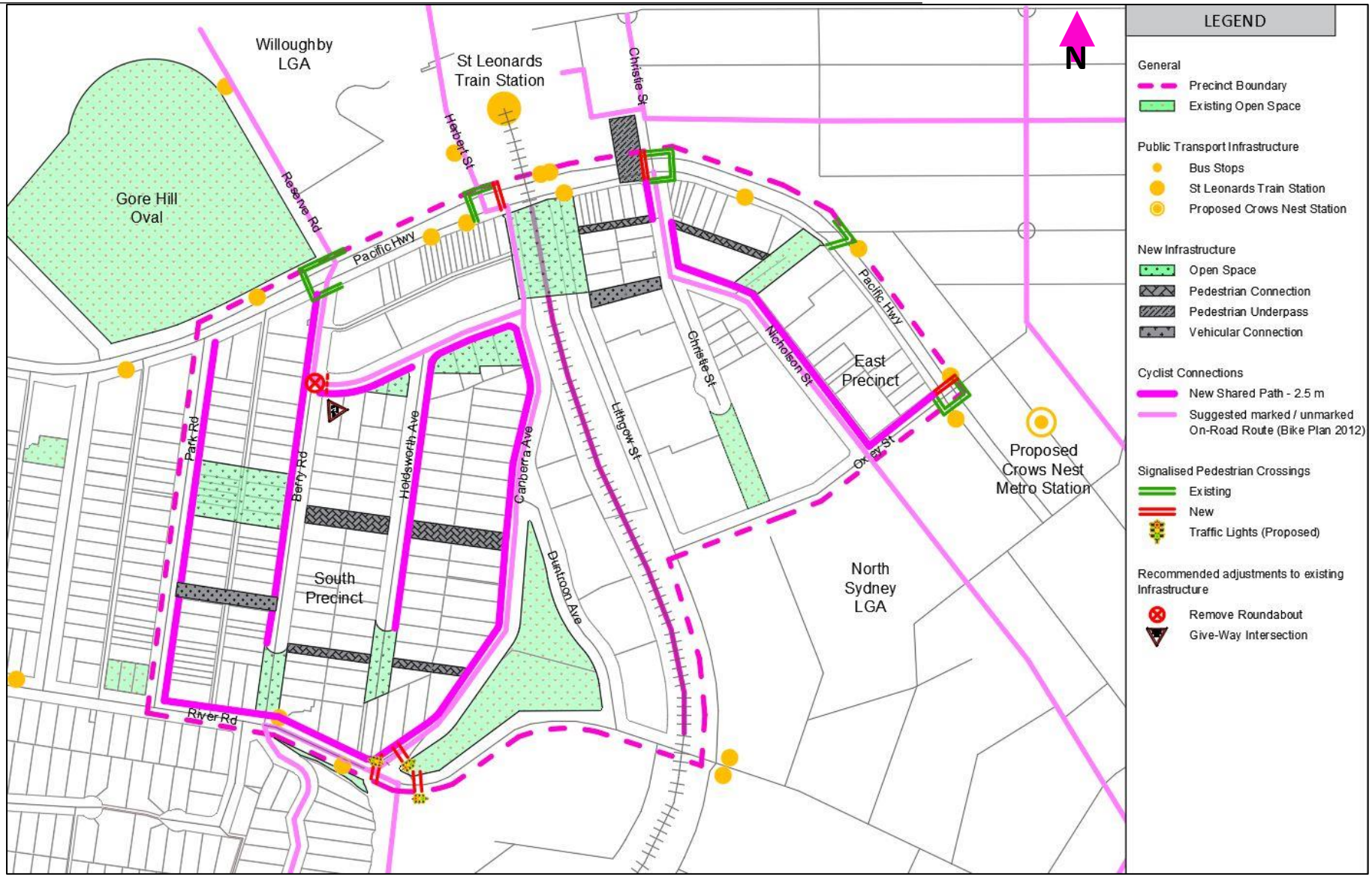


Figure 11: Recommended Bicycle Network

5.5 Public Transport Demand & Capacity Analysis

The strategic significance of the Precinct is in part, derived from its connectivity to the greater Sydney region via public transport services. The effectiveness of these public transport services will be a critical driver in realising the population and employee growth targets over the next 20 years.

5.5.1 Travel Zone Analysis

The Bureau of Transport Statistics (BTS) provides journey to work (JTW) data across the NSW region. This data provides information regarding the origin and destination of trips between home and place of employment, as well as travel mode. The data is grouped by 'travel zones' (TZ), which are smaller than local government areas (LGA), and are typically characterised by:

- a homogenous land-use,
- boundaries following topographical features,
- relatively constant population between adjacent zones, and
- contains no more than one freeway, interchange or train station.

The study area comprises part of 3 travel zones (Ref 1832, 1844 & 1911), as shown in Figure 12. The location of workplaces on the residents in these areas is outlined in Figure 13, whilst the place of residence for the employees within the study area is outlined in Figure 14.

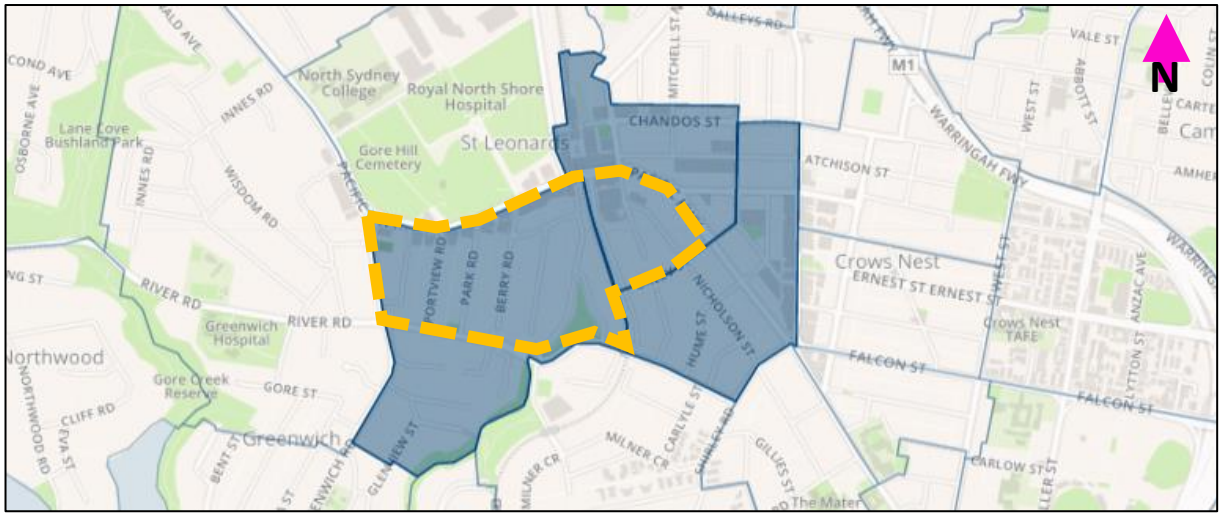


Figure 12: Travel Zones (BTS)

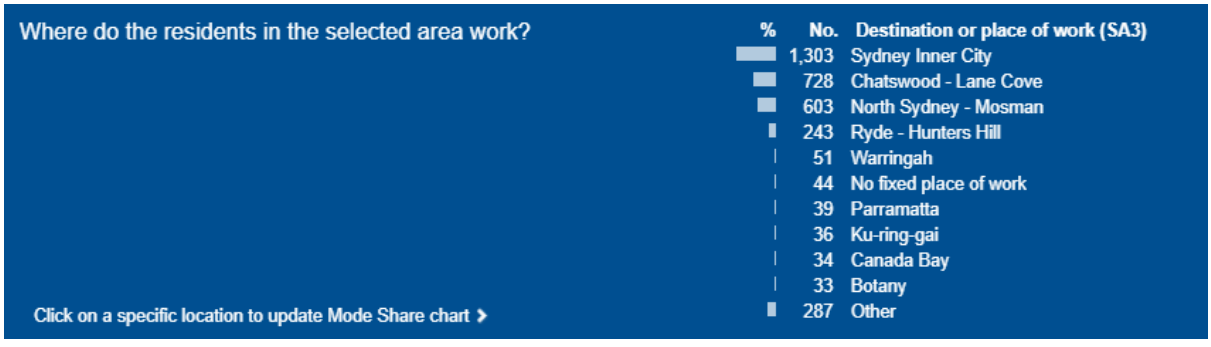


Figure 13: Workplace Location of Residents within Study Area

Figure 14: Place of Residence for Employees within Study Area

In summary, this data highlights that a dominant proportion of residents within the study area work in the City, with Chatswood, Lane Cove, North Sydney and Ryde also being notable workplace destinations. In regards to employees within the study area, their place of residence is more widely distributed across Sydney, with key places including Chatswood, Lane Cove, North Sydney, Ku-ring-gai, City, Warringah and Ryde.

When integrating the existing bus services, train lines and future metro line, a high-level public transport coverage map can be developed, as shown in Figure 15. When considering this public transport coverage in conjunction with key travel destinations outside the precinct, it is noted that major workplace or residential hubs including the City, Chatswood, Ku-ring-gai and North Sydney are very well connected via train, metro and bus.

Notwithstanding, it is noted that Ryde and Warringah have very poor connectivity in regards to available options, directness and frequency. Considering that 11% of employees within the study area live in Ryde and Warringah, and 8% of residents in the study area work in these areas, improved connectivity to Ryde and Warringah may be warranted.

5.5.2 Train

As stated in section 3.3.1, during the AM and PM peak hours, 19 trains operate at St Leonards station, of which 15 trains run along the T1 North Shore line and four (4) trains on the T1 Northern Line via Macquarie Park in both directions. Given the suburban capacity, with a maximum of 20 trains per hour per direction, the line appears to be close to capacity.

In 2014, during the AM peak hour approximately 18,000 passengers travelled in city bound direction. At this station, the largest number of commuters is OUT in the AM peak and IN in the PM peak.

With the additional 7,500 residents and 3,700 employees in the southern and eastern precincts, it is likely that the demand for train services will exceed the capacity. This additional transport demand will need to be supplemented by the Metro in this precinct.

5.5.3 Metro

By 2024, Sydney Metro will be extended into the Sydney CBD and beyond to the south-west (Bankstown) covering St Leonards area. The Metro will have a target capacity of about 40,000 passengers per hour, as opposed to current heavy rail capacity of 24,000 passengers per hour. It will run an ultimate frequency of one train in every two (2) minutes during the peak hours so that customers will not require any timetable. This will reduce waiting time at the Crows Nest Metro as passengers will able to “turn up and go”, as opposed to pre-plan to co-ordinate with a specific train.

Sydney Metro, together with signalling and infrastructure upgrades across the existing Sydney rail network, will increase the train capacity by more than twice the existing. Therefore, the daily additional passenger demand (estimated 7,000) due to the developments within the study area can easily be accommodated by the operation of Sydney Metro.

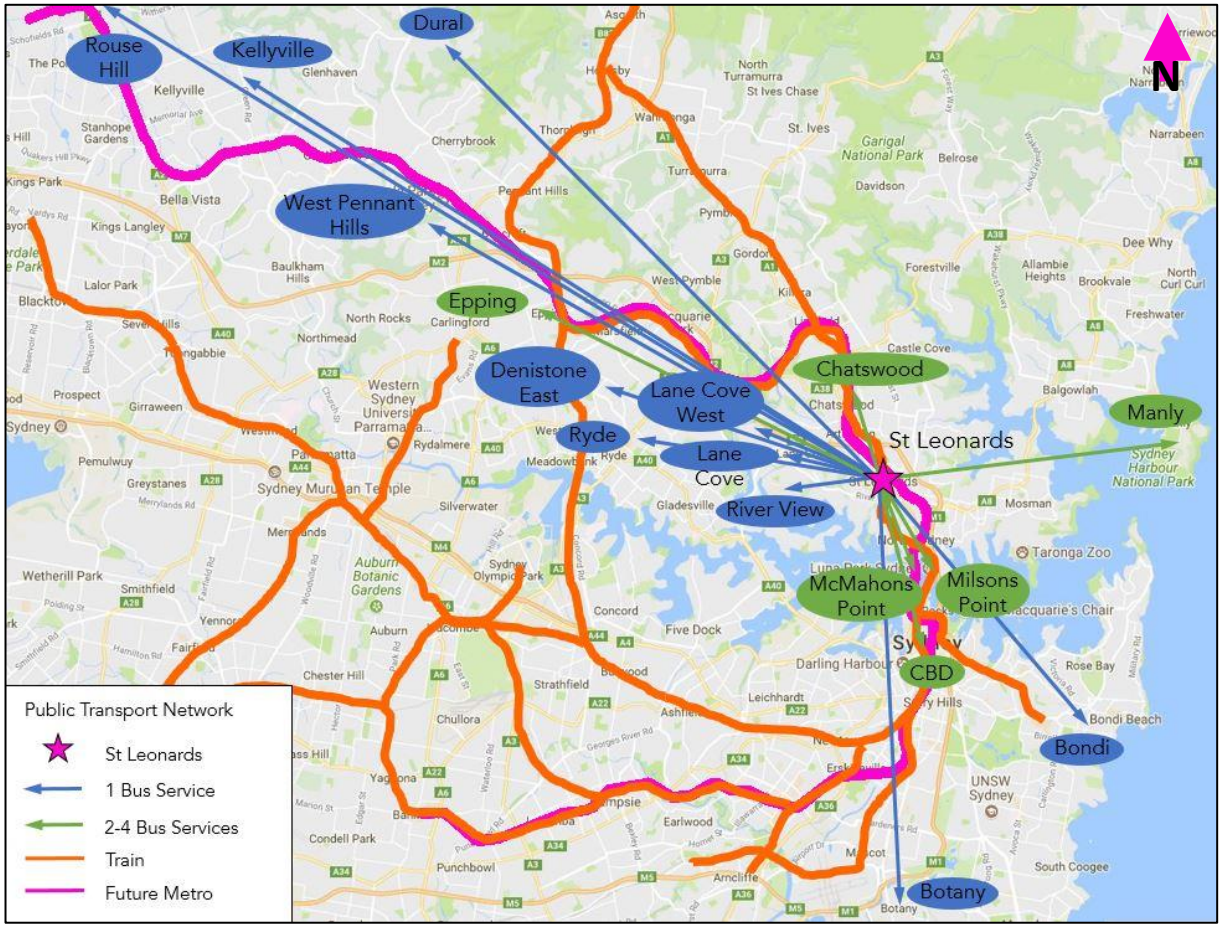


Figure 15: Combined Public Transport Network at St Leonards

5.5.4 Bus

As stated in section 3.3.2, currently St Leonards is well served by the bus network. Considering the integrated transport map in Figure 15, it is evident that upon arrival of Sydney Metro, the network efficiency will increase extensively, to as far as Rouse Hill (north-west) and Bankstown (south-west). Therefore, in the long term, an opportunity will arise to reform the bus network coverage in the lower North Shore area by facilitating greater interchange from bus to railway and Metro. For example, currently bus route services are provided to Rouse Hill, West Pennant Hills, Chatswood to the north-west and Milsons Point, Sydney CBD to the south-east covering the St Leonards area. These services could be rerouted to other areas without covering the St Leonards area as high frequency alternate transport mode is readily available in this precinct.

The recommended reform of the bus network and operation of the NorthConnex motorway are likely to improve capacity at the Pacific Highway which could be redistributed to dedicated bus lanes or cycleway lanes along the highway. However, this proposal would require extensive traffic modelling, discussion and liaison with various transport authorities, including TfNSW and RMS.

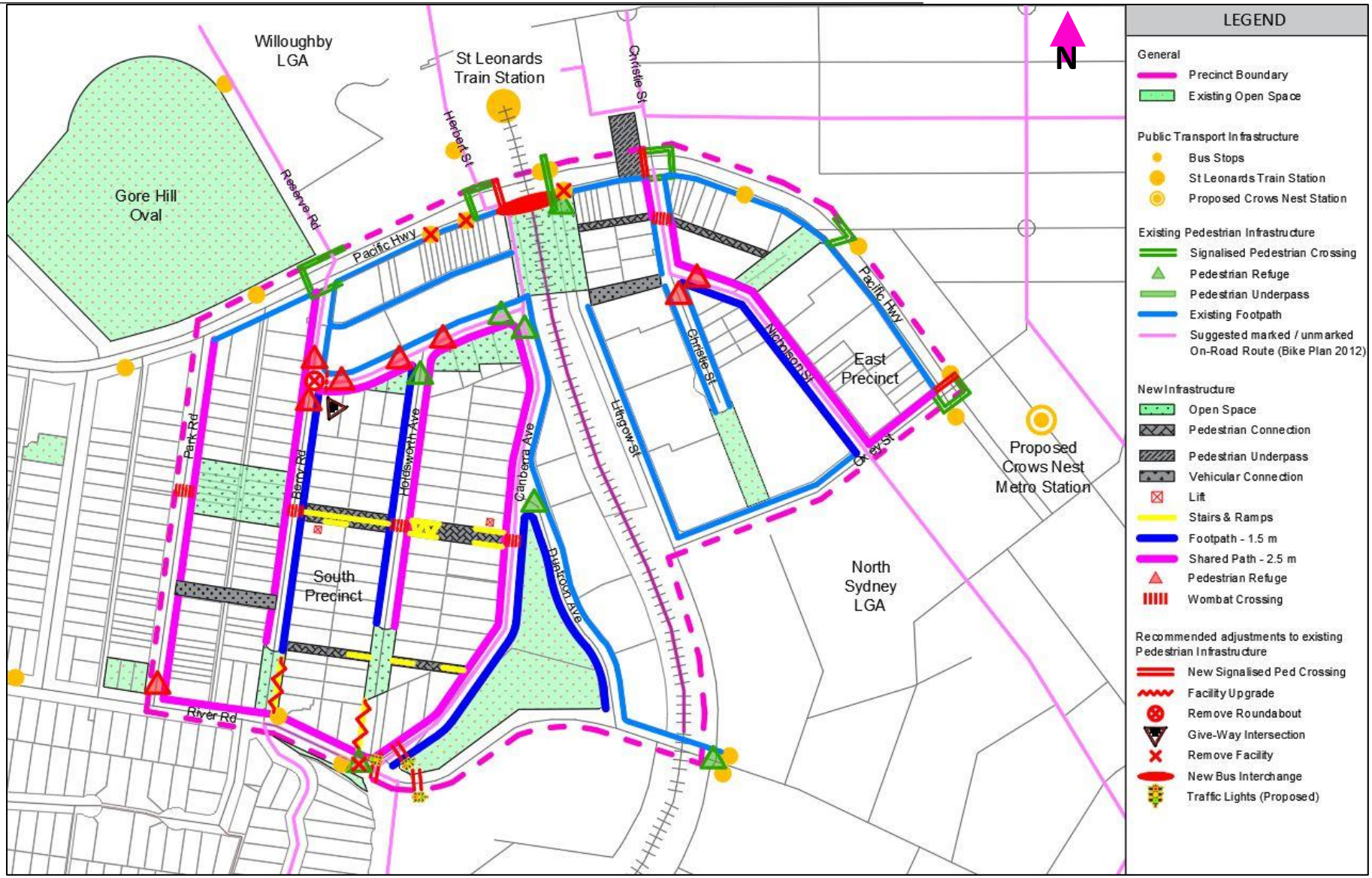


Figure 16: Recommended Pedestrian, Bike and Public Transport Infrastucture (combined)

As part of the Crows Nest metro development, existing bus stops on Pacific Highway close to the station will be retained. However, it appears that there is a bus layover shortage in the lower North Shore area. A bus interchange could be incorporated within the plaza development (Figure 16). There are four (4) existing bus stops on the southern side of Pacific Highway in the study area. These bus stops could be integrated into a bus interchange at the plaza.

By 2022, all bus stops should be upgraded to DDA compliant as required by the State Government legislation. Upon construction, the pedestrian and public transport infrastructure and networks should be maintained at a high quality to encourage their use within and around the St Leonards area.

Following the operation of Sydney Metro, rerouting some bus routes along with some bus priority measures in the Pacific Highway should be sufficient to cater the additional daily bus trips (approximately 800) generated by the future developments in the study area.

5.5.5 Taxi

As stated in section 3.3.3, there is no existing taxi zone in or around St Leonards station. With the growing popularity of Uber services, a designated Taxi Zone and 'kiss & ride' facility is warranted on both sides of the Pacific Highway. A designated Taxi Zone could be considered as part of the plaza development. If any Taxi Zone is not feasible along the highway, alternate taxi or 'kiss & ride' facility could be considered in the side streets with good accessibility in the highway.

As part of the Crows Nest Metro station, 'kiss & ride' facility and Taxi Zones will be provided in Clarke Street under North Sydney LGA.

5.5.6 Wayfinding

Good public transport should be substantiated by good wayfinding strategies to improve their usage and accessibly. Therefore, all bus, train and Metro stops should be incorporated with good wayfinding signage in the study area.

5.5.7 Parking Restriction in Residential Streets

As stated in section 3, currently 53% employees drive to St Leonards. Given the good public transport availability with extensive network coverage, this proportion of employees driving to the precinct is higher than any comparable major regional centre. This is partly attributed to the available unrestricted parking within walking distance, such as current unrestricted parking in Holdsworth Avenue.

Therefore, with the development of the southern and eastern precincts, time restricted meter parking (not Residential Parking Scheme) could be considered at a later stage.

6. Conclusion

This report has undertaken a cumulative assessment for the future pedestrian, cyclist and public transport demand associated with the growth of the southern and eastern precincts at St Leonards. The key points of the cumulative assessment are summarised below:

- There are many gaps and missing links at the pedestrian networks in both the precincts. The existing steep topography in the southern precinct and high traffic volume in the Pacific Highway with minimum crossing facilities acts as a major pedestrian barrier between the precincts and the station;
- Despite enormous potential, the existing on-road bike network is currently disjointed, unattractive and winds thought the local road network resulting minimum cycling opportunity for all user groups;
- The existing train service (T1 line) is nearing capacity which will be supplemented by the future Crows Nest Metro from 2024;
- The existing bus network in the locality has good coverage; however, the bus usage at the precinct is relatively low possibly for the unreliable travel time due to high congestion of the Pacific Highway;
- There is a high proportion of employees driving into St Leonards area, possibly due to availability of unrestricted parking within walking distance of the study area;
- A better, well connected and attractive bike and pedestrian infrastructure, associated with good wayfinding signage will improve pedestrian trips to the major transport hubs and diverse land uses in these precincts;
- A number of at grade pedestrian crossings at the existing signalised intersections with the Pacific Highway will improve local and regional north-south pedestrian and cyclist connectivity between the LGAs. To the south, a signalised crossing facility on River Road will improve the pedestrian and cyclist connectivity to North Sydney Council (e.g. Wollstonecraft station);
- Following the operation of the Metro services, the bus network at St Leonards could be reviewed and some bus routes could be redirected to other areas;
- The Sydney Metro will likely double the existing city rail capacity at St Leonards and will likely cater for the future public transport demand at this precinct; and
- The proposed plaza over the railway line and the additional pedestrian underpass across the Pacific Highway will improve the pedestrian connectivity and permeability in the area, however, the plaza should also establish the east-west bike connectivity.

Therefore, the pedestrian, cyclists and public transport demand generated by the planned developments in the study area will easily be accommodated by the recommended measures outlined in this report.

Attachment 1 TfNSW Letter

NSW GOVERNMENT | Transport for NSW

General Manager
Lane Cove Council
PO Box 20
Lane Cove NSW 1595

Attention: Mr Christopher Pelcz (Strategic Planner)

Draft South St Leonards Master Plan – SU5573

Dear Sir

Thank you for the correspondence from Lane Cove Council received on 10 March 2015 regarding the public exhibition of the above Master Plan proposal in St Leonards and Greenwich.

Roads and Maritime will be providing a separate response.

TfNSW recognises and supports the policy direction outlined within the Metropolitan Strategy "*A Plan for Growing Sydney*" to accommodate an additional 664,000 new dwellings by 2031 through *Direction 2.1: Accelerate Housing Supply across Sydney*, and *Direction 2.2: Accelerate Urban Renewal across Sydney* and subsequent actions including:

- Action 2.1.1: Accelerate Housing Supply and Local Housing choices;
- Action 2.2.2: Undertake Urban Renewal in Transport Corridors which are being Transformed by Investment, and Around Strategic Centres

TfNSW also recognises that *Direction 1.6: Expand the Global Economic Corridor* and *Direction 1.7: Grow Strategic Centres* identifies St Leonards as one of Sydney's Strategic Centre along the Global Corridor and is proposed as an area of intense, mixed economic and social activity that are built around the transport network. The following actions are also supported:

- Action 1.6.1: Grow High-Skilled Jobs in the Global Economic Corridor by Expanding Employment Opportunities and Mixed-Use Activities
- Action 1.7.1: Invest in Strategic Centres Across Sydney to Grow Jobs and Housing and Create Vibrant Hubs of Activity

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www.transport.nsw.gov.au
ABN 18 804 239 602

TfNSW is therefore supportive of the subject Master Plan proposal, as it will increase housing density and activate St Leonards to fulfil its role as a Strategic Centre and provide a mixture of uses to support the Transport Network.

If Council decides to proceed with the proposal and a 'Gateway' approval is granted by the Department of Planning & Environment, then TfNSW requests that a Transport and Accessibility Assessment be prepared to support the Master Plan proposal. Given the scale of the preferred option which is estimated generate an increase of some 2,000 dwellings, the proposal is likely to have an impact on the existing and future Transport network. The requirements of the Transport and Accessibility Assessment are outlined in **TAB A**.

Thank you again for the opportunity of providing advice for the subject Planning Proposal. If you require clarification of any issue raised, please don't hesitate to contact Edmond Platon, Transport Planner on 8202 2557 or edmond.platon@transport.nsw.gov.au

If you require any clarification of any issue raised, please don't hesitate to contact Mark Ozinga on 8202 2198.

Yours sincerely

16/4/15

Mark Ozinga
Manager Land Use Planning and Development
Planning

CD15/04248

TAB A

Transport and Accessibility Assessment

TfNSW requests that a Transport and Accessibility Assessment be prepared to support the Master Plan proposal as part of the 'Gateway' process. The Transport and Accessibility Assessment should address the following:

1. An estimate of the total daily and peak hour trips generated by the proposal including vehicle, public transport, pedestrian and cycle trips.

2. The traffic and safety impact of vehicle movements (daily and peak) on the existing and future road network particularly at surrounding intersections (including affected signalised intersection along Pacific Highway), with consideration of the cumulative impacts from other approved developments in the area.

3. Assessment of the additional public transport trips generated by the proposal and the impacts on existing and future public transport (i.e. bus and rail) services and infrastructure.

4. Details of measures to mitigate traffic, public transport and road safety impacts including the need/associated funding for road improvement works.

   It is noted that the Pacific Highway is a major arterial road at this location carrying significant traffic volume including a high number of public transport and high productivity vehicles. Therefore, any proposals that would impact on through traffic along Pacific Highway and public transport services will need careful consideration as they are unlikely to be supported.

5. Consideration and assessment of measures to promote travel choices that support the achievement of State targets, such as a location-specific sustainable travel plan and sustainable travel initiatives, including the provision of end-of-trip facilities for pedestrians and cyclists. This includes prioritising walking and cycling within a 2km and 5km radius of the St Leonards Station respectively as stated within *Sydney's Walking Future*.

   The following bicycle and pedestrian facilities should be considered in the assessment:
   - The proposed additional connections across Pacific Highway including provision of crossings on all legs of signalised intersections. However as detailed in (4) above, impacts on through traffic and public transport services will need to be carefully considered.
   - Provision of bicycle lanterns at signalised crossing locations along bicycle desire lines.
   - Safe and efficient crossings across River Road (particularly near the intersection of River Road/Canberra Avenue) to provide pedestrian access to existing bus stops on the southern side of River Road.

Attachment 2 NSW Planning & Environment Gateway Determination for St Leonards South Letter

NSW GOVERNMENT | Planning & Environment

Our ref: PP_2016_LANEC_001_00 (16/08397)

Mr Craig Wrightson
General Manager
Lane Cove Council
PO Box 20
Lane Cove NSW 1595

Dear Mr Wrightson

Planning proposal to amend Lane Cove Local Environmental Plan 2009

I am writing in response to Lane Cove Council's letter dated 19 May 2016 requesting a Gateway determination under section 56 of the *Environmental Planning and Assessment Act 1979* (the Act) in respect of the planning proposal to amend zoning, floor space ratio, lot size and height of buildings controls *under Lane Cove Local Environmental Plan 2009* for the St Leonards South Precinct

As delegate of the Greater Sydney Commission, I have now determined the planning proposal should proceed subject to the conditions in the attached Gateway determination.

Council may still need to obtain agreement of the Secretary to comply with the requirements of relevant S117 Directions. Council should ensure this occurs prior to the plan being made.

Plan making powers were delegated to councils in October 2012. It is noted that Council has requested to be issued with delegation for this planning proposal. I have considered the nature of Council's planning proposal and have decided not to issue an authorisation for Council to exercise delegation to make this plan.

The amending Local Environmental Plan (LEP) is to be finalised within 12 months of the week following the date of the Gateway determination. Council should aim to commence the exhibition of the planning proposal as soon as possible. Council's request for the Department of Planning and Environment to draft and finalise the LEP should be made 6 weeks prior to the projected publication date.

The State Government is committed to reducing the time taken to complete LEPs by tailoring the steps in the process to the complexity of the proposal, and by providing clear and publicly available justification for each plan at an early stage. In order to meet these commitments, the Greater Sydney Commission may take action under section 54(2)(d) of the Act if the time frames outlined in this determination are not met.

Should you have any queries in regard to this matter, I have arranged for Ms Lauren Templeman at the Department's Sydney East Region team to assist you. Ms Templeman can be contacted on (02) 9228 6590.

Yours sincerely

2/9/16

Dr Oliver Holm
Acting Deputy Secretary
Planning Services

Encl: Gateway Determination

NSW GOVERNMENT | Planning & Environment

Gateway Determination

***Planning proposal (Department Ref: PP_2016_LANEC_001_00)**: to amend zoning, floor space ratio, lot size and height of buildings controls under Lane Cove Local Environmental Plan 2009 for the St Leonards South Precinct.*

I, the Acting Deputy Secretary, Planning Services at the Department of Planning and Environment as delegate of the Greater Sydney Commission, have determined under section 56(2) of the *Environmental Planning and Assessment Act 1979* (the Act) that an amendment to the *Lane Cove Local Environmental Plan 2009* to amend zoning, FSR, lot size and building height controls should proceed subject to the following conditions:

1. Prior to public exhibition, the planning proposal is to be updated to:

   a) justify the inconsistency with s.117 Direction 2.3 Heritage Conservation, via a study to assess the impacts of the proposal on local heritage houses located at 3, 5 and 7 Park Road;
   b) justify the inconsistency s.117 Direction 3.1 Residential Zones and s.117 Direction 3.4 Integrating Land Use and Transport, via a traffic and accessibility study focussing on the impacts of the current proposal and other approved proposals in the immediate area;
   c) demonstrate that there is no inconsistency with SEPP Affordable Rental Housing;
   d) replace proposed clauses 4.6(8)(ca), 5.1 and 6.8 with a 'plain English' explanation to explain Council's intention/ outcomes for the St Leonards South Precinct while allowing flexibility in the drafting of provisions;
   e) include an Incentive Height of Buildings Map and an Incentive Floor Space Ratio Map;
   f) replace the existing Special Provisions Area Map with a non-LEP version; and
   g) include a satisfactory arrangements provision for contributions to designated State public infrastructure identified as part of a draft or final strategic planning review for the St Leonards and Crows Nest Station Precinct.

   The amended planning proposal is to be submitted to the Department for review prior to exhibition.

2. A draft Development Control Plan for the St Leonards South Precinct area is to be exhibited with the planning proposal in order to clarify intended built form outcomes for the precinct and justify any non-compliance with SEPP 65 design criteria.

3. Consultation is required under sections 56(2)(c) and 57 of the Act as follows:

   a) The planning proposal is classified as routine as described in *A Guide to Preparing Local Environmental Plans* (*Department of Planning and Infrastructure 2013*) and must be made publicly available for a minimum of 28 days.

   b) The relevant planning authority must comply with the notice requirements for public exhibition of planning proposals and the specifications for material that must be made publicly available along with planning proposals as identified in section 5.5.2 of *A Guide to Preparing LEPs (Department of Planning and Infrastructure 2013).*

4. Consultation is required with the following agencies under section 56(2)(d) of the EP&A Act:
   - Planning and Environment: Urban Renewal
   - Transport for NSW: Sydney Trains;
   - Transport for NSW: Road and Maritime Services;
   - Willoughby Council;
   - North Sydney Council;
   - Environment and Heritage;
   - Education and Communities;
   - Northern Sydney Local Health District;
   - Royal North Shore Hospital;
   - Sydney Airport Corporation Ltd;
   - Department of Infrastructure and Regional Development; and
   - Civil Aviation Safety Authority.

   The agencies are to be provided with a copy of the planning proposal and any relevant supporting material, and given at least 21 days to comment on the proposal.

5. A public hearing is not required to be held into the matter by any person or body under section 56(2)(e) of the Act. This does not discharge Council from any obligation it may otherwise have to conduct a public hearing (for example, in response to a submission or if reclassifying land).

6. The timeframe for completing the LEP is to be 12 months from the week following the date of the Gateway determination.

7. All LEP maps are to be consistent with the Department's *Standard Technical Requirements for Spatial Datasets and Maps 2015.*

NSW GOVERNMENT | Planning & Environment

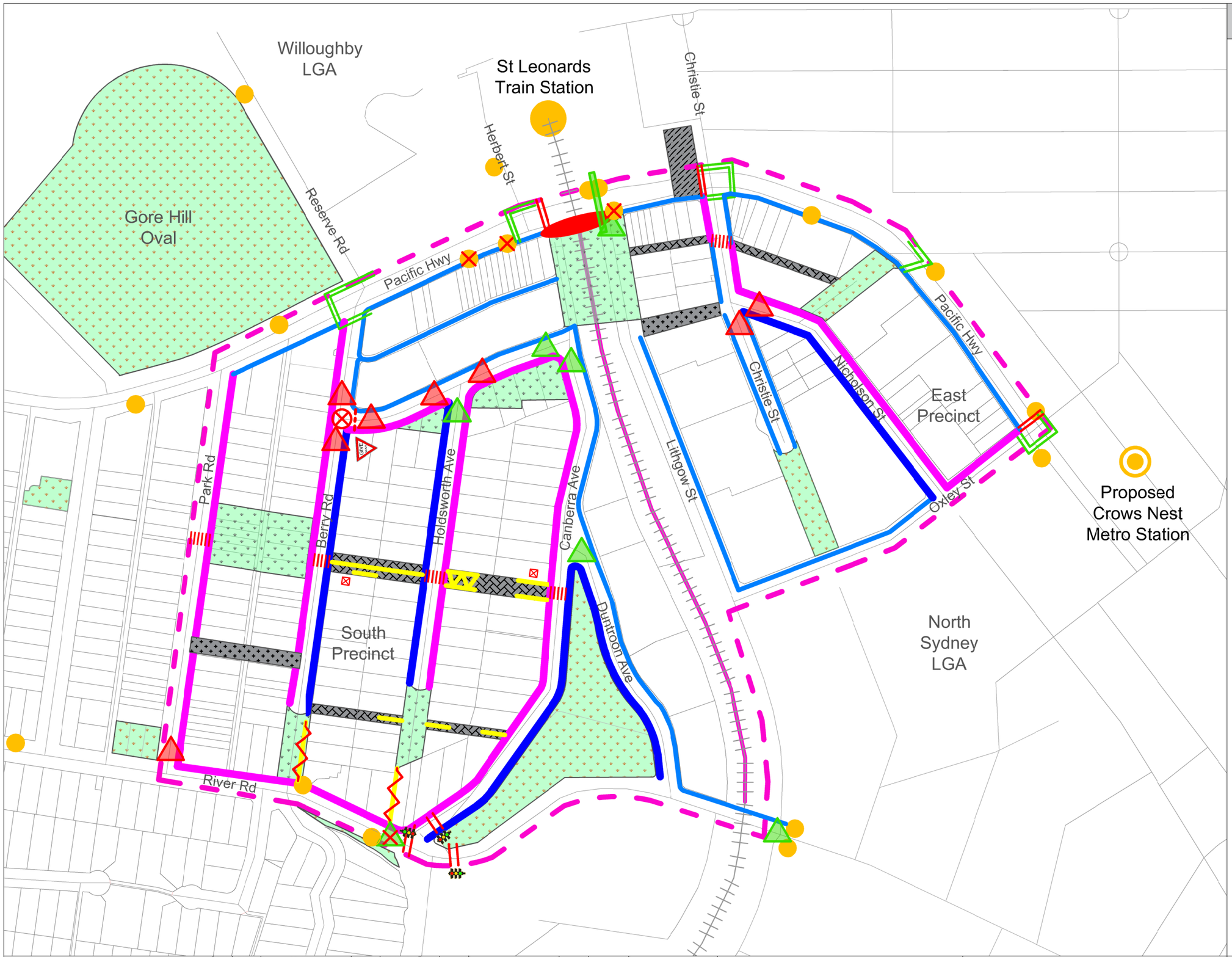
8. Prior to finalisation, the planning proposal is to be amended to demonstrate consistency with any available findings of a draft or final strategic planning review for the St Leonards and Crows Nest Station Precinct.

Dated 2nd day of September 2016

Dr Oliver Holm
Acting Deputy Secretary
Planning Services
Department of Planning and Environment

Delegate of the Greater Sydney Commission

Attachment 3 Maps



LEGEND

General
- Precinct Boundary
- Existing Open Space

Public Transport Infrastructure
- Bus Stops
- St Leonards Train Station
- Proposed Crows Nest Station

Existing Pedestrian Infrastructure
- Signalised Pedestrian Crossing
- Pedestrian Refuge
- Pedestrian Underpass
- Existing Footpath

New Infrastructure
- Open Space
- Pedestrian Connection
- Pedestrian Underpass
- Vehicular Connection
- Lift
- Stairs & Ramps
- Footpath - 1.5 m
- Shared Path - 2.5 m
- Pedestrian Refuge
- Wombat Crossing

Recommended adjustments to existing Pedestrian Infrastructure
- New Signalised Ped Crossing
- Facility Upgrade
- Remove Roundabout
- Give-Way Intersection
- Remove Facility
- Proposed New Bus Interchange
- Traffic Lights (Proposed)

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ptcconsultants.co

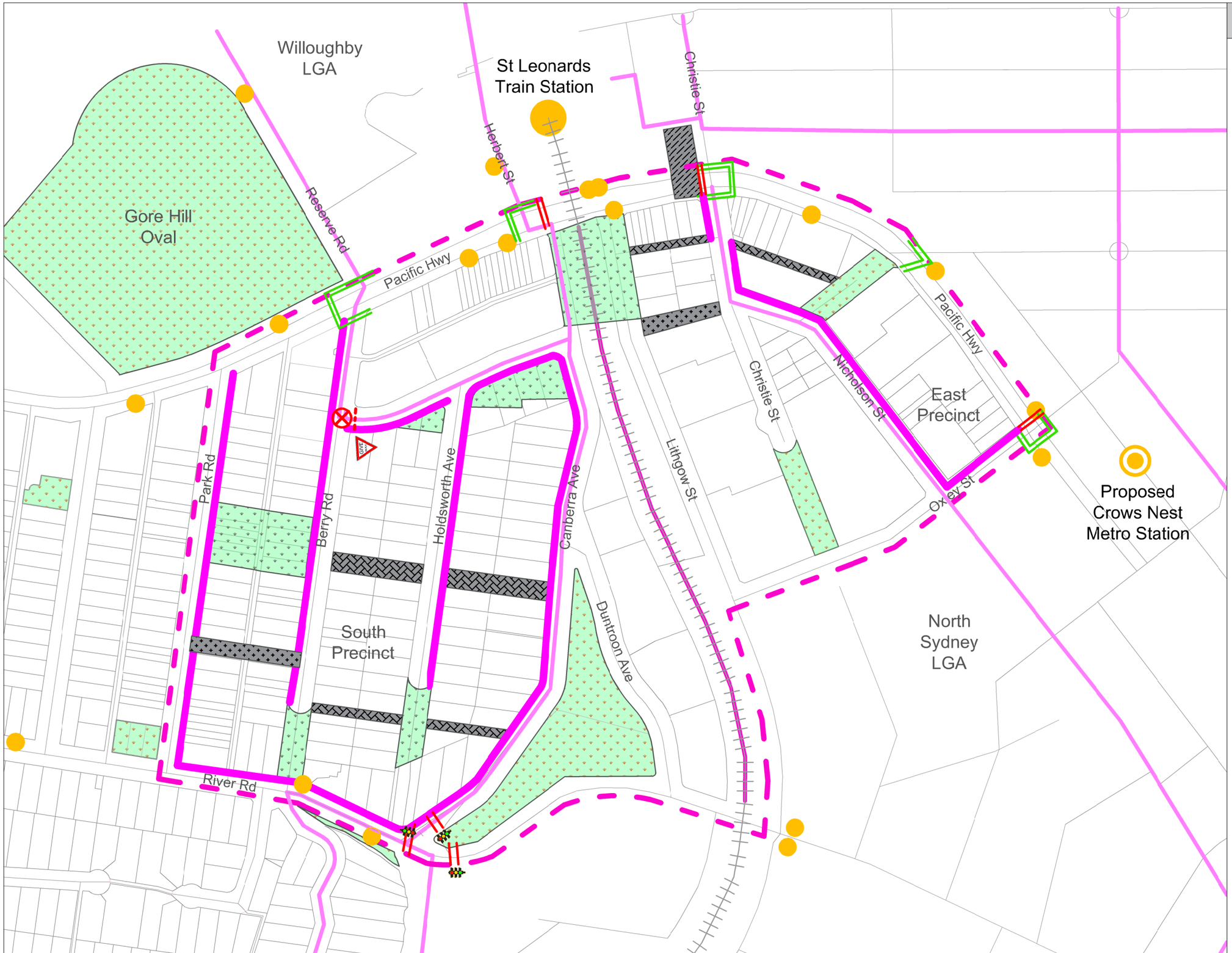
REV	DATE	COMMENT	DRAWN	REVIEWED
2	26/09/17	FOR INFORMATION	KB	AU
1	19/09/17	FOR INFORMATION	KB	AU

PROJECT: St Leonards Cumulative Transport and Accessibility Study

DRAWING TITLE: Recommended Pedestrian Network

CLIENT: Lane Cove Council
DRG. #: PTC-005
PROJECT #: PTC2-2178
SCALE: 1:3000

REV: 2



LEGEND

General
- Precinct Boundary
- Existing Open Space

Public Transport Infrastructure
- Bus Stops
- St Leonards Train Station
- Proposed Crows Nest Station

New Infrastructure
- Open Space
- Pedestrian Connection
- Pedestrian Underpass
- Vehicular Connection

Cyclist Connections
- New Shared Path - 2.5 m
- Suggested marked / unmarked On-Road Route (Bike Plan 2012)

Signalised Pedestrian Crossings
- Existing
- New
- Traffic Lights (Proposed)

Recommended adjustments to existing Infrastructure
- Remove Roundabout
- Give-Way Intersection

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REV	DATE	COMMENT	DRAWN	REVIEWED
3	28/09/17	FOR INFORMATION	KB	AU
2	26/09/17	FOR INFORMATION	KB	AU
1	19/09/17	FOR INFORMATION	KB	AU

PROJECT: St Leonards Cumulative Transport and Accessibility Study

DRAWING TITLE: Recommended Bicycle Network

CLIENT: Lane Cove Council
DRG. #: PTC-006
PROJECT #: PTC2-2178
SCALE: 1:3000
REV: 3

Willoughby LGA

St Leonards Train Station

Gore Hill Oval

Reserve Rd

Herbert St

Christie St

Pacific Hwy

Park Rd

Berry Rd

Holdsworth Ave

Canberra Ave

Lithgow St

Christie St

Nicholson St

Oxley St

East Precinct

Proposed Crows Nest Metro Station

South Precinct

Duntroon Ave

North Sydney LGA

River Rd

LEGEND

General
- Precinct Boundary
- Existing Open Space

Public Transport Infrastructure
- Bus Stops
- St Leonards Train Station
- Proposed Crows Nest Station

Existing Pedestrian Infrastructure
- Signalised Pedestrian Crossing
- Pedestrian Refuge
- Pedestrian Underpass
- Existing Footpath
- Suggested marked / unmarked On-Road Route (Bike Plan 2012)

New Infrastructure
- Open Space
- Pedestrian Connection
- Pedestrian Underpass
- Vehicular Connection
- Lift
- Stairs & Ramps
- Footpath - 1.5 m
- Shared Path - 2.5 m
- Pedestrian Refuge
- Wombat Crossing

Recommended adjustments to existing Pedestrian Infrastructure
- New Signalised Ped Crossing
- Facility Upgrade
- Remove Roundabout
- Give-Way Intersection
- Remove Facility
- New Bus Interchange
- Traffic Lights (Proposed)

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REV	DATE	COMMENT	DRAWN	REVIEWED
2	26/09/17	FOR INFORMATION	KB	AU
1	19/09/17	FOR INFORMATION	KB	AU

PROJECT: St Leonards Cumulative Transport and Accessibility Study

DRAWING TITLE: Recommended Pedestrian, Bike and Public Transport Infrastructure (combined)

CLIENT: Lane Cove Council
DRG. #: PTC-007
PROJECT #: PTC2-2178
SCALE: 1:3000

REV: 2