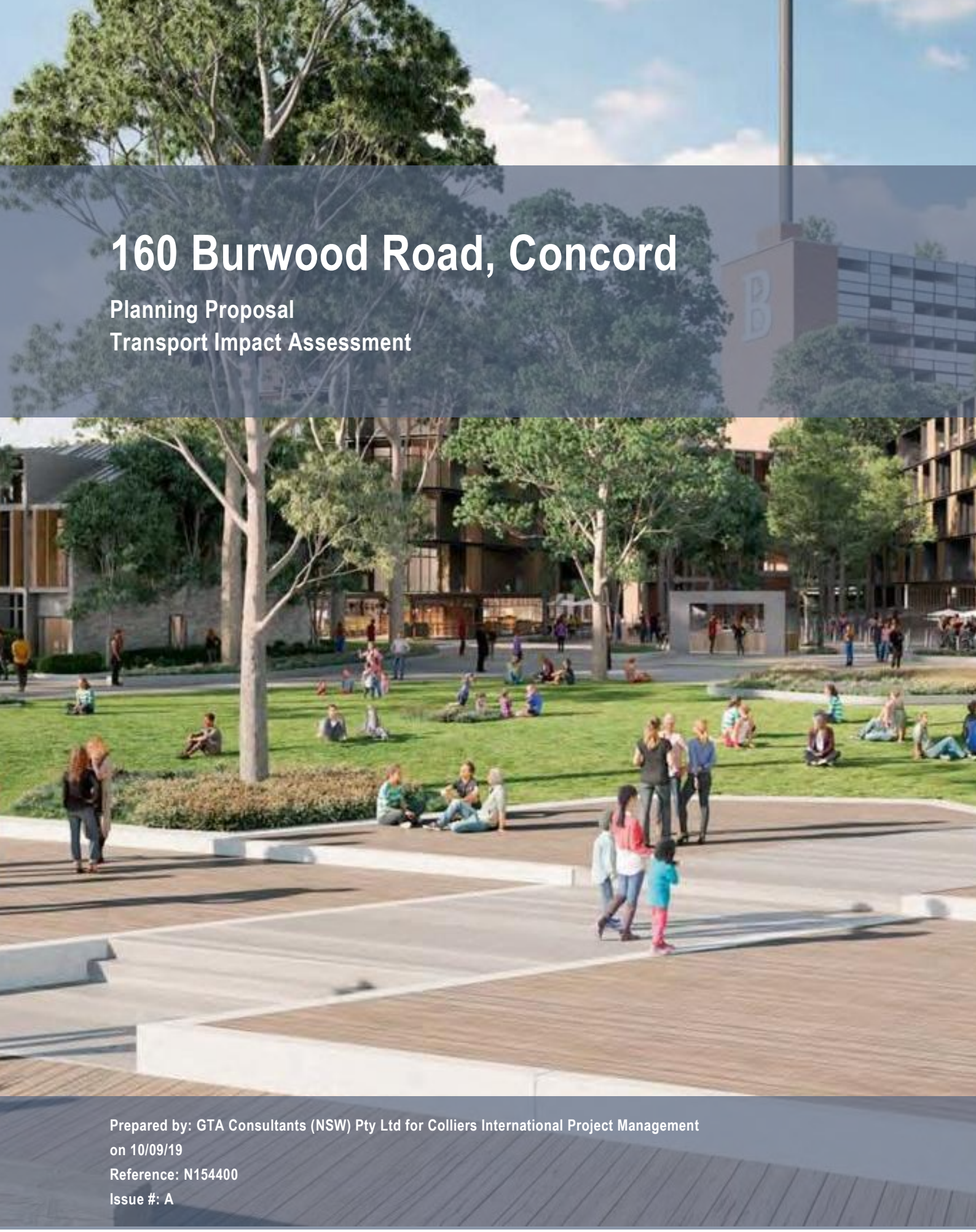

160 Burwood Road, Concord

Planning Proposal
Transport Impact Assessment

Prepared by: GTA Consultants (NSW) Pty Ltd for Colliers International Project Management
on 10/09/19
Reference: N154400
Issue #: A

GTAconsultants

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Quality Record

Issue	Date	Description	Prepared By	Checked By	Approved By	Signed
A	10/09/19	Final	Mackenzie Brinums Mansee Sachdeva	Brett Maynard	Brett Maynard	

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EXECUTIVE SUMMARY

A Planning Proposal has been lodged with City of Canada Bay Council for a mixed use redevelopment of the Bushells factory site located at 160 Burwood Road in Concord. It should be noted that the evolution and assessment of the proposal itself has occurred over several years and has incorporated feedback from several of the transport stakeholders including Council and Roads and Maritime Services. During the course of design development and Council consultation for the project, GTA has formally assessed a range of yield options from 360-680 apartments and 4,000 to 8,000 square metres of non-residential uses, in addition to community facilities. On the basis of this assessment, a residential yield of 400-500 dwellings is recommended, noting that there is limited sensitivity in terms of road network operation within this range.

The strategic value of the site is a unique large waterfront landholding offering transport accessibility from both the water and a direct road connection (Burwood Road) to the arterial road network (Parramatta Road). While the site is not located within the various centres and precincts that have been identified, it is in a high residential amenity location and a comprehensive transport strategy has been identified including:

- Easy access to existing high-frequency bus services (Route 466 in particular at up to five services per hour, which operates between Ashfield and Cabarita Park via Burwood Road).
- A shuttle bus service that would operate in a loop through the local area and would potentially provide access to Majors Bay Road shops, Concord Hospital, Concord Library and Burwood Station. It is anticipated that two vehicles would be used, with an approximate one-hour round trip and therefore half-hour service intervals.
- An on-site car share pod with a minimum of 10 car share vehicles up completion of the full redevelopment.
- A fleet of e-bikes (or best available technology at the time) for fast and easy connection to local destinations including the future Metro West station.
- Travel demand management for existing and future local residents through the provision of new on-site facilities and services as part of the proposal.
- Integrated walking and cycling links within the public domain and open space, improving local walking and cycling connectivity.
- A series of potential road network improvement measures to address both existing and future traffic conditions.

A peer review of the proposal completed by Jacobs concluded that the recent increase in regular route bus services along Burwood Road should be sufficient to meet the demand for the site.

The intention is that the shuttle bus would be self-sustaining after the initial 3-year commitment, noting the shuttle bus service could be integrated with TfNSW on-demand bus services or similar future provisions to achieve the best leverage and benefit to the broader local community. This is consistent with the Jacobs review comment that an extension of the on-demand bus services may be recommended to provide links to the hospital and other centres.

Staging of the development is expected to align with surrounding infrastructure projects such as Sydney Metro West, considering the required timeframe for the rezoning itself, concept master plan approval, staged development applications and construction.

Detailed traffic analysis (using updated 2019 traffic surveys, post opening of WestConnex) at a suitable level of resolution for the Planning Proposal stage has been prepared, noting that there will be changes in local and regional traffic patterns in the coming years as a result of WestConnex, the Parramatta Road Urban Transformation Corridor, as well as Sydney Metro West.

Specifically, it is noted that:

- Conservatively high residential trip generation rates have been used to ensure appropriate sensitivity testing of the surrounding road network. Retail traffic generation rates are based on GTA's experience with local retail in a mixed use development environment, noting that a major supermarket would not be provided (something that is an anchor characteristic of local/ smaller shopping centres that exhibit higher traffic generation rates).

- Reduced car travel throughout the day/ week can be expected from the surrounding existing local area for convenience retail and food/ beverage related trips as a result of the proposed commercial/ retail uses, which will benefit the broader area.
- The Burwood Road/ Crane Street intersection is key for access to and from the site. This intersection operates inefficiently due to the traffic signal phasing and delays are currently experienced along Crane Street at this intersection, predominantly due to through traffic. While future traffic forecasts show that some through traffic will return to arterial road routes (e.g. Parramatta Road) once WestConnex fully opens, background traffic growth would still result in this intersection being at capacity during peak hours (before consideration of the proposal).
- Existing and future traffic pressures exist on Burwood Road is it provides the only north-south link servicing a significant portion of the Bayview Park peninsula, with no connection to the east available.
- To address local traffic issues, a series of improvement opportunities have been identified, including turning movement restrictions at the Burwood Road/ Crane Street intersection and providing a left-out only connection from Marceau Drive into Crane Street.
- Analysis of a range of development yield options (as previously mentioned) indicates that there is only a limited local road sensitivity to development yields and the proposed solutions are consistent, given that the key traffic issues exist now and would be exacerbated by background traffic growth (i.e. without any redevelopment of the site).
- Parramatta Road/ Burwood Road intersection analysis is indicative and provided to establish likely incremental impact of the proposal, noting traffic conditions in the vicinity of this intersection are likely to change as part the Parramatta Road Urban Transformation Corridor and associated precinct planning. Therefore, detailed analysis of Parramatta Road as part of this proposal is not appropriate.
- A green travel plan could be implemented for the proposed development, consistent with current best practice, in order to reduce road network peak period wherever possible.

The project team would work with Roads and Maritime and Council to agree operational and physical improvements to affected intersections, particularly the Burwood Road/ Crane Street intersection (with consideration of implications at the Broughton Street/ Crane Street intersection). Preliminary consultation suggests that select peak period right turn bans at this specific location may be an appropriate treatment measure. Analysis shows that the intersection would operate within capacity with right turn bans on both the Crane Street approaches (eastern and western leg) during the peak hour periods, following opening of the proposed development. More detailed local area traffic analysis would be prepared at the DA stage in order to finalise the package of local traffic improvements.

While not required by the proposal, providing a left-out only connection from Marceau Drive into Crane Street would also help reduce queuing and delays at the Burwood Road/ Crane Street intersection, while improving the permeability of the local road network. It is acknowledged that supporting local area traffic management measures would be required to manage any through traffic use of this route.

The TIA recommends that car parking for the future land uses be provided in accordance with the requirements of the City of Canada Bay DCP, while noting that there may be an opportunity to share (part of) the residential visitor parking provision with the retail parking, as well as reducing the overall visitor parking provision to be more consistent with typical high-density developments. On-street parking restrictions (resident parking scheme and/or short-term parking to be developed with Council at the DA stage) are proposed to manage the potential demand for all-day parking, noting that short-term use of on-street parking along the site frontage is appropriate and consistent with local area traffic management principles. There is no reason to expect a detrimental impact on local resident parking on this basis, noting that the majority of local residents have off-street parking for multiple vehicles.

In conclusion, the proposal has the potential to make a positive contribution to the surrounding area by providing a new retail precinct, with cafes, restaurants and cultural spaces. In combination with the proposed shuttle bus and car share facilities, the development would minimise the need for private car travel for new residents, as well as existing residents in the immediate local area. Appropriate traffic solutions are available to manage future background traffic growth along with the proposal.

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Figures

Tables

1. INTRODUCTION

01

1.1. Background & Proposal

It is understood that a Planning Proposal has been lodged with City of Canada Bay Council to amend the current planning controls for the current Bushells factory site located at 160 Burwood Road in Concord. The Proposal seeks to amend the planning controls in the Canada Bay Local Environment Plan 2013 from 1N (Industrial) to B4 (Residential – Mixed Use) as delineated in the Canada Bay Local Environmental Plan 2013. In rezoning the site, the proposal seeks to increase the permissible height limit and introduce a site-specific floor-space ratio.

An indicative development yield for the site comprises some 399 residential apartments set above 3,500 square metres gross floor area (GFA) of lower level non-residential land uses.

GTA Consultants (GTA) was commissioned by Colliers International on behalf of FreshFood Sydney Pty Ltd to undertake a transport impact assessment for the proposed development.

1.2. Purpose of this Report

This report sets out an assessment of the anticipated transport implications of the proposed development, including consideration of the following:

- existing traffic and parking conditions surrounding the site
- suitability of the proposed parking in terms of supply (quantum) and layout
- service vehicle requirements
- pedestrian and bicycle requirements
- the traffic generating characteristics of the proposed development
- suitability of the proposed access arrangements for the site
- the transport impacts of the development proposal on the surrounding road network.

1.3. References

In preparation of this assessment and report references have been made to the following:

- an inspection of the site and its surrounds
- traffic and parking surveys undertaken on Thursday 22 August 2019 and 24 August 2019 as referenced in the context of this report
- City of Canada Bay Development Control Plan (DCP)
- City of Canada Bay Local Environmental Plan (LEP) 2013
- Roads and Maritime Guide to Traffic Generating Developments 2002
- other documents and data as referenced in this report.

2. STRATEGIC CONTEXT

02

2.1. Overview

The following key strategies and plans have influenced development opportunities in local and regional area, together with real effects on future travel demand and mode splits.

A trigger for significant change in the inner west will be implementation of WestConnex and Sydney Metro West. WestConnex will assist in reducing demand and improve travel times for vehicles along Parramatta Road and other east-west roads near the site, while Sydney Metro West will improve travel time, reliability and reduce costs compared a range of other travel modes and reinforce the link to key employment areas including Sydney CBD and Parramatta. The service will also alleviate some of the demand on the existing T1 Western Line.

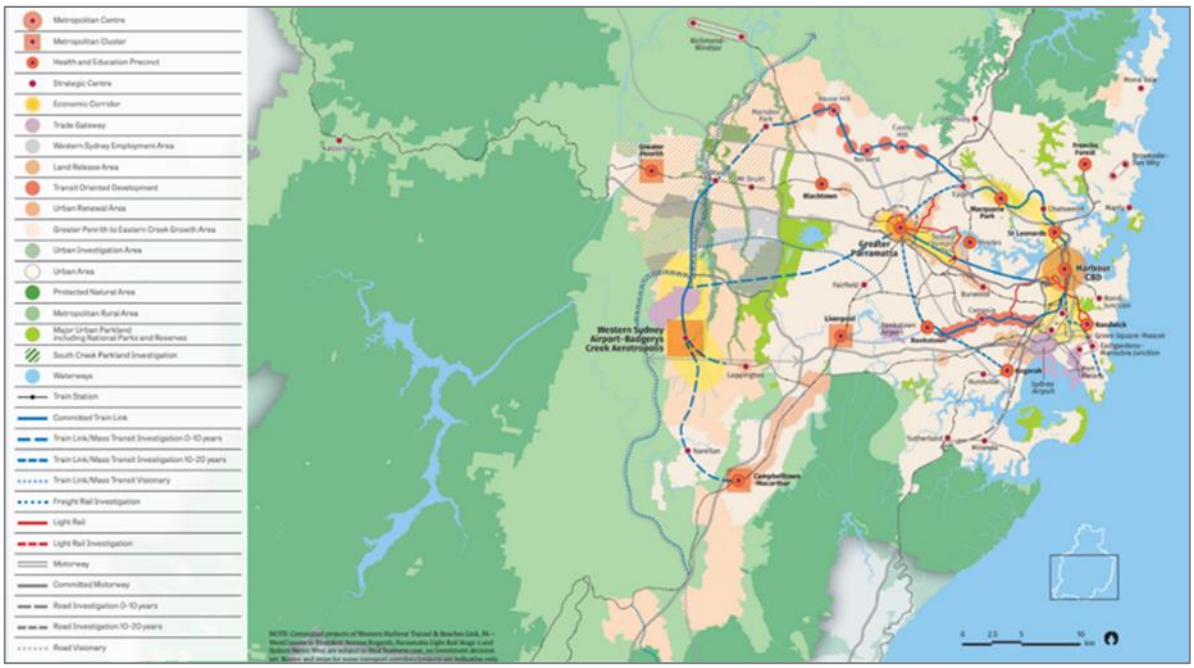
2.2. The Greater Sydney Region Plan 2018

The Greater Sydney Commission (GSC) is an independent organisation that leads metropolitan planning for Greater Sydney. It has prepared the Greater Sydney Region Plan which outlines how Greater Sydney will manage growth and guide infrastructure delivery. The plan has been prepared in conjunction with the NSW Government's Future Transport 2056 Strategy and informs Infrastructure NSW's State Infrastructure Strategy.

The GSC's vision is to create three connected cities; a Western Parkland City west of the M7, a Central River City with Greater Parramatta at its heart and an Eastern Harbour City. By integrating land use, transport links and infrastructure across the three cities, more people will have access within 30-minutes to jobs, schools, hospitals and services.

The Greater Sydney Region Plan is a 20-year plan with a 40-year vision and has four key focuses; infrastructure and collaboration, liveability, productivity and sustainability. The Greater Sydney Structure Plan 2056 is shown indicatively in Figure 2.1.

Figure 2.1: Greater Sydney Structure Plan 2056 – The Three Cities



Source: Greater Sydney Commission

2.3. Future Transport 2056

Future Transport 2056 provides a 40-year strategy for how transport will be planned, amended and forecasted within NSW, both regional and metropolitan, for the expected 12 million residents within the state. Future Transport 2056 follows from the 2012 Long Term Transport Master Plan which listed over 700 transport projects, the majority of which are completed or in progress. It also ties in with Greater Sydney Region Plan and the subsequent district plans to support the three cities metropolis vision.

Future Transport 2056 is supported by two key documents, Greater Sydney Services and Infrastructure Plan and Regional NSW Services and Infrastructure Plan, which provide guidance and planning for these areas.

From a metropolitan view, Future Transport 2056 and associated plans include the 30-minute city where jobs and services are within 30 minutes of residents with Greater Sydney. Strategic transport corridors to move people and goods are outlined between metropolitan and strategic centres, clusters and surrounds. The Movement and Place framework is also emphasised to support liveability, productivity and sustainability.

The plan introduces several initiatives that relate to the road hierarchy and transport network within the site:

- New Infrastructure:
  - WestConnex
  - Parramatta Light Rail
  - Long Term Future Mass Transit Link from Macquarie Park to Hurstville via Rhodes.
- The Parramatta Road public transport upgrade
- The Parramatta River Ferries upgrade project
- Priority Cycleway links in inner Sydney.

2.4. The Eastern City District Plan

The Eastern City District Plan follows from the Metropolis of Three Cities article with a focus on the Eastern District of Sydney which contains the site. It presents a 20-year plan to manage growth in the context of economic, social and environmental matters to achieve the 40-year plan outlined both in Future Transport and Metropolis of Three Cities. The article serves as a bridge between regional and local planning.

The Plan introduces several planning priorities, including:

- E3: Providing services and social infrastructure to meet peoples' chancing needs
- E5: Providing housing supply, choice and affordability with access to jobs, services and public transport
- E10: Planning for integrated land use and transport planning, whereby an indicator is a maximum 30-minute access to a metropolitan centre/cluster. The relevant cluster for the site is the Sydney CBD.

2.5. WestConnex

Once completed, the WestConnex project will provide a new continuous 33-kilometre link between the M4 Western Motorway and the M5 South-West Motorway. The project is to be delivered in three stages, with the anticipated final completion date for all works in 2023.

The WestConnex project has delivered the following:

- Widened the M4 Western Motorway between Parramatta and Homebush.

- Extended the M4 Western Motorway in twin underground tunnels from Homebush to Haberfield.
- Provided smoother roads and new intersections between Parramatta and Homebush.

The WestConnex project will:

- Provide quicker, more reliable trips between Western Sydney and the Port Botany/ Sydney Airport precinct to support Sydney's urban freight task.
- Help distribute traffic across the wider road network, removing bottlenecks and relieving congestion for local trips.
- Provide better connections along the M4 Western Motorway and M5 corridors to cater for the forecast growth in employment and population along these routes.
- Allow urban revitalization and increase opportunities for active and public transport along and across Parramatta Road.

The WestConnex project has and will continue to increase capacity along M4 Western Motorway and Parramatta Road corridor. It is anticipated that through traffic currently using Parramatta Road will be re-assigned to the new WestConnex link, increasing capacity for Parramatta Road. In addition, it is likely that additional capacity will be generated for parallel east-west routes such as Gipps Street and Crane Street.

An overview of the WestConnex project is illustrated in Figure 2.2 below.

Figure 2.2: WestConnex overview

Base image source: https://www.nsw.gov.au/news-and-events/news/tunnelling-on-westconnexs-new-m5-begins/ dated 30 November 2016

2.6. Sydney Metro West

The NSW Government has committed to building a new metro railway line from Sydney CBD to Parramatta via the Bays Precinct in Rozelle and Sydney Olympic Park. The project will focus on the corridor between the Parramatta River and existing T1 Western Line, servicing key existing centres and growth areas. Stage 1 (Northwest) of Sydney Metro

commenced operations in May 2019, with Stage 2 (City and Southwest) under construction and due for completion in 2024. Sydney Metro West will likely service five key precincts:

- Westmead – which is becoming one of the largest health, education, research and training precincts in Australia
- Parramatta – where the number of jobs is expected to double over the next 20 years to 100,000
- Sydney Olympic Park – where 34,000 jobs and more than 23,000 residents will be located by 2030
- The Bays Precinct – Sydney's new innovation hub where 95 hectares of land is being regenerated
- The Sydney CBD – allowing easy access to the existing public transport network and Sydney Metro Northwest and Sydney Metro City & Southwest.

The NSW Government anticipated the new railway line would be completed and operational in the second half of the 2020's. It will directly benefit the future residents and employees of the surrounding Parramatta area. The NSW Transport Minister confirmed that Sydney West Metro must be built before 2031 to alleviate the severe overcrowding on the existing T1 Western Line which is already operating at 135 per cent seating capacity during peak periods.

The Sydney Metro West study area is shown in Figure 2.3. Near the site, Sydney Metro is currently investigating options for a new intermediate station at North Burwood.

Figure 2.3: Sydney Metro West study area

Source: https://www.sydneymetro.info/files/west-map accessed 4 September 2019

3. EXISTING CONDITIONS

03

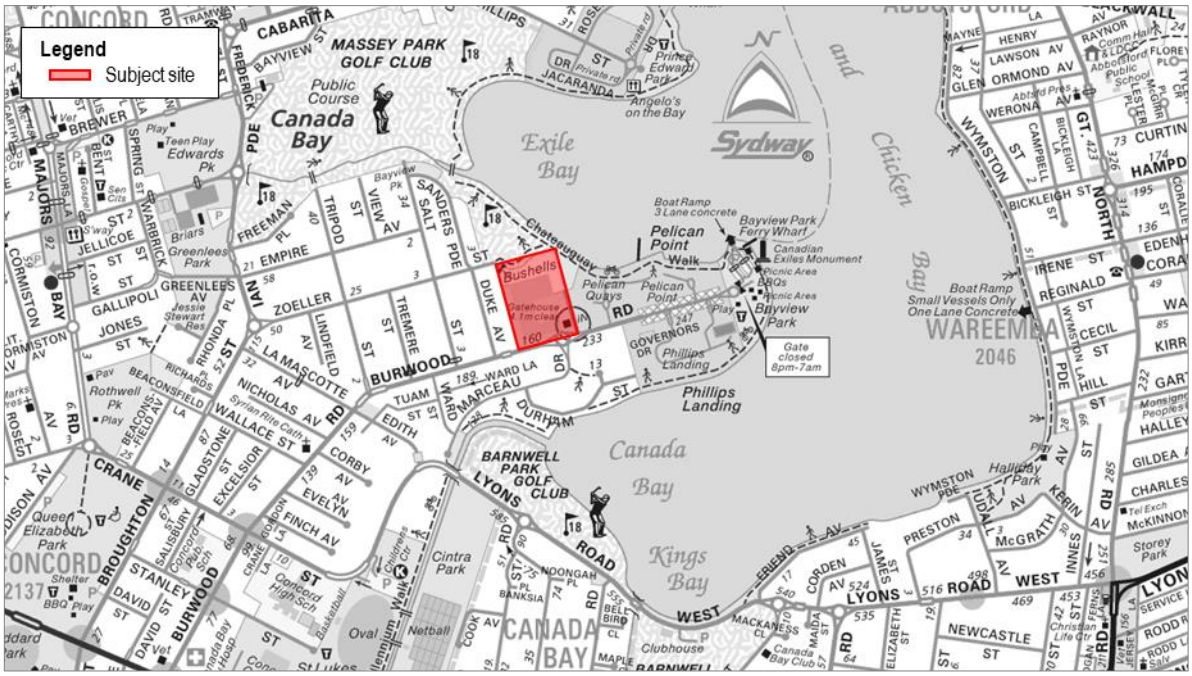
3.1. Location

The subject site is located at 160 Burwood Road, Concord and is Lot 5 of DP129325. The site of approximately four hectares in area has a southern frontage of 170 metres to Burwood Road and a northern frontage of 10 metres to Zoeller Street. The site also has a boundary to Exile Bay in the north-east.

The site is currently classified as IN1 – General Industrial under the City of Canada Bay LEP 2013. The site is currently occupied by factory premises (in existence for a significant period of time). The surrounding properties predominantly include low and medium density residential uses. Exile Bay is located to the north-east of the site and Bayview Park and Ferry Wharf are located on the point to the east.

It is understood that the current factory site is coming to the end of its economic life. The site's peninsula location, limited road access for heavy vehicles and proximity to adjoining residential areas, represent significant constraints for the operation of ongoing industrial activity. The location of the subject site and its surrounding environs is shown in Figure 3.1.

Figure 3.1: Site location and environs



Base image source: Sydway

3.2. Transport Network

3.2.1. Surrounding Road Network

The surrounding road network has been outlined in Table 3.1 and shown in Figure 3.2.

Table 3.1: Road network outline

Road Name	Classification	Properties
Parramatta Road	State Road	• East-west alignment • 16.4m road width • 23.0m road reserve • Three lanes either direction • 60km/h speed zoning • Parking is not permitted on either side of the road
Gipps Street	State Road	• East-west alignment • 12.4m road width • 18.3m road reserve • One (1) lane in either direction • 60km/h speed zoning • Parking is permitted either side of the road
Burwood Road	Mainly a local road, however between Crane Street and Parramatta Road is a Regional Road	• North-south alignment • 12.8m road width • 19.9m road reserve • One to two lanes of traffic in either direction • 50km/h speed zoning, with a section subject to 40km/h school zoning • Parking is subject to zone and time either side of the road
Broughton Street/ Ian Parade	Mainly a local road, however Broughton Street between Crane Street and Parramatta Road is a Regional Road	• North-south alignment • 12.1m road width • 19.4m road reserve • One lane of traffic in either direction • 50km/h speed zoning • Parking is permitted either side of the road
Crane Street	Regional Road	• East-west alignment • 12.6m road width • 19.0m road reserve • Two lanes of traffic in either direction • 50km/h speed zoning • Parking is primarily not permitted on either side of the road
Zoeller Street	Local road	• East-west from the Ian Parade/ Broughton Street/ Zoeller Street roundabout to cul-de-sac 590m to the west • 12.7m road width • 19.7m road reserve • One lane of traffic in either direction • 50km/h speed zoning • Parking is permitted either side of the road

Figure 3.2: Road network diagram

Base image source: https://tfnsw.carto.com/u/transportnsw/viz/5f7ced38-9883-11e5-93a8-42010a14800c/embed_map accessed 3 September 2019

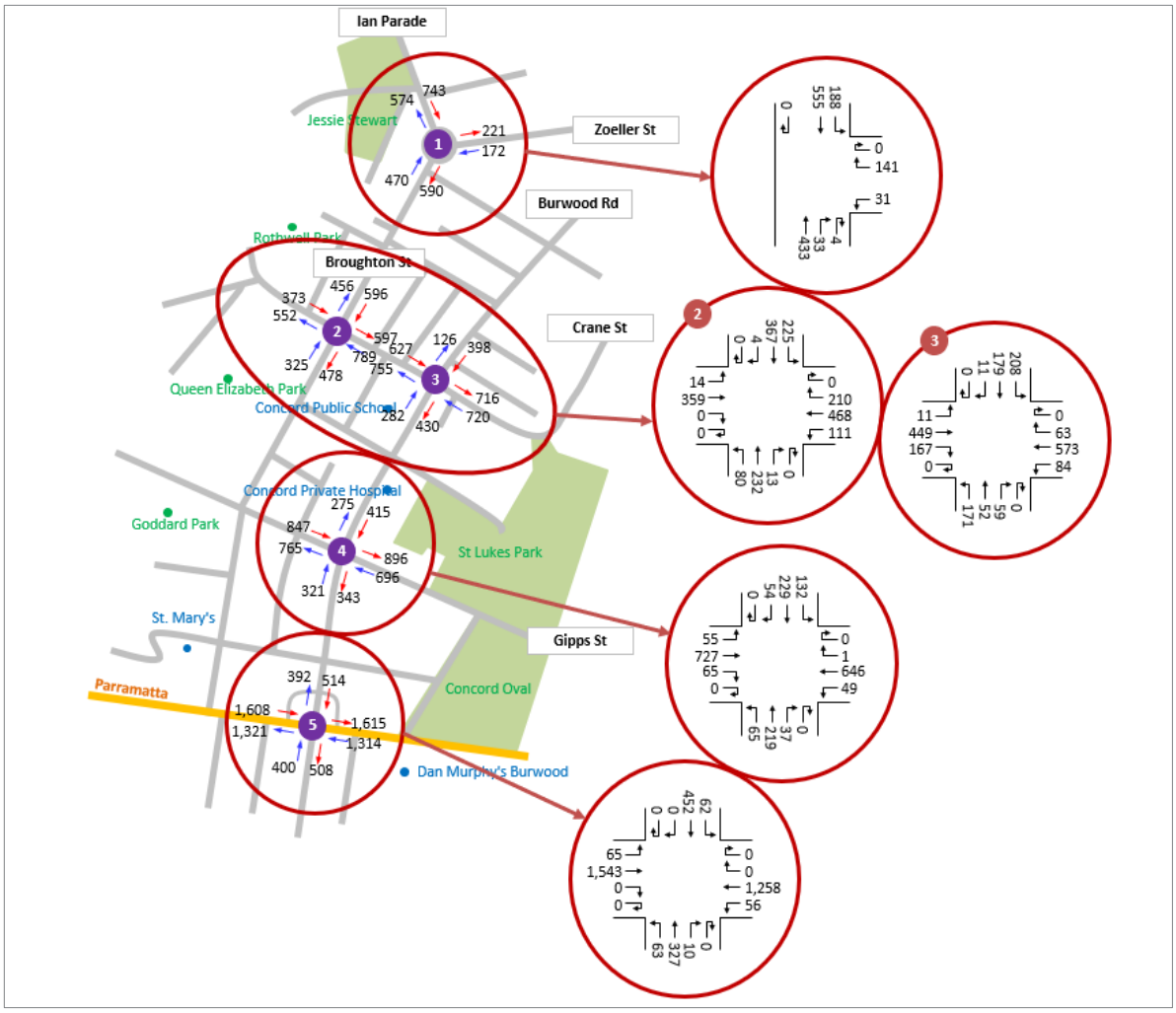
3.3. Traffic Volumes

GTA completed traffic movement counts at the following key intersections on Thursday 22 August 2019 between 7am and 9am, and between 2:30pm and 6:30pm:

- Burwood Road/ Crane Street
- Burwood Road/ Gipps Street
- Burwood Road/ Parramatta Road
- Broughton Street/ Zoeller Street/ Ian Parade
- Broughton Street/ Crane Street.

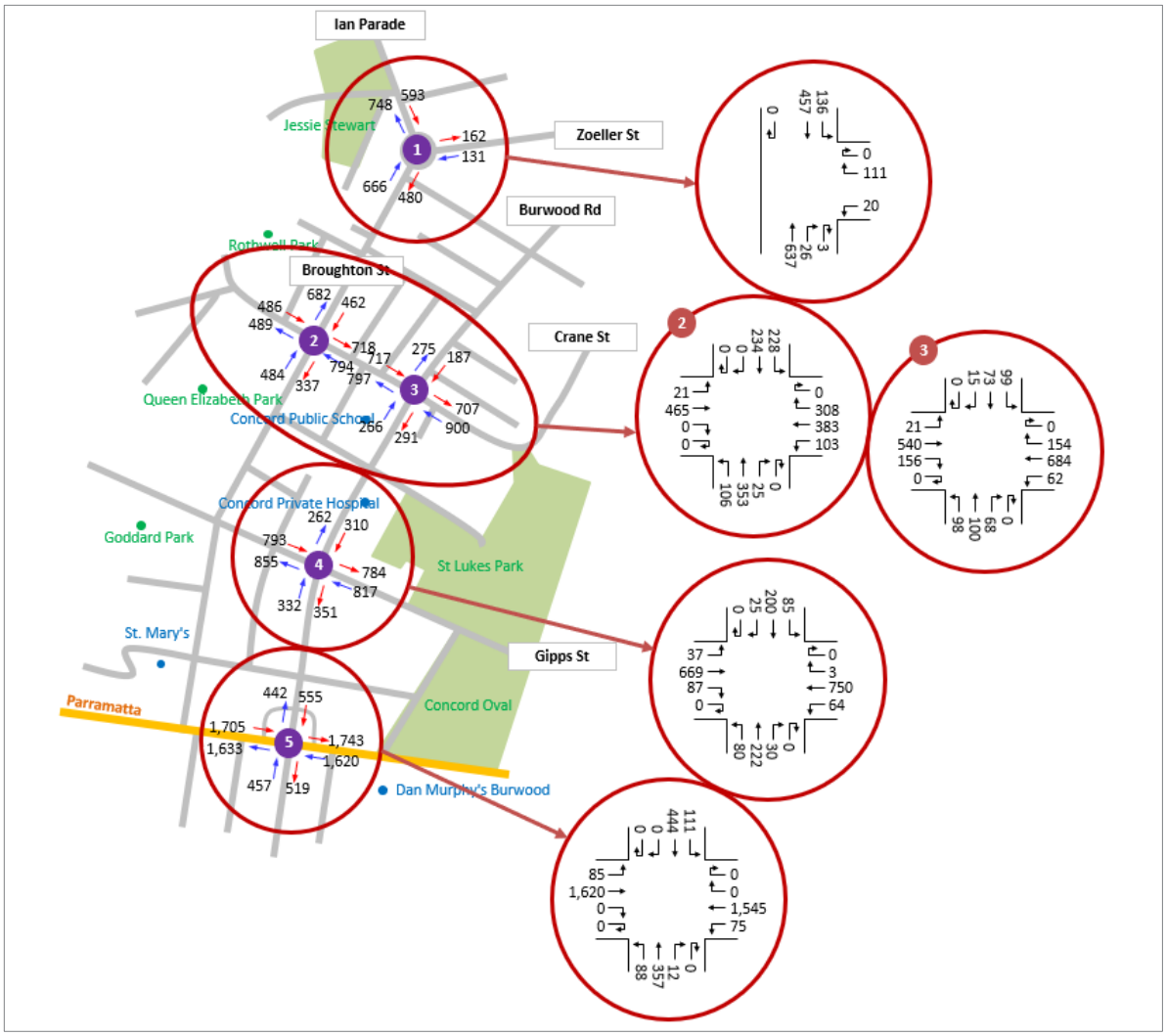
The AM and PM peak hours were found to occur from 8:00am to 9:00am and 5:00pm to 6:00pm respectively, with traffic volumes summarised in Figure 3.3 and Figure 3.4.

Figure 3.3: Existing AM peak hour traffic volumes



Source: Matrix Traffic and Transport

Figure 3.4: Existing PM peak hour traffic volumes



Source: Matrix Traffic and Transport

3.4. Intersection Operation

The operation of the key intersections within the study area have been assessed using SIDRA Intersection[1] (SIDRA), a computer-based modelling package which calculates intersection performance.

The commonly used measure of intersection performance, as defined by the Roads and Maritime, is vehicle delay. SIDRA determines the average delay that vehicles encounter and provides a measure of the level of service.

Table 3.2 shows the criteria that SIDRA adopts in assessing the level of service.

Table 3.2: SIDRA level of service criteria

Level of Service (LOS)	Average Delay per vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Sign
A	Less than 14	Good operation	Good operation

[1] Program used under license from Akcelik & Associates Pty Ltd.

B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Near capacity	Near capacity, accident study required
E	57 to 70	At capacity, at signals incidents will cause excessive delays	At capacity, requires other control mode
F	Greater than 70	Extra capacity required	Extreme delay, major treatment required

Table 3.3 presents a summary of the existing operation of the intersection.

Table 3.3: Existing operating conditions

Intersection	Peak	Degree of saturation (DOS)	Average delay (sec)	95th percentile queue (m)	Level of service (LOS)
Broughton Street/ Zoeller Street/ Ian Parade	AM	0.25	12	11	A
	PM	0.17	11	7	A
Broughton Street/ Crane Street	AM	0.76	29	123	C
	PM	0.79	32	134	C
Burwood Road/ Crane Street	AM	0.73	32	153	C
	PM	0.83	38	193	C
Burwood Road/ Gipps Street	AM	0.75	30	132	C
	PM	0.78	29	136	B
Burwood Road/ Parramatta Road	AM	0.54	19	141	B
	PM	0.58	23	166	B

The results presented in Table 3.3 indicates that all intersections are operating at acceptable Level of Service (D) or better. The 95th percentile queues are generally within 120-160 metres for key intersections and as such are not expected to impact the operations of the upstream or downstream intersections.

3.5. Car Parking

Unrestricted kerbside parking is permitted on all roads in the vicinity of the site. There is a considerable on-street parking supply located on surrounding roads including Burwood Road, which provides parallel parking near the site and some 45-degree angle parking to the east. During the weekday afternoon peak, the car parking demand is low to moderate with demand increasing throughout the afternoon, typically associated with residents returning home.

3.6. Sustainable Transport

3.6.1. Public Transport

The site is well serviced by the surrounding bus network, with the 466 and 502 bus routes stopping adjacent to the site on Burwood Road, while several other services are within a short walk further south along Burwood Road or northwest on Ian Parade. A summary of the available bus stops near the site is provided in Table 3.4.

Table 3.4: Schedule of bus network

Route number	Route description	Location of nearest bus stop	Distance to nearest bus stop	Frequency (peak / off-peak)
439	Mortlake to City Martin Place	Burwood Road near Crane Street	800m	30 mins peak/ off peak
460	Five Dock to Concord Hospital via Canada Bay	Ian Parade	700m	Hourly off peak (5 services per day)
464	Ashfield to Mortlake	Burwood Road near Crane Street	800m	10-20 mins peak/ 30 mins off peak
466	Ashfield to Cabarita Park	Outside site on Burwood Road	0m	15 mins peak/ 30 mins off peak
502	Five Dock to City Town Hall	Outside site on Burwood Road	0m	10-20 mins peak flow only
M41	Hurstville to Macquarie Park	Burwood Road near Crane Street	800m	10 mins peak/ 15 mins off peak
L39	PrePay Only - Mortlake to City Martin Place (Limited Stops)	Burwood Road near Crane Street	800m	15-20 mins peak flow only

Services to the closest train station (Burwood Station) take approximately eight minutes from the Marceau Drive/ Burwood Road bus stop via the 466 bus route. This service runs approximately every 15 minutes during peak time. The M41 route also provides a connection to Burwood Station at a higher frequency of every 10 minutes during peak hours.

The bus network adjacent to the site and further afield is shown in Figure 3.5 and Figure 3.6.

Figure 3.5: Adjacent bus network

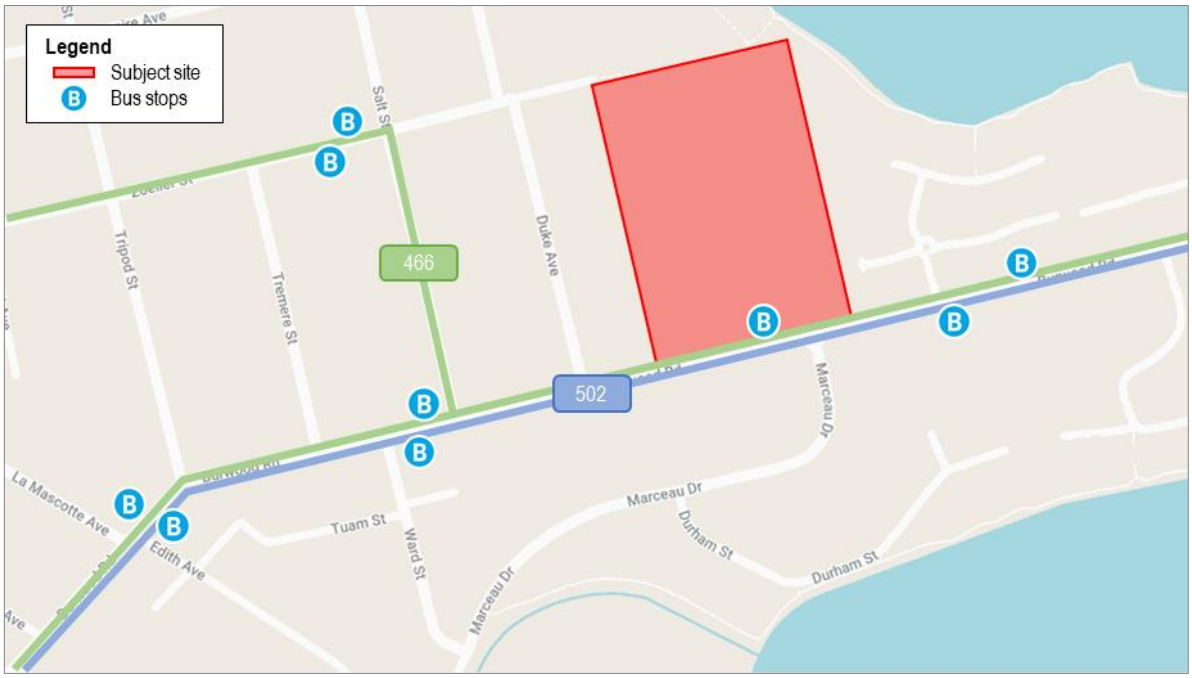
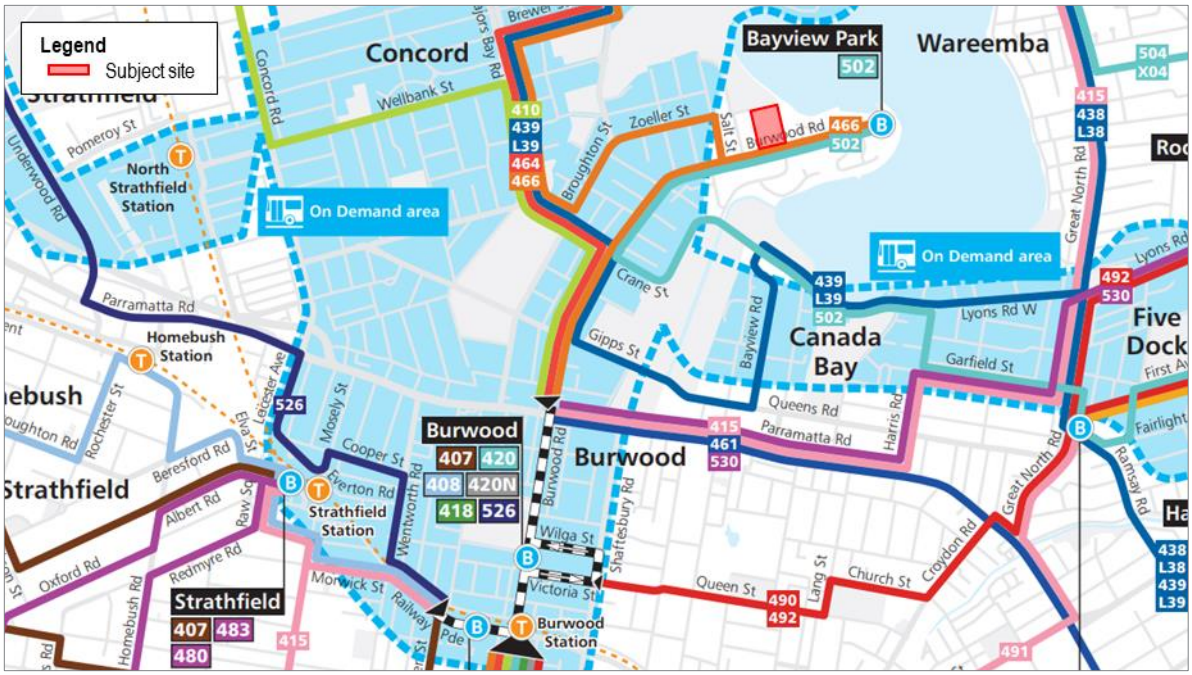


Figure 3.6: Broader bus network



Base image source: Transport for NSW Inner West and Southern region network dated 28 July 2019

The site is also located adjacent to the Transport for NSW's On Demand public transport services which allow users to book a vehicle and be picked up from either home or a convenient nearby location, and dropped off at a local transport hub or point of interest. It's easy to book using an app, online or by phone. In future, there is potential for coverage to expand to cover the site as demand for the service increases.

Burwood Station is located approximately 2.3 kilometres south of the site and services the T2 Inner West and Leppington Line and T9 Northern Line. The station provides frequent heavy rail services during peak and off-peak periods.

The Bayview Park Wharf is located to the east of the site. This terminal was removed from Sydney Ferries timetables in 2013 due to low patronage.

3.6.2. Active Transport

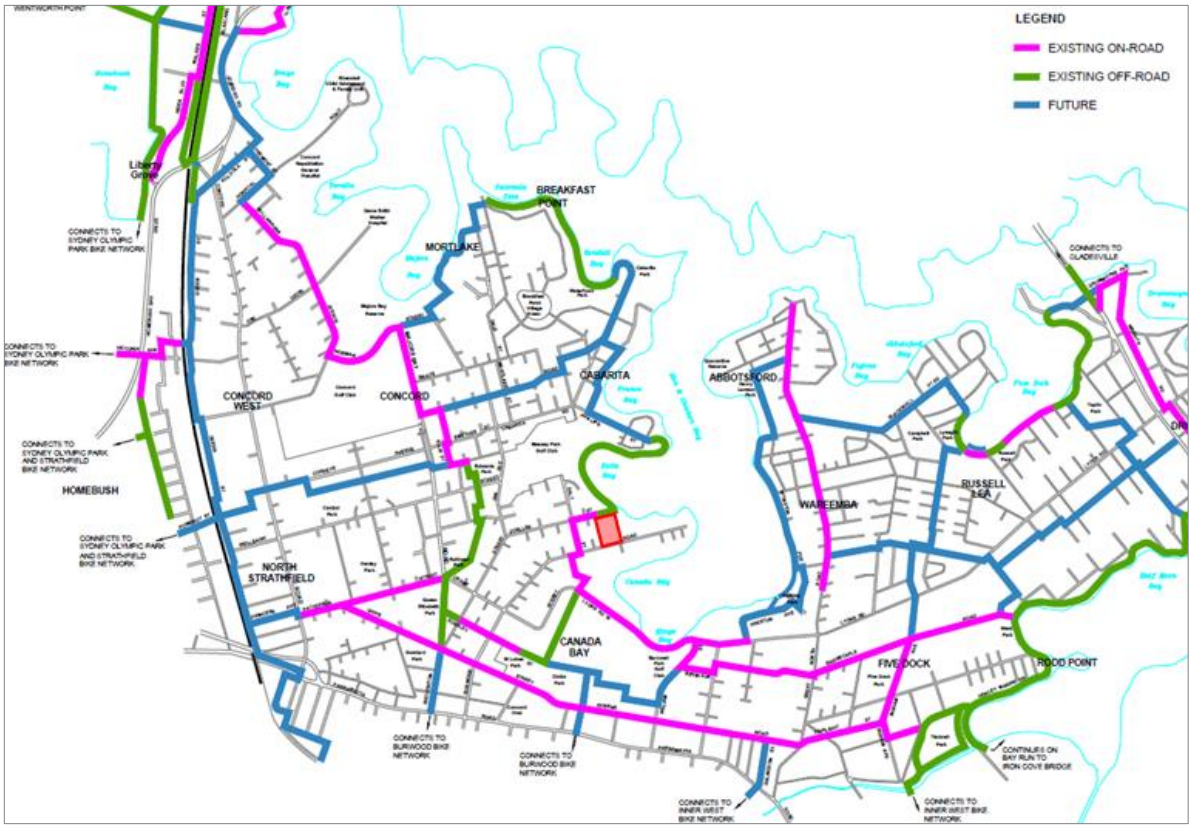
Pedestrian paths are located on all major roads within the immediate road network, providing good pedestrian connectivity. Pedestrian crossings are available at all signalised intersections along Burwood Road in the vicinity of the site. The available pedestrian paths provide good access to local parks and shops, with the relatively flat topography in the immediate vicinity of the site providing good walking and cycling conditions.

The City of Canada Bay prepared the *Interim Bike Network Map*, detailing on and off-road cycling routes in the local area.

The site is well located in the local cycling network, although there are no formal bicycle routes on Burwood Road. An on-road bike lane on Queens Road/ Gipps Street connects Concord with suburbs to the east. This route is accessed from off-road routes located within a short distance to the south of the site. A cycle route also connects Concord with Homebush Bay to the northwest through a number of on-street cycle paths. This route can be accessed from Salt Street located in close proximity to the west of the site.

The City of Canada Bay existing and planned future bike network map is shown in Figure 3.7.

Figure 3.7: City of Canada Bay existing bike network map



Source: City of Canada Bay Interim Bike Network Map, dated 8 January 2019

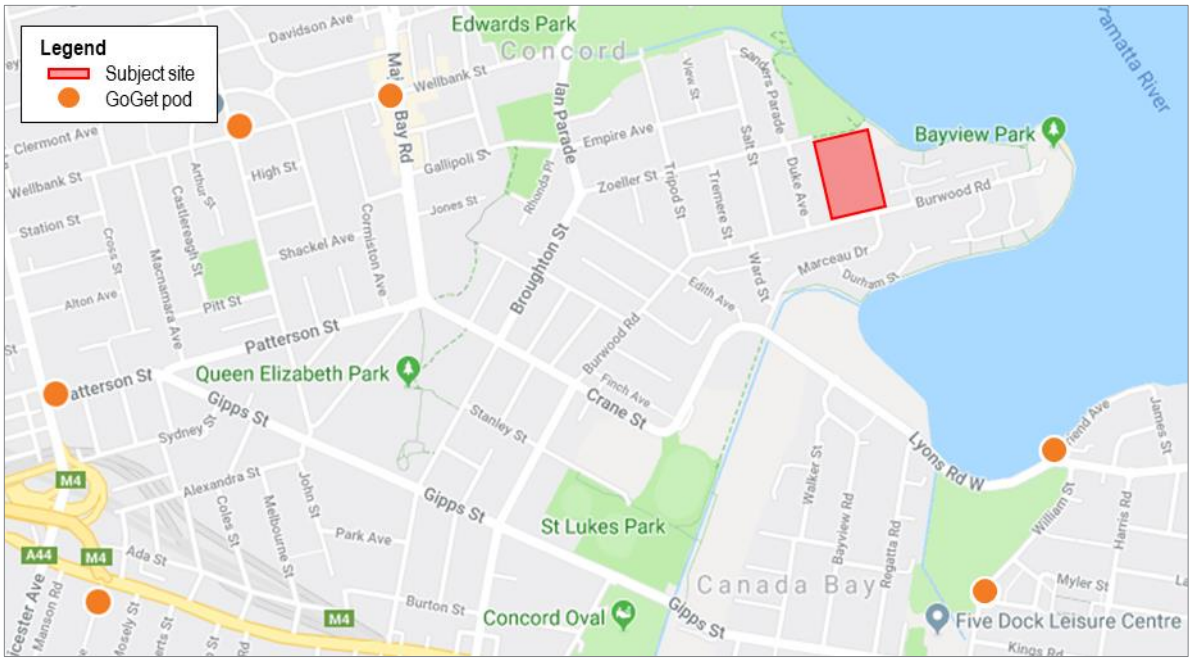
3.7. Local Car Share Initiatives

GoGet (along with other car share providers) has become increasingly common throughout Sydney and is now recognised as a viable transport option for drivers throughout Sydney. They are now a well-utilised service especially in the inner suburbs due to limited parking availability and the expense involved in parking close to the Sydney CBD. GoGet offer a viable alternative to the private car for trips where distances are short and are likely to be of benefit to future tenants and commercial residents of the proposed development.

Research suggests that a single car share vehicle can replace at least 10 private vehicles and (on average) services 23 members. On this basis, the provision of car share vehicles on-site has the potential to significantly reduce private car ownership and/or usage.

GoGet car share pods located close to the site are shown in Figure 3.8, with the closest pod located on Lyons Road West. The existing local area has limited demand for car share given the lower residential density and availability of off-street car parking. However, car share pods within a higher density residential development could be a catalyst for car share usage in the area.

Figure 3.8: Surrounding GoGet pods



Source: https://www.goget.com.au/ accessed 5 September 2019

3.8. Existing Travel Behaviour

The 2016 Australian Bureau of Statistics journey to work data for the existing residents in the local area surrounding the site is provided in Table 3.5. The results for the surrounding travel zone have been benchmarked against Sydney Greater Metropolitan Region (GMR).

Table 3.5: ABS journey to work data – Concord

Mode of travel	Surrounding Concord area mode share	GMR mode share
Car, driver	73%	61%
Car, passenger	4%	5%
Train	8%	19%
Bus	10%	7%
Ferry	1%	1%
Walk	2%	5%
Bicycle	1%	1%
Motorcycle	1%	1%
Total	**100%**	**101%**

Note: Includes SA1:12001138327

Table 3.5 indicates that despite the relatively close proximity of the site to the Sydney CBD, the existing residents surrounding the site have a higher private vehicle mode share (73 per cent) compared with the average for the wider Sydney GMR (61 per cent). Public transport uptake is slightly lower than the wider Sydney GMR noting the surrounding

area is limited to bus services unless connecting at Burwood or Strathfield stations. Active travel modes such as walking and cycling is similar to the wider Sydney GMR at around five per cent.

4. DEVELOPMENT PROPOSAL

04

4.1. Land Uses

The proposal incorporates a new mixed-use development along with new internal roads and open space. The proposed future development includes:

- Retention of the iconic Bushells building including 'B' signage and chimney stack, together with key elements of the existing industrial building fabric.
- New buildings generally ranging between two and seven storeys, with one 13 storey building.
- 399 apartments, with 10 per cent of the development (approximately 40 apartments) proposed for affordable housing.
- 20 per cent of dwellings designed to meet the needs of an ageing population (Silver Level of the Liveable Housing Design Guidelines).
- Retention of sight lines to the iconic Bushells building.
- Significant areas of public open space, including through-site access to a new waterfront public park and beach access to Exile Bay.
- A range of cultural and community infrastructure and recreational facilities.
- Approximately 3,500 square metres of retail hub with a mix of convenience shopping, specialty food, cafes and dining for residents and nearby locals.

A summary of the proposed land uses is shown in Table 4.1, noting that a dwelling yield of between 400 and 500 dwellings is being investigated in terms of the relative traffic impact as discussed further in Section 7.

Table 4.1: Development schedule

Type Use	Type	Size
Residential	Affordable (mix)	40 apartments
	1-bedroom	60 apartments
	2-bedroom	239 apartments
	3-bedroom	60 apartments
	Sub Total	**399 apartments**
Non-Residential	Retail and restaurant	3,500m^2
	Urban services	1,200m^2
	Sub Total	**4,700m^2**

4.2. Vehicle Access

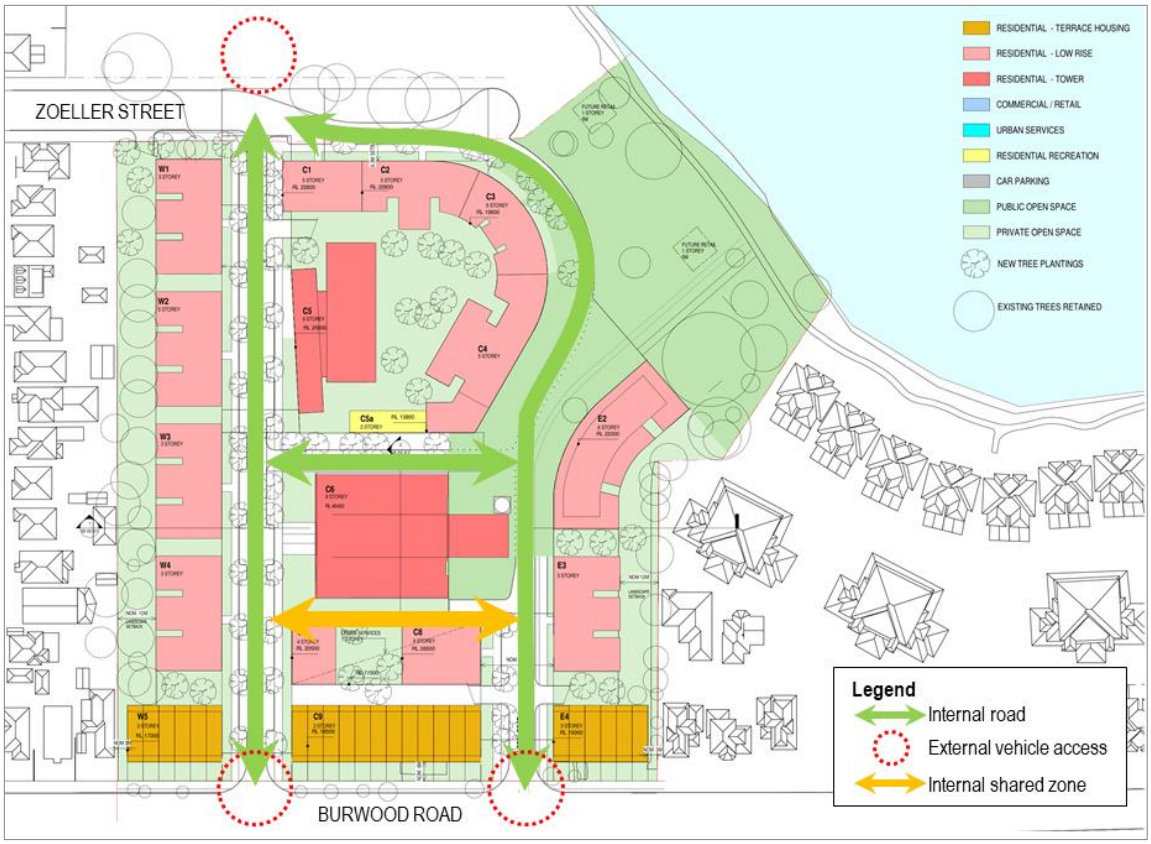
Vehicle access to the site is proposed via access points on Burwood Road and Zoeller Street.

The access point to Burwood Road would form a fourth leg (northern approach) to the existing Burwood Road/ Marceau Drive roundabout. The site access to Zoeller Street would form a standard unsignalised access point.

A new internal road link is proposed to run parallel to Duke Street (50 metres to the east) and would form unsignalised intersections at either end with Burwood Road and Zoeller Street.

The new internal roads are shown in Figure 4.1

Figure 4.1: Internal road layout



Base image source: BVN Architecture, Drawing Number 1504003 dated 6 September 2019

4.3. Car Parking

It is proposed to provide four separate basement car parks corresponding to the west, east and central (north and south) precincts of the site. There is potential for extra car parking spaces to be provided as indented parking on the new internal access roads which would likely serve the retail and recreational facilities.

Further car parking layout details would be provided as part of any future Development Application.

4.4. Other Considerations

4.4.1. Pedestrian Facilities

Pedestrian paths will be provided throughout the site and will link key destinations within the site to the external road network and public realm.

As shown in Figure 4.1, a shared pedestrian and vehicle zone is proposed to the south of the existing Bushells building, with pedestrian paths to be provided along both sides of the internal road network.

Retail and community spaces are proposed to be located to activate street frontages. The main pedestrian entrances to the village centre will be located along Burwood Road.

4.4.2. Bicycle Facilities

The development plans do not yet show bicycle end-of-trip facilities. Notwithstanding, it is intended that appropriate bicycle facilities will be provided on-site to encourage cycling as a viable mode of transport.

4.4.3. Loading Areas

Further design of on-site loading and servicing facilities dock will be considered as part of any future Development Application, however it is anticipated that much of the loading activity would occur on-street in loading zones on the proposed internal roads.

4.5. Mode Share Targets

As previously mentioned in Section 3.8, the most recently available Journey to Work data for existing residents surrounding the site shows that residents have a higher private vehicle mode share than the wider Sydney GMR, while public transport and active transport is similar or lower than the wider Sydney GMR.

With the development of the site providing convenient links to the existing walking and cycling network, and the potential improvements to the public transport network in the area particularly with the implementation of Sydney Metro West as discussed in Section 2, it is anticipated that there will be less reliance on private vehicles and a higher uptake of public transport and active transport modes of travel.

On this basis, target mode shares for the site have been developed as shown in Table 4.2.

Table 4.2: Future mode share targets for the site and relevant travel zones

Mode	Future mode share targets for the site	Sydney Greater Metropolitan Region
Vehicle (as driver or passenger)	70%	67%
Public Transport (train, metro, bus and ferry)	25%	27%
Walk or Cycle	5%	6%
Total	**100%**	**100%**

5. CAR PARKING ASSESSMENT

05

5.1. Car Parking Requirements

The car parking requirements for different development types are set out in Part C of the City of Canada Bay's DCP. The minimum car parking requirements for residential uses are set out in Part C Section C3.1 of the DCP.

Given the proposal includes an affordable housing component, reference has also been made to the *State Environmental Planning Policy (Affordable Rental Housing) 2009* (Affordable Housing SEPP), which states that a consent authority must not refuse consent to development on parking grounds if at least 0.5 parking spaces are provided for each dwelling containing one bedroom, at least 1 parking space is provided for each dwelling containing two bedrooms and at least 1.5 parking spaces are provided for each dwelling containing three or more bedrooms. For the purpose of the planning proposal, it has been assumed that all affordable housing units are single bedroom units.

A review of the car parking requirements for the proposed yields is provided in Table 5.1

Table 5.1: Car parking requirements

Use		Car parking requirement	Number of dwellings/ size (GFA)	Car parking requirement	Reference
Residential	Affordable (mix)	0.5 spaces per dwelling [1]	40	20	Affordable Housing SEPP
	1-bedroom dwelling	1 space per dwelling	60	60	City of Canada Bay DCP
	2-bedroom dwelling	1.5 spaces per dwelling	239	359	City of Canada Bay DCP
	3-bedroom dwelling	2 spaces per dwelling	60	120	City of Canada Bay DCP
	Visitors [2]	0.2 spaces per dwelling	399	80	City of Canada Bay DCP
Non-residential [3]	Retail and restaurant	1 space per 40m^2 [4]	3,500m^2	88	City of Canada Bay DCP
			Total	**727**	**-**

[1] Based on Affordable Housing SEPP, assuming all affordable apartments are 1-bedroom.
[2] Canada Bay DCP requires 0.5 visitor spaces per dwelling however Council has indicated that 0.2 spaces per dwelling would be acceptable in accordance with typical RMS rates, given the scale of the proposed development.
[3] It is assumed that the proposed recreational facilities would largely service residents of the development and/or the local area and therefore no specific parking demand has been assigned. Any minor demand could be accommodated by retail parking.
[4] At this stage all non-residential facilities have been assessed as retail land uses.

Based on the above, the proposed development is required to provide 727 car parking spaces. Parking associated with the non-residential uses can be refined as part of any future Development Application, once the likely non-residential tenants and/or operation of the floor space is known. Notwithstanding, parking will be provided in line with the requirements of City of Canada Bay DCP and the Affordable Housing SEPP.

It is also noted that there may be an opportunity to provide a shared car parking pool for the retail, other non-residential and residential visitor parking demands. In this regard, it is noted that residential visitor demands typically peak in the evening, whilst retail demands typically peak during the day. More specifically, it is commonly accepted that daytime residential visitor demands are 50 per cent of the evening demands.

Therefore, it could be appropriate that a reduction (based on a temporal profile of car parking demand) in residential visitor parking could be applied. Moreover, visitor parking is typically provided at a rate of one space per five to seven apartments for high density developments (Road and Maritime, 2002), noting that this typically represents an over-supply for larger developments with integrated basements and further justifying a reduction in visitor parking.

Future Development Application(s) for the site would need to justify any proposed visitor parking reduction.

5.2. Retail/ Restaurant Demand

Given the desirable location and scale of the development, there is potential for the retail or restaurant uses (depending on the tenant(s) secured) to become a regionally significant site that may attract a large number of patrons at key times of the day/ week. If this were to occur, there are a number of measures outlined below that could be implemented to aid efficient use of the on-site car parking and to ensure the impact to existing on-streetcar parking demand is minimal. The surrounding road network provides appropriate regional road connections to the east, west and south in particular, supporting any regional demand generated.

5.2.1. On-Street Resident Parking Scheme

As previously mentioned, there is a large supply of on-street unrestricted car parking spaces in the vicinity of the development. To protect the amenity of the surrounding area, the introduction of timed parking in conjunction with a resident parking scheme should be investigated. This could be restricted to one side of the road, or implemented on both sides, depending on the residential and visitor demand.

It is understood that Council may not be supportive of such parking restrictions, however they may be necessary to protect the amenity of local residents and should be considered further during future Development Application(s) for the site, noting that typical resident parking permit policies may need to be adjusted to suit local neighbourhood characteristics.

5.2.2. Car Park Supporting Technology

For a development of this size, there are other measures that can be undertaken to improve the efficiency and utilisation of the car spaces, particularly for visitors to the site. A parking guidance system with dynamic signage may be appropriate to aid drivers to find a vacant car space, with the option of individual bays having car parking sensors, or areas/ levels having sensors.

5.2.3. Paid Parking/ Time Restrictions

The implementation of paid parking and/ or time restricted parking could also be considered as a car parking demand management tool, as regularly implemented in public car park facilities and shopping centres. Entrance treatments should be designed to meet requirements for card consoles. Any such parking management would also need to consider on-street parking in the immediate local area.

6. SUSTAINABLE TRANSPORT

06

6.1. Bicycle End of Trip Facilities

Bicycle parking for the site should be provided in accordance with the requirements of the City of Canada Bay DCP, as summarised in Table 6.1. Bicycle parking provisions would be refined as part of any future Development Application.

Table 6.1: Bicycle parking requirements

Use	Size	DCP bicycle parking/ storage rate	Bicycle Parking requirement
Residential	399 dwellings	1 bicycle storage space/ dwelling	399 bicycle storage spaces
		1 bicycle parking space/ 12 dwellings	34 bicycle parking spaces
Non-residential [1]	3,500m^2 GFA	1 bicycle storage space/ 300m^2	12 bicycle storage spaces
		1 bicycle parking space/ 500m^2	7 bicycle parking spaces
Total			**411 bicycle storage spaces and 41 bicycle parking spaces**

[1] At this stage all non-residential facilities have been assumed as retail land use

Table 6.1 indicates that any future development at the site (based on the indicative yield) should provide in the order of 411 bicycle storage spaces and 41 visitor bicycle parking spaces. Residential bicycle storage would typically be provided as part of the required storage cage for each apartment.

6.1.1. Cyclist and Pedestrian Access

Cyclist and pedestrian access to the new uses would be provided from the future internal road network as well as from the surrounding road network, including Burwood Road, Zoeller Street and to the existing foreshore walkway.

The form of the potential active transport corridor has not yet been determined but could include a continuation of the existing footpath with an on-road mixed traffic bicycle facility, separated cycleway or similar. The make up of the future facility would need to be determined in consultation with Council and local residents as part of any future Development Application. It should be noted that the proposed shared path south of the Bushells building would provide an east-west link for cyclists.

The facility would encourage residents, customers and employees of the development to walk or cycle between the site and nearby transport nodes.

6.1.2. Future Bicycle Route Facilities

It is understood from consultation with Roads and Maritime that the Urban Growth Parramatta Road Urban Transformation has an associated proposed cycleway along Patterson Street, Gipps Street and Queens Road. The cycleway is included in the Urban Amenity Improvement Plan set to be implemented between 2019 and 2023 and could involve significant changes to intersection arrangements.

A shared bicycle and pedestrian path facility would be constructed along Burwood Road between Gipps Street and Bayview Park to provide a high-quality connection to this proposed facility.

While this route is still to be implemented, The River Run off-road walking and cycling path under the City of Canada Interim Bike Network Map, as detailed in Section 3.6.2, will allow for a complete foreshore connection linking the site between Breakfast Point, Cabarita and Abbotsford. Once complete, the site will have a good active transport connection and would help to achieve an increase in active transport uptake.

6.1.3. Electric Bicycles

There is potential to provide a fleet of electric bicycles (or the best available technology at the time) as part of the development for use by residents. Electric bicycles can offer a quick, convenient and inexpensive self-operated ride to a

train station, a bus stop or a specific destination. The benefit of providing electric alternatives is they require little or no physical effort and can be used by nearly anyone. Provision of a number of electric bicycles would allow residents to utilise the existing and planned future cycling paths to connect with surrounding railways stations, as well as the future Sydney Metro West station which could potentially be located at North Burwood. This will in turn reduce any unnecessary vehicle trips associated with first and last kilometre of residents' journeys.

6.2. Car Share Vehicles

As discussed in Section 3.7, research suggests that a single car share vehicle can replace at least 10 private vehicles and (on average) services 23 car share members. On this basis, the provision of car share vehicles on-site has the potential to significantly reduce private car ownership and/or usage, along with the corresponding reduction in road network peak period travel.

The Green Building Council of Australia recommends one car share vehicle per 70 residents. At an average of (say) two residents per dwelling, this would represent a potential future supply of 11-12 car share vehicles for around 400 dwellings. It is recommended that as part of the likely staged development construction, an initial pod of two vehicles is provided, with additional vehicles added in response to the occupation of subsequent development stages and/or in response to demand. A suitable objective would be to provide a minimum of 10 car share vehicles up completion of the full redevelopment.

6.3. Public Transport

6.3.1. Regular Route Bus Services

Direct and convenient pedestrian links from the development to the existing bus stops on Burwood Road and Zoeller Street would be provided as part of the development. As previously mentioned, while there are several bus stops within close proximity to the site, the frequency of buses servicing the site and variety of routes from the site could provide a greater level of service.

The main local destinations for public transport patrons from the site are likely to be Burwood Railway Station and the Majors Bay Road shopping precinct, as well as connections to the east including Victoria Road. For residents of the new development travelling to the Burwood Station, the 466 bus from the bus stop adjacent to the site which provides a 15 to 30-minute frequency service. With the development potentially accommodating around 1,000 residents living on the site, the demand on the bus service is likely to increase, resulting in a demand for greater frequency of service in the peak hour to encourage public transport use.

Residents wanting to travel to the Majors Bay Road shopping strip via public transport can catch the 466 bus or alternatively walk 10 to 15 minutes to the Crane Street bus stop and catch either the M41, 464 or 439 buses.

As discussed, the 466 bus provides a connection to Burwood Station where commuters can transfer to the T9 Northern Line or T2 Inner West Line and Leppington Line, providing connections to other parts of Sydney including the CBD.

The utilisation of the 466 bus should be monitored to assess whether the frequency of this service needs to be increased, particularly during off-peak periods where the frequency is currently every 30 minutes.

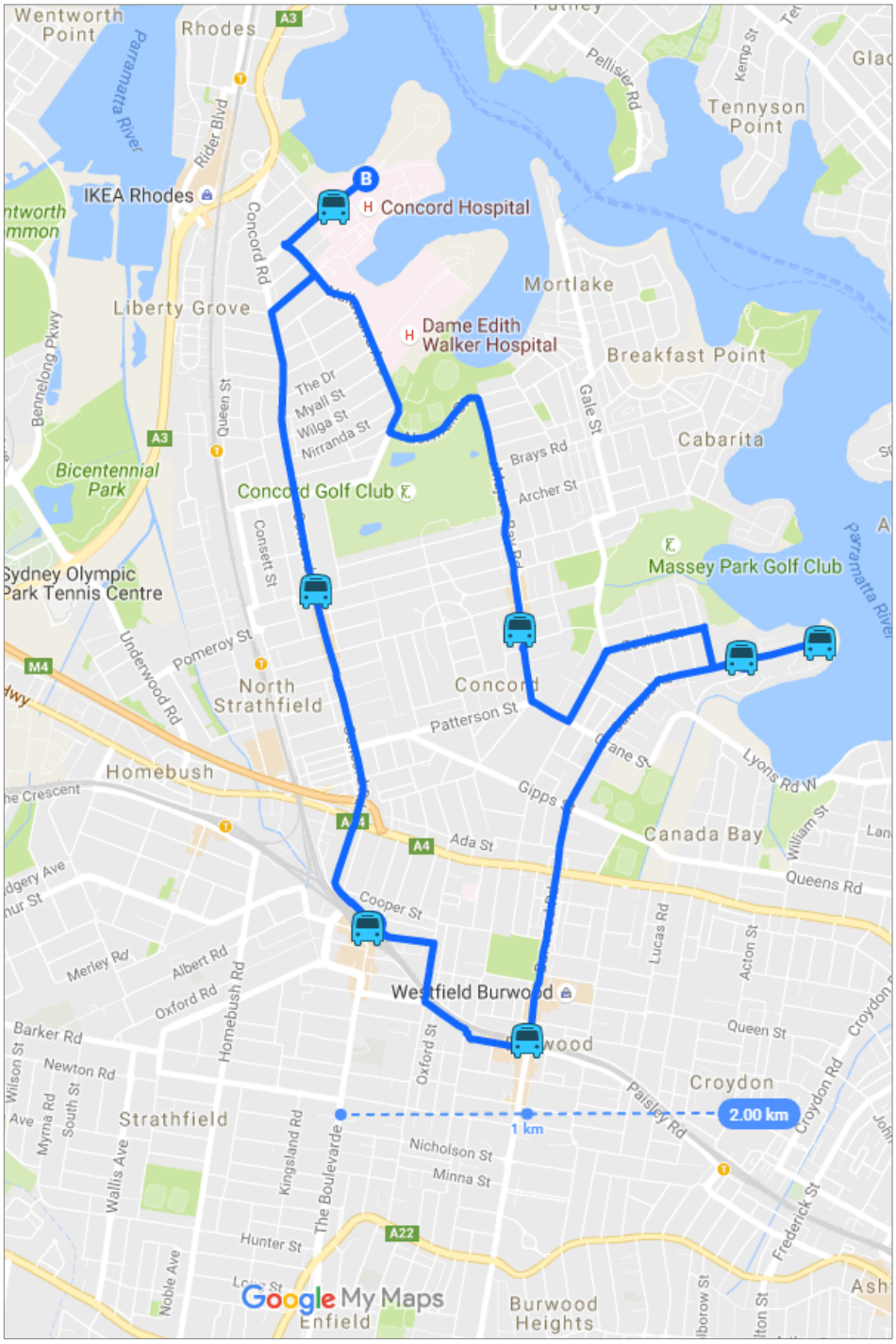
6.3.2. Proposed Shuttle Bus Service

A new shuttle bus service is proposed to improve public transport provision to the site. The bus would be privately funded for the first three years after occupation and would provide a direct link from the development site to key local destinations and bus/ rail interchanges (including the new Metro West station once open). The shuttle bus would operate in a loop through the local area and would potentially provide access to Majors Bay Road shops, Concord Hospital, Concord Library and Burwood Station.

The most appropriate vehicle is likely to be a 21-seat minibus (Coaster, Rosa or equivalent), with such services (operated by the local council) currently in operation in Artarmon. It is anticipated that two vehicles would be used, with an approximate one-hour round trip and therefore half-hour service intervals.

The preliminary planned shuttle bus route is shown in Figure 6.1, with the shuttle bus route to be refined through consultation with relevant stakeholders prior to development occupation.

Figure 6.1: Proposed shuttle bus route



6.3.3. Ferry

Historically, Sydney Ferries serviced the Bayview Park Wharf as part of the Parramatta River services. The Bayview Park wharf is located between the Abbotsford and Cabarita Wharves. The Bayview Park wharf was previously serviced by two weekday morning and two afternoon services.

The Sydney's Ferry Future document was released in May 2013 and outlines a 20-year plan for the ferry network. The document identifies a number of initiatives to improve the operation and capacity of the ferry network.

The document includes a review of 30 potential new locations that could be served by the ferry network, including the Bayview Park Wharf.

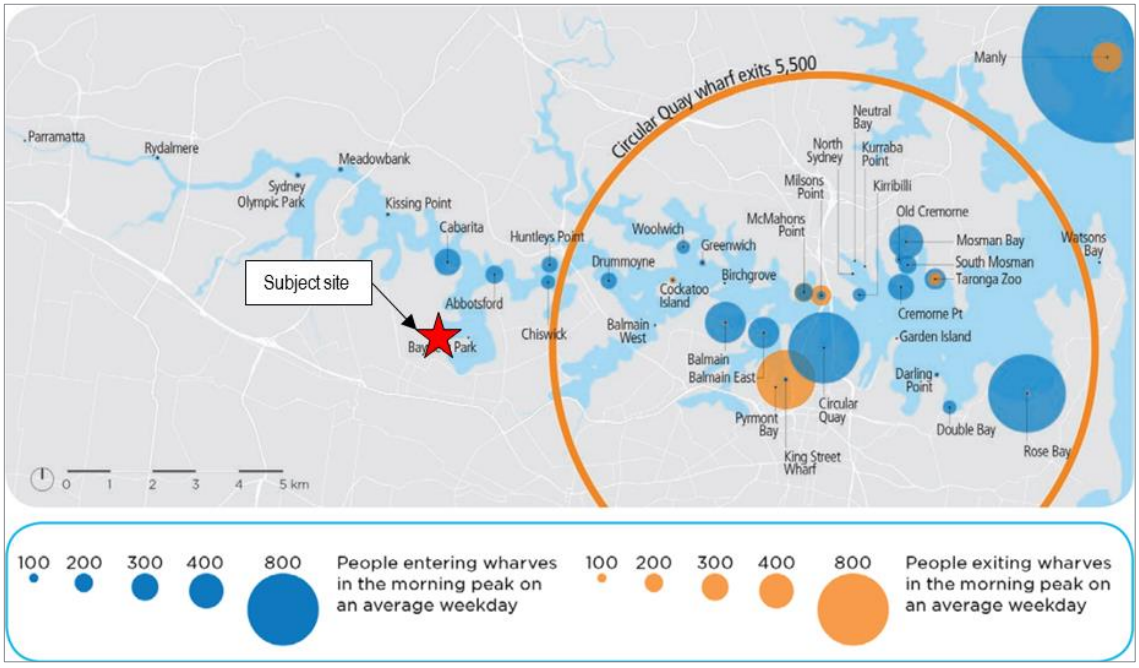
Each of the locations was assessed against the following:

- current and future demand with a focus on population, employment and attractions within the walking catchment of the wharf
- directness of the ferry route relative to the road alternative
- the costs of new infrastructure
- the frequency, cost, travel time and catchment of other modes compared to ferries.

Five new potential ferry wharves were identified on this basis. As part of the review, the Bayview Park and Balmain West Wharves were identified as being poorly patronised and recommended for services to be ceased to these wharves.

An overview of the ferry patronage (2012) is provided in Figure 3 of the Sydney's Ferry Future document reproduced in Figure 6.2.

Figure 6.2: Sydney Ferries patronage overview



Source: Sydney's Ferry Future, dated May 2013

Specifically, it is noted that the Bayview Park Wharf was observed to carry 28 passengers in the AM peak period compared to 880 at Cabarita Wharf and 690 at Abbotsford Wharf (the two adjacent wharves) for the same time period.

Reference is made to the NSW Bureau of Transport Statistics (BTS) Journey to Work data which was collected in 2011. The data provides a mode share breakdown by travel zone for residents' journey to work. The data has been analysed to assess the ferry patronage for surrounding suburbs (with ferry wharves) and including the development site, as shown in Table 6.2.

Table 6.2: BTS travel to work data – ferry travel

Suburb	Travel zone number	Number of workers living in suburb	Number of workers travel on ferry	Percentage of workers travel on ferry
Abbotsford	731	1,067	54	5%
Wareemba	733	1,532	78	5%
Wareemba South	734	1,504	23	2%
Cabarita	738	1,309	99	8%
Breakfast Point	701	1,593	105	7%
Canada Bay	735	1,342	9	1%
Five Dock	738	1,741	25	1%
Concord (development site)	704	933	25	3%

The BTS data shows that 54 workers in Abbotsford and 99 workers in Cabarita travelled to work by ferry. This is in comparison to the observed ferry numbers provided in the Sydney's Ferry Future document of 690 people at Abbotsford Wharf and 880 people at Cabarita Wharf. This shows that both the Abbotsford Wharf and Cabarita Wharf serve a wider catchment than their own suburb.

Comparing the BTS data to the Sydney's Ferry Future observations for the Bayview Park Wharf shows 25 workers travel to work by ferry, and 28 people were observed at the wharf. This implies that historically the Bayview Park Wharf only served the immediate local catchment.

Ferry services to Bayview Park have now ceased operation. Improved efficiencies along all wharves along the Parramatta River were cited as reasons for the cessation of services to Bayview Park Wharf. It is also noted that ferry trips to Bayview Park require the ferry to deviate significantly from Parramatta River (i.e. resulting in a diverted ferry trip rather than a passing trip).

Consideration is given to the potential demand by residents of the new development for the Bayview Park Wharf should the ferry services be resumed. Assuming each dwelling of the development has (on average) one worker, there would be around 400 to 500 additional workers at the site. Referring to the BTS data, the highest percentage of workers travelling on the ferry is in Cabarita at eight per cent. Applying this high rate of eight per cent to the development site would result in around 40 workers travelling to work on the ferry.

Assuming the 25 commuters recorded in the BTS data would resume using the ferry service, a total of at least 65 commuters could be expected to use the Bayview Park Wharf if the services were to be resumed. Noting that there would likely need to be a regeneration of the overall precinct rather than just this site in isolation in order to justify resumption of a ferry service, the reinstatement of the ferry service would align with the GSC vision of the adjacent Central River City.

7. TRAFFIC IMPACT ASSESSMENT

07

7.1. Traffic Generation – Proposed Development

7.1.1. Residential Uses

Traffic generation estimates for the residential use have been sourced from the Roads and Maritime *Guide to Traffic Generating Developments* 2002 (the Guide). Having regard for the proximity of the site to existing and future public transport services, employment and large-scale retail opportunities, a rate of 0.3 trips per dwelling is considered appropriate for the site.

As discussed in Section 4.1, this transport assessment includes a sensitivity assessment whereby the traffic impact has been quantified for both a 400 dwelling scenario and a 500-dwelling scenario. Considering this, the 400 and 500 dwelling scenarios would likely generate 120 and 150 trips in the peak hour respectively, or up to 1,500 trips daily.

7.1.2. Other Non-Residential Uses

There are several other non-residential land uses, such as retail, restaurant, club, market and gallery, envisaged as part of the development. The breakdown of these uses is only indicative at the moment and hence subject to change.

In this instance a retail traffic generation rate has been adopted for each of the non-residential uses. Specifically, the Guide recommends a peak weekday rate of 5.6 trips per 100 square metres for specialty retail, which has been assumed to occur in the PM peak hour. The AM peak hour rate has been assumed as 50 per cent of the PM peak hour rate (common transport engineering practice).

This approach is considered conservative, noting that the restaurant use has a lower traffic generation rate of five movements per 100 square metres (the Guide).

Considering the 3,500 square metres of non-residential space, it is estimated that this would generate around 98 trips in the AM peak hour and 196 trips in the PM peak hour.

Further to this, a 25 per cent reduction has been assumed to take into account internal trips from residents of the development. This is considered appropriate as the proposed non-residential uses are of a neighbourhood scale (i.e. small footprint stores), reliant on the local (walk-up) residential catchment.

7.1.3. Summary

A summary of the anticipated development traffic generation is provided in Table 7.1. It is noted that the in/out splits have been developed by adopting standard percentages.

Table 7.1: Summary of traffic generation

Use	AM peak hour			PM peak hour		
	In	Out	Total	In	Out	Total
Residential (400 dwellings)	24	96	120	84	36	120
Residential (500 dwellings)	30	120	150	105	45	150
Non-Residential	59	15	74	74	74	147
Total (400 dwellings)	**83**	**111**	**194**	**158**	**110**	**267**
Total (500 dwellings)	**89**	**135**	**224**	**179**	**119**	**297**

Table 7.1 indicates that the proposed development with 400 dwellings could generate between 195 and 270 trips per hour. If the proposed dwelling yields was increased to 500 dwellings, an additional 30 peak hour trips would increase traffic generation to between 225 and 300 trips per hour.

It should be noted that the non-residential traffic generation associated with the proposal is greater than the residential component, hence the traffic analysis is less sensitive to changes the residential yield. However, the non-residential component of the development is also providing a broader public benefit and some of the above traffic generation will be from the local area/ residents. It is recommended that this is given due consideration when considering the acceptability of traffic impacts and any modifications to the proposal.

7.2. Traffic Generation – Existing Use

The existing site is zoned IN1 – General Industrial and occupied by factory premises. The site is operational and currently generating traffic volumes that are distributed across the surrounding road network. Traffic counts of the existing vehicle access points servicing the site indicate that the site currently generates the following peak hour movements:

- AM peak hour: 27 movements
- PM peak hour: 19 movements.

It is understood that in recent years production at the site and in-turn persons employed at the site has reduced. As such, it is anticipated that historically the site would have generated additional traffic beyond its current levels.

In this regard, an assessment of the site's current traffic generation potential could be made by applying the Guide traffic generation rate for industrial uses to the existing floor area. Such an assessment is presented in Table 7.2 (the existing floor area has been adopted from the existing site-specific planning controls).

Table 7.2: Potential traffic generation – existing industrial use

Use	Size [1]	Traffic generation rates		Traffic generation movements	
		AM	PM	AM	PM
Industrial	40,000m^2	0.52 movements/ 100m^2	0.56 movements/ 100m^2	208 movements	224 movements

[1] Based on an overall site area of 4ha (40,000sqm) and a maximum floor space ratio of 1:1.

The existing site, adopting the current planning controls, has the potential to generate some 220 peak hour movements. This is significantly greater than the traffic currently being generated by the site (reduced production).

The proposed development seeks to increase the traffic generation by approximately 60 per cent of the existing potential traffic generation of the site.

7.3. Distribution and Assignment

The directional distribution and assignment of traffic generated by the proposed development will be influenced by a number of factors, including the:

configuration of the arterial road network in the immediate vicinity of the site

1. existing operation of intersections providing access between the local and arterial road network
2. surrounding employment centres, retail centres and schools in relation to the site
3. configuration of access points to the site.

Traffic accessing the site would generally do so via Burwood Road and Zoeller Street which connects the site to the broader arterial/ higher order road network. Traffic would gradually disperse (east and west) from these corridors when moving further south at Crane Street, Gipps Street and Parramatta Road.

Having consideration for the above, for the purposes of estimating vehicle movements, the directional distributions shown in Figure 7.1 and Figure 7.2 have been assumed which is based on the existing 2019 turning movement counts at the key surveyed intersections.

Figure 7.1: Assumed inbound directional distribution

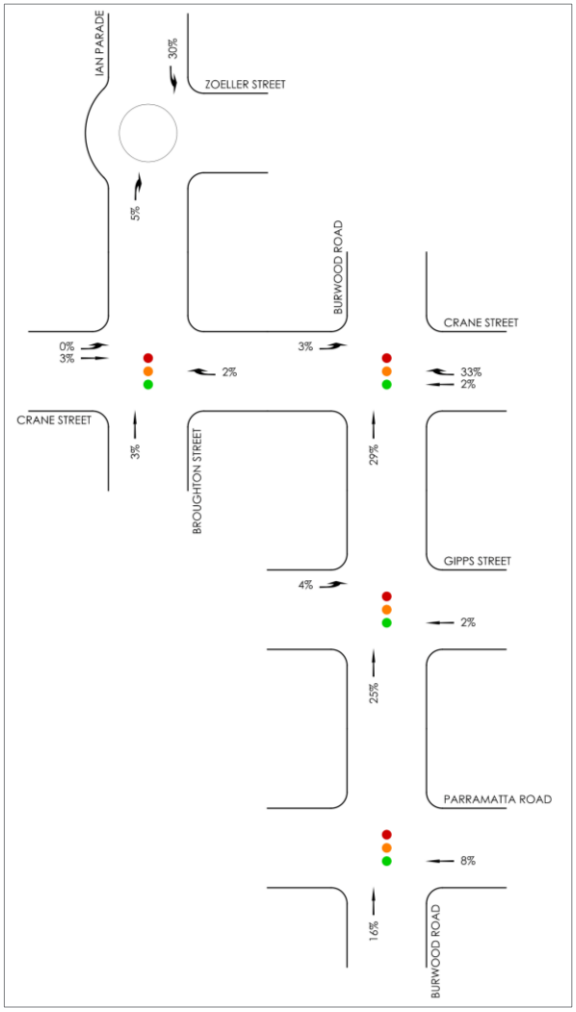
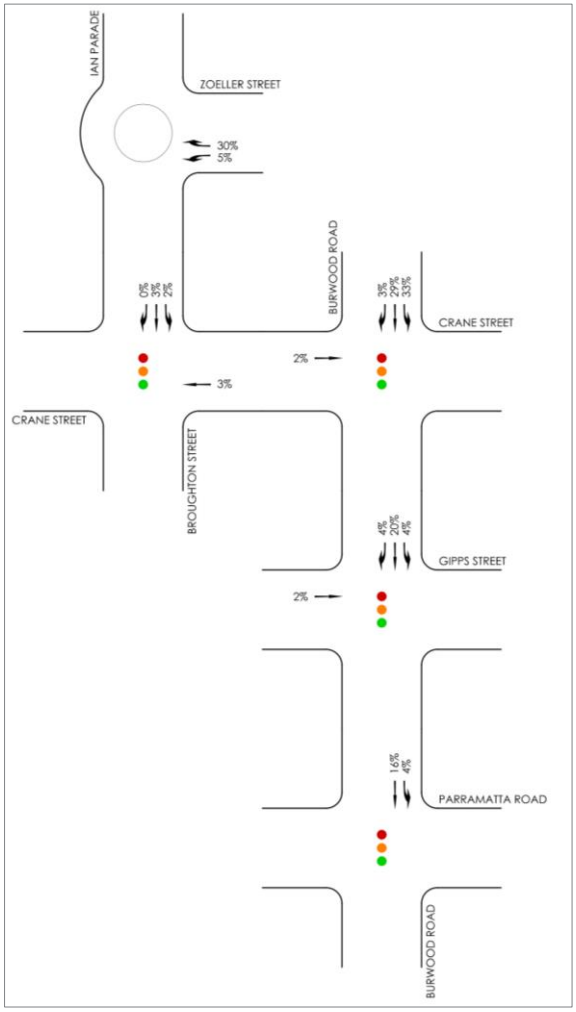


Figure 7.2: Assumed outbound directional distribution



7.4. Traffic Impact

7.4.1. 2019 with Development

The impact of the development traffic upon the surrounding intersections has been assessed using SIDRA. The impacts for both 400 dwellings and 500 dwellings were assessed. On the basis of the traffic generation estimates and distribution presented above, Table 7.3 presents a summary of the intersection operation of the key surveyed intersection following full development of the site.

Table 7.3: 2019 intersection operation with development traffic

Intersection	Peak	Degree of saturation (DOS)		Average delay (sec)		95th percentile queue (m)		Level of service (LOS)	
Number of dwellings		400	500	400	500	400	500	400	500
Broughton Street/ Zoeller Street/ Ian Parade	AM	0.32	0.33	12	12	14	15	A	A
	PM	0.22	0.23	11	11	9	9	A	A
Broughton Street/ Crane Street	AM	0.77	0.77	29	29	126	126	C	C
	PM	0.80	0.80	32	32	138	138	C	C
Burwood Road/ Crane Street	AM	0.82	0.82	37	41	173	181	C	C
	PM	0.93	0.93	48	49	233	251	D	D
Burwood Road/ Gipps Street	AM	0.79	0.79	33	33	137	137	C	C
	PM	0.84	0.86	32	32	145	145	C	C
Burwood Road/ Parramatta Road	AM	0.56	0.56	20	20	147	147	B	B
	PM	0.59	0.60	23	23	169	169	B	B

In general, Table 7.3 indicates that all intersections are operating at satisfactory levels (LOS D or better).

Zoeller Street/ Broughton Street

The Zoeller Street/ Broughton Street intersection is expected to operate similar to existing conditions, with minor increases to 95th percentile queues of up to three to four metres overall.

Crane Street/ Broughton Street

The Crane Street/ Broughton Street is expected to operate similar to existing conditions with the additional development traffic, with similar levels of delay and an increase in 95th percentile queues of up to four metres.

Crane Street/ Burwood Road

The Crane Street/ Burwood Road intersection is expected to operate with only minor increases to the average delays and 95th percentile queues in the AM Peak. The average delay in the PM Peak is expected to increase from 38 seconds to 48-49 seconds with the critical movements experiencing the longest delays being the right turn from the south and west approaches. The 95 percentile queues are expected just reach Broughton Street and may impact the operation at this intersection.

Gipps Street/ Burwood Road

The Gipps Street/ Burwood Road intersection is expected to operate at an acceptable level of service, with manageable queues and delays on all approaches. The development traffic will result in minimal increases to the average delay and 95th percentile queue on all approaches.

Parramatta Road/ Burwood Road

The Parramatta Road/ Burwood Road intersection is expected to operate with only minor increases to the average delays and 95th percentile queues in both the AM and PM peaks. It is noted that the intersection currently experiences delays and queues related to downstream congestion on Parramatta Road which is not modelled in the SIDRA analysis.

7.4.2. 2036 without Development

Growth factors sourced from the STFM have been applied to existing traffic volumes to estimate 2036 traffic volumes. Table 7.4 presents a summary of the intersection operation of the key surveyed intersection in 2036 without development traffic.

Table 7.4: 2036 intersection operation without development traffic

Intersection	Peak	Degree of saturation (DOS)	Average delay (sec)	95th percentile queue (m)	Level of service (LOS)
Broughton Street/ Zoeller Street/ Ian Parade	AM	0.30	13	14	A
	PM	0.20	12	8	A
Broughton Street/ Crane Street	AM	0.88	35	168	C
	PM	0.93	41	203	C
Burwood Road/ Crane Street	AM	0.88	42	218	C
	PM	0.90	44	228	D
Burwood Road/ Gipps Street	AM	0.97	45	196	D
	PM	0.94	42	210	C
Burwood Road/ Parramatta Road	AM	0.56	23	142	B
	PM	0.56	26	147	B

Table 7.4 indicates that all intersections are generally operating at an acceptable level of service (LOS D) or better, however the Burwood Road/ Crane Street and Burwood Road/ Gipps Street intersections would effectively be at capacity.

7.4.3. 2036 with Development

400 dwellings

Table 7.5 presents a summary of the intersection operation of the key surveyed intersection in 2036 following full development of the site.

Table 7.5: 2036 intersection operation with development traffic

Intersection	Peak	Degree of saturation (DOS)		Average delay (sec)		95th percentile queue (m)		Level of service (LOS)	
Broughton Street/ Zoeller Street/ Ian Parade	AM	0.38	0.40	14	14	19	20	A	A
	PM	0.27	0.27	12	12	12	12	A	A
Broughton Street/ Crane Street	AM	0.89	0.90	36	36	174	177	C	C
	PM	0.94	0.94	42	42	208	209	C	C
Burwood Road/ Crane Street	AM	0.92	0.89	47	38	241	226	D	C
	PM	1.01	1.01	65	69	316	318	E	E
Burwood Road/ Gipps Street	AM	1.01	1.01	55	54	231	231	D	D
	PM	0.97	0.96	52	44	245	216	D	D
Burwood Road/ Parramatta Road	AM	0.57	0.57	23	23	144	144	B	B
	PM	0.59	0.58	23	27	169	149	B	B

Table 7.5 indicates that all intersections are generally operating at an acceptable level of service (LOS D) or better except for the following intersections:

- The Burwood Road/ Crane Street intersection is expected to operate at LOS E and over capacity during the PM peak hour
- The Burwood Road/ Gipps Street intersection is expected to operate over its capacity during the AM peak hour

A degree of saturation of 1.0 indicates that the intersection is operating at capacity and any further increase in traffic will lead to higher delays and queues. It is noted that these intersections are expected to be close to their capacity in 2036 even without the development traffic. Once SIDRA calculates an intersection reaching a degree of saturation 1.0, any slight increase in traffic at the intersection causes queues and delays to increase exponentially.

In general, the results with 500 dwellings are similar to the 400 dwellings scenario.

7.5. Proposed Mitigation Measures

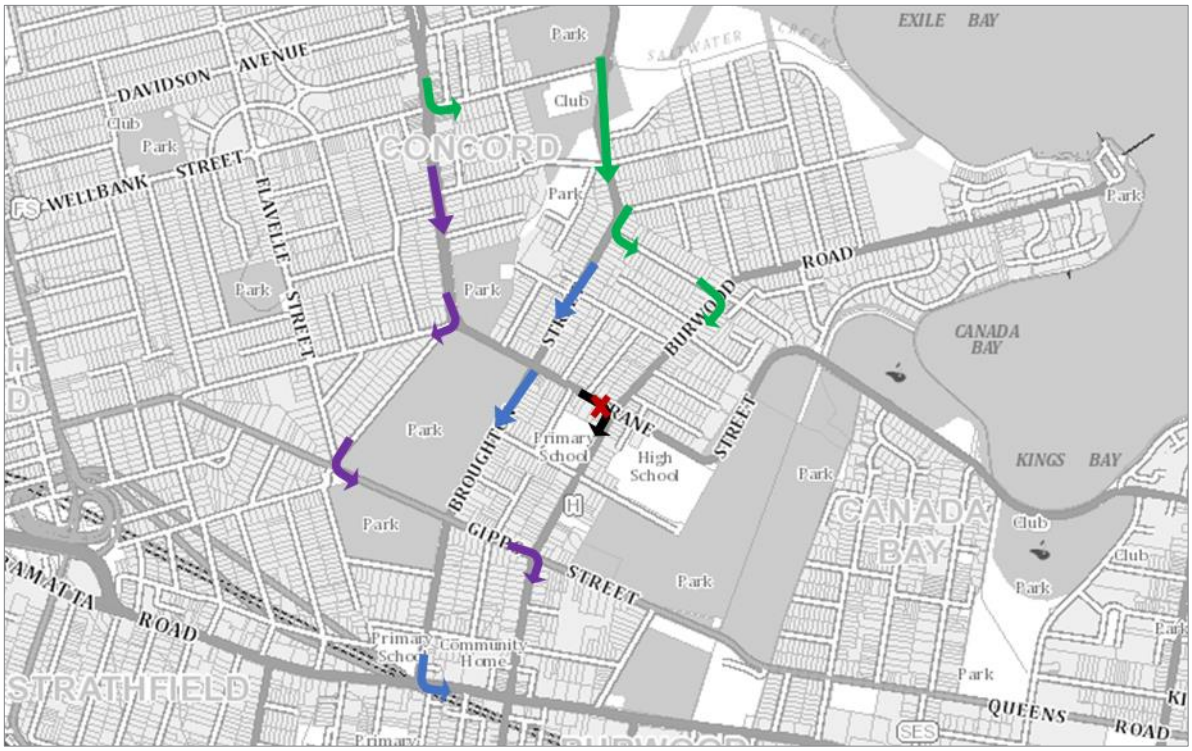
7.5.1. Turning Movement Restrictions and Traffic Calming

The project team would work with Roads and Maritime and Council to agree operational and physical improvements to affected intersections, particularly the Burwood Road/ Crane Street intersection. These may include:

- Select peak period right turn bans to improve intersection efficiency where turning movements are currently low. Preliminary consultation with Roads and Maritime suggests that this may be an appropriate treatment measure, with buses excepted. Analysis shows that the intersection would operate within capacity with a right turn ban on the west approach at the Crane Street/ Burwood intersection during 2036 peak periods post development.
- Further local area traffic management devices to reduce travel speeds and improve operation.

It is noted that Council could consider reviewing some of the local area traffic management schemes particularly along Broughton Street, north of Crane Street, to ensure traffic control devices meet the needs of future traffic and access conditions. With the ban of right turn from Crane Street (west approach) into Burwood Road, some alternative possible route choices are presented in Figure 7.3.

Figure 7.3: Possible alternative routes



Base image source: Six Maps

The intersection modelling results for the Crane Street/ Burwood Road intersection in 2036 with the 500 dwelling development scenario are shown in Table 7.6.

Table 7.6: Crane Street/ Burwood Road 2036 intersection operation with 500 dwelling development and proposed mitigation measures

Intersection	Peak Hour	Post development			
		Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service (LOS)
Crane Street/ Burwood Road	AM	0.77	33	144	C
	PM	0.92	39	290	C

As shown in Table 7.6, the intersection is expected to operate at a level of service C or better in the PM peak hour in 2036 with the implementation of right turn ban at Burwood Road from Crane Street (west approach). Although the ban restriction is not necessary in the AM peak given the acceptable level of service, testing of this mitigation measure indicates that the intersection operation would improve greatly (benefitting significantly more road users than it impacts). In addition, queues and delays are expected to be similar to that of existing conditions, if not better.

The above analysis confirms the feasibility and appropriateness of the proposed peak period right turn restrictions.

As shown in Figure 7.3, one possible alternative is for traffic to utilise the right turn at the downstream intersection of Gipps Street and Burwood Road. Sensitivity test at this intersection was carried out by adding 10 per cent of the inbound banned right turn traffic from Crane Street to Burwood Road to the right turn right from Gipps Street into Burwood Road. It is noted the intersection of Gipps Street and Burwood Road is expected to operate at capacity for 2036 traffic conditions and therefore drivers are more likely to look for alternative routes based on their origin and destination if the right turn from Crane Street (west approach) to Burwood Road is not available. The Burwood Road/

Gipps Street intersection operation under 2036 conditions with the 500 dwelling development traffic and the banned right turn is presented in Table 7.7.

Table 7.7: Burwood Road/ Gipps Street 2036 intersection operation with 500 dwelling development with and without proposed mitigation measures

Intersection	Peak Period	Degree of saturation (DOS)		Average delay (sec)		95th percentile queue (m)		Level of service (LOS)	
		Without additional 10% RT traffic	With additional 10% RT traffic	Without additional 10% RT traffic	With additional 10% RT traffic	Without additional 10% RT traffic	With additional 10% RT traffic	Without additional 10% RT traffic	With additional 10% RT traffic
Burwood Road/ Gipps Street	AM	1.01	1.01	54	55	232	234	D	D
	PM	0.96	1.01	44	58	216	288	D	E

As presented in Table 7.7, the performance of the intersection is marginally impacted by the additional traffic with the 95th percentile queues at Crane Street increasing by about 10 vehicles or roughly about 50 metres. A further detailed assessment may be carried out by collecting data and study travel patterns for the right turn proposed to be banned at the development application stage.

7.5.2. Opening Marceau Drive Connection

To improve the connectivity and permeability of the surrounding road network, a connection between Marceau Drive and Crane Street could be reinstated to allow for left-out movements only. This would likely result in reduced traffic demand at the Burwood Road/ Crane Street intersection particularly, as well as at the Burwood Road/ Gipps Street intersection, particularly given that approximately a third of the outbound development traffic is expected to turn left at Crane Street from Burwood Road. Noting the likely benefit this connection would have on the key surrounding intersections, the proposed development is not reliant on this connection being provided as indicated by the SIDRA modelling results in Section 7.4 and 7.5.1.

7.6. Summary

Against existing traffic volumes in the vicinity of the site, the additional traffic generated by the proposed development could not be expected to compromise the safety or function of the surrounding road network, following implementation of select agreed road network improvements. In addition, there is minimal difference in terms of traffic impact between the 400 and 500 dwelling development yields. This is demonstrated in Table 7.8 and Table 7.9 which show that the 500 dwelling scenario results in an increase in traffic of up to one per cent from the 400 dwelling scenario, or up to 20 vehicle trips at any one intersection. Considering the traffic modelling outcomes mentioned above, a development yield containing 500 dwellings is supportable from a transport impact perspective.

Further to this, the proposed development will also provide a variety of local and speciality shops in which will directly service the immediate surrounding residential catchment. Currently, the nearest local shops are located on Majors Bay Road. The proposed commercial and retail offering will ultimately reduce the number of local trips surrounding residents take to get to get to their local shops by providing daily needs within an easy walk of people.

Table 7.8: 2019 traffic volume comparison

Intersection	Existing		With 400 dwelling development				With 500 dwelling development			
	AM	PM	AM	Difference	PM	Difference	AM	Difference	PM	Difference
Broughton Street/ Zoeller Street/ Ian Parade	1,385	1,390	1,471	6%	1,498	8%	1,482	7%	1,509	9%
Broughton Street/ Crane Street	2,083	2,226	2,104	1%	2,252	1%	2,107	1%	2,255	1%
Burwood Road/ Crane Street	2,027	2,070	2,194	8%	2,279	10%	2,214	9%	2,300	11%
Burwood Road/ Gipps Street	2,279	2,252	2,356	3%	2,349	4%	2,365	4%	2,358	5%
Burwood Road/ Parramatta Road	3,836	4,337	3,891	1%	4,409	2%	3,898	2%	4,416	2%

Table 7.9: 2036 traffic volume comparison

Intersection	2036 background growth		With 400 dwelling development				With 500 dwelling development			
	AM	PM	AM	Difference	PM	Difference	AM	Difference	PM	Difference
Broughton Street/ Zoeller Street/ Ian Parade	1,679	1,629	1,766	5%	1,737	7%	1,776	6%	1,748	7%
Broughton Street/ Crane Street	2,536	2,629	2,557	1%	2,655	1%	2,559	1%	2,658	1%
Burwood Road/ Crane Street	2,246	2,290	2,413	7%	2,500	9%	2,433	8%	2,520	10%
Burwood Road/ Gipps Street	2,627	2,485	2,704	3%	2,581	4%	2,713	3%	2,591	4%
Burwood Road/ Parramatta Road	3,540	3,906	3,595	2%	3,978	2%	3,601	2%	3,985	2%

8. OTHER CONSIDERATIONS

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8.1. Car Share

As previously mentioned, there are no car sharing facilities within close proximity of the site. As part of the development, car share spaces could be provided on-site to provide residents an alternative to owning their own car. The benefits of car share can be:

- Reduced car usage – research shows that people drive on average 20 per cent less when using car share
- Fewer cars – Industry evidence suggests a single car share space can replace the need for around five parking spaces for residents and/or visitors
- Promotes and maintains liveable communities – encourages public and active transport use, facilitating interactions which creates cohesive residential communities
- Provides economic benefit – can be cheaper alternate to owning a car for infrequent drivers
- Cleaner Air – more fuel-efficient cars results in less pollution.

The inclusion of car sharing facilities on-site may support a dispensation in car parking provision should a reduction from the required rates outlined in the DCP be sought.

8.2. Autonomous Vehicles

With continuing technological advancements, research and development into autonomous vehicles, there is the potential for significant impacts to the automotive industry which will in turn alter the way in which we plan and design cities. While is it unlikely that fully autonomous vehicles will be available in the short term, research suggests that there is potential for the technology and associated enabling legislation to be available within the next 25 years. In this regard, the potential impacts of autonomous vehicles on the proposed development are considered.

One of the main considerations with regard to this development is the reduction in car parking space required for autonomous vehicles. Self-parking vehicles would not require open-door space for drivers and passengers to enter and exit the car upon parking. Drivers and passengers could be dropped off prior to parking, and the vehicle could then park itself. Research suggests the parking space could require 15 per cent less space[2].

In addition to this, the whole concept of car ownership could alter further reducing car parking requirements. Instead of individual car ownership, car sharing may become more popular with the ability for individuals to request a vehicle pick them up and drop them off without the need for the vehicle to park at either the origin or the destination. While this may have a positive impact in the reduction of car parking space required, it has the potential to increase traffic volumes with unoccupied vehicle trips.

Given the long-term outlook for the implementation of fully autonomous vehicles, no immediate impact is considered for the development. However, given the long-term potential for a reduction in car parking demand, consideration should be given to the ability to retrofit alternative use(s) into basement car parking. Possible design considerations include providing car spaces with increased height clearance to accommodate the height requirements of commercial floor space.

[2] http://www.mckinsey.com/industries/automotive-and-assembly/our-insights/ten-ways-autonomous-driving-could-redefine-the-automotive-world

8.3. Development Staging

As discussed in Section 2.6, the NSW Government has indicated plans to deliver Sydney Metro West in the late 2020s. In addition, the next stage of WestConnex near Iron Cove and Rozelle is expected to open in 2023, potentially having further benefit to reducing traffic volumes along Parramatta Road and nearby east-west links.

When considering the timeframes related to gaining approval for the proposed rezoning, concept master plan, staged development applications and construction itself, it is expected that the development will align well with the implementation of these infrastructure projects, which will likely further assist in reducing the travel demand of the site, as well as alleviate demand for key roads surrounding the site.

9. CONCLUSION

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CONCLUSION

Based on the analysis and discussions presented within this report, the following conclusions are made:

1. It is proposed to rezone the subject site to a B4 Mixed Use zone, increase the permissible height limit for the site and introduce a site-specific floor space ratio.
2. The indicative development yield is 399 apartments, 3,500 square metres GFA of non-residential uses.
3. GTA has considered a range of residential yield options, from 300-600 dwellings, noting that the adopted traffic geenration rates is 30 peak hour trips per 100 dwellings. Detailed traffic analysis was completed to investigate the varying traffic impact of the development if it was to contain 400 dwellings compared to containing 500 dwellings.
    - With 400 dwellings, the development is anticipated to generate in the order of 195 movements in the AM peak hour and 270 movements in the PM peak hour.
    - With 500 dwellings, the development is anticipated to generate in the order of 225 movements in the AM peak hour and 300 movements in the PM peak hour.
4. It is recommended that car parking for the future land uses be provided in accordance with the requirements of the City of Canada Bay DCP. There may be an opportunity to share (part of) the residential visitor parking provision with the retail parking, as well as reducing the overall visitor parking provision to be more consistent with typical high-density developments.
5. It is recommended that bicycle parking for the future land uses be provided in accordance with the requirements of the City of Canada Bay DCP.
6. There is generally adequate capacity in the surrounding road network to cater for the traffic generated by the proposed development, in addition to projected future traffic increases/ decreases, following implementation of select agreed road network improvements.
7. The project team would work with Roads and Maritime and Council to agree operational and physical improvements to affected intersections, particularly the Burwood Road/ Crane Street intersection (including implications at the Broughton Street/ Crane Street iintersection). Preliminary consultation suggests that select peak period right turn bans at this specific location may be an appropriate treatment measure. Analysis shows that the intersection would operate within capacity with right turn bans on both the Crane Street approaches (eastern and western leg) during the peak hour periods.
8. While not requried by the proposal, providing a left-out only connection from Marceau Drive into Crane Street would also help reduce queuing and delays at this intersection, while improving the permeability of the local road network.
9. It is noted that Council could consider reviewing some of the local area traffic management schemes particularly along Broughton Street, north of Crane Street, to ensure traffic control devices meet the needs to future traffic and access conditions.
10. To reduce private car use, a privately funded frequent shuttle bus service is proposed to be funded by the development. The shuttle bus would operate in a loop connecting the development site to key local destinations including Majors Bay Road Shops, Concord Hospital, Concord Library and Burwood Station and bus/ rail interchanges (including the new Metro West station once open).
11. There is potential of electric bicycles to be provided to residents of the development to complete the first and last kilometre of their journey to surrounding transport interchanges such as Burwood and Strathfield Stations, as well as the future Sydney Metro West Burwood North Station.
12. An on-site car share pod of minimum 10 vehicles is recommended to assist with managing car ownership and travel demand, with incremental implementation.
13. Given the proposed retail and commercial uses, it is likely the proposed development will result in a reduction in local vehicle trips of the surrounding area by providing daily needs within an easy walk.

14. Staging of the development will also align with surrounding infrastructure projects such as Sydney Metro West, considering the required timeframe for the rezoning itself, concept master plan approval, staged development applications and construction.

15. Future development has the potential to make a positive contribution to the surrounding area by providing a new retail precinct, with cafes, restaurants and cultural spaces. In combination with the proposed shuttle bus as well as car share facilities, the development would minimise the need for private car travel for new residents, as well as existing residents in the immediate local area.

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