CENTRAL PLAZA, 34-46 BROOKHOLLOW AVENUE, NORWEST

TRANSPORT IMPACT ASSESSMENT

PREPARED FOR WESCO GROUP
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Stantec

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A	21/08/2020	Final	Andrew Zhou	Ashish Modessa	Rhys Hazell
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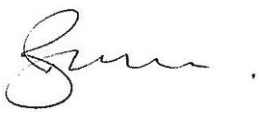
Approved by: 

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Executive Summary

A planning proposal is to be lodged with The Hills Shire Council for amendments to Local Environmental Plan 2012 (LEP 2012) and Development Control Plan 2012 (DCP 2012) for future mixed-use development at 34-46 Brookhollow Avenue, Norwest. The planning proposal incorporates a potential mixed-use development comprising 47,752 square metres of commercial space, residential units, childcare centre, licenced hotel and ancillary retail provided across three sites.

The opportunity for such development potential has largely been realised by the introduction of Sydney Metro to northwest Sydney and the elevation of Norwest from a business park to a strategic centre. Norwest Metro station is opposite the site on the eastern side of Brookhollow Avenue, with the first stage of Sydney Northwest Metro linking Tallawong station with Chatswood having begun operations in late-May 2019. Metro services have significantly improved travel time and reliability compared with bus and private car to key centres including Epping, Macquarie Park, Chatswood, St Leonards, North Sydney and Sydney CBD. This expands the 30-minute public transport coverage for Norwest, a key strategy of the NSW Government with patrons able to travel as far east as Chatswood by public transport compared with the historical coverage that only expanded as far as Castle Hill.

Sydney Metro will likely continue to substantially shift travel behaviour of both the existing and future workforce and residents that will limit the reliance on travel by private vehicle and therefore significantly contributing to easing historical traffic congestion through the area. This has been reflected in the transport mode split targets for the development which are more representative of the benchmarked areas in Sydney that are afforded a high level of public transport accessibility similar to that has been introduced to Norwest recently and exhibit an even proportion of commercial and high-density residential uses.

Overall, the key strategic merits with respect to the planning proposal include:

- high-density mixed-use development within a strategic centre and adjacent to a new major rail and bus interchange providing access to local and regional major employment centres.
- integrated land uses that provide opportunities for co-location of jobs and housing; thus, supports trip containment internally (i.e. minimising external traffic generation); and creates more proportional two-directional trips for better utilisation of public transport infrastructure in and out of Norwest across the day.

Key merits with the urban design concept include:

- Ground floor activation for community use by creation of open space adjacent to Norwest Metro Station, surrounded by a licenced hotel and retail space.
- Minimal setbacks to Norwest Boulevard to activate the frontages, with security and weather protection to encourage pedestrian activity generally.
- Separation of commercial and residential uses into individual buildings, with the residential building ensuring a logical transition to the adjacent residential zone towards the western end of the site.

- Convenient pedestrian links between Norwest Boulevard and Brookhollow Avenue to increase connectivity through the site, with ground floor uses to establish a pedestrian friendly environment internal and external to the site.
- Location of the access road where an existing driveway intersects with Brookhollow Avenue, with no vehicle access from Norwest Boulevard or adjacent residential areas.
- The ability to provide a balanced provision of car parking spaces across the separate basements for use by the various uses considers the prime location of the site within Norwest and near Norwest Metro and Marketown.

The recommended car parking requirements of 630 spaces is considered appropriate for the anticipated transport requirements of future residents, employees and visitors. It strikes a balance between more aggressive limited parking provisions across Sydney and the higher rates specified in DCP 2012. The approach also recognises that the historical reliance on travel by private vehicle will likely significantly change over coming years with the continued expansion of Sydney Metro and assists in realising reduced traffic generation in and around the area.

The planning proposal could potentially generate up to 230 additional vehicle trips over the existing land use in any peak hour: or an additional 150 inbound vehicle trips and 120 outbound vehicle trips in the peak directions. This represents less ‘tidal’ traffic flow compared to the traditional wholly commercial nature of the site and broader Norwest and Bella Vista commercial areas.

Existing traffic conditions in Norwest are in transition and not considered representative of future conditions. As such, an assessment based on current conditions and intersection configurations would not provide meaningful results to inform the planning proposal. It would not take into consideration any shift in travel behaviour of the existing and future workforce and residents or other forecasted growth in the area. Council and Transport for NSW engaged traffic modelling to be completed for the Norwest and Bella Vista precincts to better understand future traffic conditions. It is understood that the base model has been agreed, with uplift associated with a number of development sites in the precinct (including the subject site) expected to be finalised in the near future. The applicant is committed to ongoing stakeholder engagement (and any such future Voluntary Planning Agreements) in this regard.

1 Introduction

1.1 Background

A planning proposal is to be lodged with The Hills Shire Council for amendments to Council's Local Environmental Plan 2019 (LEP 2019) to permit future mixed-use development at 34-46 Brookhollow Avenue, Norwest. The site is bound by Brookhollow Avenue to the east, Norwest Boulevard to the north and low-density residential land uses to the south.

Wesco Group has engaged Stantec to assess the transport, parking and traffic implications associated with the planning proposal.

1.2 Development Proposal

The planning proposal seeks to amend the planning controls to permit mixed use development on land currently zoned B7 Business Park and increase the maximum floor space ratio and height controls that currently apply to the site. This is consistent with broader planning growth in Norwest, initially envisaged and now triggered by Sydney Metro services.

The proposal incorporates a mixed-use development ultimately comprising one residential building (Site A) and two commercial buildings (Sites B and C) with podium levels also including ancillary retail, childcare centre and licenced hotel. The indicative combined yield is as follows:

- 35,500 square metres of commercial space
- 76 residential apartments:
    - 12 x 1-bedroom
    - 36 x 2-bedroom
    - 28 x 3-bedroom
- 1,162 square metres licenced hotel floor area
- 1,003 square metres of retail space
- 639 square metre (100-place) childcare centre.

The Gross Floor Area (GFA) split cross the three buildings is summarised in Table 1.

Table 1: Gross Floor Area by building

Land use	Building A	Building B	Building C
Commercial	-	13,098m^2	22,402m^2
Childcare	-	639m^2	-
Retail	-	-	1,003m^2
Hotel/ Pub	-	-	1,162m^2
Residential	9,576m^2	-	-
Total	**9,576m^2**	**13,737m^2**	**24,567m^2**

The proposed site plan is shown in Figure 1 which shows the layout of the individual buildings and the proposed site access along Brookhollow Avenue. Separate basement car parks will be accessed via separate ramps for each section of the proposal, with at-grade loading facilities. The proposed site access driveway would intersect with Brookhollow Avenue in the south-east corner of the site, and furthest from the newly operating Norwest Boulevard traffic signals. This will minimise interference between the Norwest Boulevard/ Brookhollow Avenue traffic signals and the site access.

Other key transport related aspects of the planning proposal include:

- Ground floor activation for community use by creation of open space adjacent to Norwest Metro Station, surrounded by a licenced hotel and retail space.
- Minimal setbacks to Norwest Boulevard to activate the frontages, with security and weather protection to encourage pedestrian activity generally.
- Separation of commercial and residential uses into individual buildings, with the residential building ensuring a logical transition to the adjacent residential zone towards the western end of the site.
- Convenient pedestrian links between Norwest Boulevard and Brookhollow Avenue to increase connectivity through the site, with ground floor uses to establish a pedestrian friendly environment internal and external to the site.
- Inclusion of an internal turnaround area, accessible via the proposed site access, to facilitate set-down/ pick-up activity (taxis, private vehicles, ride share services).

Figure 1: Proposed site plan

Source: PBD Architects

1.3 Purpose of this Report

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

- existing and planned transport services surrounding the site
- trip generating characteristics of the proposal
- pedestrian and bicycle considerations and requirements
- suitability of proposed parking in terms of supply and indicative layout
- suitability of future access arrangements for the precinct
- transports impact of the proposal on the surrounding network.

1.4 References

In preparing this report, reference has been drawn from a number of background sources, including:

- several inspections of the site and its surrounds
- The Hills Shire Council's Local Environmental Plan (LEP) 2019
- The Hills Shire Council's Development Control Plan (DCP) 2012
- The NSW Government's Future Transport 2056 Strategy 2018
- Greater Sydney Commission's Our Greater Sydney 2056 Central City District Plan 2018
- The NSW Government's Greater Sydney Services and Infrastructure Plan 2018
- The Hills Shire Council's The Hills Corridor Strategy 2015
- Australian Standard/ New Zealand Standard, Parking Facilities, Part 1: Off-Street Car Parking AS/NZS 2890.1:2004
- Australian Standard, Parking Facilities, Part 2: Off-Street Commercial Vehicle Facilities AS 2890.2:2018
- Australian Standard, Parking Facilities, Part 6: Off-Street Parking for People with Disabilities AS 2890.6:2022
- traffic surveys undertaken by Matrix Traffic and Transport Data as referenced in the context of this report
- plans for the proposed development prepared by PBD Architects
- other documents and data as referenced in this report.

2 Strategic Context

2.1 Overview

The following key strategies and plans have influenced development opportunities in the strategic centre of Norwest and broader north-west growth area, together with real effects on future travel demand and mode splits for both workers and residents alike.

A trigger for real growth in Norwest is the Sydney Metro that operates as a standalone railway covering more than 66 kilometres. Sydney Metro Northwest is the first stage of the project linking Schofields and Chatswood via Norwest, Castle Hill and Epping with services having commenced in May 2019. Sydney Metro City & Southwest lines are currently under construction and is expected to be completed by 2024. This will provide additional metro links between Chatswood and Bankstown via the Sydney CBD and Sydenham. Sydney Metro will improve travel time, reliability and reduce costs compared with bus and private car travel to key employment areas including Macquarie Park, Chatswood, North Sydney and Sydney CBD.

Sydney Metro has and will continue to greatly improve the 30-minute coverage for Norwest with commuters travelling as far east as Chatswood by public transport. The 30-minute coverage will also be expanded for areas to the north and south of the metro line including towards Hornsby and Rhodes via The Northern heavy rail line.

2.2 Relevant Strategies and Plans

2.2.1 The NSW Government Future Transport 2056 Strategy

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 the 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.

2.2.2 The Greater Sydney Region Plan 2018

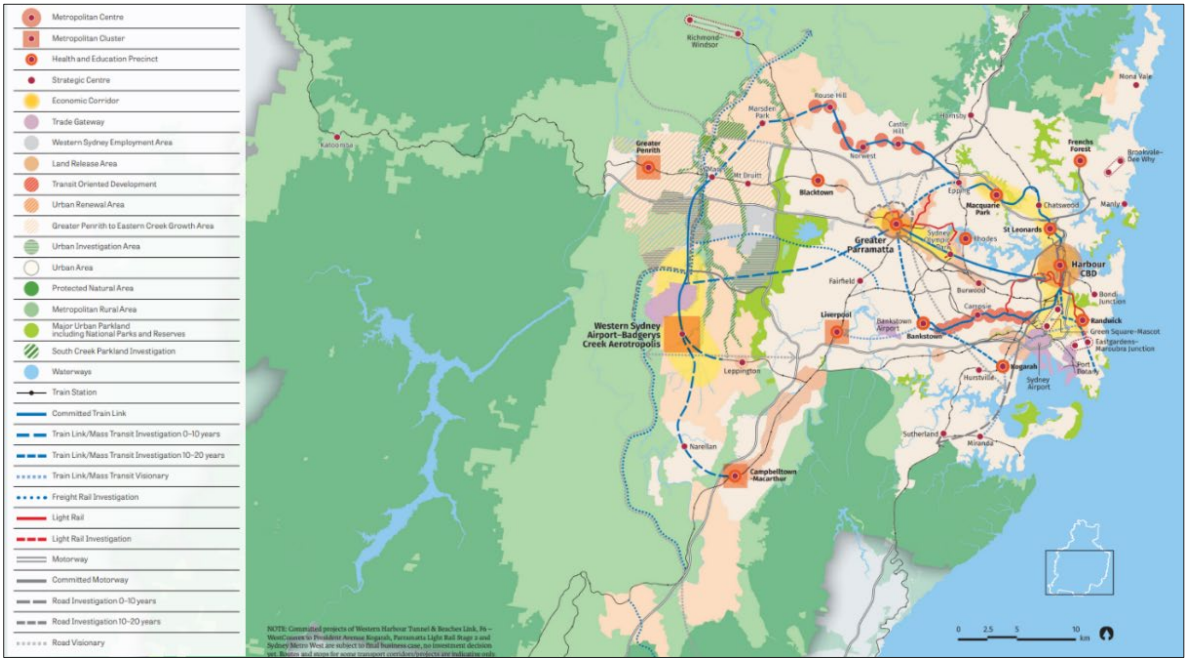
The Greater Sydney Commission (GSC) is an independent organisation that leads metropolitan planning for Greater Sydney. It has prepared the Greater Sydney Region Plan which outlines how Greater Sydney will manage growth and guide infrastructure delivery. The plan has been prepared in

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 in Figure 2 with Norwest highlighted on the Metro line and recognised as a strategic centre.

Figure 2: Greater Sydney Structure Plan 2056 – The Three Cities



Source: Greater Sydney Commission

2.2.3 Central City District Plan

The vision for Greater Sydney as a metropolis of three cities – the Western Parkland City, the Central River City and the Eastern Harbour City and a 30-minute city – means residents in the Central City District will have quicker and easier access to a wider range of jobs, housing types and activities as part of the overall transformation. The vision will improve the District's lifestyle and environmental assets.

The Central City District is the central and major component of the Central River City. The Central City District will grow substantially, capitalising on its location close to the geographic centre of Greater Sydney. Unprecedented public and private investment is contributing to new transport and other infrastructure leading to major transformation.

The Plan puts emphasis on developing the economy with jobs and skills growth from infrastructure investment. Norwest is identified as a strategic centre for urban growth with a balance of mixed-use

development to allow new residents the opportunity to benefit from access and services provided within the centre.

New safe walking and cycling connections will be provided between parks, bushland, playgrounds and waterways. The Central District will be supported by cohesive and socially dynamic communities with new social infrastructure like schools and community services, new cultural and sporting facilities.

The Central City District is shown in Figure 3.

Figure 3: The Central City District

Source: Greater Sydney Commission

2.2.4 Greater Sydney Services and Infrastructure Plan

Greater Sydney's population is forecast to grow from five million to eight million people over the next 40 years. To address the challenges and opportunities facing Sydney and the GSC's vision of a metropolis of three cities where people have access to jobs and services within 30-minutes by public transport, the Services and Infrastructure Plan was developed to plan for future transport in Sydney. Building on the Future Transport Strategy 2056, the Plan establishes specific transport outcomes for Greater Sydney and identifies policies, services and infrastructure initiatives to achieve these.

The plan puts emphasis on requiring more efficient modes of transport, specifically public transport, shared transport and walking and cycling. To support this, the NSW Government is investing in new transport links, such as Sydney Metro, utilising existing capacity and ensuring the transport network sustains the liveability and sustainability of centres it passes through.

2.2.5 The Hills Corridor Strategy

With the introduction of Sydney Metro Northwest, over 50,000 new residents are expected to move to The Hills over the next 20 years. Council drafted the Hills Corridor Strategy to create a plan that creates a vision for the Shire's suburbs in the future.

The strategy looks specifically at measures to meet the future housing and employment growth expected for Cherrybrook, Castle Hill, Showground, Norwest, Bella Vista, Kellyville and Rouse Hill stations while maintaining sustainable and liveable suburbs.

The vision for Norwest is reproduced below:

"*A specialised employment retail and entertainment centre with some opportunity for higher density residential living around the Norwest Lake Precinct*"

The vision includes potential growth for approximately 5,650 dwellings and 26,200 jobs in Norwest, which is 2,200 dwellings and 16,050 jobs more than the planned growth under current controls.

2.2.6 Transport Management Association (TMA)

TMAs are member-controlled organisations that provide transportation services in a particular area, such as a commercial precinct, shopping centre or industrial park. They are generally public-private partnerships primarily consisting of businesses. The idea of TMAs is to encourage businesses to band together to implement initiatives to reduce the total travel demand of a precinct.

TMAs can provide a range of services that encourage other modes of transport other than private vehicle, including the following:

- shuttle services
- shared parking
- rideshare
- flexitime support
- Transport Access Guide (TAG).

An example of a TMA in Sydney is Connect Macquarie Park and North Ryde (Connect) which was established in 2013 and managed by a Board of Association including representatives from the City of Ryde, Transport for NSW and business members. It informs members of the suite of transport options available in precinct including Cohop carpooling and Keoride on demand transport services that can reduce reliance on private vehicle travel in an area that experiences peak period traffic congestion. This scenario is similar to Norwest, with collaborative transformative change anticipated to realise future travel mode share targets.

3 Site and Transport Context

3.1 Site Context

34-46 Brookhollow Avenue, Norwest is within The Hills Shire Council Local Government Area, 10 kilometres north of Parramatta CBD and 30 kilometres northwest of Sydney CBD. The site of approximately 16,000 square metres has frontages of approximately 190 metres to Norwest Boulevard to the north and 90 metres to Brookhollow Avenue to the east. The site is currently zoned as B7 Business Park and occupied by commercial offices.

The key east-west traffic route through the area is via Norwest Boulevard. Norwest Boulevard is a State Road with generally two lanes in each direction with a central median. Parking is not permitted with minor adjoining roads generally allowing for kerbside parking.

Brookhollow Avenue is a local road that connects with Norwest Boulevard at each end and provides access to a range of commercial developments. The site currently provides two separate access driveways on Brookhollow Avenue some 50 metres and 85 metres south of Norwest Boulevard.

Norwest is generally undergoing extensive redevelopment with a range of residential and commercial developments either in planning or already under construction.

Sydney Metro Northwest services operate at four-minute frequencies during peak periods, vastly improving the level of public transport accessibility across northwest Sydney.

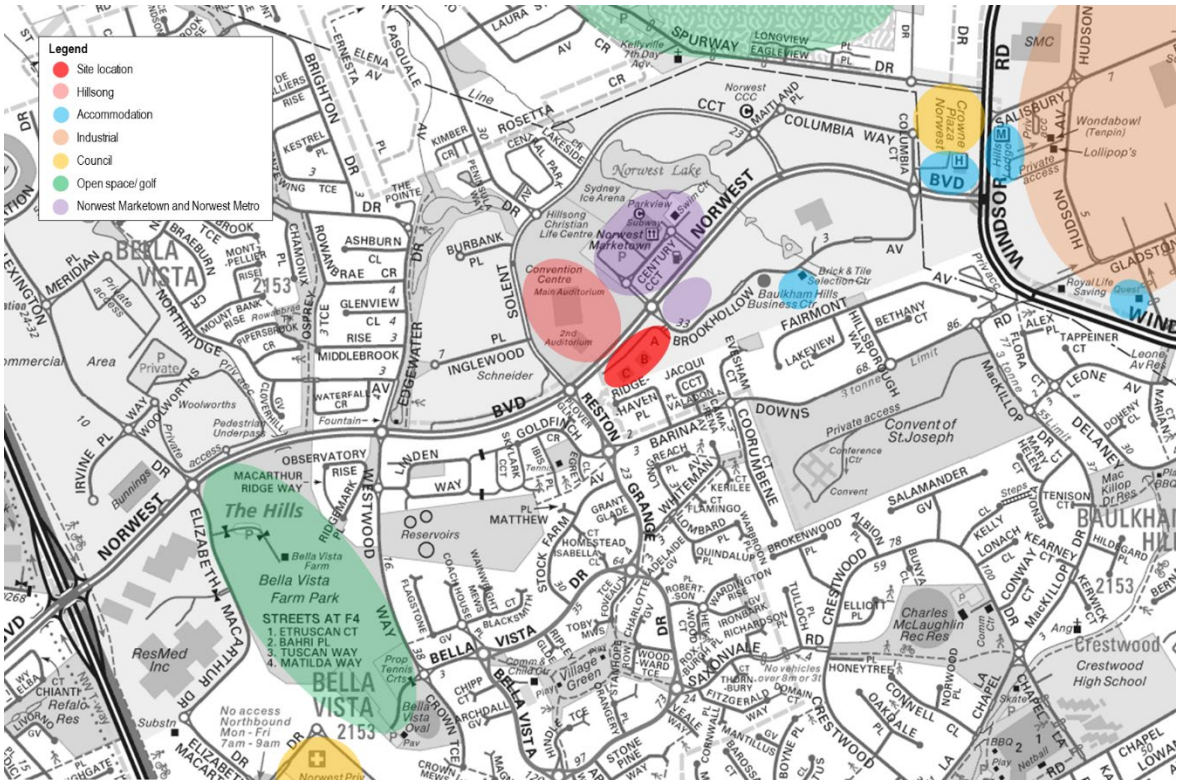
Norwest Marketown shopping centre is less than 200 metres north of the site. It includes a Coles supermarket, pharmacy, business services and food offerings and is a key centre in the local area. Norwest lake is to the north-west and Hillsong Church north of the site, on the northern side of Norwest Boulevard. Other existing and planned developments ensure a range of business, retail, restaurant and residential land uses deliver a diverse mix of activity within a commercial and increasingly residential precinct. Bella Vista Farm Park is west of the site and Castle Hill Country Club further to the north. Norwest Private Hospital is also within approximately 1.5 kilometres.

The location of the site and its surrounding environs is shown in Figure 3 to Figure 5.

Figure 3: Norwest aerial view

Base image source: Nearmap

Figure 4: Site Location and surrounds



Basemap Source: Sydway

Figure 5: Site location and walking catchment

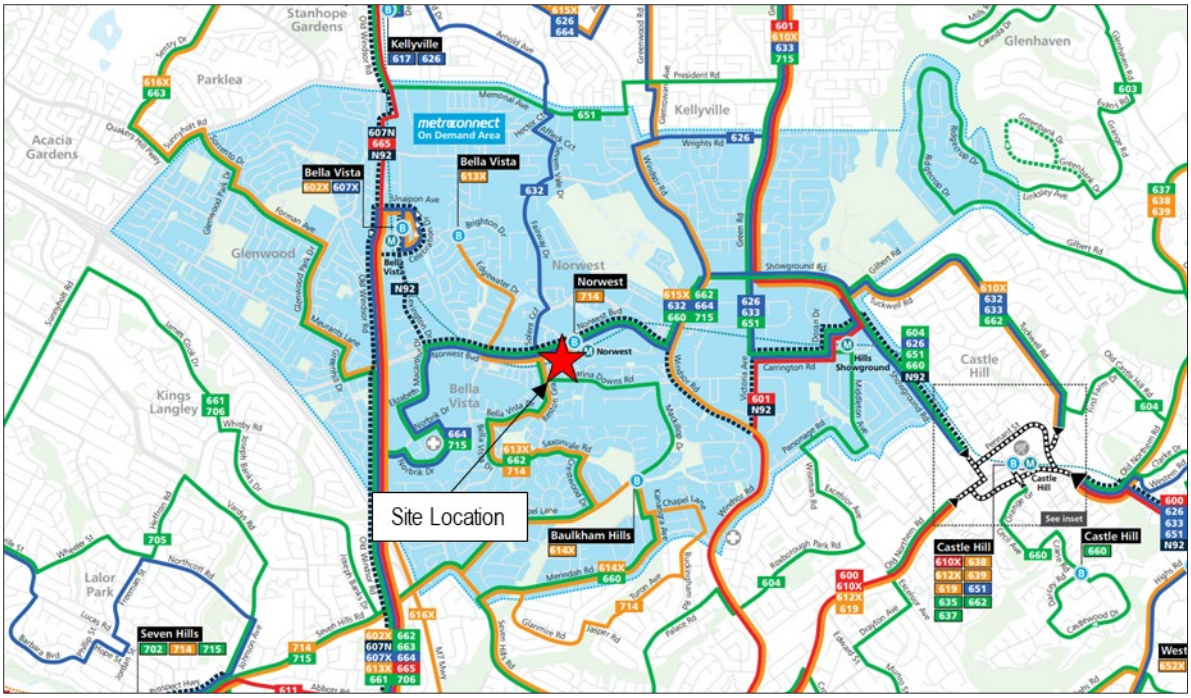
Base image source: Nearmap

3.2 Public Transport

3.2.1 Buses

The site is near several bus routes (613X, 632, 660, 662, 664, 714, 715, 730, 745) which travel along Norwest Boulevard and combine to link the immediate area with the broader Hills LGA, Westmead, Parramatta and Sydney CBD via the M2. The surrounding extensive bus network is shown in Figure 6, with the closest bus stops adjacent to the site on Norwest Boulevard at Norwest Metro Station.

Figure 6: Surrounding bus network



Source: CDC Bus (www.cdcbus.com.au)

3.2.2 Sydney Metro

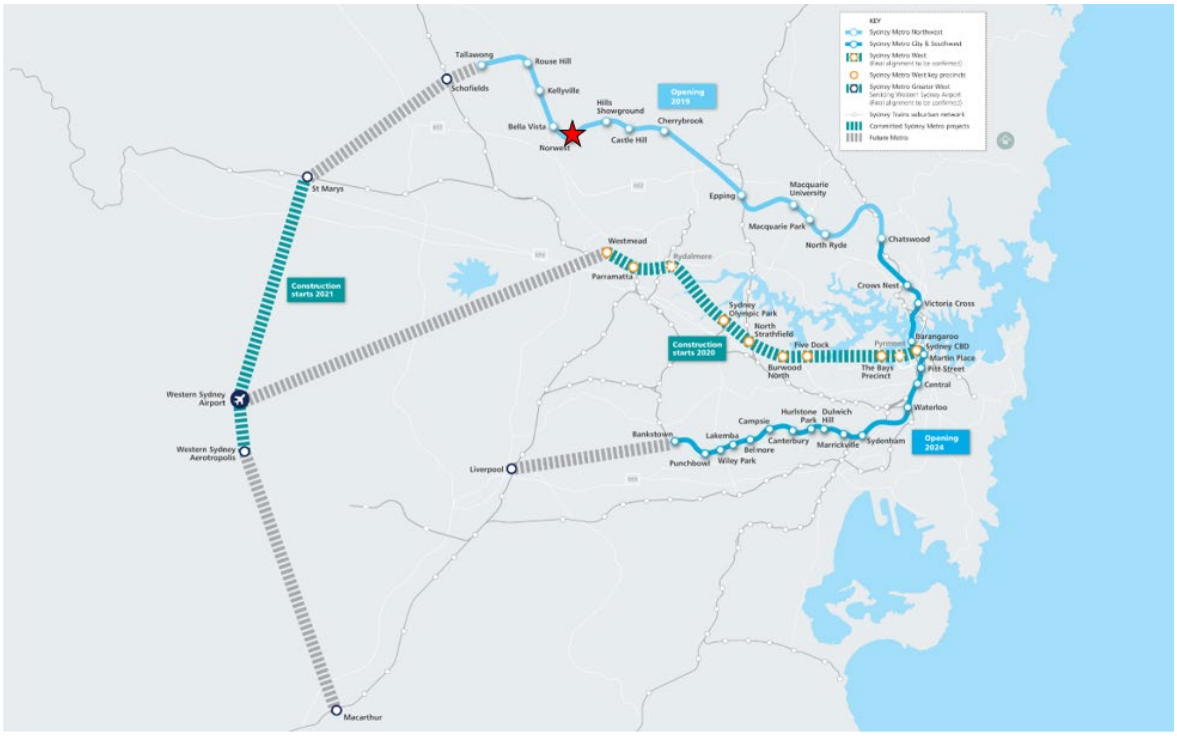
As discussed, Stage 1 of Sydney Metro Northwest extends from Cudgegong Road, Schofields to Chatswood. Stage 2 of Sydney Metro will extend south from Chatswood, under Sydney Harbour, via new underground station precincts within the CBD and stretching through the existing line to Bankstown.

Sydney Metro Northwest has delivered eight new railway stations and 4,000 commuter car parking spaces to Sydney's growing Northwest. Trains run every four minutes in the peak; that is 15 trains an hour operating as a walk up 'no timetable' service. Norwest Station includes planning for the site and ultimate significant over-station mixed-use development.

Sydney Metro will improve accessibility and travel time to key employment areas including Macquarie Park, Chatswood, North Sydney and Sydney CBD, creating opportunities to change travel behaviour for existing and future workers and residents alike.

An overview of the future Sydney Metro network is shown in Figure 7.

Figure 7: Sydney Metro route alignment



Source: Sydney Metro

3.3 Pedestrian and Cycle Access

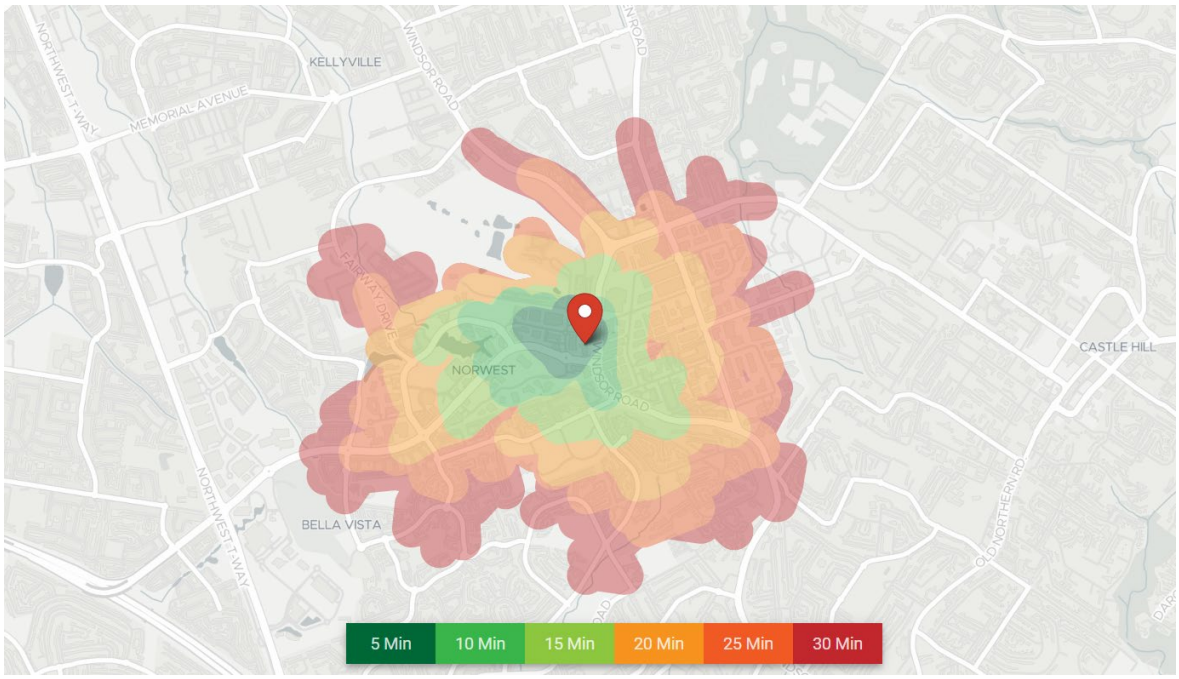
3.3.1 Pedestrian Amenity

Pedestrian paths are provided on both sides of the majority of surrounding roads including Columbia Court, Columbia Way, Solent Circuit, Norwest Boulevard and Brookhollow Avenue. The site is conveniently located east of the metro station and Norwest Marketown. There are five locations where pedestrians are able to safely cross Norwest Boulevard, including the following:

- Windsor Road/ Norwest Boulevard traffic signals
- Norwest Boulevard/ Solent Circuit traffic signals
- Norwest Lake pedestrian link under Norwest Boulevard
- Norwest Metro pedestrian link under Norwest Boulevard
- Norwest Boulevard/ Brookhollow Avenue/ Century Circuit traffic signals.

The walking catchment map is shown in Figure 8 and illustrates both existing connectivity throughout Norwest and identifies areas of opportunity to continue to promote walking within the local area.\

Figure 8: Existing catchment map



Source: app.targomo.com

3.3.2 Cycling Facilities

Figure 9 highlights the network of cycling routes within the local and regional area. Cycling infrastructure is generally limited through the local area, evidenced by the absence of an east-west path between Windsor Road and Old Windsor Road. There does remain a lack of quality east-west connections between Windsor Road and Old Windsor Road, which would also link the site with Norwest Metro station and Norwest Marketown.

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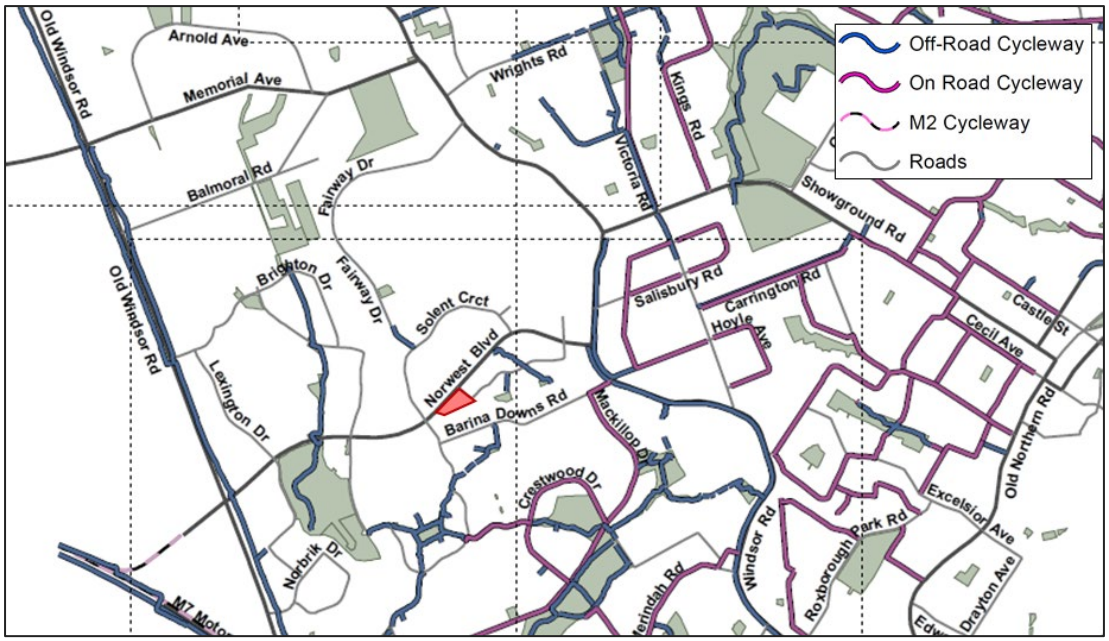
Figure 9: Existing cycling routes



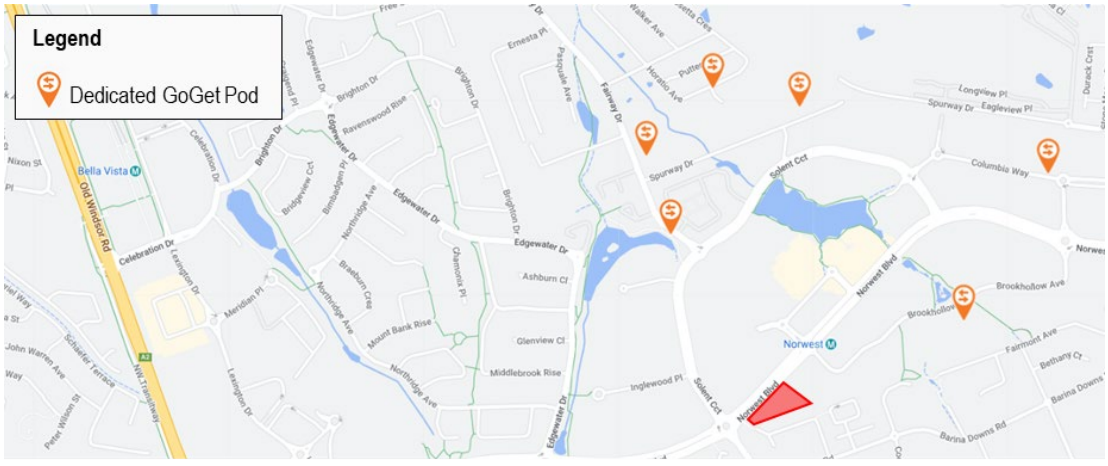
Source: The Hills Shire Council

3.4 Local Car Sharing Initiatives

Car share schemes have become increasingly common throughout Sydney and are now recognised as a viable transport option for drivers throughout Sydney. They 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. Whilst car share is in relative infancy in the local and regional area, they will form an integral part of the ongoing transformation of Norwest.

GoGet car share does have select car share pods close to the site, shown in Figure 10. The closest pod is within the Adina Apartments on Brookhollow Avenue east of the site. GoGet has also been involved with providing pods as part of recent residential developments in Norwest, including The Orchards development north of the site.

Figure 10: GoGet car share pods



Source: GoGet (www.goget.com.au)

4 Trip Generation Assessment

4.1 Existing Travel Behaviours

2016 Census data, as compiled by the Australian Bureau of Statistics (ABS) has been reviewed to understand the travel demand characteristics for the Statistical Area Level 2 (SA2) containing and surrounding the subject site in Baulkham Hills West.

4.1.1.1 Place of Work

Unsurprisingly, the 2016 Census data indicates majority of travel by private car. A total of 93 per cent of workers in the statistical area travelled to work by car (89 per cent driver and four per cent passenger), with six per cent travelling by public transport and one per cent by active travel means.

The census data also indicates that 39 per cent of all people working in The Hills Shire also live in the area. Of the workers that lived outside of The Hills Shire, 19 per cent lived around Blacktown, seven per cent in Parramatta and six per cent in Hornsby.

4.1.1.2 Place of Residence

The 2016 Census data indicates that 82 per cent of residents that lived in the statistical area travelled by car (77 per cent driving and five per cent passenger), 15 per cent travelled by public transport and two per cent by active travel means.

Again, there is a reasonable correlation between those who live in The Hills Shire and also working in the area (31 per cent). Of the workers that worked outside of The Hills Shire, 12 per cent worked in the Sydney City area, 12 per cent in Parramatta, eight per cent in Blacktown and five per cent each in the Ryde and Hornsby areas.

The high reliance on cars is largely reflective of the historic public transport availability for Norwest/ Baulkham Hills, where buses have long been the only mode of public transport available with frequent services mainly available to Parramatta and North Sydney/ Sydney CBD.

4.2 Travel Mode Share Targets

It is important to acknowledge that both the housing product and public transport accessibility will not be the same as those historically provided in the area. With more apartment living and access to Sydney Metro, the area will undergo significant change including population mix and travel patterns. On this basis, a series of benchmark suburbs were identified to determine appropriate travel mode share targets for the site, which would also be applicable to surrounding areas.

Journey to Work (JTW) has been used to develop mode split targets since it remains the most reliable data available. However, analysis of travel patterns from the Household Travel Survey, available only at a higher scale for Greater Sydney, shows that peak hour car driver mode share, considering all trip purposes could be lower than that of the JTW. Therefore, the mode split targets proposed for all trips generated by the planning proposal are considered conservative given they are based on JTW mode splits. The mode split targets are summarised in Table 2.

Table 2: Target mode splits

Travel Mode	Vehicle (driver/ passenger)	Train	Bus	Walking/ Cycling
Existing Workers	93%	2%	4%	1%
Existing Residents	82%	2%	13%	2%
Target	**50%**	**30%**	**15%**	**5%**
Benchmark Sites Average [1]	59%	27%	7%	7%

[1] Benchmark sites included Macquarie Park, Concord West-Rhodes, Hurstville, Strathfield, and Burwood.

The target mode splits have been developed by benchmarking against areas in Sydney that exhibit an even proportion of commercial and high-density residential land uses and include Macquarie Park, Concord West-Rhodes, Hurstville, Strathfield and Burwood. Having consideration to the likely timing for the development to be fully completed along with broader changes occurring in the area (Central River City and Sydney Metro), the travel behaviours of future workers are expected to be more consistent with these benchmark areas, if not better given the proximity of the site to the metro station, than the areas with similar characteristics to the existing Norwest/ Baulkham Hills area. It is important to recognise this change in order to realise the future benefits.

4.3 Trip Generation

The anticipated person trip generation associated with the planning proposal and corresponding generation by transport mode are summarised in Table 3 and Table 4 respectively. The person trip generation rates for most land uses have been sourced from TfNSW Technical Direction 2013/04a (TDT 2013/4a) for high-density residential, office and shopping centre uses, using sites of similar characteristics to the future Norwest.

Table 3: Person trip generation (network peak hours)

Land Use	Size	Person Trip Generation Rates (AM)	Person Trip Generation (AM)	Person Trip Generation Rates (PM)	Person Trip Generation (PM)
Commercial	35,500 sqm	1.7 trips per 100sqm	604	1.35 trips per 100sqm	479
Residential	76 units	0.67 trips per unit	51	0.62 trips per unit	47
Retail	1,003 sqm	3.58 trips per 100sqm	36	7.46 trips per 100sqm	75
Childcare	100 children 14 employees	Assumed all passer by trips and employee trips occur outside peaks	-	Assumed all passer by trips and employee trips occur outside peaks	-
Pub	1,162 sqm	No trips in AM peak	-	7.46 trips per 100sqm	87
Total			**691 person trips/ hour**		**688 person trips/ hour**

Table 3 indicates that the planning proposal is expected to generate approximately 690 person trips in any peak hour, with the commercial uses generating most activity. Table 4 has been prepared to understand how this translates to vehicle-based travel based on the higher weekday PM peak period. It indicates that trips by vehicle (as driver or passenger) would likely account for 345 person trips, or

around 290 to 315 vehicle trips per hour. The assessment also indicates that about 207 and 104 trips will occur via train and bus respectively, with some 34 active travel trips.

Table 4: Trip generation by transport mode

Travel Mode	Mode Split Target	Trips (AM or PM)
Vehicle (driver or passenger)	50%	345 (288-313 vehicle trips) [1]
Train	30%	207
Bus	15%	104
Walking and cycling	5%	34
Total		**690 person trips**

[1] Based on 1.1 to 1.2 people per vehicle

5 Sustainable Transport Assessment

5.1 Overview

A key strategic merit of the planning proposal that promotes sustainable travel is provision of high-density mixed-use development within the core of a strategic centre; and adjacent to a rail and bus interchange that provides convenient access to local and regional major employment centres.

In addition, with the integrated land uses that provide opportunities for co-location of jobs and housing, there is opportunity to contain trips internally thereby minimising external traffic and facilitating more evenly split bi-directional trips for more equitable utilisation of public transport services and road infrastructure in and out of Norwest across the day.

5.2 Active and Public Transport

The planning proposal provides convenient movement of people through the site, with the site design responding to the Norwest Metro station. The proposal incorporates activate frontages on Norwest Boulevard and Brookhollow Avenue to improve amenity and safety for pedestrians in the precinct. Traffic signals at the intersection of Norwest Boulevard/ Brookhollow Avenue provides safe crossing facilities and significantly improves pedestrian amenity over historical conditions. This will significantly improve connectivity generally and is supported by links underneath Norwest Boulevard.

As discussed, the planning proposal could generate some 207 and 104 trips by train and bus respectively. The site is immediately adjacent to Norwest Metro station and associated bus facilities that will connect employees and residents to the broader key centres. With Sydney Metro greatly increasing the coverage and convenience to access the Greater Sydney region, there will be a natural reduced reliance on private car use which is a fundamental aspect of employment and residential growth in the area.

These estimated peak hour trips would likely equate to less than 20 people on any new metro train or individual bus service. Future public transport services will be capable of accommodating significant volumes of people during peak periods with the numbers generated by the proposal representing a minor proportion of the overall initial and future demand.

5.3 Bicycle Parking and Associated Facilities

Bicycle parking requirements for different development types are set out in The Hills DCP 2012. The DCP 2012 recommends bicycle parking be provided at a rate of two spaces, plus five per cent of the total car parking spaces for commercial and retail uses. DCP 2012 does not include specific bicycle parking rates for residential apartments, childcare or licensed hotel uses. As such, one option is to adopt the retail and commercial rate for all land uses. On this basis, the planning proposal would require provision of approximately 35 bicycle parking spaces.

Notwithstanding, to facilitate the desire for residents, workers and visitors to make regular use of more sustainable and active travel modes, the following bicycle parking rates are recommended:

- Non-residential – one space per 200 square metres with bicycle parking provided in secure bicycle storage facilities for use by non-residential employees and bicycle racks for visitors in publicly accessible areas to encourage usage.
- Residential – one space per two apartments in bicycle storage facilities or racks within the secure basements.

The recommended bicycle rate for non-residential uses has been determined with consideration to commercial rates adopted in other Council DCPs, as summarised in Table 5. The adopted rate is considered appropriate for the planning proposal without representing an oversupply in an area that currently has low active travel mode share.

Table 5: Comparison of DCP commercial bicycle parking requirements

Council	Commercial Rate
The Hills	2 + 5% of car parking supply
Parramatta	1 space per 200sqm
Canada Bay	1 space per 200sqm for staff plus 1 space per 750sqm for visitors
North Sydney	1 space per 150sqm for staff plus 1 space per 400sqm for visitors
Sydney	1 space per 150sqm for staff plus 1 space per 400sqm for visitors

Therefore, the planning proposal should seek to provide at least 225 bicycle parking spaces and/ or storage facilities. This includes 29 bicycle racks for use by residents in Site A and 196 bicycle racks for the non-residential uses which would be proportionately distributed across Sites' B and C. Appropriate end of trip facilities including showers and lockers for the non-residential uses would be incorporated into the proposal as part the development application stages.

5.4 Travel Demand Management Initiatives

Key influencers to realising these travel behavioural changes for future employees, residents and visitors is implementing a suite of measures to promote such travel use. Some of these initiatives are discussed below.

5.4.1.1 Transport Management Association

The applicant is one of a select few key landowners in Norwest. In a similar manner as implemented in Macquarie Park, with Connect Macquarie, there is real opportunity for development of a TMA for Norwest with a view to promoting non-private car travel through public and active travel and provision of convenient services (such as shuttle buses, ride sharing, carpooling etc., to encourage take-up. One of the fundamental measures that a TMA should aim to implement is a framework Green Travel Plan (GTP) documenting transport initiatives that would form the basis for plans adopted by individual sites and/ or tenants.

5.4.1.2 Green Travel Plan

A GTP is a package of measures aimed at promoting sustainable travel and reducing reliance on private vehicles. It is not designed to be 'anti-car', however aims to encourage and support people's aspirations for carrying out their daily business in a more sustainable way. Travel plans can provide measures to:

- Restrict car use (disincentives or 'sticks').
- Encourage or support sustainable travel, reduce the need to travel or make travelling more efficient (incentives or 'carrots').

A site specific GTP would promote more sustainable and environmentally friendly travel choices for employees and residents. As discussed, there will be a range of "non-car" transport options available near the site, specifically Sydney Metro.

The key objectives of GTPs are to:

- encourage walking and cycling
- encourage public transport use
- reduce car use, particularly single drivers
- encourage more efficient and equitable car use, where practical.

It is the intention therefore, that GTPs deliver the following benefits:

- enable higher public and active travel mode share targets to be achieved
- contribute to greenhouse gas emission reductions and carbon footprint minimisation
- contribute to healthy living for all
- contribute to social equity and reduction in social exclusion
- improve knowledge and contribute to learning.

With the successful implementation of a Green Travel Plan, there is a real opportunity to realise mode share targets and potentially exceed targets for non-car-based trips. This specifically includes single occupancy car trips given the sites key location in Norwest and adjacent to Norwest Metro Station.

5.4.1.3 Car Share Service

There is also opportunity to negotiate with car share providers, such as GoGet, to provide car share vehicles within the development or in close vicinity to further encourage lower car ownership rates, particularly those associated with more than one vehicle.

Car share spaces could be provided within the basement car parks and/ or within bays along the central spine road to maximise visibility and be more accessible to the general public, increasing the feasibility for the provider.

The provision of car share spaces is becoming common in DCPs for other areas and are acknowledged to be able to be used as a method to reduce car parking provisions for developments.

5.4.1.4 Shuttle Service

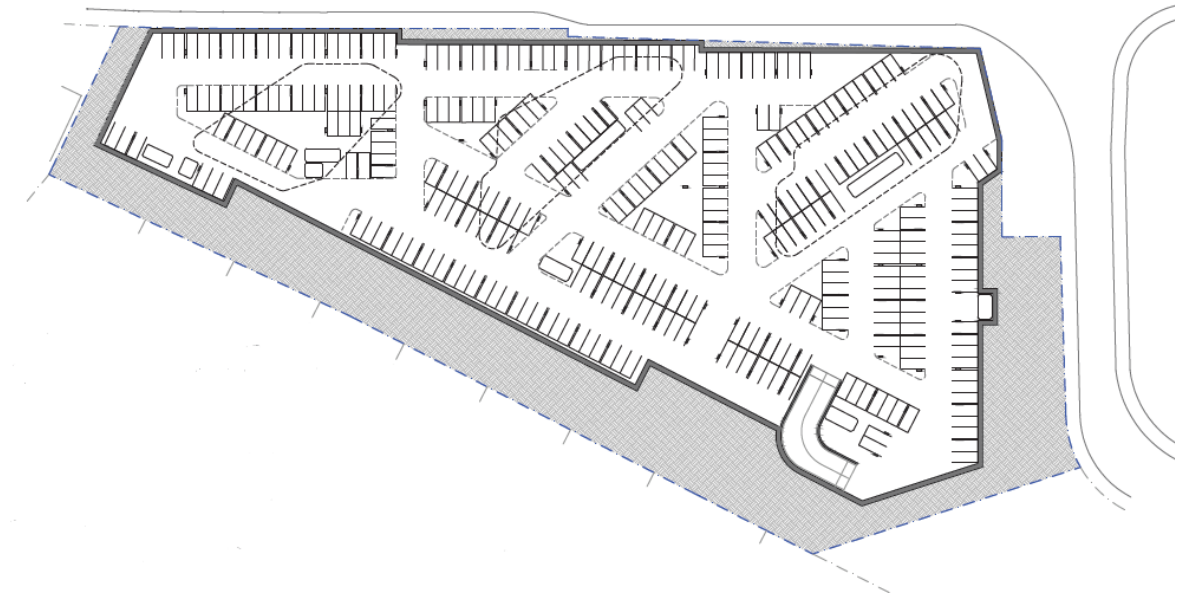
The applicant and other key landowners are committed to providing a shuttle service for Norwest to improve convenience and connectivity throughout. Key to this will be connecting residential areas on the fringe of Norwest with public transport services in Norwest, and Norwest Marketown itself.

6 Parking and Loading Assessment

6.1 Overview

The proposal has the potential to provide 790 parking spaces with the quantum of parking and number car park levels constrained by the Metro tunnel exclusion zone (directly under the site) and will be subject to future detailed Structure and Services coordination. An indicative basement car park layout is shown in Figure 11.

Figure 11: Indicative typical basement layout



Source: PBD Architects, Basement Parking Plan

The design permits construction to commence from either side of the site with an easement maintained along the southern boundary that would theoretically permit a temporary road to be constructed to maintain access to the existing uses and/ or future uses, depending on the order of construction.

Based on the indicative basement layout, it is expected that full compliance will be achieved with relevant Australian Standards and Council DCP requirements. Detailed assessments will need to be completed as part of the Development Application.

6.2 Car Parking

6.2.1 Commercial Uses

6.2.1.1 Commercial/ Office

The site specific DCP requires commercial (office) land-uses to provide on-site car parking at a minimum rate of one space per 60m^2 GFA. Based on a total floor area of 35,500m^2 GFA, this equates to a minimum requirement of 592 spaces.

6.2.1.2 Retail

The site specific DCP requires retail land-uses to provide on-site car parking at a minimum rate of one space per 100m^2 GFA. Based on a total floor area of 1,003m^2 GFA, this equates to a minimum of 10 spaces.

6.2.1.3 Childcare Centre

DCP 2012 includes car parking rates for childcare centres with this equating to one space per six children plus one space for each employee as it relates to the site. Based on a capacity of 100 children and up to 15 employees, this equates to 31 spaces.

6.2.1.4 Licenced Hotel

Part of the site has been converted from commercial space to a licenced hotel. The hotel is of similar size to that forming part of the planning proposal and was approved for provision of 24 dedicated parking spaces, plus the ability to use vacant commercial spaces after normal business hours for overflow demand. The planning proposal is consistent with this approval.

6.2.1.5 Overall Commercial

Based on the analysis and discussions in this section, the proposed parking rates for the commercial component of the development and associated provisions are summarised in Table 6.

Table 6: Proposed commercial parking requirements

Use	Size	Parking rate	Recommended Parking
Commercial/ office	35,500 sqm	1 space per 60 sqm	592
Retail	1,003 sqm	1 space per 100 sqm	10
Childcare	100 children 14 employees	1 space per 6 children + 1 space per employee	31
Licenced hotel	Consistent with approved DA		24
Total			**657 spaces**

Table 6 illustrates that the overall recommended parking requirement for the commercial component of the development is 657 spaces, of which 592 spaces are for commercial/ office use.

6.2.2 Residential

The site specific DCP requires residential land-uses to provide on-site parking in accordance with Clause 7.11 of The Hills LEP 2019. However, the clause applies to developments that includes residential dwellings on land identified as “Area A” or “Area B” on the Floor Space Ratio Map. As the site is not on land identified as either areas, a comparison of rates has been made with the intention of identifying a suitable and balanced parking provision for the planning proposal.

The NSW Department of Planning and Environment Apartment Design Guide[1] provides commentary on acceptable car parking provision. The Guide states that for developments:

"within 800m of a railway station or light rail stop in Sydney Metropolitan Area; or on land zoned, or within 400m of land zoned B3 Commercial Core, B4 Mixed Use or equivalent in a nominated regional centre, the lessor resident and/ or visitor car parking rate of either the 'Guide to Traffic Generating Developments' (October 2002) or the relevant Council's requirements can be used."

Being within 100-200 metres of Norwest Metro Station and with amended land uses, it is appropriate to reference the residential parking requirements for metropolitan sub-regional centres, as defined by Guide 2002.

In realising the transitional nature of the local area and along the metro line across The Hills Shire Council, resident parking needs to reflect historical trends in The Hills where 'downsizing' and larger size apartments with a reasonable level of car ownership prevails, the proposal includes an equitable supply of parking across all apartment types. In this regard, the rates contained in The Guide (2002), particularly those for large apartments are considered marginally low for the area, with the planning proposal remaining mostly consistent with DCP 2012. The only variation relates to two-bedroom apartments and minor reduction to visitor parking rates.

A review of these residential rates against the apartment size schedule results is summarised in Table 7.

Table 7: Comparison of relevant residential parking requirements

Source	Description	Parking rate	Parking requirement
Hills DCP	1 bed	1 space / apartment	12
	2 bed	2 spaces / apartment	72
	3 bed	2 spaces / apartment	56
	Visitor	2 spaces / 5 apartments	30
		Total	**170 spaces**
Guide 2002	1 bed	0.6 spaces / apartment	7
	2 bed	0.9 spaces / apartment	32
	3 bed	1.4 spaces / apartment	39
	Visitor	1 space / 5 apartments	15
		Total	**93 spaces**
Recommended	1 bed	1 space / apartment	12
	2 bed	1 space / apartment	36
	3 bed	2 spaces / apartment	56
	Visitor	1 space / 5 apartments	15
		Total	**119 spaces**

The recommended 119 residential car parking spaces is appropriate when considering a range of factors, including the sites' location close to Metro services, changing nature of the area and Council's historically higher DCP parking requirements. In this regard it strikes a positive balance between the

[1] NSW Department of Planning and Environment, Apartment Design Guide, July 2015.

higher DCP 2012 parking requirement of 170 spaces and the broader intent of lower parking rates as per TfNSW Guidelines (93 spaces).

6.2.3 Recommended Provisions Summary

Based on the analysis and discussions in this report, the recommended parking provisions are summarised in Table 8.

Table 8: Recommended parking provision

Use	Description	Size/ no.	Parking rate	Parking requirement
Commercial		35,500sqm	1 space / 60 sqm	592
Residential	1 bed	6	1 space / apartment	12
	2 bed	32	1 space / apartment	36
	3 bed	28	2 spaces / apartment	56
	Visitor	76 apartments	1 space / 5 apartments	15
Retail		1,032 sqm	1 space / 50 sqm	10
Childcare		100 children 14 employees	1 space / 6 children + one space/ employee	31
Licenced hotel		Consistent with approved DA		24
Total				**776 spaces**

Such parking provisions are considered appropriate for the anticipated transport requirements of future residents, employees and visitors alike, whilst also recognises the changing nature of the area and surrounding environment made possible by the introduction of Sydney Metro. Such provisions also assist in capping traffic generating characteristics of the proposal which is crucial for an area that requires a coordinated approach to travel mode share and relieving historical traffic congestion.

On the basis, the development is required to provide 764 parking spaces.

6.2.4 Accessible Car Parking

DCP 2012 requires two per cent of the total parking supply to be accessible. In this regard, of the proposed 657 non-residential spaces (including residential visitor spaces), 13 should be accessible and proportionally spread across the sites.

In addition, five per cent of apartments are required to be adaptable, with provision for one accessible parking space for each adaptable apartment. Based on the proposed 76 apartments, this equates to four adaptable apartments which will require four accessible spaces.

It is expected that such provision will be incorporated as part of future development applications for each site.

6.3 Motorcycle Parking

For the motorcycle requirements, DCP 2012 states the following:

"Motorcycle parking is to be provided for all developments with on-site parking of more than 50 car parking spaces, at a rate of one motorcycle parking space for every 50 car parking spaces or part thereof."

On this basis and considering the recommended 776 car spaces, 16 motorcycle spaces are required. Such provision would be incorporated as part of future development applications.

6.4 Loading Provisions

Stantec's experience with calculating loading requirements for new large-scale mixed-use developments has shown the DCP 2012 and Guide 2002 rates generally result in an excessive loading dock provision.

Stantec's database of loading demand associated with specialty retail stores indicates that they typically receive an average of 0.5 deliveries per day per tenant. Considering the proposed two retail tenancies, this would likely result in one delivery per day. Applying a 50 per cent contingency results in up to two deliveries per day.

For commercial tenancies, deliveries are typically by small delivery vehicles (mostly 6.4 metre small rigid trucks, vans, utes etc.) unless there is a tenancy turnover or delivery of large furniture and appliances. Deliveries are typically couriers, postal, some food and other day-to-day commercial business-related activity. All are generally infrequent.

The average residential apartment turnover rate is approximately 0.2 per cent of all apartments in any given week. Conservatively assuming a rate of 0.5 per cent to account for seasonal variations and given the proposed 76 apartments, there would be on average less than one apartment moving in or out in any given week. A booking system is typically implemented to ensure equitable use by residents.

In addition, it is generally accepted that 10 per cent of residents' purchase groceries via a home delivery service each week. For 76 apartments, this equates to about eight apartments generating one home delivery per week, representing an average of around one apartment receiving a home delivery service per day.

Based on similar developments, waste collection for all uses may be in the order of five trucks per week.

Based on the above, each site could expect up to five service vehicle deliveries per day that require access to the respective loading docks. This is low activity and able to be accommodated as part of day-to-day operations noting that most loading activity occurs outside the road network peak hours.

A loading area will be provided for each of the three sites. The loading areas will be provided along the southern section of the site with a combination of vertical horizontal transportation proposed to transfer garbage bins from internal bin storage rooms to holding areas within the loading areas. A similar procedure will be used for the transfer of items between apartments and tenancies and the

loading areas. Detailed assessment of the loading dock will need to be completed as part of the Development Applications.

Maintenance and trade vehicles will be able to make use of visitor/ unallocated parking provided in the basement car parks. These vehicles will typically include vans and utes that are used for such day-to-day activities and will be limited in height to the standard 2.2 metre clearances.

7 Traffic Assessment

7.1 Traffic Generation

7.1.1 Overview

As discussed, a key element of the planning proposal is the mixed-use nature and the tendency to reduce peak direction tidal traffic flows that have been so common through Norwest. This is reflected when comparing the traffic generated by the existing site compared with the proposed scheme, a reality that would not have been achieved with a commercial only development.

7.1.2 Existing Site

Traffic survey data was collected at the existing site access driveways to understand existing site generation. The average weekday traffic generation during the road network peak periods have been summarised in Table 9.

Table 9: Existing site traffic generation (vehicles per hour)

Weekday AM Peak Hour			Weekday PM Peak Hour		
Inbound	Outbound	Total	Inbound	Outbound	Total
92	12	**104 vehicles**	13	75	**88 vehicles**

Table 9 indicates that the existing site generates between 90 and 105 vehicle trips per hour during any weekday peak period. The results illustrate the tidal nature of the existing site generation with the peak direction traffic flows representing more than 85 percent of all movements.

7.1.3 Proposed Scheme

Traffic generation estimates for the planning proposal have been determined having consideration to the TfNSW Guide to Traffic Generating Developments 2002 (Guide 2002) and TDT 2013/4a, together with Stantec's database of similar developments in like locations.

7.1.3.1 Commercial Uses

The road network peak hour traffic generation rates applicable to the commercial component have been determined based on the trip rates per car parking space extrapolated from the office block results tables contained in TDT 2013/4a.

Considering the site's proximity to Norwest metro station and future transport aspirations across the broader precinct, a peak hour rate of 0.6 trips per space in the AM peak hour and 0.5 trips per space

in the PM peak hour has been adopted for this assessment. This is slightly lower than the Sydney sites average (0.69 and 0.53 trips per space respectively) assessed in TDT 2013/4a and closely aligned with the Sydney Olympic Park site (0.56 and 0.53 trips per space respectively) noting that Norwest is afforded far superior transport options than Sydney Olympic Park. As a conservative assessment, the adopted rates are not as low as other sites, such as North Sydney, Chatswood and Parramatta as they are in more established centres with lower car parking requirements (average of 0.38 and 0.25 trips per space respectively). It is noted that these rates reflect traffic generation during the road network peak as opposed to the site peak, which can differ slightly.

7.1.3.2 Residential Uses

TDT 2013/4a also provides updated rates for high density residential flat dwellings (2012 surveys) that are close to frequent public transport services and greater than six storeys.

The residential component of the planning proposal meets these requirements especially given that metro services will be well established by the time any such staged development is completed. As such, these rates are considered an accurate reflection of future residential uses.

7.1.3.3 Retail Uses

The retail component of is relatively minor and expected to be mostly ancillary to the residential and commercial uses. As such, a road network peak hour traffic generate rate of 3.5 vehicle trips per hour has been adopted for the PM peak and based on the Guide 2002.

Traffic generation during the AM peak will predominately be pedestrians associated with the residential and commercial uses and/ or those in the surrounding area who either live or work in Norwest. Therefore, traffic generated by the retail component in the morning has been assessed as a 50 per cent reduction on the PM peak hour.

Furthermore, retail analysis suggests that approximately 40 per cent of retail activity within mixed-use developments is generated by the residential and commercial components of the same site (trip containment). That said, a conservative reduction of 25 per cent has been applied, suggesting that up to 75 per cent of weekday PM traffic could be generated externally.

7.1.3.4 Childcare Centre

The road network peak hour traffic generation rates for the childcare centre component has been referenced from the Guide 2002 for long-day care facilities.

Given the mixed-use nature of the planning proposal and the childcare centre expected to operate as supplementary to the residential and commercial components, it has been assumed that 75 per cent of trips to/ from the childcare centre will be linked trips generated by employees and residents associated with the development. The remainder of trips are expected to be from parents working and/ or living in the broader Norwest/ Baulkham Hills area (i.e. pass-by trips).

7.1.3.5 Licensed Hotel

It is not envisaged that the licenced hotel will be open during the weekday AM peak period and therefore will not be expected to generate traffic.

During the weekday PM peak, the estimated traffic generation rate for the licenced hotel has been determined in reference to restaurants in the Guide 2002. Given the nature of licenced hotels whereby visitors tend to arrive (and depart) slightly later than the road network peak, it has been assumed that the licenced hotel would generate 50 per cent less activity in the weekday PM peak hour.

7.1.4 Directional Splits

Estimates of peak hour traffic volumes associated with the planning proposal are set out in the following tables and assume the directional split of traffic (i.e., the ratio between the inbound and outbound traffic movements) as detailed in Table 10.

Table 10: Traffic directional splits

Land Use	Period	Inbound	Outbound
Commercial	AM Peak	80%	20%
	PM Peak	30%	70%
Residential	AM Peak	20%	80%
	PM Peak	70%	30%
Retail and Childcare Centre	AM Peak	50%	50%
	PM Peak	50%	50%
Licenced Hotel	AM Peak	-	-
	PM Peak	80%	20%

Based on these distributions, the anticipated traffic generation of the site has been detailed in Table 11 and Table 12.

Table 11: Weekday AM peak hour traffic generation

Land use	Vehicle trip generation rates	Reductions adopted	Forecast vehicle trips (vehicles per hour)		
			Inbound	Outbound	Total
Commercial (35,500m^2 GFA)	0.6 vehicle trips/ space	-	284	71	355
Residential (76 apartments)	0.19 vehicle trips per apartment	-	3	11	14
Retail (1,003m^2 GFA)	1.75 vehicle trips per 100m^2 GFA	25% - linked trips	7	7	14
Childcare Centre (100 children)	0.8 vehicle trips/ child	75% - linked trips	10	10	20
Licenced Hotel (1,162m^2 GFA)	Not open during this peak	-	-	-	-
Total			**304**	**99**	**403**
Less existing traffic generation			92	12	104
Additional traffic generation			**+212**	**+87**	**+299**

Table 12: Weekday PM peak hour traffic generation

Land use	Vehicle trip generation rates	Reductions adopted	Forecast vehicle trips (vehicles per hour)		
			Inbound	Outbound	Total
Commercial (35,500m^2 GFA)	0.5 vehicle trips per space	-	89	207	296
Residential (76 apartments)	0.15 vehicle trips per apartment	-	8	3	11
Retail (1,003m^2 GFA)	3.5 vehicle trips per 100m2 GFA	25% linked trip reduction applied	13	13	26
Childcare Centre (100 children)	0.7 vehicle trips per child	75% linked trip reduction applied	9	9	18
Licenced Hotel (1,162m^2 GFA)	5 vehicle trips per 100m2 GFA	50% reduction applied - peak demand estimated to be later than road network peak	23	6	29
Total			**142**	**238**	**380**
Less existing traffic generation			13	75	88
Additional traffic generation			**+129**	**+163**	**+292**

Based the above, the planning proposal could potentially generate between 380 and 405 trips during any weekday peak hour. This represents an increase of approximately 300 trips in any peak hour over the existing development. The directional split of development traffic reduces the effects of tidal traffic flows with the peak direction representing less than 75 per cent of all trips in the AM peak and around 62 per cent in the PM peak, noticeably lower than if the site was retained solely for commercial uses.

The trip generation assessment by transport mode detailed in Section 4.3 confirmed that the planning proposal could generate up to about 315 vehicle trips per hour in any peak hour based on the mode share targets. This is broadly consistent with the findings of this traffic-based assessment.

7.2 Distribution and Assignment

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

1. configuration of the arterial road network in the immediate vicinity of the site
2. existing (and future) operation of intersections providing access between the local and arterial road network
3. surrounding employment centres, retail centres and schools in relation to the site
4. likely distribution of employee's residences in relation to the site
5. configuration of access points to the site.

Having consideration to the above, for the purposes of estimating vehicle trips, the following directional distributions have been assumed:

- Norwest Boulevard (west) – 50%
- Norwest Boulevard (east) – 25%
- Brookhollow Avenue (east) – 25%.

Based on the above, Table 13 shows the estimated increase in movements near the site following full site development.

Table 13: Site Generated Traffic Volumes (including existing site traffic)

Road Section	Inbound	Outbound	Two-Way
AM peak hour			
Norwest Boulevard (west)	152	50	202
Norwest Boulevard (east)	76	25	101
Brookhollow Avenue (east)	76	25	101
Total	**304**	**100**	**404**
PM peak hour			
Norwest Boulevard (west)	71	119	190
Norwest Boulevard (east)	36	60	96
Brookhollow Avenue (east)	36	60	96
Total	**143**	**239**	**382**

Table 13 indicates that the planning proposal is likely to generate about 150 vehicle trips in the peak direction on Norwest Boulevard west of the site and 75 vehicle trips east of the site on each of Norwest Boulevard and Brookhollow Avenue. This distribution represents total site traffic generation and assumes no reduction to account for traffic associated with the existing land uses.

7.3 Traffic Impact

7.3.1 Road Network

The proximity of the Sydney Metro to Norwest and the greater northwest Sydney region is likely to continually shift travel behaviour of both existing and future workforce and residents. This will result in a significant shift in traffic congestion that has been a common and known issue in the area for several years.

It is worth also noting that with more residents and mixed-use developments in the area, the very much ‘tidal’ flow of traffic in the peak direction will decline. Less reliance on travel by private vehicle will also further benefit future traffic conditions.

It is widely recognised that existing traffic conditions through Norwest (and Bella Vista, Castle Hill etc.) are not representative of future conditions. The recent upgrades to the Norwest Boulevard/ Brookhollow Avenue intersection to traffic signals also alters how traffic moves through the area, with the recent changes still having an impact on how movements occur in the area, especially with the

improvement of pedestrian connectivity compared with the historic roundabout that was heavily traffic focused. Therefore, assessing the traffic generation of the planning proposal against the current transitional period conditions will not provide meaningful results to inform future traffic conditions. It is also important to consider all other planned and future growth in the area.

Whilst it is understood that forecast traffic modelling is being completed for the Norwest and Bella Vista precincts, publicly accessible information is expected to be available in the near future. The traffic model will consider relevant potential development sites (being the subject of rezoning, masterplanning, planning proposals, DA's etc.) to ensure a robust approach and to understand future traffic conditions not only in the immediate vicinity of individual sites but also the broader precinct generally. This will be key and allows the precinct to develop over time in an environment in which metro services and other targeted transport initiatives will transform how people move. Such change will take time and as such, agreement on the timing of the traffic model will be critical to accuracy.

The traffic modelling and study currently being undertaken by TfNSW, and Council is for the purpose of accommodating future planned growth and development at Norwest including the subject Planning Proposal.

7.3.2 Site Access

The proposed site access Brookhollow Avenue approximately 80 metres south of Norwest Boulevard at an existing driveway location. The proposal would reduce the number of site access driveways by removal of the existing northern access. In addition, the setback of basement accesses allows for adequate queuing capacity (if any) along the access roadway limiting potential impacts on the local road network. It is expected that the site access can achieve compliance with relevant Australian Standards and Council DCP requirements, with a detailed assessment to be included as part of development applications.

The anticipated site generated traffic is shown in Figure 12 and Figure 13.

Figure 12: Site access road (AM peak hour)

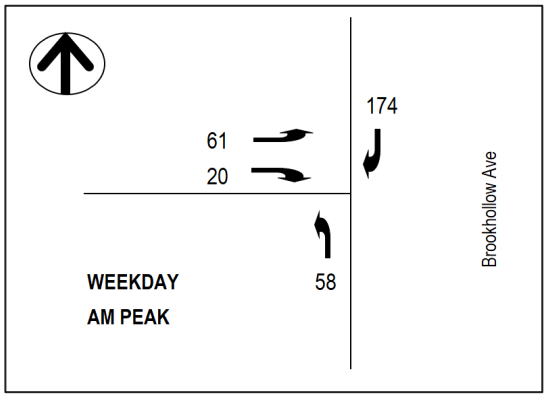
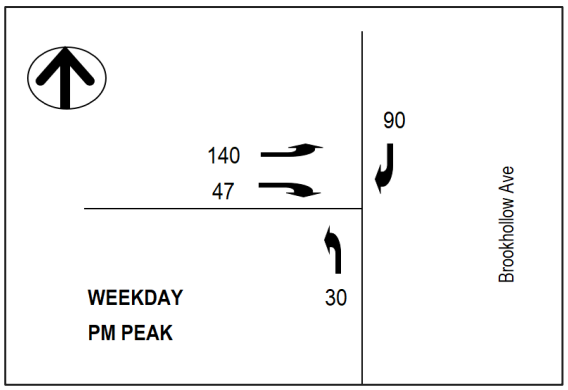


Figure 13: Site access road (PM peak hour)



Based on initial sensitivity modelling of the access driveway, it is expected that there will be minimal delays and queuing experienced should through traffic along Brookhollow Avenue be in the order of 500 vehicles per hour in each direction.

Notwithstanding, the operation of the site access will be confirmed as part of local area traffic modelling required as part of future staged development applications. The modelling will also inform the appropriate design for the access with consideration to proximity to the Norwest Boulevard/ Brookhollow Avenue signalised intersection and other existing and proposed developments.