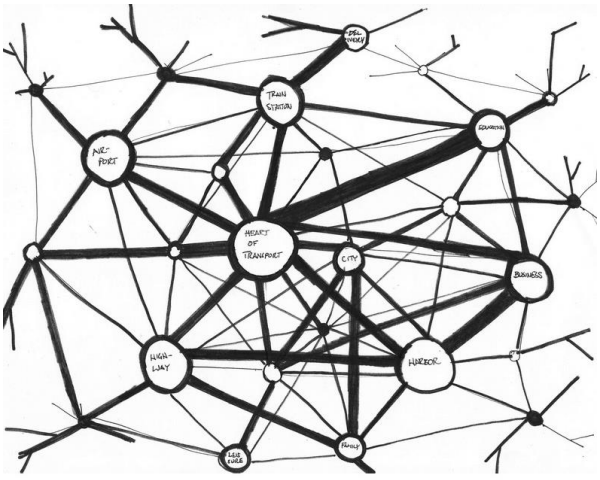
THOMPSON STANBURY ASSOCIATES

ABN: 79 943 737 368

PARKING TRAFFIC & TRANSPORT IMPACT ASSESSMENT

PROPOSED NEW HILLSONG HUB BUILDING (2 CENTURY CIRCUIT BAULKHAM HILLS)



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Office:
Suite 15/9 Hoyle Ave., Castle Hill NSW 2154

All Correspondence:
75 Gindurra Ave., Castle Hill NSW 2154

Ph: (02) 8850 2788

Mob:
0418 262 125 (David Thompson)
0450 747 401 (Yafeng Zhu)

Email:
david@thompsonstanbury.com.au
yafeng@thompsonstanbury.com.au

Website:
www.thompsonstanbury.com.au

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1. INTRODUCTION

This Practice has been engaged by Hillsong Church Ltd. to prepare a parking, traffic and transport impact assessment associated with a development application for the construction of a new commercial office building within the Hills Campus of the Hillsong Church located at 2 Century Circuit, Baulkham Hills. The new building, known as the 'New Hub', is to accommodate existing and future expansions of the existing commercial component of the Hillsong Church operations currently contained on-site.

The New Hub building is proposed to comprise a multi-storey office building providing a gross floor area of 5,221m^2. The building is proposed to be contained within the south-western corner of the site, provided over existing at-grade parking areas. The existing at-grade parking (106 spaces) displaced by the building is proposed to be largely reinstated through the provision of basement / undercroft parking below the New Hub building, which is set to provide 99 new car spaces, meaning that the existing on-site parking capacity is to be marginally reduced by seven spaces.

This report assesses and documents likely parking, traffic and transportation impacts resulting from the development proposal and recommends, where appropriate treatments to ameliorate such impacts. In this regard, this assessment focuses on the following issues:

- The parking demand associated with the various existing and approved site uses;
- Identification of the additional parking demand projected to be generated by the proposed additional building;
- Assessment of the ability of the existing and proposed on-site parking provision to accommodate the additional parking demand generated by the proposed additional building;
- Existing traffic demands and conditions within the road network surrounding the subject site;
- Identification of the additional traffic likely to be generated by the proposal additional building;
- Identification of planned upgrades to the adjoining road network;
- Assessment of the ability of the surrounding road network, both with and without the planned upgrades, to accommodate the additional traffic projected to be generated by the proposed additional building; and
- Assessment of the existing and proposed site access, internal circulation and servicing arrangements of the new building and site as a whole.

Reference has been made in this report to the following documents:

- The Roads & Maritime Services' *Guide to Traffic Generating Developments*;
- Part C Section 1 of The Hills Shire Council's *The Hills Development Control Plan 2012* (DCP) relating to *Parking*;
- Australian Standard for *Parking Facilities Part 1: Off-Street Car Parking* (AS2890.1-2004);
- Australian Standard for *Parking Facilities Part 2: Off-Street Commercial Vehicle Facilities* (AS2890.2-2002);
- Australian Standard for *Parking Facilities Part 3: Bicycle Parking* (AS28903-2015); and
- Australian Standard for *Parking Facilities Part 6: Off-Street Parking for People with Disabilities* (AS2890.6-2009).

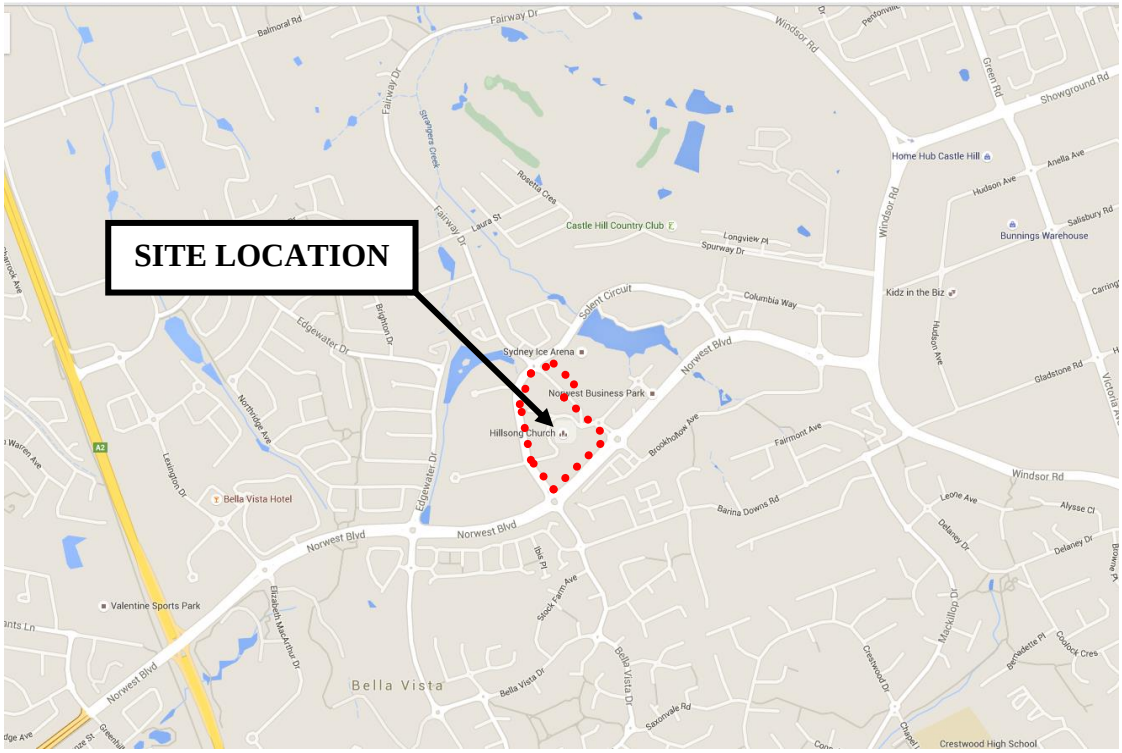
The report should be read in conjunction with the architectural plans prepared by DWP Suters.

2. SITE DETAILS

2.1 Site Location

The site is located on the north-eastern corner of the intersection of Norwest Boulevard, Solent Circuit (West) and Reston Grange, Baulkham Hills. The site location is shown within local and aerial context by **Figures 1** below & **2** overleaf, being extracts of Google Maps and Google Earth, respectively.

FIGURE 1
SITE LOCATION WITHIN A LOCAL CONTEXT



Source: Google Maps

2.2 Site Description

The site provides a street address of 2 Century Circuit, Baulkham Hills. The site forms an irregularly shaped parcel of land providing approximate frontages of 210m, 550m and 70m to Norwest Boulevard, Solent Circuit (West) and Century Circuit, respectively. The total site area is approximately 8.1 hectares.

FIGURE 2
SITE LOCATION WITHIN AN AERIAL CONTEXT

Source: Google Earth

2.3 Existing Use

The Hills Campus of the Hillsong Church comprises the following:

- The existing 'Hub' building located within the central southern portion of the site containing approximately 2,100m^2 of office space accommodating both an administration and education function;
- The Hillsong Convention Centre located within the central portion of the site containing a 3,500 seat main auditorium; and
- On-site parking within the southern, western and northern portions of the site containing 1,273 spaces.

The above on-site car parking is currently serviced by four driveways as follows:

- Two combined ingress / egress driveways connecting with Solent Circuit approximately 130m and 300m to the north of Norwest Boulevard;
- The southern approach to the roundabout controlled intersection of Solent Circuit and Fairway Drive; and
- The western approach to the roundabout controlled intersection of Century Circuit and the Norwest Market Town Shopping Centre.

Further to the above, the total Hillsong site provides a performing arts and media centre known as 'Epicentre' (currently under construction) within the north-eastern corner of the site. Epicentre is to accommodate the following:

- A 500 seat theatre;
- A 300 seat chapel;
- A television studio,
- A recording studio,
- Seminar rooms; and
- Practice rooms

Upon completion, Epicentre is to be serviced by an on-site parking area containing 280 parking spaces and be serviced by an additional ingress / egress access driveway connecting with Solent Circuit in the north-eastern corner of the site.

The total current parking provision within the Hills Campus of the Hillsong Church is therefore approved to be 1,553 spaces.

2.4 Surrounding Uses

The Hills Campus of the Hillsong Church is surrounded by the following land-uses:

- Norwest Market Town Shopping Centre is located to the east, serviced by Century Circuit;
- Sydney Ice Arena is located to the north-east, fronting and serviced by Solent Circuit;
- Residential development is located to the north, fronting and serviced by Fairway Drive and Central Park Avenue;
- A mix of large commercial / industrial buildings occupy land to the west of the site fronting and being serviced by Solent Circuit, Inglewood Place and Burbank Place; and
- Smaller scale commercial development is located to the south fronting Norwest Boulevard, but accessed via Brookhollow Drive.

3. PROPOSED DEVELOPMENT

3.1 Built Form

The development proposal involves the construction of a new commercial office building within the Hills Campus of the Hillsong Church site. The building is proposed to provide four habitable storeys providing a gross floor area of 5,221m^2 (including undercroft).

The new building is to accommodate existing and future expansions of the existing office component of the Hillsong Church operations currently contained on-site. In this regard, the building is proposed to only be occupied during normal weekday business periods. The building is not proposed to be occupied during weekend periods.

The building is proposed to be contained within the south-western corner of the site, provided in place of existing at-grade parking. The existing at-grade parking displaced by the building is proposed to be reinstated through the provision of basement / undercroft parking situated below the New Hub building and parking within the setback zone, providing up to 99 new passenger vehicle parking spaces, such that the existing on-site parking provision is proposed to be slightly reduced by seven spaces. In this regard, the consolidated site wide parking provision is 1,546 spaces.

The building is proposed to be serviced by existing access driveways connecting the Hills Campus site with Solent Circuit and Century Circuit.

4. PARKING CONSIDERATIONS

4.1 Vehicular Parking

4.1.1 Existing Parking Provision

The Hills Campus of the Hillsong Church currently provides on-site at-grade parking for 1,273 spaces. This however does not include the 'Epicentre' development component of the Campus located in the north-eastern corner of the site, currently under construction (see Section 4.1.2 of this report).

4.1.2 Approved Parking Provision

A performing arts and media centre known as 'Epicentre' is currently under construction within the north-eastern corner of the site. This component of the campus is approved to provide an additional 280 car parking spaces.

The Hills Campus of the Hillsong Church therefore is approved to provide a total current parking provision of 1,553 spaces.

4.1.3 Existing Parking Demand

Detailed parking demand surveys of the Hills Campus were undertaken in association with the Epicentre development application Parking Impact Assessment prepared by this Practice in 2013. These surveys were undertaken on a three hourly basis on Wednesday, Thursday, Saturday and Sunday the 19th, 20th, 22nd and 23rd of June, 2013.

Table 1 provides a summary of the survey results, whilst full details are available upon request.

TABLE 1
JUNE 2013 HILLS CAMPUS PARKING DEMAND SURVEYS

Time	Survey Day			
	Wednesday	**Thursday**	**Saturday**	**Sunday**
8.00am	125	111	62	371
10.00am	-	-	-	1201
11.00am	389	611	108	-
12.00pm	-	-	-	1125
2.00pm	424	362	554	112
4.00pm	-	-	-	243
5.00pm	261	240	196	-
7.00pm	-	-	-	1118
8.00pm	119	120	689	-
10.00pm	-	-	-	42

Note: Survey times were slightly different on the Sunday in order to capture the various services.

Table 1 presents that the campus-wide peak parking demand was surveyed to be 1,201 spaces, occurring at 10.00am on the Sunday. The weekday peak parking

demand was however surveyed to be 611 spaces occurring at 11.00am on the Thursday surveyed.

Since the undertaking of the abovementioned 2013 parking demand surveys, Hillsong has entered into an agreement with the adjoining Norwest Market Town Shopping Centre to allow staff of the centre to park within the Campus during weekday periods. Parking demand within the Campus during weekday periods has therefore increased over and above that surveyed in 2013.

In order to ascertain an accurate indication of the abovementioned increased weekday parking demand, this Practice supervised the undertaking of further parking demand surveys in association with the current assessment. The parking surveys were repeated on Thursday the 7th of April 2016. **Table 2** below provides a summary of the 2013 and 2016 Thursday parking demand survey results.

TABLE 2
COMPARISON OF 2013 AND 2016 THURSDAY PARKING DEMAND
HILLSONG PARKING PRECINCT

	2013	**2016**
8.00am	111	275
11.00am	611	883
2.00pm	362	724
5.00pm	240	429

Table 2 indicates that the peak weekday operational parking demand of the Campus has increased between 2013 and 2016 from 611 to 883 spaces.

4.1.4 Approved Parking Demand

This Practice prepared a Parking Impact Assessment in support of the approved Epicentre development in December 2013. **Table 3** below provides a summary of the parking assessment of the various components of the Epicentre development contained within the December 2013 submission in accordance with Part C Section 1 of Council's DCP.

TABLE 3
ASSESSMENT OF PARKING REQUIREMENTS OF THE
EPICENTRE DEVELOPMENT

Land-Use	**Seats / Floor Area Proposed**	**DCP Parking Rate**	**Parking Required**
Theatre	500 seats	1 per 5 seats	100 spaces
Chapel	300 seats	1 per 5 seats	60 spaces
Basement Level Seminar	236m^2	1 per 25m^2 GFA	10 spaces
Ground Level Studio, Youth Area, Seminar	1,524m^2	1 per 25m^2 GFA	61 spaces
Level 1,Classroom, Studio, Rehearsal	1,291m^2	1 per 25m^2 GFA	52 spaces
Level 2 Seminar, Studio	821m^2	1 per 25m^2 GFA	33 spaces
		TOTAL	**316 spaces**

The Epicentre development was therefore calculated to generate a parking demand for 316 spaces in accordance with previously supported methodology and current DCP 2012 requirements.

Notwithstanding the abovementioned parking assessment, it was argued within the December 2013 assessment that it is highly improbable that all differing components of the proposal will be occupied at capacity simultaneously. In this regard, it was considered reasonable that an 85th percentile parking demand be assessed, thereby reducing the peak operational parking demand of the Epicentre development to 269 spaces. The approved Epicentre parking provision of 280 spaces was therefore considered to be suitable and in fact provide a parking oversupply of 11 spaces.

The current approved parking demand of the total development during weekday periods is therefore calculated to be 1,152 spaces (being the recently surveyed peak demand of 883 spaces in addition to the previously assessed Epicentre demand of 269 spaces). The approved site wide parking provision of 1,553 spaces is therefore calculated to provide a minimum capacity to accommodate an additional 401 vehicles being parked on-site during weekday business periods.

4.1.5 Proposed Parking Provision

The new development is proposed to marginally reduce the approved Campus wide parking provision from 1,553 to 1,546 spaces.

4.1.6 Required Parking Provision

4.1.6.1 Council Parking Requirements

The Hills Shire Council provide locally sensitive parking requirements for new developments within Part C Section 1 of its DCP. The DCP provides the following requirements relevant to the proposed commercial office building:

> *Commercial Premises (including business and office premises)*
> *1 space per 25m^2*

Application of the above parking requirement to the proposed office building providing a gross floor area of 5,221m^2 results in a parking requirement of 209 spaces being applicable to the proposal.

4.1.6.2 Roads & Maritime Services

The Roads & Maritime Services provide the following parking recommendations relevant to the development within their *Guide to Traffic Generating Developments* where all parking is to be provided on-site:

> *Commercial Premises*
> *1 space per 40m^2*

The Roads & Maritime Services therefore require the provision of 131 parking spaces for the proposed new commercial building.

4.1.6.3 Discussion on Parking Requirements

The previous sub-sections of this report present that Council and the Roads & Maritime Services require 209 and 131 parking spaces to support the proposed office building.

The significant disparity between the Council and Roads & Maritime Services parking requirements is largely due to the Roads & Maritime Services adopting a significantly public transport utilisation rate for employees of commercial buildings than Council. In this regard, it is not considered that Council's local government area wide parking requirement for commercial premises is adequately cognisant of the likely impact of the construction and opening of Sydney Metro Northwest on the future journey to work patterns of employees of commercial premises.

The Norwest station forming part of Sydney Metro Northwest, currently under construction, is to be located on the south-eastern corner of the intersection of Norwest Boulevard, Century Circuit and Brookhollow Avenue, within 100m of the subject site. The immediate proximity of the site to this station is considered to result in it representing one of the most appropriate examples within the Local Government Area for reduced parking provision for commercial premises.

The Hills Shire Council does provide a reduced parking rate for commercial premises within centres, however the DCP does not define the subject precinct as a 'centre', as it was formulated prior to the commencement of the Sydney Metro Northwest. This reduced parking rate is 1 space per 40m^2, being consistent with that required by the Roads & Maritime Services. It is accordingly considered most appropriate that the DCP parking requirement for centres be applied to the subject proposal and accordingly, parking associated with the new commercial building be calculated based on a rate of 1 space per 40m^2 gross floor area, resulting in an additional parking demand of 131 spaces.

4.1.7 Assessment of Parking Provision

The site wide peak parking demand has previously been presented to be 1,152 and 1,201 spaces during weekday business and weekend periods respectively. The approved site-wide parking provision of 1,553 spaces reduced to 1,546 spaces as a result of the subject development, therefore provides a capacity to accommodate an additional parking demand of 394 spaces during peak weekday business periods and 345 spaces during peak weekend operations (Sunday morning services).

The proposed commercial building has been assessed to generate a parking demand of 131 spaces, whereby parking is calculated utilising Council's rate for commercial premises within centres, being consistent with that recommended by the Roads & Maritime Service' *Guide to Traffic Generating Developments*. The proposed parking provision is therefore considered to be capable of accommodating the additional parking demand projected to be generated by the subject development, with spare capacity. Indeed, the proposed site wide parking provision is also capable of accommodating the additional parking demand of 209 spaces generated by subject development in the event that parking is calculated strictly in accordance with Council's standard parking rate for commercial premises outside of centres. In

consideration of this and the abovementioned discussion, the proposed site-wide parking provision is therefore considered to be capable of accommodating the additional parking demand generated by the proposed New Hub building during weekday business periods.

4.2 Motorcycle Parking

A total of 4 motorcycle parking spaces are proposed to be provided within the parking area below the new commercial building. Council provides the following locally sensitive numerical requirements for the provision of motorcycles within developments providing more than 50 parking spaces within its Part C Section 1 of its DCP:

1 space per 50 vehicle spaces

Based on a worst case scenario of the development generating a demand for 209 passenger vehicle parking spaces, a total of 4 motorcycle parking spaces are required. The proposed motorcycle parking provision of 4 spaces is therefore considered to be adequate.

4.3 Bicycle Parking

A total of 12 bicycle parking spaces are proposed to be provided within the parking area below the new commercial building. Council provides the following locally sensitive numerical requirements for the provision of bicycles within commercial developments which exceed 5,000m^2 within Part C Section 1 of its DCP:

2 spaces plus 5% of the total passenger vehicle parking provision

Based on a worst case scenario of the development generating a demand for 209 passenger vehicle parking spaces, a total of 12 bicycle parking spaces are required. The proposed bicycle parking provision of 12 spaces is therefore considered to be adequate.

4.4 Disabled Parking

A total of 4 of the parking spaces below the commercial building are proposed to be designated as disabled parking spaces.

Council provides the following locally sensitive numerical requirements for the provision of disabled parking within commercial developments within Part C Section 1 of its DCP:

2% of the total passenger vehicle parking provision

Based on a worst case scenario of the development generating a demand for 209 passenger vehicle parking spaces, a total of 4 disabled parking spaces are required. The proposed disabled parking space parking provision of 4 spaces is therefore considered to be adequate.

5. TRAFFIC CONSIDERATIONS

5.1 Existing Traffic Function and Conditions

The following provides a brief description of the road network surrounding the subject site:

- **Norwest Boulevard** is a State Road under the care and control of the Roads & Maritime Services. It performs an east-west arterial road function between Windsor Road in the east and the M7 Motorway and Old Windsor Road in the west. Norwest Boulevard intersects with both Windsor Road and Old Windsor Road under traffic signal control, however a grade separated arrangement is provided at Old Windsor Road whereby on and off ramps service the north and southbound carriageways of the north-south arterial route. Further, Norwest Boulevard provides north facing on and off ramps to the M7 Motorway.

  Norwest Boulevard primarily provides a four lane divided carriageway providing two through lanes in each direction, being separated by a vegetated median. Traffic flow is governed by a sign posted speed limit of 70km/h.

  Norwest Boulevard intersects with Solent Circuit (West) and Reston Grange under two lane circulating roundabout control immediately to the south-west of the subject site. Further, Norwest Boulevard also intersects with Century Circuit (West) and Brookhollow Avenue immediately to the south-east of the subject site under similar two lane circulating roundabout control.

- **Solent Circuit** performs a local access function under the care and control of The Hills Shire Council. It forms a crescent shaped road, connecting with Norwest Boulevard twice, adjacent to the site and some 800m to the east, whereby it intersects under major / minor priority control with Norwest Boulevard performing the priority route and where right turn movements to the State Road are prohibited.

  Solent Circuit primarily forms a dual carriageway providing one through lane of traffic in each direction in conjunction with parallel parking along both kerb alignments. Sign posted parking restrictions apply on approach and departure to Norwest Boulevard in the vicinity of the site to facilitate the provision of two approach and departure lanes. Traffic flow is governed by a sign posted speed limit of 50km/h.

  Solent Circuit intersects with Inglewood Place and Burbank Place adjacent to the subject site under major / minor priority control with Solent Circuit forming the priority route in both instances. Breaks in the Solent Circuit central median are provided at these junctions as well as the two southern access driveways servicing the subject site to facilitate unrestricted turning movements.

Further to the north, Solent Circuit intersects with Fairway Drive under single lane circulating roundabout control, the southern approach to this intersection forming a further site access driveway.

- **Reston Grange** performs a collector road traffic function under the care and control of The Hills Shire Council. It provides a connection between the southern Bella Vista residential precinct to Norwest Boulevard.

  Reston Grange provides an 11m wide pavement providing one through lane of traffic in each direction in conjunction with parallel parking along both kerb alignments. Pavement widening on approach to Norwest Boulevard in conjunction with kerb side parking restrictions facilitates the provision of two approach lanes to the State Road.

  Traffic flow within Reston Grange is governed by a sign posted speed limit of 50km/h.

- **Century Circuit** performs an access function between Norwest Boulevard and Norwest Market Town Shopping Centre, under the care and control of The Hills Shire Council. It provides a U-shape, connecting with Norwest Boulevard twice, once under roundabout control adjacent to the subject site and once under major / minor priority control some 200m to the east, whereby turning movements are restricted to left in / left out only by virtue of the existing central median within Norwest Boulevard.

  The western approach of Century Circuit to Norwest Boulevard provides a dual carriageway providing two southbound approach lanes to the State Road and one departure lane. Century Circuit forms a roundabout intersection some 100m to the north of Norwest Boulevard, whereby approaches connect with the primary at-grade Norwest Market Town Shopping Centre car park (ingress only) and the subject site (ingress / egress).

  Traffic flow within Century Circuit is governed by a speed limit of 50km/h.

- **Brookhollow Avenue** performs an access function to abutting commercial / industrial developments, under the care and control of The Hills Shire Council. It provides a crescent shape intersecting with Norwest Boulevard to the immediate south-east of the site and 800m to the east, with both intersections being governed by roundabout control.

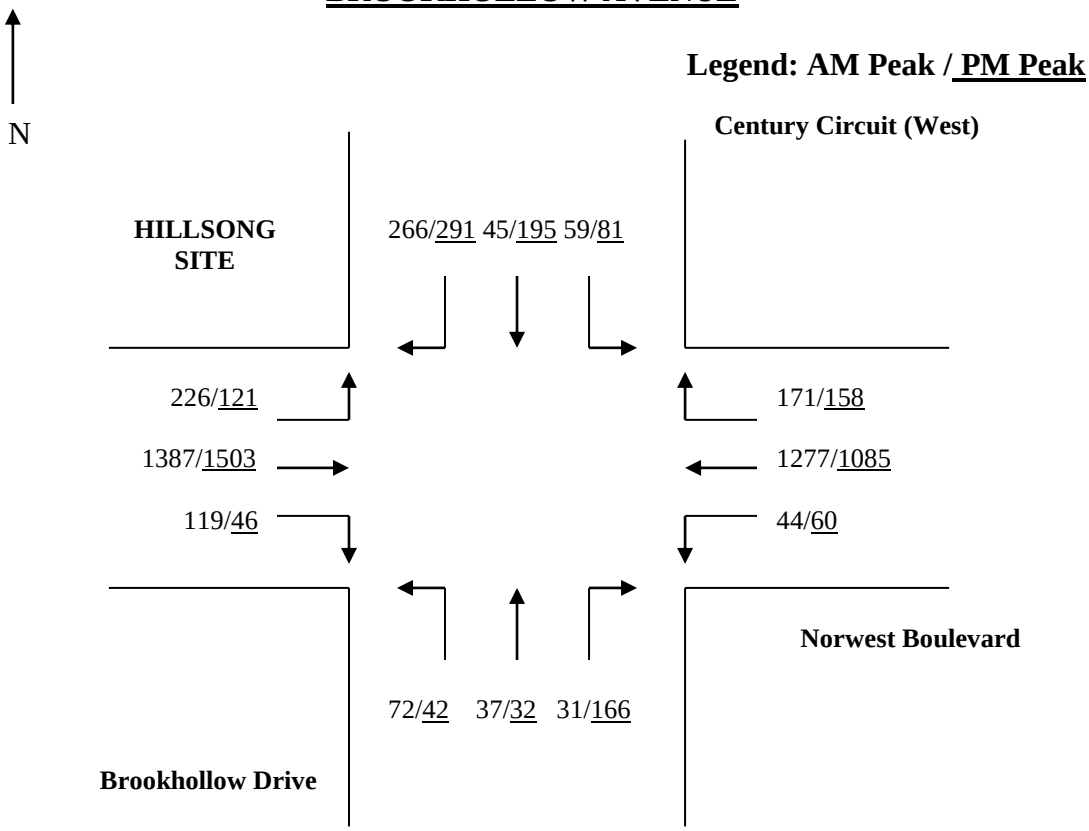
  Brookhollow Avenue provides an 11m wide pavement providing one through lane of traffic in each direction with parallel parking along both alignments. Traffic flow is governed by a sign posted speed limit of 50km/h.

5.2 Existing Traffic Volumes

This Practice has commissioned weekday morning and evening peak period traffic surveys in the immediate vicinity surrounding the subject site in order to obtain an accurate indication of existing traffic conditions. Traffic surveys were undertaken between 7.00am – 9.00am and 4.00pm – 6.00pm on the 24th of June 2016 at the intersection of Norwest Boulevard, Century Circuit and Brookhollow Avenue. Further, this Practice has obtained traffic recent weekday 2016 surveys of the intersection of Norwest Boulevard, Solent Circuit (West) and Reston Grange from The Hills Shire Council.

Figures 3 below and **4** overleaf illustrate the surveyed weekday peak hour traffic flows at the subject intersections, whilst more detailed summaries are available upon request. The minor gains / losses between the intersections are a result of varying survey days.

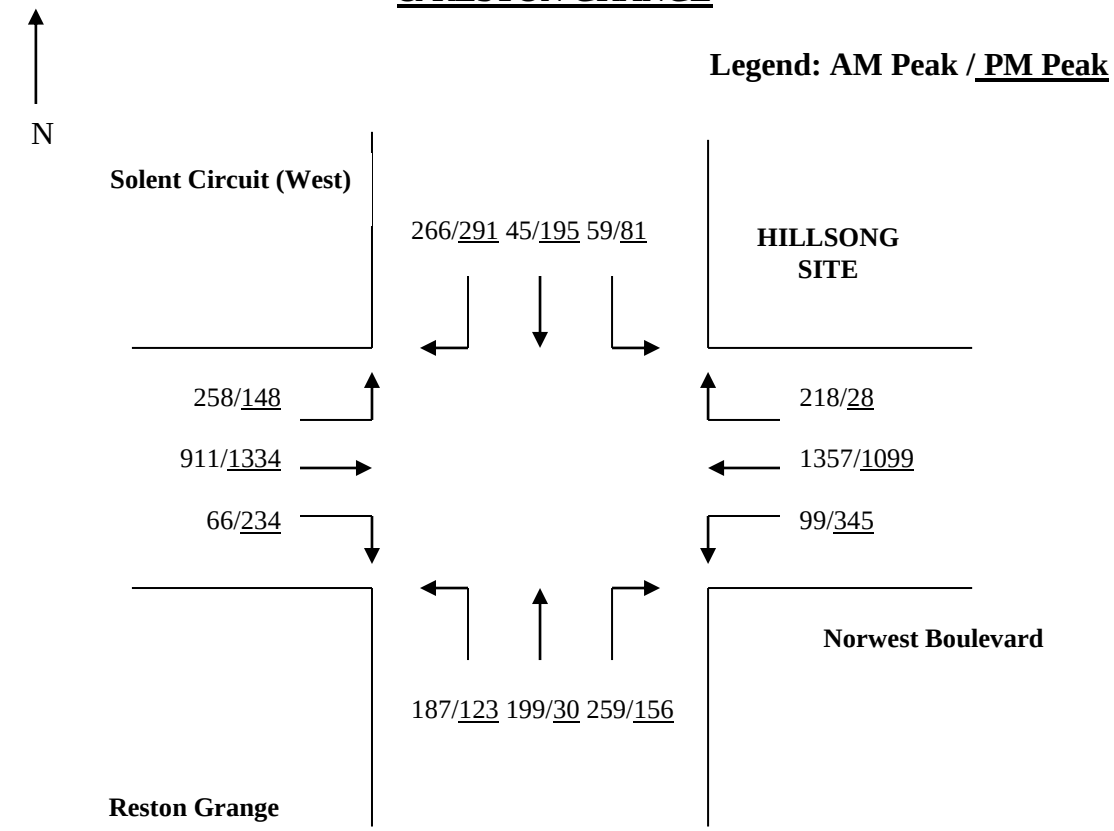
FIGURE 3
EXISTING WEEKDAY PEAK TRAFFIC VOLUMES
INTERSECTION OF NORWEST BOULEVARD, CENTURY CIRCUIT & BROOKHOLLOW AVENUE



Notes:

1. The right turn movement from Norwest Boulevard to Brookhollow Avenue includes 1 and 5 morning and evening U-turn movements from the Norwest Boulevard eastbound to westbound carriageway.
2. The right turn movement from Norwest Boulevard to Century Circuit (West) includes 84 and 13 morning and evening U-turn movement from the Norwest Boulevard westbound to eastbound carriageway.

FIGURE 4
EXISTING WEEKDAY PEAK TRAFFIC VOLUMES
INTERSECTION OF NORWEST BOULEVARD, SOLENT CIRCUIT (WEST) & RESTON GRANGE



Notes:

3. The right turn movement from Norwest Boulevard to Reston Grange includes 7 and 58 morning and evening U-turn movements from the Norwest Boulevard eastbound to westbound carriageway.
4. The right turn movement from Norwest Boulevard to Solent Circuit (West) includes 1 evening U-turn movement from the Norwest Boulevard westbound to eastbound carriageway.

Figures 3 and **4** indicate the following:

- Norwest Boulevard through movements provide peak hour directional demands of between approximately 1,250 – 1,750 vehicles;

- Directional traffic volumes within Norwest Boulevard are slightly tidal during peak periods with westbound demands dominating during the morning peak and eastbound demands dominated during the evening peak;

- Solent Circuit West through movements provide peak hour directional demands of between 200 – 700 vehicles;

- Directional traffic volumes within Solent Circuit (West) are significantly tidal with northbound flows dominating during the morning peak and southbound flows dominating during the evening peak;

- Reston Grange through movements provide peak hour directional demands of between approximately 200 – 750 vehicles;

- Directional traffic volumes within Reston Grange are significantly tidal with northbound flows dominating during the morning peak and southbound flows dominating during the evening peak;

- Century Circuit (West) through movements provide peak hour directional demands of between approximately 300 - 550 vehicles;

- Directional traffic volumes within Century Circuit are slightly tidal with northbound flows dominating during the morning peak and southbound flows dominating during the evening peak; and

- Brookhollow Avenue through movements provide peak hour directional demands of between approximately 150 – 300 vehicles.

5.3 Existing Intersection Operation

In order to estimate the existing peak efficiency of the adjoining road network, a SIDRA computer network analysis has been undertaken. SIDRA is a computerised traffic arrangement program which, when volume and geometrical configurations of a network of intersections are imputed, provides an objective assessment of the operation efficiency under varying types of control (i.e. signs, signal and roundabouts). Key indicators of SIDRA include level of service where results are placed on a continuum from A to F, with A providing the greatest intersection efficiency and therefore being the most desirable by the Roads and Maritime Services.

SIDRA uses detailed analytical traffic models coupled with an iterative approximation method to provide estimates of the abovementioned key indicators of capacity and performance statistics. Other key indicators provided by SIDRA are average vehicle delay, the number of stops per hour and the degree of saturation. Degree of saturation is the ratio of the arrival rate of vehicles to the capacity of the approach. Degree of saturation is a useful and professionally accepted measure of intersection performance.

SIDRA provides analysis of the operating conditions that can be compared to the performance criteria set out in **Table 4** overleaf (being the RMS NSW method of calculation of Level of Service).

TABLE 4 LEVELS OF SERVICE CRITERIA FOR INTERSECTION		
Level of Service	**Average Delay per Vehicle (secs/veh)**	**Traffic Signals, Roundabout**
A	Less than 14	Good Operation
B	15 to 28	Good with acceptable delays & spare capacity
C	29 to 42	Satisfactory
D	43 to 56	Operating near capacity
E	57 to 70	At capacity; at signals, incidents will cause excessive delays Roundabouts require other control mode
F	> 70	Extra capacity required

The existing conditions have been modelled utilising the peak hour traffic volumes presented within **Figures 3** and **4**. **Table 5** below provides a summary of the SIDRA output data whilst full details are available upon request.

TABLE 5 SIDRA MODELLING ANALYSIS EXISTING CONDITIONS		
Intersection	**AM Peak**	**PM Peak**
Norwest Bvd / Century Ct / Brookhollow Av		
Average Vehicle Delay	8.3	12.3
Degree of Saturation	0.73	0.89
Level of Service	A	A
Norwest Bvd / Solent Ct / Reston Gr		
Average Vehicle Delay	15.2	12.0
Degree of Saturation	0.91	0.88
Level of Service	B	A

Table 5 indicates the following weekday commuter peak period operational performance:

- The intersection of Norwest Boulevard, Century Circuit and Brookhollow Avenue operates with a level of service 'A' during both peaks representing good operation with spare capacity; and

- The intersection of Norwest Boulevard, Solent Circuit and Reston Grange operates with a level of service 'B'/'A' during peak periods also representing good operation with spare capacity.

5.4 Public Transport & Non Car Travel

5.4.1 Buses

Buses currently form the main public transport mode for the North-West area and indeed, the Norwest precinct. Accordingly, there is a comprehensive network of services, which service existing bus stops within both Norwest Boulevard and Reston Grange (located within 100m walking distance of the subject site).

This includes services to the Sydney CBD, Macquarie Park, Parramatta, St Marys, Rouse Hill, Blacktown and Seven Hills.

Buses servicing the Norwest precinct are currently operated by Hillsbus and Busways. Hillsbus currently operate 6 services along Norwest Boulevard whilst Busways operate 2 services as follows:

- 2 services terminate at the City;
- 1 service terminates at Macquarie Park;
- 1 service terminates Blacktown;
- 1 service terminates at Seven Hills;
- 1 service operates between Stanhope Parkway and St Marys;
- 1 service operates between Castle Hill and Parramatta; and
- 1 service operates between Rouse Hill and Parramatta; Castle Hill from the west and south.

Frequencies vary however all services provide regular (between 15 – 30 minute) services during weekday peak commuter periods.

5.4.2 Train

Construction works are currently underway associated with the Sydney Metro Northwest between Epping and Rouse Hill. The subject precinct will be provided with a station adjacent to the intersection of Norwest Boulevard, Century Circuit and Brookhollow Avenue, with a pedestrian access within 100m walking distance of the subject site.

5.4.3 Pedestrian Conditions / Infrastructure

The following pedestrian infrastructure is provided within the vicinity of the site:

- Footpaths are provided on both sides of Norwest Boulevard;
- Footpaths are provided on both sides of Solent Circuit;
- Footpaths are provided on both sides of Century Circuit between Norwest Boulevard and Norwest Market Town;
- Marked pedestrian crossings are provided over the northern and eastern approaches of the intersection of Century Circuit and the Norwest Market Town Shopping Centre car park access road;
- A series of marked pedestrian crossings are provided over the east-west section of Century Circuit adjacent to Norwest Market Town Shopping Centre;

- Pedestrian refuges are provided within all approaches to the roundabout controlled junction of Solent Circuit and Fairway Drive; and

- A pedestrian subway is provided below Norwest Boulevard to the east of Century Circuit (East).

5.5 Planned Road Upgrades

A Traffic Masterplan was prepared for the Norwest Business Park on behalf of The Hills Shire Council which was assessed by and commented on by the Roads & Maritime Services (RMS) in a letter to Council dated 21 November 2005. This Masterplan outlined a series of upgrades to the Norwest road network and Norwest Boulevard in particular, which are planned to be implemented in the short to medium term with the approval of the RMS:

- The signalisation of the intersection of Norwest Boulevard, Brookhollow Avenue (East) and Columbia Way operating under a two signal phase arrangement, with right turn movements from Norwest Boulevard to Brookhollow Avenue and Columbia Way being prohibited;

- The signalisation of the junction of Norwest Boulevard and Solent Circuit (East) operating under a three signal phase arrangement;

- The signalisation of the intersection of Norwest Boulevard, Brookhollow Avenue (West) and Century Circuit to operate under a double diamond signal phasing arrangement;

- The signalisation of the intersection of Norwest Boulevard, Solent Circuit (West) and Reston Grange to operate under a double diamond signal phasing arrangement;

- The signalisation of the intersection of Norwest Boulevard, Westwood Way and Edgewater Drive to operate under a single diamond overlap signal phasing arrangement; and

- The signalisation of the intersection of Norwest Boulevard, Lexington Drive and Elizabeth Macarthur Drive to operate under a double diamond signal phasing arrangement.

This Practice has been advised by The Hills Shire Council that the signalisation of Norwest Boulevard, Century Circuit and Brookhollow Avenue is to be undertaken within the immediate term associated with the construction of the Sydney Metro Northwest. In this regard, it is understood that the intersection will be signalised prior to the occupation of the proposed building.

5.6 Development Traffic Generation

The Roads & Maritime Services provide the following peak hour traffic generation rates for office buildings within *TDT 2013/04* (*Guide to Traffic Generating Developments*):

1.6 trips per 100m^2 GFA during the AM peak
1.2 trips per 100m^2 GFA during the PM peak

Based on the above rates, the development is projected to generate in the order of 84 morning and 63 evening peak hour vehicle trips to and from the site. For the purposes of this assessment, the development is projected to provide an 80% inbound / 20% outbound split during the morning peak and the reverse condition during the evening peak. Accordingly, the subject development is projected to generate 67 inbound and 17 outbound trips during the morning peak hour and 13 inbound and 50 outbound trips during the evening peak hour.

5.7 Trip Assignment

In order to gauge the impact of the traffic projected to be generated by the proposed development on the local road network, it is necessary to distribute the traffic generated by the development along the major approach routes before it dissipates throughout the general road network.

The subject site provides access connections to both Solent Circuit and Century Circuit and recent observations have indicated that traffic to / from the total development is generally reasonably evenly split between the two access roads. The ability of Century Circuit to accommodate additional traffic associated with the subject development is envisaged to be significantly assisted by the impending signalisation of Norwest Boulevard, Century Circuit and Brookhollow Avenue. Accordingly, in order to generate a worst case scenario, it has been assumed that all additional traffic to and from the site associated with the subject proposal will occur via Solent Circuit, originating from and departing to the south via the intersection of Norwest Boulevard, Solent Circuit and Reston Grange. In this regard, additional traffic associated with the subject proposal has been assigned in accordance with existing traffic distributions presented within **Figure 4**, as follows:

<u>AM Peak</u>

- 40% of inbound traffic during the AM peak is projected to travel via Norwest Boulevard from the west;
- 30% of inbound traffic during the AM peak is projected to travel from the south via Reston Grange;
- The remaining 30% of inbound traffic during the AM peak is projected to travel from the east via Norwest Boulevard;
- 70% of outbound traffic during the AM peak is projected to travel to the west via Norwest Boulevard;

- 15% of outbound traffic during the AM Peak is projected to travel to the south via Reston Grange;

- The remaining 15% of outbound traffic during the AM peak is projected to travel to the east via Norwest Boulevard.

PM Peak

- 70% of inbound traffic during the PM peak is projected to travel via Norwest Boulevard from the west;

- 15% of inbound traffic during the PM peak is projected to travel from the south via Reston Grange;

- The remaining 15% of inbound traffic during the PM peak is projected to travel from the east via Norwest Boulevard;

- 50% of outbound traffic during the PM peak is projected to travel to the west via Norwest Boulevard;

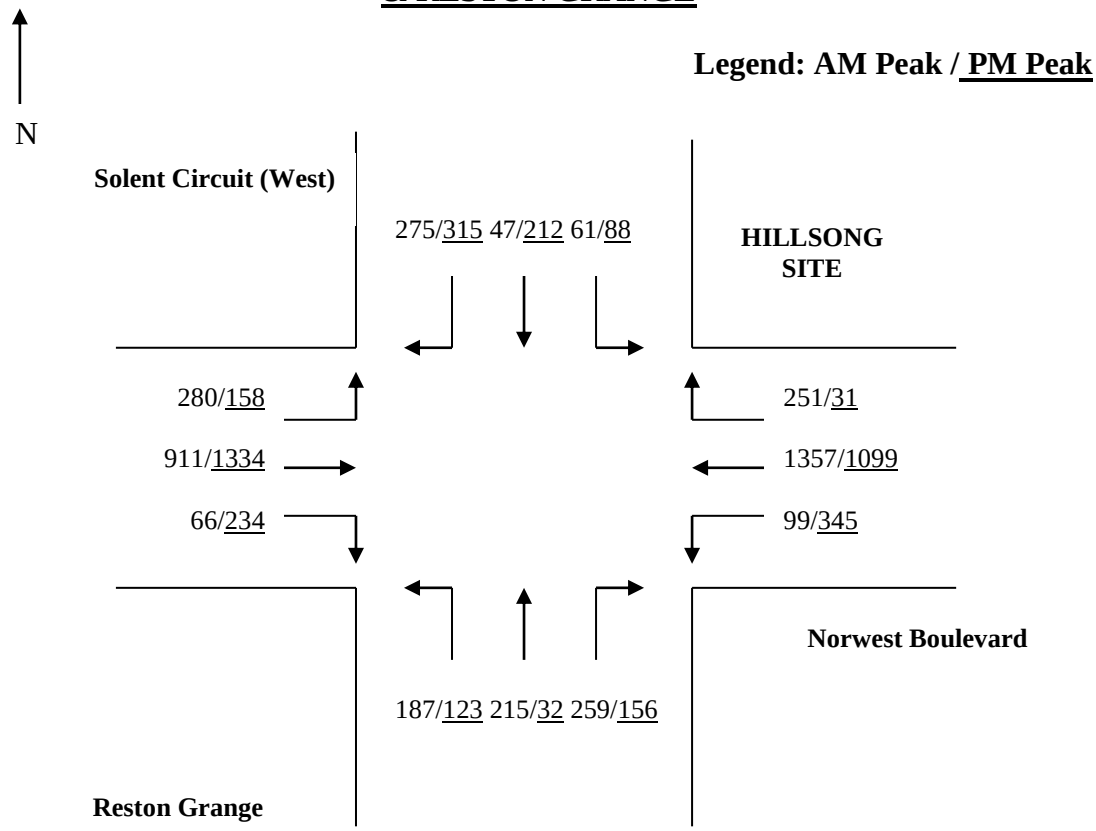
- 30% of outbound traffic during the PM Peak is projected to travel to the south via Reston Grange; and

- The remaining 15% of outbound traffic during the PM peak is projected to travel to the east via Norwest Boulevard.

5.8 Projected Traffic Volumes

Based on the discussion provided previously on likely traffic generation and trip assignment, the projected peak hour traffic volumes at the intersection of Norwest Boulevard, Solent Circuit and Reston Grange have been formulated by adding the trip assignment presented within Section 5.7 of this report to the existing volumes provided within **Figure 4**. **Figure 5** overleaf provides an estimation of the future traffic volumes associated with and adjoining the subject site.

FIGURE 5
PROJECTED WEEKDAY PEAK TRAFFIC VOLUMES INCORPROATING THE SUBJECT DEVELOPMENT
INTERSECTION OF NORWEST BOULEVARD, SOLENT CIRCUIT (WEST) & RESTON GRANGE



Notes:

5. The right turn movement from Norwest Boulevard to Reston Grange includes 7 and 58 morning and evening U-turn movements from the Norwest Boulevard eastbound to westbound carriageway.
6. The right turn movement from Norwest Boulevard to Solent Circuit (West) includes 1 evening U-turn movement from the Norwest Boulevard westbound to eastbound carriageway.

5.9 Projected Intersection Performance

Utilising the projected traffic generation characteristics of the proposed development and the abovementioned assumed trip assignment, the intersection of Norwest Boulevard, Solent Circuit and Reston Grange has been modelled in order to estimate that likely impact on traffic safety and efficiency. A summary of the most pertinent results are indicated within **Table 6** overleaf whilst full details are available if required.

TABLE 6 SIDRA MODELLING ANALYSIS INTERSECTION OF NORWEST BOULEVARD, SOLENT CIRCUIT & RESTON GRANGE				
	Existing Conditions		**Projected Conditions**	
	AM Peak	**PM Peak**	**AM peak**	**PM peak**
Average Vehicle Delay	15.2	12.0	26.2	21.0
Degree of Saturation	0.91	0.88	1.06	0.98
Level of Service	B	A	B	B

Table 6 indicates that whilst the level of service at the intersection of Norwest Boulevard, Solent Circuit and Reston Grange is projected to remain good incorporating the subject development, the intersection degree of saturation is expected to approach capacity.

The planned signalisation of the intersection of Norwest Boulevard, Solent Circuit and Reston Grange is expected to significantly increase the capacity of the intersection to accommodate existing traffic demands and future demands incorporating the subject development.

Further to the above, the opening of the Sydney Metro Northwest is expected to significantly alter surrounding community travel patterns, reducing adjoining traffic demands, thereby increasing the capacity of the surrounding road network to accommodate any additional demands associated with the subject development. In consideration of this and the abovementioned discussion, the surrounding road network is considered to be capable of accommodating the subject development in a safe and efficient manner.

6. INTERNAL CIRCULATION ARRANGEMENTS

6.1 Parking Area Design

The internal circulation of the new and / or reconfigured parking areas have been designed to accord with the relevant requirements of AS2890.1-2004 and AS2890.6-2009 for a User Class 2 facility, providing the following base dimensions:

- Normal parking space width = 2.5m;
- Disabled parking space width = 2.4m (plus an adjoining 2.4m wide shared area);
- Motorcycle parking space width = 1.2m;
- Additional space width adjoining obstruction = 0.3m;
- Normal and disabled parking space length = 5.4m;
- Motorcycle parking space length = 2.5m;
- Parking aisle width = 5.8m;
- One-way straight roadway width = 3.0m;
- Two-way straight roadway width = 5.5m;
- Column set-back from parking space opening = 0.75m (or additional space width of 0.3m);
- Clearance throughout parking area = 2.2m;
- Clearance above disabled parking spaces = 2.5m;
- Maximum grade of parking module = 1 in 20; and
- Parking aisle extension past the end space of a dead end aisle = 1.0m.

In order to further assess the internal passenger vehicle manoeuvrability within the parking areas, this Practice has undertaken a desktop analysis of the ability of passenger vehicles to manoeuvre throughout the basement parking levels. This assessment has concluded that passenger vehicles are able to manoeuvre throughout the internal circulation areas with a reasonable level of safety and efficiency and opposing vehicle movements are able to be accommodated where necessary. In consideration of this and the above compliance with the relevant specifications of AS2890.1-2004 and AS2890.6-2009, the proposed basement layout as it relates to internal passenger vehicle and motorcycle manoeuvrability is considered to be satisfactory.

6.2 Servicing Considerations

The proposal involves the provision of a single external servicing bay providing dimensions of 7.4m x 3.5m located adjacent to the lift core.

The Hills Shire Council provides locally sensitive numerical servicing bay requirements for new developments within Part C Section 1 if it's DCP. The DCP provides the following requirements for offices:

1 space for the first 1,860m^2
1 space for the next 3,720m^2
1 space for the next 3,720m^2
1 space for each extra 9,250m^2

Application of the abovementioned requirements to the subject development results in a requirement for two servicing bays. Notwithstanding this, the DCP specifies that variations may be considered to Council requirements where applicants are able to demonstrate compliance with the objections of the specific section of the Plan. The objectives are as follows:

(i) To provide suitable access on-site for service vehicles, for the purpose of loading and / or delivering goods.
(ii) To ensure that types of loading and delivery areas are suited to the needs of the development.
(iii) To ensure that adequate numbers of loading and delivery areas are allocated for appropriate types of service vehicles.
(iv) To protect neighborhood amenity and safety in the design and construction and operation of loading and service areas in accordance with Council's ECD objective 7.

The above objectives essentially require that developments provide an adequate number of servicing bays of adequate size and manoeuvring area to accommodate the maximum sized vehicle expected to service the development.

The subject development is expected to require semi regular servicing associated with refuse collection activities (say twice per week) and the receipt of deliveries (say once per day). Refuse collection activities are expected to be undertaken by Council's collection vehicle which is understood to be similar in size and manoeuvrability to that of a 12.5m long Heavy Rigid Vehicle (HRV). Deliveries associated with the development are expected to be limited to stationary and the like, which is likely to be undertaken by vans and small deliveries vehicles up to and including Small Rigid Vehicles (SRVs).

The subject development is therefore projected to be required to provide one vehicle servicing bay capable of accommodating vehicles associated with deliveries up to and including SRVs. The proposed provision of a single loading bay capable of accommodating a vehicle up to and including the length of SRV is therefore considered to be satisfactory.

In addition to the above, it is understood that the internal manoeuvring aisles within the off-street car parking area, in the vicinity of the waste storage bin is proposed to accommodate Council's collection vehicles during the waste collection process. In order to demonstrate that vehicles up to and including Council's refuse collection vehicle is capable of servicing the subject site, swept paths have been overlaid on the architectural plans utilising Autoturn software and vehicle specifications for a 12.5m long refuse collection vehicle provided by the program. These paths indicate that the subject development design is capable of accommodating the required manoeuvring requirements of the largest vehicle expected to service the subject site in a safe and efficient manner. In consideration of this and the abovementioned discussion, the proposed development servicing arrangements are considered to be satisfactory.

7. CONCLUSION

This Practice has undertaken an assessment of the potential parking, traffic and transport related impacts resulting from a proposal to provide a new commercial office building within the south-western corner of The Hills Campus of Hillsong Church at 2 Century Circuit, Baulkham Hills. Based on this assessment, the following conclusions are now made:

- The new office building is proposed to be provided over existing passenger vehicle parking areas, resulting in the loss of 106 spaces, which is to be largely reinstated through the provision of 99 new spaces within the undercroft/basement parking areas situated below the new building and within the at-grade setback zone such that the existing site-wide parking provision is to be marginally reduced by seven spaces;

- Surveys of existing site-wide parking demand indicate that there is capacity to accommodate up to an additional 394 parked vehicles during weekday business periods and 345 parked vehicles during peak weekend periods;

- Strict application of Council's DCP parking requirements for commercial premises to the subject development results in a parking demand of 209 spaces;

- It is however considered that a reduced parking rate should be applied to the subject development given the proximity of the site to the Bella Vista station of the Sydney Metro Northwest, currently under construction;

- The parking demand of the development is more reasonably estimated by applying Council's parking requirements for commercial premises within centres (which is consistent with that recommended by the Roads & Maritime Services), resulting in a parking demand of 131 spaces;

- Regardless of the parking rate applied the development, the proposed on-site parking provision is capable of accommodating the additional demand generated by additional floor space;

- The surrounding road network operates with a reasonable level of service during peak periods with spare capacity;

- The proposed development is projected to generate up to 84 additional peak hour vehicle trips to and from the subject development;

- The surrounding road network is projected to be capable of accommodating the additional traffic projected to be generated by the subject development;

- Norwest Boulevard is planned to be subject to a series of upgrades in the short to medium term, whereby the primary site approach intersections are to be signalised increasing the capacity of those intersections to accommodate additional demand;

- Further, the opening of the Sydney Metro Northwest (expected to be prior to occupation of the subject development) is anticipated to alter existing precinct travel patterns, reducing private vehicle travel demands, further increasing the overall capacity of the surrounding road network; and

- The proposed internal circulation, servicing and parking arrangements provide for satisfactory manoeuvring throughout the subject site in accordance with the relevant Australian Standard requirements.

Based on contents of this report and the above conclusions, it is our view that there are no parking, traffic or transport related issues associated with the proposed development which would prevent this Practice from recommending the proposal for approval.