## APPENDIX B: TRAFFIC AND TRANSPORT IMPACT ASSESSMENT PREPARED BY AECOM

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21 January 2014

Gazcorp Pty Ltd
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Dear Nicholas

**Alexandria Mixed Use Development - Stage 2 Master Plan DA Traffic Impact Statement**

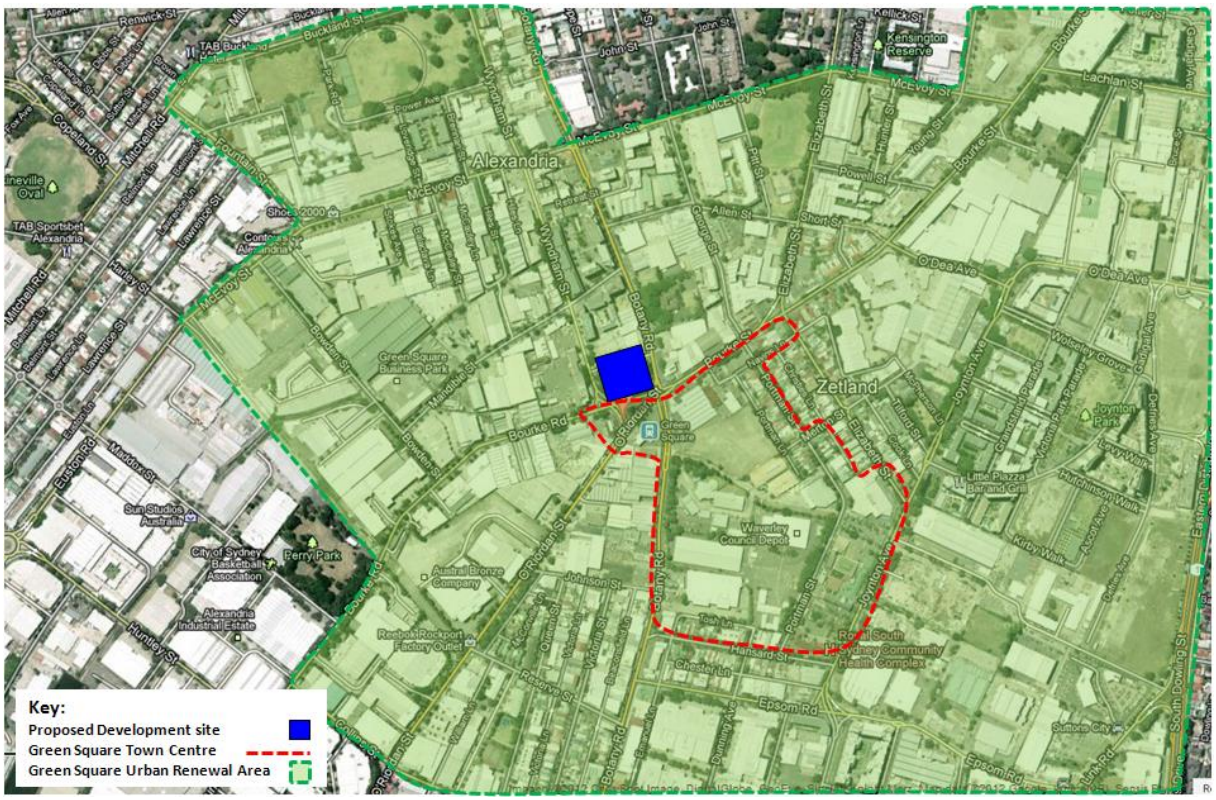
Gazcorp has commissioned AECOM to prepare a traffic impact statement to support the Stage 2 Master Plan Development Application (DA) of the residential component of the development at 296-298 Botany Road and 284-300 Wyndham Street, Alexandria, Sydney. Further traffic analysis may be required at Council's request to be provided at the DA phase of the residential development.

## 1.0 Background Transport Context

### 1.1 Project Description

The proposed mixed use development is located adjacent to Green Square Station and the proposed regeneration of Green Square Town Centre, as shown in Figure 1. The site is located on the corner of Bourke Street, Botany Road and Wyndham Street within the City of Sydney boundary. It is also inside the Green Square Urban Renewal Area.

**Figure 1 Location of Development Site**




Source: AECOM 2014

## 1.2 Previous Approval

A Stage 1 DA submission for a commercial and retail development on the same site was approved by the City of Sydney Council in early 2013. The approved development consisted of 11,452m$^2$ of retail and commercial floor space. In addition, there were two levels of basement car parking providing a total of 327 parking spaces to be accessed from Wyndham Street. A traffic impact assessment for the Stage 1 development, as part of the DA submission was also approved.

A Stage 2 Master Plan DA (This study) is required for the residential component of the development which is above the Stage 1 retail development levels, prior to the submission of the full DA.

## 1.3 Existing Transport Context

The proposed development is located inside the Green Square Urban Renewal Area and is between the Sydney Central Business District (CBD), the Sydney International (Kingsford Smith) Airport and Port Botany within the City of Sydney Local Government Area.

Green Square Train Station is located approximately 100m south of the site. The station is on the T2 (Airport, Inner West and South) Line with services between Town Hall and Macarthur. There are up to 10 city-bound services during the AM peak hour and 8 services from the city during the PM peak hour. Green Square Train Station is a privately owned station and has operated with a premium entry charge (a station access fee for passengers) through to March 2011. This acted to increase the cost of rail travel to a level where other modes of transport become comparatively more efficient to use. In response to the resulting low patronage levels at the station, the premium entry charge was lifted. This resulted in a 70% increase of Train Station users within a year (information obtained from the Sydney Trains website).

Bus services within the Green Square area are provided by Sydney Buses and tend to be in the north-south direction. There are currently a number of bus routes that service the Green Square Town Centre (305, 309, 310, 343, 345, 355, 370, L09). Three additional express routes pass through Green Square but do not stop (X03, X09, X10). These bus services provide direct connection to the CBD, Coogee, Port Botany and Kingsford. The closest bus stops to the site are located on Botany Road near Mandible Street and on Botany Road near the Green Square Station (309, 310, 370, L09) which are within 100m or 2-minute walk of the site. Bus stops are also located along Elizabeth Street (343, 345) and further along Botany Road to the north and south (305, 355) which are within 7-minute walk of the site.

Pedestrian footpaths are currently provided on both sides of the major road network including Botany Road, Wyndham Street and Bourke Street. Connection from the proposed development site to Green Square Station is provided via pedestrian crossings at the Botany Road/Bourke Street intersection.

The Green Square area forms a key part of the Sydney Cycleway Network and there are currently three streets that have a separated cycleway within the immediate vicinity of the site; Bourke Road, Mandible Street and Bowden Street. These streets are designed to provide cyclists with a safe and accessible thoroughfare between the southern suburbs and the CBD / neighbouring suburbs. On-road cycle routes in Allen Street and Portman Street provide cyclists with access to the north, east and south, where each route links to the wider Sydney Cycleway Network. Botany Road (between Mandible Street and Allen Street) provides an off road cycleway linking the Mandible Street separated cycleway with the Allen Street on-road cycle route.

The site has good access to Sydney's motorway and arterial road network. Green Square is the focal point at which four major arterial roads converge, Botany Road, O'Riordan Street, Bourke Road and Wyndham Street, which provide good connectivity to Sydney CBD and Sydney Airport.

## 1.4 Future Transport Context

The NSW Long Term Transport Master Plan 2012 indicates that the Airport Rail Line is approaching seated capacity between Green Square and Central. Sydney Trains aim to increase services through Green Square Train Station to approximately 16 per hour by 2016 to meet the expected Green Square travel demand. This initiative is also described in the Green Square Town Centre Masterplan.

Light rail has also been strongly promoted in City of Sydney's Sydney 2030 plan to link Green Square with the CBD. This will reduce vehicular traffic in the area.

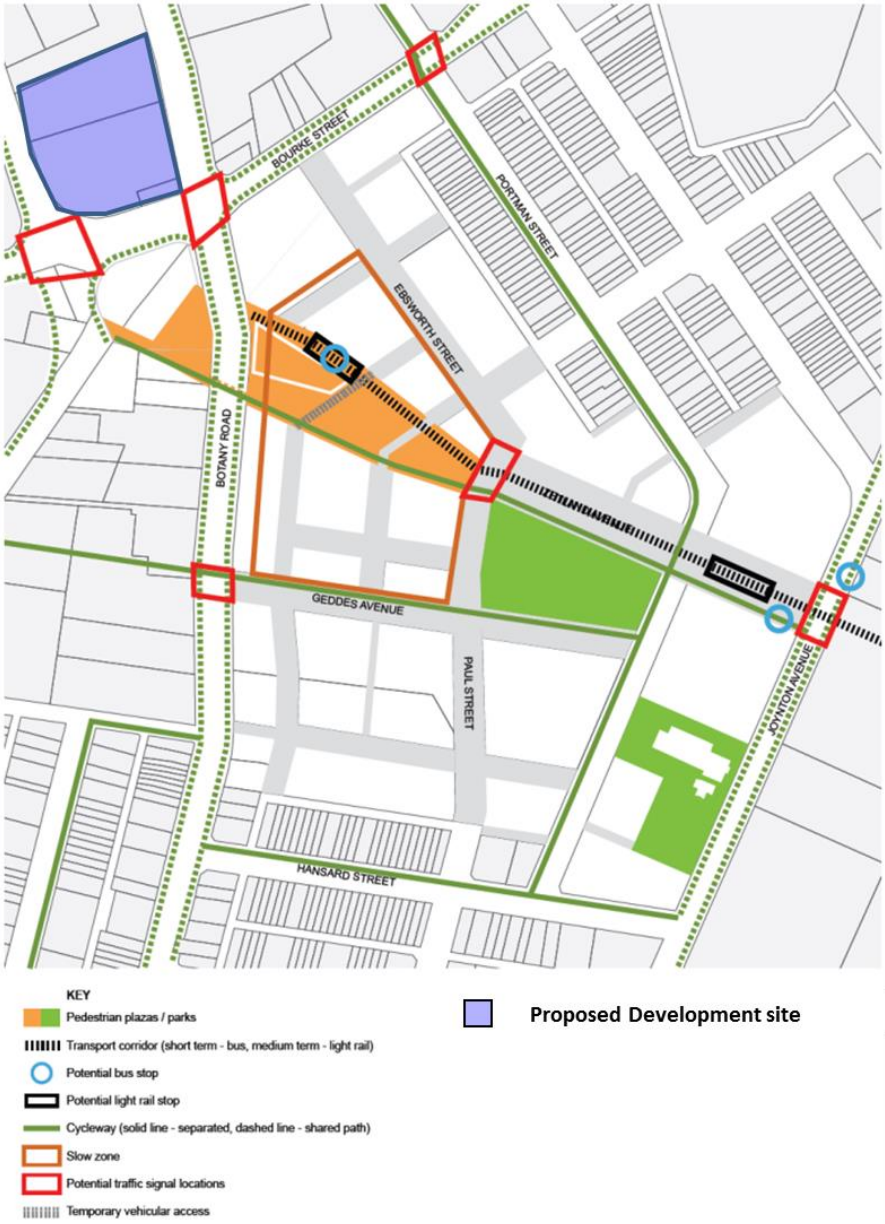
The Green Square Masterplan indicates that there will be potential growth in bus services with the regeneration of Green Square Town Centre. It is indicated that there will be additional routes connecting Green Square directly with major destinations and an integrated bus stop and pedestrian network plan. This is consistent with the New

South Wales Government's long term plan *Sydney's Bus Future* published in December 2013 as new suburban bus routes are planned to pass through Green Square.

Green Square currently has a strong existing cycle network; however it is not yet complete, with the Bourke Street separated cycleway not currently extending as far south as Green Square. It is proposed that this route will eventually link with the Bourke Road separated cycleway to create one continuous route - acting to increase the practicality of the Sydney Cycleway Network for future Green Square residents and ultimately contribute toward increased cycle modeshare in the area. The City of Sydney Council sought community feedback on the design plans in December 2013 and will continue the next stage works in early 2014. The link along Alexandra Canal between Green Square and Sydney Airport has also been identified as a strategic bicycle corridor in Sydney's Cycling Future.

In the long term, the road network will be modified with the planned regeneration of the Green Square Town Centre. The proposed long term road layout and public transport facilities from Green Centre Town Centre Transport Structure Plan is shown in **Figure** 2.

**Figure 2 Future road layout**




Source: City of Sydney DCP 2012, AECOM 2014

## 2.0 Proposed Development

The Preferred Concept Plan for Stage 2 proposes a residential development with approximately 400 dwelling units consisting of 160 one-bedroom units, 200 two-bedroom units and 40 three-bedroom units.

The proposal for the Stage 2 development also includes:

- Two levels of residential parking located above the retail and commercial levels, accessed from Botany Road
- Communal open space at podium level (above the residential parking) with a swimming pool, outdoor gym and landscaped areas, and
- Upper level residential development consisting of two-storey terrace at podium level and two residential blocks located at the south-western and south-eastern corners of the site (A total of 400 dwelling units).

### 2.1 Car Park Access Strategy

The Stage 2 development car park will be accessed via Botany Road, separating from the Stage 1 car park access at Wyndham Street. The proposed access will be located approximately 100m north of the Botany Road / Bourke Street intersection. It will be a left-in left-out configuration whereby it is proposed that a short median is constructed on Botany Road adjacent to the access to enforce the left-in left-out movement. The median is assumed to have no impacts to other driveways located along the southbound carriageway of Botany Road.

**Figure 3 Location of proposed access**


Source: AECOM 2014

There is over 200m of safe intersection sight distance (SISD) between traffic on Botany Road to the south of the car park access, and traffic from the proposed car park. This SISD exceeds the minimum requirement of 97m identified in Austroads (2010) with Roads and Maritime Services supplement guide (2011).

### 2.2 Parking Provision

Off-street parking will be provided in two levels above the retail and commercial levels, in accordance with the City of Sydney Council Development Control Plan and Local Environmental Plan. Off-street vehicle parking requirements within the City of Sydney LGA are set out in the City of Sydney LEP 2012 and DCP 2012.

### 2.3 Pedestrian and Cyclist Facilities

Bicycle parking facilities will be provided in accordance with the City of Sydney DCP 2012.

## 3.0 Traffic Appraisal

This section of the letter discusses the likely traffic increases of the proposed redevelopment on the local road network.

### 3.1 Trip Generation

The Roads and Maritime Services Guide to Traffic Generating Developments with updated traffic survey rate (Technical Direction TDT 2013/04a, August 2013) has been used to determine the number of vehicle trips the Stage 2 development will generate. As the site is located close to Green Square Train Station and bus stops, it is anticipated that the majority of trips would be made by public transport. The supplementary guide advises the following traffic generation rates for high density developments that are close to public transport:

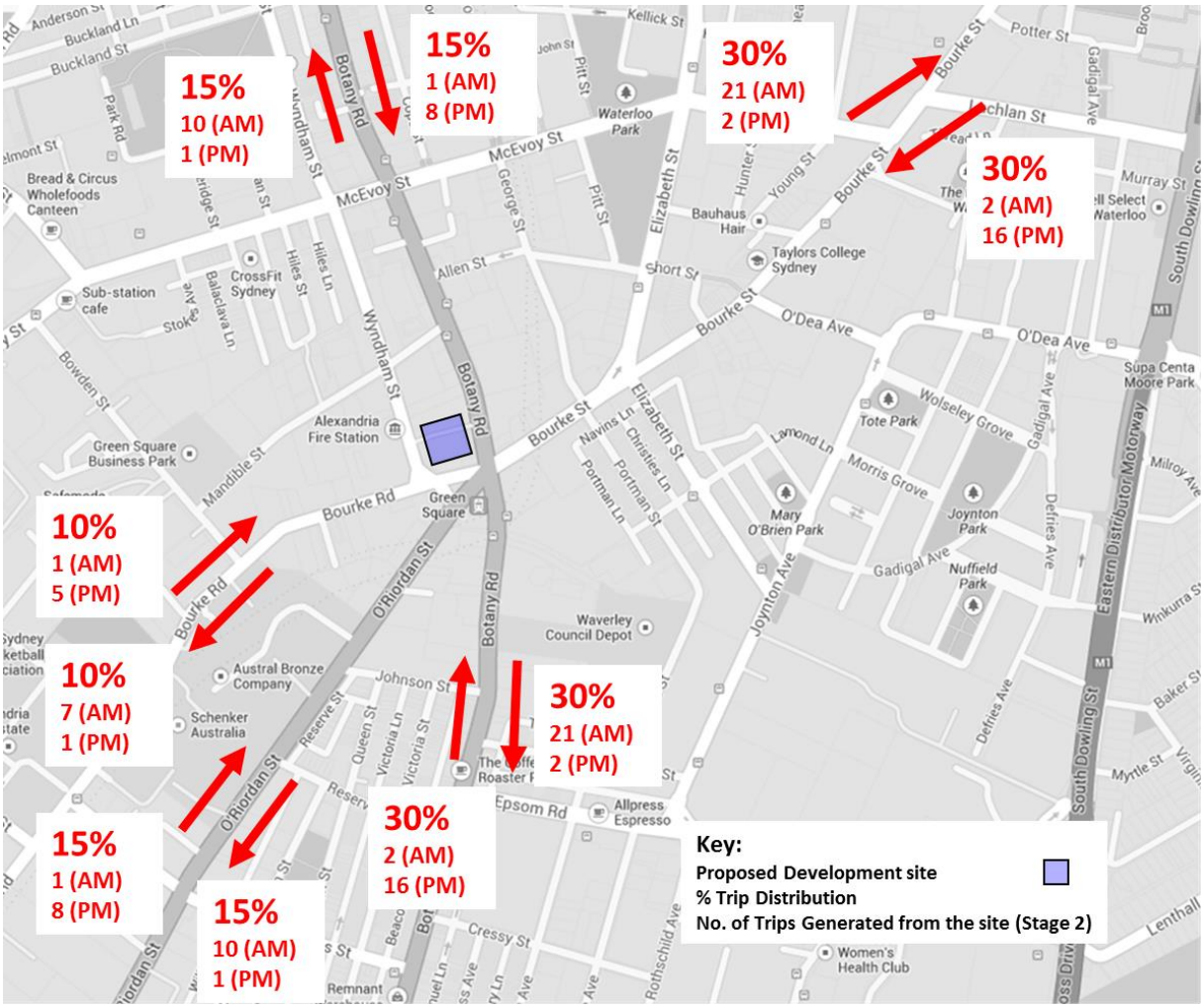
- 0.07 – 0.32 vehicle trips / unit (average 0.19) AM peak hour
- 0.06 – 0.41 vehicle trips / unit (average 0.15) PM peak hour

Applying a rate of 0.19 trips per unit for the AM peak hour and 0.15 trips per unit for the PM peak hour, the proposed Stage 2 development will generate 76 vehicle trips in the AM peak hour and 60 vehicle trips in the PM peak.

### 3.2 Trip Distribution

Trip distribution for the proposed Stage 2 development has been based on the approved Stage 1 traffic study and the Green Square Masterplan. The pattern of trip distribution for the development and the associated trips are shown in the figure below.

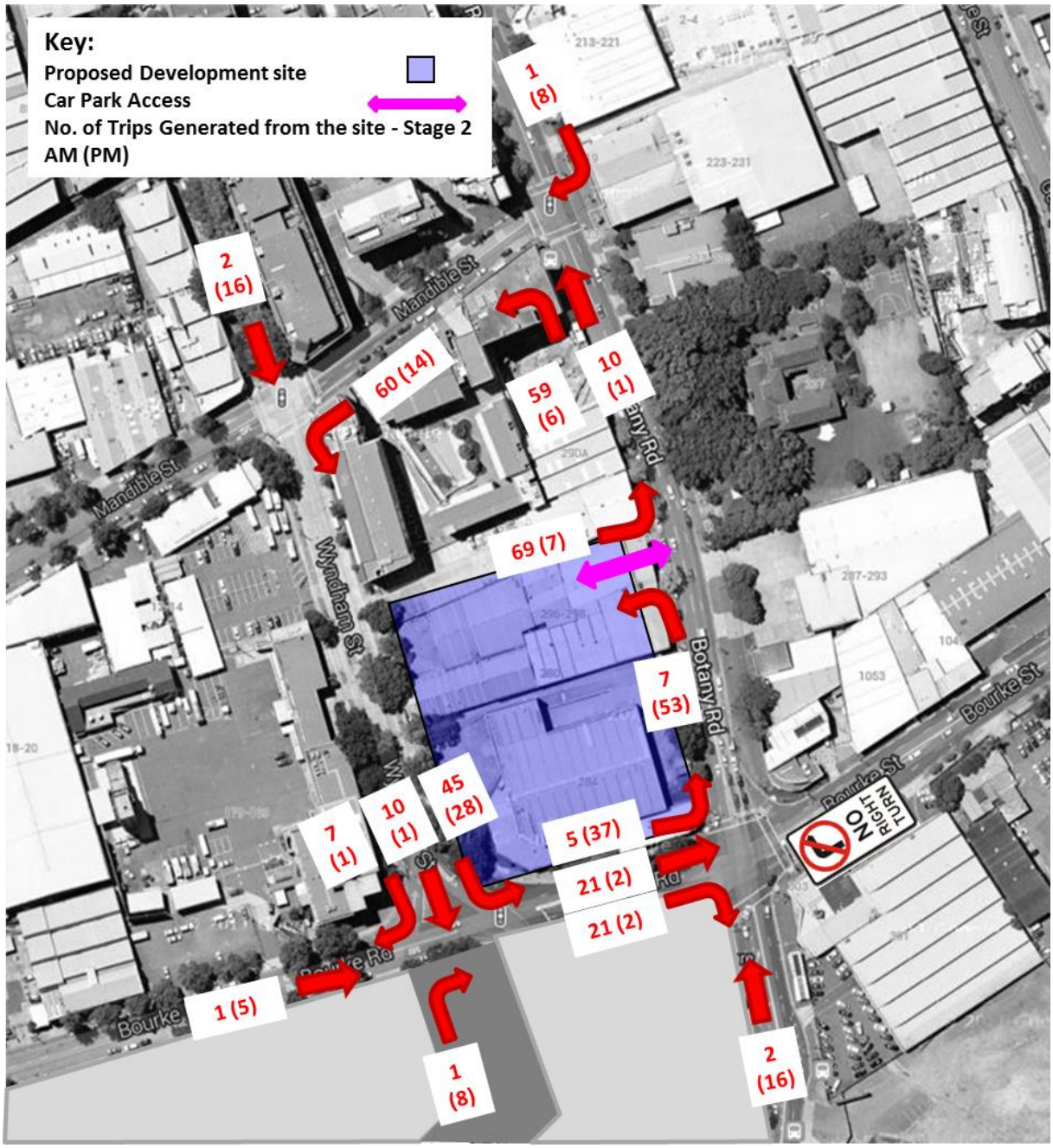
**Figure 4 Trip Generation and Distribution for AM and PM Peak Hour (Stage 2 development)**




Source: AECOM 2014

During the peak hours, the increase of traffic on the main arterial roads is generally less than two per cent. Due to the left-in left-out access configuration, some of the local intersections may experience more development traffic in future. The diagram below shows the expected turning volumes at these intersections with the proposed reconfigured road layout.

**Figure 5 Traffic increased at local intersections for AM and PM Peak Hour (Stage 2 development)**




Source: AECOM 2014

The analysis shows that the increase of turning traffic is expected to be fewer than 20 vehicles for the majority of movements. Slightly higher traffic volumes occur for left turning movements at intersections immediately surrounding the site due to the left-in/left-out site access, however these movements will only contribute a small proportion of background traffic at the intersections.

### 3.3 Impact Assessment

The number of trips generated by the Stage 2 development is expected to be less than 10% of the northbound traffic on Botany Road in the future year peak hour, which is within the range of typical daily traffic variations. Traffic exiting the Stage 2 car park access should be able to enter the traffic stream of Botany Road through gaps

created by the signalised intersection of Botany Road / Bourke Road / Bourke Street to the south. For these reasons, the access on Botany Road is considered to have a negligible impact on Botany Road.

After exiting the Stage 2 car park access, the generated traffic will be dispersed across a number of different routes and is a very small proportion of background traffic at most of the main arterial roads and local intersections. As the net vehicular impacts of the proposed development will be minimal, there is no requirement for road network upgrades to cater for the traffic generated by the proposed residential development.

## 4.0 Summary and Conclusions

This letter has been prepared to consider the potential traffic and transport impacts associated with the proposed Stage 2 development at 296-298 Botany Road and 284-300 Wyndham Street, Alexandria, Sydney.

The site has very good accessibility to existing public transport services and facilities. These services could be further improved in future when Green Square Town Centre is in place.

The Concept Plan proposes a residential development with approximately 400 dwelling units above the Stage 1 retail development levels. The vehicular access to the Stage 2 development car park will be via Botany Road as a left-in-left-out arrangement. The parking facilities will be provided in accordance with the City of Sydney LEP 2012 and DCP 2012.

Based on the Roads and Maritime Services trip generation rate for high density dwellings, it is anticipated that the proposed Stage 2 development will generate 76 vehicle trips in the AM peak hour and 60 vehicle trips in the PM peak. Given the site is located next to Green Square Train Station, it is expected that the majority of residents will utilise the rail services rather than private car for the majority of trips. As the net vehicular impacts of the proposed development are minimal, there is no requirement for road network upgrades to cater for the traffic generated by the proposed residential development.

Kind regards

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15 June 2016

Tim Aldham
Specialist Planner
Strategic Planning & Urban Design
City of Sydney

Dear Tim

**Gazcorp Alexandria Planning Proposal - Addendum Traffic Study**

AECOM was engaged by GazCorp to prepare a number of traffic studies to support the Alexandria Mixed Use Development Planning Proposal.

This letter has been prepared in response to City of Sydney's email correspondence dated 14 June 2016 requesting a short statement clarifying the findings and providing any relevant additional information in relation to the additional / changes in land uses compared to previous documentation.

Since the submission of the S96 - Addendum to Traffic Impact Assessment prepared by AECOM dated 22 December 2015, the following changes in land uses have been considered:

1. Increase of residential dwellings from 400 to 480 (as part of the Stage 2 Development).
2. Conversion of the commercial use (approximately 1,100m$^2$ of GFA as documented in the S96 report) to a child-care centre.

**Impact to trip generation**

The latest land use and yield were considered and a net change of potential trip generation was summarised in table below. With the increase in residential yield and the conversion of the commercial space to a child care centre with approximately 100 children (together with the previous consideration of reduction of retail space in the S96 documentation), there is a net reduction in peak hour trip generation of 55 trips compared to the original approved scheme.

| Land use | Originally approved yield | Current yield | Difference in yield | Trip rates | Change in no. of trips |
|---|---|---|---|---|---|
| Retail | 8,989 m$^2$ of GFA (7,270 m$^2$ of GLFA) | 6,065 m$^2$ of GFA (4,897 m$^2$ of GLFA) | -2,934 m$^2$ of GFA (-2,373 m$^2$ of GLFA) | 0.043 per m$^2$ of GLFA | -102 |
| Commercial | 2,400 m$^2$ of GFA | 0 m$^2$ of GFA | -2,400 m$^2$ of GFA | 0.02 per m$^2$ of GFA | -48 |
| Child care | 0 m$^2$ of GFA | 1,105 m$^2$ of GFA (approximately 100 children) | 1,105 m$^2$ of GFA (approximately 100 children) | 0.8 per child | 80 |
| Residential | 400 apartments | 480 apartments | 80 apartments | 0.19 per apartment | 15 |
| Total | | | | | -55 |

Accordingly, with reduced vehicle trip generation associated with the changes in land uses and their potential yield, the network performance of the surrounding road network would improve when compared to the original approved scheme. Therefore a revision or update of the model is not considered to be necessary, as the impact of the development is already considered marginal.

**Impact to car parking provision**

With the conversion of the commercial space to a child care centre, consideration was given whether additional off-street parking spaces are required. Based on the approved Stage 1 DA and the S96 documentation, a rate of 2.9 spaces per 100m$^2$ were approved for the commercial uses. Therefore, the 1,105m$^2$ of commercial space would have approximately 32 parking spaces associated with it.

Therefore, if the commercial space were to convert to a child care centre (for up to 100 children) then 25 spaces are required based on the RMS requirements of 1 space per 4 children. This requirement is marginally less than what has been previously approved for the equivalent amount of commercial space. So the impact to car parking provision is minimal.

Based on the above considerations, the increase in residential yield (from 400 to 480 apartments) and the conversion of the commercial space to a child care centre with approximately 100 children would have negligible impacts to trip generation and car parking provision and can be supported from a traffic and parking perspective.

Yours faithfully

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# 296-298 Botany Road Mixed-Use Development

## Section 96 - Addendum to Traffic Impact Assessment

# 296-298 Botany Road Mixed-Use Development

Section 96 - Addendum to Traffic Impact Assessment

Client: Gazcorp Pty Ltd

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AECOM in Australia and New Zealand is certified to the latest version of ISO9001, ISO14001, AS/NZS4801 and OHSAS18001.

# Quality Information

Document 296-298 Botany Road Mixed-Use Development

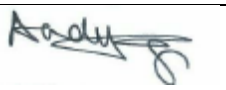
Ref 60241806

Date 22-Dec-2015

Prepared by Sahan Wijayaratna

Reviewed by Andy Yung

Revision History

| Revision | Revision Date | Details | Authorised | |
|---|---|---|---|---|
| | | | Name/Position | Signature |
| A | 17-Dec-2015 | Draft Report | Andy Yung<br>Associate Director - Transport Advisory | |
| B | 22-Dec-2015 | Final Report | Andy Yung<br>Associate Director - Transport Advisory |  |

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# 1.0 Introduction

In May 2012, AECOM prepared a Traffic Impact Assessment (TIA) in support of a development application (DA) to City of Sydney for 296-298 Botany Road Mixed-Use Development. Following the approval of this DA, changes have been made to the proposed development, requiring a section 96 application to be made to City of Sydney.

AECOM has been commissioned by Gazcorp Pty Ltd to prepare a Traffic and Parking Report, in support of the Section 96 application for Stage 1 of the development. Stage 1 consists of the retail and commercial aspects of the development and Stage 2 consists of the residential aspect of the proposed mixed use development.

The main purpose of this report is to review and identify the likely traffic and parking impacts / benefits associated with the proposed changes to Stage 1 of the development. Where traffic impacts are identified, appropriate mitigation measures will be recommended.

Modifications to Stage 1 of the proposed development in the following areas are considered and discussed in the subsequent sections of the report:

- Proposed development
- Pedestrian access and connectivity
- Parking provision
- Car park and loading dock access arrangements.

# 2.0 Planning Policy

Historically, the Green Square area was located within the South Sydney City Council, which in 2004 merged with the City of Sydney Council. Many of the previous development controls implemented by the South Sydney City Council were still applicable to the Green Square area at the time of submission. The City of Sydney was in the process of preparing a new Development Control Plan and Local Environment Plan at the time of submission of the Stage 1 DA in 2012.

Since the submission of the DA in 2012, the Sydney Development Control Plan (DCP) 2012 and Sydney Local Environmental Plan (LEP) 2012 were adopted by Council on 14 May 2012 and came into effect on 14 December 2012. Once formally adopted, the plan superseded several previous development control documents. Aspects of the approved development have been modified in addition to planned design modification, to bring the development in line with controls set out in the Sydney DCP 2012 and LEP 2012.

# 3.0 Proposed Development

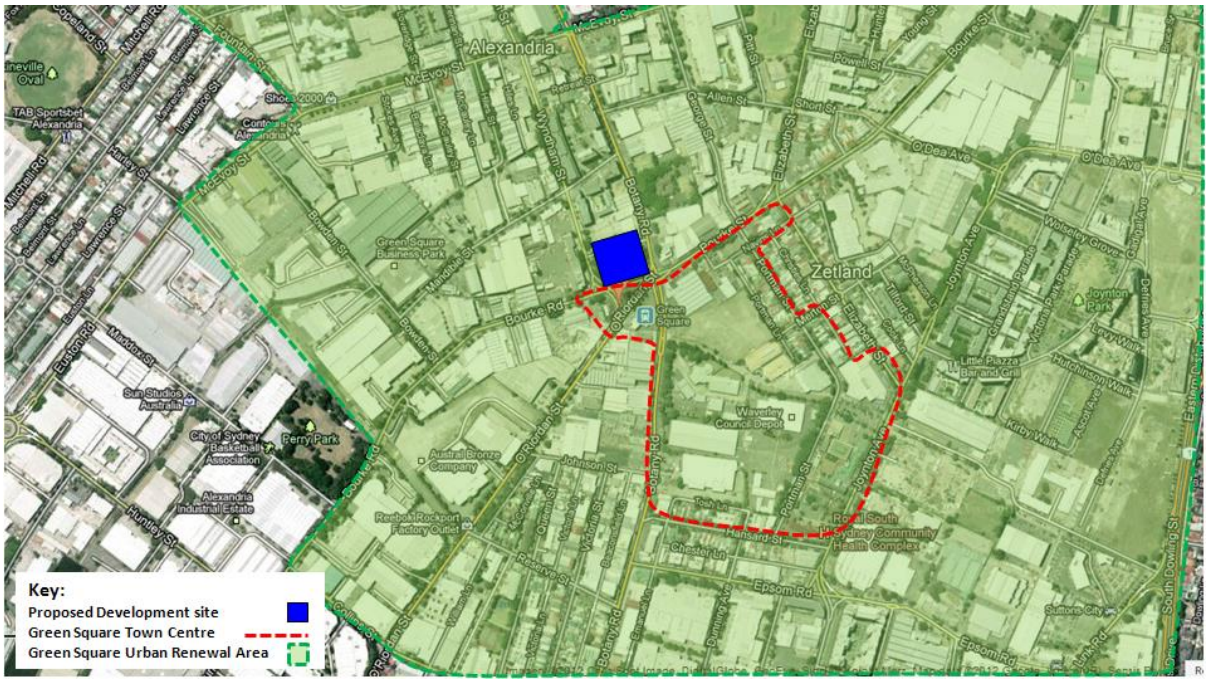
## 3.1 Stage 1 DA

The proposed mixed use development is located at 296-298 Botany Road and 284-300 Wyndham Street, Alexandria, adjacent to the proposed Green Square Town Centre, which is strategically located 4.5km south of the Sydney CBD, as shown in **Figure 1**.

In the 2012 DA, Stage 1 of the approved development consisted of the retail and commercial aspects of the development and Stage 2 consisted of the residential aspect of the proposed mixed use development. The specific project component in relation to Stage 1 of the mixed-use development included:

- One level of retail/commercial consisting of a supermarket, speciality stores and commercial services.
- Two levels of car parking under the mixed use development with proposed access from Wyndham Street.
- An additional car park access from Botany Street to provide access to the above ground car park for Stage 2 of the development.

**Figure 1 Location of Development Site**




Source: AECOM, 2012

The approved gross floor areas (GFA) for each land use are 8,989 square metres for retail and 2,400 square metres for commercial services.

## 3.2 Proposed modifications

As part of the revised development scheme, the key modifications made for Stage 1 is some reduction in development yields as well as the reduction in parking from two levels to one level, to bring parking provision in line with the City of Sydney LEP 2012 parking requirements.

The proposed gross floor areas (GFA) for the modified development have been summarised in **Table 1**. It is evident that the proposed Stage 1 GFA is significantly lower than what was previously approved, with a reduction of total GFA by 37 per cent.

**Table 1 Gross Floor Areas (GFA) and Gross Leasable Floor Areas**

| Land Use | Previously approved GFA (sqm) | Proposed GFA (sqm) | Change in GFA (sqm) |
|---|---|---|---|
| *Stage 1* | | | |
| Retail | 8,989 | 6,055 | - 2,934 |
| Commercial services | 2,400 | 1,105 | - 1,295 |
| **Total** | **11,389** | **7,160** | **- 4,229** |

Source: SJB, 2015

Additional changes were made as part of the design process, which have been examined in the subsequent sections.

## 3.3 Implications to Traffic Impact Assessment

The Paramics modelling results presented in the previously approved TIA highlighted the proposed development added marginal delays to the road network and surrounding intersections. The intersection of Bourke Road/Botany Street will operate at capacity under the existing and proposed layout in the future regardless of development traffic.

With the reductions in the gross floor areas as well as reduction in parking supply (to be discussed in Section 5), the number of trips generated in each peak period is also anticipated to reduce, with the development catering for fewer visitors. Accordingly, with reduced vehicle trip generation associated with the reduction in GFA, the traffic model results and intersection performance of the surrounding road network would improve. Therefore a revision or update of the model is not considered to be necessary, as the impact of the development is already considered marginal.

# 4.0 Pedestrian Access and Connectivity

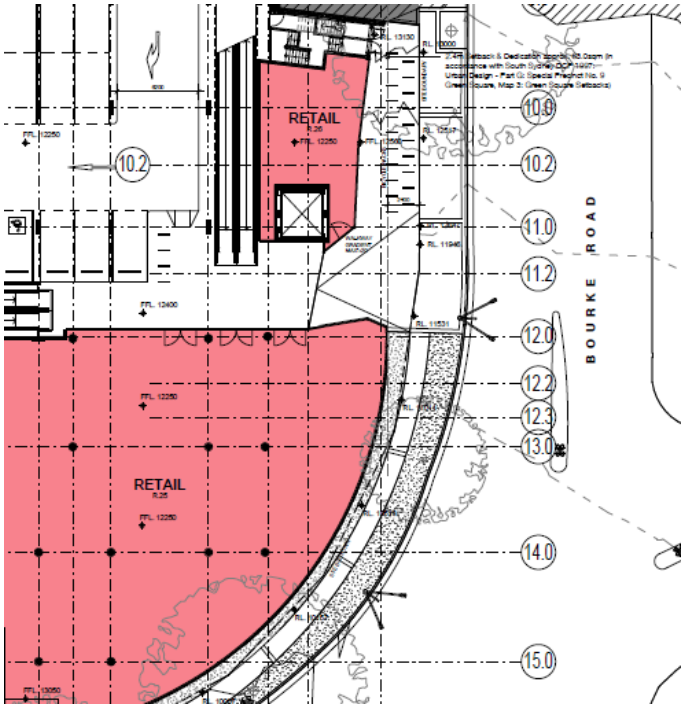
## 4.1 Stage 1 DA

The area surrounding the proposed development provided an adequate level of accessibility for pedestrians. Although indirect, within the current network infrastructure, pedestrians from the proposed site can safely access the Green Square station eastern entry via two signalised pedestrian crossings on Botany Road and Bourke Road.

The approved development was seeking enhanced pedestrian accessibility through provision of improved crossing facilities and improvements to the pedestrian environment on Bourke Road. In the short term, it is proposed to install signalised pedestrian facilities across Bourke Road and O'Riordan Street to accommodate the future pedestrian desire line between the proposed site and Green Square Station. The development is committed to improve the pedestrian accessibility to the site in the short term.

The main form of access to the retail portion of the approved development was via a ramped path from Bourke Road to the basement car park / retail level with lift and escalator access to other levels, as shown in **Figure 2**.

**Figure 2 Bourke Road approved pedestrian entry**

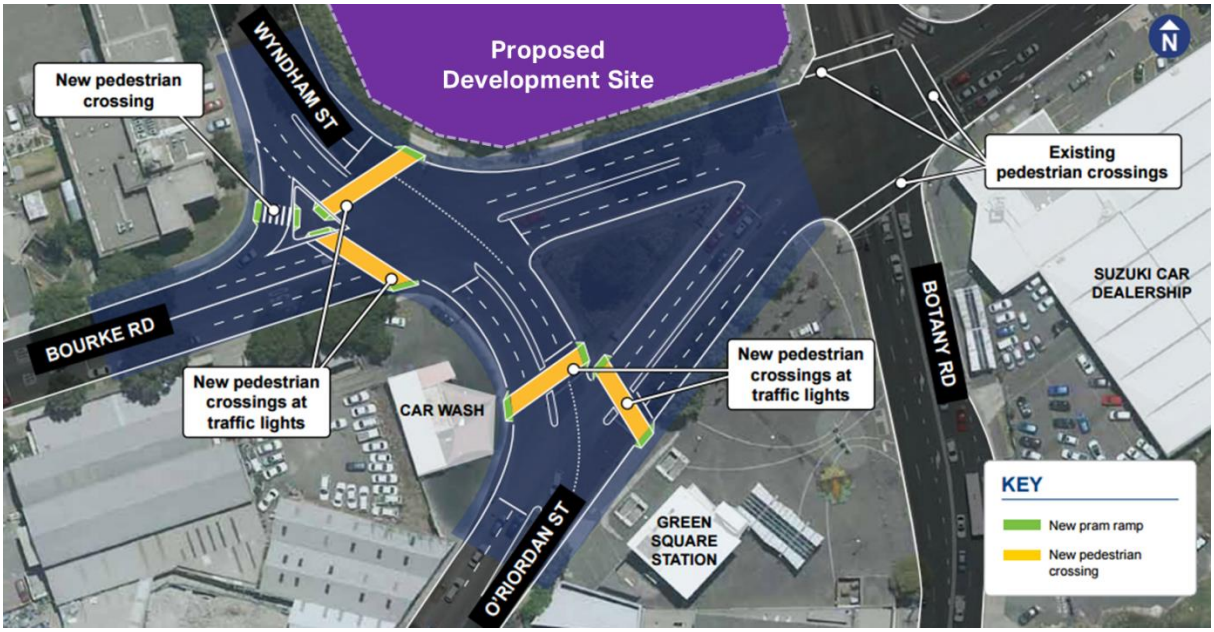



Source: SJB, 2012.

## 4.2 Proposed modifications

Since the approval of the DA in 2012, Roads and Maritime Services designed and installed pedestrian facilities at the intersection of Bourke Street, Wyndham Street and O'Riordan Street, as shown in **Figure 3**. The implementation is consistent with the recommendation from the Stage 1 DA, to install appropriate pedestrian facilities to accommodate the future pedestrian desire line between the proposed site and Green Square Station. With the new infrastructure in place, pedestrians can safely and conveniently access Green Square Station via signalised pedestrian crossings.

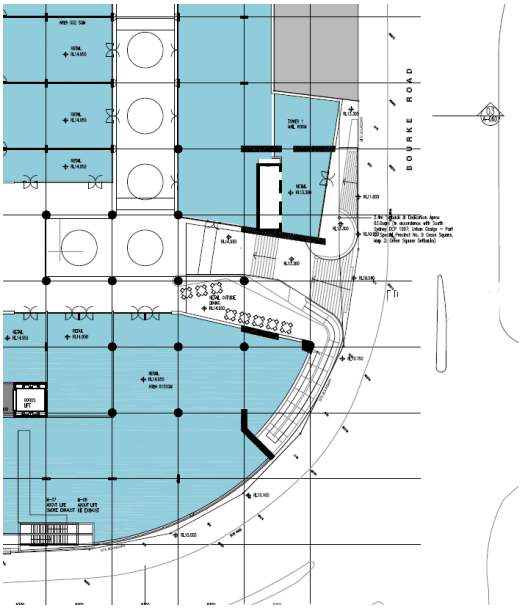
**Figure 3 New pedestrian facilities around the development site**




Source: Roads and Maritime Services, 2014.

The proposed plan maintains pedestrian access from Bourke Road as previously approved. The key modification is the reconfiguration of the entry to provide stairs and a ramp to access the Ground Level, a change from the previously approved entry accessing the Basement Level 1. The modification has been shown in **Figure 4**.

**Figure 4 Bourke Road modified pedestrian entry**




Source: SJB, 2015.

## 4.3 Implications to Traffic Impact Assessment

The proposed modification to the pedestrian access configuration is expected to have negligible impact pedestrian connectivity for the development and the surrounding area. The installation of signalised pedestrian crossings at Bourke Road, Wyndham Street and O'Riordan Street has improved safety and access, especially for people walking to and from Green Square Station. Accordingly, the pedestrian situation has improved when compared to the Stage 1 DA.

# 5.0 Parking Provision

## 5.1 Stage 1 DA

Off-street parking for Stage 1 of the proposed development was to be accommodated in two levels of parking under the mixed use development.

The South Sydney Development Control Plan (DCP) No. 11 and DCP Part G: Special Precinct, which applied to the Green Square Urban Renewal Area in 2012, outlined the parking rates for relevant land uses within the Green Square area. DCP No. 11 states that gross floor areas should be used to calculate parking requirements and that survey based assessments should be used for retail developments.

Based on this approach, a total of 327 off street parking spaces (inclusive of 4 disabled spaces for the retail component) were required for the Stage 1 development within the site with 307 allocated to the retail component and 20 spaces allocated to the gym component of the proposed development. Parking for the proposed development will be provided to allow accessibility, while encouraging the use of other modes of transport wherever possible. The site's location and design will provide a high level of accessibility to other retail, employment, leisure and transport within the Green Square regeneration area.

Stage 1 of the proposed development is set to provide 30 cycle parking spaces, with a provisional 385 proposed for Stage 2 of the development.

## 5.2 Proposed modifications

The City of Sydney LEP 2012 removed minimum parking rates for developments set out in South Sydney Development Control Plan (DCP) No. 11 and adopted maximum rates. However, the maximum rate clause set out in Section 7.7 of the Sydney LEP 2012 does not apply for retail parking provision if: "the building has more than 2,000 square metres of gross floor area used for the purposes of retail premises." Accordingly, the parking rate adopted in the previously approved Stage 1 DA was maintained and applied to the modified development GFA.

The previously approved rate of parking provision presented in the Stage 1 DA was equivalent to:

- Retail / Commercial parking rate = 327 spaces / 11,389 sqm GFA = 2.9 spaces per 100 sqm GFA.

This rate was applied to the modified development to determine the recommended number of parking spaces:

- Retail / Commercial parking = 2.9 spaces / 100 sqm GFA x 7,160 sqm GFA = 205 spaces

Therefore, the proposed retail off street parking provision has been reduced during this iteration of the design improvements from 327 to 205 spaces (inclusive of 10 disabled spaces). As previously indicated, parking for the will be provided to allow accessibility, while use of public and active transport modes would be encouraged.

To meet the requirements of City of Sydney DCP 2012 in terms of bicycle parking, the proposed provision of cycle spaces in Stage 1 from 30 spaces to 60 spaces (40 visitor spaces and 20 staff spaces) which exceeds the minimum requirements.

## 5.3 Implications to Traffic Impact Assessment

As discussed previously, the Paramics modelling results presented in the approved TIA highlighted the proposed development added marginal delays to the road network and surrounding intersections. The intersection of Bourke Road/Botany Street will operate at capacity under the existing and proposed layout in the future regardless of development traffic.

With reductions in the total provision of parking, it is anticipated that the private vehicle transport mode may become less appealing and people will likely shift towards public or active transport modes to access the centre. This would cause in a reduction in vehicle trip generation, which would lead to an improvement in the Paramics traffic model results as well as the intersection performance of the surrounding network. Therefore a revision or update of the model is not considered to be necessary, as the impact of the development is already considered marginal.

# 6.0 Car Park and Loading Dock Access Arrangements

## 6.1 Stage 1 DA

### 6.1.1 Car Park Access and Circulation

The access to the off-street car park for the Stage 1 development was proposed to be located on Wyndham Street, approximately 100m north of Bourke Street. Access to the basement car park will be via a two-lane two way ramp from Wyndham Street.

The access from Wyndham Street was previously approved as a left-in left-out configuration with a moveable median along Wyndham Street to enforce these movements as well as allowing an all movement access to and from the fire station on Wyndham Street opposite the site when required. A right turn entry into the development from Wyndham Street was proposed in order to reduce the amount of circulating traffic within the road network (in response to RMS's suggestion to include an internal link within the development to reduce circulating traffic). It should also be noted that the circulating traffic as a result of the left-in left-out configuration has negligible impacts to the surrounding road network. The left out arrangement remains the same as the previously approved access arrangement.

It should be confirmed that there are no proposed changes / modifications to the car park access arrangements that were approved in previous DA – with all movements permitted expect a right turn movement out of the car park access.

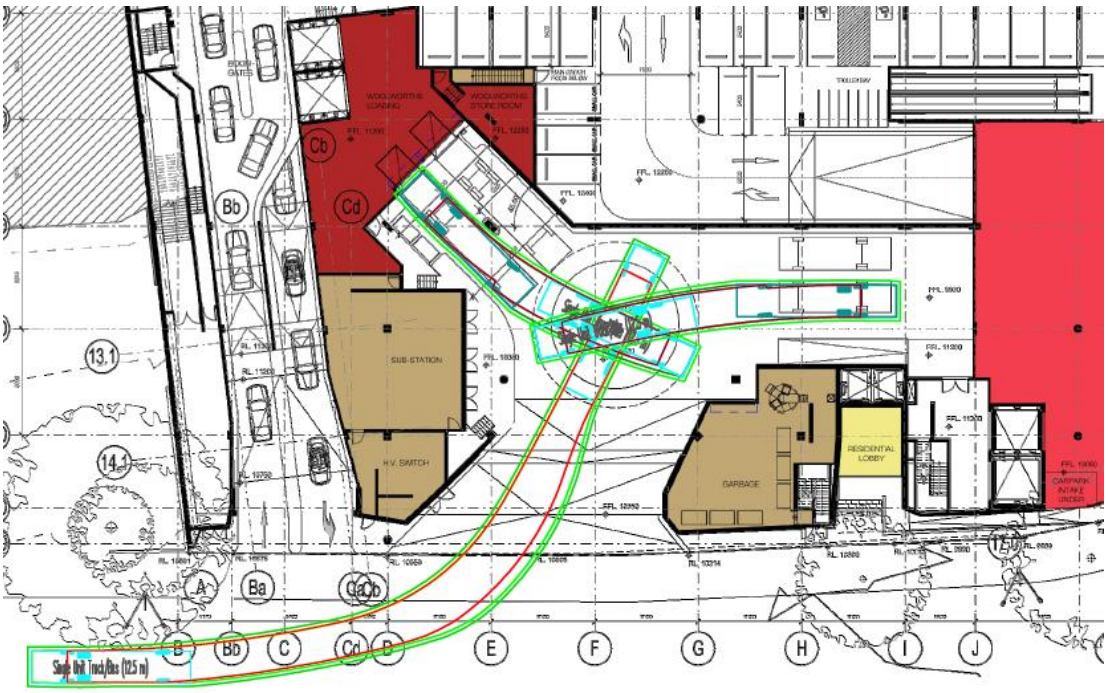
### 6.1.2 Loading Dock Access

A single level loading dock with a turn table was approved with access from Wyndham Street. The loading dock allows provision for:

- 2 single unit trucks (12.5m length)
- 2 service vehicles (8.8m length).

The swept paths of the vehicle types identified above have been assessed and validated using AutoTrack. All vehicles comply with Austroads standards and vehicles manoeuvre bays, within the dock, using the minimum turning radius defined by Austroads turning templates and Australian Standard Part 2: Off-street commercial vehicle facilities. **Figure 5** displays the swept path analysis for a single unit trucks into the designated bays.

**Figure 5: Swept Path Analysis of Loading Dock**



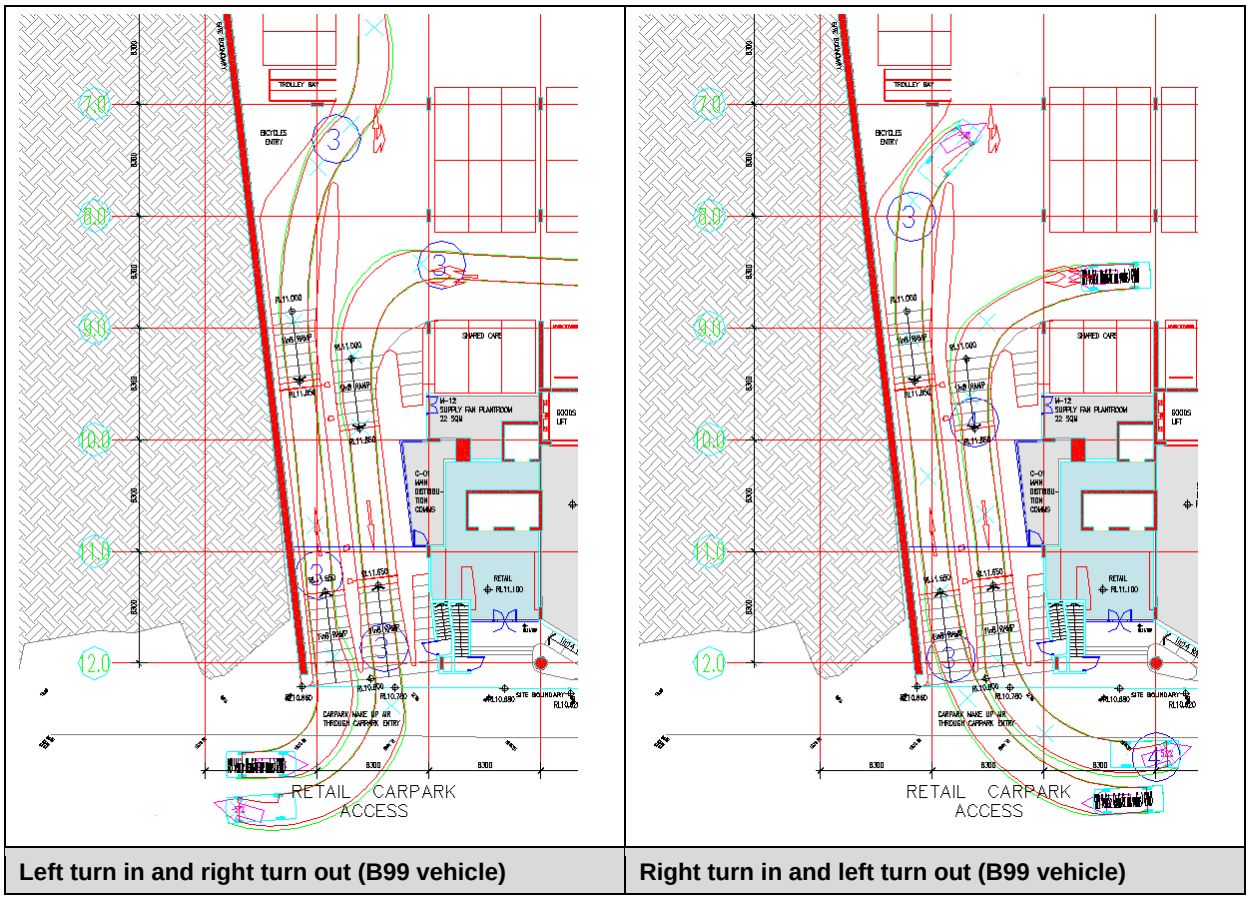

Source: AECOM, 2015.

## 6.2 Proposed modifications

### 6.2.1 Car Park Access and Circulation

The proposed location of the access to the car remains unchanged, on Wyndham Street, approximately 100m north of Bourke Street. Minor modifications have been made to the access configuration and internal car park circulation, thus vehicle swept path assessments have been conducted using AutoTrack. **Figure 6** presents the turning paths for the car park access.

**Figure 6 Swept path of vehicle access to the retail car park**




**Left turn in and right turn out (B99 vehicle)** | **Right turn in and left turn out (B99 vehicle)**

Source: AECOM, 2015

It is evident that the modified car park access allows both access and egress for opposed turning movements for vehicles larger than or equal to 99.8 per cent of light vehicles in Australia (B99) as defined by Austroads turning templates.

The circulation within the car park was found to be acceptable for a B99 vehicle. The parking bay dimensions, aisle widths and ramp grade for the modified car park comply with Australian Standard 2890 Part 1: Off-street Car Parking.

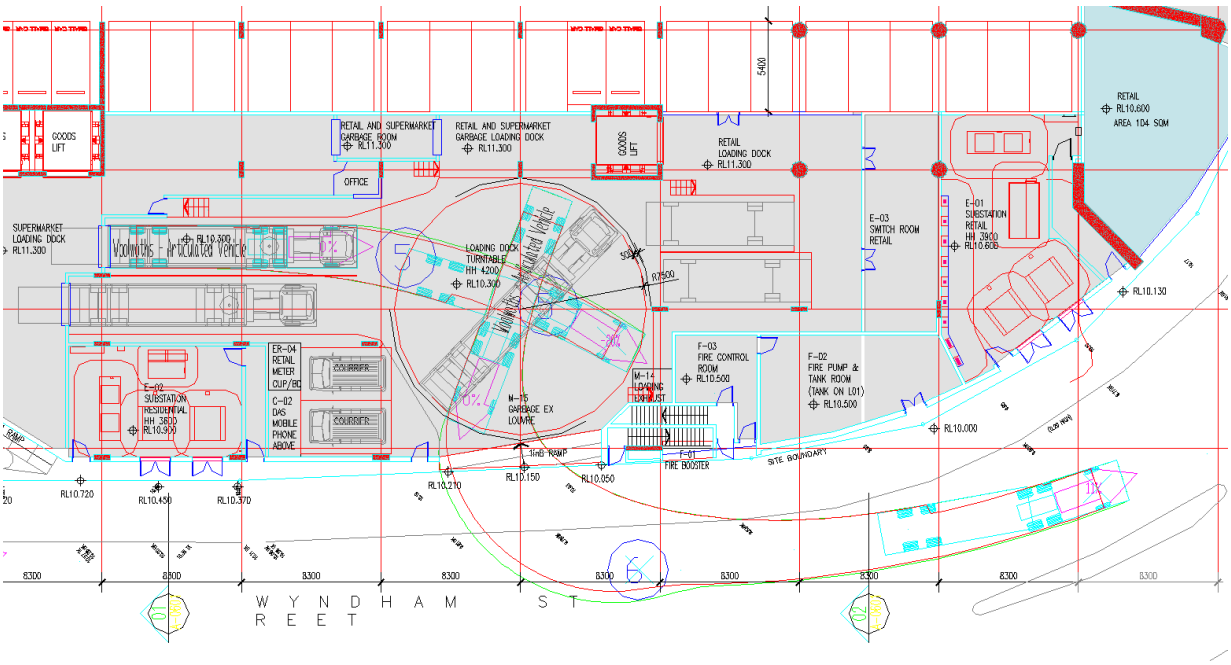
### 6.2.2 Loading Dock Access

The loading dock access has been shifted along Wyndham Street, closer to Bourke Road, by approximately 15 metres. The loading dock has been modified to allow provision for:

- 2 single Woolworths articulated trucks (~14.765m length) using the turntable
- 2 service vehicles (8.8m length)
- 2 courier vans (~4.5m length).

The swept paths of the vehicle types identified above have been assessed and validated using AutoTrack. It should be noted that a vehicle was modified to allow a swept path to be tested for a Woolworths articulated vehicle. All other vehicles comply with Austroads standards and vehicles manoeuvre bays, within the dock, using the minimum turning radius defined by Austroads turning templates and Australian Standard Part 2: Off-street commercial vehicle facilities. **Figure 7** presents the swept path analysis for a Woolworths truck into the designated bays and exiting the loading dock.

**Figure 7 Swept path of Woolworths articulated vehicle access to loading dock**




Source: AECOM, 2015

## 6.3 Implications to Traffic Impact Assessment

The proposed changes to the loading dock access strategy are expected to have negligible impacts to the surrounding road network and intersections.

# 7.0 Conclusions

Since the submission of the Stage 1 DA, there has been on-going design process prior to the construction of Stage 1 of the 296-298 Botany Road Mixed-Use Development. Modifications to the design have been considered in the context of traffic and transport impacts of this development.

As a result of the review, it can be confirmed that all the proposed modifications to the Stage 1 have either reduced the development impact on the road network or are expected to have negligible impacts to the surrounding road network and intersections.

## APPENDIX C: WIND ASSESSMENT PREPARED BY CPP

18 December 2014 CPP Project 8241

SJB

Level 2, 490 Crown Street
Surry Hills
NSW 2010

Attn: Mr. Francisco Layson

Project: 296-298 Botany Road

Dear Francisco,

Please find herein an initial assessment of the wind conditions in and around the proposed mixed-use development at 296-298 Botany Road. The assessment is based on the drawings provided on 16 December 2014, Figure 1. It is understood that the plan-form shape of the residential towers may change, but the general massing and orientation are fixed. The site is located to the north-west of the Green Square development, Figure 2.

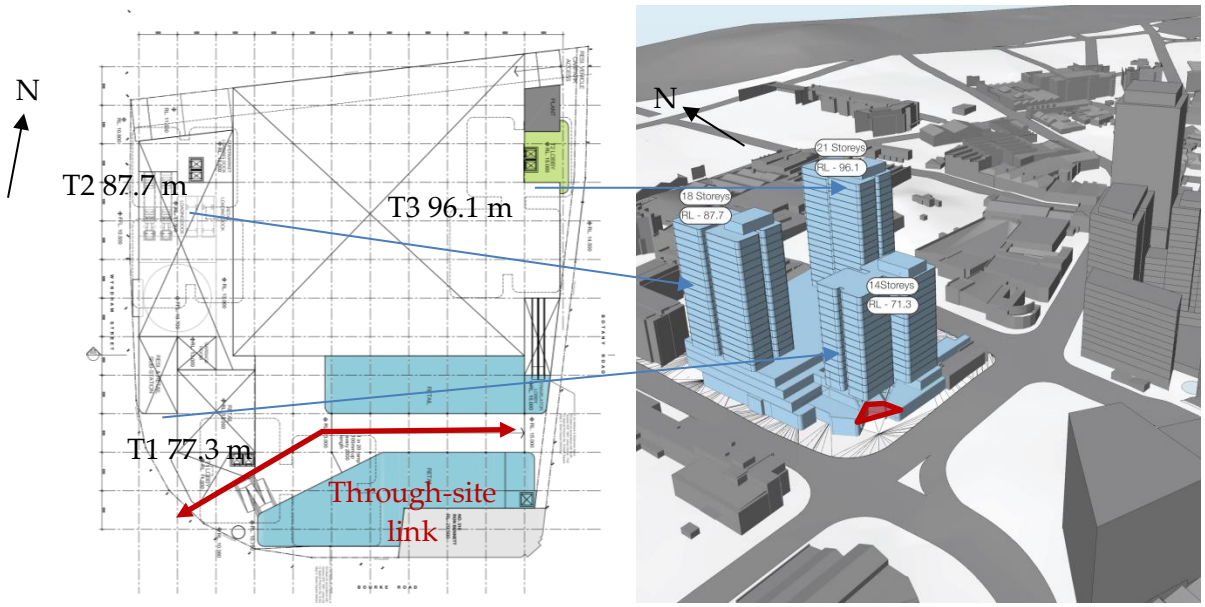



Figure 1: Ground floor plan (L), schematic looking north-west (R)

The site, blue shade buildings in Figure 1 (R), is generally surrounded by low to medium-rise buildings with the proposed Green Square development to the south-east. From a wind engineering perspective, topography surrounding the site is relatively flat dropping slightly to the south.



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Figure 2: Aerial view

**Wind Climate**

The wind rose for Sydney airport is shown in Figure 3 and is considered to be representative of prevailing winds at the site. It is evident that the prevailing winds come from the north-east, south, and west. Winds from the north-east tend to be summer sea breezes and bring welcome relief on summer days. Winds from the south occur throughout the year and tend to be cold, generally associated with frontal systems that can last several days. Winds from the west are the strongest of the year and are associated with large weather patterns and thunderstorm activity. These winds occur throughout the year and can be cold or warm depending on the inland conditions. This wind assessment is focused on these prevailing wind directions.

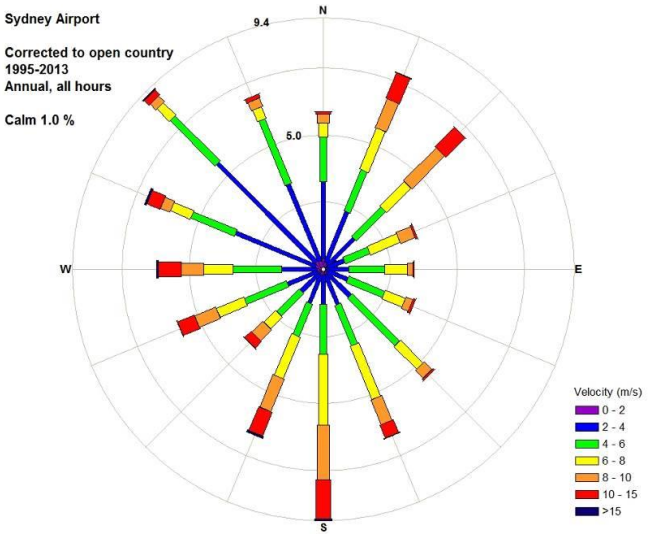


Figure 3: Wind rose for Sydney Airport



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**Wind Flow Mechanisms**

When the wind hits an isolated building, the wind is accelerated down and around the windward corners, Figure 4; this flow mechanism is called downwash and causes the windiest conditions at ground level on the windward and sides of the building. In Figure 4 smoke is being released into the wind flow to allow the wind speed, turbulence, and direction to be visualised. The image on the left shows smoke being released across the windward face, and the image on the right shows smoke being released into the flow at about third height in the centre of the face.

Techniques to mitigate the effects of downwash winds on pedestrians include the provision of horizontal elements, the most effective being a podium to divert the flow away from pavements and building entrances. Awnings along street frontages perform a similar function and generally, the larger the horizontal element the more effective it will be in diverting the flow.

Channelling occurs when the wind is accelerated between two buildings or along straight streets with buildings on either side.

Figure 4 shows wind is accelerated substantially around the corners of the building. When balconies are located on these corners they are likely to be breezy, and will be used less by the owner due to the regularity of stronger winds. Owners quickly become familiar with when and how to use their balconies. If the corner balconies are deep enough, articulated, or have regular partition privacy fins then local calmer conditions can exist.

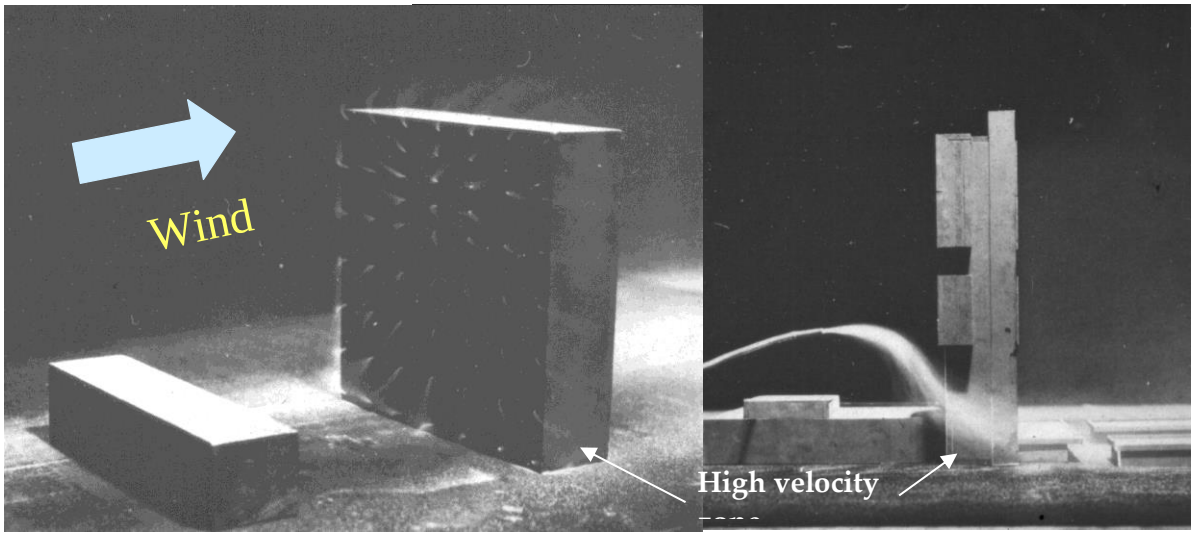


Figure 4: Flow visualisation around a tall building

**Pedestrian Level Environmental Wind Conditions**

In general terms this site is located in a relatively windy location and once the Green Square development is constructed the prevailing winds will be accelerated around the large development, impacting on the proposed development. The design of the towers with little podium setback will induce downwash impinging on ground level.

Wind conditions in the through-site link are expected to be relatively windy. It is



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understood the laneway is only open at either end, being closed at roof level along its entire length. This is considered good from an internal flow wind perspective, as the internal flow is driven by the pressure differential between the two main entrances. With the south exit being located directly underneath the tallest tower, the pressure differential between the entrances is expected to be large for the majority of wind directions, hence drive the flow through the laneway. To mitigate this pressure driven flow, one of the entrances should be considerably smaller in open cross-sectional area than the passageway thereby focusing the windy area. If the passageway is expected to be used for outdoor café-style activities, it would be recommended that one of the entrances is effectively closed. Similarly the gap between the roof and the podium should be as small as possible to prevent wind and wind-driven rain ingress to the space. Pedestrians generally have a higher expectation of environmental conditions in semi-outdoor spaces, and with a roof over the main section of the laneway this would be almost perceived as indoor space therefore any adverse environmental conditions would be noticed.

Winds from the north-east will impact on the broad face of Tower 3. With the low height and position on the podium, the downwash flow will be discharged along the laneway to the north and across the podium. Wind conditions at ground level are expected to be satisfactory for accessways. Unless one of the two openings to the through-site is reduced in size the wind conditions in the through-site link are expected to be unsuitable for their intended retail purpose. As these prevailing winds occur on hot summer afternoons when people generally like to be outdoors, relatively calm and windy area have been marked on Figure 5 for the podium roof to assist with landscaping design.

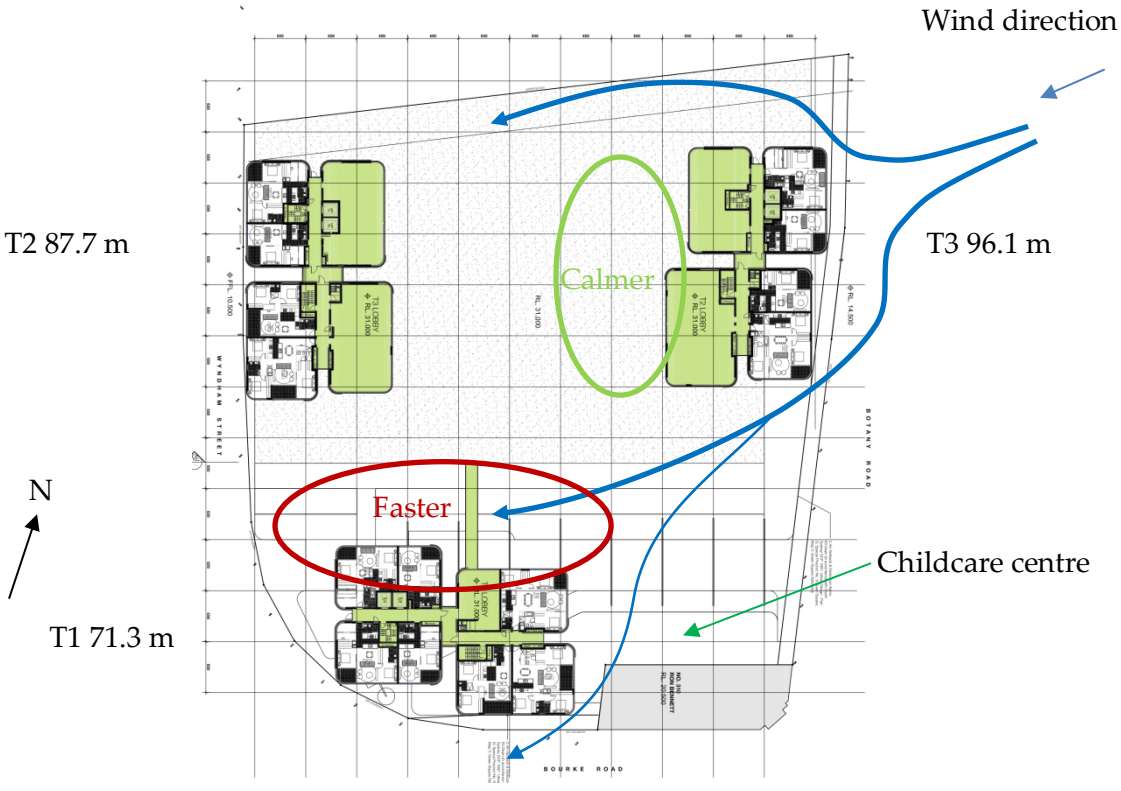


Figure 5: Winds from the north-east



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For winds from the south quadrant, wind conditions at ground level will be governed by the proposed large triangular building to the immediate south of the site. This would provide significant wind protection to the site. If this building is not constructed, windier conditions would be expected to be generated along Wyndham Street, due to the lack of podium setback at the base of the façade, Figure 6. The south-west corner of Tower 1 extending over the entrance to the through-site link is expected to generate windy conditions under this exposed corner. It would be recommended to include an awning at podium roof level to ameliorate the wind conditions at the entry as annotated in Figure 1.

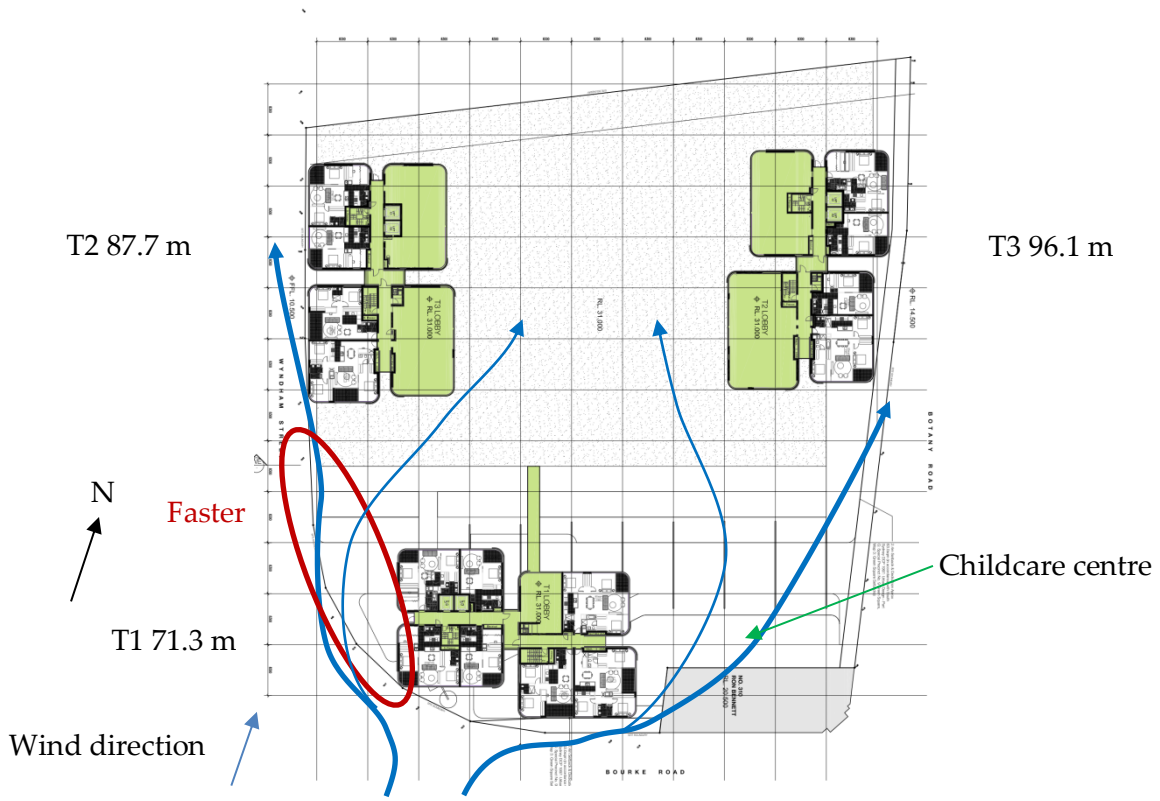


Figure 6: Winds from the south without proposed building to the immediate south

Winds from the west would be relatively undisturbed on reaching the site. Downwash would be expected from the broad face of Tower 2 and the narrow face of Tower 1. The spacing between the towers would be expected to divert the majority of the flow across the podium protecting the ground level from impinging downwash. However, this flow has the potential to cause uncomfortable wind issues along the open laneway for the intended use of the space.



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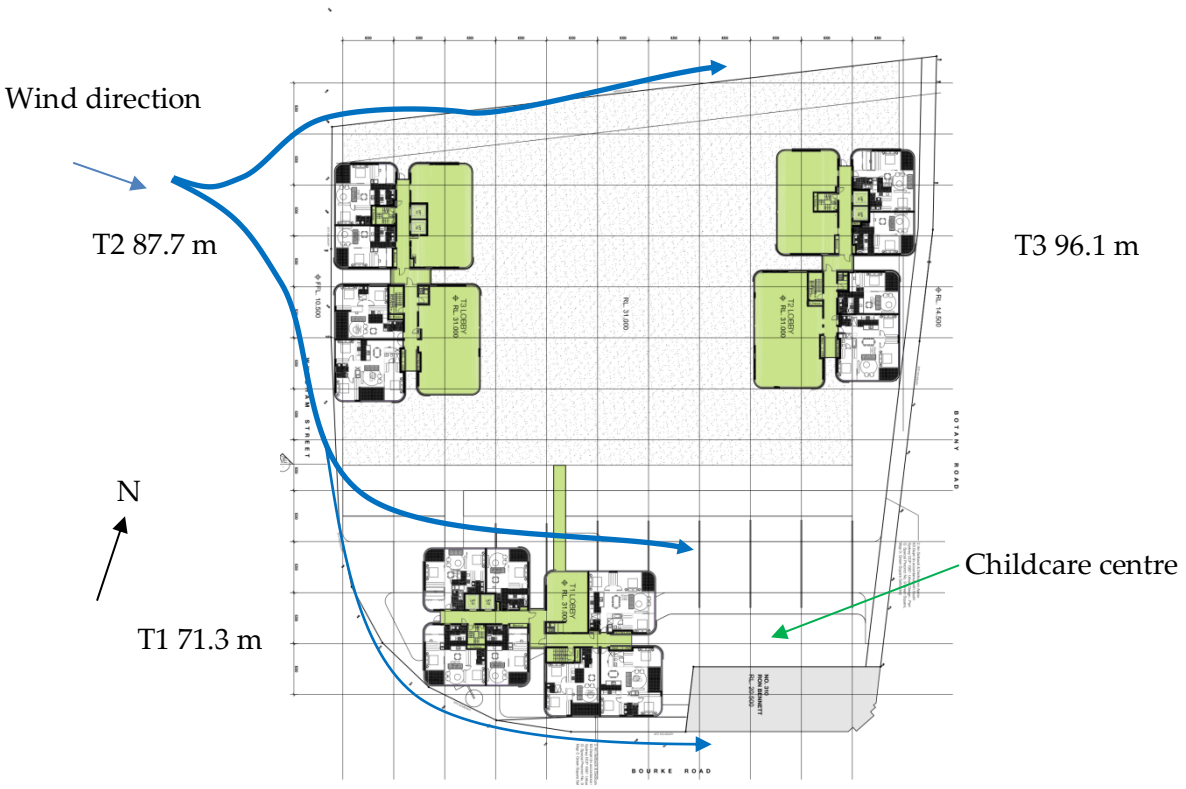


Figure 7: Winds from the west

In summary, the impact of the proposed development on the surrounding wind conditions is highly dependent on the completion of other proposed neighbouring buildings, particularly the triangular building to the immediate south. If this building is not constructed, then it would be recommended to include an awning at podium level across the laneway entry.

For a development of this size, it is strongly recommended to quantify the wind conditions and loading on the structure through a detailed wind tunnel testing programme.

I hope this is of assistance, please do not hesitate to contact me if you have any questions regarding any aspect of this report.

Yours sincerely,

Graeme Wood
Director



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CERMAK
PETERKA
PETERSEN

WIND ENGINEERING AND AIR QUALITY CONSULTANTS

01 April 2015 CPP Project 8241

SJB

Level 2, 490 Crown Street
Surry Hills
NSW 2010

Attn: Mr. Francisco Layson

Project: 296-298 Botany Road

Dear Mr. Layson,

Please find herein a brief review of impact of the proposed massing changes on the pedestrian level wind environment around the proposed development at 296-298 Botany Road. The change in geometry is to address Council concerns regarding the wind along Wyndham Street for winds from the south quadrant. This report follows on from a review of the proposed drawings with respect to the previous configuration, Figure 1.

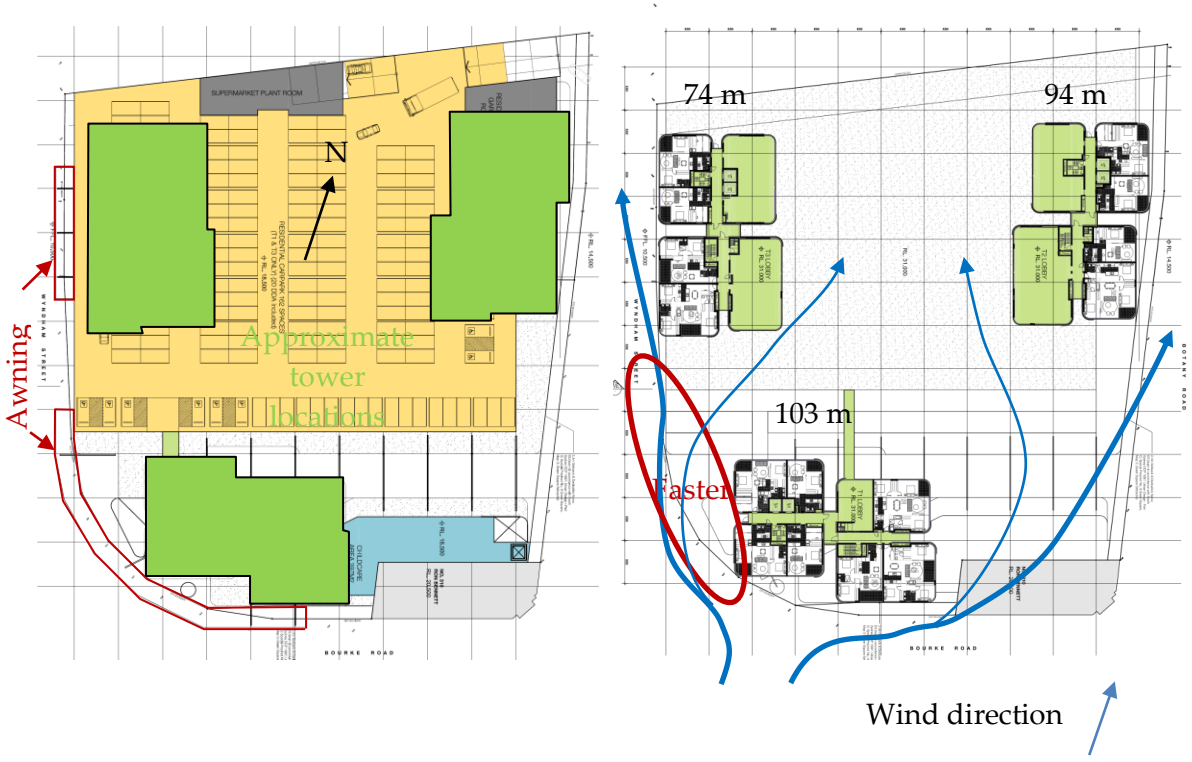


Figure 1: Plan view of the proposed development: revised (L), and previous showing wind flow patterns for winds from the south (R)

The overall flow pattern around the revised geometry will be similar to the previous development. From a wind perspective, the largest changes are the relocation of the north-west tower to the east to create a 4 m podium along Wyndham Street, and the rounding of the tower corners for the Masterplan scheme. The relocation of the tower will have a beneficial impact to the wind environment along Wyndham Street and the greater the distance the better the wind conditions. The squaring of the tower corners will induce more



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downwash for winds from the south, slightly worsening the wind conditions along Wyndham Street; this is particularly the case for Tower 1. To mitigate this impact awnings have been included around the corner and along Wyndham Street at critical locations to protect pedestrians from both wind and wind-driven rain.

To quantify the wind conditions discussed in this and previous report, physical modelling would be required.

I hope this is of assistance, please do not hesitate to contact me if you have any questions regarding any aspect of this report.

Yours sincerely,

Graeme Wood
Director



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22 June 2016 CPP Project 8241

Gazcorp Pty. Ltd.

Level 10, 60 Park Street
Sydney
NSW 2000

Attn: Mr. Nicholas Gazal

Project: 296-298 Botany Road

Dear Mr. Gazal,

Please find herein a brief review of impact of the proposed massing changes on the pedestrian level wind environment around the proposed development at 296-298 Botany Road. The change in geometry is to address Council concerns regarding the wind conditions in and around the site is similar to the previous reporting. This report follows on from a review of the proposed drawings with respect to the previous configuration, Figure 1.

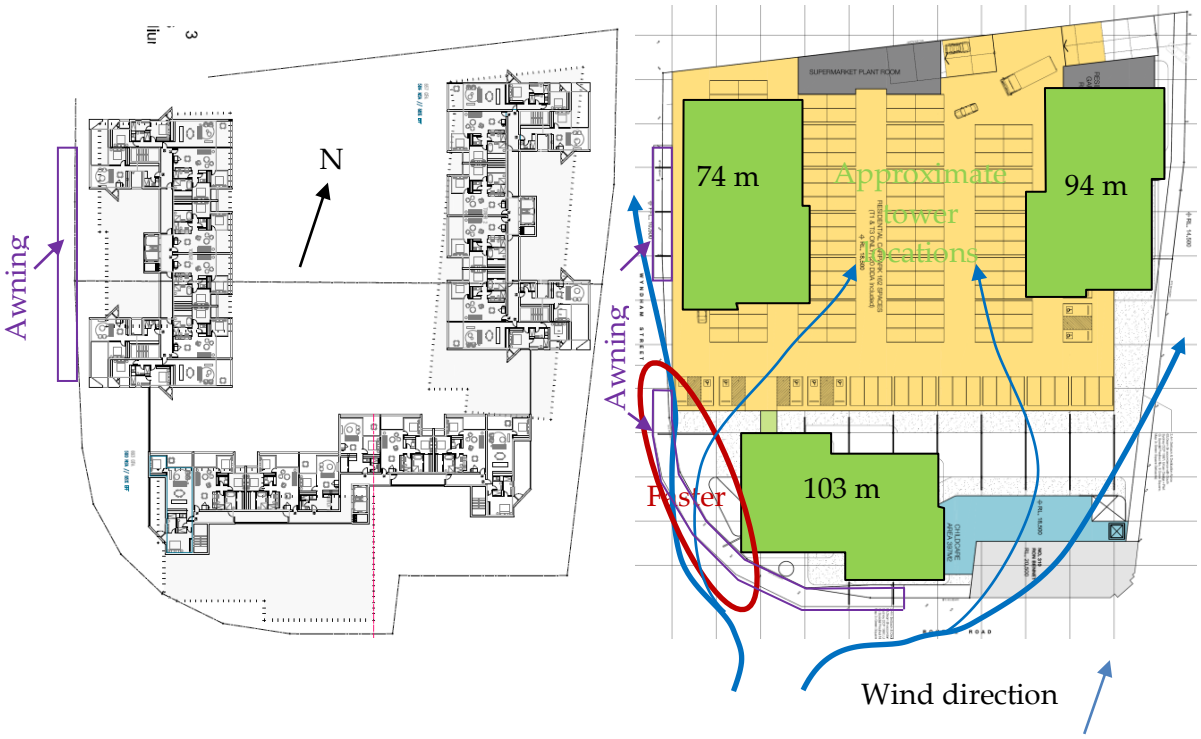


Figure 1: Plan view of the proposed development: revised (L), and previous scheme of April 2015 showing wind flow patterns for winds from the south (R)

The overall flow pattern around the revised geometry will be similar to the previous scheme. From a wind perspective, the largest changes are the change in shape of and position of the south tower relative to the edge of the podium. The increased setback of the south tower from the podium edge is a benefit from a wind perspective and removes the recommendation to include an awning wrapping around the corner of Wyndham and Bourke Streets. The setback of the north-west tower from Wyndham Street remains the



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same, and therefore it would be recommended to include an awning as noted in Figure 1(L) to offer protection to pedestrians from downwash flow from the north-west tower for winds form the south quadrant wind, and wind-driven rain.

With the proposed setbacks, the increase in width of the south tower is not expected to have a significant impact on the pedestrian level wind conditions at ground level, but would improve the wind conditions on the podium roof. The information in the previous wind reports remains valid with the minor updates with the revised geometry discussed herein.

To quantify the wind conditions discussed in this and previous report, physical modelling would be required.

I hope this is of assistance, please do not hesitate to contact me if you have any questions regarding any aspect of this report.

Yours sincerely,

Graeme Wood
Director



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