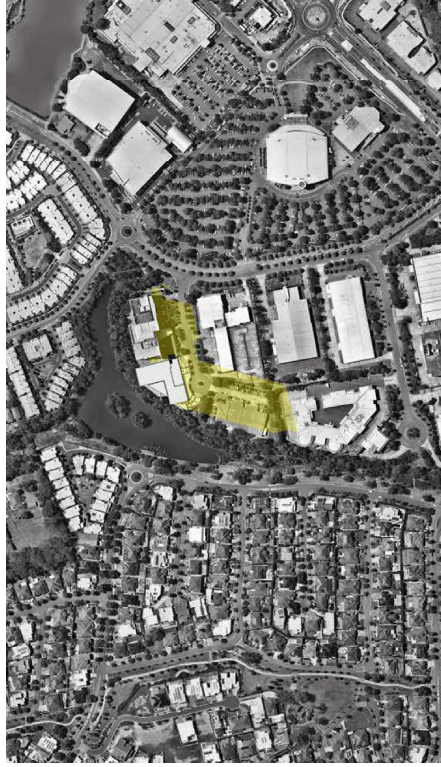


Shadow Analysis

Winter Solstice 12noon

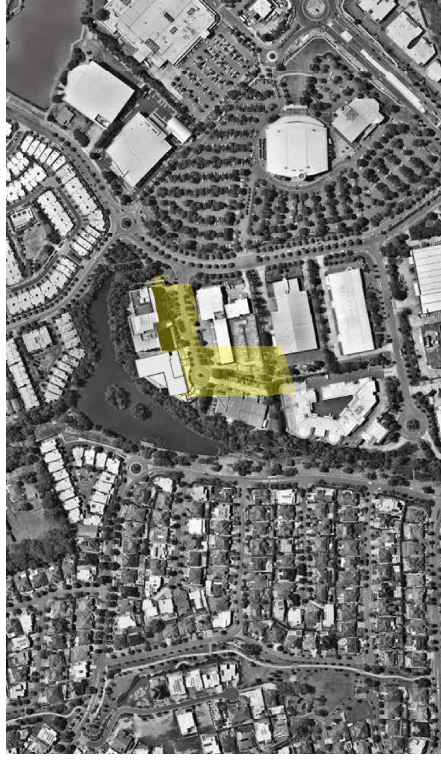


scott carver
[Planning Proposal]
[2019/2020] [1-1 Business Place, Norwell]

45

Shadow Analysis

Winter Solstice 1pm

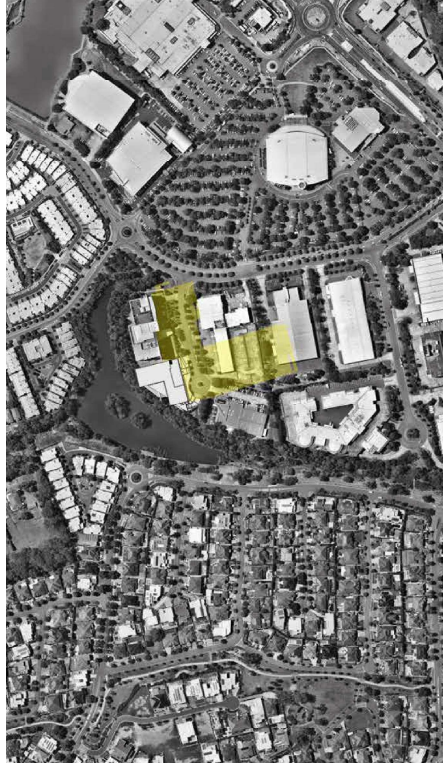


scott carver
[Planning Proposal]
[2019/2020] [1-1 Business Place, Norwell]

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Shadow Analysis

Winter Solstice 2pm



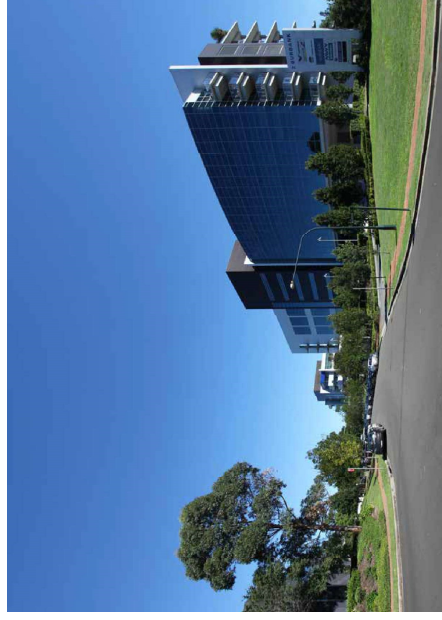
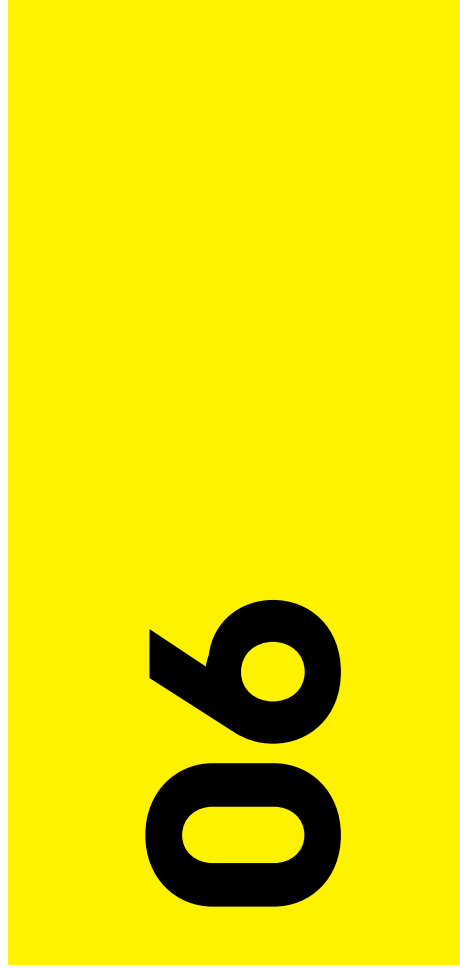
Shadow Analysis

Winter Solstice 3pm



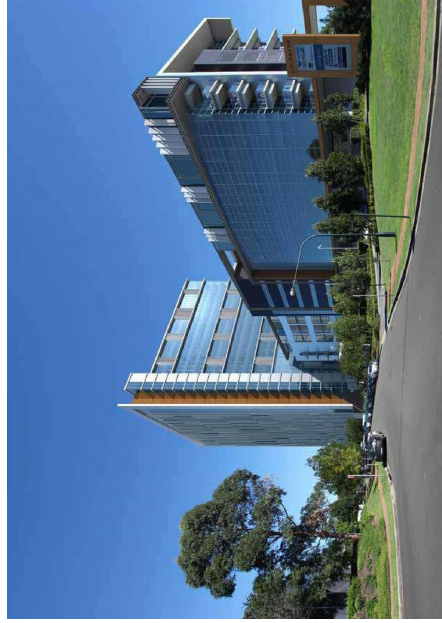
Visualisation

Existing Building Building Perspective from Burbank Place



Proposed Building

Building Perspective from Burbank Place

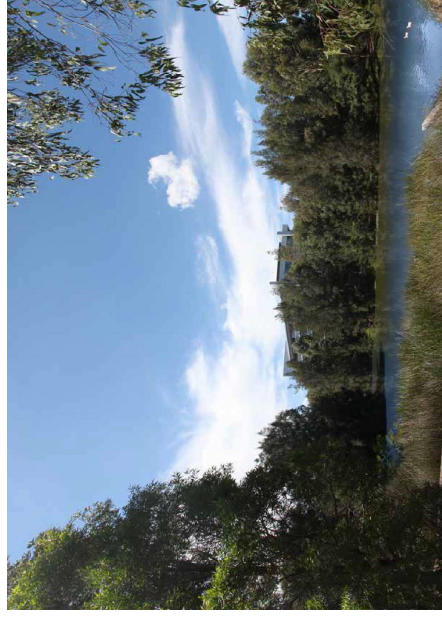


scott carver
[Planning Proposal]
[20190205] [1-1 Burbank Place, Norwalk]

51

Existing Building

Building Perspective from Strangers Lake



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[Planning Proposal]
[20190205] [1-1 Burbank Place, Norwalk]

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Proposed Building

Building Perspective from Strangers Lake

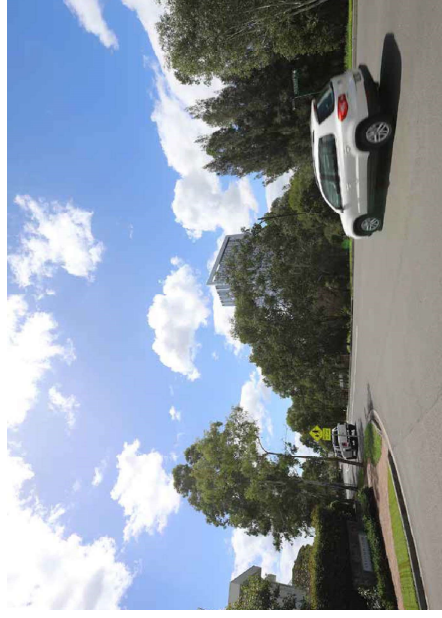


scott carver
[Planning Proposal]
[2018/2019] [1-12 Business Place, Norwood]

53

Proposed Building

Building Perspective from intersection of Edgewater Drive and The Pointe

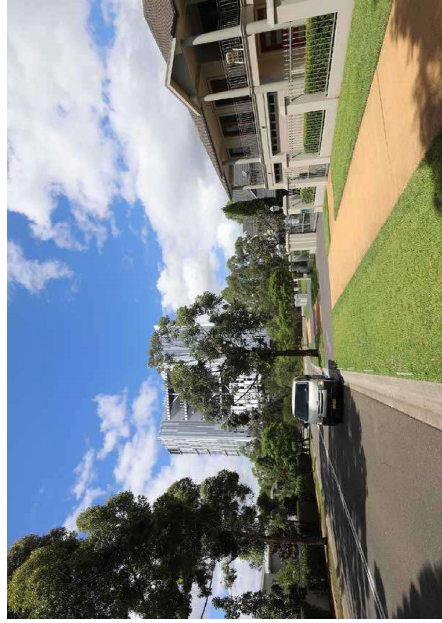


scott carver
[Planning Proposal]
[2018/2019] [1-12 Business Place, Norwood]

54

Proposed Building

Building Perspective from The Pointe looking South-East



scott
caver
[Following Proposal]
[2020/2021] N-2 Business Plaza Northwest

SJB Urban

2-4 Burbank Place Urban Design Review

2-4 Burbank Place,
Baulkum Hills

Prepared for
Capital Bluestone

Issued
23 May 2018

Used for: 480 Coast Street
Survey: 18/NSW/2010
Australia
Adelaide
23 May 2018
architect@sjb.com.au
sjb.com.au



We create amazing places

At SJB we believe that the future of the city
is in generating a rich urban experience
through the delivery of density and activity,
facilitated by land uses, at various scales,
designed for everyone.

Version: 03
Prepared for: Capital Bluestone
Client: 18/NSW/2010
Contact Details:
SJB Urban
480 Coast Street
Adelaide
South Australia 5000
T: 81 22 6389 6811
architect@sjb.com.au
sjb.com.au
SJB Architecture (NSW) Pty Ltd
ABN 28 116 273 426
18/NSW/2010
Adrian Haddock 7188, John Pridell 7004



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Introduction



Introduction

1.4 A Metropolis of Three Cities

The site is located within the Central City District, which is part of the Central River City identified in the Greater Sydney Regional Plan. The Central City District includes the local government areas of Blacktown, Cumberland, Parramatta and The Hills.

and transition of the district, focusing on Greater Parametia and the Olympic Peninsula (GPOP) as the anchor.

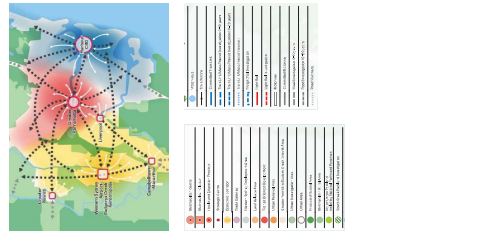
Sydney Metro Northwest as a catalyst to realise the area, and promote a vibrant, transit-oriented employment and residential hub. The Central City District Plan identifies a range of population trends, as well as job and housing targets. Some of the trends and targets relevant to this proposal are:

- Projected dwelling requirement of 546,000 dwellings within the District by 2038;
- Projected dwelling requirement of 53,000 by 2033;
- Norwest job target of 53,000 by 2033.

Norwest is a Strategic Centre for developing higher densities, commercial activity and employment.

2-4 Burbank Place

SJB



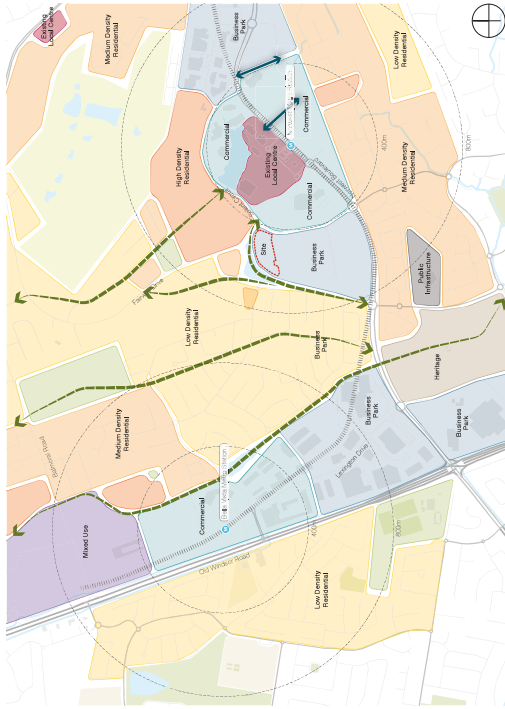
Introduction

1.5 North West Rail Link Structure Plan 2013

This North West Rail Link is a 28km priority transport infrastructure project with one from Cloughjordan to Esping, Limerick and Spiddalside rail network. The delivery of the rail link will provide opportunity for the North West to increase a housing choice and a high level of a mobility.

2-4 Durbank Place is located within the North West, an important employment centre. It is envisaged that the rail link will assist in strengthening the already established commercial zone.

The North West Rail Link includes a new station on the North West to support transport oriented employment and growth.



2-4 Durbank Place

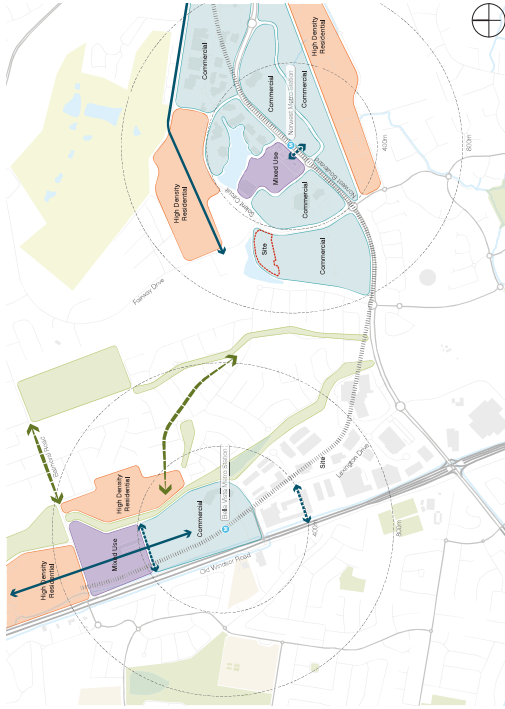
Introduction

1.6 The HIB Corridor Strategy 2015

The HIB Corridor Strategy is a response to the North West Rail Link Structure Plan released by the Department of Transport and Infrastructure. The strategy provides a framework for the delivery of future housing and employment growth for north of the new Metro Station.

2-4 Durbank Place is located within the North West, an important employment centre. It is envisaged that the rail link will assist in strengthening the already established commercial zone.

Northwest is to be the largest employment centre in the North West to support transport oriented employment and growth.



2-4 Durbank Place

Introduction

1.7 Recent Planning Proposals and Development Applications

There are a number of recent Planning Proposals and Development Applications within the area and are as follows:

1. Norwest One-Station Development
2. Marketown Shopping Centre - 40 Solent Circuit
3. 24/7 Mollard Place
4. The Greens - 40 Solent Circuit
5. The Greens - 40 Solent Circuit
6. 24/7 Mollard Place
7. 8 Solent Circuit
8. 2500 Brookfield Ave

The concurrent development that is either under review, approved or under construction in Norwest, demonstrates the potential for the area to be developed for high density mixed-use and residential towers and intensification of commercial offerings.

This is in part due to the new metro station and the desire to create a vibrant, walkable, and transit-oriented community that integrates land uses and provides for residential and commercial in the same locality creates vibrant public spaces and improves the amenity for those who work in the area. Located at the edge of the business park precinct, there is an opportunity to create a new, vibrant, and walkable community in this dedicated town centre. This is set to change as the development opportunity of the filling site and surrounding area is realised and the potential for the land increases when the train station is operational.

Planning Proposals and Development Applications are responding to the strategic value of the local area.

Most of the proposals/applications are residential - still lacking in commercial development.

Local employment would support residential growth in Norwest.

Introduction

1.8 Planning Proposals Images



Marketown Shopping Centre



The Esplanade
11-13 Solent Circuit, Norwest



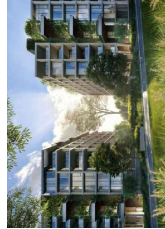
2-7 Mollard Place



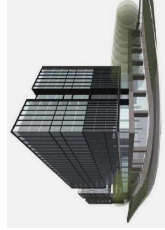
AWED Norwest
Norwest Boulevard, Bala Vista



The Greens
40 Solent Circuit



47 Spurway Drive



8 Solent Circuit

Site Analysis

2

Site Analysis

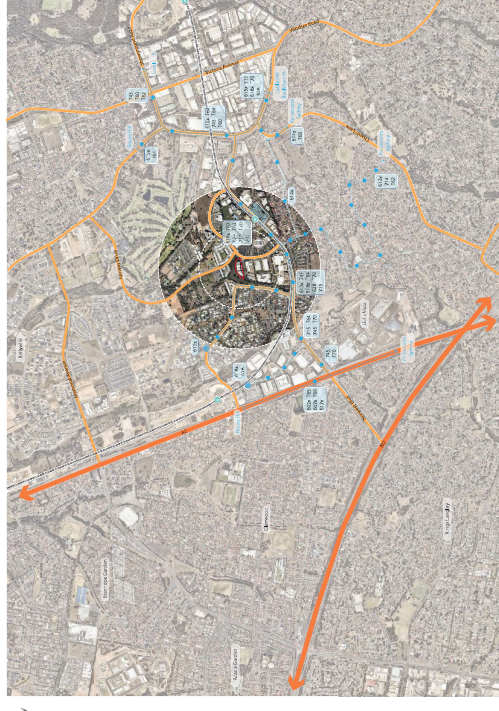
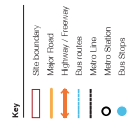
2.1 Regional Context - Burbank Place

The site is located within the Norwest Business Park in Baulkham Hills, characterised by large office building typology adjacent to residential areas predominantly 1-2 storeys in height. There are several creeks which run through the area, which are important ecological corridors to maintain and enhance.

The site is well serviced by the road network, and is in close proximity to Old Windsor Road which connects to Rouse Hill and through to Parramatta, as well as the M7 linking the Hills Shire to Liverpool.

The area is currently well serviced by an extensive and frequent bus network which links the Hills State to Sydney CBD and Cheltenham. The North West Rail Link is currently under construction and will provide better and more efficient public transport to Sydney CBD.

In close proximity to the site is Norwest Marketown which provides local retail, supermarket and amenity. Castle Towers Shopping Centre, 5km from the site provides a regional retail offering with a more extensive range of shops.

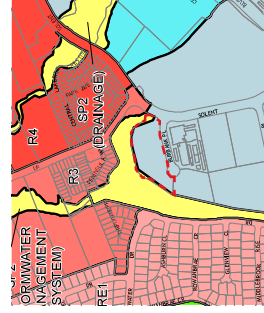


2-4 Burbank Place

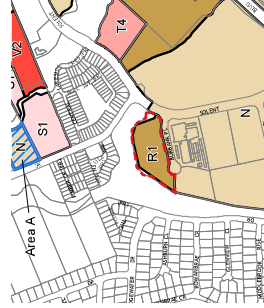
SJB

Site Analysis

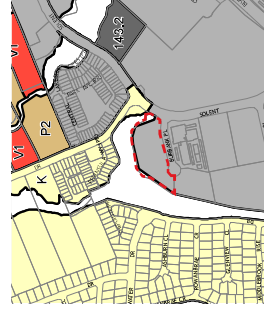
2.2 Hills Shire Council Local Environmental Plan 2012



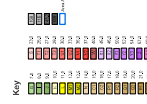
The subject site is zoned B7 Business Park



The subject site has an all-sewer floor space ratio of 1.4:1



The subject site has an allowable building height of 115m



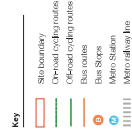
Site Analysis

2.3 Access and Movement

Public Transport

Pedestrian and Cycling

Podestrian movement in Norwest is compromised by the prioritisation of vehicular movement and the large block sizes. There are a few roads that have dedicated bike lanes that connect the Bella Vista Waters, the riparian zone and Norwest Lake. There are high amenity walking and cycling tracks alongside the water bodies for recreation and socialising.

 $\frac{1}{2}$

2-4 Burbank Place

17

2-4 Burbank Place

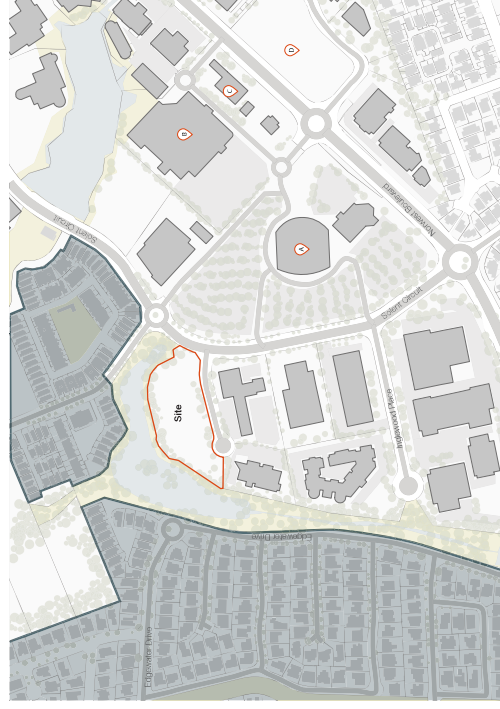
of

Site Analysis

2.4 Built Form and Key Sites

- A. Hillsong Church and Training College
B. Market Town Shopping Centre
C. Service Station
D. Proposed Metro Station

The bull form in the local area is reflective of the large floor plates required in a business park. There are vast spaces between building envelopes largely dedicated to car parking and some landscaping. This is gradually changing as the morphology of the product moves toward higher densities and yield within the site.



2-4 Burbank Place

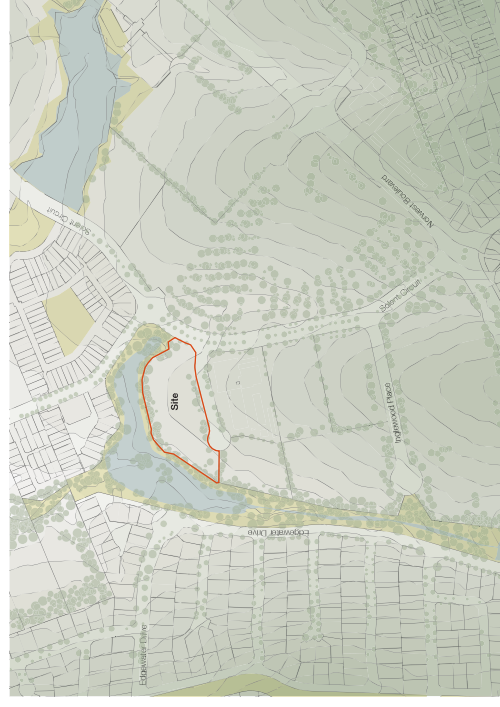
19

Site Analysis

2.5 Landscape, Public Realm and Vegetation

The subject site is wrapped by the riparian zone to the north and west. This is a major asset to the site and will provide significant amenity value to the future development. Norwest Lake is adjacent to the town centre.

The topography is subtle enough to make it *wakata*, while still creating aesthetically appealing views across the area from Bella Vista Farm.



2-4 Burbank Place

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Site Analysis

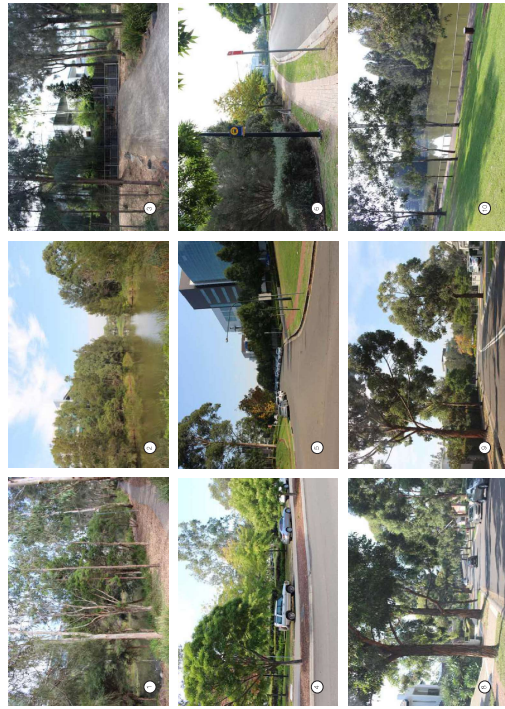
2.6 Site Photos

1. View across lake to subject site. Density of trees on north side of lake provides screening at ground level.
2. View from north of lake looking onto development site. Vegetation provides screening, providing overlooking or impact of visual bulk.
3. View from south of lake looking onto development site. There is not provided. There are two pedestrian crossings in this precinct.
4. Pedestrian crossing along Skene Street towards town centre.
5. Pedestrian crossing along Skene Street towards town centre.
6. Pedestrian crossing along Skene Street towards town centre.
7. Looking over subject site. Development activity is visible in the background.
8. View from north of lake looking onto development site. Screening across line of sight of proposed development.
9. View from south of lake looking onto development site. Screening across line of sight of proposed development.
10. View from edge of water body at the end of Edgewater Drive. The development is visible from the water body. The development is visible from the water body.



SAB

2-4 through trees



21

Site Analysis

2.7 Constraints

- The proposed development will be visible from residential areas, particularly from the base of Edgewater Drive in Balla.
- Pedestrian access around and across the blockway corridor is currently limited – and the only path provided is narrow and unimproved. Pedestrian access across the blockway corridor has been created.
- There is a lack of activation on the street in the entire area, with no pedestrian crossings or other street-level activity.
- Pedestrian access is a difficult line getting around with a lack of pedestrian crossings and other street-level activity.
- Traffic volumes in the area are high and congestion can be an issue.
- The western side of the proposed development, including the Balla Church site is currently under development.
- The eastern side of the proposed development is still open lots in the area also being developed.
- Views from Balla Vista form should be maintained according to the DCP.



SAB

2-4 through trees



22

Precinct Vision and Design Principles

- | | |
|---|---|
|  | Better fit
contextual, local and of its place |
|  | Better performance
sustainable, adaptable and durable |
|  | Better for community
inclusive, connected and diverse |
|  | Better for people
safe, comfortable and liveable |
|  | Better values
creating and adding value |
|  | Better working
functional, efficient and fit for purpose |
|  | Better look and feel
inspiring and attractive |



Precinct Vision and Design Principles

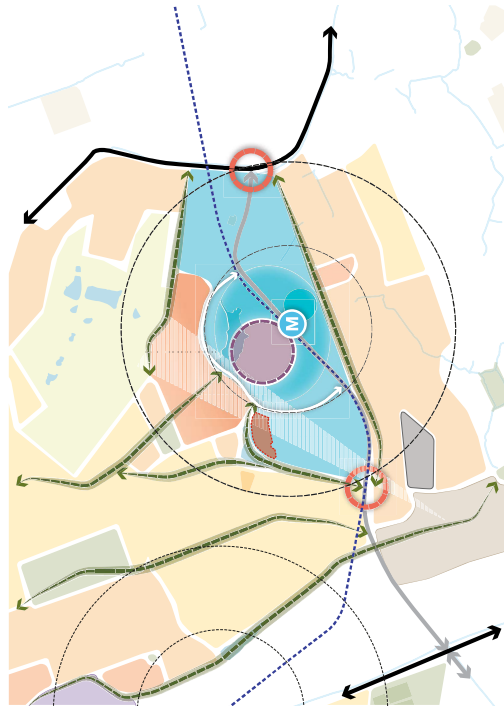
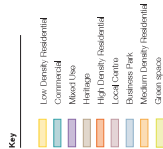
3.1 Vision

2-4 Barbark: Then will reflect the future of Norwest, and champion return of Business Parks in Sydney, while remaining sensitive to other land uses in the local area.

The character of the business park is changing to a new type of development, one that is more integrated with the surrounding urban fabric, and public realm, activation, healthy, and most significantly, transport oriented design, walkability, high amenity streets, and public realm, activation, healthy, and most significantly, suitable for commercial uses at a certain scale. The proposed response to deliver this new package in Norwest and support the growth of commercial activity in the Barbark.

This proposed development intends to be sensitive to the surrounding urban fabric, and public realm, activation, healthy, and most significantly, suitable for commercial uses at a certain scale. The proposed response to deliver this new package in Norwest and support the growth of commercial activity in the Barbark.

The proposed development intends to be sensitive to the surrounding urban fabric, and public realm, activation, healthy, and most significantly, suitable for commercial uses at a certain scale. The proposed response to deliver this new package in Norwest and support the growth of commercial activity in the Barbark.



2-4 Barbark: Vision

Precinct Vision and Design Principles

3.2 Design Principles



S.43

2-4 Barbark: Vision



26

Precinct Vision and Design Principles

Better for community
inclusion, connector and diverse

Image credit: Shutterstock.com

- Consider how the **Urban Structure** can contribute to the public realm, the surrounding environment, and positive surroundings, and enhanced amenity.
- Provide an **Urban Structure** that supports a variety of active transport modes and access to services, facilities and public spaces.
- Provide an **Urban Structure** that has permeable edges and interfaces, as well as thoroughfare and routes that are welcoming and people friendly.
- Provide an **Urban Structure** that has permeable edges and interfaces, as well as thoroughfare and routes that are welcoming and people friendly.
- Consider how the **Urban Structure** can contribute to the public realm, the surrounding environment, and positive surroundings, and enhanced amenity.

Image credit: Shutterstock.com

2-4 Urban form

S.63

Better for people
safe, comfortable and livable

Image credit: Shutterstock.com

- After the **Urban Structure** is completed, there should be a variety of public spaces and facilities that provide a range of diverse experiences – outdoor, indoor, and semi-outdoor – that support a variety of activities and uses.
- Ensure that the **Urban Structure** that ascertains strong relationships between spaces and the surrounding environment, and provides a variety of public spaces and facilities that support a variety of activities and uses.
- The **Design and Mix** of the proposed development should focus on a variety of commercial tenants, with a mix of uses that provide a variety of experiences and opportunities for the community.
- Consider how the **Urban Structure** can contribute to the public realm, the surrounding environment, and positive surroundings, and enhanced amenity.

Image credit: Shutterstock.com

27

Better values
creating and adding value

Image credit: Shutterstock.com

- The **Urban Structure** should be designed to support a variety of commercial tenants, with a mix of uses that provide a variety of experiences and opportunities for the community.
- Ensure that the **Urban Structure** that ascertains strong relationships between spaces and the surrounding environment, and provides a variety of public spaces and facilities that support a variety of activities and uses.
- The **Design and Mix** of the proposed development should focus on a variety of commercial tenants, with a mix of uses that provide a variety of experiences and opportunities for the community.
- Consider how the **Urban Structure** can contribute to the public realm, the surrounding environment, and positive surroundings, and enhanced amenity.

Image credit: Shutterstock.com

2-4 Urban form

S.63

Better working
functional, efficient and fit for purposes

Image credit: Shutterstock.com

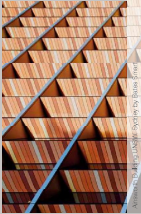
- The **Urban Structure** of proposed development should be designed to support a variety of commercial tenants, with a mix of uses that provide a variety of experiences and opportunities for the community.
- Ensure that the **Urban Structure** that ascertains strong relationships between spaces and the surrounding environment, and provides a variety of public spaces and facilities that support a variety of activities and uses.
- The **Design and Mix** of the proposed development should focus on a variety of commercial tenants, with a mix of uses that provide a variety of experiences and opportunities for the community.
- Consider how the **Urban Structure** can contribute to the public realm, the surrounding environment, and positive surroundings, and enhanced amenity.

Image credit: Shutterstock.com

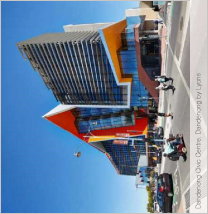
28



Better look and feel
engaging, inviting and attractive



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© 2019, City of Sydney, Sydney City Centre

• **Distill the Urban Structure** and other local influences within the development to create a distinct sense of place, discerning the intended use of the building and its relationship to the surrounding context.

• **Propose an Urban Grain** that is at an appropriate scale for a business park use, while still reading as an urban form.

• **Act for a Density and Mix** within the development is appropriate in scale and creates headroom at street level for a mix of uses, including commercial tenancy should be present on the street and an amenity provided by a greater density of employees in internal and external spaces that contribute to the precinct.

• The **Height and Mass** form a series of connected spaces that create a visually appealing built form within the precincts, scale, and proportion to the surrounding context.

• The **Height and Mass** should create a visually appealing built form within the precincts, scale, and proportion to the surrounding context.

• The **Structure and Landscape** should integrate high quality landscaping and greenery into the workplace and surrounding environment. The maturity of the large street trees and the canopy of the landscape should be maintained and enhanced to improve the visual interest of the environment at street level.

• **Exposure and Orientation** of the development should be designed to create an engaging environment by positioning, shape and materials that enhance the street frontage and positively contribute to the public realm.

S.63

P-4 Urban Form

29

Design Review and Evaluation

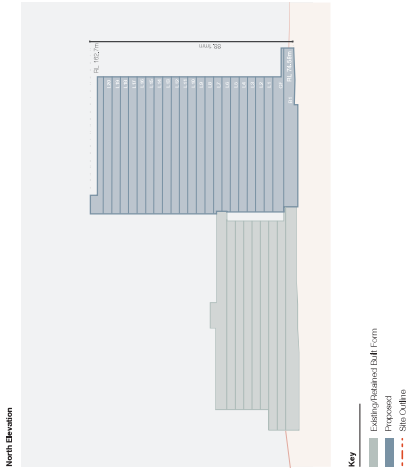
This section of the report is to evaluate the existing and proposed built environment based GANSW new policy framework and provide key recommendations. The approach draws upon the Urban Design Guide methodologies and reframes the outcome beneath the banner of each of the seven values in Better Placed.

4

	Better fit contextual, local and of its place
	Better performance sustainable, adaptable and durable
	Better for community inclusive, connected and diverse
	Better for people safe, comfortable and livable
	Better value creating and adding value
	Better working functional, efficient and fit for purpose
	Better look and feel engaging, inviting and attractive

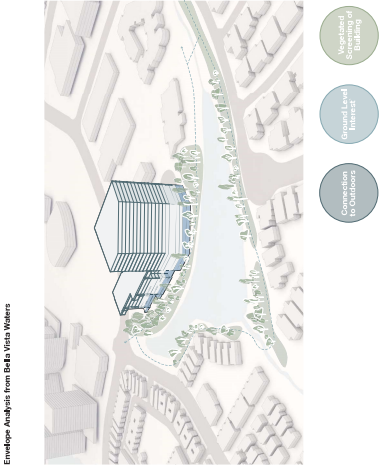
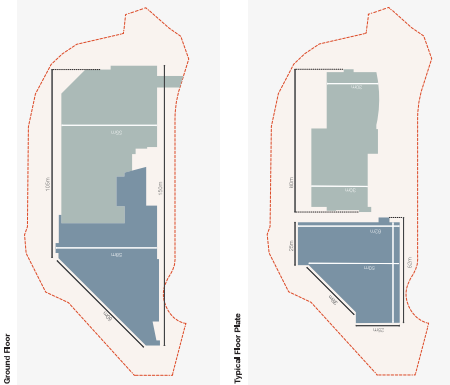
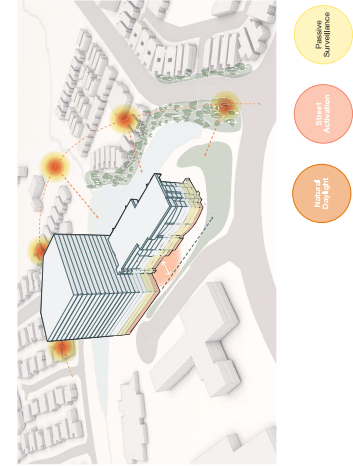
4.1 The Proposal

The Proposal is located to the eastern side of the site.

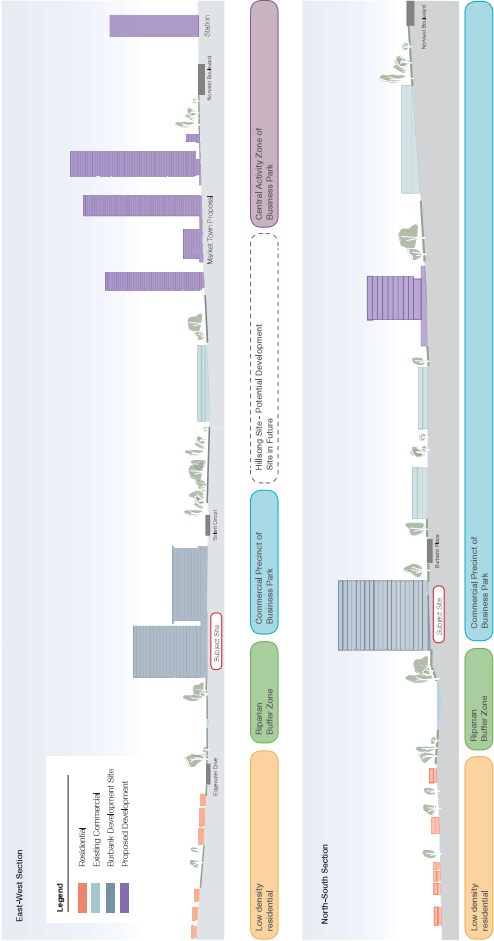


4.2 Perspective Analysis

Envelope Analysis from Burbank Place



4.3 Sections

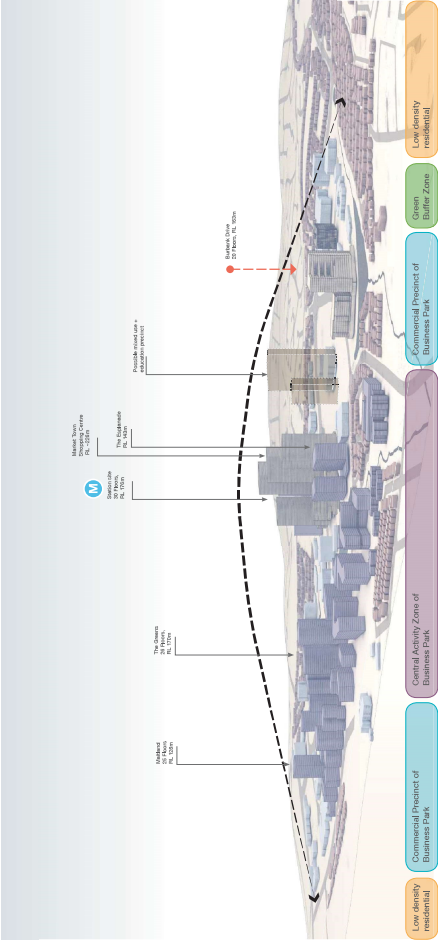


S.43

2-4 building floors

33

4.4 3D Perspective of Norwest



S.43

2-4 building floors

34

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Let's talk design.

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Surf City NSW 2010
Australia
Tel: 02 9390 2011
info@sjb.com.au

Capital Bluestone
Burbank Place- Planning Proposal

Traffic and Parking Report

June 2017

Capital Bluestone
Burbank Place- Planning Proposal

Traffic and Parking Report
Quality Assurance Statement

Prepared by:
Fred Gennaoui

Principal Consultant

Reviewed by:
Mark Apeldoorn
Director

Approved for Issue by:
Mark Apeldoorn
Director

Status: Final

Date: 19 June 2017



PO Box 937, Newtown NSW, Sydney 2042
Australia

P: +61 2 8373 7145

www.tdgaustralia.com.au

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1. Introduction

1.1 Background

The Burbank Place development is situated at the north-western corner of Solent Circuit with Burbank Place, within the Norwest Business Park. The development currently comprises two buildings with a total floor area of 13,890 m² GFA of commercial development with a shared basement car park. It should be noted that some 2,293 m² GFA have already been approved for N°2 Burbank Place.

Capital Bluestone is proposing to proceed with a redevelopment of the site requiring the replacement of No.4 Burbank Place building with a tower office building to provide a total of 34,900m² GFA of office space and 1,210 car spaces for the two buildings.

TDG in association with Gennaoui Consulting Pty Ltd has been commissioned to assess the proposed parking provisions and traffic implications of the proposed redevelopment.

1.2 Site Location and Study Area

The proposed development is situated on the north side of Burbank Place. All access to and from the development is off Burbank Place. The site of the proposed developments is shown in **Figure 1**. The immediate study area has been defined as the area bounded by and including Norwest Boulevard, Solent Circuit and all side streets off Solent Circuit.



Figure 1: Site Location of the Burbank Place Development

1.3 Study Approach

This report summarises the findings, conclusions and recommendations with respect to the parking requirements and traffic impacts of the proposed redevelopment.

2. Parking Requirement & Provision

2.1 The Proposal

Capital Bluestone is proposing to proceed with a redevelopment of the site to provide a total of 34,725m² GFA of office space and 1210 car spaces as noted in **Table 1**. It should be noted that some 2,293 m² GFA have already been approved for No.2 Burbank Place.

Address	Existing	Additional	Total
No 2 Burbank Place –	10,341	2,293	12,634
No 4 Burbank Place –	3,549	18,542	22,091
Total	13,890	20,835	34,725

Table 1: Proposed Floor Area for No.2 & No.4 Burbank Place

2.2 Parking Requirements

2.2.1 Council’s Requirements

Council’s DCP (2012) stipulates a parking provision of 1 space per 25 m² GFA. Applying this rate, some 1,396 spaces including visitor parking spaces would be needed to comply with Council’s DCP as noted in **Table 2**.

Requirement	Existing	Additional	Total
Required by DCP	556	833	1,389
Proposed	687	523	1,210

Table 2: Proposed Floor Area for No.2 & No.4 Burbank Place

2.3 Proposed Parking Supply

Some 1,210 spaces will be provided with the proposed development which results in a provision of 1 space per 28.7m² GFA. Therefore adopting this slightly lower rate is appropriate for the proposed redevelopment of the site given that:

- Its proximity to the new Metro Station at Norwest within less than 800 m walking distance.
- Council currently has a different parking rate of 1 space per 40 m² for commercial developments in the Centres of Castle Hill, Baulkham Hill and Rouse Hill. This rate is similar to the rate suggested in the RMS Guidelines (RTA, 2002).
- In the next few years, with the level of potential growth in commercial, retail and residential within the Norwest Business Park and the completion of the Metro line, it will become larger than some of the existing centres. Furthermore, the Bella Vista Planning Report (Transport for NSW) indicates a maximum rate of 1 space per 100 m² GFA at North Ryde which will be serviced by the North Western Metro line.

3. Existing Traffic Conditions

3.1 The Road Network

Access to all areas within the Norwest Business Park is provided by Norwest Boulevard, which connects Windsor Road to Old Windsor Road. The main access to the proposed Burbank Corporate Centre development will be via Burbank Place off Solent Circuit.

Solent Circuit has a four lane divided carriageway. At Burbank Place, it has a continuous median restricting access to and from Burbank Place to left turning only movements.

Norwest Boulevard has a four lane divided carriageway between Windsor Road and Old Windsor Road. Two-lane circulating roundabouts control most intersections along Norwest Boulevard, between Windsor Road and Old Windsor Road. Windsor Road has a four lane divided carriageway excluding long turning lanes at Norwest Boulevard and Showground Road.

Fairway Drive provides access to the Balmoral Estate to the north of the Business Park. It has a four-lane undivided carriageway including parking on both sides. It is controlled by a one lane circulating roundabout at Solent Circuit; the roundabout also provides access to the Hillsong site.

Traffic signals are installed at the intersections of Norwest Boulevard with Windsor Road and with Old Windsor Road. Traffic signals are proposed at the intersections of Norwest Boulevard with Solent Circuit east, with Century Circuit and with Solent Circuit/Reston Grange.

3.2 Operation of Existing Road System

3.2.1 Traffic Counts

The latest peak hourly volumes shown in **Appendix A**, at the following intersections were adopted for this study:

- Norwest Boulevard with Windsor Road (signalised);
- Norwest Boulevard with Solent Circuit (roundabout);
- Solent Circuit with Fairway Drive (roundabout); and
- Norwest Boulevard with Solent Circuit east (T-junction 2017 counts).

Traffic volumes peaked between 8:00 and 9:00 am and from 4:30 to 5:30 pm during the morning and afternoon respectively.

3.2.2 Existing Operation of Major Approach Roads

The existing traffic volumes along Norwest Boulevard, Solent Circuit, and Windsor Road are summarised in **Table 3**, together with their appropriate Level of Service.

LOCATION	LANES	AM PEAK		PM PEAK	
		East/North	South/West	East/North	South/West
Uninterrupted Volumes (Table 2 Appendix C)					
Norwest Boulevard*					
Windsor Rd to Columbia	4DC	837	2,645	C	2,245
Columbia to Solent Cir (east)	4DCL	822	1,988	A	1,628
West of Solent Cir (east)	4DCL	876	1,778	A	1,363
Brookhollow to Reston Gr	4DCL	1,229	1,674	A	1,572
Reston Gr to Westwood	4DCL	1,368	1,817	A	1,502
Windsor Road					
North of Norwest Blvd	4DCL	783	2536	B	2189
South of Norwest Blvd	4DCL	1583	1528	A	1526
Interrupted Volumes (Table 1 Appendix C)					
Solent Circuit					
Norwest to Inglewood	4DP	677	372	A	205
West of Fairway Dr	4DP	208	453	A	429
Norwest to Maitland	4DP	412	124	A	104

Table 3: Existing Carriageway Level of Service

The concepts of carriageway capacity and Level of Service (LoS) are described in **Appendix B** together with criteria for their assessment. The absence of traffic movements entering/crossing Windsor Road and Norwest Boulevard from major developments, being access denied roads, means that the service one-way hourly volumes included in Table B1 of **Appendix B** could be used for these two roads.

Norwest Boulevard currently operates at a satisfactory LoS of ‘C’ or better. To the north of Norwest Boulevard, Windsor Road operates at a Level of Service ‘B’ improving to a very good Level of Service ‘A’ to the south of Norwest Boulevard.

Solent Circuit and Inglewood Place operate at a very good Level of Service ‘A’.

3.2.3 Operation of Existing Critical Intersections

The concepts of intersection capacity and Level of Service, as defined in the Guidelines published by the RTA (2002), are described in **Appendix C** together with criteria for their assessment. The assessment of the Level of Service of traffic signals is based on the evaluation of the average delay (seconds/vehicle) of vehicles on all approaches. The assessment of the Level of Service of roundabouts and signed controlled intersections is based on the average delay (seconds/vehicle) of the critical movement.

An analysis of the operation of critical intersections in the vicinity of the site was carried out using the SIDRA computer modelling program. The results of this analysis are summarised in **Table 4**.

INTERSECTION	AM		PM	
	Delay sec/v	LoS	Delay sec/v	LoS
Traffic Signals				
Norwest Boulevard with:				
- Windsor Road	30.6	C	29.8	C
Roundabouts				
Norwest Boulevard with:				
- Solent Circuit / Reston Grange	29.9	C	26.6	B
- Fairway Drive	13.0	A	12.6	A
Signs				
Norwest Boulevard with:				
- Solent Circuit (east)	20.5	B	>70	F

Table 4: Existing Operation of Intersections

The unsignalised intersection of Solent Circuit East with Norwest Boulevard currently operates at a good Level of Service ‘B’ during the morning peak hour. Conditions worsen to a very poor Level of Service ‘F’ during the afternoon peak; this is largely due to the extensive delays experienced by vehicles left turning out of Solent Circuit as a result of the heavy traffic volumes along Norwest Boulevard. Traffic signals are scheduled for installation at this location.

The traffic signals at the intersection of Norwest Boulevard with Windsor Road operates at a satisfactory Level of Service ‘C’ during the morning peak slightly improving in the afternoon period. During the morning peak period, the roundabout controlling the intersection of Norwest Boulevard with Solent Circuit and Reston Grange operates at satisfactory Level of Service ‘C’. Conditions slightly improve in the afternoon when it operates at a Level of Service ‘B’. It is understood that the RMS and Council are planning to replace the roundabout with traffic signals in the next few years.

The roundabout at the intersection of Fairway Drive with Solent Circuit operates at a good Level of Service ‘A’.

4. Traffic Impact of Proposed Development

4.1 Trip Generation and Distribution of Proposed Development

4.1.1 Trip Generation of Proposed Redevelopment

The trip generation of the Burbank development were estimated based on the latest RMS Technical Direction 2013/04a which stipulates for office development the following peak hourly generation rates

- AM Peak hour: 1.6 trips / 100 m² GFA; 70% arrival / 30% departure;
- PM Peak Hour: 1.2 trips per hour; 30% arrival / 70% departure.

Thus the proposed redevelopment of the site will generate an about 330 and 250 additional vehicle trips during the morning and afternoon respectively as noted in **Table 5**.

TRIP GENERATION	GFA	AM Peak		PM Peak	
		Arr	Dep	Arr	Dep
Existing	13,890	178	44	50	117
Additional Approved	2,293	29	7	8	19
Additional Proposed	18,545	237	59	67	156
Total Additional	20,838	267	67	75	175
Total	34,728	445	111	125	292

Table 5: Trip Generation of Proposed Planning Proposal

4.1.2 Trip Distribution and Assignment

It has been assumed that traffic signals proposed at the intersection of Solent Circuit east with Norwest Boulevard would be in place. It has further been assumed that the planned replacement of the roundabout at the intersection of Norwest Boulevard with Solent Circuit and Reston Grange with traffic signals would also be completed by the time the redevelopment of the Burbank Site is completed.

The major approach and departure routes for trips currently generated by the nearby Century Estate, summarised in **Table 6**, were adopted for the distribution of the additional trips of the proposed redevelopment.

APPROACH ROADS	TO / FROM	AM PEAK		PM PEAK	
		Arr	Dep	Arr	Dep
Distribution %					
Norwest Boulevard	West	51%	32%	20%	31%
Windsor Rd	North	13%	16%	18%	22%
Windsor Rd	South	7%	19%	21%	20%
Fairway Drive	North	11%	26%	5%	7%
Reston Grange	South	18%	7%	36%	20%
	Total	100%	100%	100%	100%
Norwest Boulevard	West	136	21	15	54
Windsor Rd	North	35	11	14	39
Windsor Rd	South	19	13	16	35
Fairway Drive	North	29	17	4	12
Reston Grange	South	48	5	27	35
	Total	267	67	75	175

Table 6: Peak Hourly Generation of Century Estate

The route distribution for approaching and departing traffic, included in **Table 6**, was adopted to assign the additional traffic generated and attracted by the proposed redevelopment to the road network as noted in **Table 6**. The assignment of trips to the road network also took into account the following:

- Vehicular access to and from the commercial car park will be off Burbank Place;
- The median in Solent Circuit restrict traffic to left turning in and out from Burbank Place.

4.2 Traffic Impact of Proposed Development

4.2.1 Impact on Major Approach Roads

The carriageway traffic volumes along Norwest Boulevard and Solent Circuit and other major approach roads are summarised in **Table 7**, together with their appropriate Level of Service, for traffic conditions including the proposed redevelopment of No.2 & 4 Burbank Place.

The section of Solent Circuit between Norwest Boulevard and Inglewood Place would operate at Level of Service “B” or better during the morning and afternoon peak hours respectively.

The section of Norwest Boulevard between Windsor Road and Columbia Place would operate at Level of Service “C”, the remaining length of this road would continue to operate at a Level of Service “A”.

LOCATION	LANES	AM PEAK		PM PEAK	
		East/North	South/West	East/North	South/West
Uninterrupted Volumes (Table 2 Appendix C)					
<i>Norwest Boulevard*</i>					
Windsor Rd to Columbia*	4DCL	861	2699	C	1337
Columbia to Solent Cir (east)	4DCL	846	2042	A	1160
West of Solent Cir (east)	4DCL	876	1832	A	1113
Brookhollow to Reston Gr	4DCL	1229	1728	A	1502
Reston Gr to Westwood	4DCL	1504	1838	A	1625
<i>Windsor Road</i>					
North of Norwest Blvd	4DCL	794	2571	B	1386
South of Norwest Blvd	4DCL	1602	1541	A	1682

Interrupted Volumes (Table 1 Appendix C)

Solent Circuit					
Norwest to Inglewood	4DP	915	398	B	656
West of Fairway Dr	4DP	275	479	A	473
Norwest to Maitland	4DP	412	148	A	394

4DCL 4 lanes divided carriageway with clearway and limited access and limited intersections
4DP 4 lanes divided carriageway with parking

Table 7: Future Carriageway Level of Service

North of Norwest Boulevard, Windsor Road would operate at Level of Service “C” or better.
To the south of Norwest Boulevard, Windsor Road would operate at a Level of Service “B” .

4.2.2 Impact on Critical Intersections

For the purpose of this assessment, it has been assumed that traffic signals will be in place at the intersections of Norwest Boulevard with Solent Circuit east, and wit Solent Circuit west / Reston Grange. An analysis of the operation of the four intersections likely to be impacted by the proposed redevelopment of No. 2 & 4 Burbank Place was also carried out using the SIDRA computer intersection modelling program. The results of this analysis are included in **Appendix D** and summarised in **Table 8**.

The roundabout at the intersection of Fairway Drive with Solent Circuit would continue at a very good Level of Service “A”.

The replacement of the roundabout controlling the intersection of Norwest Boulevard with Solent Circuit and Reston Grange with traffic signals would operate at a Level of Service “C” during the morning and afternoon peak periods.

INTERSECTION	AM		PM	
	Delay sec/v	LoS	Delay	LoS sec/v
Traffic Signals				
Norwest Boulevard with:				
- Windsor Road	32.4	C	31.2	C
- Solent Circuit / Reston Grange	29.0	C	28.5	C/D
- Solent Circuit (east)	14.9	A/B	19.3	B
Roundabouts				
Norwest Boulevard with:				
- Fairway Drive	13.3	A	13.2	A

Table 8: Operation of Intersections with Burbank Place Redevelopment

The traffic signals at the intersection of Norwest Boulevard with Windsor Road would continue to operate at a satisfactory Level of Service “C” during both the morning and afternoon peak periods.

A signalised intersection of Solent Circuit East with Norwest Boulevard would operate in the future at a Level of Service B during the morning peak and the afternoon peak.

5. Summary and Conclusions

5.1 Access and Parking

Capital Bluestone is proposing to proceed with a redevelopment of the site requiring the replacement of No4 Burbank Place building with a tower office building to provide a total of 34,900m² GFA of office space and 1210 car spaces for the two buildings.

The proposed parking supply of 1,210 spaces would result in a provision of 1 space per 28.7m² GFA; Council's DCP requires the provision of 1 space per 25 m² GFA. Adopting this slightly lower rate is appropriate for the proposed redevelopment of the site given that:

- Its proximity to the new Metro Station at Norwest within less than 800 m walking distance.
- Council currently has a different parking rate of 1 space per 40 m² for commercial developments in the Centres of Castle Hill, Baulkham Hill and Rouse Hill. This rate is similar to the rate suggested in the RMS Guidelines (RTA, 2002).
- In the next few years, with the level of potential growth in commercial, retail and residential within the Norwest Business Park and the completion of the Metro line, it will become larger than some of the existing centres. Furthermore, the Bella Vista Planning Report (Transport for NSW) indicates a maximum rate of 1 space per 100 m² GFA at North Ryde which will be serviced by the North Western Metro line.

5.2 Traffic Impact

Thus the proposed redevelopment of the site will generate an about 330 and 250 additional vehicle trips during the morning and afternoon respectively.

The proposed development will only marginally affect the Level of Service of all major approach roads to the site. The section of Solent Circuit between Norwest Boulevard and Inglewood Place would operate at Level of Service "B" or better. The section of Norwest Boulevard between Windsor Road and Columbia Place would operate at Level of Service "C". All other roads would continue to operate at their current levels of service.

The proposed development would not affect the current operation of the intersections of Norwest Boulevard with Windsor Road and of Solent Circuit with Fairway Drive.

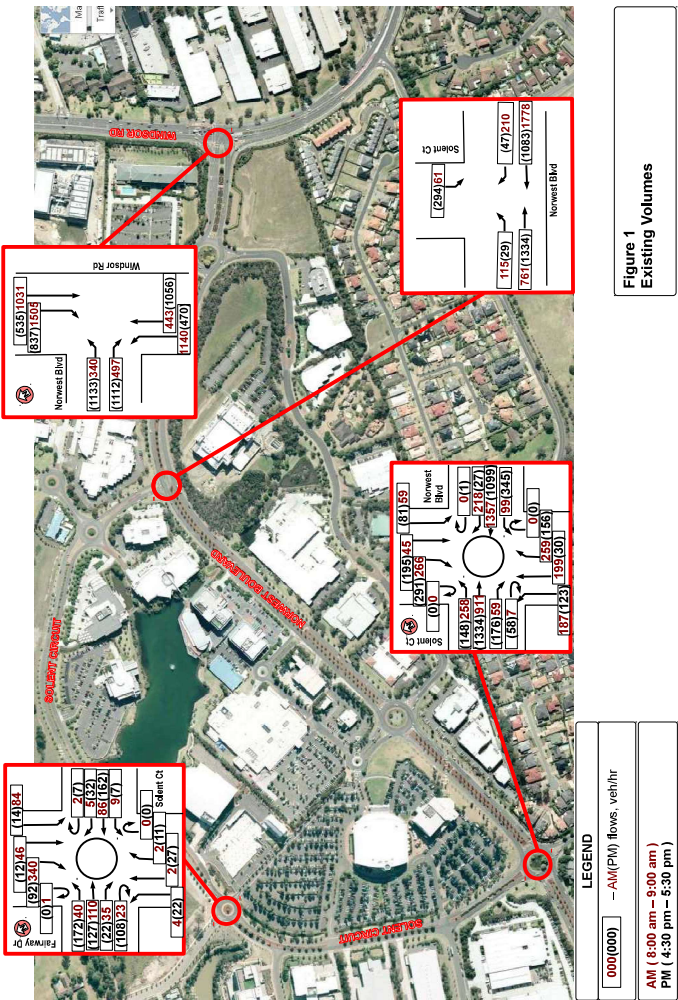
The provisions of traffic signals at the intersections of Norwest Boulevard with Solent Circuit East and with Reston Grange and Solent Circuit would result in considerably improved conditions at that location.

6. References

- Baulkham Hills Council (2004) "Development Control Plan No 12 Parking". September.
- RMS Technical Direction: TDT 2013/04a: Guide to Traffic Generating Developments – Updated Traffic Surveys.

Appendix A

Existing Traffic Volumes



The capacity of major streets within an urban area can be based on an assessment of their operating Level of Service.

Level of Service is defined by NAASRA (1988) as a "qualitative measure of the effects of a number of features, which include speed and travel time, traffic interruptions, freedom to manoeuvre, safety, driving comfort and convenience, and operating costs. Levels of service are designated from A to F from best (free flow conditions) to worst (forced flow with stop start operation, long queues and delays) as follows:

- *LEVELS OF SERVICE
- A - Free flow (almost no delays);

B - Stable flow (slight delays);

C - Stable flow (acceptable delays);

D - Approaching unstable flow (tolerable delays);

E - Unstable flow (congestion; intolerable delays); and

F - Forced flow (jammed).

A service volume, as defined by Austroads, is the maximum number of vehicles that can pass over a given section of roadway in one direction during one hour while operating conditions are maintained at a specified Level of Service. It is suggested that ideally arterial and sub-arterial roads should not exceed service volumes at Level of Service C. At this level, whilst most drivers are restricted in their freedom to manoeuvre, operating speeds are still reasonable and acceptable delays experienced. However, in urban situations, arterial and sub-arterial roads operating at Level of Service D are still considered adequate. Traffic Volumes along urban roads with interrupted and uninterrupted flow conditions are included in Table B1 and B2 respectively.

DESCRIPTION	LEVEL OF SERVICE					
	A	B	C	D	E	F
2 Lane Undivided	540	630	710	810	900	F
4 Lane Undivided	900	1050	1200	1350	1500	O
4 Lane Undivided with Clearways	1080	1260	1440	1620	1800	R
4 Lane Divided with Clearways	1140	1330	1520	1710	1900	C
4 Lane Divided with Clearways, limited access and limited intersections	1610	1870	2140	2410	2670	E
6 Lane Undivided	1440	1680	1920	2160	2400	D
6 Lane Divided with Clearway	1740	2030	2320	2610	2900	

Table B1: Level of Service Interrupted Flow Conditions along Urban Roads (One Way Hourly Volumes)

Appendix B

Concept of Carriageway Capacity and Level of Service

DESCRIPTION	LEVEL OF SERVICE					
	A	B	C	D	E	F
4 Lane Undivided (13m)	1260	1470	1680	1890	2100	F
4 Lane Undivided with Clearways	1510	1760	2010	2270	2520	O
4 Lane Divided with Clearways	1600	1860	2130	2400	2660	R
4 Lane Divided with Clearways, limited access and limited intersections	2250	2620	3000	3380	3740	C
6 Lane Undivided	2020	2350	2690	3020	3360	E
6 Lane Divided with Clearway	2440	2840	3250	3660	4060	D
6 Lane Divided with Clearways, limited access and limited intersections	3375	3930	4500	5070	5610	

* 40% higher than base volumes in Table B1

Table B2: Level of Service Uninterrupted Flow Conditions along Urban Roads (One Way Hourly Volumes)

Appendix C

Guidelines for Evaluation of Intersection Capacity

The RTA has included in the "Guide to Traffic Generating Developments" (Dec 1993, Issue 2) a section on the assessment of intersections. The assessment of the Level of Service of an intersection is based on the evaluation of the following Measures of Effectiveness:

- (a) Average delay (seconds/veh) (all forms of control)
- (b) Delay to critical movement (seconds/veh) (all forms of control)
- (c) Degree of saturation (traffic signals and roundabouts)
- (d) Cycle length (traffic signals)

INTANAL was used to calculate the relevant intersection parameters. INTANAL is software which allows comparisons between different forms of intersection control and different forms of intersection configurations to be readily evaluated. That is at each intersection the priority control, roundabout and signal control options will be examined to determine the most efficient form of control.

The best indicator of the Level of Service at an intersection is the average delay experienced by vehicles at that intersection. For traffic signals, the average delay over all movements should be taken. For roundabouts and priority control intersections (with Stop and Give Way signs or operating under the T-junction rule) the critical movement for Level of Service assessment should be that with the highest average delay.

With traffic signals, delays per approach tend to be equalised, subject to any over-riding requirements of signal co-ordination as well as to variations within individual movements. With roundabouts and priority - control intersections, the critical criterion for assessment is the movement with the highest delay per vehicle. With this type of control the volume balance might be such that some movements suffer high levels of delay while other movements have minimal delay. An overall average delay for the intersection of 25 seconds might not be satisfactory if the average delay on one movement is 60 seconds.

The average delay for Level of Service E should be no more than 70 seconds. The accepted maximum practical cycle length for traffic signals under saturated conditions is 120 - 140 seconds. Under these conditions 120 seconds is near maximum for two and three phase intersections and 140 seconds near maximum for more complex phase designs. Drivers and pedestrians expect cycle lengths of these magnitudes and their inherent delays in peak hours. A cycle length of 140 seconds for an intersection which is almost saturated has an average vehicle delay of about 70 seconds, although this can vary. If the average vehicle delay is more than 70 seconds, the intersection is assumed to be at Level of Service F.

Table C1 sets out average delays for different levels of service. There is no consistent correlation between definitions of levels of service for road links as defined elsewhere in this section, and the ranges set out in Table C1. In assigning a Level of Service, the average delay to the motorist/public needs to be considered keeping in mind the location of the intersection. For example, drivers in inner-urban areas of Sydney have a higher tolerance of delay than drivers in country areas. Table C1 provides a recommended baseline for assessment.

Level of Service	Average Delay per Vehicle (seconds/veh)	Traffic Signals, Roundabout	Give Way and Stop Signs
A	less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 - 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays Roundabouts require other control mode	At capacity, required other control mode

Table C1: Level of Service Criteria for Intersections

The figures in Table C1 are intended as a guide only. Any particular assessment should take into account site-specific factors including maximum queue lengths (and their effect on lane blocking), the influence of nearby intersections and the sensitivity of the location to delays. In many situations, a comparison of the current and future average delay provides a better appreciation of the impact of a proposal, and not simply the change in the Level of Service.

The intersection degree of saturation (DS) can also be used to measure the performance of isolated intersections. At intersections controlled by traffic signals, both queue length and delays increase rapidly as DS approaches 1.0. An upper limit of 0.9 is appropriate. When DS exceeds 0.8 - 0.85, overflow queues start to become a problem. Satisfactory intersection operation is generally achieved with a DS of about 0.7 - 0.8. (Note that these figures are based on isolated signalised intersections with cycle lengths of 120 seconds. In co-ordinated signal systems DS might be actively maximised at key intersections). Although in some situations additional traffic does not alter the Level of Service, particularly where the Level of Service is E or F, additional capacity may still be required. This is particularly appropriate for service level F, where small increases in flow can cause disproportionately greater increases in delay. In this situation, it is advisable to consider means of control to maintain the existing level of absolute delay. Suggested criteria for the evaluation of the capacity of signalised intersections based on the Degree of Saturation are summarised in Table C2.

Level of Service	Optimum Cycle Length (Seconds) (Co)	Volume/Saturation Y	Intersection Degree Of Saturation X
A/B - Very good operation	< 90	< 0.70	< 0.80
C - Satisfactory	90-120	0.70-0.80	0.80-0.85
D - Poor but manageable	120-140	0.80-0.85	0.85-0.90
E/F - Bad, extra capacity required	>140	>0.85	> 0.90

Table C2: Criteria for Evaluating Capacity Of Signalised Intersections*

* Source: Roads & Traffic Authority (2002)

Appendix D

Sidra Results

MOVEMENT SUMMARY

 Site: 1 [Norwest Boulevard / Solent Circuit (West) Existing AM Peak Hour]

14746 Norwest Business Park
Existing AM Peak Hour
Roundabout

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South: Reston Grange												
1	L2	187	2.0	0.740	17.7	LOS B	6.4	45.8	0.99	1.18	46.7	
2	T1	199	2.0	0.740	17.6	LOS B	6.4	45.8	0.98	1.18	48.0	
3	R2	259	2.0	0.740	27.5	LOS B	5.3	37.7	0.94	1.16	43.4	
3u	U	1	2.0	0.740	29.9	LOS C	5.3	37.7	0.94	1.16	44.3	
Approach		646	2.0	0.740	21.6	LOS B	6.4	45.8	0.97	1.17	45.6	
East: Norwest Boulevard												
4	L2	99	2.0	0.781	8.6	LOS A	10.3	73.6	0.88	0.89	52.2	
5	T1	1357	2.0	0.781	9.0	LOS A	10.3	73.6	0.89	0.92	53.3	
6	R2	218	2.0	0.781	15.6	LOS B	10.1	72.3	0.90	0.96	52.8	
6u	U	1	2.0	0.781	18.0	LOS B	10.1	72.3	0.90	0.96	54.2	
Approach		1675	2.0	0.781	9.8	LOS A	10.3	73.6	0.89	0.92	53.2	
North: Solent Circuit												
7	L2	59	2.0	0.239	9.5	LOS A	1.2	8.9	0.82	0.89	52.0	
8	T1	45	2.0	0.239	9.5	LOS A	1.2	8.9	0.82	0.89	53.6	
9	R2	266	2.0	0.421	14.6	LOS B	2.8	20.1	0.88	0.99	50.7	
9u	U	1	2.0	0.421	17.0	LOS B	2.8	20.1	0.88	0.99	51.9	
Approach		371	2.0	0.421	13.2	LOS A	2.8	20.1	0.87	0.96	51.2	
West: Norwest Boulevard												
10	L2	258	2.0	0.749	11.3	LOS A	8.6	61.3	0.93	1.10	50.8	
11	T1	911	2.0	0.749	12.3	LOS A	8.6	61.3	0.93	1.12	51.4	
12	R2	59	2.0	0.749	19.0	LOS B	8.1	57.7	0.94	1.13	51.0	
12u	U	7	2.0	0.749	21.4	LOS B	8.1	57.7	0.94	1.13	52.3	
Approach		1235	2.0	0.749	12.4	LOS A	8.6	61.3	0.93	1.12	51.3	
All Vehicles		3927	2.0	0.781	12.9	LOS A	10.3	73.6	0.91	1.03	51.0	

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akeelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

 Site: 1 [Norwest Boulevard / Solent Circuit (West) Existing PM Peak Hour]

14746 Norwest Business Park
Existing PM Peak Hour
Roundabout

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South: Reston Grange												
1	L2	123	2.0	0.309	9.8	LOS A	1.7	11.9	0.88	0.92	51.6	
2	T1	30	2.0	0.309	8.5	LOS A	1.9	13.5	0.88	0.94	51.6	
3	R2	156	2.0	0.309	14.0	LOS A	1.9	13.5	0.88	0.94	51.4	
3u	U	1	2.0	0.309	16.4	LOS B	1.9	13.5	0.88	0.94	52.8	
Approach		310	2.0	0.309	11.8	LOS A	1.9	13.5	0.87	0.93	51.5	
East: Norwest Boulevard												
4	L2	345	2.0	0.880	15.6	LOS B	13.6	96.5	1.00	1.31	48.0	
5	T1	1099	2.0	0.880	17.1	LOS B	13.6	96.5	1.00	1.33	48.3	
6	R2	27	2.0	0.880	24.2	LOS B	12.7	90.3	1.00	1.34	47.9	
6u	U	1	2.0	0.880	26.6	LOS B	12.7	90.3	1.00	1.34	49.1	
Approach		1472	2.0	0.880	16.9	LOS B	13.6	96.5	1.00	1.32	48.2	
North: Solent Circuit												
7	L2	81	2.0	0.784	26.6	LOS B	6.2	44.3	0.95	1.20	42.1	
8	T1	195	2.0	0.784	26.5	LOS B	6.2	44.3	0.95	1.20	43.1	
9	R2	291	2.0	0.559	18.7	LOS B	4.0	28.8	0.94	1.08	48.1	
9u	U	1	2.0	0.559	21.2	LOS B	4.0	28.8	0.94	1.08	49.2	
Approach		568	2.0	0.784	22.5	LOS B	6.2	44.3	0.95	1.14	45.4	
West: Norwest Boulevard												
10	L2	148	2.0	0.704	5.5	LOS A	8.2	58.3	0.75	0.57	53.0	
11	T1	1334	2.0	0.704	5.8	LOS A	8.4	59.6	0.77	0.61	54.2	
12	R2	176	2.0	0.704	12.1	LOS A	8.4	59.6	0.78	0.68	53.9	
12u	U	58	2.0	0.704	14.6	LOS B	8.4	59.6	0.78	0.68	55.4	
Approach		1716	2.0	0.704	6.7	LOS A	8.4	59.6	0.77	0.62	54.1	
All Vehicles		4066	2.0	0.880	13.0	LOS A	13.6	96.5	0.88	0.97	50.3	

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akeelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

 Site: 1 [Solent Circuit / Fairway Drive Existing AM Peak Hour]

14746 Norwest Business Park
Existing AM Peak Hour
Roundabout

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South: Fairway Drive												
1	L2	4	2.0	0.010	6.1	LOS A	0.1	0.4	0.54	0.58	52.1	
2	T1	2	2.0	0.010	6.4	LOS A	0.1	0.4	0.54	0.58	53.3	
3	R2	2	2.0	0.010	10.8	LOS A	0.1	0.4	0.54	0.58	53.2	
3u	U	1	2.0	0.010	12.8	LOS A	0.1	0.4	0.54	0.58	54.1	
Approach		9	2.0	0.010	8.0	LOS A	0.1	0.4	0.54	0.58	52.8	
East: Solent Circuit												
4	L2	9	2.0	0.110	6.3	LOS A	0.6	4.3	0.57	0.61	52.6	
5	T1	86	2.0	0.110	6.6	LOS A	0.6	4.3	0.57	0.61	53.7	
6	R2	5	2.0	0.110	11.0	LOS A	0.6	4.3	0.57	0.61	53.6	
6u	U	2	2.0	0.110	13.0	LOS A	0.6	4.3	0.57	0.61	54.5	
Approach		102	2.0	0.110	6.9	LOS A	0.6	4.3	0.57	0.61	53.6	
North: Fairway Drive												
7	L2	84	2.0	0.380	5.1	LOS A	2.4	17.4	0.42	0.63	51.6	
8	T1	46	2.0	0.380	5.4	LOS A	2.4	17.4	0.42	0.63	52.8	
9	R2	340	2.0	0.380	9.7	LOS A	2.4	17.4	0.42	0.63	52.6	
9u	U	1	2.0	0.380	11.7	LOS A	2.4	17.4	0.42	0.63	53.5	
Approach		471	2.0	0.380	8.5	LOS A	2.4	17.4	0.42	0.63	52.4	
West: Solent Circuit												
10	L2	40	2.0	0.133	4.0	LOS A	0.7	5.3	0.08	0.51	53.8	
11	T1	110	2.0	0.133	4.3	LOS A	0.7	5.3	0.08	0.51	55.1	
12	R2	35	2.0	0.133	8.7	LOS A	0.7	5.3	0.08	0.51	55.0	
12u	U	23	2.0	0.133	10.7	LOS A	0.7	5.3	0.08	0.51	55.9	
Approach		208	2.0	0.133	5.7	LOS A	0.7	5.3	0.08	0.51	54.9	
All Vehicles		790	2.0	0.380	7.5	LOS A	2.4	17.4	0.35	0.59	53.2	

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akcelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: 1 [Solent Circuit / Fairway Drive Existing PM Peak Hour]

14746 Norwest Business Park
Existing PM Peak Hour
Roundabout

Movement Performance - Vehicles												
Mov ID	OD	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South: Fairway Drive												
1	L2	22	2.0	0.063	6.0	LOS A	0.3	2.3	0.51	0.60	52.6	
2	T1	27	2.0	0.063	6.2	LOS A	0.3	2.3	0.51	0.60	53.9	
3	R2	11	2.0	0.063	10.6	LOS A	0.3	2.3	0.51	0.60	53.7	
3u	U	1	2.0	0.063	12.6	LOS A	0.3	2.3	0.51	0.60	54.7	
Approach		61	2.0	0.063	7.0	LOS A	0.3	2.3	0.51	0.60	53.4	
East: Solent Circuit												
4	L2	7	2.0	0.187	5.3	LOS A	1.0	7.3	0.43	0.56	52.8	
5	T1	162	2.0	0.187	5.5	LOS A	1.0	7.3	0.43	0.56	54.0	
6	R2	32	2.0	0.187	9.9	LOS A	1.0	7.3	0.43	0.56	53.9	
6u	U	7	2.0	0.187	11.9	LOS A	1.0	7.3	0.43	0.56	54.8	
Approach		208	2.0	0.187	6.4	LOS A	1.0	7.3	0.43	0.56	53.9	
North: Fairway Drive												
7	L2	14	2.0	0.111	5.4	LOS A	0.6	4.1	0.44	0.64	51.3	
8	T1	12	2.0	0.111	5.7	LOS A	0.6	4.1	0.44	0.64	52.5	
9	R2	92	2.0	0.111	10.0	LOS A	0.6	4.1	0.44	0.64	52.3	
9u	U	1	2.0	0.111	12.0	LOS A	0.6	4.1	0.44	0.64	53.2	
Approach		119	2.0	0.111	9.1	LOS A	0.6	4.1	0.44	0.64	52.2	
West: Solent Circuit												
10	L2	172	2.0	0.314	4.4	LOS A	2.0	14.4	0.27	0.54	53.0	
11	T1	127	2.0	0.314	4.7	LOS A	2.0	14.4	0.27	0.54	54.2	
12	R2	27	2.0	0.314	9.1	LOS A	2.0	14.4	0.27	0.54	54.1	
12u	U	108	2.0	0.314	11.1	LOS A	2.0	14.4	0.27	0.54	55.0	
Approach		434	2.0	0.314	6.5	LOS A	2.0	14.4	0.27	0.54	53.9	
All Vehicles		822	2.0	0.314	6.9	LOS A	2.0	14.4	0.36	0.56	53.6	

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akcelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1 [Norwest Boulevard / Solent Circuit (East) Existing AM Peak Hour]

14746 Norwest Business Park
Existing AM Peak Hour
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
East: Norwest Boulevard												
5	T1	1607	2.0	0.417	0.0	LOS A	0.0	0.0	0.00	0.00	59.9	
6	R2	267	2.0	0.640	20.5	LOS B	3.8	27.0	0.87	1.15	32.2	
Approach		1874	2.0	0.640	3.0	NA	3.8	27.0	0.12	0.16	56.0	
North: Solent Circuit (East)												
7	L2	124	2.0	0.274	13.4	LOS A	1.1	7.5	0.73	0.91	38.0	
Approach		124	2.0	0.274	13.4	LOS A	1.1	7.5	0.73	0.91	38.0	
West: Norwest Boulevard												
10	L2	145	2.0	0.265	5.6	LOS A	0.0	0.0	0.00	0.17	55.0	
11	T1	899	2.0	0.265	0.0	LOS A	0.0	0.0	0.00	0.07	59.2	
Approach		1014	2.0	0.265	0.8	NA	0.0	0.0	0.00	0.08	58.7	
All Vehicles		3012	2.0	0.640	2.7	NA	3.8	27.0	0.11	0.17	56.3	

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akcelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: 1 [Norwest Boulevard / Solent Circuit (East) Existing PM Peak Hour]

14746 Norwest Business Park
Existing PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD	Demand Flows	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed	
		Total veh/h	%	v/c	sec		veh	m		per veh	km/h	
East: Norwest Boulevard												
5	T1	1228	2.0	0.319	0.0	LOS A	0.0	0.0	0.00	0.00	59.9	
6	R2	62	2.0	0.300	26.0	LOS B	1.0	7.4	0.89	0.99	29.0	
Approach		1290	2.0	0.319	1.3	NA	1.0	7.4	0.04	0.05	56.3	
North: Solent Circuit												
7	L2	320	2.0	1.067	105.9	LOS F	21.6	153.8	1.00	2.64	11.6	
Approach		320	2.0	1.067	105.9	LOS F	21.6	153.8	1.00	2.64	11.6	
West: Norwest Boulevard												
10	L2	42	2.0	0.367	5.6	LOS A	0.0	0.0	0.00	0.04	56.7	
11	T1	1370	2.0	0.367	0.0	LOS A	0.0	0.0	0.00	0.02	59.7	
Approach		1412	2.0	0.367	0.2	NA	0.0	0.0	0.00	0.02	59.6	
All Vehicles		3022	2.0	1.067	11.9	NA	21.6	153.8	0.12	0.31	47.5	

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik MSD).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: 1 [Windors Road / Norwest Boulevard Existing AM Peak Hour]

14746 - Norwest Business Park
Existing AM Peak Hour
Signals - Fixed Time Isolated Cycle Time = 100 seconds (Practical Cycle Time)

Movement Performance - Vehicles												
Mov ID	OD	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South: Windsor Road												
1	L2	1140	2.0	0.876	34.5	LOS C	22.1	157.1	1.00	0.96	38.0	
2	T1	443	2.0	0.485	36.1	LOS C	9.4	67.1	0.91	0.76	37.8	
Approach		1583	2.0	0.876	35.0	LOS C	22.1	157.1	0.98	0.90	38.0	
NorthEast: Bus Lane (North)												
24a	L1	6	100.0	0.006	7.4	LOS A	0.1	0.8	0.23	0.54	51.6	
Approach		6	100.0	0.006	7.4	LOS A	0.1	0.8	0.23	0.54	51.6	
North: Windsor Road												
8	T1	1031	2.0	0.319	3.4	LOS A	7.2	51.2	0.32	0.28	56.9	
9	R2	1505	2.0	0.887	38.9	LOS C	30.5	217.4	0.99	1.06	36.5	
Approach		2536	2.0	0.887	24.4	LOS B	30.5	217.4	0.72	0.74	42.7	
West: Norwest Boulevard												
10	L2	340	2.0	0.133	12.7	LOS A	3.1	22.1	0.41	0.66	49.1	
12	R2	497	2.0	0.840	60.8	LOS E	8.9	63.7	1.00	0.95	29.8	
Approach		837	2.0	0.840	41.3	LOS C	8.9	63.7	0.76	0.83	35.5	
All Vehicles		4962	2.1	0.887	30.6	LOS C	30.5	217.4	0.81	0.81	39.8	

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik MSD).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians							
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian Distance ped	Prop. Queued	Effective Stop Rate per ped
P1S	South Slip/Bypass Lane Crossing	53	11.0	LOS B	0.1	0.1	0.65
P3	North Full Crossing	53	44.3	LOS E	0.1	0.1	0.94
P4	West Full Crossing	53	44.3	LOS E	0.1	0.1	0.94
P4S	West Slip/Bypass Lane Crossing	53	32.9	LOS D	0.1	0.1	0.81
All Pedestrians		211	33.1	LOS D		0.84	0.84

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 1 [Windsor Road / Norwest Boulevard Existing PM Peak Hour]

14746 - Norwest Business Park
Existing PM Peak Hour
Signals - Fixed Time Isolated Cycle Time = 70 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Deg. Satn HV % v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South: Windsor Road											
1	L2	470	2.0	0.203	13.9	LOS A	3.7	26.7	0.50	0.72	53.5
2	T1	1056	2.0	0.891	37.0	LOS C	21.7	154.2	1.00	1.07	41.1
Approach		1526	2.0	0.891	29.9	LOS C	21.7	154.2	0.85	0.96	44.3
NorthEast: Bus Lane (North)											
24a	L1	6	2.0	0.005	10.8	LOS A	0.1	0.5	0.40	0.59	55.9
Approach		6	2.0	0.005	10.8	LOS A	0.1	0.5	0.40	0.59	55.9
North: Windsor Road											
8	T1	535	2.0	0.210	6.4	LOS A	4.0	28.5	0.47	0.40	62.5
9	R2	837	2.0	0.874	43.5	LOS D	16.7	119.2	1.00	1.00	37.4
Approach		1372	2.0	0.874	29.0	LOS C	16.7	119.2	0.79	0.77	44.4
West: Norwest Boulevard											
10	L2	1133	2.0	0.529	16.7	LOS B	12.4	88.4	0.69	0.78	48.4
12	R2	1112	2.0	0.877	44.0	LOS D	14.9	106.4	1.00	1.02	35.5
Approach		2245	2.0	0.877	30.2	LOS C	14.9	106.4	0.84	0.90	41.0
All Vehicles		5149	2.0	0.891	29.8	LOS C	21.7	154.2	0.83	0.88	42.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Level of Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1S	South Slip/Bypass Lane Crossing	53	23.3	LOS C	0.1	0.1	0.82	0.82
P3	North Full Crossing	53	29.3	LOS C	0.1	0.1	0.92	0.92
P4	West Full Crossing	53	29.3	LOS C	0.1	0.1	0.92	0.92
P4S	West Slip/Bypass Lane Crossing	53	20.9	LOS C	0.1	0.1	0.77	0.77
All Pedestrians		211	25.7	LOS C			0.86	0.86

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1 [Norwest Boulevard / Solent Circuit (West) Future AM Peak Hour]

14746 Norwest Business Park
Future AM Peak Hour
Signals - Fixed Time Isolated Cycle Time = 70 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD	Demand Flows	Deg.	Average	Level of	95% Back of	Queue	Prop.	Effective	Average	
Mov	OD	Total HV	Satn	Delay	Service	Vehicles	Distance	Queued	Stop Rate	Speed	
		veh/h	v/c	sec		veh	m		per veh	km/h	
South: Reston Grange											
1	L2	187	2.0	0.199	11.9	LOS A	2.7	19.4	0.54	0.70	49.5
2	T1	247	2.0	0.791	33.4	LOS C	8.8	63.0	0.98	0.93	39.0
3	R2	259	2.0	0.735	37.7	LOS C	9.1	64.8	1.00	0.89	36.9
Approach		693	2.0	0.791	29.2	LOS C	9.1	64.8	0.87	0.85	40.4
East: Norwest Boulevard (East)											
4	L2	99	2.0	0.065	6.6	LOS A	0.5	3.4	0.24	0.61	53.3
5	T1	1357	2.0	0.804	29.0	LOS C	16.8	119.8	0.98	0.94	40.8
6	R2	272	2.0	0.743	37.7	LOS C	9.6	68.2	1.00	0.90	36.8
Approach		1728	2.0	0.804	29.1	LOS C	16.8	119.8	0.94	0.92	40.6
North: Solent Circuit											
7	L2	59	2.0	0.059	10.7	LOS A	0.7	5.3	0.46	0.65	50.4
8	T1	50	2.0	0.260	33.3	LOS C	1.7	11.9	0.96	0.71	39.0
9	R2	287	2.0	0.784	44.1	LOS D	5.4	38.8	1.00	0.92	34.7
Approach		396	2.0	0.784	37.8	LOS C	5.4	38.8	0.92	0.85	36.9
West: Norwest Boulevard (West)											
10	L2	394	2.0	0.203	5.7	LOS A	0.0	0.0	0.00	0.53	54.8
11	T1	911	2.0	0.801	34.1	LOS C	11.2	79.4	1.00	0.96	38.6
12	R2	66	2.0	0.397	40.7	LOS C	2.3	16.4	0.98	0.75	35.8
Approach		1371	2.0	0.801	26.2	LOS B	11.2	79.4	0.71	0.82	42.0
All Vehicles		4188	2.0	0.804	29.0	LOS C	16.8	119.8	0.85	0.87	40.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Level of Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	29.3	LOS C	0.1	0.1	0.92	0.92
P2	East Full Crossing	53	29.3	LOS C	0.1	0.1	0.92	0.92
P3	North Full Crossing	53	29.3	LOS C	0.1	0.1	0.92	0.92
All Pedestrians		158	29.3	LOS C			0.92	0.92

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1 [Norwest Boulevard / Solent Circuit (West) Future PM Peak Hour]

14746 Norwest Business Park
Future PM Peak Hour
Signals - Fixed Time Isolated Cycle Time = 60 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows	Deg. Satn	Average Delay	Level of Service	95% Back of Queue	Effective Stop Rate	Average Speed			
ID	Mov	Total HV %	v/c	sec		Vehicles veh	per veh	km/h			
South: Reston Grange											
1	L2	173	2.0	0.190	10.9	LOS A	2.1	15.0	0.55	0.70	50.2
2	T1	57	2.0	0.554	30.1	LOS C	3.3	23.3	0.99	0.79	39.2
3	R2	156	2.0	0.554	35.8	LOS C	3.3	23.3	0.99	0.79	37.9
Approach		386	2.0	0.554	23.8	LOS B	3.3	23.3	0.79	0.75	42.8
East: Norwest Boulevard (East)											
4	L2	345	2.0	0.287	9.7	LOS A	3.8	27.4	0.51	0.70	51.0
5	T1	1099	2.0	0.859	31.4	LOS C	14.1	100.5	0.98	1.03	39.7
6	R2	57	2.0	0.289	34.5	LOS C	1.7	11.8	0.96	0.74	38.1
Approach		1501	2.0	0.859	26.5	LOS B	14.1	100.5	0.87	0.94	41.8
North: Solent Circuit											
7	L2	81	2.0	0.083	10.3	LOS A	0.9	6.5	0.49	0.66	50.6
8	T1	230	2.0	0.881	36.3	LOS C	8.1	57.7	1.00	1.06	37.8
9	R2	345	2.0	0.628	33.6	LOS C	5.1	36.5	0.99	0.83	38.5
Approach		656	2.0	0.881	31.7	LOS C	8.1	57.7	0.93	0.89	39.4
West: Norwest Boulevard (West)											
10	L2	163	2.0	0.084	5.6	LOS A	0.0	0.0	0.00	0.53	54.9
11	T1	1334	2.0	0.872	32.0	LOS C	15.4	109.9	1.00	1.07	39.4
12	R2	176	2.0	0.777	38.0	LOS C	5.7	40.6	1.00	0.92	36.7
Approach		1673	2.0	0.872	30.1	LOS C	15.4	109.9	0.90	1.00	40.2
All Vehicles		4216	2.0	0.881	28.5	LOS B	15.4	109.9	0.89	0.94	40.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Queue m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
P2	East Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
P3	North Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
All Pedestrians		158	24.4	LOS C			0.90	0.90

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1 [Solent Circuit / Fairway Drive Future AM Peak Hour]

14746 Norwest Business Park
Future AM Peak Hour
Roundabout

Movement Performance - Vehicles													
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h		
South: Fairway Drive													
1	L2	4	2.0	0.010	6.3	LOS A	0.1	0.4	0.56	0.58	52.0		
2	T1	2	2.0	0.010	6.5	LOS A	0.1	0.4	0.56	0.58	53.2		
3	R2	2	2.0	0.010	10.9	LOS A	0.1	0.4	0.56	0.58	53.1		
3u	U	1	2.0	0.010	12.9	LOS A	0.1	0.4	0.56	0.58	54.0		
Approach		9	2.0	0.010	8.1	LOS A	0.1	0.4	0.56	0.58	52.7		
East: Solent Circuit													
4	L2	9	2.0	0.116	6.7	LOS A	0.7	4.7	0.61	0.64	52.4		
5	T1	86	2.0	0.116	6.9	LOS A	0.7	4.7	0.61	0.64	53.5		
6	R2	5	2.0	0.116	11.3	LOS A	0.7	4.7	0.61	0.64	53.4		
6u	U	2	2.0	0.116	13.3	LOS A	0.7	4.7	0.61	0.64	54.3		
Approach		102	2.0	0.116	7.2	LOS A	0.7	4.7	0.61	0.64	53.4		
North: Fairway Drive													
7	L2	84	2.0	0.425	5.5	LOS A	2.8	20.2	0.50	0.65	51.5		
8	T1	75	2.0	0.425	5.8	LOS A	2.8	20.2	0.50	0.65	52.6		
9	R2	340	2.0	0.425	10.1	LOS A	2.8	20.2	0.50	0.65	52.5		
9u	U	1	2.0	0.425	12.2	LOS A	2.8	20.2	0.50	0.65	53.3		
Approach		500	2.0	0.425	8.7	LOS A	2.8	20.2	0.50	0.65	52.3		
West: Solent Circuit													
10	L2	57	2.0	0.174	4.0	LOS A	1.0	7.2	0.08	0.52	53.7		
11	T1	134	2.0	0.174	4.3	LOS A	1.0	7.2	0.08	0.52	54.9		
12	R2	35	2.0	0.174	8.7	LOS A	1.0	7.2	0.08	0.52	54.8		
12u	U	49	2.0	0.174	10.7	LOS A	1.0	7.2	0.08	0.52	55.7		
Approach		275	2.0	0.174	5.9	LOS A	1.0	7.2	0.08	0.52	54.8		
All Vehicles		886	2.0	0.425	7.7	LOS A	2.8	20.2	0.38	0.61	53.2		

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1 [Solent Circuit / Fairway Drive Future PM Peak Hour]

14746 Norwest Business Park
Future PM Peak Hour
Roundabout

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total HV veh/h	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h		
South: Fairway Drive												
1	L2	22	2.0	0.068	6.5	LOS A	0.4	2.5	0.56	0.63	52.3	
2	T1	27	2.0	0.068	6.8	LOS A	0.4	2.5	0.56	0.63	53.5	
3	R2	11	2.0	0.068	11.2	LOS A	0.4	2.5	0.56	0.63	53.4	
3u	U	1	2.0	0.068	13.2	LOS A	0.4	2.5	0.56	0.63	54.3	
Approach		61	2.0	0.068	7.6	LOS A	0.4	2.5	0.56	0.63	53.1	
East: Solent Circuit												
4	L2	7	2.0	0.201	5.8	LOS A	1.1	8.0	0.51	0.61	52.5	
5	T1	162	2.0	0.201	6.1	LOS A	1.1	8.0	0.51	0.61	53.6	
6	R2	32	2.0	0.201	10.5	LOS A	1.1	8.0	0.51	0.61	53.5	
6u	U	7	2.0	0.201	12.5	LOS A	1.1	8.0	0.51	0.61	54.4	
Approach		208	2.0	0.201	7.0	LOS A	1.1	8.0	0.51	0.61	53.6	
North: Fairway Drive												
7	L2	14	2.0	0.131	6.4	LOS A	0.7	5.1	0.56	0.70	50.9	
8	T1	16	2.0	0.131	6.6	LOS A	0.7	5.1	0.56	0.70	52.1	
9	R2	92	2.0	0.131	11.0	LOS A	0.7	5.1	0.56	0.70	51.9	
9u	U	1	2.0	0.131	13.0	LOS A	0.7	5.1	0.56	0.70	52.8	
Approach		123	2.0	0.131	9.9	LOS A	0.7	5.1	0.56	0.70	51.8	
West: Solent Circuit												
10	L2	184	2.0	0.432	4.5	LOS A	3.2	23.1	0.31	0.55	52.6	
11	T1	201	2.0	0.432	4.8	LOS A	3.2	23.1	0.31	0.55	53.8	
12	R2	27	2.0	0.432	9.1	LOS A	3.2	23.1	0.31	0.55	53.6	
12u	U	197	2.0	0.432	11.1	LOS A	3.2	23.1	0.31	0.55	54.5	
Approach		609	2.0	0.432	6.9	LOS A	3.2	23.1	0.31	0.55	53.6	
All Vehicles		1001	2.0	0.432	7.4	LOS A	3.2	23.1	0.40	0.58	53.4	

Site Level of Service (LOS) Method: Delay (RTA NSW), Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akcelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: 1 [Norwest Boulevard / Solent Circuit (East) Future AM Peak Hour]

14746 Norwest Business Park
Future AM Peak Hour
Signals - Fixed Time Isolated Cycle Time = 50 seconds (Practical Cycle Time)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total HV veh/h	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h		
East: Norwest Boulevard												
5	T1	1661	2.0	0.744	9.7	LOS A	16.1	114.8	0.80	0.75	50.3	
6	R2	267	2.0	0.608	30.6	LOS C	3.4	24.4	0.99	0.82	26.6	
Approach		1928	2.0	0.744	12.6	LOS A	16.1	114.8	0.82	0.76	47.0	
North: Solent Circuit (East)												
7	L2	148	2.0	0.206	17.7	LOS B	2.5	18.1	0.73	0.74	34.4	
9	R2	176	2.0	0.491	26.6	LOS B	4.1	29.1	0.94	0.79	34.4	
Approach		324	2.0	0.491	22.5	LOS B	4.1	29.1	0.85	0.77	34.4	
West: Norwest Boulevard												
10	L2	145	2.0	0.283	21.3	LOS B	2.9	20.4	0.82	0.76	37.1	
11	T1	869	2.0	0.664	16.1	LOS B	9.5	67.9	0.91	0.80	45.4	
Approach		1014	2.0	0.664	16.9	LOS B	9.5	67.9	0.90	0.80	44.3	
All Vehicles		3266	2.0	0.744	14.9	LOS B	16.1	114.8	0.85	0.77	45.0	

Site Level of Service (LOS) Method: Delay (RTA NSW), Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akcelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Level of Average Back of Queue Service Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	53	19.4	LOS B	0.1	0.1	0.88	0.88
P3	North Full Crossing	53	19.4	LOS B	0.1	0.1	0.88	0.88
All Pedestrians		105	19.4	LOS B			0.88	0.88

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 1 [Norwest Boulevard / Solent Circuit (East) Future PM Peak Hour]

14746 Norwest Business Park
Future PM Peak Hour
Signals - Fixed Time Isolated Cycle Time = 70 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Deg. Satn HV %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
East: Norwest Boulevard											
5	T1	1198	2.0	0.445	4.9 LOS A	8.9	63.0	0.47	0.42	54.7	
6	R2	47	2.0	0.150	39.6 LOS C	0.8	5.6	0.96	0.70	23.1	
Approach		1245	2.0	0.445	6.2 LOS A	8.9	63.0	0.49	0.43	53.2	
North: Solent Circuit (East)											
7	L2	294	2.0	0.574	30.6 LOS C	9.0	63.9	0.92	0.82	26.8	
9	R2	138	2.0	0.539	38.1 LOS C	4.7	33.2	0.98	0.79	29.3	
Approach		432	2.0	0.574	33.0 LOS C	9.0	63.9	0.94	0.81	27.7	
West: Norwest Boulevard											
10	L2	29	2.0	0.033	15.6 LOS B	0.5	3.6	0.54	0.67	40.9	
11	T1	1783	2.0	0.876	25.1 LOS B	33.4	238.1	0.95	1.02	40.0	
Approach		1812	2.0	0.876	25.0 LOS B	33.4	238.1	0.94	1.01	40.0	
All Vehicles		3489	2.0	0.876	19.3 LOS B	33.4	238.1	0.78	0.78	42.5	

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik MSD).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Level of Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	53	29.3	LOS C	0.1	0.1	0.92	0.92
P3	North Full Crossing	53	29.3	LOS C	0.1	0.1	0.92	0.92
All Pedestrians		105	29.3	LOS C			0.92	0.92

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 1 [Windors Road / Norwest Boulevard Future AM Peak Hour]

14746 - Norwest Business Park
Future AM Peak Hour
Signals - Fixed Time Isolated Cycle Time = 110 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD	Demand Flows Total veh/h	Deg. HV %	Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per/veh	Average Speed km/h
South: Windsor Road											
1	L2	1159	2.0	0.851	33.0	LOS C	23.3	165.7	0.99	0.93	38.7
2	T1	443	2.0	0.435	37.9	LOS C	10.1	71.8	0.89	0.74	37.1
Approach		1602	2.0	0.851	34.3	LOS C	23.3	165.7	0.96	0.88	38.2
NorthEast: Bus Lane (North)											
24a	L1	6	100.0	0.006	7.4	LOS A	0.1	0.9	0.22	0.54	51.6
Approach		6	100.0	0.006	7.4	LOS A	0.1	0.9	0.22	0.54	51.6
North: Windsor Road											
8	T1	1031	2.0	0.314	3.4	LOS A	7.5	53.4	0.30	0.27	56.9
9	R2	1540	2.0	0.895	42.7	LOS D	35.4	252.1	1.00	1.07	35.1
Approach		2571	2.0	0.895	26.9	LOS B	35.4	252.1	0.72	0.75	41.5
West: Norwest Boulevard											
10	L2	351	2.0	0.138	13.6	LOS A	3.6	25.5	0.41	0.67	48.5
12	R2	510	2.0	0.862	67.2	LOS E	10.2	72.5	1.00	0.96	28.4
Approach		861	2.0	0.862	45.4	LOS D	10.2	72.5	0.76	0.84	34.2
All Vehicles		5040	2.1	0.895	32.4	LOS C	35.4	252.1	0.80	0.81	39.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik MSD).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Level of Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1S	South Slip/Bypass Lane Crossing	53	11.7	LOS B	0.1	0.1	0.64	0.64
P3	North Full Crossing	53	49.3	LOS E	0.2	0.2	0.95	0.95
P4	West Full Crossing	53	48.3	LOS E	0.2	0.2	0.94	0.94
P4S	West Slip/Bypass Lane Crossing	53	34.5	LOS D	0.1	0.1	0.79	0.79
All Pedestrians		211	36.0	LOS D			0.83	0.83

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Organisation: TRAFFIC DESIGN GROUP LTD (TDG) | Processed: Tuesday, 6 June 2017 3:41:08 PM
Project: C:\Users\tonquerni\Dropbox (TDG)\Australia Business\Australia_Jobs\14500 - 14999\14746 - Capital Corporation Burbank Place Office Redevelopment\SIDRA\14746 Norwest Master File.sip7

MOVEMENT SUMMARY

Site: 1 [Windsor Road / Norwest Boulevard Future PM Peak Hour]

14746 - Norwest Business Park

Future PM Peak Hour

Signals - Fixed Time Isolated Cycle Time = 70 seconds (User-Given Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Deg. Satn %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South: Windsor Road											
1	L2	486	2.0	0.210	LOS A	3.9	27.7	0.50	0.70	48.9	
2	T1	1056	2.0	0.891	LOS C	21.7	154.2	1.00	1.10	37.5	
Approach		1542	2.0	0.891	29.4 LOS C	21.7	154.2	0.84	0.97	40.5	
NorthEast: Bus Lane (North)											
24a	L1	6	100.0	0.008	LOS A	0.1	1.0	0.40	0.57	49.5	
Approach		6	100.0	0.008	LOS A	0.1	1.0	0.40	0.57	49.5	
North: Windsor Road											
8	T1	549	2.0	0.216	LOS A	4.1	29.4	0.47	0.40	54.4	
9	R2	872	2.0	0.910	LOS D	18.8	134.0	1.00	1.08	33.6	
Approach		1421	2.0	0.910	31.7 LOS C	18.8	134.0	0.80	0.82	39.4	
West: Norwest Boulevard											
10	L2	1169	2.0	0.546	LOS B	13.0	92.5	0.70	0.79	46.5	
12	R2	1147	2.0	0.905	LOS D	16.3	115.8	1.00	1.06	33.4	
Approach		2316	2.0	0.905	32.1 LOS C	16.3	115.8	0.85	0.92	39.0	
All Vehicles		5285	2.1	0.910	31.2 LOS C	21.7	154.2	0.83	0.91	39.5	

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians											
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Level of Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped			
P1S	South Slip/Bypass Lane Crossing	53	23.3	LOS C	0.1	0.1	0.82	0.82			
P3	North Full Crossing	53	29.3	LOS C	0.1	0.1	0.92	0.92			
P4	West Full Crossing	53	29.3	LOS C	0.1	0.1	0.92	0.92			
P4S	West Slip/Bypass Lane Crossing	53	20.9	LOS C	0.1	0.1	0.77	0.77			
All Pedestrians		211	25.7	LOS C			0.86	0.86			

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.



Capital Bluestone
Burbank Place

Green Travel Plan

May 2018

Capital Bluestone
Burbank Place

Green Travel Plan
Quality Assurance Statement

Prepared by:
Michael Willson
Senior Associate / NSW Branch
Manager

Reviewed by:
Fred Gennaoui
Principal Consultant

Approved for Issue by:
Michael Willson
Senior Associate / NSW Branch
Manager
Status: Final report
Date: 23 May 2018



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1. Introduction

Capital Bluestone proposes to redevelop the existing commercial buildings located at 2-4 Burbank Place, within the Norwest Business Park. Capital Bluestone is proposing to proceed with a redevelopment of the site requiring the replacement of No.4 Burbank Place building with a tower office building to provide a total of 34,900m² GFA of office space and 1,210 car spaces for the two buildings.

The site of the proposed developments is shown in **Figure 1**.



Figure 1: Site Location of the Burbank Place Development

The purpose of this document is to establish the framework, objectives, targets, structure and systems for an operational Green Travel Plan for the site and associated development. The Green Travel Plan is structured as follows:

- Description of the existing sustainable transport facilities and services;
- The Aim of the travel plan;
- Outlining of the Targets;
- Actions to be implemented;
- Strategy for promoting and marketing the actions;
- Commitment and resources;
- Monitoring and review; and
- Governance and support.

The Green Travel Plan Initiatives are set out in the following sections.

2. Existing Sustainable Transport Options

The site has excellent access to sustainable transport facilities in the vicinity of the site, including bus services and walking and cycling facilities. In addition, the Norwest Train Station is currently under construction and is scheduled for completion before March 2019. The following discusses the existing and future facilities and services available to users of the site.

2.1 Train

The Norwest Station will be located in the Norwest Business Park, at the corner of Norwest Boulevard and Brookhollow Avenue, approximately 550 metres walking distance from the site, if walking through the Hillsong site. The station is being built as part of Transport for NSW Sydney Metro project, which is planned to eventually serve metros to the Sydney CBD, Bankstown and Hurstville as part of the government's 20-year Sydney's Rail Future strategy. Accordingly, the addition of train services within the vicinity of the site will provide excellent access to the wider Sydney area.

2.2 Buses

Bus stops are located on both sides of Norwest Boulevard, between Solent Circuit and Century Circuit, within 550 metres walking distance from the subject site. The locations of the bus stops are shown in **Figure 2**, with the and the bus network map shown in **Figure 3**. The bus services and the frequency of the services is provided within **Table 1**.

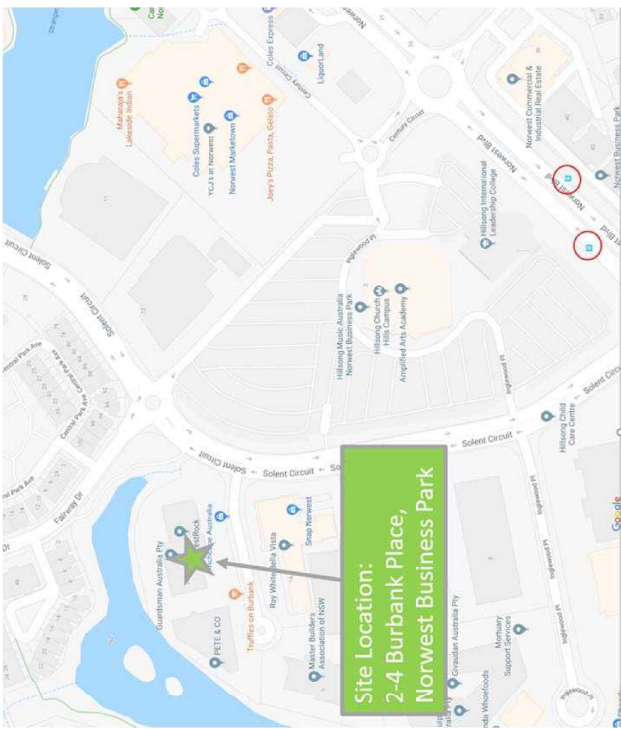


Figure 2: Bus Stop Locations



Figure 3: Hillsbus (Northern Western Sydney) Network Map

Bus Route No.	Bus Route	Frequency
618x	City to Norwest Business Park	Every 15 minutes in peak periods, and every 40 minutes during off-peak periods
628	Norwest to Chatswood	Every 15 minutes in peak periods, and every 40 minutes during off-peak periods
745	St Marys to Castle Hill	Every 12 to 25 minutes in peak periods, and up to 32 minutes during off-peak periods
T62	Castle Hill to Parramatta	Every 12 to 25 minutes in peak periods, and up to 32 minutes during off-peak periods
T64	Rouse Hill Town Centre to Parramatta	Every 40 to 50 minutes in peak periods, and every 60 minutes during off-peak periods
T70	Blacktown to Castle Hill	Every 40 to 50 minutes in peak periods, and every 60 minutes during off-peak periods

Table 1: Available Bus Services

2.3 Walking and Cycling

The site has excellent walking facilities, with footpaths provided on both sides of all roads within the vicinity of the site.

Figure 4 shows the existing cycle routes in the vicinity of the site, and highlights that there are no on or off-road cycle routes provided along Solent Circuit. However, the wide lane widths on the surrounding roads provide a safe cycling environment.

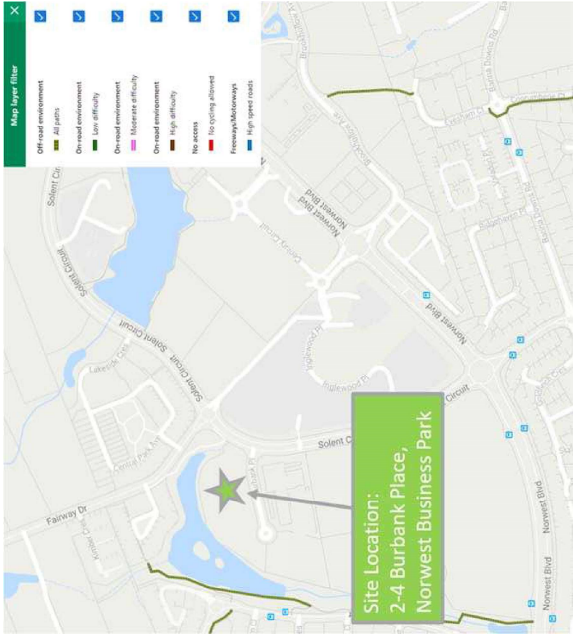


Figure 4: RMS Cycle routes

2.4 Car Share Spaces

It is noted that two car share spaces are currently provided at N° 2 Burbank Place adjacent to the site. Car share spaces are a model of car rental where people rent cars for short periods of time. Drivers are able to book the car online and then access the vehicle using an access card. It is an attractive form of transport for customers who make only occasional use of a vehicle, as well as others who would like occasional access to a vehicle of a different type than they use day-to-day.