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Site 9, Sydney Olympic Park

For Ecove Group

Traffic and Parking Assessment

For the attention of: Michael Azar

21 July 2016



Document Control

Our Reference: T2-1578, Site 9, Sydney Olympic Park, Traffic and Parking Assessment

ISSUE	DATE	ISSUE DETAILS	AUTHOR	REVIEWED
1	12/02/2016	Work In Progress	SW	SC
2	02/03/2016	Final Draft	SW	SC
3	03/03/2016	Final Report	SW	SC
4	07/03/2016	Revised Final Report	SW	SC
5	04/04/2016	Revised Final Report	SW	SC
6	12/07/2016	Revised Final Report	SW	AM
7	21/07/2016	Final Report (update)	SW	AM

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1 Introduction

1.1 Project Summary

Parking and Traffic Consultants have been engaged by Ecove Group to prepare a parking and traffic assessment. This assessment is pursuant to a development application to Sydney Olympic Park Authority for the construction of 39 storey mixed use development, consisting of 229 residential apartments, 2540m² of commercial GFA, 150m² of retail GFA and 915m² of Retail/Club GFA, including five (5) levels of above ground car parking, located on the site known as Site 9, Sydney Olympic Park.

The location of the site is shown in Figure 1

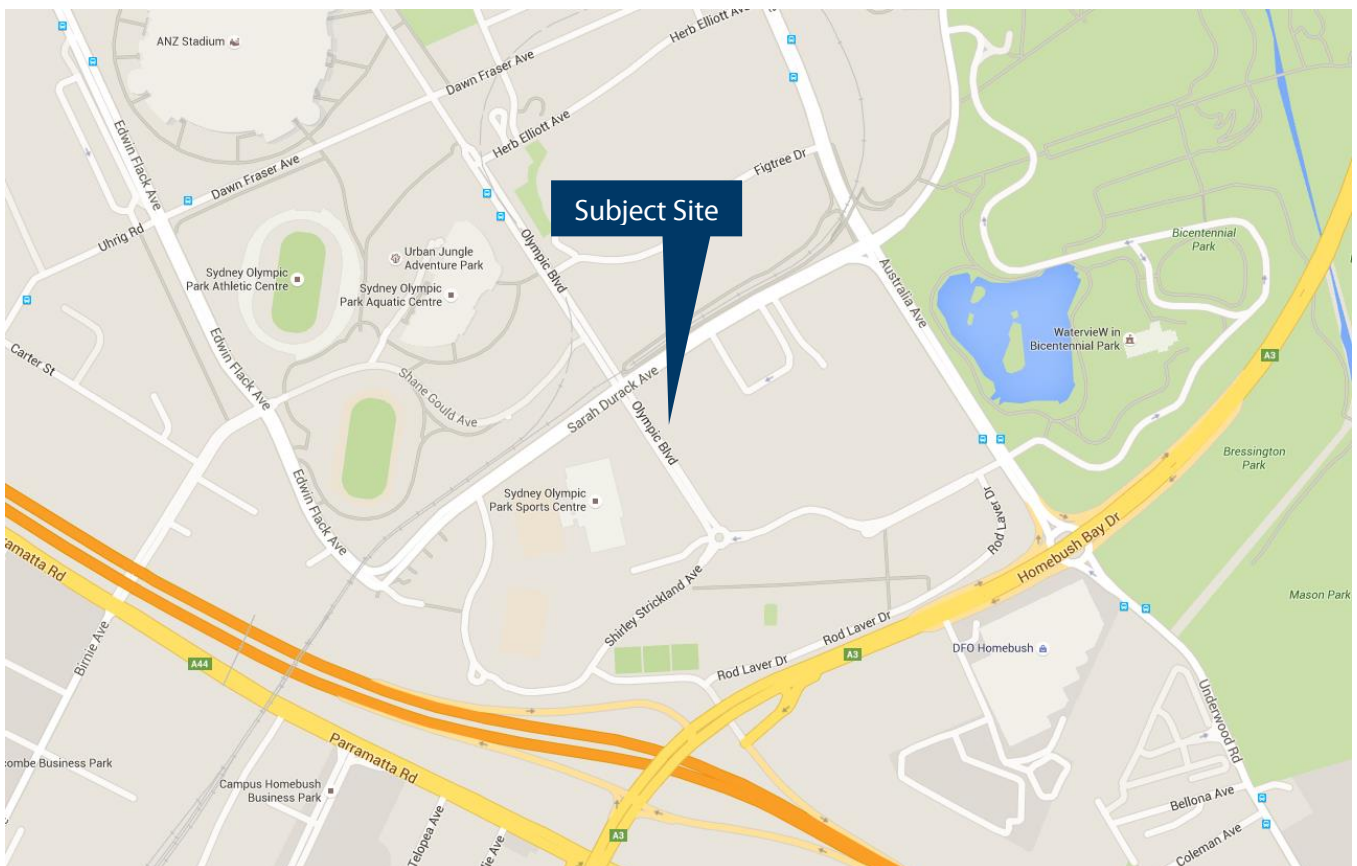


Figure 1 – Site Location

1.2 Purpose of this Report

This report presents the following considerations in relation to the Traffic and Parking Assessment of the proposal;

- Section 2 -* A description of the project,
- Section 3 -* A description of the road network serving the development property,
- Section 4 -* Determination of the traffic activity associated with the development proposal, and the adequacy of the surrounding road network,
- Section 5 -* Assessment of the proposed parking provision in the context of the relevant planning control requirements,
- Section 6 -* Assessment of the proposed car park, vehicular access and internal circulation arrangements in relation to compliance with the relevant standards, and
- Section 7 -* Review of the impacts to the development due to special events within the Sydney Olympic Park
- Section 8 -* Conclusion

1.3 Summary of Response to Secretary's Environmental Assessment Requirements (SEARs)

Table 1 – Secretary's Environmental Assessment Requirements

No.	SEARs Key Issues - Transport Report	Comments and References
Item 9 - Transport and Accessibility		
Item 9.1	Details existing public transport, pedestrian and cycle movements, routes and facilities within the vicinity of the site, including access to Olympic Park railway station and bus layovers.	The existing public transport and cycle options are outlined in Section 3.3 and consist of two (2) bus stands providing services to Parramatta, Burwood and Lidcombe, Olympic Park Rail Station providing access to the T7 – Olympic Park Line and the cycle network within Olympic Park which provides access to public transport, the local area and the wider Sydney cycle network.
Item 9.2	Determine the adequacy of existing and future transport facilities to meet the likely increase in public transport, pedestrian and cycle demands and identify measures to maintain road safety in line with CPTED principles.	The existing public transport cycle options are outlined in Section 3.3 and consist of two (2) bus stands providing services to Parramatta, Burwood and Lidcombe, Olympic Park Rail Station providing access to the T7 – Olympic Park Line and the cycle network within Olympic Park which provides access to public transport, the local area and the wider Sydney cycle network. The existing transport facilities are deemed to be adequate to accommodate any increase in demands.
Item 9.3	Identify measures to promote travel choices for residents, employees and visitors that support sustainable travel, such as implementing a location specific sustainable travel plan, green travel plans and provision of end of trip facilities.	As outlined in Section 3.3, sustainable travel options are available within close proximity of the site, which includes train and bus services and cycle facilities. End of trip facilities such as showers are provided within the building for the use for staff in the commercial/retail area. As outlined in Section 6 , a 'Travel Access Guide' to advise residents, employees and visitors of the sustainable transport options available to access the development.
Item 9.4	Provide details of the total daily and peak hour trips generated by the proposed development, including accurate details of the current and future daily vehicle movements and assess the impacts of the traffic generated on the local road network, including intersection capacity and any potential need for upgrading or road works (if required).	Intersection modelling of the intersections affected by the development has been undertaken, incorporating the recommended trip generation from the 'RMS Guide to Traffic Generating Developments' and is outlined in Section 4 . The intersection modelling results indicate that the development should have no detrimental effect on the road network in the vicinity of the site.
Item 9.5	Determine the impact of the proposed development on existing and future public transport infrastructure within the vicinity of the site.	The existing public transport cycle options are outlined in Section 3.3 and consist of two (2) bus stands providing services to Parramatta, Burwood and Lidcombe, Olympic Park Rail Station providing access to the T7 – Olympic Park Line and the cycle network within Olympic Park which provides access to public transport, the local area and the wider Sydney cycle network. The existing transport facilities are deemed to be adequate to accommodate any increase in demands.
Item 9.6	Determine the impact of the proposed development on pedestrian routes within Sydney Olympic Park, particularly between parking area P3 and the Netball Centre.	As outlined in Section 6 , the development maintains the existing pedestrian facilities in the vicinity of the site and provides a pedestrian access link through the development to maintain access between the Netball Centre and the P3 parking area.
Item 9.7	Detail the proposed access, bicycle and car parking provisions, and end of trip facilities associated with the proposed development, including compliance with the relevant parking codes and Australian Standards, and proposed measures to mitigate any associated impacts on public transport, pedestrian, cycle and traffic networks.	The access, car and cycle parking facilities proposed are outlined in Section 5 and Section 6 and the provisions and layouts meet the requirements of the SOPA Masterplan and the relevant Australian Standards.
Item 9.8	Demonstrate the provision and sufficient arrangement of on-site bicycle and car parking having regard to the availability of public transport and parking controls of Master Plan 2030.	The access, car and cycle parking facilities proposed are outlined in Section 5 and Section 6 and the provisions and layouts meet the requirements of the SOPA Masterplan and the relevant Australian Standards.

Item 9.9	Detail the traffic, transport and road safety impacts during any construction and how these impacts will be mitigated for any associated traffic, pedestrian, cyclists, parking (including the temporary loss of parking on the site), and public transport impacts. Detailed information should be provided on existing bus services and bus stops and measures to avoid impacts during the construction period. Detail the movement of construction vehicles include vehicle routes, number of trucks, hours of operation, access arrangements and traffic control measures for all construction activities.	Preliminary arrangements for construction traffic management is outlined in the Environmental Impact Assessment and a detailed Construction Traffic Management Plan would be undertaken at Construction Certificate stage to outline the management of the construction process.
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Item 10 – Major Events

Item 10.1	Adequately address the impact of major events in the precinct as it relates to the proposed development within the Town Centre (SOP Major Event Impact Assessment Guidelines).	The impact of Major Events on the development is outlined Section 7
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2 Proposal

2.1 The Development Site

The proposed development is located within the Sydney Olympic Park Precinct and is known as Site 9. The site is located at the intersection of Sarah Durack Avenue and Olympic Boulevard and is bounded by Sarah Durack Avenue to the north and Olympic Boulevard to the west.



Figure 2 – The Development Site

The development site is rectangular in shape having a total area of approximately 3,186m² and the site is currently occupied by two at grade car parks, with left in / left out driveways provided off Sarah Durack Avenue and Olympic Boulevard.



Figure 3 – Site Frontage Sarah Durack Avenue`



Figure 4 – Site Frontage Olympic Boulevard

In terms of land zoning, the site is designated as B4, Mixed Use.

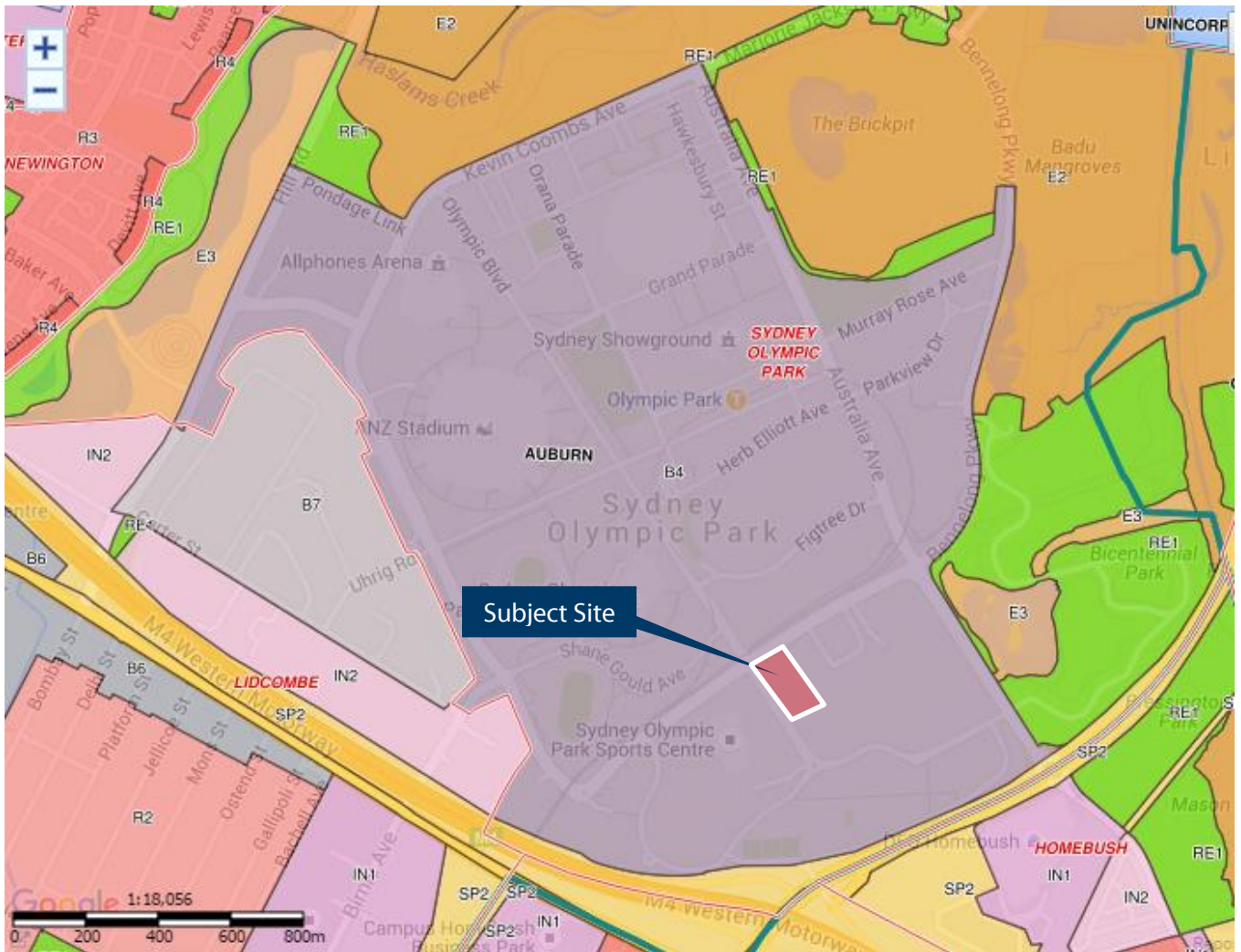


Figure 5 – Land Zoning (Auburn Council LEP)

2.2 The Development Proposal

The development proposal involves the construction of a 39 storey building, including five (5) levels of above ground parking. The building will accommodate 2540m² of commercial GFA, 150m² of retail GFA and 915m² of Retail/Club GFA and 229 residential units in the following configuration;

- 58 one bedroom units
- 129 two bedroom units
- 30 three bedroom units, and
- 12 four bedroom units

Parking is to be provided in a five (5), above ground split level car park, with vehicular access via an 11 metre wide driveway. A 6.0 metre wide, two way access road, provides access to the site and Sarah Durack Avenue and Olympic Boulevard via two left in / left out intersections.

Details of the proposal are presented on the architectural drawings prepared by Bates Smart Architects and those illustrating the parking and access arrangements are included in **Attachment 1**.

3 Existing Transport Facilities

3.1 External Road Hierarchy

The subject site is located at the intersection of Sarah Durack Avenue and Olympic Boulevard, which provide access to Homebush Bay Drive to the east.

Homebush Bay Drive provides links to a number of regional and state roads and the greater Sydney road network.

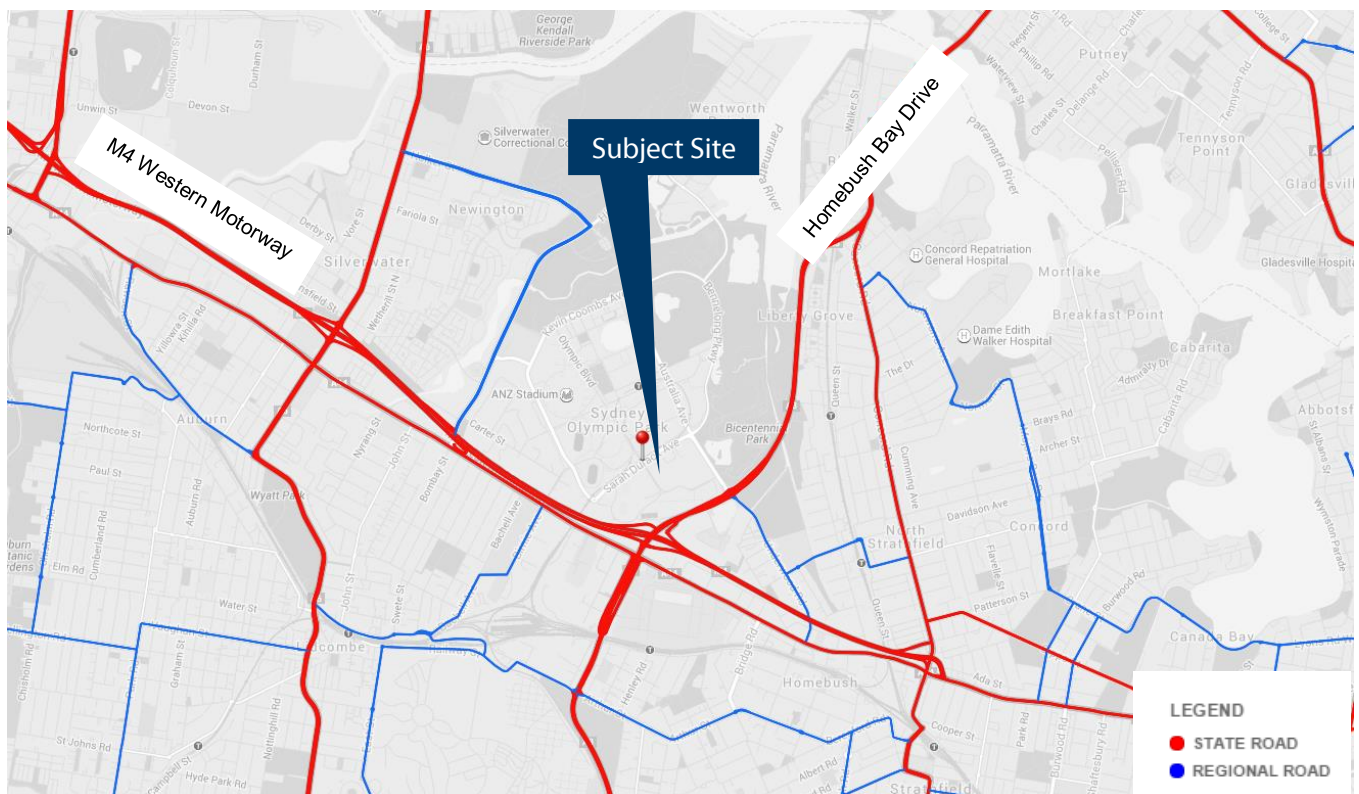


Figure 6 – External Road Hierarchy

The NSW administrative road hierarchy, illustrated in Figure 6, comprises the following road classifications, which align with the generic road hierarchy as follows:

- State Roads - Freeways and Primary Arterials (RMS Managed)
- Regional Roads - Secondary or sub arterials (Council Managed, Part funded by the State)
- Local Roads - Collector and local access roads (Council Managed)

The external road network serving the site includes:

Table 2 – External Road Network – M4 Western Motorway

M4 Western Motorway	
Road Classification	State Road (Motorway)
Alignment	East - West
Number of Lanes	3 lanes in each direction
Carriageway Type	Divided
Carriageway Width	40 metres
Speed Limit	90 kph
School Zone	No
Parking Controls	Motorway
Forms Site Frontage	No

Table 3 – External Road Network – Homebush Bay Drive

Homebush Bay Drive	
Road Classification	State Road
Alignment	North - South
Number of Lanes	3 lanes in each direction
Carriageway Type	Divided
Carriageway Width	34 metres
Speed Limit	80 kph
School Zone	No
Parking Controls	Clearway 24 hours
Forms Site Frontage	No

3.2 Internal Road Hierarchy

The internal road hierarchy is described in Section 3 of the Sydney Olympic Park Master Plan 2030 and is illustrated on Figure 7 below;

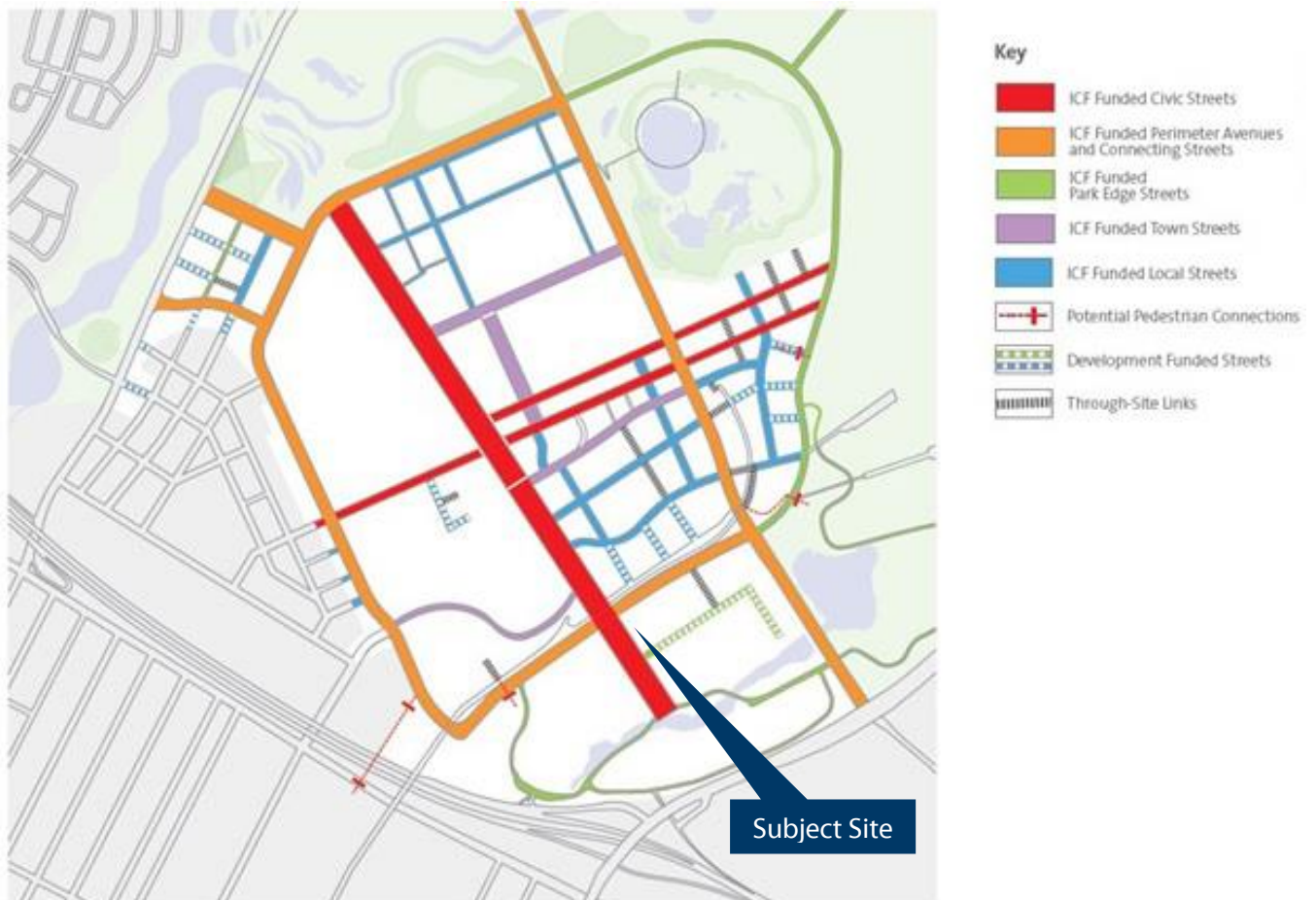


Figure 7 – Internal Road Hierarchy

Table 4 – Internal Road Network – Australia Avenue

Australia Avenue	
Road Classification	Perimeter Avenue
Alignment	North - South
Number of Lanes	3 lanes northbound, 2 lanes southbound
Carriageway Type	Divided
Carriageway Width	22 metres
Speed Limit	60 kph
School Zone	No
Parking Controls	No Stopping
Forms Site Frontage	No

Table 5 – Internal Road Network – Sarah Durack Avenue

Sarah Durack Avenue	
Road Classification	Perimeter Avenue
Alignment	East - West
Number of Lanes	2 lanes and a cycle lane in each direction
Carriageway Type	Un-divided
Carriageway Width	18 metres
Speed Limit	60 kph
School Zone	No
Parking Controls	No Stopping / No Parking
Forms Site Frontage	Yes

Table 6 – Internal Road Network – Olympic Boulevard

Olympic Boulevard	
Road Classification	Civic Street
Alignment	North - South
Number of Lanes	2 lanes in each direction
Carriageway Type	Divided
Carriageway Width	18 metres
Speed Limit	40 kph
School Zone	No
Parking Controls	2P Northbound, Bus / Coach parking Southbound
Forms Site Frontage	Yes

3.3 Public Transport

The development is well serviced by buses, and trains with two bus interchanges located within 350 metres and Sydney Olympic Park Train Station located 650 metres from the development site

3.3.1 Bus Services

The site is served by two bus interchanges located approximately 350 metres from the site on Olympic Boulevard, as shown in Figure 8



Figure 8 – Public Transport Services - Buses

The State Transit Authority (Sydney Buses) operates three services through Sydney Olympic Park

Table 7 – Bus Services

Route Number	Route Description
525	Approximately 20 minute intervals between 06.00 and 21.50 Between Parramatta, and Burwood
526	Approximately 30 minute intervals between 06.00 and 00.40 Between Sydney Olympic Park Wharf and Burwood.
401	Approximately 20 minute intervals between 06.20 and 19.00 Between Sydney Olympic Park and Lidcombe

3.3.2 Train Services

The site is serviced by Sydney Olympic Park Station which is approximately 650 metres from the development site, as shown in Figure 9.

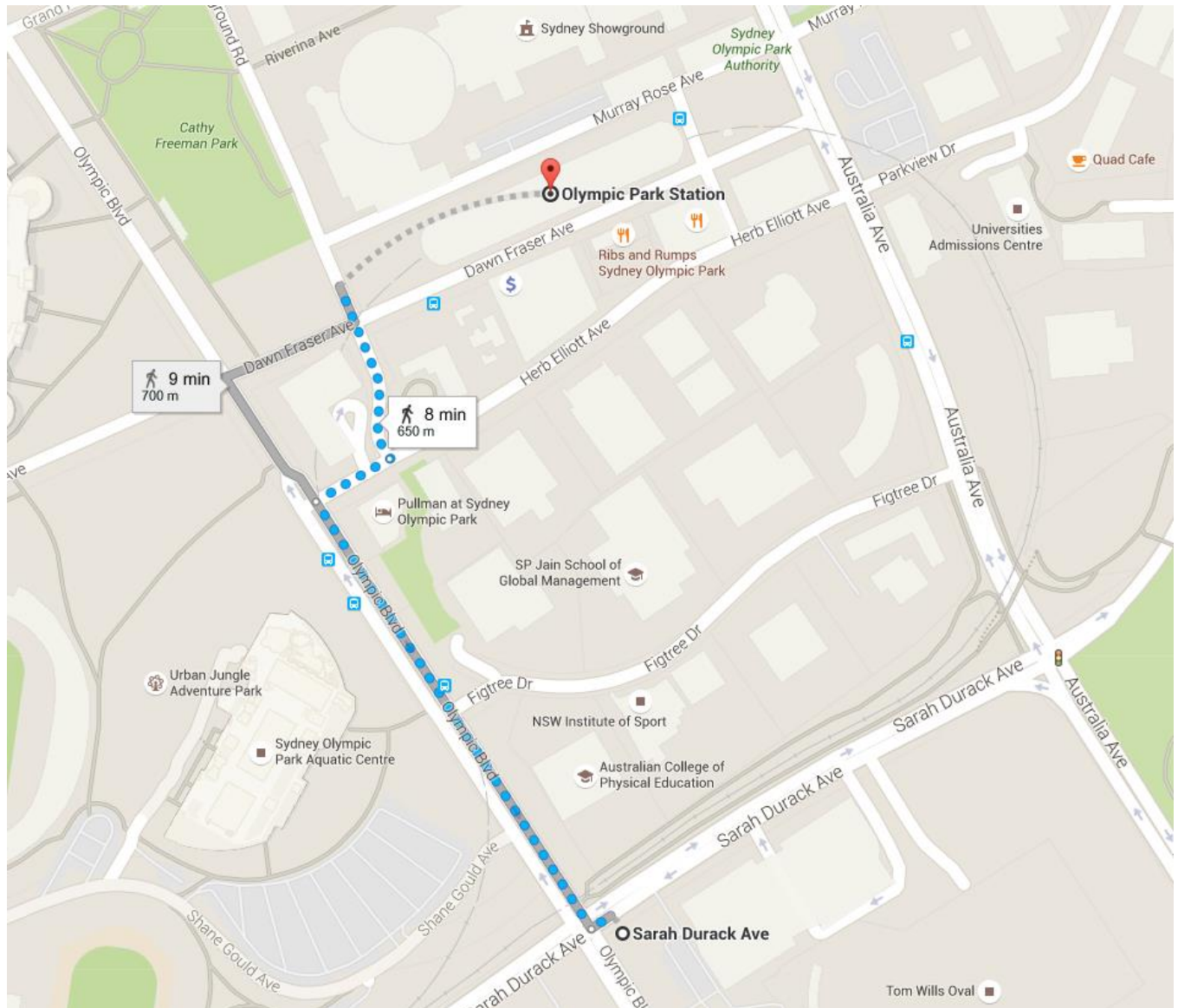


Figure 9 – Public Transport Services - Trains

Sydney Trains operates the T7 – Olympic Park Line, which operates between Sydney Olympic Park and Lidcombe between 06.00 and 00.00 at 20 minute intervals.

Alternatively, Sydney Trains operate T1 –Northern line, from Concord West Rail Station, between Hornsby and the City. Concord West Station is located approximately 1.8km (a 20 minute walk) from the site and theses services operate at approximately 15 minute intervals, between 05.00 and 00.00.

3.3.3 Walking and Cycling Network

Sydney Olympic Park contains an extensive walking and cycling network, providing links to all areas of the park, the public transport network and the wider Sydney cycle network, as shown in Figure 10.

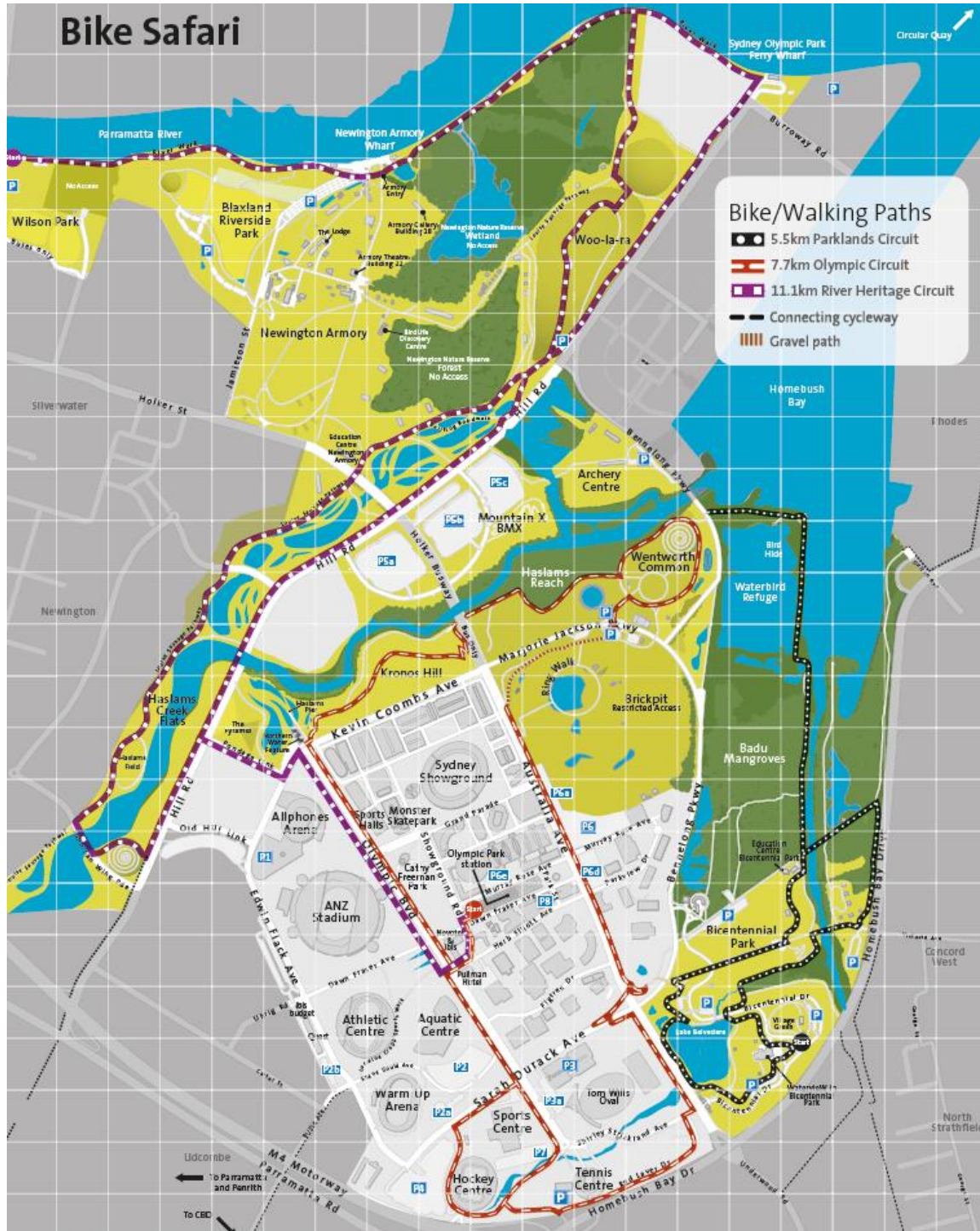


Figure 10 – Walking and Cycling Network (Source: Sydney Olympic Park Masterplan 2030)

Sydney Olympic Park has three designated cycling routes, which provide access to all areas of the park and links to the external cycle networks.

- Parklands Route,
- Olympic Circuit, and
- River Heritage Circuit.

As shown in Figure 11, pedestrians within the vicinity of the site are serviced by a 3.0m wide footway along both sides of Sarah Durack Avenue and a 7.0m wide shared footway/cycleway along both sides of Olympic Boulevard.

Cyclists are also serviced by a 1.5m wide on road cycle lane east and westbound along Sarah Durack Avenue.

Signalised pedestrian crossing facilities are also provided on all approaches at the intersection of Sarah Durack Avenue and Olympic Boulevard.

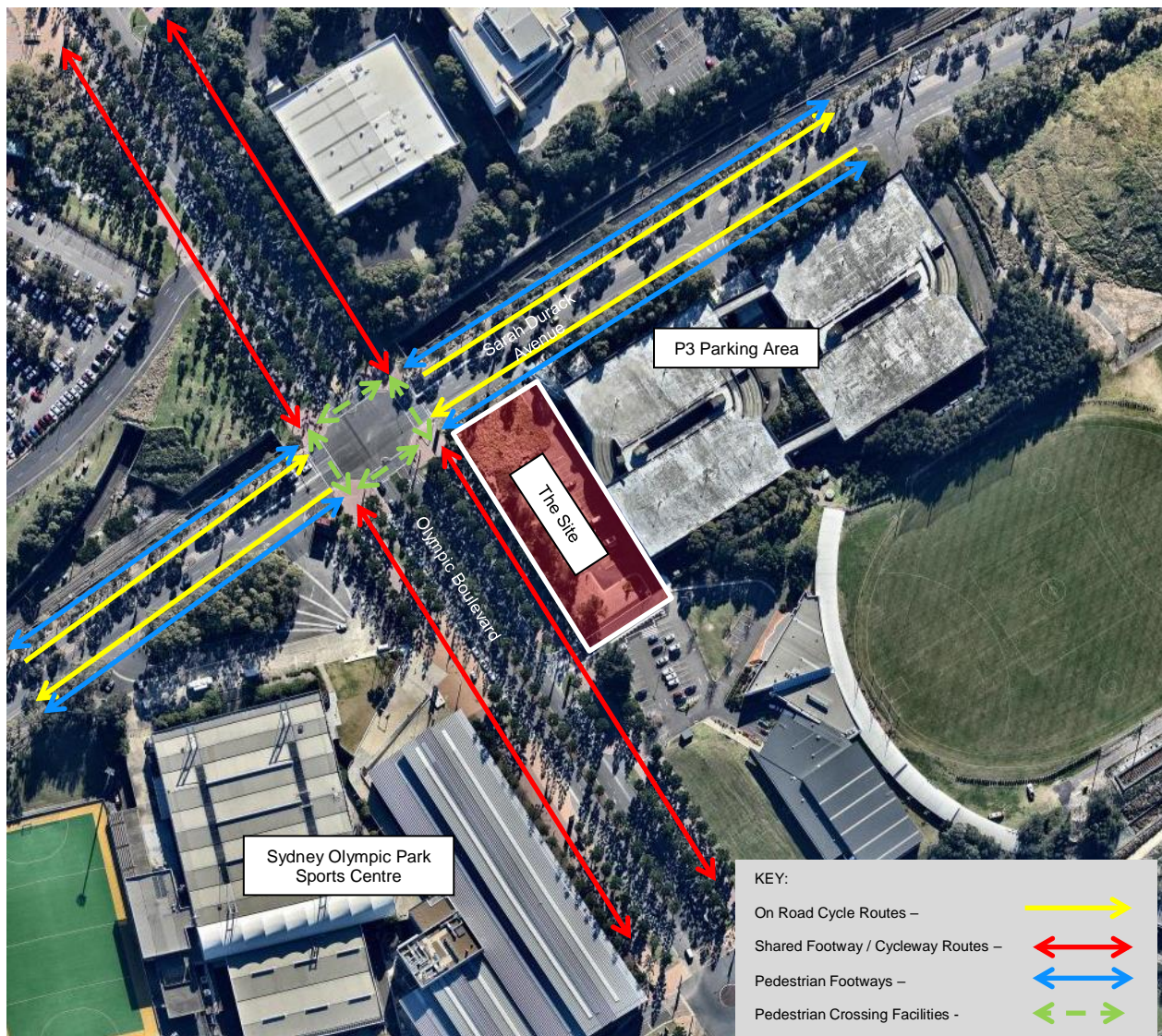


Figure 11 – Walking and Cycling Facilities in Vicinity of the Development Site.

3.4 Existing Traffic Volumes

In order to assess the existing traffic conditions in the vicinity of the site, traffic intersection surveys were undertaken at the following intersections, as shown on Figure 12.

- Sarah Durack Avenue and Australia Avenue (signalised)
- Sarah Durack Avenue and Olympic Boulevard (signalised)
- Olympic Boulevard and Shirley Strickland Avenue (roundabout)
- Shirley Strickland Avenue and Australia Avenue (priority controlled)



Figure 12 – Traffic Intersection Surveys

These surveys were undertaken on Wednesday 10th February 2016 between 7.00am and 9.00am and 4.00pm and 6.00pm. These periods were selected in order to identify the morning and afternoon peaks and from the data collected it was established that the peak periods are as follows;

- Sarah Durack Avenue and Australia Avenue
 - Morning peak – 08.00 to 09.00 (3467 vehicles)
 - Afternoon peak – 17.00 to 18.00 (3734 vehicles)
- Sarah Durack Avenue and Olympic Boulevard

- Morning peak – 08.00 to 09.00 (1095 vehicles)
- Afternoon peak – 16.15 to 17.15 (1517 vehicles)
- Olympic Boulevard and Shirley Strickland Avenue
 - Morning peak – 07.30 to 08.30 (78 vehicles)
 - Afternoon peak – 17.00 to 18.00 (235 vehicles)
- Shirley Strickland Avenue and Australia Avenue
 - Morning peak – 08.00 to 09.00 (3196 vehicles)
 - Afternoon peak – 16.45 to 17.45 (3507 vehicles)

For a robust traffic assessment, the peak intersection volumes have been adopted for each individual intersection. The peak hour survey results of these surveys are shown in Figure 13, Figure 14, Figure 15 and Figure 16.

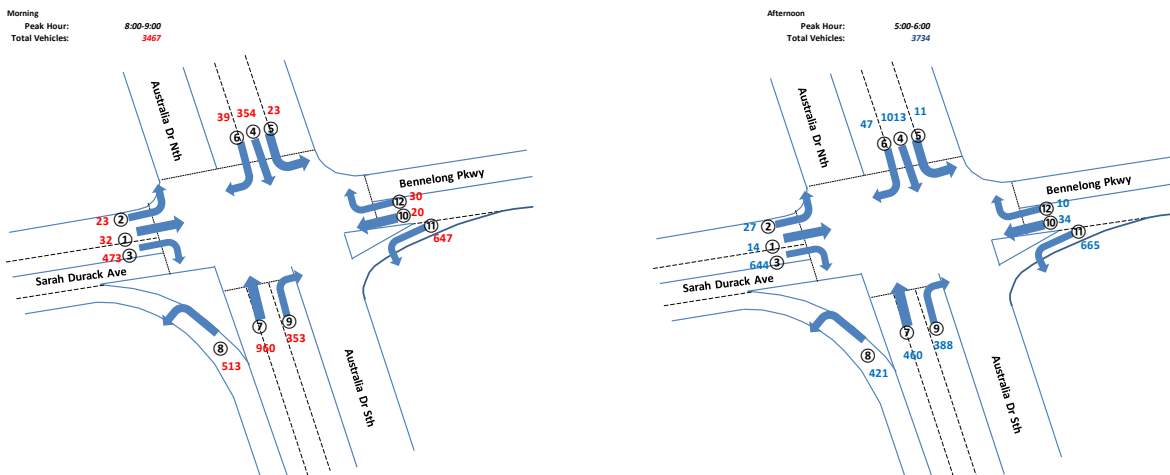


Figure 13 – Existing Morning and Evening Peak Hour Traffic Survey Results - Sarah Durack Avenue and Australia Avenue

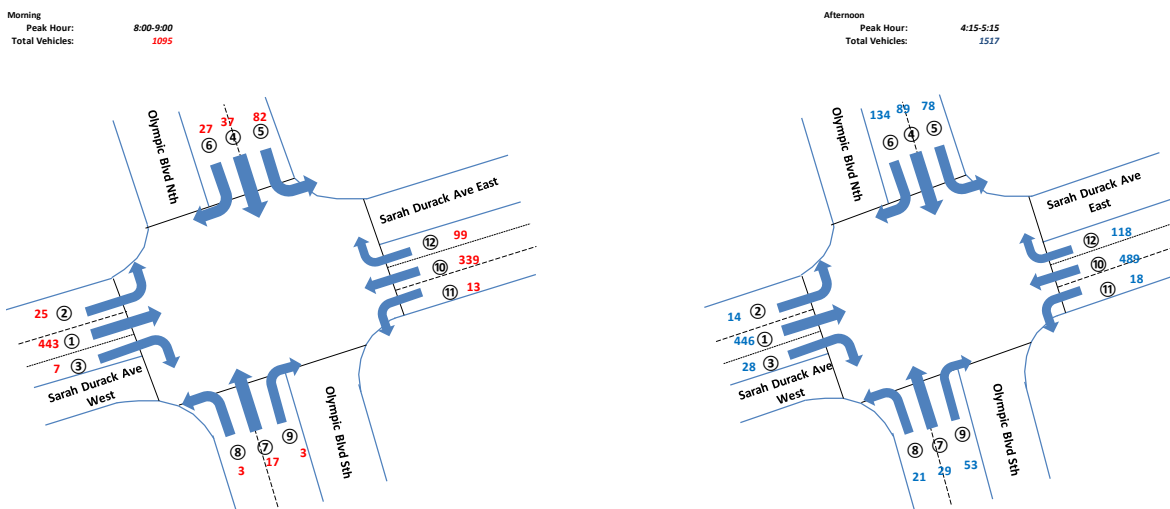
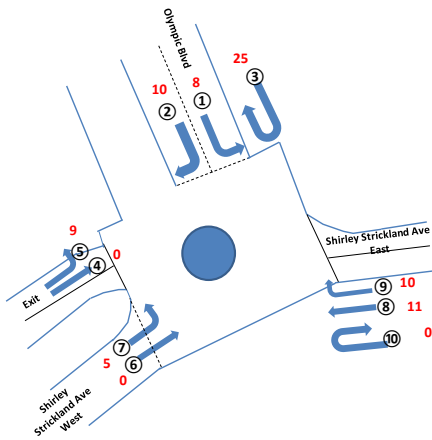


Figure 14 – Existing Morning and Evening Peak Hour Traffic Survey Results - Sarah Durack Avenue and Olympic Boulevard

Morning
Peak Hour: 7:30-8:30
Total Vehicles: 78



Afternoon
Peak Hour: 5:00-6:00
Total Vehicles: 235

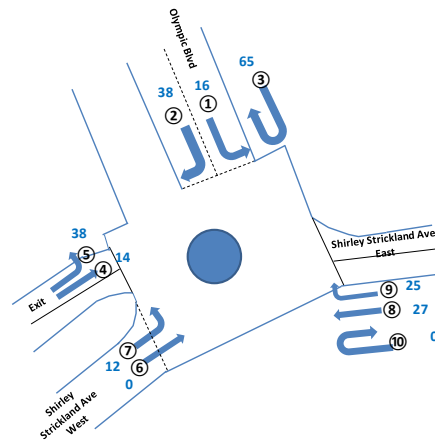
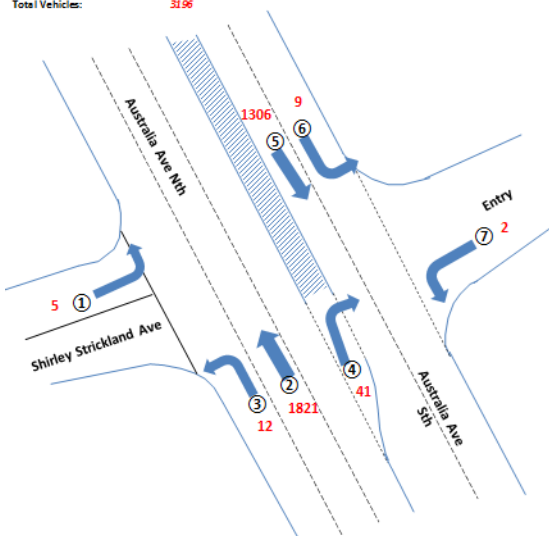


Figure 15 – Existing Morning and Evening Peak Hour Traffic Survey Results - Olympic Boulevard and Shirley Strickland Avenue

Morning
Peak Hour: 8:00-9:00
Total Vehicles: 3196



Afternoon
Peak Hour: 4:45-5:45
Total Vehicles: 3507

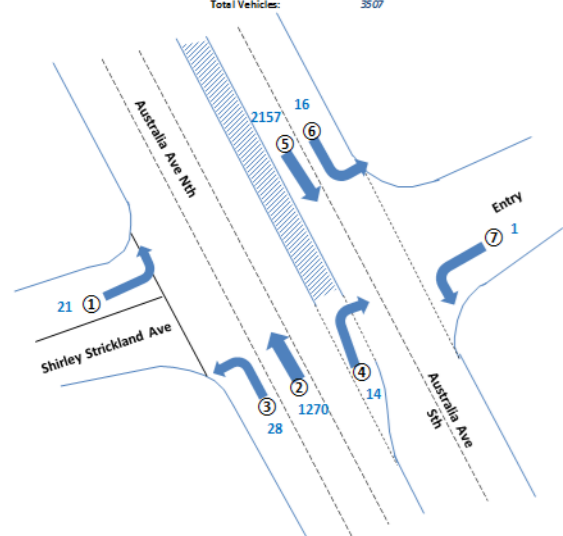


Figure 16 – Existing Morning and Evening Peak Hour Traffic Survey Results - Shirley Strickland Avenue and Australia Avenue

3.5 Intersection Modelling

In order to confirm the current operation of the intersection, an assessment has been undertaken using the SIDRA Intersection Network modelling software (Version 6.1), which presents a range of performance indicators (Level of Service, Average Delay, etc).

Typically there are three performance indicators used to summarise the performance of an intersection, being:

- Degree of Saturation – The total usage of the intersection expressed as a factor of 1 with 1 representing 100% use/saturation. (e.g. 0.8=80% saturation)
- Average Delay- The average delay encountered by all vehicles passing through the intersection. It is often important to review the average delay of each approach as a side road could have a long delay time, while the large free flowing major traffic will provide an overall low average delay.
- Level of Service (LoS) - This is a categorization of average delay, intended for simple reference. The RMS adopts the following bands:

Table 8 – Level of Service Bands

LoS	Ave.Del.in Seconds		Definition
A	0.00	14.50	Good Operation
B	14.50	28.50	Good with acceptable delays and spare capacity
C	28.50	42.50	Satisfactory
D	42.50	56.50	Operating near capacity
E	56.50	70.50	At Capacity; at signal, incidents will cause excessive delays
F	70.50	Infinity	Operating beyond capacity

A summary of the SIDRA results is presented in the following tables.

Table 9 – Existing SIDRA Modelling Results

Period	Intersection	Deg. of Sat.	Average Delay (sec)	Level of Service
AM Peak	Sarah Durack Avenue and Australia Avenue	0.840	24.6	B
	Sarah Durack Avenue and Olympic Boulevarde	0.268	19.6	B
	Olympic Boulevarde and Shirley Strickland Avenue	0.027	5.5	A
	Shirley Strickland Avenue and Australia Avenue	0.004	8.0	A*
PM Peak	Sarah Durack Avenue and Australia Avenue	0.947	41.7	C
	Sarah Durack Avenue and Olympic Boulevarde	0.604	24.9	B
	Olympic Boulevarde and Shirley Strickland Avenue	0.078	5.6	A
	Shirley Strickland Avenue and Australia Avenue	0.018	8.0	A*

* for priority controlled intersections, results are reported for the approach with the greatest delay

Based on the traffic volumes, the results indicate the intersections provide an acceptable level of service during the typical peak periods.

3.6 Existing Journey To / From Work Analysis

A review of the 'Bureau of Transport Statistics, Journey Work Database' has been undertaken to ascertain the existing travel modes utilised by employees and residents of the SOPA area, as shown in Figure 17.

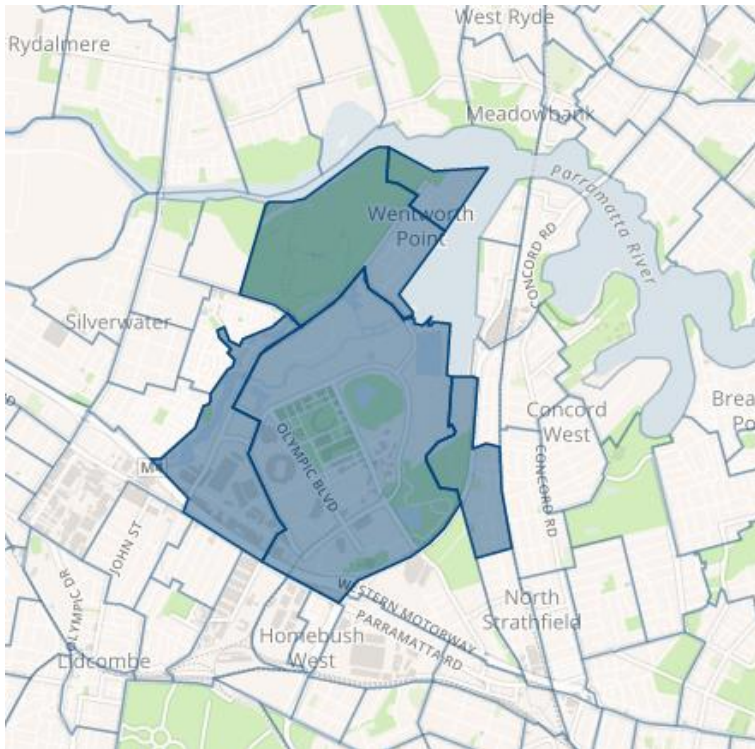


Figure 17 – Journey to Work Study Area (Source: Bureau of Transport Statistics)

Based on the information taken from the 'Place of Work' and 'Place of Residence' studies undertaken in 2011, it was concluded that;

- 12,960 people worked in the selected area.

Of these employees;

- 18% travel to / from work by train,
- 3% travel to / from work by bus,
- 1% walk to / from work, and
- 1% used 'other modes' (assumed to be cyclists).

These figures equate to approximately;

- 2,350 travelling to / from work by train,
- 400 travelling to / from work by bus,
- 150 walking to / from work, and
- 150 using other modes (assumed cycled) to travel to / from work.

It was also found that;

- 2,359 people reside in the selected area.

Of these residents;

- 21% travel to / from work by train,
- 2% travel to / from work by bus,
- 2% walked to / from work,
- 1 % used the ferry, and
- 1% used 'other modes' (assumed to be cyclists).

These figures equate to approximately;

- 500 travelling to / from work by train,
- 50 travelling to / from work by bus,
- 50 walking to / from work,
- 25 utilising the ferries, and
- 25 using other modes (assumed cycled) to travel to / from work.

4 Development Traffic Assessment

4.1 Traffic Generation

Typically, the traffic activity associated with a development or land-use can be derived through reference to published data, for example the RMS Guide to Traffic Generating Developments, or the Institute of Traffic Engineering, US data. This form of traffic projection is useful where the development has unrestrained on-site parking provision. However, the development site has restricted on-site parking provision which is in accordance with the local planning control i.e. Sydney Olympic Park Master Plan 2030 (Masterplan).

4.1.1 Residential Traffic Generation

The Guide to Traffic Generating Developments (RMS, 2002) defines any residential flat building containing greater than twenty (20) dwellings as high density. Concerning such developments, the RMS guide suggests the following trip rates per car space;

- AM Peak Hour Rate: 0.19 trips / space;
- PM Peak Hour Rate: 0.28 trips / space.

Applying the above rates to the subject development of the proposed 304 residential car spaces leads to the following trips rates and net trips rates outlined in Table 10

Table 10 – Residential Trip Generation Summary

Period	Trip Generation
AM Peak Hour Trips	57.8 (58)
PM Peak Hour Trips	85.1 (85)

The data indicates that the projected peak hour generation of vehicles resulting from the proposed project will result in **58** vehicle trips during the AM peak and **85** trips in the PM peak.

4.1.2 Retail/Commercial Traffic Generation

The development site has restricted on-site parking provision which is in accordance with the local planning control, the Sydney Olympic Park Master Plan 2030 (Masterplan), therefore, we have calculated the traffic activity associated with the proposal based on first principles approach and have referenced to the proposed on-site parking provision.

The RMS Guide assumes that 80% of employees enter or exit a commercial office building within the peak period. This data was collected prior to the introduction of flexible working hours; however given that there is no evidence to suggest a lower figure in relation to the proposed building, a peak hour traffic generation rate of 0.8 movements per parking space has been applied to the development.

We note that the casual and long-term parking is available within the vicinity of the site. A comparison of the pricing structure associated with these facilities to that of the cost of using public transport likely indicates public transport as the preferred mode of transport to be used by commuters associated with the building. There may be commuters who choose to use the surrounding public parking, however this would be a relatively low proportion, and the movements would be distributed across the internal Sydney Olympic Park road network, rather than associated directly with the site.

The proposal involves a provision for **49** parking spaces, which will be used by the commercial and retail tenants/owners. In this regard, the car park represents an office/employee car park facility. Application of the above rates of 0.8 movements per parking space indicates a peak traffic generation of **39.2 (39)** vehicle movements to and from the car park.

4.1.3 Overall Traffic Generation

As set out in Section 4.1.1 and Section 4.1.2 the combined residential and commercial / retail component of the development should generate a morning peak of **106** trips and an afternoon peak of **124** vehicle trips.

4.2 Traffic Distribution

It is assumed that road users would predominantly utilise the shortest route available to the closest state road, with this being Homebush Bay Drive (to the south), with a small number of road users entering and exiting the vicinity of the site to and from Hill Road (to the north). We have assumed that 90% of vehicles would utilise Homebush Bay Drive to access and egress the site and 10% would utilise Hill Road.

Also, given that egress from Shirley Strickland Ave to Australia Avenue is restricted to 'left turn only' it has been assumed that access and egress to the development would be as shown in Figure 18.

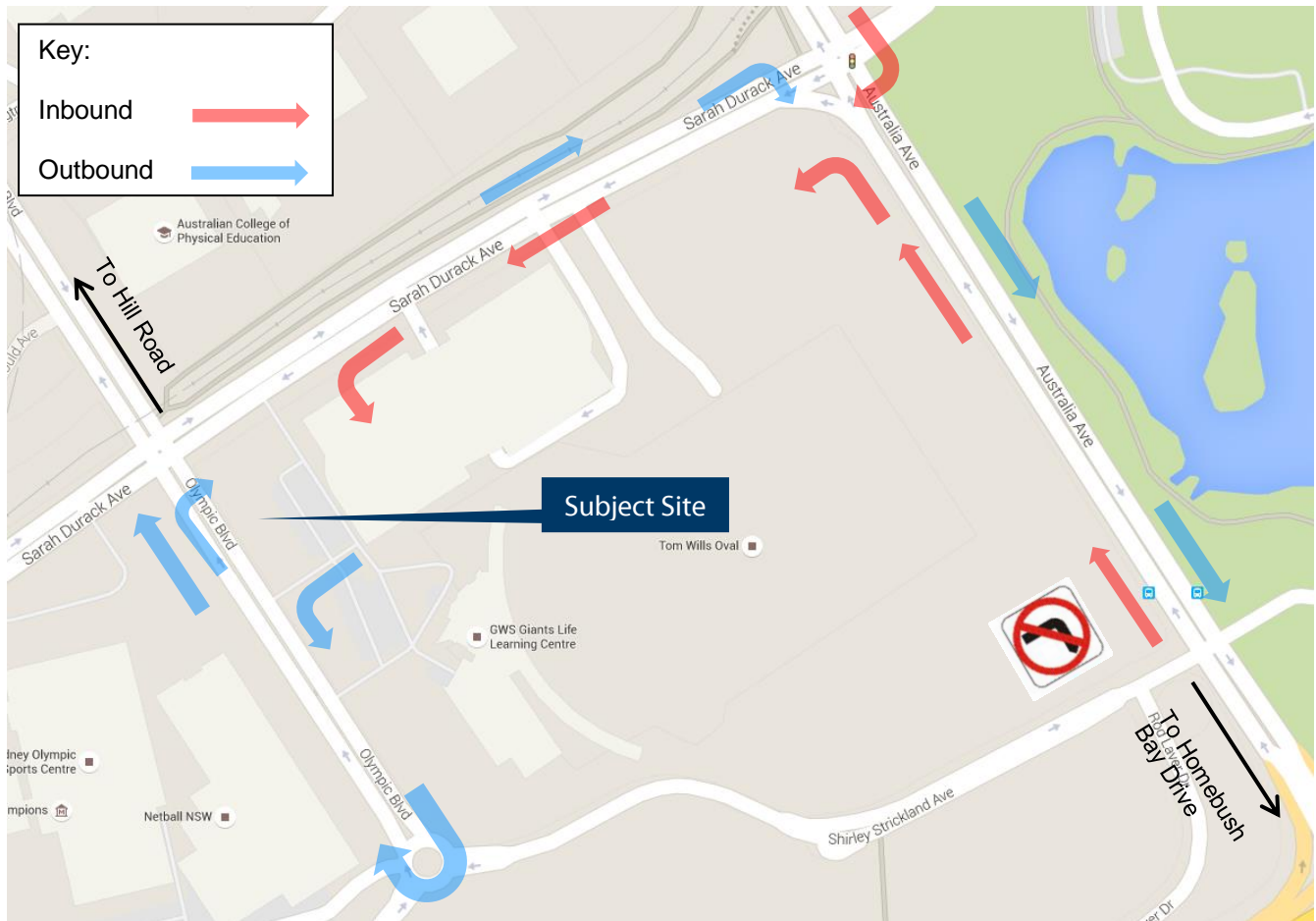


Figure 18 – Assumed Access and Egress

Based on these assumptions and the projected traffic generation, the projected traffic volumes have been applied to the road network as shown in Figure 19 and Figure 20.

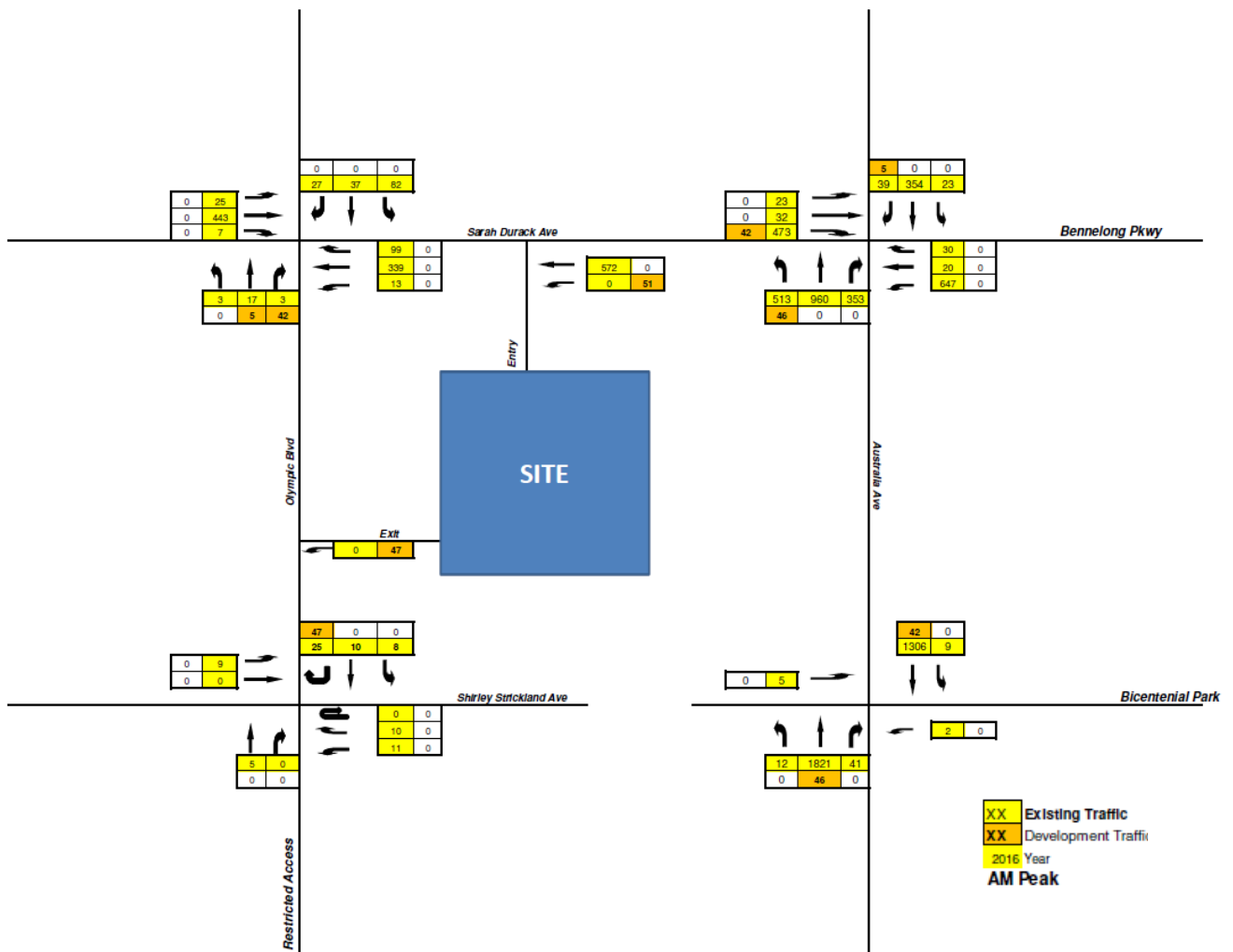


Figure 19 – Projected Morning Peak Traffic Volumes and Distribution

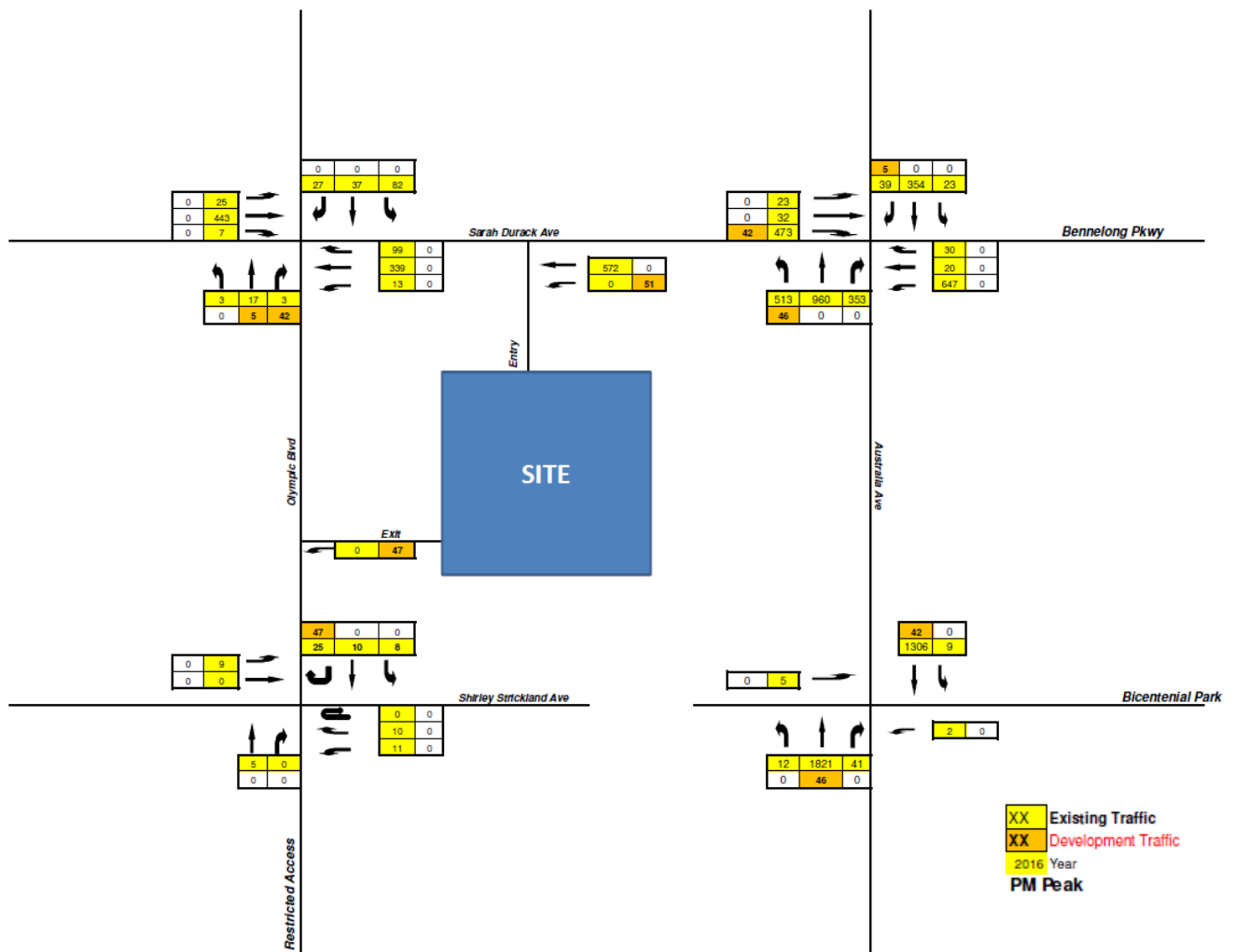


Figure 20 – Projected Evening Peak Hour Traffic Volumes and Distribution

4.3 Intersection Modelling

The projected traffic volumes have been applied to the four surveyed intersections and intersection modelling has been undertaken using SIDRA Intersection Modelling software and the results are summarised in Table 11.

Table 11 – Projected SIDRA Modelling Results

Period	Intersection	Deg. of Sat.	Average Delay (sec)	Level of Service
AM Peak	Sarah Durack Avenue and Australia Avenue	0.837	24.2	B
	Sarah Durack Avenue and Olympic Boulevarde	0.268	20.8	B
	Olympic Boulevarde and Shirley Strickland Avenue	0.054	7.2	A
	Shirley Strickland Avenue and Australia Avenue	0.002	8.0	A
PM Peak	Sarah Durack Avenue and Australia Avenue	0.895	45.8	D
	Sarah Durack Avenue and Olympic Boulevarde	0.766	30.6	C
	Olympic Boulevarde and Shirley Strickland Avenue	0.107	6.4	A
	Shirley Strickland Avenue and Australia Avenue	0.018	8.0	A

The intersection modelling indicates that, during both the morning and afternoon peak periods, the four intersections will continue to operate similar to the existing situation.

In this regard, the development proposal should not cause any detrimental impact on the operation of the road network in the context of the existing traffic activity.

In addition to this modelling, additional traffic modelling has been undertaken on the intersection of Sarah Durack Avenue and Olympic Boulevarde to investigate the provision of dedicated right turn lanes on Olympic Boulevard and the provision of diamond signal phases at the intersection. The initial outcomes from this modelling indicated that these additional facilities would not significantly improve the LOS of this intersection from the LOS of C shown in Table 11.

It should also be noted that the provision of right turn lanes on Olympic Boulevard would require the removal of up to 20 trees in the central median of Olympic Boulevard.

4.4 Projected Journey To / From Work Analysis

Further to the review of the 'Bureau of Transport Statistics, Journey Work Database' undertaken in Section 3.6, the proposed development employees and resident population has been added to the existing journey to work assessment numbers.

The development includes a combined commercial and retail GFA of 3,490 m². From the Environmental Impact Statement that accompanies this DA, it has been estimated that the combined employees for the development will be 175.

As this increase in employees of 175 is minimal when compared to the existing employment numbers in the area (approximate 0.01% increase), it has been summarised that the increase in employee numbers should have little or no effect on the sustainable transport facilities in the area.

The development also includes 229 residential units. Based on data taken from *Atlas.id.com.au*, referencing two (2) similar high density developments in the vicinity of the site and assuming 100% occupancy of the units, it has been estimated that an average of 2.15 persons reside in each unit.

Based on this estimation, the development should accommodate approximately 490 additional residents and this should therefore equate to the following additional approximate uses of modes of transport;

- 105 travelling to / from work by train,
- 10 travelling to / from work by bus,
- 10 walking to / from work,
- 5 utilising the ferries, and
- 5 using other modes (assumed cycled) to travel to / from work.

As these increases in various uses of modes of transport are minimal, it has been summarised that these increases should have little or no effect on the sustainable transport facilities in the area.

5 Parking Provision

5.1 Planning Policy Requirement – Car Parking

The parking requirements relating to new developments within Olympic Park are presented in Table 4.10 Non-Residential Uses and Table 4.11 Residential Uses, in the Sydney Olympic Park Master Plan 2030.

The parking rates are presented as a maximum provision in line with the SOPA planning principle of “promoting access and travel by public transport, walking and cycling”.

The masterplan specifies the following maximum parking provision;

- Residential use
 - One bedroom units - 1 space per unit
 - Two bedroom units - 1.2 spaces per unit
 - Three bedroom units - 1.5 spaces per unit
 - Four bedroom units - 2 spaces per unit
 - Visitors - 0.25 spaces per unit
- Commercial use - 1 space per 80m²
- Local retail use - 1 space per 50m²

5.2 Proposed Car Parking Provision

The proposed development will accommodate 229 residential units, in the following configuration;

- 58 one bedroom units
- 129 two bedroom units
- 30 three bedroom units; and
- 12 for bedroom units

The development also accommodates;

- 2540m² of commercial space
- 150m² of retail space; and
- 915m² of Retail/Club space

Applying the Masterplan rates to the development leads the provisions outlined in Table 12

Table 12 – Car Parking Provision

User Type			Master Plan Parking provision Rate	Maximum Spaces	Allocated Spaces
One-bedroom unit	58	@	1.0 spaces per unit	58	304 (total)
Two-bedroom unit	129	@	1.2 spaces per unit	154.8 (155)	
Three bedroom unit	30	@	1.5 spaces per unit	45	
Four bedroom unit	12	@	2 spaces per unit	24	
Visitors	229	@	0.25 spaces per unit	57.25 (57)	
Commercial	2540m ²	@	1 space per 80m ²	31.75 (32)	34
Retail	150m ²	@	1.0 spaces per 50m ²	3	3
Retail/ Club	915m ²	@	1.0 spaces per 50m ²	18.3 (18)	12
Maximum Spaces				392	
Total On-Site Parking Spaces Provided					353

The proposed development accommodates a total of **353** car parking spaces, allocated as shown in Table 12. The proposed provision of **353** car spaces is within the maximum allowance of **392** required by the Sydney Olympic Park Masterplan 2030.

5.3 Planning Policy Requirement – Bicycle Parking

The bicycle parking requirements relating to new developments within Olympic Park are presented in Table 4.12, in the Sydney Olympic Park Master Plan 2030.

The bicycle parking rates are presented as a minimum provision in line with the SOPA planning principle of “promoting access and travel by public transport, walking and cycling”.

The masterplan specifies the following minimum bicycle parking requirements;

- Residential use
 - One bedroom units - 1 space per unit
 - Two bedroom units - 1.2 spaces per unit
 - Three bedroom units - 1.5 spaces per unit
 - Four bedroom units - 2 spaces per unit
 - Visitors - 0.25 spaces per unit
- Commercial use
 - Permanent spaces - 1 space per 150m²
 - Visitor spaces - 1 space per 75m²

5.4 Proposed Bicycle Parking Provision

The proposed development will accommodate 229 residential units and a total commercial space of 2540m².

Applying the Masterplan rates to the development leads to the provisions outlined in Table 13.

Table 13 – Bicycle Parking Provision

Use Type			Parking provision Rate	Required Spaces	Allocated Spaces
One-bedroom unit	58	@	1.0 spaces per unit	58	282
Two-bedroom unit	129	@	1.2 spaces per unit	154.8 (155)	
Three bedroom unit	30	@	1.5 spaces per unit	45	
Four bedroom unit	12	@	2 spaces per unit	24	
Visitors	229	@	0.25 spaces per unit	57.25 (57)	
Commercial - permanent	2540m ²	@	1 space per 150m ²	16.9 (17)	17
Commercial - visitors	2540m ²	@	1 space per 75m ²	33.9 (34)	34
Required Spaces				390	
Total On-Site Parking Spaces Provided					390

The proposed development accommodates a bicycle parking provision of **390 spaces** allocated as shown in Table 14.

Table 14 – Bicycle Parking Allocation

Location	Total Allocated Spaces	Location	Number of Spaces
Residential	282	Car Park Levels 2 to 6	67
		Level 9 Bike Storage Area	103
		Residential Storage Cages (<i>see note 1</i>)	112
Residential Visitor	57	Ground Floor	14
		Car Park Levels 2 to 6	43
Commercial	17	Car Park Level 3 (within secure area)	17
Commercial Visitor	34	Ground Floor	34

Note 1: Residential storage cages accommodating bicycle storage to be a minimum size of 715mm x 1840mm in accordance with AS2890.3

The proposed provision of **390 spaces** meets the minimum required by the Sydney Olympic Park Masterplan 2030.

Whilst the development provides 390 bicycle spaces, meeting the requirements the Sydney Olympic Park Masterplan 2030, it is our opinion that the rates used to determine this requirement are inappropriately high when compared to other recent developments within Sydney Olympic Park.

The recently approved development of Site 68, Sydney Olympic Park, utilised a bicycle parking rate of 1 space per 2.5 units. If this rate of application was to be applied to this development, it would yield a residential bicycle parking provision of 92 spaces, a reduction of 190 spaces.

Also, it is noted that the Masterplan provision exceeds the resident bicycle parking requirements outlined for similar precincts in the vicinity of Olympic Park, which currently provide or are planned for high density residential developments, with similar access to alternative modes of transport (ie, bus and rail). For example, the Rhodes West Development Control Plan (2014) specifies minimum residents' bicycle parking provision of 1 space per 3 units.

5.5 End of Trip Facilities

In line with the requirements of "The Planning Guidelines for Cycling and Walking (2004); Section 7.6', End of Trip Facilities (EOTF) comprising of five (5) showers and associated toilet and lockers facilities, have been provided on Level 3, for use by the Commercial staff and visitors.

6 Access and Car Park Assessment

6.1 Vehicular Access

Access to the development is proposed via a 6.0 metre wide road which provides access from Sarah Durack Avenue to Olympic Boulevard. The road will link with both Sarah Durack Avenue to Olympic Boulevard via left in / left out intersections as shown in Figure 21.

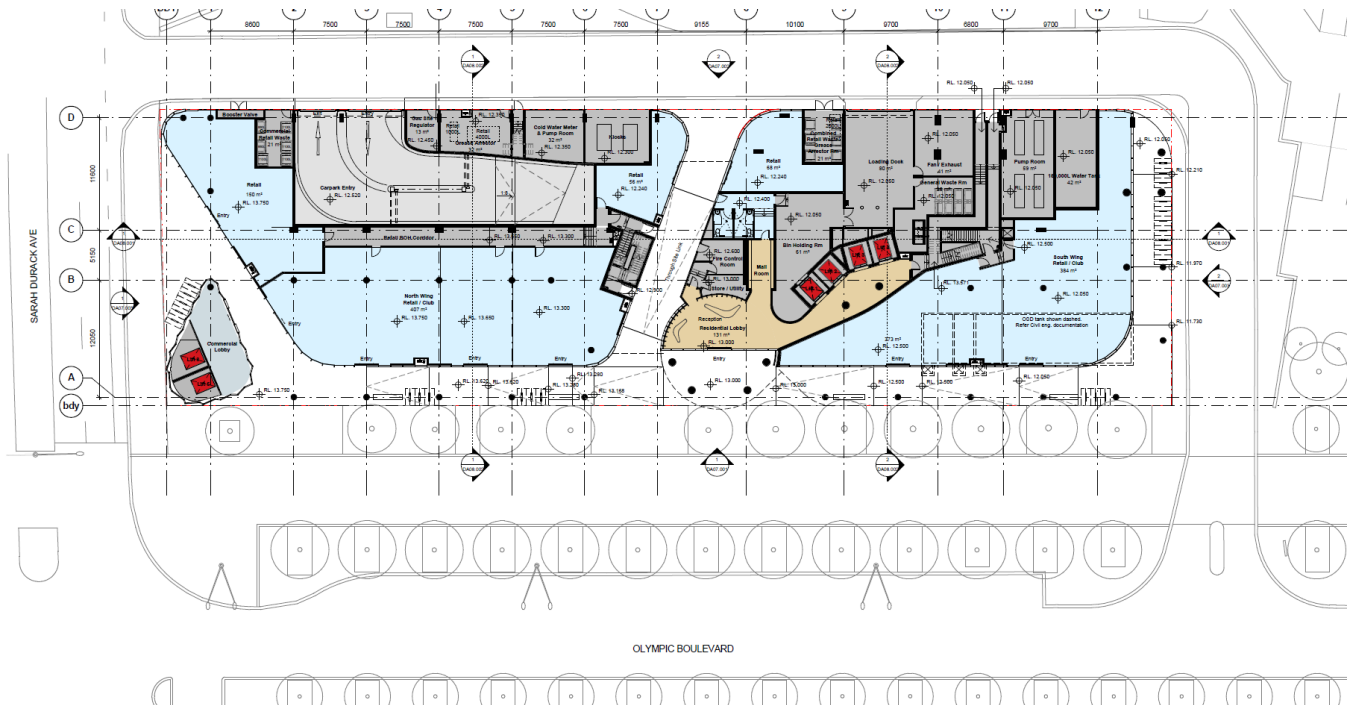


Figure 21 – Site Access Road

The driveway access into the site will be located off the access road, 18 metres from the Sarah Durack Avenue intersection. The proposed driveway is 11.0 metres wide and provides two way, segregated access to the parking levels.

According to AS2890.1, Section 3.2, the access facility can be categorised as a Category 3 parking facility which requires an entry width of 6.0 metres and an exit width of between 4.0 and 6.0 metres. The proposed driveway will have an entry width of 6.0 metres, a 1.0 metres wide central median island and an exit width of 4.0 metres thereby meeting this minimum requirement.

Access is to be controlled by a boom gate, roller shutter and card reader system, with the capacity to store three vehicles on the entry approach within the development boundary.

6.2 Sight Distance

The sight distance requirements are described in Section 3.2 of AS2890.1 and are prescribed on the basis of the sign posted speed limit or 85th percentile vehicle speeds along the frontage road. The access road will be subject to a posted speed limit of 40kph, which requires a desirable visibility distance of 55 metres and a minimum distance of 35 metres.

The driveway is located on a straight section of the access road, where unobstructed visibility is available. It is considered that implementation of a 'No Parking' restriction along the access road will further assist in the visibility, while also maintaining appropriate traffic movements.

6.3 Car Park Arrangement

The car park access arrangement, internal circulation and parking layouts have been designed in accordance with the requirements of Section 2 of AS2890.1.

Table 1.1 of AS2890.1 presents a number of classifications applicable to different land-uses. According to the Table, the most appropriate car park classification applicable to the subject car park will be a Class 1A facility, which is suitable for "Residential, domestic and employee parking".

The parking space dimensions and associated aisle widths for each classification are presented in Table 2.2, and accordingly, a Class 1A facility requires parking space dimensions of 2.4 x 5.4 metres with an access aisle width of 5.8 metres. The proposed car park has been designed to provide compliant parking space widths of 2.4 metres and an aisle width in excess of 5.8 metres. An assessment of all elements of the car park has been undertaken including column locations, aisle extensions and ramp grades and in this regard, the car park design complies with the requirements of AS2890.1.

Included within the parking arrangements is the provision of 28 accessible spaces (23 residents, 1 residential visitor, 2 commercial and 2 retail). These spaces have been provided as a mix of adaptable spaces, in accordance with AS4299:1995 and accessible spaces, in accordance with AS2890.6:2009.

The adaptable spaces have been assessed against the requirements within AS4299:1995, which requires a adaptable space dimension of 3.8 x 5.4 metres. An assessment of these spaces has been undertaken and in this regard, the adaptable spaces comply with the requirements of AS4299:1995.

The accessible spaces have been assessed against the requirements within AS2890.6:2009, which requires a accessible space dimension of 2.4 x 5.4 metres with a shared space of 2.4 metres width adjacent to any space. An assessment of these spaces has been undertaken and in this regard, the adaptable spaces comply with the requirements of AS2890.6:2009.

6.4 Internal Circulation

The ramps within the parking levels are proposed to be combined (straight) two way ramps with a width of 5.8 metres. There are also two (curved) segregated two way ramps, one located on the level 2, with a width of 8.7 metres (including a 1.2 metres wide central island) and one located on level 3, with a width of 7.2 metres (including a 0.9 metre wide central island). Both ramps have an internal radius of 3.6 metres.

According to AS2890.1, a minimum width of 5.5m is required for two-way movement on straight sections of roadways. Swept path analysis has been undertaken on the segregated ramps and this shows the curved ramp arrangement allow for two vehicles (B99) to pass unobstructed.

In this regard, the proposed ramps widths have been reviewed with swept path analysis computer program and are considered adequate to allow vehicles to pass unobstructed with appropriate clearances.

The swept path analysis is shown on the plans in Attachment 2.

6.5 Servicing

The design allows for various forms of service vehicle access. All service vehicle access will be via Olympic Boulevard and egress via Sarah Durack Avenue and the road way can accommodate a Heavy Rigid Vehicle

(12.5m in length). The road way is to be controlled by 'no parking' restriction along its whole length. As a minimum, one way shuttle access will be maintained along the road way, during any on street servicing process.

- Ausgrid maintenance vehicles – maintenance access is to be located on the southern kerb adjacent to the Ausgrid kiosks. During the maintenance processes, suitable traffic control measures will be provided in accordance with Ausgrid procedures. This process is expected to be a very low occurrence during the life time of the facility.
- Refuse vehicles – Refuse collection is to be undertaken 'on street' on the southern kerb adjacent to the general waste store room. This is expected to be a on a weekly basis, with a short waiting time to undertake the loading process. Vehicle 'warning lights' would be in operation during the process to alert other road users.
- Building serving – Servicing of the building is to be undertaken within the proposed loading dock and access is provided for a medium rigid vehicle via a 6.5 metre wide driveway on the southern kerb. Access to the loading dock is to be via a reverse manoeuvre and egress by a forward movement, to limit potential conflicts with other road users.

The swept path analysis for these operations is shown on the plans in Attachment 2.

6.6 Pedestrian and Cycling Facilities

As discussed in Section 5.3, 390 bicycle parking spaces and End of Trip Facilities are to be provided as part of the development in line with the requirements of the Sydney Olympic Park Masterplan 20130 and 'The Planning Guidelines for Walking and Cycling'. These facilities are line with the SOPA planning principle of "promoting access and travel by public transport, walking and cycling".

Also, as discussed in Section 3.3, extensive walking, cycling and public transport facilities are available within SOPA, giving potential users a wide range of alternative modes of transport to access the development.

As part of the development and as shown in Figure 21, the "Through Site Link" is provided, which will provide pedestrian and cycle access through the site. This link will provide access from the existing shared footway / cycleway on Olympic Boulevard to the existing P3 parking facility.

Wayfinding signage (external to the development) will be required to direct pedestrians and cyclists from the Sydney Olympic Park Sports Centre (on the west of Olympic Boulevard) to the pedestrian crossing facilities at the intersection of Olympic Boulevard and Sarah Durack Avenue and ultimately to the P3 parking facility to the east of the site. In addition to the wayfinding signage, 'pedestrian fencing' could be erected along the central median of Olympic Boulevard to further direct pedestrians to the existing crossing facilities.

In conjunction with these facilities, a 'Travel Access Guide', will be produced to advise residents, employees and visitors of the sustainable travel options available to access the development.

This guide will include details of the walking, cycling and public transport options available to all users.

7 Impact of Special Events

Sydney Olympic Park hosts a number of major events during a typical year, most notably the Royal Easter Show over the Easter Period and the Telstra 500 V8 Championship during early December.

In addition to the above events, the Sydney Olympic Park hosts numerous sporting events and entertainment events within ANZ Stadium and Acer Arena. For ease of reference, we have classified the events affecting the operation of the proposed building can be summarised as the following four modes:

7.1 Normal Operation (No Event)

The road network will function in the normal manner providing sufficient capacity as described in Section 4 of this report. All vehicular and pedestrian access to the building will operate in a normal manner.

7.2 Royal Easter Show Operation

The Royal Easter Show is an annual event and last for two weeks over the Easter period. This event is organised by Royal Agricultural Society (RAS) and preparation for this event start two weeks prior to the actual event and RAS requires one week after the official show period to vacate the showground.



Figure 22 – Royal Easter Show Plan

Service vehicle access into the Easter Show site is provided at the intersection of Murray Rose Avenue and Australia Avenue. A controlled pedestrian entry and egress is also located at the eastern end of Murray Rose Avenue to provide access into the showground for patrons arriving or departing via Olympic Park Railway Station. There may also be varying degrees of access control implemented by SOPA (Gate 15) in and around Murray Rose Avenue (Jacaranda Square) to facilitate taxi access and coordination of other service vehicles associated with the show.

The show typically operates between 7am and 9pm with the carnival operating until 11pm during the two weeks of the Easter Show.

Access and egress to the proposed Site 9 development would still be available via Homebush Bay Road, Australia Avenue and Sarah Durack Avenue.

7.3 Telstra 500 V8 Supercar Championship

The Sydney Telstra 500 is an annual event managed by the Homebush Motor Racing Authority (HMRA), with the first race taking place in 2009. Recently it has been indicated that the race venue is likely to be relocated to Gosford, however this change of venue has yet to be confirmed. Therefore, this assessment assumes that the event will continue at Sydney Olympic Park.

This event typical involves the installation of a race track within the Olympic Park, as illustrated on the plan overleaf.



Figure 23 – Telstra 500 V8 Supercar Championship Race Track Plan

The track utilises the area shown in Figure 23 and involves the closure of the affected road and restriction of all vehicular access to the area. The event takes place over a single weekend, although concrete barriers are installed on Friday preceding the weekend. Typically the buildings and roads affected by the event are closed from the Friday through to the Sunday, opening again on the following Monday morning, by which time much of the concrete barrier has been removed.

The following strategies are proposed to minimise impacts to buildings and the event as part of the proposed development:

- Regular communication between the Building Manager and SOPA with regard to event dates and potential impacts,
- Regular communication between Building Manager, residents and staff (emails, notices etc...) regarding possible impacts and provide clear information on alternative travel / access arrangements or shutdowns,
- Building Manager to monitor SOPA's published six monthly event calendar and provide regular updates to residents / staff as necessary,
- Coordinate with relevant authorities as required,
- Provision of staff access passes / identification if required for certain tenants / staff,
- Encourage staff and residents to use public transport or implement an office closure on Friday to minimise the need for travel to Sydney Olympic Park thereby easing unnecessary congestion. This would need to be discussed / negotiated with tenants during tenancy negotiations,
- Retail tenants to coordinate deliveries prior to and after the event. Close consultation may be required with Building Manager to assist with this process;

Access and egress to the proposed Site 9 development would still be available via Homebush Bay Road, Australia Avenue and Sarah Durack Avenue.

7.4 Stadium Events

The fourth operating mode relates to major sporting events or concerts that occur regularly throughout the year at ANZ Stadium and Acer Arena. Typically, these events occur outside of standard working hours, there will inevitably be impacts for businesses operating in the area with regard to access.

The major impact that will affect residents and staff during major events such as that described above, is:

- Traffic access to and from Olympic Park before and after events. Often, alternative traffic egress routes are suggested to tenants and staff to avoid delays at major intersections such as Homebush Bay Drive and Underwood Road;

The following strategies are proposed to minimise impacts for future tenants and the event as part of the proposed development:

- Regular communication between the Building Manager and SOPA with regard to event dates and potential impacts;
- Building Manager to monitor SOPA's published six monthly event calendar and provide regular updates to residents / staff as necessary;
- Coordinate with relevant authorities as required;
- Regular communication between Building Manager, residents and staff (emails, notices etc...) regarding possible impacts and provide clear information on alternative travel / access arrangements or shutdowns;

- Retail tenants to coordinate deliveries prior to and after the event. This may involve limiting deliveries to prior to 12pm on weekdays and no deliveries on Saturday or Sundays during events. Close consultation may be required with Building Manager to assist with this process;

These strategies are intended to comply with the Sydney Olympic Park Major Event Impact Assessment Guidelines based on discussions with SOPA's Major Events Coordinator. The strategies can be formalised following the outcome of the approval process and will be prepared in close consultation with SOPA and other relevant authorities.

Access and egress to the proposed Site 9 development would still be available via Homebush Bay Road, Australia Avenue and Sarah Durack Avenue.

8 Conclusion

In summary, the proposed development comprises a 39 storey mixed use development, consisting of 229 residential apartments, 2540m² of commercial GFA, 150m² of retail GFA and 915m² of Retail/Club GFA, including five (5) levels of above ground car parking.

The traffic activity associated with the development will be consistent with the overall planning for the Sydney Olympic Park and will not have any detrimental impact on the operation of the surrounding road network.

The proposed parking provision for 353 cars is within the maximum allowance according to the relevant planning policy and will assist in encouraging workers to travel to the site by means other than private cars. In this regard, 390 bicycle parking spaces and End of Trip Facilities are proposed within the development and the site is well served by public transport.

The parking and vehicular access arrangements have been designed in accordance with the relevant standard, being AS2890 Part 1 and Part 6.

Attachment 1 – Architectural Drawings

Attachment 2 – Swept Paths
