GTAconsultants

# Sydney Zoo
# Bungarribee Precinct, Eastern Creek
# Transport Impact Assessment

**Client //** Sydney Zoo
**Office //** NSW
**Reference //** 16S9000000
**Date //** 07/12/15

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# 1. Introduction

## 1.1 Background

Sydney Zoo is seeking approval under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for the construction of a zoo (Sydney Zoo) within the Bungarribee Precinct in the Western Sydney Parklands (WSP).

The project was declared to be State Significant Development (SSD). Assessment and approval is being pursued in accordance with the EP&A Act. The Secretary's Environmental Assessment Requirements (SEARs) for the project have been issued and set out the environmental assessment requirements for the project.

This Transport Impact Assessment Report has been prepared to address the relevant SEARs in relation to the preparation of the EIS for the Project.

## 1.2 Purpose of this Report

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

i existing traffic and parking conditions surrounding the site
ii suitability of the proposed parking in terms of supply (quantum) and layout
iii service vehicle requirements
iv multi-modal transport requirements
v the traffic generating characteristics of the proposed development
vi suitability of the proposed access arrangements for the site
vii the transport impact of the development proposal on the surrounding road network.

## 1.3 References

In preparing this report, reference has been made to the following:

- an inspection of the site and its surrounds
- Blacktown City Council Development Control Plan 2015
- Blacktown City Council Local Environment Plan 2015
- Australian Standard, Parking Facilities, Part 1: Off-Street Car Parking AS 2890.1:2004
- Australian Standard, Parking Facilities, Part 2: Off-Street Commercial Vehicle Facilities AS 2890.2:2002
- Australian Standard, Parking Facilities, Part 6: Off-Street Parking for People with Disabilities AS 2890.6:2009
- Building Code of Australia
- traffic surveys undertaken by ROAR Data as referenced in the context of this report
- plans for the proposed development prepared by ASPECT Studios, Drawing Number LO3, Revision B, dated December 2015
- other documents and data as referenced in this report.

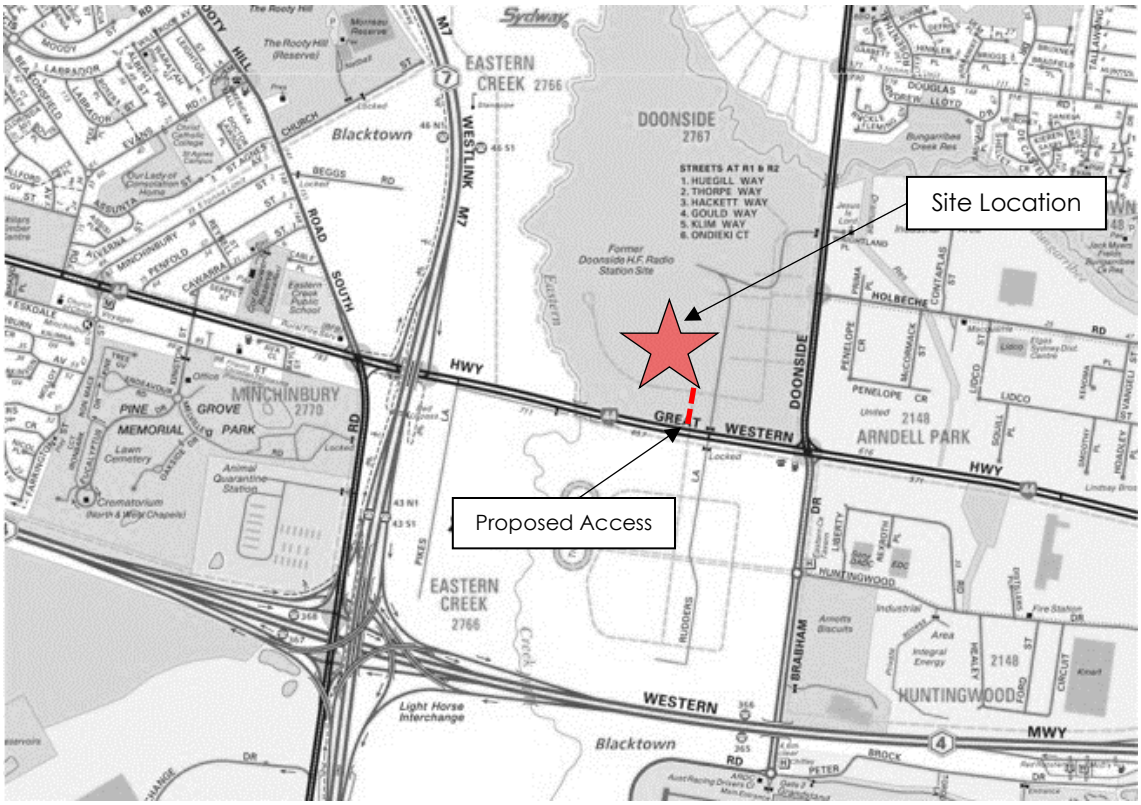
# 2. Existing Conditions

The subject site is located to the north of the Great Western Highway between the M7 Motorway and Doonside Road and covers an area of 16.5 hectares.

The surrounding land uses include Western Sydney Parklands (WSP), as well as the Huntingwood West Employment Lands to the south and Doonside Residential Precinct to the north.

The location of the subject site and its surrounding environs is shown in Figure 2.1.

**Figure 2.1: Subject Site and Its Environs**




Basemap source: Sydway

## 2.1 WSP Bungarribee Precinct

The Bungarribee Precinct is located in the northern section of WSP, spanning between Doonside and Eastern Creek over 200 hectares. Bungarribee is bounded by the M7 Motorway to the west, the Great Western Highway to the south and Doonside Road to the east.

The Bungarribee Activation project proposes a new Super Park, incorporating features outlined in the 2014 Bungarribee Master Plan, shown in Figure 2.2. A new walking and cycling track between the Great Western Highway and Eastern Road was recently completed. Construction is underway on new car parks, internal roads and walking and cycling tracks, with access via a recently constructed access from Doonside Road. [1]

[1] http://westernsydneyparklands.com.au/about-us/parklands-projects/bungarribee-precinct-activation/, accessed 11/09/15

It is noted that the vehicle connection between the Great Western Highway and Doonside Road, indicatively shown in Figure 2.2, has not been approved and therefore has not been considered as part of this assessment.

The Trust's vision for the Bungarribee Precinct is to provide additional regional recreation, tourism, social and cultural opportunities for Western Sydney. Sydney Zoo would complement this vision as a tourist facility, located in the southern section of the Precinct Park of the land identified as "tourism and business hub" in Figure 2.2).

The Master Plan will be constructed in stages over a period of the next four to five years from the date of issue of this report.

**Figure 2.2: Bungarribee Precinct Master Plan**

Image source: Western Sydney Parklands Trust

## 2.2 Road Network

### 2.2.1 Adjoining Roads

Details relating to the surrounding road network (see Figure 2.1) are discussed below.

### Great Western Highway

The Great Western Highway is classified as a State Road (HW5) and in the vicinity of the site is aligned in an east-west direction. Adjacent to the site, it has a six lane dual carriageway (three lanes in each direction). Approximately 300m to the west and 700m to the east, the roadway decreases to two lanes in each direction.

Kerbside parking is not permitted on the Great Western Highway in the vicinity of the site and there is a speed limit of 80km/h in the vicinity of the site.

The Great Western Highway carries approximately 42,500 vehicles per day[2] and is shown in Figure 2.3.

### Doonside Road

Doonside Road is classified as a Regional Road and in the vicinity of the site is aligned in a north-south direction. Adjacent to the site, Doonside Road has a dual carriageway with four traffic lanes (two in each direction). The carriageway is approximately 20m wide, set within a 30m wide road reserve.

Kerbside parking is not permitted on Doonside Road. Adjacent to the site, Doonside Road has a speed limit of 70km/h and is shown in Figure 2.4.

**Figure 2.3: Great Western Highway (looking west)** **Figure 2.4: Doonside Road (looking north)**

## 2.2.2 Surrounding Intersections

The following signalised intersections currently exist in the vicinity of the site:

- Great Western Highway/ Rudders Street
- Great Western Highway/ Doonside Road/ Brabham Drive
- Great Western Highway/ southbound M7 Motorway off-ramp
- Great Western Highway/ northbound M7 Motorway on-ramp.

There are no south-facing ramps to the M7 Motorway at the Great Western Highway; instead traffic approaching from the south along the M7 would typically use the Wallgrove Road off-ramp, approximately 2.5km south of the Great Western Highway.

2 Based on the peak hour traffic counts undertaken by GTA in July 2015 and assuming a peak-to-daily ratio of 8% for arterial roads and 10% for local roads.

In addition, Brabham Drive links with Ferrers Road which functions as a collector road, linking the Great Western Highway to the north, with The Horsley Drive to the south.

## 2.3 Traffic Volumes

GTA Consultants commissioned traffic movement counts in July 2015 at the Great Western Highway/ Rudders Street/ Bungarribee Access intersection during the following peak periods:

- 7:00am to 11:00am (Tuesday)
- 3:30pm and 6:30pm (Tuesday)
- 10:00am to 2:00pm (Saturday).

The weekday AM and PM, as well as Saturday midday peak hour traffic volumes are summarised in Figure 2.5 and Figure 2.6, with full results contained in Appendix A. The peak hours assessed include the following:

- AM peak hour – 7:45am-8:45am (referred to as 8:00am-9:00am within the context of this report)
- PM peak hour – 4:30pm-5:30pm
- Saturday peak hour – 11:45am-12:45pm.

**Figure 2.5: Existing AM/ PM Peak Traffic Volumes**

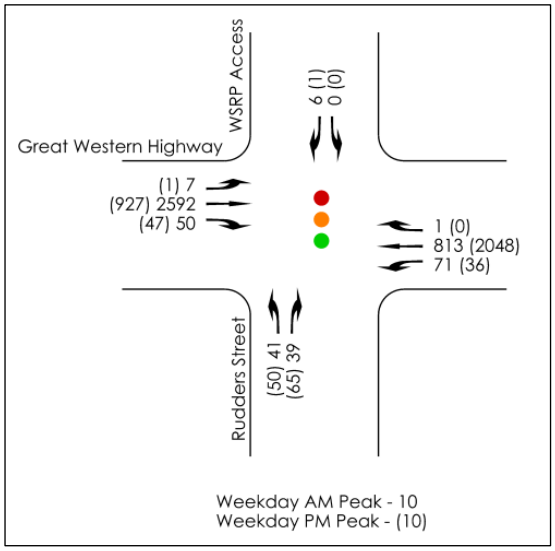
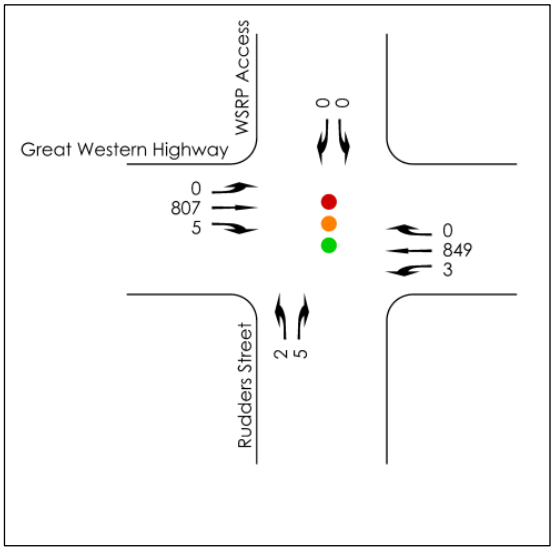



**Figure 2.6: Existing Weekend Peak Traffic Volumes**




## 2.4 Intersection Operation

The operation of the key intersections within the study area have been assessed using SIDRA INTERSECTION[3], a computer based modelling package which calculates intersection performance.

The commonly used measure of intersection performance, as defined by the RMS, is vehicle delay. SIDRA INTERSECTION determines the average delay that vehicles encounter and provides a measure of the level of service.

Table 2.1 shows the criteria that SIDRA INTERSECTION adopts in assessing the level of service.

[3] Program used under license from Akcelik & Associates Pty Ltd.

**Table 2.1: SIDRA INTERSECTION Level of Service Criteria**

| Level of Service (LOS) | Average Delay per vehicle (secs/veh) | Traffic Signals, Roundabout | Give Way & Stop Sign |
|---|---|---|---|
| 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 to 42 | Satisfactory | Satisfactory, but accident study required |
| D | 43 to 56 | Near capacity | Near capacity, accident study required |
| E | 57 to 70 | At capacity, at signals incidents will cause excessive delays | At capacity, requires other control mode |
| F | Greater than 70 | Extra capacity required | Extreme delay, major treatment required |

Table 2.2 presents a summary of the existing operation of the intersection, with full results presented in Appendix B of this report.

**Table 2.2: Existing Operating Conditions**

| Intersection | Peak | Leg | Degree of Saturation (DOS) | Average Delay (sec) | 95th Percentile Queue (m) | Level of Service (LOS) |
|---|---|---|---|---|---|---|
| Great Western Highway/ Rudders Street/ Bungarribee Access | AM | North | 0.06 | 66 | 7 | E |
| | | East | 0.32 | 2 | 6 | A |
| | | South | 0.34 | 57 | 25 | E |
| | | West | 0.61 | 2 | 22 | A |
| | | **All** | **0.61** | **3** | **25** | **A** |
| | PM | North | 0.02 | 66 | 2 | E |
| | | East | 0.67 | 1 | 23 | A |
| | | South | 0.52 | 63 | 36 | E |
| | | West | 0.22 | 3 | 11 | A |
| | | **All** | **0.67** | **4** | **36** | **A** |
| | Sat | North | 0.02 | 63 | 2 | E |
| | | East | 0.28 | 1 | 5 | A |
| | | South | 0.05 | 63 | 3 | E |
| | | West | 0.19 | 1 | 4 | A |
| | | **All** | **0.28** | **2** | **5** | **A** |

On the basis of the above assessment, the intersection of the Great Western Highway/ Rudders Street/ Bungarribee Access currently operates well, with an overall LOS A, average delay of up to 4 seconds and capacity (DOS) of up to 0.67.

Notwithstanding the above, the SIDRA modelling results indicate that the northern and southern approaches operate at LOS E during all three peak periods. This is a consequence of the average delays in excess of 60 seconds. Traffic signal operation typically seeks to minimise the average intersection delay. As such, a significant portion of green time is allocated to the eastern and western approaches to accommodate the high traffic volumes.

The SIDRA modelling indicates that there is spare capacity on the eastern and western intersection approaches, such that additional green time could be allocated to the northern and

southern approaches to accommodate additional traffic volumes without substantially impacting the overall intersection operation.

It is noted that the intersection typically operates as a T-intersection at present, with access to WSP restricted to authorised vehicles only. However, on-site observations indicated that the signal phasing currently accommodates the right turn into WSP, when activated by the presence of a vehicle.

It is also recognised that the Great Western Highway typically experiences significant queuing and delays during the AM and PM peak periods. This is generally attributed to surrounding intersections, including the Great Western Highway/ Doonside Road/ Brabham Drive intersection and the Great Western Highway/ Reservoir Road intersection, and often results in downstream queuing extending to the intersection of the Great Western Highway/ Rudders Street/ Bungarribee Access.

## 2.5 Car Parking

There is no publicly accessible parking currently available in close proximity to the site. However, it is understood that the Trust is currently constructing approximately 160 spaces along the northern alignment of the site, within the Bungarribee Precinct. There is currently no approved vehicular linkage between this parking and the proposed Sydney Zoo location.

## 2.6 Public Transport

The site is located equidistant between Rooty Hill Railway Station and Doonside Railway Station on the T1 Western Line, with Blacktown Railway Station being the closest Transport Interchange. Bus services somewhat complement the train network, with two services travelling along the Great Western Highway in the vicinity of the site. Both services link the site with Blacktown Railway Station, albeit via a relatively indirect route.

The nearest bus stops are located along the Great Western Highway, east of Rudders Street. However, no bus stop facilities are located at these stops and it is expected that they are not frequently used.

Sydney Zoo is currently in discussions with TfNSW regarding rescheduling of the 729 bus route to accommodate the greater public transport demand generated by the development. The goal of Sydney Zoo is to facilitate a minimum of 15% arrivals by public transport.

A review of the available public transport in the vicinity of the site is summarised in Table 2.3, with the bus route maps shown in Figure 2.7 and Figure 2.8.

**Table 2.3: Public Transport Provision**

| Service | Route # | Route Description | Location of Stop | Distance to Nearest Stop | Frequency On/Off Peak |
|---|---|---|---|---|---|
| Train | T1 Western | Penrith (Emu Plains) to Epping and Hornsby (Berowra) | Rooty Hill/ Doonside | 3-4km | 10/15mins |
| | T5 Cumberland | Schofields to Campbelltown | Blacktown | 6.5km | 30mins |
| | Blue Mountains | Katoomba/Lithgow to Central | | | 30-60mins (peak services don't stop at Blacktown) |
| Bus | 723 | Mt Druitt to Blacktown via Eastern Creek Business Park | Great Western Highway opposite Rudders Street | 200m | 20/60mins |
| | 729 | Blacktown, Minchinbury and Bungarribee | Great Western Highway opposite Rudders Street | 200m | 30mins |

Figure 2.7: Bus Network – Route 723

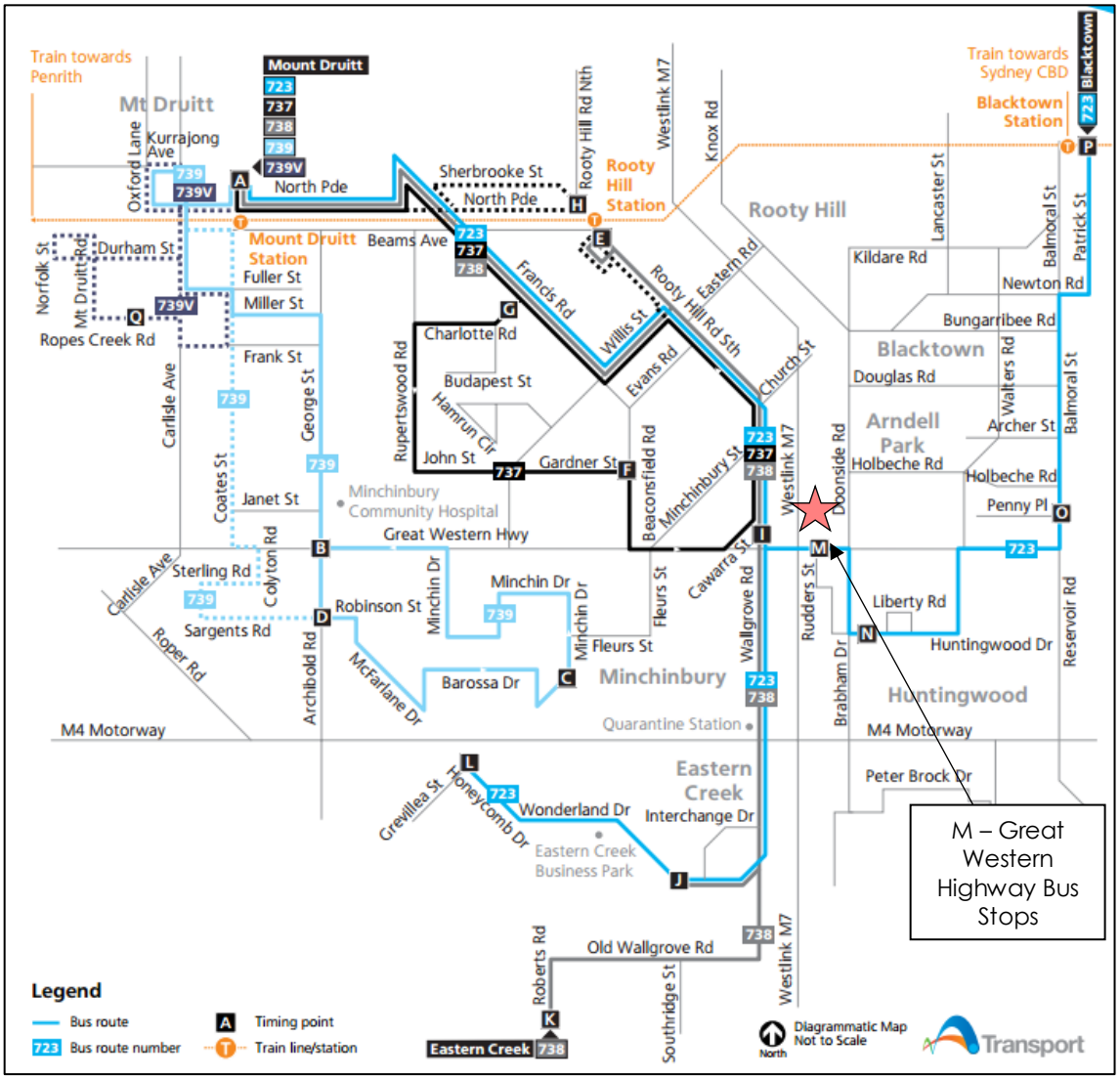



Image source: http://www.busways.com.au/sites/default/files/network_maps/723%2C737%2C738%2C739EasternCreekMinchMap.pdf, accessed 16/10/15

Figure 2.8: Bus Network – Route 729

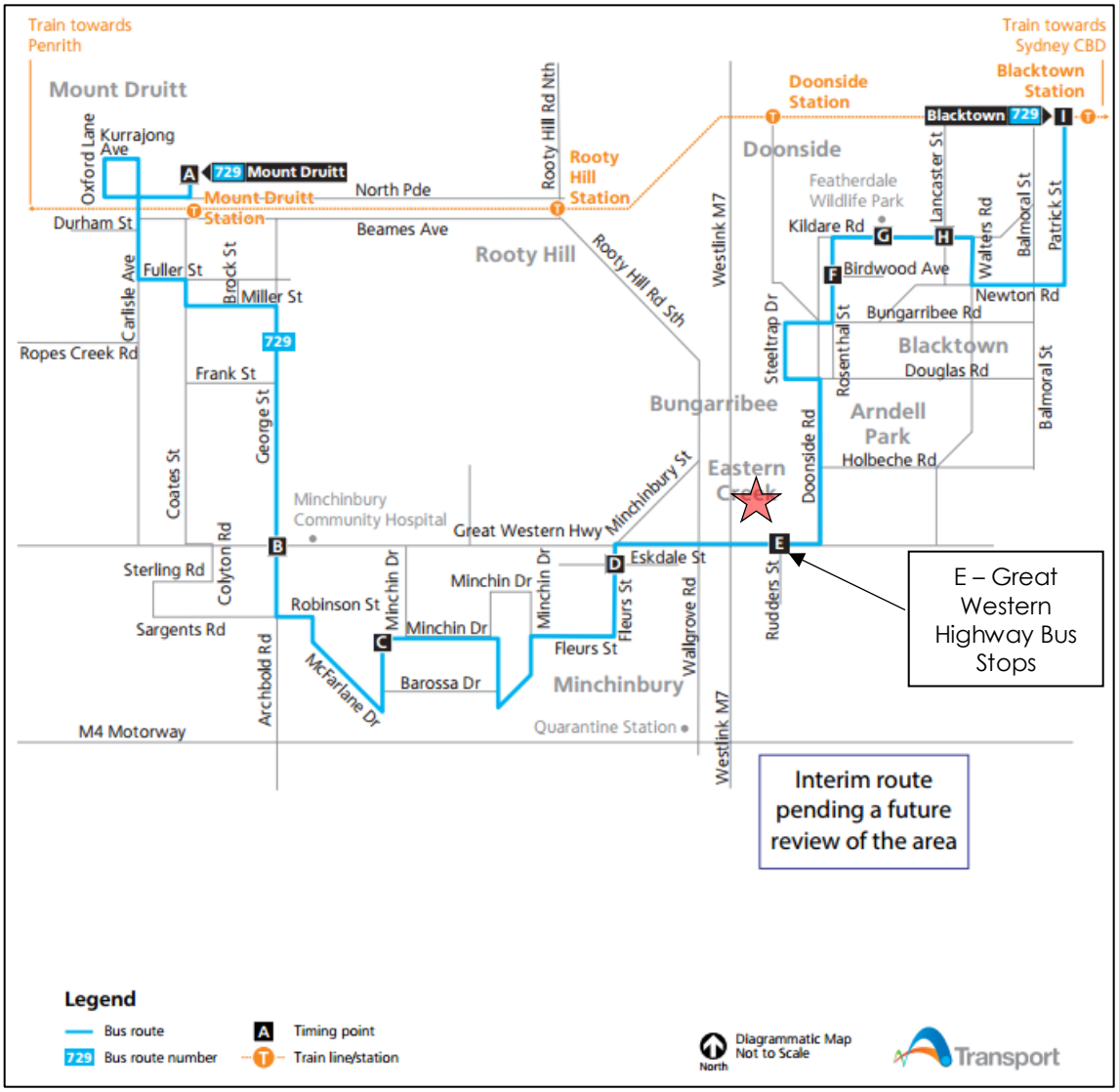



Image source: http://www.busways.com.au/sites/default/files/network_maps/723%2C737%2C738%2C739EasternCreekMinchMap.pdf, accessed 16/10/15

## 2.7 Pedestrian and Cycling Infrastructure

Due to the non-residential and parkland uses surrounding the site, there is currently poor pedestrian connectivity, with no footpaths provided along the Great Western Highway. It is understood that pedestrian improvements within WSP are currently under construction.

A separated cycleway is provided along the M7 Motorway and a north-south aligned shared path is provided within the WSP along its western boundary, as shown in Figure 2.9. In addition, Doonside Road is considered a bicycle friendly road and Blacktown City Council has also proposed an off-road cycling facility along Doonside Road.

There are currently no east-west cycling connections in the vicinity of the site. Notwithstanding this, Blacktown City Council has identified the need for a cycling connection along the Great Western Highway and in particular to link the M7 Motorway with Doonside Road.

**Figure 2.9: Blacktown Bike Plan, 2013**

Source: http://www.blacktown.nsw.gov.au/Visiting_Our_City/Transport_Access_Around_the_City/Using_Bicycles_in_Blacktown, accessed 31/08/15

# 3. Development Proposal

## 3.1 Overview

The proposed development of Sydney Zoo will include:

- Animal exhibits across several enclosures of varying design for a range of native and exotic animals
- Back-of-house buildings for exhibits
- Main entrance building comprising entry/exit and gift shop
- Restaurant and café for Sydney Zoo users only
- Kiosks and amenities for Sydney Zoo users only
- Show arena
- Picnic areas and gardens
- Wetlands and waterways
- Service building containing:
    - Administration areas;
    - Curatorial and food preparation areas; and
    - Veterinarian space.
- Service yard with maintenance shelter
- Main car park for approximately 484 vehicles, with an overflow car park for approximately 840 vehicles, access via an internal road connecting to the Great Western Highway
- Bus parking.

Construction of the project is expected to take approximately 8-12 months to complete.

Operating hours for Sydney Zoo would typically be 9:00am to 6:00pm.

The Sydney Zoo preliminary layout is shown in Figure 3.1.

**Figure 3.1: Sydney Zoo Preliminary Layout**

Source: Aspect Studios

## 3.2 Operation

### 3.2.1 Daily Visitation

Annual visitation of between 500,000 to 800,000 people is expected at Sydney Zoo. However, the daily visitation profile is expected to vary across the year, with approximately 50% of the annual visitation expected during school holidays. In particular, 16% of the annual visitation is expected during the peak summer school holiday period resulting in a maximum daily attendance of up to 8,000 people per day if the high case annual visitation scenario is achieved.

Three conservative daily visitation scenarios have been considered for weekdays and weekends, which are summarised in Table 3.1 and include the following:

- Peak period – mid/ late December to late January (summer school holiday period) and including public holidays.
- Shoulder period – beginning of November to mid/ late December and late January to end of February and including all other school holidays.
- Off-peak period – beginning of March to end of October (excluding school holidays).

**Table 3.1: Sydney Zoo Daily Visitation Profile**

| Period | Day | Approximate % of Year | Minimum Daily Visitation | Maximum Daily Visitation | Estimated % of Peak |
|---|---|---|---|---|---|
| Peak | Weekday | 5% | 3,400 | 5,500 | 100% |
| | Weekend & Public Holidays | 5% | 6,000 | 8,000 | |
| Shoulder | Weekday | 15% | 1,400 | 2,300 | 40-45% |
| | Weekend | 5% | 2,500 | 3,300 | |
| Off Peak | Weekday | 50% | 900 | 1,450 | 25-30% |
| | Weekend | 20% | 1,575 | 2,100 | |

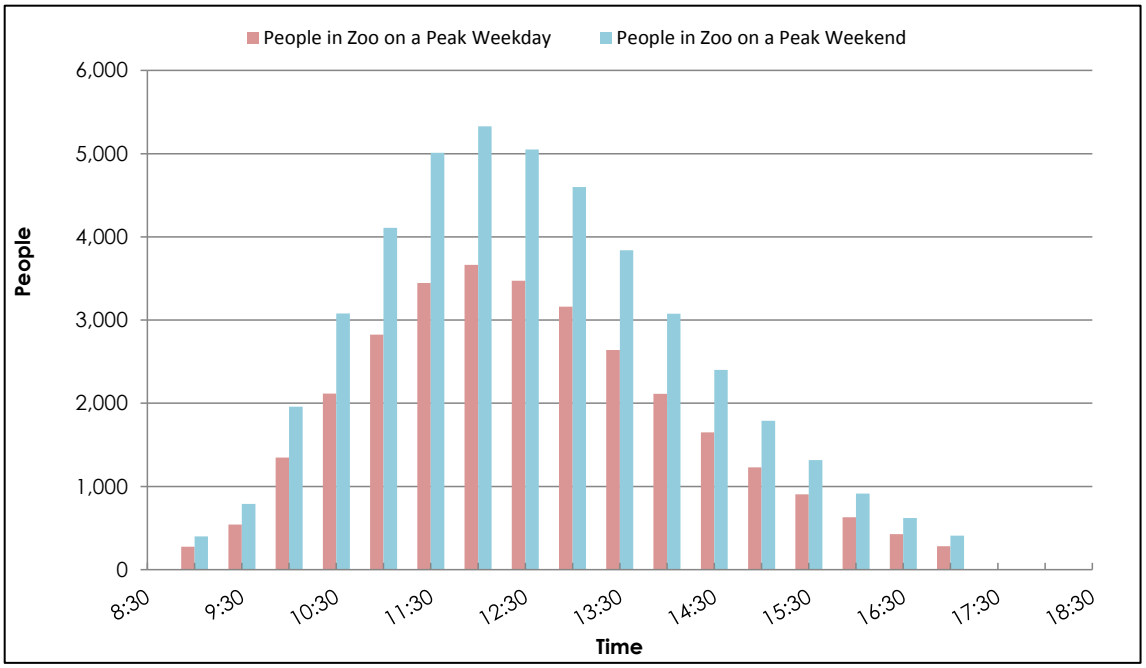
For comparative purposes and to appreciate the anticipated scale of the proposed development, the typical annual visitation and peak daily visitation for various similar tourist facilities in Sydney are summarised in Table 3.2. It is noted that annual and daily visitation for Sydney Zoo may potentially be as high as Scenic World, located in the Blue Mountains.

**Table 3.2: Visitation of Similar Facilities**

| Tourist Facility | Approximate Annual Visitation | Approximate Peak Daily Visitation |
|---|---|---|
| Sydney Zoo | 500,000 | 5,125-10,000 |
| Scenic World | 850,000 | 5,000-10,000 |
| Taronga Zoo | 1.6 million | 10,000-15,000 |
| Wet 'n' Wild | - | 15,000-20,000 |

Based on estimations provided by Sydney Zoo, the forecast visitation profile (accounting for arrivals and departures) i.e. the number of people in Sydney Zoo at any one time for a weekday and weekend during the peak period are shown in Figure 3.2.

**Figure 3.2: Maximum Period Weekday Visitation Profile**



### 3.2.2 Staff

It is anticipated that Sydney Zoo would have approximately 50 full-time staff and 50-60 casual staff. Similar to the daily visitation, daily staff numbers would vary across the year as well as between weekdays and weekends, as summarised in Table 3.3.

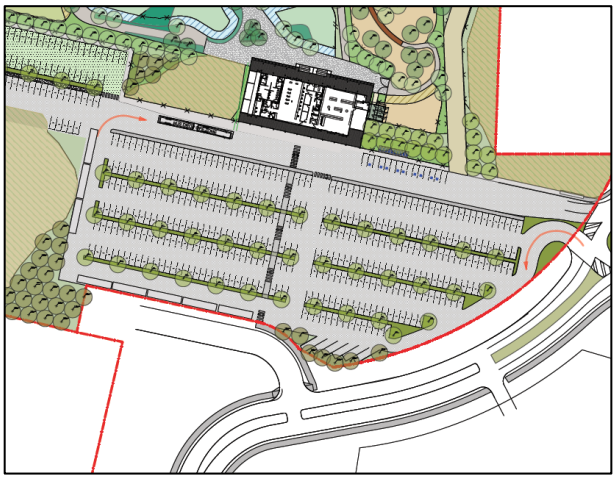
**Table 3.3: Sydney Zoo Daily Staff Profile**

| Period | Day | Holiday Period | Typical Daily Staff |
|---|---|---|---|
| Peak | Weekday | Yes | 80 |
| | Weekend & Public Holidays | | 80-110 |
| Shoulder | Weekday | No | 45 |
| | Weekend | | 50 |
| Off Peak | Weekday | No | 45 |
| | Weekend | | 50 |

## 3.3 Pedestrian and Bicycle Facilities

The development proposes a high level of pedestrian accessibility, with footpaths and pedestrian crossings provided within the car park linking Sydney Zoo entry to the surrounding WSP. It is also proposed that footpaths and/or shared paths be provided to link the Great Western Highway bus stops to the site, as shown in Figure 3.3.

**Figure 3.3: Pedestrian Connections to the Great Western Highway**



Source: Aspect Studios

Bicycle parking with capacity for up to 20 bicycles would also be provided at the main entry for use by visitors and staff. Given that Sydney Zoo would typically attract families and large groups, the proposed bicycle provision is considered suitable.

It is recommended that the bicycle parking demand be monitored following the opening of Sydney Zoo, with additional capacity provided, as required, and particularly following the completion of the surrounding cycling links proposed by Blacktown City Council.

## 3.4 Vehicle Access

Vehicle access to the car park is proposed via a two-way roadway from the Great Western Highway, including a new roundabout at the car park access.

### 3.4.1 Future Development

In the medium term, an internal road extension could connect the Sydney Zoo access road to the Doonside Road intersection recently constructed by the Trust. There are no plans, submissions or approvals in place at this stage. Further details relating to timing and also the anticipated traffic generation associated with other surrounding land uses therefore cannot be known at this stage. The Trust has agreed to this position.

A set-down/ pick-up area would be provided at the main entrance for use by buses and cars.

Servicing would typically occur via the proposed service road, which would circulate around the perimeter of Sydney Zoo.

## 3.5 Car Parking

The proposed development will provide a total of approximately 1,324 car parking spaces with the breakdown as follows:

- 484 car spaces for everyday use (on asphalt or similar)
- 840 car spaces in an overflow car park (gravel, compacted grass or a combination thereof).

The car park would also include bus parking facilities, including parallel bus parking bays with capacity for 5 coaches (or up to 8 minibuses). An additional 6 angled minibus bays are also proposed in the south-east corner of the car park.

The suitability of the car parking provision and layout is discussed in Section 4 of this report.

# 4. Car Parking



## 4.1 Car Parking Requirements

Given the unique nature of the development, no guidelines exist with regards to suitable car parking requirements. Therefore, car parking demand can be forecast using a first principles approach on the basis of the anticipated visitor and staff numbers, arrival profile, estimated vehicle occupancy and vehicle mode share.

## 4.2 Visitor Parking Demand

### 4.2.1 Vehicle Occupancy

As discussed, Sydney Zoo would typically attract families, particularly from the Western Sydney region. Reference has been made to Australian Bureau of Statistics, Census of Population and Housing data from 2011 (ABS data) to conservatively estimate the average number of people per vehicle who would likely visit Sydney Zoo. The following assumptions have been made:

- 60% of visiting families would have two parents and 40% would have one
- an average of 2 children per vehicle.

Based on the above, it is estimated that the average vehicle occupancy for a family visiting Sydney Zoo would be 3.6 people per vehicle.

With consideration for visitor forecasts provided by Sydney Zoo the average vehicle occupancy is summarised in Table 4.1.

**Table 4.1: Vehicle Occupancy Estimate**

| Visitor Group | Anticipated Visitor Composition | Average People Per Vehicle |
|---|---|---|
| Families | 85% | 3.6 |
| Couples | 12.5% | 2.0 |
| Singles | 2.5% | 1.0 |
| | **Overall Average People per Vehicle** | **3.34** |

For the purpose of this assessment, a conservative vehicle occupancy of 3 people per vehicle has been assumed.

### 4.2.2 Mode Share

With consideration for other recreational land uses and the future potential public transport accessibility of the site, an 85% vehicle mode share (decreasing to 75% on peak days) and 15% public transport/ walking and cycling mode share (or shuttle/ coach, increasing to 25% on peak days) has been adopted.

Several management measures, as well as special public transport provisions would be implemented to encourage carpooling and public transport use, particularly on peak days.

## 4.3 Arrival and Departure Profile

Based on the arrival and departure profile discussed in Section 3.2.1, the anticipated visitor arrival and departure profile, as well as the associated parking demand for a shoulder period weekday and an off-peak weekend are shown in Figure 4.1 and Figure 4.2, respectively. These periods represent at least 85% of the year, with the parking demand expected to exceed this on peak days and the occasional weekend during the shoulder period.

**Figure 4.1: Weekday Visitor Parking Demand Profile**

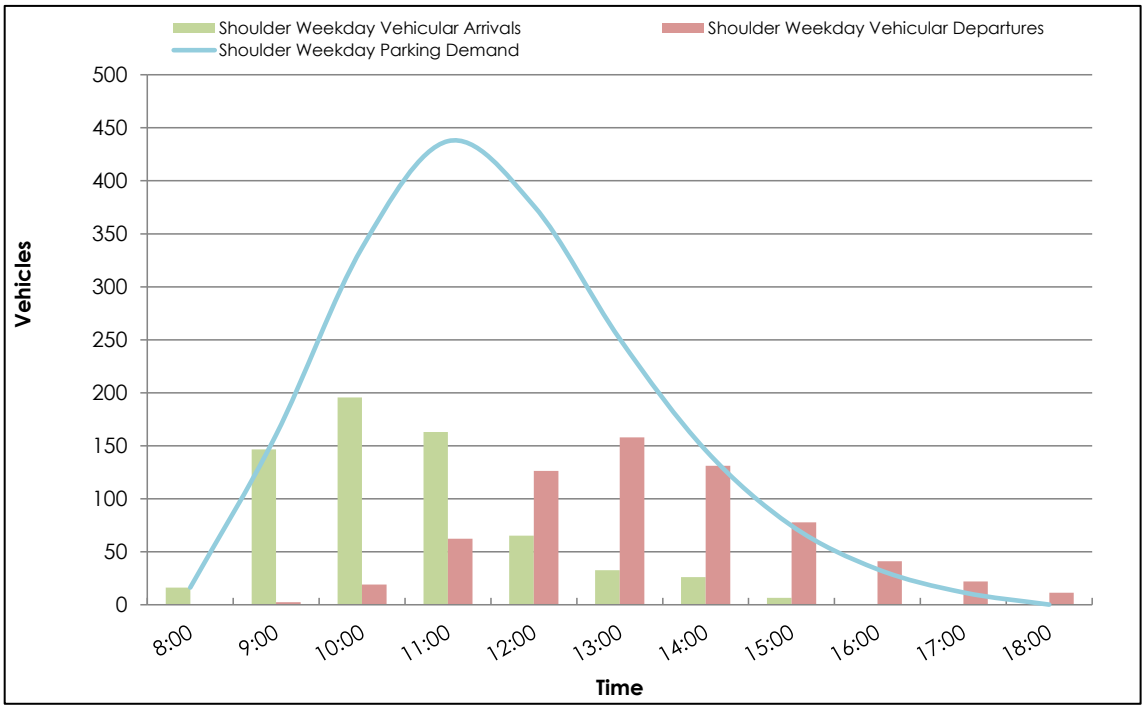
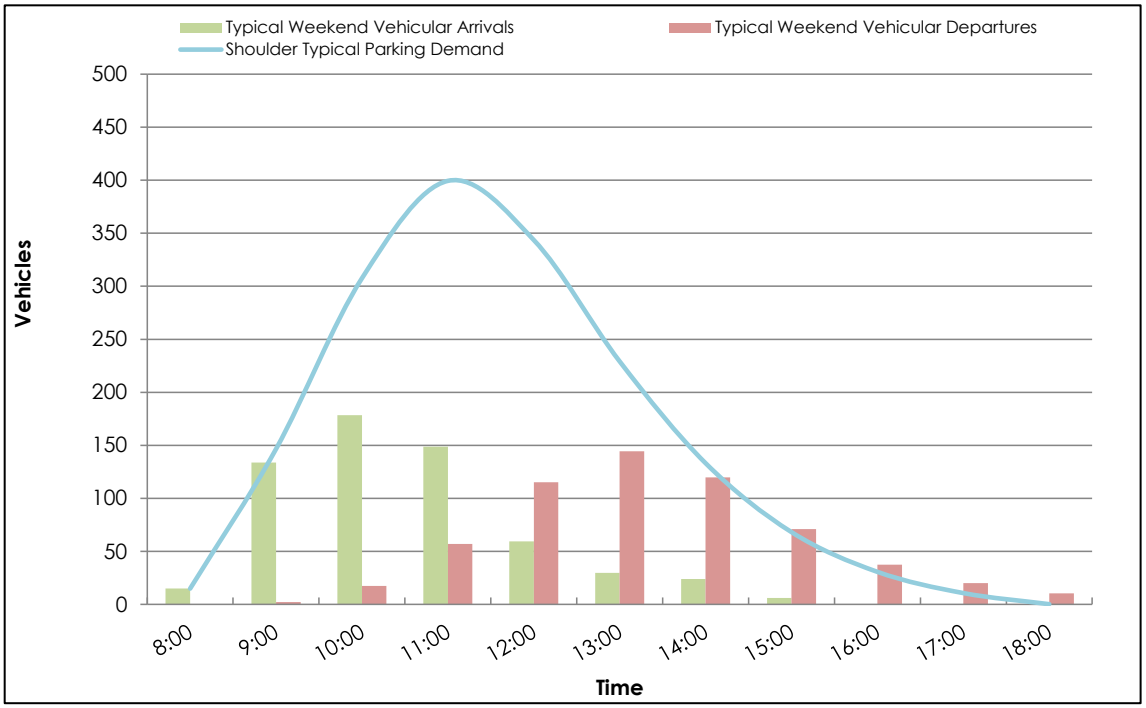


**Figure 4.2: Weekend Visitor Parking Demand Profile**




Based on the above, Sydney Zoo would require up to 450 parking spaces to accommodate the maximum parking demand on a shoulder weekday and off-peak weekend.

Using a similar approach to the above, the parking demand for the three modelled scenarios on a weekday and a weekend are summarised in Table 4.2.

**Table 4.2: Visitor Parking Demand**

| Period | Estimated Parking Demand | |
|---|---|---|
| | Weekday | Weekend |
| Peak | 950 | 1,350 |
| Shoulder | 450 | 650 |
| Off-peak | 300 | 400 |

## 4.4 Staff Parking Demand

As discussed, approximately 50 staff would be required on site on any given day, increasing to 80-110 during the peak period. Using first principles and assuming that every staff member drove, this would equate to a parking demand of approximately 50 vehicles during the shoulder period. However, staff would be encouraged to car pool and use public transport, particularly on weekends and during peak periods.

## 4.5 Adequacy of Parking Supply

The development proposes a total of approximately 1,324 car parking spaces, including approximately 484 formal car parking spaces (including 9 disabled spaces). On this basis, the formal car parking supply would typically be capable of accommodating the weekday parking

demand including staff during off-peak and shoulder periods, with the overflow car park required on weekends during the shoulder period and during the peak period.

It is noted that the above parking demand assessment conservatively considers the maximum visitation for each period of the year. Therefore, the average parking demand would not likely reach the proposed parking provision.

The parking demand would only exceed the supply on peak days (i.e. summer holiday weekends and public holidays) in the high case visitation scenario of 800,000 per annum as shown in Figure 4.3 and Figure 4.4. This shortfall is estimated at 26 visitor spaces. The frequency of this potential shortfall equates to around 5% of the year. On these peak days, appropriate management measures and/or temporary overflow parking would be required. Travel demand management measures would also be implemented for peak days, including promotion of public transport options and car pooling to minimise the need for any such temporary parking arrangements.

**Figure 4.3: Weekday Visitor Parking Demand Profile**

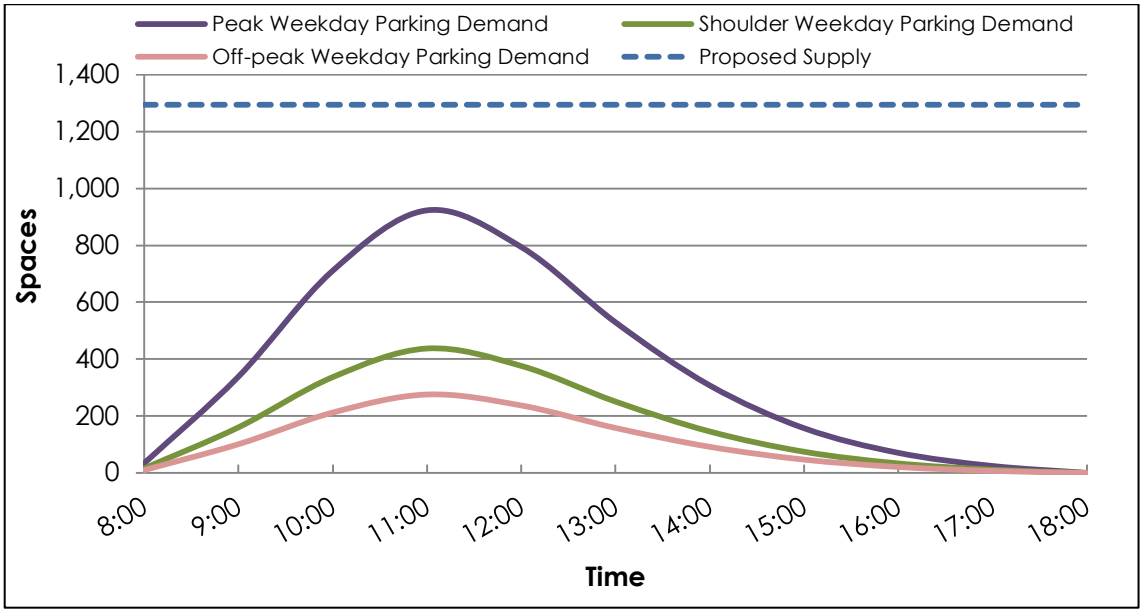
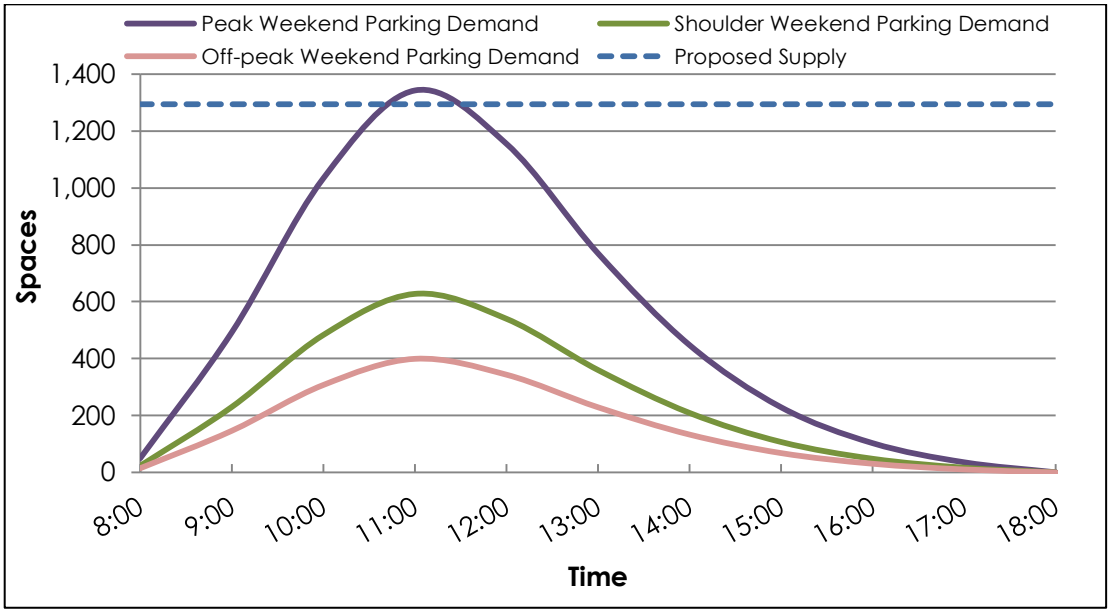


**Figure 4.4: Weekend Visitor Parking Demand Profile**




## 4.6 Disabled Parking

The Building Code of Australia specifies that disabled parking be provided at a rate of 1 space for every 50 car parking spaces or part thereof for up to 1,000 car spaces and then 1 space for each additional 100 car parking spaces of part thereof in excess of 1.000 car parking spaces.

Based on this and with consideration for the proposed formal car parking supply of 484 spaces, the development is required to provide 9-10 disabled parking spaces. This equates to approximately 2% of the formal parking supply and is consistent with other similar sites. The proposed 9 disabled parking spaces generally meets the above requirements.

## 4.7 Bus Parking

The development proposes unmarked parallel bus parking, with estimated capacity for 5 coaches (or up to 8 minibuses). An additional 6 minibus bays are also proposed in the south-east corner of the car park (see Figure 4.5).

It is also worth noting that the use of minibuses rather than coaches for tourist activities and tourist groups is significantly increasing. Information provided by Scenic World indicates that they typically experience four times more minibuses than coaches on any given day.

**Figure 4.5: Proposed Bus and Mini Bus Parking**

Source: Aspect Studios

In terms of bus/ coach access and parking for the broader precinct, it is noted that a previous traffic assessment[4] prepared on behalf of the Trust for the Bungarribee Entertainment Precinct identified the need for a bus interchange within WSP to cater for large events. It is recommended that the Trust consider this further as part of the broader Bungarribee Precinct works.

## 4.8 Comparative Assessment

For comparative purposes, a summary of the parking provision at other tourist facilities has been provided in Table 4.3, including parking, bus parking and set-down/ pick-up bays. It is worth noting that the formal parking supply and the total parking supply is in excess of five times that of Scenic World, which is anticipated to have similar annual visitation.

**Table 4.3: Parking Provisions of Similar Venues**

| Location | Formal Parking | Overflow Parking | Coach Parking | Minibus Parking | Set-down/ Pick-up (cars) | Set-down/ Pick-up (buses) |
|---|---|---|---|---|---|---|
| Proposed Sydney Zoo | 484 (37%) | 840 (63%) | 5-8 (plus additional 6 mini bus bays) | | 2-5 | |
| Scenic World | 226 (100%) | - | 31 | | 6 | 3 |
| Taronga Zoo | 658 (70%) | 176 (30%) | 12 [1] | 2 | 2 | 4 |
| Wet n Wild | 740 (40%) | 1,070 (60%) | 12 | 6 | 13 | 3 |

[1] Not including public bus bays in the Bradleys Head Road Bus Interchange.

[4] Traffic Modelling Report, Western Sydney Parklands – Entertainment Precinct – Concept Access Arrangements Review, TRAFFIX, August, 2013

## 4.9 Car Parking Layout Review

The car park layout has been reviewed against the requirements of the Australian Standard for Off Street Car Parking (AS2890.1:2004 and AS2890.6:2009) and the Australian Standard for Off-street commercial vehicle facilities (AS2890.2:2002). This assessment included a review of the following:

- bay and aisle width
- turnaround facilities
- circulation roads
- internal queuing
- set-down/ pick-up area
- parking for persons with disabilities.

Details of this review are as follows:

- Vehicular access to the site is proposed via a 16m wide two-way crossover along the eastern alignment of the site, separated by a central median. A dual-lane roundabout provides access, minimising queuing and delay during peak arrival and departure periods and while also facilitating any future through connection to the north along the access road.
- The car park is generally designed with a one-way perimeter circulating aisle and two-way central aisles, with 2.5m x 5.4m bays and 5.8m wide aisles, albeit wider aisles are provided where required to accommodate bus manoeuvres.
- The pick-up/ set-down area provided at the entry site entry would be shared by buses and cars.
- The car park circulation has dimensions such that it can accommodate a 14.5m long rigid bus design vehicle, including parking within the car park aisles on off-peak days.

This review indicates that the proposed car parking layout is expected to operate satisfactorily, as shown in the swept path analysis included as Appendix C.

# 5. Sustainable Transport Infrastructure



## 5.1 Bicycle End-of-Trip Facilities

As discussed, capacity for up to 20 bicycles would be provided at the main access to Sydney Zoo. The proposed bicycle parking would benefit the development in reducing private vehicle reliance to the site for staff and visitors. However, these would need to be complemented by suitable end-of-trip facilities, lockers, and in particular, improvements to the surrounding cycling network. It is recommended that further consultation with Blacktown City Council/ Department of Planning and Environment and The Trust be considered as part of the detailed design process, to better understand the status of proposed cycling connections, particularly the pedestrian and cycling connection along the Great Western Highway. The provision of such facilities will be enhanced to suit the possible demand should the broader bicycle network be improved.

## 5.2 Walking Network

Pedestrian footpaths would be provided within the car park and along the proposed WSP access road connecting to the Great Western Highway to ensure a suitable connection to facilitate public transport use.

## 5.3 Public Transport

The site presently has what can be considered relatively poor public transport access. Initial consultation with Transport for NSW (TfNSW) and Busways has been undertaken, with further and ongoing dialogue recommended to ensure that an increase in the number of bus services along the Great Western Highway is achieved, particularly on weekends (and preferably available upon opening of Sydney Zoo, rather than responding to subsequent demand).

Sydney Zoo's aspiration is to work with TfNSW to facilitate a mode share of up to 25% of visitors arriving via public transport. This would primarily be achieved by rescheduling existing Busways routes and services.

## 5.4 Taxi Set-down/ Pick-up

Taxi set-down/ pick-up would be accommodated at the main entry. However, to promote use of taxis, a staffed taxi booking point will be provided at Sydney Zoo exit, potentially in the gift shop. Given that there are taxi zones located at Rooty Hill, Doonside and Blacktown Railway Stations, it is anticipated that visitors would typically wait 10 minutes for a taxi.

# 6. Loading Facilities



## 6.1 Loading Requirements

Sydney Zoo requires consideration of a range of loading/ servicing requirements, including the following:

- servicing and deliveries for the kiosks and restaurant
- delivery of animals
- delivery of zoo facilities, food and equipment
- collection of waste and garbage
- regular and periodic maintenance activities.

It is understood that servicing/ loading would equate to less than 10 vehicles per day, all of which would occur outside peak arrival/ departure hours and typical road network peak periods.

## 6.2 Proposed Loading Arrangements

Loading/ servicing of the restaurant would be provided via a 7m wide two-way service road, with access provided near the car park entry. The loading dock can accommodate two vehicles of size up to 8.8m Medium Rigid Vehicles.

The loading bays on northern and southern side of the veterinary building would be capable of accommodating vehicles up to a 6.4m Small Rigid Vehicle.

The remainder of loading and servicing for Sydney Zoo would occur via the one-way service road, accessed from the western end of the site. The service road has been designed to accommodate the largest vehicle required (19m semi-trailer) to deliver animals. All other deliveries/ garbage collection is typically expected to occur via vehicles of sizes up to an 8.8m Medium Rigid Vehicle.

The internal path network is capable of accommodating a standard NSW ambulance in case of emergency, with two emergency access points provided along the northern and southern alignments of Sydney Zoo.

Swept path assessment has been completed for the proposed service vehicle road and loading dock at the proposed restaurant, as shown in Appendix C.

# 7. Traffic Impact Assessment

7

## 7.1 Traffic Generation

### 7.1.1 Visitor Traffic Generation

As discussed above, the visitation profile for Sydney Zoo will vary considerably across the year, with maximum, minimum and average daily attendance estimates for a peak, shoulder and off-peak period shown in Table 3.1.

For the purposes of this report, the traffic assessment considers the shoulder period, which is most reflective of the maximum traffic experienced on a typical day. Peak period activity when Sydney Zoo would experience its maximum daily visitation would only occur during school holidays and on public holidays. During the peak period, the surrounding road network would carry significantly less background traffic.

Traffic surveys on the Great Western Highway indicate that the peak periods for the surrounding road network occur on a weekday, with weekend traffic along the Great Western Highway approximately 50% less than during the weekday peak periods.

As discussed in Section 4, this traffic assessment also assumes the following (for a shoulder period):

- vehicle occupancy rate of 3 people per vehicle
- 85% vehicle mode share, 15% public transport mode share (or shuttle/ coach).

Based on the arrival and departure profile for the shoulder period, the anticipated weekday and weekend visitor traffic generation profiles are shown in Figure 7.1 and Figure 7.2. An additional 5% allowance has been made to conservatively account for any shuttle bus/ coach activity and/ or set-down/ pick-up activity.

The anticipated traffic generation during the relevant peak periods is summarised in Table 7.1.

**Figure 7.1: Visitor Weekday Traffic Generation**

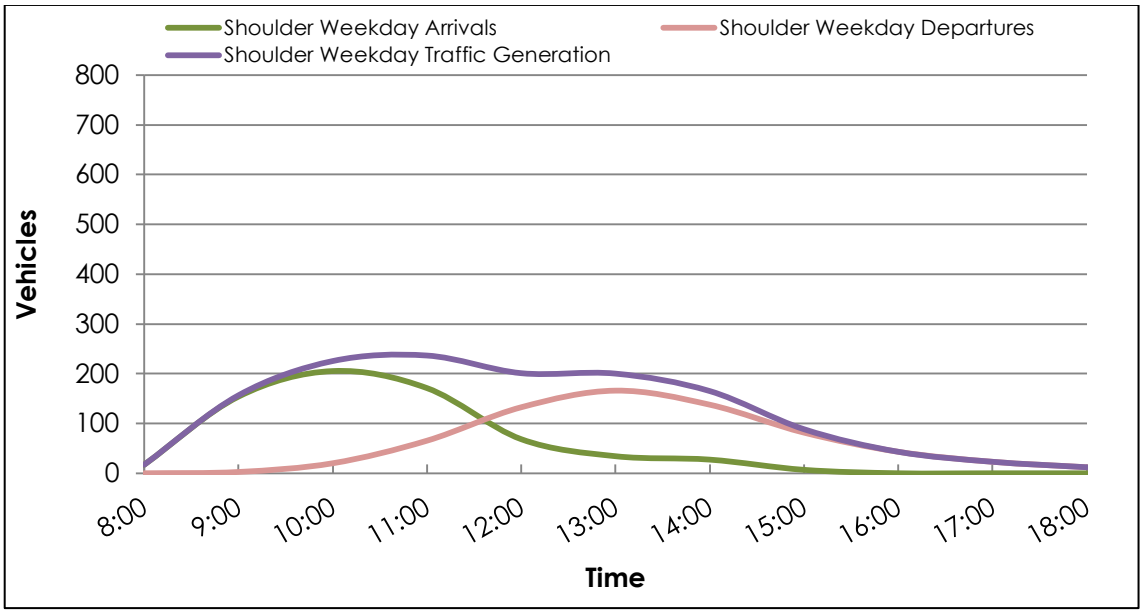


**Figure 7.2: Visitor Weekend Traffic Generation**

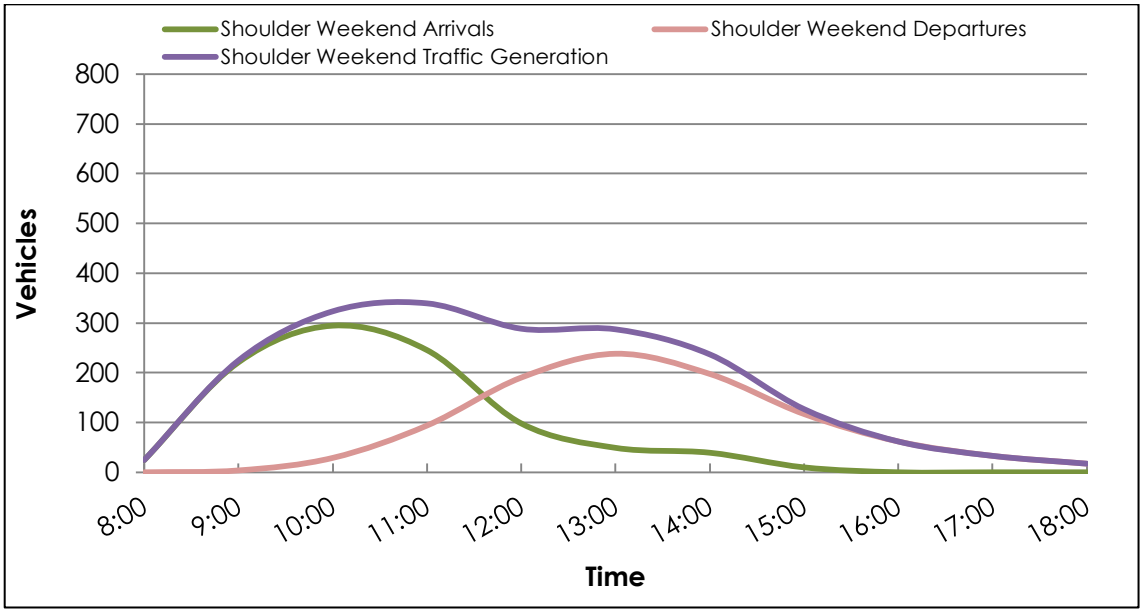



**Table 7.1: Visitor Peak Period Traffic Generation**

| Peak Period | Time | Entering Vehicles (veh/h) | Exiting Vehicles (veh/h) | Total Traffic Generation (veh/h) |
|---|---|---|---|---|
| Weekday AM (Network) | 8:00am-9:00am | 18 | 0 | 8 |
| Weekday (Site) | 11:00am-12:00am | 171 | 65 | 236 |
| Weekday PM | 4:30pm-5:30pm | 0 | 44 | 44 |
| Weekend | 11:00am-12:00pm | 246 | 94 | 40 |

### 7.1.2 Staff Traffic Generation

As discussed, up to 50 staff would be required on a shoulder day, with the majority of staff expected to arrive by 9:00am and leave after 6:00pm (assuming standard operating hours). Staff would be encouraged to car pool and use public transport, particularly on weekends and during peak periods. With consideration for this, conservative traffic generation estimates during the relevant peak periods are summarised in Table 7.2.

**Table 7.2: Staff Peak Period Traffic Generation**

| Period | Staff | Mode Share | Vehicle Occupancy (people) | Vehicles |
|---|---|---|---|---|
| Shoulder Weekday | 50 | 100% | 1 | 50 |
| Shoulder Weekend | | 90% | 1.5 | 30 |

### 7.1.3 Traffic Generation Summary

The estimated traffic generation for visitors and staff that is anticipated during the network peak periods, as well as the site peak periods (where required) is shown in Table 7.3.

**Table 7.3: Combined Peak Period Traffic Generation (Visitors and Staff)**

| Period | Time | Entering Vehicles (veh/h) | Exiting Vehicles (veh/h) | Total Traffic Generation (veh/h) |
|---|---|---|---|---|
| Weekday AM (Network) | 8:00am-9:00am | 68 [1] | 0 | 68 |
| Weekday (Site) | 11:00am-12:00am | 171 | 65 | 236 |
| Weekday PM | 4:30pm-5:30pm | 0 | 44 | 44 |
| Weekend | 11:00am-12:00pm | 246 | 94 | 340 |

[2] Including staff and visitor arrivals

## 7.2 Distribution and Assignment

For the purposes of estimating vehicle movements, the following directional distributions have been assumed:

- North via M7 Motorway - 20%
- North via Doonside Road - 10%
- East via Great Western Highway – 35%
- South via M7 Motorway/ Wallgrove Road - 20%
- South via Brabham Drive - 5%
- West via Great Western Highway -10%.

Based on the above, Figure 7.3 and Figure 7.4 have been prepared to show the estimated increase in turning movements in the vicinity of the site following the development.

**Figure 7.3: AM/PM Peak Hour Site Generated Traffic Volumes**

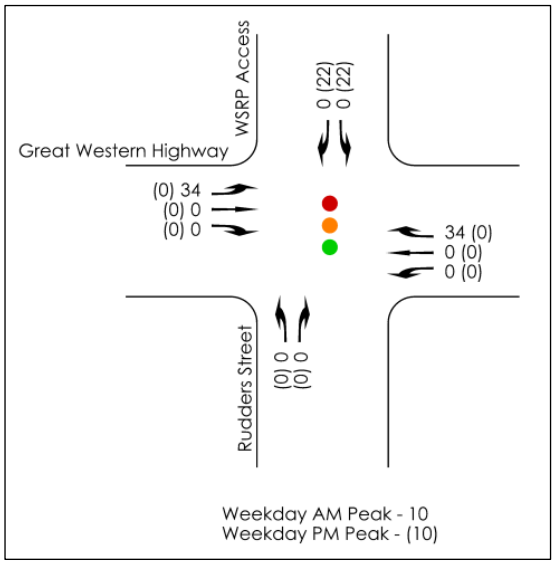
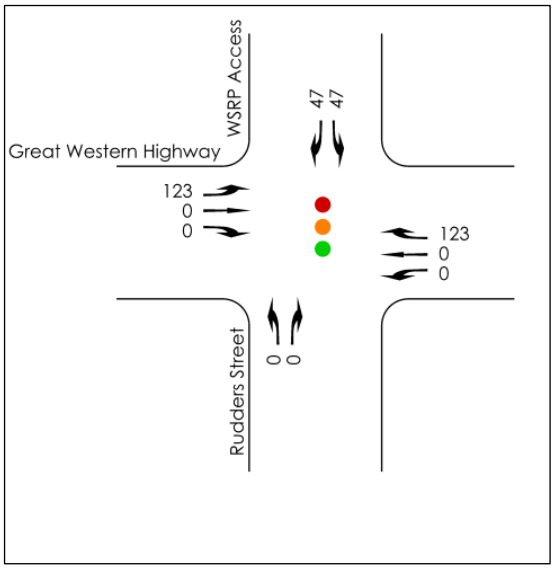



**Figure 7.4: Weekend Peak Hour Site Generated Traffic Volumes**



## 7.3 Traffic Impact

SIDRA Intersection was used to assess the operation of the Great Western Highway/ Rudders Street/ Bungarribee Access, post-development during the road network AM, PM and Saturday peak periods. Table 7.4 presents a summary of the modelling results, with full results presented in Appendix B.

**Table 7.4: Post-Development Operating Conditions**

| Intersection | Peak | Leg | Degree of Saturation (DOS) | Average Delay (sec) | 95th Percentile Queue (m) | Level of Service (LOS) |
|---|---|---|---|---|---|---|
| Great Western Highway/ Rudders Street/ Bungarribee Access | AM | North | 0.04 | 70 | 2 | E |
| | | East | 0.45 | 4 | 18 | A |
| | | South | 0.56 | 58 | 26 | E |
| | | West | 0.62 | 4 | 22 | A |
| | | **All** | **0.62** | **4** | **27** | **A** |
| | PM | North | 0.22 | 50 | 12 | D |
| | | East | 0.61 | 1 | 10 | A |
| | | South | 0.63 | 53 | 37 | D |
| | | West | 0.39 | 25 | 82 | B |
| | | **All** | **0.63** | **10** | **82** | **A** |
| | Sat | North | 0.29 | 48 | 23 | D |
| | | East | 0.30 | 7 | 48 | A |
| | | South | 0.04 | 53 | 3 | D |
| | | West | 0.30 | 19 | 58 | B |
| | | **All** | **0.30** | **15** | **58** | **B** |

The intersection of the Great Western Highway/ Rudders Street/ Bungarribee Access will continue to operate with a good level of service, albeit with increased vehicle queuing on all approaches. The assessment indicates that there is adequate capacity at the assessed intersection to accommodate the anticipated Sydney Zoo traffic.

Having consideration for the existing significant traffic and road capacity in the local area, particularly along the Great Western Highway, such an increase in traffic volumes is expected to have a negligible impact on the surrounding road network.

## 7.4 Access Arrangements

Given that the site's traffic generation typically occurs outside the road network peak periods (i.e. at approximately 11:00am), SIDRA Intersection was also used to assess the intersection operation during the site's traffic generating peak hour (during the shoulder period) to ensure appropriate access arrangements are provided, including queuing requirements within the WSP. However, for a conservative assessment the peak hour site traffic generation has been superimposed on the AM road network peak hour traffic.

The traffic modelling results are summarised in Table 7.5, with full results included in Appendix B.

**Table 7.5: Post-Development Site Peak Hourly Traffic Operating Conditions**

| Intersection | Peak | Leg | Degree of Saturation (DOS) | Average Delay (sec) | 95th Percentile Queue (m) | Level of Service (LOS) |
|---|---|---|---|---|---|---|
| Great Western Highway/ Rudders Street/ Bungarribee Access | 11:00am-12:00pm | North | 0.42 | 40 | 47 | C |
| | | East | 0.42 | 11 | 100 | A |
| | | South | 0.02 | 46 | 3 | D |
| | | West | 0.42 | 36 | 99 | C |
| | | **All** | **0.42** | **25** | **100** | **B** |

These results indicate that the intersection of the Great Western Highway/ Rudders Street/ Bungarribee Access arrangement would be suitable for the proposed development, with no physical alterations required. In particular, the turn bays and internal queuing storage are adequate to accommodate the traffic generation of the site during the shoulder period.

As discussed, it is not considered suitable to assess Sydney Zoo's potential traffic generation during its peak operating period of the year, given that this would occur infrequently and at times when typical traffic activity of the surrounding road network would not occur (traffic reductions during school holidays and public holidays). However, the intersection is generally expected to operate satisfactorily, with longer queues expected at times, consistent with larger event/ tourist venues.

## 7.5 Surrounding Land Uses

As discussed the Trust is set to develop the Bungarribee Super Park in the surrounding parklands, which could potentially include commercial properties fronting the Great Western Highway. However, subsequent to discussions with the Trust, it was agreed that given that there is insufficient detail relating to the surrounding development of the Bungarribee Precinct (and associated timing) at this stage and therefore a cumulative assessment cannot be completed. There are no plans, submissions or approvals in place on which to base an assessment. The proposed zoning of any potential future developments is also unknown.

Once planning of the surrounding Bungarribee Precinct evolves, an assessment will need to be completed on behalf of the proponent of any new development factoring in existing Sydney Zoo traffic volumes (or the Trust, where appropriate) to ensure that the internal and surrounding external transport network can accommodate any further development in the area.

Further to the above, it is worth noting that Sydney Zoo would be located within five kilometres of two other tourism facilities, including the Sydney Motorsport Park and Wet 'n' Wild, as shown in Figure 7.5. Given this, consideration has been given to the cumulative impacts of these facilities, particularly during peak periods.

### 7.5.1 Sydney Motorsport Park

Peak activity at Eastern Creek typically occurs during special events. Given that peak days at Sydney Zoo would typically be on public holidays and during school holidays, it is unlikely that major events at Eastern Creek would coincide with these peak days.

Peak activity at Sydney Motorsport Park occurs relatively infrequently and could be considered temporary. Therefore, peak activities could be managed through consultation with TfNSW and RMS (and appropriate Special Event Transport Management Plans).

**Figure 7.5: Relative Location to Other Key Tourism Facilities**

Basemap source: Nearmap

### 7.5.2 Wet 'n' Wild

The Wet 'n' Wild Transport and Accessibility Impacts report[5] and the Supplementary Transport and Accessibility Impacts report[6] have been reviewed to gain an appreciation for the peak Wet 'n' Wild activity. It is understood that Wet 'n' Wild also experiences its peak activity during the summer school holidays. The cumulative peak impact would have its largest impact on the M7 Motorway, which would carry a significant proportion of traffic to/from both sites. That said, it is unlikely that vehicles would exit the M7 Motorway at the same locations for both of the sites, given that the M4 Motorway/ M7 Motorway interchange would accommodate the majority of this traffic accessing Wet 'n' Wild. As discussed, the Great Western Highway on and off ramps, as well as Wallgrove Road, would facilitate access to/from the M7 Motorway for Sydney Zoo traffic.

Based on the above, the road network is expected to be capable of accommodating the cumulative impacts of both Wet 'n' Wild and Sydney Zoo, with negligible cumulative impacts expected at any one particular intersection.

## 7.6 Construction Traffic Impacts

A construction traffic management plan should be prepared prior to works commencing on-site. However, given that the site is located in close proximity to the surrounding arterial road network it is anticipated that the construction activities would have minimal impact on the surrounding road network.

A cumulative assessment of construction activities for Sydney Zoo, as well as other construction activity in the WSP would need to be considered.

[5] Wet 'n' Wild Sydney Transport and Accessibility Impacts (Construction and Operational), ARUP, January 2011
[6] Wet 'n' Wild Sydney Supplementary Transport and Accessibility Impacts, ARUP, June 2011

## 7.7 Operational Transport Management

An operational transport management plan would be prepared in consultation with relevant stakeholders, prior to the opening of Sydney Zoo. In particular, key considerations could include any requirement for seasonal shuttle bus services and overflow parking on adjacent land.

An initial opening period transport management plan may also be prepared, with consideration for the peak opening period and any specific opening events which would be expected to have different traffic generating characteristics and transport impacts to the typical operation of the site. During this opening period and particularly during the first peak period, overflow parking may be required (as discussed earlier) and there is potential to provide this on adjacent land, fronting the Great Western Highway, subject to further consultation with the Trust.

Further to the above, the following opening period and operational transport management measures are also being considered by Sydney Zoo, particularly during peak periods:

- online booking systems, with allocated visiting periods and staggered timing
- off-peak ticketing price reductions
- promotion of access via the M7 Motorway
- promotion of arrivals via public transport
- promotion of car pooling
- combined tour packages with other tourist destinations
- potential for additional regular route bus services and direct shuttle bus services between Blacktown Railway Station and the site (subject to further consultation with TfNSW)
- promotion of school tours during off-peak periods
- preparation of a Work Place Travel Plan to minimise staff travel by private car
- preparation of a Transport Access Guide for visitors
- extended opening hours, particularly during peak periods to flatten out the peak.

# 8. Conclusion



Based on the analysis and discussions presented within this report, the following conclusions are made:

i The proposal includes the construction of a zoological park within the Bungarribee Precinct of the Western Sydney Parklands.

ii Annual visitation of between 500,000 to 800,000 people is expected at Sydney Zoo, with peak activity typically occurring during school holiday periods and on public holidays.

iii Sydney Zoo would have approximately 50 full-time staff and 50-60 casual staff, with daily numbers varying throughout the year.

iv Vehicular access to Sydney Zoo would be provided via the recently constructed intersection with the Great Western Highway and Rudders Road, and a new road to be constructed within the Western Sydney Parklands.

v A car park with capacity for approximately1,324 vehicles would be provided along the southern alignment of the site, including a formal parking supply of 484 spaces and an overflow car park (with marked spaces) with an additional 840 spaces.

vi The proposed parking supply would be adequate to accommodate the expected parking demand, albeit with appropriate management measures and/or temporary overflow parking likely to be required for a small number of peak days annually in the event that the high case annual visitations of 800,000 is achieved.

vii Bus parking and set-down/ pick-up areas would be provided within the proposed car park and it is recommended that bicycle parking also be provided for staff and visitors.

viii The car park layout has generally been designed in accordance with the relevant Australian Standards and is expected to operate satisfactorily.

ix It is recommended that adequate pedestrian connections be provided between the site and the Great Western Highway, particularly linking to bus stops located along the Great Western Highway.

x It is recommended that additional bus services be provided to reduce reliance on private vehicle for both staff and visitors, particularly during peak periods. Future public transport provisions are currently being discussed with bus operators and TfNSW.

xi The proposed loading/ servicing arrangements would be capable of accommodating the expected requirements, both in terms of vehicle size and frequency.

xii Sydney Zoo is anticipated to generate up to 44 and 68 two-way vehicle movements during the AM and PM peak hours, respectively (during the shoulder period).

xiii Sydney Zoo is also anticipated to generate up to 340 two-way vehicle movements during the weekend peak hour (during the shoulder period).

xiv There is adequate capacity in the surrounding road network to cater for the traffic generated by the proposed development during the assessed peak periods.

xv Noting that the site's traffic generating peak occurs outside of the network peak periods, the intersection of the Great Western Highway/ Rudders Street/ Bungarribee Access would be capable of accommodating the traffic generation of the site during the identified shoulder period.

xvi Assessment has not been completed for the peak Sydney Zoo visitation period, noting that this would occur during school holiday periods, when the surrounding traffic volumes are typically lower.

xvii The surrounding road network is expected to be capable of accommodating the cumulative impacts of Sydney Zoo and surrounding tourist facilities with negligible cumulative impacts expected at any one particular intersection.

xviii A construction management plan amongst other operational transport plans should be prepared for the development.

xix Sydney Zoo is also considering a range of other management measures to reduce the impact on the surrounding transport network and flatten the peak traffic generation, as well as reduce the reliance on private vehicles for both visitors and staff.

# Appendix A

## Survey Results

# R.O.A.R. DATA

***Reliable, Original & Authentic Results***

Ph.88196847,Mob.0418-239019

Client : GTA Consultants
Job No/Name : 5687 ARNDELL PARK Rudders St
Day/Date : Tuesday 21st July 2015

| Lights | NORTH | | | WEST | | | SOUTH | | | EAST | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *New Precinct* | | | *G-W-Hwy* | | | *Rudders St* | | | *G-W-Hwy* | | | |
| **Time Period** | **L** | **T** | **R** | **L** | **T** | **R** | **L** | **T** | **R** | **L** | **T** | **R** | **TOT** |
| 0700 - 0715 | 0 | 0 | 0 | 0 | 519 | 7 | 2 | 0 | 2 | 20 | 130 | 0 | **680** |
| 0715 - 0730 | 0 | 0 | 0 | 1 | 591 | 19 | 4 | 0 | 7 | 31 | 142 | 0 | **795** |
| 0730 - 0745 | 0 | 0 | 0 | 0 | 568 | 8 | 1 | 0 | 3 | 11 | 152 | 0 | **743** |
| 0745 - 0800 | 0 | 0 | 0 | 1 | 614 | 10 | 7 | 0 | 2 | 16 | 206 | 0 | **856** |
| 0800 - 0815 | 0 | 0 | 0 | 0 | 683 | 11 | 7 | 0 | 6 | 17 | 149 | 0 | **873** |
| 0815 - 0830 | 0 | 0 | 0 | 0 | 595 | 10 | 8 | 0 | 14 | 16 | 185 | 0 | **828** |
| 0830 - 0845 | 0 | 0 | 0 | 0 | 588 | 6 | 10 | 0 | 6 | 17 | 205 | 0 | **832** |
| 0845 - 0900 | 1 | 0 | 0 | 0 | 529 | 9 | 16 | 0 | 9 | 7 | 259 | 0 | **830** |
| 0900 - 0915 | 1 | 0 | 0 | 0 | 605 | 16 | 21 | 0 | 14 | 4 | 160 | 0 | **821** |
| 0915 - 0930 | 1 | 0 | 1 | 0 | 485 | 8 | 18 | 0 | 8 | 4 | 212 | 0 | **737** |
| 0930 - 0945 | 0 | 0 | 0 | 0 | 344 | 5 | 13 | 0 | 9 | 3 | 190 | 1 | **565** |
| 0945 - 1000 | 0 | 0 | 0 | 0 | 241 | 6 | 23 | 0 | 11 | 8 | 203 | 0 | **492** |
| 1000 - 1015 | 1 | 0 | 0 | 0 | 178 | 4 | 16 | 0 | 23 | 9 | 157 | 0 | **388** |
| 1015 - 1030 | 0 | 0 | 0 | 1 | 192 | 8 | 9 | 1 | 8 | 6 | 167 | 0 | **392** |
| 1030 - 1045 | 0 | 0 | 0 | 0 | 183 | 5 | 13 | 0 | 10 | 8 | 152 | 0 | **371** |
| 1045 - 1100 | 0 | 0 | 0 | 0 | 179 | 7 | 10 | 0 | 7 | 5 | 138 | 0 | **346** |
| **Period End** | **4** | **0** | **1** | **3** | **7094** | **139** | **178** | **1** | **139** | **182** | **2807** | **1** | **10549** |

| Lights | NORTH | | | WEST | | | SOUTH | | | EAST | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *New Precinct* | | | *G-W-Hwy* | | | *Rudders St* | | | *G-W-Hwy* | | | |
| **Peak Period** | **L** | **T** | **R** | **L** | **T** | **R** | **L** | **T** | **R** | **L** | **T** | **R** | **TOT** |
| 0700 - 0800 | 0 | 0 | 0 | 2 | 2292 | 44 | 14 | 0 | 14 | 78 | 630 | 0 | **3074** |
| 0715 - 0815 | 0 | 0 | 0 | 2 | 2456 | 48 | 19 | 0 | 18 | 75 | 649 | 0 | **3267** |
| 0730 - 0830 | 0 | 0 | 0 | 1 | 2460 | 39 | 23 | 0 | 25 | 60 | 692 | 0 | **3300** |
| **0745 - 0845** | 0 | 0 | 0 | 1 | 2480 | 37 | 32 | 0 | 28 | 66 | 745 | 0 | **3389** |
| 0800 - 0900 | 1 | 0 | 0 | 0 | 2395 | 36 | 41 | 0 | 35 | 57 | 798 | 0 | **3363** |
| 0815 - 0915 | 2 | 0 | 0 | 0 | 2317 | 41 | 55 | 0 | 43 | 44 | 809 | 0 | **3311** |
| 0830 - 0930 | 3 | 0 | 1 | 0 | 2207 | 39 | 65 | 0 | 37 | 32 | 836 | 0 | **3220** |
| 0845 - 0945 | 3 | 0 | 1 | 0 | 1963 | 38 | 68 | 0 | 40 | 18 | 821 | 1 | **2953** |
| 0900 - 1000 | 2 | 0 | 1 | 0 | 1675 | 35 | 75 | 0 | 42 | 19 | 765 | 1 | **2615** |
| 0915 - 1015 | 2 | 0 | 1 | 0 | 1248 | 23 | 70 | 0 | 51 | 24 | 762 | 1 | **2182** |
| 0930 - 1030 | 1 | 0 | 0 | 1 | 955 | 23 | 61 | 1 | 51 | 26 | 717 | 1 | **1837** |
| 0945 - 1045 | 1 | 0 | 0 | 1 | 794 | 23 | 61 | 1 | 52 | 31 | 679 | 0 | **1643** |
| 1000 - 1100 | 1 | 0 | 0 | 1 | 732 | 24 | 48 | 1 | 48 | 28 | 614 | 0 | **1497** |
| **PEAK HOUR** | **0** | **0** | **0** | **1** | **2480** | **37** | **32** | **0** | **28** | **66** | **745** | **0** | **3389** |

# R.O.A.R. DATA

***Reliable, Original & Authentic Results***

Ph.88196847,Mob.0418-239019

Client : GTA Consultants
Job No/Name : 5687 ARNDELL PARK Rudders St
Day/Date : Tuesday 21st July 2015

| Heavies | NORTH | | | WEST | | | SOUTH | | | EAST | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *New Precinct* | | | *G-W-Hwy* | | | *Rudders St* | | | *G-W-Hwy* | | | |
| **Time Period** | **L** | **T** | **R** | **L** | **T** | **R** | **L** | **T** | **R** | **L** | **T** | **R** | **TOT** |
| 0700 - 0715 | 0 | 0 | 0 | 0 | 16 | 1 | 1 | 0 | 2 | 1 | 12 | 0 | **33** |
| 0715 - 0730 | 0 | 0 | 0 | 1 | 18 | 1 | 3 | 0 | 3 | 2 | 14 | 0 | **42** |
| 0730 - 0745 | 1 | 0 | 0 | 0 | 20 | 2 | 2 | 0 | 0 | 1 | 13 | 0 | **39** |
| 0745 - 0800 | 0 | 0 | 0 | 3 | 18 | 2 | 4 | 0 | 0 | 3 | 22 | 1 | **53** |
| 0800 - 0815 | 0 | 0 | 1 | 3 | 33 | 0 | 2 | 0 | 1 | 0 | 15 | 0 | **55** |
| 0815 - 0830 | 0 | 0 | 4 | 0 | 21 | 7 | 0 | 0 | 5 | 1 | 13 | 0 | **51** |
| 0830 - 0845 | 0 | 0 | 1 | 0 | 40 | 4 | 3 | 0 | 5 | 1 | 18 | 0 | **72** |
| 0845 - 0900 | 0 | 0 | 1 | 3 | 26 | 2 | 4 | 0 | 3 | 1 | 20 | 0 | **60** |
| 0900 - 0915 | 0 | 0 | 2 | 0 | 32 | 1 | 5 | 0 | 2 | 3 | 20 | 0 | **65** |
| 0915 - 0930 | 0 | 0 | 0 | 0 | 50 | 3 | 3 | 0 | 4 | 2 | 21 | 0 | **83** |
| 0930 - 0945 | 0 | 0 | 0 | 2 | 36 | 3 | 0 | 0 | 2 | 0 | 29 | 0 | **72** |
| 0945 - 1000 | 0 | 0 | 2 | 1 | 22 | 3 | 2 | 0 | 3 | 3 | 22 | 0 | **58** |
| 1000 - 1015 | 0 | 0 | 1 | 1 | 30 | 1 | 2 | 0 | 2 | 4 | 22 | 0 | **63** |
| 1015 - 1030 | 0 | 0 | 1 | 0 | 30 | 0 | 3 | 0 | 1 | 1 | 24 | 0 | **60** |
| 1030 - 1045 | 0 | 0 | 0 | 0 | 25 | 1 | 2 | 0 | 1 | 1 | 23 | 0 | **53** |
| 1045 - 1100 | 0 | 0 | 0 | 0 | 23 | 0 | 2 | 0 | 2 | 1 | 19 | 0 | **47** |
| **Period End** | **1** | **0** | **13** | **14** | **440** | **31** | **38** | **0** | **36** | **25** | **307** | **1** | **906** |

| Heavies | NORTH | | | WEST | | | SOUTH | | | EAST | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *New Precinct* | | | *G-W-Hwy* | | | *Rudders St* | | | *G-W-Hwy* | | | |
| **Peak Period** | **L** | **T** | **R** | **L** | **T** | **R** | **L** | **T** | **R** | **L** | **T** | **R** | **TOT** |
| 0700 - 0800 | 1 | 0 | 0 | 4 | 72 | 6 | 10 | 0 | 5 | 7 | 61 | 1 | **167** |
| 0715 - 0815 | 1 | 0 | 1 | 7 | 89 | 5 | 11 | 0 | 4 | 6 | 64 | 1 | **189** |
| 0730 - 0830 | 1 | 0 | 5 | 6 | 92 | 11 | 8 | 0 | 6 | 5 | 63 | 1 | **198** |
| **0745 - 0845** | 0 | 0 | 6 | 6 | 112 | 13 | 9 | 0 | 11 | 5 | 68 | 1 | **231** |
| 0800 - 0900 | 0 | 0 | 7 | 6 | 120 | 13 | 9 | 0 | 14 | 3 | 66 | 0 | **238** |
| 0815 - 0915 | 0 | 0 | 8 | 3 | 119 | 14 | 12 | 0 | 15 | 6 | 71 | 0 | **248** |
| 0830 - 0930 | 0 | 0 | 4 | 3 | 148 | 10 | 15 | 0 | 14 | 7 | 79 | 0 | **280** |
| 0845 - 0945 | 0 | 0 | 3 | 5 | 144 | 9 | 12 | 0 | 11 | 6 | 90 | 0 | **280** |
| 0900 - 1000 | 0 | 0 | 4 | 3 | 140 | 10 | 10 | 0 | 11 | 8 | 92 | 0 | **278** |
| 0915 - 1015 | 0 | 0 | 3 | 4 | 138 | 10 | 7 | 0 | 11 | 9 | 94 | 0 | **276** |
| 0930 - 1030 | 0 | 0 | 4 | 4 | 118 | 7 | 7 | 0 | 8 | 8 | 97 | 0 | **253** |
| 0945 - 1045 | 0 | 0 | 4 | 2 | 107 | 5 | 9 | 0 | 7 | 9 | 91 | 0 | **234** |
| 1000 - 1100 | 0 | 0 | 2 | 1 | 108 | 2 | 9 | 0 | 6 | 7 | 88 | 0 | **223** |
| **PEAK HOUR** | **0** | **0** | **6** | **6** | **112** | **13** | **9** | **0** | **11** | **5** | **68** | **1** | **231** |

# R.O.A.R. DATA

***Reliable, Original & Authentic Results***

Ph.88196847,Mob.0418-239019

Client : GTA Consultants
Job No/Name : 5687 ARNDELL PARK Rudders St
Day/Date : Tuesday 21st July 2015

| COMBINED | NORTH | | | WEST | | | SOUTH | | | EAST | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *New Precinct* | | | *G-W-Hwy* | | | *Rudders St* | | | *G-W-Hwy* | | | |
| **Time Period** | **L** | **T** | **R** | **L** | **T** | **R** | **L** | **T** | **R** | **L** | **T** | **R** | **TOT** |
| 0700 - 0715 | 0 | 0 | 0 | 0 | 535 | 8 | 3 | 0 | 4 | 21 | 142 | 0 | **713** |
| 0715 - 0730 | 0 | 0 | 0 | 2 | 609 | 20 | 7 | 0 | 10 | 33 | 156 | 0 | **837** |
| 0730 - 0745 | 1 | 0 | 0 | 0 | 588 | 10 | 3 | 0 | 3 | 12 | 165 | 0 | **782** |
| 0745 - 0800 | 0 | 0 | 0 | 4 | 632 | 12 | 11 | 0 | 2 | 19 | 228 | 1 | **909** |
| 0800 - 0815 | 0 | 0 | 1 | 3 | 716 | 11 | 9 | 0 | 7 | 17 | 164 | 0 | **928** |
| 0815 - 0830 | 0 | 0 | 4 | 0 | 616 | 17 | 8 | 0 | 19 | 17 | 198 | 0 | **879** |
| 0830 - 0845 | 0 | 0 | 1 | 0 | 628 | 10 | 13 | 0 | 11 | 18 | 223 | 0 | **904** |
| 0845 - 0900 | 1 | 0 | 1 | 3 | 555 | 11 | 20 | 0 | 12 | 8 | 279 | 0 | **890** |
| 0900 - 0915 | 1 | 0 | 2 | 0 | 637 | 17 | 26 | 0 | 16 | 7 | 180 | 0 | **886** |
| 0915 - 0930 | 1 | 0 | 1 | 0 | 535 | 11 | 21 | 0 | 12 | 6 | 233 | 0 | **820** |
| 0930 - 0945 | 0 | 0 | 0 | 2 | 380 | 8 | 13 | 0 | 11 | 3 | 219 | 1 | **637** |
| 0945 - 1000 | 0 | 0 | 2 | 1 | 263 | 9 | 25 | 0 | 14 | 11 | 225 | 0 | **550** |
| 1000 - 1015 | 1 | 0 | 1 | 1 | 208 | 5 | 18 | 0 | 25 | 13 | 179 | 0 | **451** |
| 1015 - 1030 | 0 | 0 | 1 | 1 | 222 | 8 | 12 | 1 | 9 | 7 | 191 | 0 | **452** |
| 1030 - 1045 | 0 | 0 | 0 | 0 | 208 | 6 | 15 | 0 | 11 | 9 | 175 | 0 | **424** |
| 1045 - 1100 | 0 | 0 | 0 | 0 | 202 | 7 | 12 | 0 | 9 | 6 | 157 | 0 | **393** |
| **Period End** | **5** | **0** | **14** | **17** | **7534** | **170** | **216** | **1** | **175** | **207** | **3114** | **2** | **11455** |

| COMBINED | NORTH | | | WEST | | | SOUTH | | | EAST | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *New Precinct* | | | *G-W-Hwy* | | | *Rudders St* | | | *G-W-Hwy* | | | |
| **Peak Period** | **L** | **T** | **R** | **L** | **T** | **R** | **L** | **T** | **R** | **L** | **T** | **R** | **TOT** |
| 0700 - 0800 | 1 | 0 | 0 | 6 | 2364 | 50 | 24 | 0 | 19 | 85 | 691 | 1 | **3241** |
| 0715 - 0815 | 1 | 0 | 1 | 9 | 2545 | 53 | 30 | 0 | 22 | 81 | 713 | 1 | **3456** |
| 0730 - 0830 | 1 | 0 | 5 | 7 | 2552 | 50 | 31 | 0 | 31 | 65 | 755 | 1 | **3498** |
| **0745 - 0845** | 0 | 0 | 6 | 7 | 2592 | 50 | 41 | 0 | 39 | 71 | 813 | 1 | **3620** |
| 0800 - 0900 | 1 | 0 | 7 | 6 | 2515 | 49 | 50 | 0 | 49 | 60 | 864 | 0 | **3601** |
| 0815 - 0915 | 2 | 0 | 8 | 3 | 2436 | 55 | 67 | 0 | 58 | 50 | 880 | 0 | **3559** |
| 0830 - 0930 | 3 | 0 | 5 | 3 | 2355 | 49 | 80 | 0 | 51 | 39 | 915 | 0 | **3500** |
| 0845 - 0945 | 3 | 0 | 4 | 5 | 2107 | 47 | 80 | 0 | 51 | 24 | 911 | 1 | **3233** |
| 0900 - 1000 | 2 | 0 | 5 | 3 | 1815 | 45 | 85 | 0 | 53 | 27 | 857 | 1 | **2893** |
| 0915 - 1015 | 2 | 0 | 4 | 4 | 1386 | 33 | 77 | 0 | 62 | 33 | 856 | 1 | **2458** |
| 0930 - 1030 | 1 | 0 | 4 | 5 | 1073 | 30 | 68 | 1 | 59 | 34 | 814 | 1 | **2090** |
| 0945 - 1045 | 1 | 0 | 4 | 3 | 901 | 28 | 70 | 1 | 59 | 40 | 770 | 0 | **1877** |
| 1000 - 1100 | 1 | 0 | 2 | 2 | 840 | 26 | 57 | 1 | 54 | 35 | 702 | 0 | **1720** |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PEAK HOUR** | **0** | **0** | **6** | **7** | **2592** | **50** | **41** | **0** | **39** | **71** | **813** | **1** | **3620** |

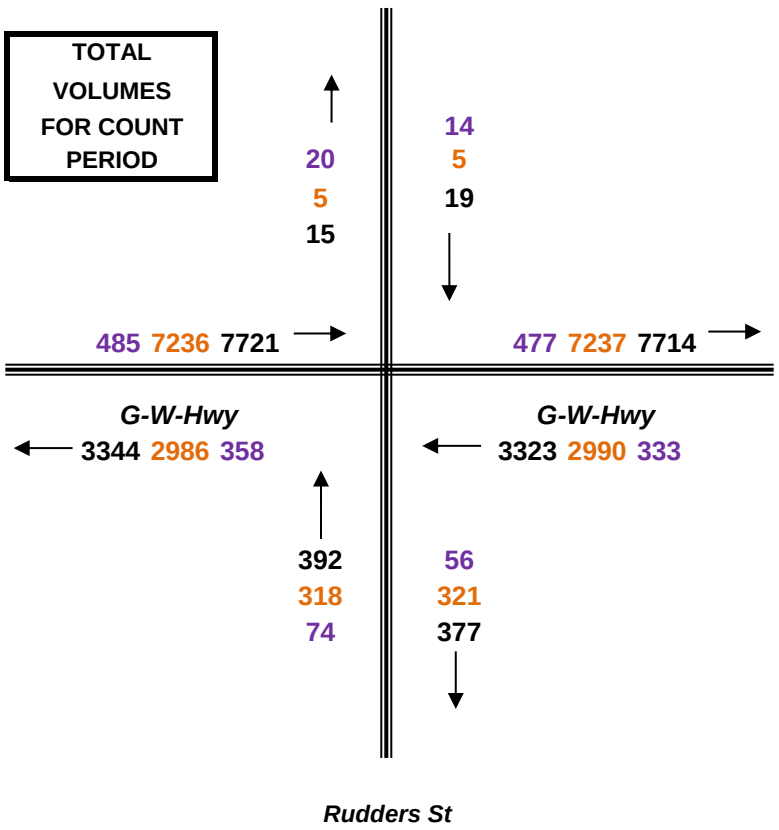
# R.O.A.R DATA

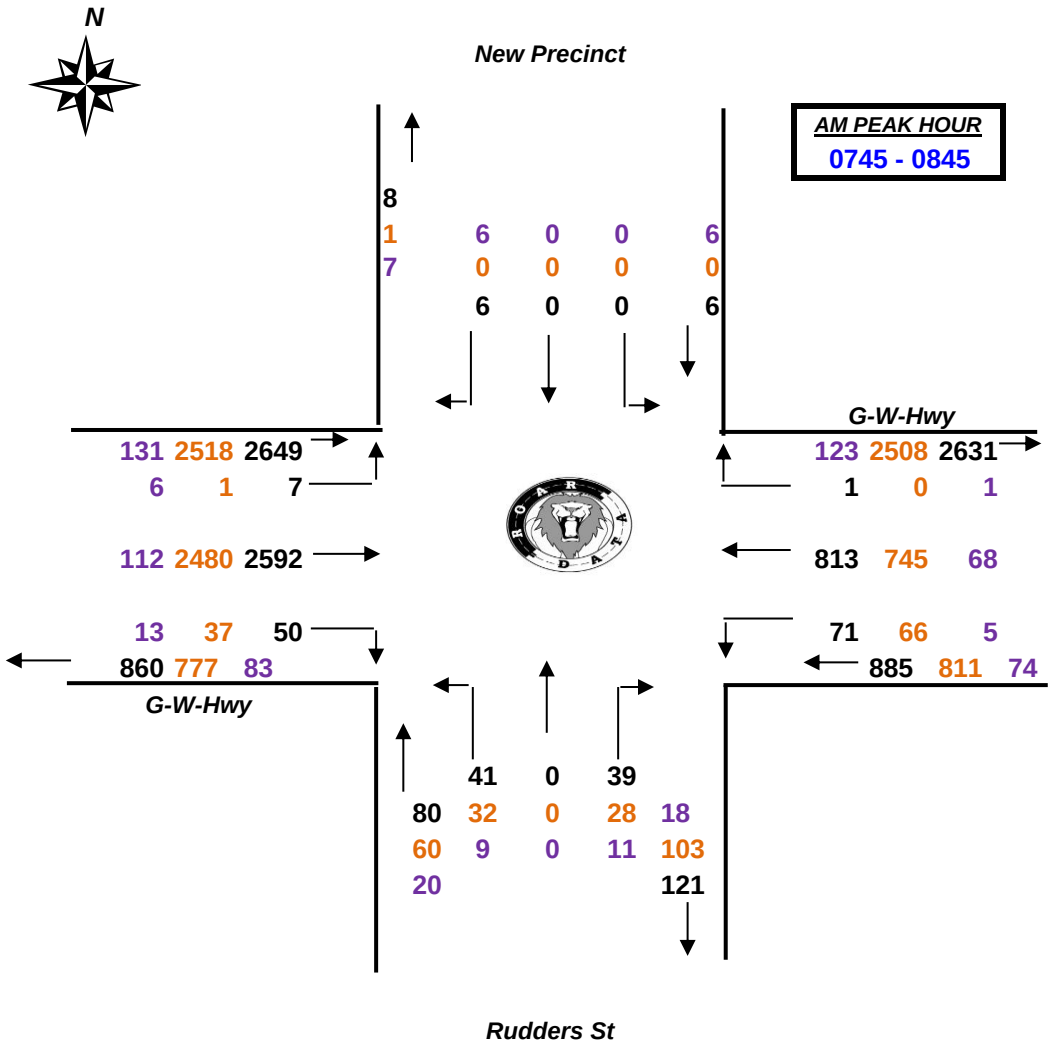
***Reliable, Original & Authentic Results***

Ph.88196847,Mob.0418-239019

| | |
|---|---|
| Client | : GTA Consultants |
| Job No/Name | : 5687 ARNDELL PARK Rudders St |
| Day/Date | : Tuesday 21st July 2015 |

**TOTAL VOLUMES FOR COUNT PERIOD**



# R.O.A.R. DATA

***Reliable, Original & Authentic Results***

Ph.88196847,Mob.0418-239019

Client : GTA Consultants
Job No/Name : 5687 ARNDELL PARK Rudders St
Day/Date : Tuesday 21st July 2015

**Lights**

| | NORTH | | | WEST | | | SOUTH | | | EAST | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *New Precinct* | | | *G-W-Hwy* | | | *Rudders St* | | | *G-W-Hwy* | | | |
| **Time Period** | L | T | R | L | T | R | L | T | R | L | T | R | TOT |
| 1530 - 1545 | 0 | 0 | 3 | 1 | 239 | 4 | 11 | 0 | 17 | 6 | 399 | 0 | **680** |
| 1545 - 1600 | 0 | 0 | 2 | 0 | 196 | 4 | 8 | 0 | 5 | 6 | 438 | 0 | **659** |
| 1600 - 1615 | 2 | 0 | 4 | 0 | 174 | 5 | 7 | 0 | 6 | 4 | 431 | 0 | **633** |
| 1615 - 1630 | 0 | 0 | 0 | 0 | 214 | 9 | 5 | 0 | 7 | 7 | 459 | 0 | **701** |
| 1630 - 1645 | 0 | 0 | 0 | 0 | 248 | 7 | 16 | 0 | 16 | 2 | 486 | 0 | **775** |
| 1645 - 1700 | 0 | 0 | 0 | 0 | 215 | 9 | 7 | 0 | 10 | 8 | 446 | 0 | **695** |
| 1700 - 1715 | 0 | 0 | 0 | 0 | 199 | 10 | 17 | 0 | 25 | 15 | 573 | 0 | **839** |
| 1715 - 1730 | 0 | 0 | 0 | 0 | 210 | 14 | 5 | 0 | 8 | 5 | 489 | 0 | **731** |
| 1730 - 1745 | 0 | 0 | 0 | 0 | 203 | 21 | 2 | 0 | 13 | 5 | 437 | 0 | **681** |
| 1745 - 1800 | 0 | 0 | 0 | 0 | 156 | 12 | 2 | 0 | 7 | 9 | 471 | 0 | **657** |
| 1800 - 1815 | 0 | 0 | 0 | 0 | 180 | 10 | 3 | 0 | 8 | 6 | 479 | 0 | **686** |
| 1815 - 1830 | 0 | 0 | 0 | 0 | 155 | 8 | 2 | 0 | 10 | 7 | 453 | 0 | **635** |
| **Period End** | **2** | **0** | **9** | **1** | **2389** | **113** | **85** | **0** | **132** | **80** | **5561** | **0** | **8372** |

**Lights**

| | NORTH | | | WEST | | | SOUTH | | | EAST | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *New Precinct* | | | *G-W-Hwy* | | | *Rudders St* | | | *G-W-Hwy* | | | |
| **Peak Period** | L | T | R | L | T | R | L | T | R | L | T | R | TOT |
| 1530 - 1630 | 2 | 0 | 9 | 1 | 823 | 22 | 31 | 0 | 35 | 23 | 1727 | 0 | **2673** |
| 1545 - 1645 | 2 | 0 | 6 | 0 | 832 | 25 | 36 | 0 | 34 | 19 | 1814 | 0 | **2768** |
| 1600 - 1700 | 2 | 0 | 4 | 0 | 851 | 30 | 35 | 0 | 39 | 21 | 1822 | 0 | **2804** |
| 1615 - 1715 | 0 | 0 | 0 | 0 | 876 | 35 | 45 | 0 | 58 | 32 | 1964 | 0 | **3010** |
| **1630 - 1730** | 0 | 0 | 0 | 0 | 872 | 40 | 45 | 0 | 59 | 30 | 1994 | 0 | **3040** |
| 1645 - 1745 | 0 | 0 | 0 | 0 | 827 | 54 | 31 | 0 | 56 | 33 | 1945 | 0 | **2946** |
| 1700 - 1800 | 0 | 0 | 0 | 0 | 768 | 57 | 26 | 0 | 53 | 34 | 1970 | 0 | **2908** |
| 1715 - 1815 | 0 | 0 | 0 | 0 | 749 | 57 | 12 | 0 | 36 | 25 | 1876 | 0 | **2755** |
| 1730 - 1830 | 0 | 0 | 0 | 0 | 694 | 51 | 9 | 0 | 38 | 27 | 1840 | 0 | **2659** |
| **PEAK HOUR** | **0** | **0** | **0** | **0** | **872** | **40** | **45** | **0** | **59** | **30** | **1994** | **0** | **3040** |

**Heavies**

| | NORTH | | | WEST | | | SOUTH | | | EAST | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *New Precinct* | | | *G-W-Hwy* | | | *Rudders St* | | | *G-W-Hwy* | | | |
| **Time Period** | L | T | R | L | T | R | L | T | R | L | T | R | TOT |
| 1530 - 1545 | 0 | 0 | 2 | 0 | 15 | 2 | 3 | 0 | 1 | 0 | 20 | 0 | **43** |
| 1545 - 1600 | 0 | 0 | 0 | 0 | 21 | 2 | 1 | 0 | 0 | 2 | 10 | 0 | **36** |
| 1600 - 1615 | 0 | 0 | 1 | 0 | 20 | 2 | 3 | 0 | 0 | 2 | 26 | 0 | **54** |
| 1615 - 1630 | 0 | 0 | 0 | 0 | 21 | 1 | 1 | 0 | 2 | 1 | 15 | 0 | **41** |
| 1630 - 1645 | 0 | 0 | 1 | 1 | 23 | 2 | 5 | 0 | 2 | 0 | 15 | 0 | **49** |
| 1645 - 1700 | 0 | 0 | 0 | 0 | 9 | 1 | 0 | 0 | 1 | 0 | 12 | 0 | **23** |
| 1700 - 1715 | 0 | 0 | 0 | 0 | 15 | 1 | 0 | 0 | 0 | 6 | 19 | 0 | **41** |
| 1715 - 1730 | 0 | 0 | 0 | 0 | 8 | 3 | 0 | 0 | 3 | 0 | 8 | 0 | **22** |
| 1730 - 1745 | 0 | 0 | 0 | 0 | 12 | 4 | 0 | 0 | 3 | 1 | 18 | 0 | **38** |
| 1745 - 1800 | 0 | 0 | 0 | 0 | 10 | 2 | 0 | 0 | 2 | 0 | 17 | 0 | **31** |
| 1800 - 1815 | 0 | 0 | 0 | 0 | 11 | 2 | 0 | 0 | 1 | 1 | 19 | 0 | **34** |
| 1815 - 1830 | 0 | 0 | 0 | 0 | 9 | 1 | 0 | 0 | 1 | 0 | 15 | 0 | **26** |
| **Period End** | **0** | **0** | **4** | **1** | **174** | **23** | **13** | **0** | **16** | **13** | **194** | **0** | **438** |

**Heavies**

| | NORTH | | | WEST | | | SOUTH | | | EAST | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *New Precinct* | | | *G-W-Hwy* | | | *Rudders St* | | | *G-W-Hwy* | | | |
| **Peak Period** | L | T | R | L | T | R | L | T | R | L | T | R | TOT |
| 1530 - 1630 | 0 | 0 | 3 | 0 | 77 | 7 | 8 | 0 | 3 | 5 | 71 | 0 | **174** |
| 1545 - 1645 | 0 | 0 | 2 | 1 | 85 | 7 | 10 | 0 | 4 | 5 | 66 | 0 | **180** |
| 1600 - 1700 | 0 | 0 | 2 | 1 | 73 | 6 | 9 | 0 | 5 | 3 | 68 | 0 | **167** |
| 1615 - 1715 | 0 | 0 | 1 | 1 | 68 | 5 | 6 | 0 | 5 | 7 | 61 | 0 | **154** |
| **1630 - 1730** | 0 | 0 | 1 | 1 | 55 | 7 | 5 | 0 | 6 | 6 | 54 | 0 | **135** |
| 1645 - 1745 | 0 | 0 | 0 | 0 | 44 | 9 | 0 | 0 | 7 | 7 | 57 | 0 | **124** |
| 1700 - 1800 | 0 | 0 | 0 | 0 | 45 | 10 | 0 | 0 | 8 | 7 | 62 | 0 | **132** |
| 1715 - 1815 | 0 | 0 | 0 | 0 | 41 | 11 | 0 | 0 | 9 | 2 | 62 | 0 | **125** |
| 1730 - 1830 | 0 | 0 | 0 | 0 | 42 | 9 | 0 | 0 | 7 | 2 | 69 | 0 | **129** |
| **PEAK HOUR** | **0** | **0** | **1** | **1** | **55** | **7** | **5** | **0** | **6** | **6** | **54** | **0** | **135** |

# R.O.A.R. DATA

***Reliable, Original & Authentic Results***

Ph.88196847,Mob.0418-239019

Client : GTA Consultants
Job No/Name : 5687 ARNDELL PARK Rudders St
Day/Date : Tuesday 21st July 2015

| COMBINED | NORTH | | | WEST | | | SOUTH | | | EAST | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *New Precinct* | | | *G-W-Hwy* | | | *Rudders St* | | | *G-W-Hwy* | | | |
| **Time Period** | **L** | **T** | **R** | **L** | **T** | **R** | **L** | **T** | **R** | **L** | **T** | **R** | **TOT** |
| 1530 - 1545 | 0 | 0 | 5 | 1 | 254 | 6 | 14 | 0 | 18 | 6 | 419 | 0 | **723** |
| 1545 - 1600 | 0 | 0 | 2 | 0 | 217 | 6 | 9 | 0 | 5 | 8 | 448 | 0 | **695** |
| 1600 - 1615 | 2 | 0 | 5 | 0 | 194 | 7 | 10 | 0 | 6 | 6 | 457 | 0 | **687** |
| 1615 - 1630 | 0 | 0 | 0 | 0 | 235 | 10 | 6 | 0 | 9 | 8 | 474 | 0 | **742** |
| 1630 - 1645 | 0 | 0 | 1 | 1 | 271 | 9 | 21 | 0 | 18 | 2 | 501 | 0 | **824** |
| 1645 - 1700 | 0 | 0 | 0 | 0 | 224 | 10 | 7 | 0 | 11 | 8 | 458 | 0 | **718** |
| 1700 - 1715 | 0 | 0 | 0 | 0 | 214 | 11 | 17 | 0 | 25 | 21 | 592 | 0 | **880** |
| 1715 - 1730 | 0 | 0 | 0 | 0 | 218 | 17 | 5 | 0 | 11 | 5 | 497 | 0 | **753** |
| 1730 - 1745 | 0 | 0 | 0 | 0 | 215 | 25 | 2 | 0 | 16 | 6 | 455 | 0 | **719** |
| 1745 - 1800 | 0 | 0 | 0 | 0 | 166 | 14 | 2 | 0 | 9 | 9 | 488 | 0 | **688** |
| 1800 - 1815 | 0 | 0 | 0 | 0 | 191 | 12 | 3 | 0 | 9 | 7 | 498 | 0 | **720** |
| 1815 - 1830 | 0 | 0 | 0 | 0 | 164 | 9 | 2 | 0 | 11 | 7 | 468 | 0 | **661** |
| **Period End** | **2** | **0** | **13** | **2** | **2563** | **136** | **98** | **0** | **148** | **93** | **5755** | **0** | **8810** |

| COMBINED | NORTH | | | WEST | | | SOUTH | | | EAST | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *New Precinct* | | | *G-W-Hwy* | | | *Rudders St* | | | *G-W-Hwy* | | | |
| **Peak Period** | **L** | **T** | **R** | **L** | **T** | **R** | **L** | **T** | **R** | **L** | **T** | **R** | **TOT** |
| 1530 - 1630 | 2 | 0 | 12 | 1 | 900 | 29 | 39 | 0 | 38 | 28 | 1798 | 0 | **2847** |
| 1545 - 1645 | 2 | 0 | 8 | 1 | 917 | 32 | 46 | 0 | 38 | 24 | 1880 | 0 | **2948** |
| 1600 - 1700 | 2 | 0 | 6 | 1 | 924 | 36 | 44 | 0 | 44 | 24 | 1890 | 0 | **2971** |
| 1615 - 1715 | 0 | 0 | 1 | 1 | 944 | 40 | 51 | 0 | 63 | 39 | 2025 | 0 | **3164** |
| **1630 - 1730** | 0 | 0 | 1 | 1 | 927 | 47 | 50 | 0 | 65 | 36 | 2048 | 0 | **3175** |
| 1645 - 1745 | 0 | 0 | 0 | 0 | 871 | 63 | 31 | 0 | 63 | 40 | 2002 | 0 | **3070** |
| 1700 - 1800 | 0 | 0 | 0 | 0 | 813 | 67 | 26 | 0 | 61 | 41 | 2032 | 0 | **3040** |
| 1715 - 1815 | 0 | 0 | 0 | 0 | 790 | 68 | 12 | 0 | 45 | 27 | 1938 | 0 | **2880** |
| 1730 - 1830 | 0 | 0 | 0 | 0 | 736 | 60 | 9 | 0 | 45 | 29 | 1909 | 0 | **2788** |
| **PEAK HOUR** | **0** | **0** | **1** | **1** | **927** | **47** | **50** | **0** | **65** | **36** | **2048** | **0** | **3175** |

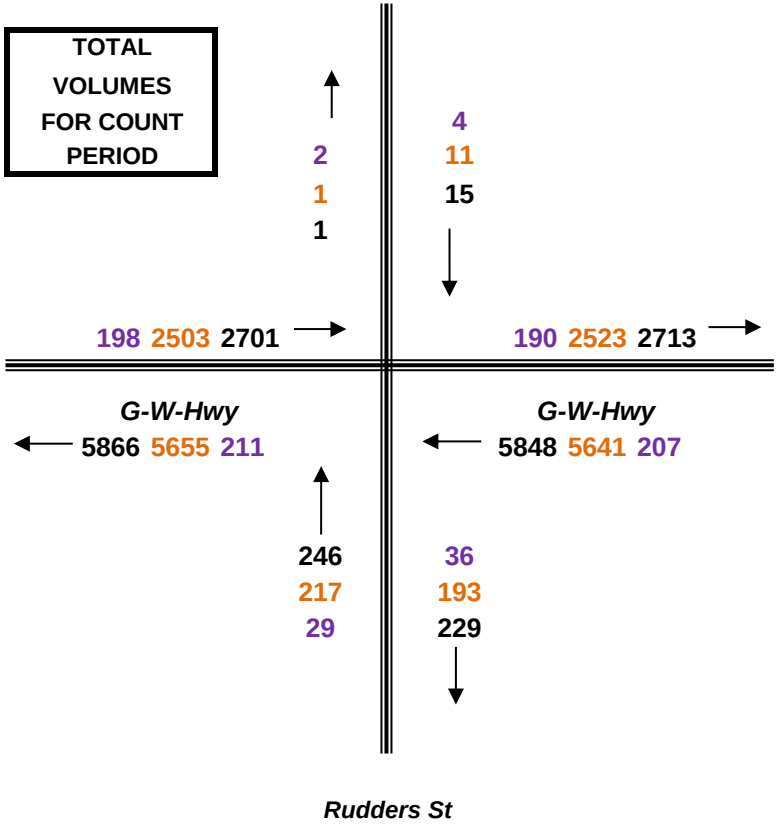
# R.O.A.R DATA

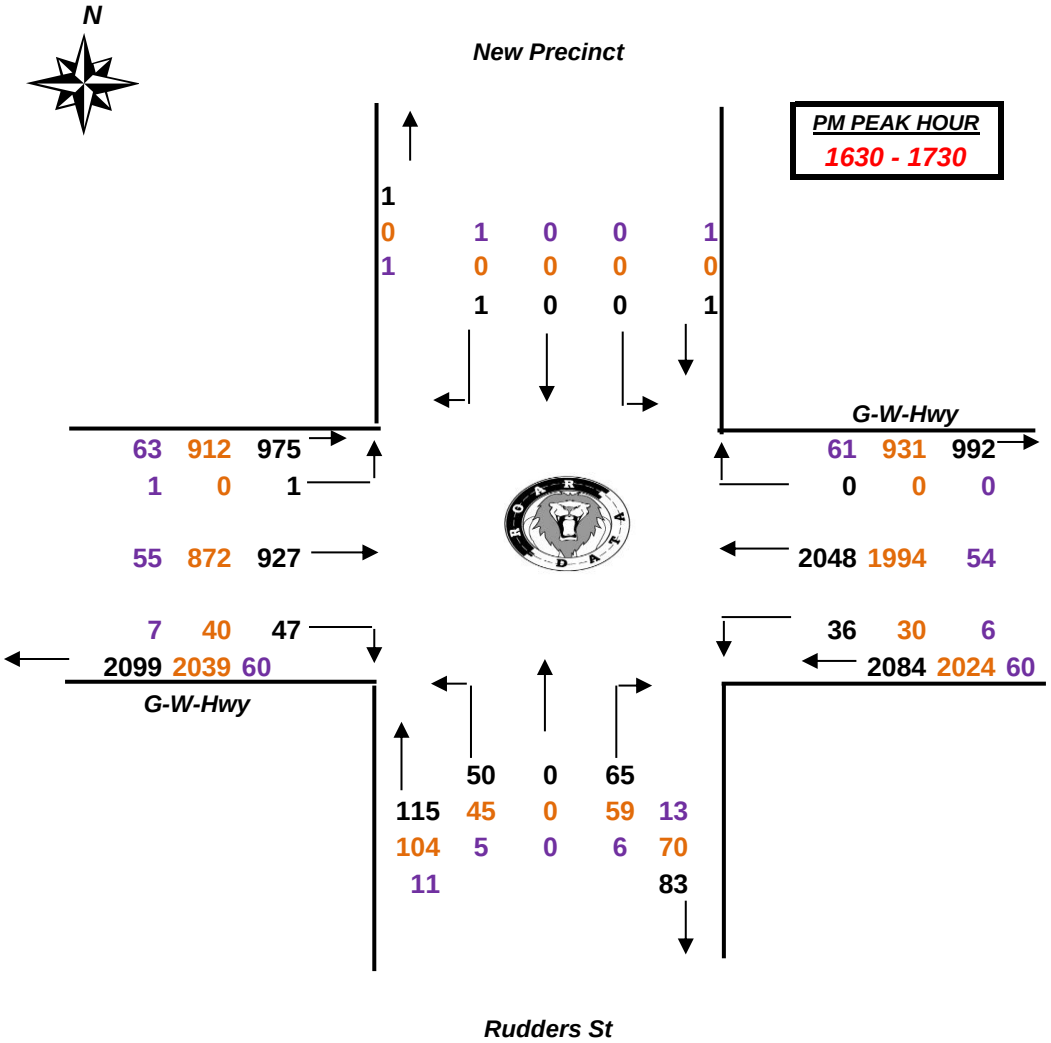
***Reliable, Original & Authentic Results***

Ph.88196847,Mob.0418-239019

| | |
|---|---|
| Client | : GTA Consultants |
| Job No/Name | : 5687 ARNDELL PARK Rudders St |
| Day/Date | : Tuesday 21st July 2015 |

**TOTAL VOLUMES FOR COUNT PERIOD**



# R.O.A.R. DATA

***Reliable, Original & Authentic Results***

Ph.88196847,Mob.0418-239019

Client : GTA Consultants
Job No/Name : 5687 ARNDELL PARK Rudders St
Day/Date : Saturday 18th July 2015

| Lights | NORTH | | | WEST | | | SOUTH | | | EAST | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *New Precinct* | | | *G-W-Hwy* | | | *Rudders St* | | | *G-W-Hwy* | | | |
| **Time Period** | **L** | **T** | **R** | **L** | **T** | **R** | **L** | **T** | **R** | **L** | **T** | **R** | **TOT** |
| 1000 - 1015 | 1 | 0 | 0 | 1 | 145 | 1 | 0 | 0 | 1 | 0 | 169 | 0 | **318** |
| 1015 - 1030 | 0 | 0 | 0 | 0 | 160 | 1 | 1 | 0 | 4 | 2 | 209 | 0 | **377** |
| 1030 - 1045 | 0 | 0 | 0 | 0 | 201 | 1 | 1 | 0 | 1 | 2 | 176 | 0 | **382** |
| 1045 - 1100 | 0 | 0 | 0 | 0 | 189 | 1 | 1 | 0 | 2 | 4 | 185 | 0 | **382** |
| 1100 - 1115 | 0 | 0 | 0 | 0 | 171 | 1 | 3 | 0 | 2 | 1 | 188 | 0 | **366** |
| 1115 - 1130 | 0 | 0 | 0 | 0 | 201 | 2 | 2 | 0 | 3 | 2 | 182 | 0 | **392** |
| 1130 - 1145 | 0 | 0 | 0 | 0 | 189 | 2 | 2 | 0 | 2 | 2 | 194 | 0 | **391** |
| 1145 - 1200 | 0 | 0 | 0 | 0 | 215 | 1 | 0 | 0 | 0 | 1 | 208 | 0 | **425** |
| 1200 - 1215 | 0 | 0 | 0 | 0 | 187 | 3 | 0 | 0 | 2 | 0 | 215 | 0 | **407** |
| 1215 - 1230 | 0 | 0 | 0 | 0 | 187 | 0 | 0 | 0 | 1 | 1 | 198 | 0 | **387** |
| 1230 - 1245 | 0 | 0 | 0 | 0 | 196 | 0 | 0 | 0 | 2 | 1 | 201 | 0 | **400** |
| 1245 - 1300 | 0 | 0 | 0 | 0 | 195 | 5 | 2 | 0 | 2 | 1 | 219 | 0 | **424** |
| 1300 - 1315 | 0 | 0 | 0 | 0 | 185 | 0 | 3 | 0 | 4 | 1 | 191 | 0 | **384** |
| 1315 - 1330 | 0 | 0 | 0 | 0 | 176 | 0 | 0 | 0 | 3 | 3 | 199 | 0 | **381** |
| 1330 - 1345 | 0 | 0 | 0 | 0 | 213 | 0 | 0 | 0 | 1 | 1 | 223 | 0 | **438** |
| 1345 - 1400 | 0 | 0 | 0 | 0 | 199 | 3 | 4 | 0 | 5 | 0 | 170 | 0 | **381** |
| **Period End** | **1** | **0** | **0** | **1** | **3009** | **21** | **19** | **0** | **35** | **22** | **3127** | **0** | **6235** |

| Lights | NORTH | | | WEST | | | SOUTH | | | EAST | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *New Precinct* | | | *G-W-Hwy* | | | *Rudders St* | | | *G-W-Hwy* | | | |
| **Peak Period** | **L** | **T** | **R** | **L** | **T** | **R** | **L** | **T** | **R** | **L** | **T** | **R** | **TOT** |
| 1000 - 1100 | 1 | 0 | 0 | 1 | 695 | 4 | 3 | 0 | 8 | 8 | 739 | 0 | **1459** |
| 1015 - 1115 | 0 | 0 | 0 | 0 | 721 | 4 | 6 | 0 | 9 | 9 | 758 | 0 | **1507** |
| 1030 - 1130 | 0 | 0 | 0 | 0 | 762 | 5 | 7 | 0 | 8 | 9 | 731 | 0 | **1522** |
| 1045 - 1145 | 0 | 0 | 0 | 0 | 750 | 6 | 8 | 0 | 9 | 9 | 749 | 0 | **1531** |
| 1100 - 1200 | 0 | 0 | 0 | 0 | 776 | 6 | 7 | 0 | 7 | 6 | 772 | 0 | **1574** |
| 1115 - 1215 | 0 | 0 | 0 | 0 | 792 | 8 | 4 | 0 | 7 | 5 | 799 | 0 | **1615** |
| 1130 - 1230 | 0 | 0 | 0 | 0 | 778 | 6 | 2 | 0 | 5 | 4 | 815 | 0 | **1610** |
| **1145 - 1245** | 0 | 0 | 0 | 0 | 785 | 4 | 0 | 0 | 5 | 3 | 822 | 0 | **1619** |
| 1200 - 1300 | 0 | 0 | 0 | 0 | 765 | 8 | 2 | 0 | 7 | 3 | 833 | 0 | **1618** |
| 1215 - 1315 | 0 | 0 | 0 | 0 | 763 | 5 | 5 | 0 | 9 | 4 | 809 | 0 | **1595** |
| 1230 - 1330 | 0 | 0 | 0 | 0 | 752 | 5 | 5 | 0 | 11 | 6 | 810 | 0 | **1589** |
| 1245 - 1345 | 0 | 0 | 0 | 0 | 769 | 5 | 5 | 0 | 10 | 6 | 832 | 0 | **1627** |
| 1300 - 1400 | 0 | 0 | 0 | 0 | 773 | 3 | 7 | 0 | 13 | 5 | 783 | 0 | **1584** |
| **PEAK HOUR** | **0** | **0** | **0** | **0** | **785** | **4** | **0** | **0** | **5** | **3** | **822** | **0** | **1619** |

# R.O.A.R. DATA

***Reliable, Original & Authentic Results***

Ph.88196847,Mob.0418-239019

Client : GTA Consultants
Job No/Name : 5687 ARNDELL PARK Rudders St
Day/Date : Saturday 18th July 2015

| Heavies | NORTH | | | WEST | | | SOUTH | | | EAST | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *New Precinct* | | | *G-W-Hwy* | | | *Rudders St* | | | *G-W-Hwy* | | | |
| **Time Period** | **L** | **T** | **R** | **L** | **T** | **R** | **L** | **T** | **R** | **L** | **T** | **R** | **TOT** |
| 1000 - 1015 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | **8** |
| 1015 - 1030 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | **8** |
| 1030 - 1045 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | **11** |
| 1045 - 1100 | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | **15** |
| 1100 - 1115 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | **13** |
| 1115 - 1130 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 3 | 0 | **6** |
| 1130 - 1145 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 7 | 0 | **9** |
| 1145 - 1200 | 0 | 0 | 0 | 0 | 9 | 1 | 1 | 0 | 0 | 0 | 5 | 0 | **16** |
| 1200 - 1215 | 0 | 0 | 0 | 0 | 6 | 0 | 1 | 0 | 0 | 0 | 7 | 0 | **14** |
| 1215 - 1230 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | **10** |
| 1230 - 1245 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | **12** |
| 1245 - 1300 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | **14** |
| 1300 - 1315 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | **6** |
| 1315 - 1330 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | **11** |
| 1330 - 1345 | 0 | 0 | 0 | 0 | 4 | 0 | 1 | 0 | 1 | 1 | 5 | 0 | **12** |
| 1345 - 1400 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | **5** |
| **Period End** | **0** | **0** | **0** | **0** | **69** | **2** | **4** | **0** | **1** | **1** | **93** | **0** | **170** |

| Heavies | NORTH | | | WEST | | | SOUTH | | | EAST | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *New Precinct* | | | *G-W-Hwy* | | | *Rudders St* | | | *G-W-Hwy* | | | |
| **Peak Period** | **L** | **T** | **R** | **L** | **T** | **R** | **L** | **T** | **R** | **L** | **T** | **R** | **TOT** |
| 1000 - 1100 | 0 | 0 | 0 | 0 | 17 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | **42** |
| 1015 - 1115 | 0 | 0 | 0 | 0 | 22 | 0 | 0 | 0 | 0 | 0 | 25 | 0 | **47** |
| 1030 - 1130 | 0 | 0 | 0 | 0 | 21 | 0 | 1 | 0 | 0 | 0 | 23 | 0 | **45** |
| 1045 - 1145 | 0 | 0 | 0 | 0 | 17 | 1 | 1 | 0 | 0 | 0 | 24 | 0 | **43** |
| 1100 - 1200 | 0 | 0 | 0 | 0 | 18 | 2 | 2 | 0 | 0 | 0 | 22 | 0 | **44** |
| 1115 - 1215 | 0 | 0 | 0 | 0 | 18 | 2 | 3 | 0 | 0 | 0 | 22 | 0 | **45** |
| 1130 - 1230 | 0 | 0 | 0 | 0 | 18 | 2 | 2 | 0 | 0 | 0 | 27 | 0 | **49** |
| **1145 - 1245** | 0 | 0 | 0 | 0 | 22 | 1 | 2 | 0 | 0 | 0 | 27 | 0 | **52** |
| 1200 - 1300 | 0 | 0 | 0 | 0 | 20 | 0 | 1 | 0 | 0 | 0 | 29 | 0 | **50** |
| 1215 - 1315 | 0 | 0 | 0 | 0 | 16 | 0 | 0 | 0 | 0 | 0 | 26 | 0 | **42** |
| 1230 - 1330 | 0 | 0 | 0 | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 24 | 0 | **43** |
| 1245 - 1345 | 0 | 0 | 0 | 0 | 18 | 0 | 1 | 0 | 1 | 1 | 22 | 0 | **43** |
| 1300 - 1400 | 0 | 0 | 0 | 0 | 14 | 0 | 1 | 0 | 1 | 1 | 17 | 0 | **34** |
| **PEAK HOUR** | **0** | **0** | **0** | **0** | **22** | **1** | **2** | **0** | **0** | **0** | **27** | **0** | **52** |

# R.O.A.R. DATA

***Reliable, Original & Authentic Results***

Ph.88196847,Mob.0418-239019

Client : GTA Consultants

Job No/Name : 5687 ARNDELL PARK Rudders St

Day/Date : Saturday 18th July 2015

| COMBINED | NORTH | | | WEST | | | SOUTH | | | EAST | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *New Precinct* | | | *G-W-Hwy* | | | *Rudders St* | | | *G-W-Hwy* | | | |
| **Time Period** | **L** | **T** | **R** | **L** | **T** | **R** | **L** | **T** | **R** | **L** | **T** | **R** | **TOT** |
| 1000 - 1015 | 1 | 0 | 0 | 1 | 146 | 1 | 0 | 0 | 1 | 0 | 176 | 0 | **326** |
| 1015 - 1030 | 0 | 0 | 0 | 0 | 163 | 1 | 1 | 0 | 4 | 2 | 214 | 0 | **385** |
| 1030 - 1045 | 0 | 0 | 0 | 0 | 206 | 1 | 1 | 0 | 1 | 2 | 182 | 0 | **393** |
| 1045 - 1100 | 0 | 0 | 0 | 0 | 197 | 1 | 1 | 0 | 2 | 4 | 192 | 0 | **397** |
| 1100 - 1115 | 0 | 0 | 0 | 0 | 177 | 1 | 3 | 0 | 2 | 1 | 195 | 0 | **379** |
| 1115 - 1130 | 0 | 0 | 0 | 0 | 203 | 2 | 3 | 0 | 3 | 2 | 185 | 0 | **398** |
| 1130 - 1145 | 0 | 0 | 0 | 0 | 190 | 3 | 2 | 0 | 2 | 2 | 201 | 0 | **400** |
| 1145 - 1200 | 0 | 0 | 0 | 0 | 224 | 2 | 1 | 0 | 0 | 1 | 213 | 0 | **441** |
| 1200 - 1215 | 0 | 0 | 0 | 0 | 193 | 3 | 1 | 0 | 2 | 0 | 222 | 0 | **421** |
| 1215 - 1230 | 0 | 0 | 0 | 0 | 189 | 0 | 0 | 0 | 1 | 1 | 206 | 0 | **397** |
| 1230 - 1245 | 0 | 0 | 0 | 0 | 201 | 0 | 0 | 0 | 2 | 1 | 208 | 0 | **412** |
| 1245 - 1300 | 0 | 0 | 0 | 0 | 202 | 5 | 2 | 0 | 2 | 1 | 226 | 0 | **438** |
| 1300 - 1315 | 0 | 0 | 0 | 0 | 187 | 0 | 3 | 0 | 4 | 1 | 195 | 0 | **390** |
| 1315 - 1330 | 0 | 0 | 0 | 0 | 181 | 0 | 0 | 0 | 3 | 3 | 205 | 0 | **392** |
| 1330 - 1345 | 0 | 0 | 0 | 0 | 217 | 0 | 1 | 0 | 2 | 2 | 228 | 0 | **450** |
| 1345 - 1400 | 0 | 0 | 0 | 0 | 202 | 3 | 4 | 0 | 5 | 0 | 172 | 0 | **386** |
| **Period End** | **1** | **0** | **0** | **1** | **3078** | **23** | **23** | **0** | **36** | **23** | **3220** | **0** | **6405** |

| COMBINED | NORTH | | | WEST | | | SOUTH | | | EAST | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *New Precinct* | | | *G-W-Hwy* | | | *Rudders St* | | | *G-W-Hwy* | | | |
| **Peak Period** | **L** | **T** | **R** | **L** | **T** | **R** | **L** | **T** | **R** | **L** | **T** | **R** | **TOT** |
| 1000 - 1100 | 1 | 0 | 0 | 1 | 712 | 4 | 3 | 0 | 8 | 8 | 764 | 0 | **1501** |
| 1015 - 1115 | 0 | 0 | 0 | 0 | 743 | 4 | 6 | 0 | 9 | 9 | 783 | 0 | **1554** |
| 1030 - 1130 | 0 | 0 | 0 | 0 | 783 | 5 | 8 | 0 | 8 | 9 | 754 | 0 | **1567** |
| 1045 - 1145 | 0 | 0 | 0 | 0 | 767 | 7 | 9 | 0 | 9 | 9 | 773 | 0 | **1574** |
| 1100 - 1200 | 0 | 0 | 0 | 0 | 794 | 8 | 9 | 0 | 7 | 6 | 794 | 0 | **1618** |
| 1115 - 1215 | 0 | 0 | 0 | 0 | 810 | 10 | 7 | 0 | 7 | 5 | 821 | 0 | **1660** |
| 1130 - 1230 | 0 | 0 | 0 | 0 | 796 | 8 | 4 | 0 | 5 | 4 | 842 | 0 | **1659** |
| **1145 - 1245** | 0 | 0 | 0 | 0 | 807 | 5 | 2 | 0 | 5 | 3 | 849 | 0 | **1671** |
| 1200 - 1300 | 0 | 0 | 0 | 0 | 785 | 8 | 3 | 0 | 7 | 3 | 862 | 0 | **1668** |
| 1215 - 1315 | 0 | 0 | 0 | 0 | 779 | 5 | 5 | 0 | 9 | 4 | 835 | 0 | **1637** |
| 1230 - 1330 | 0 | 0 | 0 | 0 | 771 | 5 | 5 | 0 | 11 | 6 | 834 | 0 | **1632** |
| 1245 - 1345 | 0 | 0 | 0 | 0 | 787 | 5 | 6 | 0 | 11 | 7 | 854 | 0 | **1670** |
| 1300 - 1400 | 0 | 0 | 0 | 0 | 787 | 3 | 8 | 0 | 14 | 6 | 800 | 0 | **1618** |
| **PEAK HOUR** | **0** | **0** | **0** | **0** | **807** | **5** | **2** | **0** | **5** | **3** | **849** | **0** | **1671** |

# R.O.A.R DATA

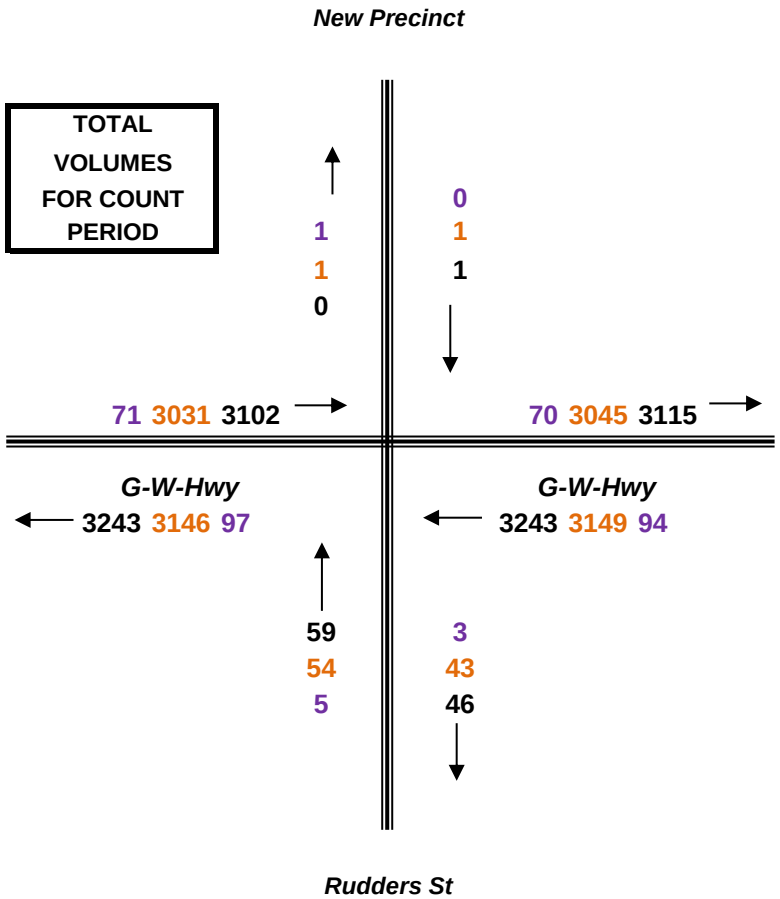
***Reliable, Original & Authentic Results***

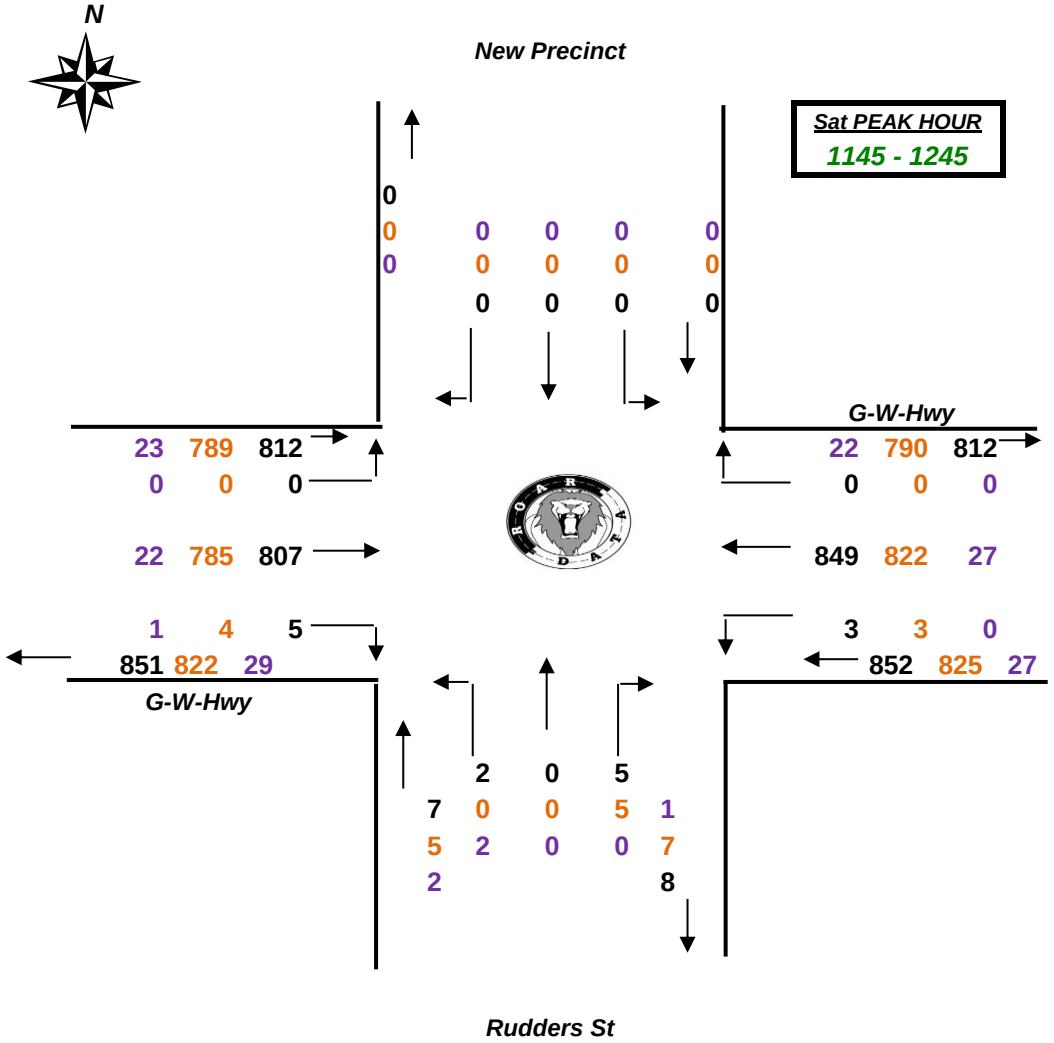
Ph.88196847,Mob.0418-239019

Client : GTA Consultants

Job No/Name : 5687 ARNDELL PARK Rudders St

Day/Date : Saturday 18th July 2015



# Appendix B

## SIDRA INTERSECTION Results

# MOVEMENT SUMMARY

## Site: GWH/ Rudders/ Bungarribee - AM - Post Dev.

Great Western Highway/ Rudders Street/ Western Sydney Regional Parklands Access
Signals - Fixed Time Coordinated  Cycle Time = 140 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

**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: Rudders Street | | | | | | | | | | | |
| 1 | L2 | 43 | 22.0 | 0.095 | 36.1 | LOS C | 1.9 | 16.2 | 0.73 | 0.68 | 41.6 |
| 2 | T1 | 1 | 0.0 | 0.551 | 76.4 | LOS F | 3.0 | 26.3 | 1.00 | 0.75 | 20.6 |
| 3 | R2 | 41 | 28.2 | 0.551 | 81.1 | LOS F | 3.0 | 26.3 | 1.00 | 0.75 | 17.9 |
| Approach | | 85 | 24.7 | 0.551 | 58.3 | LOS E | 3.0 | 26.3 | 0.86 | 0.72 | 28.5 |
| East: Great Western Highway | | | | | | | | | | | |
| 4 | L2 | 75 | 7.0 | 0.213 | 8.0 | LOS A | 0.5 | 3.7 | 0.06 | 0.25 | 59.4 |
| 5 | T1 | 856 | 8.4 | 0.321 | 0.6 | LOS A | 0.5 | 3.7 | 0.04 | 0.07 | 78.7 |
| 6 | R2 | 40 | 0.0 | 0.497 | 82.7 | LOS F | 2.9 | 20.1 | 1.00 | 0.73 | 22.5 |
| Approach | | 971 | 7.9 | 0.497 | 4.5 | LOS A | 2.9 | 20.1 | 0.08 | 0.12 | 72.3 |
| North: Park Access | | | | | | | | | | | |
| 7 | L2 | 1 | 0.0 | 0.007 | 62.3 | LOS E | 0.1 | 0.5 | 0.95 | 0.58 | 25.4 |
| 8 | T1 | 1 | 100.0 | 0.036 | 73.1 | LOS F | 0.1 | 1.5 | 0.98 | 0.61 | 19.5 |
| 9 | R2 | 1 | 0.0 | 0.036 | 76.1 | LOS F | 0.1 | 1.5 | 0.98 | 0.61 | 31.2 |
| Approach | | 3 | 33.3 | 0.036 | 70.2 | LOS E | 0.1 | 1.5 | 0.97 | 0.60 | 25.8 |
| West: Great Western Highway | | | | | | | | | | | |
| 10 | L2 | 40 | 0.0 | 0.028 | 10.4 | LOS A | 0.6 | 4.0 | 0.23 | 0.66 | 53.0 |
| 11 | T1 | 2728 | 4.3 | 0.620 | 0.7 | LOS A | 3.1 | 22.4 | 0.06 | 0.05 | 79.1 |
| 12 | R2 | 53 | 26.0 | 0.109 | 42.2 | LOS C | 1.1 | 9.5 | 0.84 | 0.71 | 40.9 |
| Approach | | 2821 | 4.7 | 0.620 | 1.6 | LOS A | 3.1 | 22.4 | 0.07 | 0.07 | 77.3 |
| All Vehicles | | 3880 | 5.9 | 0.620 | 3.6 | LOS A | 3.1 | 26.3 | 0.09 | 0.10 | 74.1 |

Level of Service (LOS) Method: Delay (RTA NSW).
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 | Distance m | Prop. Queued | Effective Stop Rate per ped |
|---|---|---|---|---|---|---|---|---|
| P1 | South Full Crossing | 53 | 9.1 | LOS A | 0.1 | 0.1 | 0.50 | 0.50 |
| P1S | South Slip/Bypass Lane Crossing | 53 | 15.6 | LOS B | 0.1 | 0.1 | 0.47 | 0.47 |
| P21 | East Stage 1 | 53 | 37.6 | LOS D | 0.1 | 0.1 | 0.92 | 0.92 |
| P22 | East Stage 2 | 53 | 64.3 | LOS F | 0.2 | 0.2 | 0.96 | 0.96 |
| P3 | North Full Crossing | 53 | 5.7 | LOS A | 0.1 | 0.1 | 0.29 | 0.29 |
| P3S | North Slip/Bypass Lane Crossing | 53 | 3.7 | LOS A | 0.0 | 0.0 | 0.23 | 0.23 |
| All Pedestrians | | 316 | 22.7 | LOS C | | | 0.56 | 0.56 |

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: GWH/ Rudders/ Bungarribee - AM - Post Dev. - 11am

Great Western Highway/ Rudders Street/ Western Sydney Regional Parklands Access
Signals - Fixed Time Coordinated  Cycle Time = 140 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

**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: Rudders Street | | | | | | | | | | | |
| 1 | L2 | 43 | 22.0 | 0.082 | 26.4 | LOS B | 1.6 | 13.3 | 0.64 | 0.66 | 46.2 |
| 2 | T1 | 1 | 0.0 | 0.549 | 76.3 | LOS F | 3.0 | 26.3 | 1.00 | 0.75 | 20.6 |
| 3 | R2 | 41 | 28.2 | 0.549 | 81.0 | LOS F | 3.0 | 26.3 | 1.00 | 0.75 | 17.9 |
| Approach | | 85 | 24.7 | 0.549 | 53.3 | LOS D | 3.0 | 26.3 | 0.82 | 0.71 | 29.9 |
| East: Great Western Highway | | | | | | | | | | | |
| 4 | L2 | 75 | 7.0 | 0.227 | 9.2 | LOS A | 1.1 | 8.4 | 0.14 | 0.30 | 57.4 |
| 5 | T1 | 856 | 8.4 | 0.342 | 1.8 | LOS A | 1.6 | 11.9 | 0.13 | 0.15 | 77.1 |
| 6 | R2 | 142 | 0.0 | 0.663 | 73.4 | LOS F | 9.6 | 67.5 | 1.00 | 0.82 | 24.0 |
| Approach | | 1073 | 7.2 | 0.663 | 11.8 | LOS A | 9.6 | 67.5 | 0.25 | 0.25 | 62.5 |
| North: Park Access | | | | | | | | | | | |
| 7 | L2 | 55 | 0.0 | 0.196 | 54.1 | LOS D | 3.1 | 22.0 | 0.93 | 0.73 | 27.1 |
| 8 | T1 | 1 | 100.0 | 0.665 | 77.0 | LOS F | 4.1 | 28.9 | 1.00 | 0.81 | 18.7 |
| 9 | R2 | 55 | 0.0 | 0.665 | 80.0 | LOS F | 4.1 | 28.9 | 1.00 | 0.81 | 30.2 |
| Approach | | 111 | 1.0 | 0.665 | 67.1 | LOS E | 4.1 | 28.9 | 0.96 | 0.77 | 28.8 |
| West: Great Western Highway | | | | | | | | | | | |
| 10 | L2 | 142 | 0.0 | 0.108 | 13.4 | LOS A | 2.9 | 20.4 | 0.33 | 0.70 | 51.3 |
| 11 | T1 | 2728 | 4.3 | 0.682 | 2.3 | LOS A | 8.3 | 60.1 | 0.15 | 0.14 | 77.0 |
| 12 | R2 | 53 | 26.0 | 0.088 | 35.2 | LOS C | 0.9 | 7.6 | 0.79 | 0.71 | 44.0 |
| Approach | | 2923 | 4.5 | 0.682 | 3.4 | LOS A | 8.3 | 60.1 | 0.17 | 0.18 | 74.2 |
| All Vehicles | | 4192 | 5.5 | 0.682 | 8.2 | LOS A | 9.6 | 67.5 | 0.22 | 0.22 | 67.2 |

Level of Service (LOS) Method: Delay (RTA NSW).
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 | Distance m | Prop. Queued | Effective Stop Rate per ped |
|---|---|---|---|---|---|---|---|---|
| P1 | South Full Crossing | 53 | 12.9 | LOS B | 0.1 | 0.1 | 0.61 | 0.61 |
| P1S | South Slip/Bypass Lane Crossing | 53 | 23.5 | LOS C | 0.1 | 0.1 | 0.58 | 0.58 |
| P21 | East Stage 1 | 53 | 31.6 | LOS D | 0.1 | 0.1 | 0.89 | 0.89 |
| P22 | East Stage 2 | 53 | 55.0 | LOS E | 0.2 | 0.2 | 0.89 | 0.89 |
| P3 | North Full Crossing | 53 | 8.9 | LOS A | 0.1 | 0.1 | 0.36 | 0.36 |
| P3S | North Slip/Bypass Lane Crossing | 53 | 6.3 | LOS A | 0.1 | 0.1 | 0.30 | 0.30 |
| All Pedestrians | | 316 | 23.0 | LOS C | | | 0.60 | 0.60 |

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: GWH/ Rudders/ Bungarribee - PM - Post Dev.

Great Western Highway/ Rudders Street/ Western Sydney Regional Parklands Access
Signals - Fixed Time Coordinated  Cycle Time = 140 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

**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: Rudders Street | | | | | | | | | | | |
| 1 | L2 | 53 | 10.0 | 0.155 | 20.5 | LOS B | 1.7 | 12.9 | 0.55 | 0.64 | 50.2 |
| 2 | T1 | 1 | 0.0 | 0.629 | 73.4 | LOS F | 4.9 | 37.2 | 1.00 | 0.80 | 21.0 |
| 3 | R2 | 68 | 9.2 | 0.629 | 77.9 | LOS F | 4.9 | 37.2 | 1.00 | 0.80 | 19.0 |
| Approach | | 122 | 9.5 | 0.629 | 53.2 | LOS D | 4.9 | 37.2 | 0.81 | 0.73 | 29.8 |
| East: Great Western Highway | | | | | | | | | | | |
| 4 | L2 | 38 | 16.7 | 0.402 | 7.6 | LOS A | 0.6 | 4.4 | 0.04 | 0.07 | 63.4 |
| 5 | T1 | 2156 | 2.6 | 0.606 | 0.4 | LOS A | 1.4 | 9.9 | 0.05 | 0.05 | 79.4 |
| 6 | R2 | 1 | 0.0 | 0.002 | 37.8 | LOS C | 0.0 | 0.3 | 0.66 | 0.62 | 32.6 |
| Approach | | 2195 | 2.9 | 0.606 | 0.5 | LOS A | 1.4 | 9.9 | 0.05 | 0.06 | 79.2 |
| North: Park Access | | | | | | | | | | | |
| 7 | L2 | 36 | 2.9 | 0.050 | 25.9 | LOS B | 1.3 | 9.5 | 0.66 | 0.63 | 35.0 |
| 8 | T1 | 1 | 100.0 | 0.331 | 70.8 | LOS F | 2.5 | 18.6 | 0.99 | 0.73 | 19.6 |
| 9 | R2 | 36 | 2.9 | 0.331 | 73.8 | LOS F | 2.5 | 18.6 | 0.99 | 0.73 | 31.3 |
| Approach | | 73 | 4.3 | 0.331 | 50.1 | LOS D | 2.5 | 18.6 | 0.83 | 0.68 | 32.5 |
| West: Great Western Highway | | | | | | | | | | | |
| 10 | L2 | 1 | 0.0 | 0.001 | 28.3 | LOS B | 0.0 | 0.3 | 0.56 | 0.62 | 44.7 |
| 11 | T1 | 976 | 5.9 | 0.385 | 21.9 | LOS B | 11.2 | 82.0 | 0.55 | 0.47 | 58.3 |
| 12 | R2 | 49 | 14.9 | 0.233 | 77.5 | LOS F | 1.7 | 13.1 | 0.97 | 0.72 | 30.1 |
| Approach | | 1026 | 6.4 | 0.385 | 24.6 | LOS B | 11.2 | 82.0 | 0.57 | 0.49 | 56.1 |
| All Vehicles | | 3416 | 4.2 | 0.629 | 10.7 | LOS A | 11.2 | 82.0 | 0.25 | 0.22 | 66.4 |

Level of Service (LOS) Method: Delay (RTA NSW).
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 | Distance m | Prop. Queued | Effective Stop Rate per ped |
|---|---|---|---|---|---|---|---|---|
| P1 | South Full Crossing | 53 | 7.8 | LOS A | 0.0 | 0.0 | 0.47 | 0.47 |
| P1S | South Slip/Bypass Lane Crossing | 53 | 31.0 | LOS D | 0.1 | 0.1 | 0.67 | 0.67 |
| P21 | East Stage 1 | 53 | 29.3 | LOS C | 0.1 | 0.1 | 0.92 | 0.92 |
| P22 | East Stage 2 | 53 | 27.7 | LOS C | 0.1 | 0.1 | 0.63 | 0.63 |
| P3 | North Full Crossing | 53 | 26.5 | LOS C | 0.1 | 0.1 | 0.62 | 0.62 |
| P3S | North Slip/Bypass Lane Crossing | 53 | 21.8 | LOS C | 0.1 | 0.1 | 0.56 | 0.56 |
| All Pedestrians | | 316 | 24.0 | LOS C | | | 0.64 | 0.64 |

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: GWH/ Rudders/ Bungarribee - Sat - Post Dev.

Great Western Highway/ Rudders Street/ Western Sydney Regional Parklands Access
Signals - Fixed Time Coordinated  Cycle Time = 140 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

**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: Rudders Street | | | | | | | | | | | |
| 1 | L2 | 2 | 100.0 | 0.006 | 15.6 | LOS B | 0.1 | 0.7 | 0.46 | 0.55 | 51.2 |
| 2 | T1 | 1 | 0.0 | 0.028 | 55.5 | LOS D | 0.4 | 2.6 | 0.89 | 0.65 | 24.8 |
| 3 | R2 | 5 | 0.0 | 0.028 | 60.3 | LOS E | 0.4 | 2.6 | 0.89 | 0.65 | 23.2 |
| Approach | | 8 | 25.0 | 0.028 | 48.6 | LOS D | 0.4 | 2.6 | 0.78 | 0.62 | 29.4 |
| East: Great Western Highway | | | | | | | | | | | |
| 4 | L2 | 3 | 0.0 | 0.196 | 7.4 | LOS A | 0.2 | 1.8 | 0.03 | 0.03 | 64.4 |
| 5 | T1 | 894 | 3.2 | 0.296 | 0.4 | LOS A | 0.4 | 3.0 | 0.03 | 0.03 | 79.4 |
| 6 | R2 | 206 | 0.0 | 0.358 | 47.4 | LOS D | 10.9 | 76.2 | 0.83 | 0.80 | 29.7 |
| Approach | | 1103 | 2.6 | 0.358 | 9.2 | LOS A | 10.9 | 76.2 | 0.18 | 0.18 | 64.5 |
| North: Park Access | | | | | | | | | | | |
| 7 | L2 | 79 | 0.0 | 0.100 | 23.3 | LOS B | 2.8 | 19.7 | 0.60 | 0.64 | 36.3 |
| 8 | T1 | 1 | 100.0 | 0.359 | 59.7 | LOS E | 5.1 | 35.8 | 0.95 | 0.76 | 21.4 |
| 9 | R2 | 79 | 0.0 | 0.359 | 62.7 | LOS E | 5.1 | 35.8 | 0.95 | 0.76 | 33.6 |
| Approach | | 159 | 0.7 | 0.359 | 43.1 | LOS D | 5.1 | 35.8 | 0.78 | 0.70 | 34.5 |
| West: Great Western Highway | | | | | | | | | | | |
| 10 | L2 | 206 | 0.0 | 0.265 | 34.9 | LOS C | 9.0 | 63.2 | 0.69 | 0.78 | 42.2 |
| 11 | T1 | 849 | 2.7 | 0.356 | 25.4 | LOS B | 10.4 | 74.7 | 0.58 | 0.50 | 55.9 |
| 12 | R2 | 5 | 20.0 | 0.016 | 68.9 | LOS E | 0.2 | 1.3 | 0.89 | 0.63 | 32.2 |
| Approach | | 1061 | 2.3 | 0.356 | 27.5 | LOS B | 10.4 | 74.7 | 0.61 | 0.56 | 52.2 |
| All Vehicles | | 2332 | 2.4 | 0.359 | 20.0 | LOS B | 10.9 | 76.2 | 0.42 | 0.39 | 55.2 |

Level of Service (LOS) Method: Delay (RTA NSW).
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 | Distance m | Prop. Queued | Effective Stop Rate per ped |
|---|---|---|---|---|---|---|---|---|
| P1 | South Full Crossing | 53 | 12.1 | LOS B | 0.1 | 0.1 | 0.59 | 0.59 |
| P1S | South Slip/Bypass Lane Crossing | 53 | 38.0 | LOS D | 0.2 | 0.2 | 0.74 | 0.74 |
| P21 | East Stage 1 | 53 | 28.5 | LOS C | 0.1 | 0.1 | 0.90 | 0.90 |
| P22 | East Stage 2 | 53 | 24.7 | LOS C | 0.1 | 0.1 | 0.59 | 0.59 |
| P3 | North Full Crossing | 53 | 29.6 | LOS C | 0.1 | 0.1 | 0.65 | 0.65 |
| P3S | North Slip/Bypass Lane Crossing | 53 | 24.7 | LOS C | 0.1 | 0.1 | 0.59 | 0.59 |
| All Pedestrians | | 316 | 26.3 | LOS C | | | 0.68 | 0.68 |

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: GWH/ Rudders/ Bungarribee - AM - Existing Operation

Great Western Highway/ Rudders Street/ Western Sydney Regional Parklands Access
Signals - Fixed Time Coordinated  Cycle Time = 140 seconds (User-Given Cycle Time)

**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: Rudders Street | | | | | | | | | | | |
| 1 | L2 | 43 | 22.0 | 0.112 | 41.8 | LOS C | 2.1 | 17.7 | 0.77 | 0.69 | 39.3 |
| 2 | T1 | 1 | 0.0 | 0.338 | 67.2 | LOS E | 2.8 | 24.4 | 0.97 | 0.75 | 22.1 |
| 3 | R2 | 41 | 28.2 | 0.338 | 71.9 | LOS F | 2.8 | 24.4 | 0.97 | 0.75 | 19.2 |
| Approach | | 85 | 24.7 | 0.338 | 56.6 | LOS E | 2.8 | 24.4 | 0.87 | 0.72 | 28.9 |
| East: Great Western Highway | | | | | | | | | | | |
| 4 | L2 | 75 | 7.0 | 0.210 | 7.9 | LOS A | 0.5 | 3.4 | 0.03 | 0.23 | 59.6 |
| 5 | T1 | 856 | 8.4 | 0.316 | 0.8 | LOS A | 0.7 | 5.1 | 0.03 | 0.06 | 78.4 |
| Approach | | 931 | 8.3 | 0.316 | 1.3 | LOS A | 0.7 | 5.1 | 0.03 | 0.08 | 77.5 |
| North: Park Access | | | | | | | | | | | |
| 7 | L2 | 1 | 100.0 | 0.011 | 68.9 | LOS E | 0.1 | 0.9 | 0.94 | 0.59 | 22.3 |
| 8 | T1 | 1 | 100.0 | 0.060 | 62.4 | LOS E | 0.5 | 6.1 | 0.93 | 0.66 | 21.0 |
| 9 | R2 | 6 | 100.0 | 0.060 | 65.5 | LOS E | 0.5 | 6.1 | 0.93 | 0.66 | 32.2 |
| Approach | | 8 | 100.0 | 0.060 | 65.6 | LOS E | 0.5 | 6.1 | 0.93 | 0.65 | 29.9 |
| West: Great Western Highway | | | | | | | | | | | |
| 10 | L2 | 7 | 85.7 | 0.008 | 10.6 | LOS A | 0.1 | 1.1 | 0.20 | 0.64 | 53.0 |
| 11 | T1 | 2728 | 4.3 | 0.603 | 0.6 | LOS A | 3.0 | 21.5 | 0.05 | 0.05 | 79.1 |
| 12 | R2 | 53 | 26.0 | 0.133 | 47.1 | LOS D | 1.2 | 10.5 | 0.88 | 0.71 | 39.0 |
| Approach | | 2788 | 4.9 | 0.603 | 1.5 | LOS A | 3.0 | 21.5 | 0.07 | 0.06 | 77.7 |
| All Vehicles | | 3813 | 6.4 | 0.603 | 2.9 | LOS A | 3.0 | 24.4 | 0.08 | 0.08 | 75.5 |

Level of Service (LOS) Method: Delay (RTA NSW).
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 | Distance m | Prop. Queued | Effective Stop Rate per ped |
|---|---|---|---|---|---|---|---|---|
| P1 | South Full Crossing | 53 | 17.0 | LOS B | 0.1 | 0.1 | 0.49 | 0.49 |
| P1S | South Slip/Bypass Lane Crossing | 53 | 12.5 | LOS B | 0.1 | 0.1 | 0.42 | 0.42 |
| P21 | East Stage 1 | 53 | 41.0 | LOS E | 0.2 | 0.2 | 0.77 | 0.77 |
| P22 | East Stage 2 | 53 | 64.3 | LOS F | 0.2 | 0.2 | 0.96 | 0.96 |
| P3 | North Full Crossing | 53 | 4.9 | LOS A | 0.1 | 0.1 | 0.26 | 0.26 |
| P3S | North Slip/Bypass Lane Crossing | 53 | 3.0 | LOS A | 0.0 | 0.0 | 0.21 | 0.21 |
| All Pedestrians | | 316 | 23.8 | LOS C | | | 0.52 | 0.52 |

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: GWH/ Rudders/ Bungarribee - PM - Existing Operation

Great Western Highway/ Rudders Street/ Western Sydney Regional Parklands Access
Signals - Fixed Time Coordinated  Cycle Time = 140 seconds (User-Given Cycle Time)

**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: Rudders Street | | | | | | | | | | | |
| 1 | L2 | 53 | 10.0 | 0.157 | 48.4 | LOS D | 2.9 | 21.9 | 0.82 | 0.70 | 37.3 |
| 2 | T1 | 1 | 0.0 | 0.518 | 68.4 | LOS E | 4.7 | 35.8 | 1.00 | 0.77 | 21.9 |
| 3 | R2 | 68 | 9.2 | 0.518 | 73.0 | LOS F | 4.7 | 35.8 | 1.00 | 0.77 | 19.7 |
| Approach | | 122 | 9.5 | 0.518 | 62.3 | LOS E | 4.7 | 35.8 | 0.92 | 0.74 | 27.2 |
| East: Great Western Highway | | | | | | | | | | | |
| 4 | L2 | 38 | 16.7 | 0.442 | 8.0 | LOS A | 1.3 | 9.4 | 0.04 | 0.08 | 62.6 |
| 5 | T1 | 2156 | 2.6 | 0.667 | 0.9 | LOS A | 3.2 | 22.7 | 0.06 | 0.06 | 78.7 |
| Approach | | 2194 | 2.9 | 0.667 | 1.0 | LOS A | 3.2 | 22.7 | 0.06 | 0.06 | 78.5 |
| North: Park Access | | | | | | | | | | | |
| 7 | L2 | 1 | 100.0 | 0.013 | 71.5 | LOS F | 0.1 | 0.9 | 0.95 | 0.59 | 22.0 |
| 8 | T1 | 1 | 100.0 | 0.017 | 61.4 | LOS E | 0.1 | 1.7 | 0.92 | 0.60 | 21.4 |
| 9 | R2 | 1 | 100.0 | 0.017 | 64.6 | LOS E | 0.1 | 1.7 | 0.92 | 0.60 | 32.6 |
| Approach | | 3 | 100.0 | 0.017 | 65.8 | LOS E | 0.1 | 1.7 | 0.93 | 0.60 | 25.7 |
| West: Great Western Highway | | | | | | | | | | | |
| 10 | L2 | 1 | 100.0 | 0.001 | 10.2 | LOS A | 0.0 | 0.2 | 0.20 | 0.63 | 53.1 |
| 11 | T1 | 976 | 5.9 | 0.218 | 0.4 | LOS A | 0.5 | 4.0 | 0.03 | 0.02 | 79.5 |
| 12 | R2 | 49 | 14.9 | 0.175 | 53.2 | LOS D | 1.3 | 10.2 | 0.93 | 0.71 | 36.8 |
| Approach | | 1026 | 6.5 | 0.218 | 2.9 | LOS A | 1.3 | 10.2 | 0.07 | 0.06 | 75.8 |
| All Vehicles | | 3345 | 4.3 | 0.667 | 3.9 | LOS A | 4.7 | 35.8 | 0.09 | 0.09 | 74.2 |

Level of Service (LOS) Method: Delay (RTA NSW).
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 | Distance m | Prop. Queued | Effective Stop Rate per ped |
|---|---|---|---|---|---|---|---|---|
| P1 | South Full Crossing | 53 | 14.2 | LOS B | 0.1 | 0.1 | 0.45 | 0.45 |
| P1S | South Slip/Bypass Lane Crossing | 53 | 10.1 | LOS B | 0.1 | 0.1 | 0.38 | 0.38 |
| P21 | East Stage 1 | 53 | 45.7 | LOS E | 0.2 | 0.2 | 0.81 | 0.81 |
| P22 | East Stage 2 | 53 | 64.3 | LOS F | 0.2 | 0.2 | 0.96 | 0.96 |
| P3 | North Full Crossing | 53 | 4.9 | LOS A | 0.1 | 0.1 | 0.26 | 0.26 |
| P3S | North Slip/Bypass Lane Crossing | 53 | 3.0 | LOS A | 0.0 | 0.0 | 0.21 | 0.21 |
| All Pedestrians | | 316 | 23.7 | LOS C | | | 0.51 | 0.51 |

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: GWH/ Rudders/ Bungarribee - Sat - Existing Operation

Great Western Highway/ Rudders Street/ Western Sydney Regional Parklands Access
Signals - Fixed Time Coordinated  Cycle Time = 140 seconds (User-Given Cycle Time)

**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: Rudders Street | | | | | | | | | | | |
| 1 | L2 | 2 | 100.0 | 0.009 | 47.2 | LOS D | 0.1 | 1.5 | 0.78 | 0.59 | 36.6 |
| 2 | T1 | 1 | 0.0 | 0.044 | 63.3 | LOS E | 0.4 | 2.8 | 0.94 | 0.65 | 23.0 |
| 3 | R2 | 5 | 0.0 | 0.044 | 68.2 | LOS E | 0.4 | 2.8 | 0.94 | 0.65 | 21.3 |
| Approach | | 8 | 25.0 | 0.044 | 62.3 | LOS E | 0.4 | 2.8 | 0.90 | 0.64 | 25.5 |
| East: Great Western Highway | | | | | | | | | | | |
| 4 | L2 | 3 | 0.0 | 0.181 | 7.5 | LOS A | 0.4 | 2.6 | 0.03 | 0.03 | 64.0 |
| 5 | T1 | 894 | 3.2 | 0.273 | 0.6 | LOS A | 0.6 | 4.4 | 0.03 | 0.03 | 79.1 |
| Approach | | 897 | 3.2 | 0.273 | 0.7 | LOS A | 0.6 | 4.4 | 0.03 | 0.03 | 79.1 |
| North: Park Access | | | | | | | | | | | |
| 7 | L2 | 1 | 0.0 | 0.006 | 63.2 | LOS E | 0.1 | 0.4 | 0.91 | 0.59 | 25.2 |
| 8 | T1 | 1 | 100.0 | 0.015 | 60.9 | LOS E | 0.1 | 1.3 | 0.91 | 0.59 | 21.5 |
| 9 | R2 | 1 | 0.0 | 0.015 | 63.9 | LOS E | 0.1 | 1.3 | 0.91 | 0.59 | 33.7 |
| Approach | | 3 | 33.3 | 0.015 | 62.3 | LOS E | 0.1 | 1.3 | 0.91 | 0.59 | 27.3 |
| West: Great Western Highway | | | | | | | | | | | |
| 10 | L2 | 1 | 0.0 | 0.001 | 9.6 | LOS A | 0.0 | 0.1 | 0.20 | 0.63 | 53.4 |
| 11 | T1 | 849 | 2.7 | 0.186 | 0.4 | LOS A | 0.5 | 3.3 | 0.03 | 0.02 | 79.5 |
| 12 | R2 | 5 | 20.0 | 0.019 | 51.5 | LOS D | 0.1 | 1.1 | 0.91 | 0.62 | 37.4 |
| Approach | | 856 | 2.8 | 0.186 | 0.7 | LOS A | 0.5 | 3.3 | 0.03 | 0.03 | 79.0 |
| All Vehicles | | 1764 | 3.2 | 0.273 | 1.1 | LOS A | 0.6 | 4.4 | 0.04 | 0.03 | 78.4 |

Level of Service (LOS) Method: Delay (RTA NSW).
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.

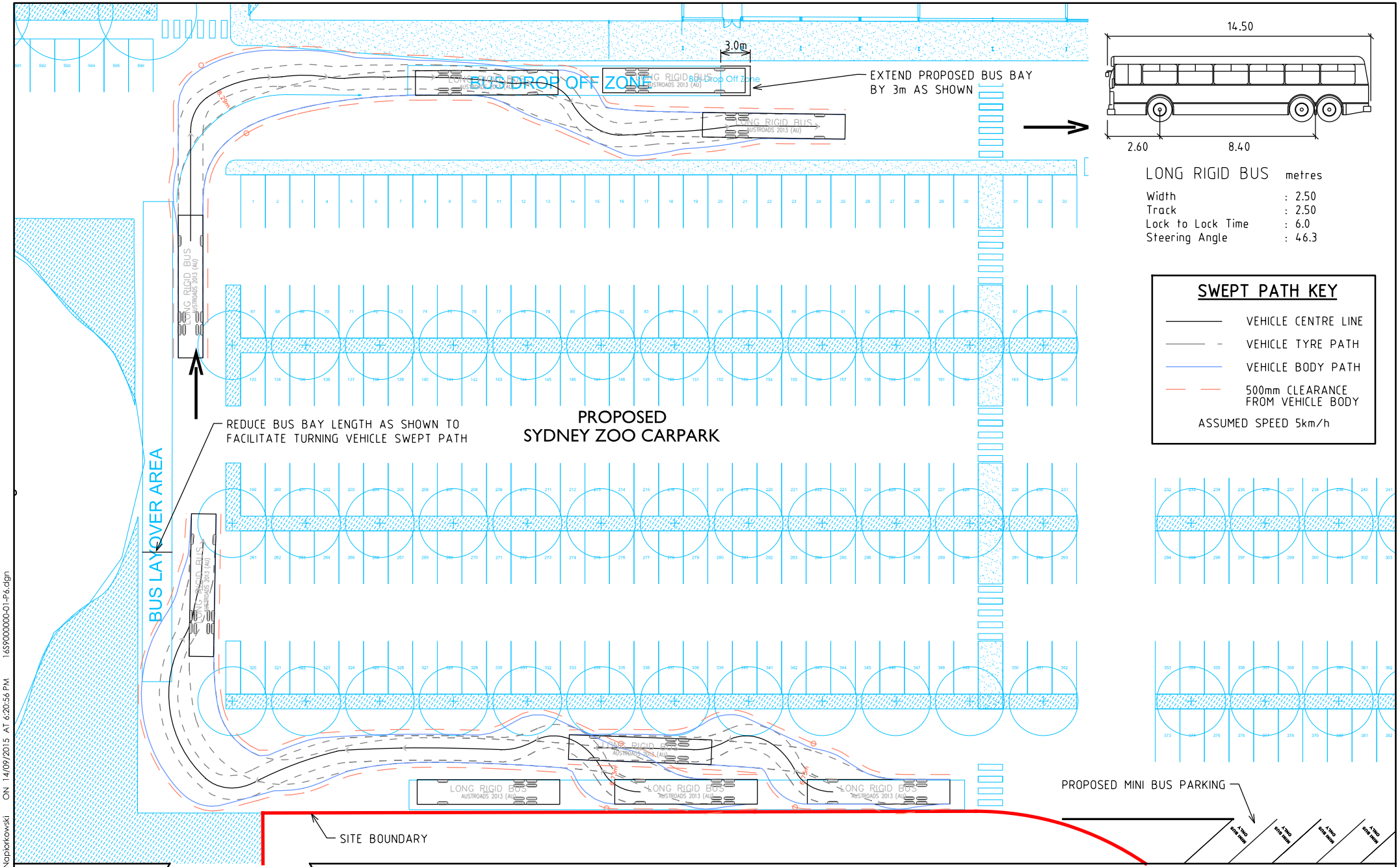
**Movement Performance - Pedestrians**

| Mov ID | Description | Demand Flow ped/h | Average Delay sec | Level of Service | Average Back of Queue Pedestrian ped | Distance m | Prop. Queued | Effective Stop Rate per ped |
|---|---|---|---|---|---|---|---|---|
| P1 | South Full Crossing | 53 | 14.2 | LOS B | 0.1 | 0.1 | 0.45 | 0.45 |
| P1S | South Slip/Bypass Lane Crossing | 53 | 10.1 | LOS B | 0.1 | 0.1 | 0.38 | 0.38 |
| P21 | East Stage 1 | 53 | 45.7 | LOS E | 0.2 | 0.2 | 0.81 | 0.81 |
| P22 | East Stage 2 | 53 | 64.3 | LOS F | 0.2 | 0.2 | 0.96 | 0.96 |
| P3 | North Full Crossing | 53 | 4.9 | LOS A | 0.1 | 0.1 | 0.26 | 0.26 |
| P3S | North Slip/Bypass Lane Crossing | 53 | 3.0 | LOS A | 0.0 | 0.0 | 0.21 | 0.21 |
| All Pedestrians | | 316 | 23.7 | LOS C | | | 0.51 | 0.51 |

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.

# Appendix C

## Swept Path Assessment




PLOTTED BY : Tom.Naplorkowski ON 14/09/2015 AT 6:20:56 PM 16S9000000-01-P6.dgn


Melbourne 03 9851 9600
Sydney 02 8448 1800
Brisbane 07 3113 5000
Canberra 02 6243 9400
Adelaide 08 8334 3600
Gold Coast 07 5510 4814
Townsville 07 4722 2765
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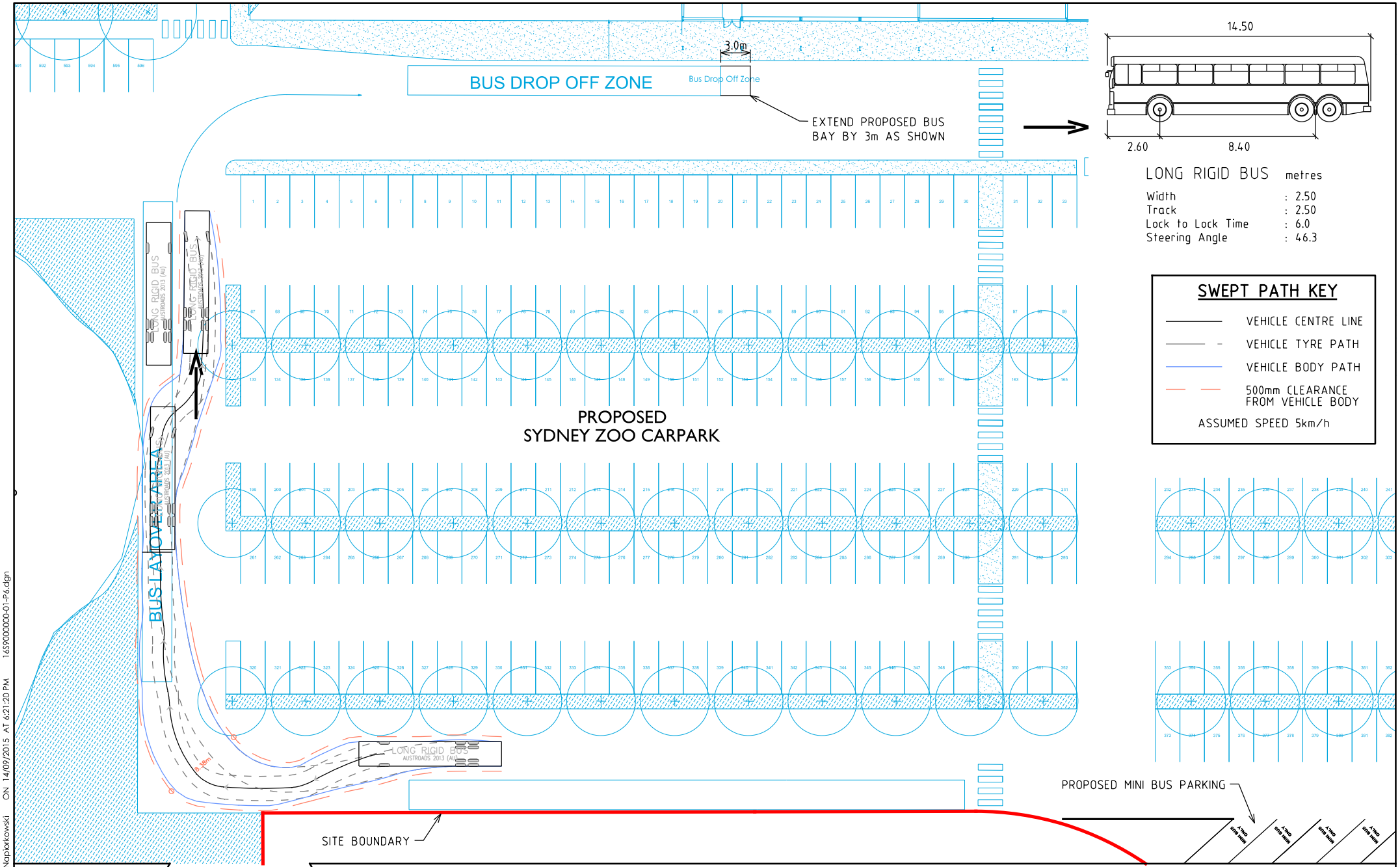
PRELIMINARY PLAN
FOR DISCUSSION PURPOSES ONLY
SUBJECT TO CHANGE WITHOUT NOTIFICATION

SYDNEY ZOO TRAFFIC ASSESSMENT
14.5m LONG RIGID BUS
SWEPT PATH ASSESSMENT

| DATE: | SCALE: | |
|---|---|---|
| 14.09.2015 | 1:500@A4 | 0 5 10 |

| APPROVED: | DRAWING NO. | SHEET: |
|---|---|---|
| BDM | 16S9000000-01-01-P6 | 01 OF 04 |

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| | |
|---|---|
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| Brisbane | 07 3113 5000 |
| Canberra | 02 6243 9400 |
| Adelaide | 08 8334 3600 |
| Gold Coast | 07 5510 4814 |
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PRELIMINARY PLAN
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SYDNEY ZOO TRAFFIC ASSESSMENT
14.5m LONG RIGID BUS
SWEPT PATH ASSESSMENT

| DATE: | SCALE: | |
|---|---|---|
| 14.09.2015 | 1:500@A4 | 0 5 10 |

| APPROVED: | DRAWING NO. | SHEET: |
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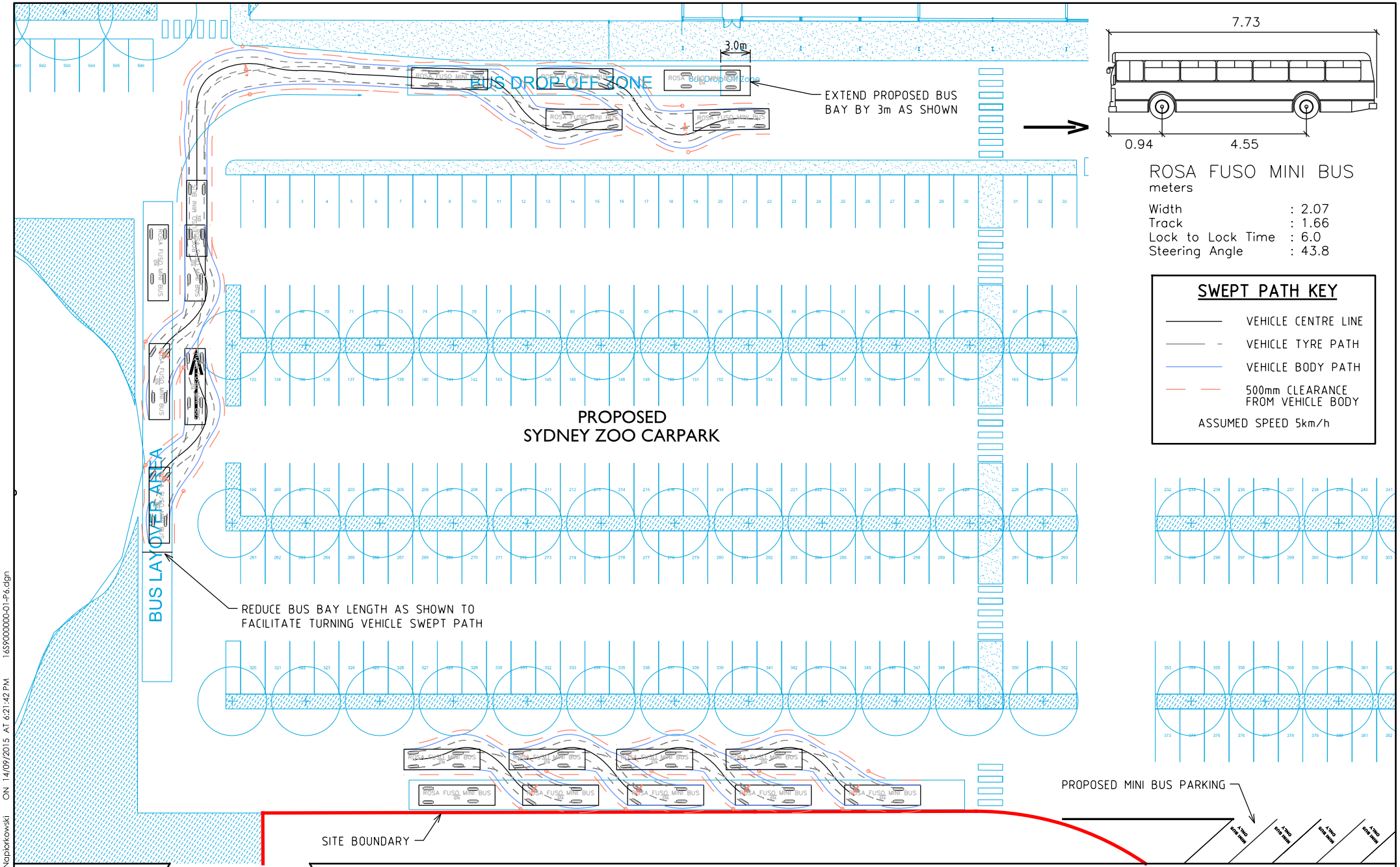


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PRELIMINARY PLAN
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SYDNEY ZOO TRAFFIC ASSESSMENT
7.8m LONG MINI BUS
SWEPT PATH ASSESSMENT

| DATE: | SCALE: | |
|---|---|---|
| 14.09.2015 | 1:500@A4 | 0 5 10 |

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|---|---|---|
| BDM | 16S9000000-01-03-P6 | 03 OF 04 |

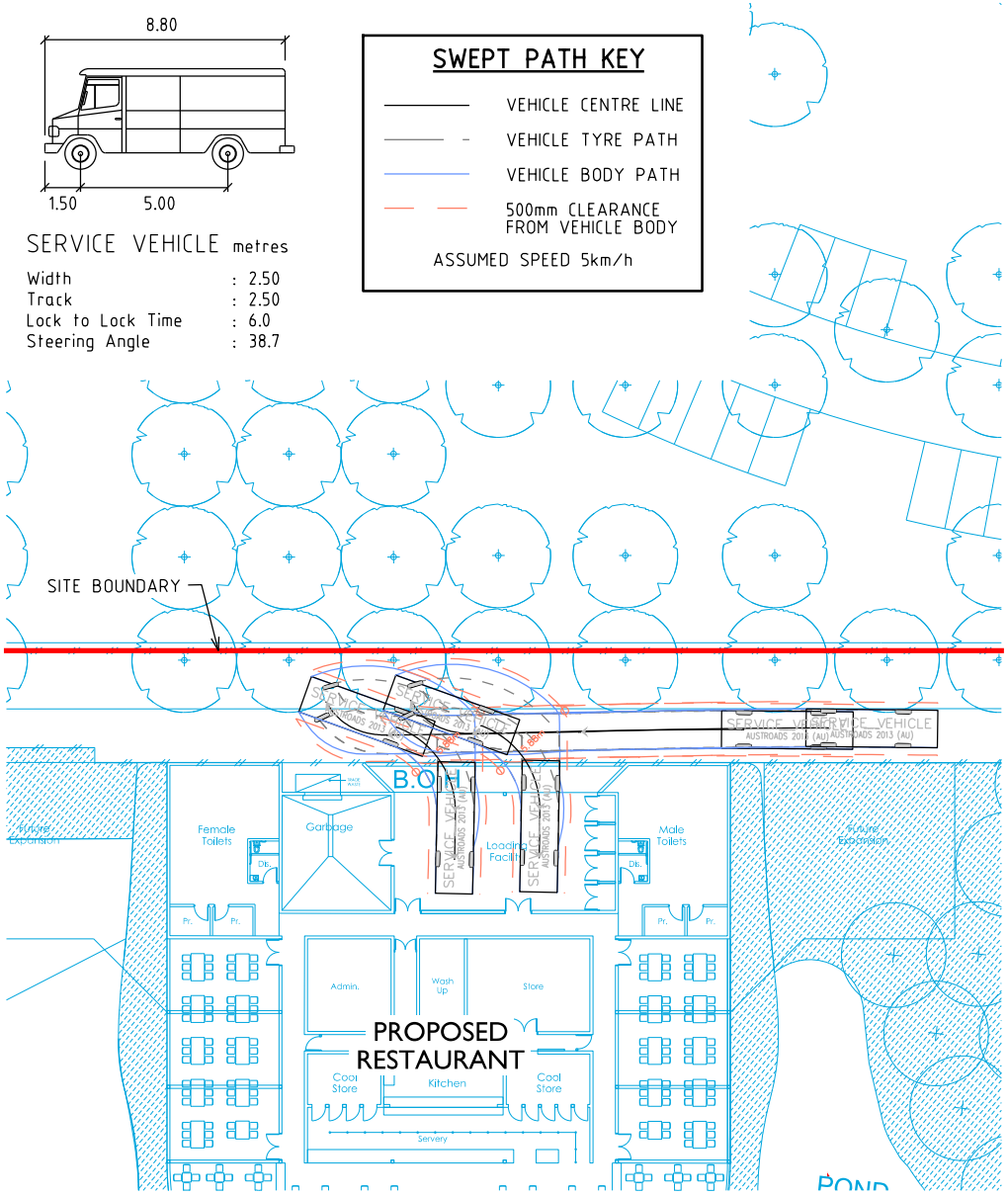
SERVICE VEHICLE metres

| | |
|---|---|
| Width | : 2.50 |
| Track | : 2.50 |
| Lock to Lock Time | : 6.0 |
| Steering Angle | : 38.7 |

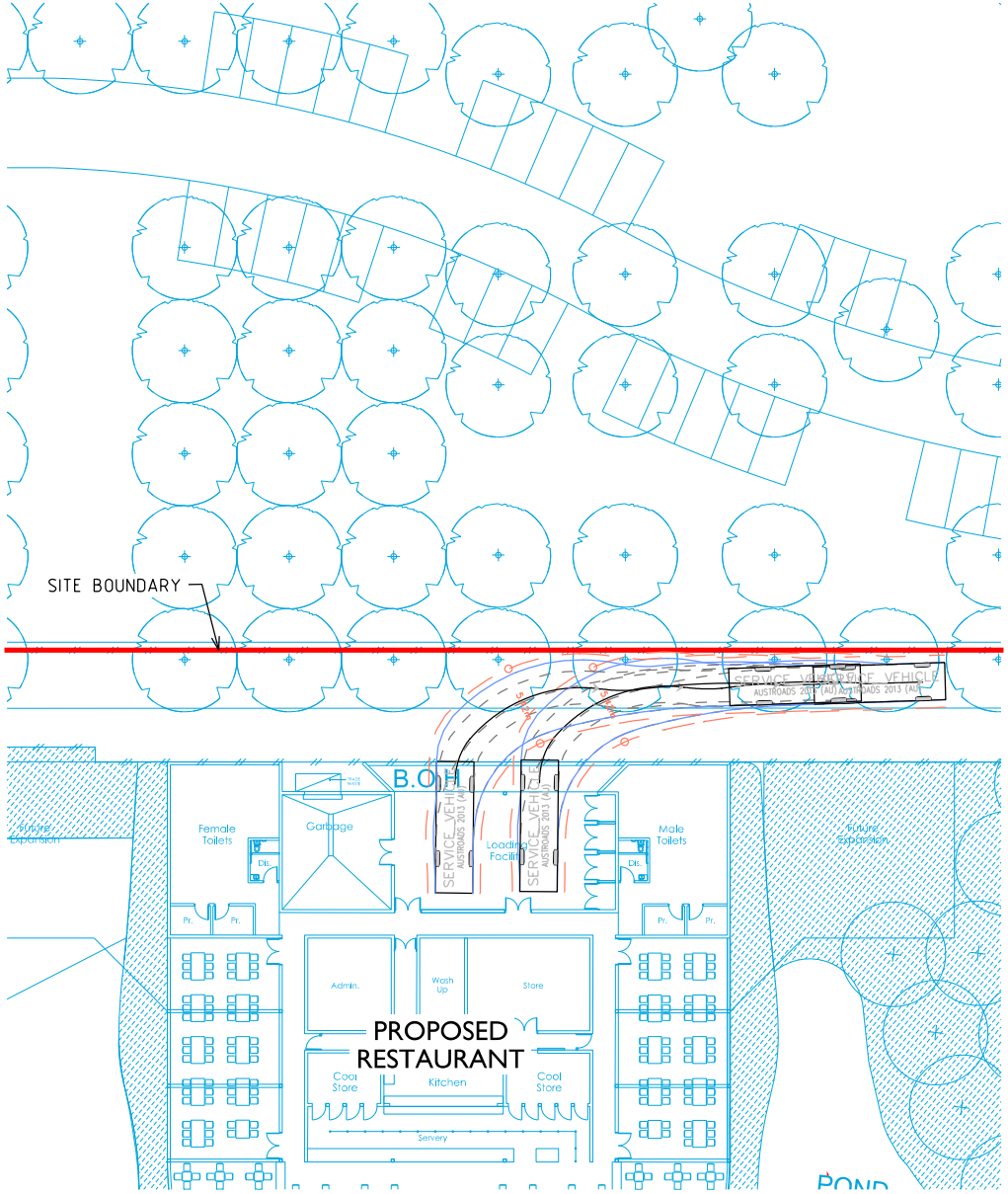
## SWEPT PATH KEY

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 500mm CLEARANCE FROM VEHICLE BODY

ASSUMED SPEED 5km/h




## INGRESS




## EGRESS

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PRELIMINARY PLAN
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SYDNEY ZOO TRAFFIC ASSESSMENT
8.8m SERVICE VEHICLE
SWEPT PATH ASSESSMENT

| DATE: | SCALE: | |
|---|---|---|
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