



# **Metro Outer Joint Development Assessment Panel Agenda**

**Meeting Date and Time:** Tuesday, 9 March 2021; 10:30am  
**Meeting Number:** MOJDAP/72  
**Meeting Venue:** City of Rockingham  
Civic Boulevard, Rockingham

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## **Attendance**

### **DAP Members**

Mr Ian Birch (Presiding Member)  
Ms Sheryl Chaffer (Deputy Presiding Member)  
Mr Jason Hick (Third Specialist Member)  
Cr Deb Hamblin (Local Government Member, City of Rockingham)  
Cr Lorna Buchan (Local Government Member, City of Rockingham)

### **Officers in attendance**

Mr Chris Parlane (City of Rockingham)  
Mr Greg Delahunty (City of Rockingham)

### **Minute Secretary**

Ms Nicole Gardner (City of Rockingham)

### **Applicants and Submitters**

Mr Brad Quatermaine (Brad Quatermaine Architect)  
Mr Trevor Darch (South Coast Baptist College)

### **Members of the Public / Media**

Nil

#### **1. Opening of Meeting, Welcome and Acknowledgement**

The Presiding Member declares the meeting open and acknowledges the traditional owners and pay respects to Elders past and present of the land on which the meeting is being held.

#### **2. Apologies**

Cr Mark Jones (Local Government Member, City of Rockingham)

#### **3. Members on Leave of Absence**

Nil.

#### **4. Noting of Minutes**

Signed minutes of previous meetings are available on the [DAP website](#).

#### **5. Declarations of Due Consideration**

The Presiding Member notes an addendum to the agenda was published to include a Location Plan and amended Site Plan provided by the City of Rockingham in relation to Item 8.1, received on 8 March 2021.

Any member who is not familiar with the substance of any report or other information provided for consideration at the DAP meeting must declare that fact before the meeting considers the matter.





## 6. Disclosure of Interests

Nil.

## 7. Deputations and Presentations

The City of Rockingham may be provided with the opportunity to respond to questions of the panel, as invited by the Presiding Member.

## 8. Form 1 – Responsible Authority Reports – DAP Applications

### 8.1 Lot 2000 (30) Gnangara Drive, Waikiki

Development Description: Proposed extension to educational establishment  
Applicant: Brad Quatermaine Architect  
Owner: South Coast Baptist College (Inc)  
Responsible Authority: 20.295.1  
DAP File No: DAP/20/01876

## 9. Form 2 – Responsible Authority Reports – DAP Amendment or Cancellation of Approval

Nil

## 10 State Administrative Tribunal Applications and Supreme Court Appeals

| Current SAT Applications    |                   |   |   |             |
|-----------------------------|-------------------|---|---|-------------|
| File No. & SAT DR No.       | LG Name           | Property Location   | Application Description                                     | Date Lodged |
| DAP/19/01708<br>DR 138/2020 | City of Kwinana   | Lot 108 Kwinana Beach Road, Kwinana                         | Proposed Bulk Liquid Storage for GrainCorp Liquid Terminals | 01/07/2020  |
| DAP/01729<br>DR 176/2020    | City of Kalamunda | Lot 130 (74) Warlingham Drive, Lesmurdie                    | Aged Residential Care Facility                              | 28/8/2020   |
| DAP/20/01764<br>DR 204/2020 | City of Swan      | Lot 780 (46) Gaston Road, Bullsbrook                        | Proposed Stock Feed Grain Mill                              | 8/09/2020   |
| DAP/20/01829<br>DR 001/2021 | City of Swan      | Lot 1 (42) Dale Road & Lot 4 (43) Yukich Close, Middle Swan | Aged care and community purpose                             | 08/01/2021  |

## 11 General Business

In accordance with Section 7.3 of the DAP Standing Orders 2020 only the Presiding Member may publicly comment on the operations or determinations of a DAP and other DAP members should not be approached to make comment.

## 12 Meeting Closure

# **LOT 2000 (30) GNANGARA DRIVE, WAIKIKI – PROPOSED EXTENSION TO EDUCATIONAL ESTABLISHMENT**

## **Form 1 – Responsible Authority Report** (Regulation 12)

|  |  |  |
|--|--|--|
| <b>DAP Name:</b>   | Metro Outer JDAP   |  |
| <b>Local Government Area:</b>  | City of Rockingham   |  |
| <b>Applicant:</b>  | Brad Quartermaine Architect  |  |
| <b>Owner:</b>  | South Coast Baptist College (Inc)  |  |
| <b>Value of Development:</b>   | \$10.55 million<br><input checked="" type="checkbox"/> Mandatory (Regulation 5)<br><input type="checkbox"/> Opt In (Regulation 6)                        |  |
| <b>Responsible Authority:</b>  | City of Rockingham   |  |
| <b>Authorising Officer:</b>  | Mr Bob Jeans, Director Planning & Development Services   |  |
| <b>LG Reference:</b>   | 20.2020.295.1  |  |
| <b>DAP File No:</b>  | 20/01876   |  |
| <b>Application Received Date:</b>  | 20/10/20   |  |
| <b>Report Due Date:</b>  | 24/2/20  |  |
| <b>Application Statutory Process Timeframe:</b>  | 90 Days (with an additional 37 agreed)   |  |
| <b>Attachment(s):</b>  | 1. Architectural Drawings<br>2. Architects Letter and Technical Reports<br>3. Schedule of Submissions<br>4. Applicant Response to Summary of Submissions |  |
| <b>Is the Responsible Authority Recommendation the same as the Officer Recommendation?</b> | <input checked="" type="checkbox"/> Yes  | Complete Responsible Authority Recommendation section              |
|  | <input type="checkbox"/> No  | Complete Responsible Authority and Officer Recommendation sections |

### **Responsible Authority Recommendation**

That the Metro Outer Joint Development Assessment Panel resolves to:

**Approve** DAP Application reference DA/20/01876 and accompanying plans:

- Site Plan, SK07 Rev I, dated 8 December 2020;
- Ground Floor Plan, SK08 Rev E, dated 16 December 2020;
- First Floor Plan, SK09, Rev D, dated 9 October 2020;
- Elevations Plans, SK 10, Rev A, dated 13 September 2020;
- Landscape Master Plan, LD-MP-01, Rev D.2, dated 15 December 2020

in accordance with Clause 68 of Schedule 2 (Deemed Provisions) of the *Planning and Development (Local Planning Schemes) Regulations 2015*, and the provisions of

Clause 68(2)(b) of the *City of Rockingham Town Planning Scheme No. 2*, subject to the following conditions:

### Conditions

1. Pursuant to clause 26 of the Metropolitan Region Scheme, this approval is deemed to be an approval under clause 24(1) of the Metropolitan Region Scheme.
2. This decision constitutes development approval only and is valid for a period of four years from the date of approval. If the subject development is not substantially commenced within the specified period, the approval shall lapse and be of no further effect.
3. Prior to applying for a Building Permit, a Stormwater Management Plan must be prepared by a suitably qualified engineering showing how stormwater will be contained on-site and those plans must be submitted to the City of Rockingham for its approval. All stormwater generated by the development must be managed in accordance with Planning Policy 3.4.3 - Urban Water Management to the satisfaction of the City of Rockingham. The approved plans must be implemented and all works must be maintained for the duration of the development.
4. Earthworks over the site associated with the development must be stabilised to prevent sand or dust blowing off the site, and appropriate measures must be implemented within the time and in the manner directed by the City of Rockingham in the event that sand or dust is blown from the site.
5. Prior to the occupation of the development, the existing crossover must be removed and the verge, footpath, kerbing and landscaping must be reinstated to the satisfaction of the City of Rockingham.
6. Prior to applying for a Building Permit, the submitted landscape Master Plan, LD-MP-01, Rev D.2 dated 15 December 2020 must be revised to the satisfaction of the City of Rockingham to include the following:
  - (i) The location, number and type of existing and proposed trees and shrubs, including calculations for the landscaping area;
  - (ii) Any lawns to be established;
  - (iii) Any natural landscape areas to be retained;
  - (iv) Those areas to be reticulated or irrigated;
  - (v) To offset the removal of the two Sheoaks (*Allocasuarina fraseriana*) and the two smaller Eucalypts, four Sheoaks and four Tuarts (*Eucalyptus gomphocephala*) must be planted elsewhere on the Lot. The locations of the new plantings must be shown on a revised Site Plan;
  - (vi) Verge treatments.

The landscaping must be completed prior to the occupation of the development, and must be maintained at all times to the satisfaction of the City.

7. Trees, shrubs taller than 2m and grasstree plants (XANTHORRHOEACEAE family) must be retained (unless specifically identified for removal on the approved plans) and, during the construction period, measures for their retention must be taken in accordance with Australian Standard AS 4970—2009, Protection of Trees on Development Sites. These measures are to be detailed in a vegetation retention management plan to the satisfaction of the City of Rockingham.
8. The on-site carpark must:
  - (i) provide a minimum of 19 car parking spaces;
  - (ii) be designed, constructed, sealed, kerbed, drained and marked in accordance with User Class 3 of Australian/New Zealand Standard AS/NZS 2890.1:2004, Parking facilities, Part 1: Off-street car parking prior to applying for a Building Permit;
  - (iii) provide 1 car parking space dedicated to people with disabilities, which are designed, constructed, sealed, kerbed, drained and marked in accordance with Australian/New Zealand Standard AS/NZS 2890.6:2009, Parking facilities, Part 6: Off-street parking for people with disabilities and which are linked to the main entrance of the development by a continuous accessible path of travel designed and constructed in accordance with Australian Standard AS 1428.1—2009, Design for access and mobility, Part 1: General Requirements for access—New building work;
  - (iv) be constructed, sealed, kerbed, drained and marked prior to the development being occupied and maintained thereafter; and
  - (v) comply with the above requirements for the duration of the development.
9. 18 on-street car parking spaces must be designed and constructed in accordance with detailed plans and specifications submitted and approved by the City of Rockingham for short-term parking along Oakwood Crescent and Fairview Drive, in accordance with Australian Standard AS 2890.5:2020, Parking facilities, On-street parking. The five (5) on-street car parking spaces proposed on Fairview Drive opposite Halfmoon Place do not form part of this approval and must be deleted, as marked in red on the Approved Site Plan.

The car parking spaces must:

- (i) be designed, constructed, sealed, kerbed, drained and marked in accordance with Australian Standard AS 2890.5—1993, Parking facilities, Part 5: On-street parking;
  - (ii) be approved by the City of Rockingham prior to applying for a Building Permit;
  - (iii) be constructed, sealed, kerbed, drained and marked prior to the development being occupied and maintained thereafter; and comply with the above requirements for the duration of the development.
10. The proposed bus parking bay in the verge of Oakwood Crescent does not form part of this approval and must be deleted, as marked in red on the Approved Site Plan.

11. In accordance with City of Rockingham Planning Policy 3.3.14 - Bicycle parking and End of Trip Facilities, 26 long-term bicycle parking spaces must be provided for the development. The bicycle parking spaces must be designed in accordance with AS2890.3—1993, Parking facilities, Part 3: Bicycle parking facilities and must be approved by the City of Rockingham prior to applying for a Building Permit and constructed prior to occupancy of the development. The bicycle parking spaces must be retained and maintained in good and safe condition for the duration of the development.
12. Existing street trees adjacent to the development site must be protected throughout construction in accordance with *Australian Standard AS 4970-2009 Protection of Trees on Development Sites*.
13. Prior to applying for a Building Permit, an Acoustic Report which demonstrates that all mechanical services associated with the proposed development and any other noise source, including noise emanating from the development, will comply with the Environmental Protection (Noise) Regulations 1997, must be submitted to and approved by the City of Rockingham.
14. Prior to the occupation of the development, a Final Acoustic Assessment must be prepared and provided to the City of Rockingham which demonstrates to City's satisfaction, that the completed development complies with the *Environmental Protection (Noise) Regulations 1997*. The Final Acoustic Assessment must include the following information:
  - (a) noise sources compared with the assigned noise levels as stated in the *Environmental Protection (Noise) Regulations 1997*, when the noise is received at the nearest "noise sensitive premises" and surrounding residential area;
  - (b) tonality, modulation and impulsiveness of noise sources; and
  - (c) confirmation of the implementation of noise attenuation measures.

Any further works must be carried out in accordance with the Acoustic Report and implemented as such for the duration of the development.
15. Prior to the occupation of the development, an illumination report must be prepared which demonstrates to the satisfaction of the City of Rockingham, that the completed development complies with the requirements of *Australian Standard AS 4282-2019, 'Control of the obtrusive effects of outdoor lighting'*.
16. Prior to applying for a Building Permit, all service areas and service related hardware, including antennae, satellite dishes and air-conditioning units, must be designed to be located away from public view and/or screened, and this design must be provided to, and approved by, the City of Rockingham.
17. Materials, sea containers, goods or bins must not be stored within the carpark at any time.
18. Prior to the lodgement of a building permit, a Waste Management Plan must be submitted for the approval of the City, and thereafter implemented for the duration of the development.
19. Prior to commencement of development, a Construction Management Plan must be prepared and approved to ensure the appropriate management of construction related impacts. The approved plan must be implemented for the duration of construction works, to the satisfaction of the City of Rockingham.

### Advice Notes

1. This Approval relates to the details provided in the application; to undertake the development in a different manner to that stated in the application, a new application for Development Approval must be submitted to the City of Rockingham.
2. A Certified Building Permit must be obtained prior to construction and thereafter an Occupancy Permit must be obtained; the applicant and owner should liaise with the City's Building Services in this regard.
3. The development must comply with the *Environmental Protection (Noise) Regulations 1997*; contact the City's Health Services for information on confirming requirements.
4. The development must comply with the Food Act 2008, the Food Safety Standards and Chapter 3 of the Australian New Zealand Food Standards Code (Australia Only); the applicant and owner should liaise with the City of Rockingham's Health Services in this regard.
5. The development must comply with the Health (Public Building) Regulations 1992; the applicant and owner should liaise with the City of Rockingham's Health Services in this regard.
6. With respect to the landscaping plan, the applicant and owner should liaise with the City of Rockingham's Land Development and Infrastructure Services to confirm requirements for the landscaping plan, including the requirements for developing and maintaining of the street verges abutting the development site.
7. All works in the road reserve, including construction of a crossover or footpath and any works to the road carriageway must be to the specifications of the City of Rockingham. The applicant should liaise with the City of Rockingham's Engineering Services in this regard.
8. The applicant is advised that in respect of Condition 3, a Stormwater Management Plan will require compliance with Planning Policy 3.4.3 – Urban Water Management. The applicant is encouraged to discuss the specific policy requirements with the City prior to the submission of the plan.
9. A Sign Permit must be obtained for any advertising associated with the development, including signage painted on the building; the applicant should liaise with the City's Building Services in this regard.
10. The applicant is responsible for protecting any existing City streetscape assets along Gnangara Drive, Oakwood Crescent and Fairview Drive during the course of the project. This includes any existing streetscape lighting, grated gully pits, side entry pits, kerb, footpaths, trees, turf etc. If any damage is caused to the existing assets (identified to be retained), they must be rectified to the satisfaction of the City of Rockingham. It is recommended that a photographic dilapidation report is undertaken by the applicant, to record the current condition of these assets.

**Details: outline of development application**

|   |   |
|---|---|
| Region Scheme                                       | Metropolitan Region Scheme  |
| Region Scheme - Zone/Reserve                        | Urban   |
| Local Planning Scheme                               | Town Planning Scheme No.2   |
| Local Planning Scheme - Zone/Reserve                | Community Purposes  |
| Structure Plan/Precinct Plan                        | N/A   |
| Structure Plan/Precinct Plan - Land Use Designation | N/A   |
| Use Class and permissibility:                       | Educational Establishment / "D" – Discretionary<br>Community Use / "D" - Discretionary  |
| Lot Size:   | 73,697 <sup>2</sup>   |
| Existing Land Use:                                  | Educational Establishment   |
| State Heritage Register                             | No  |
| Local Heritage                                      | <input checked="" type="checkbox"/> N/A<br><input type="checkbox"/> Heritage List<br><input type="checkbox"/> Heritage Area   |
| Design Review                                       | <input checked="" type="checkbox"/> N/A<br><input type="checkbox"/> Local Design Review Panel<br><input type="checkbox"/> State Design Review Panel<br><input type="checkbox"/> Other |
| Bushfire Prone Area                                 | No  |
| Swan River Trust Area                               | No  |

**Proposal:**

This application proposes the development of a multi-purpose sports centre building, outdoor playing courts and car parking as described below:

- Demolition of existing structures (a demountable class room, two sheds and a 28 bay car park);
- A proposed two storey multi-purpose sports centre and teaching block (referred to hereafter as the 'sports centre building'), which on the ground floor comprises:
  - An indoor sports centre with retractable seating and playing courts for basketball, volleyball and futsal;
  - A multi-use sports arena including gymnastic centre;
  - A fitness centre;
  - Storage, change rooms and amenities; and
  - Café;
- On the first floor comprises:
  - A breakout/viewing concourse;
  - General learning areas;
  - A conference room; staff study's and offices;
  - A viewing balcony overlooking the sports fields to the west

- Mezzanine storage.
- Two new flood lit outdoor playing courts, which will replace the two existing sports courts (basketball, netball and tennis) in the south-east corner of the site;
- A nineteen (19) bay car parking area is proposed west of the outdoor playing courts, with vehicle access from Fairview Drive;
- Eight Car parking bays and a bus parking embayment are proposed in the verge of Oakwood Crescent, with 15 car bays proposed in the verge of Fairview Drive;
- The sports centre building will be available for external hire and use, limited to out of school hours.
- The facilities are intended to cater for the Health and Physical Education curriculum and the football and gymnastics specialist programs run by the College.

The application will increase the population of the College as follows:

- 40 primary students;
- 40 secondary students;
- Six staff.

### **Background:**

The South Coast Baptist College was established on the subject land in 1988 (formerly known as the Maranatha Christian College). There have been several applications for which Development Approval has been granted to enable the school to expand over time.

On the 9th September 2020, an application was received seeking Development Approval from the City of Rockingham for four (4) proposed demountable classrooms and a 39 bay car parking area, situated in the northern corner of the subject property (City reference no.: DD020.2020.252.1).

On the 9th October 2020, the City received the current application seeking Development Approval from the MOJDAP for a proposed Sports Centre and Teaching Block building; Two (2) Outdoor Playing Courts, 19 on-site and 27 street verge car parking bays in the vicinity of the eastern corner of the of the subject property.

On the 23rd December 2020, the City of Rockingham granted conditional Development Approval to the demountable application (ref: DD020.2020.252.1) under delegated authority. In doing so, due regard was given to matters raised in submissions that were related to that development application.

### **Site Context**

The subject land is located on the south-east side of Gnangara Drive, approximately 240m east of Read Street and 580m west of Ennis Avenue, Waikiki.

The site is adjoined by the following streets:

- Gnangara Drive to the north-west;
- Oakwood Crescent to the north-east; and



- Fairview Drive to the south-east.

Residential development adjoins the south-west boundary.

Existing buildings on the site are grouped towards the north, while outdoor sports fields are located to the south. Two outdoor playing courts are situated on the south-eastern corner.

The site is surrounded by low density (R20), detached, generally single storey housing. Some medium density (R40) grouped dwellings are located near the northern corner of the site, opposite the intersection of Gngara Drive and Oakwood Crescent.

The Waikiki Village neighbourhood shopping centre is located approximately 70m to the west of the site.

### **Legislation and Policy:**

#### Legislation

- Planning and Development Act 2005
- Metropolitan Region Scheme (MRS)
- Planning and Development (Local Planning Schemes) Regulations 2015 (Regulations).
- City of Rockingham Town Planning Scheme No. 2 (TPS2).

#### State Government Policies

- State Planning Policy 7.0 - Design of the Built Environment (SPP7.0)
- Draft Operational Policy 2.4 Planning for School Sites

#### Local Policies

- Planning Policy 3.3.14 Bicycle Parking and End of Trips Facilities (PP3.3.14)

### **Consultation:**

#### Public Consultation

The application was advertised for public comment over a period of 14 days, commencing on 28 October 2020 and concluding on 11 November 2020.

Advertising was carried out in the following manner:

- Landowners and occupiers identified on the Consultation Map below were notified in writing of the proposed applications;
- Two signs were erected on the subject site in prominent locations notifying the community of the Development Applications; and
- Copies of technical documents and plans of the proposal were made available for public inspection at the City's Administration Offices and placed on the City's website.

Four (4) submissions were received at the conclusion of the advertising period, including one (1) submission in support and three (3) submissions objecting, or which raised concerns. The submissions with concerns are summarised as follows:

| <b>Issue Raised</b>  | <b>Officer comments</b>   |
|----------------------|---|
| <u>Verge Parking</u> | It is understood that cars currently park informally on the street verge or within the road carriageway at peak periods. The proposed verge bays will therefore |

|                                    |   |
|------------------------------------|---|
|                                    | formalise this arrangement in a safe and efficient manner. Verge Parking is discuss in detail in the planning assessment.   |
| <u>Need to include Bus Parking</u> | Bus Parking is discuss in detail in the planning assessment where it is concluded that the proposed bus parking bay is not supported for traffic safety reasons.  |
| <u>Property Values</u>             | This is not a relevant planning consideration.  |
| <u>Noise</u>                       | The Acoustic Report submitted with application indicates that full operational compliance can be achieved with the <i>Environmental Protection (Noise) Regulations 1997</i> .<br>Noise is discussed in detail in the planning assessment below section below.   |
| <u>Antisocial Behaviour</u>        | While there is no evidence to suggest that the proposed development will increase vandalism or graffiti at the school, it is acknowledged that schools in general are often common targets for this type of antisocial behaviour. The College's intent to upgrade security fencing is noted.  |
| <u>Lighting</u>                    | The Lighting Report submitted with the application indicates that illumination from proposed flood lights will comply with AS 4282-2019 " <i>Control of the obtrusive effects of outdoor lighting</i> ". A conditions is recommended in the event approval is granted, which will ensure that all proposed outdoor lighting will be installed to comply with the above standard.<br>Lighting is discussed further in the planning assessment below. |
| <u>Privacy</u>                     | There is adequate physical separation between the proposed Sports Centre building and residential properties to the east and south to maintain privacy for nearby residents.  |
| <u>Pests and vermin</u>            | The building must comply with the <i>Food Act 2008</i> and the <i>Health (Public Building) Regulations 1992</i> . The submitter's concerns can be effectively managed within this framework. Advice notes are recommended in the event approval is granted.   |
| <u>Waste Management</u>            | The embayment car parking proposed within the verge of Oakwood Crescent will restrict the ability to present waste bins for collection from the street. It is noted that the applicant intends to arrange for the collection of waste bins from within the site. A condition requiring a Waste Management Plan is recommended in the event approval is granted, which can detail the location and timing of waste collection arrangements.          |
| <u>Construction Impacts</u>        | Construction activity, while of limited duration, has potential to generate off site impacts if not carefully managed. A Construction Management Plan is recommended as a condition in the event approval is granted.   |

The applicant's response to the summary of the submissions is at attachment 4.

Referrals/consultation with Government/Service Agencies

Nil.

**Planning Assessment:**

The proposal has been assessed against all the relevant legislative requirements of the Scheme, State and Local Planning Policies outlined in the Legislation and Policy section of this report. The following matters have been identified as key considerations for the determination of this application:

- Car / Bus Parking
- Bicycle Parking;
- Noise; and
- Outdoor Lighting.

These matters are outlined and discussed below.

Car / Bus Parking

*Car Parking*

TPS2, Table 2 contains no parking requirements for Educational Establishments. As such, parking has been assessed as follows in accordance with WALGA's '*Road Safety Around Schools*', which indicates that 15 on-site car parking bays are required for the current application.

|              | <b>Student/Staff Increase</b> | <b>Requirement</b>   | <b>Bays Required</b> |
|--------------|-------------------------------|----------------------|----------------------|
| Primary      | 40                            | 14 bays/100 students | 5.6 (6)              |
| Secondary    | 40                            | 7 bays/ 100 students | 2.8 (3)              |
| Staff        | 6                             | 1 bay / staff member | 6                    |
| <b>Total</b> |                               |                      | <b>15 bays</b>       |

In terms of proposed on-site car parking, taking into account the loss of 28 existing on-site car bays (in the location of the proposed Sports Centre building footprint) and 23 surplus car bays (provided in the 39 bay car park in the north-eastern corner of the site approved in Development Application ref: DD020.2020.252.1), there is a technical shortfall of one on-site car parking bay. This, however is offset by the provision of verge parking, discussed below.

| <b>Proposed</b>   | <b>Bays Provided</b> |
|---|----------------------|
| Existing on-site bays lost to development                   | (-28)                |
| New (surplus) bays provided in approved north-east car park | 23                   |
| New bays proposed in Sports Centre car park                 | 19                   |
| <b>Total</b>  | <b>14</b>            |
| (+) Surplus/ Shortfall (-)                                  | -1                   |

### *Verge Parking*

In addition to the on-site parking proposed, this development application also proposes 23 embayment car bays located in the verge of Oakwood Crescent (8) and Fairview Drive (15). These bays are intended to provide for managed car parking adjacent the school for peak hour traffic dropping off and picking up students. It is understood that cars currently park informally on the street verge or within the road carriageway at peak periods. These bays will formalise this arrangement in a safe and efficient manner.

Of the 23 parallel verge car parking bays proposed, five of the bays are proposed at the end of a 'T' intersection (Cnr Halfmoon Place/ Fairview Drive) and are not supported for traffic safety reasons. Taking this into account, it is considered there are 18 acceptable parallel verge car parking bays proposed.

While not included within the site, the verge parking bays are unlikely to be used by the surrounding residential dwellings during peak school periods. As such, it is considered reasonable to include these bays in the parking assessment. There is therefore considered to be a parking surplus available to the development.

A concern was raised in submissions about cars parking on the verges of residential properties causing damage to irrigation and verge infrastructure. Under the City's Parking Local Law, it is an offense to park a vehicle on the verge without the consent of the occupier or owner of the premises. As such, this is a compliance matter, which the City will investigate in the event that a complaint is received.

### *After Hours Parking*

There will be traffic generated after school hours when the Sports Centre is hired out for use by external parties. Parking for this use has been assessed in relation to the standard for 'Recreation-Private', requiring 1 bay for every 4 people the building is designed to accommodate. Assuming (as stated in the application) the building accommodates 90 people, including players, officials, staff and spectators then 23 car bays are required.

As this use will occur outside of school hours there will be 58 on-site car parking bays in two conveniently located car parking areas, potentially available for use. This is considered adequate for the proposed use.

### *Bus Parking*

The applicant submitted an amended site plan during the assessment period, which proposes a bus parking embayment in the western verge of Oakwood Crescent, north of the proposed embayment car parking bays. While meritorious, the City has the following concerns with the proposed bus parking embayment:

- The location of the bus parking bay encroaches onto an existing crossover providing access the existing sheds on the site. There is potential for traffic conflict at this location;
- According to *Draft Operational Policy 2.4 - Planning for School Sites*, plans should provide for a minimum of "four standard rigid buses with independent pull in/out (i.e. minimum of four x 20m stands plus tapers)". The proposed plans are inconsistent in this respect, as the 25m long bus bay proposed would not be able to accommodate four buses.

- The taper for the proposed bus bay location begins approximately 5m north of an existing Transperth bus stop, meaning there is no scope to shift the bus bay south in order to avoid conflict with the existing vehicle crossover mentioned above.
- As far as the City is aware, the Public Transport Authority has not been consulted in respect to the proposed bus bay location.

For these reasons the City does not support the proposed bus parking bay.

#### Bicycle Parking

| Provision                                | Requirement  | Proposal   | Assessment   |
|--|--|--|--|
| Bicycle Parking<br>PP3.3.14 -<br>Table 1 | Short Term<br>Parking: N/A<br>Long Term<br>Parking<br>0.3 spaces per<br>student and staff:<br>Twenty six (26)  | Nil  | A condition is recommended that twenty six (26) long term bicycle parking spaces are provided. |
| End-of-Trip<br>Facilities                | One shower for the first 5 long-term parking spaces, plus an additional shower for each 4 bicycle parking spaces thereafter: Six (6) showers are required. | 10 showers are proposed in addition to changing rooms. | Complies.  |

#### Noise

The application involves development that is primarily intended for use by the school, in addition to use by external parties outside of school hours i.e. the hiring out of Sports Centre building. This has implications under the *Environmental Protection (Noise) Regulations* 1997 (the Noise Regulations), as noise emissions from mechanical sources and from the use of the Sports Centre by external parties (i.e. non-school groups) will need to comply with the Noise Regulations. It is, however, noted that noise breakout from general sporting activities undertaken by the school is considered to be 'Community Noise'. The prescribed emissions for noise outlined in Regulation 7 of the Noise Regulations do not apply to Community Noise.

Whilst the Acoustic Report submitted with the Development Application did not provide acoustic modelling, it indicated the applicant's expectations that required compliance with the Noise Regulations can be achieved. The City is generally satisfied with the Acoustic Report submitted, which concludes the following with respect to each of the potential noise sources:

#### *Noise Breakout from the Proposed Sports Centre Building:*

- Noise breakout of any amplified music (as this is mechanical in nature) must achieve compliance with the Noise Regulations. This would be addressed in the following stages of the project, once the building construction is more understood, to ensure that compliance is achieved at all times.

- Noise breakout associated with the general sporting activities conducted by the school is regarded as Community Noise under the Noise Regulations. It is proposed that the attenuation that will be provided to contain amplified music within the building will also contain general sporting activity noise.
- Should the Sports Centre building be hired out to external groups, then compliance with the Noise Regulations is required, as noise emissions from general sporting activity would no longer be considered Community Noise. Prior to this occurring however, additional acoustic modelling would be required, which would specify any mitigation strategies required.

#### *Noise Breakout from Mechanical Sources:*

A review of the potential noise emissions from the mechanical plant will be reviewed once noise levels and locations are confirmed. Compliance with the Noise Regulations is expected to be achieved at all times.

#### *Noise Emissions from External Playing Courts:*

Whilst the two external playing courts are being replaced by two new courts, they are not being altered in terms of location or orientation. Therefore compliance under the Community Noise provision of the Noise Regulations is likely to be maintained when these facilities are used by the school for normal educational activities. It is not proposed to hire the outdoor playing courts for use by external groups.

#### *Conclusion*

Standard conditions are recommended in the event approval is granted, which require that an Acoustic Report be provided:

- Prior to lodging a Building Permit, that demonstrates how all noise sources emanating from the development will comply with the Noise Regulations; and
- Prior to Occupation of the development, which demonstrates how the completed development complies with the Noise Regulations.

#### Outdoor Lighting

The two proposed outdoor playing courts will be used by students for training on school days until approximately 6-7pm. If floodlighting is required, it will only be used during 'non-curfew' hours. Under AS 4282-2019 "*Control of the obtrusive effects of outdoor lighting*" curfewed hours are between 11pm and 6am, unless otherwise specified by the controlling authority.

A new flood lighting system is proposed to replace the two existing (approximately) 5m high pole mounted flood lights that illuminate the outdoor playing courts at present. This will be in the form of six new 12m high poles, mounted with 8 angled floodlighting luminaires.

As indicated on the Streetview image below, there is a row of existing trees that is proposed to be retained, which can assist to mitigate illumination from the use of the courts during non-curfew hours.

The lighting assessment submitted with the application indicates that the light spill from the proposed flood lights will comply with AS 4282-2019 "*Control of the obtrusive effects of outdoor lighting*".

A condition is recommended, in the event approval is granted, to ensure compliance with AS 4282-2019 "*Control of the obtrusive effects of outdoor lighting*".



Streetview Image of Outdoor Playing Courts

**Conclusion:**

The Development Application is consistent with the local planning framework, in particular with the objective for the Community Purposes zone. The proposal has merit, as it proposal involves the development of sporting and teaching facilities and associated car parking that cater for the needs of the College and after hours, for use by external groups. The concerns raised in the submissions can be managed appropriately through recommended conditions. For the aforementioned reasons, the Development Application is recommended for approval.



CLIENT

PROJECT  
SOUTH COAST BAPTIST COLLEGE  
STAGE 2 - SPORTS CENTRE

DRAWING:  
SITE PLAN

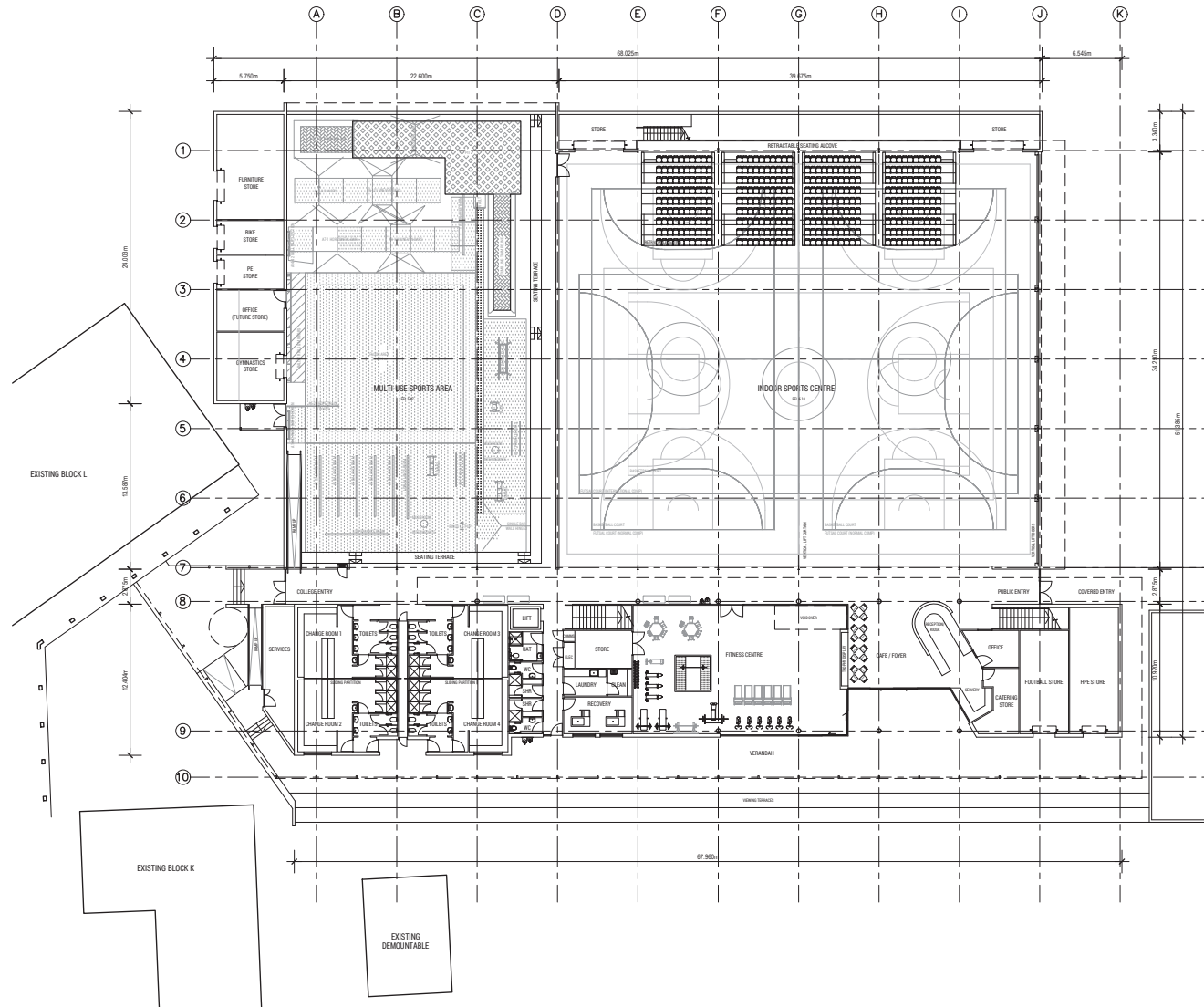


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SCALE: 1:500 @ A1  
DATE: 8 DECEMBER 2020  
STATUS: DEVELOPMENT APPROVAL  
PROJECT NO: 17.08  
DRAWING NO: SK 07 REV I

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CLIENT



PROJECT

**SOUTH COAST BAPTIST COLLEGE  
STAGE 2 - SPORTS CENTRE**

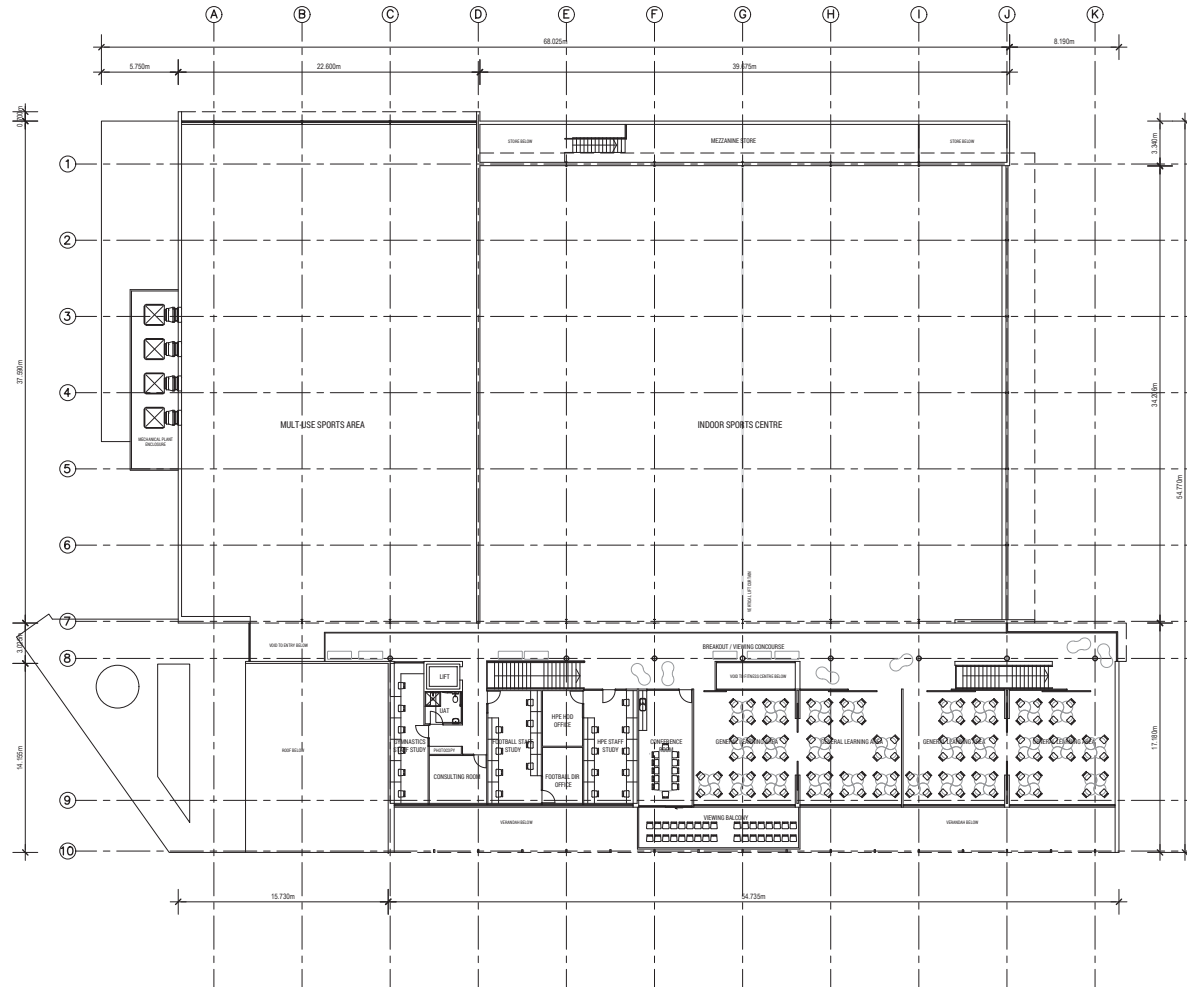
DRAWING

**GROUND FLOOR PLAN**



A: 27 Charles Street, South Perth, WA 6151  
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SCALE: 1:200 @ A1  
DATE: 16 DECEMBER 2020  
STATUS: DEVELOPMENT APPROVAL  
PROJECT NO: 17.08  
DRAWING NO: SK 08 REV E



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PROJECT

**SOUTH COAST BAPTIST COLLEGE  
STAGE 2 - SPORTS CENTRE**

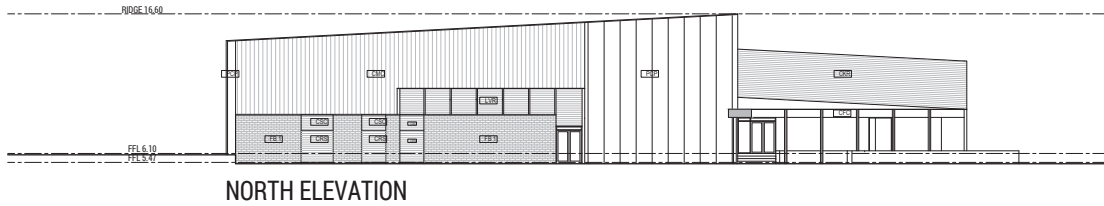
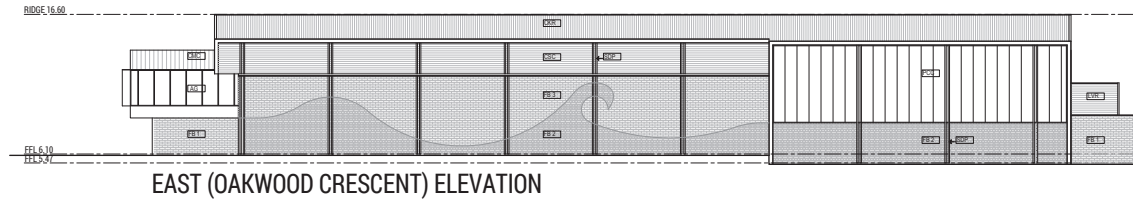
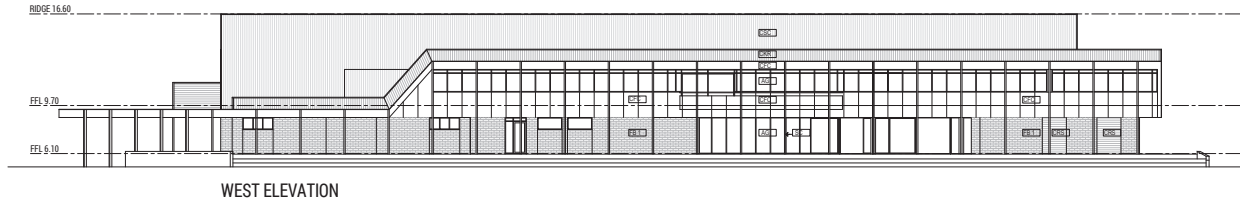
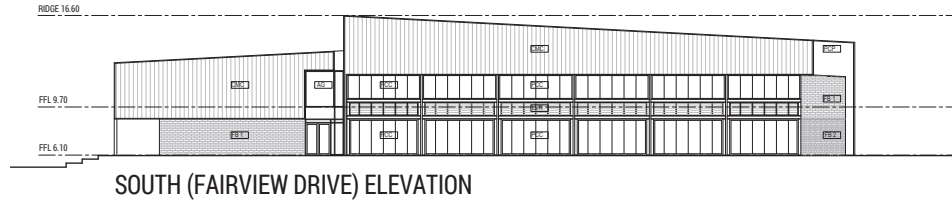
DRAWING

**FIRST FLOOR PLAN**



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SCALE: 1:200 @ A1  
DATE: 9 OCTOBER 2020  
STATUS: DEVELOPMENT APPROVAL  
PROJECT NO: 17.08  
DRAWING NO: SK 09 REV D



## LEGEND

- ALUMINUM FRAMED GLAZING**  
POWDERCOAT "WOODLAND GREY"
- COMPRESSED FIBRE CEMENT**  
CLADDING, SELECTED PAINT  
FINISH
- COLORBOND KLPLOX ROOFING**  
"SURFMIST"
- COLORBOND MAXLINE CLADDING**  
"SURFMIST"
- COLORBOND ROLLER SHUTTER**  
"SURFMIST"
- COLORBOND SPANDEX CLADDING**  
"SURFMIST"
- FACE BRICKWORK, MIDLAND**  
BRICK "MEISOUT CREAM" FLUSH  
STRETCHER BOND
- FACE BRICKWORK, MIDLAND**  
BRICK "MEISOUT CREAM"  
CORBELLED FLEMISH BOND
- FACE BRICKWORK, MIDLAND**  
BRICK "MEISOUT CREAM" FLUSH  
FLEMISH BOND
- VENTILATION LOUVER**
- POLYCARBONATE**  
TRANSLUCENT CLADDING,  
"OPAL WHITE"
- PAINTED CONCRETE PANEL**
- STEEL COLUMN**
- STEEL RAINWATER DOWN PIPE**



CLIENT



PROJECT

**SOUTH COAST BAPTIST COLLEGE**  
**STAGE 2 - SPORTS CENTRE**

DRAWING:

**ELEVATIONS**



A 27 Charles Street, South Perth, WA 6151  
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SCALE: 1:200 @ A1  
DATE: 13 SEPTEMBER 2020  
STATUS: DEVELOPMENT APPROVAL  
PROJECT NO: 17.08  
DRAWING NO: SK 10 REV A

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Ref: 17.08

7<sup>th</sup> October 2020

Planning Department  
City of Rockingham  
PO BOX 2142  
ROCKINGHAM DC WA 6967

**SOUTH COAST BAPTIST COLLEGE – SPORTS CENTRE  
LOT 2000 (30) GNANGARA ROAD, WAIKIKI; DEVELOPMENT APPLICATION**

We wish to apply for development approval for the development of a sports centre and teaching block with associated facilities at South Coast Baptist College (SCBC). We enclose the following in application for the development.

- Completed City of Rockingham Application for Development Approval
- Complete MRS Form 1
- Completed DAP Form 1
- Drawing Nos. SK07 to SK10
- Site Feature Survey drawing
- Transport Impact Assessment prepared by Shawmac
- Architectural Acoustics Development Approval Report prepared by Gabriels Hearne Farrell
- Landscape Master Plan prepared by Spring Green Landscapes
- Lighting assessment prepared by BEST Consultants

**Proposed Development**

SCBC intend to develop a new Sports Centre/ teaching block with associated external facilities. The proposed development will comprise the following facilities;

- Indoor sports courts (basketball, netball, volleyball and Futsal)
- Gymnastics Centre
- Changerooms and amenities
- Fitness Centre
- Catering facilities
- Classrooms
- Staff Offices
- Storage
- External sports courts (basketball, netball and tennis)
- Car parking



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Brad Quartermaine Architect Pty Ltd as trustee for the  
BS Quartermaine Family Trust - ABN 45 613 260 083  
Trading as Brad Quartermaine Architect

Architects Board of Western Australia Registration 3066



The new development is located in the south east corner of the campus adjacent to the corner of Oakwood Crescent and Fairview Drive.

The facilities are to intended to accommodate the Health and Physical Education curriculum of the College, as well the successful football (soccer) and gymnastics specialist programs at the College.

The College intends to make the facilities available for community sports programs and competitions. These will only occur outside of school operating hours when the facilities are not required for curricular or extra-curricular activities run by the College.

### Student & Staff Populations

The new development will increase the capacity of the College in both the primary school and the secondary school. Planned populations at the completion of the development are summarised below.

|                                  | Existing   | Projected   | Increase   |
|----------------------------------|------------|-------------|------------|
| Primary Students                 | 530        | 600         | 70         |
| Secondary Students               | 486        | 625         | 139        |
| <b>Total Additional Students</b> | <b>838</b> | <b>1025</b> | <b>187</b> |
|                                  |            |             |            |
| Staff                            | 140        | 150         | 10         |

Please note that in addition to this proposed development, the College are proposing a separate development of new classrooms and car parking which is the subject of a separate application for development approval that is currently under assessment by the City (Ref; 2020.252).

The planned increases in student and staff populations above is inclusive of the increases associated with that separate development.

### City of Rockingham Town Planning Scheme 2 (TPS2)

The site is zoned "Community Purposes – High School / Primary School" under the City of Rockingham TPS2. Education Establishment is an "D" or discretionary use under TPS2. The existing development on the site is an Education use, with the proposed development consistent with that existing use.

### Traffic Impacts

A Transport Impact Assessment has been prepared in accordance with the Western Australian Planning Commission Transport Impact Assessment Guidelines to assess the impact of the proposed development.

Please refer to the enclosed Transport Impact Assessment dated 9th September 2020 prepared by Shawmac. The report concludes that there are no negative impacts resulting from the proposed development.

Please note that the Transport Impact Assessment also takes account of the separate proposed development referred to above (Ref 2020.252).



### Car Parking Provisions

TPS2 does not prescribe minimum car parking requirements for Education Establishments. In the absence of specific requirements, car parking has been assessed utilising the minimum standards applied to public schools, based on the projected increase in student and staff populations.

|                         | Parking Requirement            | Additional Students / Staff | Additional Parking Required |
|-------------------------|--------------------------------|-----------------------------|-----------------------------|
| Primary Students        | 14 bays for every 100 students | 70                          | 10 bays                     |
| Secondary Students      | 7 bays for every 100 students  | 139                         | 10 bays                     |
| Staff                   | 1 bays for each staff member   | 17                          | 17 bays                     |
| <b>Total Additional</b> |                                |                             | <b>37 bays</b>              |

The proposed development involves the removal and replacement of a number of existing car bays to accommodate the new buildings.

In addition to on-site car parking, a number of street embayments are proposed on Oakwood Crescent and Fairview Drive adjacent to the College site. A summary of proposed additional car parking is summarised below.

|  |                |
|--|----------------|
| Existing bays lost to development footprint                        | (28) bays      |
| Total New bays provided -proposed North east car park (DA2020.252) | 39 bays        |
| Total New bays provided -proposed Sports Centre car park           | 19 bays        |
| Total New bays provided -proposed street embayments                | 27 bays        |
| <b>Net increase</b>  | <b>57 bays</b> |

### Landscaping & Existing Vegetation

The proposed development is positioned to maximize retention of existing trees along the boundary set back zones.

A landscape plan has been prepared for landscape works to the perimeter areas of the proposed development, as well as the affected street verges. Please refer to the enclosed landscape drawings prepared by Spring Green.

### Acoustic Assessment

An acoustic report has been prepared to assess the potential noise emissions, comparing the existing noise experienced by the neighboring noise sensitive premises to the likely noise emissions once this development is completed.

A preliminary acoustic review of the proposed development has been undertaken, with the following initial comments on compliance:

#### Noise Breakout from Sports Centre & Gymnasium

- Noise breakout from any amplified music, must achieve compliance with the Environmental Regulations. This will be reviewed during the following stages of the project once the building construction is more resolved.
- Compliance will be achieved at all times of operation
- Noise breakout from general sporting activities is exempt from the Regulations under the Community Noise clause. Nevertheless, the attenuation that will be provided for amplified music will also contain general sporting activity.

#### Noise Emissions from Mechanical Sources

- A review of the potential noise emissions from the mechanical plant will be reviewed once noise levels and plant specifications are confirmed. Compliance with the Environmental Regulations will be achieved at all operational times.



#### Noise Emissions from External Playing Courts

- The external playing courts are being redeveloped in their existing location as a part of this project. Therefore compliance (under the community Noise exemption) is likely to be maintained.

Please refer to the enclosed Architectural Acoustics Development Approval Report dated 7<sup>th</sup> July 2020 prepared by Gabriels Hearne Farrell.

#### Floodlighting Impacts

The intention is to light the external playing courts on the corner of Oakwood Crescent and Fairview Drive to enable use of the courts after school hours. Modelling of the court lighting has been undertaken to confirm compliance with AS/NZS 4282.2019 "Control of the obtrusive effects of outdoor lighting".

Please refer to the enclosed modelling dated 2<sup>nd</sup> July 2020 prepared by BEST Consultants.

Please don't hesitate to contact me should you require any additional information or clarification.

Yours faithfully,

**Brad Quartermaine**  
**Director**

Encl.



# ARCHITECTURAL ACOUSTICS

## DEVELOPMENT APPROVAL REPORT

**SOUTH COAST BAPTIST COLLEGE  
STAGE 2 - SPORTS CENTRE**

07<sup>th</sup> July 2020



For

**BRAD QUARTERMAINE ARCHITECT**

27 Charles Street  
SOUTH PERTH WA 6151



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| Report Version | Author           | Notes | Date                       |
|----------------|------------------|-------|----------------------------|
| Initial Report | Michael Ferguson |       | 07 <sup>th</sup> July 2020 |



Gabriels Hearne Farrell Pty Ltd is a Member Firm of the Association of Australasian Acoustical Consultants. The report author is a full member of the Australian Acoustical Society.

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## 1. INTRODUCTION

As requested, this report summarises the potential noise emissions from the proposed new Sports Centre and site alterations at South Coast Baptist College, Waikiki. The purpose of this report is to conduct an assessment of the potential noise emissions, comparing the existing noise experienced by the neighbouring noise sensitive premises to the likely noise emissions once this development is completed.

This report is based upon drawings received from the architect on the 23<sup>rd</sup> June, 2020. This report outlines the following:

- Demonstrates that the project team is aware of their Regulatory obligations with regards to noise emissions,
- Establishes the project specific Assigned Noise Level criteria in accordance with the Regulations,
- Identifies the relevant Noise Sources and the Assigned Noise Levels applicable to each source,
- Identifies acoustic issues that will be addressed in detail during design and documentation stages, to ensure compliance with the Environmental Protection (Noise) Regulations (EPNR),
- Provides an initial assessment and recommendations to ensure compliance with the EPNR where required,
- Provides an assessment of potential noise emissions in comparison to the existing emissions, including:
  - Amplified music breakout from Sports Centre (playing court or gymnastics centre)
  - Proposed mechanical systems
  - External playing courts

## 2. ENVIRONMENTAL NOISE EMISSIONS

### 2.1 Background

Noise emissions generated by the use of the proposed facilities must comply with the Environmental Protection (Noise) Regulations, 1997 (as amended Dec 2013). The criteria for noise emissions from this development to neighbouring premises are called the Assigned Noise Levels, and vary depending on time of day, receiver location, duration of the noise source etc.

However it must be noted that most activity noise emissions from schools are considered to be Community Noise and are therefore technically exempt from compliance with the regulatory Assigned Noise Levels. According to Regulation 16 and Schedule 2 (Item 4), the “exempt noise” applies to:

*“Noise emitted from a recreational or educational activity on educational premises under the control of the principal. The activity may include musical instruments, but not mechanical equipment”*

For the purposes of this report, the noise emissions that are required to meet the EPNR are:

- Mechanical units e.g. air-conditioning condensing units
- Amplified music breakout

The noise emissions from the use of the external play areas is therefore technically not required to achieve compliance, however this is largely up to the discretion of the local council. The main purpose of this report is to simply compare the current noise emissions with the predicted future emissions to ensure that the potential noise emissions are no worse. However, should the playing courts be hired out for external use then compliance with the Regulations will technically need to be achieved, likely requiring additional noise control measures to be implemented.

### 2.2 Noise Sensitive Receivers

The neighbouring highly noise sensitive premises are:

- Residences located to the East of the proposed development. These are all single storey residences, facing onto Oakwood Crescent.

Our current calculations and recommendations are based upon these above mentioned properties.

## 2.3 Influencing Factor

The site specific Assigned Noise Level criteria takes into account the land zoning and traffic flows within 100m and 450m of the relevant receiver locations. This has been based on the satellite imagery provided by Google Earth, as well as the traffic flow information provided by the Mains Roads WA website.

### Land Zoning Influencing Factor

There is no commercial land within either the inner circle or outer circle. Therefore there is no influencing factor applied due to land zoning.

### Transport Influencing Factor

Typically, the amount of traffic on nearby roads has an influencing factor on the assigned noise levels. In this instance there are two major roads just beyond the outer 450m radius (Ennis Ave and Read St), therefore there is no influencing factor applied for traffic either.

These areas and roads can be seen in the Assigned Noise Level image below:



Image 01 - Relevant Assigned Noise Level Influencing Factors for the most effected Noise Sensitive Receivers

## 2.4 Assigned Noise Levels

Based on the above, there is no Influencing Factor relevant to the residences in the immediate surrounding area to the proposed development. On this basis, the regulatory Assigned Noise Level criteria to be applied to this development are as follows:

| Type of premises receiving noise  | Time of day   | Assigned Noise Level (dB) |                 |                   |
|---|---|---------------------------|-----------------|-------------------|
|   |   | L <sub>A10</sub>          | L <sub>A1</sub> | L <sub>Amax</sub> |
| Noise sensitive premises; highly sensitive area.<br>(i.e. within 15m of a residential building) | 0700 to 1900 hours Monday to Saturday   | 45                        | 55              | 65                |
|   | 0900 to 1900 hours Sunday and public holidays   | 40                        | 50              | 65                |
|   | 1900 to 2200 hours all days   | 40                        | 50              | 55                |
|   | 2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays. | 35                        | 45              | 55                |

Table 01 -Assigned Noise Levels

The sound level parameters used for the various environmental noise criteria are described below, based on an assessment period of 15 minutes up to 4 hours:

- L<sub>A10</sub>** is the 'A' weighted noise level which is not to be exceeded for more than 10% of the time, e.g. for more than 10 minutes in 100 minutes. This is the parameter relevant to most HVAC equipment, and emissions from other longer term noise sources that run for extended duration (such as crowd noise, condensers, etc.).
- L<sub>A1</sub>** is the 'A' weighted noise level which is not to be exceeded for more than 1% of the time, e.g. for more than 1 minute in 100 minutes, or up to 24 minutes in 4 hours. This is the parameter relevant to noise sources that only occur occasionally, for short durations, (e.g. fire pumps during testing).
- L<sub>Amax</sub>** is the 'A' weighted noise level for individual events which is not to be exceeded at any time.

## 2.5 Adjustments for Noise Character

In accordance with Regulation 9, sounds with tonal, modulating or impulsive characteristics are deemed to be more annoying, and therefore an adjustment of +5dB is required to be added to the measured level for tonal and modulating characteristics, and +10dB for impulsive characteristics; where measurable at the point of reception.

In accordance with the noise assessment techniques described in the Regulations, noise emissions from most mechanical equipment such as condensing units etc. are considered tonal and therefore a +5dB adjustment is required to be added the measured (or predicted) level.

It is widely accepted amongst acoustic consultants in Western Australia that the noise emission from play areas is not considered to contain annoying characteristics within the definition of the Regulations. As such, penalties for tonality, modulation, and impulsiveness have not been applied to these noise emissions.

Typically if mechanical units are audible at the neighbouring premises then a +5dB penalty for tonality must be applied to the predicted levels. However if tonality is not measureable at the receivers locations, sometimes due to higher background noise levels, then tonality is no longer applied.

## 3. NOISE SOURCES

As discussed above, noise emissions required to achieve compliance with the EPNR are as follows:

- Amplified music breakout from Sports Centre (playing court or gymnastics centre)
- Proposed mechanical systems
- External playing courts

It is assumed that the above noise sources are only relevant to the daytime period of between 7am and 7pm Monday to Saturday. Usage outside of these hours for a school is generally atypical.

Based on the above, the relevant EPNR criteria are shown against typical times of the proposed activities. The most stringent Assigned Noise Level criteria applicable to these periods will therefore be applied (as seen below).

| Noise Emissions from Proposed Development |             |                               |
|---|-------------|-------------------------------|
|   | Time of Day | Relevant Assigned Noise Level |
| Amplified Music Breakout                  | 7am to 7pm  | L <sub>A10</sub> 47dB(A)      |
| Proposed mechanical systems               | 7am to 7pm  | L <sub>A10</sub> 47dB(A)      |
| External Playing Courts                   | 7am to 7pm  | L <sub>A10</sub> 47dB(A)*     |

Table 02 – Noise Emissions and their Relevant Assigned Noise Levels

\*Note as mentioned previously any noise emissions from the proposed external play areas are technically exempt from meeting the relevant Assigned Noise Levels, however these can be used as a rough guideline for acceptability. Should the playing courts be externally hired, then these levels are required to be met.

## **4. COMPLIANCE WITH REGULATIONS**

### **4.1 Noise Breakout from Sports Centre**

We have been advised that the proposed Sports Centre and Gymnastic Area are likely to have periods of amplified music played. As this is mechanical in nature, any music played is required to achieve compliance with the Environmental Regulations.

At this stage the exact construction of the Sports Centre is unknown, therefore we cannot undertake noise modelling of the potential emissions i.e. we do not know the attenuation that will be provided by the building fabric and ventilation paths etc. Nevertheless, compliance must be achieved with the Regulations and therefore detailed calculations will be undertaken during the following stages of this project development. From this modelling the maximum allowable internal noise levels for music playback will be specified. These noise levels must then be managed by the school to ensure compliance is maintained.

Noise emissions from internal general sporting activities is unlikely to be noticeable at the neighbouring properties and therefore this is unlikely to be a concern regarding any increase in impact upon the existing amenity.

It should also be noted that music played outdoors is unlikely to be compliant and should be avoided. If played this must be inaudible at the neighbouring properties at all times.

### **4.2 Noise Emissions from Mechanical Systems**

All HVAC and other mechanical systems must achieve compliance with the Regulations at all times of the day. As previously stated, it is assumed however that any plant will only be run between the hours of 7am and 7pm Monday to Saturday. Outside of these hours compliance may still be achieved, albeit at a lower required level.

Therefore detailed calculations of the proposed mechanical systems and their emissions to the neighbouring properties, will be undertaken in the following stages of this project once noise levels and locations are known. Compliance with the Regulations, including penalties for tonality where applicable, will be achieved.

### **4.3 Noise Emissions from External Playing Courts**

As mentioned previously, it is our understanding that noise emissions from external playing courts are exempt from meeting the Assigned Noise Levels. This is up to the discretion of the local authority and therefore it is recommended that the noise emissions from these playing courts do not noticeably exceed the existing noise emissions from the school.

Currently there are existing playing courts located on the corner of Oakwood Crescent and Fairview Drive. Based on our review of the documents provided, these playing courts are not being altered in their location or orientation. It is also our assumption that these playing courts are currently being used by the school for normal educational activities.

To our knowledge, as the school is currently operating without any restrictions on the use of these playing courts, they are effectively achieving compliance with the Regulations i.e. the current impact on the amenity of the neighbouring properties must not be exceeding the deemed benefit to the wider community, otherwise restrictions would have been put in place on their usage. Therefore we do not expect the proposed conditions to differ from the existing conditions, maintaining this 'compliance'.

Should the playing courts be hired out to external groups then whilst the noise emissions themselves may be similar, compliance with the regulations is required. This would no longer fall under the exemption for Community Noise. Should this be proposed we can undertake further acoustic modelling of these playing courts in the following stages of this project, providing advice on mitigation strategies and barriers required to maintain this compliance.



## 5. CONCLUSION

This report summarises the project requirements in terms of compliance with the Environmental Protection (Noise) Regulations, 1997. This includes determination of the relevant site specific Assigned Noise Level criteria.

A description of each noise source and applicable noise level criteria has been provided, including acknowledgment of relevant adjustments required for noise sources with particular characteristics.

A preliminary acoustic review of the current architectural documentation has been undertaken, with the following initial comments on compliance:

### Noise Breakout from Sports Centre & Gymnasium

- Noise breakout from any amplified music, must achieve compliance with the Environmental Regulations. This will be review during the following stages of the project once the building construction is more understood.
- Compliance will be achieved at all times of operation
- Noise breakout from general sporting activities is exempt from the Regulations under the Community Noise clause. Nevertheless the attenuation that will be provided for amplified music will also contain general sporting activity.

### Noise Emissions from Mechanical Sources

- A review of the potential noise emissions from the mechanical plant will be reviewed once noise levels and locations are confirmed. Compliance with the Environmental Regulations will be achieved at all operational times.

### Noise Emissions from External Playing Courts

- The external playing courts are not being altered as a part of this project. Therefore compliance (under the community Noise exemption) is likely to be maintained.

If you have any queries regarding this information please call the undersigned on 9474 5966.

Regards,

**Michael Ferguson**

Associate Director B.IntArch(Hons) M.A.A.S.



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## CONSULTANT'S ADVICE NOTICE

|                               |                                     |                    |             |
|-------------------------------|-------------------------------------|--------------------|-------------|
| <b>PROJECT:</b>               | South Coast Baptist College Stage 2 | <b>DATE:</b>       | 2 July 2020 |
| <b>CLIENT REPRESENTATIVE:</b> | Brad Quartermaine Architect         | <b>PROJECT N°:</b> | 1920.166    |
| <b>ATTENTION:</b>             | Brad Quartermaine                   | <b>CAN N°:</b>     | E01         |

| ITEM | DESCRIPTION  |
|------|--|
| 1.   | <p><b><u>City of Rockingham Condition re Spill Lighting</u></b></p> <p>The spill lighting from the netball court floodlighting luminaires has been modelled and complies with AS/NZS 4282.2019 "Control of the obtrusive effects of outdoor lighting".</p> <p>This compliance statement is based on that the surrounding buildings are within a class A3 environmental zone, this being a suburban area in towns and cities. A class A3 zone has a maximum limit of vertical illumination of less than 10 lux during non curfew hours and 2 lux during curfew hours, measured at 1.5 metres above ground at the property boundary.</p> <p>The attached calculation demonstrates that the proposed spill lighting does not exceed 10 lux during non curfew hours on either the Oakwood Crescent or Fairview Drive property boundaries. The floodlighting would not be used during curfew periods.</p> <p>The calculation was made based on AS 2560.2.4 "Guide to Sports Lighting - Outdoor Netball and Basketball" recommended lighting average level of 100 lux using AGI 32 software. The luminaire used in the calculation is the Pierlite Maxi Master mounted on a 12 metre pole.</p> |

  
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## **Obtrusive Light - Compliance Report**

AS/NZS 4282:2019, A3 - Medium District Brightness, Non-Curfew L1

Filename: Netball Courts

01-Jul-20 2:43:21 PM

### **Illuminance**

Maximum Allowable Value: 10 Lux

Calculations Tested (2):

| <u>Calculation Label</u>            | <u>Test Results</u> | <u>Max. Illum.</u> |
|-------------------------------------|---------------------|--------------------|
| North East Obtrusive Light_Ill_Seg1 | <b>PASS</b>         | 0.6                |
| South Obtrusive Light_Ill_Seg1      | <b>PASS</b>         | 1.2                |

### **Luminous Intensity (Cd) At Vertical Planes**

Maximum Allowable Value: 12500 Cd

Calculations Tested (2):

| <u>Calculation Label</u>           | <u>Test Results</u> |
|------------------------------------|---------------------|
| North East Obtrusive Light_Cd_Seg1 | <b>PASS</b>         |
| South Obtrusive Light_Cd_Seg1      | <b>PASS</b>         |

## Maxi Master Gen II LED Floodlight

PIERLITE Maxi Master LED Floodlight GEN II Range is designed for high-performance output and energy savings. This compact high performer is perfect for general illumination in light industrial, commercial and car park installations. Now offering asymmetrical distributions for lower glare and symmetrical options for general purpose floodlighting. A range of wire guards accessories are available.

- Weather protection IP65
- Diecast aluminium body powder coated black
- Lightweight for easy installation



80

CRI



IP65

Ingress  
Protection  
Rating



IK08

Impact Rating



7SDCM

MacAdam  
Steps



0 - 40°C

Operating  
Temperature



Non -  
Dimmable

Dimming



50,000hrs  
(L70/B50)

Lifetime

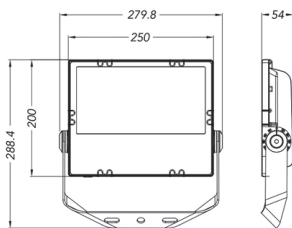


5 Years

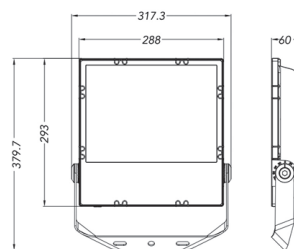
Warranty

| CODE    | SYSTEM POWER | EXIT LUMEN | LM/W    | CCT   | DIMENSIONS          | WEIGHT |
|---------|--------------|------------|---------|-------|---------------------|--------|
| MML100A | 100W         | 10500lm    | 110lm/W | 4000K | L293 x W318 x H60mm | 4kg    |
| MML100S | 100W         | 12000lm    | 120lm/W | 4000K | L293 x W318 x H60mm | 4kg    |
| MML200A | 200W         | 22000lm    | 110lm/W | 4000K | L380 x W342 x H60mm | 6kg    |
| MML200S | 200W         | 24000lm    | 120lm/W | 4000K | L380 x W342 x H60mm | 6kg    |
| MML300A | 300W         | 33000lm    | 110lm/W | 4000K | L350 x W529 x H65mm | 10kg   |
| MML300S | 300W         | 36000lm    | 120lm/W | 4000K | L350 x W529 x H65mm | 10kg   |
| MML50S  | 50W          | 5250lm     | 105lm/W | 4000K | L200 x W280 x H54mm | 2kg    |

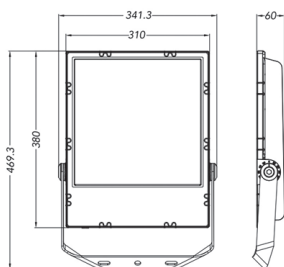
| ACCESSORY CODE | DESCRIPTION  |
|----------------|--|
| MML50WG        | MML50 WIRE GUARD STAINLESS STEEL POWDERCOATED BLACK  |
| MML100WG       | MML100 WIRE GUARD STAINLESS STEEL POWDERCOATED BLACK |
| MML200WG       | MML200 WIRE GUARD STAINLESS STEEL POWDERCOATED BLACK |
| MML300WG       | MML300 WIRE GUARD STAINLESS STEEL POWDERCOATED BLACK |



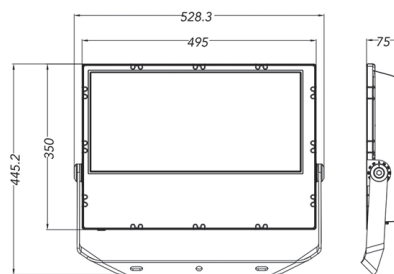
MML50S



MML100S, MML100A



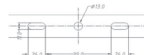
MML200A, MML200S



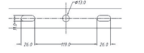
MML300S, MML300A

**MAXI Master LED Flood QW II Trunking Mounting Details:**

**1. 50W / 200W Mounting Detail:**



**2. 300W Mounting Detail:**



**3. 500W Mounting Detail:**



05/06/17



MML50S



MML100S, MML200A



MML300S, MML300A



# TRANSPORT IMPACT ASSESSMENT

|            |                                     |
|------------|-------------------------------------|
| Project:   | South Coast Baptist College Stage 2 |
| Client:    | Brad Quartermaine Architects        |
| Author:    | Paul Nguyen                         |
| Version:   | 3                                   |
| Document # | 2007008-TIA-001                     |

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## Document Status

| Version | Prepared By | Reviewed By | Approved By | Date       |
|---------|-------------|-------------|-------------|------------|
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## 1. Introduction and Background

---

Shawmac Pty Ltd has been commissioned by Brad Quartermaine Architect on behalf of the South Coast Baptist College to prepare a Transport Impact Assessment (TIA) for the proposed Stage 2 expansion of the existing school.

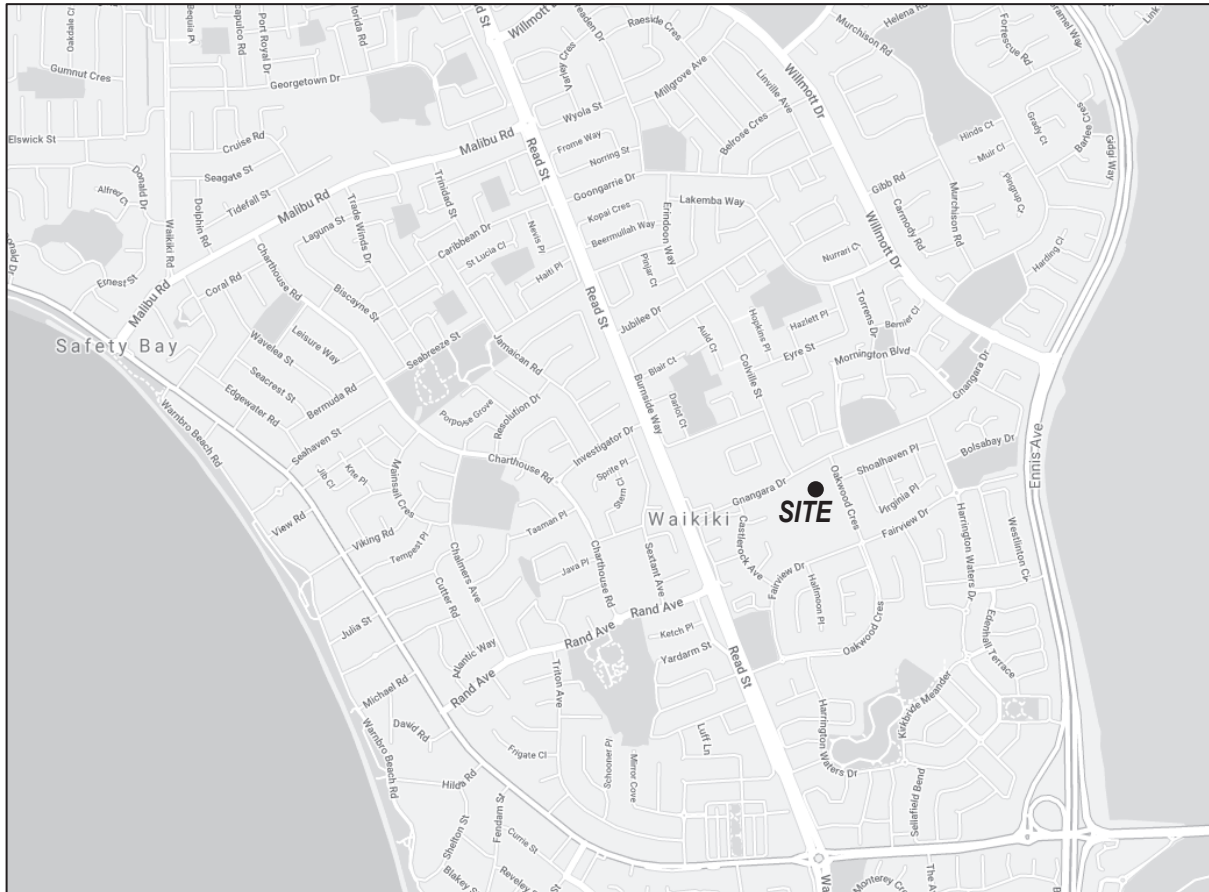
This TIA has been prepared in accordance with the Western Australian Planning Commission (WAPC) *Transport Impact Assessment Guidelines* (TIA Guidelines). The assessment considers the following key matters:

- The site and surrounding road network.
- Traffic generation characteristics.
- Traffic distribution assessment and network assignment.
- Parking assessment and management.
- Road safety assessment.
- Pedestrian and cyclist demand and facilities assessment.
- Public transport accessibility.

## 2. The Site and Surrounding Road Network

### 2.1. Site Location and Land Use

The site is located on Lot 2000, Number 30 Gngangara Drive, Waikiki in the City of Rockingham. The general site location is shown in **Figure 1**.



**Figure 1: Site Location**

An aerial photo of the site is shown in **Figure 2**.



Figure 2: Aerial Photo of Site (October 2020)

## 2.2. Road Network

### 2.2.1. Road Hierarchy

The hierarchy of the local road network according to the Main Roads WA *Road Information Mapping System* is shown in **Figure 3**.



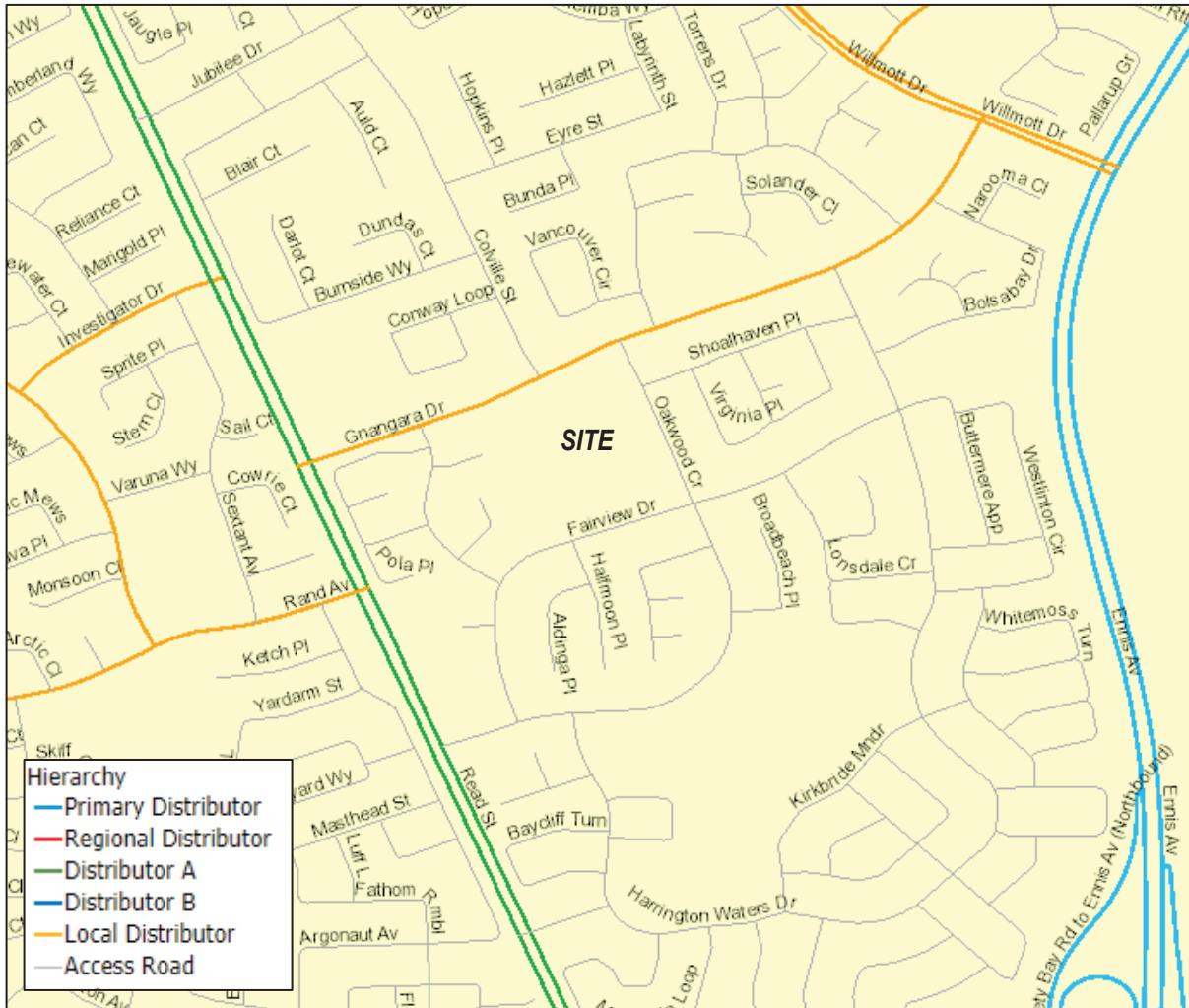


Figure 3: Road Network Hierarchy

### 2.2.2. Carriageway Width and Cross Section

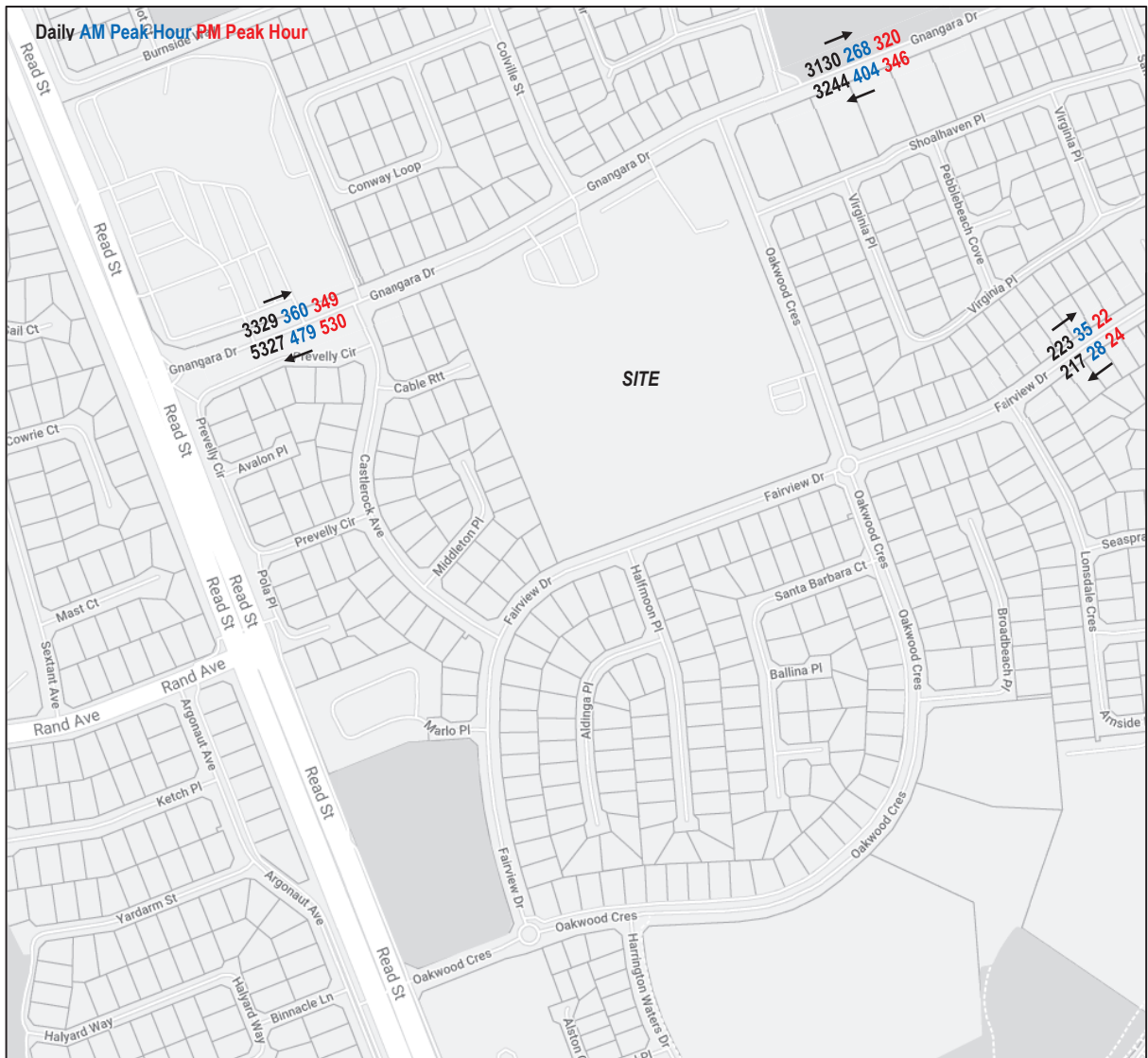
The configuration of the perimeter roads and other relevant roads are summarised in **Table 1**.

Table 1: Road Configuration

| Road and Location | Road Type              | Cross Section             | Width (approx.) | Speed Limit |
|-------------------|------------------------|---------------------------|-----------------|-------------|
| Gungahra Drive    | Local Distributor      | 2-lane Single Carriageway | 7.5m            | 50km/h      |
| Oakwood Crescent  | Access Road            | 2-lane Single Carriageway | 7.0 - 7.2m      | 50km/h      |
| Fairview Drive    | Access Road            | 2-lane Single Carriageway | 7.2m            | 50km/h      |
| Read Street       | District Distributor A | 4-lane Dual Carriageway   | 2 x 7.5m        | 70km/h      |

### 2.2.3. Daily and Peak Hour Traffic Flows

The latest available traffic counts were obtained from the City of Rockingham and from MRWA Traffic Map as summarised in **Figure 4**. Traffic count data was not available for Oakwood Crescent or Fairview Drive west of Oakwood Crescent.



**Figure 4: Existing Traffic - Average Weekday Traffic**

The typical mid-block capacities for urban roads according to Austroads *Guide to Traffic Management Part 3: Traffic Studies and Analysis* are detailed in **Figure 5**. As an undivided road with no roadside parking, the indicative mid-block capacity of Gngara Drive is 900 passenger cars / per hour / per lane.

The above volumes indicate that the current peak hour traffic flows are well within capacity. However, as the

Austrroads figure are indicatively only, the intersection capacity is often a more accurate indicate of road network capacity. The intersection capacity is discussed further in this assessment.

**Table 5.1: Typical mid-block capacities for urban roads with interrupted flow**

| Type of lane                                 | One-way mid-block capacity (pc/h) |
|--|-----------------------------------|
| <b>Median or inner lane</b>                  |                                   |
| Divided road                                 | 1000                              |
| Undivided road                               | 900                               |
| <b>Middle lane (of a 3 lane carriageway)</b> |                                   |
| Divided road                                 | 900                               |
| Undivided road                               | 1000                              |
| <b>Kerb lane</b>                             |                                   |
| Adjacent to parking lane                     | 900                               |
| Occasional parked vehicles                   | 600                               |
| Clearway conditions                          | 900                               |

Source: Table 5.1 in *Austrroads (2013)*.

Figure 5: Austrroads Typical Mid-block Capacities for Urban Roads

### 3. Proposed Development

The proposal is to construct Stage 2 of South Coast Baptist College which involves a new two-storey sports centre, 4 new demountable classrooms and two new car parking areas. It is understood that the sport centre and adjacent parking will be submitted as one development application and the demountable classrooms and north-east car park will be submitted as a separate application at the same time.

The sports centre will be available for external use but limited to out of school hours with a capacity of 90 people including players, officials, staff and spectators.

The site plans for the development are attached as **Appendix A**.

#### 3.1. Student Numbers

The proposed development will increase the overall school capacity by approximately 20% as detailed in **Table 2**.

**Table 2: School Capacity**

| Stream           | Existing     | Proposed     | Increase     |
|------------------|--------------|--------------|--------------|
| Primary School   | 530 students | 600 students | 70 students  |
| Secondary School | 486 students | 625 students | 139 students |
| Staff            | 140 staff    | 150 staff    | 10 staff     |

#### 3.2. Car Parking and Access Arrangement

The existing car park and crossover on Oakwood Crescent will be removed to accommodate the new sports centre and new car parking areas will be constructed in the Oakwood Crescent / Gngara Drive intersection and along the Fairview Drive frontage. The net increase in on-site car parking is 30 bays.

23 new street parking bays are proposed along Oakwood Crescent and Fairview Drive. A new bus embayment is also proposed along Oakwood Crescent.

The proposed car parking and access arrangement is shown in **Figure 6**.



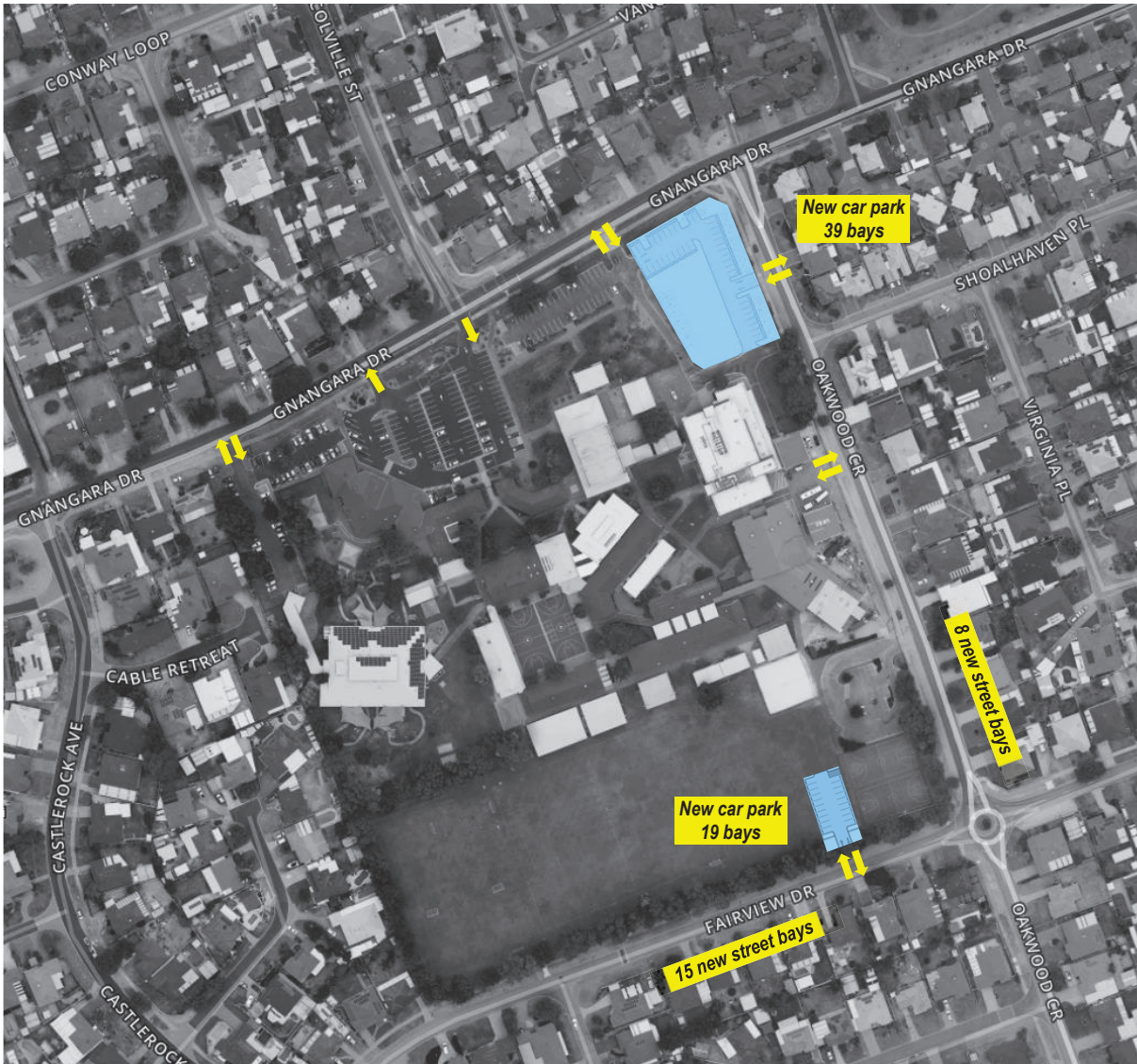


Figure 6: Proposed Car Parking and Access Arrangement

## 4. Transport Impact Assessment – School Use

### 4.1. Traffic Generation

The vehicular traffic generation rates for primary schools according to the TIA Guidelines is 0.5 vehicle trips per child to school and 0.5 trips per child from school during each of the morning and afternoon peak hours (i.e. 1 trip per student per peak period) based on the *Perth and Regions Travel Surveys* (PARTS). For secondary schools, PARTS indicate that the proportion driven to school is generally a little lower. For simplicity, it is suggested that the same rate is used for secondary school students.

The school traffic generation based on the 209 student increase is summarised in **Table 3**.

**Table 3: School Traffic Generation**

| Streams                   | Population Increase                   |
|---------------------------|---------------------------------------|
| Student Number (FTE)      | 209                                   |
| Peak Hour Generation Rate | 1 trip per student (0.5 in / 0.5 out) |
| AM/PM Peak Trips          | 210 trips (105 in / 105 out)          |

The increase in traffic generation based on the additional 209 student is therefore approximately 210 vehicle trips during each peak hour (105 inbound and 105 outbound).

### 4.2. Traffic Distribution

Based on the location and the layout of the road network, the majority of traffic is likely to travel to and from the school via Gnangara Drive. Based on peak hour traffic surveys along Gnangara Drive the school traffic is currently distributed as follows:

- Inbound traffic movements are split evenly from both directions (46% west / 54% east in the morning peak and 51% west / 49% east in the afternoon peak).
- Outbound traffic is split approximately 69% west / 31% east in the morning peak and 75% west / 25% east in the afternoon peak.

The greater proportion outbound towards the west is likely due to the ease of turning left during the peak periods.

The additional school traffic has been assigned based on the existing distribution and the resulting peak hour traffic flows are shown in **Figure 7**. It has been conservatively assumed that all additional school traffic is generated via the access points on Gnangara Drive.

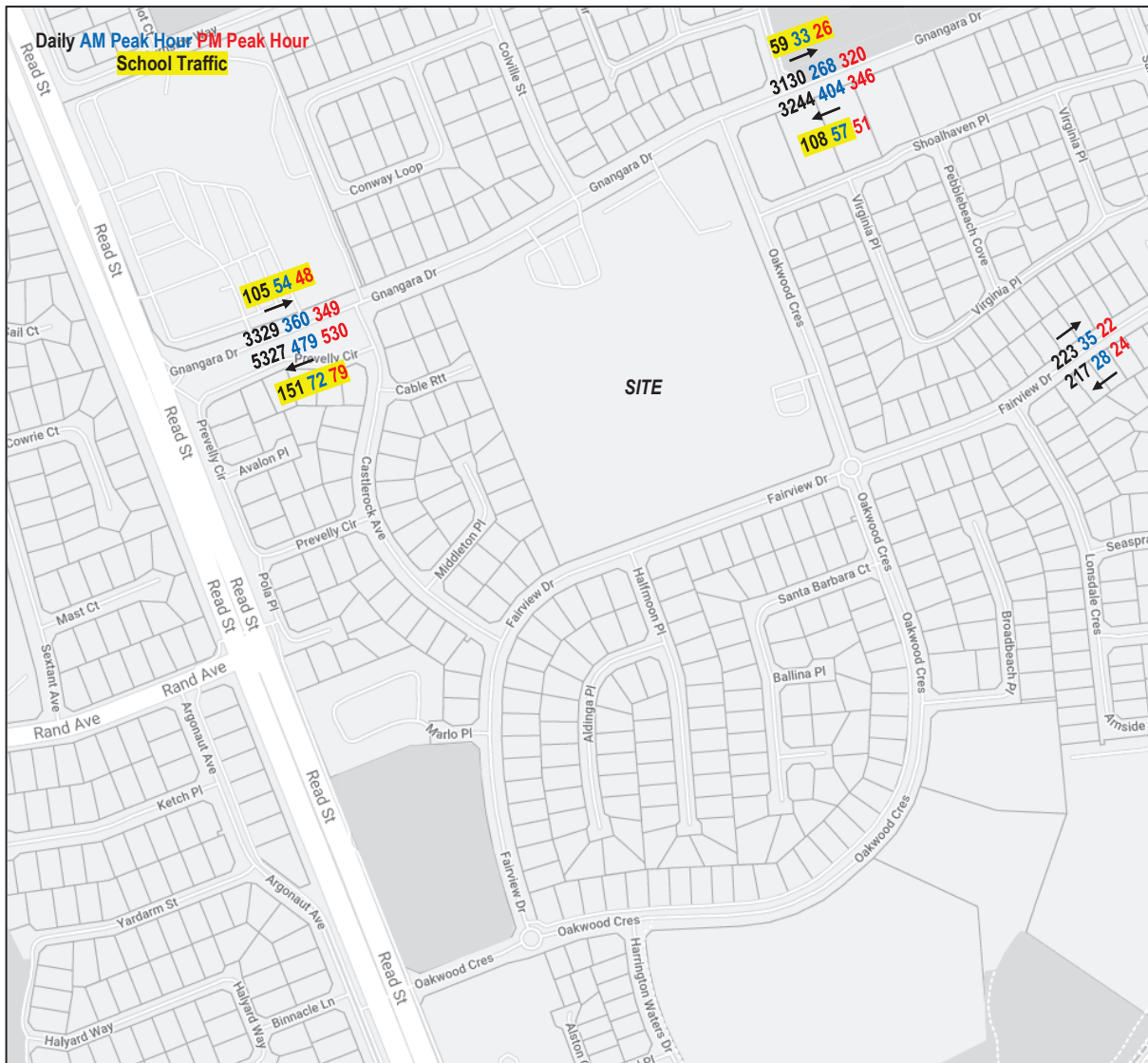


Figure 7: Distribution of Additional School Traffic

### 4.3. Mid-block Capacity

As shown, with the additional school vehicle trips added, the peak hour traffic volumes on Gngangara Drive would remain well within the typical mid-block capacity of 900 cars / hour / lane as suggested by Austroads.

It is noted that for brief periods during the school peak hours, traffic along Gngangara Drive appears to be close to “capacity” despite the volumes being within the typical hourly capacity for this road. As observed on site during the peak periods, there are several factors that contribute to this as described below:

- The 40km/h school zone speed limit applies during the school peaks and so slower traffic can often give the impression of congestion.

- There is a traffic warden crossing to the east of the main car park entry which frequently stops traffic to allow pedestrians to cross. This creates momentary queuing which typically clears shortly after the crossing finishes.
- While there are brief periods of “congestion”, these are typically isolated events and traffic is generally free flowing within a short amount of time. Drivers are also generally more tolerant of slower traffic around schools, particularly during peak school times.

As mentioned previously, the mid-block capacity is indicative only and intersection performance is often a more accurate indicator of road network capacity.

#### 4.4. Intersection and Access Capacity

The peak hour capacity of the following locations has been assessed in SIDRA Intersection 9:

- Gngara Drive / Oakwood Crescent.
- The school access west of Oakwood Crescent (School Access 1).
- The main car park entry and exit only crossovers on Gngara Drive.

The following access points have been excluded as explained below:

- The westernmost school access has not been assessed as this car park is not changing in size and is allocated for staff use only.
- The proposed accesses on Oakwood Crescent has not been assessed as the through volumes on Oakwood Crescent are low and traffic from this car park will be split between Oakwood Crescent and Gngara Drive.
- The proposed access on Fairview Drive has not been assessed as this car park is small and will not generate a significant volume of traffic during the peak hours. The through volumes on Fairview Drive are also expected to be low.

The peak hour traffic volumes were obtained from on-site surveys undertaken in November 2020 during the school term. The default SIDRA gap acceptance parameters were used in the model.

The results of the assessment are summarised in **Table 4** and the SIDRA results are provided in **Appendix B**.



**Table 4: Access and Intersection Capacity Analysis Results**

| Location                          | Peak Period        | Degree of Saturation | Average Delay | Worst Delay | Maximum Queue | Average Level of Service | Worst Level of Service |
|-----------------------------------|--------------------|----------------------|---------------|-------------|---------------|--------------------------|------------------------|
| Gnangara Drive / Oakwood Crescent | AM Peak - Existing | 0.208                | 1.7s          | 7.1s        | 1.7m          | A                        | A                      |
|                                   | AM Peak - Future   | 0.238                | 1.7s          | 7.9s        | 1.9m          | A                        | A                      |
|                                   | PM Peak - Existing | 0.209                | 1.6s          | 7.5s        | 1.9m          | A                        | A                      |
|                                   | PM Peak - Future   | 0.226                | 1.6s          | 8.3s        | 2.1m          | A                        | A                      |
| School Access 1                   | AM Peak - Existing | 0.253                | 0.9s          | 7.3s        | 0.7m          | A                        | A                      |
|                                   | AM Peak - Future   | 0.283                | 1.2s          | 8.1s        | 1.0m          | A                        | A                      |
|                                   | PM Peak - Existing | 0.211                | 0.9s          | 7.7s        | 1.0m          | A                        | A                      |
|                                   | PM Peak - Future   | 0.238                | 1.4s          | 8.5s        | 1.7m          | A                        | A                      |
| Entry Only Access                 | AM Peak - Existing | 0.233                | 1.8s          | 9.7s        | 2.9m          | A                        | A                      |
|                                   | AM Peak - Future   | 0.286                | 2.2s          | 10.8s       | 4.1m          | A                        | B                      |
|                                   | PM Peak - Existing | 0.222                | 1.6s          | 9.8s        | 1.5m          | A                        | A                      |
|                                   | PM Peak - Future   | 0.268                | 1.9s          | 11.1s       | 2.7m          | A                        | B                      |
| Exit Only Access                  | AM Peak - Existing | 0.242                | 1.1s          | 9.4s        | 2.1m          | A                        | A                      |
|                                   | AM Peak - Future   | 0.304                | 1.5s          | 10.9s       | 3.7m          | A                        | B                      |
|                                   | PM Peak - Existing | 0.202                | 0.8s          | 7.8s        | 1.3m          | A                        | A                      |
|                                   | PM Peak - Future   | 0.231                | 1.1s          | 8.9s        | 2.2m          | A                        | A                      |

As shown, the existing intersections and access points along Gnangara Drive are operating well within capacity during the peak school hours with all measures of operational performance within acceptable levels. The results of the modelling are generally consistent with the observed Level of Service, queuing and delays on-site. It is noted that there was a brief period during the afternoon peak when queuing from the west of the school extended back beyond the main car park exit. However, this lasted approximately 5 minutes and the queue was continuously moving, albeit slowly. Outside of this 5 minute period, queuing was minimal and it is not considered necessary to calibrate the modelling to represent this 5 minute period.

With the addition of the school traffic, the intersections and access points will continue to operate within capacity with only minor increases in degree of saturation, delay and queuing. It is reminded that the proposed development will increase the school capacity by approximately 20% which is a relatively modest amount that can reasonably be absorbed into the capacity of the road network.

#### 4.5. Intersection and Access Capacity – Long Term

A secondary capacity analysis has been undertaken to account for general traffic growth along Gngangara Drive 10 years after full opening of the expansion. In the absence of historical traffic data, the City has requested that a 3% annual growth rate is adopted.

The results of the long term assessment are summarised in **Table 5**.

**Table 5: Access and Intersection Capacity Analysis Results – Long Term**

| Location                           | Peak Period         | Degree of Saturation | Average Delay | Worst Delay | Maximum Queue | Average Level of Service | Worst Level of Service |
|------------------------------------|---------------------|----------------------|---------------|-------------|---------------|--------------------------|------------------------|
| Gngangara Drive / Oakwood Crescent | AM - 2031           | 0.281                | 1.7s          | 9.4s        | 2.2m          | A                        | A                      |
|                                    | AM - 2031 w/ school | 0.311                | 1.8s          | 10.7s       | 2.5m          | A                        | B                      |
|                                    | PM - 2031           | 0.277                | 1.7s          | 10.2s       | 2.5m          | A                        | B                      |
|                                    | PM - 2031 w/ school | 0.295                | 1.7s          | 11.3s       | 2.9m          | A                        | B                      |
| School Access 1                    | AM - 2031           | 0.335                | 0.9s          | 10.2s       | 0.9m          | A                        | B                      |
|                                    | AM - 2031 w/ school | 0.365                | 1.2s          | 11.5s       | 1.4m          | A                        | B                      |
|                                    | PM - 2031           | 0.286                | 0.9s          | 10.9s       | 1.3m          | A                        | B                      |
|                                    | PM - 2031 w/ school | 0.313                | 1.5s          | 12.5s       | 2.2m          | A                        | B                      |
| Entry Only Access                  | AM - 2031           | 0.300                | 1.9s          | 13.1s       | 3.9m          | A                        | B                      |
|                                    | AM - 2031 w/ school | 0.359                | 2.4s          | 14.8s       | 6.3m          | A                        | B                      |
|                                    | PM - 2031           | 0.288                | 1.5s          | 13.5s       | 1.9m          | A                        | B                      |
|                                    | PM - 2031 w/ school | 0.338                | 2.0s          | 15.5s       | 4.0m          | A                        | C                      |
| Exit Only Access                   | AM - 2031           | 0.334                | 1.2s          | 15.0s       | 3.0m          | A                        | B                      |
|                                    | AM - 2031 w/ school | 0.426                | 1.9s          | 18.5s       | 5.8m          | A/B                      | C                      |
|                                    | PM - 2031           | 0.280                | 0.8s          | 11.0s       | 1.6m          | A                        | B                      |
|                                    | PM - 2031 w/ school | 0.308                | 1.1s          | 12.8s       | 2.6m          | A                        | B                      |

Under long term traffic growth assumptions, the intersections and access points along Gngangara Drive would continue to operate within capacity during the peak school hours with and without the additional school traffic. All measures of operational performance remain within acceptable levels.

#### 4.6. Proposed Gngangara Drive Modifications

The City has advised of potential road network changes along Gngangara Drive including:

- Upgrading the Gngangara Drive / Oakwood Crescent intersection to a roundabout.
- Creating a central median along Gngangara Drive that would restrict Coleville Street to left-in / left-out

only movements. The school entry point opposite Coleville Street would then be restricted to left-in only movements.

It is understood that the purpose of the modifications are to improve the visibility of the intersections, improve turning flows, and provide cyclist and pedestrian refuges for users crossing the road.

Another analysis has been undertaken to assess the impact of the proposed road network changes. The analysis has been based on the long term (2031) volumes with the additional school traffic added and right turn movements at Coleville Street and the main school entry redistributed based on the restrictions. The results are summarised in **Table 6** and attached as **Appendix C**.

**Table 6: Access and Intersection Capacity Analysis Results – Long Term with Gngangara Drive Modifications**

| Location                           | Peak Period | Degree of Saturation | Average Delay | Worst Delay | Maximum Queue | Average Level of Service | Worst Level of Service |
|------------------------------------|-------------|----------------------|---------------|-------------|---------------|--------------------------|------------------------|
| Gngangara Drive / Oakwood Crescent | AM Peak     | 0.509                | 4.0s          | 15.9s       | 30.4m         | A                        | B                      |
|                                    | PM Peak     | 0.445                | 3.2s          | 14.7s       | 25.8m         | A                        | B                      |
| School Access 1                    | AM Peak     | 0.441                | 1.4s          | 18.3s       | 6.0m          | A                        | C                      |
|                                    | PM Peak     | 0.355                | 1.7s          | 16.3s       | 7.1m          | A                        | C                      |
| Entry Only Access                  | AM Peak     | 0.360                | 1.2s          | 3.4s        | 0m            | A                        | A                      |
|                                    | PM Peak     | 0.303                | 0.8s          | 3.4s        | 0m            | A                        | A                      |
| Coleville Street LILO              | AM Peak     | 0.292                | 0.3s          | 6.7s        | 0.5m          | A                        | A                      |
|                                    | PM Peak     | 0.306                | 0.7s          | 6.7s        | 0.8m          | A                        | A                      |
| Exit Only Access                   | AM Peak     | 0.426                | 1.9s          | 18.5s       | 14.4m         | A                        | C                      |
|                                    | PM Peak     | 0.308                | 1.1s          | 12.8s       | 6.4m          | A                        | B                      |

With the proposed modifications, the road network would also have capacity to accommodate the projected traffic volumes with the additional school traffic included.

## 5. Transport Impact Assessment – Private Sports Centre Use

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As mentioned previously, the private use of the Sports Centre facilities is only proposed outside of school hours (weeknights and weekends).

As advised by the school, the capacity of the sports centre for private use is 90 people including player, officials, spectators and staff. Based on an assumed vehicle occupancy of 2 people per vehicle, full use of the sports centre would generate approximately 45 vehicle trips. The worst-case traffic scenario would be all 45 vehicles departing from one session and 45 vehicles arriving during a second session.

This amount of traffic is considered to be low to moderate and can also be accommodated within the existing capacity of the road network. The traffic data indicates that traffic flows reduce significantly after school hours and the weekend peak hour traffic is much lower than the weekday peak hour traffic.



## 6. Parking and Access Assessment

### 6.1. Car Parking Supply

#### 6.1.1. School Use

Stage 2 development proposes two new onsite parking areas including 39 bays in the north-east corner of the site and 19 bays adjacent to the new sports centre. Additionally, 23 street parking bays are proposed along Oakwood Crescent and Fairview Drive.

Although the street parking bays are not technically part of the school site, these bays are unlikely to be occupied by the surrounding residential developments during school peak periods and it is reasonable to count these bays as part of the supply to avoid the oversupply of parking within the school site.

The overall increase in parking available to the school is 53 bays including 30 additional on-site bays and 23 street parking bays.

The City of Rockingham Town Planning Scheme No. 2 (TPS2) does not specify the parking supply requirements for educational establishments. The BMW requirements for public schools have been used to determine the likely parking demand as detailed in **Table 7**.

**Table 7: BMW Car Parking Requirements**

| Stream                | Bay Type           | Car Parking Requirement        | Students (FTE) | Bays Required |
|-----------------------|--------------------|--------------------------------|----------------|---------------|
| Pre-primary to Year 6 | Staff              | 10 bays per 100 PP-Y6 students | 70             | 7             |
|                       | Pick-up / Drop-off | 14 bays per 100 PP-Y6 students |                | 10            |
| Secondary School      | Staff              | 10 bays per 100 students       | 139            | 14            |
|                       | Pick up / Drop off | 7 bays per 100 students        |                | 10            |
| Total                 |                    |                                |                | 41            |

As above, the additional 209 students would require 41 bays and the proposed 53 additional bays would be adequate. The BMW requirements assume that there is typically 1 staff member for every 10 students. As the school expansion only proposes 10 additional staff members the actual staff parking demand is 10 bays assuming all staff drive. On this basis the realistic parking requirement for the school expansion is 30 bays.

#### 6.1.2. Sports Centre

The City's Town Planning Scheme requires 1 bay for every 4 people accommodated for Private Recreation uses. Based on the capacity of 90 people, 23 bays are required for private use of the sports centre. The adjacent car

park would accommodate the majority of the parking demand with the balance of demand accommodated by the 23 street parking bays adjacent to or within short walking distance of the sports centre.

## 6.2. Access Sight Distance

Figure 3.8 of AS2890.1, shown as **Figure 8**, prescribes the minimum required entering sight distance (ESD) for access driveways based on varying approach speed of vehicles on the frontage road.

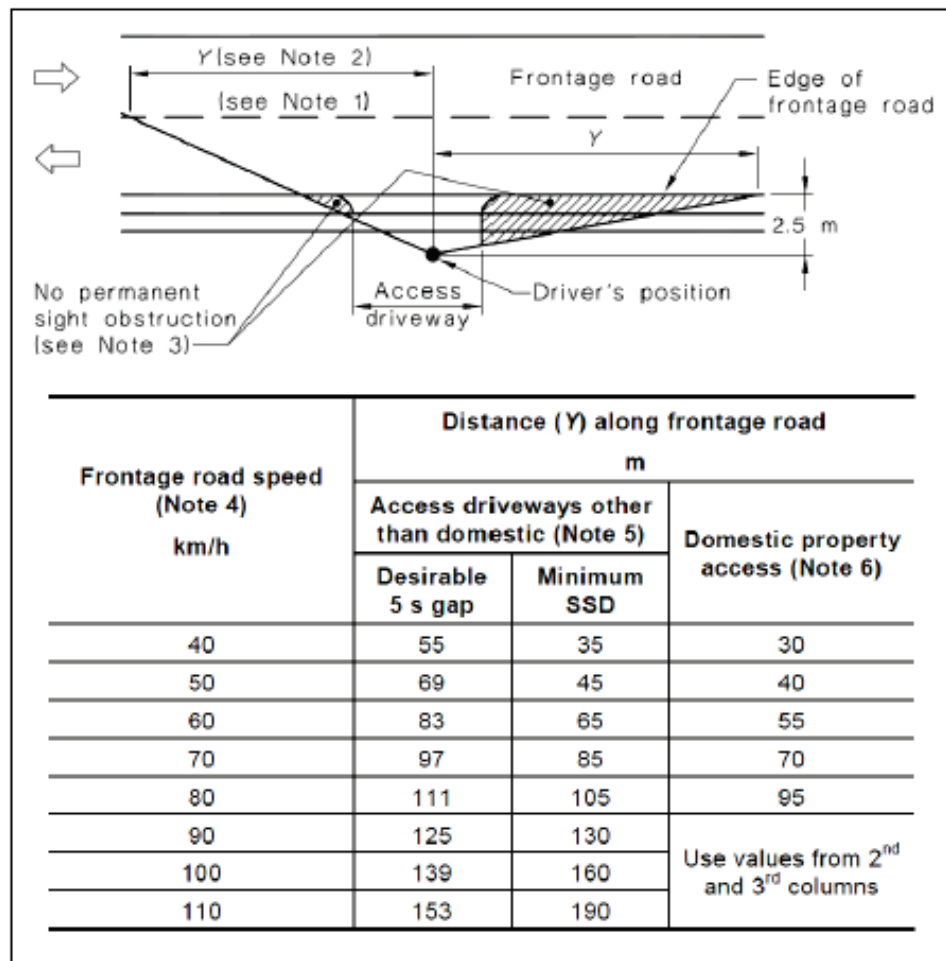


Figure 8: AS2890.1 Access Sight Distance Requirements

Based on the 50km/h speed limit along Oakwood Crescent and Fairview Drive, the minimum required sight distance is 45m (69m desirable). As shown in **Figure 9** and **Figure 10**, the desirable sight distance is achieved at both proposed crossovers in both directions except for towards the north from the Oakwood Crescent exit. In this direction, the minimum sight distance is achieved. It is noted that vehicles approaching from this direction will have slowed down while turning and so the actual sight distance requirements would be much lower.



Figure 9: Sight Distance – Proposed Crossover on Oakwood Crescent



Figure 10: Sight Distance – Proposed Crossover on Fairview Drive



## 7. Road Safety Assessment

### 7.1. Crash History

The crash history of the adjacent road network was obtained from the MRWA Reporting Centre. A summary of the recorded incidents over the five-year period ending December 2019 is shown in **Figure 11**.

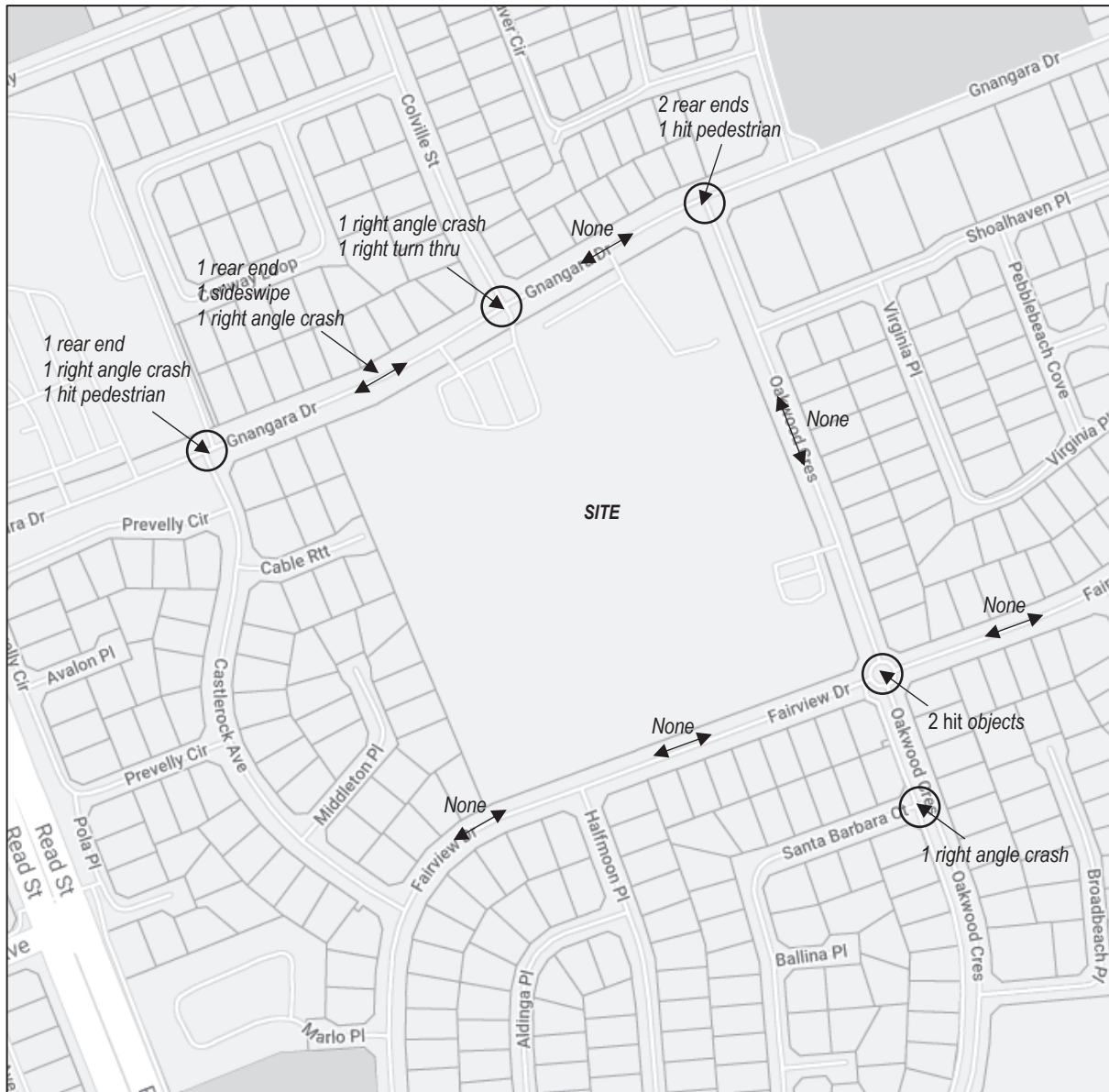


Figure 11: Crash History January 2015 to December 2019

The occurrence of crashes on the adjacent road network is considered to be low compared to the traffic volumes and there does not appear to be any clusters of a particular crash type in any location. A detailed review of the

intersection crash patterns did not return any results due to there being less than 6 crashes at each intersection.

The crash history does not indicate any safety issues with the road network. The expected volume of traffic generated by the proposed development is not considered to increase the likelihood of crashes significantly. No other site specific or safety issues were identified.

Although not currently a major issue, the proposed central median along Gnangara Drive will reduce the risk of right turn crashes at the Colville Street intersection and the main car park entry to the school.

## 8. Pedestrian and Cyclist Accessibility

### 8.1. Existing Pedestrian and Cyclist Facilities

The existing path network in the vicinity of the school is shown in **Figure 12**. As shown, the majority of roads have at least one path. The existing path network is considered to be adequate.

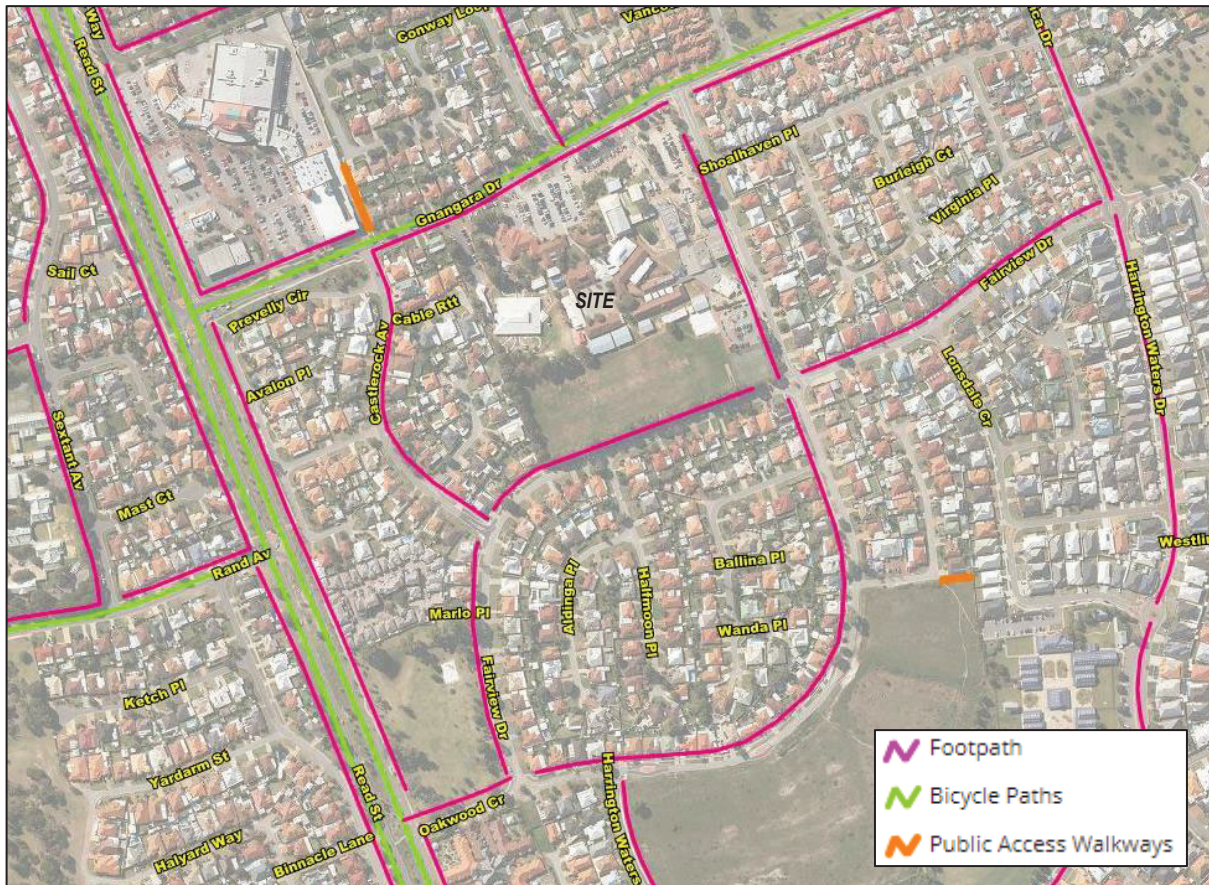


Figure 12: Path Network

### 8.2. Bicycle Parking

There are two existing bicycle parking areas with approximately 25 spaces each. It is understood that the existing bicycle parking is well utilised by primary school students but is underutilised by the secondary school students.

The City's Planning Policy No 3.3.14 *Bicycle Parking and End of Trip Facilities* requires 0.3 spaces per student and staff. Based on the proposed 209 additional students and 10 additional staff, the bicycle parking requirement is 66 spaces. While the provision of 66 spaces is likely to be more than required based on the current utilisation, extra bicycle parking may encourage more students and staff to consider cycling to school which is ideal.

## 9. Public Transport Accessibility

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### 9.1. Existing Public Transport Services

The following bus services currently operate within walking distance of the school:

- Transperth Bus Route 562 between Rockingham Station and Warnbro Station via Willmott Drive. The school service stops on the Oakwood Crescent frontage of the school. The remaining services stop on Santa Monica Drive south of Gngara Drive.
- Transperth Bus Route 558 between Rockingham Station and Mandurah Station via Warnbro Station.
- Transperth Bus Route 559 between Rockingham Station and Secret Harbour via Warnbro Station.
- Transperth Bus Route 561 between Rockingham Station and Secret Harbour West via Warnbro Station.

Transperth Bus Routes 558, 559 and 561 all stop on Read Street south of Gngara Drive.

The available bus services are considered to be adequate and it is assumed that these services can be expanded subject to additional demand.



## 10. Conclusion

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A Transport Impact Assessment of the proposed Stage 2 development of South Coast Baptist College concluded the following:

- The school expansion is predicted to generate 210 additional vehicle trips during the peak hours and is therefore likely to have a low to moderate impact on the road network. A detailed capacity analysis indicates that the additional school traffic can be accommodated within the capacity of the existing road network.
- The City of Rockingham's planning scheme does not specify the parking requirements for educational establishments. If using the BMW guidelines for public schools as a reference, the additional 209 students would require 41 parking bays. The development plans indicate an overall increase of 53 bays which satisfies this requirement.
- The existing and proposed path network is adequate for the safe and efficient movement of pedestrians and cyclists travelling to and from the school.
- According to the City's Bicycle Parking Policy, an additional 66 bicycle parking spaces are required to service the additional students and staff.
- The existing public transport service and private school bus services are considered sufficient to accommodate the demand.
- A review of the crash history did not identify any atypical crash patterns or safety issues with the adjacent road network. The expected volume of traffic generated by the development is not likely to increase the risk of crashes on the adjacent road network. Although not currently a major issue, the proposed central median along Gnangara Drive will reduce the risk of right turn crashes at the Colville Street intersection and the main car park entry to the school.





## Appendix A - Stage 2 Development Plans

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0m 10m 20m 40m



CLIENT

PROJECT  
SOUTH COAST BAPTIST COLLEGE  
STAGE 2 - SPORTS CENTRE

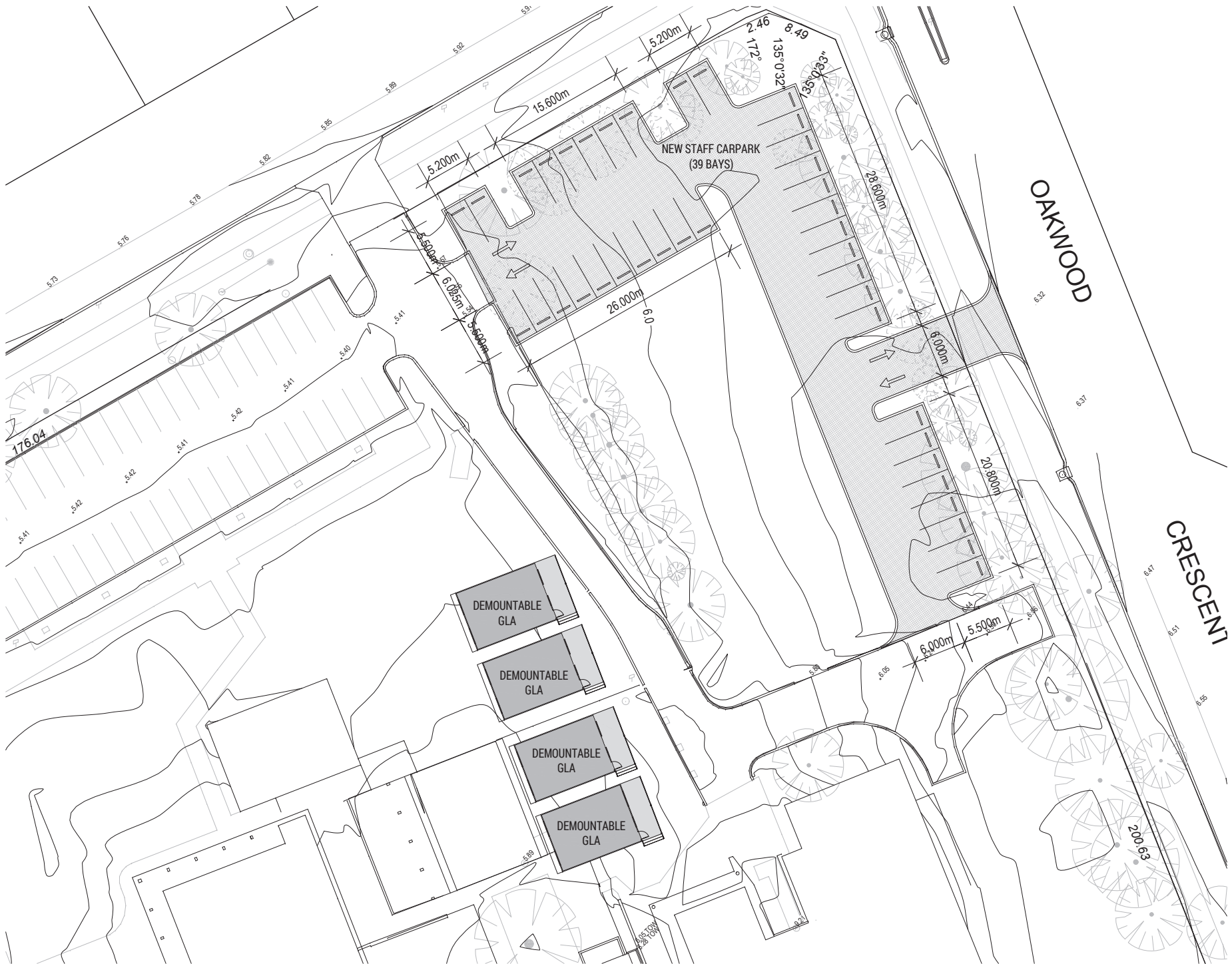
DRAWING:  
SITE PLAN

**bradquartermaine**  
architect

A: 27 Charles Street, South Perth, WA 6151  
E: brad@quartermaine.com.au  
M: 0477 931 941

SCALE: 1:500 @ A1  
DATE: 8 DECEMBER 2020  
STATUS: DEVELOPMENT APPROVAL  
PROJECT NO: 17.08  
DRAWING NO: SK 07 REV I

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CLIENT



PROJECT

SOUTH COAST BAPTIST COLLEGE  
DEMOUNTABLE GLA'S 2020

DRAWING

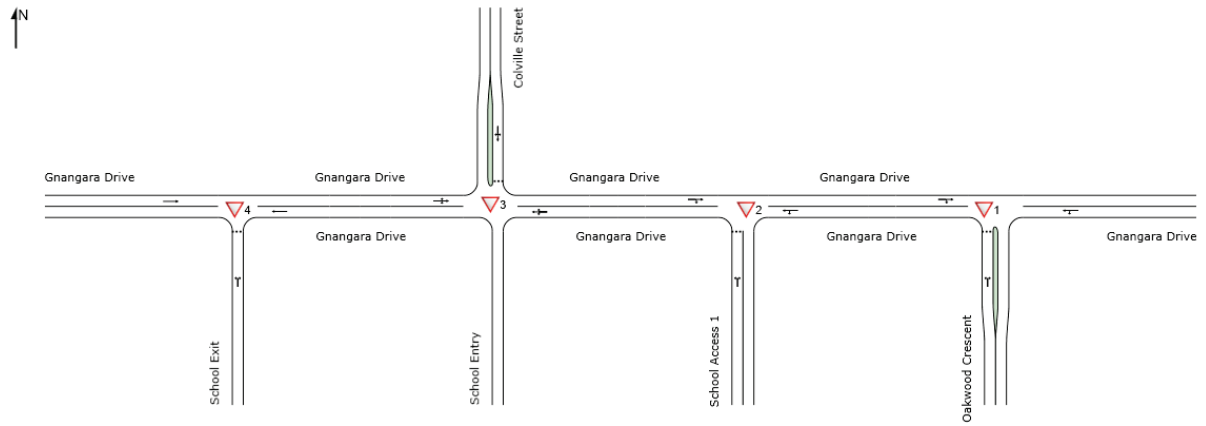
SITE PLAN



A: 27 Charles Street, South Perth, WA 6151  
E: brad@quartermaine.com.au  
M: 0417 931 941

SCALE: 1:500 @ A1  
DATE: 3 NOVEMBER 2020  
STATUS: CONCEPT DESIGN  
PROJECT NO: 17.12  
DRAWING NO: SK 01 REV A

## Appendix B - SIDRA Assessment Results





## MOVEMENT SUMMARY

▼ Site: 1 [Gngangara Drive / Oakwood Crescent (Site Folder: AM Peak - Existing)]

■ Network: N101 [AM Peak - Existing (Network Folder: General)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |                 |      |               |     |           |             |                  |                       |        |           |                     |                  |             |
|------------------------------|------|-----------------|------|---------------|-----|-----------|-------------|------------------|-----------------------|--------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | DEMAND FLOWS    |      | ARRIVAL FLOWS |     | Deg. Satn | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE |        | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h ] | HV % | [ Total HV ]  | %   | v/c       | sec         |                  | [ Veh. veh ]          | Dist m |           |                     |                  | km/h        |
| South: Oakwood Crescent      |      |                 |      |               |     |           |             |                  |                       |        |           |                     |                  |             |
| 1                            | L2   | 104             | 0.0  | 104           | 0.0 | 0.144     | 4.8         | LOS A            | 0.2                   | 1.5    | 0.45      | 0.62                | 0.45             | 35.8        |
| 3                            | R2   | 36              | 0.0  | 36            | 0.0 | 0.144     | 7.1         | LOS A            | 0.2                   | 1.5    | 0.45      | 0.62                | 0.45             | 37.6        |
| Approach                     |      | 140             | 0.0  | 140           | 0.0 | 0.144     | 5.4         | LOS A            | 0.2                   | 1.5    | 0.45      | 0.62                | 0.45             | 36.5        |
| East: Gngangara Drive        |      |                 |      |               |     |           |             |                  |                       |        |           |                     |                  |             |
| 4                            | L2   | 33              | 0.0  | 33            | 0.0 | 0.208     | 3.5         | LOS A            | 0.0                   | 0.0    | 0.00      | 0.04                | 0.00             | 40.0        |
| 5                            | T1   | 363             | 5.0  | 363           | 5.0 | 0.208     | 0.1         | LOS A            | 0.0                   | 0.0    | 0.00      | 0.04                | 0.00             | 39.7        |
| Approach                     |      | 396             | 4.6  | 396           | 4.6 | 0.208     | 0.4         | NA               | 0.0                   | 0.0    | 0.00      | 0.04                | 0.00             | 39.7        |
| West: Gngangara Drive        |      |                 |      |               |     |           |             |                  |                       |        |           |                     |                  |             |
| 11                           | T1   | 208             | 5.0  | 208           | 5.0 | 0.165     | 0.7         | LOS A            | 0.2                   | 1.7    | 0.27      | 0.14                | 0.27             | 38.5        |
| 12                           | R2   | 67              | 0.0  | 67            | 0.0 | 0.165     | 5.2         | LOS A            | 0.2                   | 1.7    | 0.27      | 0.14                | 0.27             | 38.3        |
| Approach                     |      | 275             | 3.8  | 275           | 3.8 | 0.165     | 1.8         | NA               | 0.2                   | 1.7    | 0.27      | 0.14                | 0.27             | 38.5        |
| All Vehicles                 |      | 811             | 3.5  | 811           | 3.5 | 0.208     | 1.7         | NA               | 0.2                   | 1.7    | 0.17      | 0.17                | 0.17             | 38.6        |

## MOVEMENT SUMMARY

▼ Site: 1 [Gngangara Drive / Oakwood Crescent (Site Folder: AM Peak - With School)]

■ Network: N101 [AM Peak - With School (Network Folder: General)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |                 |          |               |       |           |             |                  |                       |            |           |                     |                  |             |
|------------------------------|------|-----------------|----------|---------------|-------|-----------|-------------|------------------|-----------------------|------------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | DEMAND FLOWS    |          | ARRIVAL FLOWS |       | Deg. Satn | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE |            | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h ] | [ HV % ] | [ Total HV ]  | [ % ] |           |             |                  | [ Veh. veh ]          | [ Dist m ] |           |                     |                  |             |
| South: Oakwood Crescent      |      |                 |          |               |       |           |             |                  |                       |            |           |                     |                  |             |
| 1                            | L2   | 104             | 0.0      | 104           | 0.0   | 0.157     | 5.1         | LOS A            | 0.2                   | 1.6        | 0.49      | 0.66                | 0.49             | 35.5        |
| 3                            | R2   | 36              | 0.0      | 36            | 0.0   | 0.157     | 7.9         | LOS A            | 0.2                   | 1.6        | 0.49      | 0.66                | 0.49             | 37.5        |
| Approach                     |      | 140             | 0.0      | 140           | 0.0   | 0.157     | 5.8         | LOS A            | 0.2                   | 1.6        | 0.49      | 0.66                | 0.49             | 36.3        |
| East: Gngangara Drive        |      |                 |          |               |       |           |             |                  |                       |            |           |                     |                  |             |
| 4                            | L2   | 33              | 0.0      | 33            | 0.0   | 0.238     | 3.5         | LOS A            | 0.0                   | 0.0        | 0.00      | 0.03                | 0.00             | 40.0        |
| 5                            | T1   | 420             | 5.0      | 420           | 5.0   | 0.238     | 0.1         | LOS A            | 0.0                   | 0.0        | 0.00      | 0.03                | 0.00             | 39.7        |
| Approach                     |      | 453             | 4.6      | 453           | 4.6   | 0.238     | 0.3         | NA               | 0.0                   | 0.0        | 0.00      | 0.03                | 0.00             | 39.7        |
| West: Gngangara Drive        |      |                 |          |               |       |           |             |                  |                       |            |           |                     |                  |             |
| 11                           | T1   | 241             | 5.0      | 241           | 5.0   | 0.186     | 0.8         | LOS A            | 0.3                   | 1.9        | 0.27      | 0.13                | 0.27             | 38.6        |
| 12                           | R2   | 67              | 0.0      | 67            | 0.0   | 0.186     | 5.6         | LOS A            | 0.3                   | 1.9        | 0.27      | 0.13                | 0.27             | 38.3        |
| Approach                     |      | 308             | 3.9      | 308           | 3.9   | 0.186     | 1.8         | NA               | 0.3                   | 1.9        | 0.27      | 0.13                | 0.27             | 38.5        |
| All Vehicles                 |      | 901             | 3.7      | 901           | 3.7   | 0.238     | 1.7         | NA               | 0.3                   | 1.9        | 0.17      | 0.16                | 0.17             | 38.7        |

## MOVEMENT SUMMARY

Site: 2 [Gngangara Drive Access 1 (Site Folder: AM Peak - Existing)]

Network: N101 [AM Peak - Existing (Network Folder: General)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
|------------------------------|------|---------------|--------|--------------------|-----|-----------|-------------|------------------|-----------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | DEMAND FLOWS  |        | ARRIVAL FLOWS      |     | Deg. Satn | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV ] % | [ Total HV ] veh/h | %   |           |             |                  | [ Veh. veh            | Dist ] m |           |                     |                  |             |
| South: School Access 1       |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 1                            | L2   | 21            | 0.0    | 21                 | 0.0 | 0.057     | 4.9         | LOS A            | 0.1                   | 0.5      | 0.48      | 0.65                | 0.48             | 35.3        |
| 3                            | R2   | 23            | 0.0    | 23                 | 0.0 | 0.057     | 7.3         | LOS A            | 0.1                   | 0.5      | 0.48      | 0.65                | 0.48             | 35.3        |
| Approach                     |      | 44            | 0.0    | 44                 | 0.0 | 0.057     | 6.2         | LOS A            | 0.1                   | 0.5      | 0.48      | 0.65                | 0.48             | 35.3        |
| East: Gngangara Drive        |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 4                            | L2   | 78            | 0.0    | 78                 | 0.0 | 0.253     | 3.4         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.08                | 0.00             | 39.7        |
| 5                            | T1   | 404           | 5.0    | 404                | 5.0 | 0.253     | 0.0         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.08                | 0.00             | 36.2        |
| Approach                     |      | 482           | 4.2    | 482                | 4.2 | 0.253     | 0.6         | NA               | 0.0                   | 0.0      | 0.00      | 0.08                | 0.00             | 38.4        |
| West: Gngangara Drive        |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 11                           | T1   | 254           | 5.0    | 254                | 5.0 | 0.153     | 0.3         | LOS A            | 0.1                   | 0.7      | 0.11      | 0.04                | 0.11             | 36.6        |
| 12                           | R2   | 21            | 0.0    | 21                 | 0.0 | 0.153     | 5.8         | LOS A            | 0.1                   | 0.7      | 0.11      | 0.04                | 0.11             | 39.2        |
| Approach                     |      | 275           | 4.6    | 275                | 4.6 | 0.153     | 0.7         | NA               | 0.1                   | 0.7      | 0.11      | 0.04                | 0.11             | 37.5        |
| All Vehicles                 |      | 801           | 4.1    | 801                | 4.1 | 0.253     | 0.9         | NA               | 0.1                   | 0.7      | 0.06      | 0.10                | 0.06             | 37.5        |

## MOVEMENT SUMMARY

Site: 2 [Gngangara Drive Access 1 (Site Folder: AM Peak - With School)]

Network: N101 [AM Peak - With School (Network Folder: General)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
|------------------------------|------|---------------|--------|--------------------|-----|-----------|-------------|------------------|-----------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | DEMAND FLOWS  |        | ARRIVAL FLOWS      |     | Deg. Satn | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV ] % | [ Total HV ] veh/h | %   |           |             |                  | [ Veh. veh            | Dist ] m |           |                     |                  |             |
| South: School Access 1       |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 1                            | L2   | 31            | 0.0    | 31                 | 0.0 | 0.092     | 5.1         | LOS A            | 0.1                   | 0.9      | 0.51      | 0.69                | 0.51             | 34.9        |
| 3                            | R2   | 35            | 0.0    | 35                 | 0.0 | 0.092     | 8.1         | LOS A            | 0.1                   | 0.9      | 0.51      | 0.69                | 0.51             | 34.9        |
| Approach                     |      | 66            | 0.0    | 66                 | 0.0 | 0.092     | 6.7         | LOS A            | 0.1                   | 0.9      | 0.51      | 0.69                | 0.51             | 34.9        |
| East: Gngangara Drive        |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 4                            | L2   | 108           | 0.0    | 108                | 0.0 | 0.283     | 3.4         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.09                | 0.00             | 39.6        |
| 5                            | T1   | 431           | 5.0    | 431                | 5.0 | 0.283     | 0.0         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.09                | 0.00             | 35.4        |
| Approach                     |      | 539           | 4.0    | 539                | 4.0 | 0.283     | 0.7         | NA               | 0.0                   | 0.0      | 0.00      | 0.09                | 0.00             | 38.2        |
| West: Gngangara Drive        |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 11                           | T1   | 275           | 5.0    | 275                | 5.0 | 0.173     | 0.5         | LOS A            | 0.1                   | 1.0      | 0.15      | 0.05                | 0.15             | 35.3        |
| 12                           | R2   | 29            | 0.0    | 29                 | 0.0 | 0.173     | 6.2         | LOS A            | 0.1                   | 1.0      | 0.15      | 0.05                | 0.15             | 39.0        |
| Approach                     |      | 304           | 4.5    | 304                | 4.5 | 0.173     | 1.0         | NA               | 0.1                   | 1.0      | 0.15      | 0.05                | 0.15             | 36.8        |
| All Vehicles                 |      | 909           | 3.9    | 909                | 3.9 | 0.283     | 1.2         | NA               | 0.1                   | 1.0      | 0.09      | 0.12                | 0.09             | 37.1        |

## MOVEMENT SUMMARY

Site: 3 [Gngara Drive Entry Only (Site Folder: AM Peak - Existing)]

Network: N101 [AM Peak - Existing (Network Folder: General)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |      |                    |     |           |             |                  |                       |          |           |                     |                  |             |
|------------------------------|------|---------------|------|--------------------|-----|-----------|-------------|------------------|-----------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | DEMAND FLOWS  |      | ARRIVAL FLOWS      |     | Deg. Satn | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV % | [ Total HV ] veh/h | %   | v/c       | sec         |                  | [ Veh. veh            | Dist ] m |           |                     |                  | km/h        |
| East: Gngara Drive           |      |               |      |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 4                            | L2   | 71            | 0.0  | 71                 | 0.0 | 0.212     | 3.6         | LOS A            | 0.1                   | 0.5      | 0.05      | 0.10                | 0.05             | 39.5        |
| 5                            | T1   | 311           | 5.0  | 311                | 5.0 | 0.212     | 0.1         | LOS A            | 0.1                   | 0.5      | 0.05      | 0.10                | 0.05             | 35.5        |
| 6                            | R2   | 15            | 0.0  | 15                 | 0.0 | 0.212     | 4.7         | LOS A            | 0.1                   | 0.5      | 0.05      | 0.10                | 0.05             | 45.7        |
| Approach                     |      | 397           | 3.9  | 397                | 3.9 | 0.212     | 0.9         | NA               | 0.1                   | 0.5      | 0.05      | 0.10                | 0.05             | 38.6        |
| North: Colville Street       |      |               |      |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 7                            | L2   | 16            | 0.0  | 16                 | 0.0 | 0.047     | 5.4         | LOS A            | 0.1                   | 0.4      | 0.44      | 0.65                | 0.44             | 41.5        |
| 8                            | T1   | 1             | 0.0  | 1                  | 0.0 | 0.047     | 7.8         | LOS A            | 0.1                   | 0.4      | 0.44      | 0.65                | 0.44             | 40.9        |
| 9                            | R2   | 16            | 0.0  | 16                 | 0.0 | 0.047     | 9.7         | LOS A            | 0.1                   | 0.4      | 0.44      | 0.65                | 0.44             | 41.5        |
| Approach                     |      | 33            | 0.0  | 33                 | 0.0 | 0.047     | 7.6         | LOS A            | 0.1                   | 0.4      | 0.44      | 0.65                | 0.44             | 41.5        |
| West: Gngara Drive           |      |               |      |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 10                           | L2   | 19            | 0.0  | 19                 | 0.0 | 0.233     | 5.1         | LOS A            | 0.4                   | 2.9      | 0.32      | 0.18                | 0.32             | 45.2        |
| 11                           | T1   | 264           | 5.0  | 264                | 5.0 | 0.233     | 0.8         | LOS A            | 0.4                   | 2.9      | 0.32      | 0.18                | 0.32             | 27.6        |
| 12                           | R2   | 104           | 0.0  | 104                | 0.0 | 0.233     | 5.5         | LOS A            | 0.4                   | 2.9      | 0.32      | 0.18                | 0.32             | 37.7        |
| Approach                     |      | 387           | 3.4  | 387                | 3.4 | 0.233     | 2.3         | NA               | 0.4                   | 2.9      | 0.32      | 0.18                | 0.32             | 36.0        |
| All Vehicles                 |      | 817           | 3.5  | 817                | 3.5 | 0.233     | 1.8         | NA               | 0.4                   | 2.9      | 0.20      | 0.16                | 0.20             | 37.6        |

## MOVEMENT SUMMARY

Site: 3 [Gngara Drive Entry Only (Site Folder: AM Peak - With School)]

Network: N101 [AM Peak - With School (Network Folder: General)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |      |                    |     |           |             |                  |                       |          |           |                     |                  |             |
|------------------------------|------|---------------|------|--------------------|-----|-----------|-------------|------------------|-----------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | DEMAND FLOWS  |      | ARRIVAL FLOWS      |     | Deg. Satn | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV % | [ Total HV ] veh/h | %   | v/c       | sec         |                  | [ Veh. veh            | Dist ] m |           |                     |                  | km/h        |
| East: Gngara Drive           |      |               |      |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 4                            | L2   | 98            | 0.0  | 98                 | 0.0 | 0.232     | 3.6         | LOS A            | 0.1                   | 0.6      | 0.05      | 0.12                | 0.05             | 39.4        |
| 5                            | T1   | 321           | 5.0  | 321                | 5.0 | 0.232     | 0.1         | LOS A            | 0.1                   | 0.6      | 0.05      | 0.12                | 0.05             | 34.9        |
| 6                            | R2   | 15            | 0.0  | 15                 | 0.0 | 0.232     | 4.9         | LOS A            | 0.1                   | 0.6      | 0.05      | 0.12                | 0.05             | 45.6        |
| Approach                     |      | 434           | 3.7  | 434                | 3.7 | 0.232     | 1.1         | NA               | 0.1                   | 0.6      | 0.05      | 0.12                | 0.05             | 38.4        |
| North: Colville Street       |      |               |      |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 7                            | L2   | 16            | 0.0  | 16                 | 0.0 | 0.052     | 5.5         | LOS A            | 0.1                   | 0.5      | 0.47      | 0.67                | 0.47             | 40.9        |
| 8                            | T1   | 1             | 0.0  | 1                  | 0.0 | 0.052     | 9.0         | LOS A            | 0.1                   | 0.5      | 0.47      | 0.67                | 0.47             | 40.6        |
| 9                            | R2   | 16            | 0.0  | 16                 | 0.0 | 0.052     | 10.8        | LOS B            | 0.1                   | 0.5      | 0.47      | 0.67                | 0.47             | 40.9        |
| Approach                     |      | 33            | 0.0  | 33                 | 0.0 | 0.052     | 8.2         | LOS A            | 0.1                   | 0.5      | 0.47      | 0.67                | 0.47             | 40.9        |
| West: Gngara Drive           |      |               |      |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 10                           | L2   | 19            | 0.0  | 19                 | 0.0 | 0.286     | 5.4         | LOS A            | 0.6                   | 4.1      | 0.39      | 0.22                | 0.39             | 44.8        |
| 11                           | T1   | 293           | 5.0  | 293                | 5.0 | 0.286     | 1.1         | LOS A            | 0.6                   | 4.1      | 0.39      | 0.22                | 0.39             | 26.0        |
| 12                           | R2   | 144           | 0.0  | 144                | 0.0 | 0.286     | 5.9         | LOS A            | 0.6                   | 4.1      | 0.39      | 0.22                | 0.39             | 37.4        |
| Approach                     |      | 456           | 3.2  | 456                | 3.2 | 0.286     | 2.8         | NA               | 0.6                   | 4.1      | 0.39      | 0.22                | 0.39             | 35.5        |
| All Vehicles                 |      | 923           | 3.3  | 923                | 3.3 | 0.286     | 2.2         | NA               | 0.6                   | 4.1      | 0.24      | 0.19                | 0.24             | 37.1        |



## MOVEMENT SUMMARY

Site: 4 [Gngara Drive Exit Only (Site Folder: AM Peak - Existing)]

Network: N101 [AM Peak - Existing (Network Folder: General)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
|------------------------------|------|---------------|--------|--------------------|-----|-----------|-------------|------------------|-----------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | DEMAND FLOWS  |        | ARRIVAL FLOWS      |     | Deg. Satn | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV ] % | [ Total HV ] veh/h | %   |           |             |                  | [ Veh. veh            | Dist ] m |           |                     |                  |             |
| South: School Exit           |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 1                            | L2   | 128           | 0.0    | 128                | 0.0 | 0.196     | 4.9         | LOS A            | 0.3                   | 2.1      | 0.48      | 0.66                | 0.48             | 37.6        |
| 3                            | R2   | 44            | 0.0    | 44                 | 0.0 | 0.196     | 9.4         | LOS A            | 0.3                   | 2.1      | 0.48      | 0.66                | 0.48             | 35.4        |
| Approach                     |      | 172           | 0.0    | 172                | 0.0 | 0.196     | 6.1         | LOS A            | 0.3                   | 2.1      | 0.48      | 0.66                | 0.48             | 37.3        |
| East: Gngara Drive           |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 5                            | T1   | 377           | 5.0    | 377                | 5.0 | 0.198     | 0.0         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| Approach                     |      | 377           | 5.0    | 377                | 5.0 | 0.198     | 0.0         | NA               | 0.0                   | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| West: Gngara Drive           |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 11                           | T1   | 461           | 5.0    | 461                | 5.0 | 0.242     | 0.1         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| Approach                     |      | 461           | 5.0    | 461                | 5.0 | 0.242     | 0.1         | NA               | 0.0                   | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| All Vehicles                 |      | 1010          | 4.1    | 1010               | 4.1 | 0.242     | 1.1         | NA               | 0.3                   | 2.1      | 0.08      | 0.11                | 0.08             | 39.2        |

## MOVEMENT SUMMARY

Site: 4 [Gngara Drive Exit Only (Site Folder: AM Peak - With School)]

Network: N101 [AM Peak - With School (Network Folder: General)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |      |                  |     |           |             |                  |                       |          |           |                     |                  |             |
|------------------------------|------|---------------|------|------------------|-----|-----------|-------------|------------------|-----------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | DEMAND FLOWS  |      | ARRIVAL FLOWS    |     | Deg. Satn | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV % | [ Total HV veh/h | %   |           |             |                  | [ Veh. veh            | Dist ] m |           |                     |                  |             |
| South: School Exit           |      |               |      |                  |     |           |             |                  |                       |          |           |                     |                  |             |
| 1                            | L2   | 190           | 0.0  | 190              | 0.0 | 0.304     | 5.3         | LOS A            | 0.5                   | 3.7      | 0.52      | 0.72                | 0.58             | 37.4        |
| 3                            | R2   | 65            | 0.0  | 65               | 0.0 | 0.304     | 10.9        | LOS B            | 0.5                   | 3.7      | 0.52      | 0.72                | 0.58             | 34.9        |
| Approach                     |      | 255           | 0.0  | 255              | 0.0 | 0.304     | 6.8         | LOS A            | 0.5                   | 3.7      | 0.52      | 0.72                | 0.58             | 37.0        |
| East: Gngara Drive           |      |               |      |                  |     |           |             |                  |                       |          |           |                     |                  |             |
| 5                            | T1   | 387           | 5.0  | 387              | 5.0 | 0.203     | 0.0         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| Approach                     |      | 387           | 5.0  | 387              | 5.0 | 0.203     | 0.0         | NA               | 0.0                   | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| West: Gngara Drive           |      |               |      |                  |     |           |             |                  |                       |          |           |                     |                  |             |
| 11                           | T1   | 509           | 5.0  | 509              | 5.0 | 0.267     | 0.1         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| Approach                     |      | 509           | 5.0  | 509              | 5.0 | 0.267     | 0.1         | NA               | 0.0                   | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| All Vehicles                 |      | 1151          | 3.9  | 1151             | 3.9 | 0.304     | 1.5         | NA               | 0.5                   | 3.7      | 0.12      | 0.16                | 0.13             | 38.9        |



## MOVEMENT SUMMARY

Site: 1 [Gngangara Drive / Oakwood Crescent (Site Folder: PM Peak - Existing)]

Network: N101 [PM Peak - Existing (Network Folder: General)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |      |                    |     |           |             |                  |                       |          |           |                     |                  |             |
|------------------------------|------|---------------|------|--------------------|-----|-----------|-------------|------------------|-----------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | DEMAND FLOWS  |      | ARRIVAL FLOWS      |     | Deg. Satn | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV % | [ Total HV ] veh/h | %   |           |             |                  | [ Veh. veh            | Dist ] m |           |                     |                  |             |
| South: Oakwood Crescent      |      |               |      |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 1                            | L2   | 77            | 0.0  | 77                 | 0.0 | 0.140     | 4.7         | LOS A            | 0.2                   | 1.4      | 0.45      | 0.63                | 0.45             | 35.6        |
| 3                            | R2   | 47            | 0.0  | 47                 | 0.0 | 0.140     | 7.5         | LOS A            | 0.2                   | 1.4      | 0.45      | 0.63                | 0.45             | 37.5        |
| Approach                     |      | 124           | 0.0  | 124                | 0.0 | 0.140     | 5.7         | LOS A            | 0.2                   | 1.4      | 0.45      | 0.63                | 0.45             | 36.6        |
| East: Gngangara Drive        |      |               |      |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 4                            | L2   | 42            | 0.0  | 42                 | 0.0 | 0.197     | 3.5         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.05                | 0.00             | 39.9        |
| 5                            | T1   | 334           | 5.0  | 334                | 5.0 | 0.197     | 0.1         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.05                | 0.00             | 39.6        |
| Approach                     |      | 376           | 4.4  | 376                | 4.4 | 0.197     | 0.4         | NA               | 0.0                   | 0.0      | 0.00      | 0.05                | 0.00             | 39.7        |
| West: Gngangara Drive        |      |               |      |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 11                           | T1   | 290           | 5.0  | 290                | 5.0 | 0.209     | 0.5         | LOS A            | 0.3                   | 1.9      | 0.23      | 0.11                | 0.23             | 38.8        |
| 12                           | R2   | 70            | 0.0  | 70                 | 0.0 | 0.209     | 5.2         | LOS A            | 0.3                   | 1.9      | 0.23      | 0.11                | 0.23             | 38.5        |
| Approach                     |      | 360           | 4.0  | 360                | 4.0 | 0.209     | 1.4         | NA               | 0.3                   | 1.9      | 0.23      | 0.11                | 0.23             | 38.7        |
| All Vehicles                 |      | 860           | 3.6  | 860                | 3.6 | 0.209     | 1.6         | NA               | 0.3                   | 1.9      | 0.16      | 0.16                | 0.16             | 38.7        |

## MOVEMENT SUMMARY

Site: 1 [Gngangara Drive / Oakwood Crescent (Site Folder: PM Peak - With School)]

Network: N101 [PM Peak - With School (Network Folder: General)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |      |               |      |           |             |                  |                       |          |           |                     |                  |             |
|------------------------------|------|---------------|------|---------------|------|-----------|-------------|------------------|-----------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | DEMAND FLOWS  |      | ARRIVAL FLOWS |      | Deg. Satn | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV % | [ Total veh/h | HV % | v/c       | sec         |                  | [ Veh. veh            | Dist ] m |           |                     |                  | km/h        |
| South: Oakwood Crescent      |      |               |      |               |      |           |             |                  |                       |          |           |                     |                  |             |
| 1                            | L2   | 77            | 0.0  | 77            | 0.0  | 0.151     | 4.9         | LOS A            | 0.2                   | 1.5      | 0.48      | 0.66                | 0.48             | 35.3        |
| 3                            | R2   | 47            | 0.0  | 47            | 0.0  | 0.151     | 8.3         | LOS A            | 0.2                   | 1.5      | 0.48      | 0.66                | 0.48             | 37.3        |
| Approach                     |      | 124           | 0.0  | 124           | 0.0  | 0.151     | 6.2         | LOS A            | 0.2                   | 1.5      | 0.48      | 0.66                | 0.48             | 36.4        |
| East: Gngangara Drive        |      |               |      |               |      |           |             |                  |                       |          |           |                     |                  |             |
| 4                            | L2   | 42            | 0.0  | 42            | 0.0  | 0.224     | 3.5         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.05                | 0.00             | 39.9        |
| 5                            | T1   | 385           | 5.0  | 385           | 5.0  | 0.224     | 0.1         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.05                | 0.00             | 39.6        |
| Approach                     |      | 427           | 4.5  | 427           | 4.5  | 0.224     | 0.4         | NA               | 0.0                   | 0.0      | 0.00      | 0.05                | 0.00             | 39.7        |
| West: Gngangara Drive        |      |               |      |               |      |           |             |                  |                       |          |           |                     |                  |             |
| 11                           | T1   | 316           | 5.0  | 316           | 5.0  | 0.226     | 0.6         | LOS A            | 0.3                   | 2.1      | 0.23      | 0.11                | 0.23             | 38.8        |
| 12                           | R2   | 70            | 0.0  | 70            | 0.0  | 0.226     | 5.6         | LOS A            | 0.3                   | 2.1      | 0.23      | 0.11                | 0.23             | 38.5        |
| Approach                     |      | 386           | 4.1  | 386           | 4.1  | 0.226     | 1.5         | NA               | 0.3                   | 2.1      | 0.23      | 0.11                | 0.23             | 38.7        |
| All Vehicles                 |      | 937           | 3.7  | 937           | 3.7  | 0.226     | 1.6         | NA               | 0.3                   | 2.1      | 0.16      | 0.15                | 0.16             | 38.7        |

## MOVEMENT SUMMARY

Site: 2 [Gngangara Drive Access 1 (Site Folder: PM Peak - Existing)]

Network: N101 [PM Peak - Existing (Network Folder: General)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
|------------------------------|------|---------------|--------|--------------------|-----|-----------|-------------|------------------|-----------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | DEMAND FLOWS  |        | ARRIVAL FLOWS      |     | Deg. Satn | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV ] % | [ Total HV ] veh/h | %   |           |             |                  | [ Veh. veh            | Dist ] m |           |                     |                  |             |
| South: School Access 1       |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 1                            | L2   | 51            | 0.0    | 51                 | 0.0 | 0.105     | 4.8         | LOS A            | 0.1                   | 1.0      | 0.47      | 0.65                | 0.47             | 35.4        |
| 3                            | R2   | 36            | 0.0    | 36                 | 0.0 | 0.105     | 7.7         | LOS A            | 0.1                   | 1.0      | 0.47      | 0.65                | 0.47             | 35.4        |
| Approach                     |      | 87            | 0.0    | 87                 | 0.0 | 0.105     | 6.0         | LOS A            | 0.1                   | 1.0      | 0.47      | 0.65                | 0.47             | 35.4        |
| East: Gngangara Drive        |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 4                            | L2   | 31            | 0.0    | 31                 | 0.0 | 0.211     | 3.4         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.04                | 0.00             | 40.0        |
| 5                            | T1   | 372           | 5.0    | 372                | 5.0 | 0.211     | 0.0         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.04                | 0.00             | 38.0        |
| Approach                     |      | 403           | 4.6    | 403                | 4.6 | 0.211     | 0.3         | NA               | 0.0                   | 0.0      | 0.00      | 0.04                | 0.00             | 38.9        |
| West: Gngangara Drive        |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 11                           | T1   | 340           | 5.0    | 340                | 5.0 | 0.195     | 0.2         | LOS A            | 0.1                   | 0.6      | 0.07      | 0.03                | 0.07             | 37.6        |
| 12                           | R2   | 20            | 0.0    | 20                 | 0.0 | 0.195     | 5.4         | LOS A            | 0.1                   | 0.6      | 0.07      | 0.03                | 0.07             | 39.4        |
| Approach                     |      | 360           | 4.7    | 360                | 4.7 | 0.195     | 0.5         | NA               | 0.1                   | 0.6      | 0.07      | 0.03                | 0.07             | 38.1        |
| All Vehicles                 |      | 850           | 4.2    | 850                | 4.2 | 0.211     | 0.9         | NA               | 0.1                   | 1.0      | 0.08      | 0.10                | 0.08             | 37.3        |

## MOVEMENT SUMMARY

Site: 2 [Gngangara Drive Access 1 (Site Folder: PM Peak - With School)]

Network: N101 [PM Peak - With School (Network Folder: General)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
|------------------------------|------|---------------|--------|--------------------|-----|-----------|-------------|------------------|-----------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | DEMAND FLOWS  |        | ARRIVAL FLOWS      |     | Deg. Satn | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV ] % | [ Total HV ] veh/h | %   |           |             |                  | [ Veh. veh            | Dist ] m |           |                     |                  |             |
| South: School Access 1       |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 1                            | L2   | 75            | 0.0    | 75                 | 0.0 | 0.164     | 5.0         | LOS A            | 0.2                   | 1.7      | 0.50      | 0.68                | 0.50             | 35.1        |
| 3                            | R2   | 53            | 0.0    | 53                 | 0.0 | 0.164     | 8.5         | LOS A            | 0.2                   | 1.7      | 0.50      | 0.68                | 0.50             | 35.1        |
| Approach                     |      | 128           | 0.0    | 128                | 0.0 | 0.164     | 6.5         | LOS A            | 0.2                   | 1.7      | 0.50      | 0.68                | 0.50             | 35.1        |
| East: Gngangara Drive        |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 4                            | L2   | 57            | 0.0    | 57                 | 0.0 | 0.238     | 3.4         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.06                | 0.00             | 39.8        |
| 5                            | T1   | 397           | 5.0    | 397                | 5.0 | 0.238     | 0.0         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.06                | 0.00             | 36.9        |
| Approach                     |      | 454           | 4.4    | 454                | 4.4 | 0.238     | 0.4         | NA               | 0.0                   | 0.0      | 0.00      | 0.06                | 0.00             | 38.5        |
| West: Gngangara Drive        |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 11                           | T1   | 349           | 5.0    | 349                | 5.0 | 0.217     | 0.4         | LOS A            | 0.2                   | 1.2      | 0.14      | 0.05                | 0.14             | 35.7        |
| 12                           | R2   | 38            | 0.0    | 38                 | 0.0 | 0.217     | 5.8         | LOS A            | 0.2                   | 1.2      | 0.14      | 0.05                | 0.14             | 39.1        |
| Approach                     |      | 387           | 4.5    | 387                | 4.5 | 0.217     | 0.9         | NA               | 0.2                   | 1.2      | 0.14      | 0.05                | 0.14             | 37.1        |
| All Vehicles                 |      | 969           | 3.8    | 969                | 3.8 | 0.238     | 1.4         | NA               | 0.2                   | 1.7      | 0.12      | 0.14                | 0.12             | 36.7        |

## MOVEMENT SUMMARY

Site: 3 [Gngangara Drive Entry Only (Site Folder: PM Peak - Existing)]

Network: N101 [PM Peak - Existing (Network Folder: General)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
|------------------------------|------|---------------|--------|--------------------|-----|-----------|-------------|------------------|-----------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | DEMAND FLOWS  |        | ARRIVAL FLOWS      |     | Deg. Satn | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV ] % | [ Total HV ] veh/h | %   |           |             |                  | [ Veh. veh            | Dist ] m |           |                     |                  |             |
| East: Gngangara Drive        |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 4                            | L2   | 30            | 0.0    | 30                 | 0.0 | 0.193     | 4.3         | LOS A            | 0.1                   | 0.8      | 0.10      | 0.07                | 0.10             | 39.5        |
| 5                            | T1   | 301           | 5.0    | 301                | 5.0 | 0.193     | 0.2         | LOS A            | 0.1                   | 0.8      | 0.10      | 0.07                | 0.10             | 35.6        |
| 6                            | R2   | 24            | 0.0    | 24                 | 0.0 | 0.193     | 5.1         | LOS A            | 0.1                   | 0.8      | 0.10      | 0.07                | 0.10             | 45.8        |
| Approach                     |      | 355           | 4.2    | 355                | 4.2 | 0.193     | 0.9         | NA               | 0.1                   | 0.8      | 0.10      | 0.07                | 0.10             | 38.9        |
| North: Colville Street       |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 7                            | L2   | 28            | 0.0    | 28                 | 0.0 | 0.076     | 5.6         | LOS A            | 0.1                   | 0.7      | 0.46      | 0.67                | 0.46             | 41.5        |
| 8                            | T1   | 1             | 0.0    | 1                  | 0.0 | 0.076     | 7.5         | LOS A            | 0.1                   | 0.7      | 0.46      | 0.67                | 0.46             | 40.9        |
| 9                            | R2   | 25            | 0.0    | 25                 | 0.0 | 0.076     | 9.8         | LOS A            | 0.1                   | 0.7      | 0.46      | 0.67                | 0.46             | 41.5        |
| Approach                     |      | 54            | 0.0    | 54                 | 0.0 | 0.076     | 7.6         | LOS A            | 0.1                   | 0.7      | 0.46      | 0.67                | 0.46             | 41.5        |
| West: Gngangara Drive        |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 10                           | L2   | 58            | 0.0    | 58                 | 0.0 | 0.222     | 4.2         | LOS A            | 0.2                   | 1.5      | 0.15      | 0.12                | 0.15             | 46.2        |
| 11                           | T1   | 302           | 5.0    | 302                | 5.0 | 0.222     | 0.3         | LOS A            | 0.2                   | 1.5      | 0.15      | 0.12                | 0.15             | 31.3        |
| 12                           | R2   | 43            | 0.0    | 43                 | 0.0 | 0.222     | 5.2         | LOS A            | 0.2                   | 1.5      | 0.15      | 0.12                | 0.15             | 38.4        |
| Approach                     |      | 403           | 3.7    | 403                | 3.7 | 0.222     | 1.4         | NA               | 0.2                   | 1.5      | 0.15      | 0.12                | 0.15             | 39.1        |
| All Vehicles                 |      | 812           | 3.7    | 812                | 3.7 | 0.222     | 1.6         | NA               | 0.2                   | 1.5      | 0.15      | 0.13                | 0.15             | 39.4        |

## MOVEMENT SUMMARY

Site: 3 [Gngangara Drive Entry Only (Site Folder: PM Peak - With School)]

Network: N101 [PM Peak - With School (Network Folder: General)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
|------------------------------|------|---------------|--------|--------------------|-----|-----------|-------------|------------------|-----------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | DEMAND FLOWS  |        | ARRIVAL FLOWS      |     | Deg. Satn | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV ] % | [ Total HV ] veh/h | %   |           |             |                  | [ Veh. veh            | Dist ] m |           |                     |                  |             |
| East: Gngangara Drive        |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 4                            | L2   | 55            | 0.0    | 55                 | 0.0 | 0.219     | 4.1         | LOS A            | 0.1                   | 0.9      | 0.10      | 0.09                | 0.10             | 39.4        |
| 5                            | T1   | 325           | 5.0    | 325                | 5.0 | 0.219     | 0.2         | LOS A            | 0.1                   | 0.9      | 0.10      | 0.09                | 0.10             | 35.0        |
| 6                            | R2   | 24            | 0.0    | 24                 | 0.0 | 0.219     | 5.3         | LOS A            | 0.1                   | 0.9      | 0.10      | 0.09                | 0.10             | 45.6        |
| Approach                     |      | 404           | 4.0    | 404                | 4.0 | 0.219     | 1.0         | NA               | 0.1                   | 0.9      | 0.10      | 0.09                | 0.10             | 38.6        |
| North: Colville Street       |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 7                            | L2   | 28            | 0.0    | 28                 | 0.0 | 0.084     | 5.7         | LOS A            | 0.1                   | 0.8      | 0.49      | 0.69                | 0.49             | 40.9        |
| 8                            | T1   | 1             | 0.0    | 1                  | 0.0 | 0.084     | 8.7         | LOS A            | 0.1                   | 0.8      | 0.49      | 0.69                | 0.49             | 40.6        |
| 9                            | R2   | 25            | 0.0    | 25                 | 0.0 | 0.084     | 11.1        | LOS B            | 0.1                   | 0.8      | 0.49      | 0.69                | 0.49             | 40.9        |
| Approach                     |      | 54            | 0.0    | 54                 | 0.0 | 0.084     | 8.2         | LOS A            | 0.1                   | 0.8      | 0.49      | 0.69                | 0.49             | 40.9        |
| West: Gngangara Drive        |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 10                           | L2   | 58            | 0.0    | 58                 | 0.0 | 0.268     | 4.8         | LOS A            | 0.4                   | 2.7      | 0.25      | 0.15                | 0.25             | 45.6        |
| 11                           | T1   | 329           | 5.0    | 329                | 5.0 | 0.268     | 0.6         | LOS A            | 0.4                   | 2.7      | 0.25      | 0.15                | 0.25             | 29.0        |
| 12                           | R2   | 79            | 0.0    | 79                 | 0.0 | 0.268     | 5.6         | LOS A            | 0.4                   | 2.7      | 0.25      | 0.15                | 0.25             | 38.0        |
| Approach                     |      | 466           | 3.5    | 466                | 3.5 | 0.268     | 1.9         | NA               | 0.4                   | 2.7      | 0.25      | 0.15                | 0.25             | 37.7        |
| All Vehicles                 |      | 924           | 3.5    | 924                | 3.5 | 0.268     | 1.9         | NA               | 0.4                   | 2.7      | 0.20      | 0.15                | 0.20             | 38.4        |



## MOVEMENT SUMMARY

Site: 4 [Gnangara Drive Exit Only (Site Folder: PM Peak - Existing)]

Network: N101 [PM Peak - Existing (Network Folder: General)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
|------------------------------|------|---------------|--------|--------------------|-----|-----------|-------------|------------------|-----------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | DEMAND FLOWS  |        | ARRIVAL FLOWS      |     | Deg. Satn | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV ] % | [ Total HV ] veh/h | %   |           |             |                  | [ Veh. veh            | Dist ] m |           |                     |                  |             |
| South: School Exit           |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 1                            | L2   | 114           | 0.0    | 114                | 0.0 | 0.123     | 4.6         | LOS A            | 0.2                   | 1.3      | 0.41      | 0.58                | 0.41             | 38.0        |
| 3                            | R2   | 18            | 0.0    | 18                 | 0.0 | 0.123     | 7.8         | LOS A            | 0.2                   | 1.3      | 0.41      | 0.58                | 0.41             | 36.0        |
| Approach                     |      | 132           | 0.0    | 132                | 0.0 | 0.123     | 5.0         | LOS A            | 0.2                   | 1.3      | 0.41      | 0.58                | 0.41             | 37.9        |
| East: Gnangara Drive         |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 5                            | T1   | 323           | 5.0    | 323                | 5.0 | 0.169     | 0.0         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.00                | 0.00             | 40.0        |
| Approach                     |      | 323           | 5.0    | 323                | 5.0 | 0.169     | 0.0         | NA               | 0.0                   | 0.0      | 0.00      | 0.00                | 0.00             | 40.0        |
| West: Gnangara Drive         |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 11                           | T1   | 386           | 5.0    | 386                | 5.0 | 0.202     | 0.1         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| Approach                     |      | 386           | 5.0    | 386                | 5.0 | 0.202     | 0.1         | NA               | 0.0                   | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| All Vehicles                 |      | 841           | 4.2    | 841                | 4.2 | 0.202     | 0.8         | NA               | 0.2                   | 1.3      | 0.06      | 0.09                | 0.06             | 39.4        |

## MOVEMENT SUMMARY

Site: 4 [Gnangara Drive Exit Only (Site Folder: PM Peak - With School)]

Network: N101 [PM Peak - With School (Network Folder: General)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
|------------------------------|------|---------------|--------|--------------------|-----|-----------|-------------|------------------|-----------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | DEMAND FLOWS  |        | ARRIVAL FLOWS      |     | Deg. Satn | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV ] % | [ Total HV ] veh/h | %   | v/c       | sec         |                  | [ Veh. veh            | Dist ] m |           |                     |                  | km/h        |
| South: School Exit           |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 1                            | L2   | 169           | 0.0    | 169                | 0.0 | 0.192     | 4.8         | LOS A            | 0.3                   | 2.2      | 0.45      | 0.62                | 0.45             | 37.9        |
| 3                            | R2   | 27            | 0.0    | 27                 | 0.0 | 0.192     | 8.9         | LOS A            | 0.3                   | 2.2      | 0.45      | 0.62                | 0.45             | 35.8        |
| Approach                     |      | 196           | 0.0    | 196                | 0.0 | 0.192     | 5.4         | LOS A            | 0.3                   | 2.2      | 0.45      | 0.62                | 0.45             | 37.8        |
| East: Gngangara Drive        |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 5                            | T1   | 347           | 5.0    | 347                | 5.0 | 0.182     | 0.0         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| Approach                     |      | 347           | 5.0    | 347                | 5.0 | 0.182     | 0.0         | NA               | 0.0                   | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| West: Gngangara Drive        |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 11                           | T1   | 440           | 5.0    | 440                | 5.0 | 0.231     | 0.1         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| Approach                     |      | 440           | 5.0    | 440                | 5.0 | 0.231     | 0.1         | NA               | 0.0                   | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| All Vehicles                 |      | 983           | 4.0    | 983                | 4.0 | 0.231     | 1.1         | NA               | 0.3                   | 2.2      | 0.09      | 0.12                | 0.09             | 39.2        |

## MOVEMENT SUMMARY

Site: 1 [Gngangara Drive / Oakwood Crescent (Site Folder: AM Peak - 2031)]

Network: N101 [AM Peak - 2031 (Network Folder: General)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
|------------------------------|------|---------------|--------|--------------------|-----|-----------|-------------|------------------|-----------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | DEMAND FLOWS  |        | ARRIVAL FLOWS      |     | Deg. Satn | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV ] % | [ Total HV ] veh/h | %   | v/c       | sec         |                  | [ Veh. veh            | Dist ] m |           |                     |                  | km/h        |
| South: Oakwood Crescent      |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 1                            | L2   | 104           | 0.0    | 104                | 0.0 | 0.179     | 5.6         | LOS A            | 0.3                   | 1.8      | 0.54      | 0.71                | 0.54             | 35.0        |
| 3                            | R2   | 36            | 0.0    | 36                 | 0.0 | 0.179     | 9.4         | LOS A            | 0.3                   | 1.8      | 0.54      | 0.71                | 0.54             | 37.2        |
| Approach                     |      | 140           | 0.0    | 140                | 0.0 | 0.179     | 6.6         | LOS A            | 0.3                   | 1.8      | 0.54      | 0.71                | 0.54             | 35.9        |
| East: Gngangara Drive        |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 4                            | L2   | 33            | 0.0    | 33                 | 0.0 | 0.281     | 3.5         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.03                | 0.00             | 40.0        |
| 5                            | T1   | 502           | 5.0    | 502                | 5.0 | 0.281     | 0.1         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.03                | 0.00             | 39.7        |
| Approach                     |      | 535           | 4.7    | 535                | 4.7 | 0.281     | 0.3         | NA               | 0.0                   | 0.0      | 0.00      | 0.03                | 0.00             | 39.7        |
| West: Gngangara Drive        |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 11                           | T1   | 288           | 5.0    | 288                | 5.0 | 0.217     | 0.9         | LOS A            | 0.3                   | 2.2      | 0.28      | 0.12                | 0.28             | 38.5        |
| 12                           | R2   | 67            | 0.0    | 67                 | 0.0 | 0.217     | 6.3         | LOS A            | 0.3                   | 2.2      | 0.28      | 0.12                | 0.28             | 38.2        |
| Approach                     |      | 355           | 4.1    | 355                | 4.1 | 0.217     | 2.0         | NA               | 0.3                   | 2.2      | 0.28      | 0.12                | 0.28             | 38.4        |
| All Vehicles                 |      | 1030          | 3.8    | 1030               | 3.8 | 0.281     | 1.7         | NA               | 0.3                   | 2.2      | 0.17      | 0.15                | 0.17             | 38.6        |

## MOVEMENT SUMMARY

Site: 1 [Gngangara Drive / Oakwood Crescent (Site Folder: AM Peak - 2031 With School)]

Network: N101 [AM Peak - 2031 With School (Network Folder: General)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
|------------------------------|------|---------------|--------|--------------------|-----|-----------|-------------|------------------|-----------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | DEMAND FLOWS  |        | ARRIVAL FLOWS      |     | Deg. Satn | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV ] % | [ Total HV ] veh/h | %   | v/c       | sec         |                  | [ Veh. veh            | Dist ] m |           |                     |                  | km/h        |
| South: Oakwood Crescent      |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 1                            | L2   | 104           | 0.0    | 104                | 0.0 | 0.197     | 6.0         | LOS A            | 0.3                   | 2.0      | 0.57      | 0.75                | 0.57             | 34.6        |
| 3                            | R2   | 36            | 0.0    | 36                 | 0.0 | 0.197     | 10.7        | LOS B            | 0.3                   | 2.0      | 0.57      | 0.75                | 0.57             | 36.9        |
| Approach                     |      | 140           | 0.0    | 140                | 0.0 | 0.197     | 7.2         | LOS A            | 0.3                   | 2.0      | 0.57      | 0.75                | 0.57             | 35.5        |
| East: Gngangara Drive        |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 4                            | L2   | 33            | 0.0    | 33                 | 0.0 | 0.311     | 3.5         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.03                | 0.00             | 40.0        |
| 5                            | T1   | 559           | 5.0    | 559                | 5.0 | 0.311     | 0.1         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.03                | 0.00             | 39.7        |
| Approach                     |      | 592           | 4.7    | 592                | 4.7 | 0.311     | 0.3         | NA               | 0.0                   | 0.0      | 0.00      | 0.03                | 0.00             | 39.7        |
| West: Gngangara Drive        |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 11                           | T1   | 321           | 5.0    | 321                | 5.0 | 0.240     | 1.1         | LOS A            | 0.3                   | 2.5      | 0.28      | 0.11                | 0.28             | 38.4        |
| 12                           | R2   | 67            | 0.0    | 67                 | 0.0 | 0.240     | 6.9         | LOS A            | 0.3                   | 2.5      | 0.28      | 0.11                | 0.28             | 38.1        |
| Approach                     |      | 388           | 4.1    | 388                | 4.1 | 0.240     | 2.1         | NA               | 0.3                   | 2.5      | 0.28      | 0.11                | 0.28             | 38.4        |
| All Vehicles                 |      | 1120          | 3.9    | 1120               | 3.9 | 0.311     | 1.8         | NA               | 0.3                   | 2.5      | 0.17      | 0.15                | 0.17             | 38.6        |

## MOVEMENT SUMMARY

Site: 2 [Gngara Drive Access 1 (Site Folder: AM Peak - 2031)]

Network: N101 [AM Peak - 2031 (Network Folder: General)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
|------------------------------|------|---------------|--------|--------------------|-----|-----------|-------------|------------------|-----------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | DEMAND FLOWS  |        | ARRIVAL FLOWS      |     | Deg. Satn | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV ] % | [ Total HV ] veh/h | %   | v/c       | sec         |                  | [ Veh. veh            | Dist ] m |           |                     |                  | km/h        |
| South: School Access 1       |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 1                            | L2   | 21            | 0.0    | 21                 | 0.0 | 0.077     | 5.8         | LOS A            | 0.1                   | 0.7      | 0.59      | 0.74                | 0.59             | 34.0        |
| 3                            | R2   | 23            | 0.0    | 23                 | 0.0 | 0.077     | 10.2        | LOS B            | 0.1                   | 0.7      | 0.59      | 0.74                | 0.59             | 34.0        |
| Approach                     |      | 44            | 0.0    | 44                 | 0.0 | 0.077     | 8.1         | LOS A            | 0.1                   | 0.7      | 0.59      | 0.74                | 0.59             | 34.0        |
| East: Gngara Drive           |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 4                            | L2   | 78            | 0.0    | 78                 | 0.0 | 0.335     | 3.4         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.06                | 0.00             | 39.8        |
| 5                            | T1   | 559           | 5.0    | 559                | 5.0 | 0.335     | 0.0         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.06                | 0.00             | 37.0        |
| Approach                     |      | 637           | 4.4    | 637                | 4.4 | 0.335     | 0.4         | NA               | 0.0                   | 0.0      | 0.00      | 0.06                | 0.00             | 38.5        |
| West: Gngara Drive           |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 11                           | T1   | 352           | 5.0    | 352                | 5.0 | 0.208     | 0.4         | LOS A            | 0.1                   | 0.9      | 0.10      | 0.03                | 0.10             | 36.2        |
| 12                           | R2   | 21            | 0.0    | 21                 | 0.0 | 0.208     | 7.3         | LOS A            | 0.1                   | 0.9      | 0.10      | 0.03                | 0.10             | 39.1        |
| Approach                     |      | 373           | 4.7    | 373                | 4.7 | 0.208     | 0.8         | NA               | 0.1                   | 0.9      | 0.10      | 0.03                | 0.10             | 37.0        |
| All Vehicles                 |      | 1054          | 4.3    | 1054               | 4.3 | 0.335     | 0.9         | NA               | 0.1                   | 0.9      | 0.06      | 0.08                | 0.06             | 37.3        |

## MOVEMENT SUMMARY

Site: 2 [Gngara Drive Access 1 (Site Folder: AM Peak - 2031 With School)]

Network: N101 [AM Peak - 2031 With School (Network Folder: General)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
|------------------------------|------|---------------|--------|--------------------|-----|-----------|-------------|------------------|-----------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | DEMAND FLOWS  |        | ARRIVAL FLOWS      |     | Deg. Satn | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV ] % | [ Total HV ] veh/h | %   |           |             |                  | [ Veh. veh            | Dist ] m |           |                     |                  |             |
| South: School Access 1       |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 1                            | L2   | 31            | 0.0    | 31                 | 0.0 | 0.127     | 6.0         | LOS A            | 0.2                   | 1.2      | 0.63      | 0.78                | 0.63             | 33.5        |
| 3                            | R2   | 35            | 0.0    | 35                 | 0.0 | 0.127     | 11.5        | LOS B            | 0.2                   | 1.2      | 0.63      | 0.78                | 0.63             | 33.5        |
| Approach                     |      | 66            | 0.0    | 66                 | 0.0 | 0.127     | 8.9         | LOS A            | 0.2                   | 1.2      | 0.63      | 0.78                | 0.63             | 33.5        |
| East: Gngara Drive           |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 4                            | L2   | 108           | 0.0    | 108                | 0.0 | 0.365     | 3.4         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.07                | 0.00             | 39.7        |
| 5                            | T1   | 586           | 5.0    | 586                | 5.0 | 0.365     | 0.0         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.07                | 0.00             | 36.2        |
| Approach                     |      | 694           | 4.2    | 694                | 4.2 | 0.365     | 0.5         | NA               | 0.0                   | 0.0      | 0.00      | 0.07                | 0.00             | 38.3        |
| West: Gngara Drive           |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 11                           | T1   | 373           | 5.0    | 373                | 5.0 | 0.232     | 0.7         | LOS A            | 0.2                   | 1.4      | 0.14      | 0.04                | 0.15             | 34.6        |
| 12                           | R2   | 29            | 0.0    | 29                 | 0.0 | 0.232     | 8.0         | LOS A            | 0.2                   | 1.4      | 0.14      | 0.04                | 0.15             | 38.9        |
| Approach                     |      | 402           | 4.6    | 402                | 4.6 | 0.232     | 1.2         | NA               | 0.2                   | 1.4      | 0.14      | 0.04                | 0.15             | 36.0        |
| All Vehicles                 |      | 1162          | 4.1    | 1162               | 4.1 | 0.365     | 1.2         | NA               | 0.2                   | 1.4      | 0.09      | 0.10                | 0.09             | 36.7        |



## MOVEMENT SUMMARY

▼ Site: 3 [Gnangara Drive Entry Only (Site Folder: AM Peak - 2031)]

■ Network: N101 [AM Peak - 2031 (Network Folder: General)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |      |                    |     |           |             |                  |                       |          |           |                     |                  |             |
|------------------------------|------|---------------|------|--------------------|-----|-----------|-------------|------------------|-----------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | DEMAND FLOWS  |      | ARRIVAL FLOWS      |     | Deg. Satn | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV % | [ Total HV ] veh/h | %   | v/c       | sec         |                  | [ Veh. veh            | Dist ] m |           |                     |                  | km/h        |
| East: Gnangara Drive         |      |               |      |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 4                            | L2   | 71            | 0.0  | 71                 | 0.0 | 0.275     | 3.8         | LOS A            | 0.1                   | 0.7      | 0.06      | 0.08                | 0.06             | 39.6        |
| 5                            | T1   | 430           | 5.0  | 430                | 5.0 | 0.275     | 0.1         | LOS A            | 0.1                   | 0.7      | 0.06      | 0.08                | 0.06             | 36.2        |
| 6                            | R2   | 15            | 0.0  | 15                 | 0.0 | 0.275     | 5.5         | LOS A            | 0.1                   | 0.7      | 0.06      | 0.08                | 0.06             | 45.9        |
| Approach                     |      | 516           | 4.2  | 516                | 4.2 | 0.275     | 0.8         | NA               | 0.1                   | 0.7      | 0.06      | 0.08                | 0.06             | 38.6        |
| North: Colville Street       |      |               |      |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 7                            | L2   | 16            | 0.0  | 16                 | 0.0 | 0.063     | 5.8         | LOS A            | 0.1                   | 0.6      | 0.54      | 0.71                | 0.54             | 39.8        |
| 8                            | T1   | 1             | 0.0  | 1                  | 0.0 | 0.063     | 10.6        | LOS B            | 0.1                   | 0.6      | 0.54      | 0.71                | 0.54             | 40.0        |
| 9                            | R2   | 16            | 0.0  | 16                 | 0.0 | 0.063     | 13.1        | LOS B            | 0.1                   | 0.6      | 0.54      | 0.71                | 0.54             | 39.8        |
| Approach                     |      | 33            | 0.0  | 33                 | 0.0 | 0.063     | 9.5         | LOS A            | 0.1                   | 0.6      | 0.54      | 0.71                | 0.54             | 39.8        |
| West: Gnangara Drive         |      |               |      |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 10                           | L2   | 19            | 0.0  | 19                 | 0.0 | 0.300     | 6.1         | LOS A            | 0.5                   | 3.9      | 0.34      | 0.16                | 0.36             | 45.2        |
| 11                           | T1   | 365           | 5.0  | 365                | 5.0 | 0.300     | 1.1         | LOS A            | 0.5                   | 3.9      | 0.34      | 0.16                | 0.36             | 27.3        |
| 12                           | R2   | 104           | 0.0  | 104                | 0.0 | 0.300     | 6.6         | LOS A            | 0.5                   | 3.9      | 0.34      | 0.16                | 0.36             | 37.7        |
| Approach                     |      | 488           | 3.7  | 488                | 3.7 | 0.300     | 2.5         | NA               | 0.5                   | 3.9      | 0.34      | 0.16                | 0.36             | 35.1        |
| All Vehicles                 |      | 1037          | 3.8  | 1037               | 3.8 | 0.300     | 1.9         | NA               | 0.5                   | 3.9      | 0.20      | 0.13                | 0.21             | 37.0        |

## MOVEMENT SUMMARY

▼ Site: 3 [Gnangara Drive Entry Only (Site Folder: AM Peak - 2031 With School)]

■ Network: N101 [AM Peak - 2031 With School (Network Folder: General)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |      |                    |     |           |             |                  |                       |          |           |                     |                  |             |
|------------------------------|------|---------------|------|--------------------|-----|-----------|-------------|------------------|-----------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | DEMAND FLOWS  |      | ARRIVAL FLOWS      |     | Deg. Satn | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV % | [ Total HV ] veh/h | %   | v/c       | sec         |                  | [ Veh. veh            | Dist ] m |           |                     |                  | km/h        |
| East: Gnangara Drive         |      |               |      |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 4                            | L2   | 98            | 0.0  | 98                 | 0.0 | 0.296     | 3.8         | LOS A            | 0.1                   | 0.7      | 0.06      | 0.09                | 0.06             | 39.5        |
| 5                            | T1   | 440           | 5.0  | 440                | 5.0 | 0.296     | 0.1         | LOS A            | 0.1                   | 0.7      | 0.06      | 0.09                | 0.06             | 35.6        |
| 6                            | R2   | 15            | 0.0  | 15                 | 0.0 | 0.296     | 5.8         | LOS A            | 0.1                   | 0.7      | 0.06      | 0.09                | 0.06             | 45.8        |
| Approach                     |      | 553           | 4.0  | 553                | 4.0 | 0.296     | 0.9         | NA               | 0.1                   | 0.7      | 0.06      | 0.09                | 0.06             | 38.4        |
| North: Colville Street       |      |               |      |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 7                            | L2   | 16            | 0.0  | 16                 | 0.0 | 0.071     | 6.0         | LOS A            | 0.1                   | 0.6      | 0.57      | 0.73                | 0.57             | 39.0        |
| 8                            | T1   | 1             | 0.0  | 1                  | 0.0 | 0.071     | 12.3        | LOS B            | 0.1                   | 0.6      | 0.57      | 0.73                | 0.57             | 39.6        |
| 9                            | R2   | 16            | 0.0  | 16                 | 0.0 | 0.071     | 14.8        | LOS B            | 0.1                   | 0.6      | 0.57      | 0.73                | 0.57             | 39.0        |
| Approach                     |      | 33            | 0.0  | 33                 | 0.0 | 0.071     | 10.5        | LOS B            | 0.1                   | 0.6      | 0.57      | 0.73                | 0.57             | 39.0        |
| West: Gnangara Drive         |      |               |      |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 10                           | L2   | 19            | 0.0  | 19                 | 0.0 | 0.359     | 6.8         | LOS A            | 0.9                   | 6.3      | 0.42      | 0.21                | 0.51             | 44.3        |
| 11                           | T1   | 394           | 5.0  | 394                | 5.0 | 0.359     | 1.8         | LOS A            | 0.9                   | 6.3      | 0.42      | 0.21                | 0.51             | 24.6        |
| 12                           | R2   | 144           | 0.0  | 144                | 0.0 | 0.359     | 7.3         | LOS A            | 0.9                   | 6.3      | 0.42      | 0.21                | 0.51             | 37.0        |
| Approach                     |      | 557           | 3.5  | 557                | 3.5 | 0.359     | 3.4         | NA               | 0.9                   | 6.3      | 0.42      | 0.21                | 0.51             | 34.0        |
| All Vehicles                 |      | 1143          | 3.6  | 1143               | 3.6 | 0.359     | 2.4         | NA               | 0.9                   | 6.3      | 0.25      | 0.17                | 0.29             | 36.2        |

## MOVEMENT SUMMARY

Site: 4 [Gnangara Drive Exit Only (Site Folder: AM Peak - 2031)]

Network: N101 [AM Peak - 2031 (Network Folder: General)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
|------------------------------|------|---------------|--------|--------------------|-----|-----------|-------------|------------------|-----------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | DEMAND FLOWS  |        | ARRIVAL FLOWS      |     | Deg. Satn | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV ] % | [ Total HV ] veh/h | %   |           |             |                  | [ Veh. veh            | Dist ] m |           |                     |                  |             |
| South: School Exit           |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 1                            | L2   | 128           | 0.0    | 128                | 0.0 | 0.270     | 6.1         | LOS A            | 0.4                   | 3.0      | 0.59      | 0.79                | 0.66             | 36.8        |
| 3                            | R2   | 44            | 0.0    | 44                 | 0.0 | 0.270     | 15.0        | LOS B            | 0.4                   | 3.0      | 0.59      | 0.79                | 0.66             | 33.9        |
| Approach                     |      | 172           | 0.0    | 172                | 0.0 | 0.270     | 8.4         | LOS A            | 0.4                   | 3.0      | 0.59      | 0.79                | 0.66             | 36.3        |
| East: Gnangara Drive         |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 5                            | T1   | 522           | 5.0    | 522                | 5.0 | 0.274     | 0.0         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| Approach                     |      | 522           | 5.0    | 522                | 5.0 | 0.274     | 0.0         | NA               | 0.0                   | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| West: Gnangara Drive         |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 11                           | T1   | 638           | 5.0    | 638                | 5.0 | 0.334     | 0.1         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| Approach                     |      | 638           | 5.0    | 638                | 5.0 | 0.334     | 0.1         | NA               | 0.0                   | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| All Vehicles                 |      | 1332          | 4.4    | 1332               | 4.4 | 0.334     | 1.2         | NA               | 0.4                   | 3.0      | 0.08      | 0.10                | 0.09             | 39.1        |

## MOVEMENT SUMMARY

Site: 4 [Gnangara Drive Exit Only (Site Folder: AM Peak - 2031 With School)]

Network: N101 [AM Peak - 2031 With School (Network Folder: General)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |        |               |        |           |             |                  |                       |          |           |                     |                  |             |
|------------------------------|------|---------------|--------|---------------|--------|-----------|-------------|------------------|-----------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | DEMAND FLOWS  |        | ARRIVAL FLOWS |        | Deg. Satn | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV ] % | [ Total veh/h | HV ] % | v/c       | sec         |                  | [ Veh. veh            | Dist ] m |           |                     |                  | km/h        |
| South: School Exit           |      |               |        |               |        |           |             |                  |                       |          |           |                     |                  |             |
| 1                            | L2   | 190           | 0.0    | 190           | 0.0    | 0.426     | 7.5         | LOS A            | 0.8                   | 5.8      | 0.65      | 0.94                | 0.92             | 36.1        |
| 3                            | R2   | 65            | 0.0    | 65            | 0.0    | 0.426     | 18.5        | LOS C            | 0.8                   | 5.8      | 0.65      | 0.94                | 0.92             | 32.7        |
| Approach                     |      | 255           | 0.0    | 255           | 0.0    | 0.426     | 10.3        | LOS B            | 0.8                   | 5.8      | 0.65      | 0.94                | 0.92             | 35.5        |
| East: Gnangara Drive         |      |               |        |               |        |           |             |                  |                       |          |           |                     |                  |             |
| 5                            | T1   | 532           | 5.0    | 532           | 5.0    | 0.279     | 0.0         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| Approach                     |      | 532           | 5.0    | 532           | 5.0    | 0.279     | 0.0         | NA               | 0.0                   | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| West: Gnangara Drive         |      |               |        |               |        |           |             |                  |                       |          |           |                     |                  |             |
| 11                           | T1   | 686           | 5.0    | 686           | 5.0    | 0.359     | 0.2         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| Approach                     |      | 686           | 5.0    | 686           | 5.0    | 0.359     | 0.2         | NA               | 0.0                   | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| All Vehicles                 |      | 1473          | 4.1    | 1473          | 4.1    | 0.426     | 1.9         | NA               | 0.8                   | 5.8      | 0.11      | 0.16                | 0.16             | 38.7        |

## MOVEMENT SUMMARY

Site: 1 [Gngara Drive / Oakwood Crescent (Site Folder: PM Peak - 2031)]

Network: N101 [PM Peak - 2031 (Network Folder: General)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |      |                    |     |           |             |                  |                       |          |           |                     |                  |             |
|------------------------------|------|---------------|------|--------------------|-----|-----------|-------------|------------------|-----------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | DEMAND FLOWS  |      | ARRIVAL FLOWS      |     | Deg. Satn | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV % | [ Total HV ] veh/h | %   | v/c       | sec         |                  | [ Veh. veh            | Dist ] m |           |                     |                  | km/h        |
| South: Oakwood Crescent      |      |               |      |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 1                            | L2   | 77            | 0.0  | 77                 | 0.0 | 0.178     | 5.3         | LOS A            | 0.3                   | 1.8      | 0.54      | 0.71                | 0.54             | 34.6        |
| 3                            | R2   | 47            | 0.0  | 47                 | 0.0 | 0.178     | 10.2        | LOS B            | 0.3                   | 1.8      | 0.54      | 0.71                | 0.54             | 37.0        |
| Approach                     |      | 124           | 0.0  | 124                | 0.0 | 0.178     | 7.2         | LOS A            | 0.3                   | 1.8      | 0.54      | 0.71                | 0.54             | 35.9        |
| East: Gngara Drive           |      |               |      |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 4                            | L2   | 42            | 0.0  | 42                 | 0.0 | 0.264     | 3.5         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.04                | 0.00             | 39.9        |
| 5                            | T1   | 462           | 5.0  | 462                | 5.0 | 0.264     | 0.1         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.04                | 0.00             | 39.7        |
| Approach                     |      | 504           | 4.6  | 504                | 4.6 | 0.264     | 0.4         | NA               | 0.0                   | 0.0      | 0.00      | 0.04                | 0.00             | 39.7        |
| West: Gngara Drive           |      |               |      |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 11                           | T1   | 401           | 5.0  | 401                | 5.0 | 0.277     | 0.7         | LOS A            | 0.3                   | 2.5      | 0.23      | 0.09                | 0.23             | 38.8        |
| 12                           | R2   | 70            | 0.0  | 70                 | 0.0 | 0.277     | 6.3         | LOS A            | 0.3                   | 2.5      | 0.23      | 0.09                | 0.23             | 38.5        |
| Approach                     |      | 471           | 4.3  | 471                | 4.3 | 0.277     | 1.6         | NA               | 0.3                   | 2.5      | 0.23      | 0.09                | 0.23             | 38.7        |
| All Vehicles                 |      | 1099          | 3.9  | 1099               | 3.9 | 0.277     | 1.7         | NA               | 0.3                   | 2.5      | 0.16      | 0.14                | 0.16             | 38.7        |

## MOVEMENT SUMMARY

Site: 1 [Gngara Drive / Oakwood Crescent (Site Folder: PM Peak - 2031 With School)]

Network: N101 [PM Peak - 2031 With School (Network Folder: General)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |      |                    |     |           |             |                  |                       |            |           |                     |                  |             |
|------------------------------|------|---------------|------|--------------------|-----|-----------|-------------|------------------|-----------------------|------------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | DEMAND FLOWS  |      | ARRIVAL FLOWS      |     | Deg. Satn | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE |            | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV % | [ Total HV ] veh/h | %   | v/c       |             |                  | sec                   | [ Veh. veh |           |                     |                  |             |
| South: Oakwood Crescent      |      |               |      |                    |     |           |             |                  |                       |            |           |                     |                  |             |
| 1                            | L2   | 77            | 0.0  | 77                 | 0.0 | 0.196     | 5.7         | LOS A            | 0.3                   | 1.9        | 0.57      | 0.74                | 0.57             | 34.2        |
| 3                            | R2   | 47            | 0.0  | 47                 | 0.0 | 0.196     | 11.3        | LOS B            | 0.3                   | 1.9        | 0.57      | 0.74                | 0.57             | 36.7        |
| Approach                     |      | 124           | 0.0  | 124                | 0.0 | 0.196     | 7.8         | LOS A            | 0.3                   | 1.9        | 0.57      | 0.74                | 0.57             | 35.5        |
| East: Gngara Drive           |      |               |      |                    |     |           |             |                  |                       |            |           |                     |                  |             |
| 4                            | L2   | 42            | 0.0  | 42                 | 0.0 | 0.291     | 3.5         | LOS A            | 0.0                   | 0.0        | 0.00      | 0.04                | 0.00             | 39.9        |
| 5                            | T1   | 513           | 5.0  | 513                | 5.0 | 0.291     | 0.1         | LOS A            | 0.0                   | 0.0        | 0.00      | 0.04                | 0.00             | 39.7        |
| Approach                     |      | 555           | 4.6  | 555                | 4.6 | 0.291     | 0.4         | NA               | 0.0                   | 0.0        | 0.00      | 0.04                | 0.00             | 39.7        |
| West: Gngara Drive           |      |               |      |                    |     |           |             |                  |                       |            |           |                     |                  |             |
| 11                           | T1   | 427           | 5.0  | 427                | 5.0 | 0.295     | 0.9         | LOS A            | 0.4                   | 2.9        | 0.24      | 0.09                | 0.26             | 38.7        |
| 12                           | R2   | 70            | 0.0  | 70                 | 0.0 | 0.295     | 6.9         | LOS A            | 0.4                   | 2.9        | 0.24      | 0.09                | 0.26             | 38.4        |
| Approach                     |      | 497           | 4.3  | 497                | 4.3 | 0.295     | 1.7         | NA               | 0.4                   | 2.9        | 0.24      | 0.09                | 0.26             | 38.6        |
| All Vehicles                 |      | 1176          | 4.0  | 1176               | 4.0 | 0.295     | 1.7         | NA               | 0.4                   | 2.9        | 0.16      | 0.13                | 0.17             | 38.7        |



## MOVEMENT SUMMARY

Site: 2 [Gngangara Drive Access 1 (Site Folder: PM Peak - 2031)]

Network: N101 [PM Peak - 2031 (Network Folder: General)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |      |               |      |           |             |                  |                       |          |           |                     |                  |             |
|------------------------------|------|---------------|------|---------------|------|-----------|-------------|------------------|-----------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | DEMAND FLOWS  |      | ARRIVAL FLOWS |      | Deg. Satn | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV % | [ Total veh/h | HV % |           |             |                  | [ Veh. veh            | Dist ] m |           |                     |                  |             |
| South: School Access 1       |      |               |      |               |      |           |             |                  |                       |          |           |                     |                  |             |
| 1                            | L2   | 51            | 0.0  | 51            | 0.0  | 0.141     | 5.6         | LOS A            | 0.2                   | 1.3      | 0.57      | 0.73                | 0.57             | 34.2        |
| 3                            | R2   | 36            | 0.0  | 36            | 0.0  | 0.141     | 10.9        | LOS B            | 0.2                   | 1.3      | 0.57      | 0.73                | 0.57             | 34.2        |
| Approach                     |      | 87            | 0.0  | 87            | 0.0  | 0.141     | 7.8         | LOS A            | 0.2                   | 1.3      | 0.57      | 0.73                | 0.57             | 34.2        |
| East: Gngangara Drive        |      |               |      |               |      |           |             |                  |                       |          |           |                     |                  |             |
| 4                            | L2   | 31            | 0.0  | 31            | 0.0  | 0.286     | 3.4         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.03                | 0.00             | 40.0        |
| 5                            | T1   | 515           | 5.0  | 515           | 5.0  | 0.286     | 0.0         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.03                | 0.00             | 38.5        |
| Approach                     |      | 546           | 4.7  | 546           | 4.7  | 0.286     | 0.2         | NA               | 0.0                   | 0.0      | 0.00      | 0.03                | 0.00             | 39.0        |
| West: Gngangara Drive        |      |               |      |               |      |           |             |                  |                       |          |           |                     |                  |             |
| 11                           | T1   | 471           | 5.0  | 471           | 5.0  | 0.267     | 0.2         | LOS A            | 0.1                   | 0.8      | 0.07      | 0.02                | 0.07             | 37.5        |
| 12                           | R2   | 20            | 0.0  | 20            | 0.0  | 0.267     | 6.7         | LOS A            | 0.1                   | 0.8      | 0.07      | 0.02                | 0.07             | 39.4        |
| Approach                     |      | 491           | 4.8  | 491           | 4.8  | 0.267     | 0.5         | NA               | 0.1                   | 0.8      | 0.07      | 0.02                | 0.07             | 37.9        |
| All Vehicles                 |      | 1124          | 4.4  | 1124          | 4.4  | 0.286     | 0.9         | NA               | 0.2                   | 1.3      | 0.08      | 0.08                | 0.08             | 37.0        |

## MOVEMENT SUMMARY

Site: 2 [Gngangara Drive Access 1 (Site Folder: PM Peak - 2031 With School)]

Network: N101 [PM Peak - 2031 With School (Network Folder: General)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |      |               |      |           |             |                  |                       |          |           |                     |                  |             |
|------------------------------|------|---------------|------|---------------|------|-----------|-------------|------------------|-----------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | DEMAND FLOWS  |      | ARRIVAL FLOWS |      | Deg. Satn | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV % | [ Total veh/h | HV % | v/c       | sec         |                  | [ Veh. veh            | Dist ] m |           |                     |                  | km/h        |
| South: School Access 1       |      |               |      |               |      |           |             |                  |                       |          |           |                     |                  |             |
| 1                            | L2   | 75            | 0.0  | 75            | 0.0  | 0.224     | 6.0         | LOS A            | 0.3                   | 2.2      | 0.62      | 0.79                | 0.64             | 33.7        |
| 3                            | R2   | 53            | 0.0  | 53            | 0.0  | 0.224     | 12.5        | LOS B            | 0.3                   | 2.2      | 0.62      | 0.79                | 0.64             | 33.7        |
| Approach                     |      | 128           | 0.0  | 128           | 0.0  | 0.224     | 8.7         | LOS A            | 0.3                   | 2.2      | 0.62      | 0.79                | 0.64             | 33.7        |
| East: Gngangara Drive        |      |               |      |               |      |           |             |                  |                       |          |           |                     |                  |             |
| 4                            | L2   | 57            | 0.0  | 57            | 0.0  | 0.313     | 3.4         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.04                | 0.00             | 39.9        |
| 5                            | T1   | 540           | 5.0  | 540           | 5.0  | 0.313     | 0.0         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.04                | 0.00             | 37.6        |
| Approach                     |      | 597           | 4.5  | 597           | 4.5  | 0.313     | 0.3         | NA               | 0.0                   | 0.0      | 0.00      | 0.04                | 0.00             | 38.7        |
| West: Gngangara Drive        |      |               |      |               |      |           |             |                  |                       |          |           |                     |                  |             |
| 11                           | T1   | 480           | 5.0  | 480           | 5.0  | 0.293     | 0.5         | LOS A            | 0.2                   | 1.8      | 0.14      | 0.04                | 0.15             | 35.2        |
| 12                           | R2   | 38            | 0.0  | 38            | 0.0  | 0.293     | 7.3         | LOS A            | 0.2                   | 1.8      | 0.14      | 0.04                | 0.15             | 39.0        |
| Approach                     |      | 518           | 4.6  | 518           | 4.6  | 0.293     | 1.0         | NA               | 0.2                   | 1.8      | 0.14      | 0.04                | 0.15             | 36.4        |
| All Vehicles                 |      | 1243          | 4.1  | 1243          | 4.1  | 0.313     | 1.5         | NA               | 0.3                   | 2.2      | 0.12      | 0.12                | 0.13             | 36.1        |

## MOVEMENT SUMMARY

Site: 3 [Gngangara Drive Entry Only (Site Folder: PM Peak - 2031)]

Network: N101 [PM Peak - 2031 (Network Folder: General)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |      |               |      |           |             |                  |                       |          |           |                     |                  |             |
|------------------------------|------|---------------|------|---------------|------|-----------|-------------|------------------|-----------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | DEMAND FLOWS  |      | ARRIVAL FLOWS |      | Deg. Satn | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV % | [ Total veh/h | HV % |           |             |                  | [ Veh. veh            | Dist ] m |           |                     |                  |             |
| East: Gngangara Drive        |      |               |      |               |      |           |             |                  |                       |          |           |                     |                  |             |
| 4                            | L2   | 30            | 0.0  | 30            | 0.0  | 0.257     | 4.8         | LOS A            | 0.1                   | 1.1      | 0.10      | 0.05                | 0.10             | 39.6        |
| 5                            | T1   | 417           | 5.0  | 417           | 5.0  | 0.257     | 0.2         | LOS A            | 0.1                   | 1.1      | 0.10      | 0.05                | 0.10             | 36.1        |
| 6                            | R2   | 24            | 0.0  | 24            | 0.0  | 0.257     | 6.1         | LOS A            | 0.1                   | 1.1      | 0.10      | 0.05                | 0.10             | 45.9        |
| Approach                     |      | 471           | 4.4  | 471           | 4.4  | 0.257     | 0.8         | NA               | 0.1                   | 1.1      | 0.10      | 0.05                | 0.10             | 38.7        |
| North: Colville Street       |      |               |      |               |      |           |             |                  |                       |          |           |                     |                  |             |
| 7                            | L2   | 28            | 0.0  | 28            | 0.0  | 0.102     | 6.1         | LOS A            | 0.1                   | 0.9      | 0.56      | 0.73                | 0.56             | 39.7        |
| 8                            | T1   | 1             | 0.0  | 1             | 0.0  | 0.102     | 10.3        | LOS B            | 0.1                   | 0.9      | 0.56      | 0.73                | 0.56             | 40.0        |
| 9                            | R2   | 25            | 0.0  | 25            | 0.0  | 0.102     | 13.5        | LOS B            | 0.1                   | 0.9      | 0.56      | 0.73                | 0.56             | 39.7        |
| Approach                     |      | 54            | 0.0  | 54            | 0.0  | 0.102     | 9.6         | LOS A            | 0.1                   | 0.9      | 0.56      | 0.73                | 0.56             | 39.7        |
| West: Gngangara Drive        |      |               |      |               |      |           |             |                  |                       |          |           |                     |                  |             |
| 10                           | L2   | 58            | 0.0  | 58            | 0.0  | 0.288     | 4.7         | LOS A            | 0.3                   | 1.9      | 0.16      | 0.09                | 0.16             | 46.4        |
| 11                           | T1   | 418           | 5.0  | 418           | 5.0  | 0.288     | 0.4         | LOS A            | 0.3                   | 1.9      | 0.16      | 0.09                | 0.16             | 32.0        |
| 12                           | R2   | 43            | 0.0  | 43            | 0.0  | 0.288     | 6.2         | LOS A            | 0.3                   | 1.9      | 0.16      | 0.09                | 0.16             | 38.5        |
| Approach                     |      | 519           | 4.0  | 519           | 4.0  | 0.288     | 1.3         | NA               | 0.3                   | 1.9      | 0.16      | 0.09                | 0.16             | 38.7        |
| All Vehicles                 |      | 1044          | 4.0  | 1044          | 4.0  | 0.288     | 1.5         | NA               | 0.3                   | 1.9      | 0.15      | 0.11                | 0.15             | 38.8        |

## MOVEMENT SUMMARY

Site: 3 [Gngangara Drive Entry Only (Site Folder: PM Peak - 2031 With School)]

Network: N101 [PM Peak - 2031 With School (Network Folder: General)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |      |                    |     |           |             |                  |                       |          |           |                     |                  |             |
|------------------------------|------|---------------|------|--------------------|-----|-----------|-------------|------------------|-----------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | DEMAND FLOWS  |      | ARRIVAL FLOWS      |     | Deg. Satn | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV % | [ Total HV ] veh/h | %   |           |             |                  | [ Veh. veh            | Dist ] m |           |                     |                  |             |
| East: Gngangara Drive        |      |               |      |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 4                            | L2   | 55            | 0.0  | 55                 | 0.0 | 0.283     | 4.6         | LOS A            | 0.2                   | 1.2      | 0.10      | 0.07                | 0.11             | 39.5        |
| 5                            | T1   | 441           | 5.0  | 441                | 5.0 | 0.283     | 0.3         | LOS A            | 0.2                   | 1.2      | 0.10      | 0.07                | 0.11             | 35.3        |
| 6                            | R2   | 24            | 0.0  | 24                 | 0.0 | 0.283     | 6.4         | LOS A            | 0.2                   | 1.2      | 0.10      | 0.07                | 0.11             | 45.7        |
| Approach                     |      | 520           | 4.2  | 520                | 4.2 | 0.283     | 1.0         | NA               | 0.2                   | 1.2      | 0.10      | 0.07                | 0.11             | 38.3        |
| North: Colville Street       |      |               |      |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 7                            | L2   | 28            | 0.0  | 28                 | 0.0 | 0.116     | 6.3         | LOS A            | 0.2                   | 1.1      | 0.60      | 0.76                | 0.60             | 38.8        |
| 8                            | T1   | 1             | 0.0  | 1                  | 0.0 | 0.116     | 12.2        | LOS B            | 0.2                   | 1.1      | 0.60      | 0.76                | 0.60             | 39.5        |
| 9                            | R2   | 25            | 0.0  | 25                 | 0.0 | 0.116     | 15.5        | LOS C            | 0.2                   | 1.1      | 0.60      | 0.76                | 0.60             | 38.8        |
| Approach                     |      | 54            | 0.0  | 54                 | 0.0 | 0.116     | 10.7        | LOS B            | 0.2                   | 1.1      | 0.60      | 0.76                | 0.60             | 38.8        |
| West: Gngangara Drive        |      |               |      |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 10                           | L2   | 58            | 0.0  | 58                 | 0.0 | 0.338     | 5.7         | LOS A            | 0.5                   | 4.0      | 0.27      | 0.13                | 0.30             | 45.5        |
| 11                           | T1   | 445           | 5.0  | 445                | 5.0 | 0.338     | 0.8         | LOS A            | 0.5                   | 4.0      | 0.27      | 0.13                | 0.30             | 28.6        |
| 12                           | R2   | 79            | 0.0  | 79                 | 0.0 | 0.338     | 6.8         | LOS A            | 0.5                   | 4.0      | 0.27      | 0.13                | 0.30             | 37.9        |
| Approach                     |      | 582           | 3.8  | 582                | 3.8 | 0.338     | 2.1         | NA               | 0.5                   | 4.0      | 0.27      | 0.13                | 0.30             | 36.7        |
| All Vehicles                 |      | 1156          | 3.8  | 1156               | 3.8 | 0.338     | 2.0         | NA               | 0.5                   | 4.0      | 0.21      | 0.13                | 0.23             | 37.6        |

## MOVEMENT SUMMARY

Site: 4 [Gnangara Drive Exit Only (Site Folder: PM Peak - 2031)]

Network: N101 [PM Peak - 2031 (Network Folder: General)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |      |                    |     |           |             |                  |                       |          |           |                     |                  |             |
|------------------------------|------|---------------|------|--------------------|-----|-----------|-------------|------------------|-----------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | DEMAND FLOWS  |      | ARRIVAL FLOWS      |     | Deg. Satn | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV % | [ Total HV ] veh/h | %   |           |             |                  | [ Veh. veh            | Dist ] m |           |                     |                  |             |
| South: School Exit           |      |               |      |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 1                            | L2   | 114           | 0.0  | 114                | 0.0 | 0.151     | 5.3         | LOS A            | 0.2                   | 1.6      | 0.50      | 0.66                | 0.50             | 37.6        |
| 3                            | R2   | 18            | 0.0  | 18                 | 0.0 | 0.151     | 11.0        | LOS B            | 0.2                   | 1.6      | 0.50      | 0.66                | 0.50             | 35.4        |
| Approach                     |      | 132           | 0.0  | 132                | 0.0 | 0.151     | 6.0         | LOS A            | 0.2                   | 1.6      | 0.50      | 0.66                | 0.50             | 37.5        |
| East: Gngara Drive           |      |               |      |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 5                            | T1   | 447           | 5.0  | 447                | 5.0 | 0.234     | 0.0         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| Approach                     |      | 447           | 5.0  | 447                | 5.0 | 0.234     | 0.0         | NA               | 0.0                   | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| West: Gngara Drive           |      |               |      |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 11                           | T1   | 534           | 5.0  | 534                | 5.0 | 0.280     | 0.1         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| Approach                     |      | 534           | 5.0  | 534                | 5.0 | 0.280     | 0.1         | NA               | 0.0                   | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| All Vehicles                 |      | 1113          | 4.4  | 1113               | 4.4 | 0.280     | 0.8         | NA               | 0.2                   | 1.6      | 0.06      | 0.08                | 0.06             | 39.4        |

## MOVEMENT SUMMARY

Site: 4 [Gnangara Drive Exit Only (Site Folder: PM Peak - 2031 With School)]

Network: N101 [PM Peak - 2031 With School (Network Folder: General)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
|------------------------------|------|---------------|--------|--------------------|-----|-----------|-------------|------------------|-----------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | DEMAND FLOWS  |        | ARRIVAL FLOWS      |     | Deg. Satn | Aver. Delay | Level of Service | AVERAGE BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV ] % | [ Total HV ] veh/h | %   |           |             |                  | [ Veh. veh            | Dist ] m |           |                     |                  |             |
| South: School Exit           |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 1                            | L2   | 169           | 0.0    | 169                | 0.0 | 0.237     | 5.5         | LOS A            | 0.4                   | 2.6      | 0.54      | 0.70                | 0.54             | 37.5        |
| 3                            | R2   | 27            | 0.0    | 27                 | 0.0 | 0.237     | 12.8        | LOS B            | 0.4                   | 2.6      | 0.54      | 0.70                | 0.54             | 35.1        |
| Approach                     |      | 196           | 0.0    | 196                | 0.0 | 0.237     | 6.5         | LOS A            | 0.4                   | 2.6      | 0.54      | 0.70                | 0.54             | 37.3        |
| East: Gnangara Drive         |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 5                            | T1   | 471           | 5.0    | 471                | 5.0 | 0.247     | 0.0         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| Approach                     |      | 471           | 5.0    | 471                | 5.0 | 0.247     | 0.0         | NA               | 0.0                   | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| West: Gnangara Drive         |      |               |        |                    |     |           |             |                  |                       |          |           |                     |                  |             |
| 11                           | T1   | 588           | 5.0    | 588                | 5.0 | 0.308     | 0.1         | LOS A            | 0.0                   | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| Approach                     |      | 588           | 5.0    | 588                | 5.0 | 0.308     | 0.1         | NA               | 0.0                   | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| All Vehicles                 |      | 1255          | 4.2    | 1255               | 4.2 | 0.308     | 1.1         | NA               | 0.4                   | 2.6      | 0.08      | 0.11                | 0.08             | 39.2        |



## Appendix C - SIDRA Results with Gngangara Drive Modifications

### MOVEMENT SUMMARY

Site: 1v [Gngangara Drive / Oakwood Crescent (Site Folder: AM Peak - 2031 With School and Road Modifications)]

Site Category: -  
Roundabout

| Vehicle Movement Performance |      |               |        |               |        |           |             |                  |                   |          |           |                     |                  |             |
|------------------------------|------|---------------|--------|---------------|--------|-----------|-------------|------------------|-------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | INPUT VOLUMES |        | DEMAND FLOWS  |        | Deg. Satn | Aver. Delay | Level of Service | 95% BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV ] % | [ Total veh/h | HV ] % |           |             |                  | [ Veh. veh        | Dist ] m |           |                     |                  |             |
| South: Oakwood Crescent      |      |               |        |               |        |           |             |                  |                   |          |           |                     |                  |             |
| 1                            | L2   | 104           | 0.0    | 104           | 0.0    | 0.200     | 6.6         | LOS A            | 1.3               | 9.4      | 0.79      | 0.76                | 0.79             | 35.4        |
| 3                            | R2   | 36            | 0.0    | 36            | 0.0    | 0.200     | 10.5        | LOS B            | 1.3               | 9.4      | 0.79      | 0.76                | 0.79             | 38.4        |
| 3u                           | U    | 1             | 0.0    | 1             | 0.0    | 0.200     | 15.9        | LOS B            | 1.3               | 9.4      | 0.79      | 0.76                | 0.79             | 44.5        |
| Approach                     |      | 141           | 0.0    | 141           | 0.0    | 0.200     | 7.7         | LOS A            | 1.3               | 9.4      | 0.79      | 0.76                | 0.79             | 36.6        |
| East: Gngangara Drive        |      |               |        |               |        |           |             |                  |                   |          |           |                     |                  |             |
| 4                            | L2   | 33            | 0.0    | 33            | 0.0    | 0.509     | 3.3         | LOS A            | 4.2               | 30.4     | 0.59      | 0.43                | 0.59             | 38.4        |
| 5                            | T1   | 559           | 5.0    | 559           | 5.0    | 0.509     | 3.0         | LOS A            | 4.2               | 30.4     | 0.59      | 0.43                | 0.59             | 38.6        |
| 6u                           | U    | 1             | 0.0    | 1             | 0.0    | 0.509     | 12.6        | LOS B            | 4.2               | 30.4     | 0.59      | 0.43                | 0.59             | 46.1        |
| Approach                     |      | 593           | 4.7    | 593           | 4.7    | 0.509     | 3.1         | LOS A            | 4.2               | 30.4     | 0.59      | 0.43                | 0.59             | 38.6        |
| West: Gngangara Drive        |      |               |        |               |        |           |             |                  |                   |          |           |                     |                  |             |
| 11                           | T1   | 321           | 5.0    | 321           | 5.0    | 0.355     | 1.4         | LOS A            | 3.1               | 22.3     | 0.24      | 0.40                | 0.24             | 39.2        |
| 12                           | R2   | 67            | 0.0    | 67            | 0.0    | 0.355     | 5.7         | LOS A            | 3.1               | 22.3     | 0.24      | 0.40                | 0.24             | 39.9        |
| 12u                          | U    | 145           | 0.0    | 145           | 0.0    | 0.355     | 9.5         | LOS A            | 3.1               | 22.3     | 0.24      | 0.40                | 0.24             | 9.2         |
| Approach                     |      | 533           | 3.0    | 533           | 3.0    | 0.355     | 4.2         | LOS A            | 3.1               | 22.3     | 0.24      | 0.40                | 0.24             | 30.9        |
| All Vehicles                 |      | 1267          | 3.5    | 1267          | 3.5    | 0.509     | 4.0         | LOS A            | 4.2               | 30.4     | 0.46      | 0.45                | 0.46             | 35.2        |

## MOVEMENT SUMMARY

▽ Site: 2 [Gnangara Drive Access 1 (Site Folder: AM Peak - 2031 With School and Road Modifications)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |        |               |        |           |             |                  |                   |          |           |                     |                  |             |
|------------------------------|------|---------------|--------|---------------|--------|-----------|-------------|------------------|-------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | INPUT VOLUMES |        | DEMAND FLOWS  |        | Deg. Satn | Aver. Delay | Level of Service | 95% BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV ] % | [ Total veh/h | HV ] % |           |             |                  | [ Veh. veh        | Dist ] m |           |                     |                  |             |
| South: School Access 1       |      |               |        |               |        |           |             |                  |                   |          |           |                     |                  |             |
| 1                            | L2   | 31            | 0.0    | 31            | 0.0    | 0.195     | 7.5         | LOS A            | 0.6               | 4.3      | 0.77      | 0.89                | 0.80             | 32.2        |
| 3                            | R2   | 35            | 0.0    | 35            | 0.0    | 0.195     | 18.3        | LOS C            | 0.6               | 4.3      | 0.77      | 0.89                | 0.80             | 31.5        |
| Approach                     |      | 66            | 0.0    | 66            | 0.0    | 0.195     | 13.2        | LOS B            | 0.6               | 4.3      | 0.77      | 0.89                | 0.80             | 31.8        |
| East: Gnangara Drive         |      |               |        |               |        |           |             |                  |                   |          |           |                     |                  |             |
| 4                            | L2   | 108           | 0.0    | 108           | 0.0    | 0.441     | 3.4         | LOS A            | 0.0               | 0.0      | 0.00      | 0.06                | 0.00             | 39.7        |
| 5                            | T1   | 731           | 5.0    | 731           | 5.0    | 0.441     | 0.0         | LOS A            | 0.0               | 0.0      | 0.00      | 0.06                | 0.00             | 38.4        |
| Approach                     |      | 839           | 4.4    | 839           | 4.4    | 0.441     | 0.5         | NA               | 0.0               | 0.0      | 0.00      | 0.06                | 0.00             | 38.9        |
| West: Gnangara Drive         |      |               |        |               |        |           |             |                  |                   |          |           |                     |                  |             |
| 11                           | T1   | 518           | 5.0    | 518           | 5.0    | 0.318     | 1.0         | LOS A            | 0.8               | 6.0      | 0.15      | 0.03                | 0.20             | 35.6        |
| 12                           | R2   | 29            | 0.0    | 29            | 0.0    | 0.318     | 10.9        | LOS B            | 0.8               | 6.0      | 0.15      | 0.03                | 0.20             | 38.6        |
| Approach                     |      | 547           | 4.7    | 547           | 4.7    | 0.318     | 1.5         | NA               | 0.8               | 6.0      | 0.15      | 0.03                | 0.20             | 36.1        |
| All Vehicles                 |      | 1452          | 4.3    | 1452          | 4.3    | 0.441     | 1.4         | NA               | 0.8               | 6.0      | 0.09      | 0.09                | 0.11             | 36.9        |

## MOVEMENT SUMMARY

▽ Site: 3 [Gnangara Drive Entry Only (Site Folder: AM Peak - 2031 With School and Road Modifications)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |        |               |        |           |             |                  |                   |          |           |                     |                  |             |
|------------------------------|------|---------------|--------|---------------|--------|-----------|-------------|------------------|-------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | INPUT VOLUMES |        | DEMAND FLOWS  |        | Deg. Satn | Aver. Delay | Level of Service | 95% BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV ] % | [ Total veh/h | HV ] % |           |             |                  | [ Veh. veh        | Dist ] m |           |                     |                  |             |
| East: Gnangara Drive         |      |               |        |               |        |           |             |                  |                   |          |           |                     |                  |             |
| 4                            | L2   | 243           | 0.0    | 243           | 0.0    | 0.360     | 3.4         | LOS A            | 0.0               | 0.0      | 0.00      | 0.16                | 0.00             | 39.2        |
| 5                            | T1   | 440           | 5.0    | 440           | 5.0    | 0.360     | 0.0         | LOS A            | 0.0               | 0.0      | 0.00      | 0.16                | 0.00             | 36.2        |
| Approach                     |      | 683           | 3.2    | 683           | 3.2    | 0.360     | 1.2         | NA               | 0.0               | 0.0      | 0.00      | 0.16                | 0.00             | 38.3        |
| All Vehicles                 |      | 683           | 3.2    | 683           | 3.2    | 0.360     | 1.2         | NA               | 0.0               | 0.0      | 0.00      | 0.16                | 0.00             | 38.3        |

## MOVEMENT SUMMARY

▽ Site: 3 [Gnangara Drive Coleville St (Site Folder: AM Peak - 2031 With School and Road Modifications)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |        |               |        |           |             |                  |                   |          |           |                     |                  |             |
|------------------------------|------|---------------|--------|---------------|--------|-----------|-------------|------------------|-------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | INPUT VOLUMES |        | DEMAND FLOWS  |        | Deg. Satn | Aver. Delay | Level of Service | 95% BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV ] % | [ Total veh/h | HV ] % |           |             |                  | [ Veh. veh        | Dist ] m |           |                     |                  |             |
| North: Colville Street       |      |               |        |               |        |           |             |                  |                   |          |           |                     |                  |             |
| 7                            | L2   | 17            | 0.0    | 17            | 0.0    | 0.018     | 6.7         | LOS A            | 0.1               | 0.5      | 0.49      | 0.63                | 0.49             | 42.3        |
| Approach                     |      | 17            | 0.0    | 17            | 0.0    | 0.018     | 6.7         | LOS A            | 0.1               | 0.5      | 0.49      | 0.63                | 0.49             | 42.3        |
| West: Gnangara Drive         |      |               |        |               |        |           |             |                  |                   |          |           |                     |                  |             |
| 10                           | L2   | 19            | 0.0    | 19            | 0.0    | 0.292     | 3.4         | LOS A            | 0.0               | 0.0      | 0.00      | 0.02                | 0.00             | 40.1        |
| 11                           | T1   | 538           | 5.0    | 538           | 5.0    | 0.292     | 0.0         | LOS A            | 0.0               | 0.0      | 0.00      | 0.02                | 0.00             | 39.5        |
| Approach                     |      | 557           | 4.8    | 557           | 4.8    | 0.292     | 0.1         | NA               | 0.0               | 0.0      | 0.00      | 0.02                | 0.00             | 39.6        |
| All Vehicles                 |      | 574           | 4.7    | 574           | 4.7    | 0.292     | 0.3         | NA               | 0.1               | 0.5      | 0.01      | 0.03                | 0.01             | 39.9        |

## MOVEMENT SUMMARY

▽ Site: 4 [Gnangara Drive Exit Only (Site Folder: AM Peak - 2031 With School and Road Modifications)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |        |               |        |           |             |                  |                   |          |           |                     |                  |             |
|------------------------------|------|---------------|--------|---------------|--------|-----------|-------------|------------------|-------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | INPUT VOLUMES |        | DEMAND FLOWS  |        | Deg. Satn | Aver. Delay | Level of Service | 95% BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV ] % | [ Total veh/h | HV ] % |           |             |                  | [ Veh. veh        | Dist ] m |           |                     |                  |             |
| South: School Exit           |      |               |        |               |        |           |             |                  |                   |          |           |                     |                  |             |
| 1                            | L2   | 190           | 0.0    | 190           | 0.0    | 0.426     | 7.5         | LOS A            | 2.1               | 14.4     | 0.65      | 0.94                | 0.92             | 36.1        |
| 3                            | R2   | 65            | 0.0    | 65            | 0.0    | 0.426     | 18.5        | LOS C            | 2.1               | 14.4     | 0.65      | 0.94                | 0.92             | 32.9        |
| Approach                     |      | 255           | 0.0    | 255           | 0.0    | 0.426     | 10.3        | LOS B            | 2.1               | 14.4     | 0.65      | 0.94                | 0.92             | 35.5        |
| East: Gnangara Drive         |      |               |        |               |        |           |             |                  |                   |          |           |                     |                  |             |
| 5                            | T1   | 532           | 5.0    | 532           | 5.0    | 0.279     | 0.0         | LOS A            | 0.0               | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| Approach                     |      | 532           | 5.0    | 532           | 5.0    | 0.279     | 0.0         | NA               | 0.0               | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| West: Gnangara Drive         |      |               |        |               |        |           |             |                  |                   |          |           |                     |                  |             |
| 11                           | T1   | 686           | 5.0    | 686           | 5.0    | 0.359     | 0.2         | LOS A            | 0.0               | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| Approach                     |      | 686           | 5.0    | 686           | 5.0    | 0.359     | 0.2         | NA               | 0.0               | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| All Vehicles                 |      | 1473          | 4.1    | 1473          | 4.1    | 0.426     | 1.9         | NA               | 2.1               | 14.4     | 0.11      | 0.16                | 0.16             | 38.7        |

## MOVEMENT SUMMARY

Site: 1v [Gnangara Drive / Oakwood Crescent (Site Folder: PM Peak - 2031 With School and Road Modifications)]

Site Category: -  
Roundabout

| Vehicle Movement Performance |      |               |        |               |        |           |             |                  |                   |          |           |                     |                  |             |
|------------------------------|------|---------------|--------|---------------|--------|-----------|-------------|------------------|-------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | INPUT VOLUMES |        | DEMAND FLOWS  |        | Deg. Satn | Aver. Delay | Level of Service | 95% BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV ] % | [ Total veh/h | HV ] % |           |             |                  | [ Veh. veh        | Dist ] m |           |                     |                  |             |
| South: Oakwood Crescent      |      |               |        |               |        |           |             |                  |                   |          |           |                     |                  |             |
| 1                            | L2   | 77            | 0.0    | 77            | 0.0    | 0.157     | 5.5         | LOS A            | 1.0               | 7.0      | 0.71      | 0.70                | 0.71             | 35.9        |
| 3                            | R2   | 47            | 0.0    | 47            | 0.0    | 0.157     | 9.3         | LOS A            | 1.0               | 7.0      | 0.71      | 0.70                | 0.71             | 38.7        |
| 3u                           | U    | 1             | 0.0    | 1             | 0.0    | 0.157     | 14.7        | LOS B            | 1.0               | 7.0      | 0.71      | 0.70                | 0.71             | 44.9        |
| Approach                     |      | 125           | 0.0    | 125           | 0.0    | 0.157     | 7.0         | LOS A            | 1.0               | 7.0      | 0.71      | 0.70                | 0.71             | 37.4        |
| East: Gnangara Drive         |      |               |        |               |        |           |             |                  |                   |          |           |                     |                  |             |
| 4                            | L2   | 42            | 0.0    | 42            | 0.0    | 0.445     | 2.7         | LOS A            | 3.5               | 25.8     | 0.48      | 0.34                | 0.48             | 38.7        |
| 5                            | T1   | 513           | 5.0    | 513           | 5.0    | 0.445     | 2.4         | LOS A            | 3.5               | 25.8     | 0.48      | 0.34                | 0.48             | 39.1        |
| 6u                           | U    | 1             | 0.0    | 1             | 0.0    | 0.445     | 11.9        | LOS B            | 3.5               | 25.8     | 0.48      | 0.34                | 0.48             | 46.5        |
| Approach                     |      | 556           | 4.6    | 556           | 4.6    | 0.445     | 2.4         | LOS A            | 3.5               | 25.8     | 0.48      | 0.34                | 0.48             | 39.1        |
| West: Gnangara Drive         |      |               |        |               |        |           |             |                  |                   |          |           |                     |                  |             |
| 11                           | T1   | 427           | 5.0    | 427           | 5.0    | 0.393     | 1.5         | LOS A            | 3.5               | 25.3     | 0.28      | 0.33                | 0.28             | 39.4        |
| 12                           | R2   | 70            | 0.0    | 70            | 0.0    | 0.393     | 5.8         | LOS A            | 3.5               | 25.3     | 0.28      | 0.33                | 0.28             | 40.1        |
| 12u                          | U    | 80            | 0.0    | 80            | 0.0    | 0.393     | 9.5         | LOS A            | 3.5               | 25.3     | 0.28      | 0.33                | 0.28             | 9.0         |
| Approach                     |      | 577           | 3.7    | 577           | 3.7    | 0.393     | 3.2         | LOS A            | 3.5               | 25.3     | 0.28      | 0.33                | 0.28             | 35.1        |
| All Vehicles                 |      | 1258          | 3.7    | 1258          | 3.7    | 0.445     | 3.2         | LOS A            | 3.5               | 25.8     | 0.41      | 0.37                | 0.41             | 37.1        |

## MOVEMENT SUMMARY

▽ Site: 2 [Gnangara Drive Access 1 (Site Folder: PM Peak - 2031 With School and Road Modifications)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |        |               |        |           |             |                  |                   |          |           |                     |                  |             |
|------------------------------|------|---------------|--------|---------------|--------|-----------|-------------|------------------|-------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | INPUT VOLUMES |        | DEMAND FLOWS  |        | Deg. Satn | Aver. Delay | Level of Service | 95% BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV ] % | [ Total veh/h | HV ] % |           |             |                  | [ Veh. veh        | Dist ] m |           |                     |                  |             |
| South: School Access 1       |      |               |        |               |        |           |             |                  |                   |          |           |                     |                  |             |
| 1                            | L2   | 75            | 0.0    | 75            | 0.0    | 0.276     | 7.1         | LOS A            | 1.0               | 7.1      | 0.70      | 0.88                | 0.81             | 33.3        |
| 3                            | R2   | 53            | 0.0    | 53            | 0.0    | 0.276     | 16.3        | LOS C            | 1.0               | 7.1      | 0.70      | 0.88                | 0.81             | 32.7        |
| Approach                     |      | 128           | 0.0    | 128           | 0.0    | 0.276     | 10.9        | LOS B            | 1.0               | 7.1      | 0.70      | 0.88                | 0.81             | 33.1        |
| East: Gnangara Drive         |      |               |        |               |        |           |             |                  |                   |          |           |                     |                  |             |
| 4                            | L2   | 57            | 0.0    | 57            | 0.0    | 0.355     | 3.4         | LOS A            | 0.0               | 0.0      | 0.00      | 0.04                | 0.00             | 39.9        |
| 5                            | T1   | 620           | 5.0    | 620           | 5.0    | 0.355     | 0.0         | LOS A            | 0.0               | 0.0      | 0.00      | 0.04                | 0.00             | 38.9        |
| Approach                     |      | 677           | 4.6    | 677           | 4.6    | 0.355     | 0.3         | NA               | 0.0               | 0.0      | 0.00      | 0.04                | 0.00             | 39.2        |
| West: Gnangara Drive         |      |               |        |               |        |           |             |                  |                   |          |           |                     |                  |             |
| 11                           | T1   | 560           | 5.0    | 560           | 5.0    | 0.340     | 0.7         | LOS A            | 0.8               | 5.9      | 0.14      | 0.04                | 0.18             | 36.4        |
| 12                           | R2   | 38            | 0.0    | 38            | 0.0    | 0.340     | 8.6         | LOS A            | 0.8               | 5.9      | 0.14      | 0.04                | 0.18             | 38.8        |
| Approach                     |      | 598           | 4.7    | 598           | 4.7    | 0.340     | 1.2         | NA               | 0.8               | 5.9      | 0.14      | 0.04                | 0.18             | 36.9        |
| All Vehicles                 |      | 1403          | 4.2    | 1403          | 4.2    | 0.355     | 1.7         | NA               | 1.0               | 7.1      | 0.12      | 0.12                | 0.15             | 36.7        |

## MOVEMENT SUMMARY

▽ Site: 3 [Gnangara Drive Entry Only (Site Folder: PM Peak - 2031 With School and Road Modifications)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |        |               |        |           |             |                  |                   |          |           |                     |                  |             |
|------------------------------|------|---------------|--------|---------------|--------|-----------|-------------|------------------|-------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | INPUT VOLUMES |        | DEMAND FLOWS  |        | Deg. Satn | Aver. Delay | Level of Service | 95% BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV ] % | [ Total veh/h | HV ] % |           |             |                  | [ Veh. veh        | Dist ] m |           |                     |                  |             |
| East: Gnangara Drive         |      |               |        |               |        |           |             |                  |                   |          |           |                     |                  |             |
| 4                            | L2   | 135           | 0.0    | 135           | 0.0    | 0.303     | 3.4         | LOS A            | 0.0               | 0.0      | 0.00      | 0.11                | 0.00             | 39.5        |
| 5                            | T1   | 441           | 5.0    | 441           | 5.0    | 0.303     | 0.0         | LOS A            | 0.0               | 0.0      | 0.00      | 0.11                | 0.00             | 37.4        |
| Approach                     |      | 576           | 3.8    | 576           | 3.8    | 0.303     | 0.8         | NA               | 0.0               | 0.0      | 0.00      | 0.11                | 0.00             | 38.6        |
| All Vehicles                 |      | 576           | 3.8    | 576           | 3.8    | 0.303     | 0.8         | NA               | 0.0               | 0.0      | 0.00      | 0.11                | 0.00             | 38.6        |

## MOVEMENT SUMMARY

▽ Site: 3 [Gnangara Drive Coleville St (Site Folder: PM Peak - 2031 With School and Road Modifications)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |        |               |        |           |             |                  |                   |          |           |                     |                  |             |
|------------------------------|------|---------------|--------|---------------|--------|-----------|-------------|------------------|-------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | INPUT VOLUMES |        | DEMAND FLOWS  |        | Deg. Satn | Aver. Delay | Level of Service | 95% BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV ] % | [ Total veh/h | HV ] % |           |             |                  | [ Veh. veh        | Dist ] m |           |                     |                  |             |
| North: Colville Street       |      |               |        |               |        |           |             |                  |                   |          |           |                     |                  |             |
| 7                            | L2   | 29            | 0.0    | 29            | 0.0    | 0.030     | 6.7         | LOS A            | 0.1               | 0.8      | 0.49      | 0.64                | 0.49             | 42.4        |
| Approach                     |      | 29            | 0.0    | 29            | 0.0    | 0.030     | 6.7         | LOS A            | 0.1               | 0.8      | 0.49      | 0.64                | 0.49             | 42.4        |
| West: Gnangara Drive         |      |               |        |               |        |           |             |                  |                   |          |           |                     |                  |             |
| 10                           | L2   | 58            | 0.0    | 58            | 0.0    | 0.306     | 3.4         | LOS A            | 0.0               | 0.0      | 0.00      | 0.05                | 0.00             | 39.9        |
| 11                           | T1   | 524           | 5.0    | 524           | 5.0    | 0.306     | 0.0         | LOS A            | 0.0               | 0.0      | 0.00      | 0.05                | 0.00             | 38.8        |
| Approach                     |      | 582           | 4.5    | 582           | 4.5    | 0.306     | 0.4         | NA               | 0.0               | 0.0      | 0.00      | 0.05                | 0.00             | 39.1        |
| All Vehicles                 |      | 611           | 4.3    | 611           | 4.3    | 0.306     | 0.7         | NA               | 0.1               | 0.8      | 0.02      | 0.07                | 0.02             | 39.5        |

## MOVEMENT SUMMARY

▽ Site: 4 [Gnangara Drive Exit Only (Site Folder: PM Peak - 2031 With School and Road Modifications)]

Site Category: -  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |               |        |               |        |           |             |                  |                   |          |           |                     |                  |             |
|------------------------------|------|---------------|--------|---------------|--------|-----------|-------------|------------------|-------------------|----------|-----------|---------------------|------------------|-------------|
| Mov ID                       | Turn | INPUT VOLUMES |        | DEMAND FLOWS  |        | Deg. Satn | Aver. Delay | Level of Service | 95% BACK OF QUEUE |          | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed |
|                              |      | [ Total veh/h | HV ] % | [ Total veh/h | HV ] % |           |             |                  | [ Veh. veh        | Dist ] m |           |                     |                  |             |
| South: School Exit           |      |               |        |               |        |           |             |                  |                   |          |           |                     |                  |             |
| 1                            | L2   | 169           | 0.0    | 169           | 0.0    | 0.237     | 5.5         | LOS A            | 0.9               | 6.4      | 0.54      | 0.70                | 0.54             | 37.5        |
| 3                            | R2   | 27            | 0.0    | 27            | 0.0    | 0.237     | 12.8        | LOS B            | 0.9               | 6.4      | 0.54      | 0.70                | 0.54             | 35.0        |
| Approach                     |      | 196           | 0.0    | 196           | 0.0    | 0.237     | 6.5         | LOS A            | 0.9               | 6.4      | 0.54      | 0.70                | 0.54             | 37.3        |
| East: Gnangara Drive         |      |               |        |               |        |           |             |                  |                   |          |           |                     |                  |             |
| 5                            | T1   | 471           | 5.0    | 471           | 5.0    | 0.247     | 0.0         | LOS A            | 0.0               | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| Approach                     |      | 471           | 5.0    | 471           | 5.0    | 0.247     | 0.0         | NA               | 0.0               | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| West: Gnangara Drive         |      |               |        |               |        |           |             |                  |                   |          |           |                     |                  |             |
| 11                           | T1   | 588           | 5.0    | 588           | 5.0    | 0.308     | 0.1         | LOS A            | 0.0               | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| Approach                     |      | 588           | 5.0    | 588           | 5.0    | 0.308     | 0.1         | NA               | 0.0               | 0.0      | 0.00      | 0.00                | 0.00             | 39.9        |
| All Vehicles                 |      | 1255          | 4.2    | 1255          | 4.2    | 0.308     | 1.1         | NA               | 0.9               | 6.4      | 0.08      | 0.11                | 0.08             | 39.2        |



# SOUTH COAST BAPTIST COLLEGE Stage 2

## Landscape Masterplan Sports Centre

Client:  
South Coast Baptist College  
p - 08 9540 4404  
e - darch@scbc.wa.edu.au

| Dwg Plan No: | Drawing title:                    | Size: | Scale:   | Issue: |
|--------------|-----------------------------------|-------|----------|--------|
| LD-CS-00     | Cover Sheet                       | A1    | NTS      | D.2    |
| LD-MP-01     | Landscape Master Plan             | A1    | 1:500    | D.2    |
| LD-SP-01     | Landscape Softscape Plan          | A1    | 1:500    | D.1    |
| LD-DD-01     | Details Drawing Plan              | A1    | As shown | B      |
| LD-LTS-01    | Landscape Technical Specification | A1    | NTS      | A      |
| LD-SEP-01    | Sediment & Erosion Plan           | A1    | NTS      | A      |
|              |                                   |       |          |        |

Notes:

- All details and measurement should be cross checked onsite prior to construction and any discrepancy to be reported to the Principal/Project Landscape Designer or Project Manager.
- All RL's and existing alignment to be cross checked onsite.
- All details should be subject where Ref. to engineer drawings noted, to be cross check and follow as per engineer details.
- Mounding of soil as directed by principal/Project Landscape Designer or Project Manager on site.
- Site to be setout by Principal/Project Landscape Designer or Project Manager with the main contractor prior to start construction.
- All final setout should be coordinated and approved by principal/ Project Landscape Designer or Project Manager prior to construction or material order.
- All external work carried out on council property shall be in accordance with council's policy.
- All existing services to be located and protected prior to any construction.
- Construction works and all on-site operations are to be undertaken by skilled and/ or experienced trades persons where appropriate to the works.
- All horticultural works shall be carried out by qualified horticulturists, experienced with current horticultural practices.
- All existing trees shall be protected at all times during construction.
- Trees to be removed shall be removed so as to fall away from the Tree Protection Zone. Stumps and roots shall be removed so as to minimise disturbance to adjacent trees to be retained.
- Where trees to be removed are in close proximity to trees to be retained the Project Arborist shall set the depth of the stump grinding. Stumps within the Tree Protection Zone of other trees to be retained should not be removed using excavation equipment.

keys



|           |            |                           |
|-----------|------------|---------------------------|
| D.2       | 15/12/2020 | Revision issue            |
| D.1       | 15/12/2020 | Revision issue            |
| D         | 14/12/2020 | Revision issue            |
| C         | 03/11/2020 | Revision issue            |
| B         | 09/09/2020 | Revision issue            |
| A         | 27/08/2020 | Landscape Masterplan plan |
| Issue No: | Date:      | Revision:                 |



GENERAL NOTES

These drawings shall be read in conjunction with each other and with all consultants' drawings and documentation.  
All dimensions in mm unless otherwise stated.  
All tree dimensions and RLs in metres.  
Use figure dimensions only.  
Verify all dimensions on site before the commencement of any work.  
Contractors shall locate and protect all services prior to construction.  
All work shall be carried out in accordance with AS4, BCA and Local Government Regulations.  
Structural details shall be subject to Engineer's Specifications.  
Drainage & water installation details shall be subject to Hydraulic Engineer's Specifications.  
Amendments are indicated by but are not limited to graphic "clouds" shown on the drawings.  
All work shall be carried out in a professional manner by Qualified Tradesman according to Landscape Drawings and Engineer's Specifications.  
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|-------------------|------------------|
| Designed by: SPGL | Checked by:      |
| Drawn by: JCP     | SHEET No: 1 of 8 |
| Date: 13/08/2020  | Ref No: SPGL1531 |
| Scale: NTS        |                  |

DWG. TITLE  
LANDSCAPE MASTERPLAN  
COVER SHEET

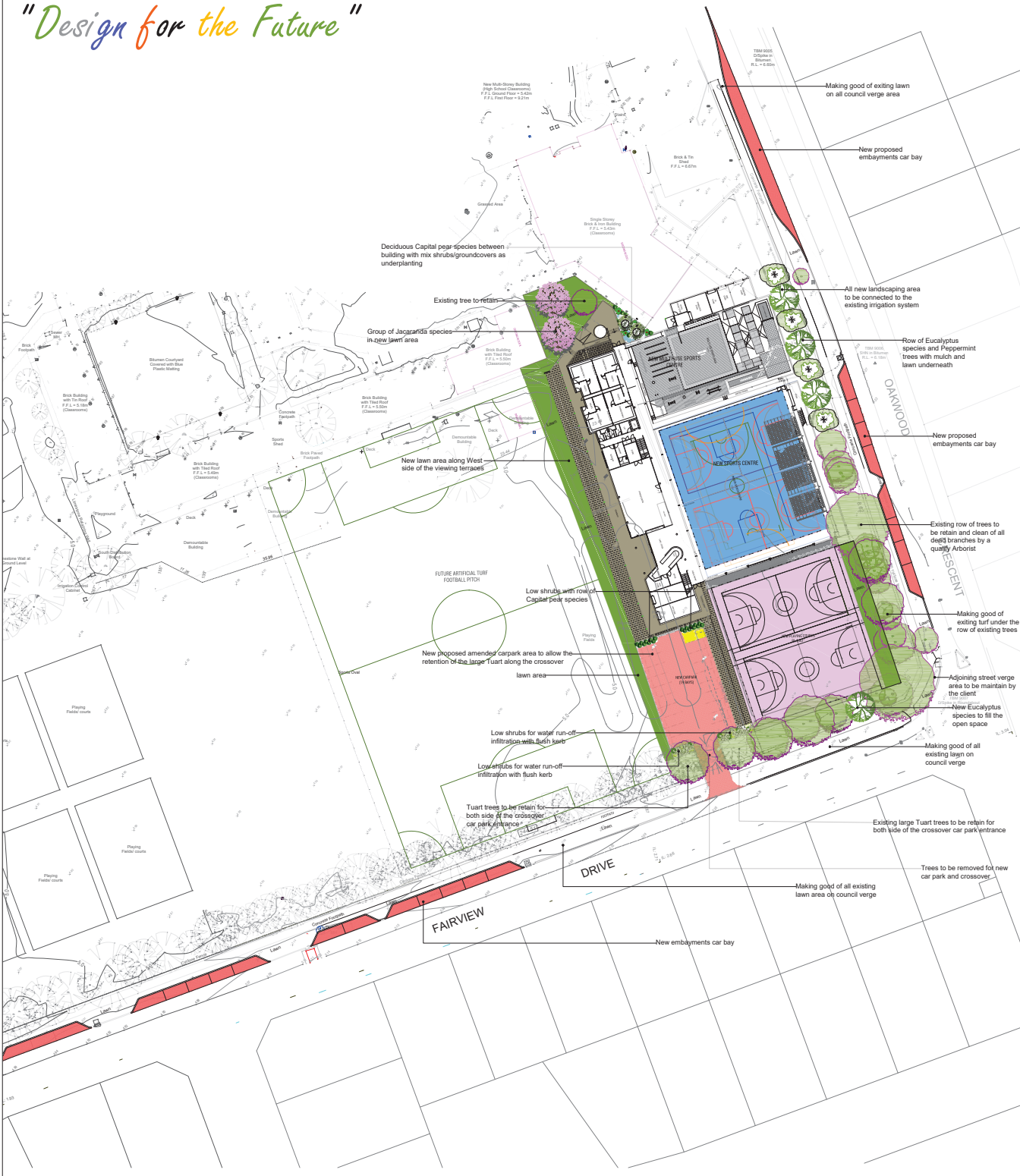
PROJECT  
STAGE 2 - SPORT CENTRE  
South Coast Baptist College  
30 Gnaragara Dr  
WAIKIKI WA 6169



Jean-Clement Printemps  
Landscape Designer  
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www.springgreen.com.au

LD-CS-01 **D.2**

"Design for the Future"



- keys
- Existing tree
  - Jacaranda mimosifolia 10x8m (Jac)
  - Eucalyptus leucosylin Rosea 10x7m (EucR)
  - Agonis flexuosa 10x5m (Agof)
  - Pyrus calleryana Bradford 9x3m (Pyr)
  - Grevillea pinnatifida 'Seaspray' 700x1000mm (Gres)
  - Rosmarinus officinalis 'Boule' 600x600mm (Roum)
  - Leucophyta 'Silver nugget' 500x500mm (Lub)
  - Carex appressa 1x1m (Canx)
  - Ficinia nodosa 500x500mm (Fic)
  - Juncus ustulatus 800x300mm (Junc)

|     |            |                      |
|-----|------------|----------------------|
| D.2 | 15/12/2020 | Revision Issue       |
| D.1 | 15/12/2020 | Revision Issue       |
| D   | 14/12/2020 | Revision Issue       |
| C   | 03/11/2020 | Revision Issue       |
| B   | 09/09/2020 | Revision Issue       |
| A   | 27/08/2020 | Landscape Masterplan |

North Arrow pointing up, labeled 'M.G.A.' and 'GENERAL NOTES'.

These drawings shall be read in conjunction with each other and with all consultants' drawings and documentation. All dimensions in mm unless otherwise stated. All tree dimensions and RLs in metres. Use figured dimensions only. Verify all dimensions on site before the commencement of any works. Contractors shall locate and protect all services prior to construction. All work shall be carried out in accordance with ASA, BCA and Local Government Regulations. Structural details shall be subject to Engineer's Specifications. Drainage & water installation details shall be subject to Hydraulic Engineer's Specifications. Annotations are indicated by but are not limited to graphic 'bombs' shown on the drawings. All work shall be carried out in a professional manner by Qualified Tradesmen according to Landscape Drawings and Engineer's Specifications. No responsibility will be taken by Springgreen Landscapes for any variations in design, construction method, materials specified, and general specifications without permission from project Engineer or Landscape Designer. This drawing is copyright to Springgreen Landscapes and may not be used or reproduced at anytime without prior consent.

|                   |                  |
|-------------------|------------------|
| Designed by: SPGL | Checked by:      |
| Drawn by: JCP     | SHEET No: 2 of 6 |
| Date: 13/08/2020  | Ref No: SPGL1531 |
| Scale: 1:500 @ A1 |                  |

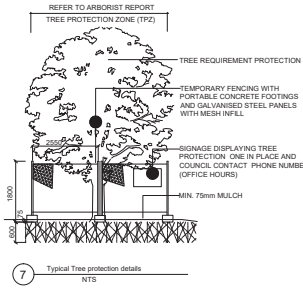
DWG. TITLE  
LANDSCAPE MASTERPLAN  
  
PROJECT  
STAGE 2 - SPORT CENTRE  
South Coast Baptist College  
30 Gungahra Dr  
WAIKIKI WA 6169

**SOUTH COAST BAPTIST COLLEGE**

**Spring green LANDSCAPES**  
boutique landscape design

Jean-Clement Printemps  
Landscape Designer

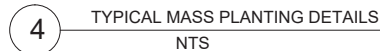
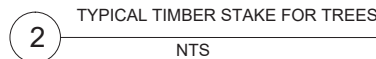
M 04 1089 9088  
E contact@springgreen.com.au  
www.springgreen.com.au



- NOTES:
- PRIOR TO THE COMMENCEMENT OF ANY WORK ON SITE, EXISTING TREES TO BE RETAINED ARE TO BE PROTECTED FROM DAMAGE BY FENCING AS PER DETAIL PROVIDED. FENCING SHALL BE MAINTAINED IN GOOD AND EFFECTIVE ORDER UNTIL THE WORK IS COMPLETED.
  - FENCING TO ALIGN WITH OUTER EXTENT OF TREE BRANCHES (DAPLINE). ANY VARIATION TO HAVE APPROVAL OF SUPERVISING ARBORIST/STW/CITY PARKS TREE MAINTENANCE COORDINATOR.
  - ALL CARE TO BE TAKEN TO ENSURE TREE'S HEALTH IS PROTECTED INCLUDING AND NOT RESTRICTED TO:
    - NO STORAGE OF MATERIALS WITHIN TREE PROTECTION ZONE.
    - NO OIL, TAR, BITUMEN, CEMENT, PAINT, OR OTHER MATERIALS BE ALLOWED TO CONTAMINATE TREE PROTECTION ZONE. NO MIXING OF CONCRETE, MORTAR OR WASHING PAINTING EQUIPMENT TO OCCUR WITHIN TPZ OR AREA DRAINING TOWARDS TPZ
    - NO LEVEL CHANGES WITHIN TREE PROTECTION ZONE
    - NO LIGHTING OF FIRES BENEATH OR IN PROXIMITY ZONE
    - NO ATTACHMENTS OF ROPES, GUYS, CABLES OR NOTICE BOARDS TO TREE
    - PROVISION OF MIN. 75mm DEPTH WEED FREE, RECYCLED HARDWOOD CHIP/LEAF LITTER MULCH FROM AND APPROVED SOURCE

7 Typical Tree protection details  
NTS

| keys   |  |
|--|--|
|  | Existing tree<br><br>Jacaranda mimosaefolia<br>10x8m (Jas) |
|  | Eucalyptus leucocoryn<br>Roses 10x7m (Eur)                 |
|  | Agonis flexuosa<br>10x5m (Ago)                             |
|  | Pyrus calleryana<br>"Bradford" 9x3m (Pyr)                  |
|  | Grevillea preissii "Seaspay"<br>700x1000mm (Grs)           |
|  | Rosmarinus officinalis "Boule"<br>600x600mm (Rosm)         |
|  | Leucophyta "Silver nugget"<br>500x500mm (Lub)              |
|  | Carax appressa<br>500x500mm (Cax)                          |
|  | Ficinia nodosa<br>500x500mm (Fic)                          |
|  | Juncus usitatus<br>800x300mm (Junc)                        |
| D.1  | 15/12/2022 Revision issue                                  |
| C  | 14/12/2022 Revision issue                                  |
| C  | 03/11/2020 Revision issue                                  |
| B  | 09/09/2022 Revision issue                                  |
| A  | 27/08/2020 Landscape Masterplan                            |
| Date:  | Revision:  |
| <br>N.G.A.<br><b>GENERAL NOTES</b>   |  |
| <p>These drawings shall be read in conjunction with all drawings and with all consultants' drawings and specifications.</p> <p>All dimensions in mm unless otherwise stated.</p> <p>All tree dimensions and R/Ls in metres.</p> <p>Use figured dimensions only.</p> <p>Verify all dimensions on site before the commencement of any works.</p> <p>Contractors shall locate and protect as indicated by ASA, BCA and Local Government Regulations.</p> <p>All work shall be carried out in accordance with Engineering Specifications. Structural details shall be subject to Engineer's Specifications. Drainage &amp; water installation details shall be subject to Hydraulic Engineer's Specifications.</p> <p>Amendments are to be carried out in a professional manner by Qualified Technicians according to Landscape Drawings and Engineer's Specifications.</p> <p>No responsibility will be taken by Springfield Landscapes for any variations in design, construction method, materials specified, and general specifications without permission from project Engineer or Landscape Designer.</p> <p>This drawing is copyright to Springfield Landscapes and may not be used or reproduced at anytime without prior consent.</p> |  |
| Designed by: SPGL  | Checked by:  |
| Drawn by: JCP  | SHEET No: 3 of 6   |
| Date: 13/08/2020   | Ref No: SPGL 1331  |
| Scale: 1:500 @ A1  |  |
| <b>DWG. TITLE</b>  |  |
| <b>SOFTSPACE MASTERPLAN</b>  |  |
| <b>PROJECT</b>   |  |
| STAGE 2 - SPORT CENTRE   |  |
| South Coast Baptist College  |  |
| 30 Grangaroo Dr  |  |
| WAIKIKI WA 6169  |  |
| <b>SOUTH COAST BAPTIST COLLEGE</b>   |  |
| <br>boutique landscape design  |  |
| Jean-Clement Printemps<br>Landscape Designer<br>M 04 1298 0266<br>E: contact@springgreengreen.com.au<br>www.springgreengreen.com.au  |  |
| <b>LD-SP-01</b>  | <b>D.1</b>   |





LANDSCAPE TECHNICAL SPECIFICATION

EXCAVATION (IF APPLICABLE)

REMOVE SOIL, GRASS, WEEDS, ROOTS AND OTHER DEBRIS TO 300mm BELOW THE TOP OF ADJACENT HARD SURFACED MARGINS, AND FINISHED GROUND LEVELS. REMOVE FROM SITE AS DIRECTED.

SUB SOIL CULTIVATION (IF APPLICABLE)

CULTIVATE THE REDUCED SUB-SOIL TO A DEPTH OF 225MM OR AS SPECIFIED, BREAK UP SUB-SOIL BY MECHANICAL RIPPING AND DIGGING TO ASSIST DRAINAGE AND AERATION AS PER SITE REQUIREMENT

TOPSOIL MIXTURE

PLACE WEEDFREE AND SCREENED AMENDED SITE TOPSOIL FOR NATIVE. CONTRACTOR TO PROVIDE SOIL TEST TO DEMONSTRATE COMPLIANCE WITH AUSTRALIAN STANDARDS.

MULCH

MULCH SHOULD BE HEAT TREATED TO BE FREE OF WEEDS.  
MULCH TO HAVE A MAXIMUM 75mm DEPTH (FOREST BARK MULCH OR AS PER SPECIFICATION) TO COMPLY WITH AS 4454. MULCH TO BE 100MM MINIMUM (FOREST BARK MULCH OR AS SPECIFY) TO AREA WITHOUT PLANTING FOR WEED MAXIMISED SUPPRESSION.

FERTILISER

AN APPROVED SLOW RELEASE FERTILISER WHICH PHOSPHORUS LEVEL SHOULD BE LESS THAN 3% SUCH AS BAILEYS 'AUSTRALIAN NATIVE BLEND' OR OSMOCOTE 'PLUS TRACE ELEMENTS' FOR NATIVE GARDENS, USED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. A SURFACE DRESSING OF 'BLOOD AND BONE' FERTILIZER SHALL BE PLACED ON THE SOIL WITHIN 300mm DIA. OF EACH PLANT AT MANUFACTURER'S RECOMMENDED RATE.

SUBSOIL DRAINAGE (IF APPLICABLE)

SUPPLY AND INSTALL SUBSOIL DRAINAGE TO ALL GARDEN BEDS AND TREE PLANTING HOLES TO ENSURE EFFECTIVE DRAINAGE TO AS 3500. PROVIDE SUBSOIL DRAINS AS SPECIFIED WHERE NECESSARY TO INTERCEPT GROUND WATER SEEPAGE AND PREVENT WATER BUILDUP BEHIND RETAINING WALLS AND UNDER PAVEMENT. CONNECT SUBSOIL DRAINS TO STORMWATER DRAINAGE SYSTEM OR RECYCLING WATER TANK. OBTAIN DRAINAGE PLANS FROM OWNER OR OWNERS REPRESENTATIVE WHICH ARE NECESSARY FOR THE CONNECTION TO STORMWATER DRAINS. WHERE CONNECTION INTO AN EXISTING DRASIN IS REQUIRED, CARRY OUT THE EXCAVATION NECESSARY TO LOCATE AND EXPOSE THE CONNECTION POINT. ON COMPLETION REINSTATE THE SURFACES AND ELEMENTS WHICH HAVE BEEN DISTURBED SUCH AS ROADS, PAVEMENTS, KERBS, FOOTPATHS AND VERGES.

DRAINAGE / SERVICES

REFER TO ENGINEER'S DRAWINGS FOR GRADING, DRAINAGE AND SERVICES INFORMATION. DRAINAGE / SERVICES

IRRIGATION

AUTOMATIC IRRIGATION DESIGN SYSTEM TO BE PROVIDED BY A QUALIFY SUPPLIER TO SATISFY COUNCIL REQUIREMENTS FOR THE SPECIFIC DEVELOPMENT AREA.

MAINTENANCE

ALL LANDSCAPE AREAS (HARDSCAPE AND SOFTSCAPE) TO BE MAINTAINED FOR A PERIOD OF 52 WEEKS OR AS SPECIFIED BY CLIENT REQUIREMENT. CONTRACTOR RESPONSIBLE AT HIS COST FOR REPLACEMENT OF ANY PLANTING MATERIALS NOT IN GOOD GROWING CONDITION AT END OF 52 WEEKS PERIOD OR AS PER CLIENT REQUIREMENT.

ADVANCED TREE PLANTING

ALL TREE STOCK TO BE NATSPEC COMPLIANT.

EXCAVATE A SQUARE HOLE TWICE THE WIDTH OF THE ROOT BALL. CULTIVATE BASE OF HOLE TO A FURTHER DEPTH OF 100mm. LOOSED COMPACTED SIDES OF HOLE.

FILL HOLE WITH WATER AND LET DRAIN THOROUGHLY PRIOR TO PLANTING. NOTIFY CLIENT'S REPRESENTATIVE IF DRAINAGE PROBLEMS FROM THE HOLES ARE EXISTENT. DUE TO EXISTING ROCK CONDITIONS DRAINAGE MAY BE REQUIRED FROM TREE PITS.

NAIL TIES TO APPROXIMATELY 300mm FROM TOP END. DRIVE IN STAKES AS SPECIFIED. POSITION THE TREE SO THAT THE TOPSOIL LEVEL OF THE ROOT BALL IS LEVEL WITH THE SURROUNDING FINISHED SURFACE. WHERE POSSIBLE POSITION THE TREE SO THAT THE BRANCHES DO NOT RUB AGAINST STAKES OR WILL IN FUTURE, CONFLICT WITH BUILDINGS OR OVERHEAD WIRES.

BACKFILL WITH AN EVEN MIXTURE OF EXCAVATED MATERIAL AND IMPORTED TOPSOIL. PLACE SLOW RELEASE FERTILIZERS TABLETS AT QUARTER THE DEPTH OF THE ROOT BALL. DO NOT ALLOW TABLETS TO COME INTO CONTACT WITH ROOTS.

TAMP BACKFILL LIGHTLY AND FORM A TEMPORARY WATERING RING. FINISH SURFACE TREATMENT WITH 100mm DEPTH OF 25-50mm FOREST BARK MULCH.

WATER TREE THOROUGHLY TO ELIMINATE AIR POCKETS.

TURFING

OBTAIN TURF FROM A SPECIALIST TURF GROWER. PROVIDE TURF OF EVEN THICKNESS, FREE FROM WEEDS AND OTHER FOREIGN MATTER. DELIVER THE TURF WITHIN 24 HOURS OF CUTTING, AND LAY IT WITHIN 36 HOURS OF CUTTING. PREVENT IT FROM DRYING OUT BETWEEN CUTTING AND LAYING.

FERTILISING

MIX THE FERTILISER THOROUGHLY INTO THE TOPSOIL BEFORE PLACING THE TURF. APPLY LAWN FERTILISER AT THE COMPLETION OF THE FIRST AND LAST MOWINGS, AND AT OTHER TIMES AS REQUIRED TO MAINTAIN HEALTHY GRASS COVER. LAYING

GENERAL

LAY THE TURF IN THE FOLLOWING MANNER:

- IN STRETCHER PATTERN WITH THE JOINTS STAGGERED AND CLOSE BUTTED.
- PARALLEL WITH THE LONG SIDES OF LEVEL AREAS, AND WITH CONTOURS ON SLOPES.
- FINISH FLUSH, AFTER TAMPING, WITH ADJACENT FINISHED SURFACES OF GROUND, PAVING EDGING, OR GRASS SEEDED AREAS.

STRIP TURF LAYING: CLOSE BUTT THE END JOINTS AND SPACE THE STRIPS 300mm APART. APPLY A LAYER OF TOP DRESSING BETWEEN THE STRIPS OF TURF. FINISH WITH AN EVEN SURFACE.

TAMPING: LIGHTLY TAMP TO AN EVEN SURFACE IMMEDIATELY AFTER LAYING. DO NOT USE A ROLLER.  
PEGGING: ON STEEP SLOPES PEG TURF TO PREVENT DOWN SLOPE MOVEMENT. REMOVE PEGS WHEN THE TURF IS ESTABLISHED.

WATERING

WATER IMMEDIATELY AFTER LAYING UNTIL THE TOPSOIL IS MOISTENED TO ITS FULL DEPTH. CONTINUE WATERING TO MAINTAIN MOISTURE TO THIS DEPTH. KEEP THE GRASS IN A HEALTHY CONDITION.

MOWING

MOW TO MAINTAIN THE GRASS HEIGHT WITHIN THE REQUIRED RANGE. CARRY OUT THE LAST MOWING WITHIN 7 DAYS BEFORE THE END OF THE PLANTING ESTABLISHMENT PERIOD.  
REMOVE GRASS CLIPPINGS FROM THE SITE AFTER EACH MOWING.

MAINTENANCE

GENERAL: MAINTAIN TURFED AREAS UNTIL THE ATTAINMENT OF A DENSE CONTINUOUS SWARD OF HEALTHY GRASS OVER THE WHOLE TURFED AREA, EVENLY GREEN AND OF A CONSISTENT HEIGHT.

FAILED TURF: LIFT FAILED TURF AND RELAY WITH NEW TURF.

LEVELS: WHERE LEVELS HAVE DEVIATED FROM THE DESIGN LEVELS AFTER PLACING AND WATERING, LIFT TURF AND REGRADE TOPSOIL TO ACHIEVE DESIGN LEVELS.

TOP DRESSING

WHEN THE TURF IS ESTABLISHED MOW, REMOVE CUTTINGS AND LIGHTLY TOP DRESS TO A DEPTH OF 10 MM. RUB THE DRESSING WELL INTO THE JOINTS AND CORRECT ANY UNEVENNESS IN THE TURF SURFACE.

keys



B

A 27/08/2020 Landscape Masterplan plan

Issue No: Date: Revision:



GENERAL NOTES

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Designed by: SPGL Checked by:

Drawn by: JCP SHEET No: 5 of 6

Date: 13/08/2020 Ref No: SPGL1501

Scale: NTS

DWG. TITLE  
LANDSCAPE MASTERPLAN  
TYPICAL DETAILS

PROJECT  
STAGE 2 - SPORT CENTRE  
South Coast Baptist College  
30 Gungahra Dr  
WAIKIKI WA 6169



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LD-LTS-01

Issue:

A





### Schedule of Submissions

Proposed Educational Establishment Additions (Sports Centre, Playing Courts, Classrooms and Car Parking) - Lot 2000 (No.30) Gngangara Drive, Waikiki (20.2020.252.1 & 20.2020.295.1)


| PUBLIC SCHEDULE OF SUBMISSIONS  |  |   |
|---------------------------------|--|---|
| Name                            | Address  | Comment   |
| 1. Mrs Kerrilyn Gaffney         | 45 Belmez Turn<br>PORT KENNEDY<br>WA 6172<br><a href="mailto:kellygaf@gmail.com">kellygaf@gmail.com</a>              | It would be of great benefit to the Waikiki community to have the gymnasium accessible to the public. See Eaton recreation centre, Subiaco Lord's sport fixtures or Mt Barker recreation centre. Membership fees would benefit the college but the broader community have access to a facility closer to their home. Vastly improving the local community surrounding the school.   |
| 2. Mr Ross & Mrs Linda Chappell | Unit 2, 92<br>Oakwood<br>Crescent<br>WAIKIKI WA<br>6169  | <p>My husband &amp; I would like to make comment and express our concerns about the above development. We live @ unit 2 92 Oakwood Crescent Waikiki and our main concern is the parking. As we already know a new round a bout is to be constructed on our corner with Gngangara Drive. We have already been in discussion with Brandon Bennett about the access to our (and our neighbour in Unit 3) driveways. When the changes to the road are made a new island will be constructed in Oakwood Crescent and we have been advised that as this may impact our access the island will be made flat to the road where our driveway is impacted so we can drive over it.</p> <p>Now with the parking bays that have been proposed along Oakwood we have a similar concern about the access to and from our driveway. With the proposed round a bout, will the parking bays be positioned so that they are farther along Oakwood (away from the round a bout) so as not to impede our access? As far as the buildings that are proposed we do not have an issue with them just that some precaution can be taken to minimise the dust that will obviously come with the construction.</p> <p>I thank you for the opportunity to raise our concerns and look forward to hearing from you/City of Rockingham to answer our queries and concerns.</p> |
| 3. Mr L M & Mrs H Doherty       | 74 Oakwood<br>Crescent<br>WAIKIKI WA<br>6169<br><a href="mailto:doherty2117@bigpond.com">doherty2117@bigpond.com</a> | <p>We are writing to address our concerns and issues in the application for development approval for the above.</p> <p>We live at 74 Oakwood Crescent, Waikiki. (house directly across from the car park and basketball courts) and wish to make you aware of strong objections that we have with regard to the proposed development above. As an immediate neighbour to the site of the proposed development, we believe the development will have a serious impact on our standard living.</p> <p>The specific objections listed below are what we believe will affect our home and cause negative impacts. We are against the full approval for this development, especially the Sports Centre, with catering facilities and fitness centre etc.</p> <ol style="list-style-type: none"> <li><b>Devaluation of our home</b> - This would increase noise, traffic and loss to our privacy, whilst viewing big buildings and rubbish bins. This would make our house unfavourable to a new buyer, if we decided to sell in the future.</li> <li><b>Increased noise</b> - With late night and early morning/ weekend functions held the noise, traffic and home security would impact on our living and privacy.</li> </ol>  |

### Schedule of Submissions

Proposed Educational Establishment Additions (Sports Centre, Playing Courts, Classrooms and Car Parking) - Lot 2000 (No.30) Gngara Drive, Waikiki (20.2020.252.1 & 20.2020.295.1)

| SCHEDULE OF SUBMISSIONS |         |  |
|-------------------------|---------|--|
| Name                    | Address | Comment  |
| No.3 – cont..           |         | <p>3. <b>Extra traffic and Parking bays</b> – It is difficult at present to enter and depart our own driveway at school pick up and drop offs already, with increased traffic and congestion, having parking bays developed directly across from our house, would make it extremely harder to access our premises. We are constantly fixing and paying for lawn sprinklers, due to these cars using our verge as a u turn and a pick and drop off zone.</p> <p>4. <b>Maintenance Vehicles</b> – Having the new facilities available, maintenance vehicles such as caterers, waste management, garden maintenance, and specialised service vehicles will be more frequent and assume will have access to the venue, early mornings, late nights and weekends. This would have an impact on the noise and disruption to our home life.</p> <p>5. <b>Rubbish Waste Bins</b> – These are already located in an unsecure spot directly across from our home, every stormy/windy night, these bins open loudly and the next day/s rubbish is scattered everywhere, in our garden beds, on our front lawn and we are constantly removing debris on a daily basis. I believe the bins need to be in a secure and enclosed location as originally once located. I have photo proof of the rubbish on several occasions. Please let me know if you wish to view these. Rubbish would increase, therefore extra bins would be required and more litter would end up on our property, which would be frustrating.</p> <p>6. <b>Graffiti and Vandalism</b> – This occurs on a regular basis with tagging fencing, cutting fencing, jumping the gates/fencing etc, whilst disturbing us and our neighbours. Police have been called a few times for these kind of behaviours. We assume that these activities would increase with said proposal.</p> <p>7. <b>Security</b> – The school security is not very well managed or monitored and more security would be needed in and around the school. Our home and children's safety are at risk due to frequent loitering.</p> <p>8. <b>Pests</b> – The catering facilities would encourage pests, such as mice, rats and cockroaches. We already have a big problem with rats in our area and our house is pest controlled and maintained.</p> <p>9. <b>Light Pollution</b> – The school is already well lit up around the car park, basketball courts and buildings so would not encourage or enjoy extra or brighter lighting, this would impose on our young children sleeping.</p> <p>10. <b>Construction and Site debris</b> – The rubbish, concrete, dust, and sand/soil whilst the site is under construction is also a major concern for our property. The school already dumps soil/sand at the fence line in big piles and left for a long period of time. (still there now!) This makes a big mess of our homes therefore we cannot leave our doors and window open whilst at home, due to the dust and dirt it leaves.</p> <p>11. <b>Privacy</b> – We as a family would lose our privacy.</p> |

Schedule of Submissions  
Proposed Educational Establishment Additions (Sports Centre, Playing Courts, Classrooms and Car Parking) - Lot 2000 (No.30) Gnangara Drive, Waikiki (20.2020.252.1 & 20.2020.295.1)

| SCHEDULE OF SUBMISSIONS |  |  |
|-------------------------|--|--|
| Name                    | Address  | Comment  |
| No.3 – cont..           |  | <p>We are currently having some issues with the school at present, due to the rubbish problems, waste management truck and lawn maintenance truck and tractors coming early weekday mornings, weekends and school holidays. The cleaners who currently attend the school also disturb us late at night between the hours of 8.00pm to 11.00pm taking the rubbish to the bins with their loud trolleys and emptying into the bins, the loud bangs of rubbish being dropped wakes us and our children up.</p> <p>We were considering contacting the school due to the current issues we are having and assume these issues will still occur or increase if the development goes ahead. We are parents of young children, who work full time and require the weekends to sleep in and relax like most people.</p> <p>We would seek some sort of compensation or significant changes to be made/considered to reduce or eliminate the above concerns, before accepting these developments.</p> <p>We would kindly request the City of Rockingham Council to take our objections into consideration whilst deciding the application. Would be happy for a representative to come and meet and discuss our concerns, whilst viewing some of our issues addressed above.</p> <p>We would like to hear from you with our issues addressed.</p>                                   |
| 4. Mr Jason Lowry       | 13 Seaspray Place<br>WAIKIKI WA 6169<br><a href="mailto:jasonlowry@bigpond.com">jasonlowry@bigpond.com</a> | <p>There are car parking and road access issues with this proposal. I believe there needs to be extra street embayment's for the bus stop and for the school busses on Oakwood crescent, this will stop them blocking the flow of traffic and stop people parking in them. There also needs to be some kind of physical barrier to stop people parking in the sight lines of the carpark entrances, at the moment people just park everywhere and anywhere, (See Attachment of car parked on verge in roundabout at corner of Oakwood and Fairview). There is a potential problem with the entrance to the new carpark on Oakwood Crs, it is close to the intersection with Gnangara Dr and i can see that people turning into the carpark from the south bound lane will block up to the intersection and then people trying to turn from Gnangara Dr into Oakwood Crs will block that up as well, to elevate that I suggest that the centre median be extended past the entrance so all entrance and exit will be north flowing. This is an additional suggestion to help flow of traffic exiting from Gnangara Dr on to Read St that a left turn lane be installed starting from just past Castlerock Av, this will also help flow into an from the Waikiki shopping centre.</p>  |

## Summary of Submissions

| 1. Traffic and Parking   |
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| <p><u>Submission:</u></p> <p>Concerns about the embayment car parking bays proposed opposite 74 Oakwood Crescent. It is difficult at present to access 74 Oakwood Crescent at school drop off and pick up times. Increased traffic and congestion would make property access more difficult. Cars park on and drive over the street verge when making U-turns at drop off/ pick up times, cause damage to lawn sprinklers.</p> |
| <p><u>Applicant's Response:</u></p> <p>Embayment's will provide more structure and control to parking compared to current uncontrolled verge parking.</p> <p>U-turn manoeuvres are related to driver behaviour rather than parking design. The College implement regular communication with College families to provide traffic management and car parking advice.</p>   |
| <p><u>Submission:</u></p> <p>Concerns that the proposed car parking will adversely impact on access to 2/92 Oakwood Crescent. The proposed car parking bays should be located further south along Oakwood Crescent so as not to impede on property access.</p>   |
| <p><u>Applicant's Response:</u></p> <p>The proposed car park is allocated for staff parking and not parent parking, therefore usage patterns would not lead to congestion that would interfere with property access.</p>   |
| <p><u>Submission:</u></p> <p>There should be extra embayment parking provided for school busses to use, including on Oakwood Crescent.</p>   |
| <p><u>Applicant's Response:</u></p> <p>The College are willing to formalise an embayment on Oakwood Crescent for the private charter school buses.</p>   |
| <p><u>Submission:</u></p> <p>There should be some form of physical barrier to stop people parking in the sight lines of the car park entrances. At the moment there is unmanaged car parking in the street verge.</p>  |





Formalised parking embayments are located to maintain sightlines from crossovers in accordance with Australian Standards.

Uncontrolled verge parking is related to driver behaviour rather than parking design. The College implement regular communication with College families to provide traffic management and car parking advice.

Submission:

The entry to the car park proposed on Oakwood Crescent should be moved south, away from the intersection of Ghangara Drive, to prevent south bound traffic using this entrance potentially causing traffic to back up into the intersection.

Applicant's Response:

Crossover relocated southward as requested by the City of Rockingham.

The proposed car park is allocated for staff parking and not parent parking, therefore usage patterns would not lead to congestion that would potentially impact on the intersection.

**Property values**

Submission:

Increased traffic and loss of privacy will adversely impact on property values.

Applicant's Response:

Increased traffic does not directly correlate with loss of privacy.

**Noise**

Submission:

Concerns that noise from the sports centre and service vehicles late at night, early in the morning and during the weekends will adversely impact on residential amenity.

Applicant's Response:

Activity at the Sports Centre late at night is not planned. All noise generated by the proposed Sports Centre will be controlled as required under the Environmental Protection (Noise) Regulations, 1997.

**Antisocial behaviour**

Submission:

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| Concerns that vandalism and graffiti at the school which is currently experienced will increase with the development of the sport centre. Security at the school will need to improve.  |
| <p><u>Applicant's Response:</u></p> <p>The College are in the process of upgrading security fencing to the perimeter of the site along Oakwood Crescent and Fairview Drive. This will be completed prior to the development of the Sports Centre.</p>   |
| <b>Lighting</b>   |
| <p><u>Submission:</u></p> <p>Concern that any brighter illumination proposed would adversely impact on residential amenity. The school is already well lit up around the car park, basketball courts and buildings.</p>   |
| <p><u>Applicant's Response:</u></p> <p>The spill lighting from the playing court floodlighting has been modelled and complies with AS/NZS 4282.2019 "Control of the obtrusive effects of outdoor lighting". Refer to BEST Consultants report.</p>   |
| <b>Privacy</b>  |
| <p><u>Submission:</u></p> <p>Concern the proposed development would adversely impact on the privacy of nearby residents.</p>  |
| <p><u>Applicant's Response:</u></p> <p>The proposed development does not result in any overlooking of nearby properties. Noise levels will be controlled as required under the Environmental Protection (Noise) Regulations, 1997.</p>  |
| <b>Pests and vermin</b>   |
| <p><u>Submission:</u></p> <p>Concern the proposed catering facilities would encourage pests and vermin. There is already a problem with rats in the area.</p>   |
| <p><u>Applicant's Response:</u></p> <p>Catering facilities will comply with the requirements of the Food Act 2008, Food Regulations 2009 and Australian Standard (AS 4674-2004) <i>Design, construction and fit-out of food premises</i>.</p>   |
| <b>Waste Management</b>   |
| <p><u>Submission:</u></p> <p>Concern that the development will generate more waste, resulting in more litter on the submitter's property. Rubbish bins from the school are currently presented to the verge of Oakwood Crescent for collection. On windy nights there is noise from bin lids opening and rubbish from the bins gets scattered onto the submitter's property at 72 Oakwood Crescent.</p> |
| <p><u>Applicant's Response:</u></p> <p>The College intend to relocate bins to a location within the site boundaries. Access for waste collection will be within the site - bins will not be placed on the verge for collection.</p>   |
| <b>Construction Impacts</b>   |
| <p><u>Submission:</u></p> <p>Concern about the impact of dust and rubbish on nearby residents while the development is under construction.</p>  |
| <p><u>Applicant's Response:</u></p> <p>Builders will be required to prepare and implement a construction management plan that will include dust mitigation and waste management.</p>  |