North-East Link Project

Traffic Review of EES prepared for
Hunt & Hunt Lawyers on behalf of
Carey Baptist Grammar School
**Ratio:** Consultants Pty Ltd

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**Appendices:**

- **Appendix A** GTA - Traffic and Transport Review (2015)
- **Appendix B** Parking Survey Results
- **Appendix C** SIDRA Results
Name
1.1.1 Brett James Young

Position
1.1.2 Director – Traffic, Ratio Consultants

Address
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Qualifications and Experience
— Bachelor of Engineering (with Honours), University of Canterbury
— Member, Victorian Planning and Environmental Law Association
— Member, Institute of Transportation Engineers – Australian and New Zealand Section

1.1.4 I have approximately 11 years of experience in Traffic Engineering, including:
— Two and a half years with Traffic Design Group Ltd (Auckland, New Zealand);
— Nine years with Ratio Consultants Pty Ltd.

1.1.5 I have experience and expertise in traffic engineering, road safety planning and development impact assessments of a wide range of land-use developments.

Identity of persons contributing works
1.1.6 James McKenzie, Senior Traffic Engineer at Ratio Consultants and Emily Young, Traffic Engineer at Ratio Consultants, assisted in the preparation of my Evidence Statement, including the analysis of parking and traffic survey data.

Instructions
1.1.7 In the course of preparing this report I was instructed by Hunt and Hunt Lawyers to determine, to the extent I was able to review the sections of the draft Environmental Effects Statement (“EES”) documents that are relevant to my expert discipline.

1.1.8 Out of that review I was instructed to assess the process described in the draft EES for satisfactory management of any of the issues defined as relevant such that the interests of Carey are protected.

1.1.9 Further, I was instructed to identify any matters where the operations, property or personnel associated with Carey are at any risk or interference either during the construction of the Project or in the ongoing operation of the Project after Completion.

Declaration
1.1.10 I confirm that I have read and that I understand the Planning Panels Victoria’s ‘Guide to Expert Evidence’ and that I comply with the provisions of that guide.

1.1.11 I have no relationship with the client other than a business engagement to comment on this matter.

1.1.12 I also declare that I have made all the inquiries that I believe are desirable and appropriate and no matters of significance which I regard as relevant
have to my knowledge been withheld from the Inquiry and Advisory Committee.

Brett Young
Director
2.1 Introduction

I was engaged by Hunt & Hunt Lawyers on behalf of Carey Baptist Grammar School to conduct a review of the car parking and traffic considerations of the Environmental Effects Statement (EES) prepared for the North East Link Project and provide advice that will inform the submission being made by Carey Baptist Grammar School.

North East Link would be Victoria’s largest ever road project. It provides a new freeway standard connection between the M80 Ring Road and an upgraded Eastern Freeway, completing the ‘missing link’ in Melbourne’s metropolitan ring road.

The project has three key elements, as follows:

- **M80 Ring Road to the northern portal** – From the M80 Ring Road at Plenty Road and the Greensborough Bypass at Plenty River Drive, North East Link would extend to the northern tunnel portal near Blamey Road using a combination of above, below and at surface road sections. New road interchanges would be provided at the M80 Ring Road and Grimshaw Street.

- **Northern portal to southern portal** – At the northern portal of the tunnel, the road would transition into twin tunnels that connect to Lower Plenty Road via a new interchange before travelling under residential areas, Banyule Flats and the Yarra River to a new interchange at Manningham Road. The tunnel would then continue to the southern portal located south of the Veneto Club.

- **Eastern Freeway** – From around Hoddle Street in the west through to Springvale Road in the east, modifications to the Eastern Freeway would include widening to accommodate future traffic volumes and new dedicated bus lanes for the Doncaster Busway. A new interchange at Bulleen Road would connect North East Link to the Eastern Freeway.

On February 2018, the Minister for Planning determined that the proponent for North East Link must prepare an EES to inform the Minister’s assessment of the project.

A Reference Design for the project is included in the EES to provide an indication of what the project will look like post-construction as well as the area required during the construction phase.

The EES recommends a number of Environmental Performance Requirements (EPR) that define the project-wide environmental outcomes that must be achieved during design, construction and operation of North East Link (regardless of the design solutions adopted).

As part of the EES, a number of technical reports were also prepared. Of particular relevance to this report is the Traffic and Transport Technical Report (TIA) prepared by SmedTech and peer reviewed by GTA Consultants.

The North East Link EES is on public exhibition for 40 business days from 10 April to 7 June 2019, during which time, stakeholders and members of the public can make written submissions.

2.2 Structure of Report

The following report has been structured as follows:
CONTEXT
— A description of the existing vehicle access arrangements and car parking of the Carey Grammar Sports Complex. This has been informed via the following:
  • A tour of the Carey Grammar Sports Complex and multiple site inspections to review the site geometry, vehicle access arrangements, car parking areas, travel patterns of staff, students and visitors, as well as any existing issues with regards to vehicle access and car parking.
  • Discussions with staff of Carey Baptist Grammar School.
  • The Carey Baptist Grammar School Master Plan – Bulleen Campus, particularly the Traffic and Transport Review prepared by GTA consultants.
  • Parking and traffic surveys of Carey Grammar Sports Complex and the surrounding facilities.

IMPACT
— Outline the projects impact to the existing vehicle access arrangements and car parking of the Carey Grammar Sports Complex on the basis of the EES documents and relevant appendices. Particular attention was given to the following EES documents:
  • Traffic and Transport Chapter.
  • Traffic and Transport Technical Report.
  • Social Impact Assessment Chapter.
  • Social Assessment Technical Report.
  • Land Use Planning Chapter.
  • Land Use Planning Technical Report.

RECOMMENDATIONS
— Provide recommendations to the Reference Design and/or the proposed Environmental Performance Requirements and note any additional Performance Requirements to be considered that would enable the school to continue to operate as normal as possible both through the construction period and after the project has been completed.

2.3 Reference Documents

In the course of preparing this report, I have had access to and relied upon the following documents:
— Carey Baptist Grammar School Master Plan – Bulleen Campus prepared by Hayball Architects.
— Traffic and Transport Review of the Carey Baptist Grammar School – Bulleen Campus, prepared by GTA in 2015 (Reference Number 16M1072000). This is attached at appendix A of this Report.
— EES Documentation, including:
  • Summary Report.
  • EES Map Book.
  • Traffic and Transport Chapter.
  • Traffic and Transport Technical Report.
  • Social Impact Assessment Chapter.
  • Social Assessment Technical Report.
  • Land Use Planning Chapter.
  • Land Use Planning Technical Report.
  • Environmental Management Framework.
  • Sport and Recreation EES Options Fact Sheet.
— Carey Grammar Sports Complex scheduling information received from Carey Baptist Grammar School’s Bulleen Facilities Manager.
— Bus routes information provided by Panorama Coaches relating to buses travelling to and from Carey Grammar Sports Complex.
— Traffic and Parking surveys commissioned by Ratio Consultants.
3.1 Site Location

The Carey Grammar Sports Complex (CGSC) is located at 169 Bulleen Road in Bulleen, approximately 400 metres north of the Eastern Freeway and Bulleen Road interchange as shown in Figure 3.1.1.

Figure 3.1.1: Site Location

3.2 Existing Operations

Carey Grammar Sports Complex Facilities

CGSC is the sporting campus of Carey Baptist Grammar School, with students from other campuses travelling to the site for a wide range of sporting endeavors both during and outside of school hours.

The site contains a diverse range of indoor and outdoor sporting fields, courts and related infrastructure. The site currently comprises the following sporting facilities:

- 7 multipurpose grassed sports fields accommodating football, cricket, soccer, softball, rugby and tennis. The fields are line marked for the different sports depending on the season.
- Other outdoor sports and facilities include:
  - Cricket practice nets.
  - Shot put and long jump.
  - Tennis Courts.
  - Netball Courts.
  - Basketball Courts.
  - Fitness Station.
- Indoor sporting facilities include:
  - Indoor sports courts which can accommodate netball, basketball, volleyball and badminton.
  - Pool facilities.

A plan of the existing site layout is shown below in Figure 3.2.1.
3.3 Site Operation

The sporting facilities at CGSC are predominantly for the use of students from the Kew and Donvale campuses of Carey Baptist Grammar School. In addition to these students, the site is also visited by staff and external users.

Student Activities
The types of student activities that occur are:

- Physical Education (during school hours) – Students arrive by bus.
- Co-curricular (before and after school) – Up to 400 students arrive by bus for after school activities. Some before school training occurs seasonally.
- Co-curricular (Saturdays) – APS interschool competition brings significant numbers of participants and spectators to the site.
- House sports activities – 10 events happen annually in both summer and winter, with up to 1500 students and 200 staff at the site.

Staff Movements
The following staff movements occur at CGSC:

- Teachers arrive by car in advance to the students to prepare for physical education sessions and supervise after school activities and matches.
- Up to six full-time maintenance staff on the site at any time.
- Other staff visit to maintain the rowing boats which are stored on site.

External Groups
A number of external groups have access to the facilities on a managed basis as discussed below:
— Total Aquatic Solutions (TAS) have access to the swimming pool before and after school.
— Old Carey Grammarians – Sporting club for school alumni, with games on Saturdays and training during the week. The schedule is managed around the APS interschool competition fixtures.
— Casual users including Bulleen Basketball, Yarra Valley Netball, Gym Club and other school swim carnivals.
— St Clement of Rome Primary School, Warrandyte Primary School and Anderson Creek Primary School also have access to the swimming pool during school hours (typically 9:30am to 11:00am) in Term 4.
4.1 Existing Car Parking

There are 229 existing car parking spaces within CGSC, located within eight car parking areas. In addition to the parking spaces, there are four bus bays and a 'kiss-and-go' parking area for drop offs.

An aerial image of the site with the location and number of available parking spaces shown below in Figure 4.1.1.

Figure 4.1.1: Carey Sports Complex On-Site Parking

In addition to the on-site parking supply, there are approximately 280 publicly available parking spaces located throughout Bulleen Park, in close proximity to CGSC. Additional informal/overflow parking is available along the edges of some of the access roads.

4.2 Parking Surveys

In order to determine the existing parking demand of CGSC users, Ratio Consultants commissioned surveys of parking supply and demand on Thursday 2 May 2019 between 4.00pm to 9.00pm and on Saturday 4 May 2019 between 8.00am to 5.00pm. This survey period was chosen specifically to coincide a period of normal activity for the sports complex.

The survey was conducted across all the on-site parking areas, the publicly available parking spaces throughout Bulleen Park and any informal/overflow parking areas along the edges of the access roads.

The locations of the surveyed parking areas are shown in Figure 4.2.1.
The CGSC schedule, received from Carey Baptist Grammar School, indicates that the following events were scheduled to occur on the site during the parking survey periods:

**Thursday 2 May**
- 4.00pm to 5.00pm: Nine school groups training for soccer, football and basketball.
- 4.00pm to 9.00pm: TAS utilising all eight lanes of the pool, with the diving pool being used until 7.00pm.
- 6.00pm to 9.00pm: Old Carey football training on one field.
- 7.30pm to 9.00pm: GKR Karate using two indoor courts.

**Saturday 4 May**
- 8.00am to 1.00pm: All seven outdoor fields and two indoor courts in use for the majority of this time, with students playing soccer, football, netball and rugby in the APS interschool competition.
- 12.30pm to 5.00pm: Old Carey Football playing on three outdoor fields for the majority of this time.
- 1.00pm to 5.00pm: Carey Gym Club utilising two indoor courts and B-C Soccer using an outdoor field.

To understand the schedule for the organised sporting events within Bulleen Park, a desktop review was conducted. It is understood that the
Victorian Amateur Football Association (VAFA), the Football Federation Victoria (FFV) and the Yarra Junior Football League regularly play games at Bulleen Park.

A review of the fixture for each of these leagues suggests that the following games took place at Bulleen Park on Saturday 4 May:

- 9:40am: Premier Reserve Women's (VAFA) played on Bulleen Oval West (Marcellin vs St Mary’s Salesian)
- 11:40am: William Buck Premier Women’s (VAFA) played on Bulleen Oval West (Marcellin OC vs St Mary’s Salesian)
- 2:00pm: Thirds Division 2 (VAFA) played on Bulleen Oval West (Old Geelong vs Marcellin OC)

A site inspection on Saturday 4 May confirms that there were football matches played on Bulleen Oval West at 11:40am and 2:00pm, as fixtured.

Survey Results

The detailed survey results are presented in Appendix B, with a summary of the main points discussed below. For both survey periods, the supply is defined as the number of formal car parking spaces within CGSC, with the total parking demand of CGSC users including the formal car parking within CGSC, any external formal car parking areas within Bulleen Park where CGSC users would likely park, and the informal parking areas in the vicinity of CGSC.

Thursday 2 May 2019

It is understood that the car park to the west of Bulleen Oval (CP6) can be closed off during certain times. A site inspection undertaken on Thursday 2 May indicates that it was open during the Thursday survey period and was being used to accommodate the parking demand of external users (using the club rooms adjacent to Bulleen Oval). As such, the car parking demand in this car park was excluded from the below analysis.

The demand was calculated from all the internal CGSC car parks in addition to any demand in CP7 and IP4, which was assumed to be associated with CGSC users due to its proximity to CGSC.

The survey results revealed:
- There was observed to be a supply of 229 formal parking spaces available within the CGSC site.
- The demand for parking varied throughout the evening, ranging between 14% and 57% of available supply.
- The peak hour occurred at 5.00pm, when a total demand of 131 parking spaces was recorded, representing a percentage occupancy of 57%. This coincides with parents picking up students from the nine different sporting groups, as well as overlapping with the TAS swimming group.
- The CGSC has the capacity on site to accommodate all of the parking demand associated with Thursday evening sporting activities.

Figure 4.2.2 provides a graphical representation of the observed Thursday parking demands.
Saturday 4 May 2019

Based on a site inspection undertaken on Saturday 4 May 2019 it was identified that the car park to the west of Bulleen Oval (CP6) was closed during the survey period, as no events were taking place on Bulleen Oval. There were several organised sporting events taking place on the Bulleen Oval West.

As such, it is assumed that the parking demand generated by CGSC comprises the demand observed within the site, in addition to demand observed at CP4, CP7 and IP4 as shown in Figure 4.2.1. It is assumed that observed demand in all other parking as associated with the football activities on Bulleen Oval West or other events not associated with CGSC.

The survey results revealed:

— There was observed to be a supply of 229 formal parking spaces available within the CGSC site.
— The demand for parking varied throughout the day, ranging between 3% and 133%.
— The peak hour occurred at 3.00pm, when a total demand of 304 parking spaces was recorded, representing a percentage occupancy of 133%, which indicated that drivers are required to park external to the site, within CP4, CP7 and IP4. The peak hour coincides with the crossover of up to six Old Carey sporting games.
— CGSC currently does not have the capacity on-site to accommodate all of the parking demand associated with peak Saturday sporting events and relies on informal parking within the site and formal parking outside the site during these times.

Figure 4.2.3 provides a graphical representation of the Saturday parking demands.
Comparison to GTA Parking Survey (2015)

GTA Consultants also conducted parking surveys for the existing on-site parking during the preparation of a traffic and transport review for the Carey Grammar Master Plan. The traffic and transport review undertaken by GTA is attached at Appendix A of this Report.

Surveys were conducted on the morning of Saturday 25 July 2015 and the evening of Thursday 30 July 2015.

A summary of the results is provided below in Figure 4.2.4.

The findings of the GTA survey are synonymous with the Ratio surveys outlined above, confirming sufficient parking availability on-site observed on the Thursday evening, with observed Saturday demand being higher than the parking supply.

It is noted that the GTA surveys recorded a total supply of 257 car parking spaces for CGSC, as opposed to 229 car parking spaces as recorded by the Ratio surveys. The discrepancy in the recorded supply is due to the following:

— The supply recorded by GTA has included the publicly available CP7 (which can be seen in Figure 3.2.1). The Ratio surveys have not included this car park as it is not within the boundaries of CGSC,
The supply recorded by GTA has not included the disabled parking spaces within CGSC, however these spaces have been included in the Ratio surveys; and

The supply recorded by Ratio has included an additional 19 car parking spaces within CP9 which are not marked on the Master Plan, however are currently being used for car parking.

Conclusion

It is clear from the recent parking survey results, and from the 2015 surveys, that the peak parking demand at CGSC generally occurs on Saturdays. This usually occurs when there are several overlapping sporting events occurring on-site, with the demand produced from the large number of participants and spectators. As the demand begins to exceed the supply, surveys and site observations indicate that drivers are parking within the public car parks and any informal parking areas along the road edges.

4.3 Likelihood of Parking Demand Exceeding Supply

The parking survey discussed in Section 4.2 was conducted on a busy Saturday that had multiple sporting groups within CGSC. The results indicate that the demand is far greater than the supply during that day.

To understand the likelihood of the number of times this scenario is likely to occur over a year, the CGSC schedule for the last 12 months has been obtained from Carey Baptist Grammar School and reviewed.

It is estimated from the schedule that a similar parking demand could be expected up to 30 days a year (generally on Saturdays). This is likely to occur when the APS inter school tournament is played in the morning and the Old Carey sporting teams play in the afternoon, with the crossover between the two likely to incur the greatest demand for parking.

4.4 Implications – Construction

Construction Compound

The Reference Design of the construction of the North East Link shows the construction compound boundary extending across the access road to the remainder of Bulleen Park, as illustrated in Figure 4.4.1 below.
If this construction compound boundary line is to be understood literally as a fence around the compound it would block the access road which would have the following impacts:

- It would restrict the ability for CGSC users to park in some of the publicly available parking areas to the immediate north of the campus.
- Vehicle access to Gate 2 would be blocked which would impact the current vehicle circulation arrangement within the campus (which is currently one-way with entry via Gate 1 and exit via Gate 2) as well as impact bus drop-off areas.
- Direct vehicle access to Gate 3 would be blocked. Vehicles having to travel through the entire CGSC to get to/from the second largest on-site car park located in the north-western corner of CGSC. This would be an inconvenience to drivers and would impact the existing one-way flow through the site. Works would likely be required within CGSC to facilitate suitable two-way vehicle circulation via the existing loop road, such as line marking, signage and potentially widening to the existing road carriageway.

It is not clear why the construction compound boundary is shown to extend across the access road.
Project Boundary

The Reference Design of the construction of the NE Link (seen in Figure 4.4.1) also shows that the Project Boundary extends significantly into CGSC. The term Project Boundary is defined within the Glossary as:

The project boundary encompasses all areas that would be used for permanent structures, temporary construction areas and areas for potential minor road and rail works. It defines the area within which the project would be developed and is the area that has been used as the basis for the specialist assessments. It is different to the study area adopted in the specialist assessments which is typically a much broader area allowing for a more comprehensive assessment of the impacts of the project.

It is not clear in the documentation reviewed why the project boundary extends into the CGSC site, or what impact this could have on the ability to use the on-site car parking.

There are approximately 75 car parking spaces within CGSC encompassed by the project boundary line and 80 publicly available car parking spaces outside of CGSC (excluding informal car parking areas) encompassed by the project boundary line that could impact on parking availability for the sports activities in CGSC.

As discussed in Section 4.2, CGSC rely on all of their on-site parking as well as public parking within Bulleen Park to accommodate the peak parking demand of the site.

The section of the circulation road within CGSC which runs around the north and east of Dunshea Oval is also located within the Project Boundary. It is unclear from the Reference Design or the EES Documentation if this section of the circulation road would still be available for use by CGSC during construction of the project.

Restricting vehicle access via this section of the circulation road would require the majority of CGSC users to access the site via Gate 3 (to access on-site car parking areas) and would have a significant impact on vehicle circulation throughout the site. More specifically, this would impact the existing one-way flow throughout the site. Works would be required within CGSC to facilitate suitable two-way vehicle circulation via the remaining sections of the circulation road (which are located outside of the Property Boundary), such as widening to the existing road carriageway (which may be difficult in certain locations due site constraints), providing new line-marking, and signage.

4.5 Implications – Operation

Permanent Loss of Car Parking Spaces

The Reference Design of the operation of the North East Link indicates that some of the on-site car parking spaces to the east of Dunshea Oval would be permanently lost following the construction of the project.

There is currently a total of 27 car parking spaces in the location that would be impacted, however the Carey Grammar Master Plan – Bulleen Campus, prepared by Hayball Architects in 2015, indicates that it was planned to upgrade this area to provide more car parking. A total of 65 of the parking spaces shown on the Master Plan would be permanently lost as a result of the project.
Figure 4.5.1 shows the area of car parking that will be permanently lost due to the project.

**Figure 4.5.1 Car parking area lost due to the project**

Source: sheet 22 of the Environmental Effects Statement Map Book

Figure 4.5.2 shows the 27 existing car parking spaces that would be permanently lost as a result of the project.

**Figure 4.5.2 Existing Car Parking Spaces Impacted**

Figure 4.5.3 shows the 65 car parking spaces marked on the Master Plan that would be permanently lost as a result of the project.
The Reference Design for the operation of the North East Link indicates that other on-site car parking areas would not be impacted following construction of the project.

The parking survey results discussed in Section 4.2 indicate that there is already a deficiency in parking on site during the peak Saturday period, with vehicles having to park external to the site. The loss of parking would further exacerbate this issue.

4.6 Recommendations

Based on the assessment undertaken above, the following is recommended:

Construction

Recommendation 1

The Construction Compound Boundary should be amended to lie outside of the Bulleen Park access road so that unfettered access to CGSC via the three existing gates is maintained throughout construction.

Recommendation 2

The Project Boundary line should be shifted outside the CGSC boundary, including the Bulleen Park access road that is relied on to access the carpark located to the north of Wilcox Field.

Figure 4.6.1 illustrates the recommended change to the Construction Compound and Project Boundary lines to ensure vehicle access to car parking is maintained.
Recommendation 3
The Project Boundary should be shifted clear of the circulation road within CGSC to ensure that the existing vehicle circulation arrangements within CGSC are maintained.

Figure 4.6.2 illustrates the recommended change to the Project Boundary line to ensure the existing vehicle circulation arrangement within CGSC is maintained.
In addition to the above, if access to any existing on-site car parking is going to be restricted during the construction stage, then a temporary car park should be provided for CGSC users.

This arrangement could be similar to what is already proposed for the Veneto Club. Within the Appendices of the Social Impact Technical Report, there are discussions about the impacts to the Veneto Club during construction. Specifically, it is identified that a portion of the existing car parking for The Veneto Club will become temporarily occupied during construction and as such, a temporary car park will be provided, with the location likely to be within Bulleen Oval.

**Recommendation 4**

If access to any existing on-site car parking is likely to be restricted during construction, it is recommended that the Reference Design be amended to include construction of temporary parking in proximity but outside the boundary of CGSC and for the exclusive use of CGSC, or alternatively that an Environmental Performance Requirement with an outcome to this effect be included.

**Recommendation 5**

To prevent construction workers from parking in the publicly available car parking spaces within Bulleen Park (which is currently relied upon to accommodate the parking demand of users of both Bulleen park and CGSC), an Environmental Performance Requirement should be incorporated to ensure that workers are provided with their own dedicated parking.
Operation

The Environmental Performance Requirement (EPR T1) located within Technical Report A (Traffic and Transport) states the following in relation to the loss of car parking:

To optimize the design of works in consultation with appropriate road management authorities, public transport authorities, relevant land managers and local councils as part of the detailed design process to minimise loss of car parking in consultation with relevant local councils.

In addition to the above, the appendices of the Social Assessment Technical Report discuss multiple times that the North East Link project is committed to a ‘zero net loss of car parking’.

Recommendation 6

For the project to adhere to the project’s commitment to a zero loss of car parking and to offset the loss of on-site car parking at CGSC, it is recommended that the Reference Design be amended to include construction of additional permanent parking in proximity but outside the boundary of CGSC and for the exclusive use of CGSC, or alternatively that an Environmental Performance Requirement with an outcome to this effect be included.
5.1 Existing Operation

Existing Vehicle Access Arrangements

Vehicle access to Carey Grammar Sports Complex and Bulleen Park is currently provided via a sole access point connecting to/from Bulleen Road, as illustrated in Figure 5.1.1.

Figure 5.1.1: Existing Vehicle Access Arrangement

The Bulleen Road access point is currently unsignalised, with priority given to vehicles travelling along Bulleen Road. The access point comprises separate right and left-turn lanes for vehicles departing onto Bulleen Road and a channelised right-turn lane along Bulleen Road to cater for vehicles entering CGSC / Bulleen Park from the north.

The existing layout of the Bulleen Road access is shown in Figure 5.1.2.
An internal access road extends west from the Bulleen Road access point, providing vehicle access to the different car parking areas, Bulleen Park and to CGSC.

CGSC itself is provided with three separate connections to the internal access road, as follows:

- Gate 1: Entry only access point for both buses and passenger vehicles.
- Gate 2: Exit only access point for both buses and passenger vehicles.
- Gate 3: Entry and exit access for passenger vehicles.

The gates between the internal access road and CGSC are shown in Figure 5.1.3.
Vehicle access to The Veneto Club, which is located approximately 400 metres to the north of CGSC, is currently provided via a separate access point connecting directly to/from Bulleen Road. The Veneto Club access is also currently unsignalised and is shown in Figure 5.1.4 below.
Traffic Surveys

To determine the current level of traffic accessing CGSC, Bulleen Park & The Veneto Club, Ratio Consultants commissioned traffic movements count surveys on Thursday 2 May 2019 between 4:00pm and 9:00pm and on Saturday between 8:00am and 5:00pm at the following locations:

- CGSC & Bulleen Park access to/from Bulleen Road;
- The Veneto Club access to/from Bulleen Road; and
- Gate 1, 2 & 3 of CGSC.

As previously discussed, the surveys were commissioned to coincide with the normal operation of CGSC. The exact activities schedule at CGSC during the survey times were outlined previously in Section 3.2.

The turning movement count survey locations and peak hour results are shown in Figure 5.1.5 & Figure 5.1.6 and summarised in Figure 5.1.7. The peak hours stated below represents the hours when there was the highest level of traffic accessing CGSC, Bulleen Park and The Veneto Club.

Figure 5.1.5: Turning Movement Count Results – Thursday 2 May 2019
The following is noted from the traffic movement survey counts:

- The weekday peak hour for traffic accessing CGSC, Bulleen Park and The Veneto Club occurred between 5:30pm and 6:30pm (due to afterhours training at CGSC and Bulleen Park).
- The weekend peak hour for traffic accessing CGSC, Bulleen Park and The Veneto Club occurred between 9:30am and 10:30am (due to school and club sports at CGSC and Bulleen Park).
The main access for CGSC and Bulleen Park was observed to carry a high level of traffic during both the weekday peak hour (460 movements) and the weekend peak hour (592 movements).

The Veneto Club access was also observed to carry a reasonable level of traffic during both the weekday peak hour (301 movements) and the weekend peak hour (222 movements).

The results of the traffic surveys are consistent with site observations and anecdotal evidence provided from Carey Baptist Grammar School which suggests the following:

- There is a high level of congestion at the Bulleen Road access during periods of peak operation of CGSC and Bulleen Park.
- Motorists experience significant queues and delays associated with vehicles departing the main access to CGSC and Bulleen Park.
- Turning right out onto Bulleen Road is particularly difficult with many vehicles choosing to instead turn left and find alternate routes to depart to the south.
- There have been a number of casualty crashes and near misses at the Bulleen Road access due to the high level of traffic.

**Comparison to GTA Traffic Survey (2015)**

GTA consultants also conducted traffic surveys of CGSC and the main access to Bulleen Road as part of the Carey Grammar Master Plan.

The surveys were undertaken on Saturday 25 July 2015 and Thursday 30 July 2015 and were selected to coincide with the peak operation of CGSC. The Veneto Club access was not surveyed as part of the GTA assessment.

A comparison of the traffic volumes commissioned by Ratio Consultants and GTA is shown in Figure 5.1.8.

**Figure 5.1.8: Comparison of Traffic Volumes**

<table>
<thead>
<tr>
<th>Surveys</th>
<th>Survey Period</th>
<th>CGSC &amp; Bulleen Park Main Access</th>
<th>CGSC Gate 1</th>
<th>CGSC Gate 2</th>
<th>CGSC Gate 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ratio Surveys - 2019</td>
<td>Weekday PM Peak (5:30pm to 6:30pm)</td>
<td>460 vph</td>
<td>113 vph</td>
<td>1 vph</td>
<td>146 vph</td>
</tr>
<tr>
<td></td>
<td>Weekend peak (9:30am to 10:30am)</td>
<td>592 vph</td>
<td>219 vph</td>
<td>50 vph</td>
<td>291 vph</td>
</tr>
<tr>
<td>GTA surveys - 2019</td>
<td>Weekday PM Peak (4:30pm to 5:30pm)</td>
<td>374 vph</td>
<td>85 vph</td>
<td>13 vph</td>
<td>159 vph</td>
</tr>
<tr>
<td></td>
<td>Weekend peak (4:30pm to 5:30pm)</td>
<td>618 vph</td>
<td>185 vph</td>
<td>34 vph</td>
<td>231 vph</td>
</tr>
</tbody>
</table>

The above table demonstrates that there was a relatively similar level of traffic observed within both the Ratio and GTA surveys.
5.2 Implications – Construction

Section 10 of the Traffic and Transport Technical Report assesses the construction impacts of the North East Link on the surrounding transport and network and its users. The sections relevant to CGSC are discussed further below.

Key Construction Sites Generating Haulage Vehicles

Section 10.2 of the Traffic and Transport Technical Report provides estimates of the volume of vehicle movements associated with trucks hauling spoil.

It is noted that truck movements associated with hauling spoil do not account for all daily truck trips during construction (other truck trips include the delivery of materials to the different construction compounds), however these movements account for the vast majority of trips (estimated to be 80% of truck trips within the Report).

During the main period of construction (which is approximately a 5 year period from 2021 and 2025) the Report estimates that there would be an average of 400 daily truck movements along the section of Bulleen Road fronting CGSC. This estimate includes truck movements associated with the haulage of spoil from both the northern launch and southern launch sites.

The volume of truck movements associated with hauling spoil is estimated to increase to approximately 750 daily truck movements during the peak construction period of the project.

Overall, the additional truck movements (400 daily truck movements on average and up to 750 daily truck movements during peak construction periods of the project) represent a relatively small proportion of the total traffic that is currently carried by Bulleen Road, as shown in the Figure 5.2.1.

Figure 5.2.1: Additional Truck Volumes on Bulleen Road

<table>
<thead>
<tr>
<th>Approximate Existing Traffic Volume (estimated from the peak hour volumes)</th>
<th>Bulleen Road fronting CGSC</th>
</tr>
</thead>
<tbody>
<tr>
<td>30,000 vehicles per day</td>
<td></td>
</tr>
</tbody>
</table>

| Estimated Average Truck Movements                                          | 400 vehicles per day        |
| % Increase from existing volumes                                          | 1% increase                 |
| Estimated Peak Truck Movements                                            | 750 vehicles per day        |
| % Increase from existing volumes                                          | 2.5% increase               |

Notwithstanding, it is anticipated that the additional construction traffic would result in some additional congestion and delays in accessing CGSC and therefore should be programmed to occur outside of peak hours of CGSC where possible.

This recommendation is already addressed by Environmental Performance Requirement (EPR) T2 which states the following:
Prior to commencement of relevant works, develop and implement Transport Management Plan(s) (TMP) to minimise disruption to affected local land uses, traffic, car parking, public transport (rail, tram and bus), pedestrian and bicycle movements and existing public facilities during all stages of construction.

The TMP must be informed and supported by an appropriate level of transport modelling and must include:

- Requirements for limiting the amount of construction haulage during the peak periods

Recommendation 7

It is noted that the peak period of activity for CGSC is Saturday Sport. It is therefore recommended that construction haulage activity in the vicinity of the site should also seek to avoid Saturday. This could be achieved through an amendment to EPR T2 such as follows:

Requirements for limiting the amount of construction haulage during the peak periods, including during peak periods of activity for significant land uses such sporting facilities.

Site Compound Access

As can be seen in the Reference Design for the construction of the North East Link, there is a construction compound located on Bulleen Oval which is located to the immediate north of CGSC. The reference design is shown in Figure 5.2.2.

Figure 5.2.2: Reference Design of construction of the project

Section 10.4 of the Traffic and Transport Technical Report outlines the forecast delivery volumes to each of these construction compounds. For the construction compounds within the North-East Link Corridor (which
includes the construction compound to the immediate north of CGSC), the Report estimates that there would be an average of 20 daily deliveries for each compound. This equates to a total of 40 daily vehicle movements (20 movements into the compound and 20 movements out of the compound).

It is not clear from the Traffic and Transport Technical Report how these trucks would access the construction compound. This may initially occur from the existing unsignalised access to Bulleen Road and later from the new signalised access to Bulleen Road (which is shown within the Reference Design approximately 250 metres of the existing access).

Whilst it is noted that the construction compound is not anticipated to generate a significant level of traffic (only 40 daily movements), access to the compound via the existing unsignalised access to Bulleen Road will introduce a mixture of passenger vehicles and heavy vehicles, which raises potential safety concerns.

Accordingly, it is considered that access to the construction compound should be limited to times outside of peak periods of CGSC, particularly if the construction compound is required to be accessed via the existing unsignalised access to Bulleen Road.

This recommendation is already partially covered within the Environmental Performance Requirement (EPR) T2, which states:

Prior to commencement of relevant works, develop and implement Transport Management Plan(s) (TMP) to minimise disruption to affected local land uses, traffic, car parking, public transport (rail, tram and bus), pedestrian and bicycle movements and existing public facilities during all stages of construction.

The TMP must be informed and supported by an appropriate level of transport modelling and must include:

- Requirements for limiting the amount of construction haulage during the peak periods
- Measures to ensure connectivity and safety for all transport network users during construction.

Recommendation 7 previously discussed, recommends that EPR T2 is amended to ensure that ‘peak periods’ as noted above be extended to consider the peak times associated with sporting facilities such as CGSC.

It is also noted that the Social Assessment Technical Report states that:

The project may require temporary traffic signals to be installed at the intersections of Carey Grammar Sports Complex and Marcellin College access road to facilitate truck movements.

Contrary to the above statement, no reference to temporary signals at the existing access has been found in the Traffic and Transport Technical Report.

**Recommendation 8**

It is recommended that further clarification be provided on whether it is in fact proposed to install temporary signals at the existing access to Bulleen Road, including details of the configuration, so that the impacts of this scenario can be further assessed as it relates to CGSC.
Road Closures and Diversions

SHORT-TERM ROAD CLOSURES

Section 10.5 of the Traffic and Transport Technical Report outlines the potential closures and diversions for the project’s construction.

In regards to short-term closures, the Traffic and Transport Technical Report states:

*It is likely that some roads would require short-term closures to allow for construction activities. This would normally occur where works are taking place close to or above existing traffic lanes. These short-term closures would normally occur overnight or possibly over long weekends depending on the staging of the works.*

The report also identifies Bulleen Road north of the Eastern Freeway as a location that will require short-term closures due to the delivery and installation of concrete beams or bridge sections.

It is also noted that the Social Assessment Technical Report states that:

*It is likely that traffic conditions would change along the road network near construction sites due to temporary lane and road closures, detours and additional construction traffic especially on local and arterial roads, where a number of recreational and open space areas are located. Specifically, there would be increased truck movements along Bulleen Road and Manningham Road and the Eastern Freeway. These changed conditions would cause congestions and delays in accessing recreational facilities located within the Bulleen Park sports precinct (such as activities within unaffected parts of Carey Grammar School, Trinity Grammar School and Marcellin College and Bulleen Park sporting grounds). It is notable these facilities are used on the weekend and in off-peak periods for training, games and events, when potential queueing and delays would increase if this use coincided with construction-related traffic changes. People would have to factor in additional travel times while accessed these facilities.*

It is considered that all short-term road closures along Bulleen Road should be restricted to times outside of the operation of CGSC to ensure that vehicle access is maintained. As discussed above, The Traffic and Transport Technical Report outlines that short-term road closures would normally occur overnight or on long weekends. Given that CGSC would likely operate during long weekends, it is recommended that all short-term road along Bulleen Road are limited to overnight periods.

**Recommendation 9**

To ensure that road closures along Bulleen Road during construction do not impact on access to CGSC, it is recommended EPR T2 is amended as follows:

*Requirements for maintaining transport capacity in the peak periods, including weekend peak periods associated with land uses such as sporting grounds. Short term road closures in the vicinity of sporting grounds should be limited to overnight periods.*

LONG-TERM ROAD CLOSURES

No long-term closures are specifically identified within the Traffic and Transport Technical Report that would directly impact the operation of CGSC.
Bus Services

Carey Baptist Grammar School currently engage private bus services to transport students between the school campuses (Kew and Donvale) and CGSC. These bus services are used on both weekdays and weekends.

Based on information provided from the bus operators, it is understood that the bus routes are generally as follows:

**Kew Campus to CGSC:** Kew Campus - Burke Road – Doncaster Road – Bulleen Road – CGSC (and vice versa)

**Donvale Campus to CGSC:** (1) Donvale Campus – Springvale Road – Eastern Freeway – Bulleen Road – CGSC or (2) Donvale Campus – Reynolds Road – Thompsons Road – Bulleen Road – CGSC or (3) Donvale Campus – Templestowe Road – Bulleen Road – CGSC

The increase in traffic on the surrounding road network (due to construction vehicles) and road closures and diversions during construction may increase the travel time between the school campuses and CGSC and potentially require bus operators to take alternate routes (depending on the stage of construction and works being undertaken). It is not clear exactly what the increase in travel time will be along the bus routes during construction.

5.3 Implications – Operation

Reference Design

The North East Link Project will result in the removal of the existing access to CGSC & Bulleen Park connecting to/from Bulleen Road to make way for the surface roads and tunnel access.

The Reference Design of the operation of the project includes a new signalised access to Bulleen Road, located approximately 250 metres to the north of the existing access, which would provide vehicle access to/from Bulleen Park, CGSC and The Veneto Club.

It is understood from the Reference Design and the EES Documentation that the existing access to The Veneto Club connecting to/from Bulleen Road would also be removed during the operation of the project. Accordingly, the sole access to The Veneto Club would also be via the signalised intersection that also provides access to Bulleen Park & CGSC.

The location of the new signalised access is shown in Figure 5.3.1.
The new signalised access to Bulleen Road is shown in the Reference Design with the following layout:

- Two lanes of through traffic on both sides of Bulleen Road;
- Separate right-turn lane along Bulleen Road for vehicles turning into the access road;
- A left-turn deceleration lane along Bulleen Road;
- Single left and right-turn lanes for vehicles departing onto Bulleen Road; and
- A leg on the eastern side of Bulleen Road connecting to the existing Marcellin College access, which appears to cater for exit movements only. This access is currently gated and is assumed to remain so.

The layout of the signalised intersection is shown in more detail in Figure 5.3.2.
As discussed previously, motorists currently experience difficulty turning right out of the unsignalised access to CGSC / Bulleen Park, due to the high level of traffic. It is acknowledged that the provision of a new signalised access to CGSC / Bulleen Park would provide a safer environment for vehicles to turn right out of the site onto Bulleen Road as well as for right turn entry movements.

Notwithstanding the safety improvements, a review of the signalised access is required to determine if the layout shown within the Reference Design is sufficient to accommodate the anticipated level of traffic in the 2036 design scenario (or if any modifications are required to the Reference Design).

A review of the performance of the intersection is undertaken below.

**Intersection Performance - EES Documentation**

Detailed intersection modelling is presented within the Traffic and Transport Technical Report for a series of intersections within the North-East Link Corridor, including the new signalised access to Bulleen Road.

The modelling has been undertaken for a weekday AM and PM peak period (two hours within each peak period have been modelled) for the design year of 2036. The modelling has been undertaken for the design year of 2036 using the software package VISSIM.

The detailed results of the model are presented in Appendix E of the Traffic and Transport Technical Report and are summarised in Figure 5.3.3 and Figure 4.3.4.

**Figure 5.3.3: 2036 Weekday AM Peak**

<table>
<thead>
<tr>
<th>Approach</th>
<th>AM PEAK (FIRST HOUR)</th>
<th></th>
<th>AM PEAK (SECOND HOUR)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Arrived volume</td>
<td>Level of Service</td>
<td>95%ile Queue (m)</td>
</tr>
<tr>
<td>Bulleen Road (south)</td>
<td>1,380</td>
<td>A</td>
<td>35</td>
</tr>
<tr>
<td>Bulleen Road (north)</td>
<td>1,770</td>
<td>A</td>
<td>65</td>
</tr>
<tr>
<td>CGSC, Bulleen Park, The Veneto Club Access (west)</td>
<td>10</td>
<td>D</td>
<td>10</td>
</tr>
<tr>
<td>Intersection</td>
<td>3,160</td>
<td>A</td>
<td>1.8</td>
</tr>
</tbody>
</table>
In summary, the traffic modelling undertaken within Traffic and Transport Technical Report demonstrates the following:

**AM Peak Period**

- The intersection is predicted to operate with a Level of Service of A during the AM peak, with minimal queues and delays.
- The maximum delay at the intersection is associated with vehicles departing the western leg (which provides access to CGSC, The Veneto Club and Bulleen Park), with an average delay of between 30 and 37 seconds during the AM peak. This delay is considered to be relatively minor.

**PM Peak Period**

- The intersection is predicted to operate with a Level of Service of A during the PM peak hour with minimal queues and delays.
- The maximum delay at the intersection is again associated with vehicles departing the western leg, with an average delay of between 26 and 27 seconds. This delay is also considered to be relatively minor.

Overall, the analysis undertaken within the Traffic and Transport Technical Report indicates that the signalised intersection shown in the Reference Design is sufficient to accommodate the anticipated level of traffic during both the weekday AM and PM peak periods for the 2036 design year.
Intersection Performance – Ratio Analysis

Ratio Consultants has undertaken an independent analysis of the performance of the new signalised access to Bulleen Road to verify if the current layout of the intersection is sufficient to accommodate the anticipated level of traffic for the 2036 design year (or determine if any modifications are required).

The analysis has been undertaken during a weekday PM peak period and a Saturday peak period to coincide with the peak operation of CGSC, Bulleen Park and The Veneto Club.

The microsimulation of the signalised access has been undertaken using SIDRA. SIDRA is a computer software program that was developed by the Australian Road Research Board (ARRM) to design and analyse the performance of both signalised and unsignalised intersections.

The parameters used to assess the intersections are summarised below.

**Degree of Saturation (D.O.S.)** is a ratio of arrival (or demand) flow to capacity. Degrees of saturation above 1.00 represent oversaturated conditions and degrees of saturation below 1.00 represent under saturated conditions. The D.O.S. ratings are detailed in Table 8.8.

Although operating conditions with a D.O.S. of close to 1.00 are undesirable, it is acknowledged that this level of congestion is typical of many metropolitan intersections during the AM and PM peak hours.

### Table 8.8: Degree of Saturation Ratings

<table>
<thead>
<tr>
<th>Degree of Saturation (D.O.S.)</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 0.6</td>
<td>Excellent</td>
</tr>
<tr>
<td>0.61 – 0.70</td>
<td>Very Good</td>
</tr>
<tr>
<td>0.71 – 0.80</td>
<td>Good</td>
</tr>
<tr>
<td>0.81 – 0.90</td>
<td>Fair</td>
</tr>
<tr>
<td>0.91 – 1.00</td>
<td>Poor</td>
</tr>
<tr>
<td>Greater than 1.00</td>
<td>Very poor</td>
</tr>
</tbody>
</table>

The **95th percentile queue length (95%ile queue)** is the value below which 95 percent of all observed cycle queue lengths fall, or 5 percent of all observed queue lengths exceed.

**Average Delay** is the average time, in seconds, that vehicles can be expected to wait at an intersection.

**TRAFFIC VOLUMES**

The following traffic volumes have been used in the SIDRA analysis:

- The weekday through traffic volumes along Bulleen Road for the 2036 design year have been extracted from the large-scale modelling undertaken within the Traffic and Transport Technical Report. This approach is consistent with the intersection modelling presented within the Traffic and Transport Technical Report.

- The volume of traffic generated by CGSC, Bulleen Park and The Veneto Club is based on the existing traffic volumes derived from the traffic surveys commissioned by Ratio Consultants and presented earlier within this Report. It was noted from site observations that there was a relatively low level of activity within The Veneto Club during the Saturday survey period. This observation is consistent with the results of the parking survey, which demonstrate that a parking occupancy of only 25% occurred within The Veneto Club car park.
during the recorded Saturday peak hour of traffic. As a result, the volume of traffic assumed to be generated by the Veneto Club on a Saturday has been factored up to assume the Veneto Club is operating at near capacity (which often occurs on Saturdays throughout the year). The volume of traffic anticipated to generated by CGSC, Bulleen Park and The Veneto Club varies significantly from the volume of traffic estimated within the intersection modelling presented within the Traffic and Transport Technical Report. A comparison between the volume of traffic estimated to access CGSC, Bulleen Park and The Veneto Club in the modelling presented within the Traffic and Transport Technical Report and Ratio analysis is shown in Figure 5.3.6 below.

**Figure 5.3.6: Comparison of traffic volumes**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekday AM Peak</td>
<td>10 movements</td>
<td>Not modelled as this does not represent the peak period of activity of CGSC, Bulleen Park and The Veneto Club</td>
<td>n/a</td>
</tr>
<tr>
<td>Weekday PM Peak</td>
<td>160 movements</td>
<td>761 movements</td>
<td>601 movements</td>
</tr>
<tr>
<td>Saturday Peak</td>
<td>Not modelled</td>
<td>1,390 movements</td>
<td>n/a</td>
</tr>
</tbody>
</table>

The traffic surveys commissioned by Ratio indicate that the western leg of the intersection (servicing CGSC, Bulleen Park and The Veneto Club) would likely generate a significantly higher level of traffic than what was assumed in the modelling undertaken in the Traffic and Transport Technical Report.

The intersection modelling presented within the Traffic and Transport Technical Report does not consider a weekend peak period. Given that the peak level of traffic accessing CGSC, Bulleen Park and The Veneto Club typically occurs on a Saturday, it is considered that the signalised access needs to be analysed under this scenario for the purposes of design.

Weekend through traffic volumes along Bulleen Road for the 2036 design year are not presented within the Traffic and Transport Technical Report. These volumes have been estimated for the Sidra analysis by noting the difference between the existing through volumes along Bulleen Road on a weekday and a weekend (as determine via the traffic surveys), and scaling the 2036 weekday volumes accordingly.

**TRAFFIC DISTRIBUTION**

The following distribution of traffic has been assumed for CGSC, Bulleen Park and The Veneto Club:

- **CGSC**: The distribution of traffic for CGSC has been estimated based on student catchment data obtained for Carey Baptist Grammar School. This data suggests that approximately 80% of CGSC traffic would arrive and depart from the south and 20% of CGSC traffic would arrive and depart from the north.
— **Bulleen Park**: It has been estimated that approximately 50% of Bulleen Park traffic would arrive and depart from the south and 50% of Bulleen Park traffic would arrive and depart from the north.

— **The Veneto Club**: It has been estimated that approximately 50% of The Veneto Club traffic would arrive and depart from the south and 50% of The Veneto Club traffic would arrive and depart from the north.

The above traffic distribution assumptions vary from the distribution recorded within the traffic survey data collected by Ratio Consultants, which indicate that a larger proportion of the traffic accessing CGSC and Bulleen Park depart to the north. This is due to the difficulty motorists currently experience turning right at the existing Bulleen Road access, with observations suggesting that a large proportion of vehicles currently turn left onto Bulleen Road and return to the south via alternate routes (such as u-turns at the median break opposite the Marcellin College access). The SIDRA results of the weekday operation of the signalised access for the 2036 design year are shown in Figure 5.3.7 below.

*Figure 5.3.7: SIDRA Results – Weekday PM Peak Hour*

<table>
<thead>
<tr>
<th>Approach</th>
<th>Movement</th>
<th>WEEKDAY PEAK</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>D.O.S.</td>
</tr>
<tr>
<td>Bulleen Road (S)</td>
<td>Left</td>
<td>0.150</td>
</tr>
<tr>
<td></td>
<td>Through</td>
<td>0.801</td>
</tr>
<tr>
<td>Bulleen Road (N)</td>
<td>Through</td>
<td>0.822</td>
</tr>
<tr>
<td></td>
<td>Right</td>
<td>0.729</td>
</tr>
<tr>
<td>Western Access Road</td>
<td>Left</td>
<td>0.195</td>
</tr>
<tr>
<td></td>
<td>Right</td>
<td>0.816</td>
</tr>
<tr>
<td>All Vehicles</td>
<td></td>
<td>0.822</td>
</tr>
</tbody>
</table>

The SIDRA results of the weekend operation of the signalised access for the 2036 design year are shown in Figure 5.3.8.

*Figure 5.3.8: SIDRA Results – Weekend Peak*

<table>
<thead>
<tr>
<th>Approach</th>
<th>Movement</th>
<th>WEEKEND PEAK</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>D.O.S.</td>
</tr>
<tr>
<td>Bulleen Road (S)</td>
<td>Left</td>
<td>0.350</td>
</tr>
<tr>
<td></td>
<td>Through</td>
<td>1.079</td>
</tr>
<tr>
<td>Bulleen Road (N)</td>
<td>Through</td>
<td>0.736</td>
</tr>
<tr>
<td></td>
<td>Right</td>
<td>1.092</td>
</tr>
<tr>
<td>Western Access Road</td>
<td>Left</td>
<td>0.214</td>
</tr>
<tr>
<td></td>
<td>Right</td>
<td>1.094</td>
</tr>
<tr>
<td>All Vehicles</td>
<td></td>
<td>1.094</td>
</tr>
</tbody>
</table>
In summary, the SIDRA results of the signalised access of Bulleen Road demonstrate the following:

- The overall DOS in the weekday PM peak hour during the 2036 design year is 0.822, equating to a performance rating of ‘Fair’. The maximum delay at the intersection is associated with vehicles turning right out of the western access road (average delay of 51.8 seconds) and vehicles turning right into western access road (average delay of 52.0 seconds).

- The overall DOS in the weekend peak hour during the 2036 design year is 1.094, indicating that the intersection would operate with a rating of ‘very poor’. The average delay associated with vehicles turning right out of the western access road is 161 seconds and the 95-percentile queue associated with this movement is 255 metres. The average delay associated with vehicles turning right into the western access road is 160 seconds and the 95-percentile queue is 247 metres.

Overall, the SIDRA analysis undertaken above indicates that the intersection would operate within capacity during the weekday peak hour, however above capacity during the weekend peak hour with significant queues and delays, particularly on the western leg and on the right turn in from the northern approach.

The discrepancy in performance between the SIDRA analysis undertaken above and the analysis within the Traffic and Transport Technical Report can be attributed to the much higher level of traffic that is estimated to be generated by CGSC, Bulleen Park and the Veneto Club (as highlighted in Table 4.2.4).

Detailed SIDRA results are shown in Appendix C.

**Recommended Intersection Upgrade**

In order to assist vehicles turning into and out of the western access road in the weekend peak hour period, the signalised access would need to be upgraded as per one of the two options outlined below:

**Option 1:** Double right turn lanes on the western leg of the intersection (for vehicles turning out of the site onto Bulleen Road) and increased length of the right-turn lane on the Bulleen Road northern approach to 200 metres.

The layout of the intersection for Option 1 is shown in Figure 5.3.10.
**Figure 5.3.9: Layout of Option 1 Upgraded Intersection**

*Option 2: Double right turn lanes on the western leg of the intersection (for vehicles turning out of the site onto Bulleen Road) and double right-turn lanes on the Bulleen Road northern approach (for vehicles turning into the site from Bulleen Road). It is noted that this intersection would require a larger footprint than Option 1 to incorporate the second right-turn lane along Bulleen Road and the second departure lane along the western leg of the intersection.*

The layout of the intersection for Option 2 is shown in Figure 5.3.10.
OPTION 1 – SIDRA ANALYSIS
A SIDRA analysis has been undertaken of the upgraded signalised access as per Option 1 during the weekend peak, with the results summarised in Figure 5.3.11.

Figure 5.3.11: SIDRA Results – Upgraded Access Option 1 – Weekend Peak

<table>
<thead>
<tr>
<th>Approach</th>
<th>Movement</th>
<th>WEEKEND PEAK</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>D.O.S.</td>
</tr>
<tr>
<td>Bulleen Road (S)</td>
<td>Left</td>
<td>0.366</td>
</tr>
<tr>
<td></td>
<td>Through</td>
<td>0.959</td>
</tr>
<tr>
<td>Bulleen Road (N)</td>
<td>Through</td>
<td>0.576</td>
</tr>
<tr>
<td></td>
<td>Right</td>
<td>0.932</td>
</tr>
<tr>
<td>Western Access Road</td>
<td>Left</td>
<td>0.247</td>
</tr>
<tr>
<td></td>
<td>Right</td>
<td>0.912</td>
</tr>
<tr>
<td>All Vehicles</td>
<td></td>
<td>0.939</td>
</tr>
</tbody>
</table>
In summary, the SIDRA results of the signalised access for Option 1 demonstrates:

- The upgraded access is operating within capacity during the weekend peak hour period with a DOS of 0.939.
- The average delay associated with vehicles turning right out of the western access road is 78 seconds which has reduced significantly from 161 seconds. The 95th percentile queue associated with this movement has decreased from 255 metres to 84 metres.
- The average delay associated with vehicles turning right into the western access road is 78 seconds which has also decreased significantly from 160 seconds. The 95th percentile queue associated with this movement has decreased from 247 metres to 172 metres and can fully be accommodated within the right-turn lane along Bulleen Road (which has been increased to a length of 200 metres).

Overall, the SIDRA analysis for Option 1 demonstrates that the upgraded signalised access with double right-turn lanes along the western leg and an increased right-turn lane on Bulleen Road (to 200 metres) would operate within its capacity with significant decreases to queues and delays.

**OPTION 2 – SIDRA ANALYSIS**

A SIDRA analysis has been undertaken of the upgraded signalised access as per Option 2 during the weekend peak, with the results summarised in Figure 5.3.12.

<table>
<thead>
<tr>
<th>Approach</th>
<th>Movement</th>
<th>WEEKEND PEAK</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>D.O.S</td>
<td>95%ile Queue (m)</td>
<td>Average Delay (s)</td>
</tr>
<tr>
<td>Bulleen Road (S)</td>
<td>Left</td>
<td>0.330</td>
<td>32.2</td>
<td>8.5</td>
</tr>
<tr>
<td></td>
<td>Through</td>
<td>0.864</td>
<td>325.2</td>
<td>21.6</td>
</tr>
<tr>
<td>Bulleen Road (N)</td>
<td>Through</td>
<td>0.599</td>
<td>133.2</td>
<td>5.2</td>
</tr>
<tr>
<td></td>
<td>Right</td>
<td>0.894</td>
<td>68.4</td>
<td>66.3</td>
</tr>
<tr>
<td>Western Access Road</td>
<td>Left</td>
<td>0.292</td>
<td>46.8</td>
<td>27.6</td>
</tr>
<tr>
<td></td>
<td>Right</td>
<td>0.829</td>
<td>65.7</td>
<td>59.6</td>
</tr>
<tr>
<td>All Vehicles</td>
<td></td>
<td>0.894</td>
<td>325.2</td>
<td>20.1</td>
</tr>
</tbody>
</table>

In summary, the SIDRA results of the signalised access for Option 2 demonstrates:

- The access is operating within capacity during the weekend peak hour period with a DOS of 0.894.
- The average delay associated with vehicles turning right out of the western access road is 60 seconds which has reduced significantly from 161 seconds (when compared to the layout shown in the Reference Design). The 95th percentile queue associated with this movement has decreased from 255 metres to 66 metres.
- The average delay associated with vehicles turning right into the western access road is 66 seconds which has also decreased significantly from 160 seconds. The 95th percentile queue associated with this movement has decreased from 247 metres to 68 metres and
can fully be accommodated within the double right-turn lanes along Bulleen Road.

Overall, the SIDRA analysis for Option 2 demonstrates that the upgraded signalised access with double right-turn lanes along the western leg and double right-turn lanes along Bulleen Road would also operate within its capacity with significant decreases to queues and delays.

In summary, the SIDRA analysis undertaken demonstrates that the layouts shown in Option 1 and Option 2 provide a more appropriate outcome for the new signalised access than the layout shown in Reference Design.

It is also noted that no growth factor has been applied for the traffic accessing CGSC, Bulleen Park and The Veneto Club in the 2036 design scenarios analysed above (as volumes for these uses have been based on the existing survey volumes). Any growth associated with CGSC, Bulleen Park or The Veneto Club would likely increase the level of traffic through this intersection, which would further support the need for one of these two options to be adopted.

Detailed SIDRA results of these scenarios are shown in Appendix C.

Relocation of Sporting Facilities

There are a number of sporting facilities in the proximity of CGSC which would need to be relocated due to the construction of the North East Link. Several preliminary options have been developed for the relocation of these sporting facilities, as shown in Appendix A of the Social Assessment Technical Report. Some of these options indicate that the relocated sporting facilities would require access via the new signalised access along Bulleen Road which also provides access to CGSC, Bulleen park and The Veneto Club.

Based on the results of the SIDRA analysis above, it is clear that one of the upgraded access options would be required in this scenario to accommodate the traffic associated with CGSC, Bulleen park, The Veneto Club, plus the relocated sporting facilities (which would also likely peak at the same time).

This conclusion is also partially contemplated within the Social Assessment Technical Report, which states the following in relation to one of the options which proposes to relocate the Boroondara Tennis Centre to the west of CGSC:

‘A new signalised intersection at Bulleen Road would assist access to sporting fields, facilities and the Veneto Club. Additional capacity for the exit to Bulleen Road may need to be considered to allow for increased traffic demand. This could be via a double right-turn lane compared with the single right-turn lane as per the North East Link reference project.’

The SIDRA analysis undertaken within this Report demonstrates that the new signalised access would not operate within its capacity (and result in significant queues and delays) in the scenario that CGSC, Bulleen Park and the Veneto Club peak simultaneously.
Recommendation 10

It is recommended the Reference Design of the new signalised access to Bulleen Road should be modified to show a larger footprint that caters for one of the following options:

- Double right turn lanes on the western leg of the intersection and an increased right turn lane on Bulleen Road to a length of 200 metres; or
- Double right turn lanes on the western leg of the intersection and double right-turn lanes along Bulleen Road (northern leg).

Impact on Bus Services

As discussed previously, Carey Baptist Grammar School currently engage private bus services to transport students between the school campuses (Kew and Donvale) and CGSC.

Based on information provided from the bus operators, it is understood that the bus routes are generally as follows:

**Kew Campus to CGSC:** Kew Campus - Burke Road – Doncaster Road – Bulleen Road – CGSC (and vice versa)

**Donvale Campus to CGSC:** (1) Donvale Campus – Springvale Road – Eastern Freeway – Bulleen Road – CGSC or (2) Donvale Campus – Reynolds Road – Thompsons Road – Bulleen Road – CGSC or (3) Donvale Campus – Templestowe Road – Bulleen Road – CGSC

These bus services would be able to operate via the same routes once construction of the north-east link is complete.
Based on the assessment undertaken above, I have made the following recommendations:

### Car Parking Considerations

#### CONSTRUCTION

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recommendation 1</td>
<td>The Construction Compound Boundary be amended to lie outside of the Bulleen Park access road so that unfettered access to CGSC via the three existing gates is maintained throughout construction.</td>
</tr>
<tr>
<td>Recommendation 2</td>
<td>The Project Boundary line be shifted outside the CGSC boundary, including the Bulleen Park access road that is relied on to access the carpark located to the north of Wilcox Field.</td>
</tr>
<tr>
<td>Recommendation 3</td>
<td>The Project Boundary be shifted clear of the circulation road within CGSC to ensure that the existing vehicle circulation arrangements within CGSC are maintained.</td>
</tr>
<tr>
<td>Recommendation 4</td>
<td>If access to any existing on-site car parking is likely to be restricted during construction, it is recommended that the Reference Design be amended to include construction of temporary parking in proximity but outside the boundary of CGSC and for the exclusive use of CGSC, or alternatively that an Environmental Performance Requirement with an outcome to this effect be included.</td>
</tr>
<tr>
<td>Recommendation 5</td>
<td>To prevent construction workers from parking in the publicly available car parking spaces within Bulleen Park (which is currently relied upon to accommodate the parking demand of users of both Bulleen park and CGSC), an Environmental Performance Requirement should be incorporated to ensure that workers are provided with their own dedicated parking.</td>
</tr>
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#### OPERATION

<table>
<thead>
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<th>Details</th>
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<tr>
<td>Recommendation 6</td>
<td>For the project to adhere to the project’s commitment to a zero loss of car parking, and to offset the loss of on-site car parking at CGSC, it is recommended that the Reference Design be amended to include construction of additional permanent parking in proximity but outside the boundary of CGSC and for the exclusive use of CGSC, or alternatively that an Environmental Performance Requirement with an outcome to this effect be included.</td>
</tr>
</tbody>
</table>
Vehicle Access Considerations

CONSTRUCTION

Recommendation 7
It is noted that the peak period of activity for CGSC is Saturday Sport. It is therefore recommended that construction haulage activity in the vicinity of the site should also seek to avoid Saturday. This could be achieved through an amendment to EPR T2 such as follows:

Requirements for limiting the amount of construction haulage during the peak periods, including during peak periods of activity for significant land uses such as sporting facilities.

Recommendation 8
Further clarification required on whether it is in fact proposed to install temporary signals at the existing access to Bulleen Road, including details of the configuration, so that the impacts of this scenario can be further assessed as it relates to CGSC.

Recommendation 9
To ensure that road closures along Bulleen Road during construction do not impact on access to CGSC, it is recommended EPR T2 is amended as follows:

Requirements for maintaining transport capacity in the peak periods, including weekend peak periods associated with land uses such as sporting grounds. Short term road closures in the vicinity of sporting grounds should be limited to overnight periods.

OPERATION

Recommendation 10
It is recommended the Reference Design of the new signalised access to Bulleen Road should be modified to show a larger footprint that caters for one of the following options:

- Double right turn lanes on the western leg of the intersection and an increased right turn lane on Bulleen Road to a length of 200 metres; or
- Double right turn lanes on the western leg of the intersection and double right-turn lanes along Bulleen Road (northern leg).
5.8 Traffic Consultant Report

Carey Grammar (Bulleen Campus)
169 Bulleen Road, Bulleen
Traffic and Transport Review (for Carey PCG)

Client: Carey Baptist Grammar School
Reference: 16M1072000
GTA Consultants Office: VIC

Issue: Final 27/11/15

Quality Record

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<th>Prepared By</th>
<th>Checked By</th>
<th>Approved By</th>
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<td>A</td>
<td>27/11/15</td>
<td>Final</td>
<td>Goran Mitic</td>
<td>Simon Beardall</td>
<td>Tim De Young</td>
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Executive Summary

In July 2015, GTA Consultants (GTA) was commissioned by Carey Baptist Grammar School (CBGS) to undertake a review of the existing operation of the Carey Grammar Sports Complex in Bulleen, to assist with the preparation of the Master Plan for the School. It is noted that this report has been prepared for the Carey PCG and should not be issued external to the project team.

The Master Plan will result in a number of changes to the existing facilities and reviews the potential to alter on-site car parking arrangements.

Existing Traffic and Car Parking Characteristics

In July 2015 GTA undertook weekday PM and Saturday Midday peak period traffic movement observations of the on-site car parking areas, and at the Bulleen Road/Site Access intersection. These observations indicated the following:

- Parents experience significant queuing and delays when undertaking pick-up and drop-off activities during both peak periods.
- The intersection of Bulleen Road/Site Access currently experiences high levels of congestion during both peak periods.
- The afternoon peak period experiences greater levels of congestion, with vehicles seeking to exit from the internal link road to Bulleen Road subject to lengthy delays as a result of through traffic on Bulleen Road.
- A large amount of informal car parking (i.e. on the side of the access road and other areas in close proximity to the sporting ovals) occurred on-site even when formal car parking spaces were available.
- Wayfinding signage was limited and hard to see.

Traffic Impact Consideration

Whilst student numbers are anticipated to increase at the Kew campus, traffic movements associated with the Bulleen campus following the completion of proposed works are expected to remain generally consistent with existing activity levels. Advice provided to GTA indicates that on occasions an additional bus transporting students to and from the Bulleen campus could be expected.

Notwithstanding, it is recommended that that various traffic mitigating measures be considered as part of the overall Master Plan, which aim to improve the operation of the on-site car parking areas and internal traffic movements, as follows:

- Introducing marshals on-site to direct motorists at peak times, to improve traffic flow and to minimise the traffic congestion currently being experienced within the internal link network and at the Bulleen Road access point (particularly far exit movements).
- Provision of wayfinding signage to guide motorists internal to the site – this should be worked up further with the project team as part of any planning application.

With regards to external traffic impacts, it is recommended that the signalisation of the Bulleen Road/Access point intersection be considered. GTA has commenced preliminary discussions with VicRoads on this matter.

Car Parking Considerations

As part of the proposed Master Plan, it is proposed to increase the existing level of car parking on the site. The increase in on-site car parking will assist in the management of parking activities at periods of high demands (i.e. Saturday sports).
1. Introduction

1.1 Background

In July 2015, GTA Consultants (GTA) was commissioned by Carey Baptist Grammar School (CBGS) to undertake a review of the existing operation of the Carey Grammar Sports Complex in Bulleen, to assist with the preparation of the Master Plan for the School.

The Master Plan conceptual design (prepared by Hayball) for the Bulleen campus has developed a series of Principles which will guide the future growth and development of the campus. Eleven Principles are grouped as three themes:

- precincts and identity
- spaces and places
- access and wayfinding.

The Master Plan will result in a number of changes to the existing facilities and reviews the potential to alter on-site car parking arrangements.

1.2 Purpose of this Report

The report sets out a summary of the car parking and traffic review, including the following items:

- context of the sports complex with respect to surrounding road network
- existing traffic volumes generated by the sports complex and a review of traffic volumes on the surrounding streets
- pedestrian and vehicle access arrangements
- car parking provision (including pick up and drop off areas)
- existing on-site car parking and traffic conditions as observed by GTA.

1.3 References

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

- Boroondara Planning Scheme
- Australian Standard / New Zealand Standard, Parking Facilities (AS2890)
- Master Plan (Draft 2) prepared by Hayball Pty Ltd, dated May 2015
- traffic and car parking surveys commissioned by GTA Consultants as referenced in the context of this report
- various inspections of the site and its surrounds
- other documents as nominated.

GTA undertook two separate inspections of the site to better understand the existing transport related conditions on site and in the immediate vicinity of the School:

- Saturday 25 July 2015: 7:30am -12.30pm
- Thursday 30 July 2015: 3:00pm -6:30pm.

These times were selected to coincide with the peak operation of the site, noting Saturday school sport and after school sports training were occurring at the time of these surveys. In particular, the Saturday surveys were completed on a day where the Carey Grammar “Old Boys” football was scheduled to be played immediately after the regular Saturday school sports.
2. Existing Conditions

2.1 Subject Site

The subject site is located at 169 Bulleen Road in Bulleen and is the main sports complex for Carey Grammar. The Bulleen campus does not accommodate classrooms as such, rather student attending sporting activities (i.e. training or sports days) are scheduled to arrive from either the Kew or Donvale campuses.

The site contains a number of sporting ovals, buildings and car parking.

The site has an eastern frontage of approximately 85m to Bulleen Road. Bulleen Road is located within a Road Zone 1 in the Manningham Planning Scheme and is under the control and management of VicRoads.

The site is located within an Urban Floodway Zone (UFZ). The location of the subject site and the surrounding environs is shown in Figure 2.1, and the land zoning is shown in Figure 2.2.

Figure 2.1: Subject Site and its Environs

(Reproduced with Permission from Melway Publishing Pty Ltd)

2.2 Vehicle Access

The sports complex has one access point to the external road network (Bulleen Road) and has three access points internal to the subject site, which provide connections to on-site car parking areas. The function of each of the access points is summarised below and illustrated in Figure 2.3.

- Access Point 1: Bulleen Road/Carey Bulleen Sports Complex Access/Bulleen Swim Centre Access
- Access Point 2: Car Park Entry only access point
- Access Point 3: Car Park Exit only access point
- Access Point 4: Car Park Entry and Exit access point.

Figure 2.3: Carey Grammar Sports Complex (Bulleen) - Vehicle Access Locations

(Reproduced from Land Channel web site)
2.3 Car Parking

2.3.1 Supply

GTA compiled an inventory of existing car parking conditions at the sports complex. The inventory identified a total of 257 available car parking spaces. The inventoried area is presented in Figure 2.4.

Figure 2.4: Car Parking Inventory Area

2.3.2 Demand

GTA undertook car parking demand surveys of the on-site parking supply on Saturday 25 July and Thursday 30 July 2015, during the previously identified peak periods:

The results of these surveys are summarised in Table 2.1.

Table 2.1: Summary of Car Parking Demand Surveys

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Supply</td>
<td>Demand</td>
</tr>
<tr>
<td>8:00 am</td>
<td>257</td>
<td>176</td>
</tr>
<tr>
<td>9:00 am</td>
<td>257</td>
<td>338</td>
</tr>
<tr>
<td>10:00 am</td>
<td>257</td>
<td>377</td>
</tr>
<tr>
<td>11:00 am</td>
<td>257</td>
<td>394</td>
</tr>
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<td>64</td>
</tr>
<tr>
<td>6:00 pm</td>
<td>257</td>
<td>64</td>
</tr>
</tbody>
</table>

Notes:
The informal car spaces within the sports complex have been excluded from the overall parking supply, but any car parking demands in this area have been included.

Additional car parking is located to the north of Gate 2. Although these car parking spaces are not located within the sports complex, it was observed that some parents parked their vehicles in this location.

The car parking surveys results for the surveyed Saturday and Thursday are shown in Figure 2.5 and Figure 2.6, respectively.

Figure 2.5: Car Parking Profile – Saturday 25 July 2015

Figure 2.6: Car Parking Profile – Thursday 30 July 2015

Table 2.1 indicates that on the surveyed Saturday, car parking demands recorded on the subject site were typically greater than the car parking supply. As a result, a number of motorists were observed to park their vehicles informally within the site.

The parking results for the surveyed Thursday afternoon period indicate that car parking demands recorded on the site were low to moderate with ample vacancies available (generally along the eastern side of the site) at all times of the survey period. An inspection of the site indicates that no vehicles were parked informally during this time.

It is understood that typically, the over flow of car parking demands on a Saturday occurs as a result of the overlap of various school sporting events.

Further to the above, it is noted that additional car parking (101 spaces) are available to the immediate north of Gate 2. Although these car parking spaces are not located within the sports complex, it was observed that some parents parked their vehicles in this location.

The car parking surveys results for the surveyed Saturday and Thursday are shown in Figure 2.5 and Figure 2.6, respectively.
2.4 School Bus Services

The School operate a number of privately chartered bus services to transfer students from the main Kew campus to the sports complex as required. Buses are able to park in dedicated bus parking areas located to the immediate east of the existing sports pavilion.

On weekends, additional bus services accommodating visiting sports teams also access the site on an as needs basis.

2.5 Traffic Volumes

To gain an in-depth understanding of the existing traffic conditions within the site and at the main access point to Bulleen Road, GTA undertook full turning traffic movement counts at the four access locations.

The Saturday and Thursday peak hour traffic volumes are shown in Figure 2.7 and Figure 2.8, respectively.

Figure 2.7: Existing Saturday Peak Hour Traffic Volumes (10:15am-11:15am)

Figure 2.8: Existing Thursday Peak Hour Traffic Volumes (4:30pm-5:30pm)

Figure 2.7 and Figure 2.8 indicate the site currently generates in the order or 620 and 375 movements during the Saturday and weekday afternoon peak period respectively.

2.6 Road Network

2.6.1 Bulleen Road

Bulleen Road functions as an arterial road (VicRoads controlled) and is classified as a Road Zone Category 1 (R1Z) in the Manningham Planning Scheme. It is a two-way road aligned in a north-south direction and configured with a four-lane and 8m wide median divided carriageways.

Traffic flows on Bulleen Road are heavily influenced by vehicle movements at the Eastern Freeway interchange located approximately 400m to the south of the site.

2.7 Sustainable Transport Infrastructure

2.7.1 Pedestrian and Public Transport Access

On-site observations indicate that footpaths are provided on both sides of Bulleen Road, south of the site access point. Safe pedestrian crossing points are provided on the northern, eastern and western approaches of the Bulleen Road/Eastern Freeway off-ramp/Thompsons Road signalised intersection located approximately 375m south of the site access point. It was further observed that limited pedestrian infrastructure exists internal to the subject site for uses of the sporting complex.

In addition to the above, the nearest bus stop to the sporting complex is located approximately 550m south of the access point.

2.8 Accident History

The reported casualty accident history for the roads and intersections adjoining the subject site has been sourced from VicRoads CrashStats accident database. This database records all accidents causing injury that have occurred in Victoria since 1987 (as recorded by Victorian Police) and categorises these accidents as follows:

- Fatal injury: at least one person was killed in the accident or died within 30 days as a result of the accident.
- Serious injury: at least one person was sent to hospital as a result of the accident.
- Other injury: at least one person required medical treatment as a result of the accident.

A summary of the accidents in the vicinity of the subject site for the last available five year period (January 2009 – December 2013) is presented in Table 2.2.

Table 2.2: Casualty Accident History

<table>
<thead>
<tr>
<th>Location</th>
<th>Fatality</th>
<th>Serious Injury</th>
<th>Other Injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulleen Road &amp; Site Access Point</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>On Bulleen Road near Site Access Point</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
</tbody>
</table>

Source: VicRoads

Table 2.2 indicates that a total of five accidents have been reported in the immediate vicinity of the site access point to Bulleen Road. Furthermore, the accident data indicates that no accident trends exist in this location.

2.9 On-Site Observations

As outlined earlier, GTA undertook two separate inspection of the site as follows:

- Saturday 25 July 2015: 7:30am-12:30pm
- Thursday 30 July 2015: 3:00pm-6:30pm

A number of photos taken at the times of these site inspections are presented in Attachment A.
2.9.1 Saturday 25 July 2015
- Majority of the traffic accessing the sports grounds came from the south (i.e. Eastern Freeway interchange / eastern suburbs).
- Traffic flows at 8:00am were predominately one-way into the site, with a lesser amount of traffic leaving the site between 8:00am-9:00am.
- The traffic leaving the site during the early hours were observed to be predominately parents dropping children off for sport activities.
- On-site car parking was observed to fill up quickly between 8:00am and 8:30am.
- A large amount of informal car parking (i.e. on the side of the access road and other areas in close proximity to the sporting oval) occurred on-site even when formal car parking spaces were available.
- It was observed the parent’s often chose to park informally at a location closer to the sporting oval on which their child was playing on, rather than travelling further into the site to park in a regular car space.
- Delays for vehicles entering/exiting the site between 8:00am – 9:30am were observed to be relatively minimal, with the traffic lights located at the Eastern Freeway interchange to the south of the site assisting in creating gaps for traffic.
- A number of drivers appeared to disobey the one way directional flow throughout the on-site car parking areas. Typically, those drivers who were observed to travel through the site in the wrong direction were non Carey parents (i.e. visitors to the sports complex).
- Wayfinding signage was limited and hard to see.
- Traffic became significantly worse between 10:30am and 11:00am, representing the change over time between the early and mid-morning sports.
- Car parking occupancy levels reached capacity at approximately 9:00am.
- Delays experienced by driver exiting the site between 10:30am and 11:00am became significant, with delays of greater than 5 minutes for some drivers.
- Typically the right turn exit lane was observed to be fully occupied during the survey period. On-site observations indicate that some motorists wishing to turn right onto Bulleen Road chose to turn left due to extensive delays/minimal gaps available in Bulleen Road.
- The majority of drivers leaving the site turned left and travelled north. This is likely to be as a result of the lack of capacity to turn right out of the site and head south.
- A number of drivers who turn left out of the site were observed to undertake a U-turn at the Marcellin College site access point located to the north of the site.
- During the mid-morning peak, vehicle queues into the site extended back to the main sporting pavilion.
- Southbound traffic on Bulleen Road was observed to queue back from the Freeway interchange past the site access point and up Bulleen Road approximately 1.2km to the north of the site (near Avon Street).

2.9.2 Thursday 30 July 2015 (3:00pm-6:00pm)
- Majority of the traffic accessing the sports grounds came from the south (i.e. freeway interchange / eastern suburbs), although a number of right turn entry movements were also observed.
- Predominantly, entry movements were observed to occur between 3:00pm and 3:30pm, prior to the commencement of after-school sport activities on site.
- Three buses carrying students entered the site during this time and entered Gate #1.
- Traffic activity internal to the site was low between 4:00pm and 5:00pm (while sports activities were taking place).
- Prior to 5:00pm, acceptable queues and delays, with respect to entering and exiting movements, were recorded on all approaches at the intersection with Bulleen Road.
- At 5:00pm, an internal queue of approximately 25 car lengths (180m approx.) was recorded, with a majority of these vehicles wanting to turn left onto Bulleen Road.
- A 5 car queue of right-turn entry movements was recorded at 5:00pm. These right turning vehicles experienced a delay of approximately 60 sec due to heavy northbound traffic flow on Bulleen Road at this time.
- The intersection of Bulleen Road/Site Access point is heavily congested as a result of queuing extending back from the Eastern Freeway interchange.
- In the afternoon period, the majority of through traffic on Bulleen Road travels north. Drivers seeking to turn left out of the site were observed often having to wait for gaps in the traffic stream created by the signalised intersection at the Eastern Freeway interchange.
- Southbound traffic on Bulleen Road was observed to queue back from the Freeway interchange past the site access point and up Bulleen Road approximately 1.2km to the north of the site (near Avon Street).
3. Master Plan

3.1 Overview

The proposed Master Plan seeks to facilitate the ongoing redevelopment of the School’s Sports Complex. Specifically, the following works are to be completed as illustrated below in Figure 3.1:

- Renovation of the Gadsen Pavilion.
- Upgrades to the Spicer Oval to accommodate Soccer use.
- Construction of a multipurpose sports and teaching facility with the Gerard Cramer building.
- Creation of a new synthetic surface to accommodate.
- Construction of a super shed at the western edge of the site.
- Creation of additional car parking spaces.

Figure 3.1: Proposed Master Plan

3.2 Student and Staff Levels

The Bulleen campus does not generate a demand for students or staff in its own right; rather all visitors to the site are scheduled by the School. Advice provided to GTA indicates following the completion of the Master Plan activities levels are expected to remain generally consistent with those presently on-site, albeit for the occasional additional bus which will pick up and drop off students as required.

3.3 Car Parking

The Master Plan seeks to increase the existing car parking supply on the site and to improve the overall operation of the on-site car parking areas. Specifically, and as outlined in Figure 3.2, an additional 49 car parking spaces (a total of 306 on-site) are proposed to be provided to the north, east and south sides of the Dunshea Oval. The provision additional car parking along the eastern side of Dunshea Oval will require the re-configuration of existing car parking spaces.

In addition to the above, it is recommended that additional wayfinding signage be introduced at key locations to minimise confusion for parents during peak drop-off/pick-up times. This additional wayfinding is expected to result in a better level of utilisation of the on-site car parking areas, an improvement internal traffic flow and reduction in the internal congestion at the Bulleen Road access point.

Figure 3.2: Proposed Car Parking Layout

3.4 Vehicle Access

As mentioned earlier, the sports complex has one access point to the external road network (Bulleen Road) and has three access points internal to the subject site, which provide connections to on-site car parking areas. As part of the proposed Master Plan of the subject site, no modifications are proposed to be made to these access points.

The provision of additional car parking in this location will require the re-configuration of existing car parking spaces.
4. Traffic Impacts

4.1 Traffic

As described earlier, traffic movements associated with the Bulleen campus are expected to remain generally consistent with existing activity levels.

Based on the above, it is considered that any traffic related increase associated with the above will be negligible and as such, cannot be expected to further impact the operation of the internal link roads and the external road network (Bulleen Road). Notwithstanding, it is recommended that the following measures be considered as part of the overall Master Plan, with the aim to improve the operation of the on-site car parking areas and internal traffic movements:

- Introducing marshals on-site to direct motorists at peak times, to improve traffic flow and to minimise the traffic congestion currently being experienced within the internal link network and at the Bulleen Road access point (particularly for exit movements).
- Provision of wayfinding signage to guide motorists internal to the site – this should be worked further with the project team as part of any planning application.

With regards to external traffic impacts, it is recommended that the signalisation of the Bulleen Road/Access point be considered to increase the intersections capacity and reduce delays to motorists leaving the site.

GTA has commenced discussions/correspondence with VicRoads (Tim Black - Traffic Specialist and Daniel Salazar - Team Leader at VicRoads regarding the potential to signalise the Bulleen Road access point. Based on these discussions, the following is summarised:

- VicRoads are aware of the existing delays to the School access point when sporting events are in place.
- VicRoads are aware that the left turn lane from the western link road connecting to Bulleen Road (which provides access to the School grounds and Council land) has been extended in recent years.
- However they acknowledge that the extension of the left turn lane can only help with the operation of this intersection up to a certain point. Beyond this additional capacity to allow vehicles to exit the western link road will be required to see a reduction in queues and delays.
- VicRoads consider the only effective solution could include signals, however this will require major civil works, longer turn lanes close to the bridge and a potential delay to Bulleen Road traffic.
- VicRoads are concerned with the likely cost of these works (noting it is our understanding the School would need to cover these costs).
- Notwithstanding, VicRoads welcome the project team undertaking further investigations in support of potential traffic signals at this location subject to appropriate analysis and planning process being followed.

5. Summary and Next Steps

Overall, the traffic conditions within the site were observed to work quite well, however during peak periods, extensive delays were observed on the link road connecting to the site access point to Bulleen Road.

In this regard, a high level of non-school related traffic congestion was observed at the Bulleen Road/Site Access point during the afternoon and Saturday peak periods. This combined with parents seeking to gain access to and from the site results in long delays and queues internal to the site along the access road.

Essentially, there is currently insufficient capacity to adequately cater for traffic generated by the site at the Bulleen Road/Site Access point intersection under its current configuration during peak road network times and on days where large events are taking place on site (i.e. Saturday sport).

With regards to car parking, the critical period was observed to occur during the mid-morning when early morning sports and later morning sporting activities overlapped. It was observed that initially the occupation of parking spaces and internal traffic flow does not operate as efficiently as they could.

With the above in mind, it is recommended that further discussions be held with VicRoads in relation to upgrade the intersection Bulleen Road/Site Access point to a signalised intersection to increase its capacity.

Furthermore, it is recommended that improvement works within the site (i.e. way finding signage/line marking) to better manage the on-site parking supply and internal traffic movements during peak periods, etc.) be incorporated as part of the Master Plan. These items should be workedshopped in further detail within the project team.
Appendix A

Site Photos – Saturday 25 July 2015

![Figure 1: Traffic Congestion on Internal Road Network, Immediately West of Bulleen Road (Adjacent to Sports Complex)](image1)

![Figure 2: Traffic Congestion on Internal Road Network, Immediately West of Bulleen Road (Adjacent to Sports Complex)](image2)
Appendix B

Site Photos – Thursday 30 July 2015

Figure 3: Traffic Congestion at the Bulleen Road/Site Access Intersection
Figure 4: Heavy Northbound Vehicle Movements on Bulleen Road near Site Access Point (Minimal Gaps available for right-turn out movements)

Figure 5: Traffic Congestion on Internal Road Network, Immediately West of Bulleen Road (Adjacent to Sports Complex)

Figure 6: Traffic Congestion on Internal Road Network, Immediately West of Bulleen Road (Adjacent to Sports Complex)

Figure 7: Heavy Southbound Vehicle Movements on Bulleen Road near Site Access Point
Appendix C

Proposed Masterplan (Hayball)
**KEY PROJECTS**

1. Transform the Gerard Cramer Pavilion Undercroft
2. Renovate and Extend the Gadsden Pavilion, add lift access to upper level
3. Upgrade the Aquatic Centre
4. Create a Dynamic Campus Heart
5. Renovate Wilson Field B
6. Develop a New Super Shed
7. Expand the South Cricket Practise Nets
8. Expand the North Cricket Practise Nets
9. Convert Rees and Smith Ovals
10. Convert Spicer Oval
11. Identify the Campus Entry
12. Enhance Traffic and Transport Management
13. Create a Secondary Activity Space
14. Create Clear Pedestrian Networks
15. Enhance Spectator Amenities
16. Create a Landscape Palette for the Campus

---

**Transform the Gerard Cramer Pavilion Undercroft**

**Renovate and Extend the Gadsden Pavilion, add lift access to upper level**

**Upgrade the Aquatic Centre**

**Create a Dynamic Campus Heart**

**Renovate Wilson Field B**

**Develop a New Super Shed**

**Expand the South Cricket Practise Nets**

**Expand the North Cricket Practise Nets**

**Convert Rees and Smith Ovals**

**Convert Spicer Oval**

**Identify the Campus Entry**

**Enhance Traffic and Transport Management**

**Create a Secondary Activity Space**

**Create Clear Pedestrian Networks**

**Enhance Spectator Amenities**

**Create a Landscape Palette for the Campus**
Appendix B Parking Survey Results
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**PUBLIC OCCUPANCIES**
175 346 408 477 435 335

**PUBLIC VACANCIES**
1143 972 910 841 883 983

**PUBLIC % OCCUPANCIES**
13% 26% 31% 36% 33% 25%

ışı: not available for public parking

![Graph](image.png)
Parking Occupancy Survey

Date: Saturday, 4 May 2019
Location: 169 Bulleen Road, Bulleen
GPS: -37.776498, 145.078399
Weather: Fine

Customer:

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PUBLIC CAPACITY: 1318
PUBLIC OCCUPANCIES: 47
PUBLIC VACANCIES: 1271
PUBLIC % OCCUPANCIES: 4%

*not available for public parking*
SITE LAYOUT

Site: 101  [Bulleen Road Signalised Intersection - Weekday PM Peak - 2036]

Bulleen Road Signalised Intersection
Site Category: (None)
Signals - Fixed Time Isolated
### MOVEMENT SUMMARY

**Site: 101 [Bulleen Road Signalised Intersection - Weekday PM Peak - 2036]**

Bulleen Road Signalised Intersection  
Site Category: (None)  
Signals - Fixed Time Isolated  
Cycle Time = 90 seconds (Site User-Given Cycle Time)

#### Movement Performance - Vehicles

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<th>Demand Flows</th>
<th>Deg Sat v/c</th>
<th>Average Delay sec</th>
<th>Level of Service</th>
<th>95% Back of Queue Vehicles veh</th>
<th>Prop Queued</th>
<th>Effective Stop Rate</th>
<th>Avr. No. Cycles</th>
<th>Average Speed km/h</th>
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Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).  
Vehicle movement LOS values are based on average delay per movement.  
Intersection and Approach LOS values are based on average delay for all vehicle movements.  
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.  
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
**Movement Summary**

**Site:** 101 [Bulleen Road Signalised Intersection - Weekend Peak - 2036 - Sensitivity]

Bulleen Road Signalised Intersection  
Site Category: (None)  
Signals - Fixed Time Isolated  
Cycle Time = 110 seconds (Site Optimum Cycle Time - Minimum Delay)

### Movement Performance - Vehicles

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<th>HV %</th>
<th>Deg Sat Rate (s/c)</th>
<th>Average Delay (s/veh)</th>
<th>Level of Service</th>
<th>95% Back of Queue (Vehicles)</th>
<th>Distance (m)</th>
<th>Prop. Queued</th>
<th>Effective Stop Rate</th>
<th>Aver No. Cycles</th>
<th>Aver Speed (km/h)</th>
</tr>
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**South: Bulleen Road (South)**

1. L2  
   - 513  
   - 0.0  
   - 0.350  
   - 10.3  
   - LOS B  
   - 6.8  
   - 47.4  
   - 0.34  
   - 0.70  
   - 0.39  
   - 58.9  

2. T1  
   - 1937  
   - 0.0  
   - 1.079  
   - 134.7  
   - LOS F  
   - 111.2  
   - 778.2  
   - 1.00  
   - 1.65  
   - 1.92  
   - 19.3

Approach  
- 2450  
- 0.0  
- 1.079  
- 109.8  
- LOS F  
- 111.2  
- 778.2  
- 0.98  
- 1.45  
- 1.60  
- 22.5

**North: Bulleen Road (North)**

8. T1  
   - 1863  
   - 0.0  
   - 0.738  
   - 9.4  
   - LOS A  
   - 33.8  
   - 238.6  
   - 0.80  
   - 0.58  
   - 0.80  
   - 59.3

9. R2  
   - 344  
   - 0.0  
   - 1.002  
   - 160.0  
   - LOS F  
   - 35.3  
   - 247.3  
   - 1.10  
   - 1.29  
   - 2.16  
   - 16.7

Approach  
- 2207  
- 0.0  
- 1.002  
- 32.9  
- LOS C  
- 35.3  
- 247.3  
- 0.67  
- 0.67  
- 0.85  
- 42.5

**West: Western Access Road**

10. L2  
   - 182  
   - 0.0  
   - 0.214  
   - 25.2  
   - LOS C  
   - 5.9  
   - 41.3  
   - 0.65  
   - 0.74  
   - 0.74  
   - 42.1

12. R2  
   - 351  
   - 0.0  
   - 1.094  
   - 160.9  
   - LOS F  
   - 36.5  
   - 255.2  
   - 1.10  
   - 1.38  
   - 2.17  
   - 16.1

Approach  
- 533  
- 0.0  
- 1.094  
- 114.8  
- LOS F  
- 36.5  
- 255.2  
- 0.88  
- 1.15  
- 1.88  
- 29.4

**All Vehicles**  
- 5190  
- 0.0  
- 1.094  
- 77.0  
- LOS E  
- 111.2  
- 778.2  
- 0.78  
- 1.09  
- 1.29  
- 27.7

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

Site: 101 [Weekend Peak - 2036 Option 1]

Bulleen Road Signalised Intersection
Site Category: (None)
Signals - Fixed Time Isolated
MOVEMENT SUMMARY

Site: 101 [Weekend Peak - 2036 Option 1]

Bulleen Road Signalised Intersection
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 120 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>Turn</th>
<th>Demand Flows Total</th>
<th>HV %</th>
<th>Deg. Satn v/c</th>
<th>Average Delay sec</th>
<th>Level of Service</th>
<th>95% Back of Queue Vehicles</th>
<th>Distance m</th>
<th>Prop. Queued</th>
<th>Effective Stop Rate</th>
<th>Aver. No. Cycles</th>
<th>Average Speed km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td>South: Bulleen Road (South)</td>
<td></td>
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<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>1</td>
<td>L2</td>
<td>513</td>
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<td>0.363</td>
<td>12.2</td>
<td>LOS B</td>
<td>8.2</td>
<td>57.7</td>
<td>0.38</td>
<td>0.73</td>
<td>0.49</td>
<td>55.3</td>
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<td>2</td>
<td>T1</td>
<td>1937</td>
<td>0.0</td>
<td>0.939</td>
<td>45.4</td>
<td>LOS D</td>
<td>71.5</td>
<td>500.5</td>
<td>0.93</td>
<td>1.02</td>
<td>1.13</td>
<td>37.5</td>
</tr>
<tr>
<td>Approach</td>
<td>2450</td>
<td>0.0</td>
<td>0.939</td>
<td>38.4</td>
<td>LOS D</td>
<td>71.5</td>
<td>500.5</td>
<td>0.81</td>
<td>0.96</td>
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<tr>
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<tr>
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<td>T1</td>
<td>1863</td>
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<td>LOS A</td>
<td>19.7</td>
<td>138.2</td>
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<td>0.40</td>
<td>64.3</td>
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<tr>
<td>9</td>
<td>R2</td>
<td>344</td>
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<td>0.932</td>
<td>78.1</td>
<td>LOS E</td>
<td>24.5</td>
<td>171.6</td>
<td>1.00</td>
<td>1.01</td>
<td>1.39</td>
<td>27.7</td>
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<td>0.932</td>
<td>16.1</td>
<td>LOS B</td>
<td>24.5</td>
<td>171.6</td>
<td>0.50</td>
<td>0.48</td>
<td>0.56</td>
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<tr>
<td>West: Western Access Road</td>
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<td></td>
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<td></td>
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<td>LOS E</td>
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<td>1.01</td>
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<tr>
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<td>0.0</td>
<td>0.912</td>
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<td>LOS E</td>
<td>12.0</td>
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<tr>
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<td>0.939</td>
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<td>LOS C</td>
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<td>500.5</td>
<td>0.69</td>
<td>0.75</td>
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</table>

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

Movement Performance - Pedestrians

<table>
<thead>
<tr>
<th>Mov ID</th>
<th>Description</th>
<th>Demand Flow ped/h</th>
<th>Average Delay sec</th>
<th>Level of Service</th>
<th>Average Back of Queue Pedestrian</th>
<th>Distance m</th>
<th>Prop. Queued</th>
<th>Effective Stop Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>P31</td>
<td>North Stage 1</td>
<td>21</td>
<td>54.2</td>
<td>LOS E</td>
<td>0.1</td>
<td>1</td>
<td>0.95</td>
<td>0.95</td>
</tr>
<tr>
<td>P32</td>
<td>North Stage 2</td>
<td>21</td>
<td>54.2</td>
<td>LOS E</td>
<td>0.1</td>
<td>1</td>
<td>0.95</td>
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</tr>
<tr>
<td>P4</td>
<td>West Full Crossing</td>
<td>21</td>
<td>54.2</td>
<td>LOS E</td>
<td>0.1</td>
<td>1</td>
<td>0.95</td>
<td>0.95</td>
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<tr>
<td>All Pedestrians</td>
<td>63</td>
<td>54.2</td>
<td>LOS E</td>
<td>0.95</td>
<td>0.95</td>
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</tbody>
</table>

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

Site: 101 [Weekend Peak - 2036 Option 2]

Bulleen Road Signalised Intersection
Site Category: (None)
Signals - Fixed Time Isolated
**MOVEMENT SUMMARY**

**Site: 101 [Weekend Peak - 2036 Option 2]**

Bulleen Road Signalised Intersection  
Site Category: (None)  
Signals - Fixed Time Isolated  
Cycle Time = 100 seconds (Site Optimum Cycle Time - Minimum Delay)

### Movement Performance - Vehicles

<table>
<thead>
<tr>
<th>Movement</th>
<th>Demand Flows</th>
<th>Average Delay</th>
<th>Level of Service</th>
<th>95% Back of Queue</th>
<th>Prop. Queued</th>
<th>Effective Stop Rate</th>
<th>Aver. No. Cycles</th>
<th>Aver. Speed</th>
<th>Total Distance</th>
</tr>
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<tbody>
<tr>
<td>South: Bulleen Road (South)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>1 L2</td>
<td>513</td>
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<td>0.330</td>
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<td>325.2</td>
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<tr>
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<td>0.0</td>
<td>0.864</td>
<td>18.8</td>
<td>LOS B</td>
<td>46.5</td>
<td>325.2</td>
<td>0.71</td>
<td>0.79</td>
</tr>
<tr>
<td>North: Bulleen Road (North)</td>
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</tr>
<tr>
<td>8 T1</td>
<td>1863</td>
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<td>0.599</td>
<td>5.2</td>
<td>LOS A</td>
<td>19.0</td>
<td>133.2</td>
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<tr>
<td>9 R2</td>
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<td>0.894</td>
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<td>68.4</td>
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<td>19.0</td>
<td>133.2</td>
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<td>0.52</td>
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<tr>
<td>West: Western Access Road</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 L2</td>
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<td>46.8</td>
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<td>0.82</td>
</tr>
<tr>
<td>12 R2</td>
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<td>9.4</td>
<td>65.7</td>
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<td>0.94</td>
</tr>
<tr>
<td>Approach</td>
<td>533</td>
<td>0.0</td>
<td>0.829</td>
<td>48.6</td>
<td>LOS D</td>
<td>9.4</td>
<td>65.7</td>
<td>0.93</td>
<td>0.90</td>
</tr>
<tr>
<td>All Vehicles</td>
<td>5190</td>
<td>0.0</td>
<td>0.894</td>
<td>20.1</td>
<td>LOS C</td>
<td>46.5</td>
<td>325.2</td>
<td>0.66</td>
<td>0.69</td>
</tr>
</tbody>
</table>

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

### Movement Performance - Pedestrians

<table>
<thead>
<tr>
<th>Movement</th>
<th>Demand Flow ped/h</th>
<th>Average Delay sec</th>
<th>Level of Service</th>
<th>Average Back of Queue ped</th>
<th>Prop. Queued</th>
<th>Effective Stop Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>P31 North Stage 1</td>
<td>21</td>
<td>44.2</td>
<td>LOS E</td>
<td>0.1</td>
<td>0.94</td>
<td>0.94</td>
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<td>P32 North Stage 2</td>
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<td>44.2</td>
<td>LOS E</td>
<td>0.1</td>
<td>0.94</td>
<td>0.94</td>
</tr>
<tr>
<td>P4 West Full Crossing</td>
<td>21</td>
<td>44.2</td>
<td>LOS E</td>
<td>0.1</td>
<td>0.94</td>
<td>0.94</td>
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<tr>
<td>All Pedestrians</td>
<td>63</td>
<td>44.2</td>
<td>LOS E</td>
<td>0.94</td>
<td>0.94</td>
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</tbody>
</table>

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