# Brighton Council

## South Brighton Infrastructure Feasibility and Master Plan Infrastructure Assessment

December 2020

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# 1. Introduction

## 1.1 Background

South Brighton has long been earmarked as a residential growth option and is identified as a greenfield development precinct in the Southern Tasmanian Regional Land Use Strategy (STRLUS) and the Brighton Local Area Plan 2012 (BLAP 2012).

In early 2020, the Department of Education (DoE) announced that a new $30 million high school will be built in Brighton, providing state of the art learning facilities for Years 7-12. The site chosen for the Brighton High School is 10 hectares of land within the Greenfield Development Precinct on the corner of Elderslie and Brighton Road.

The strong projected population growth and the recent announcement of the Brighton High School on land that was set aside to accommodate Brighton’s residential growth provides a significant impetus for a comprehensive strategic Master Plan to be developed for the Brighton South area.

GHD has been engaged to by Brighton Council, in partnership with DoE, to undertake the infrastructure feasibility study (Stage 1) and the development of a high-level concept plan for the area (Stage 2).

There are many challenges for developing the area, including multiple landowners and significant infrastructure upgrades for road, sewer, water and stormwater. This report focuses on the infrastructure feasibility study (Stage 1) of the scope of works and will outline the key constraints based on a number of scenarios.

## 1.2 Site location

The South Brighton Development Precinct covers an area of approximately 73 ha and is bounded by Elderslie Road and William Street to the north and the Highway Services Precinct to the south. Brighton Road bisects the Development Precinct.

To the north of the site is the beginning of the commercial strip which runs along Brighton Road into the township of Brighton. Further to the south is the Brighton Industrial Estate and Transport Logistics Hub.

The Development Precinct consists of two large greenfield sites to the west of Brighton Road and two infill development areas to the east (see Figure 1).

Based on the original RFQ, we note that 10 ha of the 33 Elderslie Road property adjacent to Brighton Road was the proposed site for the New Brighton high school, with the remainder of the site (10.73ha) having potential for residential development. This is further outlined in Section 1.6.

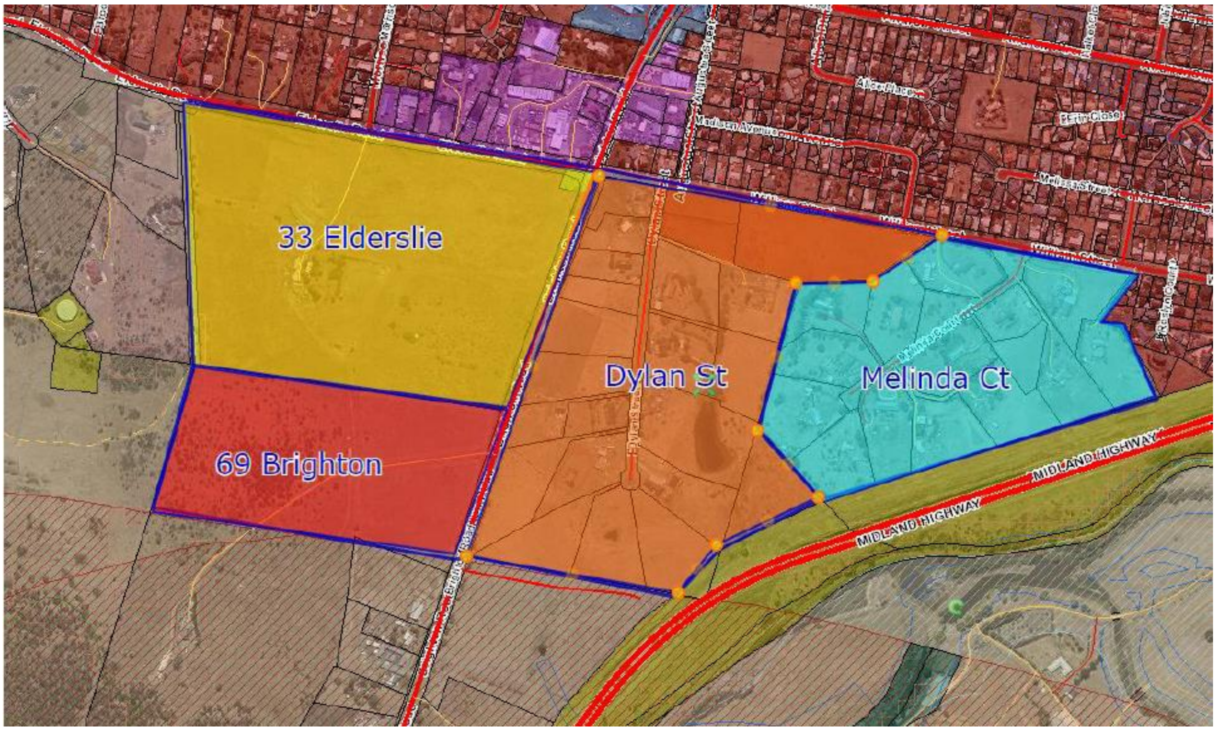



**Figure 1 Subject site**

*Image provided by Brighton Council*

## 1.3 Purpose of this report

This infrastructure feasibility study considers the condition and capacity of the existing infrastructure servicing the site including stormwater, sewer and the transport network and identifies options for infrastructure upgrades required for various development scenairos for the South Brighton area.

## 1.4 Scope and limitations

*This report: has been prepared by GHD for Brighton Council* and *may only be used and relied on by Brighton Council for the purpose agreed between GHD and the Brighton Council as set out in section 1.3 of this report.*

*GHD otherwise disclaims responsibility to any person other than Brighton Council arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.*

*The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.*

*The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.*

*The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.*

*GHD has prepared this report on the basis of information provided by Brighton Council and others who provided information to GHD (including Government authorities)], which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.*

## 1.5 Scope of works

The Stage 1 – Infrastructure feasibility study scope of works include the following:

- Scenario analysis
  - Scenario a) – the existing site with no development (base case)
  - Scenario d) – only the high school
  - Scenario c) – the high school plus residential development at remainder of 33 Elderslie Road, 69 Brighton Road, Dylan St, and Melinda Court
- Options assessment (limited to two options and excludes costings)
  - Scenario c) and scenario d)

## 1.6 Assumptions

The analysis contained in this report is based on a range of assumptions made by GHD including, but not limited to, the following:

- 33 Elderslie Road
  - The site is 20.73ha with 10ha utilised for the school and we have assumed that the site aside from the school will be developed at 15 dwellings per hectare.
  - We have based our assessments of a school on a school population of 600 students with 100 staff.
- 69 Brighton Road
  - Approximately 11ha of this 26ha property is within the Development Precinct. The remainder of the property is effectively sterilised from development by an Attenuation buffer for the Bridgewater Quarry operated by Boral, however; we have assumed that the land will be rezoned and the whole site is available for development
- Dylan Street area
  - The Dylan St area is approximately 24.5ha and includes 22 individual properties. Ten of the properties are vacant lots
- Melinda Court area
  - The Melinda Court area is approximately 16.2ha and consists of 15 properties. All but one of the lots is developed by a single dwelling.
- Traffic data (refer Section 5.1.2) provided by Brighton Council and Department of State Growth accurately represent existing conditions of the road network around the subject site. Where traffic data was not available volumes utilised are based on assumptions stated within this report.
- Crash data (refer Section 5.1.4) sourced from Department of State Growth (September 2020) provides an accurate record of incidents in the existing road network around the subject site.
- Traffic generation rates and trip distributions of the proposed land uses are as per the assumptions detailed in Section 5.2.2 and 5.2.3 of this report.

## 1.7 Exclusions

We have excluded Scenario b) which proposed to assess all land being developed as residential with no high school development

Concept design and drawings exclude water and electrical aspects of the project.

The economic analysis of all the options (i.e. lifecycle costs and CAPEX costs) has been excluded.

We have excluded contacting the following existing utilities and service providers, as we understand Brighton Council and DoE will undertake this activity:

- TasNetworks
- Telstra
- TasWater (Water)
- NBN Co

# 2. Stormwater

## 2.1 Desktop Review

A desktop review has been undertaken based on the information provided, the planning requirements, and publicly available information including:

- 1.0 m topographic contours sourced from ELVIS (https://elevation.fsdf.org.au/);
- Dam and easement layers on https://maps.thelist.tas.gov.au/listmap/app/list/map; and
- Discussion with Council at the inception meeting; and
- Site photos.

These provide a good basis for consideration of the site stormwater under the different development scenarios as outlined below. A stormwater constraints map is also included in Appendix A.

## 2.2 Scenario analysis

### 2.2.1 Base Case (Scenario A) – the existing site with no development

The existing site is primarily grassed paddocks with some rural residential properties along Dylan Street and Melinda Court.

The majority of the site drains to the east and south east through easements in the Dylan Street area to a dam and then through a culvert under the Midland Highway. There are existing swales along Brighton Road, William Street and Elderslie Road.

The dams at 11 and 17 Dylan Street do not appear to have dam permits (based on the register on thelist.tas.gov.au). The construction and design of the dams is unknown. Both of these dams drain along an existing creekline to the culvert under the Midland Highway.

Council has advised there has been some flooding at 2A Dylan Street in extreme rainfall events particularly. It is understood that the drainage along Dylan Street is problematic at times.

### 2.2.2 Only the High School (Scenario D)

*Drainage Paths*

A new high school is proposed to be constructed at 33 Elderslie Road fronting Brighton Road. This area generally drains overland to the north east corner at the intersection of Brighton Road / Elderslie Road / William Street. It will be possible to drain the majority of the site along Brighton Road towards this intersection and into the existing drainage system there. However, due to the existing issue with drainage at 2A Dylan St (refer section 2.2.1), peak outflow would need to be addressed.

The southern portion of the school site along Brighton Road currently drains to the south, through a culvert under Brighton Road, and along an existing easement to the dam at 17 Dylan Street.

*Peak Outflows*

Should the school (only) be developed, the existing drainage paths described above would be retained. However, development of the school would increase the impervious area and formalise the drainage paths within the school site. This would result in an increase in runoff volume and peak flows.

### *Options assessment*

Based on the assessment, the increased in runoff volume and peak flows for Scenario D would need to be addressed through the following options. These are further presented in Appendix A.

1. upgrade of downstream drainage paths (likely including the culvert under the Brighton Road), or:
2. decrease the peak discharge from the site using on-site detention

### *Option 1*

Assuming the infrastructure downstream of the Brighton Road culvert has sufficient capacity for the increased runoff flows, upgrading of the culvert may be a more cost-effective option. However, as only the school is being developed in Scenario D, upgrading the downstream infrastructure to Jordan River is unlikely to be feasible and therefore stormwater detention within the school site would be required for the school development to proceed.

A high level estimate of upgrade requirements are presented in Table 1 below including indicative differential cost (i.e. excluding preliminaries, project management, design, etc.). please note that the quantities and costs are indicative only.

**Table 1 Infrastructure Upgrade Option (in lieu of detention)**

| Item | Description | Quantity | Unit | Rate ($) | Amount ($) | Comment |
|---|---|---|---|---|---|---|
| 1 | Culvert under Brighton Road | 20 | m | 658.28 | 13,166 | ~DN1200 equivalent assumed |
| 2 | Pipe to Dylan Street | 105 | m | 658.28 | 69,119 | |
| 3 | Dylan St Culvert | 20 | m | 658.28 | 13,166 | |
| 4 | Channel Improvements: | | | | | Excavation of surface drains |
| 4.1 | 5 Dylan Street | 145 | m | 15.91 | 2,307 | Assumes channel is located in existing easements. No allowance for acquisition or stakeholder engagement |
| 4.2 | 9 Dylan Street | 121 | m | 15.91 | 1,925 | |
| 4.3 | 13 Dylan Street | 50 | m | 15.91 | 796 | |
| 4.4 | 'Public Open Space' - Melinda Court | 60 | m | 15.91 | 955 | |
| 5 | 7 Dylan Street Culvert | 5 | m | 658.28 | 3,291 | |
| 6 | 11 Dylan Street Spillway upgrade | 1 | Item | 5,000 | 5,000 | Assumes the dam is in good condition. Excludes embankment works, design, stakeholder engagement, land/easement acquisition. |
| | Subtotal (ex GST) | | | | 109,724 | |
| | | | | | | |
| | **Risk Items** | | | | | |
| 7 | 11 Dylan Street Spillway upgrade / embankment works | | | May not be required if Dam is in good condition and of sound construction. | | |
| 8 | Midland Highway Culvert | | | May not be required depending on existing capacity and impact of peak | | |
| 9 | Rail Culvert | | | | | |
| | **Subtotal (ex GST)** | | | | **~109,724** | |
| | **Total (ex GST)** | | | | **~109,724** | |

*Option 2*

As noted previously, an alternative to upgrading infrastructure along the downstream drainage path is to decrease the peak discharge from the site using onsite detention.

Currently, there is insufficient information on the proposed school development's increase in impervious area to determine the size of detention required within the school site. However, as agreed with DoE, we have assumed a 50% impervious area as noted in Table 2 below.

**Table 2 Detention Option – Indicative Volume**

| Catchment Area ($m^2$) | % impervious | Detention Volume ($m^3$) |
|---|---|---|
| 10,000 | 50% | 188 |

*Stormwater Quality*

The development of the school would require treatment of stormwater prior to discharge from the site. The stormwater treatment would likely need to meet the reduction targets set out Table 3 .

**Table 3 Stormwater Treatment Requirements**

| Pollutant | Pollutant Reduction Requirement |
|---|---|
| Gross Pollutants | 100% |
| Total Suspended Solids | 80% |
| Total Phosphorus | 45% |
| Total Nitrogen | 45% |

This could typically be achieved through a variety of measures including:

- Vegetated Swales;
- Bioretention;
- Constructed Wetland; and/or
- Proprietary products.

However, there is currently insufficient information to provide a concept for stormwater treatment from the school site.

### 2.2.3 High School & Residential Development (Scenario C)

Stormwater runoff from the Residential Development is assumed to have a density of 15 lots / ha. Based on the surrounding area, the equivalent impervious percentage is 55% impervious.

*Drainage Paths*

The proposed development of the school and surrounding residential subdivision would utilise the same drainage paths as outlined in Section 2.2.2 for the 'School Only' case. However, in addition to these drainage paths, 69 Brighton Road would also drain to the culvert under Brighton Road and then along existing easements to the dam at 17 Dylan Street.

Further, the Dylan Street area drainage would be generally in line with the existing easements and road reserve to the dam on 11 Dylan Street, and then through to the culvert under the Midland Highway. The Melinda Court properties drain to the south.

The general flow paths outlined above are proposed to be retain.

### *Peak Outflows*

With the inclusions of the additional residential development on 33 Elderslie Road the impervious area is likely to be increased through the development of the remaining land. Detention of stormwater from the development will be required to limit the peak flow from the development.

### *Options assessment*

Based on the assessment, the increased in runoff volume and peak flows for Scenario D would need to be addressed through the following options. These are further presented in Appendix A.

1. upgrade of downstream drainage paths (likely including the culvert under the Brighton Road), or:
2. decrease the peak discharge from the site through the use of on-site detention

### *Option 1*

The requirements for this option are similar to those under Option 1 for Scenario D. Refer to Section 2.2.2.

### *Option 2*

This option considers decreasing the peak discharge from the various sites identified in Scenario C and D using on-site detention.

A solution to achieving this is to take an all of community approach and utilise the existing dam at 11 Dylan Street as the single point of detention storage. For the dam to function as detention storage, the water level would need to be lowered. A permanent pond could be retained at a lower level than current, however, depending on the condition of the dam, a new outlet structure may need to be reconstructed to meet the required volumes.

Based on the layout and other infrastructure, an approximate storage requirement above the permanent water body would be 5,500 $m^3$ (assuming no more than 55% impervious once developed). This volume includes the detention requirement for the school site as well. This could be accommodated in the dam with approximately 1 m fluctuating water level. These numbers will need to be reassessed once a layout and a preferred concept design is chosen and developed.

Noting the above, the existing dam may need significant works to comply with modern dam guidelines and requirements resulting in additional costs and potentially prolonged stakeholder coordination and management.

An alternative for stormwater detention is to build a new above ground storage (dam) or individual lot based ‘rainwater tank’ style detention storages. The latter would have the advantage of being constructed, owned, and maintained by the private property owners and could be constructed as the impervious areas are constructed rather than being an initial construction cost for the entire development. However, it is typically easy to convert these tanks into rainwater tanks so they are full during rainy periods (and so do not provide detention storage) and as such, Brighton Council would need to consider the risk to performance of the individual lot based approach.

Based on the above, there are various ways to manage the peak flows because of the development. The detention could be spread throughout the area in multiple ways including a mixture of on-site detention through the use of the dam at 11 Dylan St, a new above-ground storage dam, and/or individual lot-based detention storage.

Below ground detention would also be possible but is typically expensive compared with the above ground options.

### *Stormwater Quality*

The development of the school and residential area would require treatment of stormwater prior to discharge from site. The stormwater treatment would likely need to meet the reduction targets set out in Table 4.

**Table 4 Stormwater Treatment Requirements**

| Pollutant | Pollutant Reduction Requirement |
|---|---|
| Gross Pollutants | 100% |
| Total Suspended Solids | 80% |
| Total Phosphorus | 45% |
| Total Nitrogen | 45% |

This could typically be achieved through a variety of measures including:

- Vegetated Swales;
- Bioretention;
- Constructed Wetland; and/or
- Proprietary products.

A concept design for stormwater treatment will need to be undertaken when concept layouts are developed and would likely include a range of the above treatment infrastructure. However, as a guide, should only one type of treatment be installed, the below treatment areas shown in Table 5 would likely be required for various impervious areas.

**Table 5 Indicative Treatment Areas to achieve target treatment**

| Treatment type | % of Impervious Area | Location Adjustment Factor | Adjusted % of Impervious area | Impervious area ($m^2$) | | |
|---|---|---|---|---|---|---|
| | | | | 10,000 | 50,000 | 100,000 |
| Bioretention | 1.35% | 1.03 | 1.39% | 139 | 697 | 1,394 |
| Pond | 3.30% | 0.83 | 2.73% | 273 | 1,366 | 2,732 |
| Swale | N/A* | 1.06 | N/A* | N/A* | N/A* | N/A* |
| Wetland | 2.40% | 0.87 | 2.10% | 210 | 1,049 | 2,098 |

* Insufficient treatment by itself but could be combined with other treatments to good effect.

It is likely that treatment infrastructure would be included throughout the development with potential for treatment areas to be concentrated immediately downstream of the existing dam, perhaps including the existing dam.

## 2.3 Options assessment summary

There are potential savings if the stormwater detention is for both the school and remaining residential development area identified in Scenario C and D are developed together as a centralised dam. However, if a decentralised detention arrangement is proposed, there is likely minimal advantage in developing the strategy for the School at the same time as the surrounding residential development. Similarly, infrastructure for addressing stormwater quality could be designed throughout the development. There is some advantage in nodal treatment devices servicing areas greater than one lot as maintenance and aesthetic considerations can be better managed. However, the school site is of sufficient size to constitute a nodal treatment location feeding into the larger catchment.

# 3. Sewer

## 3.1 Desktop Review

A desktop review has been undertaken based on the information provided, the planning requirements, and publicly available information including:

- 1.0 m topographic contours sourced from ELVIS (https://elevation.fsdf.org.au/);
- Sewer network layers on https://maps.thelist.tas.gov.au/listmap/app/list/map; and
- Discussion with TasWater via the Service Enquiry Process.

These provide a good basis for consideration of the site sewer under the different development scenarios as outlined below. A sewer constraints map is also included in Appendix A.

## 3.2 Scenario analysis

### 3.2.1 Base Case (Scenario A) – the existing site with no development

A portion of the site (33 Elderslie Road, 113 Brighton Road, 2 Dylan Street, and 1 Melinda Court) currently has a sewer service provided by TasWater which is shown in Figure 2. Each of these connections is only for 1 Equivalent Tenement (ET). The ET has been calculated in accordance with the TasWater Supplement to Water Supply Code of Australia WSA 03 - 2011-3.1 MRWA Edition V2.0.

The remainder of the site is unserviced with onsite disposal of wastewater. The existing condition of these systems is unknown at the time of writing and likely to vary between the properties.

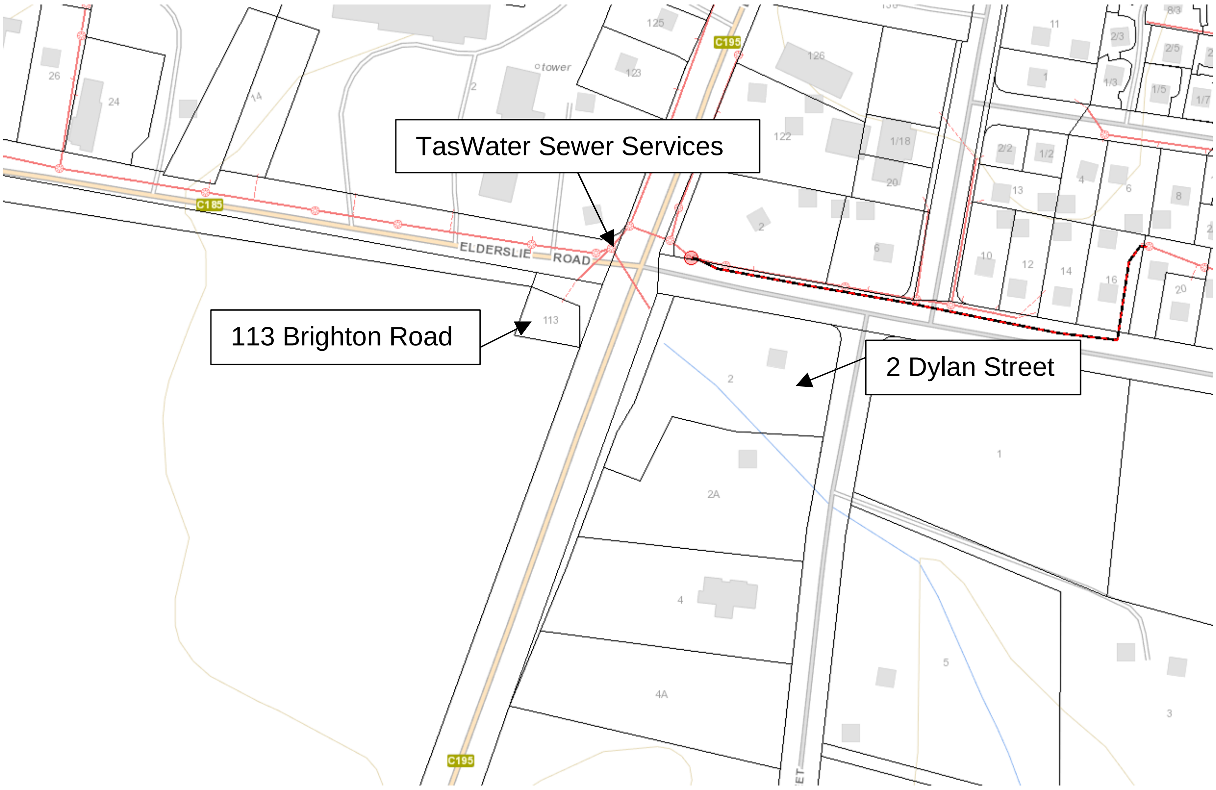



**Figure 2 Existing TasWater Sewer Services on site**

The William Street Sewage Pump Station (SPS) currently services 33 Elderslie Road, 113 Brighton Road and 2 Dylan Street with 1 Melinda Court serviced by gravity to the Andrew Street SPS. The William Street SPS currently discharges to a gravity system, then to the Andrew Street SPS.

### 3.2.2 Only the High School (Scenario D)

The proposed High School is assumed to have a sewer load of 39.9 ET. This is far in excess of the existing TasWater service to the property. The ET has been calculated based on the 600 students and 100 staff, and ET rate for school in TasWater Supplement to WSA 02-2014-3.1 MRWA Edition V2.0.

TasWater has advised that the William Street SPS is at capacity and that there is insufficient room on the site to upgrade the SPS. TasWater has advised that the sewage from the site will need to discharge to the Andrew Street SPS before being pumped by TasWater to their Treatment Plant.

#### *Options assessment*

The following options have been considered to provide a sewer service to the school site. These are further presented in Appendix A.

1. New SPS

a. On School Property; or

b. Downstream of Dylan Street

2. Gravity Pipeline along William Street

#### *Option 1 - New Sewage Pump Station*

The proposed school will need to provide for a new SPS, which can be accomplished with two options depending on stakeholder requirements.

#### *Option 1a - SPS on School Property / Elderslie Road/ Brighton Road Corner*

There is an opportunity to locate the SPS on the school's land near the intersection and then hand the land and infrastructure over to TasWater. There is currently a small parcel of land (113 Brighton Road) owned by the Department of State Growth which may be suitable to locate the SPS on. This option provides a pump station close to the school (reducing the length of gravity main to the SPS from the School). A new rising main will be required along William Street and likely through to the Andrew Street SPS.

The rising main can be installed at a relatively shallow depth but will need to be installed in or close to the roadway. This will incur additional costs compared with installation in a 'greenfield' location.

State Growth has not been contacted regarding use of their land for the possible SPS as part of this work.

#### *Option 1b - SPS downslope of Dylan Street*

The school may wish to keep the new SPS away from their frontage by constructing a gravity pipe to a new SPS at a downhill location (i.e. on the LGA land between the Dylan St Properties and the Midlands Highway). However, this would require new easements between the school and Dylan Street, along Dylan Street, and adjacent to the existing drainage easements through properties at the end of Dylan Street to a proposed SPS. Easements can be minimised by utilising Dylan Street for the majority of the gravity main. Likely route and associated easements are provided in Appendix A.

TasWater has the power to compulsorily acquire easements for sewer infrastructure, however crossing multiple landowners' properties could prove time consuming and may not be desirable without landowner support.

Refer to section 3.2.3 for further details around the Dylan Street SPS.

### *Option 2 - Gravity Pipeline along William Street*

With regards to the gravity pipeline, the Andrew Street SPS is below the lowest point of the proposed school site. A gravity main could be constructed from the site adjacent to the Brighton Road / Elderslie Road / William Street intersection, along William Street to Andrew Street. The advantage of this option is that pumping would not be required and a new dedicated SPS site would not be required. However, there is a high point in William Street which would require the pipeline to be constructed at least 4 m deep for much of the length. Based on the 1:25,000 geology maps, Tholeiite basalt is present. This is typically very hard rock and is consistent with the anecdotal descriptions provided by Council at the inception meeting. Geotechnical investigations are beyond the scope of this assessment, however, we consider construction of a gravity pipeline is unlikely to be feasible.

**Figure 3 Existing William Street SPS**

### 3.2.3 High School & Residential Development (Scenario C)

Development of the school and residential areas face similar constraints to the school only development as discussed in Section 3.2.2. However, there is an additional constraint that much of the residential area (on both sides of Brighton Road and Dylan Street) drain to neither the existing William Street SPS, nor a possible new SPS within the school site.

A new SPS is proposed within either the LGA or Crown Land adjacent to the highway at the end of Dylan Street. This would be able to service the entire site which is not currently serviced off William Street. The SPS would have a 30 m odour attenuation buffer to residential dwellings. The rising main from this SPS would ultimately discharge at the Andrew Street SPS and likely be laid along the highway boundary, although alternate alignments are possible. Connection to another rising main closer to the proposed SPS may be possible.

The likely route for the rising main is included in Appendix A. A rising main constructed along the boundary of the highway road reserve would be significantly cheaper than the equivalent construction within or close to a road carriageway.

## 3.3 Options assessment summary

The advantage of developing the school and the residential development together is that the proposed Dylan Street SPS (adjacent the Highway) could service both developments. The cost of the SPS for the combined school and residential development is likely to be considerably less than the cost of an SPS for the school and an SPS for the residential development, especially when land take and aesthetics are considered.

Netco has had previous involvement at the site and surrounding areas and has provided a budget estimate for a SPS downslope from Dylan Street and adjacent to the highway (see Table 6). We would anticipate a similar cost for the School Only Case if the SPS were located in Dylan Street or on the school site. Further detail is given in Appendix B.

**Table 6 Budget Cost Estimate***

| Case | Pump Flow & Head | Budget Cost |
|---|---|---|
| School Only | 3.3 L/s @ 25 m | $248,085 |
| Development and School | 34.5 L/s @ 25 m | $576,260 |

* Indicative costings provided by Netco

Based on the above, it is likely, that efficiencies can be achieved through a cost sharing arrangement between stakeholders for the various development identified in Scenarios C and D.

A summary of the options for providing sewer infrastructure for this development in provided in Table 7.

### Table 7 Summary of Options (Sewer)

| Parameter | School Only | | Combined School and Residential Development |
|---|---|---|---|
| | SPS on site | Dylan St SPS | |
| Gravity Main Length (m) | 0 | 800 | 800 |
| Rising Main Length (m) | 1,530 | 1,310 | 1,310 |
| Easement Length (m) | 0 | 264 | 264# |
| Pipeline Cost/m | Higher due to construction in road (William Street) | Medium – local road construction (Dylan Street), Low cost adjacent highway | Medium – local road construction (Dylan Street), Low cost adjacent highway |
| SPS funding* | Fully funded by DoE | Fully funded by DoE | Co-funding+ |
| Pipeline funding* | Fully funded by DoE | Fully funded by DoE | Developer, DoE |

* Based on TasWater's general policy. Alternate arrangements may be negotiated with TasWater

+ Co-funding mechanism to be determined. TasWater or Council may require developer contribution.

# Easement length may be reduced with development depending on proposed road locations.

# 4. Water

While consideration of water supply has been excluded from this report, there are several water mains which cross the site and are included on Figure 4 below.

These are:

- DN300 Mild Steel reticulation main;
- DN648 Mild Steel Cement Lined main;
- DN630 HDPE Tasmanian Irrigation Pipeline.

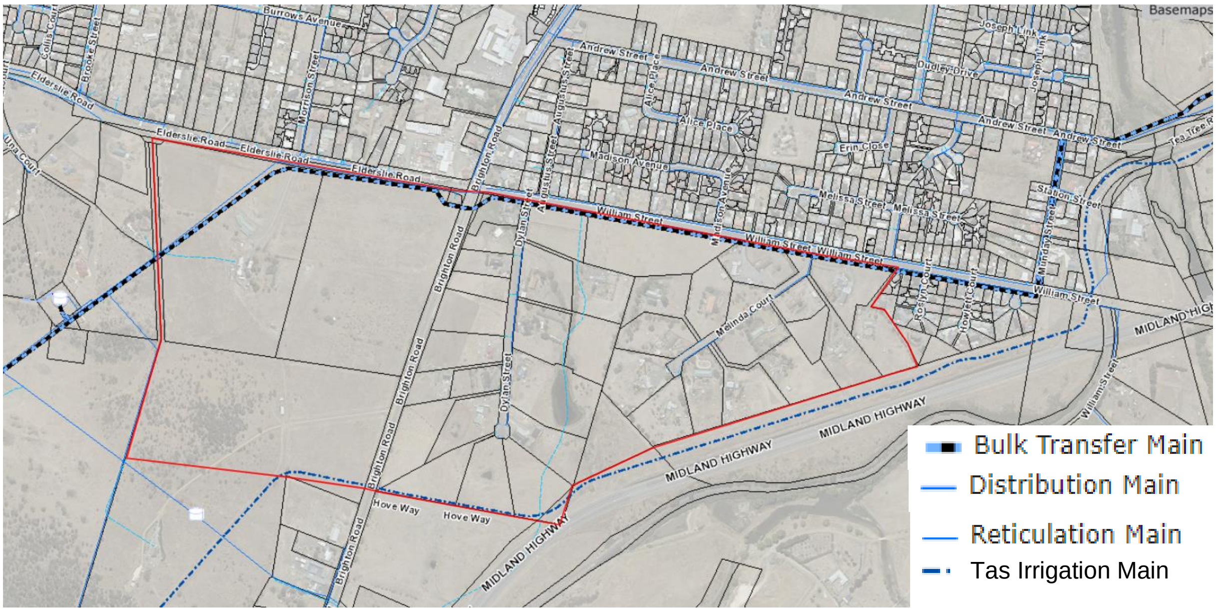



**Figure 4 Existing Water Supply Assets**

The DN300 and DN648 are within the same corridor to the north east of the site.

Relocation of these mains is possible, however, it would be costly for these large mains. It is possible to work around the large diameter water mains. This is generally the approach recommended.

# 5. Transport

## 5.1 Desktop Review

A desktop review has been conducted to understand the existing conditions of the transport network and is detailed within the following sections.

### 5.1.1 Transport network

For the purpose of this assessment the transport network comprises of the following roads as presented in Figure 5:

- Brighton Road
- Elderslie Road
- William Street
- Dylan Street
- Melinda Court
- Morrison Street
- Augustus Street
- Hove Way

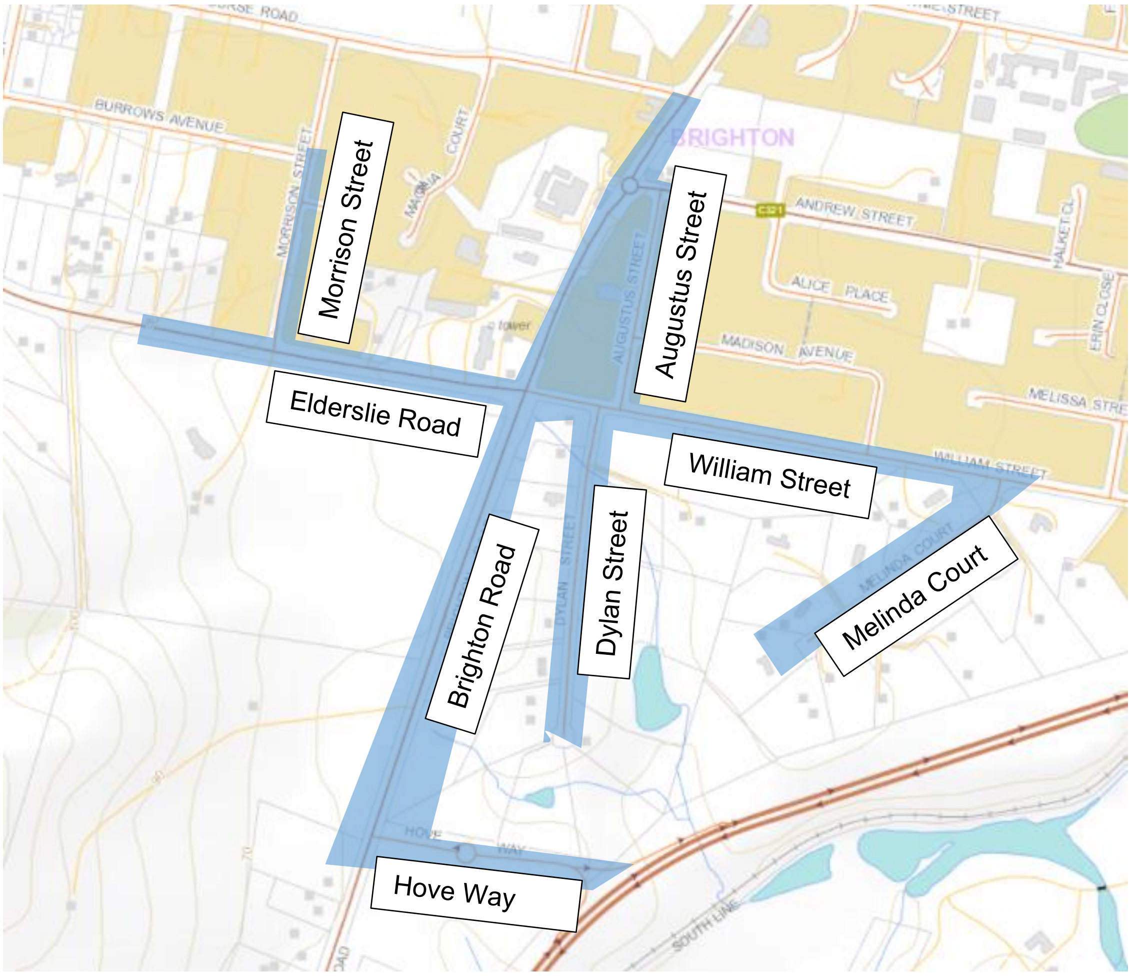



**Figure 5 Transport network**

Each of the above roads are examined in detail as follows.

### *Brighton Road*

Brighton Road is a sub arterial road with a two-way, two lane cross section and a speed limit of 70 km/h adjacent to 69 Brighton Road and 50 km/h for the shopping zone from 100 m south of the approach to Elderslie Road / William Street. Brighton Road was formerly part of the Midland Highway (National Highway 1) until the completion of the Brighton Bypass in 2012. The cross-section of the road is approximately 7 m wide with sealed shoulders provided on either side of the road. There are no footpaths on Brighton Road south of Elderslie Road / William Street. Street lighting is provided along Brighton Road.

### *Elderslie Road*

Elderslie Road is a sub arterial road with a two-way, two lane cross section and a speed limit of 60 km/hr. The prevailing conditions of the road has a width of 6.5 m with a footpath and indented parking bays on the north side of the road. The southern side of the road has an unsealed shoulder with informal 90 degree angle parking located immediately east of 33 Elderslie Road. Elderslie Road intersects with Brighton Road at a four-way junction with William Street – where Brighton Road has priority and Elderslie Road and William Street are subject to a give way control.  Morrison Street intersects with Elderslie Road at a t-junction, approximately 350 m west of Brighton Road. Inbound and outbound indented bus bays with bus shelters are provided adjacent to the intersection of Brighton Road. A footpath is provided on the southern side of the street for a short section servicing the outbound bus stop.  Street lighting is provided at the intersection of Elderslie Road with Brighton Road and at the bus shelters however does not continue along Elderslie Road.

### *William Street*

William Street is a local road with a two-way, two lane cross section and a speed limit of 50 km/hr. The prevailing conditions of the road is a width of 7.0 m with no centre or edge line delineation. There is a footpath on the north side of the road between Augustus Road and Munday Street. William Street intersects with Brighton Road at a four-way junction including Elderslie Road – where Brighton Road has priority and William Street and Elderslie Road are subject to a give way control. Dylan Street and Melinda Court intersection with William Street at t-junctions approximately 100 m and 670 m respectively east of Brighton Road. There are inbound and outbound bus stops on William Street immediately east of the intersection with Augustus Street. Street lighting is provided along William Street.

### *Dylan Street*

Dylan Street is local cul-de-sac road with a speed limit of 50 km/hr. The two-way road has an approximate width of 6 m with no edge or centre line marking. Dylan Street provides access to a number of existing residences and is solely used by traffic accessing these locations. There is no footpath on either side of the road. Street lighting is provided along Dylan Street.

### *Melinda Court*

Melinda Court is local cul-de-sac road with a speed limit of 50 km/hr. The two-way road has an approximate width of 6 m with no edge or centre line marking. Melinda Court provides access to a number of existing residences and is solely used by traffic accessing these locations. There is no footpath on either side of the road. Street lighting is provided along Melinda Court.

### *Morrison Street*

Morrison Street is local road with a speed limit of 50 km/hr. The two-way road has an approximate width of 5.8 m with no edge or centre line marking. There is a footpath on the east side of the road. Morrison Street intersects with Elderslie Road opposite the access to 33 Elderslie Road.

### *Augustus Street*

Augustus Street is local road that with a speed limit of 50 km/hr. The two-way road has an approximate width of 6 m with no edge or centre line marking. There is a footpath on the east side of the road. Morrison Street intersects with William Street 20 m east of Dylan Street.

### *Hove Way*

Hove Way is a local road that extends approximately 250 m between the Midland Highway and Brighton Road. Hove Way was constructed in 2020 with the intention of providing direct access to development at 40 Brighton Road (service centre). A three-leg roundabout is proposed to provide access from Hove Way to the service centre in the south.

### 5.1.2 Traffic demand

Traffic data for a number of roads within the transport network was provided by Brighton Council.  Traffic volumes are provided in Table 8. Some of the data provided was greater than 5 years old and has been adjusted according to available historic growth data for the surrounding state road network. Where data was not available descriptive comments have been included to inform the traffic analysis. Based on the *RTA Guide to Traffic Generating Development – Technical Direction 04a* (RMS, 2013) (*RTA Technical Direction*) for low density residential 0.9 peak hour trips are anticipated per lot. To approximate the existing traffic one peak hour trip per existing lot was used for Dylan Street and Melinda Court.

**Table 8 Traffic volumes**

| Road | Direction | AM peak | PM peak | HV% | Comments |
|---|---|---|---|---|---|
| Brighton Road | NB | 276 | 607 | 9% | 2017 tube counts |
| | SB | 585 | 337 | 9% | |
| Elderslie Road | WB | 72 | 88 | 10% | Estimation from 2014 count |
| | EB | 106 | 135 | 10% | Estimation from 2003 count |
| William Street | WB | 64 | 39 | 10.5% | 2017 tube counts |
| | EB | 30 | 72 | 10.5% | |
| Dylan Street | - | ~22 | ~22 | - | No traffic counts, low traffic volume observed on site |
| Melinda Court | - | ~15 | ~15 | - | No traffic counts, low traffic volume observed on site |
| Morrison Street | NB | 22 | 24 | 8% | Estimation from 2010 count |
| | SB | 11 | 21 | 8% | |
| Augustus Street | NB | ~20 | ~20 | - | No traffic counts, low traffic volume observed on site |
| | SB | ~20 | ~20 | - | |

*Sourced from Brighton Council*

### 5.1.3 Transport modes

Journey to work data was sourced from the 2016 census for Brighton to look at the mode choice patterns for commuting and is presented in Table 9. It is seen that there is high private vehicle use and a particularly low uptake of active and public transport.

**Table 9 Journey to work data**

| Mode | Trips | Proportion (%) |
|---|---|---|
| Car, as driver | 1,477 | 74.6 |
| Car, as passenger | 123 | 6.2 |
| Worked at home | 49 | 2.5 |
| Walked only | 30 | 1.5 |
| Public transport (bus) | 31 | 1.6 |
| Truck | 27 | 1.4 |

#### *Public transport*

Metro Tasmania has a bus service that runs between Brighton and Glenorchy. The service provides hourly services between 6:40 AM and 5:40 PM with an additional service at 7:10 AM. It is noted that all services after 8:00 AM require a change at Bridgewater in order to continue through to Glenorchy. Services to Brighton (from Glenorchy) commence at approximately 7:40 AM and are provided hourly through till 3:40 PM then at half hour intervals through until 5:40 PM. With the exception of the additional services in the afternoon peak all required a change at Bridgewater.

#### *Walking and cycling*

There are footpath connections along Brighton Road north of Elderslie Road / William Street and along the northern side of both Elderslie Road and William Street the provide access to the wider footpath network within the Brighton township.

There is no dedicated infrastructure for people riding bicycles in the immediate vicinity of the development site, although inexperience or unconfident riders are legally able to use the footpaths.

### 5.1.4 Road safety

Crash data was obtained from the Department of State Growth for the 5-year period between 1 January 2015 and 31 December 2019 for the road network indicated in Figure 5.

There were 11 crashes recorded during this period, shown in Figure 6, including two that resulted in injury, one being serious. Both injury crashes were on Brighton Road adjacent to the intersection with Andrew Street. No crashes were recorded on Dylan Street, Morrison Street or Melinda Court. The dominant crash types were manoeuvring incidents on Brighton Road. The majority of the crashes occurred in daylight, with 8 crashes (73%).

Table 10 provides a summary of the crash data during the 5-year period.

**Table 10 Summary of crash data 2015 - 2019**

| Location | Number of Crashes | | Dominant Crash Types |
|---|---|---|---|
| | Total | Injury | |
| *Midblock* | | | |
| Brighton Road | 6 | 2 | 4 – Manoeuvring |
| William Street | 1 | 0 | Parked vehicle |
| Elderslie Road | 1 | 0 | Right through |
| *Intersections* | | | |
| Brighton Road / Elderslie Road / William Street | 2 | 0 | 2 – Cross Traffic |
| William Street / Augustus Street | 1 | 0 | Cross Traffic |

*Sourced from Department of State Growth June 2020 (Spatial Data Selector)*

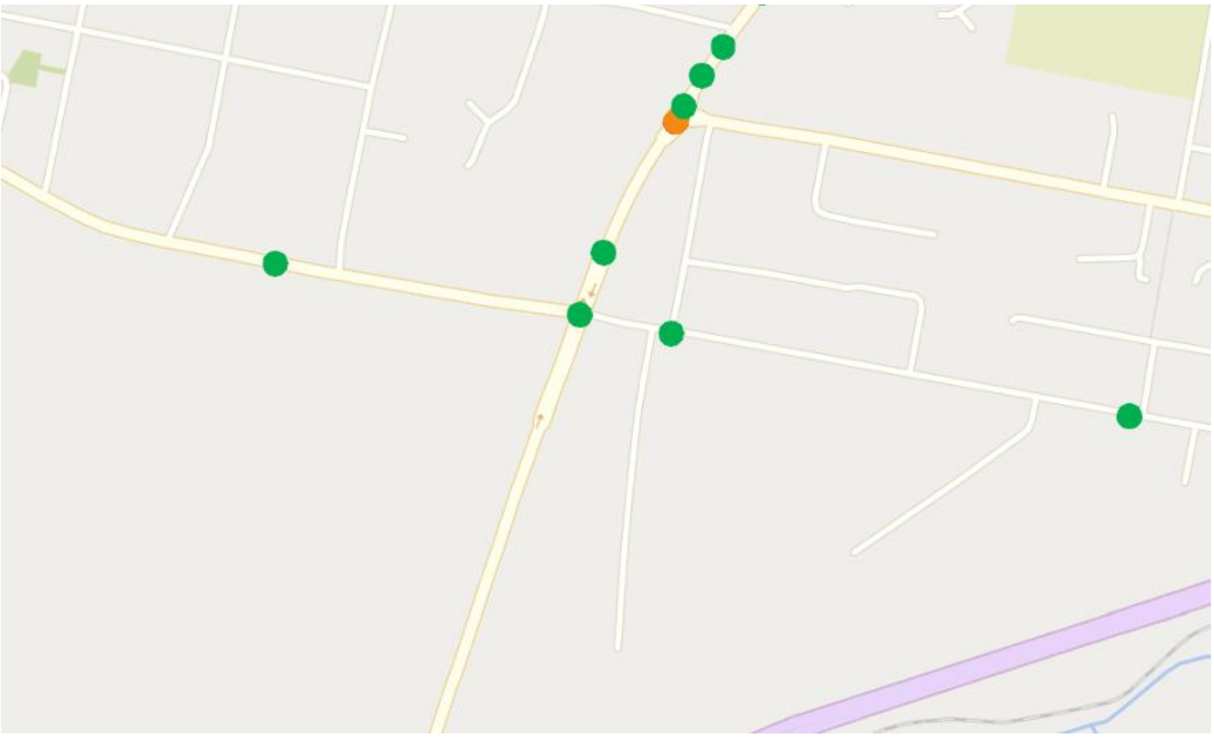


**Figure 6 Crash locations (by severity)**

**Green indicates Property Damage, orange indicates Casualty incidents*

## 5.2 Scenario analysis

### 5.2.1 Base Case (Scenario A) – the existing site with no development

*Existing conditions*

Existing conditions of the intersections anticipated to be impacted by the development were modelled to allow comparison with the proposed scenarios. It is noted that the available traffic data was limited which restricts the ability for the models to be calibrated to existing conditions, however the base models serve as a useful reference point.

The following T-intersections were modelled in SIDRA intersection and due to low existing volumes were shown to currently operate at Level of Service (LoS) A for all approaches:

- Elderslie Road / Morrison Street
- William Street / Dylan Street
- William Street / Augustus Street
- William Street / Melinda Court

Extensive results for the intersection of Brighton Road, Elderslie Road and William Street are included in Appendix C. The 95$^{th}$ percentile queues and average delays for the intersection approaches are provided in Table 11.

### Table 11 Brighton Road / Elderslie Road / William Street results

| Period | Elderslie Road | Brighton Road NB | William Street | Brighton Road SB |
|---|---|---|---|---|
| *95$^{th}$ Percentile Queues* | | | | |
| AM | 4 veh | 0 veh | 1 veh | 1 veh |
| PM | 4 veh | 1 veh | 1 veh | 1 veh |
| *Average Delay* | | | | |
| AM | 41.8 s | 0.7 s | 13.5 s | 0.7 s |
| PM | 45.3 s | 1.3 s | 17.9 s | 1.1 s |
| *Level of Service (Delay)* | | | | |
| AM | E | A | B | A |
| PM | E | A | C | A |

#### *Future conditions*

In order to accurately consider the performance of the network a 'future' scenario is considered that also incorporates planned developments such as the Brighton Service Centre, and consideration to background traffic growth.

Due to the availability of traffic data for Brighton Road a calculation of the growth rate for Brighton Road has not been undertaken and instead previous studies have been consulted, as follows:

- *Brighton Service Centre – Traffic Impact Assessment* (Pitt & Sherry, 2018) considers a compound growth rate of 2.7% as well as development traffic generated by the service centre
- *Brighton Road Corridor Study* (Midson, 2014) adopts a lower growth rate of 1.0% compounding

The more conservative of the two growth rates is adopted noting the study was also conducted more recently and allows incorporation of the service centre development traffic. Values are provided for the 2018 and 2028 post development traffic scenarios in the report. These values were interpolated to compute a volume that is representative of 2022 volumes with reference to the *Brighton Service Centre – Traffic Impact Assessment*. As a growth rate calculation has not been undertaken this time frame cannot be validated but instead the values represent the future performance of Brighton Road and adjoining intersections if and when traffic volumes are in the order of those shown in Table 12. In order to consider the requirement for road upgrades with respect to the future demand, traffic volumes should be intermittently monitored to allow visibility of when the future demand may be reached as a sensitivity analysis between the base and future demand has not been undertaken.

**Table 12 Modelled two-way demands**

| Time | Base demand | Future demand (Background growth and Service Centre development) |
|---|---|---|
| AM | 907 | 1,080 |
| PM | 994 | 1,363 |

A noticeable decrease in the side road LoS is noted, with the Elderslie Road right turn approach failing under the forecast PM traffic demand due to delays of greater than 300 seconds. LoS F is anticipated for both side road approach in the PM and Elderslie Road in the AM indicating unsatisfactory performance. It is considered that this junction should be upgraded prior to the Brighton Road traffic demand reaching those shown in Table 12. The 95$^{th}$ percentile queues and average delays for the intersection approaches are provided in Table 13. Detailed model results for the intersection of Brighton Road, Elderslie Road and William Street are included in Appendix C.

**Table 13 Brighton Road/ Elderslie Road/ William Street future results**

| Period | *Elderslie Road* | Brighton Road NB | William Street | Brighton Road SB |
|---|---|---|---|---|
| *95$^{th}$ Percentile Queues* | | | | |
| AM | 20 veh | 1 veh | 2 veh | 1 veh |
| PM | 52 veh | 1 veh | 3 veh | 1 veh |
| *Average Delay* | | | | |
| AM | 208.4 s | 0.5 s | 18.1 s | 0.9 s |
| PM | > 300 s | 1.0 s | 91.2 s | 1.9 s |
| *Level of Service (Delay)* | | | | |
| AM | F | A | C | A |
| PM | F | A | F | A |

### 5.2.2 Only the High School (Scenario D)

***Traffic Generation***

A traffic generation analysis was undertaken based on a high school catering to 600 students and 100 staff. The *RTA Guide to Traffic Generating Development* (RMS, 2002) (*RTA Guide*) does not provide guidance for schools, however provides the rates shown in Table 14 for child care centres. Research into trip generation rates for schools was undertaken for the RMS and ranges for trip generation are provided in the report *Trip generation and parking demand at Schools Analysis Report* (GTA, 2014) which are provided in Table 14.

**Table 14 Trip generation rates for schools per student**

| Source | AM generation | PM generation |
|---|---|---|
| RTA Guide – Child care | 1.4 | 0.8 |
| GTA – High school | 0.83 | 0.51 |

*Source: RMS 2002 & GTA 2014*

The rate provided for high schools is considered appropriate given the increased likelihood of active and public transport use by high school students. To conservatively allow for increased private vehicle use by staff, trip generation rates for staff of 1.0 and 0.8 for the AM and PM periods respectively have been adopted.

## Table 15 Traffic generation – High school

| Generation | AM | PM |
|---|---|---|
| Staff | 100 | 80 |
| Students | 498 | 306 |
| Total | 598 | 386 |

It has been indicated by Department of Education that the primary access for the school is anticipated to be from Elderslie Road. However alternate access from Brighton Road is likely for some trips.

The following trip distributions are estimated for the high school site:

- 30% access from Brighton Road
- 70% access from Elderslie Road comprised of:
  - 15% trips from Elderslie Road and side streets
  - 55% trips access Elderslie Road via Brighton Road
- Vehicle directional splits are adopted of 60/40 in/out for the AM peak and the inverse for the PM peak (GTA, 2014).

### *Intersection modelling*

The following intersections are anticipated to be impacted by the development of the high school and have been analysed with respect to estimated traffic performance under the future demand scenario for Brighton Road:

- Brighton Road / Elderslie Road / William Street
- Elderslie Road / Morrison Street

Detailed lane performance results are provided in Appendix D, with summaries of the intersection performance provided as follows.

### Brighton Road / Elderslie Road / William Street

A noticeable decrease in the side road LoS is noted, with the Elderslie Road right turn approach failing under the forecast AM and PM traffic demand. The deterioration is largely due to the demand modelled for Brighton Road however the results indicate limited capacity for Brighton Road to provide gaps for entering side road vehicles. It is considered that this junction should be upgraded prior to the Scenario D demand (future demand and scenario D development). The 95$^{th}$ percentile queues and average delays for the intersection approaches are provided in Table 16.

## Table 16 Brighton Road/ Elderslie Road/ William Street Scenario D results

| Period | *Elderslie Road* | Brighton Road NB | William Street | Brighton Road SB |
|---|---|---|---|---|
| *95$^{th}$ Percentile Queues* | | | | |
| AM | 107 veh | 1 veh | 2 veh | 1 veh |
| PM | 130 veh | 1 veh | 5 veh | 1 veh |
| *Average Delay* | | | | |
| AM | > 300 s | 1.4 s | 30.3 s | 1.7 s |
| PM | > 300 s | 1.2 s | 199.8 s | 3.1 s |
| *Level of Service (Delay)* | | | | |
| AM | F | A | C | A |
| PM | F | A | F | A |

### Elderslie Road / Morrison Street / School Entrance

The intersection of Elderslie Road, Morrison Street and the proposed high school access was modelled as a basic four-leg junction with no auxiliary lanes to review the performance of the intersection. The proposed junction performs at LoS A for all approaches under the proposed conditions with minimal queuing or delays observed. It is noted that SIDRA provides an average performance over a modelled hour so does not considered that the school peak may occur within a shorter period (15 to 30 minutes). It is expected that if the peak is experienced over a shorter period of time some queueing may occur but will clear quickly after the short peak. The 95th percentile queues and average delays for the intersection approaches are provided in Table 17. It is considered that the intersection performs satisfactorily under the basic configuration, however auxiliary lanes from the school entrance may be beneficial to ease queueing during short school peaks.

**Table 17 Elderslie Road/ Morrison Street Scenario D results**

| Period | Elderslie Road EB | School access | Elderslie Road WB | Morrison Street |
|---|---|---|---|---|
| *95th Percentile Queues* | | | | |
| AM | 1 veh | 1 veh | 1 veh | 1 veh |
| PM | 1 veh | 1 veh | 1 veh | 1 veh |
| *Average Delay* | | | | |
| AM | 0.9 s | 5.9 s | 0.4 s | 4.7 s |
| PM | 0.8 s | 6.2 s | 3.0 s | 5.1 s |
| *Level of Service (Delay)* | | | | |
| AM | A | A | A | A |
| PM | A | A | A | A |

It is observed that the traffic volume generated can be sufficiently catered for within the junction with Morrison Street, however it is noted that the Department of Education intends to provide a separate access to the school off Elderslie Road. It is likely this access would be located midblock between Brighton Road and Morrison Street, providing sufficient spacing between the intersections. Based on the traffic generation it is not anticipated that this would have significant impacts on the performance of Morrison Street.

### 5.2.3 High School & Residential Development (Scenario C)

#### *Traffic generation*

A traffic generation analysis of the residential lots was undertaken based on the *RTA Technical Direction* and are detailed in Table 18.

**Table 18 Trip generation rates for residential development per dwelling**

| Residential density | Peak hour generation | Source |
|---|---|---|
| Medium | 0.65 | RMS 2002 |
| High | 0.67 | RTA 2013 |

*Source: RMS 2002 & RMS 2013*

The development is predominantly medium density with some allowance for high density residential development. A higher traffic generation is referenced for high density housing than medium density due to the more recent surveys that the rate is sourced from. The higher of the two traffic generation rates has been adopted for both housing types.

Lot allocations are assumed for each site of the development and are provided in Table 19.

### Table 19 Anticipated lot allocations and traffic generation

| Site | Approximate area | Lot allocation | AM Trip generation | PM Trip generation |
|---|---|---|---|---|
| 69 Brighton Road | 11 ha | 165 | 111 | 111 |
| Dylan Street | < 24.5 ha | 170 | 114 | 114 |
| Melinda Court | < 16.2 ha | 122 | 82 | 82 |
| 33 Elderslie Road | 20.73 ha | 161<br>*plus* High school | 108<br>+598 | 108<br>+386 |

**Lot allocation for Dylan Street based on Dylan Street Master Plan; 69 Brighton Road, 33 Elderslie Road and Melinda Court at provided rate of 15 dwellings per hectare with a reduction for existing dwellings on Melinda Court*

The following trip distributions are assumed for the residential sites:

- Traffic generated from Dylan Street and Melinda Court will travel through to William Street then be distributed accordingly
- Traffic generated from Elderslie Road:
  - 20% will travel to/from east of the site
  - 80% will travel to and from Brighton Road via the junction with Elderslie Road
- Trips will be distributed based on current travel patterns on Brighton Road:
  - 30% trips to/from north
  - 70% trips to/from south
- Trips are estimated to have a 30/70 in/out split in the AM and a 60/40 split in the PM

It is noted that the new roundabout on Hove Way provides a potential connection to Dylan Street. This connection is likely to result in the diversion of northbound trips from Melinda Court and Dylan Street to this connection as well as southbound trips to both sites, alleviating some pressure on the intersection of Brighton Road / William Street. For the purpose of assessing William Street, this diversion is not considered. However, an assessment of a potential junction with Hove Way is considered qualitatively in in the following sections.

#### *Intersection modelling*

The following intersections are anticipated to be impacted by the development from the high school and have been analysed with respect to estimated traffic performance under the future demand scenario for Brighton Road:

- Brighton Road / Elderslie Road / William Street
- Elderslie Road / Morrison Street
- William Street / Dylan Street (and Augustus Street)
- William Street / Melinda Court
- New intersections at 69 Brighton Road and Hove Way

Detailed lane performance results are provided in Appendix E, with summaries of the intersection performance provided as follows.

#### Brighton Road / Elderslie Road / William Street

A further decrease in the side road LoS is noted with the side road approaches performing at LoS F under the existing intersection configuration, noting particularly the reduction in performance at the William Street approach in the AM. It is considered that this junction should be upgraded prior to reaching the Brighton Road and development traffic demands. The 95th percentile queues and average delays for the intersection approaches are provided in Table 21.

**Table 20 Brighton Road / Elderslie Road / William Street Scenario C results**

| Period | *Elderslie Road* | Brighton Road NB | William Street | Brighton Road SB |
|---|---|---|---|---|
| *95th Percentile Queues* | | | | |
| AM | 179 veh | 1 veh | 107 veh | 1 veh |
| PM | 218 veh | 1 veh | 112 veh | 2 veh |
| *Average Delay* | | | | |
| AM | > 300 s | 1.7 s | > 300 s | 2.1 s |
| PM | > 300 s | 1.5 s | > 300 s | 4.4 s |
| *Level of Service (Delay)* | | | | |
| AM | F | A | F | A |
| PM | F | A | F | A |

Although relatively low average delays are observed for Brighton Road approaches, these averages are indicative of much higher turning movement delays. The delay for southbound right turn movement into Elderslie Road was observed to be 21.1 seconds in the afternoon (PM peak).

Based on the modelling results it is considered that the existing access onto Brighton Road does not provide satisfactory access conditions for the side road with delays exceeding 300 seconds on Elderslie Road and William Street.

### Elderslie Road / Morrison Street / School Entrance

The intersection of Elderslie Road, Morrison Street and the proposed high school / residential access was modelled as a basic four-leg junction with no auxiliary lanes to review the performance of the intersection. As noted in Section 5.2.2, the model does not consider the short duration of the school peaks. The results are summarised in Table 21.

**Table 21 Elderslie Road/ Morrison Street Scenario C results**

| Period | Elderslie Road EB | School access | Elderslie Road WB | Morrison Street |
|---|---|---|---|---|
| *95th Percentile Queues* | | | | |
| AM | 1 veh | 1 veh | 1 veh | 1 veh |
| PM | 1 veh | 1 veh | 1 veh | 1 veh |
| *Average Delay* | | | | |
| AM | 1.9 s | 5.6 s | 3.7 s | 4.7 s |
| PM | 1.3 s | 6.4 s | 3.0 s | 5.1 s |
| *Level of Service (Delay)* | | | | |
| AM | A | A | A | A |
| PM | A | A | A | A |

As noted in Section 5.2.2 due to the traffic demand, even with the additional residential traffic it is not likely that separating the school access to be a separate access (and providing the residential access aligned with Morrison Street) is not anticipated to impact the performance of either junction adversely.

### William Street / Dylan Street (and Augustus Street)

The intersection of William Street and Dylan Street was modelled as a network with William Street and Augustus Street to account for impacts of the closely spaced intersections. All approaches to the intersections performed at LoS A for all approaches under the proposed conditions with minimal queuing or delays observed. Given the potential for further connectivity between the Dylan Street development and the surrounding road network it is considered that the proposed development can be accommodated.

### William Street / Melinda Court

The intersection of Melinda Court and William Street showed similar performance to the William Street / Dylan Street intersection. This indicates that the main network constraint of the eastern residential developments is access via William Street.

#### *Potential internal road connection with Hove Way*

The potential internal road connection with Hove Way has been assessed against the 2028 traffic volumes provided in the *Brighton Service Centre – Traffic Impact Assessment* (Pitt & Sherry, 2018). This process was undertaken to review the impacts of the potential Hove Way connection. Due to the relatively low traffic generation from Dylan Street and Melinda Court an additional connection to the roundabout is not anticipated to significantly impact the performance of this intersection. However, consideration should be given to the intersection of Hove Way and Brighton Road as well as the access to the Midland Highway noting the additional connectivity.

### Brighton Road / new road at 69 Brighton Road

The residential development at 69 Brighton Road includes a new access from Brighton Road (approximately half way between Elderslie Road and Hove Way). The access was modelled as a basic T-junction with the 95$^{th}$ percentile queues and average delays for the intersection approaches are provided in Table 22. Poor LoS is achieved on the new road connection due to high through traffic volumes on Brighton Road, however it is comparable to the existing performance from Elderslie Road onto Brighton Road.

**Table 22 Brighton Road / New connection Scenario C results**

| Period | Brighton Road NB | New connection | Brighton Road SB |
|---|---|---|---|
| *95$^{th}$ Percentile Queues* | | | |
| AM | 0 veh | 2 veh | 1 veh |
| PM | 0 veh | 2 veh | 10 veh |
| *Average Delay* | | | |
| AM | 0.3 s | 40.2 s | 0.5 s |
| PM | 0.4 s | 49.5 s | 10.3 s |
| *Level of Service (delay)* | | | |
| AM | A | E | A |
| PM | A | E | A |

The new intersection is considered to service the development demand as a basic junction however, upgrade of the intersection may be necessary to minimise delays, improve safety outcomes, support additional access from the junction in future and increase accessibility if volumes on Brighton Road increase.

*Austroads Guide to Road Design Part 4: Intersections and Crossings General* provides guidance for the provision of tuning lane provision at intersection. The predicted through volume on Brighton Road exceeds 1200 vehicles per hour and the turn volumes of approximately 30 vehicles per hour indicate that as a minimum a channelised right turn lane is required for the intersection (refer Figure 7).

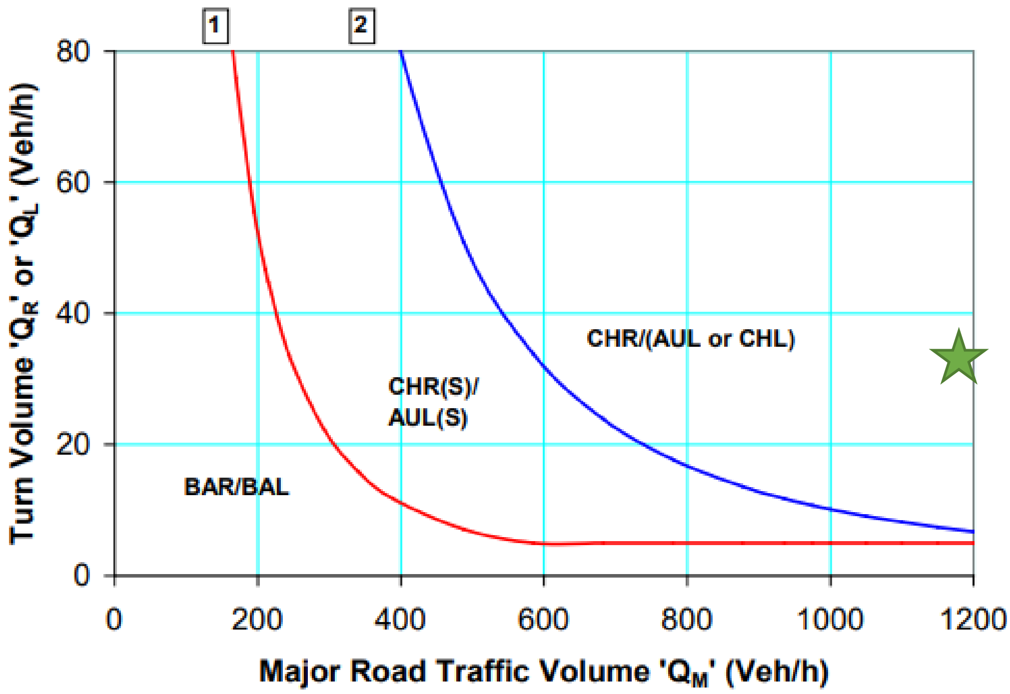



**Figure 7 Turn lane warrants**

*Source: Austroads Guide to Road Design Part 4: Intersections and Crossings General*

## 5.3 Options assessment

### 5.3.1 Capacity impacts

The intersection of Brighton Road / Elderslie Road / William Street has been demonstrated to require improvements to address capacity on the side roads solely under the future demand case (no development). The capacity deteriorates with future development of the high school (off Elderslie Road) and further with the additional residential development accessed off William Street and Elderslie Road. Consideration could be given to a roundabout treatment at this location (as proposed in the Corridor Study) to improve access to Elderslie Road and William Street and also as part of a wider traffic calming scheme to manage speeds on Brighton Road approaching the commercial centre.

The proposed new junction providing access to residential development at 69 Brighton Road is significantly impacted by the high through volumes on Brighton Road. A short lane, or left slip lane on the new approach will result in significantly reduced delays for the left turn movement however would provide minimal benefit for right turns. A right turn acceleration lane southbound on Brighton Road may provide some improvement however due to the high proportion of northbound movements past the site this is unlikely to alleviate much delay. The PM performance indicates that a separate right turn lane may be beneficial to allow vehicles to store and not delay southbound through movements. A roundabout would likely provide the best access performance for side roads. However as this assessment is based on the ability of existing infrastructure to service further developments, the performance of a roundabout has not been considered within this assessment.

Alternatively, consideration could be given to developing the subdivision plan to include access to residential development at 69 Brighton Road from a location further south on Brighton Road to align with the new Hove Way junction that could include consideration of a roundabout treatment to assist with access and egress from both Hove Way and the new subdivision road.

### 5.3.2 Amenity Impacts

The RTA Guide provides performance standards for the amenity of roads subject to additional traffic from a development. The guide classes roads as collector and local as shown in Table 23.

**Table 23 Environmental capacity performance standards (RMS, 2002)**

| Class | Speed (km/hr) | Environmental Goal | Maximum veh/hr |
|---|---|---|---|
| Local | 40 km/hr | 200 veh/hr | 300 veh/hr |
| Collector | 50 km/hr | 300 veh/hr | 500 veh/hr |

The transport network is assessed against the standards in Table 24.

**Table 24 Amenity assessment**

| Road | Classification | Estimated peak volume | Comments |
|---|---|---|---|
| Brighton Road | Sub-arterial | 1600 vph | Capacity of arterial roads typically defined as 1800 vph per lane with adjustments for lane width and heavy vehicle use. It is considered that the peak volume is within capacity however may cause significant performance impacts to side roads. |
| Elderslie Road | Sub-arterial | 600 vph | Exceeds maximum for collector road function, however due to arterial function of road is considered appropriate. Capacity limited by connection to Brighton Road. |
| William Street | Local | 300 vph | Although William Street provides some distributing function to other local roads, this development should be considered as an upper limit for William Street in its current function as it is maximum for local road and environmental goal for a road with collector function. |
| Dylan Street | Local | 160 vph | Within environmental goal for local road. |
| Melinda Court | Local | 130 vph | Within environmental goal for local road. |

As observed in Table 24 the main amenity limitations to the development are the intersection of Brighton Road / Elderslie Road / William Street and the amenity on William Street. The following considerations should be made:

- Upgrades to intersection of Brighton Road / Elderslie Road / William Street
- Limitations to further development off William Street without alternate access to preserve amenity of William Street
- Review function of William Street

Consideration should be given to the nature and function of Brighton Road in light of past changes (i.e. construction of the Brighton Bypass in 2012) and future changes including the potential developments discussed in this report. In the Corridor Study (Midson, 2014) it is noted that the 'new' *Brighton Road corridor needs to provide a low speed environment and enhance access to commercial and residential development*. The Corridor Study also refers to the use of horizontal deflection devices (including roundabouts and street trees) as a form of network traffic calming. It is considered that there is an opportunity to reduce the speed of the corridor alongside the realisation of the masterplan and associated road upgrades which compliment a low speed environment.

Australia Standards AS1742.4 Speed Controls provides guidance for the setting of speed limits. When an area is 'fully built up' which includes schools, residential and commercial development on 90% of the road frontage the recommended speed limit is 60 km/hr, although 70 km/hr may also be considered acceptable. It is recommended to review the speed limit and the potentially to reduce the speed limit in front of the school to 60 km/hr when the development is in place.

Brighton Road is a sub-arterial road however the historic changes related to the construction of the Brighton Bypass and future changes within the realisation of the masterplan provide opportunity to consider the function and associated classification of the road. There is potential within the western side of the proposed residential development for lots to have frontage and therefore direct access onto Brighton Road. If vehicle accesses are provided directly onto Brighton Road the speed reduction to 60 km/hr is recommended as a minimum traffic calming measure. It is noted that a high number of accesses conflicts with the existing characteristic of Brighton Road as a high-volume traffic carrying road. Given the peak hour volume of Brighton Road well exceeds that of a road classified as a 'collector', and noting a considerable use by heavy vehicles it is recommended to limit the number of vehicle accesses directly onto Brighton Road. It is recommended to instead provide direct and frequent active transport connections between residential developments and the Brighton Road corridor to increase permeability.

### 5.3.3 Public transport

There is currently limited public transport connecting Brighton to greater Hobart. It is considered that due to the location of the development in relation to the existing bus route (Brighton Road corridor) that the development would be able to be serviced by existing public transport routes. Some development around Melinda Court is anticipated to be further than 400 m from the route, however bus stops are noted along William Street. The ability for public transport to cater well to the development is subject to capacity of current services and potential frequency improvements. Pedestrian connectivity should be prioritised to make effective use of existing services.

### 5.3.4 Walking and cycling

Ensuring footpaths are extended along the street frontages of the development site will be important to maintain and encourage walking access between the high school, the new residential developments and the nearby services in the commercial centre and the broader Brighton township. As discussed above, consideration of more direct pathway connections between the "outside edges" of the development site and Brighton Road is also important to improve access to public transport and to encourage more people to walk and ride bicycles for local trips.

### 5.3.5 Road safety

The majority of crashes recorded in the vicinity of the development sites were within the Brighton Road corridor. Although no specific trends were identified the increase in traffic on Brighton Road creates a proportional increase in crash risk for the corridor.

The intersection of Brighton Road / Elderslie Road / William Street has two cross traffic incidents. The likelihood of further crashes is increased by both the increase of volume and reduction in performance at the intersection resulting from the additional development. Vehicles that are delayed may be more likely to accept smaller, riskier gaps to enter or cross the major road. As such intersection upgrades such as the proposed roundabout (Midson Traffic, 2014) would be anticipated to greatly improve the safety at the intersection.

## 5.4 Potential mitigations

Within Section 5.2 it is noted that the intersection of Brighton Road / William Street / Elderslie Road currently performs at LoS F for the Elderslie Road right turn approach with conditions for other approaches including right turns from Brighton Road deteriorating under future and development scenario conditions. This is largely due to the high through volume on Brighton Road during peak periods resulting in limited gaps for turning vehicles to cross or enter the traffic stream.

Similarly, the proposed new road access to residential development at 69 Brighton Road indicates a likely LoS E and LoS F for AM and PM peaks respectively, based on the forecast future demand.

A roundabout was proposed with the *Brighton Road Corridor Study* (Midson, 2014) for the intersection of Brighton Road / William Street / Elderslie Road. This is assessed in Section 5.4.1 under the forecast future volumes.

To provide a consistent traffic management approach along Brighton Road a roundabout is proposed at the new access road to 69 Brighton Road. Considering the network more holistically there are advantages to realigning the new access road to align with the new Hove Way connection allowing roundabout access from both Hove Way and 69 Brighton Road as well as providing consistent traffic management along the Brighton Road corridor. A roundabout connection of Brighton Road / 69 Brighton Road / Hove Way has also been assessed in Section 5.4.2.

Key performance criteria for the assessment of the feasibility of the proposed roundabouts are as follows:

- A LoS D or better on all approaches to the roundabout indicates satisfactory performance of the intersections
- Limited performance impacts on Brighton Road, however it is assumed that a minor deterioration in the form of delays within LoS B would be considered acceptable
- Approach delays noting worst leg as the standard assessment for roundabouts

For the purpose of the assessment a single lane roundabout was first considered for each intersection with basic upgrades required to achieve compliance with the performance criteria tested as required.

### 5.4.1 Brighton Road / William Street / Elderslie Road – proposed roundabout

A summary of the results for a proposed roundabout at Brighton Road / William Street / Elderslie Road under each of the scenario demand flows is provided in Table 25. The results are provided in Appendix F.

It is observed that with the development of the school and residential land (Scenario C) there are increased delays on Elderslie Road in the PM peak resulting in LoS F. To address the poor LoS on Elderslie Road, a left turn slip lane was trialled from Elderslie Road onto Brighton Road (North) which significantly reduced delays and achieve an acceptable LoS. It is considered that a roundabout is an acceptable solution for this intersection however the detailed design of the roundabout will need to consider the future capacity requirements and the need for auxiliary lanes (such as a left turn slip lane) to ensure satisfactory performance of all approaches. The impact on Brighton Road is considered acceptable with both approaches maintaining a LoS A.

**Table 25 Brighton Road / Elderslie Road / William Street roundabout**

| Demand | Worst leg | Worst leg delay (seconds) | Worst leg LoS |
|---|---|---|---|
| *AM* | | | |
| Future | Elderslie Road | 9.7 | LOS A |
| Scenario D | William Street | 11.5 | LOS B |
| Scenario C | William Street | 22.7 | LOS C |
| Scenario C – with slip lane | William Street | 21 | LOS C |
| *PM* | | | |
| Future | Elderslie Road | 15.6 | LOS B |
| Scenario D | Elderslie Road | 10.8 | LOS B |
| Scenario C | Elderslie Road | 129.6 | LOS F |
| Scenario C – with slip lane | Elderslie Road | 21.5 | LOS C |

### 5.4.2 Brighton Road / new access road to 69 Brighton Road / Hove Way – proposed roundabout

A summary of the results for a proposed roundabout at Brighton Road / new access road to 69 Brighton Road / Hove Way under each of the scenario demand flows is provided in Table 26. The results are provided in Appendix F.

**Table 26 Brighton Road / New connection proposed roundabout results**

| Demand | Worst leg | Worst leg delay (seconds) | Worst leg LoS |
|---|---|---|---|
| *AM* | | | |
| Scenario C | Hove Way | 34.6 | LOS C |
| Scenario C – with slip lane | Hove Way | 34 | LOS C |
| *PM* | | | |
| Scenario C | Brighton Road (South) | 290.8 | LOS F |
| Scenario C – with slip lane | New Access Road (West) | 20.3 | LOS C |

Performance on Brighton Road is significantly impacted by the roundabout resulting in LoS F for the southern approach – this is due to the high number of vehicles turning right from Hove Way. A partial dual lane roundabout was trialled with a second lane running northbound on Brighton Road. The second lane provides significant alleviation resulting in LoS C as the worst approach and the Brighton Road southern approach improving to LoS B.

Impacts on Brighton Road are mainly observed on the southern approach with the northern approach retaining LoS A in all scenarios.

# 6. Summary

The infrastructure assessment for the South Brighton Development Precinct included a desktop review of available data for stormwater, sewer and transport infrastructure. An assessment of the capacity of the existing infrastructure has been undertaken (Scenario A) and a feasibility assessment was completed for two development scenarios:

- Development of the high school only (Scenario D)
- Development of the high school and residential development (Scenario C)

The findings of this feasibility assessment are summarised in **Table 27** below.

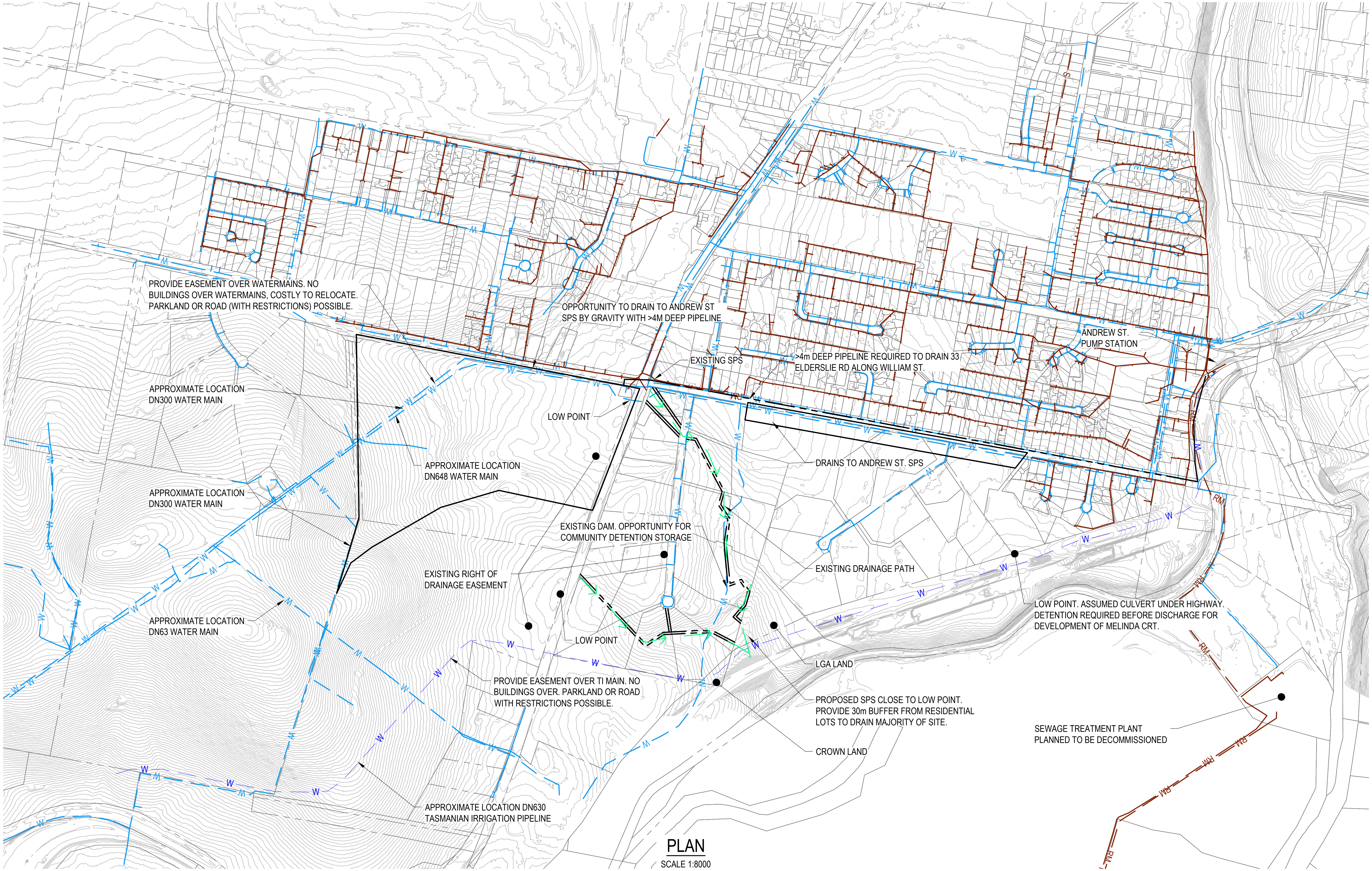
**Table 27 Summary of Results**

| | Base Case (Scenario A) | High School Only (Scenario D) | High School & Residential Development (Scenario C) |
|---|---|---|---|
| **Stormwater** | Overland flow via swales to dams off Dylan Street then discharge via creek and culvert under the Midland Highway.<br>*Existing infrastructure is sufficient.* | The existing stormwater system can accommodate the school development with inclusion of peak flow management measures i.e. stormwater detention system. The school site is of sufficient size to constitute a nodal treatment location feeding into the larger catchment.<br>Stormwater treatment measures are also required.<br>*<u>Option 1</u>: Decrease the peak discharge from the site using stormwater detention system and stormwater treatment measures*<br>*<u>Option 2:</u> Upgrade of downstream drainage paths (likely including the culvert under the Brighton Road)* | Existing stormwater system can accommodate the school and residential development with inclusion of peak flow management measures i.e. stormwater detention system. The school site is of sufficient size to constitute a nodal treatment location feeding into the larger catchment.<br>There are potential savings if the stormwater detention for both the school and remaining residential development are developed together as a centralised dam.<br>If a decentralised detention arrangement is proposed, there is likely minimal advantage in developing the strategy for the School at the same time as the surrounding residential development.<br>Stormwater treatment measures are also required.<br>*<u>Option 1</u>: A single all of community stormwater detention system and stormwater treatment measures (could be using existing dams off Dylan Street).*<br>*<u>Option 2</u>: Decentralised stormwater detention system and stormwater treatment measures, including onsite detention and treatment for the school site.* |
| **Sewer** | Four existing lots are connected to a sewer service provided by TasWater. Each of these connections is only for 1 Equivalent Tenement (ET). The remainder of the site is unserviced with onsite disposal of wastewater.<br>Sewer services connect into the William Street Sewage Pump Station (SPS) or the Andrew Street SPS. William Street SPS currently discharges to a gravity system, then to Andrew Street SPS. TasWater has advised that the William Street SPS is at capacity and that there is insufficient room on the site to upgrade the SPS.<br>*Existing infrastructure is sufficient.* | The proposed school will need to consider a new SPS. There is an opportunity to locate this on the school's land near the Brighton Road / Elderslie Road / William Street intersection and then hand the land and infrastructure over to TasWater. However, the school may wish to keep the new SPS away from their frontage by piping to a new SPS at a downhill location.<br>*<u>Option 1</u>: New SPS near the Brighton Road / Elderslie Road / William Street intersection*<br>*<u>Option 2</u>: Piping to a new SPS at a downhill location (away from the school frontage).* | The advantage of developing the school and the residential development together is that the proposed Dylan Street SPS (adjacent the Highway) could service both developments.<br>The cost of the SPS for the combined school and residential development is likely to be considerably less than the cost of an SPS for the school and an SPS for the residential development, especially when land take and aesthetics are considered.<br>*<u>Option 1</u>: Dylan Street SPS to service the school and residential developments.*<br>*<u>Option 2</u>: SPS for the school and a SPS for the residential developments.* |
| **Water** | Although water supply has been excluded from this infrastructure assessment, there are three existing water mains that cross the site and need to be noted in the design for the site. | | |

| | Base Case (Scenario A) | High School Only (Scenario D) | High School & Residential Development (Scenario C) |
|---|---|---|---|
| **Transport** | All intersections operating at a Level of Service A – with some minor queuing on side streets at junctions with Brighton Road.  However, traffic growth on Brighton Road will require consideration of junction treatments at Elderslie Road / William Street / Brighton Road to address capacity issues on the side streets.<br>*<u>Option 1</u>:  Elderslie Road / William Street / Brighton Road intersection requires upgrade due to general traffic growth on the network (possible roundabout treatment as per Midson Traffic 2014).* | The addition traffic generated by the High School will generally be using Elderslie Road and will require consideration of junction treatments at Elderslie Road / William Street / Brighton Rd to address capacity issues on the side streets but particularly on Elderslie Road.<br>*<u>Option 1</u>:  Elderslie Road / William Street / Brighton Road intersection requires upgrade due to general traffic growth on the network plus additional traffic generated by the school (possible roundabout treatment as per Midson Traffic 2014).*<br>*Additional access to be provided at junction of Elderslie Road and Morrison Street to provide access to High School (basic four-leg intersection with short left turn lane on school approach recommended).* | The addition traffic generated by the High School plus the residential development off William Street will require consideration of junction treatments at Elderslie Road / William Street / Brighton to address capacity issues on the side streets but particularly on Elderslie Road.<br>The proposed new junction providing access to residential development at 69 Brighton Road is significantly impacted by the high through volumes on Brighton Road and will require consideration of treatments to improve access – either through the inclusion of turning lanes or relocating the connection further south on Brighton Road to align with the new Hove Way junction could include consideration of a roundabout treatment.<br>The additional leg at Morrison Street / Elderslie Road for access to the school site is to be provided in both options.<br>*<u>Option 1</u>:  Elderslie Road / William Street / Brighton Road intersection requires upgrade due to general traffic growth on the network (possible roundabout treatment as per Midson Traffic 2014).*<br>*Intersection treatment at the new road to 69 Brighton Road requires consideration to address capacity issues.*<br>*<u>Option 2</u>:  Elderslie Road / William Street / Brighton Road intersection requires upgrade due to general traffic growth on the network (possible roundabout treatment as per Midson Traffic 2014).*<br>*Relocate the new road to 69 Brighton Road adjacent to Hove Way and upgrade to address capacity issues (possible roundabout treatment).* |

# Appendices

# **Appendix A** – Sewer and Stormwater Constraints and Options

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SCALE 1:8,000 AT ORIGINAL SIZE

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GHD

BRIGHTON COUNCIL
SOUTH BRIGHTON INFRASTRUCTURE
FEASABILITY & MASTERPLAN

# SEWER AND STORMWATER CONSTRAINTS

| | |
|---|---|
| Job Number | 12532056 |
| Revision | A |
| Date | SEPT '20 |

## Figure 01

Plot Date: 22 September 2020 - 10:57 AM Plotted by: Robert Casaclang Jr Cad File No: G:\32\12532056\CADD\Drawings\12532096-FIG01.dwg


BRIGHTON COUNCIL
SOUTH BRIGHTON DEVELOPMENT
SCENARIO C - SCHOOL ONLY
SEWER OPTIONS & EASEMENTS

| | |
|---|---|
| Job Number | 12532056 |
| Revision | A |
| Date | NOV 2020 |

Figure A-2

2 Salamanca Square Hobart TAS 7000 Australia T 61 3 6210 0600 F 61 3 6210 0601 E hbamail@ghd.com W www.ghd.com

Plot Date: 10 November 2020 - 4:09 PM Plotted by: Fiona Haynes Cad File No: G:\32\12532056\CADD\Drawings\Blocks\Services base.dwg


BRIGHTON COUNCIL
SOUTH BRIGHTON DEVELOPMENT
SCENARIO D - SCHOOL & RESIDENTIAL

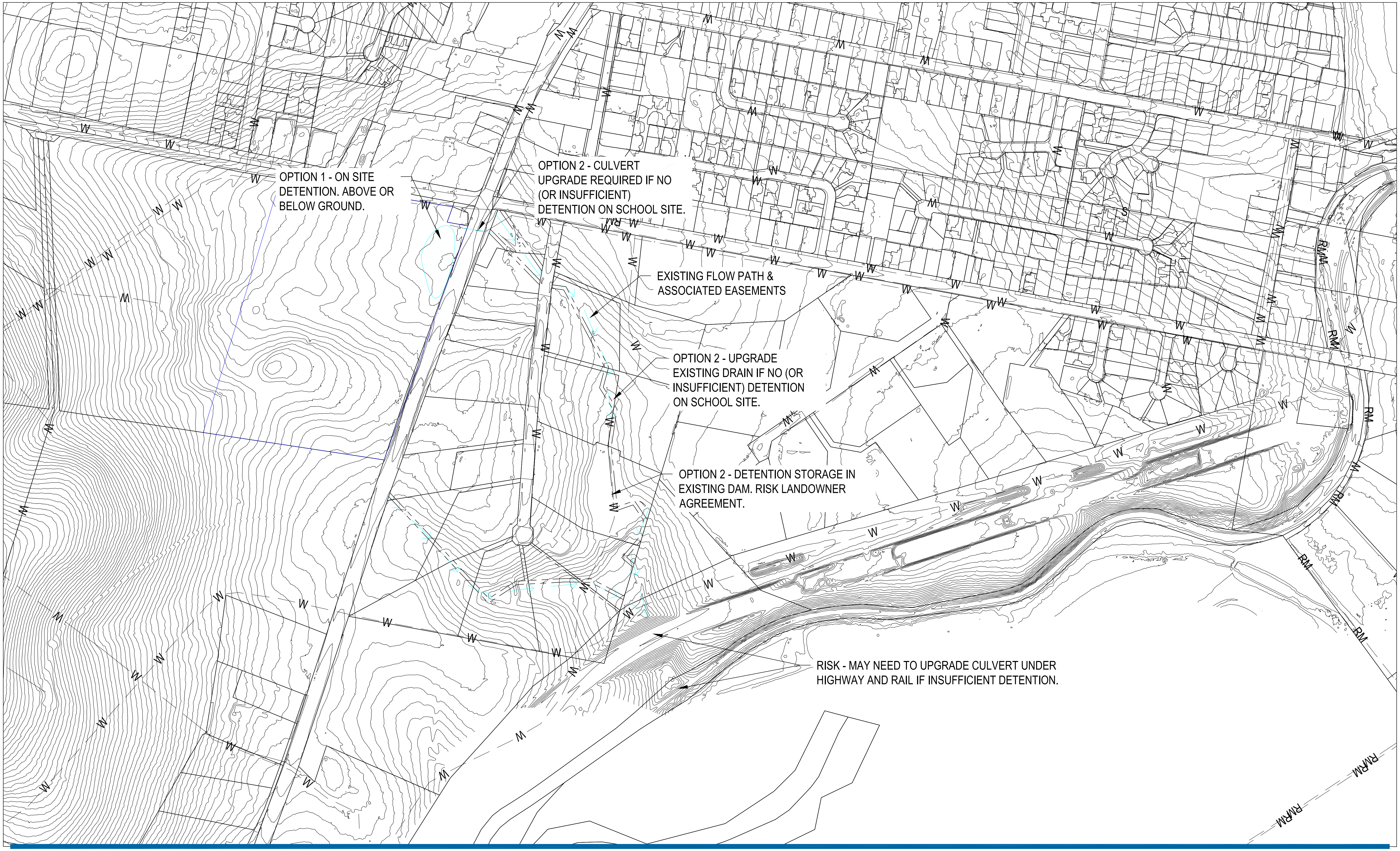
## SEWER OPTIONS & EASEMENTS

| | |
|---|---|
| Job Number | 12532056 |
| Revision | A |
| Date | NOV 2020 |

# Figure A-3

2 Salamanca Square Hobart TAS 7000 Australia **T** 61 3 6210 0600 **F** 61 3 6210 0601 **E** hbamail@ghd.com **W** www.ghd.com

Plot Date: 10 November 2020 - 4:11 PM Plotted by: Fiona Haynes Cad File No: G:\32\12532056\CADD\Drawings\Blocks\Services base.dwg




BRIGHTON COUNCIL
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INFRASTRUCTURE ASSESSMENT

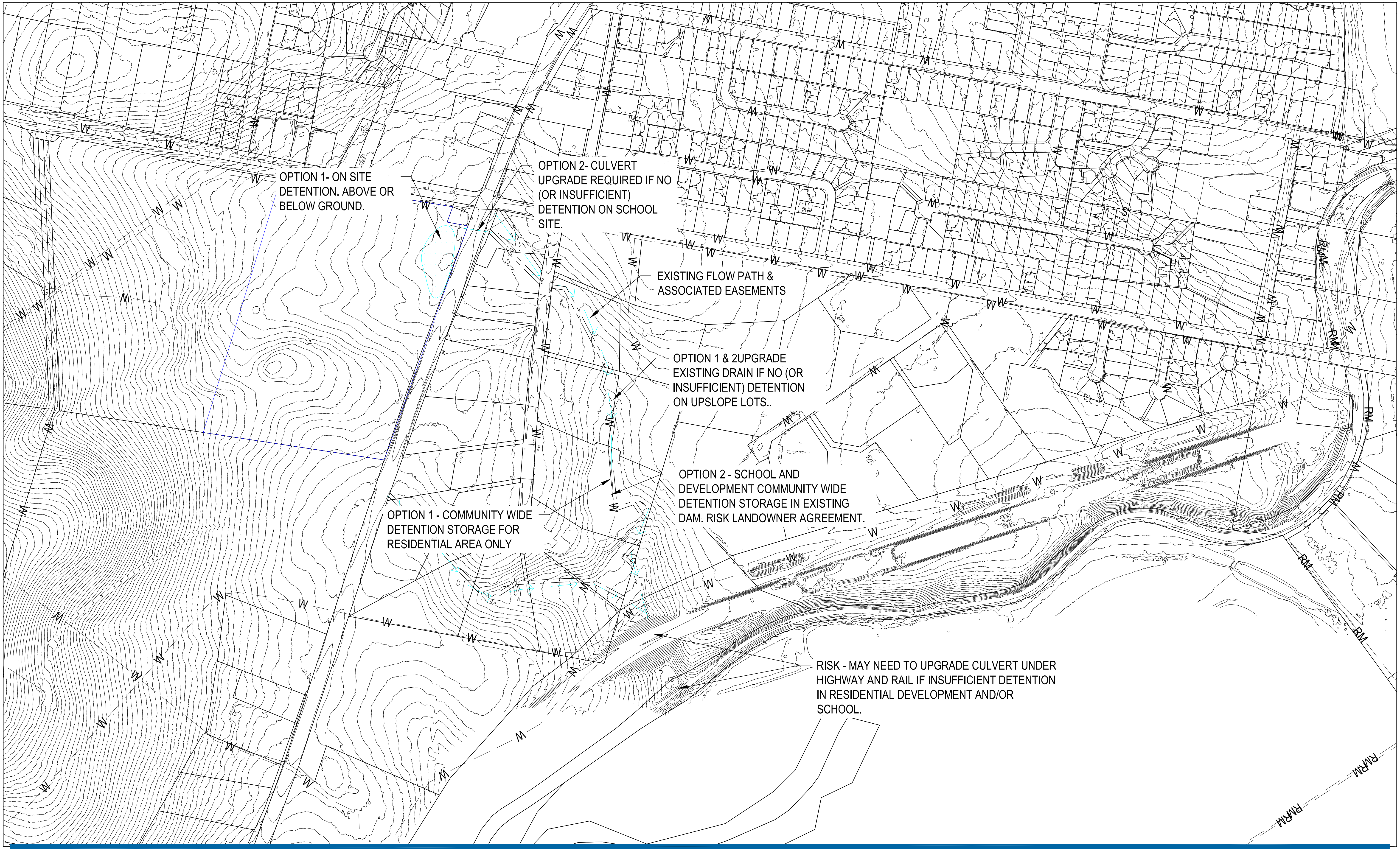
## SCENARIO C - SCHOOL ONLY STORMWATER OPTIONS

Job Number 12532056
Revision A
Date NOV 2020

**Figure A-4**

2 Salamanca Square Hobart TAS 7000 Australia T 61 3 6210 0600 F 61 3 6210 0601 E hbamail@ghd.com W www.ghd.com

Plot Date: 10 November 2020 - 3:04 PM Plotted by: Fiona Haynes Cad File No: G:\32\12532056\CADD\Drawings\Blocks\Services base.dwg

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INFRASTRUCTURE ASSESSMENT

# SCENARIO D - SCHOOL & RESIDENTIAL STORMWATER OPTIONS

| | |
|---|---|
| Job Number | 12532056 |
| Revision | A |
| Date | NOV 2020 |

# Figure A-5

2 Salamanca Square Hobart TAS 7000 Australia T 61 3 6210 0600 F 61 3 6210 0601 E hbamail@ghd.com W www.ghd.com

Plot Date: 10 November 2020 - 2:56 PM Plotted by: Fiona Haynes Cad File No: G:\32\12532056\CADD\Drawings\Blocks\Services base.dwg

# **Appendix B** – NETCO SPS Quotation

NETCO PUMPS & EQUIPMENT

Dylan Street Calculations for Case 1 – School Only

| Design Assumptions (TasWater Supplement to WSA 02-2014-3.1) | |
|---|---|
| Loading Rate (l/ET/day) | 450 |
| EP/ET | 3 |
| ADWF (l/d/EP) | 150 |
| Sewer below water table, $Portion_{Wet}$ | 0.7 |
| Soil aspect, $S_{aspect}$ | 0.8 |
| Network Defects Aspect, $N_{aspect}$ | 0.6 |
| Leakage Severity, C | 1.4 |
| ARI (Years) | 5 |
| Factor Containment | 1.3 |
| $Portion_{Impervious}$ | 0.2 |

| Input Data | |
|---|---|
| ET | 40 |
| A | 10 |

| Calculated Values | |
|---|---|
| EP | 120.0 |
| Density | 12.0 |
| $A_{EFF}$ | 2.8 |
| $Factor_{Size}$ | 1.2 |
| $Factor_{Containment}$ | 1.3 |
| $I_{1,2}$ | 13.1 |
| I | 20.1 |
| RDI (l/s) | 2.2 |
| GWI (l/s) | 0.2 |
| ADWF (l/s) | 0.2 |
| d | 4.1 |
| PDWF (l/s) | 0.9 |
| Design Flow (l/s) | 3.3 |

| $I_{1,2}$ Linear Interpolation | |
|---|---|
| Annual Exceedance Probability, For ARI=2.00 (%) | 39.35 |
| Rainfall Duration (hours) | 1 |
| $AEP_1$ (%) | 50 |
| $AEP_2$ (%) | 20 |
| $IFD_1$ (mm) | 11.5 |
| $IFD_2$ (mm) | 15.9 |

Nomenclature

| Symbol | Description | Units |
|---|---|---|
| A | Gross plan area of the development's catchment | hectares |
| ET | Equivalent Tenement | |
| EP | Equivalent population | |
| PDWF | Peak Dry Weather (Sanitary) Flow | l/d |
| ADWF | Average Dry Weather Flow | l/d |
| d | Peaking factor | |
| GWI | Ground Water Infiltration | l/s |
| $Portion_{Wet}$ | Portion of pipe network estimated to have groundwater table levels in excess of pipe inverts | |
| RDI | Peak rainfall dependant inflow | l/s |
| $A_{EFF}$ | Effective area capable of contributing rainfall dependent infiltration | hectares |
| Density | The development's EP density per gross hectare | |
| I | Function of rainfall intensity at the developments geographic location | |
| $I_{1,2}$ | 1 hour duration rainfall intensity at the location, for an average recurrence interval of 2 years | |

NETCO PUMPS & EQUIPMENT

Dylan Street Calculations for Case 2 – School and Residential Development

| Design Assumptions (TasWater Supplement to WSA 02-2014-3.1) | |
|---|---|
| Loading Rate (l/ET/day) | 450 |
| EP/ET | 3 |
| ADWF (l/d/EP) | 150 |
| Sewer below water table, $Portion_{Wet}$ | 0.7 |
| Soil aspect, $S_{aspect}$ | 0.8 |
| Network Defects Aspect, $N_{aspect}$ | 0.6 |
| Leakage Severity, C | 1.4 |
| ARI (Years) | 5 |
| Factor Containment | 1.3 |
| $Portion_{Impervious}$ | 0.2 |

| Input Data | |
|---|---|
| ET | 976 |
| A | 40 |

| Calculated Values | |
|---|---|
| EP | 2928.0 |
| Density | 73.2 |
| $A_{EFF}$ | 27.9 |
| $Factor_{Size}$ | 1.0 |
| $Factor_{Containment}$ | 1.3 |
| $I_{1,2}$ | 13.1 |
| I | 17.0 |
| RDI (l/s) | 18.6 |
| GWI (l/s) | 0.7 |
| ADWF (l/s) | 5.1 |
| d | 3.0 |
| PDWF (l/s) | 15.2 |
| Design Flow (l/s) | 34.5 |

| $I_{1,2}$ Linear Interpolation | |
|---|---|
| Annual Exceedance Probability, For ARI=2.00 (%) | 39.35 |
| Rainfall Duration (hours) | 1 |
| $AEP_1$ (%) | 50 |
| $AEP_2$ (%) | 20 |
| $IFD_1$ (mm) | 11.5 |
| $IFD_2$ (mm) | 15.9 |

Nomenclature

| Symbol | Description | Units |
|---|---|---|
| A | Gross plan area of the development's catchment | hectares |
| ET | Equivalent Tenement | |
| EP | Equivalent population | |
| PDWF | Peak Dry Weather (Sanitary) Flow | l/d |
| ADWF | Average Dry Weather Flow | l/d |
| d | Peaking factor | |
| GWI | Ground Water Infiltration | l/s |
| $Portion_{Wet}$ | Portion of pipe network estimated to have groundwater table levels in excess of pipe inverts | |
| RDI | Peak rainfall dependant inflow | l/s |
| $A_{EFF}$ | Effective area capable of contributing rainfall dependent infiltration | hectares |
| Density | The development's EP density per gross hectare | |
| I | Function of rainfall intensity at the developments geographic location | |
| $I_{1,2}$ | 1 hour duration rainfall intensity at the location, for an average recurrence interval of 2 years | |

NETCO
PUMPS & EQUIPMENT

# Quotation


Quotation to: GHD

Project: Dylan Street Pump Station

Contact: Fiona Haynes

Reference: 20115072

NETCO PUMPS & EQUIPMENT

2 Austral Place, PO Box 800
Derwent Park, TAS 7009

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November 4th, 2020 Reference: 20115072

# GHD Consultants

Fiona Haynes
Fiona.Haynes@ghd.com

## Sewage Pumping Station- Dylan Street Brighton

Dear Fiona,

Thank you for the opportunity to submit our proposal for the supply and installation of a sewage pump station for your development at Brighton, as discussed we are considering a pump station for just the School and also a larger station that would cater to the whole development of 976 ET.

With consideration to the storage requirements for the larger station I have worked on a configuration based on a 3200mm diameter wet well x 5.5 metres deep to try and keep as shallow as possible while still allowing for a 3 metre diameter overflow tank. This of course is without consideration for the local geography which may also affect the design.

I have attached separate sheets showing the design calculations, also without knowing the rising main details I have just worked on a total dynamic head of 25 metres for both pump selections assuming that the station location hasn't changed much and it would still be pumping to Andrew Street. The snapshot below gives a summary of what is required and the body of the quote gives further detail.

| Catchment | Pump Flow & Head | Emergency Storage Required (4hrs @ ADWF) | Wet Well size | Pump Spec | Additional Storage Volume | Total cost |
|---|---|---|---|---|---|---|
| Case 1 school only | 3.3 L/s @ 25m | 2.88 m3 | 1.8m dia x 3.5m H | Grundfos SEG.40.31.2.50B | N/A | $248,085.00 |
| School and residential development | 34.5 L/s @ 25m | 73.44 m3 | 3.2m dia x 5.5m H | SulzerXFP100G CB1. PE185/4 | 70KL | $576,260.00 |

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# Proposal – Case 2, school and residential development.

| | | |
|---|---|---|
| We Offer | : | To fully supply and install one (1) Netco "Premier" Twin-Pump Concrete Packaged Pumping Station model PPG-5500 complete with all pumps, valves, pipework and electrical controls. |

**Pump Chamber** :

The pump chamber is a heavy duty, mould-formed and intensely vibrated reinforced concrete pump chamber 3200mm internal diameter x 5500mm deep, manufactured from 50mPa sulphate resistant cement and calcareous aggregate.

The Netco PPG Series Pump Station is a concrete mould-formed pump station that carries a full WSAA appraisal and recommendation for all members. It incorporates features such as:

- Calcareous aggregate and sulphate resistant cement construction
- Fully mould-formed one-piece benching construction
- HDPE lining on all pump station increments
- Integral valve chamber for smaller, neater footprint and avoidance of soil settlement problems.
- Guaranteed 60mm cover on all steel reinforcing
- Approved on the City West Water approved products list as endorsed by TasWater.
- Fast, easy and safe installation, off-site construction of pump chamber

**Valve Chamber** :

An integral valve chamber is included and formed as part of the chamber wall. This makes for a much neater footprint as well as overcoming any potential soil subsidence problems that usually occur on deep pump station excavations.

**Coverslab** :

The coverslab approx. 6200mm long x 3500mm wide will be lifted into position and installed so that it completely covers the pump well and the valve pit.

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## Pumps

Pumps : Twin (2) heavy-duty 18.5KW, 400V, Sulzer sewage pumps model XFP100G PE185/4 3~ will be bolted to matching Flygt cast-iron auto-couplings and mounted on Schedule 10s Stainless Steel guide rails inside the pump chamber.

Twin guide rails to suit the standard dimensions for the pump pedestal and the depth of the wet well shall be supplied with each pump. The guide rails will be designed to permit the pump to slide freely and seat correctly when lowered into the working position and shall be sized to suit the pump model. Brackets shall also be designed to support and attach the guide rails to the pump discharge pipework (riser pipe) and the wet-well wall. Each pump shall also be supplied complete with a top mounting bracket for the guide rails.

Pump auto-couplings will be bolted to the floor of the pump chamber using stainless steel rod and approved epoxy resin. A clay dam will then be formed around the pumps and a high-impact base-setting epoxy used around the pumps to ensure 100% stability and zero movement during pump vibration.

Lifting Chain : Two (2) 8mm x 4 metre, grade 50 certified Stainless Steel lifting chains will be supplied, each c/w Stainless Steel head ring and Stainless Steel hammerlock fitting. The chains will be supplied complete with certification tags.


## Pipework & Valves

| | | |
|---|---|---|
| Pipework | : | Pumps will be plumbed in 180mm SDR 11 Polyethylene pipework with electrofusion welded joints. The pipework will continue through the valve pit and into a manifold which will continue through the flowmeter pit before terminating in a 150mm flange to be bolted to the 180mm HDPE rising main by the civil contractor. |
| Valves | : | Two (2) DN150 AVK swing check valves and two (2) DN150 key operated gate valves will be supplied and installed in the valve chamber – one (1) of each incorporated into each pump discharge line.<br><br>Fabricated CNC cut valve support brackets will be supplied and bolted to the floor of the valve chamber. |
| Scour Line | : | A scour line will be added to the discharge manifold to enable scouring of the rising main. This includes a 3 way valve arrangement of DN100mm valves and a pump-out tee with a 100mm camlock connection. |
| Knifegate Valve | : | A heavy-duty 300mm uni-directional Grade 316 S/S inlet knifegate valve will be mounted on a stainless steel inlet stub complete with spigot and rising spindle to underneath of coverslab (key operated). |
| Drop Pipe | : | A fabricated 300mm S/S inlet drop pipe will be fitted over the end of the inlet knifegate valve. |

## Electrical Switchboard & Ancillary Items

Switchgear : A full municipal style switchboard will be provided to the new TasWater Type 2 specification and drawings incorporating:

- Free standing switchboard on 75mm galvanised channel plinth. Constructed externally from 316 Stainless steel. Separate compartments for each pump starter, for telemetry and for 415V distribution.
- Fitted with Aurora meter panel with separate access door and Aurora approved lock.
- Outer lockable door to access all controls, switches, meters and the like on the inner escutcheons. Separate access door for pump disconnect plugs, float switch plugs and level probe connection.
- Fitted with interlocked Mains and Generator incoming circuit breakers. Fitted with Marechal DS3 generator inlet socket.
- Fitted with 3-phase surge protection device.
- Fitted with voltmeter plus selector and phase failure relay.
- Fitted with two (2) off soft starters for the 18.5kW pumps, pump controls include ammeter, Man/off/Auto/LoLev O'ride control switch, start, stop, reset buttons and run and fault lights. Also to have Hours run meter, starts counter and current transducer for monitoring motor current by telemetry.
- Fitted with thermostat-controlled cabinet heaters
- Fitted with door operated switches for intruder alarm complete with keyed disable switch plus buzzer and light
- Fitted with controls for well-washer.
- Control system works with analogue probe and 2-off float switches. Primary control by RTU and analogue probe with back-up control by float switches and relays if analogue probe fails.
- Fitted with RTU and radio for telemetry system.
- Controls fitted with rechargeable battery back-up. Battery charger/power supply to have low-volt drop out to prevent deep discharge.
- Fitted with level indicating display for analogue probe plus pilot lights for float switches.
- Fitted with RCD-protected socket outlet. Also fitted with separate RCD and switch for external light.
- Fitted with flashing alarm light and anti-vandal cage.
- Fitted with Marechal DS1 Decontactors and plugs for pump disconnection plus float switch plugs and sockets.
- Fitted with flowmeter and analogue input to telemetry.

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Telemetry : Telemetry equipment hardware to be supplied includes:

- Scadapac 334E RTU
- Scadapac 5414 expansion module
- Trio QR4 radio
- Polyphasor ISB50LN-C2 Coax Surge Protector
- RJ-serial cable adaptor RTU-radio
- Coax cable Radio-surge protector
- Coax cable to antenna
- Antenna with bracket
- Program Citect
- Install antenna and commission
- Program RTU
- E+H remote mount hydrostatic level sensor with 10m cable
- Pre SAT testing
- Final SAT testing

Cable Zone : Pump and float cables will enter the switchboard via three (3) 100mm sweep conduit bends, which will be installed between the pit and controller.

Level Control : All pump stop, start and alarm level controls will be via a hydrostatic level sensor in the wet well.

Two (2) heavy-duty 10 metre back-up Flygt EM10 level-sensing float switches will be supplied and installed as part of the package. These are rated for wastewater and are a specific non-tangling teardrop design.

Flow Meter : A 150mm Endress and Hauser Promag 50W electromagnetic flow meter with remote transmitter head will be mounted in a standard concrete manhole pit on the rising main and be wired back to the main switchboard.

Well Washer : A McBerns auto well washer will be mounted inside the station, with all power and water connections made. This will also include a solenoid pit outside the station to activate the washer at the end of each pump cycle. The washer will be of wall-mount configuration.

Light : A 100W Metal Halide self-contained weatherproof floodlight, switched in the main switchboard, together with all necessary mountings will be mounted on a proprietary 5m high light pole adjacent to the wet well as shown on the drawings. Aim for maximum illumination in the wet well.

| | | |
|---|---|---|
| RPZD Assembly | : | An RPZD valve assembly and tap will be fitted for the pump station and this will include a hinged, lockable galvanized cage approx. 1800mm long x 450mm wide x 600mm high. |
| Covers | : | Wet well and Valve Chamber covers shall be heavy-duty lockable Austral International aluminium safety covers. The wet well cover will be the FSP premium series model FSP2013 complete with four-side void protection and the valve pit cover will be the TSP series dual grate cover model TSP1617 - these will be supplied and installed on site. The FSP series cover forms a full four sided safety barrier around the access for operator safety and prevent personnel from falling into the wet well or valve chamber. |
| Venting | : | A 150mm x 9000mm high galvanized vent pole will be mounted on the pump station coverslab. Also mounted to the side at the base of the pole will be a FiltaVent two-way passive venting ground mounted, activated carbon cartridge odour filtration system model FV40. The FV40 is a robust vent filter and suitable for municipal sewer odour mitigation with more than 99.5% of odours removed. The units have replaceable activated carbon cartridges, are Insect and vermin proof and vandal resistant. |
| Inlet Manhole | : | An 1500mm diameter x 3500mm deep inlet manhole will be part of the pump station construction which will feed into the pump station. Netco will install the manhole and all the interconnecting pipework, the manhole will be epoxy lined as per TasWater's requirement. |
| HDPE Lining | : | The pump station will include HDPE lining within the wet well to protect against hydrogen sulphide gas attack. This is a cast-in product known as BluSeal Anchor Knob Sheet and will be part of the factory fabrication. The HDPE lining will include the underside of the integral valve chamber and underside of the coverslab, access cover penetrations are also lined on the edges. The benched part of the wet well is not lined as this is below water level and not subject to H2S corrosion. |
| Core Holes | : | All concrete core holes are allowed for by Netco and these will be done on site. |
| Installation | : | Excavation will be undertaken and managed by Netco, the pit will then be dewatered and the base compacted and then leveled with 7mm screenings or concrete blinding. |

The pump chamber will then be installed in the ground by Netco and concrete ballast will then be provided as required. Pumps, guide rails, pipework, valves, and all other fittings will then be installed. Pumps and level controls will be wired to the controller, the system commissioned electrically and fully test run to site requirements.

Crane Hire : Crane hire has been covered for the installation of this pump station by Netco Pumps for up to a period of 8 hours.

Concrete : Concrete ballast has been allowed for to a maximum of 10 cubic metres. The necessity of this will need to be determined by the civil engineer but it is often unnecessary unless in high water table or water charged ground.

In brief the pump stations will be provided to the customer as a complete package ready for connection to all external pipework.

Note : An excavation rock rate has been taken into account and a ratio of 60% rock allowed for given the high likelihood of rock at this site, the allowance would be subject to change at time of installation.

## Overflow Tank

The Netco overflow tanks are a GRP construction one-piece overflow tank and for the larger residential scenario we require a 70KL tank.

These tanks offer many advantages for this type of installation including;

- One piece design, will not shrink, move or crack
- Impermeable solid resin construction for acid and chemical resistance – no need for H2S protection.
- Fast to install, lightweight design.
- Safer, no workmen in the open excavation
- Safer for the public, excavation is only open for very short time.
- Wash system pre-installed, no one entering confined space

We offer : One only 70 KL FRP Horizontal Storage Vessel constructed in Isophthalic resin measuring and 3000mm diameter x 12,000mm in length.

The tank will have 300mm flanged outlets drilled to AS4087 for connection points and 2 x 900mm manway riser complete with class B aluminium cover supplied to enable personnel entry.

Tanks are fully quality assured and would be manufactured to BS 4994.

Netco would install a dead man footing either side of the tank which would be calculated against uplift, the tanks are then strapped down to the footing by means of 5 tonne strap anchors to the manufacturer's instruction to protect the tank against floating.

Sprinkler system : A sprinkler system for washdown will be pre-installed inside the tank ready for hook up to the water system and solenoid control.

Pipework : Netco will be responsible for all interconnecting pipework between the pump station, inlet manhole and pump station.

Telemetry : Telemetry programming, integration and testing would be upgraded to suit the additional overflow tank controls and alarms.

**Package : $576,260.00 + GST**

## Additional Information:

Excavation : Netco has allowed for excavation for this pump station based on market rates and an excavation rock rate has been taken into account with a ratio of 60% rock allowed for given the high likelihood of rock at this site, the allowance would be subject to change at time of installation.

Freight : All freight and transport requirements in regard to the pump station and its components has been fully allowed for.

Drawings : Drawings for the pump station will be modelled by Netco and supplied to GHD for inclusion in their design package, Netco will also supply electrical drawings, draft manuals and a PowerCAD model to include with the design submission to TasWater.

Validity : This quotation is valid for a period of 30 days, and thereafter subject to confirmation or review.

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Derwent Park, TAS 7009
p. 03 6272 6628
f. 03 6272 6281
sales@netcopumps.com.au
www.netcopumps.com.au

Note : The following items have not been allowed for and will need to be considered:

- Inlet and rising main runs and connections
- Electrical Feed and connection to switchboard, not sure where this is coming from. Netco has allowed all other electrical from switchboard to pumps and wiring of all motors and instruments.
- Liaison with council and Aurora including any permits, applications, fee's etc.
- Security fencing, additional hardstand etc.

Thank you for the opportunity to work with you on this project Fiona, and we assure you of our best attention at all times. If you have any further queries or require any additional information, please do not hesitate to call our sales office on (03) 6272 6628.

Yours faithfully,

**Nathan Cruickshank**
Manager, Netco Pumps

# **Appendix C** - Transport Network Analysis, Base Case (Scenario A)

### Base Case (Scenario A) – the existing site with no development

#### *Existing conditions*

Results for the Level of Service (LoS) assessment at the intersection of Brighton Road, Elderslie Road and William Street (by lane) are illustrated in Figure 8 and Figure 9. Although the side road approaches perform at low LoS, there is minimal queuing within the model. The lane LoS indicates that the poor performance of the right turn from Elderslie Road onto Brighton Road results in the reduced approach performance of LoS.

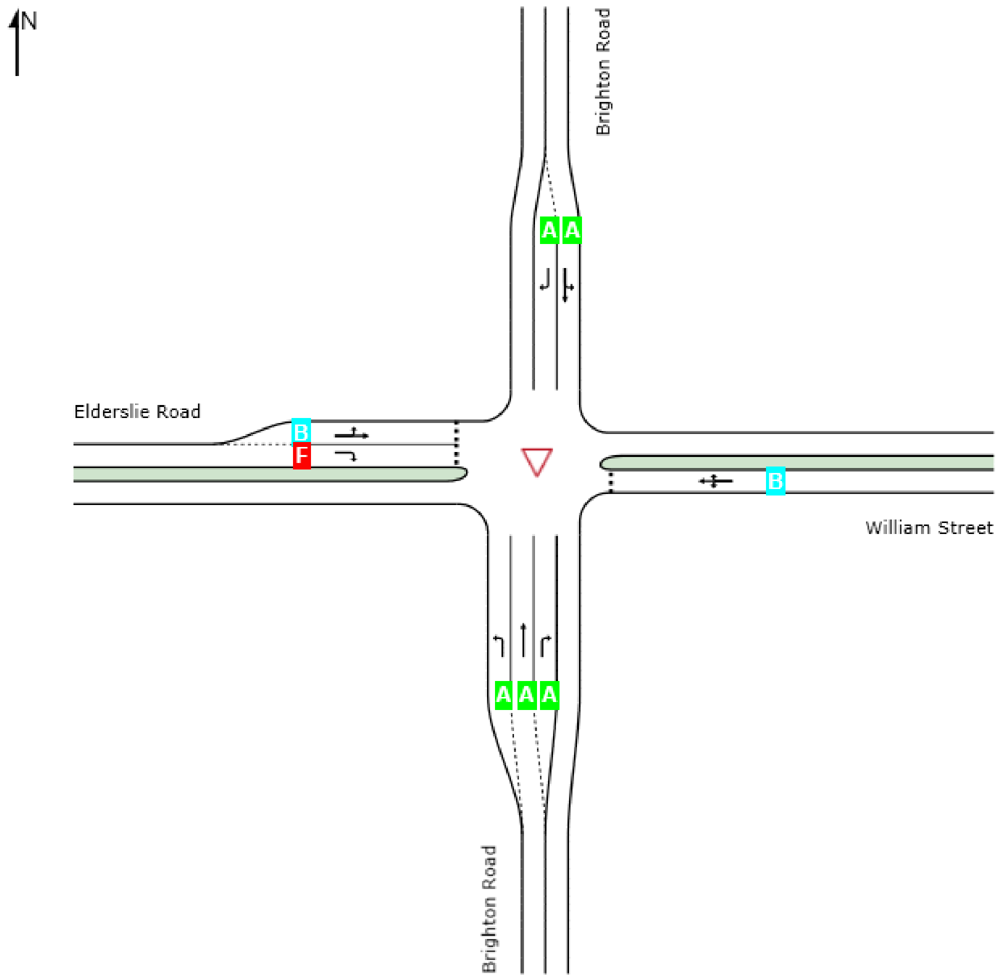


**Figure 8 AM Base model LoS – Brighton Road / Elderslie Road / William Street**

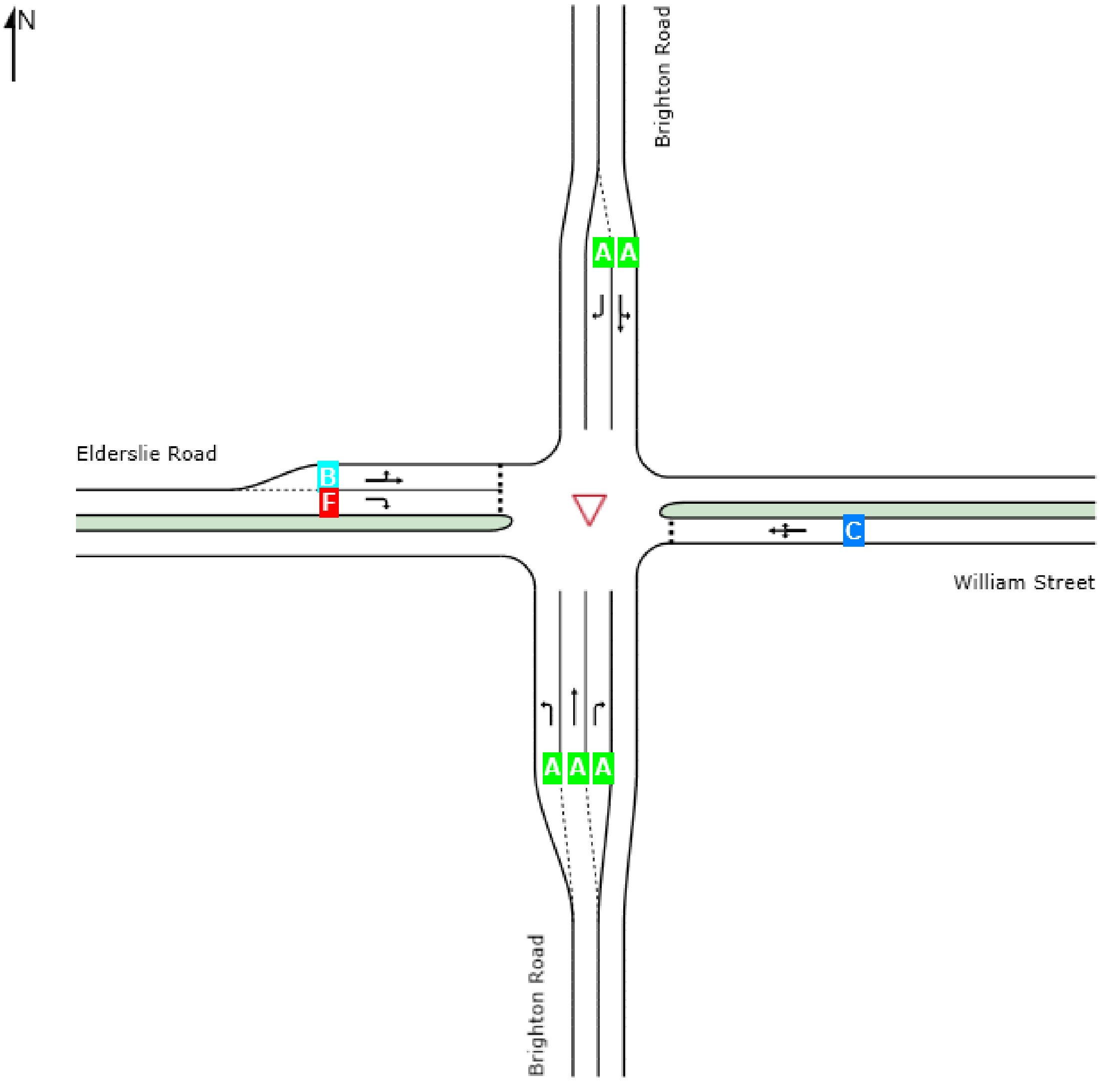


**Figure 9 PM Base model LoS – Brighton Road / Elderslie Road / William Street**

### *Future conditions*

The LoS for the intersection of Brighton Road, Elderslie Road and William Street future base model results (by lane) are illustrated in Figure 10**Error! Reference source not found.** and Figure 11. A noticeable decrease in the side road LoS is noted, with the Elderslie Road right turn approach deteriorating to LoS F under the forecast PM traffic demand. It is considered that due to the increase in traffic volumes on Brighton Road, regardless of the side road demand the strong through volumes create difficulty for side road access.

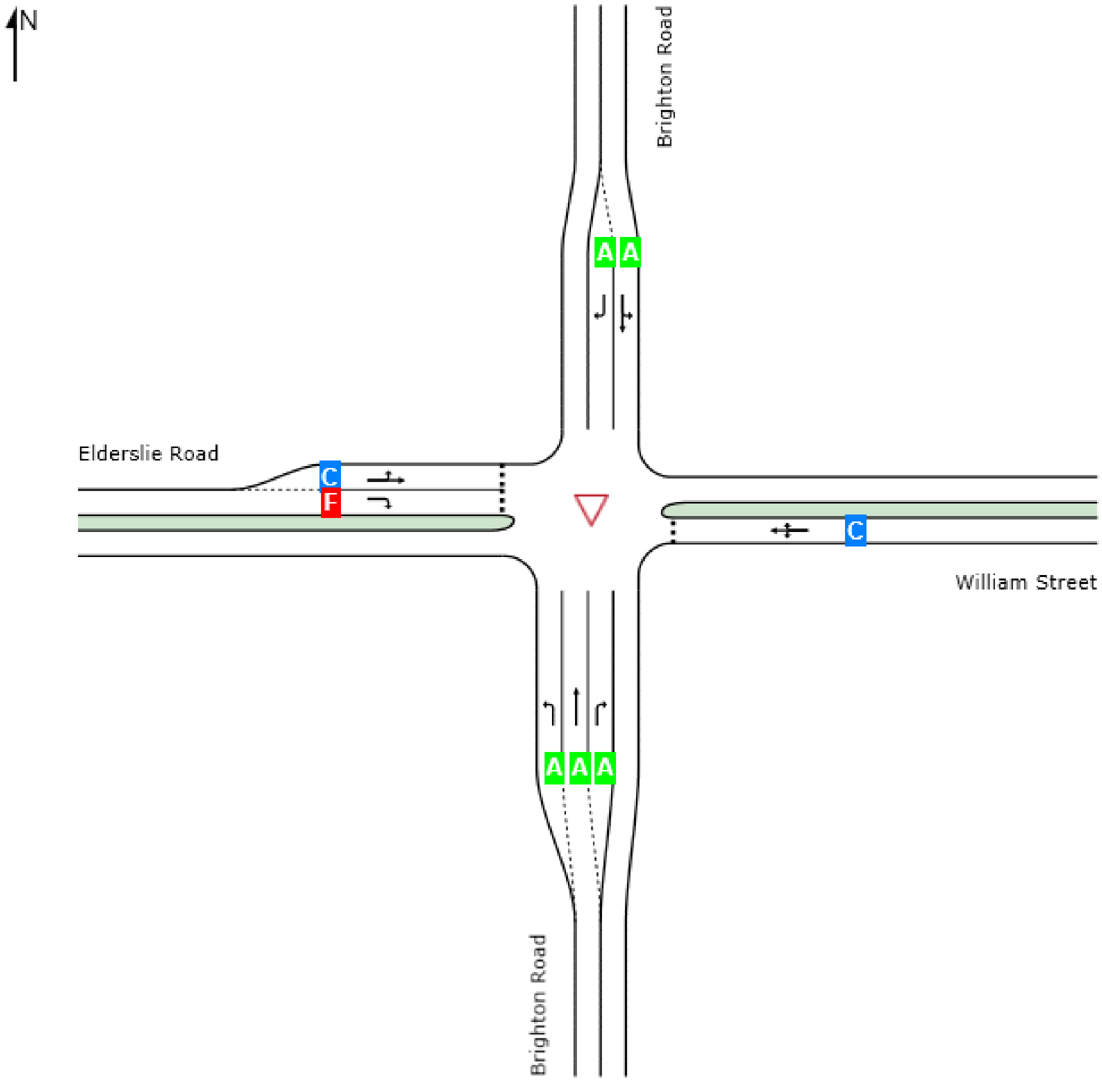


**Figure 10 AM Future LoS – Brighton Road/ Elderslie Road/ William Street**

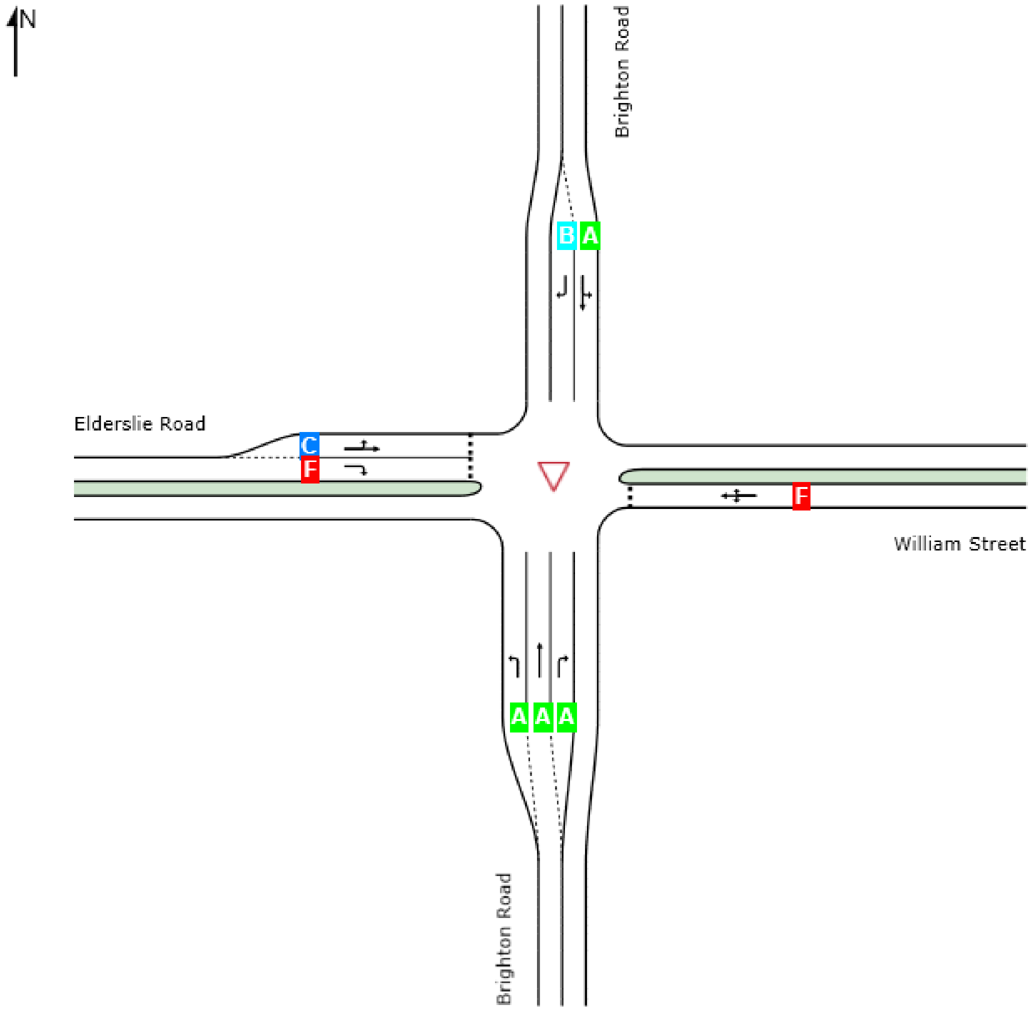


**Figure 11 PM Future LoS – Brighton Road/ Elderslie Road/ William Street**

# **Appendix D** - Transport Network Analysis, Only the High School (Scenario D)

**Scenario D – High School only**

***Brighton Road/ Elderslie Road/ William Street***

The LoS for the intersection of Brighton Road, Elderslie Road and William Street Scenario D model results (by lane) are illustrated in Figure 12 and Figure 13. Side road LoS is further deteriorated with the additional traffic demand generated by the high school. It is considered that due to the increase in traffic volumes on Brighton Road, regardless of the side road demand the strong through volumes create difficulty for side road access.

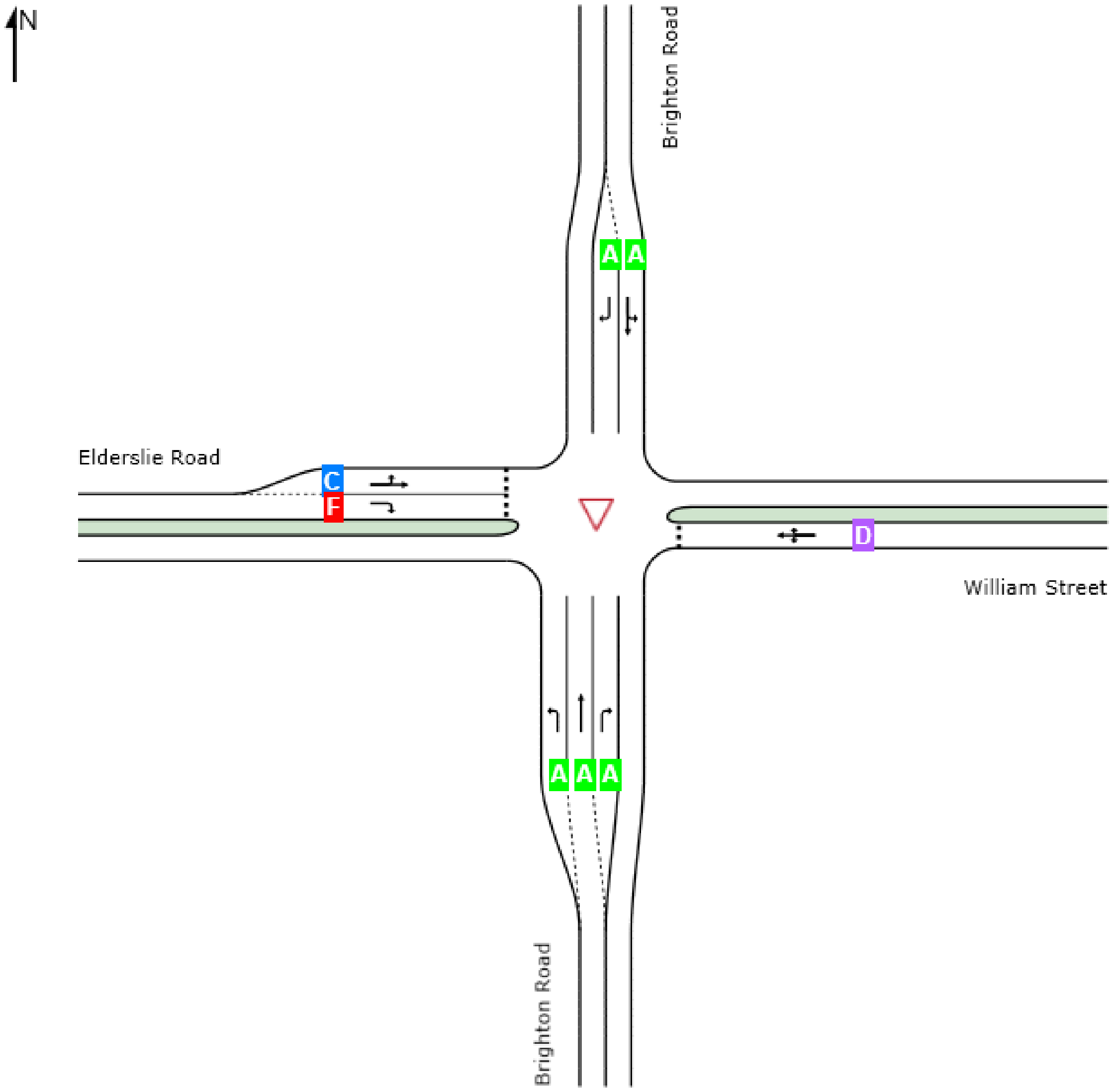


**Figure 12 AM Scenario D LoS – Brighton Road/ Elderslie Road/ William Street**

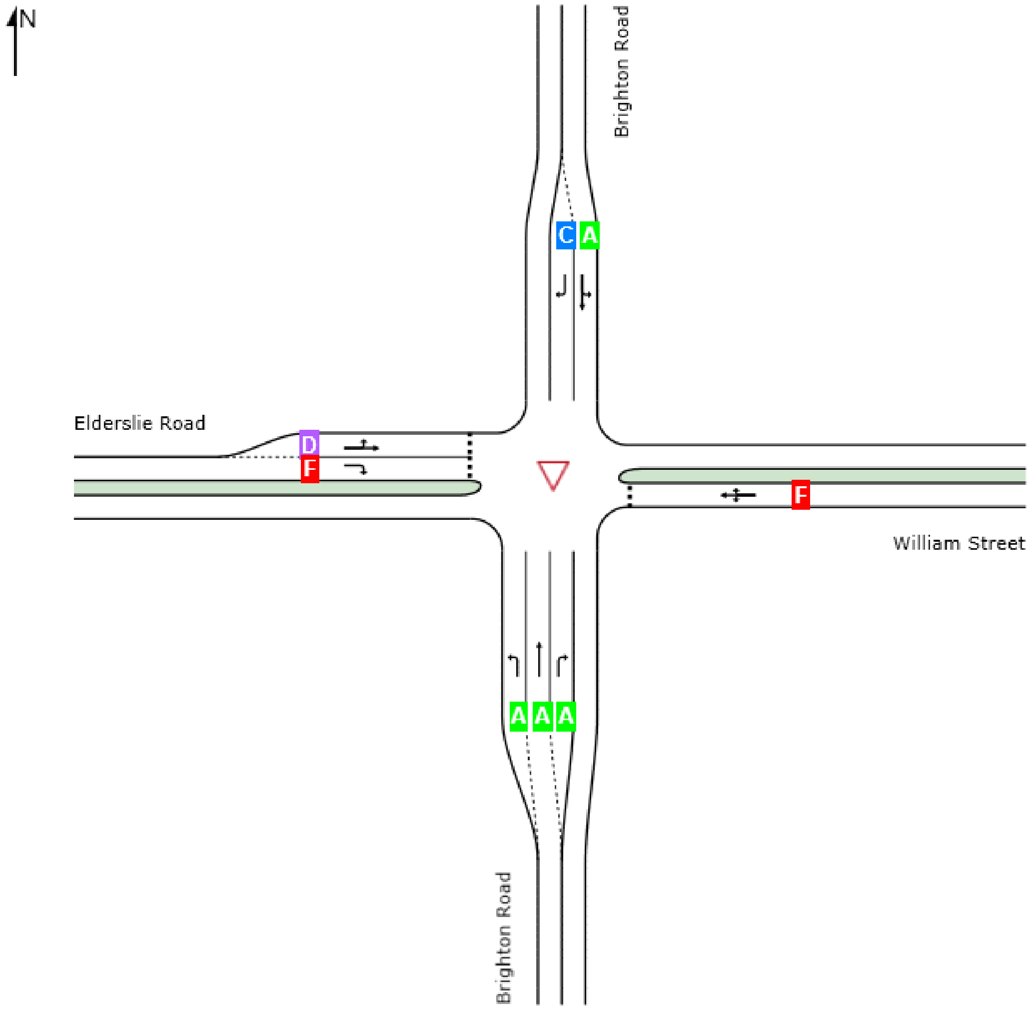


**Figure 13 PM Scenario D LoS – Brighton Road/ Elderslie Road/ William Street**

# **Appendix E** - Transport Network Analysis, High School and Residential Development (Scenario C)

### High School & Residential Development (Scenario C)

#### *Brighton Road/ Elderslie Road/ William Street*

The intersection of Brighton Road, Elderslie Road and William Street LoS results (by lane) for Scenario C are illustrated in Figure 14 and Figure 15. A noticeable decrease in the side road LoS is noted with the side road approaches performing at LoS E and LoS F.

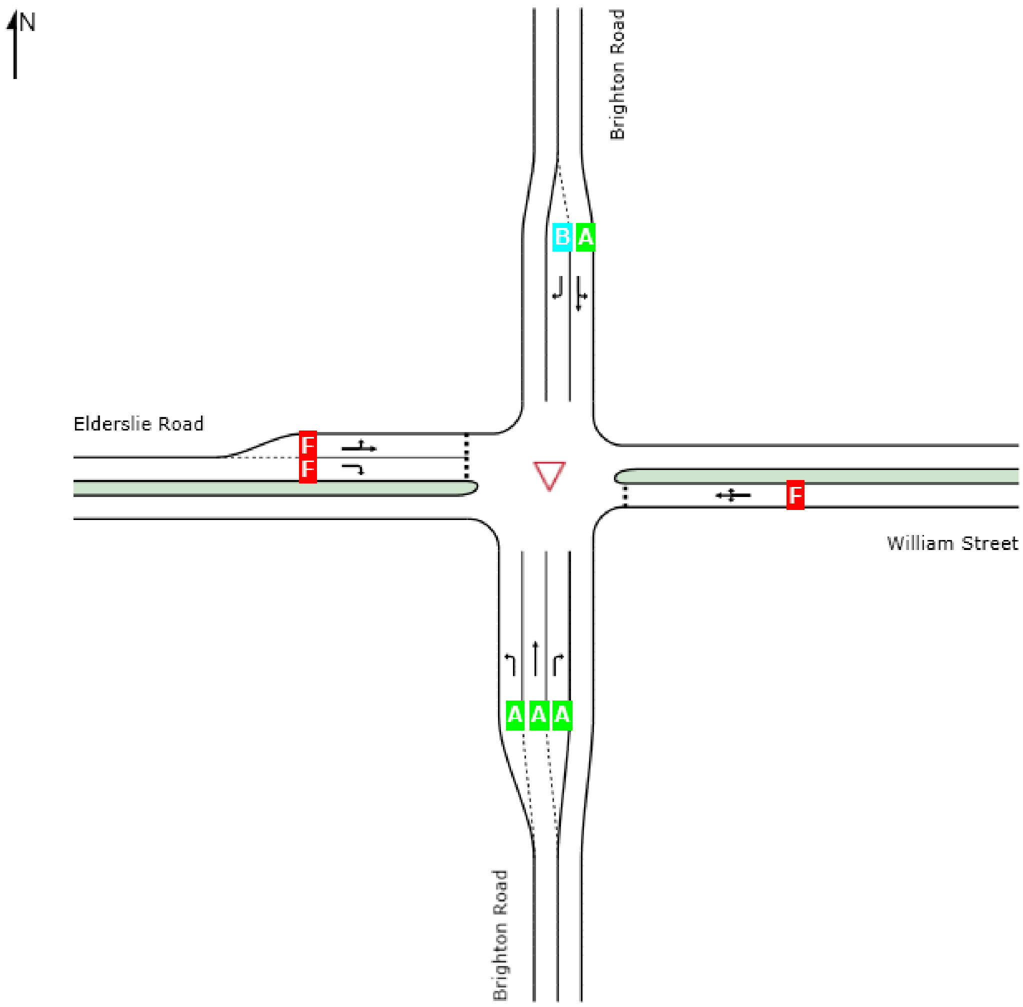


**Figure 14 AM Scenario C LoS – Brighton Road/ Elderslie Road/ William Street**

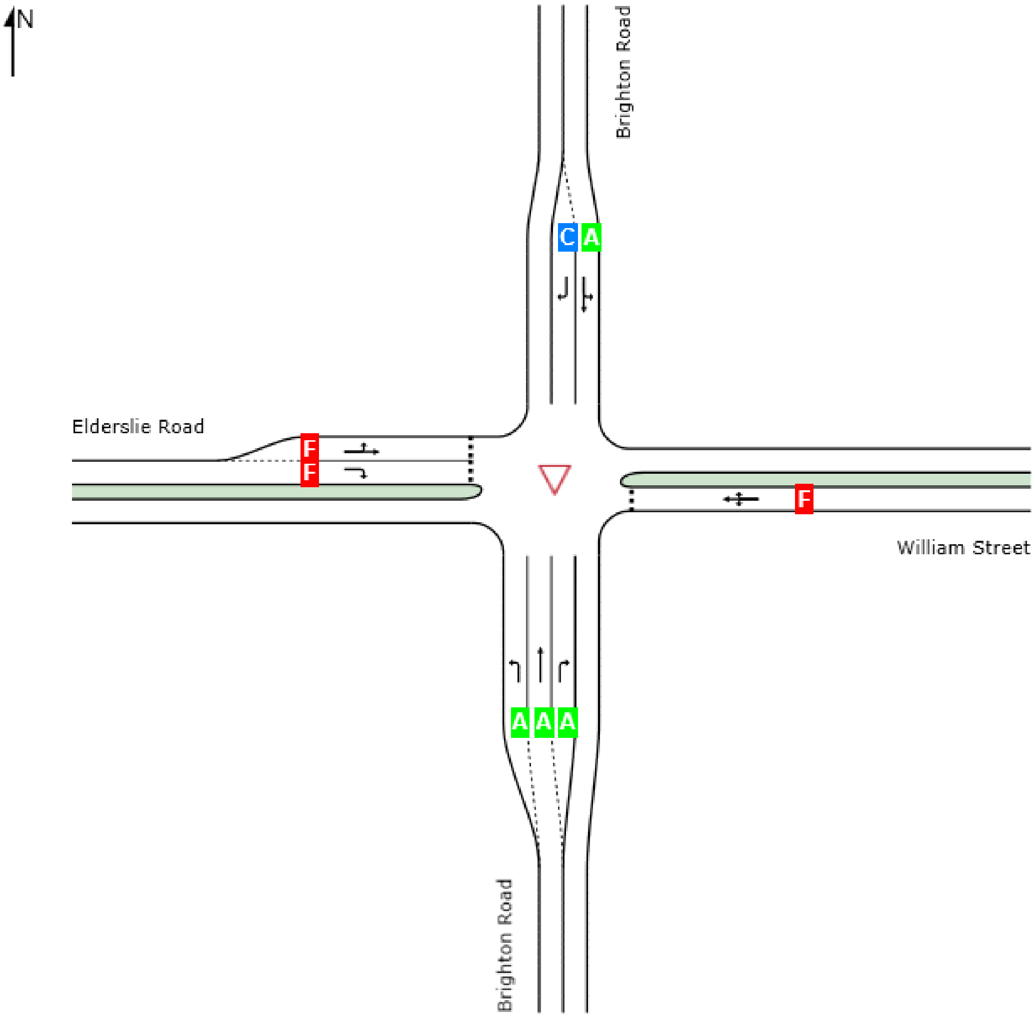


**Figure 15 PM Scenario C LoS – Brighton Road/ Elderslie Road/ William Street**

### *Brighton Road / New access (69 Brighton Road)*

The residential development at 69 Brighton Road includes a new access from Brighton Road (approximately half way between Elderslie Road and Hove Way). The LoS for the intersection is illustrated in Figure 16.

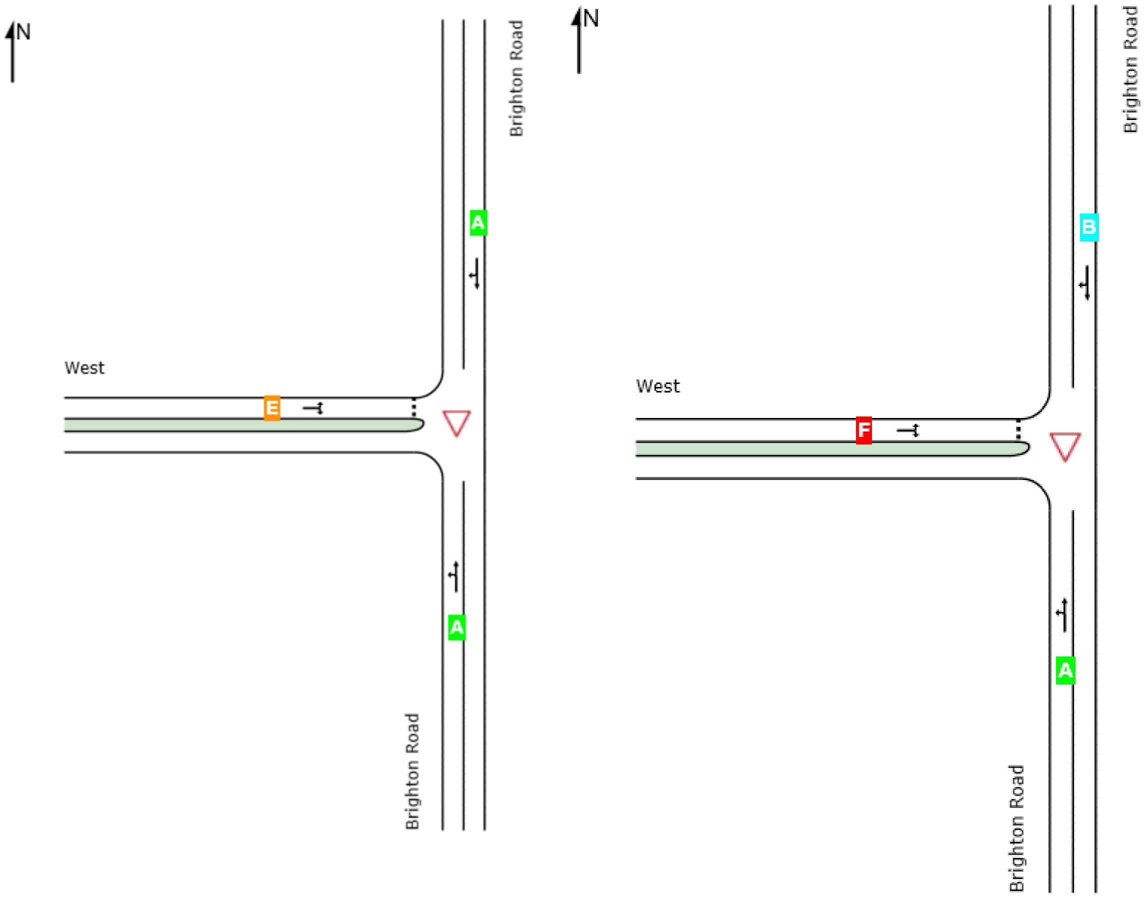


**Figure 16 Scenario C LoS – Brighton Road/ New connection**

# **Appendix F** – Proposed Roundabout Analysis

### *Brighton Road / Elderslie Road / William Street*

Detailed results for each of the roundabout scenarios for the intersection of Brighton Road / Elderslie Road / William Street are provided in Table 28through to Table 31.

**Table 28 Brighton Road / Elderslie Road / William Street Scenario A future results**

| Period | *Elderslie Road* | Brighton Road (S) | William Street | Brighton Road (N) |
|---|---|---|---|---|
| *95th Percentile Queues* | | | | |
| AM | 2 veh | 3 veh | 1 veh | 5 veh |
| PM | 3 veh | 9 veh | 1 veh | 3 veh |
| *Average Delay* | | | | |
| AM | 9.7 s | 2.8 s | 8.6 s | 3.9 s |
| PM | 15.6 s | 3.6 s | 5.4 s | 4.4 s |
| *Level of Service (Delay)* | | | | |
| AM | LOS A | LOS A | LOS A | LOS A |
| PM | LOS B | LOS A | LOS A | LOS A |

**Table 29 Brighton Road / Elderslie Road / William Street Scenario D results**

| Period | *Elderslie Road* | Brighton Road (S) | William Street | Brighton Road (N) |
|---|---|---|---|---|
| *95th Percentile Queues* | | | | |
| AM | 3 veh | 5 veh | 2 veh | 7 veh |
| PM | 3 veh | 4 veh | 1 veh | 3 veh |
| *Average Delay* | | | | |
| AM | 10.6 s | 3.5 s | 11.5 s | 5.5 s |
| PM | 10.8 s | 3 s | 8.1 s | 4.8 s |
| *Level of Service (Delay)* | | | | |
| AM | LOS B | LOS A | LOS B | LOS A |
| PM | LOS B | LOS A | LOS A | LOS A |

### Table 30 Brighton Road / Elderslie Road / William Street Scenario C results

| Period | *Elderslie Road* | Brighton Road (S) | William Street | Brighton Road (N) |
|---|---|---|---|---|
| *95th Percentile Queues* | | | | |
| AM | 5 veh | 6 veh | 6 veh | 11 veh |
| PM | 31 veh | 23 veh | 2 veh | 4 veh |
| *Average Delay* | | | | |
| AM | 12.6 s | 4.4 s | 22.7 s | 9.4 s |
| PM | 129.6 s | 8.1 s | 9.2 s | 6.2 s |
| *Level of Service (Delay)* | | | | |
| AM | LOS B | LOS A | LOS C | LOS A |
| PM | LOS F | LOS A | LOS A | LOS A |

### Table 31 Brighton Road / Elderslie Road / William Street Scenario C with slip lane results

| Period | *Elderslie Road* | Brighton Road (S) | William Street | Brighton Road (N) |
|---|---|---|---|---|
| *95th Percentile Queues* | | | | |
| AM | 4 veh | 3 veh | 6 veh | 6 veh |
| PM | 4 veh | 3 veh | 6 veh | 6 veh |
| *Average Delay* | | | | |
| AM | 12.4 s | 3.8 s | 21 s | 5.4 s |
| PM | 12.4 s | 3.8 s | 21 s | 5.4 s |
| *Level of Service (Delay)* | | | | |
| AM | LOS B | LOS A | LOS C | LOS A |
| PM | LOS B | LOS A | LOS C | LOS A |

### *Brighton Road / new access road to 69 Brighton Road / Hove Way*

Detailed results for each of the roundabout scenarios for the intersection of Brighton Road / new access road to 69 Brighton Road / Hove Way are provided in Table 32 through to Table 33.

**Table 32 Brighton Road / new access road to 69 Brighton Road / Hove Way Scenario C results**

| Period | *Elderslie Road* | Brighton Road (S) | William Street | Brighton Road (N) |
|---|---|---|---|---|
| *95th Percentile Queues* | | | | |
| AM | 5 veh | 6 veh | 6 veh | 11 veh |
| PM | 31 veh | 23 veh | 2 veh | 4 veh |
| *Average Delay* | | | | |
| AM | 12.6 s | 4.4 s | 22.7 s | 9.4 s |
| PM | 129.6 s | 8.1 s | 9.2 s | 6.2 s |
| *Level of Service (Delay)* | | | | |
| AM | LOS B | LOS A | LOS C | LOS A |
| PM | LOS F | LOS A | LOS A | LOS A |

**Table 33 Brighton Road / new access road to 69 Brighton Road / Hove Way Scenario C with slip lane results**

| Period | *Elderslie Road* | Brighton Road (S) | William Street | Brighton Road (N) |
|---|---|---|---|---|
| *95th Percentile Queues* | | | | |
| AM | 4 veh | 3 veh | 6 veh | 6 veh |
| PM | 4 veh | 3 veh | 6 veh | 6 veh |
| *Average Delay* | | | | |
| AM | 12.4 s | 3.8 s | 21 s | 5.4 s |
| PM | 12.4 s | 3.8 s | 21 s | 5.4 s |
| *Level of Service (Delay)* | | | | |
| AM | LOS B | LOS A | LOS C | LOS A |
| PM | LOS B | LOS A | LOS C | LOS A |

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Document Status

| Revision | Author | Reviewer | | Approved for Issue | | |
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| | | | | | | |

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