WALLBRIDGE GILBERT AZTEC

Flemington Street Pty Ltd

Flemington Street Glenside Code Amendment

STORMWATER REPORT

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1 INTRODUCTION

Wallbridge Gilbert Aztec (WGA) have been engaged to complete a review of the proposed re-zoning of the Flemington Street Community Facilities land to Housing Diversity Neighbourhood. The Housing Diversity Neighbourhood Zone seeks to deliver a medium density residential outcome with site areas in the order of 120 m^2.

The site covers approximately 1.5 ha. A locality sketch for the site can be seen in *Figure 1*.

The intent of this study is to identify the impact that the re-zoning of this land will have on the existing stormwater infrastructure. The study will also identify potential options/upgrades that may be required to ensure the network can cope with any increase in stormwater runoff. In addition, the study will consider potential opportunities to install water sensitive urban design (WSUD) devices.

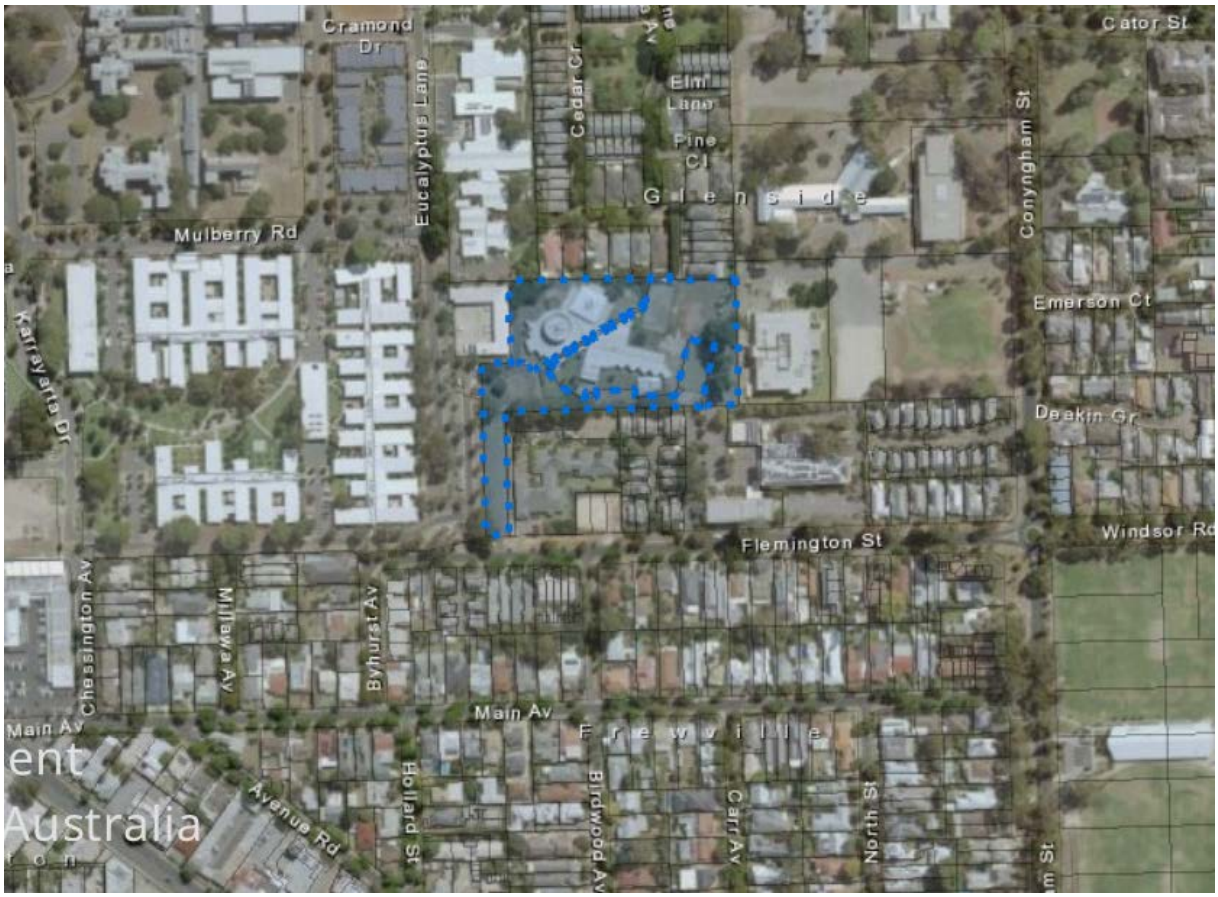

Figure 1 - Site Locality Plan

2 DEVELOPMENT SITE

2.1 EXISTING SITE

The site is currently a community facility (Adelaide Synagogue and the former Masada College).

From the Locations SA Viewer, it can be seen that there is an existing 375 mm stormwater pipe within Flemington Street. This pipe originates in Flemington Street, to the east of the proposed re-zoned land. It drains towards and through the Glenside site, where it discharges into a detention basin that forms part of the larger Brownhill Keswick Creek catchment. Refer *Figure 2* for a plan showing the stormwater infrastructure around the site.

Figure 2 - Stormwater Network (Source: Locations SA Viewer)

2.2 DEVELOPMENT

It is proposed for this site to be re-zoned and become Housing Diversity Neighbourhood. The Housing Diversity Neighbourhood Zone seeks to deliver a medium density residential outcome with site areas in the order of 120 m^2.

The general lie of the land is from the east to west, and it would be anticipated that the development would follow the same overall gradient.

3 STORMWATER MANAGEMENT

3.1 RE-ZONED CATCHMENT

As part of the code amendment, it is proposed for this site to be re-zoned and become Housing Diversity Neighbourhood. Calculations were undertaken in the modelling program DRAINS to determine the expected runoff for the site.

For this model, ILSAX has been used to model catchment hydrology. The following runoff parameters were selected:

- Paved (impervious) area depression storage 1 mm
- Supplementary area depression storage 1 mm
- Grassed (pervious) area depression storage 5 mm
- Soil Type 3
- Antecedent Moisture Condition 3

The site was assessed for area of paved, supplementary and impervious land use. A summary of the percentage breakdown assumed for the various land types can be seen in Table 1.

Table 1 - Land Use Characteristics

Land Use	% Impervious (DCP)	% Impervious (Supplementary)	% Grassed
Residential	75 %	10 %	15 %

Rainfall data, storm losses and temporal patterns were obtained from the Australian Rainfall & Runoff (AR&R) Data Hub (Babister, M., Trim, A., Testoni, I. & Retallick, M. 2016. The Australian Rainfall & Runoff Datahub, 37th Hydrology and Water Resources Symposium Queenstown NZ).

The DRAINS model was run for both the 5 % and 20% AEP event, and results from the modelling detailing the expected site runoff can be seen in Table 2.

Table 2 - DRAINS Modelling Results

Land Use	20% AEP	5% AEP	1% AEP
Residential	177 L/s	273 L/s	409 L/s

Council's default detention and discharge requirements are these:

- The volume of any detention device shall be equal to the volume of water generated on the site with an impervious (C_p = 0.9) site coverage of 75% and pervious (C_p = 0.1) area of 25%, during a 5% AEP flood event for a 10 minute duration.

- The maximum rate of discharge from the site shall be equal to the volume of water generated on the site with an impervious (C_p = 0.9) site coverage of 40% and pervious (C_p = 0.1) area of 60%, during a 20% AEP flood event for a 10 minute duration.

For this site, the results from the DRAINS modelling to satisfy these two criteria are shown in Table 3.

Table 3 - DRAINS Modelling Results

Council Condition	
Condition 1 – Minimum Detention Volume	159 m^3
Condition 2 – Maximum Site Discharge	90 L/s

From these results, it was found that detention storage would be required on site, to ensure that the runoff for the residential site does not exceed these requirements. The detention storage required for the site, for both the minor and major storm event, can be seen in Table 4.

Table 4 - DRAINS Modelling Results

	Detention Storage Volume
Minor Storm Event (20 % AEP)	100 m^3
Major Storm Event (5% AEP)	220 m^3
Major Storm Event (1% AEP)	365 m^3

As part of the detailed design for the site, further consideration will need to be given to understand how this detention storage will be accommodated on site. Either a detention basin could be installed, or the storage could be provided underground within pipes/detention tanks. A mixture of controls balanced between individual allotments and within public land will also be considered. Any measures implemented within public lands will also be designed to consider the impacts these would have on the overall amenity and/or multi functionality utilisation of these footprints.

4 WATER SENSITIVE URBAN DESIGN

4.1 GENERAL

The implementation of a WSUD strategy will facilitate opportunities for environmental enhancement within the re-zoned land. Various methods of treatment can be adopted to treat water quality runoff from the roads and road reserves. Devices such as rain gardens or tree pits; or a similar treatment device; may be adopted throughout the site.

Stormwater quality improvement would be implemented and designed to ensure it meets the criteria specified with Section 4.2.

4.2 WATER QUALITY TREATMENT REQUIREMENTS

The design of the future site treatment systems should comply with the standards as defined by the South Australian EPA Water Quality Policy [EPP Water Quality (2003)], Council's Standards and Guidelines and the WSUD best management practice pollutant reduction targets as defined in the WSUD Guidelines for the Greater Adelaide Region.

Based on the EPP Water Quality (2003) for fresh water environments, the listed pollutant concentrations will be used as the limiting targets. These are based on the general water quality criteria in Schedule 2 Table 1 EPP (2003).

EPP Water Quality Criteria

Total Phosphorous	=	0.5 mg/L
Total Nitrogen	=	5 mg/L
Suspended Sediment	=	20 mg/L

The results obtained will also be compared to the WSUD Guidelines for the Greater Adelaide Region, which are based on recognised Australian best practice.

WSUD Guidelines Water Quality Criteria

Total Phosphorous	=	60% Removal
Total Nitrogen	=	45% Removal
Suspended Sediment	=	80% Removal
Gross Pollutants	=	90% Removal

4.3 SOIL EROSION AND DRAINAGE MANAGEMENT PLAN

During the construction phase of the site works, a Soil Erosion and Drainage Management Plan (SEDMP) shall be implemented in accordance with the Environment Protection Act 1993. A plan will be prepared to meet the requirements in accordance with the Code of Practice for the Construction and Building Industry (1999) during the final documentation phase.

The SEDMP will encompass surface stormwater management practices that shall be implemented during the construction phase. The SEDMP will provide a guide to the constructor to plan site management measures that should be implemented in order to prevent sediment and pollutant exports during the construction stages. Whilst the site's conditions will change as the construction progresses, it is the environmental duty of the constructor to ensure that the site SEDMP is progressively maintained and upgraded to suit.

The SEDMP shall include and not be limited to, sediment trap / basin, silt fences, diversion swales to control site flow, single site access point with shaker pad and other measures as deemed necessary. The design of the SEDMP will be undertaken as part of the detailed design phase.

4.4 MUSIC MODELLING

A preliminary music model was established to determine the treatment that would be required for the site. The model utilised bioretention and a detention basin to treat stormwater runoff from the proposed development (Housing Diversity Neighbourhood). Detention basin sizes were as shown in Section 3.2, Table 4, while the required area of the bioretention swales can be seen in Table 5 below.

Alternative treatment devices could be installed, provided that the treatment devices also meet the treatment requirements specified in Section 4.2.

Table 5 - MUSIC Modelling Results

	Required Area
Residential	100 m^2

5 STORMWATER MANAGEMENT FRAMEWORK STRATEGY

In order to ensure that stormwater runoff from the proposed future residential development of the site is managed effectively to meet Council's detention requirements, detention storage will be required. It was found that in order to ensure the outflow from the site doesn't exceed Council's requirements 365 m^3 of detention is required for the 1% AEP storm event.

In order to ensure stormwater runoff from the site complies with the standards as defined by the South Australian EPA Water Quality Policy [EPP Water Quality (2003)], Council's Standards and Guidelines and the WSUD best management practice pollutant reduction targets as defined in the WSUD Guidelines for the Greater Adelaide Region, water quality treatment will be required on site. Assuming bioretention swales/rain gardens are utilised on site, the devices installed will need to meet the minimum required area specified in Table 5 in order to ensure the treatment requirements are met.

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