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# Proposed Residential Flat Building

96-98 Lethbridge Street & 42-46 Evan  
Street, Penrith

WSUD Strategy Report Issue A

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# 1 Introduction

This document outlines the Water Sensitive Urban Design (WSUD) Strategy for the proposed residential flat building development located at 96-98 Lethbridge Street and 42-46 Evan Street, Penrith. This strategy looks at the principles, objectives and targets for WSUD, the opportunities and constraints to the implementation of WSUD, as well as the proposed WSUD measures to be implemented as part of the proposed works. This report is to be read in conjunction with Stormwater Concept Plan and Flood Study Report prepared by SGC P/L, ref. 2020.0222.

The Concept Plans prepared by Urban Link Architects show 2 residential flat buildings with associated driveways to basement carparks. The proposed development is illustrated in Figure 1.1 below.



Figure 1.1 Site Plan

## 2 Water Sensitive Urban Design

### 2.1 Principles, Objectives and Targets

Penrith City Council has implemented a Water Sensitive Urban Design Policy in 2013. The aim of this policy is to respond to the growth of developable land within the Penrith Local Government Area (LGA) and improve the water conservation, and the quality and quantity of stormwater runoff from both new land development, and redevelopment of existing properties as they are developed.

The Policy is used to provide guidance for engineers and architects to ensure that developments mitigate their stormwater impacts on the natural environment.

Water Conservation aims to reduce the demand for potable water. This initiative was developed by the NSW State Government. The main tool for reducing demand for potable water is the BASIX scheme. The proposed development of this site will require the use of BASIX.

Urban development increases the pollutant load of stormwater to the receiving water bodies. Stormwater Quality controls have been derived to reduce the impact of this increased loading on the environment. Penrith City Council has set targets for stormwater treatment trains to meet on a per site basis.

The targets that Council has set as part of the Water Sensitive Urban Design policy 2013 are as follows:

- 90% reduction of mean annual load of total gross pollutants
- 85% reduction of mean annual load of Total Suspended Solids (TSS)
- 60% reduction of mean annual load of Total Phosphorus (TP)
- 45% reduction of mean annual load of Total Nitrogen (TN)

Stormwater runoff modelling is carried out using the software called MUSIC (Model for Urban Stormwater Improvement Conceptualisation) using data from Council's WSUD Technical Guidelines.

### 2.2 Site Analysis

The development site falls towards the existing culvert at the low lying area traversing the site. It is proposed to drain the site in the natural direction of the runoff and make connection to this existing culvert.

As a result, the proposed stormwater treatment train will treat the runoff from most of the site area with the exception of the partial landscaping area.

## 2.3 Treatment Train

The site consists of two catchments, each has various sub-catchments that collect detrimental pollutants at various rates. The MUSIC model adopts the pollutant parameters from Council WSUD Technical Guidelines. The catchments are allocated as outlined in the following table.

**Table 2.1 Catchment Area – 0.4683ha**

| Type             | Area to OSD 1 (m <sup>2</sup> ) | Fraction Impervious | Area to OSD 2(m <sup>2</sup> ) | Fraction Impervious |
|------------------|---------------------------------|---------------------|--------------------------------|---------------------|
| <b>Roof</b>      | 1916                            | 100%                | 1307                           | 100%                |
| <b>Landscape</b> | 491                             | 0%                  | 148                            | 0%                  |
| <b>Paved</b>     | 323                             | 100%                | 156                            | 100%                |
| <b>Bypass</b>    | 232                             | 20%                 | 110                            | 0%                  |
| <b>Total</b>     | 2962                            |                     | 1721                           |                     |

It is proposed to meet Council’s stormwater quality improvement targets outlined in part 2 of this strategy with a combination of proprietary devices. The proposed stormwater quality improvement devices are outlined in the following table.

**Table 2.2 Stormwater Quality Improvement Devices**

| Treatment Train                 | Description  |
|---------------------------------|--|
| <b>Ocean Guard (Pit Basket)</b> | This is a proprietary pit basket from Ocean Protect. The proposed device will remove pollutants down to 200microns. The inserts are located inside the inlet pits. Nine (9) are proposed for the pits that are not in the flood affected area.         |
| <b>Stormfilter</b>              | Stormfilter is a proprietary cartridge from Ocean Protect. The device has the capacity to remove suspended solids, fine particles and other nutrients such as TSS, TP & TN. The stormfilters are proposed in the stormfilter chamber in the OSD tanks. |

MUSIC was used to model the proposed site drainage stormwater treatment train. The proposed treatment train on the development application documentation meets the objectives and targets of Penrith City Council’s WSUD Policy 2013.

The following table summarises the results from the MUSIC model.

**Table 2.3 MUSIC Summary Table**

| Nutrient                      | Post-Development<br>without Treatment<br>(kg/yr) | Post-Development<br>with Treatment<br>(kg/yr) | Reduction<br>(%) |
|-------------------------------|--|---|------------------|
| <b>Total Suspended Solids</b> | 114  | 16.9  | 85.1             |
| <b>Total Phosphorus</b>       | 0.411  | 0.13  | 68.3             |
| <b>Total Nitrogen</b>         | 5.23   | 2.78  | 46.8             |
| <b>Gross Pollutants</b>       | 65.9   | 2.21  | 100              |

The results indicate that the proposed stormwater treatment train meets the requirements of the Penrith City Council Water Sensitive Urban Design Policy 2013.

## 3 Draft Operations & Maintenance Schedule

### 3.1 General

The maintenance schedule covers all the stormwater quality measures adopted for the proposed development. The maintenance of some of these measures (proprietary products) is controlled by manufacturers' requirements for mechanical devices and industry standards for environmental measures.

#### 3.1.1 Oceanguard Inserts

The maintenance frequency of the oceanguard baseket is dependent on several variables, such as catchment area, surrounding land use, vegetation type, traffic loading and rainfall patterns. It is recommended that during the first year of operation the units should be monitored monthly, with maintenance as required.

To ensure that the units perform optimally, the material collected by the filter bag should be emptied when the level of material is approximately half to two thirds of the total bag depth or when there is evidence of material overflow.

Although the bag has greater storage area, it is recommended that it is not left to fill completely prior to emptying, for the following reasons:-

- The bags are capable of retaining a heavy mass of material (in excess of 50kg); material near the top of the bag can be resuspended during high to extreme rainfall events; and
- Blockage of the overflow sections can occur, when material is allowed to build up above the filter bag.

Maintenance frequency should be adjusted to accommodate variable rainfall patterns. Regions east of the Great Dividing Range typically are dominated by greater rainfall during summer and Autumn Months, as such more maintenance is typically required during these periods. It is recommended that biannual inspections be carried out in November and April, while quarterly inspections should be conducted in February, April, July and November.

It is also recommended that additional monitoring should be conducted following moderate to extreme rainfall events, in particular, when preceding months have had little to no rainfall. This monitoring is considered necessary to accommodate for higher volumes of runoff generated during major rainfall events, an anticipated greater accumulation of surface contamination during low rainfall periods and to ensure that the units have not been damaged due to high pipe velocities. Table 3.1 below indicates the recommended inspection and maintenance frequency.

**Table 3.1 Oceanguard Maintenance Frequency**

| ITEM                                 | PERIOD                                  | RESPONSIBILITY            | MAINTENANCE PROCEDURE  |
|--------------------------------------|---|---------------------------|--|
| Inspection –<br>Minor<br>Maintenance | 12 monthly<br>and after<br>major storms | Maintenance<br>Contractor | Follow recommended procedure<br>set out in Stormwater 360<br>“Operation and Maintenance<br>Guidelines” |
| Inspection –<br>Major<br>Maintenance | 2-6 years<br>except in<br>case of spill | Maintenance<br>Contractor | Follow recommended procedure<br>set out in Stormwater 360<br>“Operation and Maintenance<br>Guidelines” |

Reference should be made to manufacturer’s specifications for inspection procedure, OHS, grates removal, cleaning methods, disposal of material and other procedures. The specifications are included in Appendix 1 for more details.

### 3.1.2 Stormfilter

The recommended maintenance frequency for the Stormfilter device is included in **Error! Reference source not found.** below.

**Table 3.2 Stormfilter Maintenance Frequency**

| ITEM                                 | PERIOD                                 | RESPONSIBILITY            | MAINTENANCE PROCEDURE  |
|--------------------------------------|--|---------------------------|--|
| Inspection –<br>Minor<br>Maintenance | 2 years and<br>after major<br>storms   | Maintenance<br>Contractor | Follow recommended procedure<br>set out in Stormwater 360<br>“Operation and Maintenance<br>Guidelines” |
| Inspection –<br>Major<br>Maintenance | 1 year<br>(except in<br>case of spill) | Maintenance<br>Contractor | Follow recommended procedure<br>set out in Stormwater 360<br>“Operation and Maintenance<br>Guidelines” |

Reference should be made to manufacturer’s specifications for operation and maintenance. The specifications are included in Appendix 2 for more details.

## 4 Conclusions

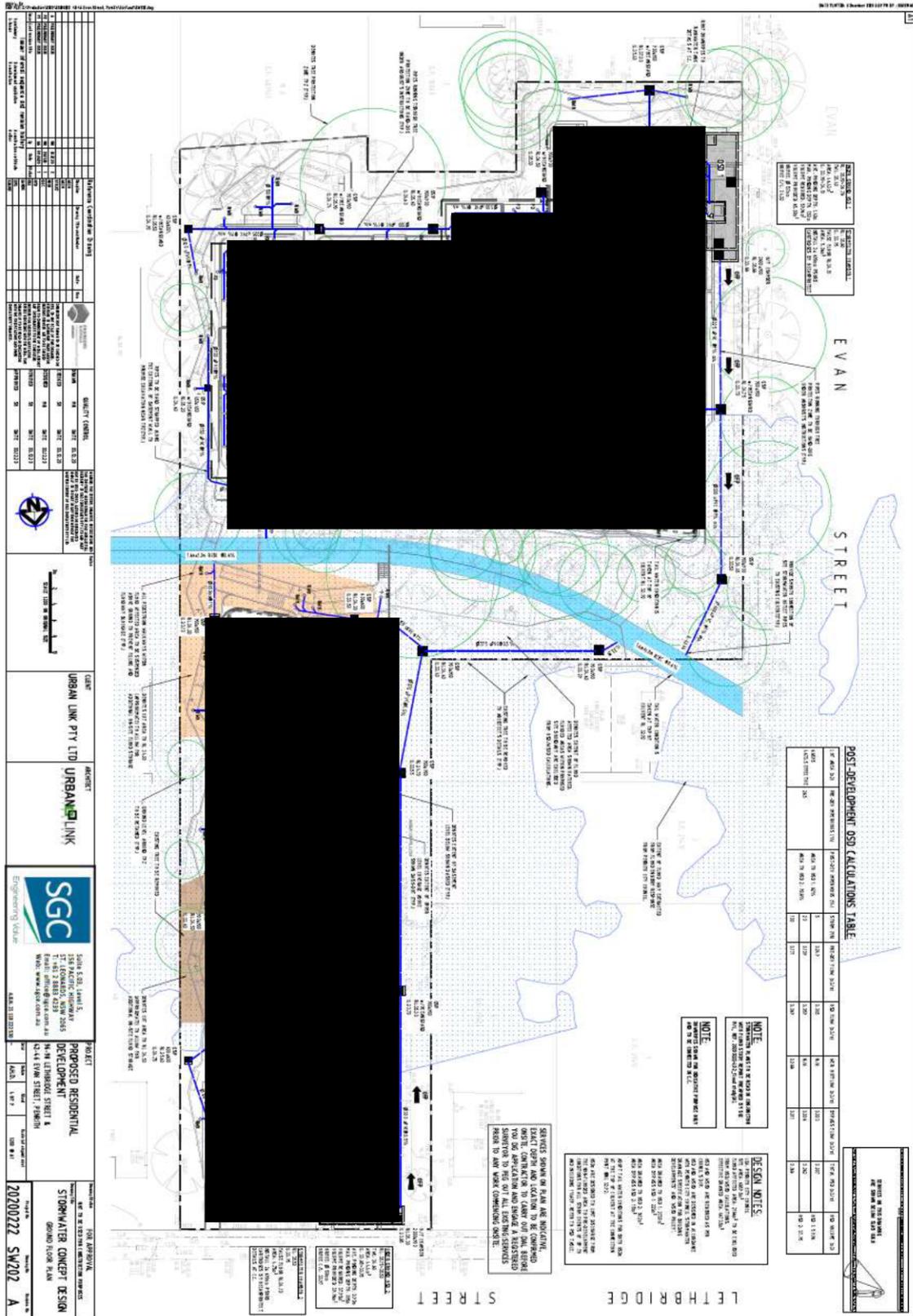
An investigation of the proposed site and stormwater treatment train has been undertaken for 96-98 Lethbridge Street and 42-46 Evan Street, Penrith.

A detailed MUSIC model was established for the site. The model was based on the parameters provided within the Penrith City Council WSUD Technical Guidelines. Using a combination of proprietary devices, the proposed stormwater treatment train will meet the WSUD Targets adopted by Penrith City Council.

It is recommended that Council approves the proposed treatment train for the townhouses development.

# Appendix 1

## Stormwater Layout Plan





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