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WSUD Strategy Report

614-632 High Street, Penrith

WSUD Strategy Report Issue C

Prepared For Urban Apartments

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1 Introduction

This document outlines the Water Sensitive Urban Design (WSUD) Strategy for the proposed mixed-use development located at 614-632 High 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.

The site is legally described as Lot 10 DP1162271, Urban Apartments is proposing a mixed-use development.

The Concept Plans prepared by DKO Architects show 44 level apartments with one basement. 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 on a per lot basis as each of the proposed lots is developed.

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 High Street. It is proposed to drain the site in the natural direction of the runoff and make connection to the new kerb inlet pit on High Street with extension of stormwater line to existing kerb inlet pit.

As a result, the proposed stormwater treatment train will treat the runoff from all site area.

2.3 Water Conservation

The proposed development is a mixed-use building. Site area is 4715m². As per Penrith council WSUD policy 3.1, buildings not covered by BASIX are to install rainwater tanks to meet 80% of non-potable demand including outdoor use and toilets. The residential element

of the proposed development is covered by BASIX and no RWT required. A RWT is provided for the non-residential elements only. A music model has been conducted and the result as following:

- A 80m³ rainwater tank to be installed.
- To collect at least 807m² of roof area.
- To be connected to toilets(7 in total) on level 1 and irrigation system on ground floor for re-use.

Non-potable water demand as following:

Irrigation annual demand: 208m²x0.4KL/year=83.2KL/year

Toilet daily demand: 0.1x7=0.7KL/day

2.4 Treatment Train

A basement is proposed under ground floor, and the outline is shown on SW201. Due to site constraints, passive stormwater treatment such as bio-retention is not feasible. Therefore, the use of stormwater cartridges should be accepted for water quality treatment.

The site consists of one catchment only, which 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 – 0.4601ha+0.01ha pool=0.4715ha

Type	Area (m ²)	Fraction Impervious
Paved Area to SF Chamber	2089	95%
Roof to RWT and SF Chamber	807	100%
Landscape to SF Chamber	1040	20%
Paved Area to OG	332	90%
Future Road Dedication to OG	275	100%
Bypass	58	100%
Total	4601	

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
Ocean Guard (Pit Basket)	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. Three (3) are proposed for the pits in the driveway.

Stormfilter	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 stormfilter is proposed under the driveway at the proposed entry into the development.
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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 without Treatment (kg/yr)	Post-Development with Treatment (kg/yr)	Reduction (%)
Total Suspended Solids	336	48.6	85.5
Total Phosphorus	0.589	0.166	71.8
Total Nitrogen	4.9	2.07	57.7
Gross Pollutants	64.3	1.1	98.3

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.

3.2 Stormwater Treatment Device

3.2.1 Oceanguard Inserts

The maintenance frequency of the Oceanguards 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 Oceanguards Maintenance Frequency

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

3.2.2 Stormfilter

The recommended maintenance frequency for the Stormfilter device is included Table 3.2 below.

Table 3.2 Stormfilter Maintenance Frequency

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

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

3.2.3 Rainwater Tank

Table 3.3 Catchment Area – 0.4715ha

ITEM	PERIOD	RESPONSIBILITY	MAINTENANCE PROCEDURE
First flush device	Every 1-3 Months	Maintenance Contractor	Inspect and clean first flush device from debris.
Contamination (Mosquito/vermin breeding or algae growth)	Every 1-3 Months	Maintenance Contractor	Disinfection of tank.
Inlet/Outlet screen	Every 6 Months	Maintenance Contractor	Remove leaves and debris on surface.
Roof gutters	Every 6 Months	Maintenance Contractor	Remove leaves and debris on surface.
Pumps/strainer	Every 6 Months	Maintenance Contractor	Inspect and clean pump/strainer from debris.
Tank structure	Every 2 years	Maintenance Contractor	Check footings and fittings for signs of corrosion.
Depth of sediment within tank	Every 5 years	Maintenance Contractor	Desludge tank by engaging a professional tank cleaner.

The following critical items should be observed:

- A 24-hour Emergency & Maintenance contract shall be obtained from a company capable of executing the work and shall be kept in force by the property owner(s) for the life of the building.
- The contractor shall provide a name plate stating the name, working hours, telephone number and after-hours telephone number. Such name plate shall be fixed to the front of the control panel.

4 Conclusions

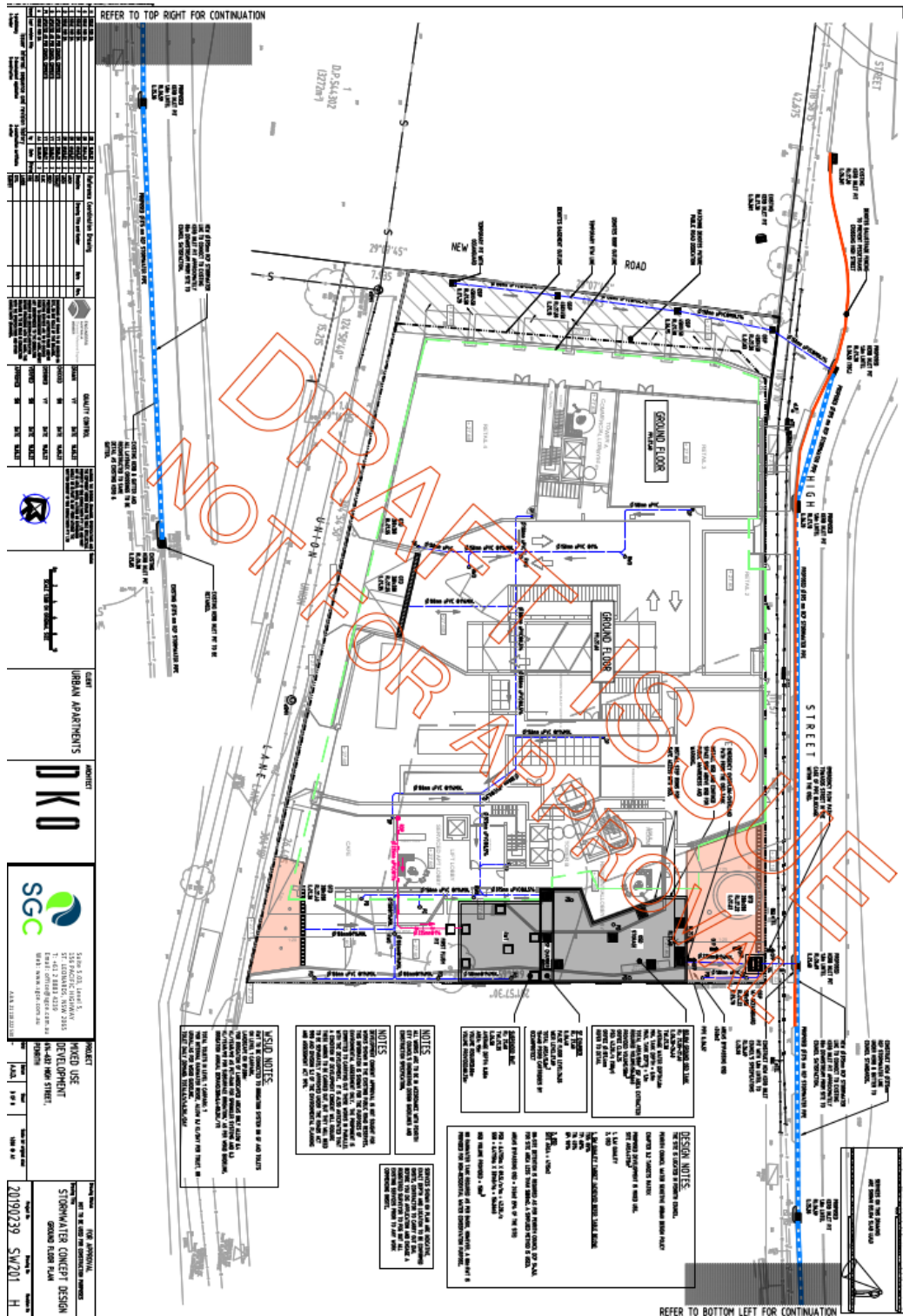
An investigation of the proposed site and stormwater treatment train has been undertaken for 614-632 High Street Penrith.

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 mixed-use development.

Appendix 1

Stormwater Layout Plan





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