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Proposed Senior Housing

103-109 Laycock Street, Cranebrook

WSUD Strategy Report Issue A

Alvaro Architects Pty. Ltd.

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Revision Table

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1 Introduction

This document outlines the Water Sensitive Urban Design (WSUD) Strategy for the proposed senior housing development located at 103-109 Laycock Street, Cranebrook. 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 prepared by SGC P/L, ref. 20190170.

The Concept Plans prepared by Alvaro Architects show 16 dwelling houses with associated driveways and car parking spaces on ground. The proposed development is illustrated in Figure 1.1 below.

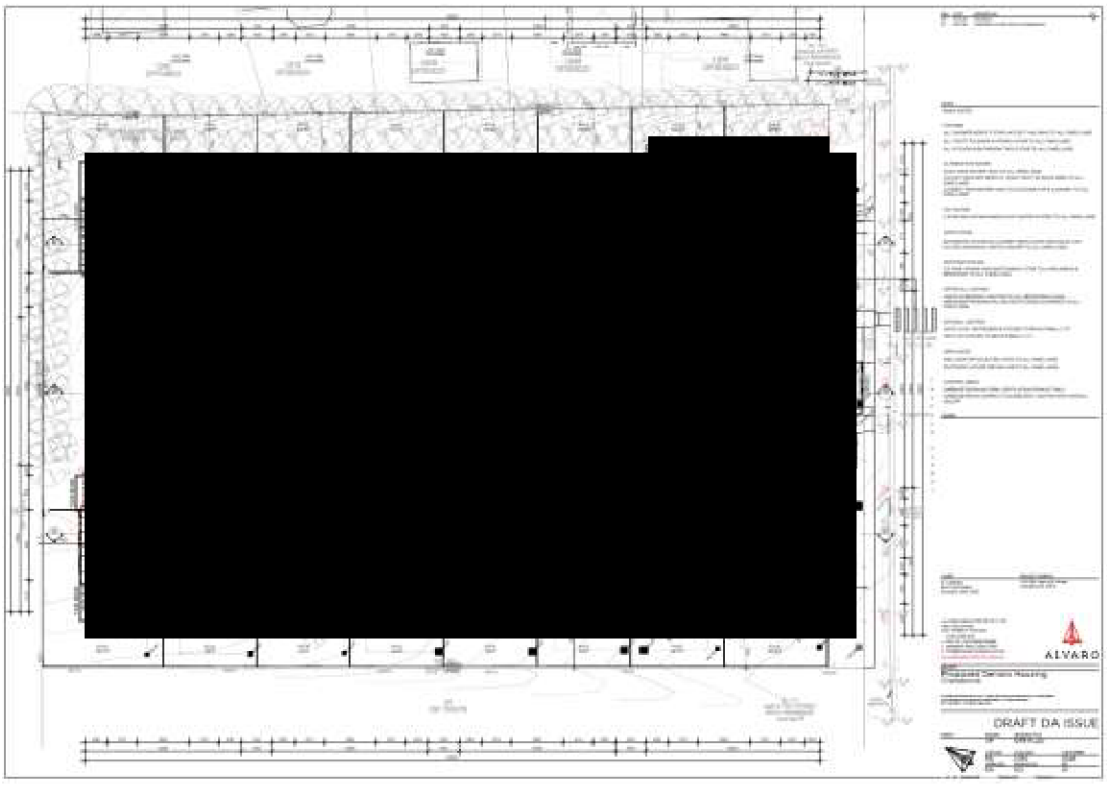


Figure 1.1 Site Plan

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 from the rear towards Laycock Street. It is proposed to drain the site in the natural direction of the runoff and make connection to the existing kerb inlet pit in front of the site.

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 and roof area.

2.3 Treatment Train

The site consists of one main catchment with 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 – 0.8004ha

Type	Area to OSD (m^2)	Fraction Impervious	Area bypass OSD (m^2)	Fraction Impervious
Roof	2256 734	100%	210	100%
Landscape	2662	0%	808	0%
Paved	1317	100%		
Total	6986		1018	

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. Eight (8) are proposed for the pits that are not in the flood affected area.
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 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 without Treatment (kg/yr)	Post-Development with Treatment (kg/yr)	Reduction (%)
Total Suspended Solids	292	42.3	85.5
Total Phosphorus	0.755	0.275	63.6
Total Nitrogen	8.2	4.02	50.9
Gross Pollutants	99.8	0.000399	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 empting, 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 – 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.

3.1.2 Stormfilter

The recommended maintenance frequency for the Stormfilter device is included in 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.

4 Conclusions

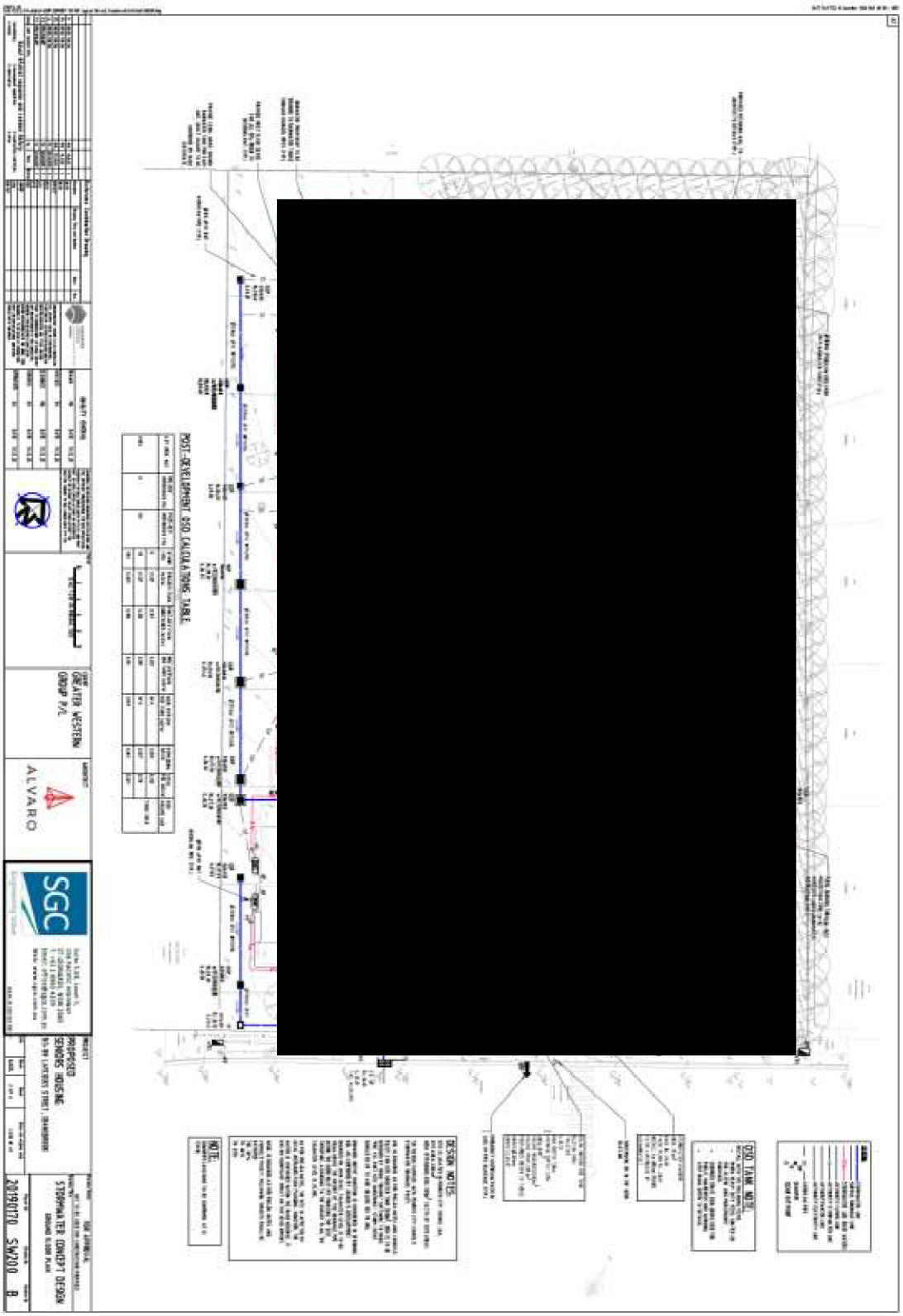
An investigation of the proposed site and stormwater treatment train has been undertaken for 103-109 Laycock Street, Penrith.

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 senior housing development.

Appendix 1

Stormwater Layout Plan



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