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PROPOSED SEPP 2004 HOUSING

Project Address LEONAY GOLF COURSE, LEONAY PARADE, LEONAY

WSUD Strategy Report Issue A

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Revision Table

Revision	Date	Issue Description	Issued by	Approved by	Signed
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Table of Contents

List of Figures

List of Tables

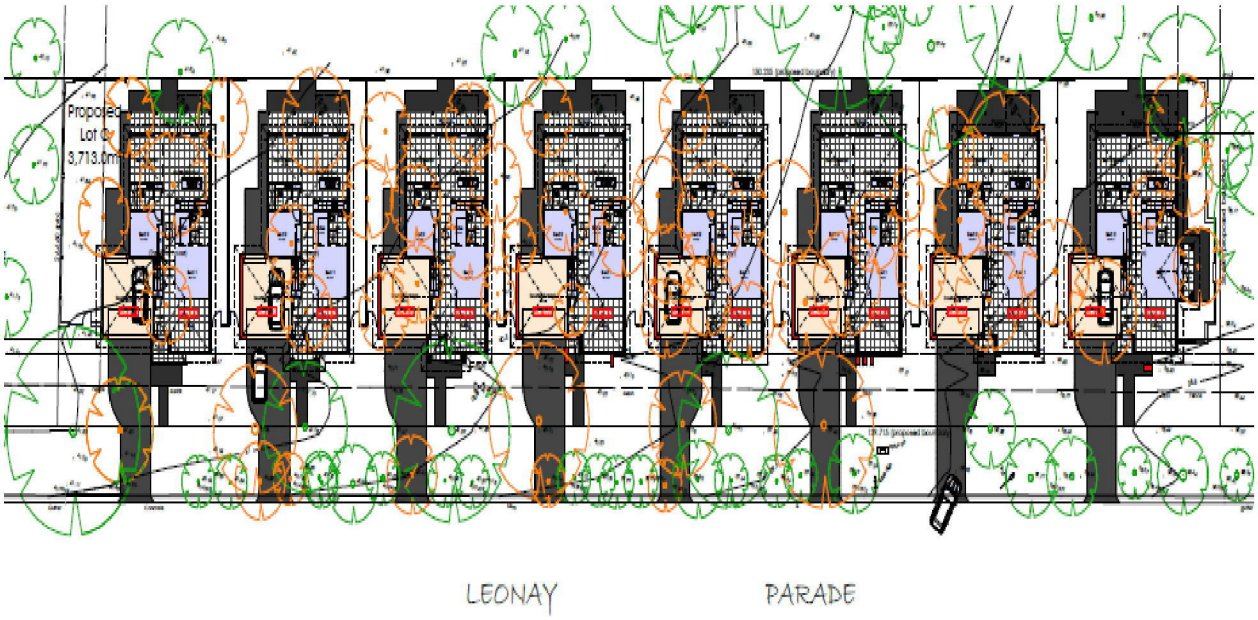
1 Introduction

This document outlines the Water Sensitive Urban Design (WSUD) Strategy for the proposed townhouses located at Leonay Golf Course, Leonay Parade, Leonay. 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 110 DP 1135581. Leonay Fairways Pty Limited is proposing a eight (8) SEPP housing for seniors or people with disability 2004

The Concept Plans prepared by Pretech Architects shows eight houses with associated driveways. 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 the street. It is proposed to drain the site in the natural direction of the runoff and make connection to the street kerb & gutter.

As a result, the proposed storm water treatment train will treat the runoff from most of the proposed site area.

Treatment Train

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 – 0.112ha

Type	Area (m^2)	Fraction Impervious
Roads		100%
Roof		100%
Driveway		100%
Other Impervious		100%
Pervious		0%
Bypass		0%
Total		

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.

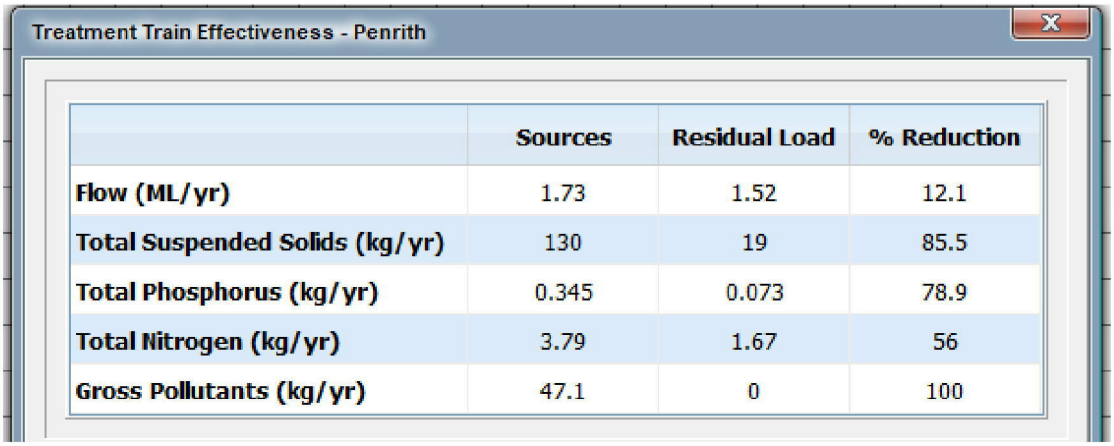
Table 2.2 Stormwater Quality Improvement Devices

Rainwater Tank	It is proposed to have only one (1) each lot with a 1.5kL rainwater tank associated with unit 5 only.
EnviroPro (Pit Basket)	This is a proprietary pit basket from Stormwater360. 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 Stormwater 360. 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.

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



	Sources	Residual Load	% Reduction
Flow (ML/yr)	1.73	1.52	12.1
Total Suspended Solids (kg/yr)	130	19	85.5
Total Phosphorus (kg/yr)	0.345	0.073	78.9
Total Nitrogen (kg/yr)	3.79	1.67	56
Gross Pollutants (kg/yr)	47.1	0	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.

3.2 Silt/Oil Arrestor Device

The proposed silt/oil arrestor device for the proposed development is a Humeceptor device type STC3. The recommended maintenance procedure by the manufacturer is summarised in this section. The detailed maintenance procedure is included in Appendix 1.

Maintenance of HumeceptorTM is performed using vacuum/eductor trucks. This ensures that no requirement for entry into the unit is necessary for maintenance.

During maintenance of an in-line **Hume***ceptor*™ such as STC3, oil is removed through the 150 mm oil sample port and sediment is removed through the 610 mm diameter outlet riser pipe. Alternatively, oil may be removed from the 610 mm opening if enough water is removed from the treatment chamber to lower the oil level to the bottom of the drop and decant pipes.

The following outline is a typical step-by-step procedure for **Hume***ceptor*™ maintenance:

1. Check for oil (using a dipstick, tube or sampling device)
2. Remove and store ant free oil separately using a small portable pump
3. Decant the relatively clean water from the central zone to either:
    - Sewer (*requires prior approval from the sewer authority/municipality and may not be allowed in all areas*)
    - Upstream pipe *(position sandbags in the inlet pipe to create temporary storage)*
4. Remove the sludge/sediment from the bottom of the **Hume***ceptor*™ using the vacuum truck
5. Allow the **Hume***ceptor*™ to re-fill with water.

As a general rule an annual maintenance schedule is recommended. However, maintenance requirement frequency will vary with the volumes of stormwater pollution generated by your site (number of spills, amount of sediment, etc.). So, while annual maintenance is recommended, the frequency of maintenance may be varied (increased or reduced) based on local conditions; if the unit is filling up with sediment more quickly than projected, maintenance may be required semi-annually; conversely once the site has stabilised maintenance may only be required every two or three years.

Although **Hume***ceptor*™ will continue to operate effectively until sediment completely fills the treatment chamber. It is still deemed good practice that maintenance should be performed "annually" **or** "once the sediment depth exceeds the guideline values" provided in Table 3.1, whichever condition is achieved first.

Table 3.1 Sediment Depth Indicating Maintenance

Sediment depths indicating maintenance*	
MODEL	SEDIMENT DEPTH (mm)
STC3	350

The following table summarises the maintenance frequency for the Humeceptor model STC3 (reference is made to Humes Maintenance Procedure for Humeceptors, which is included in part under the appendix).

Table 3.2 Maintenance Frequency

ITEM	PERIOD	RESPONSIBILITY	MAINTENANCE PROCEDURE
Inspection – Minor Maintenance	6 monthly and after major storms	Maintenance Contractor	Follow recommended procedure set out in Humes "Maintenance Procedure for Humeceptors
Inspection – Major Maintenance	12 monthly and after major storms	Maintenance Contractor	Follow recommended procedure set out in Humes "Maintenance Procedure for Humeceptors
Major Maintenance – Sediment Removal	12 monthly or as required (sediment depth 350mm)	Maintenance Contractor	Follow recommended procedure set out in Humes "Maintenance Procedure for Humeceptors

3.2.1 Enviropod Inserts

The maintenance frequency of the enviropods 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 3.3 below indicates the recommended inspection and maintenance frequency.

Table 3.3 Enviropods 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 Bio-retention Pond

Following its construction, the bio-retention pond should be inspected every 1 to 3 months (or after each major rainfall event) for the initial vegetation establishment period to determine whether or not the bio-retention zone requires maintenance, or the media requires replacement. The following critical items should be monitored:

- Ponding, clogging and blockage of the filter media;

- Establishment of desired vegetation/plants and density; and
- Blockage of the outlet from the bio-retention system.

After the initial establishment period (typically 1 to 2 years), inspections may be extended to the frequencies shown in the maintenance frequency table below.

If the bio-retention system is not maintained frequently, the entire filter media may need to be replaced due to clogging of the media material with fine particles. This can result in frequent maintenance being more cost effective in the long-term.

The following maintenance activities will be required with inspection frequencies shown in Table 3.4 below.

- Maintenance of flow to and through the system;
- Maintaining the surface vegetation;
- Preventing undesired overgrowth vegetation/weeds from taking over the area;
- Removal of accumulated sediments; and
- Debris removal.

The recommended maintenance frequency for the bio-retention pond is included in Table 3.4 below.

Table 3.4 Bio-retention Pond Maintenance Frequency

ITEM	PERIOD	RESPONSIBILITY	MAINTENANCE PROCEDURE
Inspection – Minor Maintenance	6 mths and after major storms	Maintenance Contractor	Debris clean out including surface of bio-retention, inlet, outlet and overflow
Inspection – Minor Maintenance	6 mths and after major storms	Maintenance Contractor	Trench surface vegetation. Trimming, weed infestation, erosion.
Inspection – Minor Maintenance	6 mths and after major storms	Maintenance Contractor	Dewatering between storms, top soil layer replacement or possibly entire media layer replacement
Inspection – Major Maintenance	1 year and after major storms	Maintenance Contractor	Pit and grate condition. Evidence of cracking or spalling of concrete structures. Evidence of erosion in downstream channel

3.2.3 Stormfilter

The recommended maintenance frequency for the Stormfilter device is included in Table 3.4 below.

Table 3.5 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 Leonay Golf course, Leonay Parade, Lenoay.

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 and bio-retention basins, 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 proposed SEPP housing for seniors or people with a disability.

Appendix 1

Stormwater Layout Plan

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