Proposed Darlington Public School Re-development

Stormwater Operation and Maintenance Plan (SOMP) Stormwater Quality Treatment System

Issued for:

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Report Amendment Register

Rev. No.	Date	Issue/Amendment	Prepared by	Reviewed by	Title
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Date: 19/04/2022

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Discipline: Civil

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1. Introduction

Meinhardt - Bonacci has been commissioned by A W Edwards to prepare this Stormwater Operation and Maintenance Plan (SOMP) to support the State Significant Development Application (SSDA) for Darlington Public School re-development at 417 Abercrombie Street Darlington within the City of Sydney Local Government Area. The proposed re-development consists of a new building to cater for increased population.

This report provides a summary of the Stormwater Operation and Maintenance Plan (SOMP) to ensure proposed stormwater quality measures remain effective. This OMP has been prepared to fulfil the Conditions of Consent in the SSD Draft Conditions D22 as outlined below:

D	22		**Stormwater Operation and Maintenance Plan**	Prior to the commencement of operation, an Stormwater Operation and Maintenance Plan (SOMP) is to be submitted to the Certifier along with evidence of compliance with the SOMP. The SOMP must ensure the proposed stormwater quality measures remain effective and contain the following: (a) maintenance schedule of all stormwater quality treatment devices; (b) record and reporting details; (c) relevant contact information; and (d) Work Health and Safety requirements.

2. Site Description

2.1 Location

The proposed development is located in Darlington, NSW and within City of Sydney local government area. The site is bounded by Abercrombie Street to the south, Golden Grove Street to the west, a two-storey building on the northwest of the site and a private driveway and a student accommodation to the east. Refer to Figure 1 for a locality and aerial map of the proposed development.

Figure 1 Locality and Aerial Map of the Site (Source: Nearmaps)

2.2 Proposed Re-development

The proposed development consists construction of a new building between 2 & 3 stories and new landscape areas and a new basketball court. To keep the school functioning during the time of construction, staging is proposed.

The proposed development will include the following civil engineering elements:

- Earthworks cut/fill.
- Stormwater drainage system cater for the major/minor storm events defined by City of Sydney Council Development Control Plan (DCP).
- Stormwater quantity control using on-site detention systems.
- Stormwater quality control system using stormfilter cartridges.
- Soil and water management strategies during construction phase.

2.3 Staging

The development is proposed to be undertaken in 3 stages. Early works includes the construction of a basketball court. Stage 1 involves the construction of a new building, while southern portion of the site remains untouched during Stage 1. Stage 2 involves the construction of a new building in the southwest corner of the site. Refer to Figure 2, Figure 3 and Figure 4 for staging extent.

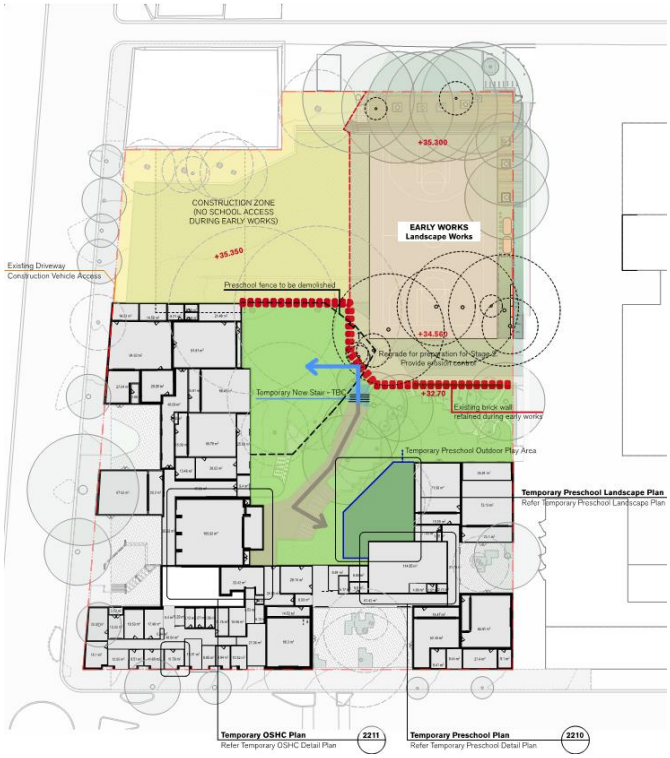


Figure 2 Early Works

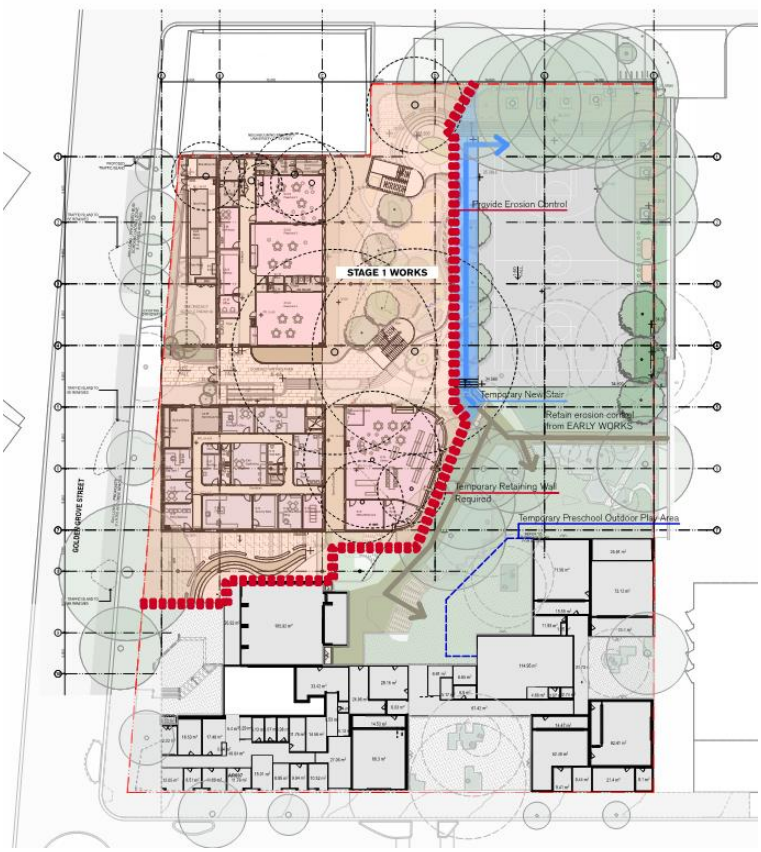


Figure 3 Stage 1 Works

Figure 4 Stage 2 Works

2.4 Water Quality

To protect the ecology of City of Sydney, it is expected that this development will require to satisfy the water quality requirements of City of Sydney Council. *Sydney City Council DCP 2012 Section 3* outlines that any development greater than 1000m^2 must undertake a stormwater quality assessment to demonstrate that the development will achieve the post development pollutant load standards indicated below (Figure 9):

(a) reduce the baseline annual pollutant load for litter and vegetation larger than 5mm by 90%;

(b) reduce the baseline annual pollutant load for total suspended solids by 85%;

(c) reduce the baseline annual pollutant load for total phosphorous by 65%; and

(d) reduce the baseline annual pollutant load for total nitrogen by 45%.

Figure 5 City of Sydney Pollution Reduction Target Rates (DCP 2012)

2.5 Water Quality Strategy

Proprietary water quality treatment products including Enviropods and stormfilter cartridges will be the main treatment measures to achieve Council's adopted pollutants reduction rates. Rainwater runoff from roof will be reticulated into the rainwater tank for landscape irrigation use. Rainwater re-use would also assist in meeting water quality requirements. The proposed development also demonstrates Water Sensitive Urban Design (WSUD), site constraints may not allow bio-retention, however other landscaped measures including swales and small raingarden(s) may be used as part of the water quality treatment train.

Final water quality control measures will not be in place until the completion of stage 2, however, the pollutant source from the existing land use within the stage 1 extent is a mixture of bitumen pavement and roof while the proposed stage 1 pollutant source is roof and landscape. Therefore, the change of land use already provides water quality improvement to the existing situation.

Above proposed water quality measures have been modelled using software MUSIC (version 6.3), the preliminary MUSIC layout is shown below in Figure 6.

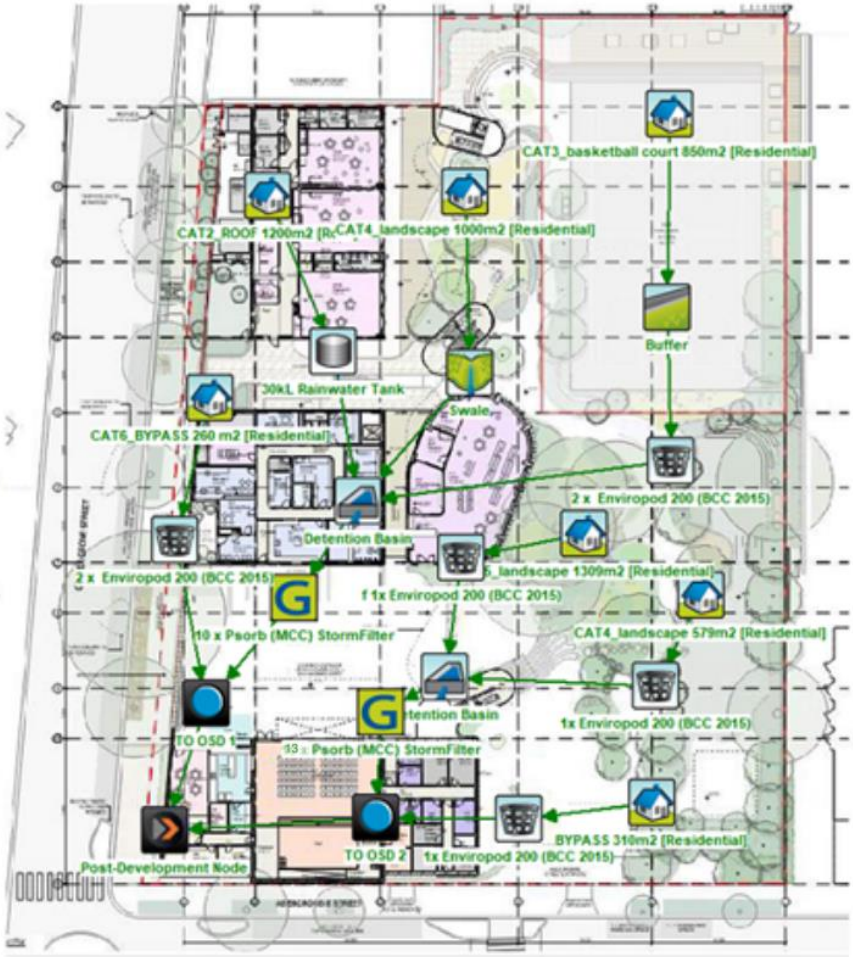
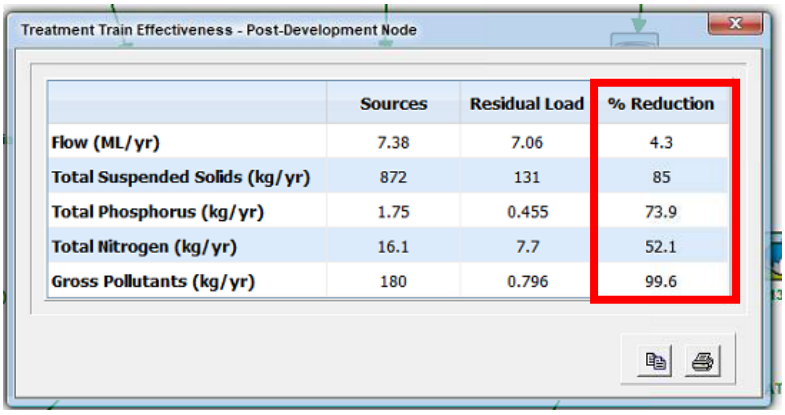


Figure 6 MUSIC Modelling Layout

The results of MUSIC modelling show that stormwater has been treated and the pollutant removal rate achieves pollutant reduction targets adopted by City of Sydney Council. The results from the MUSIC model are shown in Figure 11. City of Sydney Council MUSIC link report is in **Appendix B**. The MUSIC result also indicates that the 30kL rainwater can meet 95% of the reuse demand.



	Sources	Residual Load	% Reduction
Flow (ML/yr)	7.38	7.06	4.3
Total Suspended Solids (kg/yr)	872	131	85
Total Phosphorus (kg/yr)	1.75	0.455	73.9
Total Nitrogen (kg/yr)	16.1	7.7	52.1
Gross Pollutants (kg/yr)	180	0.796	99.6

Figure 5 MUSIC Modelling Results – Proposed Development with Final Water Quality Control Measures Installed

Given that the stormwater treatment device Stormfilter cartridges will be installed within the OSD tank, similar discussion of staging/lot consolidation applies to water quality system as they will not be available during stage 1 construction.

2.6 Drainage

The re-development will need to install a major/minor stormwater system. Pits and pipes will capture and convey run-off generated from minor storm events up to the 20 year average recurrence interval (ARI) in accordance with Educational Facilities Standards & Guidelines (EFSG). The final discharge points are split into the drainage system on Abercrombie Street and Golden Grove Street after being treated by water quality and water quantity measures. Figure 11 below shows the final drainage scheme.

The proposed basketball court with surrounding footpath and landscape will make connection to the existing drainage line. And eventually make connection to proposed stage 1 drainage system.

Early works and stage 1 drainage system will then make connection to the existing internal drainage line and eventually discharge via the kerb outlets to Abercrombie Street while stage 2 drainage system will partially make connection to the drainage system on Golden Grove Street after treated by OSD 1 and will partially discharge to Abercrombie Street via a single kerb outlet after treated by OSD 2.

A major system is also required for the proposed development in the form of overland flow paths. The major overland flow system is designed to convey flows surcharged from the underground drainage system for storm events up to and including 100 year ARI. The overland flow is to be directed away from the buildings towards the public road kerb and gutter system on Abercrombie Street provided that there are no adverse impacts on the downstream properties.

Refer to Figure 8 for overall stormwater drainage system layout and overland flow path for the final scheme.

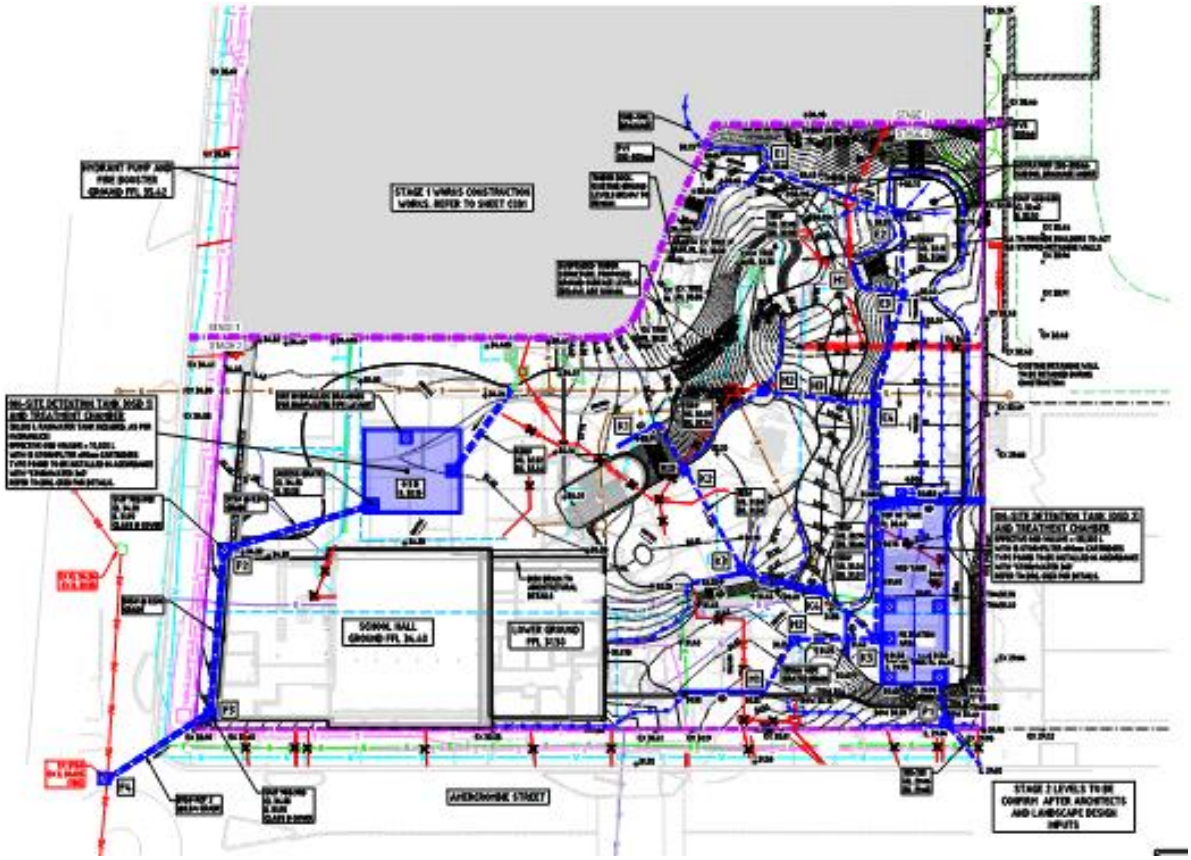


Figure 8 Stormwater Strategy - Plan

3. Stormwater Drainage and Stormwater Quality Treatment System

Location of Stormwater Quality Treatment System/Devices is shown in Fig.8 and detail as below.

– ON-SITE DETENTION TANK (OSD 1) AND TREATMENT CHAMBER
(30,000 L rainwater tank included, as per hydraulics) effective OSD 1 volume = 70,000 L
with 13 Stormfilter 690mm cartridges type PSORB to be installed in accordance with "stormwater 360' refer to Fig. 9.

- ON-SITE DETENTION TANK (OSD 2) AND TREATMENT CHAMBER
Effective OSD Volume = 120,000 L with 13 Stormfilter 690mm cartridges type PSORB to be installed in accordance with "stormwater 360' refer to Fig. 9.

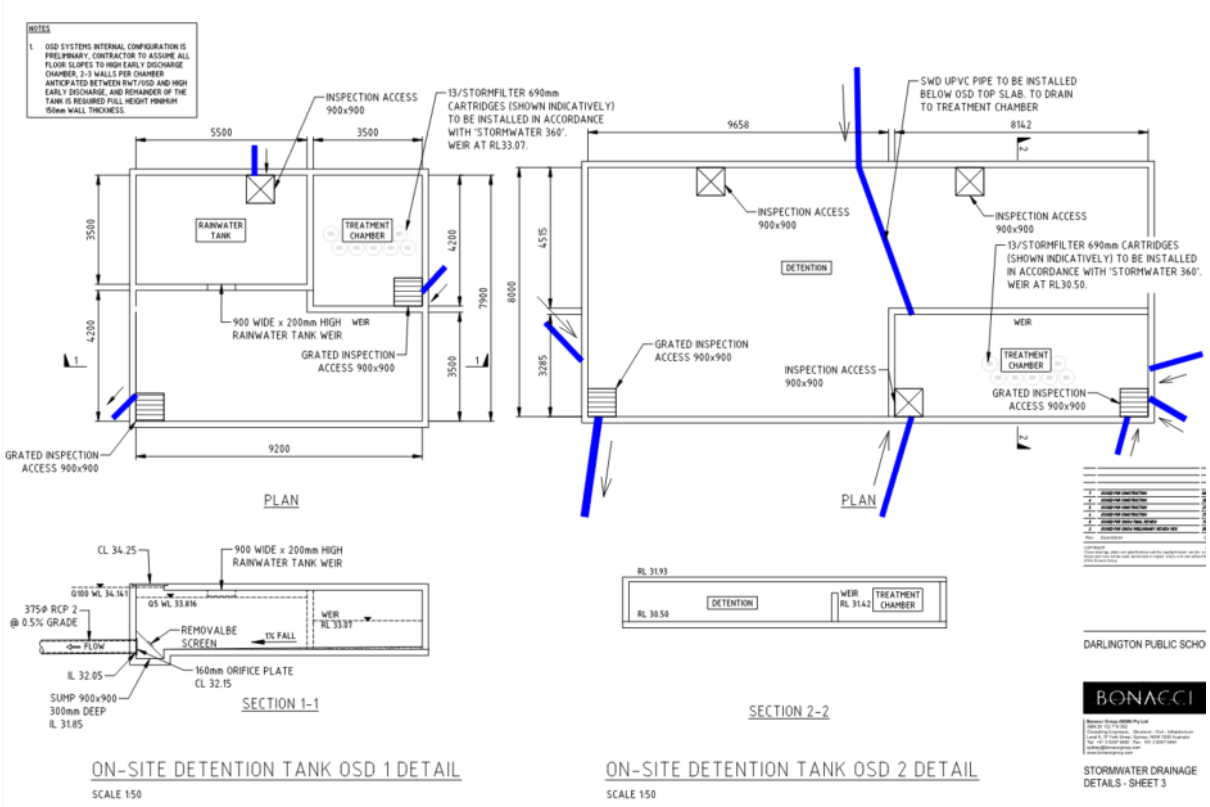


Figure 9 Stormwater Strategy – Details

4. Maintenance Schedule of Stormwater Quality Treatment Devices

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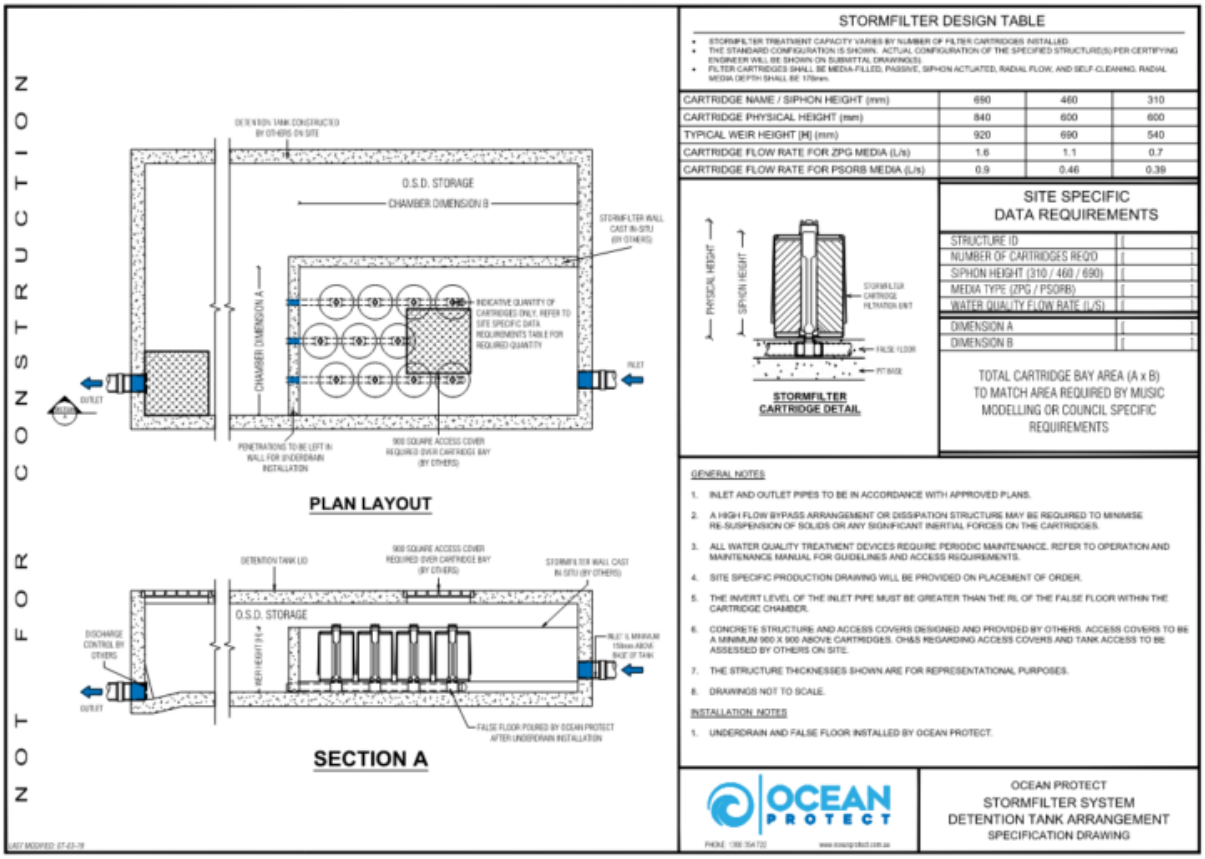


Figure 10 Stormwater Quality Treatment Devices

The primary purpose of stormwater treatment devices is to capture and prevent pollutants from entering waterways, maintenance is a critical component of ensuring the ongoing effectiveness of this process. The specific requirements and frequency for maintenance depends on the treatment device and pollutant load characteristics of each site. This manual has been designed to provide details on the cleaning and maintenance processes for the StormFilter as recommended by the manufacturer.

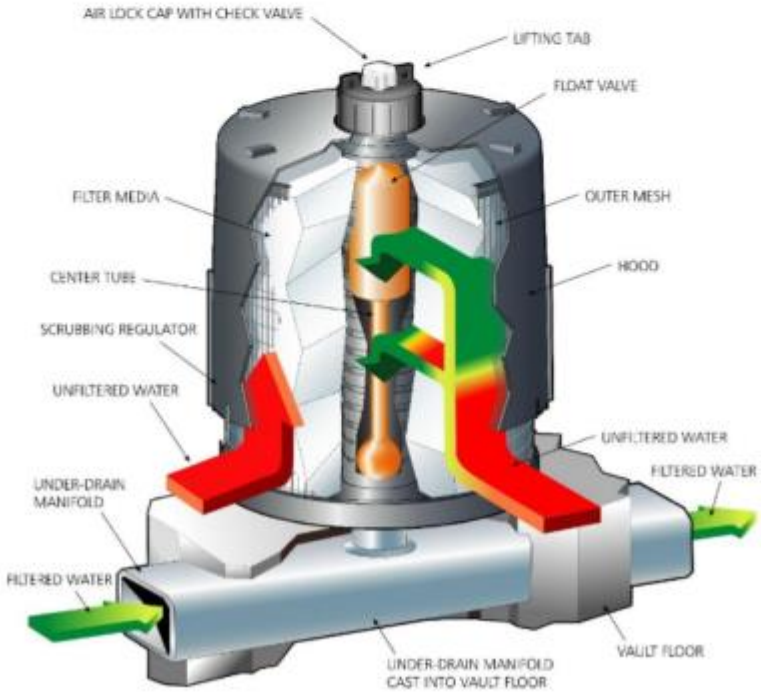
The StormFilter is designed and sized to meet stringent regulatory requirements. It removes the most challenging target pollutants (including fine solids, soluble heavy metals, oil, and soluble nutrients) using a variety of media. For more than two decades, StormFilter has helped clients meet their regulatory needs and, through ongoing product enhancements, the design continues to be refined for ease of use and improved performance.

Operational Overview

During a storm, runoff percolates through the filtration media and starts filling the cartridge central tube. The air inside the hood is purged through a one-way check valve as the water rises. When water reaches the top of the float, buoyant forces pull the float free and allow filtered water to exit the cartridge.

A siphon is established within each cartridge that draws water uniformly across the full height of the media profile ensuring even distribution of pollutants and prolonged media longevity.

As the storm subsides and the water level in the structure starts falling, a hanging water column remains under the cartridge hood until the water level reaches the scrubbing regulators at the bottom of the hood. Air then rushes through the regulators breaking the siphon and creating air bubbles that agitate the surface of the filter media causing accumulated sediment to settle on the treatment bay floor. This unique surface-cleaning mechanism helps prevent surface blinding and further extends cartridge life.



Why do I need to perform maintenance?

Adhering to the inspection and maintenance schedule of each stormwater treatment device is essential to ensuring that it functions properly throughout its design life.

During each inspection and clean, details of the mass, volume and type of material that has been collected by the device should be recorded. This data will assist with the revision of future management plans and help determine maintenance interval frequency. It is also essential that qualified and experienced personnel carry out all maintenance (including inspections, recording and reporting) in a systematic manner.

Maintenance of your stormwater management system is essential to ensuring ongoing at-source control of stormwater pollution. Maintenance also helps prevent structural failures (e.g. prevents blocked outlets) and aesthetic failures (e.g. debris build up), but most of all ensures the long term effective operation of the StormFilter.

Maintenance Procedures

To ensure optimal performance, it is advisable that regular maintenance is performed. Typically, the StormFilter requires an inspection every 6 months with a minor service at 12 months. Additionally, as the StormFilter cartridges capture pollutants the media will eventually become occluded and require replacement (expected media life is 1-3 years).

Primary Types of Maintenance

The table below outlines the primary types of maintenance activities that typically take place as part of an ongoing maintenance schedule for the StormFilter.

	Description of Typical Activities	Frequency
Inspection	Visual Inspection of cartridges & chamber Remove larger gross pollutants Perform minimal rectification works (if required)	Every 6 Months
Minor Service	Evaluation of cartridges and media Removal of accumulated sediment (if required) Wash-down of StormFilter chamber (if required)	Every 12 Months
Major Service	Replacement of StormFilter cartridge media	As required

Maintenance requirements and frequencies are dependent on the pollutant load characteristics of each site. The frequencies provided in this document represent what the manufacturer considers to be best practice to ensure the continuing operation of the device is in line with the original design specification.

Inspection

The purpose of the inspecting the StormFilter system is to assess the condition of the StormFilter chamber and cartridges. When inspecting the chamber, particular attention should be taken to ensure all cartridges are firmly connected to the connectors. It is also an optimal opportunity to remove larger gross pollutants and inspect the outlet side of the StormFilter weir.

Minor Service

This service is designed to ensure the ongoing operational effectiveness of the StormFilter system, whilst assessing the condition of the cartridge media.

1. Establish a safe working area around the access point(s)
2. Remove access cover(s)
3. Evaluate StormFilter cartridge media (if exhausted schedule major service within 6 months)
4. Measure and record the level of accumulated sediment in the chamber
   (if sediment depth is less than 100 mm skip to step 9)
5. Remove StormFilter cartridges from the chamber
6. Use vacuum unit to removed accumulated sediment and pollutants in the chamber
7. Use high pressure water to clean StormFilter chamber
8. Re-install StormFilter cartridges
9. Replace access cover(s)

Major Service (Filter Cartridge Replacement)

For the StormFilter system a major service is reactionary process based on the outcomes from the minor service, specifically the evaluation of the cartridge media.

Trigger Event	Maintenance Action
Cartridge media is exhausted[1]	Replace StormFilter cartridge media[2]

[1] Multiple assessment methods are available, contact Ocean Protect for assistance
[2] Replacement filter media and components are available for purchase from Ocean Protect.

This service is designed to return the StormFilter device back to optimal operating performance

1. Establish a safe working area around the access point(s)
2. Remove access cover(s)
3. By first removing the head cap, remove each individual cartridge hood to allow access to the exhausted media.
4. Utilise a vacuum unit to remove exhausted media from each cartridge
5. Use vacuum unit to remove accumulated sediment and pollutants in the chamber
6. Use high pressure water to clean StormFilter chamber
7. Inspect each empty StormFilter cartridges for any damage, rectify damage as required
8. Re-fill each cartridge with media in line with project specifications
9. Re-install replenished StormFilter cartridges
10. Replace access cover(s)

Additional Types of Maintenance

Occasionally, events on site can make it necessary to perform additional maintenance to ensure the continuing performance of the device.

Hazardous Material Spill

If there is a spill event on site, the StormFilter unit should be inspected and cleaned. Specifically, all captured pollutants and liquids from within the unit should be removed and disposed in accordance with any additional requirements that may relate to the type of spill event. Additionally, it will be necessary to inspect the filter cartridges and assess them for contamination, depending on the type of spill event it may be necessary to replace the filtration media.

Blockages

In the unlikely event that flooding occurs upstream of the StormFilter system the following steps should be undertaken to assist in diagnosing the issue and determining the appropriate response.

1. Inspect the upstream diversion structure (if applicable) ensuring that it is free of debris and pollutants
2. Inspect the StormFilter unit checking the underdrain manifold as well as both the inlet and outlet pipes for obstructions (e.g. pollutant build-up, blockage), which if present, should be removed.

Major Storms and Flooding

In addition to the scheduled activities, it is important to inspect the condition of the StormFilter after a major storm event. The focus is to inspect for damage and higher than normal sediment accumulation that may result from localised erosion. Where necessary damaged components should be replaced and accumulated pollutants should be removed and disposed.

Disposal of Waste Materials

The accumulated pollutants found in the StormFilter must be handled and disposed of in a manner that is in accordance with all applicable waste disposal regulations. When scheduling maintenance, consideration must be made for the disposal of solid and liquid wastes. If the filter media has been contaminated with any unusual substance, there may be additional special handling and disposal methods required to comply with relevant government/authority/industry regulations.

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Media Options

The StormFilter system has the ability to operate with a variety of media options. These options are designed to target site or regulatory specific requirements. The current range of options is as follows:

- PhosphoSorb™
- ZPG™
- Perlite

PhosphoSorb™ (PSorb) media is the most advanced option available and is suited to most applications. Produced locally in Australia by Ocean Protect, PSorb achieves the optimum combination of pollutant removal and cost-effective treatment.

PSorb is a lightweight Perlite-based media coated in activated alumina. It removes Total Suspended Solids and Nutrients including some soluble forms of both Nitrogen and Phosphorus. PSorb media was developed to improve not only performance but also to provide a longer service life and to reduce OH&S risk by drastically reducing cartridge weight.

5. Contact Information

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W: www.oceanprotect.com.au

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PO Box 75, Casula Mall NSW 2170

6. Work Health and Safety Requirements

Important

Only qualified personnel should maintain, operate and repair you Stormwater system. Any wiring of equipment should be performed by a qualified electrician.

Warning

Operation may cause injury. Take all necessary precautions, wear protective equipment, refer to Engineers Department. For your own safety, read all instruction manuals prior to working on equipment.

Safety Precautions

- Follow all "occupation, health and safety" regulations.
- Ensure maintenance personnel are aware of "Confined Spaces" guidelines, which must be followed.
- Make sure that there is sufficient oxygen and that there are no poisonous gases present.
- Check the explosion risk before wielding or using electric hand tools.
- Do not ignore health hazards. Observe strict cleanliness.
- Ensure that the lifting equipment (where required) is in good condition.
- All personnel who are to work with these systems should be vaccinated against diseases that can occur.
- Keep a first aid kit handy.

Health & Safety

Maintenace should be carried out by a competent contractor in accordance with the above procedures. Health and Safety at Work legislation and good building practice.

A warning notice should be visible at the top of each access shaft - 'danger, harmful fumes' and ' respirators should be worn in this tank.' Before entering persons must be qualified in accordance with 'confined space' requirements

Access to a StormFilter unit requires removing heavy access covers/grates, and it is necessary to enter into a confined space. Pollutants collected by the StormFilter will vary depending on the nature of your site. There is potential for these materials to be harmful. For example, sediments may contain heavy metals, carcinogenic substances or objects such as broken glass and syringes. For these reasons, all aspects of maintaining and cleaning your StormFilter require careful adherence to Occupational Health and Safety (OH&S) guidelines.

It is important to note that the same level of care needs to be taken to ensure the safety of non-work personnel. As a result, it may be necessary to employ traffic/pedestrian control measures when the device is situated in, or near areas with high vehicular/pedestrian activity.

Personnel health and safety

Whilst performing maintenance on the StormFilter, precautions should be taken in order to minimise (or, if possible, prevent) contact with sediment and other captured pollutants by maintenance personnel. The following personal protective equipment (PPE) is subsequently recommended:

- Puncture resistant gloves
- Steel capped safety boots
- Long sleeve clothing, overalls or similar skin protection
- Eye protection
- High visibility clothing or vest

During maintenance activities, it may be necessary to implement traffic control measures. Ocean Protect recommend that a separate site-specific traffic control plan is implemented as required to meet the relevant governing authority guidelines.

Whilst some aspects of StormFilter maintenance can be performed from surface level, there will be a need to enter the StormFilter system (confined space) during a major service. It is recommended that all maintenance personnel evaluate their own needs for confined space entry and compliance with relevant industry regulations and guidelines. Ocean Protect maintenance personnel are fully trained and carry certification for confined space entry applications.

7. Record and Reporting

MAINTENANCE SERVICE LEDGER	
MODEL No	
INSTALLATION ADDRESS	
INITIAL OPERATING DATE	
WORKING CAPACITY	
PRIMARY CHAMBER SPILL CAPACITY	
OIL ALERT PROBE trigger threshold	
MINUMUM MAINTENANCE FREQUENCIES	*ANNUALLY from the initial operational date or if indicated by the oil alert probe alarm*
Note: Oil Alert Probe alarm is triggered when fuel/oil hydrocarbons reaches 10% of primary chamber capacity.	

MAINTENANCE RECORD

SERVICE DATE	COALESCER FLUSHED	PRIMARY CHAMBER SEDIMENT REMOVED & HYDROCARBONS SKIMMED	SECONDARY CHAMBER SEDIMENT REMOVED & HYDROCARBONS SKIMMED	OIL ALERT PROBE CLEANED & ALARM CHECKED	SERVICE MANAGER NAME & SIGNATURE