



Powell Tolner & Associates Ltd

BELOW GROUND DRAINAGE MAINTENANCE PLAN

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1 Introduction

This document has been prepared to provide a maintenance methodology to the surface water drainage elements proposed for this development. If any discrepancies from manufactures guidance is encountered, the proprietary system guidance should be adopted.

Both the foul and surface water drainage systems are designed to be self-cleansing, albeit it is advised that regular maintenance is carried out to ensure the long-term efficiency of both networks. Of particular importance are the surface water drainage runs between the primary siphonic outlets and the outfall into the drains within North Street.

The drainage networks are comprised of drainage channels, vortex flow controls, cellular attenuation tanks, proprietary systems and areas of permeable paving along with connecting pipe network, manholes & inspection chambers. Refer to drawings 9865-PTA-XX-XX-DR-8100 for the proposed drainage layouts.

The service yards are laid to falls towards drainage channels that positively drain into the surface water system below. While localised ponding on these channels is expected within the higher intensity storms, frequent, or long-lasting ponding here is a sign that the system requires maintenance.

The warehouse roof is drained via primary and secondary siphonic rainwater pipes. The system is designed to drain 189mm/hr rainfall. The secondary system is designed to drain 95mm/hr rainfall, and discharges above ground through the tail pipe. The secondary system is only designed to be utilised in the higher intensity storm events, so water discharging from the secondary tail pipes in milder storms is a sign that the system requires maintenance. Refer to Sapoflow's drawings for further information on the Siphonic drainage system.

Any man-entry into the system and silt removal should be by trained personnel with adequate personal protective equipment. Approved safety procedures must be followed in accordance with the Health and Safety Act.

This drainage systems maintenance will be the responsibility of the project developer or by an appointed maintenance company and as such an appropriated maintenance regime should be implemented (as below).

2 Manholes, Inspection Chambers, Pipe Work, Drainage Channels & Gullies

The surface water drainage system should be inspected and maintained periodically, primarily to check for silt sedimentation within the system or ingress of any detritus or debris which would decrease system performance. Table 1 sets out the recommended maintenance actions and frequency.

It is particularly important that the main runs, outlets and storage structures are maintained frequently and failure to do so may result in flooding occurring within the site.

Maintenance schedule	Required action	Typical frequency
Regular Maintenance	Remove manhole and chamber covers to sewers and flow control on network– inspect to ensure water is flowing freely and that the water flow route is unobstructed. Remove debris and silt as required.	Half Yearly Undertake one of these inspections after leaf fall in autumn
Occasional Maintenance	None required	
Remedial Actions	Re-line or replace pipework if unable to clear blockages by jetting.	As required
Monitoring	Inspect chambers for build-up of silt and debris	Half yearly

Table 1 – Operation & maintenance requirements for pipe network, manholes & inspection chambers, drainage channels & gullies - Based on CIRIA SuDS Manual 2015

3 Vortex Flow Control

Vortex flow controls typically rely on their geometry to create a vortex within the device to restrict the flow rate to a specified design point.

These systems have a larger cross-sectional area than that of a comparable orifice that is sized for the same design point, reducing the risk of blockage.

Table 2 sets out the recommended maintenance actions and frequency.

Maintenance schedule	Required action	Typical frequency
Regular Maintenance	Inspect and identify if it is not operating correctly. If required, take remedial action.	Initially monthly for 3 months, then half yearly.
Remedial Actions	Repair/rehabilitate flow control.	As required.
Monitoring	Inspect chambers for build-up of silt and debris	Half yearly

Table 2 – Operation & maintenance requirements for vortex flow controls

4 Attenuation Tanks

Geocellular attenuation tanks are proposed, they are modular storage systems made with plastic units. These units can be assembled to achieve the required volume and usually on multiple layers. Generally, the units have 95% voids content and are used to create an efficient below ground structure to temporarily store surface water. The installed attenuation tank is by Stormmaster, refer to the manufacturers maintenance requirements for further info.

Table 3 sets out the recommended maintenance actions and frequency.

Maintenance schedule	Required action	Typical frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then annually.
	Remove debris from the catchment surface (where it may cause risks to performance).	Monthly.
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockages by sediment, algae or other matter; remove and replace surface infiltration medium as required.	Annually.
	Remove sediments from pre-treatment structures and/or internal forebays.	Annually, or as required.
Remedial Actions	Repair/rehabilitate inlets, outlets, overflows and vents.	As required.
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually
	Survey inside of tank for sediment build-up and remove if necessary.	Every 5 years or as required.

**Table 3 – Operation & maintenance requirements for attenuation storage tanks –
Based on CIRIA SuDS Manual 2015**

5 Porous Paved Area

The following Table 4 sets out the recommended maintenance actions and frequency for porous paved area. These areas should not be used as storage areas for topsoil, sand, etc without the use of a protective layer. The neglect of these areas is likely to reduce the efficiency of the means of drainage.

Maintenance schedule	Required action	Typical frequency
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surfaces from adjacent impermeable areas as this are is most likely to collect the most sediment.
Occasional Maintenance	Stabilise and mow contributing and adjacent areas.	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements.
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the surface.	As required
	Remedial works to any depressions, rutting and cracked considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping.	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Inspect for evidence of poor operation and/or weed growth -if required, take remedial action	Three-monthly, 48 hours after large storms in the first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies.	Annually
	Monitor inspection chambers	Annually

Table 4 – Operation & maintenance requirements for Porous Paved Area - Based on CIRIA SuDS Manual 2015

6 Proprietary Surface Water Treatment Devices

These are manufactured products to provide a treatment to the surface water by removing specific pollutants. The product installed is Hydroil by Marsh Industries.

In the event of a spillage, the separator should be emptied. Emptying should be undertaken by a registered waste removal company, experienced in separator emptying.

Every five years, the separator should be emptied and given a general inspection to test its integrity and performance, after which the separator must be refilled with clean water.

A detailed log should be kept up when the separator has been inspected, maintained, emptied and serviced, along with records of any specific events relating to the system such as cleaning, spillages.

Failure to carry out the maintenance may result in pollution of the environment.

Table 5 sets out the recommended maintenance actions and frequency. Manufacturer guidance/recommendations should always be used when available.

Maintenance schedule	Required action	Typical frequency
Regular Maintenance	Remove litter and debris and inspect for sediment, oil and grease accumulation.	Monthly for 3 months, then annually.
	Change the filter media.	As recommended by manufacturer.
	Remove sediment, oil grease and floatables.	As necessary – indicated by system inspections or immediately following significant spill.
Remedial Actions	Replace malfunctioning parts or structures.	As required.
Monitoring	Inspect for evidence of poor operation.	Biannually
	Inspect filter media and establish appropriate replacement frequencies.	Biannually
	Inspect sediment accumulation rates and establish removal frequencies.	Monthly during first half year of operation, then every six months.

Table 5 – Operation & maintenance requirements for proprietary surface water treatment systems - Based on CIRIA SuDS Manual 2015

7 Construction Stage

All recently installed drainage is to be checked at least once weekly via walkover survey during the full period of construction. All excess silts and debris to be removed and disposed of appropriately. Temporary covers to be installed in order to avoid any site debris entering the newly installed chambers, linear channel drains & pipework. Excavated materials should be placed in such a manner that any instability will not result in them directly entering the drainage network.