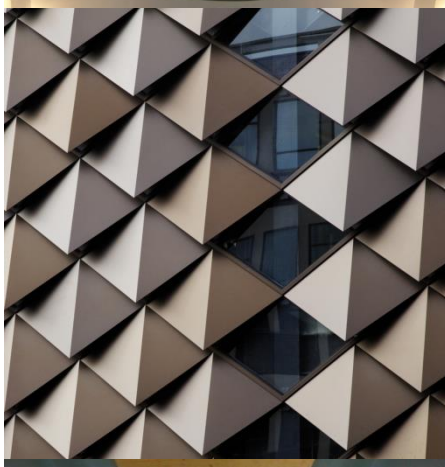

SEND School, Scunthorpe

SuDS Operations and Maintenance Manual

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Table of Contents

1.0 Introduction

1.1 Project Background

Curtins Consulting Limited has been appointed by Morgan Sindall Construction & Infrastructure Ltd to prepare a SuDS Operations and Maintenance Manual for the proposed SEND school. Particular reference is paid to the inspection, aftercare and maintenance of SuDS features as part of this manual in order to demonstrate to the Lead Local Flood Authority (LLFA) or adopting authority the effectiveness and longevity of the SuDS features designed within the scheme as opposed to the standard Building Regulations, local and domestic drainage and/or the main discharge drainage connections to 'Sewers for Adoption' standards.

This report is based on current best practice guidance.

Proposals contained or forming part of this report represent the design intent and may be subject to alteration or adjustment in completing the detailed design for this project. Where such adjustments are undertaken as part of the detailed design and are deemed a material derivation from the intent contained in this document, prior approval shall be obtained from the relevant authority in advance of commencing such works.

In accordance with the FRA the surface water network has been designed to accommodate the 1 in 100 year storm rainfall event plus an allowance for climate change. It may be that the exceedance flows above the 1 in 30 year storm rainfall event are stored within the site partially above ground, on non-habitable external landscaping, parking or other space. As the flows are generally being attenuated on site and within SuDS features there will be a period after storm events where the network will still be partially or fully surcharged and draining down. Where this surcharging is still present after 48 hours appropriate action should be taken as noted below. As such the responsibility for maintaining the features will be clearly defined, and consistency is carried through from conception to maintenance.

1.2 Scope of O&M Manual

This manual is intended to give an overview of the operation and maintenance for the range of SuDS features included within the drainage strategy and in relation to the typical details only. Where proprietary products are specified the manufacturers' instructions and recommendations should be followed in priority to this document unless specifically noted otherwise due to project constraints.

The recommended operations and frequencies are typical only and should be more frequent initially to ensure that there are no unforeseen issues with the operation and then adjusted to suit the site requirements.

2.0 Attenuation Tank (Geo-cellular Units)

2.1 Location and Description

The attenuation tank is located to the north of the development under the proposed MUGA pitch, as shown on drainage strategy drawings FS0903-CUR-XX-XX-DR-C-920010 to FS0903-CUR-XX-XX-DR-C-920015.

The tank has been designed in accordance with CIRIA C753 and the product specific requirements.

A typical arrangement is shown on the construction details drawings FS0903-CUR-XX-ZZ-DR-C-920201 to FS0903-CUR-XX-ZZ-DR-C-920203.

Geo-cellular units are proprietary products and therefore manufacturer's recommendations should also be taken into consideration. Additionally, different manufacturers may have different connection types and arrangements which will need to be taken into consideration.

2.2 Operation

The attenuation tank is intended to be the surface water storage feature to attenuate the discharge from the site up to and including the 1 in 100 year plus event with an allowance for climate change. As such during rainfall events the basin will fill completely. The tank is intended to be empty between rainfall events.

Access for maintenance has been provided through the central filter drain with the units being effectively sealed laterally preventing the ingress of deleterious material. The main maintenance of this central filter drain should be undertaken in accordance with the filter drain section.

2.3 Inspection and Maintenance Regime

Regular inspection and maintenance is important for the effective operation of attenuation tanks as designed. As the feature is buried a regularly inspection regime is very important to ensure the correct functionality of the surface water drainage network. Maintenance responsibility for the attenuation tank and its surrounding area should be placed with the School.

Sediment/material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols, especially where run-off is taken from potentially contaminated areas such as car parks/service yards.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required)	Inspect inlets, outlets and overflows for blockages, and clear if required. If faults persist jetting and CCTV survey may be required.	Monthly and after large storms.
	Check penstocks and other mechanical devices (if present).	Half yearly.
	Inspect ventilation cowl (if present)	Monthly and after large storms.
Regular maintenance\inspection	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six monthly.
	Debris removal from catchment surface (where may cause risks to performance)	Monthly.
	Where rainfall infiltrates into blocks from above, check surface of filter for blockage by silt, algae or other matter. Remove and replace surface infiltration medium as necessary.	Monthly (and after large storms).
	Remove sediment from pre-treatment structures	Annually (or as required after heavy rainfall events).
Remedial actions	Repair/rehabilitation of inlets, outlet, overflows and vents.	As required.

3.0 Filter Strips, French Drains and Under-drained Swales

3.1 Location and Description

Filter strips, French drains and under-drained swales are located as shown on drainage strategy drawings FS0903-CUR-XX-XX-DR-C-920010 to FS0903-CUR-XX-XX-DR-C-920015.

A typical arrangements of each system being used are shown on the construction details drawings FS0903-CUR-XX-ZZ-DR-C-920201 to FS0903-CUR-XX-ZZ-DR-C-920203.

3.2 Operation

The filter strips, French drains and under drained swales are intended to be the surface water conveyance, water quality and attenuation storage features. These features are intended to be dry except during rainfall events.

The surface water should permeate through the upper layer of the feature in to the permeable stone below. The water is then collected and conveyed in the perforate pipe within the aggregate trench.

Access for maintenance has been provided through access chambers and rodding points.

3.3 Inspection and Maintenance Regime

Regular inspection and maintenance is important for the effective operation of the features. Maintenance responsibility for the features and their surrounding area should be placed with the School.

Plant management, to achieve the required habitat/appearance, should be specified clearly in a maintenance schedule by the Landscape Architect planned to coincide with other site-wide maintenance operations.

Sediment/material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols, especially where run-off is taken from potentially contaminated areas such as car parks/service yards.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required)	Inspect feature surface to identify evidence of erosion, compaction, ponding, sedimentation and contamination.	Half-yearly and after large storms.
	Check feature surface for even gradients.	Half-yearly.
	Inspect gravel diaphragm trench upstream of filter strip for clogging.	Half-yearly.
	Inspect silt accumulation rates and establish appropriate removal frequencies.	Half-yearly.
Regular maintenance\inspection	Litter and debris removal.	Monthly or as required.
	Grass cutting (to maintain grass height within Landscape Architect's specified design range).	To be confirmed by Landscape Architect [monthly (during growing season) or as required]
	Manage other vegetation and remove nuisance plants/dead growth.	Monthly (at start, then as required).
	Remove sediment from main channel.	Annually (or as required after heavy rainfall events).
Occasional maintenance	Check for poor vegetation growth due to lack of sunlight or dropping of leaf litter, and cut back adjacent vegetation where possible.	Annually, or as required. As per Landscape Architect's specification.
	Re-seed areas of poor vegetation growth (seed mix to landscape architect's specification).	Annually, or as required. As per Landscape Architect's specification.

Remedial actions	Repair of erosion or other damage by re-seeding or re-turfing. Soil reinforcement such as coir matting should be used and staked in. accordance with manufacturer's instructions.	As required.
	Realignment of flow channel/dished surface.	As required.
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface.	As required.
	Re-level uneven surfaces and reinstate design levels. This may be required as part of sediment removal.	As required.
	Replace geotextiles, clean and replace filter media, if clogging occurs.	As required. Check manufacturer's product lifespan (Terram 1000 typical design life is 25 years).
	Excavate trench walls to expose clean soils if infiltration performance reduces to unacceptable levels.	As required.

4.0 Permeable Pavements

4.1 Location and Description

The permeable pavements are located as shown on drainage strategy drawings FS0903-CUR-XX-XX-DR-C-920010 to FS0903-CUR-XX-XX-DR-C-920015 and the proposed paving plan drawing FS0903-CUR-XX-XX-DR-C-900020

The permeable pavements have/will be designed in accordance with CIRIA C753 and BS7533-13.

A typical arrangements of each system being used are shown on drawing FS0903-CUR-XX-XX-DR-C-900010.

Permeable pavements contain proprietary products and as such where used the manufacturer's recommendations should be followed.

4.2 Operation

The permeable pavements are intended to be water quality and attenuation storage features. These features are intended to be dry except during rainfall events. The permeable pavements may also be utilised as an infiltration area or soakaway for other areas of the development.

The surface has been designed to be porous or to contain gaps where rain can flow through the upper construction layers into the voided stone which makes up the sub-base. Where these features are intended to be used as infiltration devices or soakaways any capping also needs to be permeable to permit the flows to the formation.

Access for maintenance is not provided as this is a surface feature only.

4.3 Inspection and Maintenance Regime

Regular inspection and maintenance is important for the effective operation of the pervious pavement. Maintenance responsibility for the pavement and its surrounding area should be placed with School.

Sediment/material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols, as run-off is taken from potentially contaminated areas such as car parks/service yards.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required)	Initial inspection.	Monthly for three months after installation.
	Inspect for evidence of poor operation and/or weed growth. If required, take remedial action.	3-monthly, 48 hours after large storms.
	Inspect silt accumulation rates and establish appropriate brushing frequencies. Silt can also be caused by adjacent landscaping areas which should be profiled to provide a flat area or berm adjacent to the paving.	Annually.
	Monitor inspection chambers.	Annually.
Regular maintenance\inspection	Brushing and vacuuming.	Three times/year at end of winter, mid-summer, after autumn leaf fall, or as required based on site-specific observations of clogging or manufacturers' recommendations.
Occasional maintenance	Stabilise and mow contributing and adjacent areas.	As required and as per Landscape Architect's specification.
	Removal of weed.	As required.
Remedial actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving.	As required.
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to	As required.

	the structural performance or a hazard to users.	
	Rehabilitation of surface and upper sub-structure. This could include replacement of the jointing and bedding material. The upper geotextiles layer may also need replacing if clogged.	As required (if infiltration performance is reduced as a result of significant clogging). Check manufacturer's product lifespan.

5.0 Pipes (Including Oversized) & Manholes

5.1 Location and Description

Pipes are the main conveyance system across the site with the network as shown on drainage strategy drawings The permeable pavements are located as shown on drainage strategy drawings FS0903-CUR-XX-XX-DR-C-920010 to FS0903-CUR-XX-XX-DR-C-920015.

Typical details for pipe bedding and drainage detailing are shown on drawing FS0903-CUR-XX-ZZ-DR-C-920201 to FS0903-CUR-XX-ZZ-DR-C-920203.

Pipes are proprietary products and the materials can vary across the site and as such where used the manufacturer's recommendations should be followed. Regardless of the product used the pipes will be fully compliant with the Curtins' drainage specification.

5.2 Operation

Pipes are intended to be the main conveyance system across the development and where oversized they form the attenuation volume required by the limitation of the discharge rate. They are intended to be dry except for during rainfall events. These have been designed to be self-cleansing where possible for smaller diameter pipes, and for larger diameters the risk is reduced due to the overall pipe size.

Access for maintenance is provided through access chambers, manholes, rodding plates and rodding eyes.

5.3 Inspection and Maintenance Regime

Regular inspection and maintenance is important to identify areas which may have been obstructed/clogged and may not be draining correctly, thus exposing the development to a greater level of flood risk. Maintenance responsibility for the pipes should be placed with School.

Sediment/material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols, as run-off is taken from potentially contaminated areas such as car parks/service yards.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required)	Initial inspection should be provided as post construction CCTV survey.	N/A
	Inspect for evidence of poor operation via water level in chambers. If required, take remedial action.	3-monthly, 48 hours after large storms.
Occasional maintenance	Check and remove large vegetation growth near pipe runs.	6-monthly.
Remedial actions	Rod through poorly performing runs as initial remediation.	As required.
	If poor performance persists, jet and CCTV survey poorly performing runs.	As required.
	Seek advice as to remediation techniques suitable for the type of performance issue and location.	As required If the above does not improve performance.

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