

Connell Co-op College,
Manchester

SuDs Operations and
Maintenance Manual

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1.0 Introduction

1.1 Project Background

Key GeoSolutions Ltd has been appointed by Darwin Group to prepare a SuDS Drainage Operations and Maintenance Manual as supplementary to the SuDs Drainage Strategy for the proposed extension of the existing Connell Co-op College, Manchester. Particular reference is paid to the inspection, aftercare and maintenance of SuDS drainage features as part of this manual in order to demonstrate to the LLFA 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 DCG 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 and construction for this project. Where such adjustments are undertaken 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 of 40% for climate change. As the flows are generally being attenuated on site and within SuDS features there will be a period of time after storm events where the network is still partially or fully surcharged and is draining down. Where this surcharging is still present after 48hrs appropriate action should be taken as noted below.

The development makes modifications to the existing private drainage network to accommodate the proposed development. Therefore, whilst this manual is focused on the new development aspects of the inspection and maintenance should be applied to the existing network to ensure the functioning in perpetuity of the whole system.

Surcharging within the public surface water network may cause water levels within the private system to remain high. This may be indicated by water emerging or failing to drain within the public highways network. No opening up works, or maintenance, should be undertaken on the public sewerage network unless explicitly stated by the Sewerage Undertaker. Any issues thought to be caused offsite should be referred to United Utilities for their action, or to the Local Authority for issues with highways drainage such as road gullies.

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 with the drainage strategy and in relation to typical details only. Where proprietary products are specified the manufacturer's 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.

As the school is a private single site the operations and maintenance should be the responsibility of the school. This can be outsourced to a third-party management company, but the ultimate responsibility will lie with the school for the correct operation and maintenance once the initial snagging period has been completed. During construction, the operations and maintenance will be the responsibility of the Main Contractor.

2.0 Attenuation Tank (Geocellular Units)

2.1 Location and Description

The attenuation tanks are located to the north east and east of the proposed school building with one under the proposed playground, and one to the south east of the proposed playground, as shown on drainage strategy drawing DR001.

The tank has/will be designed in accordance with CIRIA C753 and C737.

A typical arrangement is shown on drawing DR004.

Geocellular 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 in to consideration, with the original design intent being via a lateral filter drain and as such section 3.0 should also be referred to in maintaining the tank.

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 40% climate change event. As such during rainfall events the tank will fill to a maximum. The tank is intended to be empty between rainfall events.

Direct access for maintenance is not required as it is intended to be separated by the filter drain and geotextile to prevent the ingress of deleterious materials. This also reduces the maintenance requirements down to the relatively smaller area of the filter drain. Only once operational issues with the filter drain have been assessed does the tank need to be considered for maintenance.

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 regular inspection regime is very important to ensure the correction functionality of the surface water drainage network.

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.
	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
	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

3.1 Location and Description

The features are located to the side of the attenuation tanks, under the hard standing to the south and east parking areas, and under the rain garden, as shown on drainage strategy drawing DR001.

The features have/will be designed in accordance with CIRIA C753.

A typical arrangement is shown on drawing DR004.

3.2 Operation

The filter strips and French drains 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.

For the hardstanding, car parking, and rain garden areas the surface water should permeate through the upper layer of the feature into the permeable stone of the filter trench 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 at the top and or bottom of the run.

3.3 Inspection and Maintenance Regime

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.

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
	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)
Remedial actions	Replace geotextiles and clean and replace filter media, if clogging occurs. Terram 1000 typical design life is 25 years.	As required.
	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 to the south and east of the development including the new hardstanding and car parking, as shown on drainage strategy drawing DR001.

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

A typical arrangement is shown on drawing DR003.

Permeable pavements in both the car park and hardstanding contain proprietary products and as such where used the manufacture'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 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 subbase.

Access for maintenance is provided as these are open surface features with the car park accessible by vehicles and the hardstanding is open around the building.

4.3 Inspection and Maintenance Regime

Regular inspection and maintenance is important for the effective operation of the pervious pavement.

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.

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	Annually.

	caused by adjacent landscaping areas which should be reprofiled to provide a flat area or berm adjacent to the paving.	
	Monitor inspection chambers.	Annually.
Regular maintenance\inspection	Brushing and/or 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 the structural performance or a hazard to users.	As required.
	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 and Terram 1000 has a life span of 25 years.	As required (if infiltration performance is reduced as a result of significant clogging).

5.0 Pipes (Including Oversized), Linear Channels & Manholes

5.1 Location and Description

Pipes are the main conveyance across the site with the network as shown on drainage strategy drawing DR001.

A typical details for pipe bedding and detailing are shown on drawings DR003 and DR004.

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

5.2 Operation

Pipes are intended to be the main conveyance 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 drainage correctly thus exposing the development to a greater level of flood risk.

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.

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 continued poor performance 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 above does not improve performance.

6.0 Flow Control Chambers

6.1 Location and Description

The flow control chamber is located to the south of the proposed building in chamber SW10, as shown on drainage strategy drawing DR001.

A typical detail for the flow control chamber is shown on drawing DR004.

Flow control chambers are proprietary products and as such where used the manufacture's recommendations should be followed. Regardless of the flow control used it will be fully compliant with the drainage specification.

6.2 Operation

Flow control chambers are intended to restrict the surface water runoff discharge rate from the site to a designed rate utilising techniques such as an orifice plate, vortex separator or mechanical float control.

The flow control chamber includes a high level overflow which should only flow in very extreme events (less than 1% probability in any one year including an allowance for climate change) or where the adopted network downstream is having capacity issues. Therefore where regular activation of this overflow has been identified this should be reported to the Sewerage Undertaker so that they can investigate their network.

6.3 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.

Once a large storm event has passed it may be necessary to remove the sediment/material to allow the flow control to operate correctly. The integral bypass penstock valve will discharge blocked water within the chamber to allow for safe entry and maintenance of the flow control chamber.

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.

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	Open penstock when poorly performing runs as initial remediation. Inspect and rectify any issues found.	As required.
	If continued poor performance 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 above does not improve performance.

7.0 Rain Garden

7.1 Location and Description

The rain garden is located to the north of the site between the proposed building and the north of the proposed playground, as shown on drainage strategy drawing DR001.

A typical detail for the rain garden is shown on drawing DR004, with further details provided by the Landscape Architect on drawing 1235-01.

7.2 Operation

The rain garden 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 40% climate change event. As such during rainfall events the area is intended to fill with water, but slowly percolate through the material below. Where the rate of water entering the feature exceeds the infiltration rate a high-level overflow has been included as a direct connection to the carrier drain below. The rain garden is intended to be dry in between rainfall events.

Access for maintenance has been provided through the adjacent paths. Minimum side slopes of 1 in 3 are provided for landscape maintenance with the feature being shallow.

7.3 Inspection and Maintenance Regime

Regular inspection and maintenance is important for the effective operation of rain gardens as designed and to maintain a high quality biodiversity space. Maintenance responsibility for the rain garden and its surrounding area will be with the school or appointed body on their behalf.

Regular mowing in and around rain garden is required only along maintenance access routes, amenity areas (eg footpaths), across embankments and across the main storage area. The remaining areas can be managed as “meadow”, unless additional management is required or desired for landscaping purposes. Low flow channels, if desired, can be managed with less frequent mowing to improve water quality and increase ecological value.

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
Regular maintenance\inspection	Remove litter and debris	Monthly
	Cut grass – meadow grass in and around basin	Half yearly (spring – before nesting season, and autumn)
	Manage other vegetation	Monthly (at start, then as required).
	Inspect high-level overflow for blockages and clear if required.	Monthly
	Inspect banksides for evidence of physical damage	Monthly
Occasional maintenance	Re-seed areas of poor vegetation growth	As required
	Prune and trim any trees and remove cuttings	Every 2 years, or as required
	Remove sediment from main basin when required	Every 5 years, or as required (likely to be minimal)
Remedial actions	Repair of erosion or other damage by re-seeding or re-turfing	As required.
	Repair/rehabilitation of inlets, outlets and overflows. Reference should be made to original design details.	As required.
	Re-level uneven surfaces and reinstate design levels. This may be required as part of sediment removal.	As required.

Appendix

Appendix A – Drainage Layout, Drainage Details, O&Ms Layout