Proposed

Management & Maintenance Plan

for

SUDS and Attenuation Elements

Planning Reference SD22A/0391

Proposed Extension and Alterations

to

Existing Motor Showroom & Workshop

February 2023

ALAN CLARKE
& ASSOCIATES
consulting civil & structural engineers
PROJECT MANAGERS

ALAN CLARKE & ASSOCIATES
CASTLEBLAYNEY ENTERPRISE CENTRE, DUBLIN ROAD, CASTLEBLAYNEY, CO MONAGHAN
t: 042 9740071 e: info@alanclarke.ie

Proposed Management & Maintenance Plan for SUDS & Attenuation Elements

SuDs Layout & Proposed Drainage System

The proposed surface water collection system will consist of a piped drainage network discharging surface water from permeable paved areas, roads and rainwater pipes as shown on the proposed site layout drawing prepared by Alan Clarke & Associates (drawing number 22164-500 Rev P2). The runoff from all existing and proposed road surfaces is routed through SuDs features consisting of permeable block paving, an isolator/filtration cell contained in the attenuation system, and bio-retention tree pits This will have the effect of reducing the rate of runoff into the existing and new surface water drainage network, and attenuating surface water runoff as close as possible to the source of runoff. The proposed permeable block paving will allow and encourage infiltration to the existing subsoils to occur.

The surface water discharge from the site will be restricted by means of hydrobrake flow restrictors and attenuation chambers will be provided to store the excess surface water during storm periods. Detailed calculations and proposals for the piped drainage system and attenuation have been provided as part of the original planning application.

Maintenance Requirements & Proposals

In order for the surface water drainage system to function correctly in the long term, it is essential that a programme of regular maintenance of the SuDs features, collection and attenuation elements of the system is carried out. The principal elements for which maintenance is required are the permeable paved areas, collection elements such as trapped gullies at rainwater pipes, channel drains along with any necessary maintenance and sediment removal from the attenuation chambers.

All collection elements, which are the first line of defence for avoiding sedimentation in the surface water system, should be inspected on a six-monthly basis. This includes all, gully traps at rainwater pipe and sumps in channel drains. These should be emptied and cleaned once they are at or over 60% full.

The piped conveyance system is designed to ensure minimum self-cleansing velocities and should require little or no ongoing maintenance.

Regular maintenance of the permeable block paving surfaces will be required on an ongoing monthly basis, in order to keep these surfaces free of leaves and debris and ensure the

ALAN CLARKE & ASSOCIATES
CASTLEBLAYNEY ENTERPRISE CENTRE, DUBLIN ROAD, CASTLEBLAYNEY, CO MONAGHAN
t: 042 9740071 e: info@alanclarke.ie

efficiency of the pavement. Any necessary structural repairs should be carried out as necessary to maintain adequate performance.

The site attenuation will be provided by means of a series of chambers arranged in rows. These chambers are open along their length and incorporate an 'isolator row' in their construction through which all of the first flush rainfall enters the attenuation system. It is this first flush rainfall which carries the sediment entering the system. A manhole is constructed at each end of the isolator row which allows for access and maintenance of this row including removal of sediment. A copy of the operation and maintenance manual from the system manufacturer is appended to this report detailing how this isolator row functions and how it is cleaned and maintained.

Grit, debris and silt removal should be carried out by suction cleaning after temporary closing off of the outlet pipe from the system at the downstream manhole to prevent sediment from the cleaning process exiting the system into the public sewers.

All cleaning and maintenance of the system will be carried out by a specialist drain cleaning company with appropriate equipment and experienced personnel. All silt, grit and debris will be disposed of to a licensed waste management facility.

Construction Phase

Following completion of the construction of the piped drainage system and associated manholes, attenuation etc and prior to their connection to the public sewer network, the pipes and manholes will be cleaned by a specialist drain cleaning contractor and the wash water removed by suction pumping. This will be completed prior to the drainage system being made operational and opened to the public drainage system. This will ensure that the public sewer will not become an outlet for the cleaning water and associated sediment etc.

ALAN CLARKE & ASSOCIATES
CASTLEBLAYNEY ENTERPRISE CENTRE, DUBLIN ROAD, CASTLEBLAYNEY, CO MONAGHAN
t: 042 9740071 e: info@alanclarke.ie

Maintenance & Safety Data Sheets

(Hydro-Brake and Attenuation System)

ALAN CLARKE & ASSOCIATES
CASTLEBLAYNEY ENTERPRISE CENTRE, DUBLIN ROAD, CASTLEBLAYNEY, CO MONAGHAN
t: 042 9740071 e: info@alanclarke.ie

HYDRO-BRAKE® FLOW CONTROL
MAINTENANCE AND SAFETY DATA SHEET

MAINTENANCE

Normally, little maintenance is required as there are no moving parts within the Hydro-Brake® Flow Control. Experience has shown that if blockages occur they do so at the intake, and the cause on such occasions has been due to a lack of attention to engineering detail such as approach velocities being too low, inadequate benching, or the use of units below the minimum recommended size. Hydro-Brake® Flow Controls are fitted with a pivoting by-pass door, which allows the manhole chamber to be drained down should blockages occur. The smaller type conical units, below the minimum recommended size, are also supplied with roding facilities or vortex suppressor pipes as standard.

Following installation of the Hydro-Brake® Flow Control it is vitally important that any extraneous material i.e. Building materials are removed from the unit and the chamber. After the system is made live, and assuming that the chamber design is satisfactory, it is recommended that each unit be inspected monthly for three months and thereafter at six monthly intervals with hose down if required. If problems are experienced please do not hesitate to contact the company so that an investigation may be made.

Hydro-Brake® Flow Controls are typically manufactured from grade 304 Stainless Steel which has an estimated life span in excess of the design life of drainage systems.

COSHH

Hydro-Brake® Flow Controls are manufactured from Stainless Steel, which is not regarded as hazardous to health and exhibits no chemical hazard when used under normal circumstances for the stated applications.

MANUAL HANDLING

The handling of Hydro-Brake® Flow Controls should be in accordance with current legislation and regulations:

- The Health and Safety at Work Act 1972.
- The Management of Health and Safety at Work Regulations 1992.
- The Manual Handling Operations Regulations 1992.

All published and printed by the Health and Safety Executive.

StormTech®

Detention • Retention • Recharge

Subsurface Stormwater Management℠

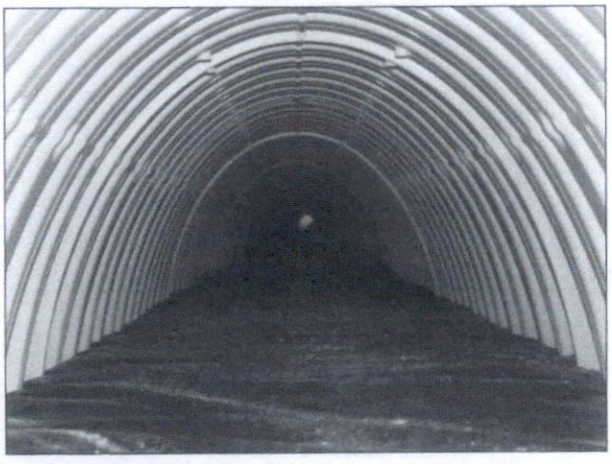
Isolator™ Row O&M Manual

StormTech® Chamber System for Stormwater Management

1.0 The Isolator™ Row

1.1 INTRODUCTION

An important component of any Stormwater Pollution Prevention Plan is inspection and maintenance. The StormTech Isolator Row is a patent pending technique to inexpensively enhance Total Suspended Solids (TSS) removal and provide easy access for inspection and maintenance.



Looking down the Isolator Row from the manhole opening, woven geotextile is shown between the chamber and stone base.

1.2 THE ISOLATOR™ ROW

The Isolator Row is a row of StormTech chambers, either SC-740 or SC-310 models, that is surrounded with filter fabric and connected to a closely located manhole for easy access. The fabric-wrapped chambers provide for settling and filtration of sediment as storm water rises in the Isolator Row and ultimately passes through the filter fabric. The open bottom chambers and perforated sidewalls allow storm water to flow both vertically and horizontally out of the chambers. Sediments are captured in the Isolator Row protecting the storage areas of the adjacent stone and chambers from sediment accumulation.

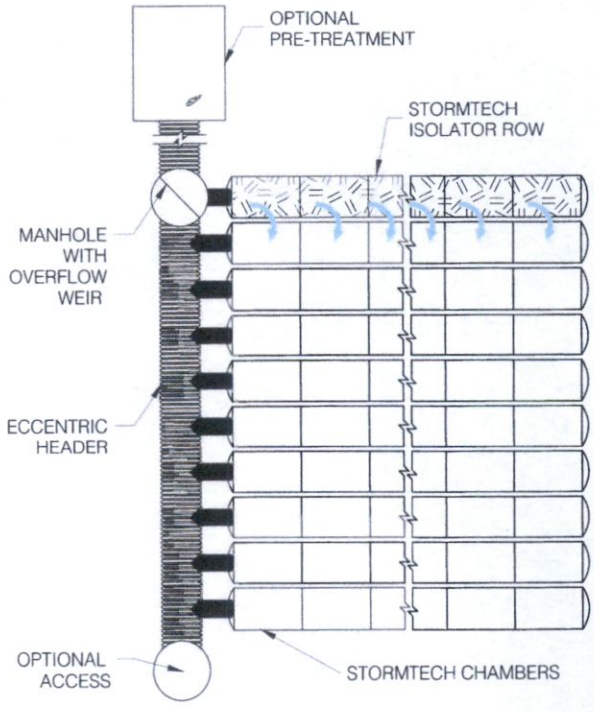
Two different fabrics are used for the Isolator Row. A woven geotextile fabric is placed between the stone and the Isolator Row chambers. The tough geotextile provides a media for storm water filtration and provides a durable surface for maintenance operations. It is also designed to prevent scour of the underlying stone and remain intact during high pressure jetting. A non-woven fabric is placed over the chambers to provide a filter media for flows passing through the perforations in the sidewall of the chamber.

The Isolator Row is typically designed to capture the "first flush" and offers the versatility to be sized on a volume basis or flow rate basis. An upstream manhole not only provides access to the Isolator Row but typically includes a high flow weir such that storm water flowrates or volumes that exceed the capacity of the Isolator Row overtop the over flow weir and discharge through a manifold to the other chambers.

The Isolator Row may also be part of a treatment train. By treating storm water prior to entry into the chamber system, the service life can be extended and pollutants such as hydrocarbons can be captured. Pre-treatment best management practices can be as simple as deep sump catch basins, oil-water separators or can be innovative storm water treatment devices. The design of the treatment train and selection of pretreatment devices by the design engineer is often driven by regulatory requirements. Whether pretreatment is used or not, the Isolator Row is recommended by StormTech as an effective means to minimize maintenance requirements and maintenance costs.

Note: See the StormTech Design Manual for detailed information on designing inlets for a StormTech system, including the Isolator Row.

StormTech Isolator Row with Overflow Spillway
(not to scale)



2.0 Isolator Row Inspection/Maintenance

2.1 INSPECTION

The frequency of Inspection and Maintenance varies by location. A routine inspection schedule needs to be established for each individual location based upon site specific variables. The type of land use (i.e. industrial, commercial residential), anticipated pollutant load, percent imperviousness, climate, etc. all play a critical role in determining the actual frequency of inspection and maintenance practices.

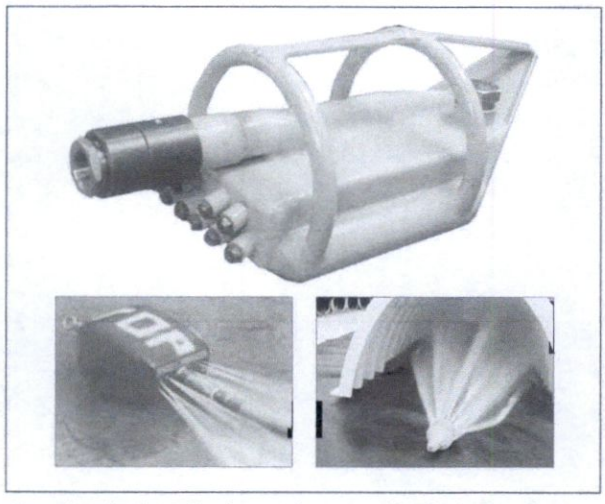
At a minimum, StormTech recommends annual inspections. Initially, the Isolator Row should be inspected every 6 months for the first year of operation. For subsequent years, the inspection should be adjusted based upon previous observation of sediment deposition.

The Isolator Row incorporates a combination of standard manhole(s) and strategically located inspection ports (as needed). The inspection ports allow for easy access to the system from the surface, eliminating the need to perform a confined space entry for inspection purposes.

If upon visual inspection it is found that sediment has accumulated, a stadia rod should be inserted to determine the depth of sediment. When the average depth of sediment exceeds 3 inches throughout the length of the Isolator Row, clean-out should be performed.

2.2 MAINTENANCE

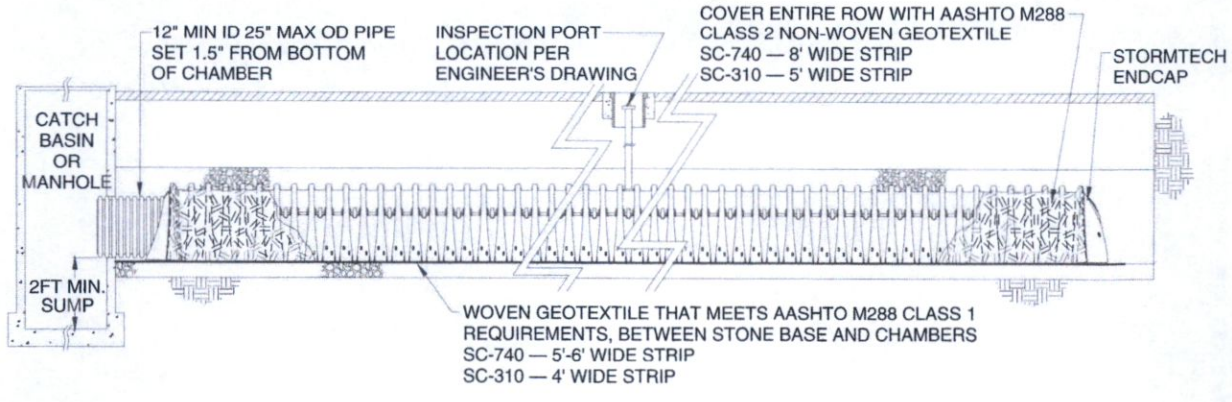
The Isolator Row was designed to reduce the cost of periodic maintenance. By "isolating" sediments to just one row, costs are dramatically reduced by eliminating the need to clean out each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided via a manhole(s) located on the end(s) of the row for cleanout. If entry into the manhole is required, please follow local and OSHA rules for a confined space entries.



Examples of culvert cleaning nozzles appropriate for Isolator Row maintenance. (These are not StormTech products.)

Maintenance is accomplished with the JetVac process. The JetVac process utilizes a high pressure water nozzle to propel itself down the Isolator Row while scouring and suspending sediments. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/JetVac combination vehicles. Selection of an appropriate JetVac nozzle will improve maintenance efficiency. Fixed nozzles designed for culverts or large diameter pipe cleaning are preferable. Rear facing jets with an effective spread of at least 45" are best. Most JetVac reels have 400 feet of hose allowing maintenance of an Isolator Row up to 50 chambers long. **The JetVac process shall only be performed on StormTech Isolator Rows that have AASHTO class 1 woven geotextile (as specified by StormTech) over their angular base stone.**

StormTech Isolator Row (not to scale)



3.0 Isolator Row Step By Step Maintenance Procedures

Step 1) Inspect Isolator Row for sediment

A) Inspection ports (if present)

i. Remove lid from floor box frame

ii. Remove cap from inspection riser

iii. Using a flashlight and stadia rod, measure depth of sediment and record results on maintenance log.

iv. If sediment is at, or above, 3 inch depth proceed to Step 2. If not proceed to step 3.

B) All Isolator Rows

i. Remove cover from manhole at upstream end of Isolator Row

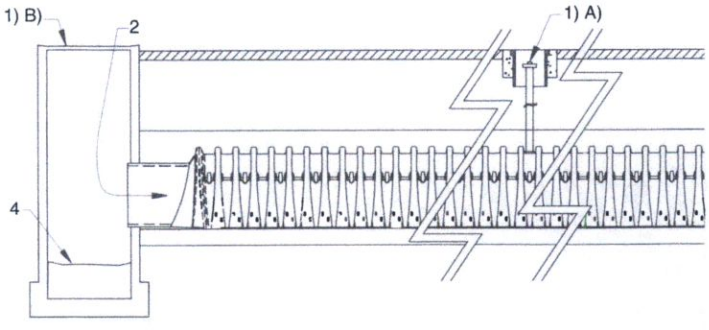
ii. Using a flashlight, inspect down Isolator Row through outlet pipe

1. Mirrors on poles or cameras may be used to avoid a confined space entry

2. Follow OSHA regulations for confined space entry if entering manhole

iii. If sediment is at or above the lower row of sidewall holes (approximately 3 inches) proceed to Step 2. If not proceed to Step 3.

StormTech Isolator Row (not to scale)



Step 2) Clean out Isolator Row using the JetVac process

A) A fixed culvert cleaning nozzle with rear facing nozzle spread of 45 inches or more is preferable

B) Apply multiple passes of JetVac until backflush water is clean

C) Vacuum manhole sump as required

Step 3) Replace all caps, lids and covers, record observations and actions

Step 4) Inspect & clean catch basins and manholes upstream of the StormTech system

Sample Maintenance Log

Date	Stadia Rod Readings		Sediment Depth (1) - (2)	Observations/Actions	Inspector
	Fixed point to chamber bottom (1)	Fixed point to top of sediment (2)			
3/15/01	6.3 ft.	none		New installation. Fixed point is CI frame at grade	djm
9/24/01		6.2	0.1 ft.	Some grit felt	sm
6/20/03		5.8	0.5 ft.	Mucky feel, debris visible in manhole and in Isolator row, maintenance due	rv
7/7/03	6.3 ft.		0	System jetted and vacuumed	djm

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