

**PROPOSED RESIDENTIAL DEVELOPMENT
MANOR FARM
BEDHAMPTON
HAMPSHIRE**

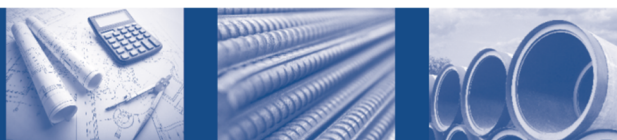
SUDS MANAGEMENT & MAINTENANCE PLAN

BARGATE HOMES LTD

Rev C

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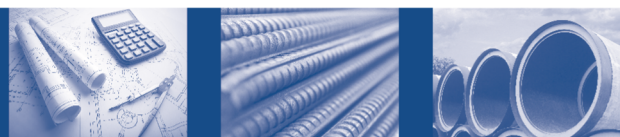
Document Issue:

Rev	Date	Issue Status	Prepared by	Checked by
-	04.04.19	First Issue	S. Smith	C. Pendle
A	28.06.19	Up-Flo Filter added	S. Smith	C. Pendle
B	14.11.19	Construction measures added - 2.4	S. Smith	C. Pendle
C	11.11.20	Revised drainage strategy added	K.Gebhart	C.Pendle

References:

The SUDS manual – CIRIA C753 (2015) ISBN 9780-86017-760-9

National Planning Policy Framework (NPPF) – Communities and Local Government
Technical Guidance - Flood Risk & Coastal Change (March 2012)



1 Introduction

- 1.1 This document sets out the principles for the long term management and maintenance of the proposed surface water Sustainable Drainage Systems (SuDS) installed at the residential development at land adjacent to Lower Road, Bedhampton.
- 1.2 The purpose of this document is to set out the basis of the development SuDS Maintenance Plan and to ensure that the adopting management company is entrusted with a robust inspection and maintenance programme, ensuring the optimum operation of the surface water drainage network is continually maintained for the lifetime of the development and to prevent the increased risk of flooding both on and off site in accordance with the National Planning Policy Framework (NPPF).
- 1.3 The activities listed in this document are generic to the relative SuDS types and represent the minimum maintenance and inspection requirements, however additional tasks or varied maintenance frequency may be instructed by the maintenance company as required. Specific maintenance needs of the SuDS elements should be monitored and maintenance schedules adjusted to suit requirements.
- 1.4 The installed SuDS system at this development are the initial responsibility of Bargate Homes.
Following installation and after an initial period (TBC) of operation, all SuDS are to be transferred to an appointed Management Company.
An agreement shall be set up by Bargate Homes, who shall confirm in writing to the Principle Planning Officer at Hampshire County Council when the maintenance agreement is completed and is operative.
- 1.5 The Management Company will then be responsible for maintaining the surface water system including all SuDS in perpetuity. All property owners should be advised that an annual management fee will need to be paid to the management company for this service.
- 1.6 All those responsible for maintenance should follow relevant Health and Safety legislation (Health and Safety at Work Regulations, 1999) for all activities listed within this report including lone working, if relevant) and risk assessments should always be undertaken.
- 1.7 Any contractor employed by the Management Company shall carry out periodic maintenance of all such SuDS in accordance with the schedules listed in this report. Inspection checks shall be carried out by a qualified and competent person, at the minimum intervals listed within the schedules and the appropriate work carried out.
- 1.8 This report is to read in conjunction with MJA drawing '5992:P01 *'Drainage Strategy'* for the location of all SuDS elements present within the development. Reference should also be made to the detailed landscape proposals for the proposed treatment / maintenance regime for all landscape features. The operations contained within this plan shall (where feasible) be in conjunction with routine grounds maintenance operations to the surrounding landscape.

2 SuDS Layout & Design

- 2.1 The storm water drainage strategy for the proposed development is to utilise a range of SuDS features to attenuate all surface water runoff from impermeable areas, with a restricted discharge via a flow control into deep borehole soakaways.
- 2.2 The proposed storm water system consists of the following drainage and SuDS components:
- Attenuation Basin
 - Storm water pipe work and road gullies
 - Flow control chambers
 - Outfall headwall
 - Linear Filter Trench (with perforated pipe)
 - Up-Flo Filter
 - Penstock Valve
- 2.3 There are three categories of maintenance activities referred to in this report:
- **Regular maintenance** (including inspections and monitoring).
Consists of basic tasks done on a frequent and predictable schedule, including vegetation management, litter and debris removal, and inspections.
 - **Occasional maintenance**
Comprises tasks that are likely to be required periodically, but on a much less frequent and predictable basis than the routine tasks (sediment removal is an example).
 - **Remedial maintenance**
Comprises intermittent tasks that may be required to rectify faults associated with the system, although the likelihood of faults can be minimised by good design.
Where remedial work is found to be necessary, it is likely to be due to site-specific characteristics or unforeseen events, and as such timings are difficult to predict.
- 2.4 It is also important that measures are taken to protect and ensure continued operation of drainage features during the construction phase. All road gullies will be blocked until the site is complete. Mesh will be placed over the outfalls and swales to prevent construction silts clogging up the drainage system and basins. The penstock valve will be set to the **CLOSED** position until all construction is complete on site. Any permeable paving will be capped with a layer of concrete during construction and cored through once the majority of the construction is complete.

3 SUDS Management & Maintenance

3.1 Storm water pipe work and road gullies

- 3.2 The key maintenance requirement for the upstream surface water drainage system includes the removal of sediments and debris from the system as required.
- 3.3 All storm water pipe work should be visually inspected a minimum of monthly for the first three months after installation and then a minimum of once year.
As road gullies are the first on the treatment train and susceptible to higher silt loadings, these will need to be inspected a minimum of monthly for the first three months after installation and then a minimum of every four months.
- 3.4 During this inspection identify any gully pots or pipes that require remedial maintenance such removal of sediment, debris, leaves and litter as required.
This involves the removal all protective covers and grids and the cleaning out of channels or gully pots by hand or with suitable jetting equipment.
- 3.5 During the inspections the general operation and structural integrity of all components should be recorded and repaired as required.

3.6 Flow Control Chamber

- 3.7 The key maintenance requirement for the flow control chambers will be the inspection of the units for blockages of the vortex flow control unit and silt removal from sump of chamber.
- 3.8 The hydraulic vortex flow control unit has no moving parts and is self-activating, requiring minimal maintenance. After initial installation, it is recommended that the unit be inspected monthly for three months.
- 3.9 Thereafter the manhole chamber and control device should be inspected at least every six months to verify the condition and operation of the unit and check for blockages within the inlet of the chamber and of the flow control device. During these inspections, accumulated silts should be removed and the sump cleaned out using a conventional sump vacuum cleaner. Flow Controls are fitted with a pivoting by-pass door, which allows the manhole chamber to be drained down should blockages occur.

3.10 Outfall Headwalls

- 3.11 Outfall headwalls should be visually inspected a minimum of monthly for the first three months after installation and then a minimum of once a year.
Accumulated sediments, debris and any overgrown vegetative material should be removed from the culvert and margins of the outlet headwalls as necessary.

- 3.12 During the inspections the general operation, and structural condition of the headwall and any erosion of banks or scour control features should be identified and rehabilitated as required.

3.13 Attenuation Basins

Key Maintenance Requirements:

- Litter/trash removal
- Inlet/outlet headwall inspection and cleaning
- Vegetation management
- Sediment monitoring and removal when required

- 3.14 Regular inspection and maintenance is important for the effective operation of the attenuation basin.
The basin will be subject to a routine monitoring and maintenance schedule as part of the general site management.
This will be carried out at intervals detailed below, and shall comprise of the following operations:
Collection and removal of all litter/large debris from the attenuation pond, inlets, outflows, and water margins once a month.
Monthly inspection of the attenuation ponds to check the following, and repair as necessary:
1. Any failure in the operation of the inlet and outlet headwalls unless adopted by others in which case they will be notified of any observed defect.
 2. Any damage or erosion to the perimeter edges and slopes of the attenuation ponds.
- 3.15 The attenuation basin will be sown with two grassland seed mixes to create a simple mosaic of grassland habitat. The floor of the basin will be seeded with a wet meadow mix (WF2), whilst the banks will be seeded with a standard wildflower meadow mix (WF1) as detailed on the landscape proposals drawings.
- 3.16 **Ground preparation**
The basin should be constructed of predominantly low fertility subsoil, with only a thin upper layer of topsoil to be left after ground modelling to take up in-perfections in the soil surface. Final surface to be harrowed / fully cultivated to break-up large soil clods.
The basin area should then be continually cultivated of a period of several weeks to remove unwanted surface vegetation and weeds prior to meadow seeding.
No herbicide is to be used due to the sensitive location for the basin construction. The ground should be cultivated to form a medium tilth and basin to be seeded at the recommended sowing rate, followed by light rolling (if necessary) throughout the meadow area.
- 3.17 **Landscape Maintenance (Year 1)**
In the first year, meadow areas should be managed more intensively to prevent the intrusion of invasive ground flora and allow a diverse sward to develop. The first cut should occur when the grass reaches approximately 100mm, down to 50mm, followed by subsequent cuts every 4-6 weeks down to 50mm throughout the first growing season.

Meadow areas should be monitored to assess the growth of any invasive species and grassland areas should be hand-weeded or spot swiped for any perennial weeds such as docks, nettles and ragwort.

3.18 Landscape Maintenance (Year 2 onwards)

Meadow areas will be maintained with a bi-annual cuts in May / June and after seed has dropped in late September. Meadow grassland should be cut to a height of approximately 100mm. All arising should be allowed to lay in-situ for 24 hours before being removed from site in order to allow any wildlife using the basin to disperse.

No fertiliser should be added to the grassland at any time and an annual monitoring visit to the grassland should be conducted to inform management that may be required.

3.19 An annual check carried out by a suitably qualified person, to assess the condition and operation of the attenuation basin inlet and outflow, and the accumulation of silt/sediment.

3.20 A record of maintenance visits and remedial operations shall be maintained.

3.21 The above operations shall (where feasible) be in conjunction with routine grounds maintenance operations to the surrounding landscape.

Basin Operation and Maintenance Requirements

Maintenance schedule	Required action	Frequency
Regular maintenance	Litter, debris and trash removal.	Monthly.
	Grass cutting – for landscaped areas and access routes.	Monthly (during growing season), or as required.
	Grass cutting – meadow grass in and around basin.	Half yearly (spring – before nesting season, and autumn).
	Manage other vegetation and remove nuisance plants.	Monthly (at start, then as required).
Occasional maintenance	Re-seed areas of poor vegetation growth.	Annually, or as required.
	Prune and trim trees and remove cuttings.	As required.
	Remove sediment from pre-treatment system when 50% full.	As required.
Remedial actions	Repair of erosion or other damage by re-seeding or re-turfing.	As required.
	Realignment of rip-rap.	As required.
	Repair/rehabilitation of inlets, outlets and overflows.	As required.
	Rehabilitate infiltration surface using scarifying and spiking techniques if performance deteriorates.	As required.
	Re-level uneven surfaces and reinstate design levels.	As required.
Monitoring	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly.
	Inspect banksides, structures, pipework, etc for evidence of physical damage.	Monthly.
	Inspect inlets and pre-treatment systems for silt accumulation. Establish appropriate silt removal frequencies.	Half yearly.
	Inspect infiltration surfaces for compaction and ponding.	Monthly.

3.22 Desilting of Attenuation Basins

In addition to regular routine items, SuDS maintenance will be carried out which may include de-silting the attenuation ponds, usually on a 10-15 year cycle depending on the on-going silt level checking.

This can be an intrusive operation when carried out within housing areas and prior to any planned desilting or dredging, consultation will be undertaken with both Buckinghamshire County Council and the Environment Agency.

3.23 Before any desilting operations are carried out, residents and members of the public in the general area will be informed and those in the immediate vicinity will be notified in writing well in advance of commencement of works.

3.24 The desilting work will be carried out under the supervision of consulting engineers and to a pre-agreed method statement. Such a method statement should be submitted in writing to the local authority and agreed in advance of the commencement of the works.

3.25 Prior to desilting works commencing, a suitably qualified ecologist shall be appointed to undertake an assessment of the ecological interest within the pond and its margins. In the event that the attenuation ponds develop particular ecological interest, then careful consideration will be given to the timing of this operation.

3.26 Linear Filter Trench

3.27 The filter trench is a below ground linear excavation filled with stone and a perforated pipe running the length.

At each end of the trench there are catchpit inspection chambers.

These catchpit chambers allow for the collection of sediments/debris from the catchpit sump and for the internal inspection / clearance of blockages of the perforated pipe if required.

3.28 Filter trenches require minimal maintenance, such and inspection of the catchpit manhole for accumulation of sediment or debris and cleaned out as required.

It is recommended that the catchpits be inspected no less frequently than 3 monthly intervals for the first year and thereafter at 6 monthly intervals.

3.29 If the filter trench becomes blocked or fails to operate as designed, then further inspection / repairs may be required from an external drainage contractor.

The perforated pipe that runs the length of the soakaway allows for internal CCTV / jet rod access for inspection and clearance of blockages.

Infiltration Trench Operation and Maintenance Requirements

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Remove sediment and debris from pre-treatment devices and floor of inspection tube or chamber.	Annually.
	Cleaning of gutters and any filters on downpipes.	Annually.
	Trimming any roots that may be causing blockages.	Annually, or as required.
Remedial Actions	Reconstruct soakaway and/or replace or clean void fill, if performance deteriorates or failure occurs.	As required.
	Replacement of clogged geotextile.	As required.
Monitoring	Inspect silt traps and note rate of sediment accumulation.	Monthly in the first year and then annually.
	Check soakaway to ensure emptying is occurring.	Annually.

3.30 Up-Flo™ Filter (by Hydro International)

3.31 The Up-Flo Filter is a modular high-rate stormwater filtration device. The frequency of the maintenance interval can be site specific and generally the first year of inspections and monitoring of pollutant accumulations will determine the required future maintenance intervals.

3.32 The inspection of the device is a simple process that requires monitoring of pollutant accumulations. The key maintenance activities include floatable, oil and sediment removal, media pack replacement and drain down filter replacement. Maintenance consists of removing sediments, floatable trash, oils, and other debris from the sump with a standard vacuum tanker. The media bags are easily replaced by hand, with no heavy lifting equipment required.

3.33 Recommended Equipment

- Safety Equipment and Personal Protective Equipment
- Scale to measure the weight of the filter bags
- Tools to remove grate or cover
- Pole with skimmer or net
- Sediment probe
- Hydro International Up-Flo™ Filter Maintenance Log
- Rubbish bags for removed floatables

3.34 Inspection Procedures

1. Set up any necessary safety equipment to provide access to the Up-Flo™ Filter. Safety equipment should notify passing pedestrian and road traffic that work is being done.
2. Remove the grate or cover to the manhole or vault.
3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities.
4. Without entering the vessel, use the pole with the skimmer net to remove floatables and loose debris from the chamber.
5. Using a sediment probe measure the depth of sediment that has collected in the sump of the vessel. Maximum sediment depth is 400 mm.

6. Remove the Filter Module lid by turning the cam latch and remove the Filter Media Pack (refer to manufacturer's specification for replacement procedures).

Weigh the filter bags from one or two modules. Filter bags should be replaced if the wet weight exceeds 18kg.

7. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components or a high standing water level (Standing water level is no higher than the base of the filter module).

8. Securely replace the grate or lid.

9. Remove safety equipment.

10. Contact Hydro International on 01275 878371 to discuss any irregularities noted during inspection or for further information.

3.35 First-Year Monitoring

Hydro International recommends that inspections be performed at least every six months during the first year of operation.

Use the following guidelines for determining maintenance intervals:

- **Floatables and Oil Monitoring:**

The water surface in the Up-Flo™ Filter should be monitored for accumulation of floatables and oil.

Floatables should not be allowed to accumulate to the point where they completely cover the surface of the water.

Oil should not be allowed to accumulate to the point where it has formed a measurable thickness on the surface of the water.

The rate of floatables and oil accumulation can be estimated by dividing the surface area covered by floatables and/or oil by the number of months since the Up-Flo™ Filter was installed.

- **Sediment Monitoring:**

A simple probe should be used to determine the depth of sediment in the sump.

The maximum allowable sediment depth in a typical 1200 mm diameter manhole equipped with an Up-Flo™ Filter is 400 mm.

In any case, sediment must be removed before it blocks the inlet to the Drain Down Filter.

The rate of sediment accumulation can be estimated by dividing the measured depth of sediment by the number of months since the Up-Flo™ Filter was installed.

- **Media Pack Monitoring:**

Filter bags should be weighed to determine the amount of particles that have been captured in the bags. Filter bags from one or two modules should be weighed.

Spent filter bags weigh approximately 18kg wet. The rate of filter bag clogging can be estimated by subtracting the wet weight of a new bag (approximately 9 kg) from the measured wet weight of the bags being checked and dividing by the number of months since the bags were installed.

- **Drain Down Filter Monitoring:**

The water level in the Up-Flo™ Filter should be monitored to ensure that the Drain Down Filter is operating properly. One to two days after a significant rainfall, the water level inside

the vessel should have dropped to a point where it is equal with the base of the Filter Modules.

If the water level has not reached that point, then the Drain Down Filter has either become clogged or blinded by trash or debris. If there is no evidence of trash or debris around the Drain Down Filter inlet, then it has likely become clogged with particles.

The rate of Drain Down Filter clogging can be estimated by noting the number of months since the Up-Flo™ Filter was installed.

3.36 Floatables, Oil, and Sump Cleanout

A commercially or council owned vac-truck is used to remove captured sediment, oil and floatables.

Floatables and loose debris can also be netted with a skimmer and pole. The access port located at the top of the manhole provides unobstructed access for a vac-truck hose and skimmer pole to be lowered to the base of the sump.

Scheduling

- Floatables and sump cleanout may typically be done during any season of the year.
- Floatables and sump cleanout should occur as soon as possible following a contaminated spill in the contributing drainage area.

Procedures

1. Set up any necessary safety equipment around the access of the Up-Flo™ Filter. Safety equipment should notify passing pedestrian and road traffic that work is being done.
2. Remove the grate or lid to the manhole or vault.
3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities.
4. If the standing water level in the sump is above the base of the Filter Modules, tug the Pull Chain(s) to release the Drain Down Plug(s). Allow the excess water to drain out of the chamber.
5. Use the skimmer pole to fit the Drain Down plug back into the open port.
6. Once all floatables have been removed, drop the vactruck hose to the base of the sump. Vac-truck out the sediment and gross debris from the sump floor.
7. Retract the vac-truck hose from the vessel.
8. Inspect the Angled Screens for blockages and ragging. If present, remove the obstruction or ragged materials from the surface using a hose or other screen-cleaning device.
9. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Note any apparent irregularities such as damaged components or blockages.
10. Securely replace the grate or lid.
11. Remove safety equipment.
12. Contact Hydro International on 01275 878371 to discuss any irregularities noted during cleanout.

3.37 Replacement of Media Packs and Drain Down Filter

Unless the Up-Flo™ Filter has been installed as a very shallow unit, it is necessary to have an confined space entry trained person enter the vessel to replace Media Packs.

Scheduling

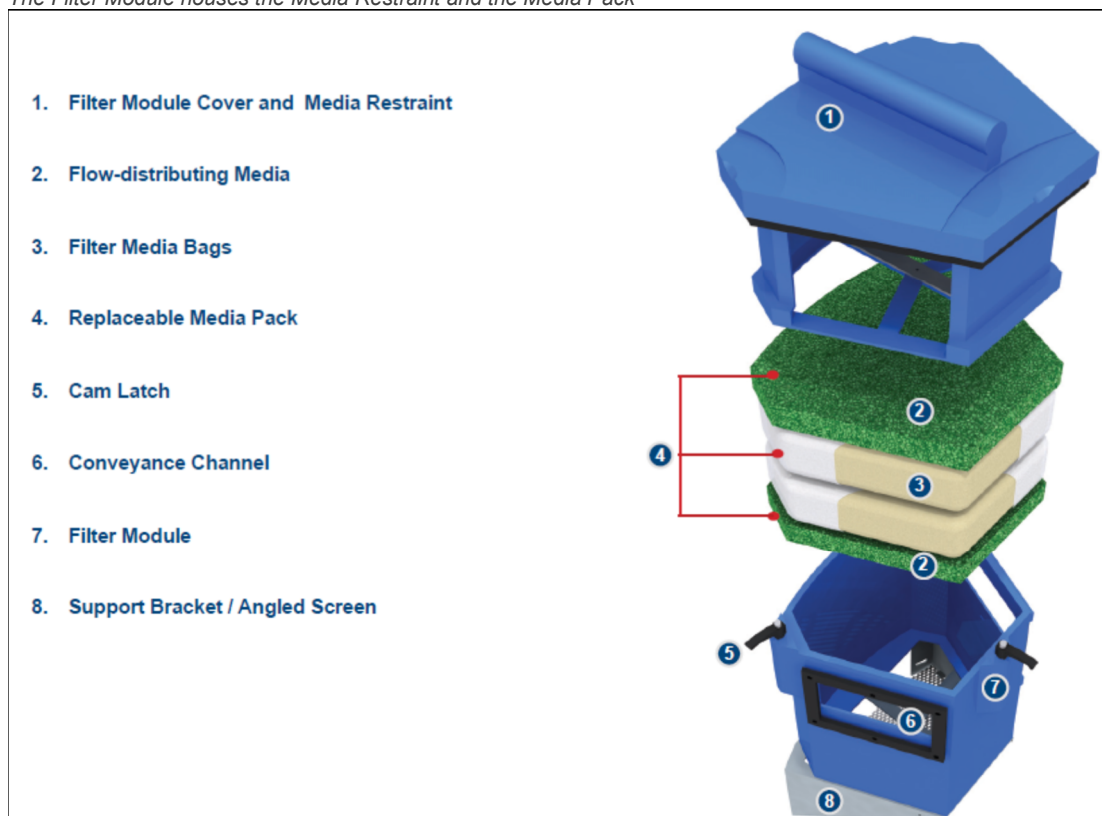
- Call Hydro International on 01275 878371 to order replacement Media Packs and Drain Down filter prior to scheduling maintenance.

- Because Media Pack replacement requires entry into the Up-Flo™ chamber, maintenance events should be scheduled during dry weather.
- Media Pack replacement should occur immediately after a contaminated spill in the contributing drainage area.

Procedures

1. Follow Floatables and Sump Cleanout Procedures, 1 – 10.
 2. Following Confined Space Entry procedures, enter the Up-Flo™ Filter Chamber.
 3. Open the Filter Module by turning the three cam latches on the front and sides of the module. Remove the lid 1 to gain access to the Media Pack
 4. Remove and discard the spent Media Pack. The Media Pack contents include:
 - A top layer of green Flow-Distributing Media.
 - Two Media Bags equipped with nylon handles.
 - A bottom layer of green 2 Flow-Distributing Media.
 5. Insert a new Media Pack, supplied by Hydro International.
 - First, insert a bottom layer of green Flow-Distributing Media. Be sure that the media sits snugly and level at the bottom of the Filter Module.
 - Next, insert the first of two replacement Media Bags. Smooth the bag out with your hands to make sure that the bag extends snugly to the walls and corners of the Filter Module.
 - Insert the second Media Bag, following the same procedure.
 - Insert the top layer of green Flow-Distributing Media.Be sure that the piece fits snugly against the walls and corners of the Filter Module.
 - Put the lid on and secure the three latches. Check to make sure that the latches are closed properly.
 6. Use a screwdriver to unscrew the Drain Down Filter from the face of the Outlet Module
DO NOT DISCARD THIS PIECE.
 7. Install new Drain Down Filter supplied by Hydro International.
 8. Exit the Up-Flo™ Filter chamber and securely replace the grate or lid.
 9. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables, oil and gross debris removed, and the depth of sediment measured.
- Note the number of Media Packs replaced.
- Note any irregularities such as damaged components or blockages.
10. Remove safety equipment.
 11. Dispose of spent media packs at your local landfill, following local regulations.
 12. Return the spent Drain Down Filter to Hydro International.
 13. Contact Hydro International to discuss any irregularities noted during annual maintenance.

The Filter Module houses the Media Restraint and the Media Pack



Up-Flo Filter Operation and Maintenance Requirements

ACTIVITY	FREQUENCY
Inspection	- Regularly during first year of installation - Every 6 months after the first year of installation
Floatables/Oils Removal	- Twice per year or as needed - Following a contaminated spill in the drainage area
Sediment Removal	- Twice per year or as needed - Following a contaminated spill in the drainage area
Media Pack Replacement	- Once per year or as needed - Following a contaminated spill in the drainage area
Drain Down Filter Replacement	- Once per year with Media Pack replacement - As needed, in the event of continuous base flow conditions

3.38 For further detailed inspection and maintenance information and procedures refer to the manufacture's document 'Up-Flo Filter Operating and Maintenance Manual'.

3.39 To order replacement parts contact Hydro International on:
Tel: 01275 878371 (Monday to Friday 9.00 am to 5.30 pm)
Fax: 01275 874979
Email: enquiries@hydro-international.co.uk

3.40 Penstock Valve

A penstock valve is included within the SuDS train to act as an emergency shut off in the instance of a spillage event. If pollution such as an oil spill is seen within the development then the shut-off valve must be set to the off position immediately and the management company contacted. The Environment Agency should also be contacted immediately on their incident hotline: **0800 80 70 60**.

4 Contact Information

For further information on the management and maintenance of SuDS on the development please contact:

MJA Consulting
Ipsium Court
24 The Quadrant
Abingdon Science Park
Oxfordshire
OX14 3YS

Tel: 01235 555173
Email: mail@mjaconsulting.co.uk

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