



Newbarn Lane

Drainage Maintenance Schedule

TO	Bellway Homes	FROM	WSP
REVISION	P02	CONFIDENTIALITY	Public

Regular inspection and maintenance are required to ensure the effective long-term operation of all drainage features. A suggested s38 Drainage Maintenance Schedule. All drainage features at the site will be under the ownership of Bellway Homes' appointed Private Management Company (PMC). The PMC will be funded by a monthly charge on residents.

AQUA SWIRL

- ✧ As per SDS Ltd's schedules (enclosed)

ATTENUATION TANK

- ✧ Typically as below:

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)	As per Bellway Homes' PMC road sweeping schedule
	Remove sediment from pre-treatment structures and/or internal forebays	Annually, or as required
Remedial actions	Repair/rehabilitate inlets, outlet, 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

DETENTION BASINS

- ✧ Monthly litter removal; monthly cutting of grass for spillways and access routes; half yearly cutting of grass for meadow grass in and around basin; monthly management of other vegetation and removal of nuisance plants; monthly inspection of inlets, outlets and overflows for blockages; monthly inspection of banksides, structures pipework etc for evidence of physical damage; monthly for first year then annual inspection of inlets and facility surface for silt accumulation and establish appropriate silt removal frequencies; annually check penstocks and other mechanical devices; annually tidy dead growth; annually remove sediment from inlets, outlet and forebay; annually manage wetland plants in outlet pool. Maintenance strips can also be utilised as part of the on-site cycle/footway network.

FILTER TRENCH

- ✧ Maintenance requirement: Monthly litter removal; monthly inspection of filter drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage; six monthly inspection of pre-treatment systems, inlets and perforated pipework for silt accumulation and establish appropriate silt removal frequencies; six monthly removal of sediment from pre-treatment devices.



GULLIES, CATCHPITS AND BELOW GROUND SURFACE WATER PIPES

- ✧ Typically as below:

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 bi-annually (late autumn then early spring) or immediately following a large storm event
Remedial actions	Repair/rehabilitate inlets, outlet, gully sucker	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually

HYDROBRAKE

- ✧ As per Hydro International schedules (appended)

DITCHES WITHIN RIPARIAN OWNERSHIP

- ✧ Twice annual litter removal at banks; Annual cutting of grass and vegetation clearance of banks; monthly inspection of outlets for first 3 months, then annually or after a large storm event for blockages; monthly inspection of banksides, structures pipework etc for evidence of physical damage; monthly for first 3 months, then at 6 months then annual inspection of inlets and facility surface for silt accumulation and establish appropriate silt removal frequencies; annually tidy dead growth; annually remove sediment from outlet; annually manage wetland plants in immediate vicinity of outlet.

FOUL WATER PUMPING INFRASTRUCTURE

- ✧ The pump station will be monitored and maintained by the pump station supplier as per their requirements the costs of which will fall to the home buyers/owners through monthly maintenance fees. Once the order has been placed specific details can be provided.



Installation & Maintenance

SDS Aqua Swirl™ Hydrodynamic Separator

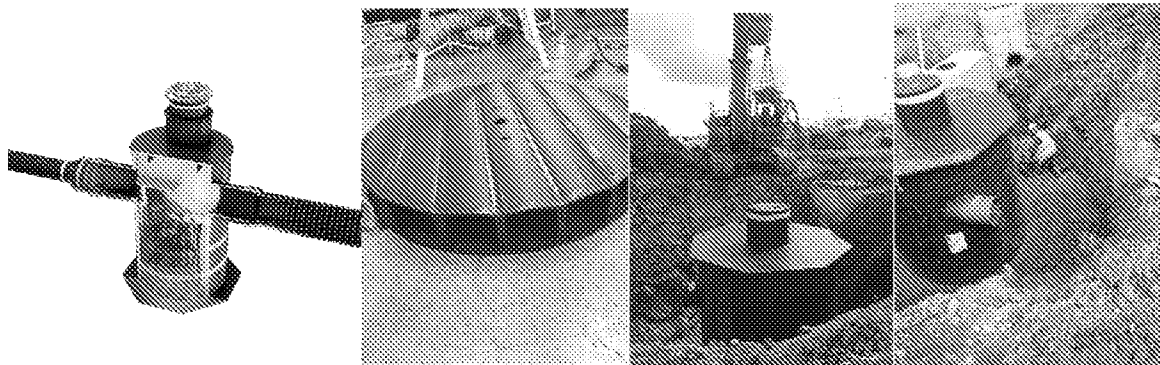
Aqua-Swirl™ systems are fabricated from high performance HDPE materials; they are durable lightweight and can be installed without use of heavy lifting equipment.

Lifting support Straps are provided to allow easy off loading and installation, resulting in significantly reduced installation costs.

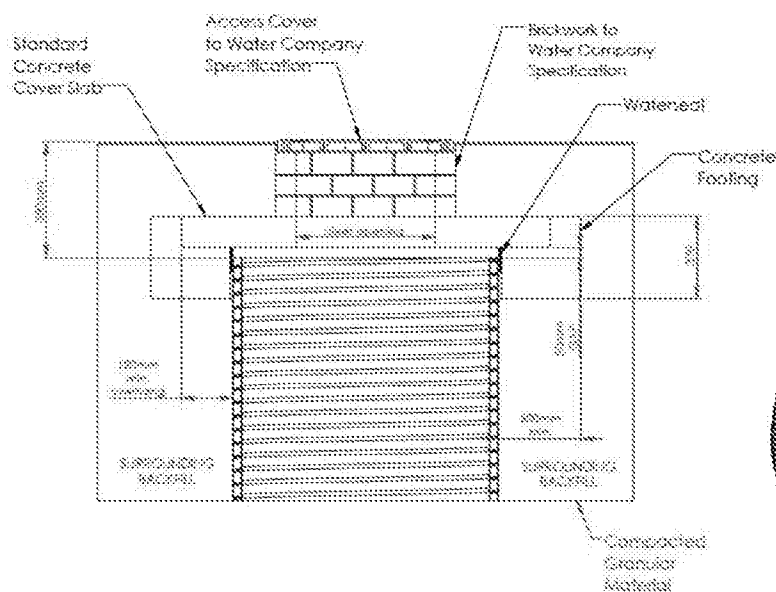
Installation:

- 1) Excavation to required size and depth allowing for 600mm around each side of the unit
- 2) Prepare the bed with 20-40mm clean stone to a depth of 300mm
- 3) Compacted in 150mm layers to ASTM D 2321 to a proctor density of 95%
- 4) Install the unit and backfill with 20-40mm clean stone in 150mm layers to ASTM D 2321 enough backfill should be placed over components prior to using heavy compaction or construction equipment to prevent damage.
- 5) Connect to drainage network pipework with rubber couplings like Fernco, Flex Seal or Band Seal.
- 6) The Aqua Swirl has a round base box section plate extending 100mm from the outside diameter to provide mitigation against buoyancy, concrete can be poured directly over and into the base plate if required to provide additional resistive force.
- 7) Aqua Swirls of AS-6 and above have both a base plate and top plate
- 8) The riser pipe is supplied to the required length to allow for a standard UK man hole installation detail and can be cut to size on site to the required depth.
- 9) Where traffic loading is required a reinforced concrete pad must be placed over the entire Aqua swirl as per design calculated by engineer.
- 10) If traffic loading is not required, it's recommended that bollards are placed around access risers in non-traffic areas to prevent inadvertent loadings by maintenance vehicles.

Product Illustration:



Manhole Detail



BBA HAPAS Approval:

- 11) Aqua Swirls & Filters are made from a structured wall HDPE pipe. The pipes are produced by extrusion of a hollow box section in polyethylene which is continuously wound onto a mandrel; successive turns being welded together by hot polyethylene melt supplied by an auxiliary extruder. Weholite is a Kitemarked product, license number KM 560128 which, is backed up with a quality management system to BS EN ISO 9000 : 2008, Certificate No. FM 12306. The HDPE pipe is manufactured in accordance with BS EN 13476 -2 : 2007 and carry BSI Kitemark and WRC accreditation to this standard. All fittings are manufactured from the same material and in the same stiffness as the pipes, in accordance with BS EN 13476 – 2:2007. Weholite pipes, fittings and fabrication (systems) have BBA HAPAS certification (18/H283).

System Operation:

The Aqua-Swirl®

Can be installed in an “off-line” configuration. Or, depending on local regulations, an “in-line” (on-line) conveyance flow diversion system can be used. The CFD model allows simple installation by connecting directly to the existing storm conveyance pipe thereby providing full treatment of the “first flush,” while the peak design storm is diverted and channelled through the main conveyance pipe

The patented Aqua-Swirl® Stormwater Treatment System provides a highly effective means for the removal of sediment, floating debris, and free oil. Swirl technology, or vortex separation, is a proven form of treatment utilized in the Stormwater industry to accelerate gravitational separation.

The treatment operation begins when Stormwater enters the Aqua-Swirl® through a tangential inlet pipe that produces a circular (or vortex) flow pattern that causes contaminants to settle to the base of the unit. Since Stormwater flow is intermittent by nature, the Aqua-Swirl® retains water between storm events providing both dynamic and quiescent settling of solids. The dynamic settling occurs during each storm event while the quiescent settling takes place between successive storms.

A combination of gravitational and hydrodynamic drag forces encourages the solids to drop out of the flow and migrate to the center of the chamber where velocities are the lowest.

The treated flow then exits the Aqua-Swirl® behind the arched outer baffle. The top of the baffle is sealed across the treatment channel, thereby eliminating floatable pollutants from escaping the system. A vent pipe is extended up the riser to expose the backside of the baffle to atmospheric conditions, preventing a siphon from forming at the bottom of the baffle.

Maintenance:

Long term performance of the Aqua Swirl or any other device depends on inspection and maintenance program.

Recommended schedule in line with Ciria C753 guidance

On hand over – 3 months -6 months -12 months and then annually or as deemed necessary from details obtain from previous inspections.

Each site sediment loadings will be different and at its highest just after the build phase, hence why a more frequent visit is required at the start of the programme.

The Aqua-Swirl® has been designed to minimize and simplify the inspection and maintenance process. The single chamber system can be inspected and maintained entirely from the surface thereby eliminating the need for confined space entry. Furthermore, the entire structure (specifically, the floor) is accessible for visual inspection from the surface. There are no areas of the structure that are blocked from visual inspection or periodic cleaning. Inspection of any free- floating oil and floatable debris can be directly observed and maintained through the manhole access provided directly over the swirl chamber.

Inspection:

To inspect the Aqua-Swirl[®], remove the manhole cover.

The only tools needed to inspect the Aqua-Swirl[®] system are a flashlight and a measuring device such as a stadia rod or pole. Given the easy and direct accessibility provided, floating oil and debris can be observed directly from the surface. Sediment depths can easily be determined by lowering a measuring device to the top of the sediment pile and to the surface of the water. When the sediment pile is within 42 to 48 inches of the water surface (or sediment pile thickness is 18 to 24 inches as measured from the base), the system should be maintained. The maximum Sediment storage capacity of the Aqua-Swirl[®] is reached when the sediment pile is within 30 inches of the water surface (or sediment accumulation is 36 inches thick as measured from the base).

It should be noted that to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile. Keep in mind that the finer sediment at the top of the pile may offer less resistance to the measuring device than the larger particles which typically occur deeper within the sediment pile.

The Aqua-Swirl[®] design allows for the sediment to accumulate in a semi-conical fashion as illustrated above. That is, the depth to sediment as measured below the water surface may be less in the center of the swirl chamber; and likewise, may be greater at the edges of the swirl chamber.

Removal:

Cleaning the Aqua-Swirl[®] is simple and quick. Free-floating oil and floatable debris can be observed and removed directly through the 750mm service access riser provided. A vacuum truck is typically used to remove the accumulated sediment and debris. An advantage of the

Aqua-Swirl[®] design is that the entire sediment storage area can be reached with a vacuum hose from the surface (reaching all the sides). Since there are no multiple or limited (hidden or "blind") chambers in the Aqua-Swirl[®], there are no restrictions to impede on-site maintenance tasks.

Disposal:

All removed products should be disposed of in line with local council requirements

Hydro International Warranty, Maintenance and COSHH Statement

This statement covers all Hydro International Hydro-Brake® Optimum, Hydro-Brake® and S-Type Vortex Flow Control units (hereafter referred to as "Flow Control").

Defects Liability Period Warranty

The standard Hydro International warranty covers products for one year from date of purchase and will only be considered for those defects or faults reported directly to Hydro International in writing. Warranties will not be considered for defects or faults caused by accident, acts of vandalism or unauthorised repair/rectification. Please Contact Hydro International for product specific details.

Maintenance

Normally, little maintenance is required as there are no moving parts within the 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. The Flow Control (where applicable) is fitted with a pivoting bypass door, which allows the manhole chamber to be drained down should blockage occur. The smaller conical units, below the minimum recommended size, are also supplied with rodding facilities or vortex suppressor pipes as standard.

Following installation of the Flow Control it is vitally important that any extraneous material ie. 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.

All Flow Control units are typically manufactured from grade 304 Stainless Steel, and if required they can also be manufactured in grade 316 Stainless Steel. Both materials have an estimated life span in excess of the design life of drainage systems.

COSHH

Flow Control units 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 Flow Control units should be in accordance with the current legislation and regulations:

- The Health and Safety at Work Act 1972
- The Management of Health and Safety at Work Regulations 1999
- The Manual Handling Operations Regulations 1992. All published and printed by the Health and Safety Executive.