

**PROPOSED RESIDENTIAL DEVELOPMENT  
LAND AT QUEEN VICTORIA HOSPITAL  
HOLTYE ROAD  
EAST GRINSTEAD  
WEST SUSSEX  
RH19 3DZ**

## **SUDS MANAGEMENT & MAINTENANCE PLAN**

**MACAR DEVELOPMENTS**

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## DOCUMENT CONTROL RECORD

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### 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 associated with the Queen Victoria Hospital in East Grinstead, West Sussex.
- 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 Brookworth 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 Brookworth Homes, who shall confirm in writing to the Principle Planning Officer at West Sussex 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 '6275-MJA-SW-XX-DR-C-080 *'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 flow controls and pumped rising main into the existing surface water sewer that runs north east of the site to 'The Weald'.
- 2.2 The proposed storm water system consists of the following SuDS components:
- Permeable block paving (under-drained)
  - Attenuation tank (cellular polypropylene cells)
  - Storm water pipe work and road gullies
  - Flow control chambers
  - Pump station
- 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. 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

#### Permeable Block Paving

- 3.1 Note: Loose materials such as sand, cement soil or other loose substances should not be stored directly on top of the permeable blocks without the use of an impenetrable sheet. To ensure the continual optimal performance of the permeable paving, it is recommended that the following maintenance should be carried out. The following guidelines are offered as an initial regime, but maybe either increased or decreased by the management company depending on the local environment and any external contributing factors.
- 3.2 Permeable pavements should be visually inspected a minimum of monthly for the first three months after installation and then a minimum of three times a year, preferably during and after heavy rainfall to check effective operation and identify areas of ponding. These inspections should occur close to the end of winter (March), mid-summer (July) and after the autumn (November).
- 3.3 During this inspection identify any areas that require remedial maintenance such as topping up of jointing grit or removal of vegetation, weeds, silts and sediments that may be clogging the joints between the blocks. Small areas such as driveways can be swept with a hand bristle broom, for larger areas such as parking courts a lorry mounted rotary brush and vacuum sweeper device can be used. Weeds can be removed from the surface through the controlled application of proprietary non-persistent contact herbicides. Those containing Glyphosate are the most suitable.
- 3.4 Care should be taken to ensure that only the detritus is removed from the joints and avoid removal of the jointing material. If required, joints should be replenished with aggregate material to lip of paver using specific 6-2mm single size grit using a stiff brush to sweep the material in ensuring joints are filled. Do not replace the jointing grit with sand as this will stop the permeable system from working.
- 3.5 For winter maintenance, the controlled use of de-icing may be used without causing significant detrimental effects towards the permeable pavements performance. When used carefully, the use of these chlorides will not result in an increase in the chloride levels in the local ground.
- 3.6 Contamination of the permeable block paving from routine landscape maintenance such as grass clippings from mowing, hedge trimming, mulching plant beds etc. should be prevented. If contamination occurs the debris should be immediately swept, collected and removed by the homeowner or landscape operative.
- 3.7 Depending on the amount of usage and the environment the permeable pavement has received and been exposed to, the sub base laying course material including geotextile membranes/ grids may require either replacement or cleaning after a 25 to 30 year period. This would be evident if the infiltration rate of the paving became prolonged, allowing ponding to develop. Should this occur, the uplifting and cleaning or replacing of the laying course maybe considered. The laying course material, jointing and blocks can be reused once cleaned, minimising costs.

- 3.8 Replacement sub-base material to be used should be a clean 4/20mm coarse graded aggregate to BS EN13242:2002. Jointing material between the blocks should be 6-2mm single size grit to the joints. Refer to MJA Consulting construction detail drawing for type of geotextile membrane/ geogrids to be used.
- 3.9 Materials removed from the voids or the layers below the surface may contain heavy metals and hydrocarbons and may need to be disposed of as controlled waste. Sediment testing should be carried out before disposal to confirm its classification and appropriate disposal methods.

*Permeable Paving Operation and Maintenance Requirements*

| Maintenance schedule   | Required action                                                                                                                                   | Frequency                                                                                                                                                                |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Regular maintenance    | 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.                                                                                                                                                             |
|                        | 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.                                                                                                | As required (if infiltration performance is reduced as a result of significant clogging).                                                                                |
| Monitoring             | Initial inspection.                                                                                                                               | Monthly for 3 months after installation                                                                                                                                  |
|                        | Inspect for evidence of poor operation and/or weed growth. If required take remedial action.                                                      | 3-monthly, 48 h after large storms.                                                                                                                                      |
|                        | Inspect silt accumulation rates and establish appropriate brushing frequencies.                                                                   | Annually.                                                                                                                                                                |
|                        | Monitor inspection chambers.                                                                                                                      | Annually.                                                                                                                                                                |

## Storm water pipe work and road gullies

- 3.10 The key maintenance requirement for the upstream surface water drainage system includes the removal of sediments and debris from the system as required.
- 3.11 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.

- 3.12 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.
- 3.13 During the inspections the general operation and structural integrity of all components should be recorded and repaired as required.

### **Flow Control Chamber**

- 3.14 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.
- 3.15 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.
- 3.16 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.

### **Cellular Attenuation Tank**

- 3.17 The key maintenance requirement for the cellular attenuation tank will be the visual inspection of the internal units via built in access chambers and integral maintenance tunnel for the removal of sediment and jetting as required. A visual inspection of the impermeable geomembrane that envelopes the structure should also be carried out to check for structural integrity.
- 3.18 The attenuation tank is to be constructed from cellular units that allow internal CCTV and jetting access for inspection and maintenance (Stormbloc® by Hydro International or similar approved). The built in modular inspection unit and maintenance tunnels within the attenuation tank allow almost the entire volume of the structure to be inspected via CCTV camera and flushed through. A catchpit chamber is to be installed immediately upstream of the attenuation tank to reduce the amount of silt entering the tank and it will generally only be necessary to ensure that the upstream catchpits / silt traps are free from debris such as leaves or sediment.
- 3.19 It is recommended that the attenuation tank system be inspected no less frequently than at monthly intervals for the first 3 months and thereafter at 6 monthly intervals. In addition, it is suggested that the installation is inspected immediately following the first storm event, whenever this should occur post installation.
- 3.20 It should also be noted that more regular inspections may be required should the catchpit(s) fill more frequently and/or if the initial inspections reveal that maintenance / cleaning will be required more regularly than at six month intervals.

- 3.21 Flushing of the system can be achieved using a jetting system with a 150 bar pump pressure (ie. approximately 80 bar at the nozzle) at a discharge flow of 300 l/min. The jet nozzle should be introduced to the system via the Inspection manhole and the integral inspection / maintenance tunnel.
- 3.22 Any silt & debris should be flushed to the inspection or catchpit manhole and removed in accordance with the Management Company policy for waste management.

*Cellular Systems - Operation and Maintenance Requirements*

| Maintenance schedule | Required action                                                                                                                                                                      | Recommended Frequency                  |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| Regular maintenance  | 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               |
| Remedial actions     | Repair/rehabilitation of 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 and after large storms        |

## **Pump Station**

- 3.23 The management company should have a maintenance contract with the pump manufacturer to ensure that the pump equipment is continuously in optimal working conditions. The manufacturer can recommend a maintenance schedule for the installed pump to help avoid unexpected and costly breakdowns.
- 3.24 An emergency pump arrangement should be agreed with the manufacturer. Should the pump fail and is unrepairable it is important that a temporary arrangement or new pump is installed immediately.

## **Downstream Defender® (by Hydro International)**

- 3.25 The Downstream Defender is a hydrodynamic vortex separator 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.
- 3.26 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. No internal components require removal. Maintenance consists of removing sediments, floatable trash, oils, and other debris from the sump with a standard vacuum tanker.

### 3.27 Recommended Equipment

- Safety Equipment and Personal Protective Equipment
- Tools to remove grate or cover
- Pole with skimmer or net
- Sediment probe
- Hydro International Downstream Defender® Maintenance Log
- Rubbish bags for removed floatables

### 3.28 Inspection Procedures

1. Set up any necessary safety equipment to provide access to the Downstream Defender®. 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.
6. 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 blockages.
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.

### 3.29 First-Year Monitoring

Hydro International recommends that inspections be performed at least every six months during the first year of operation. 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 Downstream Defender® was installed.

#### • Sediment Monitoring:

A simple probe should be used to determine the depth of sediment in the sump. Sediment removal is not required unless sediment depths exceed 75% of the maximum clean-out depths stated in Table 1.

Table 1. Downstream Defender® Pollutant Storage Capacities and Max. Cleanout Depths.

| Unit Diameter | Total Oil Storage | Oil Clean-out Depth | Total Sediment Storage | Sediment Clean-out Depth | Max. Liquid Volume Removed |
|---------------|-------------------|---------------------|------------------------|--------------------------|----------------------------|
| (feet)        | (gallons)         | (inches)            | (gallons)              | (inches)                 | (gallons)                  |
| 4             | 70                | <16                 | 141                    | <18                      | 384                        |
| 6             | 216               | <23                 | 424                    | <24                      | 1,239                      |
| 8             | 540               | <33                 | 939                    | <30                      | 2,884                      |
| 10            | 1,050             | <42                 | 1,757                  | <36                      | 5,546                      |
| 12            | 1,770             | <49                 | 2,970                  | <42                      | 9,460                      |

#### NOTES

1. Refer to Downstream Defender® Clean-out Detail (Fig. 1) for measurement of depths.
2. Oil accumulation is typically less than sediment, however, removal of oil and sediment during the same service is recommended.
3. Remove floatables first, then remove sediment storage volume.
4. Sediment removal is not required unless sediment depths exceed 75% of maximum clean-out depths stated in Table 1.

### 3.30 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 Downstream Defender®. 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. Remove all floatables with skimmer net or drop the vactruck hose to the base of the sump. Vac-truck out the sediment and gross debris from the sump floor.
5. Retract the vac-truck hose from the vessel.
6. 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.
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. Note any apparent irregularities such as damaged components or blockages.
8. Securely replace the grate or lid.
9. Remove safety equipment.
10. Contact Hydro International on 01275 878371 to discuss any irregularities noted during cleanout.

## Contact Information

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

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