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SUDS & Below Ground Drainage Maintenance Guide

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1.0 INTRODUCTION

The purpose of this document is to provide the necessary information required to maintain the drainage system, all SUDS features and accessories operational and serviceable.

2.0 OPERATION AND MAINTENANCE

Conventional Drainage and Sustainable Urban Drainage Systems (SUDS) require regular maintenance to continue to perform as designed. Recommended maintenance regimes for the systems selected for use on this development are discussed below.

3.0 CONVENTIONAL DRAINAGE SYSTEMS

3.1 Gullies, Manholes, Catchpits & Pipework

3.1.1 Operation and maintenance requirements

3.1.2 On completion of construction, internal surfaces of sewers and manholes shall be thoroughly cleansed to remove all deleterious matter, without such matter being passed forward into existing public sewers or watercourses. Maintenance responsibility for a drainage system should be always placed with an appropriate organisation.

3.1.3 All silt trapped gullies, silt traps, manholes and catchpits to be regularly inspected every three months and cleared out on a regular frequency for the first nine months. After this period, the frequency can be reduced to every six months.

3.1.4 All drainage runs to be inspected once a year. The system is to be jetted clear if necessary.

3.2 Pump Stations

3.2.1 Inspection

Pump sets should be inspected monthly by observing at least two switching cycles and checking the operation.

3.2.2 Operation and maintenance requirements

Regular inspection and maintenance is important for the effective operation of pump sets as designed. Maintenance responsibility for a pump set should be always placed with an appropriate organisation. The time between maintenance checks shall not be greater than;

- 1/4 year for pump station in commercial premises;
- 1/2 year for plants serving multiple dwellings;
- 1 year for plants in single dwellings;

Operation and maintenance requirements for pump sets are described below.

3.2.3 Regular Maintenance shall include:

1. Checking by visual inspection all connection points for leakage;
2. Operation of valves, checking ease of operation and sealing. If necessary, reset and grease;
3. Opening and closing of non-return valves; checking seating and ball/flap; functional check;
4. Cleaning the pumping unit and the pipework directly connected to it; checking impeller and bearings;
5. Checking oil level, where necessary, refill or change oil (if oil chamber fitted);
6. Internal cleaning of tank (if required or under special circumstances);
7. Checking that vent pipe is functioning.
8. Visual inspection of the electrical part of plant;
9. Visually checking condition of collection tank;
10. Every two years rinse out plant with water.

After carrying out maintenance, the plant shall be recommissioned in accordance with the clause below. A log should be kept of all maintenance work, detailing any work carried out and the applicable information. If faults are found that cannot be corrected, these shall be notified in writing to the operator of the wastewater pump set and an acknowledgement requested.

3.2.4 Commisioning

The pump set shall be commissioned by a suitably qualified person. The supplier of the wastewater pump set is responsible for ensuring the availability of this person. Testing with water for a minimum of two switching sequences is required for commissioning. During the test, dry running shall be avoided. The following items shall be checked before, during and after testing:

1. electrical safety in accordance with IEC or local regulations;
2. direction of rotation of the motor;
3. valves (operation, opening, sealing);

4. switching and setting of the control levels in the collection tank, where not present by the manufacturer;
5. watertightness of pump, valves and pipes;
6. rated voltage and frequency;
7. functional test of the non-return valve;
8. warning device; in combination with a second switching circuit where applicable;
9. discharge pipework support;
10. motor protection switch (by removing individual fuses (two-phase running));
11. oil level (if oil chamber fitted);
12. control lights, gauges and meters;
13. operation of hand pump; where fitted.

Commissioning shall be recording in writing, including important data such as the setting of the motor overload switch and t he reading from hours-run meters.

3.2.5 Testing

The pump sets shall be tested at the manufacturer's premises to BS 5316: Part1: Class C Annex B (ISO 2548) to demonstrate that they are capable of achieving the specified design duty. Type-test curves are acceptable for verification of performance.

Characteristic curves of pump generated head, efficiency, and pump and pump sets absorbed power versus flow rate shall be provided before the pump sets are delivered to site.

Hydraulic drop test shall be carried out by the Developer on site in the presence of the Undertaker to verify the theoretical performance of each pump set.

3.3 Hydrobrakes

3.3.1 Operation and maintenance requirements

Chamber is to be regularly inspected once a year and any debris and silt are to be removed from the sump.

4.0 SUDS FEATURES

4.1 General Maintenance

4.1.1 Regular inspection and maintenance is important for the effective operation of SUDS features as designed. Maintenance responsibility for SUDS features should always be placed with an appropriate organisation. Initially this should be the installer or supplier of the system who should then be responsible for handing maintenance to a suitably qualified person.

4.2 Geocellular/modular system

4.2.1 Operation and maintenance requirements

Maintenance requirements for modular system are described in Table 1.

Table 1

Maintenance Schedule	Required action	Frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly, if required, take remedial works	Monthly for 3 months, then six monthly.
	Debris removal from catchment surface (where may risk 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 overflowing to ensure that they are in good condition and operating as designed.	Annually, and after large storms.

4.2.2 Manufacturer recommendations/design life

If debris enters the Geocell units (whether in attenuation or infiltration applications), the still water within the unit will have insufficient velocity to keep the particles moving. This can lead to any of the following undesirable consequences:

- Debris will be deposited in the Geocell units around the pipe entry
- Some of the void intended for water storage will begin to fill up
- Organic matter may start to decay
- Noxious gases may build up.

Prevention

To prevent siltation, a catchpit manhole is installed at the inlet to the Tank/Soakaway. Refer to section 3.1 for catchpit maintenance.

Also before connecting to the Tank/Soakaway, the system can be jetted to remove any debris that has collected in the pipe and manholes during the installation.

4.3 Blue/Green Roof

Ensure safe access can be gained to the roof and that relevant Health and Safety procedures are followed when working at roof level. It is advised that the contractor should always seek proof of current maintenance for any roof access, fall arrest / restraint systems prior to proceeding with the work on site.

Remove all dead vegetation and debris from the roof and ensuring all outlets, gutters and downpipes are clear. Where the species mix incorporates wild flowers and grasses it is recommended that all dead vegetation is mown/strimmed down and the waste is removed from the roof and disposed of.

Any vegetation which has encroached into the drainage outlets, walkways and the vegetation barriers (pebbles) should be removed. Weeding an extensive green roof is necessary to maintain a healthy roof and all aggressive species of shrub saplings and undesirable plants should be removed. Some weeds, however are helpful to the biodiversity of the roof and should be considered a problem only if aesthetics is impacted. If considered excessive they can be removed ensuring that care is taken to follow specific instructions as to the type and species of vegetation removed. All extensive green roof installations will at times include some moss and grass.

Areas of dead vegetation / bare patches can be easily repaired and this is best done during the main growing seasons of March/April or from late August until the end of September. Take plug plants (new) or vegetation cuttings from surrounding areas of healthy mature plants and place on bare patches, pressing gently into the soil. A light sprinkling of sand mixed with compost should then be dressed over the affected area and watered to improve the uptake of the cuttings. If the vegetation is showing signs of distress, but has received regular rainfall, then the most likely problem is a lack of nutrient and a fertiliser should be applied.

Remove the lids of all Inspection chambers, ensure that all rainwater outlets and downpipes are free from blockages and that water can flow freely away. Clean filters to outlets twice yearly and replace every three years. Ensure that any protective metal flashings and termination bars remain securely fixed in place.

Examine all mastic sealant and mortar pointing for signs of degradation. Check that all promenade tiles and paving slabs are fixed securely to the roof surface and in good condition.

Advise the client of the need to repair or renew any defects as necessary.

Ensure that any new items of plant/equipment on the roof are mounted on suitable isolated slabs and that any fixings used to secure the plant/equipment in place do not penetrate the waterproofing. Report signs of damage or degradation to the waterproofing to ABG immediately, in order that arrangements can be made for remedial work to be carried out if necessary. It is recommended that a record is kept of the findings of the inspection to avoid confusion and provide an on-going record of roof performance. Plants suitable for an extensive green roof which will colonise in partial and full shade will generally be greener in colour and grow “taller” in these locations. There will be a significant variance in the growth and colour between the plants growing in full or partial shade and those exposed to full sunlight and this should be recognised as a feature of the biodiversity of each individual roof.

4.4 Permeable pavements

4.4.1 Operation and maintenance requirements

Regular inspection and maintenance is important for the effective operation of pervious pavements. Before handing over the facility to the client, it should be inspected for clogging, litter, weeds and water ponding and all failures should be rectified. After handover, the facility should be inspected regularly, preferably during and after heavy rainfall to check effective operation and to identify any areas of ponding.

Pervious surface need to be regularly cleaned of silt and other sediments to preserve their infiltration capability. Experience in the UK is limited, but advice issued with permeable precast paving has suggested a minimum of three surface sweeping per year. Manufacturer's recommendations should always be followed.

A brush and suction cleaner, which can be a lorry-mounted device or smaller precinct sweeper, should be used and the sweeping regime is as follows:

- End of winter (April) – to collect winter debris.
- Mid-summer (July/August) – to collect dust, flower and grass type deposits.
- After autumn leaf fall (November).

Care should be taken in adjusting vacuuming equipment to avoid removal of joining material. Any lost material should be replaced.

The likely design life (or period before pavement rehabilitation is required) has yet to be established for UK. However, it should be no different from standard paving assuming that an effective maintenance regime is in place to minimise the risk of infiltration clogging.

If reconstruction is necessary, the following procedure should be followed;

1. Lift surface layer and laying course.
2. Remove any geo-textile filter layer.
3. Inspect sub-base and remove, wash and replace if required.
4. Renew laying course, joining material and concrete block paving.

The reconstruction of failed areas of concrete block pavement should be less costly and disruptive than the rehabilitation of continuous concrete or asphalt porous surfaces due to the reduced area that is likely to be affected. Material removed from the voids or 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.

Maintenance plans and schedules should be prepared during the design phase. Specific maintenance needs of pervious pavement should be monitored and maintenance schedules adjusted to suit requirements.

Table 2

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 or manufacturers' recommendations.
Occasional maintenance	Stabilise and mow contributing and adjacent areas.	As required.
	Removal of weeds.	As required.
Remedial actions	Remediate any landscaping which , through the vegetation maintenance or soil slip, has been raised to within 50mm of the level of paving	As required.
	Remedial works 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. 48h after large storms.
	Inspect silt accumulation rates and establish appropriate brushing frequencies.	Annually.
	Monitor inspection chamber.	Annually.

5.0 OWNER'S MANUAL

This document should be provided to the client as an Owner's Manual on completion of the scheme. This manual will contain the following:

- Location of all SUDS facilities on site
- A summary of how the techniques work, their purpose and guidance on the "do's & don'ts" of daily use.
- A maintenance plan and a maintenance record sheet
- Advice regarding what to do if construction works take place in or on the SUDS features.

6.0 SUMMARY & CONCLUSIONS

This document is to be submitted to client/site occupier and relevant maintenance companies for future reference.