

Appendix D Maintenance Schedules

General Maintenance Considerations

Sustainable drainage systems are used to convey and treat water, and will often provide ecological and amenity benefits to the local area.

Consideration must be given to the operation of the system as a whole. This will include the hydraulic performance of SuDS components, connecting pipework, manholes and inspection chambers, ventilation pipes, safety grilles and accesses.

The visual appearance of planting should be maintained, the height and density of planting and grasses will also influence hydraulic performance in landscaped features designed for flowing water (e.g. swales).

Please refer back to the design drawings for the specification used during design.

Sites with special wildlife or habitat considerations may be subject to other site specific management plans and maintenance may need to be planned around nesting or breeding periods.

Seasonal changes will also influence maintenance, for example leaf drop in autumn and rapid growth in spring. Appropriate maintenance routines should be scheduled for these key periods. General considerations for inspection are included below.

Functional Problems

- Blockage
- Sedimentation
- Encrustation
- Tree root intrusion
- Infiltration or exfiltration cause by structural problems
- Failure of air entry and release valves
- Failure or obstruction of non-return valves

Structural Problems

- Collapse
- Cracking or fracturing
- Chemical attack
- Ground erosion
- Defective connections
- Pipe deformation
- Displaced joints

Other

- Dislodged or defective covers
- Access issues
- Structural issues affecting chambers, headwalls etc.
- Sediment
- Odours
- Erosion

Generally speaking, issues such as these can be resolved by repair, renovation or replacement. It is advisable to consult professional advice.

Attenuation Tanks

Attenuation tanks are usually buried structures, designed to store rainfall for short periods.

The inflow and outflow of water are critical to their function, and the tank structure itself should be kept free of debris, gradual build-up of silt, and should be inspected for defects.

A schedule setting out the maintenance operations, actions and frequency is included below. Please also refer to the manufacturers operation and maintenance manual if available.

CIRIA C753 TABLE 21.3 Operation and maintenance requirements for attenuation storage tanks

| 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) | Monthly |
| | For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary | Annually |
| | 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

Detention basins are designed to store water temporarily before discharging to a sewer or watercourse and may have a permanent depth of water (retention) or remain dry until rainfall occurs (detention).

CIRIA C753 TABLE 22.1 Operation and maintenance requirements for detention basins

| Maintenance schedule | Required action | Typical frequency |
|---|--|---|
| Regular maintenance | Remove litter and debris | Monthly |
| | Cut grass – for spillways and access routes | Monthly (during growing season), or as required |
| | Cut grass – 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) |
| | 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 facility surface for silt accumulation. Establish appropriate silt removal frequencies. | Monthly (for first year), then annually or as required |
| | Check any penstocks and other mechanical devices | Annually |
| | Tidy all dead growth before start of growing season | Annually |
| | Remove sediment from inlets, outlet and forebay | Annually (or as required) |
| Manage wetland plants in outlet pool – where provided | Annually (as set out in Chapter 23) | |
| Occasional maintenance | Reseed areas of poor vegetation growth | As required |
| | Prune and trim any trees and remove cuttings | Every 2 years, or as required |
| | Remove sediment from inlets, outlets, forebay and main basin when required | Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided) |
| Remedial actions | Repair erosion or other damage by reseeding or re-turfing | As required |
| | Realignment of rip-rap | As required |
| | Repair/rehabilitation of inlets, outlets and overflows | As required |

| | |
|---|-------------|
| Relevel uneven surfaces and reinstate design levels | As required |
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Permeable Paving

Permeable paving can include block paving, paving slabs or tarmac surfaces where they have been designed with open joints or pores to allow water to infiltrate below.

The water, once collected, will either be stored within a waterproof membrane beneath the surface or soak away into the ground.

Most commonly, defective operation is as a result of surface debris blocking the joints or pores, which is easily preventable through sweeping and removal of debris.

It is also common to inadvertently use kiln dried silver sand to joint permeable block paving which is too fine and prevents water from draining through. It is important to joint with the material specified during design, typically a 6mm single sized aggregate which is widely available.

A schedule setting out the maintenance operations, actions and frequency is included below. Please also refer to the manufacturers operation and maintenance manual if available.

CIRIA C753 TABLE 20.15 Operation and maintenance requirements for pervious pavements

| Maintenance schedule | Required action | Typical frequency |
|------------------------|--|--|
| Regular maintenance | Brushing and vacuuming (standard cosmetic sweep over whole surface) | Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment |
| Occasional maintenance | Stabilise and mow contributing and adjacent areas | As required |
| | Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying | As required – once per year on less frequently used pavements |
| 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, and replace lost jointing material | As required |
| | Rehabilitation of surface and upper substructure by remedial sweeping | Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging) |
| Monitoring | Initial inspection | Monthly for three months after installation |
| | Inspect for evidence of poor operation and/or weed growth – if required, take remedial action | Three-monthly, 48 h after large storms in first six months |
| | Inspect silt accumulation rates and | Annually |

 establish appropriate brushing frequencies

Monitor inspection chambers

Annually

Flow Control Devices

Flow control devices may include manhole chambers fitted with vortex flow controls or orifice plates, or orifice plates fitted to headwalls or weir walls.

Reducing the flow leaving storage areas such as basins or tanks to a set rate is important to ensure the storage area is not overwhelmed, it is therefore important to ensure the flow control is allowed to operate as intended.

A schedule setting out the maintenance operations, actions and frequency is included below. Please also refer to the manufacturers operation and maintenance manual for any proprietary devices.

An example of operation and maintenance requirements for flow control device

| Maintenance schedule | Required action | Typical frequency |
|----------------------|---|--|
| Routine maintenance | Remove litter and debris and inspect for sediment, oil and grease accumulation | As required – indicated by system inspections |
| | Remove sediment, oil, grease and floatables | As required – indicated by system inspections |
| Remedial actions | Replace malfunctioning parts or structures | As required |
| Monitoring | Inspect for evidence of poor operation | Six monthly |
| | Check the operation of bypass doors | Six monthly |
| | Inspect sediment accumulation rates and establish appropriate removal frequencies | Monthly during first half year of operation, then every six months |

Proprietary Treatment System

Proprietary treatment systems can include but are not limited to vortex separators and oil interceptors.

Such systems are designed to perform important cleansing functions and protect downstream systems from pollution and regular inspection and maintenance is critical.

Such systems may include telemetry systems or alarms to warn of inoperability or a need for maintenance.

A typical schedule setting out the maintenance operations, actions and frequency is included below. Please also refer to the manufacturers operation and maintenance manual for specific operations.

CIRIA C753 TABLE 14.2 An example of operation and maintenance requirements for a proprietary treatment system

| Maintenance schedule | Required action | Typical frequency |
|----------------------|---|---|
| Routine maintenance | Remove litter and debris and inspect for sediment, oil and grease accumulation | Six monthly |
| | Change the filter media | As recommended by manufacturer |
| | Remove sediment, oil, grease and floatables | As necessary – indicated by system inspections or immediately following significant spill |
| Remedial actions | Replace malfunctioning parts or structures | As required |
| Monitoring | Inspect for evidence of poor operation | Six monthly |
| | Inspect filter media and establish appropriate replacement frequencies | Six monthly |
| | Inspect sediment accumulation rates and establish appropriate removal frequencies | Monthly during first half year of operation, then every six months |

Trees

Trees contribute to the water cycle by absorbing water from surrounding soils. They may be planted in verges, open space or in tree pits in more urban areas. If the latter is the case it may be important to distinguish between bio-retention tree pits and ordinary tree pits to ensure the maintenance is appropriate.

A typical schedule setting out the maintenance operations, actions and frequency is included below. Please also refer to the arboricultural details produced during the design of the landscaping scheme for further details and any seasonal requirements.

CIRIA C753 TABLE 19.3 Operation and maintenance requirements for trees (after CRWA, 2009)

| Maintenance schedule | Required action | Typical frequency |
|------------------------|---|--------------------------------------|
| Regular maintenance | Remove litter and debris | Monthly (or as required) |
| | Manage other vegetation and remove nuisance plants | Monthly (at start, then as required) |
| | Inspect inlets and outlets | Inspect monthly |
| Occasional maintenance | Check tree health and manage tree appropriately | Annually |
| | Remove silt build-up from inlets and surface and replace mulch as necessary | Annually, or as required |
| | Water | As required (in periods of drought) |
| Monitoring | Inspect silt accumulation rates and establish appropriate removal frequencies | Half yearly |

Bioretention Systems

Bioretention systems can include tree pits, planters and rain gardens and use engineered soils to store and treat runoff from frequent rainfall events, there are often overflow pipes for heavier rainfall events.

A schedule setting out the maintenance operations, actions and frequency is included below. Please also refer to the manufacturers operation and maintenance manual for any proprietary systems.

CIRIA C753 TABLE 18.3 Operation and maintenance requirements for bioretention systems

| Maintenance schedule | Required action | Typical frequency |
|------------------------|---|--|
| Regular inspections | Inspect infiltration surfaces for silting and ponding, record de-watering time of the facility and assess standing water levels in underdrain (if appropriate) to determine if maintenance is necessary | Quarterly |
| | Check operation of underdrains by inspection of flows after rain | Annually |
| | Assess plants for disease infection, poor growth, invasive species etc and replace as necessary | Quarterly |
| | Inspect inlets and outlets for blockage | Quarterly |
| Regular maintenance | Remove litter and surface debris and weeds | Quarterly (or more frequently for tidiness or aesthetic reasons) |
| | Replace any plants, to maintain planting density | As required |
| | Remove sediment, litter and debris build-up from around inlets or from forebays | Quarterly to biannually |
| Occasional maintenance | Infill any holes or scour in the filter medium, improve erosion protection if required | As required |
| | Repair minor accumulations of silt by raking away surface mulch, scarifying surface of medium and replacing mulch | As required |
| Remedial actions | Remove and replace filter medium and vegetation above | As required but likely to be > 20 years |

Gullies & Catchpits

Gullies and catchpits are constructed with a sump to collect and retain sediment, debris and light oils washed into the system from impermeable surfaces.

To continue to provide a benefit to the system they should regularly be inspected and emptied.

A schedule setting out the maintenance operations, actions and frequency is included below.

BASED ON BS EN 752 An example of operation and maintenance requirements for gullies and catchpits

| Maintenance schedule | Required action | Typical frequency |
|----------------------|---|---|
| Routine maintenance | Remove litter and debris and inspect for sediment, oil and grease accumulation | Six monthly |
| | Remove sediment, oil, grease and floatables | As necessary – indicated by system inspections or immediately following significant spill |
| Remedial actions | Replace malfunctioning parts or structures | As required |
| Monitoring | Inspect for evidence of poor operation | Six monthly |
| | Inspect sediment accumulation rates and establish appropriate removal frequencies | Monthly during first half year of operation, then every six months |

Pumps

Pumping stations are used to lift wastewater from areas below the gravity drainage network, for example from basements and naturally low lying areas. Their operation is critical to the proper function of everyday drainage of the development and care must be taken not to block them by discarding inappropriate matter in drains. Please refer to the manufacturer's operation manual for specific information.

Any pump serving multiple residential dwellings shall have a maintenance check carried out at no more than 6 month intervals by a suitably qualified person. It is recommended that a maintenance contract is taken out to cover regular maintenance and repairs. (BS EN 12056-4)

After maintenance checks the pump station shall be re-commissioned in accordance with clause 7 of BS EN 12056-4:2000.

Logs of all maintenance shall be kept, and any faults that cannot be rectified reported to the pump owner/operator in writing and an acknowledgement requested.

BS EN 12056-4 Chapter 8.2 Operation and maintenance requirements for pump systems

| Maintenance Schedule | Required action | Recommended frequency |
|------------------------|---|---|
| Regular maintenance | Checking by visual inspection all connection points for leakage | 3 months for commercial premises; 6 months for multiple dwellings; |
| | Operation of valves, checking ease of operation and sealing. If necessary, reset and grease | 3 months for commercial premises; 6 months for multiple dwellings; |
| | Opening and closing of non-return valves; checking seating and ball/flap; functional check | 3 months for commercial premises; 6 months for multiple dwellings; |
| | Cleaning the pumping unit and the pipework directly connected to it; checking impeller and bearings | 3 months for commercial premises; 6 months for multiple dwellings; |
| | Checking oil level, where necessary, refill or change oil (if oil chamber fitted) | 3 months for commercial premises; 6 months for multiple dwellings; |
| | Internal cleaning of tank (if required or under special circumstances) | 3 months for commercial premises; 6 months for multiple dwellings; |
| | Visual inspection of the electrical part of the plant | 3 months for commercial premises; 6 months for multiple dwellings; |
| | Visually checking condition of collection tank; | 3 months for commercial premises; 6 months for multiple dwellings; |
| Occasional maintenance | Every two years rinse out plant with water | 2 years |

