

Drainage Management Plan – P01.1

PARK LANE PRIMARY SCHOOL – New Teaching Building

E05323



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Introduction

The purpose of this document is to give specific guidance to the maintenance requirements for individual components of the below ground drainage system and safe practice while doing so. The maintenance schedule does not only include routine maintenance of the components but also a routine inspection programme to ensure failures are located quickly and corrected using appropriate methods, with included risk assessments and safe methods of work. Maintenance requirements for the components should always be obtained from the manufacturer and followed.

Specifics of maintenance responsibilities are outlined in this document.

Drainage Maintenance Overview

Most drainage systems comprise of separate foul water and surface water networks.

The foul water network (FW) serves toilets, sinks, showers, baths, swimming pools, boiler condensate drains and any other feature that might generate contaminated water. These drains can be connected to the public foul sewer, sewage treatment plant, septic tank, or cess pit. The FW network should never be connected to the surface water network.

The surface water network (SW) serves roofs, paved areas, car parks, playgrounds and any other areas that collect uncontaminated rainwater. These drains can be connected to soakaways, ditches, watercourses, ponds, and public surface water sewers. The SW network should never be connected to the foul water network.

All drainage systems require regular maintenance, but this is especially so for SW network. After a time, the efficiency and capacity of the SW drainage system will be reduced due to leaves, rubbish, debris, and silt entering the system through the gullies, rainwater pipes, threshold drains and slot drains. This is particularly important where SW is directed to soakaways which may themselves become silted and cease to work as they should.

In the long term this could lead to failure of the system under extreme rainfall conditions and could result in flooding of the site and buildings.

The SW drainage system has been designed in accordance with the Building Regulations so as not to flood above ground during the equivalent of a 1 in 30-year storm of one-hour duration. If the system is not maintained, then protection against flooding is reduced to a level below this requirement and the risk of damage to the site and buildings increased accordingly.

The FW and SW drainage system and elements should be inspected on a regular basis and “pollutants” removed to prevent the system clogging up, restoring the silt trapping capacity of catch pits, gullies, threshold drain and slot drains.

Maintenance works identified from inspections should be carried out by a competent person or suitably qualified contractor. If the school decides to use their own staff for this work, they must ensure that the individual or individuals being asked to do the work are physically capable and have been supplied with all the appropriate tools and protective equipment necessary for the activity.

Maintenance Regime Implementation Timescale

All installed drainage will be covered and protected during the construction phase, a CCTV survey of the completed drainage system will be undertaken at the end of the construction phase to determine its condition prior to site handover and any defects identified will be rectified. Full air testing will be undertaken for all pipework throughout the construction phase and will be signed off by the local Building Control.

It is the main contractor's responsibility for drainage maintenance for the first 12 months after handover of the completed building to the client. From this point on, all drainage maintenance set out below will be the responsibility of the building management.

Health and Safety

If maintenance is carried out by professional contractors, then they will carry out their own risk assessment prior to commencing work and will come fully prepared with the appropriate tools.

The information below is advisory should the building management choose to use its own staff to carry out maintenance work. This advice is subject to a site-by-site risk assessment being carried out by the school, considering the staff undertaking the activities and the physical demands of the activities.

Risk Assessment

With any task being undertaken and or potential hazard noticed, a risk assessment must be completed. This document should contain the following:

- Potential hazards
- When hazards present a risk
- What effect does this risk have on visitors/users
- Consequence (severity) of the risk
- Likelihood (probability) of the risk
- Is the level of the risk acceptable?
- What can be done to lower a risk?
- If new procedures are in place, what is the new risk level and is it acceptable

A standard risk assessment is in a matrix form. An example is shown below in Figure 1.

CATEGORY and Hazard	Potential Consequences	Existing Controls in Place	Assesment of Risk				Further Controls Required	Action by Whom and When	Reassessment of Risk		Date Complete
			Severity	Probability	Risk Level (Severity x Probability)	Risk Mitigation (A = Acceptable)			New Risk Level	New Level Acceptable	

Figure 1 - Example Risk Assessment Matrix

General Practice

There is a very low risk of adverse health issues from contaminated water in well-designed and maintained drainage systems. However, those most at risk are maintenance staff, therefore safe systems of work should be enforced.

Use of proper procedures should be followed; including checking for open cuts, use of nitrile gloves, waterproof plasters or other skin covers.

Use of proper PPE should be strictly enforced.

Wherever work is undertaken the correct PPE should be worn and provisions made to protect others around you (for example fences, cones, tape).

All work undertaken should be by a competent worker who is competent to carry out such work. If no member of staff is suitable, professional contractors should be contacted and appointed to carry out the work.

Diseases

With any body of water, there is the potential to contain toxins that potentially cause ill health. Thorough inspection practice should lower the risks associated with the hazards.

- Contamination of the site with sewage (foul water) – this can lead to infection with E. coli, a bacterium which can cause stomach problems or more serious ill health – sewage could also be contaminated with Hepatitis A
- Weil's disease is a bacterial infection which is carried by animals, most commonly rats and cattle. It can be caught by humans through contact with infected urine in bodies of water. Infection to humans generally occurs where there are open wounds.

Highest risk occurs during litter management and clearing blockages, where safe practice must be in place to minimise the likelihood of obtaining cuts.

Lifting of Inspection Chamber and Manhole Covers

Work should be carried out with HSE's 'Manual Handling at work' publication and the use of the HSE website for guidance on Manual Handling.

- Lifting is acceptable by one man if less than 20kg in weight and the site risk assessment is satisfactory.
- May be a safe lift by two men if less than 40kg and the site risk assessment is satisfactory.

The general advice from the HSE is that mechanical lifting should be used wherever possible, rather than manual lifting. It is likely that this would be possible on all school sites so purchase of a mechanical lifting tool is recommended. There are many types to choose from and their use will reduce the risk of back injury significantly.

Special note in respect of manhole covers that have been infilled with stone or block paving. These covers are extremely heavy and exceed the maximum allowable limit for two-person manual handling so *must not be lifted manually, even by two persons*, unless the site risk assessment shows a low risk.

Drainage Maintenance

Maintenance refers to:

- Inspections required to identify performance issues
- Works to fix a discovered problem
- Landscape management
- Waste management

Good work practice is to file a sheet with tasks and frequency that they should be undertaken, signing off that they have been completed when appropriate. Also, a maintenance record should be kept and updated whenever work is undertaken on a system to allow for easier understanding if needed later.

Any works undertaken need to take consideration to have minimal effects on habitats and ecology and should be reviewed regularly to ensure that methods of work are still meeting their main objectives. This could result in a change of maintenance plan, e.g., more regular management of vegetation blocking sight for road users.

Systems that are outlined to not be the building managements responsibilities to repair/fix, should still be known when they are not functioning correctly so the third-parties responsible for this system can be contacted to fix the issue.

Components of the drainage system

The drainage system is comprised of the following components:

- Pipe network for the foul and surface water system
- Inspection chamber and manholes
- Channel and threshold drains
- Yard gullies
- Road gullies
- Flow control manholes
- Catchpit manholes
- Grease trap
- Pump Station
- Package sewage treatment plant

Components of the sustainable drainage system

The Sustainable Drainage (SuDs) are comprised of the following components:

- Soakaways
- Surface water proprietary treatment system
- Filter Drains
- Swales
- Pervious surfaces
- Attenuation storage tanks
- Critical exceedance route

Tools and Equipment

The following tools will be required if drainage maintenance is to be undertaken by school staff:

- Mechanical lifting tool to remove heavy manhole covers

- Set of long handled manhole keys for every different type of manhole cover on the site
- Crowbar to loosen jammed covers
- Club hammer to loosen jammed covers
- Set of drainage rods
- Manhole scoop or post digging scoop to be used to remove sludge from catchpit and gully sump
- Waterproof overalls
- Steel toe cap boot
- Waterproof gloves
- Safety glasses
- Face mask for use when rodding blockages
- Screwdriver for removing screw down covers
- Torch to inspect deep manhole
- Long staff to check sludge build up in chamber

Understanding the Drainage System

All lifting keys, maintenance tools and drainage product literature issued to, or purchased by, the school are to be kept in a safe place and a competent/ designated person is to make themselves familiar with the product literature supplied, and with the basic drainage methodology and components used for the school drainage system. If there is any doubt a suitably qualified person/ company should be consulted.

Clearing Blockages

Under 'SLA – schools,' 8.8 – Mains Drainage, schools should carry out the cleansing and clearance of blockages.

If a blockage is found within the system a competent member of staff could try and clear the affected section using drain rods. If this fails, then a drainage contractor would need to be called out.

If a member of staff does this work, then it should be restricted to locations where entry into the chamber is not required. If the work requires man access, then a professional drainage contractor should be called out.

Reducing the Probability of Blockages

For foul water systems the main cause of blockages is the flushing of unsuitable materials and so the best way to prevent blockages is to reduce the potential for this.

In practice this is difficult to do but introducing dispensing facilities that deliver individual sheets may reduce intentional blocking and controlling fats, waxes, clays, paints and suchlike from kitchens and work areas will also help.

For surface water systems the main cause of blockages is lack of maintenance. Surface water systems are often designed to collect detritus and foreign objects as a matter of course but by doing this it is essential that these captured materials are removed to create further capacity for collection.

It is important that materials from external areas that could block drains such as leaves, especially in the autumn, run-off from broken ground or loose surface materials from gravel car parks and suchlike are actively prevented from entering the drainage system if possible, by regular collection and removal.

Waste management

Wherever any maintenance work creates waste, proper method of disposal **must** be enforced. These will follow the most current waste management legislation.

Drainage Maintenance Schedule

Below are listed the separate maintenance schedules for the different components which make up the drainage system.

Pipe network for the foul and surface water system

Activity	Frequency	Notes
CCTV survey	Annually	Any sediment/debris found to be removed by high pressure jetting. A list of defects should be compiled and with high, medium, and low risk of failure. High risk defects should be fixed immediately, medium risk should be fixed within 6 months and low risk to be monitored annually.

Inspection chamber and manholes

Activity	Frequency	Notes
Remove cover to make sure water is free following	Monthly	Standing water may indicate blockage further up the pipeline and this should be investigated further.
Sediment removal	As required	Either with suction tanker or by hand. If carried out by hand then a manhole scoop or post hole digger scoop can be used to remove material from the manhole. This can be very physical work if done by hand.
Condition survey	Annually	Any defect rectified

Channel and threshold drains

Activity	Frequency	Notes
Visual inspection	Monthly, but every two weeks in Autumn	Empty sump and clear the units themselves using drain rods
Sediment removal	As required	Sumps will be fitted with silt buckets that can be lifted out by hand. If absent a scoop will be needed to empty the sump. Drain rods will clear the whole length of drain very quickly with no need to remove gratings except at either end of the run.
Condition survey	Annually	Any defect rectified

Yard Gullies

Activity	Frequency	Notes
Visual inspection	Monthly, but every two weeks in Autumn	Empty sump by hand when sediment is within 200mm of outlet.
Sediment removal	As required	Yard gullies and drainage channel sumps should be fitted with a silt bucket that can be lifted out by hand. If absent a scoop will be needed to empty the gully/sump.
Condition survey	Annually	Any defect rectified

Road gullies

Activity	Frequency	Notes
Visual inspection	Monthly	Empty sump with suction tanker or by hand when sediment is within 200mm of outlet.
Sediment removal	As required	If carried out by hand then a manhole scoop or post hole digger scoop can be used to remove material from the road gully. This can be very physical work if done by hand.
Condition survey	Annually	Any defect rectified

Flow control manholes

Activity	Frequency	Notes
Remove cover to make sure water is free following	Monthly	Standing water may indicate blockage further up the pipeline and this should be investigated further.
Sediment removal	As required	Either with suction tanker or by hand. If carried out by hand then a manhole scoop or post hole digger scoop can be used to remove material from the manhole. This can be very physical work if done by hand.
Condition survey	Annually	Any defect rectified

Catchpit manholes

Activity	Frequency	Notes
Remove cover to make sure water is free following	Monthly	Empty sump with suction tanker or by hand when sediment is within 200mm of outlet.
Sediment removal	As required	Either with suction tanker or by hand. If carried out by hand then a manhole scoop or post hole digger scoop can be used to remove material from the manhole. This can be very physical work if done by hand.
Condition survey	Annually	Any defect rectified

Grease Trap

This site had the following pump station installed:

- Manufacture:
- Model:

Refer to appendix B for manufactures operations and maintenance manual.

Pump Station

This site had the following pump station installed:

- Manufacture:
- Model:

Refer to appendix B for manufactures operations and maintenance manual.

Package sewage treatment plant (PSTP)

This site had the following PSTP installed:

- Manufacture:
- Model:

Refer to appendix B for manufactures operations and maintenance manual.

Sustainable Drainage System Maintenance Schedule

Staff undertaking inspections of Sustainable Drainage (SuDs) should have appropriate levels of experience doing so, if not then specific inspection visits are necessary.

Regular Maintenance

Regular SuDs inspection will:

- Help determine future maintenance plans
- Help establish ongoing hydraulic, water quality, amenity and biodiversity performances
- Allow identification off performance faults

During the first year, SuDs inspections should be carried out at least months and after storm events to ensure that the system is function and there is no apparent damage.

Typical routine inspection questions that will indicate when regular or occasional maintenance is required include:

- Are inlets or outlets blocked?
- Does and part of the system seem to be leaking?
- Is the vegetation healthy?
- Is there evidence of poor water quality?
- Is there evidence of sediment build-up beyond stated limits?
- Is there indication of oil accumulation?
- Is there evidence of ponding above an infiltration surface?
- Is there any structural damage?
- Is there any erosion over vegetated areas?

Litter and Debris Removal

Removal of litter and debris is an integral part of SuDs maintenance as it keeps the system flowing and in working order. This process should be undertaken as regular as a specific site requires, with increased work in autumn and winter months.

Vegetation Management

Grass around a SuDs system should be cut to maximise the performance of the system.

- Short grass improves appearance
- Longer grass tends to improve water quality

Grass should not be cut to the edge of a body of water to deter large birds and lower the risk of nutrients falling in the water.

Grass cutting should be done as infrequently as possible and consider the points above along with local preference.

Weeds are defined as any unwanted vegetation in a particular area, for SuDs this means invasive species or species which negatively affect the performance of a drainage system. Where there is the presence of weeds they should be removed when their numbers become too high.

In the first-year hand weeding is often required to lower the effect of surrounding vegetation during plant establishment.

Shrubs can be densely packed and grow rapidly during their first year, often requiring weeding around their base. Bark mulch should not be used around shrubs as it blocks outlets in drainage systems.

Aquatic plants need control of weeds for the first 3 years, after which irregular inspections are often enough to remove them completely. The build-up of dead vegetation should be undertaken every 3 years. Where vegetation is high, removal could be as often as every year and inspections should note if vegetation is getting too high.

Care should be taken to avoid disturbance of nesting birds and other animals, especially in breeding seasons, and not to affect the habitats of target species (e.g., water voles).

Surfaces

Where a pervious surface is present, sweeping should take place to remove silt and sediments to allow for the infiltration rates to stay at an optimal level, often only once per year.

Surfaces that convey run off or designed to allow run-off to pass through are more vulnerable to build up of algae and deterioration in structural integrity, this could lead to the potential of ice formation in winter months causing an increased risk of slipping.

Occasional Maintenance

Sediment removal

To ensure performance of SuDs the accumulated sediment in the system should be removed. The frequency of which depends on:

- Design of upstream drainage systems
- Type of system
- Design silt storage volume

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- Size of catchment area

Once construction is finished and vegetation have fully developed, sediment deposits should drop significantly.

Sediment removal should always be carried out with minimal damage to the SuDs system, ecological systems, and aesthetic appearance. The method of removal is factor to size, access, volume of sediment and depths.

For further information on sediment removal, refer to SuDs manual C753, Chapter 32: Operation and maintenance, 32.7.1.

Vegetation and plant replacement

Replacement may be required after the first 12 months or after storm events.

Dead or damaged plants should be replaced to restore the correct number of living plants per m².

Remedial Maintenance

Rehabilitation

The need of structural rehabilitation is often between 10-25 years and consists of jobs including replacement of filters and geotextiles.

Regarding infiltration, inspections should look for signs of infiltrations surfaces becoming clogged and work should be done to rectify any issues.

Surface water proprietary treatment system

The effectiveness of treatment systems is largely dependent on the maintenance of the system. A thorough more frequent inspection plan will lead to a higher quality of water.

With treatment systems the issue is that most of the system is underground, the system can be monitored by checking the water quality at the outlet of the system or with access to the system itself.

During the first few months, subsurface systems should be checked visually, and deposit collections measured to give maintenance staff an idea of deposit rates.

If there is a significant spill of a pollutant, the system must be cleaned immediately.

Routine maintenance	Typical frequency
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 floatable	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	Six-monthly
Inspect sediment accumulation rates and establish appropriate removal frequencies	Monthly during first half year of operation, then every six months

Also refer to appendix B for manufacturer's operations and maintenance manual.

Swales

For swales little maintenance is required, removal of litter and mowing of grass to ~17-150mm in length. Grass clippings are to be disposed of away from the swale to remove pollutants and nutrients.

Wet swales will not require mowing but might need some trimming maintenance during the autumn months.

Regular maintenance	Typical frequency
Remove litter and debris	Monthly, or as required
Cut grass – to retain grass height within specified design range	Monthly (during growing season) or as required
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 infiltration surfaces for ponding, compaction, silt accumulation, records areas where water is ponding for > 48 hours	Monthly, or when required
Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Half yearly
Occasional maintenance	
Reseed areas of poor vegetation growth, after plant types to better suit conditions, if required	As required or if bare soil is exposed over 10% or more of the swale treatment area
Remedial actions	
Repair erosion or other damage by re-turfing or reseeded	As required
Relevel uneven surfaces and reinstate design levels	As required
Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
Remove and dispose of oils or petrol residues using safe standard practices	As required

Pervious surfaces

Pervious pavements should be checked during and after a storm event to identify areas of ponding. The use of brush and suction equipment can be used to clean pervious surfaces of silt build up, however the vacuum should be adjusted to avoid removing joining material, if any joining material is removed then it should be replaced.

Required action	Typical frequency
Brush 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 using glyphosate applied directly into the weeds by and applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial actions	
Remediate and landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the 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, 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 hours after large storms in first six months
Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
Monitor inspection chambers	Annually

Attenuation tank

Regular maintenance	Typical frequency
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, outlets, 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

Critical exceedance route

Regular maintenance	Typical frequency
Make visual inspection. Check route is not blocked by new fences, walls, soil, or other rubbish. Remove as necessary	Monthly

References

CIRIA's The SuDs Manual – ISBN 978-0-86017-760-9.

HCC Property Services (2011) Service Legal Agreement.