

HEXA

Twycross Zoo – New Orangtuan Enclosure

Surface Water Maintenance and Management Plan

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**Engineering
opportunity.**

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Revision	Description	Issued	Checked	Date
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1.0 Maintenance Regime

On site drainage systems and SuDS features would remain under private ownership and would be maintained by an estates management company or the owner/occupier in accordance with the following guidance:

In the event of a pollution incident happening on the site, the nearest drainage inlets should be blocked up whilst the spillage is cleared up.

1.1 Main Drainage System

Gutters, rainwater pipes, outlets, gullies, and drainage channels would be inspected and thoroughly cleaned once a year. All manholes would be inspected once a year and where necessary cleaned out at the same time. Any defects to the brickwork, benching cover or frame would be made good. Attention would be made to the Confined Spaces Regulations 1997 and the provisions contained therein for access to confined spaces. Details for entrance to manholes and separator tanks are contained in the above legislation.

1.2 Cleaning of the Drainage System

The following operations would be carried out during the periodic cleaning of the drainage system.

1. Covers of inspection chambers and manholes would be removed and the sides, benching and channels cleaned.
2. Intercepting traps, if fitted, would be plunged and flushed with clean water. Care would be taken to see that the stopper in the rodding eye is securely replaced.
3. Main and branch drains should be cleaned and afterwards would be flushed with clean water. Any obstructions found would be removed and not flushed into the system.
4. Periodically, accumulated deposits in gullies would be removed. The traps would then be plunged and thoroughly flushed out with clean water.
5. Covers of inspection chambers and gullies would be replaced, bedded unsuitable grease or other sealing material and/or bolted down as appropriate to the type. Missing bolts and broken items would be renewed.

1.3 Methods of Cleaning

The drainage system would be cleaned, as appropriate, using one or more of the following methods:

a. Rodding.

Appropriate cleaning tools and techniques should be chosen to avoid damage to the pipework to be cleaned. A set of rods with appropriate ends is basic useful equipment. It is important that correctly designed proprietary ends are used on the rods. Makeshift devices attached to the ends of rods should be avoided as they are not as effective as the correctly designed article and could become detached and create a blockage which would be difficult to remove. Furthermore, it is possible that such devices could cause damage to the pipeline. If the rods have brass ferrules, they should be checked to ensure that their fastenings are secure and that there are no protruding shoulders or fastenings as these can cause damage to drain lines, especially when entering through rodding eyes.

b. Jetting.

High pressure jetting techniques are suitable for use with all currently available pipe materials and should also be considered.

c. Hydraulic rams compressed air or other gases.

Equipment is available for use with all sizes of drain likely to be encountered in building drainage and is suitable for use with all currently available pipe materials. The principle of operation is that a shock wave is induced and is transmitted by water to the point of blockage, and the technique is effective where the pipe is surcharged or can be filled with water from the blockage to a point where the equipment can be used.

1.4 Permeable Surfacing

1.4.1 Operation

The permeable surfacing features are intended to be water quality and attenuation storage features and to be dry, except during rainfall events.

Where applicable the surface has been designed to be permeable/contain gaps where rain can flow through the upper construction layers into the voids between interlocking stones which make up the subbase.

The surfacing and drainage around the new buildings has generally been designed to facilitate access for maintenance vehicles.

1.4.2 Inspection and Maintenance Regime

Regular inspection and maintenance is important for the effective operation of the permeable pavement.

A recommended schedule is detailed in the table below.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required)	Initial inspection.	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth. If required take remedial action.	3-monthly, 48 hours after large storms.
	Inspect silt accumulation rates and establish appropriate brushing frequencies. Silt can also be caused by adjacent landscaping areas which should be reprofiled to provide a flat area or berm adjacent to the paving.	Annually.
	Monitor inspection chambers.	Annually.

Regular maintenance\inspection	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 and as per landscape architect's specification.
	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. This could include replacement of the jointing and bedding material. The upper geotextiles layer may also need replacing if clogged and Terram 1000 has a life span of 25 years.	As required (if infiltration performance is reduced as a result of significant clogging).

1.5 Filter Drains

1.5.1 Operation

The filter drains are intended to be surface water conveyance, water quality and attenuation storage features for the proposed footpaths on site. These features are intended to be dry except during rainfall events.

The surface water should permeate through the upper layer of the feature in to the permeable stone below. The water is then collected and conveyed in the perforated pipe within the aggregate trench.

Access for maintenance has been provided through inspection chambers.

1.5.2 Inspection and Maintenance Regime

Regular inspection and maintenance is important for the effective operation of the features.

Sediment\material removal should be undertaken in consultation with the guidance provided by environmental regulator.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required)	Inspect feature surface to identify evidence of erosion, compaction, ponding, sedimentation and contamination	Half yearly and after large storms.
	Check feature surface for even gradients	Half yearly
	Inspect chambers for evidence of clogging	Half yearly.
	Inspect silt accumulation rates and establish appropriate removal frequencies.	Half yearly.
Regular maintenance\inspection	Litter and debris removal	Monthly or as required
	Grass cutting (to maintain grass height within landscape architect's specified design range)	To be confirmed by Landscape Architect [Monthly (during growing season) or as required]
	Manage other vegetation and remove nuisance plants/dead growth.	Monthly (at start, then as required).
	Remove sediment from main channel.	Annually (or as required after heavy rainfall events)
Occasional maintenance	Re-seed areas of poor vegetation growth (seed mix to landscape architect's specification).	Annually, or as required. As per landscape architect's specification
Remedial actions	Repair of erosion or other damage by re-seeding or re-turfing. Soil reinforcement such as coir matting should be used and staked in accordance with manufacturer's instructions.	As required.
	Realignment of flow channel surface.	As required.

	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required.
	Re-level uneven surfaces and reinstate design levels. This may be required as part of sediment removal.	As required.
	Replace geotextiles and clean and replace filter media, if clogging occurs. Terram 1000 typical design life is 25 years.	As required.

1.6 Pipes & Manholes

1.6.1 Operation

Pipes are the main conveyance for surface water across the development. They are to be dry except during rainfall events. All pipes have been designed to be self-cleansing as a result of the gradients proposed.

Access for maintenance is provided through access chambers, manholes and rodding eyes.

1.6.2 Inspection and Maintenance Regime

Regular inspection and maintenance is important to identify areas which may have been obstructed/clogged and may not be drained efficiently; thus exposing the development to a greater flood risk level.

Sediment\material removal should be undertaken with reference to relevant guidance from the environmental regulator, especially where run-off is taken from potentially contaminated areas such as vehicular access points/parking.

A recommended schedule is detailed in the table below.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required)	Initial inspection should be provided in the form of a post construction CCTV survey.	N/A
	Inspect for evidence of poor operation via water level in	Every 3 months, 48 hours after large storms.

	chambers. If required take remedial action.	
Occasional maintenance	Check and remove large vegetation growth near pipe runs.	Every 6 months
Remedial actions	Rod through poorly performing runs as initial remediation.	As required.
	If poor performance persists, jet and CCTV survey poorly performing runs.	As required.
	Seek advice for the remediation techniques suitable for the type of issue and its location.	As required If above does not improve performance.

1.7 Flow Control Chambers

Flow control chambers are proprietary products and the manufacturer's recommendations should be followed.

1.7.1 Operation

Flow control chambers are intended to restrict the surface water runoff discharge rate from the site to a designed rate utilising techniques such as an orifice plate, vortex separator or mechanical float control.

1.7.2 Inspection and Maintenance Regime

Regular inspection and maintenance is important to identify areas which may have been obstructed/clogged and may not be drain efficiently, thus exposing the development to a greater level of flood risk.

A recommended schedule is detailed in the table below.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required)	Initial inspection should be provided using a post construction CCTV survey.	N/A
	Inspect for evidence of poor operation via water level in chambers. If required take remedial action.	3-monthly, 48 hours after large storms.

Occasional maintenance	Check and remove large vegetation growth near pipe runs.	6 monthly
Remedial actions	Open penstock where poor performance is identified. Inspect and rectify any issues found.	As required.
	If continued poor performance, jet and CCTV survey.	As required.
	Seek advice as to remediation techniques suitable for the type of performance issue and location.	As required If above does not improve performance.

1.8 Attenuation 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
	Remove sediment from pre-treatment catchpits	Annually or as required
Remedial actions	Repair/rehabilitate inlets and vents	As required
Monitoring	Inspect/check all inlets and vents 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