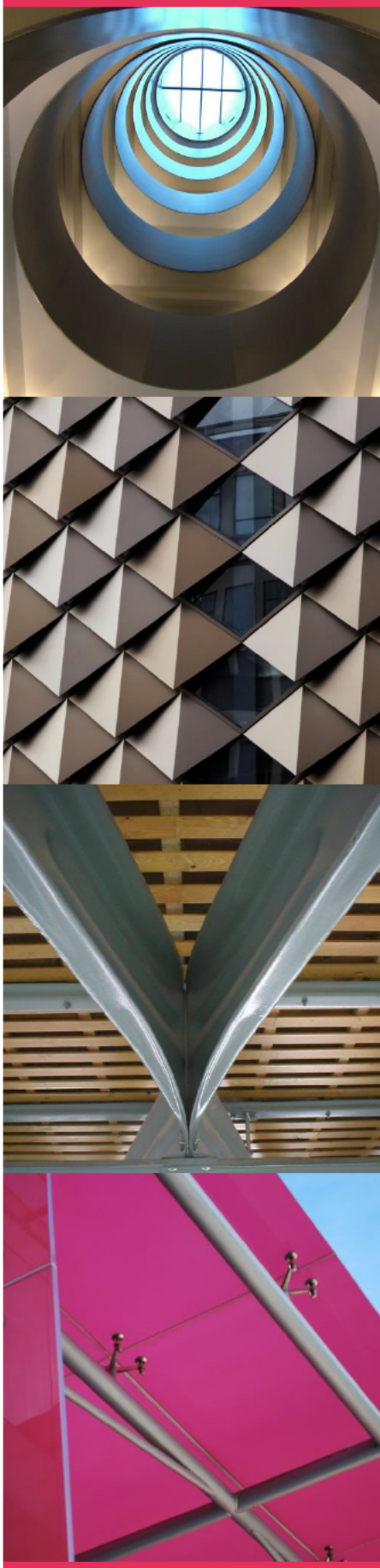

Interchange 26

SuDS Drainage Operations and Maintenance Manual

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1.0 Introduction

1.1 Project Background

Curtins Consulting Limited has prepared a SuDS Drainage Operations and Maintenance Manual as supplementary to the Drainage strategy for Interchange 26. Reference is paid to the inspection, aftercare and maintenance of SuDS drainage features as part of this manual in order to demonstrate to the LLFA or adopting authority the effectiveness and longevity of the SuDS features designed within the scheme as opposed to the standard Building Regulations local and domestic drainage and/or the main discharge drainage connections to 'Sewers for Adoption' standards.

This report is based on current best practice guidance.

In accordance with the project FRA the surface water network has been designed to accommodate the 1 in 100 year storm rainfall event plus an allowance for climate change. It may be that the exceedance flows above the 1 in 30 year storm rainfall event are stored within the site partially above ground, on non-habitable external landscaping, parking or other space. As the flows are generally being attenuated on site and within SuDS features there will be a period of time after storm events where the network is still partially or fully surcharged and is draining down. Where this surcharging is still present after 48hrs appropriate action should be taken as noted below.

There are two separate surface water networks subject to Phase 1 of this Planning Application:

The southern surface water network captures surface water runoff from the proposed road network, the Tungston private development plot and overland flow from formed earth embankments, and due to having multiple owners discharging, will be subject to adoption by Yorkshire Water under a Section 104 application. Surface water discharges to the existing open water beck to the southeast of the site via a flow control devise, with surface water attenuation provided in the form of a large attenuation basin (dry pond), oversized pipes, manholes and filter trenches. Yorkshire Water will take on maintenance of the surface water drainage following adoption, however in the interim period during the statutory 12-month statutory maintenance period, the drainage and SuDS will be maintained by the developer. As such, this document outlines the developer's operation and maintenance responsibility associated with the southern network during the 12-month maintenance period only.

The northern surface water network captures surface water from the proposed road network and overland flow from formed earth embankments only and as such will not be subject to adoption by Yorkshire Water. Surface water discharges to the existing open water beck to the northeast of the site via a flow control devise, with surface water attenuation provided in the form of an attenuation basin (dry pond), oversized pipes, manholes and filter trenches. This document outlines the developer's operation and maintenance responsibility for the 25 year concession period.

As such the responsibility for maintaining the features is clearly defined, and consistency is carried through from conception to maintenance.

1.2 Scope of O&M Manual

This manual is intended to give an overview of the operation and maintenance for the range of SuDS features included with the drainage strategy and in relation to typical details only. Where proprietary products are specified the manufacturer's instructions and recommendations should be followed in priority to this document unless specifically noted otherwise due to project constraints.

The recommended operations and frequencies are typical only and should be more frequent initially to ensure that there are no unforeseen issues with the operation and then adjusted to suit the site requirements.

2.0 Attenuation Basin (or 'Dry Pond')

2.1 Location and Description

A dry attenuation basin is provided to both the northern and southern surface water drainage networks, forming part of the green landscaped areas. These areas have been designed to act in concert with the traditional below ground (piped) drainage network to provide sufficient storm water storage to accommodate the surface water collected with more extreme rainfall events (up to and including 100 year return period events with an additional allowance for climate change in accordance with planning requirements for the development).

2.2 Operation

The attenuation basins are intended to provide surface water storage to attenuate the discharge from the site up to and including the 1 in 100 year plus 30% climate change event. As such during rainfall events the basin will fill to a maximum level of 300mm below the minimum bank level. The basin is intended to be dry in between rainfall events.

Access to the southern attenuation basin for maintenance has been provided by its proximity to the proposed road to the west, and a 3m wide assess track to the remaining perimeter in accordance with Yorkshire Water's requirements discussed as part of the Section 104 application. These hard-standing areas have been designed to accommodate the loading of anticipated maintenance vehicles. Minimum side slopes of 1 in 3 are provided to the basin as required for landscape maintenance.

Access to the southern attenuation basin for maintenance has been provided by its proximity to the proposed road to the southwest and from the existing PROW to the northeast. These hard-standing areas have been designed to accommodate the loading of anticipated maintenance vehicles. Minimum side slopes of 1 in 3 are provided to the basin as required for landscape maintenance.

2.3 Inspection and Maintenance Regime

Regular inspection and maintenance is important for the effective operation of attenuation basins as designed. Maintenance responsibility for attenuation basins and their surrounding area should be undertaken on a cyclic basis as described below.

Regular mowing in and around attenuation basins is required only along maintenance access routes, amenity areas (e.g. footpaths), across embankments and across the main storage area. The remaining areas can be managed as "meadow" unless additional management is required or desired for landscaping purposes.

Plant management, to achieve the required habitat/appearance, should be specified clearly in a maintenance schedule by the landscape architect planned to coincide with other site wide maintenance operations.

Sediment\material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols, especially where run-off is taken from potentially contaminated areas such as car parks/service yards.

Maintenance Schedule	**Required Action**	**Frequency**
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required)	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly and after large storms.
	Inspect banksides, structures, pipework etc. for evidence of physical damage.	Monthly and after large storms.
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Half yearly.
	Check penstocks and other mechanical devices (if present).	Half yearly.
Regular maintenance\inspection	Litter and debris removal	Monthly or as required
	Grass cutting (non-meadow/long grass)	To be confirmed by Landscape Architect [Monthly (during growing season) or as required]
	Grass cutting (meadow/long grass)	To be confirmed by Landscape Architect [half yearly (spring before nesting season and autumn)]
	Manage other vegetation and remove nuisance plants/dead growth.	Monthly (at start, then as required).
	Remove sediment from inlets, outlet.	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.
	Remove sediment from base	3 – 10 years (or as required after heavy rainfall events).

Maintenance Schedule	**Required Action**	**Frequency**
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 rip-rap/low flow channel.	As required.
	Repair/rehabilitation of inlets, outlets and overflows. Reference should be made to original design details.	As required.
	Re-level uneven surfaces and reinstate design levels. This may be required as part of sediment removal.	As required.

3.0 Filter Strips, French Drains and Under-drained Swales

3.1 Location and Description

Filter strips, French drains and under drained swales form an essential part of the storm water drainage network on the Project. French drains are provided to the top and bottom of formed earth embankments, to capture overland flow and to ensure that the formed earth embankments do not become overly saturated which could affect their stability.

3.2 Operation

The filter strips, French drains and under drained swales are intended to be the surface water conveyance, water quality and attenuation storage features. 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 gravel surround to the pipes is protected from the ingress of silt from overland flows by a geotextile membrane. The water is then collected and conveyed in the perforated pipe within the gravel trench. The perforated pipe is wrapped in a geotextile membrane to further minimise silts migrating into the below ground drainage network.

3.3 Inspection and Maintenance Regime

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

Plant management, to achieve the required habitat/appearance, should be specified clearly in a maintenance schedule by the landscape architect planned to coincide with other site wide maintenance operations.

Sediment\material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols, especially where run-off is taken from potentially contaminated areas such as car parks/service yards.

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 gravel diaphragm trench upstream of filter strip for 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	Check for poor vegetation growth due to lack of sunlight or dropping of leaf litter, and cut back adjacent vegetation where possible.	Annually, or as required. As per landscape architect's specification.
	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	As required.

Maintenance Schedule	Required Action	Frequency
	accordance with manufacturer's instructions.	
	Realignment of flow channel/dished 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.
	Excavate trench walls to expose clean soils if infiltration performance reduces to unacceptable levels	As required.

4.0 Pipes (Including Oversized) & Manholes

4.1 Location and Description

Pipes are the main conveyance across the site with the network as shown on drainage strategy drawing.

Pipes are proprietary products and the materials can vary across the site and as such where used the manufacture's recommendations should be followed. Regardless of the product used the pipes will be fully compliant with Curtins below ground drainage specification.

4.2 Operation

Pipes are intended to be the main conveyance across the development and where oversized they form a proportion of the attenuation volume required by the limitation of the discharge rate. They are intended to be dry except for during rainfall events. These have been designed to be self-cleansing where possible for smaller diameter pipes, and for larger diameters the risk of blockage causing a critical failure is reduced due to the overall pipe size as long as regular maintenance inspections and any subsequent cleaning operations are undertaken.

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

4.3 Inspection and Maintenance Regime

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

Sediment/material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols, as run-off is taken from potentially contaminated areas such as car parks/service yards.

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 as 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	Rod through poorly performing runs as initial remediation.	As required.
	If continued poor performance jet and CCTV survey poorly performing runs.	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.

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