



RIDGE

**SPINE ROAD
SUDS STRATEGY**

ONE HORTON HEATH

EASTLEIGH BOROUGH COUNCIL

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SPINE ROAD SUDS STRATEGY ONE HORTON HEATH

Prepared for

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SECTION 1

INTRODUCTION

1. PROJECT BACKGROUND

1.1. Overview

Ridge & Partners prepared this SuDS Strategy on behalf of Eastleigh Borough Council. The proposed development has been designed in full accordance with the Development Plan and Outline Planning Application (OPA) O/20/89498, which has a resolution to grant consent subject to S106 negotiations relating to education. This application is for full planning consent due to the time for these negotiations to complete. Submitting details of the Secondary Infrastructure Road (SIR) as a full planning application will deliver the SIR in accordance with, and as part of the OPA, but enable commencement more quickly than waiting for the resolution of the OPA S106 and the determination of an application for Reserved Matters Approval of details of the SIR. The site is located at One Horton Heath at approximately SO50 7BZ, Grid reference SU 48905 16935 (hereby referred to as the 'Application Site- reserved matters planning application).

1.2. Site Location

The application site is situated south of the Fir Tree Lane and north of the proposed Lower Acre development, adjacent to an existing solar farm. The existing site is currently an empty greenfield area.



Figure 1: Site Location Plan

The Ordnance Survey grid reference for the application site is SU 48807 17233, approximately 448807N, 117233E and the nearest postcode is SO50 7BZ. The total area of the proposed application site is 21.56ha.

1.3. Hydrological Settings

The nearest river is the River Itchen which is located 1.67km away from the proposed development. The tributary of Foxwood Stream runs between the solar farm and the Fir Tree Lane and north of the proposed one Horton heath Lower Acre site as shown in figure 3.

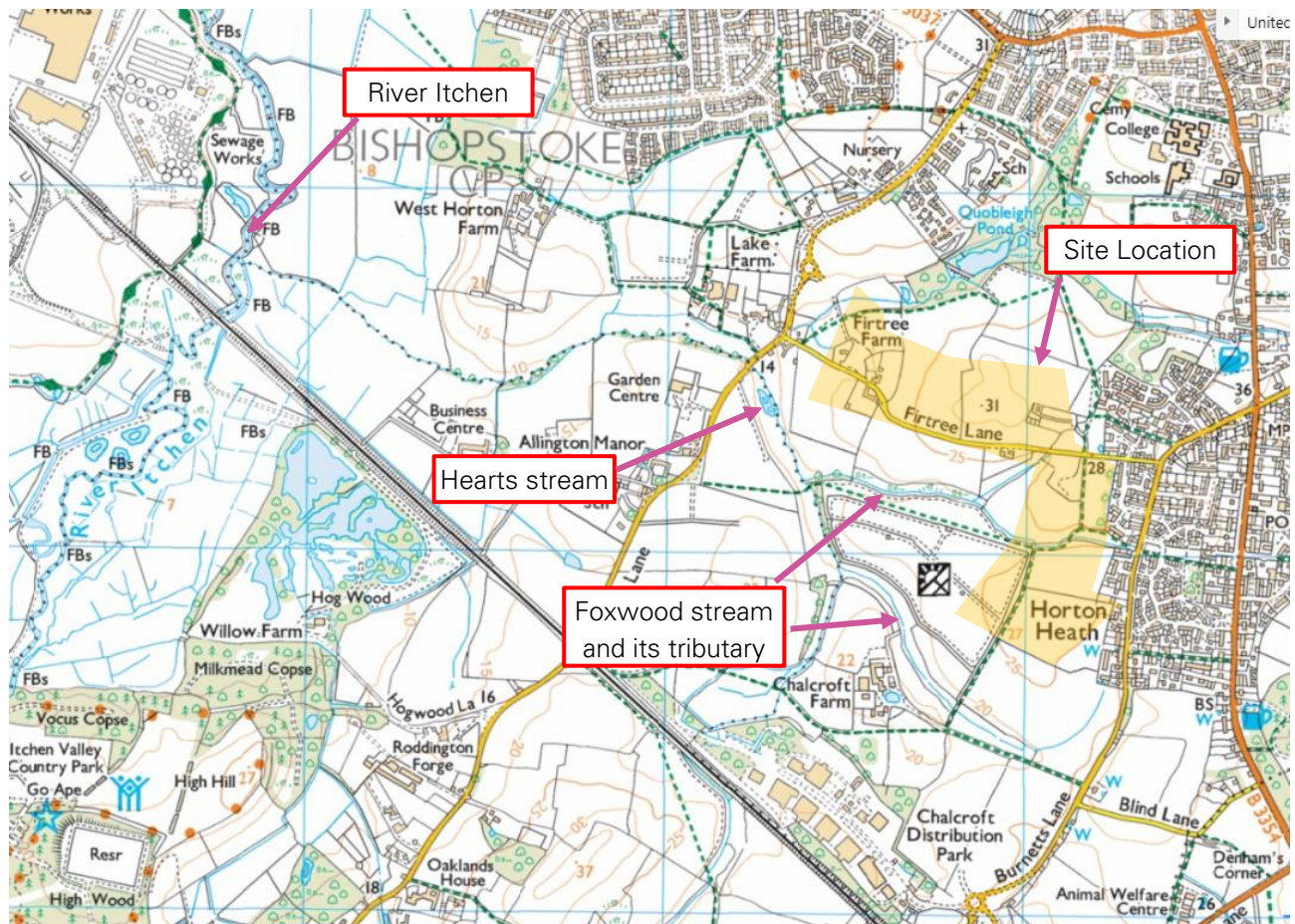


Figure 2: Location of River Itchen from the proposed site

1.4. Proposed Development

The proposed development is a part of the One Horton Heath Site Wide Infrastructure Delivery, which includes the construction of the roads, residential homes, local centres, school and its playground. However, this report primarily focuses on the spine road that spans between Fir Tree Lane and Foxwood stream, connecting the west and east portion of the development. This spine road crosses the Foxwood Stream and runs alongside the solar farm before linking to the northern section of the proposed Lower Acre site.

SECTION 2

WATER QUALITY

2. WATER QUALITY

2.1. Introduction

The proposed development utilises flow paths through swales and pond before making its final destination to the nearest watercourse, Foxwood Stream and its tributaries.

Petrol/Oil inceptor is placed between the manholes and SuDs feature such as ponds and swales to avoid any leakage or spillage to the nearby watercourse. Refer to drawing 5018551-RDG-XX-XX-DR-501 to 504.

Refer to Appendix A for overall drainage layout.

2.2. Simple Index Tool

The Simple Index Approach has been utilised to assess the water quality management set out in the SuDS Manual, with appropriate cross referencing to the relevant 'Design Conditions'.

The results of these assessments are in the following tables for each catchment area and confirm that the proposed spine roads and access roads are suitable designed into maintain water quality.

Catchment F

Access Road to Pond F

SUMMARY TABLE	
Land Use Type	Low traffic roads (e.g. residential roads and general access roads, < 300 traffic movements/day)
Pollution Hazard Level	Low
Pollution Hazard Indices	
TSS	0.5
Metals	0.4
Hydrocarbons	0.4
SuDS components proposed	
Component 1	Pervious pavement (where the pavement is not designed as an infiltration component)
SuDS Pollution Mitigation Indices	
TSS	0.7
Metals	0.6
Hydrocarbons	0.7

SuDS components proposed	
Component 2	Proprietary treatment system (Petrol/Oil Inceptor)
SuDS Pollution Mitigation Indices	
TSS	0.7
Metals	0.7
Hydrocarbons	0.7
Combined Pollution Mitigation Indices	
TSS	>0.95
Metals	>0.95
Hydrocarbons	>0.95
Acceptability of Pollution Mitigation	
TSS	Sufficient
Metals	Sufficient
Hydrocarbons	Sufficient
Spine road to pond F	
SUMMARY TABLE	
Land Use Type	Roads (excluding low traffic roads, highly frequented lorry approaches to industrial estates, trunk roads/motorways)
Pollution Hazard Level	Medium
Pollution Hazard Indices	
TSS	0.7
Metals	0.6
Hydrocarbons	0.7
SuDS components proposed	

Component 1	Pervious pavement (where the pavement is not designed as an infiltration component)
SuDS Pollution Mitigation Indices	
TSS	0.7
Metals	0.6
Hydrocarbons	0.7
SuDS components proposed	
Component 2	Proprietary treatment system (Petrol/Oil Inceptor)
SuDS Pollution Mitigation Indices	
TSS	0.7
Metals	0.7
Hydrocarbons	0.7
Combined Pollution Mitigation Indices	
TSS	>0.95
Metals	>0.95
Hydrocarbons	>0.95
Acceptability of Pollution Mitigation	
TSS	Sufficient
Metals	Sufficient
Hydrocarbons	Sufficient

Spine road to Pond F via swale

SUMMARY TABLE

Land Use Type	Roads (excluding low traffic roads, highly frequented lorry approaches to industrial estates, trunk roads/motorways)
Pollution Hazard Level	Medium
Pollution Hazard Indices	
TSS	0.7
Metals	0.6
Hydrocarbons	0.7
SuDS components proposed	
Component 1	Pervious pavement (where the pavement is not designed as an infiltration component)
SuDS Pollution Mitigation Indices	
TSS	0.7
Metals	0.6
Hydrocarbons	0.7
SuDS components proposed	
Component 2	Proprietary treatment system (Petrol/Oil Inceptor)
SuDS Pollution Mitigation Indices	
TSS	0.7
Metals	0.7
Hydrocarbons	0.7
SuDS components proposed	
Component 3	Swale
SuDS Pollution Mitigation Indices	

SuDS Pollution Mitigation Indices

TSS	0.5
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Metals	0.6
--------	-----

Hydrocarbons	0.7
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Combined Pollution Mitigation Indices

TSS	>0.95
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Metals	>0.95
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Hydrocarbons	>0.95
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Acceptability of Pollution Mitigation

TSS	Sufficient
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Metals	Sufficient
--------	------------

Hydrocarbons	Sufficient
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Access road to Pond F via swale

SUMMARY TABLE

Land Use Type	Low traffic roads (e.g. residential roads and general access roads, < 300 traffic movements/day)
Pollution Hazard Level	Low
Pollution Hazard Indices	
TSS	0.5
Metals	0.4
Hydrocarbons	0.4
SuDS components proposed	
Component 1	Pervious pavement (where the pavement is not designed as an infiltration component)
SuDS Pollution Mitigation Indices	
TSS	0.7
Metals	0.6
Hydrocarbons	0.7
SuDS components proposed	
Component 2	Proprietary treatment system (Petrol/Oil Inceptor)
SuDS Pollution Mitigation Indices	
TSS	0.7
Metals	0.7
Hydrocarbons	0.7
SuDS components proposed	
Component 3	Swale
SuDS Pollution Mitigation Indices	

SuDS Pollution Mitigation Indices

TSS 0.5

Metals 0.6

Hydrocarbons 0.7

Combined Pollution Mitigation Indices

TSS >0.95

Metals >0.95

Hydrocarbons >0.95

Acceptability of Pollution Mitigation

TSS Sufficient

Metals Sufficient

Hydrocarbons Sufficient

Catchment G

Access Road to Pond G

SUMMARY TABLE

Land Use Type Low traffic roads (e.g. residential roads and general access roads, < 300 traffic movements/day)

Pollution Hazard Level Low

Pollution Hazard Indices

TSS 0.5

Metals 0.4

Hydrocarbons 0.4

SuDS components proposed

Component 1 Pervious pavement (where the pavement is not designed as an infiltration component)

SuDS Pollution Mitigation Indices

TSS	0.7
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Metals	0.6
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Hydrocarbons	0.7
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SuDS components proposed

Component 2	Proprietary treatment system (Petrol/Oil Inceptor)
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SuDS Pollution Mitigation Indices

TSS	0.7
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Metals	0.7
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Hydrocarbons	0.7
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Combined Pollution Mitigation Indices

TSS	>0.95
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Metals	>0.95
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Hydrocarbons	>0.95
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Acceptability of Pollution Mitigation

TSS	Sufficient
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Metals	Sufficient
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Hydrocarbons	Sufficient
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Spine road to pond G

SUMMARY TABLE

Land Use Type	Roads (excluding low traffic roads, highly frequented lorry approaches to industrial estates, trunk roads/motorways)
Pollution Hazard Level	Medium
Pollution Hazard Indices	
TSS	0.7
Metals	0.6
Hydrocarbons	0.7
SuDS components proposed	
Component 1	Pervious pavement (where the pavement is not designed as an infiltration component)
SuDS Pollution Mitigation Indices	
TSS	0.7
Metals	0.6
Hydrocarbons	0.7
SuDS components proposed	
Component 2	Proprietary treatment system (Petrol/Oil Inceptor)
SuDS Pollution Mitigation Indices	
TSS	0.7
Metals	0.7
Hydrocarbons	0.7
Combined Pollution Mitigation Indices	
TSS	>0.95
Metals	>0.95

Hydrocarbons >0.95

Acceptability of Pollution Mitigation

TSS	Sufficient
Metals	Sufficient
Hydrocarbons	Sufficient

Catchment H

Access Road to Pond H

SUMMARY TABLE

Land Use Type	Low traffic roads (e.g. residential roads and general access roads, < 300 traffic movements/day)
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Pollution Hazard Level	Low
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Pollution Hazard Indices

TSS	0.5
Metals	0.4
Hydrocarbons	0.4

SuDS components proposed

Component 1	Pervious pavement (where the pavement is not designed as an infiltration component)
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SuDS Pollution Mitigation Indices

TSS	0.7
Metals	0.6
Hydrocarbons	0.7

SuDS components proposed

Component 2	Proprietary treatment system (Petrol/Oil Inceptor)
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SuDS Pollution Mitigation Indices

TSS	0.7
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Metals	0.7
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Hydrocarbons	0.7
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Combined Pollution Mitigation Indices

TSS	>0.95
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Metals	>0.95
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Hydrocarbons	>0.95
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Acceptability of Pollution Mitigation

TSS	Sufficient
-----	------------

Metals	Sufficient
--------	------------

Hydrocarbons	Sufficient
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Spine road to pond G

SUMMARY TABLE

Land Use Type	Roads (excluding low traffic roads, highly frequented lorry approaches to industrial estates, trunk roads/motorways)
---------------	--

Pollution Hazard Level	Medium
------------------------	--------

Pollution Hazard Indices

TSS	0.7
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Metals	0.6
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Hydrocarbons	0.7
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SuDS components proposed

Component 1	Pervious pavement (where the pavement is not designed as an infiltration component)
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SuDS Pollution Mitigation Indices

TSS	0.7
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Metals	0.6
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Hydrocarbons	0.7
SuDS components proposed	
Component 2	Proprietary treatment system (Petrol/Oil Inceptor)
SuDS Pollution Mitigation Indices	
TSS	0.7
Metals	0.7
Hydrocarbons	0.7
Combined Pollution Mitigation Indices	
TSS	>0.95
Metals	>0.95
Hydrocarbons	>0.95
Acceptability of Pollution Mitigation	
TSS	Sufficient
Metals	Sufficient
Hydrocarbons	Sufficient

2.3. Removal of Nutrient (Nitrates and Phosphorous)

Ponds

Retention ponds are structures that provide both retention and treatment of contaminated storm water runoff. Retention ponds include a permanent pool of water into which storm water runoff is directed and outflows are controlled to reduced flow rate. A well-designed pond provides a community asset and opportunities for new habitats. The pond's physical, biological and chemical processes work to remove storm water pollutants. Sedimentation processes remove particulates, organic matter, and metals, while dissolved metals and nutrients are removed through biological uptake. In general, a higher-level storm water quantity control can be achieved as well as providing amenity benefits.

Landscaped depressions containing permanent pools of water, retention ponds are similar in many respects to detention basins, in that they can collect and temporarily store / attenuate surface water runoff and release it more slowly to the discharge point. However, they can provide an enhanced level of water quality treatment and also provide biodiversity and amenity benefits by supporting emergent and submerged vegetation along the waterline and within shallow marshy areas. Retention ponds need to be designed with suitable upstream

pre-treatment systems to prevent open water areas becoming blocked with silt, odorous due to pollution or stagnant.

The phosphorous within the pond will be alleviated using the following mechanism:

- Sediment removal device has been included upstream to prevent gross pollution and the volume of the pond being compromised by the build up of sediments.
- The pond has been designed so that the deposited fine sediment on the bottom is not washed out in high flows.
- Uptake by plants and aquatic flora to reduce the phosphorous within the pond.

The nitrate within the pond will be alleviated using the following mechanism:

- Removal of coarse sediments within the sediment forebay.
- The permanent pool of water provides further settlement of fine sediments and removal of nutrients
- Nitrogen reducing native marginal and aquatic species (including evergreen plants).
- The incorporation of distinct zones in the large basin providing the water quality and quantity volume storage in a number of independent cells. These features create increased attenuation, longer pollutant removal pathways (and therefore enhanced pollution removal) an easier maintenance regime and more varied ecology.
- Basins include a sediment forebay, permanent micro pools, attenuation storage volume above permanent pool water level and aquatic benches surrounding the permanent micro pools, which support wetland planting, acting as a biological filter and providing ecology amenity and safety benefits. Around the micro pools shallow wet/marshy grassland areas provide further filtration.

Swale

Swales are a linear SuDS device often used along roads or paths. Dry swale is a good pollutant removal which provides significantly better performance for metals and nitrate. Dry swales typically remove 65 percent of total phosphorus (TP), 50 percent of total nitrogen (TN), and between 80 and 90 percent of metals.

The phosphorous within the swale will be alleviated using the following mechanism:

- By use of hydrobrake, the flow entering the swale can be slowed down which helps to reduce the phosphorous count within the swale.
- Uptake by plants and aquatic flora to reduce the phosphorous within the swale.
- Sediment bound phosphorous is removed through sedimentation.

SECTION 03

SUDS MAINTENANCE PLAN

3. SUDS MAINTENANCE PLAN

3.1. Introduction

This section sets out the principles for the long-term management and maintenance of the proposed surface water Sustainable Drainage Systems (SuDS) to be constructed to discharge surface water discharged from the spine road and the access road nearby within the area of One Horton Heath (See Appendix B for proposed site plan). The purpose of this section is to set out the basis of the SuDS Maintenance Plan for the development and to ensure that the management company is entrusted with a robust inspection and maintenance programme. It ensures that the optimum operation of the drainage network is continually maintained for the lifetime of the development and to prevent the increased risk of flooding both on and off site in accordance with the National Planning Policy Framework (NPPF).

All those responsible for maintenance should follow relevant Health and Safety legislation (Health and Safety at Work Regulations, 1999) for all activities listed within this section including lone working, if relevant) and risk assessments should always be undertaken. Any contractor employed by the Site Operator/Management Company shall carry out periodic maintenance of all such SuDS in accordance with the schedules listed in this section. Inspection checks shall be carried out by a qualified and competent person, at the minimum intervals listed within the schedules and the appropriate work carried out.

3.2. SuDs Layout

The storm water drainage strategy for the proposed development is to utilise a range of SuDS features to discharge the surface water to the nearest water course, Foxwood Stream via ponds.

The proposed storm water system contains the following SuDS Components:

- Ponds
- Swales
- Hydro brake Flow Controls
- Petrol/oil Inceptors

There are three categories of maintenance activities referred to in this Section:

- Regular maintenance (including inspections and monitoring).

Consists of basic tasks done on a frequent and predictable schedule, including vegetation management, litter and debris removal, and inspections.

- Occasional maintenance

Comprises tasks that are likely to be required periodically, but on a much less frequent and predictable basis than the routine tasks (sediment removal is an example).

- Remedial maintenance

Comprises intermittent tasks that may be required to rectify faults associated with the system, although the likelihood of faults can be minimised by good design. Where remedial work is found to be necessary, it is likely to be due to site-specific characteristics or unforeseen events, and as such timings are difficult to predict.

Ponds

There are 3 ponds present within the vicinity of the spine road which will be utilised to discharge the surface water from the spine road and the nearby catchments. The depth of the pond are as follows:

POND	DEPTH
Pond_F	1.0m
Pond_G	1.2m
Pond_H	1.5m

To ensure that the people who are in the vicinity of the pond are aware of the potential danger and also to minimize the risk of drowning, a lifesaving ring should be provided within the area of the pond.

Ponds will require regular maintenance to ensure continuing operation to design performance standards, and all designers should provide detailed specifications and frequencies for the required maintenance activities, along with likely machinery requirements and typical annual costs- within the Maintenance Plan. The treatment performance of ponds is dependent on maintenance, and robust management plans will be required to ensure maintenance is carried out in the long term. Different designs will have different operation and maintenance requirements, but this section gives some generic guidance.

Maintenance of ponds is relatively straightforward for landscape contractors, and typically there should only be a small amount of extra work required for a SuDS Pond is necessary for standard public open space.

Regular inspection and maintenance are important for the effective operation of ponds as designed. Maintenance responsibility for a pond and its surrounding area should always be placed with a responsible organisation. Litter and debris removal should be undertaken as part of general landscape maintenance for the site and before any other SuDS management task. All litter should be removed from site.

Any invasive maintenance work such as silt or vegetation removal is only required intermittently, but it should be planned to be sympathetic to the requirements of wildlife in a pond. Care should be taken to avoid disturbance to nesting birds during the breeding season and habitats of target species (e.g., great crested newt and water voles) at critical times. The window for carrying out maintenance to achieve this is usually towards the end of the growing season (typically September/October), although this will vary with species).

Invasive silt and vegetation removal should only be carried out to limited areas at any one time 25-30% of the pond area on one occasion each year to minimise the impact on biodiversity. Plant management, to achieve particular desired habitat effects, should be clearly specified in a maintenance schedule.

Site vegetation should be trimmed as necessary to keep the pond free of leaves and to maintain the aesthetic appearance of the site. Slope areas that have become bare should be re-vegetated and any eroded areas should be regraded before replanting.

Maintenance access (or "easement") should be provided to the pond from a public or private road. An assessment should be made at the planning stage regarding the maintenance and associated access requirements. Ideally, access should be at least 3.5 m wide, have a maximum cross fall of 1 in 7, and be sufficiently robust to withstand maintenance equipment and vehicles. However, temporary access routes for infrequent operations could be considered where permanent routes are not appropriate. The access should extend to any forebay, safety and aquatic benches, inlet and outlet infrastructure. Consideration should be given as to whether maintenance vehicles will need to turn around. Wherever possible.

SuDS ponds and wetlands should be designed so that special machinery is not required to undertake maintenance. The list of actions is not exhaustive, and some actions may not always be required. Consideration should be given to the need to control risks to biosecurity during maintenance operations.

Sediments excavated from ponds or forebays that receive runoff from residential or standard road and roof areas should be safely disposed of in accordance with current waste management legislation. However, consultation should take place with the environmental regulator to confirm appropriate protocols. Chemical testing of the sediment may be required, before sediment excavation, to determine its classification and appropriate disposal methods. For industrial site runoff, sediment testing will be essential. In the majority of cases on low-risk sites with source control and a Management Train, it will be acceptable to distribute the sediment on site, if there is an appropriate safe and acceptable location to do so. If ponds are to be drawn down, care should be taken to prevent downstream discharge of sediments and anoxic water. The environmental regulator should be notified before such activities.

New ponds may become rapidly dominated by invasive native plants, particularly common bulrush (*Typha latifolia*). As it is not desirable for all new ponds to be bulrush dominated, it should be ensured that in the first five years, while vegetation is establishing, certain plant growth is controlled. After this time, ponds can usually be allowed to develop naturally recognising that, unless the margins are occasionally managed, they are likely to become dominated by trees and shrubs.

Eutrophication of SuDS ponds can occur during the summer months. This is best alleviated by controlling the nutrient source or providing a continuous baseflow to the pond. Unless eutrophication is severe, aeration can be used as a stop-gap measure to save aquatic animal species and reduce risks to receiving waters. However, the addition of barley straw bales, dredging or rendering the nutrients inactive by chemical means can also be successful.

Maintenance Plans and schedules should be developed during the design phase. Specific maintenance needs of the pond should be monitored, and maintenance schedules adjusted to suit requirements.

CDM 2015 requires designers to ensure that all maintenance risks have been identified, eliminated, reduced and/or controlled where appropriate.

This information will be required as part of the health and safety file.

Regular Maintenance

Monthly

Remove any debris and litter. Cut grass and manage other vegetation, inspect outlet and inlet and for blockage.

Yearly

Hand cut submerged and emergent aquatic plants. Remove 25% of bank vegetation from water's edge to a minimum of 1m above water level. Tidy all dead growth before the start of growing season.

Occasional Maintenance

Remove sediment from the main body of big ponds when pool volume is reduced by 20%.

Remedial Actions

Repair erosion or other damages, replant, aerate pond when signs of eutrophication are detected, realign riprap or repair other damage, repair/rehabilitate inlets, outlets and overflows.

Swale

There is only one swale within the proposed development. The depth of the swale is 1.4m. To ensure that the people who are in the vicinity of the swale are aware of the potential danger and also to minimize the risk of drowning, a lifesaving ring should be provided within the area of the swale.

Swales will require regular maintenance to ensure continuing operation to design performance standards, and all designers should provide detailed specifications and frequencies for the required maintenance activities along with likely machinery requirements and typical annual costs - within the Maintenance Plan. The treatment performance of swales is dependent on maintenance, and robust management plans will be required to ensure maintenance is carried out in the long term. Different designs will have different operation and maintenance requirements, but this section gives some generic guidance.

Maintenance of swales is relatively straightforward for landscape contractors, and typically there should only be a small amount of extra work (if any) required for a swale over and above what is necessary for standard public open space. Provided that landscape management is already required at site, swale maintenance should have marginal cost implications. However, regular inspection and maintenance are important for the effective operation of swales as designed. Maintenance responsibility for a swale should always be placed with an appropriate organisation. If swales are implemented within private property, owners should be educated on their routine maintenance needs, and should understand the long-term Maintenance Plan and any legally binding maintenance agreement.

Adequate access should be provided to all swale areas for inspection and maintenance, including for appropriate equipment and vehicles. Litter and debris removal should be undertaken as part of general landscape maintenance for the site and before any other SuDS management task. All litter should be removed from site.

The major maintenance requirement for dry swales is mowing. Mowing should ideally retain grass lengths of 75-150 mm across the main "treatment" surface, to assist in filtering pollutants and retaining sediments and to reduce the risk of flattening during runoff events. However, longer vegetation lengths, where appropriate, are not considered to pose a significant risk to functionality.

Grass clippings should be disposed of either off site or outside the area of the swale, to remove nutrients and pollutants. For wet swales, mowing of wetland vegetation is not required. However, harvesting of very dense vegetation may be desirable in the autumn after plant die-back, to prevent the discharge of excess organic material into receiving waters. All vegetation management activities should take account of the need to maximise biosecurity and prevent the spread of invasive species.

Occasionally sediment will need to be removed (e.g., once deposits exceed 25 mm in depth), although this can be minimised by ensuring that upstream areas are stabilised and by incorporating effective pre-treatment devices. Available evidence from monitoring studies indicates that small, distributed infiltration practices such as swales do not contaminate underlying soils, even after more than 10 years of operation (TRCA, 2008). Sediments excavated from a swale that receives runoff from residential or standard road and roof areas are generally not toxic or hazardous material and can therefore be safely disposed of by either land application or landfilling. However, consultation should take place with the environmental regulator to confirm appropriate protocols. Sediment testing may be required before sediment excavation to determine its classification and appropriate disposal methods. For runoff from busy streets with high vehicle traffic, sediment testing will be essential. Any damage due to sediment removal or erosion should be repaired and immediately reseeded or planted.

Maintenance Plans and schedules should be developed during the design phase. Specific maintenance needs of the swales should be monitored, and maintenance schedules adjusted to suit requirements.

CDM 2015 requires designers to ensure that all maintenance risks have been identified, eliminated, reduced and/or controlled where appropriate. This information will be required as part of the health and safety file.

Regular Maintenance

Monthly

Remove any debris from the catchment surface (If it poses any risk on its operation work). Cut grass and manage other vegetation, inspect outlet and inlet and overflows for blockage.

Half yearly

Inspect inlet and facility surface for silt accumulation, establish silt removal frequencies.

Occasional Maintenance

Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required.

Remedial Actions

Remove erosion or other damage by re-turfing or re-seeding. Relevel uneven surface and reinstate design level. Remove build-up of sediment. Remove and dispose of oil or petrol residues using safe standard practices.

Petrol/Oil Inceptor

There are 5 petrol/oil inceptors installed within the spine of the main road and the pond. One of the primary regular tasks to be undertaken is cleaning the channel drain, removing any oil and petrol that has accumulated on the surface. Dirt, grime, debris and standing or clinging oil, petrol and tank of the inceptor to be cleaned. It is advised to be cleaned every 3 to 6 months.

Quarterly Maintenance

- Check the integrity of the inceptor and its mechanical parts and service all the electrical system.
- Inspect the filters and repair or replace as necessary
- Remove all silt and contaminants removed and disposed in accordance with regulation.

Hydro brake Flow Control

There are 11 hydro brakes placed within the manholes of surface water network. They tend to have an S-shaped discharge curve. These should be maintained in accordance with maintenance plan. The manhole with hydro brake should be checked for silt before and after each storm. It is also required to check the functionality of flow restriction as per manufacturer's specification.

3.3. Required Maintenance Schedule

To ensure the long-term performance of the proposed DS, the onsite drainage system will be owned and maintained by the site operator or a maintenance company (MC) in accordance with the indicative schedule below, in the alternative the local authority may wish to adopt such features. However, at the detailed drainage design stage a full management and maintenance plan detailing best practice system maintenance regimes and proprietary manufacturer requirements and lifecycle management, in accordance with the CIRIA SuDS Manual will need to be produced. In the absence of local authority adoptions, maintenance of the overall drainage network will be the responsibility of an appointed management company.

ELEMENT / DRAINAGE COMPONENT	OWNERSHIP ADOPTION	/ MAINTENANCE REQUIREMENTS
Flow Restriction Device & Chamber	Site Operator / MC	To be monitored for silt build-up and cleaned as required using suction methods. Check function of flow restriction componentry to suit manufacturer's guidance. Inspection annually and before / after extreme storm events.
Catchpit Manholes	Site Operator / MC	To be monitored for silt build-up and cleaned as required using suction methods. Inspection annually and before / after extreme storm events.
Gullies (Internal & External)	Site Operator / MC	To be monitored for silt build-up and cleaned as required. Where provided, ensure air traps are primed and sealed to prevent smells. Inspection quarterly.
Swales	Site Operator / MC	To be monitored for litter and debris. Strimming to remove overgrown vegetation twice yearly. Removal of self-seeded saplings to prevent new tree growth. Monitor for silt build up and remove and spread locally outside design profile as required. Inspection quarterly and before / after extreme storm events.
Ponds	Site Operator / MC	To be monitored for litter and debris. Careful strimming to remove overgrown vegetation twice yearly. Removal of self-seeded saplings to prevent new tree growth. Monitor for silt build up and remove and spread locally outside design profile as required. Inspection quarterly and before / after extreme storm events.
Petrol/Oil Inceptor	Site Operator / MC	To be monitored for silt build-up, remove grim, dirt, oil and clean as required. Check function of flow restriction componentry to suit manufacturer's guidance. Inspection quarterly and before / after extreme storm events

APPENDIX A

OVERALL DRAINAGE LAYOUT