Civil Structural Surveys Project Management

Report Title: **SUDS MANAGEMENT & MAINTENANCE PLAN**

Address: **Plot 8, Hendre Parc, Tycroes SA18 3FA**

Client: **Mr Tony Salini**

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Prepared By:	O Jones		
Checked By:	I Howells		
Approved By:	I Howells		

Registered Office
Canolfan Gorseinon Centre
Millers Drive
Gorseinon
Swansea
SA4 4QN

Telephone: 01792 805010
Email: info@hcelimited.com
Web: www.hcelimited.com

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1.0 INTRODUCTION

This document sets out the principles for the long-term management and maintenance of the surface water Sustainable Drainage Systems (SuDS) to be constructed at the new industrial building development located at plot 8, Hendre Parc, Tycroes SA18 3FA.

The purpose of this document is to set out the basis of the development SuDS Maintenance Plan and to ensure that the adopting management company is entrusted with a robust inspection and maintenance programme, ensuring the optimum operation of the surface water 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 Welsh Government National Standards for Sustainable Drainage Systems (SuDS). **The land owner will be solely responsible for the maintenance of the private SuDS features, as set out in this document.**

The activities listed in this document are generic to the relative SuDS types and represent the minimum maintenance and inspection requirements, however additional tasks or varied maintenance frequency may be instructed by the maintenance company as required. Specific maintenance needs of the SuDS elements should be monitored and maintenance schedules adjusted to suit requirements.

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 report including lone working, if relevant) and risk assessments should always be undertaken.

Any contractor employed by the Management Company shall carry out periodic maintenance of all such SuDS in accordance with the schedules listed in this report. 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.

2.0 SUDS LAYOUT & DESIGN

The storm water drainage strategy for the proposed development is utilises SuDS features to intercept and convey all pluvial surface water runoff. SuDS techniques include landscape features and control structures which manage surface water runoff. The storm water drainage is shown on drawing HCE-1715-CVD-SK02.

The proposed storm water system consists of the following SuDS components;

Underdrained Swales are stone filled trenches with a perforated pipe in the bottom covered by engineered sandy soil and turf. These intercept dirty water and allow it to soak into the ground or lead it to a water storage feature.

Rainwater Gardens are bio-remediation areas used to treat surface water run-off, capture coarse sediment/particles, and treat pollutants. They also help reduce the rate of surface water run-off by attenuation and evapotranspiration. Rainwater gardens also provide enhanced amenity due to flora and increase biodiversity by attracting insects.

Permeable surfaces as permeable block paving, porous Asphalt, gravel or free draining soils that allow rain to percolate through the surface into underlying drainage layers. They must be protected from silt, sand, compost, mulch, etc.

Basins, ponds and wetlands are depressions in the ground where water is stored and treated. Water levels rise after rain and then drops to the normal level as the excess soaks into the ground or is released slowly to a watercourse or drain. Some water maybe held back as a pond for final treatment, amenity or wildlife interest.

Inlets and outlets structures are often conveyance pipes protected with mesh guards. They must be free from obstruction at all times to allow free flow through the SuDS.

SuDS flow control structures are usually small orifices in control chamber, slots or V notches in weirs. They are usually near the surface so are accessible and easy to maintain. They may be in baskets, in small chambers or in the open.

Inspection Chambers and rodding eyes are used on bends or where pipes come together. They allow cleaning of the system if necessary.

Flood routes (exceedance routes) allow water volumes exceeding the capacity of the SUDS

3.0 SUDS MANAGEMENT & MAINTENANCE

Maintenance is categorised as follows;

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.

3.1 GENERAL REQUIREMENTS

Maintenance activities comprise • Regular Maintenance • Occasional Tasks • Remedial Work	**Frequency**
Generally **Litter** Collect all litter or other debris and remove from site at each site visit.	Monthly

- **Avoid** use of weedkillers and pesticides to prevent chemical pollution
- **Avoid** de-icing agents wherever possible to allow bio-remediation of pollutants in permeable surfaces.
- **Protect** all permeable, porous and infiltration surfaces from silt, sand, mulch and other fine particles.

Exclusions:

- Maintenance of foul drainage, pumps, etc.

3.2 FILTER STRIPS AND SWALES

Filter strips are grass verges next to hard surfaces that allow runoff to flow through vegetation removing silt and pollution.

Swales are linear, flat bottomed grassed or vegetated channels that convey water from one place to another which can also store water and allow it to soak into the ground.

Underdrained Swales are free draining swales with stone filled trenches in the bottom covered by engineered sandy soil and turf that clean dirty water and allow it to soak into the ground or lead it to a water storage feature.

FILTER STRIPS AND SWALES	
Regular Maintenance	**Frequency**
Grass Mow amenity grass access paths and verges surrounding swales and filter strips at 35-50mm minimum and 75mm maximum or as specified. Mow filter strips and swales at 100mm with 150mm maximum to filter and control runoff in normal grass swales removing first and last cut in season if grass is longer than 150mm removing cuttings to wildlife piles on site. Where marsh or wetland develops in the swale due to wet conditions then cut annually, or as required, at 100mm removing cuttings to wildlife piles on site	Monthly or as required Monthly or as required Annual or as required
Occasional Tasks	**Frequency**
Where there is a build-up of silt on the filter strip, swale, under-drained swale or at inlets, i.e. 50mm or more above the design level, then remove and spread on site. Undertake when ground is damp in autumn or early spring and transplant turf and overseed to original design levels. Spread excavated material on site above SuDS design profile, e.g. top of banks, in accordance with E.A. Waste Exemption Guidance.	As required
Remedial Work	**Frequency**
All damage to be made good to design profile unless there is a design flaw.	As required

3.3 FILTER DRAINS

Filter drains are stone filled trenches, sometimes with a perforated pipe in the bottom, that collect, clean and store runoff before conveying the water to another SuDS feature or allowing it to soak into the ground.

Treatment trenches are enlarged filter drains designed to treat a known volume of dirty water or increase soakage into the ground. They may also be used to intercept overland flows when they are referred to as **cut off drains**.

FILTER DRAINS AND INFILTRATION TRENCHES	
Regular Maintenance	**Frequency**
Grass edges Mow 1m min. wide grass surround to drain at 100mm and 150mm maximum to filter runoff and protect drain from silt.	Monthly or as required
Occasional Tasks	**Frequency**
Weeds Hand pull or spot treat individual weed growth only if necessary ensuring weedkiller does not enter the filter drain. Weed growth usually dies in dry weather.	As required
Remedial Work	**Frequency**
Siltation at surface Where there is no protective geotextile remove all stone and perforated pipe replacing as original Spec. and include separating geotextile as below. Where there is a separating geotextile (see Spec.) then remove surface stone layer and separating geotextile that protects the stone drain below. Replace geotextile and top stone layer.	As required

3.4 RAINWATER GARDENS

Rainwater Gardens are bio-remediation areas used to treat surface water run-off, capture coarse sediment/particles, and treat pollutants. They also help reduce the rate of surface water run-off by attenuation and evapotranspiration. Rainwater gardens also provide enhanced amenity due to flora and increase biodiversity by attracting insects.

Rainwater Gardens	
Regular Maintenance	**Frequency**
Grass Water regularly to promote plant growth, especially during the first two years and dry spells. Inspect site following rainfall events. Add and or replace vegetation in any eroded areas.	Weekly or as required
Occasional Tasks	**Frequency**
Prune and weed to maintain appearance. Replace mulch as needed. Soil fertilization is unnecessary as rainwater gardens are designed to absorb excess nutrients.	As required
Remedial Work	**Frequency**
Inspect the rainwater garden for dead or dying vegetation. Replace vegetation as needed.	As required

3.5 PERMEABLE SURFACES

Permeable surfaces including permeable block paving, porous asphalt, gravel or free draining soils that allow rain to percolate through the surface into underlying drainage layers. They must be protected from silt, sand, compost, mulch, etc. Permeable block paving and porous asphalt can be cleaned by suction brushing.

PERMEABLE AND POROUS SURFACES	
Regular Maintenance	**Frequency**
Cleaning Brush regularly and remove sweepings from all hard surfaces	Monthly
Occasional Tasks	**Frequency**
Permeable Pavements. Brush and vacuum surface once a year to prevent silt blockage and enhance design life.	Annually
Remedial Work	**Frequency**
Monitor effectiveness of permeable pavement and when water does not infiltrate immediately advise Client of possible need for reinstatement of top layers or specialist cleaning. Recent experience suggests jet washing and suction cleaning will substantially reinstate pavement to 90% efficiency.	As required

3.6 BASINS, PONDS AND WETLANDS

Basins, ponds and wetlands are depressions in the ground that store water. Water levels rise after rain and then drop to the normal level as the excess soaks into the ground or is released slowly to a watercourse or drain. Some water is often held back in a pond or wetland for final 'polishing' treatment or amenity interest.

- **Basins** are usually dry
- **Ponds** can be permanent or temporary and are mainly open water.
- **Wetlands** are mainly aquatic vegetation but can have small areas of open water like ponds.

BASINS, PONDS AND WETLANDS	
Regular Maintenance	**Frequency**
Grass Mow grass access paths and verges surrounding basins, ponds and wetlands areas at 35mm-50mm minimum and 75mm maximum or as specified to provide a cared for appearance and allow pedestrian access.	Monthly or as required
Mow rough grass areas for occasional access or habitat reasons at 100mm and maximum 150mm with cuttings removed to wildlife piles	As required 4-6 times annually
Grass areas not required for access may be managed for wildlife interest and to reduce costs. 2 cuts in July and September or 1 cut annually in September or October as specified and cuttings removed to wildlife piles.	Annually or as required
Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years).	Monthly (at start, then as required)
Wet woodland management Manage annually as detailed spec. with cuttings left in situ or removed to wildlife piles.	Annually or as required
Wetland Vegetation Cut (strim) at 100mm with cuttings removed to wildlife piles September - October or Maintain as a mosaic to be cut 25-30% in any one year at 100mm in September or October with cuttings removed to wildlife pile.	Annually or as required
Occasional Maintenance	**Frequency**

Where silt accumulates on apron or area in front of inlet or outlet then remove and land apply within design profile of SuDS. Where silt accumulates more than 150mm in base of wetland undertake a phased removal of silt subject to Client approval. Confirm whether a liner is present to hold water or prevent pollution of groundwater and protect. Remove silt as instructed but not more than 30% of pond or wetland area at any one time and to an agreed depth but not subsoil layer. Retain as much representative existing vegetation as possible to ensure rapid re-colonisation of open areas. Stack excavated material adjacent to wetland to allow de-watering of silt. Undertake silt removal during September-October to minimise damage to protected wildlife and ensure re-growth of aquatic vegetation before winter. Spread excavated material on site above SUDS design profile, e.g. top of banks, in accordance with E.A. Waste Exemption Guidance.	Annually or every 3 years as required
Remedial work	**Frequency**
Although not usually required this may be needed due to damage to liners or control structures.	Undertake as design details or as required
Aerate pond when signs of eutrophication are detected.	As required

3.7 INLETS, OUTLETS, CONTROLS, AND INSPECTION CHAMBERS

Inlets and outlets structures may be surface structures or conveyance pipes with guards or headwalls. They must be free from obstruction at all times.

SuDS flow control structures can be protected orifices, slots weirs or other controls at or near the surface to be accessible and easy to maintain. They may be in baskets, in small chambers or in the open.

Inspection Chambers and rodding eyes are used on bends or where pipes come together and allow cleaning of the system if necessary. They should be designed out of the system where possible.

INLETS, OUTLETS, CONTROLS AND INSPECTION CHAMBERS	
Regular Maintenance	**Frequency**
Inlets, outlets and surface control structures Inspect surface structures removing obstructions and silt as necessary. Check there is no physical damage. Strim vegetation 1m min. surround to structures and keep hard aprons free from silt and debris	Monthly Monthly
Inspection chambers and below ground control chambers	
Remove cover and inspect ensuring water is flowing freely and that the exit route for water is unobstructed. Remove debris and silt. Undertake inspection after leaf fall in autumn	Annually
Occasional Maintenance	**Frequency**
Check topsoil levels are 20mm above edges of baskets and chambers to avoid mower damage	As necessary
Remedial Work	**Frequency**

Unpack stone in basket features and unblock or repair and repack stone as design detail as necessary.	As required
Repair physical damage if necessary.	As required

3.8 OVERFLOWS AND FLOOD ROUTES

Overflows are overland across weirs, through gratings or within chambers and must be kept clear at all times to protect areas from flooding. They allow onward flow when part of the SuDS system is blocked.

Flood routes (exceedance routes) allow water volumes that exceed the capacity of the SuDS system to pass through or round the site without causing damage to property. These routes must be clear of obstructions at all times.

OVERFLOWS AND FLOOD ROUTES	
Regular Maintenance	**Frequency**
Overflows. Jet pipes leading from overflow structures annually and check by running water through the overflow. Check free flow at next SUDS feature – inlet to basin or chamber.	Annually
Overflows. Remove any accumulated grass cuttings or other debris on top of grass weirs or stone filled baskets overflows.	Monthly
Flood Routes. Make visual inspection. Check route is not blocked by new fences, walls, soil or other rubbish. Remove as necessary.	Monthly
Remedial Work	**Frequency**
Overflows. If overflow is not clear then dismantle structure and reassemble to design detail.	As required

3.9 GRASSED AREAS - ORNAMENTAL PLANTING AND EXISTING VEGETATION

Ornamental Trees - All ornamental planting to be kept weed free and pruned using secateurs to keep the shrubs to an agreed and reasonable size.

Native Trees and Shrubs – All native planting to be allowed to grow freely removing overhanging branches as required.

PLANTING AND EXISTING VEGETATION - Review	
Regular Maintenance	**Frequency**
Grass maintenance	
Amenity Grass - Mow all grass verges, paths and amenity grass at 35-50mm with 75mm max. All cuttings to remain in situ	Weekly in growing season (Apr-Sep) as required (Oct-Mar)
Rough grass – Mow at 75-100mm but not to exceed 150mm All cuttings to wildlife piles	4 per annum
Wildflower areas strimmed to 50mm in Sept-Oct or Wildflower areas strimmed to 50mm July and Sept or Wildflower areas strimmed to 50mm on 3 year rotation 30% each year All cuttings to wildlife piles	1 per annum 2 per annum 1 per annum
Ornamental tree & shrub planting. Weed all shrub beds as detailed spec as necessary. Cut back planting from lights, paths and visibility sight lines in late autumn and as necessary. Cut hedges slightly tapered back from base with flat top at specified height. Do not mulch planting adjacent to permeable/ porous paving surfaces. Remove stakes and ties from trees when no longer needed for support and within 3 years of planting. Protect from strimmer damage and remove competitive growth until well established.	4 per annum
Native trees & shrub planting. Prune to shape in year 1. Protect trees from strimmer damage and remove competitive growth until well established. Remove stakes and ties from trees when no longer needed for support and within 3 years from planting.	1 per annum
Existing trees Check existing trees for safety.	1 per annum
Remedial	**Frequency**
Replace trees and shrubs which fail in the first five years after planting. Carry out tree surgery as necessary.	

3.10 SPILLAGE – EMERGENCY ACTION

Reference should be made to the Construction Environmental Management Plan (CEMP) produced by the Principal Contractor.

Most spillages on development sites are of compounds that do not pose a serious risk to the environment if they enter the drainage in a slow and controlled manner with time available for natural breakdown in a treatment system. Therefore small spillages of oil, milk or other known organic substances should be removed where possible using soak mats as recommended by the Natural Resources Wales with residual spillage allowed to bio-remediate in the drainage system.

In the event of a serious spillage, either by volume or of unknown or toxic compounds, then isolate the spillage with soil, turf or fabric and block outlet pipes from chamber(s) downstream of the spillage with a bung(s). (A bung for blocking pipes may be made by wrapping soil or turf in a plastic sheet or close woven fabric.)

Contact the Natural Resources Wales immediately (0300 065 3000).

4.0 REFERENCES

1. HCE Drawing HCE-1715-CVD-SK02
2. HCE Drainage Calculations, HCE-1715-CVD-CAL-001