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Storm Water Strategy and Maintenance Plan

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1. Introduction

1.1. This strategy and maintenance proposal is to be read in conjunction with the following Tier Consult documents:

- Drainage drawing number T_24_2757-55-01, 55-02, 55-03

1.2. SuDS are an environmentally friendly approach to managing rainfall that uses landscape features to deal with surface water. SuDS aim to:

- Control the flow, volume and frequency of water leaving a development area.
- Prevent pollution by intercepting silt and cleaning runoff from hard surfaces.
- Provide attractive surroundings for the community.
- Create opportunities for wildlife.

1.3. The considered drainage solution comprises of a series of combined pipework, permeable paving, and geo-cellular attenuation tanks with a restricted forward flow provided in the form of a vortex flow control device. The proposed network then discharges into the existing sewers within the proposed development.

1.4. The proposed surface water networks are designed to accommodate all storm events up to the 1 in 100-year storm event, plus an additional 40% to cater for climatic change.

1.5. A plan of routine inspection maintenance should be adopted and adhered to in order to prevent failure due to inadequate maintenance. This document describes the drainage systems used and provides a framework of future maintenance procedures.

1.6. The SuDS proposed on the site have been designed for easy maintenance to comprise:

- Regular day to day care – litter collection, grass cutting and checking inlets and outlets where water enters or leaves a SuDS feature.
- Occasional tasks – removing any silt that builds up in the SuDS features.
- Remedial work – repairing damage where necessary.

2. Site Drainage Components

2.1. The site drainage network is shown on Tier Consult drawing references T_24_2757-55-01, 55-02, 55-03.

2.2. The main drainage components are:

2.2.1. Roof water from the building is collected into a gravity fed drainage system and routed to the surface water drains. The gutters and downspouts require periodic inspection and de-silting as required.

2.2.2. Surface water runoff from external paved areas is discharged into trapped gullies and linear channels. In addition, areas of external paving will drain into permeable paving then connect back into the below ground drainage network. Requires periodic inspection and de-silting of all trapped gullies and channels.

2.2.3. The pavement areas, roads, and car parking require periodic sweeping as this will remove silt and contamination directly from the paved surface before becoming mobilised during rainfall events and transported into the drainage system.

2.2.4. Oil separators remove oil-based pollutants before the flow is discharged from the site. Requires routine de-sludging.

2.2.5. The storage tank is formed with a modular crate system wrapped with an impermeable membrane to prevent escape of water and ingress of soil particles. The storage tank requires periodic inspection and possible de-silting if required.

2.2.6. The vortex flow control unit limits the discharge of surface water to the receiving drain at a predetermined rate. The chamber housing the control unit requires periodic inspection to check for any siltation and the vortex flow control units should be checked for any blockages and to ensure they are working correctly.

2.2.7. Attenuation ponds broad and vegetated banks designed to store and convey runoff and remove pollutants. Attenuation ponds require periodic inspection and the banks possible reseeding

3. Sustainable Drainage Maintenance Specification

3.1. Generally

Litter – collect all litter and other debris and remove from site at each visit.

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

3.2. 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.

Regular maintenance, **monthly** – brush regularly and remove sweepings from all hard surfaces

Occasional maintenance, **annually** – brush and vacuum surface once a year to prevent silt blockage and enhance design life.

Remedial work, **as required** – 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.

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Brushing 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 management using glyphospate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
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, 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 h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

3.3. Basin, Attenuation Facility

Basins are depressions in the ground that store water in extreme storms and generally remain dry. 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.

Regular maintenance, **monthly or as required** - Mow grass access paths and verges surrounding basins, ponds and wetlands areas to circa 50mm.

Occasional maintenance, **annually or 3 yearly** – Where silt accumulates on apron or area in front of inlet or outlet then remove and

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly (or as required)
	Cut the 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 filter strip surface to identify evidence of erosion, poor vegetation growth, compaction, ponding, sedimentation and contamination (eg oils)	Monthly (at start, then half yearly)
	Check flow spreader and filter strip surface for even gradients	Monthly (at start, then half yearly)
	Inspect gravel flow spreader upstream of filter strip for clogging	Monthly (at start, then half yearly)
	Inspect silt accumulation rates and establish appropriate removal frequencies	Monthly (at start, then half yearly)
Occasional maintenance	Reseed areas of poor vegetation growth; alter plant types to better suit conditions, if required	As required or if bare soil is exposed over > 10% of the filter strip area.
Remedial actions	Repair erosion or other damage by re-turfing or reseeding	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

3.4. 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.

Regular Maintenance, **monthly**– Inspect surface structures removing obstructions and silt as necessary.

Strim vegetation 1 meter surround to structures and keep hard aprons free from silt and debris.

Occasional maintenance, annually – remove cover and inspect ensuring water is flowing freely and that the exit route for water is unobstructed. Remove debris and silt.

3.5 Attenuation Storage Tank

Attenuation storage tanks are used to create a below ground void space for temporary storage of surface water before controlled release. The storage structure is formed using the following methods geocellular storage systems, plastic corrugated arch structures (constructed over and backfilled with an open graded aggregate base, over size pipes, concrete box culverts and GRP tanks.

Regular maintenance, **monthly** – Remove debris from the catchment surface (where it may cause risks to performance). Inspect and identify any areas that are not operating correctly. If required take remedial action.

Occasional maintenance, **annually** – Remove sediment from pre-treatment structures and internal forebays.

Remedial work, **as required** – Repair inlets, outlets, overflows and vents

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect for sediment and debris in pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	Annually
	Cleaning of gutters and ary filters on downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional maintenance	Remove sediment and debris from pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	As required, based on inspections
Remedial actions	Reconstruct soakaway and/or replace or clean void fill, if performance deteriorates or failure occurs	As required
	Replacement of clogged geotextile (will require reconstruction of soakaway)	As required
Monitoring	Inspect silt traps and note rate of sediment accumulation	Monthly in the first year and then annually
	Check soakaway to ensure emptying is occurring	Annually

3.6. Maintenance Schedule

The rate of build-up of silt and debris within the drainage system varies from site to site and is dependent upon individual site characteristics. Therefore, the frequency of actions below should be adopted as a minimum standard for a period of 24 months after the completion of the development. The period will be sufficient to assess the system performance over 2 complete seasonal cycles after which the maintenance activity schedule may be reviewed accordingly.

Action	Frequency
Clear external areas of litter including bin and recycling enclosures.	Monthly
Clear guttering of leaves and debris.	Twice yearly. Spring and Autumn after leaf fall
Permeable Surfaces	3 times per year to remove debris, dust and leaves. See recommendations above.
Inspect all storage tank access points for sediment.	6 Monthly and after heavy rainfall. Remove debris /silt as required.
Inspect all manholes chambers for siltation and debris.	6 monthly and after every major storm event. Remove debris/silt as encountered.
Vortex Flow Control Unit.	3 monthly inspect and remove debris.
Petrol/oil Separator	Inspect bi-annually and also when alerted by the audible/visual alarms. Remove oil and contaminants
Catchpits immediately upstream from storage tank.	Minimum 6 monthly and after every major storm event. Remove debris/silt as encountered.
Attenuation Ponds Remove litter and debris. Cut grass to retain grass height within operational range. Manage vegetation and remove nuisance plants. Inspect inlets and outlets for blockages. Reseed areas of poor vegetation growth and alter plant types to suit better conditions if required.	3 monthly and after every major storm event. Remove debris/silt as encountered
Storage Tank.	6 monthly to check for blockages and after every main storm event. The tank can be inspected via the access points and CCTV cameras and high-pressure jetting equipment can be deployed if required.

4. Management Company

The maintenance for the drainage features on each plot will be the responsibility of the tenant and information will be issued once known. However, an overall management company will be appointed to manage the maintenance regime for the wider drainage features such as ponds and outfalls. Personnel will be site based and where specialised contractors are required the work will be undertaken through a series of written RAMS.