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Surface Water and SuDS Assessment Rev2

1 St James' Road
Hampton Hill
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1. Introduction

This Surface Water and SuDS Assessment has been prepared to support the planning application for the proposed redevelopment of 1 St. James' Road, Hampton Hill.

Existing Site Description

The proposed redevelopment site is a ¼ acre plot located at the corner of St. James Road, Windmill Road, and Uxbridge Road.

Currently, 1 St. James' Road is an exiting residential dwelling with associated hard and soft landscaped areas.

The existing site layout is shown on the topographic survey provided in **Appendix A**.

Development Proposals

Proposals are for the redevelopment of the site to comprise 9no. flats. A Proposed site layout plan is provided **Appendix B**.

2. Planning Policy

The London Plan

Policy 5.13 Sustainable drainage

Policy 5.13 of The London Plan states that: *Development should utilise sustainable urban drainage systems (SUDS) unless there are practical reasons for not doing so, and should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible.*

Drainage should be designed and implemented in ways that deliver other policy objectives of this Plan, including water use efficiency and quality, biodiversity, amenity and recreation.

The London Borough of Richmond

Local Plan (2018) Policy LP 21 Flood Risk and Sustainable Drainage

The Council will require the use of Sustainable Drainage Systems (SuDS) in all development proposals. Applicants will have to demonstrate that their proposal complies with the following:

1. A reduction in surface water discharge to greenfield run-off rates wherever feasible.
2. Where greenfield run-off rates are not feasible, this will need to be demonstrated by the applicant, and in such instances, the minimum requirement is to achieve at least a 50% attenuation of the site's surface water runoff at peak times based on the levels existing prior to the development.

SuDS Planning Guidance

From April 2015 sustainable drainage is a material consideration in planning decisions. To reduce the risk of surface water and sewer flooding, all development proposals in the borough that could lead to changes to, and have impacts on, surface water run-off are required to follow the London Plan drainage hierarchy.

The Council requires that SuDS are used in all development proposals.

From Monday 1 April 2019, applicants are required to complete a London Sustainable Drainage Proforma for all planning applications. A copy of the completed London Sustainable Drainage Proforma is provided in **Appendix C**. The following section of this report outlines the proposed SuDS strategy.

Non-Statutory Technical Standards for SuDS

The Non-Statutory Technical Standards for SuDS, (and accompanying Local Authority SuDS Officer Organisation (LASOO) Practice Guidance) sets out the details which should be addressed within a SuDS Report, including:

- Flood Risk Outside of the Development
- Peak Flow Control and Volume Control
- Flood Risk Within the Development
- Runoff Destinations
- Structural Integrity
- Designing for Maintenance Considerations
- Construction

3. Surface Water Management and SuDS

The whole site comprises approximately 0.10ha.

Surface Water Runoff from the Existing Site

The existing site areas are:

- Roof areas – ~0.014ha
- Hardstanding areas - ~0.01ha
- Permeable areas – ~0.076ha

A copy of the public sewer records is provided in **Appendix D**. This confirms that surface water runoff from the existing site connects into the public sewer system.

In order to gain an indication of the rates of surface water runoff from hardstanding areas at the existing site, the Modified Rational Method[1] has been used, as detailed in **Appendix E.** The flow rates are shown in **Table 1**.

Table 1 –Modified Rational Method Hardstanding Existing Rates of Runoff (l/s)

Return Period	Rate of runoff from 0.015ha hardstanding
1 in 1 year	1.69
1 in 2 year	2.15
1 in 30 year	3.89
1 in 100 year	4.88

[1] The Wallingford Procedure, Volume 4, 1981

The ICP SuDS method has been used to calculate the greenfield runoff rates from the existing site. The results are provided in **Appendix F** and the flow rates are shown in **Table 2**.

Table 2 –ICP SuDS Greenfield Existing Rates of Runoff (l/s)

Return Period	Rates of runoff from 0.076ha greenfield
1 in 1 year	0.1
1 in 2 year	0.1
1 in 30 year	0.3
1 in 100 year	0.4

Surface Water Runoff from the Proposed Site

Following redevelopment of the site, the proposed areas will be:

- Roof areas – ~0.04ha
- Hardstanding areas - ~0.02ha
- Permeable areas – ~0.04ha

The London Plan and Approved Document Part H

The London Plan sets out the preferred hierarchy for the disposal of surface water runoff. Additionally, Building Regulations Approved Document Part H[2] sets out a hierarchy of preferred methods for the disposal of surface water runoff (infiltration; watercourse; public sewer system). These are considered overleaf:

[2] Building Regulations Approved Document H Section 3 page 45

1 Store rainwater for later use
There is the potential for simple rainwater reuse. See the following section of this report.

2 Use infiltration techniques
The Cranfield University 'Soilscapes' indicate that the soils at the site are loamy with naturally high groundwater.

The British Geological Survey (BGS) Geology Maps indicate that the site is underlain by Taplow Gravel Member (sand and gravel). The underlying bedrock is London Clay.

BGS also have some borehole records from nearby sites which indicate that sand / gravel is present to depths of around -5m bgl, then clay beyond this.

Southern Testing carried out 4no. boreholes at the site; a copy of the preliminary results is provided in **Appendix G**. In summary, weathered London Clay was encountered at approximately 4.80m bgl with dense to very dense gravel overlying the clay.

A soakage test was carried out in the borehole near the existing driveway however the soakage rate was very slow. In an email dated 8 April 2020[3], Southern Testing confirmed '*Based on the result we have, if you extrapolate the data based on the last few points where the soakage rate slows you can estimate that the test would not empty 50% in 24hrs'*. This is deemed to be a failure under BRE Digest 365.
On this basis, infiltration of surface water is not considered suitable.

3 Attenuate rainwater in ponds or open water features for gradual release
The site is small and there is not the space required for ponds or open water features.

[3] Email from Southern Testing to Base Energy, dated 8 April 2020

4 Attenuate rainwater by storing in tanks or sealed water features for gradual release
In light of the above, the most feasible option for the management of surface water runoff is attenuation storage with a controlled outlet, which will connect into the public sewer system.

5 Discharge rainwater direct to a watercourse
Surface water will be managed through 1 and 4.

6 Discharge rainwater to a surface water sewer/drain
Surface water will be managed through 1 and 4.

7 Discharge rainwater to the combined sewer.
Surface water will be managed through 1 and 4.

SuDS Strategy

SuDS aim to mimic natural drainage and can achieve multiple objectives such as removing pollutants from urban runoff at source, controlling surface water runoff from developments, ensuring that flood risk is not - increased further downstream and combining water management with green space which can increase amenity and biodiversity value.

When choosing and designing SuDS for a development, it is important to recognise the constraints associated with the type of SuDS to be installed, including the size of the site and the underlying ground conditions.

All surface water runoff from hardstanding areas (0.06ha) is to be managed in combination through:

- Simple rainwater recycling (3 water butts) – minimum 150litres each
- Sedum roof - small flat roof on the north side at first floor level is 47m^2; large flat roof at second floor level is 206m^2.
- Attenuation storage with a controlled outlet into the public surface water sewer system

Rainwater Recycling (Water Butts)

In order to provide a level of rainwater recycling, a water butt will be provided. Water butts will afford the opportunity for future occupants to reuse water collected in the water butt. If this supply is used frequently this may also ensure that some additional storage is available during an extreme rainfall event.

However, it is not recommended that water butts are used for storm water storage as there is a possibility that they maybe full before the onset of a storm and as such there is no guarantee that these types of system will provide additional storage when required.

Any additional storage provided by the water butt has therefore not been included within the SuDS calculations for the sit

Micro Drainage Calculations – Sedum Roof and Attenuation Storage with Controlled Outlet

As previously noted, the London Borough of Richmond require '*a reduction in surface water discharge to greenfield run-off rates wherever feasible*'.

The total greenfield rate of runoff from the total site has been calculated using the ICP SuDS method; the results are shown in **Appendix H** and **Table 3**, below.

Table 3 –ICP SuDS Total Site Greenfield Rates of Runoff (l/s)

Return Period	Rates of runoff from 0.10ha
1 in 1 year	0.2
1 in 2 year	0.2
1 in 30 year	0.4
1 in 100 year	0.6

Micro Drainage has been used to calculate storage for surface water runoff from hardstanding areas (0.06ha) in up to **the 1 in 100 year plus 40% allowance for climate change,** with flows limited to 0.2 l/s (the Qbar rate of runoff from the total site).

The calculations provided in **Appendix I** are based on the runoff from the sedum roof (which comprises approximately 0.025ha).

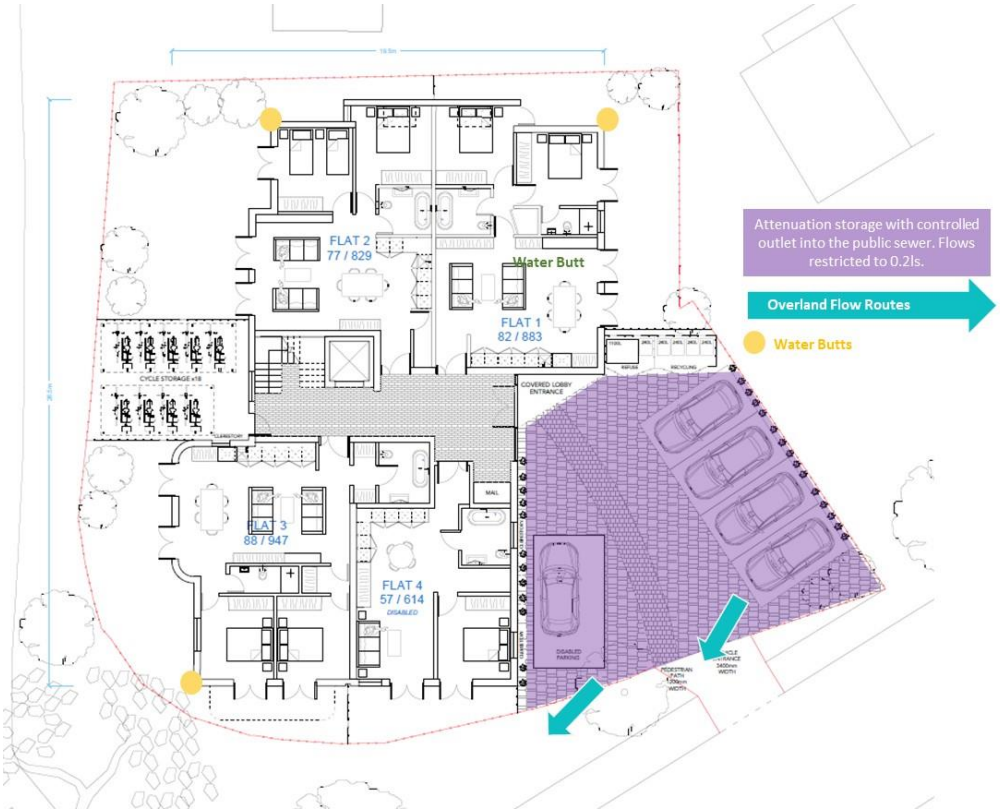
The calculation provided in **Appendix J,** take into account the runoff from the remaining hardstanding areas (0.035ha).

A total storage volume of 38.1m³ will be required. The storage has been designed at a depth of 1.5m, filling to 1.0m and with a 0.5m freeboard provided, should any excess flows be received.

As shown overleaf, the attenuation storage can feasibly be located beneath the parking / driveway area.

The SuDS strategy has been put together based on our understanding of the ground conditions and site layout. Building Control will need to be consulted on the siting of the SuDS, and the recommendations and advice of the SuDS manufacturer / installer should always be followed.

SuDS Layout and Overland Flow Routes



SuDS Maintenance

Schedules are provided below (taken from Ciria C753 The SuDS Manual): the management company will ensure that these, or similar schedules are followed.

Sedum Roof

Maintenance Schedule	Required Action	Typical Frequency
Regular Inspections	Inspect all components including soil substrate, vegetation, drains, irrigation systems, membrane and roof structure for proper operation, integrity of waterproofing and structural stability	Annually and after severe storms
	Inspect soil substrate for evidence of erosion channels and identify sediment source	Annually and after severe storms
	Inspect drain inlets to ensure unrestricted runoff from the drainage layer to the conveyance or roof drain system; inspect underside of roof for evidence of leakage	Annually and after severe storms
Regular Maintenance	Remove debris and litter to prevent clogging of inlet drains	Six monthly and annually or as required
	During establishment year replace dead plans as required	Monthly – but usually the responsibility of the manufacturer
	Post establishment replace dead plants where required	Annually (in autumn)

	Remove fallen leaves and debris from deciduous plant foliage; remove nuisance and invasive vegetation; mow grasses, prune shrubs and manage other planting as required - clippings should be removed and not allowed to accumulate	Six monthly or as required
Remedial Actions	If erosion channels are evident, these should be stabilised with extra soil substrate similar to the original material, and sources of erosion damage should be identified and controlled	As required
	If drain inlet has settled, cracked or moved, investigate and repair as appropriate	As required

Storage

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 is may cause risks to performance)	Monthly
	Remove sediment from pre-treatment structures and/or internal forebays	Annually, or as required
Remedial Actions	Repair/ rehabilitate inlets, outlet, overflow, and vents	As required

Monitoring	Inspect/ check all inlets, outlets, vents and overflows 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 five years, or as required

Pipe System

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 inlet structures and inspection chambers.	Annually or as required
	Maintain vegetation to designed limits within the vicinity of below ground drainage pipes and tanks to avoid damage to system	Monthly or as required
Remedial Actions	Repair physical damage if necessary	As required
Monitoring	Inspect all inlets, outlets and vents to ensure that they are in good condition and operating as designed.	Annually
	Survey inside of pipe runs for sediment build up and remove if necessary.	Every 5 years or as required

Hydrobrake

Hydro International Warranty, Maintenance Statement

The following has been provided by Hydro International:

Normally, little maintenance is required as there are no moving parts within the Flow Control. Experience has shown that if blockages occur they do so at the intake, and the cause on such occasions has been due to a lack of attention to engineering detail such as approach velocities being too low, inadequate benching, or the use of units below the minimum recommended size.

The Flow Control (where applicable) is fitted with a pivoting bypass door, which allows the manhole chamber to be drained down should blockage occur. The smaller conical units, below the minimum recommended size, are also supplied with rodding facilities or vortex suppressor pipes as standard.

Following installation of the Flow Control it is vitally important that any extraneous material i.e. building materials are removed from the unit and the chamber.

After the system is made live, and assuming that the chamber design is satisfactory, it is recommended that each unit be inspected monthly for three months and thereafter at six monthly intervals with hose down if required.

Water Butts

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	*The water butt should be routinely checked for litter – leaves can become trapped in the water butt which could lead to blockage of the taps and overflow*	*Monthly*
	Where appropriate, and if safe to do so, the water butt should be cleaned annually to prevent smells associated with stagnant water, and to remove any algae.	*Annually*

Exceedance

Should the local drainage system fail, it is reasonable to assume that overland flows would be directed to the landscaped areas (see SuDS Layout Plan).

Site Runoff Pollution

The SuDS Manual states '*through a variety of physical, biological, and chemical treatment processes, within the soil and root uptake zone, which filter airborne pollutants and pollutants entrained within rainwater, green roofs can help to reduce the amount of pollution delivered to the local drainage system*'.

As previously detailed, the existing site is occupied by a residential dwelling, located within a residential area. As such, it is unlikely that there will be any significant pollution of surface water runoff associated with the current land use.

Given that proposals are for residential development, it is unlikely that these will result in any increase in surface water run-off pollution.

Amenity Design

The SuDS Manual states that green roofs can provide valuable amenity if the roof is intended to be accessible or is overlooked.

The SuDS Manual also states that rainwater storage provides indirect amenity value by supporting the resilience of developments and their landscape to changes in climate and water resource availability. Attenuation storage systems can promote multi-functional use of space by allowing the surface above the tank to be used for recreation or other amenity facilities.

Biodiversity

The SuDS Manual states that green roofs can be designed to provide high ecological value. They can help to conserve valuable habitat and biodiversity and provide an oasis of life in an otherwise sterile urban environment.

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