Proposed SuDS strategy

For the Approved new dwelling r/o

62 Hillfield Road, West Hampstead, London NW6 1QA.

Prepared by

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Innervision Design Ltd

Revised to fit new layout March 2022

INNERVISION design

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Scope

Note: this report can only be assessed under the scope it is intended for as set out below:

Town and Country Planning Act 1990

The scope of this report includes the provision of supplementary information in relation to a planning application set under the provision of this Act and is intended to meet the requirements for "particulars" under Section 62; (3) & (4 A) of same.

The Town and Country Planning (Development Management Procedure) (England) Order 2015

The scope of this report includes the provision of supplementary information in relation to any related planning Condition set under the provision of this Order and is intended to meet the requirements for "particulars" under Section 27(b) of same.

Building Act 1984

Building Regulations 2010 and Statute control

This report **is not** provided in support of any application made under the Building Act 1984 or related Regulations.

Statement of conformity

While this report cannot therefore be lawfully assessed by any persons, in any capacity, for compliance with the above Building Regulations all drainage on this private site, both foul and SW will be subject to full compliance with Part H of the Building Regulations 2010 (as amended 2013).

Hence all construction details, SW runs, pipe diameters etc. as detailed in this report are designed to comply in full with the "Adequate provision" Requirement of Part H and are to be checked, inspected, tested and approved by the Building Control Body of the clients choice at the time of detailed design and construction.

SuDS design additional standards

All SuDS (Sustainable drainage system) on site will also be designed and installed in accordance with CIRIA 753 & CIRIA 768, para 169 of the NPPF, its supporting technical guidance and the DEFRA Non-Statutory Technical standards for sustainable drainage systems (2015).

1 Executive Summary

A The design team have detailed a Sedum roof as the primary SuDS strategy for the site.

B 1 in 1yr peak run-off rate to the SW network is reduced from $1.1ls^{-1}$ to circa $0ls^{-1}$ which represents a circa 100% betterment.

C All areas of hard standing on the site will be re-constructed using a permeable medium.

D The project team will install an "off line" rainwater butt to collect water for external use.

E All SuDS on site will be installed with full consideration to long term maintenance.

2 Introduction

2.1 Site location

The Approved development is on land to the rear of 62 Hillfield Road, West Hampstead, London NW6 1QA (see Figure 1).

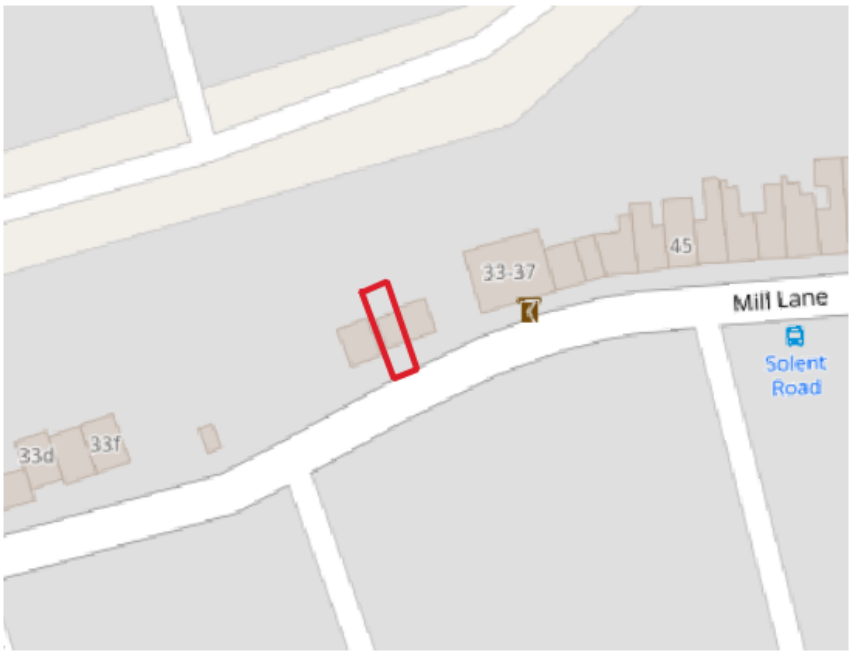


Figure 1: Site location plan, in red (source: Open Street map)

2.2 Approved development description

The Approval, 2019/0682/P, is for a new dwelling (all plans as those submitted and Approved).

2.2.1 Condition 8

> "Prior to commencement of development, details of a sustainable urban drainage systems (SUDS) shall be submitted to and approved in writing by the local planing authority. Such system shall demonstrate greenfield levels of runoff can be achieved where feasible. The system shall be implemented as part of the development and thereafter retained and maintained."

2.3 Geology

With reference to BGS mapping the site is on London Clay.

2.4 Existing surface water disposal strategy

The existing building and associated hard landscaping is drained directly to the surface water, possibly combined, network. The existing parking area is constructed in concrete and hence considered impermeable. This area of garage and car park is being built over.

The curtilage of the entire site encloses an area of approximately 85m^2 of which, pre-development, 85m^2 is classed as being impermeable (40m^2 roofs, 45m^2 impermeable hard-standing and paths). The new development decreases the impermeable area from 85m^2 to 45m^2 (45m^2 roof area).

2.4.1 Existing peak out fall rate

2.4.2 Variables

i_1 = 50.4[1] mm hr^{-1}

i_{100} = 153 mm hr^{-1}

A = 85 m^2

Cr = 1

Cv = 0.9

2.4.3 Impermeable area run-off rate for pre-developed site

$$Q_{BF1} = \frac{0.9 * 50.4 * 85}{3600}$$
$$= 1.1ls^{-1}$$

$$Q_{BF100} = \frac{0.9 * 153 * 85}{3600}$$
$$= 3.3ls^{-1}$$

Existing runff rates from the impermeable areas of the site are calculated as 1.07ls^{-1} (based on 50.4mm hr^{-1}, 1 in 1 yr summer storm).

[1] 50.4mm hr^{-1}is the mean intensity of a 1 in 1yr 6min duration summer storm, calculated to be the worst case, using standard IDF formula.

2.5 Greenfield estimation of peak rate of run-off

2.5.1 Methodology

The following greenfield run-off rate calculations have been carried out in accordance with the IH Report 124 'Flood estimation for small catchments'[1]. The pro rata method on the size of catchment has been used.

2.5.2 Formula

For catchments less than 50ha:

$$Q_{BAR50ha} = 1.08\,(50/100)^{0.89} * SAAR^{1.17} * SPR^{2.17} \tag{1}$$

$$Q_{BAR} = Q_{BAR50ha} * \frac{A}{50} \tag{2}$$

$$Q_{1yr} = Q_{BAR} * 0.85 \tag{3}$$

$$Q_{100yr} = Q_{BAR} * GC_{100} \tag{4}$$

2.5.3 Variables

Qbar/Qmed =0.85

SAAR = 650mm

Hydrological Region 6

Growth curve factors: 30 yr = 2.3; 100 yr = 3.19

SPR = 0.47

Note: Area reflects positively drained areas only. I.e. Whole site area minus areas of significant open space.

2.5.4 Calculations

$$\begin{aligned} Q_{BAR50ha} =& 1.08 * 0.5^{0.89} * 650^{1.17} * 0.47^{2.17} \\ =& 0.58 * 1954.83 * 0.19 \\ =& 221.34 \end{aligned}$$

Using Equation 2:

$$\begin{aligned} Q_{BAR} =& \frac{221.34 * 0.01}{50} \\ =& 0.04 ls^{-1} \end{aligned}$$

Using Equation 3:

$$\begin{aligned} Q_1 =& 0.04 * 0.85 \\ =& 0.03 ls^{-1} \end{aligned}$$

Using Equation 4:

$$\begin{aligned} Q_{100} =& 0.04 * 3.19 \\ =& 0.12 ls^{-1} \end{aligned}$$

2.5.5 Peak green field run-off rates

For the 1 year Return Period event the peak runoff calculates to 0.03 ls^{-1}
For the 30 year Return Period event the peak runoff calculates to 0.09 ls^{-1}
For the 100 year Return Period event the peak runoff calculates to 0.12 ls^{-1}

3 SuDS Principles

3.1 SuDS design philosophy

The CIRIA SuDS[2] manual provides the design philosophy:

> "SuDS design should, as much as possible, be based around the following:
>
> - using surface water run-off as a resource
> - managing rainwater close to where it falls
> - managing run-off at the surface
> - allowing rainwater to soak into the ground
> - promoting evapotranspiration
> - slowing and storing run-off to mimic natural run-off characteristics
> - reducing contamination of run-off through pollution prevention and controlling the run-off at source
> - treating run-off to reduce the risk of urban contaminants causing environmental pollution."

3.2 Source control

The following are widely recognised as source control SuDS.

- Sedum roofing.
- Infiltration devices. Typically soakaways.
- Rainwater harvesting.
- Bio-retention planting, rain gardens.
- Permeable paving, porous asphalt. These provide both infiltration and short term storage volumes thus reducing overall un-mitigated run-off volumes.

3.3 "End of pipe" solutions

To be considered only after implementation of the above options.

- Retention tanks with outfall controlled by hydraulic means to limiting discharge rates and volumes to discharge to existing SW flow pathways.

Sections 4.2.1 to 4.2.5 consider the viability of a range of these SuDS devices.

3.4 Design Criteria

In line with the SuDS management train, the following hierarchy have been considered in applying the use of SuDS into the proposed development scheme.

- Source control
- Site control
- Outfall control

3.4.1 Storm period

All SW drainage shall be designed to a 1 in 100 year storm event allowing for climate change of + 40%.

3.4.2 London Plan - brownfield sites

> "Most developments referred to the Mayor have been able to achieve at least 50% attenuation of the site's (prior to re-development) surface water run-off at peak times. This is the minimum expectation from development proposals"

3.4.3 Consent to discharge

Consent letter at Appendix C.

Consent allows for a:

> "**Direct Combined Connection**
> 1 x 100mm diameter direct combined connection into an existing 965mm x 610mm diameter egg shaped public combined sewer located in Mill Lane via a core-drilled saddle connection in accordance with Code for Adoption sewerage."

4 Appraisal of SuDS options

The primary aim is to meet the requirements of the Local Plan core policies.

4.1 Site constraints impacting on SuDS

- Expected poor on-site permeability of the local geology.
- No locations beyond 5m from buildings.
- Very low pro rata greenfield run-off rates.
- No access to adjacent water course or ditch.
- Approved site layout and building.
- Physically constrained site as Approved.

4.2 Source control devices

4.2.1 Sedum roofs

With reference to Section 3.1, sedum roofs promote the following SuDS design criteria:

- manages rainwater close to where it falls
- manages run-off at the surface
- promotes evapotranspiration
- slows and stores run-off to mimic natural run-off characteristics
- treats run-off to reduce the risk of urban contaminants causing environmental pollution.

The use of Sedum roofs can significantly reduce run-off volumes from roofs [3]. These are found suitable for this development.

4.2.2 Infiltration devices

Due to site constraints, as Section 4.1, these are not viable on this site.

4.2.3 Permeable paving

With reference to Section 3.1, permeable paving promotes the following SuDS design criteria:

- manages rainwater close to where it falls
- manages run-off at the surface
- allows rainwater to soak into the ground
- slows and stores run-off to mimic natural run-off characteristics
- treats run-off to reduce the risk of urban contaminants causing environmental pollution.

A 30% void ratio is assumed through a 350mm sub-base. This is appropriate for a DOT Type 3 Sub-base hence the storage capacity equates to circa 105mm per $1m^2$ therefore based on a M6 100hr + cc storm of 87mm rainfall the paving offers, without any allowance for infiltration, a circa 1:1.2 drained volume:storage volume capacity (= 20% space capacity). Hence there is no anticipated exceedance flow from the areas of permeable paving.

The areas of permeable paving are primarily disconnected from the proposed SW network, i.e. they are not primarily designed to drain to the network. Surface water retained in the sub-base matrix is lost through evaporation and infiltration, at shallow depths, into the surrounding naturally fissured sub-soils (due to action of freeze-thaw, roots, earthworms and the proposed local re-grading following any site clearance). In doing so it mimics as close as possible the natural hydrological process of water falling onto the ground and finding natural flow paths for dispersion.

Treatment potential: TSS 0.7, Metals 0.6, Hydrocarbons 0.7 = suitable for trafficked areas

All permeable paving offers sufficient storage volume to accommodate the 5mm event.

4.2.4 Rainwater harvesting

With reference to Section 3.1, Rainwater harvesting promotes the following SuDS design criteria:

- uses surface water run-off as a resource
- manages rainwater close to where it falls

For external use

Rain water harvesting / water butts: These provide additional, "off line" SuDS, and are deemed a suitable SuDS component for small plots[2]. The collection and re-use of water can reduce run off volumes arising from roofs. The collected water, via readily available diverters (e.g. Web link: Standard diverter example), being used for external uses. The project team have detailed "off line" rainwater butts to collect water for external use. Since these are in off-line configuration any exceedance flows are automatically directed back to the downpipes.

Rainwater butts can, in part, accommodate the 5mm event dependent on manual drawdown and evaporation.

4.2.5 Rain gardens/Raised planters

Due to site constraints, as Section 4.1, these are not viable on this site.

4.2.6 "End of pipe" solutions

To be considered only after implementation of the above options.

- Retention tanks with outfall controlled by hydraulic means (e.g. hydrobrakes, pipe sizing, orifice plate etc.) to limiting rates and volumes to discharge to existing flow pathways.

5 Proposed surface water disposal strategy

5.1 Roof area

The design team have detailed a Sedum roof as the primary SuDS strategy for the site, with exceedance flows taken to the existing system (without requiring alteration to, or any increase in capacity of, the existing infrastructure) via a rainwater butt in offline configuration.

.

5.1.1 Design parameters

"In summer green roofs can retain 70–80% of rainfall and in winter they retain 10–35%"[3] hence, it follows, will reduce run-off by these amounts.

The green roof will be designed to prevent run-off from all rainfall events up to the 5mm event which is equivalent to a 1 in 1 peak run-off summer storm for the site - generally the standard target reduction for sedum roofs. A suitable option with a max 20mm (20kg.m^{-2}) of retention capacity can be found in Appendix B.

1 in 1yr

Maximum mean intensity storm for the site for a 1 in 1yr return period is a 50.4 mm hr^{-1} giving a total of circa 5.0mm of rainfall.

Proposed total roof area = 45m^2

Sedum roof area = 45m^2

With the accepted 100% retention of a 5mm event by the area of sedum roof, max 1:1 out fall rate from the sedum roof area is therefore 0.04 ls^{-1}

Total proposed mean 1 in 1yr run off rate = 0.0ls^{-1}

1 in 100yr

Maximum intensity storm for the site for a 1 in 100yr return period is a 153 mm hr^{-1} summer profile storm giving a total of circa 15.3mm of rainfall.

Proposed total roof area = 45m^2

Sedum roof area = 45m^2

Assuming a conservative 50% retention of a summer storm (refer to 5.1.1 above) by the sedum roof, max 1:100 out fall rate from the sedum roof area, in ls^{-1}, is therefore circa:

$$\frac{0.5 * 0.95 * 153.0 * 45}{3600} = 0.9ls^{-1}$$

(reducing to circa 0.45ls^{-1} when established).

Total proposed mean 1 in 100yr run off rate = 0.9ls^{-1}

5.2 Permeable hard standing

5.2.1 Permeable paving

Where practicable, any remaining areas of impermeable hard standing on the existing site will be re-constructed using a permeable medium.

SAAR = circa 680mm, circa 55 - 60mm per month

Total losses average circa 350mm per month (3mm per day evaporation and 260mm per month background infiltration based on a nominal rate of 1.0 x $10^{-7}ms^{-1}$[2]).

Exceedance flows (flows over the 1.2 x M1006hr + CC event) will be conveyed at the surface via channels to the SW network on site.

5.3 Betterment on existing

1 in 1yr peak run-off rate to the SW network is reduced from 1.07ls^{-1} to 0ls^{-1} which represents a 100% betterment.

1 in 100yr peak run-off rate to the SW network is reduced from 3.25ls^{-1} to circa 0.9ls^{-1} which represents a circa 72% betterment.

5.4 Exceedance flows

Sedum roof- exceedance flows taken to the existing SW drainage on site via a water butt.

Water butt(s) - when full, the water is diverted to the existing surface water drainage on site.

Permeable paving - Any exceedance flows at the surface will be channelled to the existing SW network via silt traps.

There are no design overland exceedance flow paths other than as noted above.

5.5 Maintenance of SuDS

Ultimate responsibility for the long term maintenance with SuDS in this environment lay with the land owner/management company.

All SuDS on site will be installed with full consideration to long term maintenance. The following guidance is provided and applies:

5.5.1 Permeable pavements

Figure 2[2]provides details maintenance operations and frequency required for a permeable pavement.

TABLE 20.15 Operation and maintenance requirements for pervious pavements

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

Figure 2: Maintenance operations and scheduling for permeable pavements

5.5.2 Sedum roofs

Extensive roof maintenance - < 100mm low nutrition substrate

- Irrigation: Post-establishment, irrigation should not be required for most extensive green roofs, although the water storage capacity of the system and the plants' water demands should be appropriately assessed.
- Fertilization: Extensive green roofs typically have low nutrient requirements and are therefore often fertilized on an annual basis, each spring, using a slow-release fertilizer.
- Plant management: Removal of undesirable plant species and fallen leaves should take place twice each yearly.
- General: Drainage outlets (including inspection chambers) and shingle/gravel perimeters to be cleared of vegetation, twice yearly.

5.5.3 Water butts

A maintenance plan for water butts should include:

- Regular inspection of silt traps and filters.
- Removal of sediments and debris as required.

5.6 Summary

SuDS are provided on site which provide an up to 100% betterment for 1 in 1yr events and an up to 61% betterment for 1 in 100yr events.

The use of SuDS techniques on site, as detailed above and when installed in line with best practice (I.e. CIRIA 753 & CIRIA 768), will reduce and treat the run-off volumes in line with the core policies.

Signed: 

Dr Robin Saunders CEng, C. Build E, MCABE, BEng(Hons), PhD

Date: 4th March, 2022

References

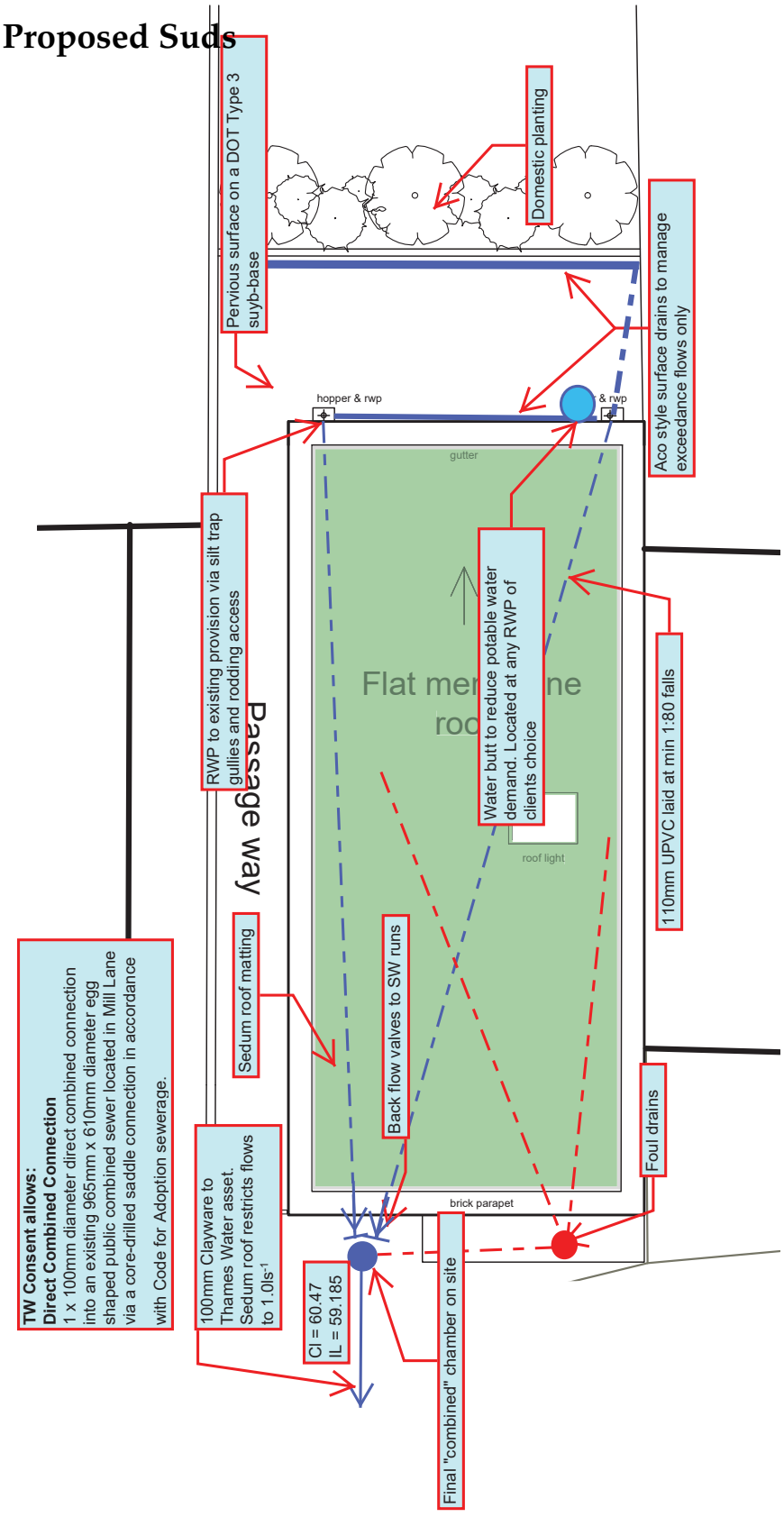
[1] DCW Marshall & AC Bayliss. Flood estimation for small catchments. Technical Report No. 124, Institute of Hydrology, June 1994.

[2] CIRIA. The SUDS manual. Technical report, CIRIA, 2015.

[3] C Hassell and B Coombes. Green roofs. Technical report, CIBSE, 2007.

A Proposal plans

A.1 Proposed Suds



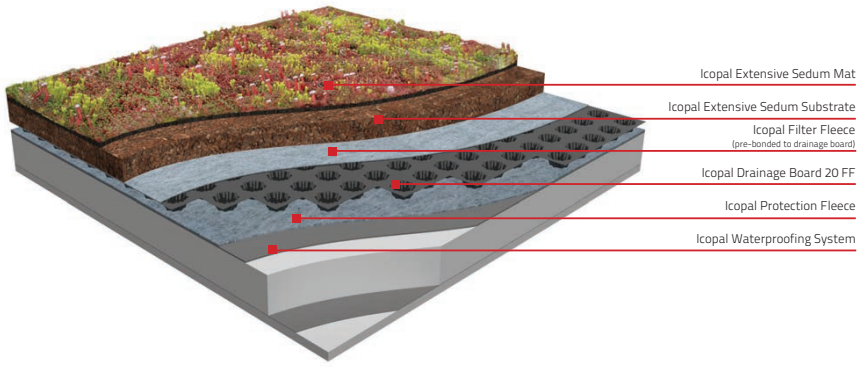
B Sedum roof

Icopal ST Sedum Mat System

GREEN ROOF SYSTEMS

Code: 3101062

An extensive lightweight green roof system utilising a pre-grown vegetation mat of 8 – 12 sedum species. Provides an immediate green planting scheme for instant impact. The vegetation mat is installed on a shallow depth of specially formulated free-draining substrate and drainage board.



System Properties

The following data relates to the green roof element only.

System Dry Weight:	80 kg/m²
System Saturated Weight:	100 kg/m²
System Typical Depth:	104 mm
Growing Substrate Depth:	50 mm (settled)
Contouring:	Flat/level

Biodiversity: ● ● ○ ○ ○

Pollen/Nectar Richness: ● ● ● ○ ○

Habitat Provision: ● ● ○ ○ ○

Key Features

- A lightweight system suitable for a range of roof construction types.
- System type allows for shallower substrate depths.
- Attractive mix of sedum species.
- Sedum plants are low-growing.
- Moderate range of bio-diversity.
- Moderate provision of Nectar and Pollen to attract insects.
- Suitable for flat and pitched roofs.
- Versatile system; quick and easy to install.
- Low maintenance and drought tolerant.
- Pre-grown mat provides an instant green coverage.

Icopal
ST Sedum Mat System

Flowering Period: May – August.
Typical Colours: Seasonal variation of yellows, whites, and pinks. Foliage turns from green to red in periods of plant stress.
N° of Species Sown: 8 – 12.

Typical Species: (subject to season variation) - Sedum acre, Sedum album, Sedum ellacombianum, Sedum floriferum, Sedum forsterianum, Sedum hybridum, Sedum kamtschaticum, Sedum montanum, Sedum oreganum, Sedum reflexum, Sedum rupestre, Sedum selskianum, Sedum sexangulare, Sedum spirium.

Flower Attraction
Low-moderate mixed pollen source, applicable to Bees – Mason, Honey Bombus spp; Insects – Chrysoperla (Lacewing), hoverfly (Episyrphus), Ladybird (Harmonia), Aphidius, Aphilinus, Aphidoletes (beneficial parasitic wasps).

Establishment Period: 6 – 8 months.

Plant Species
The sedum family of flowering plants are succulents and therefore have leaves which are able to store water. The majority grow naturally in arid, well drained areas, often on shallow substrate depths. Therefore they are drought tolerant, and able to survive in extremes of conditions. They generally flower from early summer to autumn.

General Notes
The system is suitable for both new build and refurbishment projects. Roof pitches up to 45° may be used, but for slopes over 9° a retention system is required. All slopes over 5° will require a mechanically fixed eaves edge restraint.

Detailing
A border with a recommended width of 300 – 500 mm of washed river stones (20 – 40 mm diameter) should be used around all roof penetrations, outlets, perimeters and system edges to provide a vegetation free zone.

Irrigation
Initial: Irrigation required immediately after installation for up to 8 – 12 months until fully established. Recommended irrigation period: 12 months. Pitched roofs retain less water and therefore a permanent irrigation system should be considered.
Once established: Irrigation is only generally required during prolonged periods of hot dry weather.
Water Source: A roof top source with a pressure of 2.5 – 3 bar and a flow rate of 60 L/min is recommended to connect a temporary system if required.

Maintenance:
Sedum systems are designed to be low maintenance. Species selection ensures that the roof will evolve naturally, however weeds should be removed periodically through the year to reduce the likelihood that they become dominant. It is recommended that a suitable fertiliser is applied to keep the plants healthy. This may be a spring feed of slow/controlled release fertiliser to last the growing season, or more regular granular/liquid feeds throughout the growing season.

For more information please visit
www.icopal.co.uk
TEL: 0161 865 4444 FAX: 0161 866 2616 E: info.uk@icopal.com

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Issue 01 ICO3012

C Thames Water

DS Reference: DS4115345

developer.services@thameswater.co.uk

0800 009 3921
Monday to Friday, 8am to 5pm

thameswater.co.uk/developerservices

23 February 2022

Mr Prakash Patel
KHYA Developments Limited
27 Station Road
London
N3 2SB

Notice of consent to connect to a public sewer / public lateral drain

Site address: Land R/O 62 Hillfield Road, London NW6 1QA

Dear Mr Patel,

Thank you for your application for a new sewer connection at the above address.

We are pleased to inform you that we have given our conditional consent for your proposed connection(s) to the public sewer under Section 106 of the Water Industry Act 1991.

What is this consent for?

This consent is given solely for the legal right of communication (i.e. method/mode of connection) with the public sewer, in accordance with the description below.

This consent does not guarantee capacity exists within our network. For capacity-based enquiries or preplanning concerns regarding our network please make a Pre-Planning Enquiry application. Applications can be made on the Thames Water website.

This Consent does not give you any inferred right to enter or cross land owned by a third party and must not be used to discharge any drainage-related planning conditions. You will be responsible for obtaining any necessary licences and/or permission from the highway authority, planning authority and/or private/third-party landowners.

Inspections and Completion certificates

We will need to physically inspect the connection to our sewer before you backfill the trench. Please call us on 0800 009 3921, at least **ten working days** prior to backfilling the connection works to schedule an inspection visit. Please refer to the ''Conditions of Consent (5)'' for further details.

When the connection has been completed satisfactorily, a completion certificate will be issued. This certificate authenticates the standards to which your connection works were carried out and does not infer adoption of your new drains or sewers. You will be responsible for repairs and maintenance of all drains including those outside your site boundary. You will need to submit an adoption agreement under section 102 or 104 of the Water Industry Act if you want us to adopt any of your drains or sewers. You can do this via https://developers.thameswater.co.uk/Developing-a-large-site/Apply-and-pay-for-services/Wastewater-services/Adopting-sewers-and-other-assets

Letter Issue Version 6.0

Sewer Connection Quotes

If you would like us to carry out the connection works on your behalf, we will provide you a quote and deliver in accordance with the below.

Waste connection only (no pipe laying)

We will discuss the requirements with you and quote for the works required and charge in accordance with section 7 (pages 25-28) of our current fixed price charging arrangements.

lateral drain and sewer requisitions

Waste connections including pipelaying for the provision of a lateral drain (pipe serving one property or one curtilage) and/or a new sewer (pipe serving more than one property).

If there is no public sewer easily accessible to your property or your site has no means to connect your lateral drain and/or sewer due to third party land, you can requisition (formally request) Thames Water to lay these pipes as part of our public network under Section 98-101 of the Water Industry Act 1991. Please refer to section 8 (pages 29-31) of our current charging arrangements.

You can estimate the costs for these connections yourself by referring to section 7 and 8 of our current charging arrangements here.

Our consent is subject to the conditions below:

Location	Description
Land R/O 62 Hillfield Road London NW6 1QA	**Direct Combined Connection** 1 x 100mm diameter direct combined connection into an existing 965mm x 610mm diameter egg shaped public combined sewer located in Mill Lane via a core-drilled saddle connection in accordance with Code for Adoption sewerage. As per drawing No. E19-062-100

Please note that we will allow ONE amendment to be made to this consent within 12 months from date of issue. Any more than ONE amendment within this time period will entail additional fees. Any amendments sought beyond this time period will require a new application to be submitted.

The reference number for your application is DS4115345 please quote this in any future correspondence.

If you're proposing to build within three metres of a public sewer, or within one metre of a lateral drain, you'll need to apply to us for a separate build over agreement. You can do this via thameswater.co.uk/buildover.

Please note you may require a **Permit to Work** (PTW) to proceed with connection works and any associated investigations that involve entering into the network and/or working in close

proximity to some of our more strategic assets such as trunks sewers/water mains. Please refer to the Conditions of Consent (11) for further details.

If you've any queries, please call our helpdesk on 0800 009 3921 (8am to 5pm, Monday to Friday) or email developer.services@thameswater.co.uk.

Yours sincerely,

Mandy Fuller on behalf of Colins Akemche
Technical Coordinator – Wastewater Connections

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Conditions of Consent

1. This consent is subject to conditions that may be imposed through the planning process.
2. An infrastructure charge will be payable as a result of connecting a property to the Public Sewerage System for the first time for domestic purposes by virtue of Section 146(2)b of the Water Industry Act 1991. We will invoice this charge separately if applicable.
3. Where the connection is to be made to a public sewer in third party land (i.e. outside your site boundary including public land), it is recommended that a demarcation chamber is constructed on the lateral drain at the property boundary, or as near to the property boundary as possible. The demarcation chamber and lateral drain will not be adopted as part of the section 106 agreement. You will need to submit an adoption agreement under section 102 or 104 of the Water Industry Act if you want us to adopt any of your private drains or sewers. You can do this via https://developers.thameswater.co.uk/Developing-a-large-site/Apply-and-pay-for-services/Wastewater-services/Adopting-sewers-and-other-assets
4. All materials used and standard of sewer connection works should be in accordance with Code for Adoption sewerage. Where the connection is to be constructed in plastic, please confirm the standards of materials to be used with a technical coordinator/project engineer prior to carrying out the connection. Please ensure that the specification sheet/documents for the plastic materials used are kept for review by the field engineer. Please refer to the attached Construction and Connection guide for best practice.
5. It is your responsibility to ensure that your works are inspected before the trench is backfilled. You must arrange our attendance by calling 0800 009 3921 and giving us at least ten working days' notice. If the connection cannot be inspected by a field engineer for any reason, we may request that the trench is reopened for inspection or require additional information deemed necessary for us to approve the connection. Where a connection is made via a heading/tunnelling or a field engineer cannot attend site within the agreed ten working days' notice period required, we may, in exceptional circumstances accept photographs and/or a CCTV survey report and footage subject to prior agreement with a Technical Coordinator or Project Engineer.
6. It is your responsibility to confirm the exact location, diameter, and invert levels of the public sewer prior to making the connection. You will be held liable for any misconnection (i.e. foul water discharge to a surface water sewer or surface water discharge to foul water sewer) resulting from this connection. Where you are making an indirect connection, you should carry out connectivity surveys to confirm the type of sewer your existing private drains connect to and take appropriate action to rectify if you find cross connections.
7. Connections into manholes must be made with soffits level and must enter 'with the flow'. Backdrops must be constructed outside the manhole chamber.
8. Junction connections must be made by cutting in a purpose made oblique or swept junction fitting of the same material as the public sewer, jointed using flexible couplings. Core drilled saddle connections are usually not permitted on sewers smaller than 375mm (unless otherwise approved by a Technical Coordinator/Project Engineer in writing). Where a core drilled saddle connection is approved, a flexible saddle fitting must be used

to ensure that no part of the new drains protrude into the existing sewer. We do not accept clay saddles attached to the public sewer with mortar.

9. Some Infill/recessed manhole/chamber covers are permitted on adoptable drains/sewers in accordance with the attached construction and connection guide.
10. All connections to the public sewer should be via a gravity-fed pipe. A direct connection of a rising/pumped main to the public sewer is not permitted. Where there is a proposed connection from a pump station, a break chamber should be installed at the end of the pumped main to ensure that flows into the public sewer are via gravity for a minimum of 5m
11. You will require a Permit to Work (PTW) if your works are within 3m of a wastewater trunk sewer, rising main and/or 500mm of a clean water supply trunk respectively. Please contact our Operations team on 0800 009 3964.
12. It is your responsibility to ensure that your appointed private drainage contractor is competent and has all relevant permits necessary to carry out the connection. You will be responsible for obtaining any easements for crossing third party land and licences from the highway authority. All requirements of the highway authority must be observed and signing, guarding and lighting will be required at all times in accordance with Chapter 8 of the Department of Transport's Traffic Signs Manual 2009.
13. Where there is a proposed discharge from a private pumping station and rising main system, it is your responsibility to design the system to ensure acceptable discharge levels of hydrogen sulphide (H2S), this can be achieved by ensuring that all effluent is cycled through the pumping station and rising main within a maximum of six hours to prevent septicity. Where necessary, preventative measures to ensure H2S cannot build up to dangerous levels in the system should be installed. You will be responsible for the ongoing maintenance and monitoring of the private system. Hydrogen sulphide is a major public health risk and causes serious damage to the receiving sewerage network which may result in a third party damage claim against you under Section 111 of the Water Industry Act 1991.
14. Under no circumstances should foul water be discharged into the surface water sewerage system. Surface water drainage must not discharge to the foul sewerage system unless otherwise stated in the description above. If you want to discharge surface water directly to a soakaway or to a watercourse, then you will need to obtain the consent of the Environment Agency or the Lead Local Flood Authority.
15. All proposed discharge of surface water flows must be in accordance with the site's drainage strategy as approved by planning application, which should specify the final discharge rates and volumes. Sites proposing to discharge surface water flows with no planning requirement must connect into the nearest surface water sewer unless otherwise agreed by Thames Water.
16. Only the connections detailed in the enclosed notice are approved by Thames Water. No other works affecting the public sewerage system may be carried out without Thames Water's written consent.

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17. Confined space entry procedures must be observed when breaking into the existing public sewerage system.

18. Where the developer/owner/occupier proposes to discharge trade effluent into the public sewer, a trade effluent consent will be required. Trade effluent can be best described as anything other than domestic sewage (toilet, bath or sink waste) or uncontaminated surface water and roof drainage (rainwater). For enquiries and application forms contact your Retailer or visit the Thames Water website at https://wholesale.thameswater.co.uk/Wholesale-services/Business-customers/Trade-effluent

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Hazard information
Third-party connection to sewers

Anyone wishing to connect their property to a Thames Water sewer must comply with the requirements of Section 106 of the Water Act 1991, as amended.

Significant Hazards

We strongly recommend that before carrying out work to connect to our sewers, you consider the following significant hazards:

- Oxygen deficiency
- Toxic gases, fumes or vapours
- Explosion (methane, petrol)
- Flooding
- Physical injury (slips, trips, falls)
- Infections from sewage (Weils disease)

Confined spaces

Particular care must be taken before entering or working in confined spaces. A confined space is defined as any place in which, by virtue of its enclosed nature, there arises a foreseeable specified risk. A specified risk is a risk of any of the following:

- Serious injury from a fire or explosion
- Loss of consciousness due to an increase in body temperature
- Loss of consciousness or asphyxiation arising from gases or the lack of oxygen
- Drowning arising from an increase in the level of a liquid

In addition:

- When detailing the private drainage, you should assume that the public sewer might occasionally surcharge up to ground level, and particular care is needed where development is proposed in low lying areas.
- Before entering any Thames Water asset a competent person must carry out an assessment to determine the need for entry and a safe system of work to be applied.
- Children and young persons must not enter the workspace.
- After the sewer connection work, it is important to wash before eating, smoking or treating cuts and abrasions. It is also important to avoid infection by maintaining strict personal hygiene and effective care of cuts and abrasions.

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