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ENVIRONMENTAL CONSULTING , SOFTWARE & TRAINING

Preliminary Surface Water Drainage Strategy

Site Address

19 South Street
London
W1K 2XB

Client

Totem+ Studio London

Report Reference

SWDS - 2021 - 000010

Prepared By

STM Environmental Consultants Ltd

Date

25/03/2021

1 Document Control

Preliminary Surface Water Drainage Strategy

Site Address:	19 South Street London W1K 2XB
National Grid Reference:	528320, 184444
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2 Abbreviations

Abbreviation	Description
STM	STM Environmental Consultants Limited
BGS	British Geological Survey
EA	Environment Agency
OS	Ordnance Survey of Great Britain
FRA	Flood Risk Assessment
NPPF	National Planning Policy Framework
FWD	Floodline Warning Direct
FRMS	Flood Risk Management Strategy
LLFA	Lead Local Flood Authority
SWMP	Surface Water Management Plan
SFRA	Strategic Flood Risk Assessment
CDA	Critical Drainage Area
SuDS	Sustainable Drainage Systems
GWSPZ	Groundwater Source Protection Zone

3 Disclaimer

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4 Executive Summary

Location	**19 South Street, London, W1K 2XB** **Grid reference: 528320, 184444**		
Proposed Development	Demolition of the existing 3 storey property, and the construction of a new 4 storey and basement single dwelling house.		
Current Site and Surrounding Uses	Residential.		
Hydrology	River Thames 2km from site.		
Geology	Lynch Hill Gravel Member (Superficial) and London Clay (Bedrock).		
Hydrogeology	Secondary A superficial and unproductive bedrock aquifers.		
Permeability	Freely draining and highly variable.		
Infiltration Potential	Good Potential - limited space within the site.		
Fluvial Flood Risk	Low.		
Surface Water Flood Risk	Low.		
Groundwater Flood Risk	Potential for groundwater flooding below ground level.		
Site Area	128m^2		
Existing and Proposed Site Layout	**Ground Cover**	**Existing**	**Proposed (Without SuDS)**
	Buildings	108	112
	Driveways/Patio	20	16
	Gardens/ Soft landscaping	0	0
	Total Impermeable Area	**128**	**128**

Run-Off Rates	Greenfield (GF) (l/s)	Pre - Development (PD) (l/s)	Post Development (PD) (l/s)
Qbar	0.0314	0.0528	0.0528
1 in 1	0.0267	0.0449	0.0449
1 in 30	0.0723	0.1215	0.1215
1 in 100	0.1002	0.1685	0.1685
1 in 100 + CC (40%)	0.1486	0.2497	0.2497
SuDS Target Requirement	As the development is taking place on a previously developed site the non-statutory technical standards for sustainable drainage systems S3 (peak flow) and S5 and S6 (volume controls) apply.		
Storage Required to meet Planning Requirement	Using the Microdrainage quick storage estimate method the total storage volume required to match greenfield discharges or pre-development rate was calculated to be 3.4 - 5.6 m^3.		
Preliminary SuDS Strategy	The proposed strategy will minimise the surface water runoff rate from the rooftop terrace and northern face balconies (75m^2). The remaining rooftop area (50m^2) will remain as unrestricted runoff, that will be directly connect into the gravity drainage system, thus reducing the need for additional pumps to be installed within the basement. The proposal will implement SuDS planters within the roof terrace. Runoff will then cascade down the northern face, via pipes into SuDS planters on the 3rd and 2nd floor balconies, before reaching an ultra slim rainwater harvesting tank that will allow for rainwater water reuse within the proposed development. The proposed SuDS will provide a total attenuation volume of approximately 4.1m^3 for stormwater volume control and a reduction in impermeable area of 9m^2. The excess runoff will be conveyed via a sump and pump, into the high level gravity sewer connection and will be unrestricted to minimise the flood risk to the basement following an extreme storm event. The proposal will discharge into the Thames Water Combined sewer and will discharge at high basement level (i.e - Not below basement ground level), so it can maintain the fall gradient required to join into the Thames Water Sewer.		
Conclusion	The proposed SuDS will help to reduce local flood risk by providing 4.1m^3 of attenuation on site, whilst increasing biodiversity and providing 235 litres for grey water recycling within the property. It will therefore be in compliance with the GLA current planning policy (Policy 5.13 & 5.15) and the NPPF.		

5 Introduction

STM Environmental Consultants Limited have been appointment by Totem Studio London to undertake a Surface Water Drainage Strategy for a proposed development at 19 South Street, London, W1K 2XB.

5.1 Proposed Development

The SWDS is required to support a planning application for demolition of the existing 3 storey property, and the construction of a new 4 storey and basement single dwelling house.

Copies of the development plans are presented in Appendix 1.

5.2 Report Aims and Objectives

This report sets out the proposed drainage strategy that will be employed in the designs to meet the requirements of the planning condition and the National Planning Policy Framework.

5.3 Legislative and Policy Context

5.3.1 Legislative Context

Section H3 of the Building Regulations 2010 requires that adequate provision is made for rainwater to be carried from the building roofs and paved areas. and be preferentially discharged to soakaways or some other adequate infiltration system. Where that is not reasonably practicable, a watercourse; or sewer can be used.

The Flood and Water Management Act was introduced in 2010. The Act defines the role of lead local flood authority (LLFA) for an area. All LLFA are required to develop, maintain, apply and monitor a strategy for local flood risk management in its area, called “local flood risk management strategy”.

Alongside the Act, Flood Risk Regulations (2009) outline the roles and responsibilities of the various authorities, which include preparing Flood Risk Management Plans and identifying how significant flood risks are to be mitigated.

5.3.2 Policy Context

The National Planning Policy Framework (NPPF) sets out the Government's economic, environmental and social planning policies for England. The policies set out in this framework apply to the preparation of local and neighbourhood plans and to decisions on planning applications.

Paragraph 163 of the National Planning Policy Framework (NPPF) states that:

> When determining planning applications, local planning authorities should ensure flood risk is not increased elsewhere and only consider development appropriate in areas at risk of flooding where, informed by a site-specific flood risk assessment following the Sequential Test, and if required the Exception Test, it can be demonstrated that:
>
> - within the site, the most vulnerable development is located in areas of lowest flood risk unless there are overriding reasons to prefer a different location
> - development is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed, including by emergency planning; and it gives priority to the use of sustainable drainage systems.

Paragraph 165 states that:

> Major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The systems used should:
>
> - take account of advice from the lead local flood authority;
> - have appropriate proposed minimum operational standards;
> - have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and
> - where possible, provide multifunctional benefits.
>
> A major development is defined as:
>
> - a residential development: 10 dwellings or more or residential development with a site area of 0.5 hectares or more where the number of dwellings is not yet known

- a non-residential development: provision of a building or buildings where the total floor space to be created is 1000 square metres or more or where the floor area is not yet known, a site area of 1 hectare or more.

Evidence that sustainable drainage (SuDS) has been considered should be submitted for Minor Developments.

In addition, the requirements of this report are laid out in the London Plan [2].

The Sustainable Drainage Hierarchy set out in Policy 5.13 of the Greater London Authority's (GLA) London Plan (2011) [2] stipulates that developments should utilize Sustainable Drainage Systems (SuDS), unless there are particle 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 as possible in line with the following drainage hierarchy:

- Store rainwater for later use;
- Use infiltration techniques, such as porous surfaces in non-clay areas;
- Attenuate rainwater in ponds or open water features for gradual release;
- Attenuate rainwater by storing in tanks or sealed water features for gradual release;
- Discharge directly to a water course;
- Discharge rainwater directly to a surface water sewer/drain;
- Discharge to a combined sewer.

In addition, Policy 5.15 – Water Use and Supply – promotes the minimisation of mains water use through rainwater harvesting when cost effective; while Policy 5.11 – Green roofs and Development Site Environments – requires that "Major development proposals should be designed to include roof, wall and site planting, especially, green roofs and walls where feasible". The proposed development is not considered to be "major" and thus compliance with this policy is not mandatory but may be advised in light of potential infiltration limitations associated with the underlying geology.

6 Site Characteristics

6.1 Location and Area

The site is centred at national grid reference 528320, 184444 and has an area of 128m^2.

It falls within the jurisdiction of City of Westminster London Borough in terms of the planning consultation process on flood risk and surface water management. The LLFA is Greater London Authority.

Figure 1 provides the site location map.

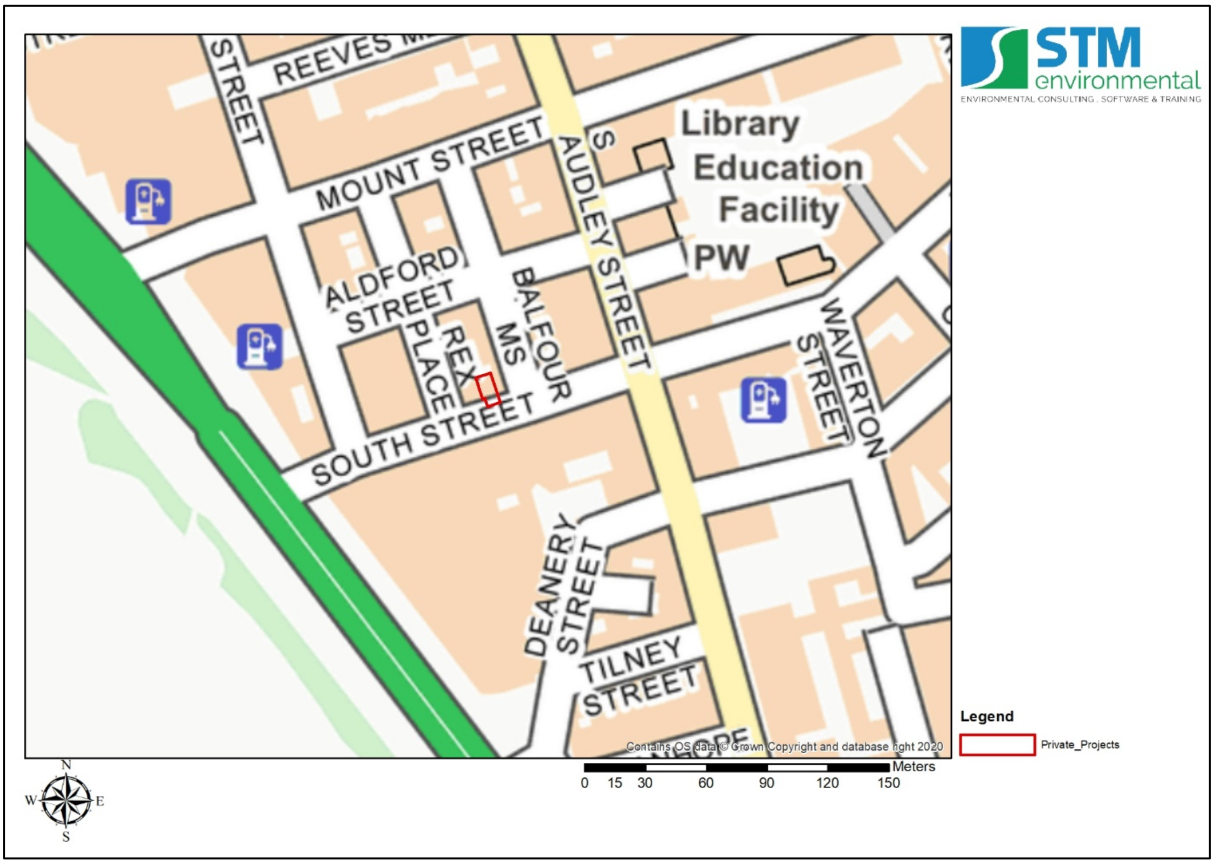


Figure 1: Site location map

6.2 Current Site and Surrounding Uses

The site is currently used as terraced residential dwelling. The surrounding area consists of mainly residential properties and Hyde Park is located at 150m to the west of the site.

6.3 Site Topography

The mapping provided in Appendix 2 shows the topography within the site.

The 1m DTM LiDAR data indicates that the ground level at the site slopes down from 22.7mAOD to 23.5mAOD, from north to south.

6.4 Hydrology

The nearest main watercourse is the River Thames, located 2km west of the site.

6.5 Geology and Hydrogeology

BGS mapping showing the geological and hydrogeological characteristics of the site are presented in Appendix 2.

The BGS information indicates that the superficial deposits at the site consist of Lynch Hill Gravel Member (Sand & Gravel) while the bedrock is classified as belonging to the London Clay.

The permeability of the bedrock geology is considered to be highly variable while that of the superficial geology is considered to be freely draining.

The BGS infiltration potential map suggests that there is likely to be good potential for infiltration methods at the site.

The maps also indicate that the groundwater table is 5mbgl.

A site investigation undertaken has confirmed that the ground water will be less than 1m below the finished floor level of the basement.

The site lies upon an unproductive bedrock and or superficial Secondary A aquifer. The site does not lie within a groundwater source protection zone.

6.6 Flood Risk

6.6.1 Fluvial Flood Risk

Fluvial and tidal risk is assessed using flooding maps produced by the Environment Agency (EA). These maps use available historic data and hydraulic modelling to define zones of flood risk. The maps allow a site to be defined in terms of its Flood Zone (e.g. 1, 2, 3a or 3b) and in terms of the overall flood risk (very low, low, medium or high).

The EA Flood Zones are defined as:

- Flood zone 1: Less than a 1 in 1000 annual probability of fluvial and/or tidal flooding;
- Flood zone 2: Between 1 in 100 and 1 in 1000 annual probability of fluvial flooding and/or between 1 in 200 and 1 in 1000 annual probability of tidal flooding;
- Flood zone 3a: Greater than 1 in 100 annual probability of fluvial flooding and/or greater than 1 in 200 annual probability of tidal flooding;
- Flood zone 3b: functional flood plain (definition specific to the LLFA). Less than a 1 in 20 annual probability of fluvial and/or tidal flooding.

The site is designated as being within flood zone 1 and is therefore considered to have a low risk of flooding. This equates to a potential yearly risk of flooding of less than 0.1% Annual Expected Probability.

6.6.2 Surface Water Flood Risk

Surface water flooding occurs when high intensity rainfall leads to run-off which flows over the ground surface, causing ponding in low-lying areas when the precipitation rate or overland flow rate is greater than the rate of infiltration, or return into watercourses. Surface water flooding can be exacerbated when the underlying soil and geology is saturated (as a result of prolonged precipitation or a high-water table) or when the drainage network has insufficient capacity.

The chief mechanisms for flooding can be divided into the following categories:

- Runoff from higher topography – the areas of greatest flood depths tend to be at the base of the steeper land;
- Localised surface water runoff – within the central parts of the borough, surface water flooding tends to be a result of localised ponding of surface water;
- Sewer Flooding – areas where extensive and deep surface water flooding is likely to be influenced by sewer flooding. Where the sewer network has reached capacity, and surcharged, this will exacerbate the flood risk in these areas.
- Low Lying Areas – areas such as underpasses, subways and lowered roads beneath railway lines are more susceptible to surface water flooding;
- Railway Cuttings – leading to internal ponding and transport disruption;
- Railway Embankments – discrete surface water flooding locations along the up-stream side of the raised network rail embankments where water flows are interrupted and ponding can occur.

A map showing the site and the modelled prediction of surface water flood risk and depth provided by the EA is available in Appendix 3. This indicates that the site is at very low risk of flooding.

The site will remain dry during all preciptation events.

6.6.3 Groundwater Flood Risk

Groundwater flooding occurs when water rises from the underlying aquifer at the location of a spring – where the underlying impermeable geology meets the ground surface. This tends to occur after much longer periods of intense precipitation, in often low-lying areas where the water table is likely to be at a shallow depth. Groundwater flooding is known to occur in areas underlain by principal aquifers, although increasingly it is also being associated with more localised floodplain sands and gravels.

Groundwater susceptibility mapping provided by BGS is presented in Appendix 3. This indicates that there is potential for groundwater flooding to occur to the property below ground level.

6.7 Existing Surface Water Drainage Features

The existing surface water drainage on site is connected into the Thames Water Combined sewer. An existing connection is located to the rear of the current dwelling in the shared courtyard for No. 17 and 19 south street. The connection runs below the existing property.

A utility search was undertaken which identified that the Thames Water combined sewer is located at the centre of South Street and flows towards the west away from the site.

7 Hydrological Run-off Assessment

To minimise the impact of the new development on local flood risk, the NPPF requires that the water drainage arrangements for any development site are that the volumes and peak flow rates leaving the site post-development are improved upon those of the existing conditions. The following run-off assessment predicts the Greenfield, pre- and post-development run-off rates and provides the required SuDS necessary for complying with the relevant planning policies.

7.1 Existing and Proposed Ground Cover

A summary of the existing and proposed site ground cover is shown below in Table 1 and Table 2 below.

Table 1: Breakdown of Ground Cover in the Proposed Development

Ground Cover	Existing Area (m^2)	Proposed Area (m^2)	Difference
Buildings	108	112	4
Patio & Lightwells	20	16	4
Gardens/ Soft landscaping	0	0	0
Total	128	128	

Table 2: Summary of Permeable and Impermeable Areas

	Impermeable Area (m^2)	Permeable Area (m^2)	Total Area (m^2)
Existing Site	128	0	0
Proposed Site	128	0	0
Difference	0	0	

8 SuDS Requirements

8.1 Peak Flow Control

With regard to peak flow control, the non-statutory technical standards for sustainable drainage systems state that:

- S3 For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100-year rainfall event must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event.

The London Plan policy 5.13 states that developers should aim for a Greenfield runoff rate from their developments. The London Plan Sustainable Design and Construction SPG (section 3.4.10) states that all developments on Greenfield sites must maintain Greenfield runoff rates. On previously developed sites, runoff rates should not be more than three times the calculated Greenfield rate.

8.2 Volume Control Requirements

With regard to volume control, the non-statutory technical standards for sustainable drainage systems state that:

- S5 Where reasonably practicable, for developments which have been previously developed, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for that event.

- S6 Where it is not reasonably practicable to constrain the volume of runoff to any drain, sewer or surface water body in accordance with S4 or S5 above, the runoff volume must be discharged at a rate that does not adversely affect flood risk.

8.3 Run-off and Storage Calculations

The IH124 method was applied to calculate the Greenfield and post-development run-off rates that include the 40% allowances for climate change. The full results are presented in Appendix 4. Table 3 and Table 4 below give a summary of the results.

Table 3: Calculation of post-development run-off rates for the site.

	Greenfield (l/s)	Greenfield + CC	Pre - Development	Pre - Development + CC	Post Development	Post Development + CC
Qbar	0.0314	0.0466	0.0528	0.0783	0.0528	0.0783
1 in 1	0.0267	0.0396	0.0449	0.0665	0.0449	0.0665
1 in 30	0.0723	0.1071	0.1215	0.1801	0.1215	0.1801
1 in 100	**0.1002**	**0.1486**	**0.1685**	**0.2497**	**0.1685**	**0.2497**

As the development is taking place on an already developed site S3 (peak flow) and S5 and S6 (volume controls) apply.

As per the local planning policy, all previously developed sites aim to achieve greenfield runoff rates (0.15l/s) and be no more than three times this value (0.45l/s) . The greenfield runoff rate for the site this site during a 1 in 1 plus CC event is less than 0.1 l/s, therefore, the 1 in 100 greenfield plus climate change event rate has been used.

However, as this rate is still very low, it is recommended that the allowable discharge rate be set at 1.0l/s to help prevent blockages.

The quick storage estimate tool in Microdrainage was used to estimate the approximate storage required. The storage volume required is estimated to be **3.4 - 5.6m^3**. Screenshots of the quick storage estimate and variables are available in Appendix 4.

9 SuDS Options

As mentioned above, planning policies require that SuDS strategies consider source control (i.e. disposal of runoff within the plot boundary), followed by site control (site wide disposal) and then regional control (appropriate for larger development with strategic drainage infrastructure). They also require that that those methods that give the most benefits in terms of sustainability are prioritised for employment (generally known as the SuDS Hierarchy) as further described below.

9.1 SuDS Hierarchy

The SuDS Hierarchy sets out the preferred method of selecting which Sustainable Drainage System should be used. Generally, 'soft SuDS' such as ponds and swales are the preferred drainage systems as they mimic natural drainage and provide a number of benefits including attenuation of surface water flows and flow rates as well as pollution.

Smaller developments which may not have the physical room for pond and swales would need to consider other options. In these cases, preference should be given to infiltration systems. However, care should be taken if implementing infiltration systems near aquifer protection zones, close to buildings or structural foundations or in areas where soils may be polluted.

The SuDS hierarchy is summarised in Figure 2 below.

Figure 2 SuDS Hierarchy

Most Sustainable	*SUDS technique*	*Flood Reduction*	*Pollution Reduction*	*Landscape & Wildlife Benefit*
↑	**Living roofs**	✔	✔	✔
	Basins and ponds - Constructed wetlands - Balancing ponds - Detention basins - Retention ponds	✔	✔	✔
	Filter strips and swales	✔	✔	✔
	Infiltration devices - soakaways - infiltration trenches and basins	✔	✔	✔
↓	**Permeable surfaces and filter drains** - gravelled areas - solid paving blocks - porous paviors	✔	✔	
Least Sustainable	**Tanked systems** - over-sized pipes/tanks - storms cells	✔		

9.2 Assessment of SuDS Options

An assessment was made of the suitability of a range of potential SuDS techniques that could be implemented as part of the development. The results of the assessment are summarised in Appendix 5 and are further discussed below.

9.2.1 Living Roofs

As buildings will cover more than 128m^2 of the site, living roofs are considered to be a viable SuDS technique. However, not all of the rooftop is suitable for the incorporation of green roof.

The third-floor rooftop area is approximately 85m^2. Which will be utilised as a rooftop terrace upon completion, therefore, any green roofing system needs to be compatible with the proposed layout, taking into account access, amenity space and roof lights.

9.2.2 Basins, Ponds, Filter Strips and Swales

Basins, ponds, filters strips and swales are not suitable due to limited space.

9.2.3 Infiltration Devices

Infiltration techniques should be given priority in any SuDS design as they deal with discharge on the site returning water to the aquifer and subsequently rivers via baseflow.

However, given the limited space availability on the site, there is no feasible location that allows for a soakaway to be installed at least 5 m from any existing or proposed foundation or 1m from the boundary as recommended by BRE Digest 365.

9.2.4 Permeable Surfaces and Filter Drains

The development will house 16m^2 of patios and lightwell areas.

The small patio leading to the rear ground floor entrance of 19 South Street will be placed above the basement structure. Any permeable surfaces introduced will required to be lined to ensure no egress of water into the basement and the depth of sub-base or storage structure will be limited.

The lightwells will also need lining and drainage incorporated. The lightwell would be suitable for SuDS planters providing there is suitable access for maintenance.

9.2.5 Tanked Systems

A tanked system incorporating a hydro brake restricting flow to the sewer would be a viable option is infiltration is not suitable. However, this option is ranked as being the least sustainable in the SuDS hierarchy.

9.2.6 Rainwater Harvesting

The use of rainwater butts and or harvesting tanks could be employed within each individual building and patios, although they would have a limited storage capacity and will be required to be an active system.

The proposal is for the development of a three-bed terraced family house. It is predicted to house 4no. people. Based on the third-floor rooftop surface area of 85m^2, and a daily average water consumption of 40litre per day (grey water usage only -

toilet flushing/washing machines) will rainfall yield will outstrip that of demand. The use of an active rainwater harvesting system is therefore applicable to this proposal.

9.2.7 Summary of results of SuDS Options Assessment

A summary of the results of the SuDS Options Assessment is presented in Table 5 below. Full details of the options assessment along with descriptions of the SuDS options are presented in Appendix 5 and Appendix 6.

Table 4: Summary of Results of SuDS Options Assessment

SuDS Technique	Potential Suitability
Rainwater Harvesting	Suitable
Infiltration: Soakaways Infiltrations trenches and basins	Unsuitable
Green/brown /blue roofs	Suitable - limited
Rain Gardens / SuDS Planters	Suitable
Permeable Pavements / Surfaces	Suitable - Lined - Difficult to implement would occupy void space.
Swales	Unsuitable
Detention basin/ponds	Unsuitable
Storage tanks/ Geocellular storage	Suitable
Oversized piping	Suitable

10 SuDS Implementation

10.1 SuDS Constraints

The size of the proposed development area is the main limitation to introducing SuDS whilst maintain functionality as a three-bedroom dwelling.

Furthermore, the existing sewer connection is located at a high level within the proposed basement, which will be required to remain, following the proposal. This will ensure the gravity system can continue to operate successfully. The excess surface waters that are attenuated will be required to pumped to this level.

The basement level is within 1m of groundwater table.

10.2 Preliminary Sustainable Drainage System

To further minimise the risk to lower ground floor amenity space, the proposed SuDS features will focus to reduce the surface water runoff from the rooftop terrace (60m^2) and the third-floor & second floor balconies (15m^2).

The remaining rooftop surface water runoff will connect discharge directly into the surface water sewer connection, minimising the surface water runoff towards the basement level, therefore, reducing the potential risk.

10.2.1 Proposed SuDS

The proposal will introduce a series of SuDS planters and ultra slim rainwater harvesting unit.

The surface water runoff will cascade through a series of bespoke SuDS planters located in the roof terrace, third floor and second floor balconies. This will be used in combination with a rainwater harvesting to allow for water reuse within the proposed development.

10.2.2 SuDS Planters

SuDS planters will be placed in the roof terrace and will covering a total area of 8m^2. These SuDS planters will reduce the overall impermeable area and provide for water re-use within the planters providing, and interception and attenuation storage within the rooftop.

The SuDS planters within the roof will consist of troughs, they will be vegetated with plants suited to deluge and drought conditions, with a substrate that will provide a growing medium. These will slow the runoff of rainwater hitting these areas and allow for attenuation.

The roof terrace planters will provide an approximate surface water attenuation of 2.0m^3 within the substrate.

The rooftop runoff will be discharge via a downpipe situated in the north eastern corner of the development.

The downpipe will connect to additional SuDS planters located on the 3rd and 2nd floor balconies. The SuDS planters will be topped with shallow vegetation troughs that are situated above a void that will allow for rainwater attenuation.

The SuDS planters on the 3rd floor will be 2000mm long, 600mm wide and 1100mm tall. The trays, containing a vegetated substrate, similar to a sedum green roof, will be 200mm deep and will situated above the void area. This planter will provide approximately 1.1m^3 of attenuation and further 1m^2 of permeable area.

The SuDS planters on the 2rd floor balcony will be 1200mm long, 500mm wide and 900mm heigh. The tray will be 200mm deep and will situated above the void area. This planter will provide 0.8m^3 of attenuation.

The voids will allow for attenuation and will gradually discharge back into the drainage network following a storm event. They will be fitted with overflow outlets, that will operate if the structure reaches capacity during a storm event.

Examples of different types of SuDS planters are available in Appendix 6.

10.2.3 Rainwater Harvesting

As mentioned above, the demand for non-potable water within the development will outstrip the average annual rainfall yield. Therefore, rainwater harvesting is considered to be suitable for stormwater volume control. The rainwater harvesting system will be available to supply grey water for re-use with the proposed dwelling.

The cascading runoff through the SuDS planters describe above, will drain to the basement level, where an Ultra Slim Wall Tank Rainwater Harvesting System will be situated.

As space is a major limiting factor within the proposal, and the implications of a high groundwater table (below basement level) therefore, the use of a 235-litre rainwater harvesting system (0.8m long, 0.2m wide and 1.8m tall) will be implemented.

Once at capacity, the overflow from the rainwater harvesting unit will discharge directly into a drainage sump and pump that will convey the surface waters back to the high-level gravity sewer connection situated within the basement.

Detail of the proposed rainwater harvesting tank are available in Appendix 6.

The proposed SuDS are detailed in the plans in Appendix 1 and in mapping shown in Appendix 8.

10.2.4 Discharge Control Device

As the proposed development will require the use of a sump and pump from within the basement, this will be used to control the discharge from the proposed development into the Thames Water combine sewer connection.

It is proposed that this rate is left unrestricted to prevent flooding at basement level. Given the small size of the site and the reduction in runoff that will be provided by the SuDS measures, it will be a significant betterment on the existing scenario.

10.2.5 Surface Water Discharge Points

As there is no nearby watercourse and infiltration is not feasible, run-off from the development will be conveyed via 100mm diameter lateral drains to the Thames Water Combined sewer on South Street.

The closest asset is the existing asset that services No.17 and No.19 South Street and is located within the shared courtyard, to the north. It has a cover level of 22.80mAOD. The existing pipe works flows within the property at high basement level.

The proposal will maintain the sewer runs at the exiting height within the proposed development. I.e., the surface water connection will be above the basement ground floor level.

A copy of the drainage asset search is available in Appendix 9.

10.2.6 Treatment of Run-off

Treatment of roof water runoff will be provided through the provision of trapped gullies and water butts to intercept gross solids and sediment; guidance will be provided to householders on appropriate maintenance requirements including regular cleaning of gullies.

10.2.7 Exceedance Flows

The site is sloped at 22.7 - 23.5mAOD. The elevation review of the LIDAR 1m DTM Mapping indicates that in the event of exceedance on the site, that overland flows would likely run north on the shared common alleyway to the north of the site. However, as the proposal is introducing a new basement level, the water is unlikely to follow overland route. If a failure was to occur it would likely impact the basement of the new dwelling. The lower ground floor will be fitted within an internal drainage system that will allow the water to safely exit the building via a pumping network.

It can be seen from the design proposals; the proposed system includes approximately $3m^3$ of attenuation and provides 235litre of water reuse of additional storage capacity (not including pipes and manholes).

10.3 Maintenance and Adoption of SuDS

All SuDS features will be properly installed by competent persons. They will be maintained regularly to ensure that their design capacity and attenuation characteristics provide the required storage volume.

Landscaping and adjacent areas will be designed such that they do not cause soil, mulch and other materials to be washed onto the permeable surfaces and into drains causing clogging.

Owners of the properties/persons responsible for maintenance of SuDS components will be provided with operation and maintenance manuals which will include information such as:

- the location of SuDS components;
- an explanation of design intent and objective of the SuDS;
- the requirements for regular and occasional inspection and maintenance;
- visual indicators that may trigger maintenance.

Regular maintenance of SuDS components is relatively straightforward with the main tasks consisting of:

- Regular visual inspections – checking inlets are not blocked and verifying that clogging has not occurred;
- Litter and debris removal;
- Grass cutting;
- Preventive sweeping;
- Weeding and invasive plant control;
- Oil and stain removal.

Occasional maintenance activities to ensure the long-term performance of the SuDS features include:

- Sediment removal
- Vegetation and plant replacement

These simple measures will ensure that the storage capacity of the system is maintained and that the need for reconstruction and replacement of components is minimised.

Further details on SuDS maintenance measures that will be employed at the site can be found in Appendix 8.

11 Conclusion and Recommendations

The site has many limitations these are; available space, high level existing drainage connections, and high ground water (below the basement).

The proposed strategy will minimise the surface water runoff rate from the rooftop terrace and northern face balconies (75m^2). The remaining rooftop area (50m^2) will remain as unrestricted runoff, that will be directly connect into the gravity drainage system, thus reducing the need for additional pumps to be installed within the basement.

The proposal will implement SuDS planters within the roof terrace. Runoff will then cascade down the northern face, via pipes into SuDS planters on the 3rd and 2nd floor balconies, before reaching an ultra slim rainwater harvesting tank that will allow for rainwater water reuse within the proposed development.

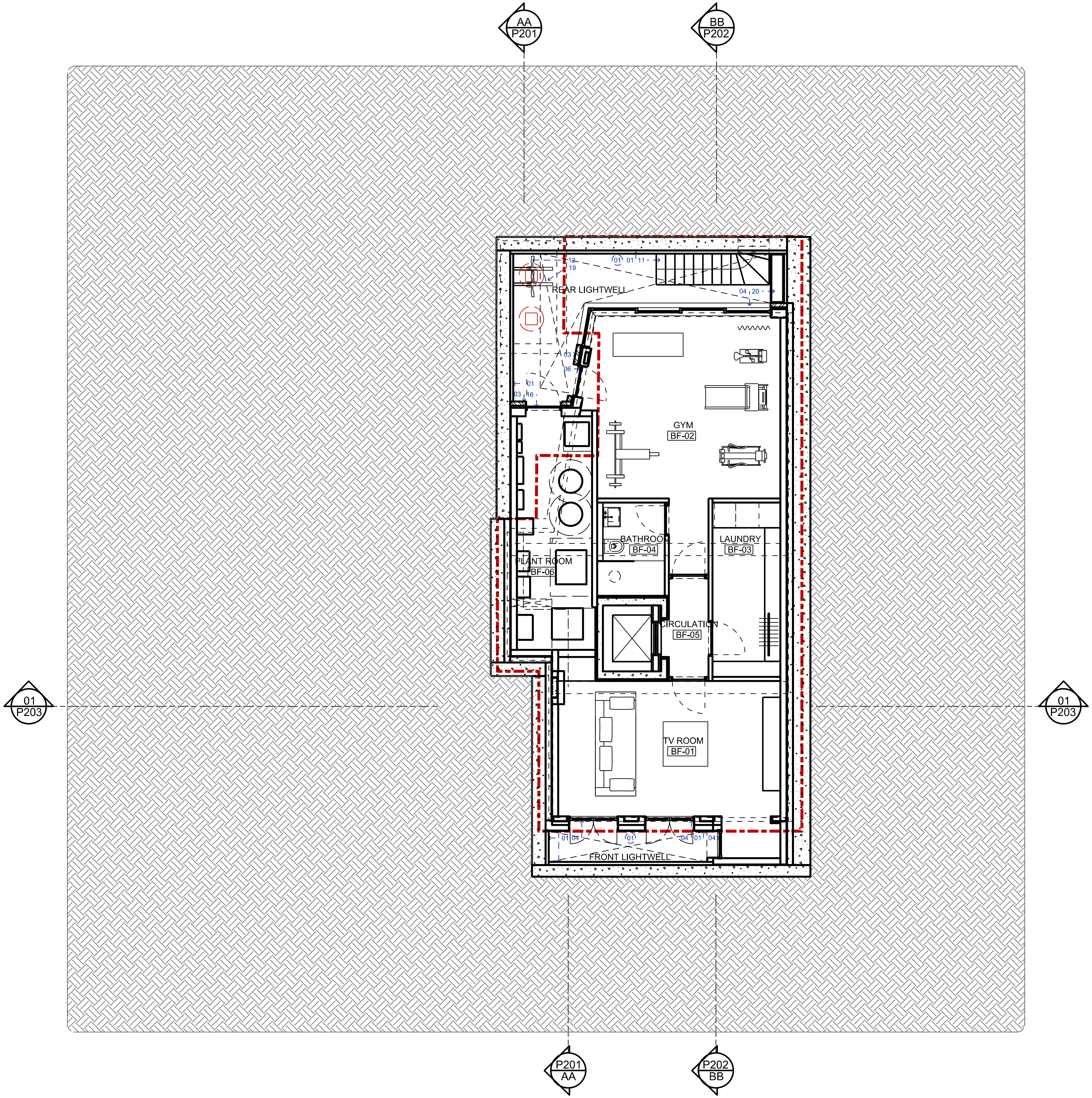
The proposed SuDS will help to reduce local flood risk by providing 4.1m3 of attenuation on site, whilst increasing biodiversity and providing 235 litres for grey water recycling within the property. It will therefore be in compliance with the GLA current planning policy (Policy 5.13 & 5.15) and the NPPF.

12 References

1. Communities and Local Government - National Planning Policy Framework NPPF, March 2012.
2. Greater London Authority – London Sustainable Drainage Action Plan, 2015.
3. CIRIA, Defra, Environment Agency – UK SuDS Manual, 2015.
4. Greater London Authority – London Sustainable Drainage Action Plan, 2015.

13 Appendices

13.1 Appendix 1 – Development Plans



NOTES
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2. drawings are to be read in conjunction with relevant, legend, schedules and documentations.
3. all works are to be undertaken in accordance with relevant building codes and standards.

0m 5m

N

LEGEND

01 Portland stone
02 Black brick
03 White brick
04 Low iron double glazed windows with bronze frame
05 Bronze door with fanlight
06 Bronze door
07 Bronze balustrade
08 Glass balustrade
09 Low iron double glazed openable roof light
10 Low iron double glazed fixed roof light
11 Stairs in Portland stone
12 bike store
13 Planters
14 Balanced flue
15 ASHP vent with acoustic attenuators
16 Louvered door with acoustic attenuators
17 waste and recycling
18 opaque double glazed windows with bronze frame
19 sump pumps
20 grey water tank
21 SUDS planter

Existing building outline

rev	description	drawn/checked	date
04	planning issue	od/ih	15.03.21
03	planning issue	od/ih	04.02.21
02	client sign off	od/ih	12.01.21
01	structure added	od/ih	25.11.20
-	client sign off	od/ih	12.11.20

issue for PLANNING

client Sam Farmar

job 19 South street W1K 2XB London

title PROPOSED BASEMENT FLOOR PLAN

dwg no. P001

rev 04

date 18.08.20

scale 1:100 @A3

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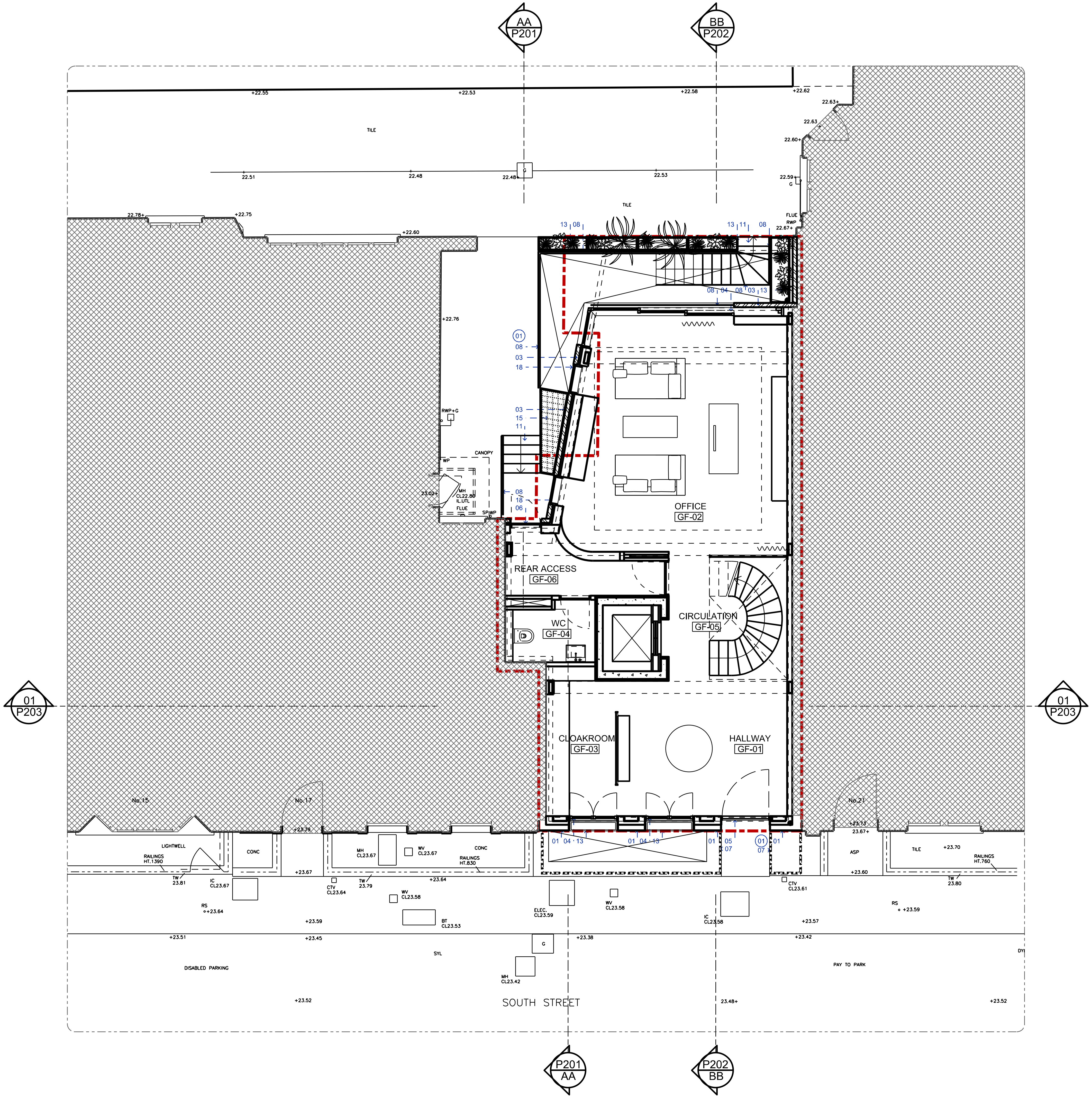

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21 SUDS planter

Existing building outline

rev	description	drawn/checked	date
04	planning issue	od/ih	15.03.21
03	planning issue	od/ih	04.02.21
02	client sign off	od/ih	12.01.21
01	structure added	od/ih	25.11.20
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issue for **PLANNING**

client: Sam Farmar

job: 19 South street, W1K 2XB London

title: PROPOSED GROUND FLOOR PLAN

dwg no. **P002**

rev: 04

date: 18.08.20

scale: 1:100 @A3

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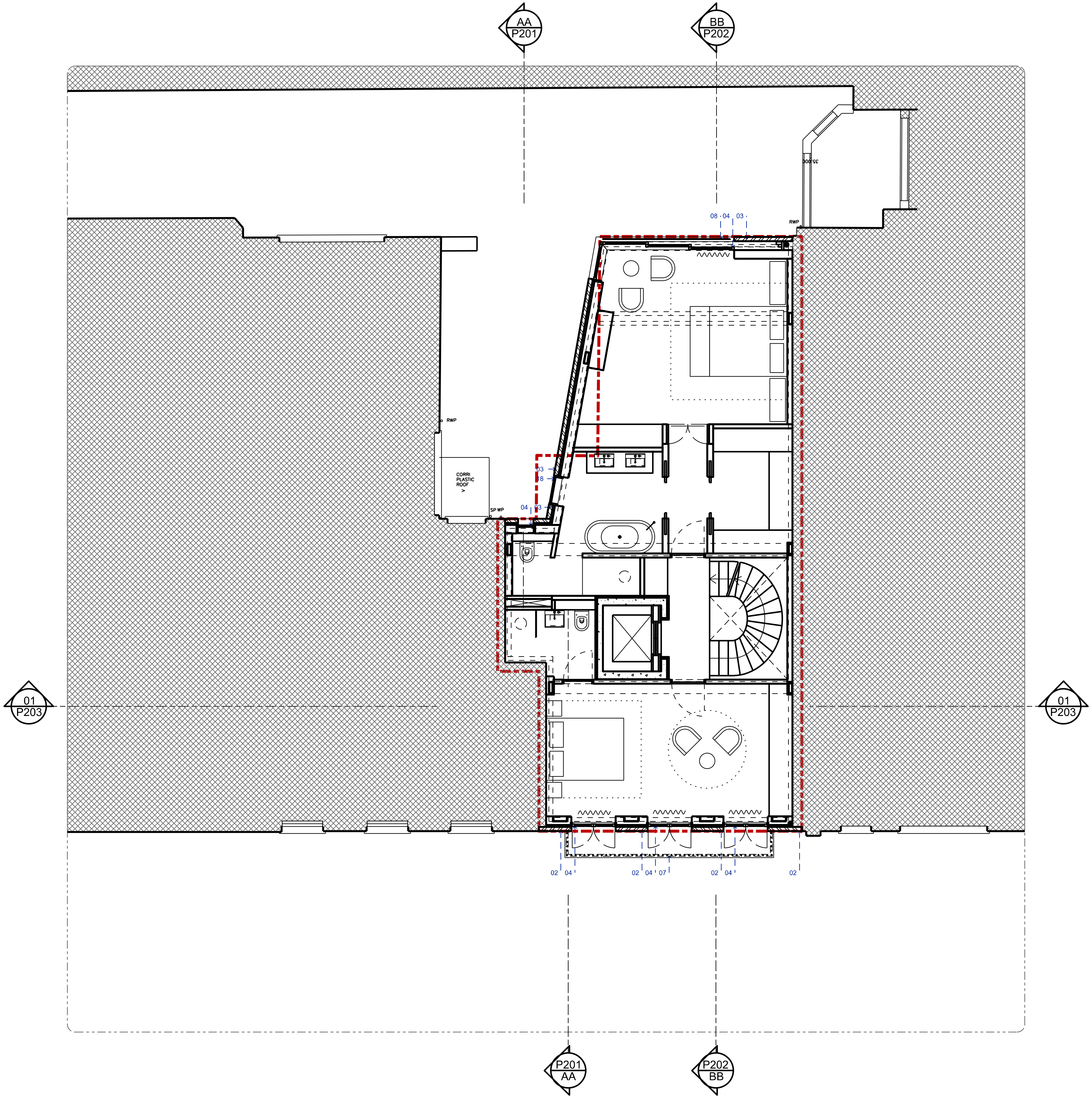

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Existing building outline - - - -

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03	planning issue	od/ih	04.02.21
02	client sign off	od/ih	12.01.21
01	structure added	od/ih	25.11.20
-	client sign off	od/ih	12.11.20

issue for **PLANNING**

client: Sam Farmar

job: 19 South street, W1K 2XB London

title: PROPOSED FIRST FLOOR PLAN

dwg no. **P003**

rev 04

date 18.08.20

scale 1:100 @A3

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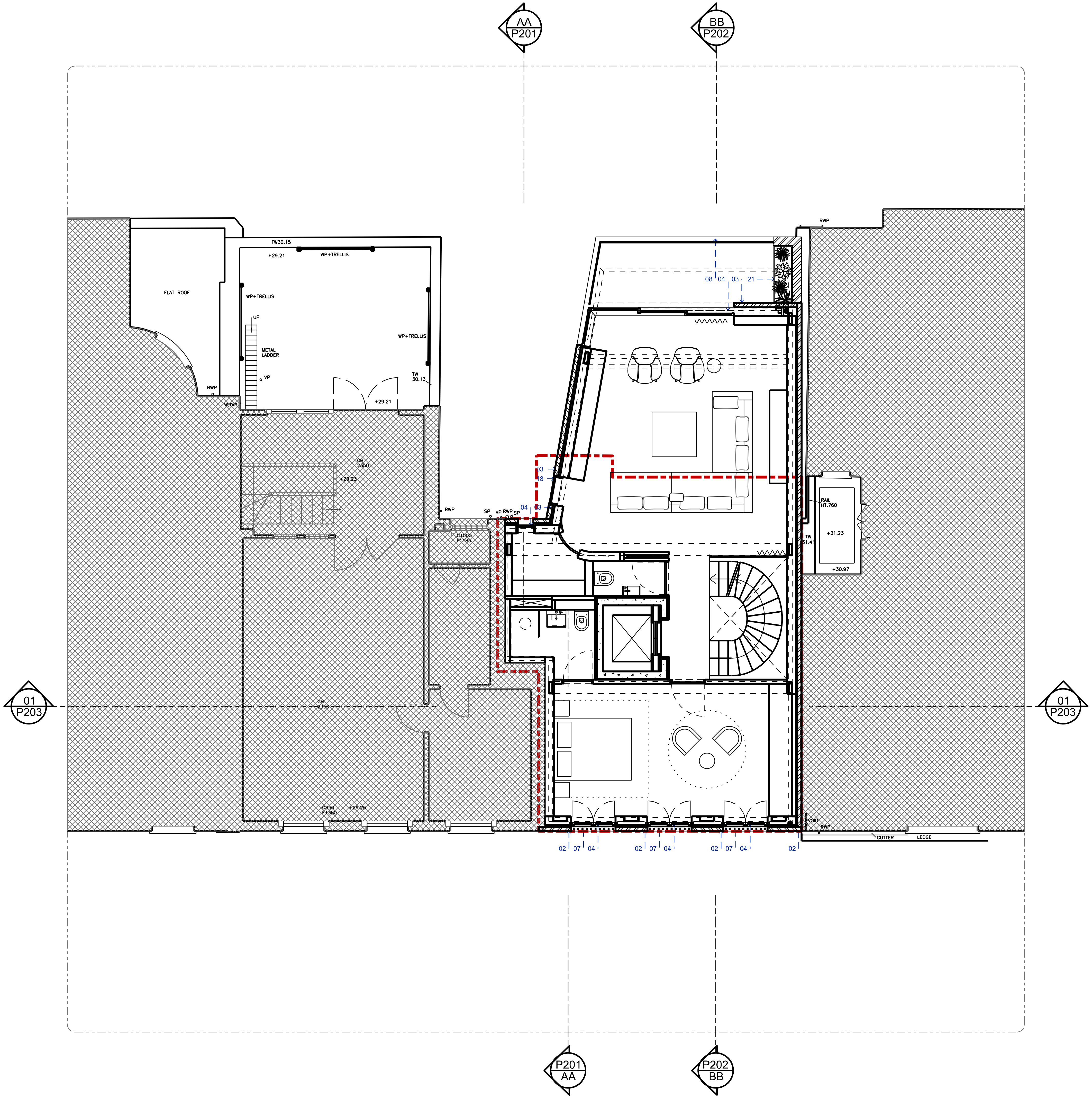

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0m 5m

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19 sump pumps
20 grey water tank
21 SUDS planter

Existing building outline

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03	planning issue	od/ih	04.02.21
02	client sign off	od/ih	12.01.21
01	structure added	od/ih	25.11.20
-	client sign off	od/ih	12.11.20

issue for **PLANNING**

client: Sam Farmar

job: 19 South street, W1K 2XB London

title: PROPOSED SECOND FLOOR PLAN

dwg no. **P004**

rev: 04

date: 18.08.20

scale: 1:100 @A3

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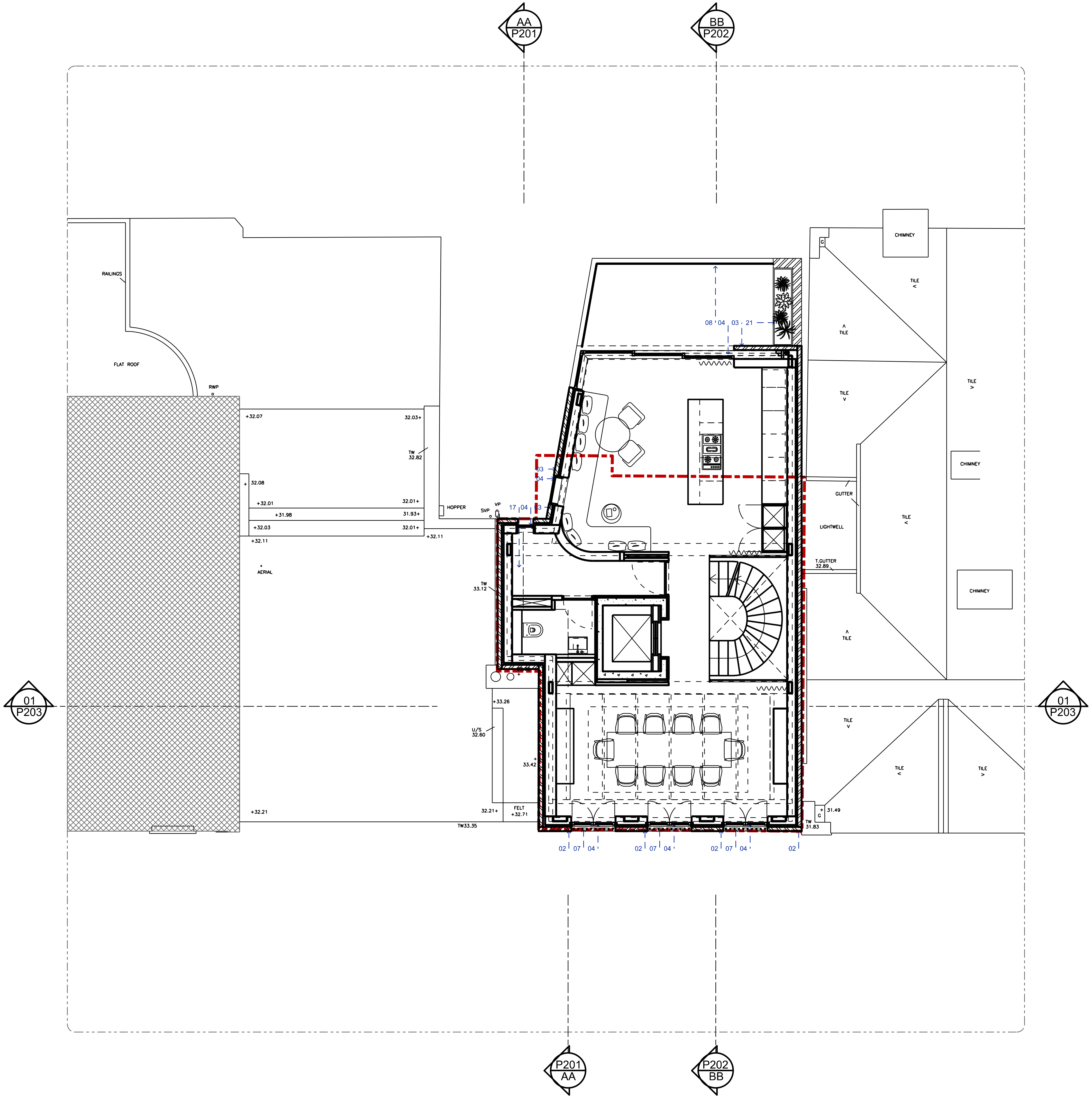

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21 SUDS planter

Existing building outline

rev	description	drawn/checked	date
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03	planning issue	od/ih	04.02.21
02	client sign off	od/ih	12.01.21
01	structure added	od/ih	25.11.20
-	client sign off	od/ih	12.11.20

issue for PLANNING

client Sam Farmar

job 19 South street W1K 2XB London

title PROPOSED THIRD FLOOR PLAN

dwg no. P005

rev 04

date 18.08.20

scale 1:100 @A3

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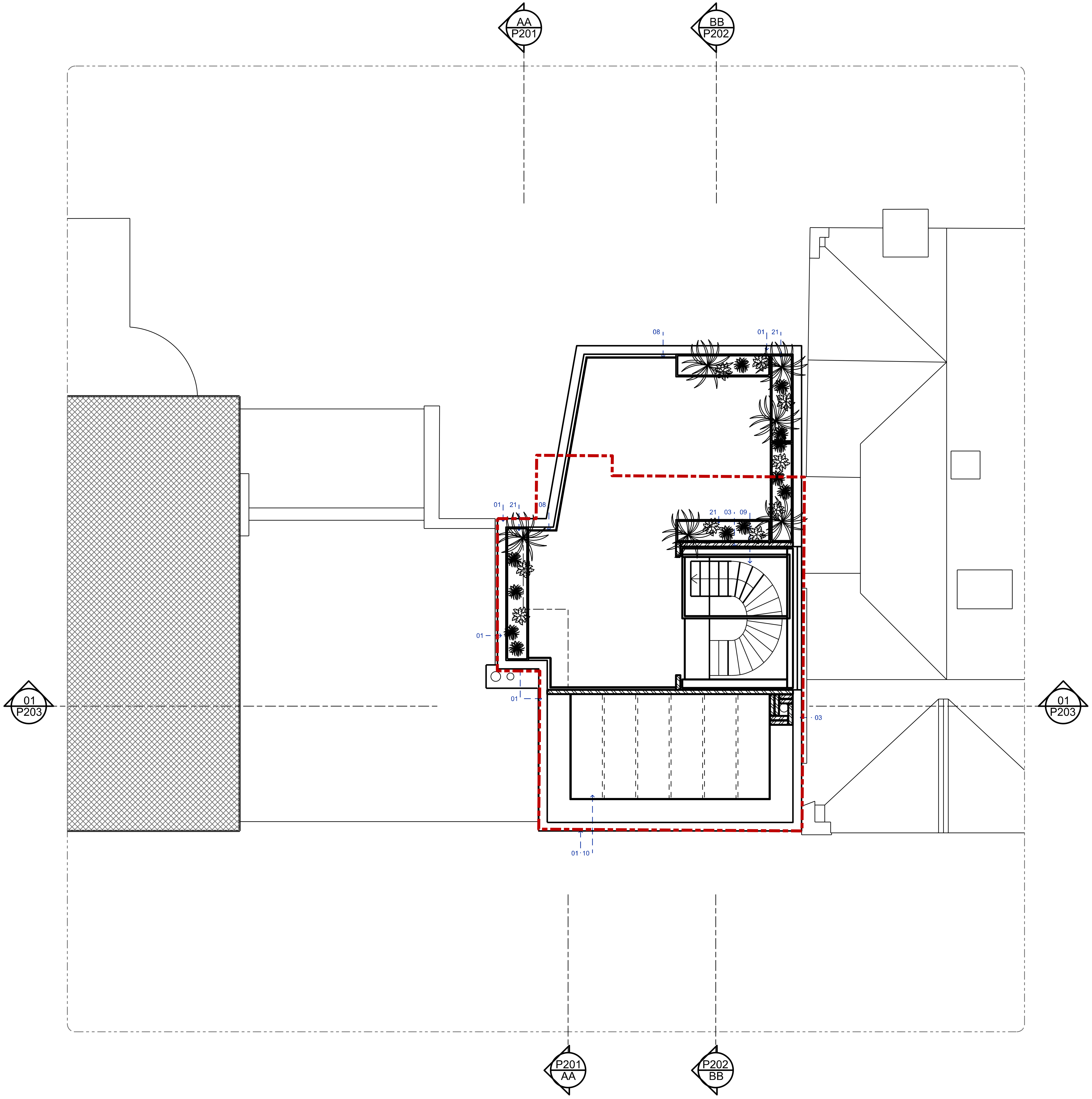

NOTES
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Existing building outline

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02	client sign off	od/ih	12.01.21
01	structure added	od/ih	25.11.20
-	client sign off	od/ih	12.11.20

issue for PLANNING

client Sam Farmar

job 19 South street W1K 2XB London

title PROPOSED ROOF PLAN

dwg no. P006

rev 04

date 18.08.20

scale 1:100 @A3

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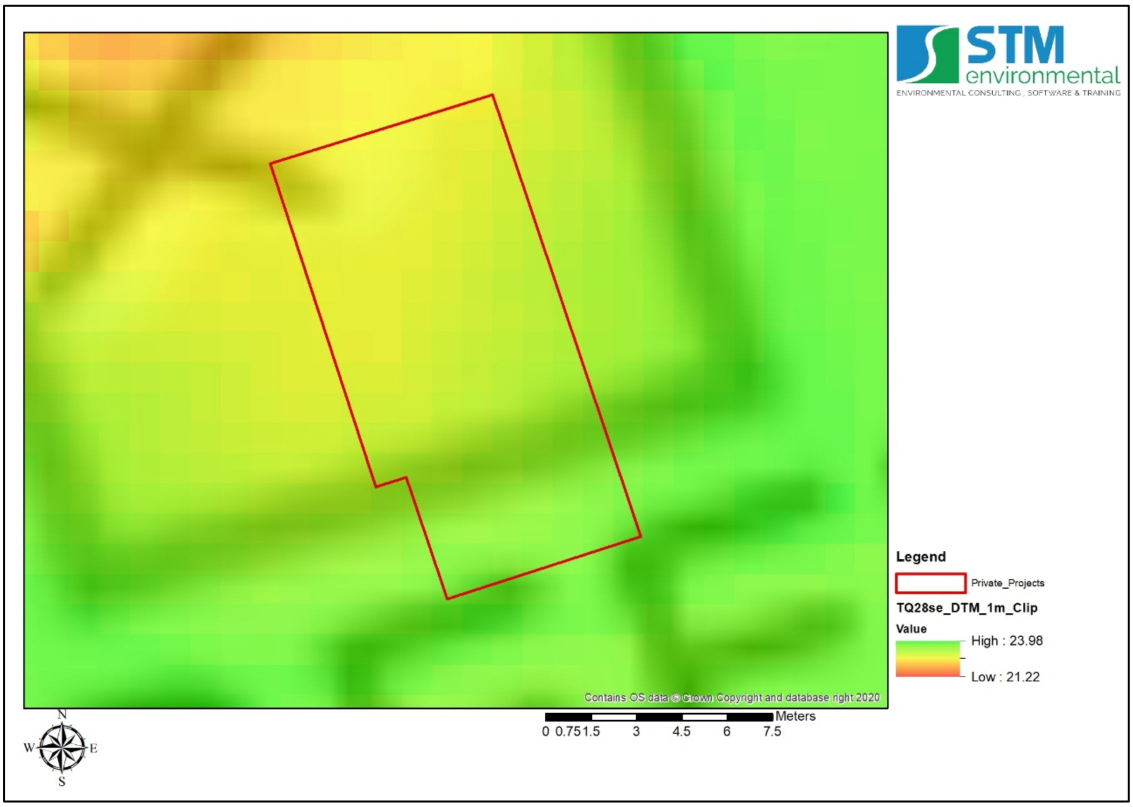
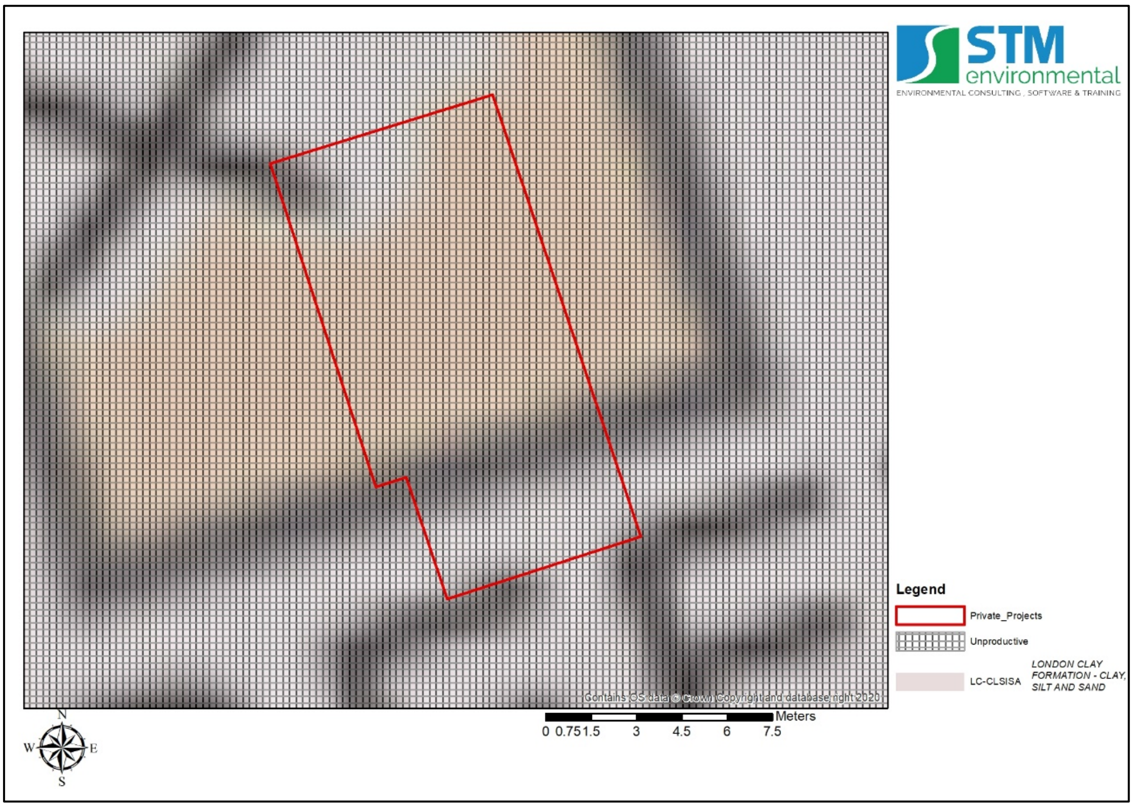
13.2 Appendix 2– Site Topography and Drainage Characteristics

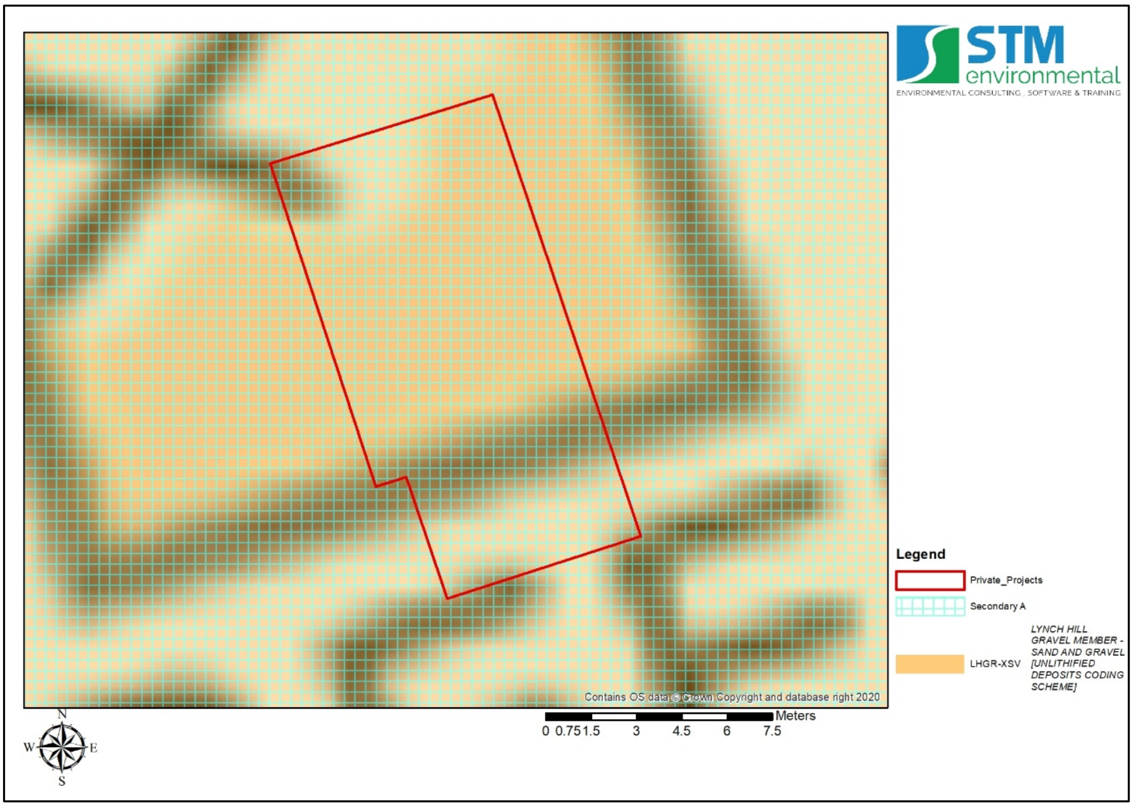
13.2.1 LIDAR Mapping showing Site Topography - (Source: OS 2019)



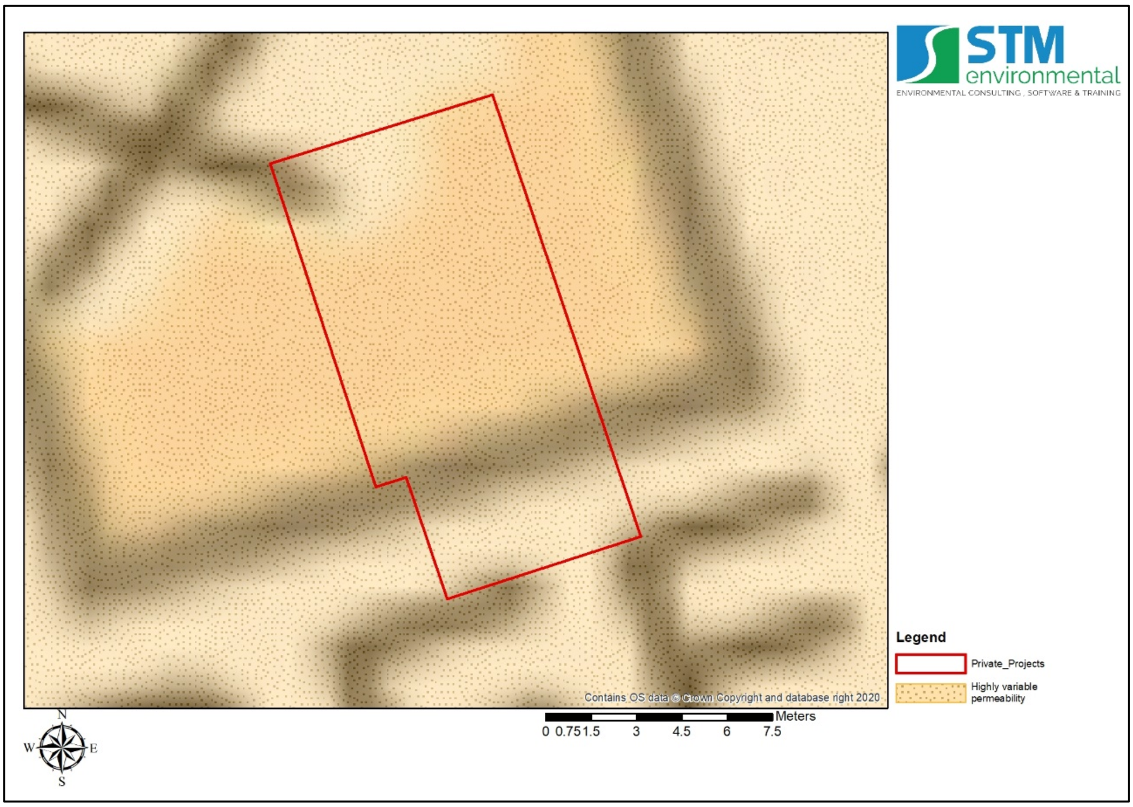
13.2.2 Bedrock Hydrogeology (Source: BGS, 2016)



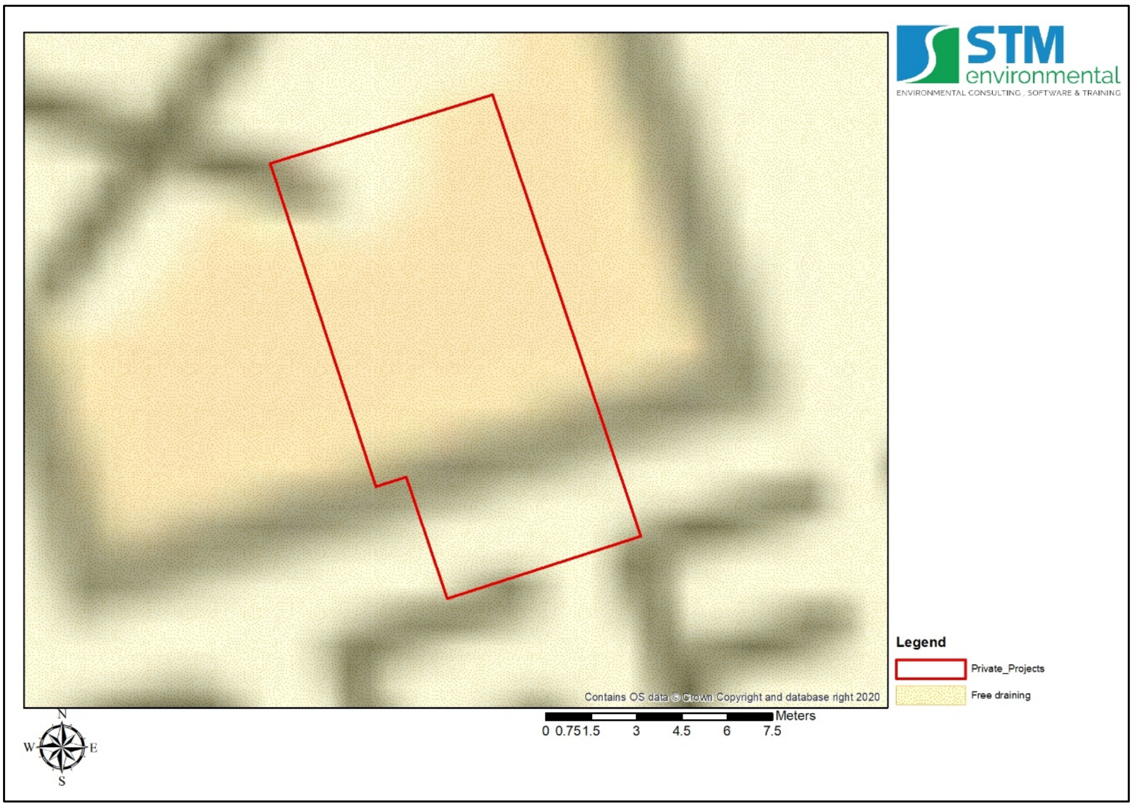
13.2.3 Superficial Hydrogeology (Source: BGS, 2016)



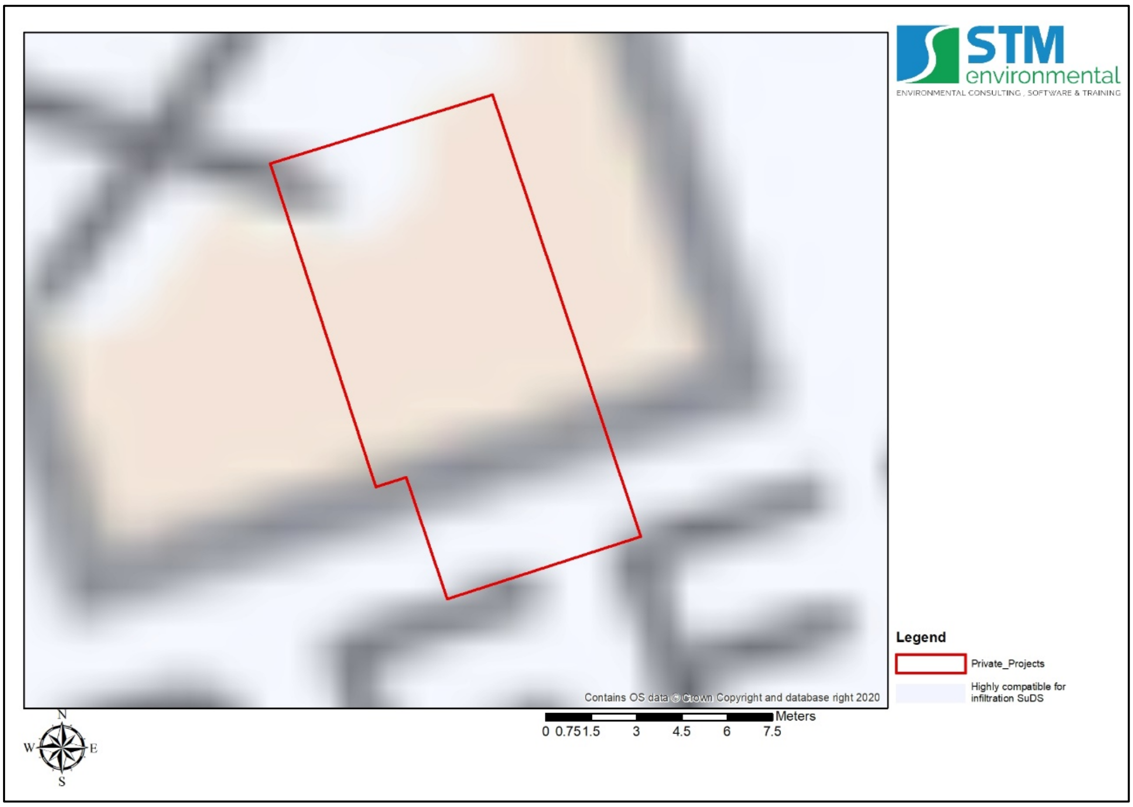
13.2.4 Bedrock Permeability (Source BGS 2016)



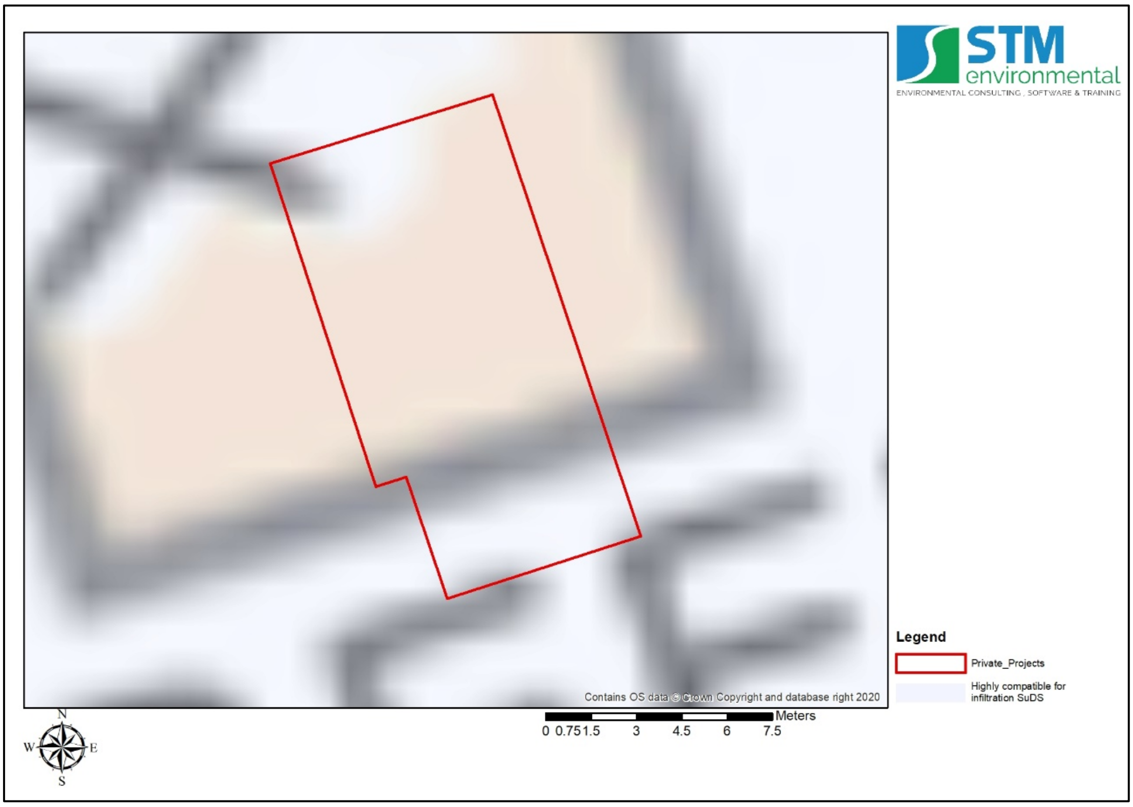
13.2.5 Superficial Permeability (Source BGS:2016)



13.2.6 Infiltration Drainage Potential (Source: BGS, 2016)

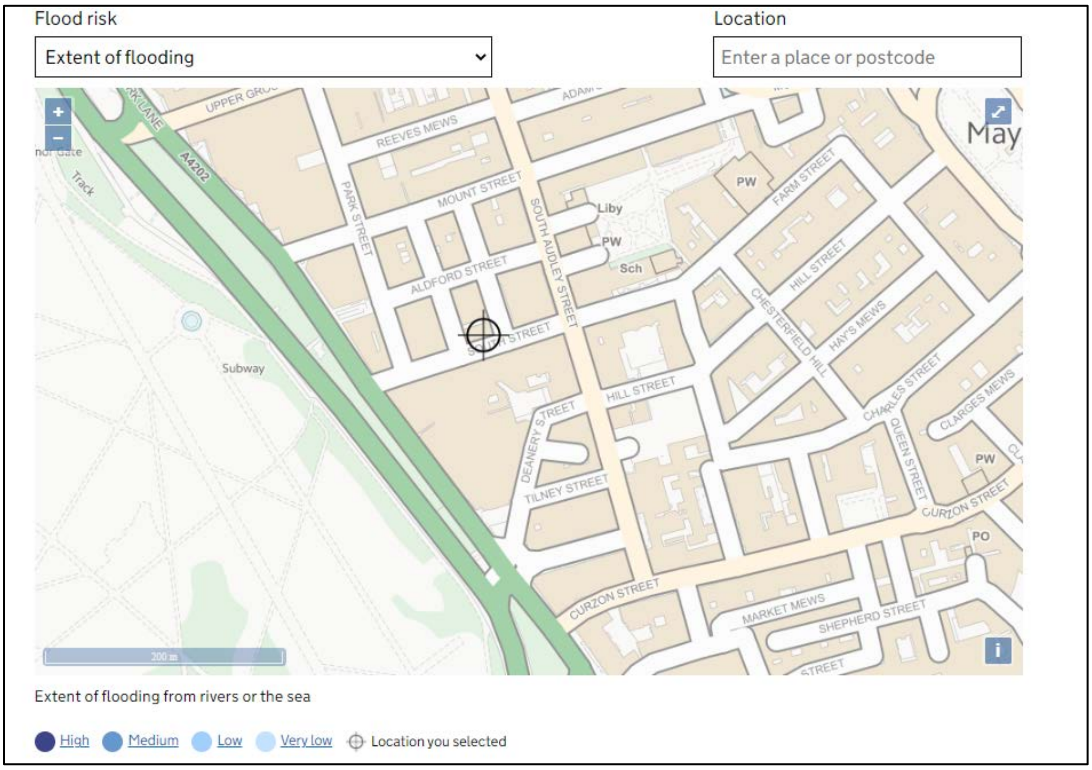


13.2.7 Groundwater Table Depth (Source: BGS 2016)



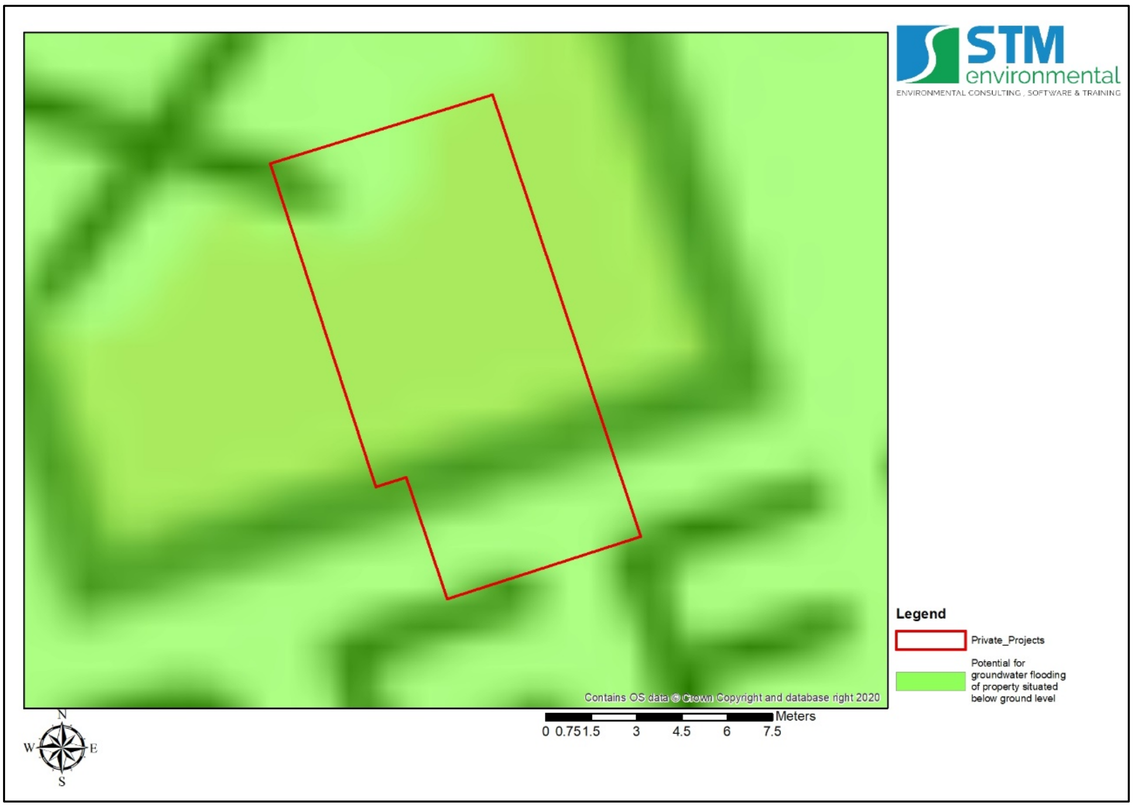
13.3 Appendix 3 – Flood Risk Mapping

13.3.1 Long Term Fluvial Flood Risk Map (EA)



13.3.2 Long Term Pluvial Flood Risk Map (EA)

13.3.3 Groundwater flooding susceptibility (Source: BGS, 2016).



13.4 Appendix 4 – Run-Off Rate and Storage Calculations

13.4.1 UK SuDS

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Matthew Ashdown
Site name:	19 South Street
Site location:	W1K 2XB

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	51.50831° N
Longitude:	0.15235° W
Reference:	3394153526
Date:	Mar 19 2021 15:07

Runoff estimation approach

IH124

Site characteristics

Total site area (ha): 0.1

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

Hydrological characteristics

	Default	Edited
SAAR (mm):	612	612
Hydrological region:	6	6
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q_{BAR} (l/s):	0.41	0.41
1 in 1 year (l/s):	0.35	0.35
1 in 30 years (l/s):	0.95	0.95
1 in 100 year (l/s):	1.32	1.32
1 in 200 years (l/s):	1.54	1.54

Surface water storage requirements for sites

www.uksuds.com | Storage estimation tool

Calculated by:	Matthew Ashdown
Site name:	19 South Street
Site location:	W1K 2XB

This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is not to be used for detailed design of drainage systems. It is recommended that hydraulic modelling software is used to calculate volume requirements and design details before finalising the design of the drainage scheme.

Site Details

Latitude:	51.50835° N
Longitude:	0.15235° W
Reference:	332387773
Date:	Mar 19 2021 15:10

Site characteristics

Total site area (ha):	0.0128
Significant public open space (ha):	0
Area positively drained (ha):	0.0128
Impermeable area (ha):	0.0128
Percentage of drained area that is impermeable (%):	100
Impervious area drained via infiltration (ha):	0
Return period for infiltration system design (year):	10
Impervious area drained to rainwater harvesting (ha):	0
Return period for rainwater harvesting system (year):	10
Compliance factor for rainwater harvesting system (%):	66
Net site area for storage volume design (ha):	0.02
Net impermable area for storage volume design (ha):	0.01
Pervious area contribution to runoff (%):	30

* where rainwater harvesting or infiltration has been used for managing surface water runoff such that the effective impermeable area is less than 50% of the 'area positively drained', the 'net site area' and the estimates of Q_{BAR} and other flow rates will have been reduced accordingly.

Design criteria

Climate change allowance factor:	1.4
Urban creep allowance factor:	1.1
Volume control approach	Use long term storage
Interception rainfall depth (mm):	5
Minimum flow rate (l/s):	2

Methodology

esti	IH124
Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
SPR:	0.47	0.47

Hydrological characteristics

	Default	Edited
Rainfall 100 yrs 6 hrs:	--	63
Rainfall 100 yrs 12 hrs:	--	105.49
FEH / FSR conversion factor:	1.37	1.37
SAAR (mm):	612	612
M5-60 Rainfall Depth (mm):	20	20
'r' Ratio M5-60/M5-2 day:	0.4	0.4
Hydological region:	6	6
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 10 year:	1.62	1.62
Growth curve factor 30 year:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Q_{BAR} for total site area (l/s):	0.05	0.05
Q_{BAR} for net site area (l/s):	0.08	0.08

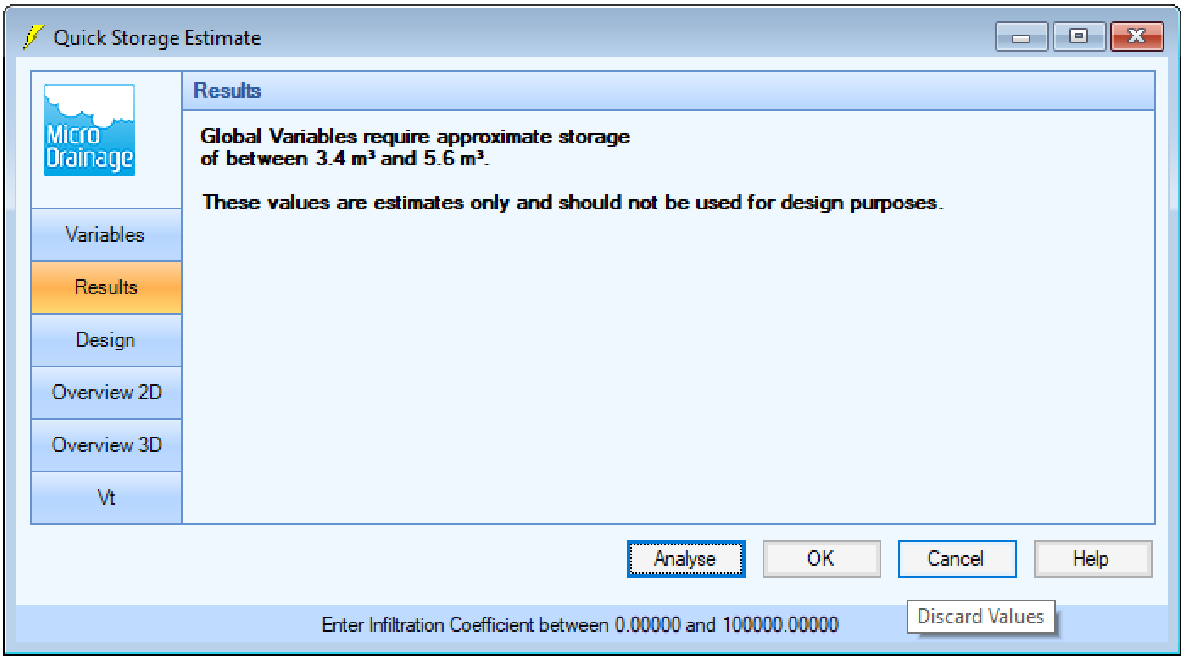
Site discharge rates

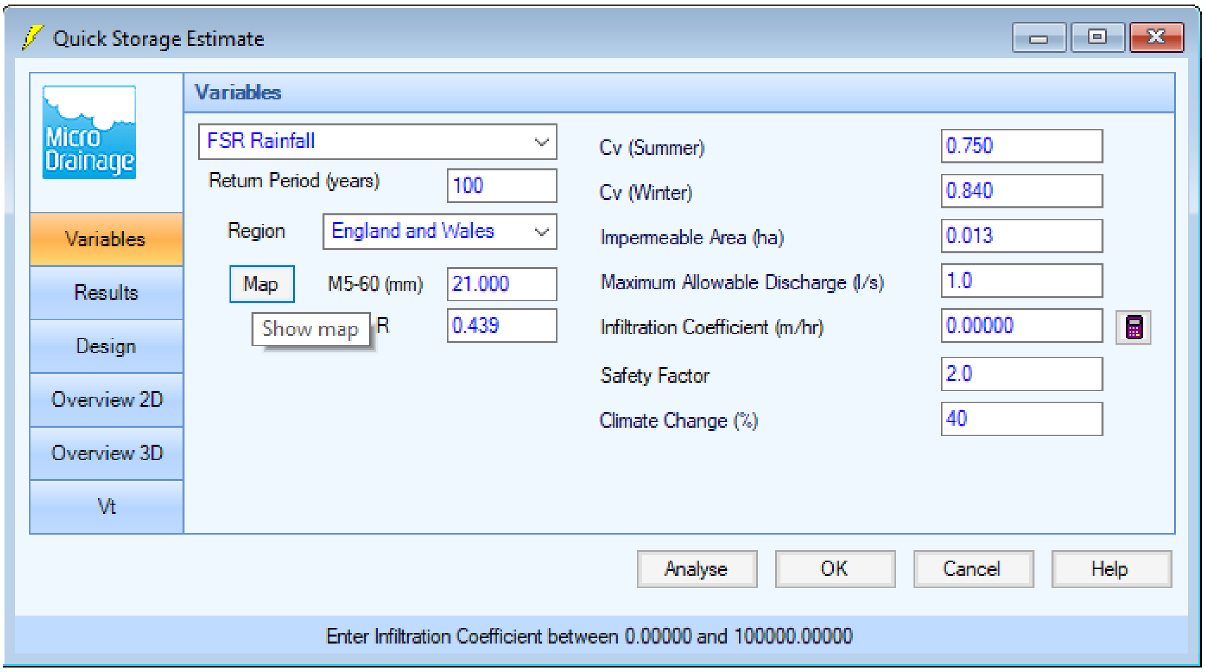
	Default	Edited
1 in 1 year (l/s):	2	2
1 in 30 years (l/s):	2	2
1 in 100 year (l/s):	2	2

Estimated storage volumes

	Default	Edited
Attenuation storage 1/100 years (m³):	1	1
Long term storage 1/100 years (m³):	0	0
Total storage 1/100 years (m³):	1	1

13.4.2 Microdrainage Quick Storage Estimates





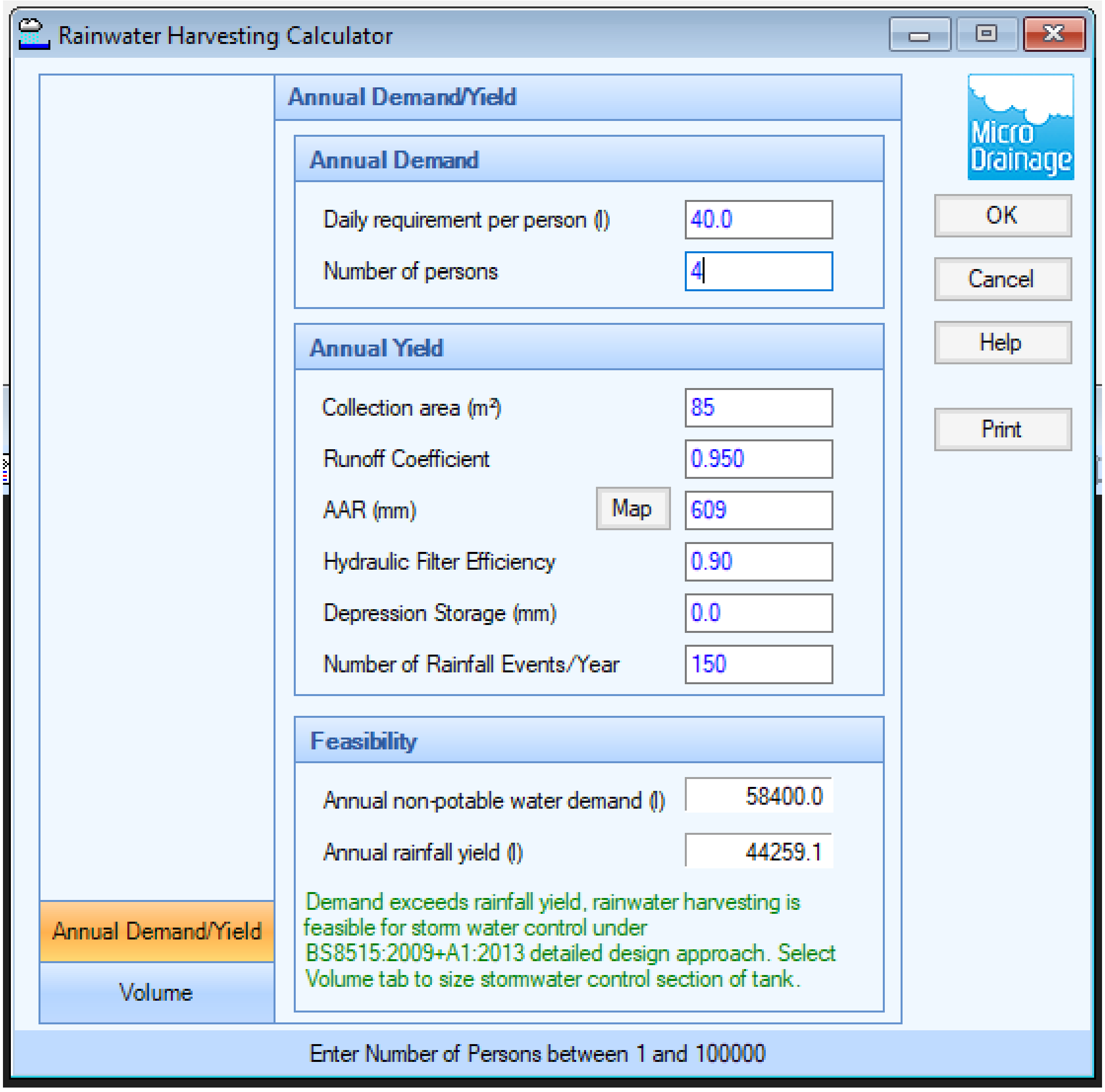
13.5 Appendix 5 – SuDS Suitability Assessment

Suds Technique	Typical Uses	Potential Issues	Potential Suitability
Rainwater Harvesting	Capture of rainwater into a tank(s) for use (usually non-potable) such as irrigation, toilet flushing, vehicle or plant cleansing.	Care is needed to prevent the development of bacteria, algae and insect infestation.	Suitable on small scale for interception storage
Infiltration: Soakaways Infiltration Trenches and Basins	Infiltration components are used to capture surface water runoff and allow it to infiltrate (soak) and filter through to the subsoil layer, into the groundwater.	High groundwater Highly variable bedrock permeability Maintenance	Unsuitable - Space
Green/Brown /Blue Roofs	Used on flat or shallow pitched roofs to provide a durable roof covering which also provides thermal	Maintenance - Ensuring safe access	Suitable

Suds Technique	Typical Uses	Potential Issues	Potential Suitability
	insulation, amenity space, biodiversity habitat as well as attenuation of rainwater.		
Rain Gardens	Creation of planted landscaped areas to allow the diversion of a portion of rainwater from either downpipes or surrounding paved surfaces. Raingardens can either allow infiltration into the ground or have tanked systems for water retention.	Require maintenance	Suitable
Permeable Pavements / Surfaces	Permeable hard surfaces that allow rainwater to pass through either into the ground or to tanked systems. Good as interception storage.	Potential impact of saturation on pavement stability to be considered. May require extensive use of impermeable membranes and under-drainage. Maintenance required.	Unsuitable.
Swales	Dry ditches used as landscape features to allow the storage and infiltration of rainwater. Often used as linear features alongside roads, footpaths or rail lines but capable of being integrated into the design of many open spaces.	Finding available space in proposed site layout	Unsuitable
Detention Basin/Ponds	Landscape features designed to store and in some cases infiltrate rainwater. Detentions basins are usually dry, whereas a pond should retain water. These features need areas of open space but can often be combined with other sustainable drainage techniques.	Potential health and safety issues. Finding available space in	Unsuitable

Suds Technique	Typical Uses	Potential Issues	Potential Suitability
		proposed site layout	
Storage Tanks/ Geocellular Storage	Usually below ground level, they attenuate rainwater for later slow release back into the drainage system.	Pumping may sometimes be required to empty the tank into the drainage system	Suitable
Oversized Piping	Using larger than necessary pipework creates additional space to store rainwater.	Lacks the wider benefits of the green infrastructure-based techniques	Suitable

13.5.1 Microdrainage Rainwater Harvesting Calculation



13.6 Appendix 6 – Descriptions Of SuDS Techniques

13.6.1 Living/Green Roofs

Green roofs are multi-layered vegetated systems, built on roof covers. These systems are designed to return the surface water runoff from a building to the sites pre-construction level, and can be built into new build or retrofitted and are suitable for any building with flat to gently sloping roofs providing the existing roof can take the required load.

Figure 3 Green roof at the Queen Elizabeth Olympic Park (University of East London)

The topographical variation is incorporated into the substrate depth. It varies between 75 and 200 mm to create varied microclimates and hydrological regimes increasing habitat heterogeneity.

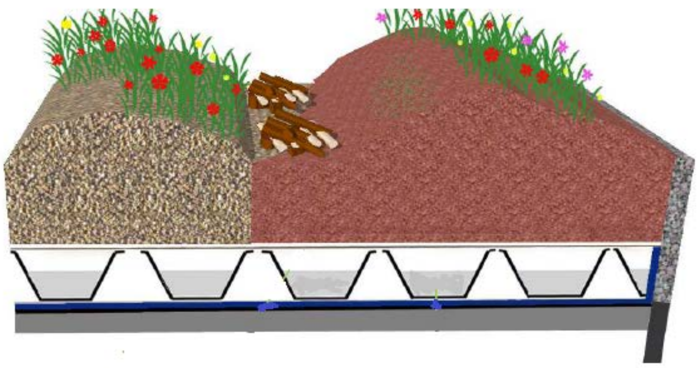


Figure 4 Biodiverse green roof diagram (University of East London)

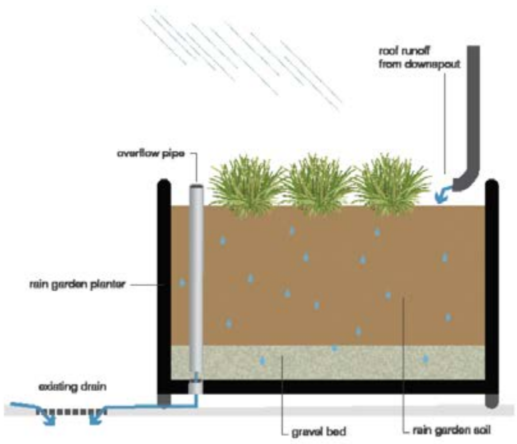
Above the roof decking lies a standard waterproofing layer. The geocomposite drainage and water attenuation layers provide a water volume of 12 l/m^2. Geotextile filters are then places to act as root barriers and prevent sediments being released from the roof.

The outlet will be sized appropriately in order to cope with storm events.

13.6.2 Rain Garden

A rain garden is a shallow depression, with absorbent, yet free draining soil and plants that can withstand occasional temporary flooding. Rain gardens are designed to mimic the natural water retention of undeveloped land and to reduce the volume of rainwater running off into drains from impervious areas and treat low level pollution.

Rain gardens usually absorb all the rainwater that flows into them, but when they do fill up following particularly heavy rainfall, any excess water is redirected to the existing drains. These simple rain gardens do not require any redesign of the existing drainage system and can be installed wherever space permits (see Planning and Design below) and in most soil types.



Rain garden planter

Street rain garden

Rain gardens are usually situated some distance from buildings or site boundaries, although the exact location will depend on the local topography and available space. In order to reduce the likelihood of property damage to insignificant levels, it is recommended that rain gardens are situated at least 3m (10 feet) from any building.

A rain garden 150mm deep and 20% of the area of the area of the roof that it serves will be able to intercept all of the run-off from a typical summer storm where 10-15mm of rain might fall. Rain gardens on more permeable soils will be even more effective. Over the course of an average year, a rain garden of this size will intercept most of the rainfall that it receives, only overflowing after several days of persistent rainfall.

13.6.3 SuDs Planter Storage Volume/Rain water Harvesting Systems

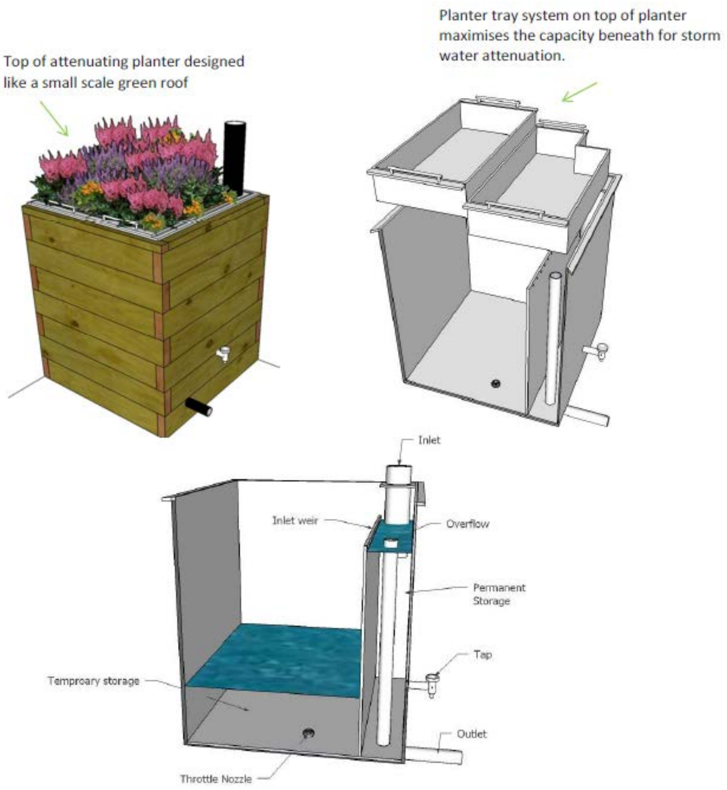


Figure 5: SuDS Planter with attenuation storage (Thames Water)

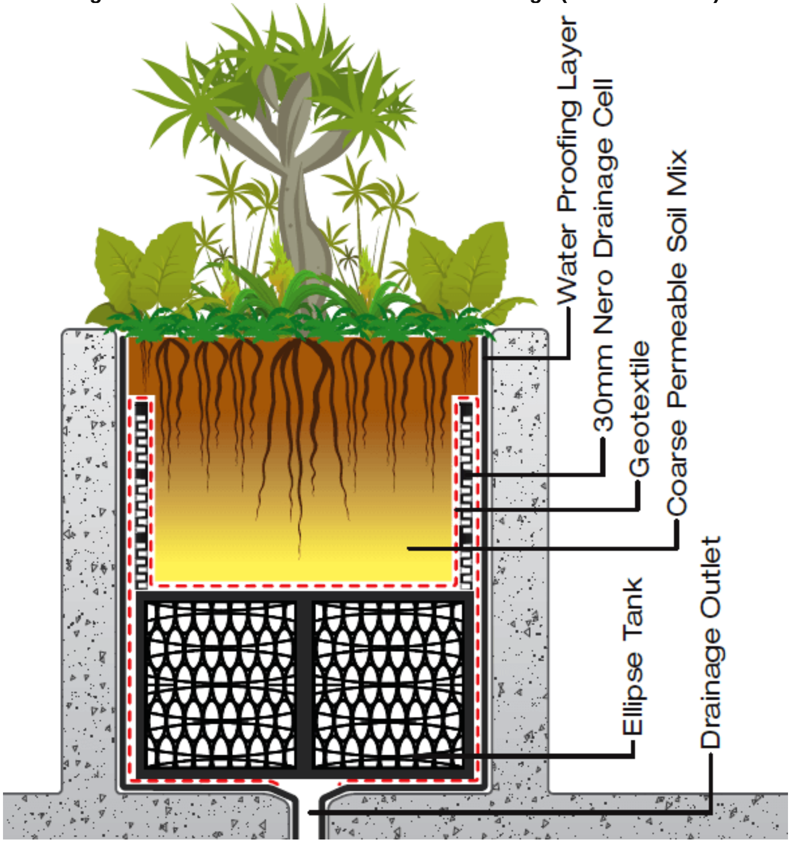


Figure 6: SuDS Planter Cross Section

SuDs planters are an innovative way of increasing the water attenuation, additionally providing an opportunity to green areas where is not practical to remove or break up permeable surfaces. With excellent retro-fit potential SuDs planters can be designed to receive rain water from a drainpipe or other inlet or simply used to receive rainwater falling on them. SuDS planters are best placed where they can be used in conjunction with other SuDS

They offer multi-use benefits such as aesthetic improvements and biodiversity potential. Furthermore, with capacity for water storage, they are well situated in grow your own schemes, providing a substrate for plant growth and a water storage capacity, for use in watering other plants.

13.6.4 SuDS Planters

SuDSPlanter™

A cleaner, greener way to manage surface water sustainably.

Loss of permeable landscape has meant higher peak flows, serious flooding, pollution, damage to property and habitats, and contamination of groundwater sources.

Our changing climate

Today's climate means we face increasingly uncertain weather patterns, higher frequency flooding and a stressed environment. Our issues with more extreme weather have been exacerbated by the loss of permeable landscapes in towns and cities, replaced by paved areas, roads, roofs, so increasing our amount of surface water run-off. This is rainwater 'looking' for somewhere to go...

Our piped drainage systems receive flows quicker than ever before, and in larger volumes than they are designed to cope with. To add to this we have an increasing pollution risk from highway runoff carrying sediments and debris into local streams and rivers. In extreme events our combined sewer overflows surge into these watercourses too, all adding to the rising levels of pharmaceuticals, phosphorus and nitrates arriving in our waterways.

Pollution entering our rivers reduces oxygen levels making it difficult for aquatic plants and fish to survive. For humans this can affect water quality in the towns and countryside, impacting on drinking water for wildlife, livestock and ourselves.

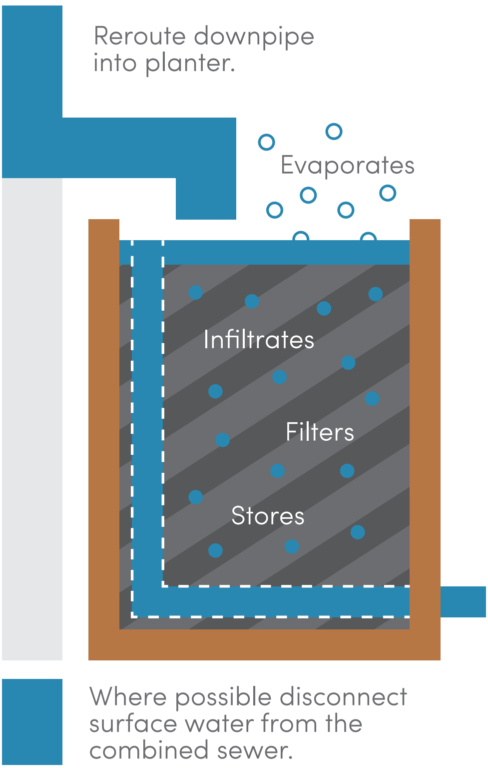
We want to help change this.

Meet the SuDSPlanter

SuDSPlanter is a uniquely designed rain garden which captures rainwater runoff from roofs, rather than leaving it to flow into the drains and sewers, potentially overloading the system. It's a cleaner, greener more sustainable way to guard against today's increasing risk of flooding and contamination.

The SuDSPlanter provides water storage in dry or drought conditions, as well as storm storage designed to cope in wet environments. This makes the planter ideal for our changing weather patterns, combatting the increasing flood risk and water scarcity which we face.

How it works



- **Reduces flood risk by diverting water from drains & sewers.**
- **Filters, cleans, stores & slowly releases rainwater run-off.**
- **Increases biodiversity & reduces pollution.**
- **Provides storage in times of drought.**

The SuDSPlanter is designed to capture rainwater run-off from roofs by rerouting the downpipe into the planter instead of directly into the drains. The planter is made up of a series of layers, acting as both a sponge and a natural filter, attenuating flow and removing sediment and bird poo as the water soaks through to the reservoir below.

Our specially designed growing media provides the perfect environment for plants to thrive; nutrient and water retention, filtration and soil volume to sustain plant growth in both wet and dry conditions.

Options

Recycled lumber

These are manufactured using a plastic coated metal frame with recycled plastic lumber infills. All materials are 100% recycled or recyclable.

Sizes

1200mm x 600mm x 950mm

1600mm x 600mm x 950mm

2000mm x 600mm x 950mm

Colours

Bespoke colours available on request.

- **100% recycled materials.**
- **No treatment required prior to use.**
- **Minimum 15 year life expectancy.**
- **Fully recyclable at the end of its use.**
- **Graffiti resistant.**

Installation

For DIY installations, we provide an instruction manual with your planter, which has handy maintenance tips too. If you would like us to install your SuDSPlanter for you, simply ask us when you place your order

Solid timber

Our timber planters are made from the finest water resistant softwoods naturally impregnated with natural oils to reduce the need for tanalith.

Sizes

1200mm x 600mm x 950mm

1600mm x 600mm x 950mm

Colours

Bespoke colours available on request.

- **UK sourced, FSC accredited wood.**
- **No treatment required prior to use.**
- **Minimum 15 year life expectancy.**
- **Fully recyclable at the end of its use.**

Planting

Your SuDSPlanter is a great way to increase biodiversity, as it works best with as wide a variety of plants as possible. For the best results, choose from our list of suitable plants, or we can supply you with a selection of young plants for establishing: simply ask when you place your order.

Our aim

When we set out to create SuDSPlanter our aim was to produce an environmentally sound flood mitigation device which would improve home owners' lives through urban greening and flood defence. This has developed into a product range which delivers a simple, retrofit solution to surface water for a variety of roof sizes to match any residential, commercial or educational environment. SuDSPlanter is brought to you by:

Lorna Davis

Specialist consultant in sustainable drainage for the engineering and water industry.

Alex Stephenson

Over 40 years of experience in drainage engineering and waste water solutions.

Proudly made in the UK

We pride ourselves in sourcing and assembling all of SuDSPlanters materials within the UK. Our manufacturing facility is based in Mid Wales, with carpenters crafting each product from scratch.

SuDSPlanter™

Order yours now at sudsplanter.com

Lead times on ordering are required, so please do get in touch to discuss your requirements:

enquiries@sudsplanter.com @SuDSPlanter

13.6.5 Ultra Slimline Rainwater Harvesting Tank

New Ultra Slim Wall Tank Rainwater Harvesting System

A complete entry level rainwater harvesting system for retrofit, smaller property and installing in a confined space, incorporating a wall tank, filter diverter, rainwater delivery pump and mains top up valve.

The Ultra Slim Wall Tank System is modular, easy to install and durable and is manufactured to the highest standards. The full system requires a single downpipe connection, access to power and a mains water supply to top up if there is insufficient rain. This product builds upon our proven first generation 2009 design and is ideal for supplying water for toilet flushing, laundry and garden use. The system features;

- 235 litre tank modules (only 20cm deep)
- 470 litre base tank system with add-on tanks in 235 litre increments
- *E*asier to install galvanised steel wall mounting bracket
- *R*ecessed inter tank connector to create a 'seamless' wall of water storage
- CAD designed internal support structure to carry the vertical, horizontal and lateral loads
- *S*tandard colour green granite (see insert) and optional colours available by special order
- UK made tank

Supplied with:

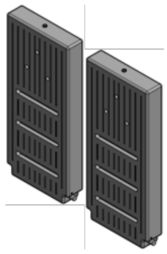
- High performance Compact filter diverter and fittings to ensure a water tight connection to the tank
- Quiet and low energy pump that delivers rainwater on demand to connected services
- Automatic mains water top up valve
- Pack of regulation advisory labels

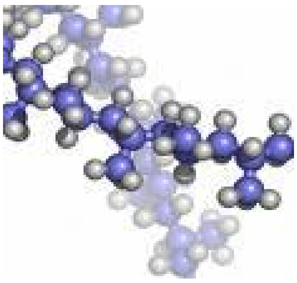
The tank system is made from high density food grade polyethylene and all components feature high levels of UV protection. The system is easy to install by a competent DIY or general trades installer. When a connected service demands water, the pump is activated to draw water from the tank. In the event that demand exceeds the available rainwater a mains water valve is automatically opened to partly refill the tank.

Ultra Slim Wall Tank Rainwater Harvesting System

SW044H01

SPECIFICATION

Tank System		• Twin tank 470 litre base unit is 160 x 20 bracket. • Including the Compact Filter Diverter the min. overall length is 180 cm. • Each incremental 235 litre tank adds a further 80 cm to the length of the system. • Supplied with self-install 1/2” BSP outlet fitting and 50 mm tank connector • Optional cover if an access opening required • Optional throttle valve for storm water attenuation
Filter Diverter		• An efficient Compact Filter Diverter for a max. 90m² roof. • Its unique low maintenance and largely self-cleaning design removes leaves and gutter debris from rainwater. • Incorporates a durable 650 micron stainless steel filter and can be installed in 68 – 110 mm O.D. round downpipe and adapted to other sizes and profiles. • Also incorporates a tank overflow and divert open or closed features. • 50 mm fittings to ensure a water tight connection to the tank
Electronic Pump		• 7 lpm flow rate ideal for toilet cistern replenishment and micro irrigation. • Requires 230v 50Hz power supply • Standard bare pump and connection kit or optional plug-n-play unit • Pump is mounted inside the property. • Pressure switch activates pump when water is demanded. • Quiet and energy efficient to operate.
Mains Top Up Valve		• Automatic mains water top up • Requires 230v 50Hz power supply • Top up activated by tank mounted float switch • Complies with water regulations • Standard mains top up kit of components or optional plug-n-play unit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13.6.6 Geocellular structures, oversized pipes and tanks

Modular plastic geocellular structures, with a high void ratio, are a new below ground storage arrangement that can replace underground pipes or tanks that have been used to store water. They can also be used to convey or infiltrate surface water runoff into the ground.

Underground storage features attenuate an agreed volume with a control structure to limit the discharge rate. Structural design must be provided to ensure integrity of the box, pipe or tank under loading. Silt interception and management arrangement is critical to long-term effectiveness of these structures and this must be demonstrated at design stage and confirmed for the design life of the development. It can be implemented either in the form if a modular box system with inlet and outlet pipework connected to the sides of the structure or in the form of a honeycomb structure with perforated pipes running under or through the box. Water is forced into the box when flows increase. There are now shallow, load bearing boxes which can be used under pavements and in particular below permeable pavement which protects the box from silt contamination and provides treatment with enhanced storage. Moreover, geocellular systems can be installed above a high-water table.

13.7 Appendix 7 – SuDS Maintenance Manual

The information presented below is taken from the CIRIA SuDS Manual (Report c753). Further details on installation and maintenance can be found in this manual.

13.7.1 Rainwater Tank Harvesting Maintenance

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Inspection and cleaning of collection systems, filters, throttles and vales, pumps. - Remove Manhole Cover - Inspect for major debris	Quarterly for the 1st year; Annually;
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
Remedial actions	- Remove and clean filter head under tap if required. - Replace filter trap and manhole cover if performance deteriorates or failure occurs	Annually;
	Replace parts as required; If failure in pumping occurs etc. Cleaning of system;	As required
Monitoring	Inspect silt traps and note rate of sediment accumulation	Quarterly.

Maintenance will usually be carried out manually, although a suction tanker can be used for sediment/ debris removal for large systems;

If maintenance is not undertaken for long periods, deposits can become hard-packed and require considerable effort to remove.

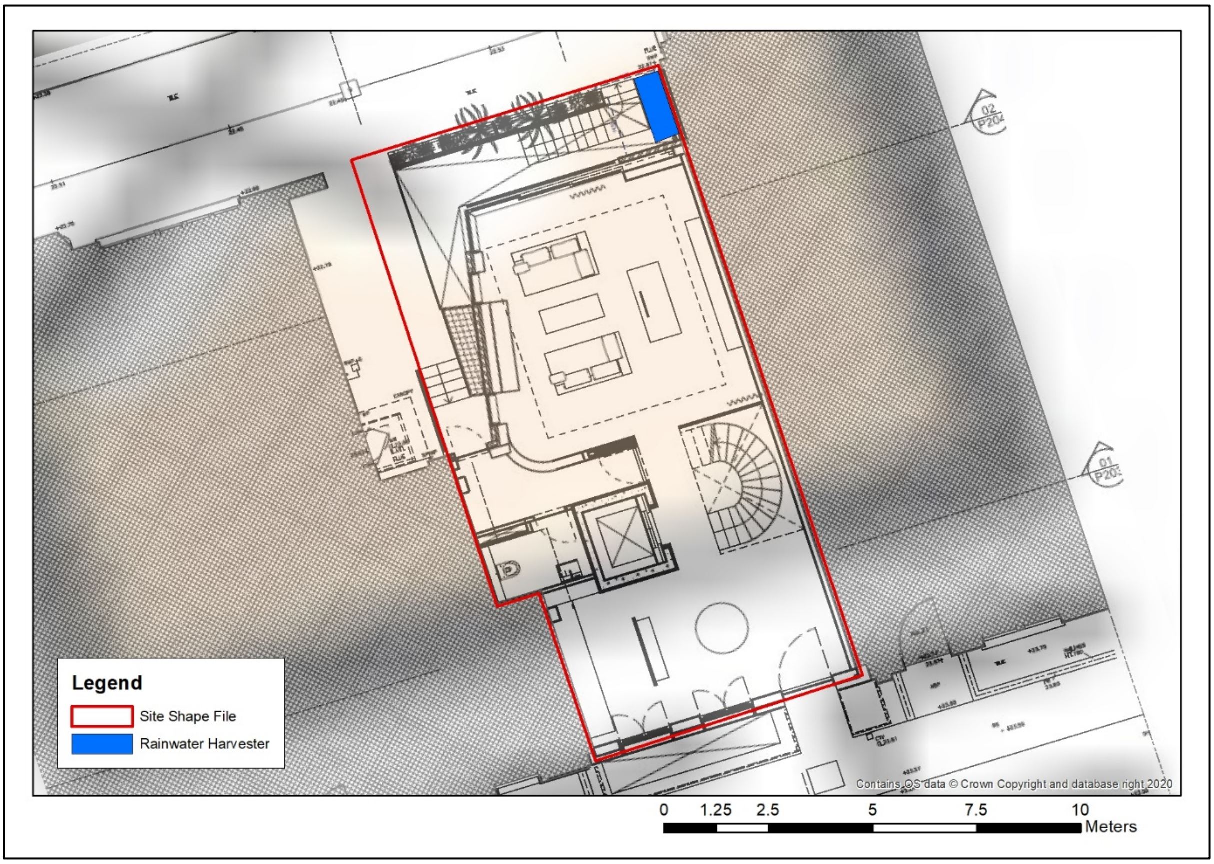
Many rainwater harvesting tanks provide are self-cleaning systems that reduce the amount of maintenance that is require.

Effective monitoring will give information on changes in sediment build up rate and provide a warning of potential failure in the long term.

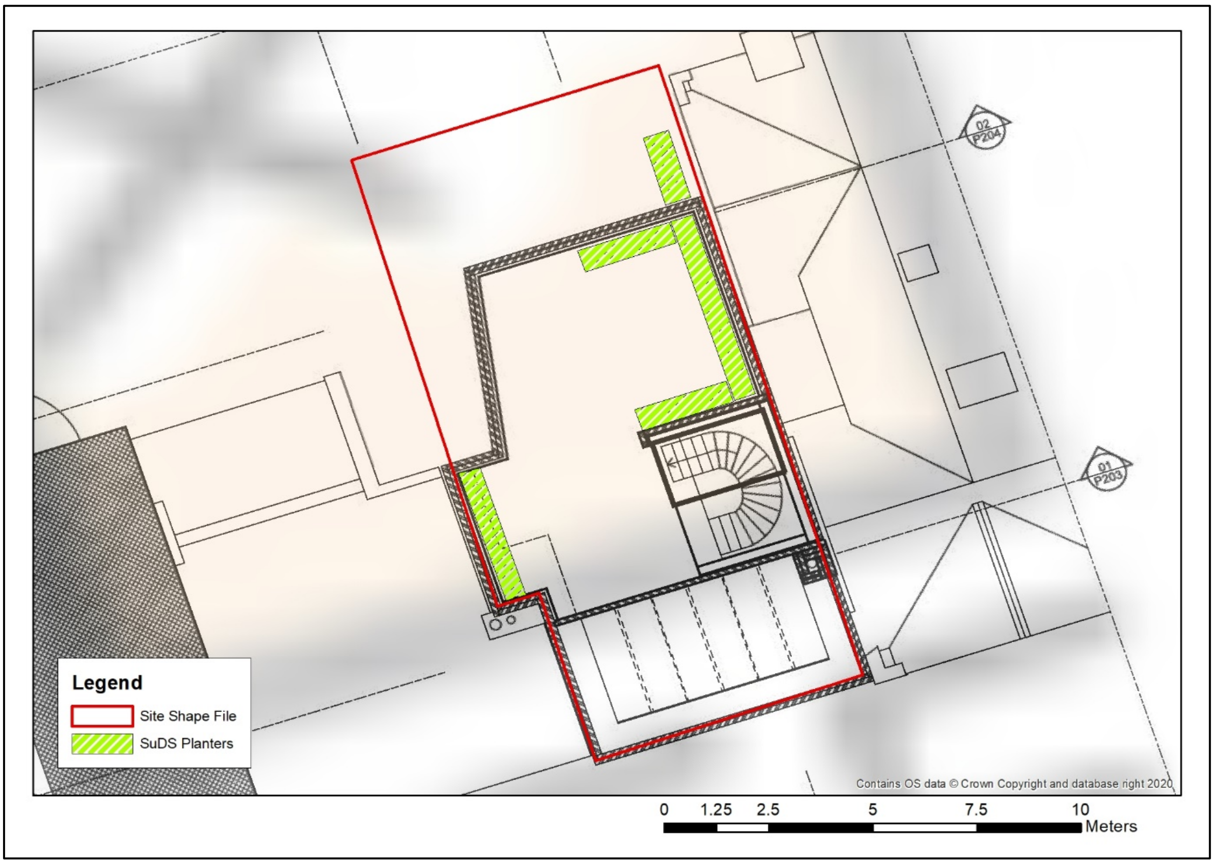
Maintenance responsibility should be placed with an appropriate organisation, and maintenance schedules should be developed during the design phase;

13.8 Appendix 8 - Potential SuDS Layout

13.8.1 Rainwater Harvesting Tank



13.8.2 SuDS Planters



13.9 Appendix 9 - Asset Location