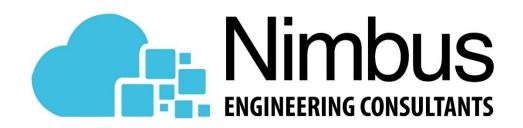
FLOOD RISK ASSESSMENT AND SUDS REPORT

FOR FLAT 1, 253 GOLDHURST TERRACE, LONDON,

NW6 3EP

DOCUMENT NO: C3000-R2-REV-A

PREPARED BY



Contents

1. SITE DETAILS			3
	Gre	eater London	3
	Lor	ndon Borough of Camden	3
	1.1	Development Proposals	3
	1.2	Geology of The Area	4
2.	FL	OOD RISK ASSESSMENT	8
4	2.1	Fluvial or Tidal Flooding	10
4	2.2	Flooding from Land (Overland Flow)	11
4	2.3	Flooding from Groundwater	15
	2.4	Flooding from Sewers	18
	2.5 F	looding from Reservoirs, Canals, or Other Artificial Sources	20
6.	SUS	TAINABLE URBAN DRAINAGE SYSTEMS	21
7.	SuE	OS PROPOSALS FOR DEVELOPMENT	25
8.	PR	OPOSED SuDS SOLUTION	27
9.	TIM	ESCALE AND MAINTENANCE OF DRAINAGE WORKS	28
3.	SU	MMARY AND CONCLUSIONS	31

APPENDICES

APPENDIX A – DRAWINGS

APPENDIX B – HISTORIC BOREHOLES

APPENDIX C – SURAFCE WATER RUN OFF CALCULATIONS

APPENDIX D – WATER AUTHORITY ASSET PLANS

1. SITE DETAILS

Site Name	Flat 1, 253 Goldhurst Terrace
Site Address	Flat 1, 253 Goldhurst Terrace, London, NW6 3EP
Purpose of	Residential
Development	
Existing Land Use	Brownfield
OS NGR	525815E, 184020N
County	Greater London
Country	England
Local Planning	London Borough of Camden
Authority	

1.1 Development Proposals

A set of drawings showing the existing and proposed site layouts are included in Appendix

A. These show that the proposals are for a basement extension.

1.2 Geology of The Area

According to the British Geological Survey, the superficial deposits at the site are unknown, as shown in Figure 1, below. The bedrock at the area is of the London Clay Formation, shown in Figure 2, below.

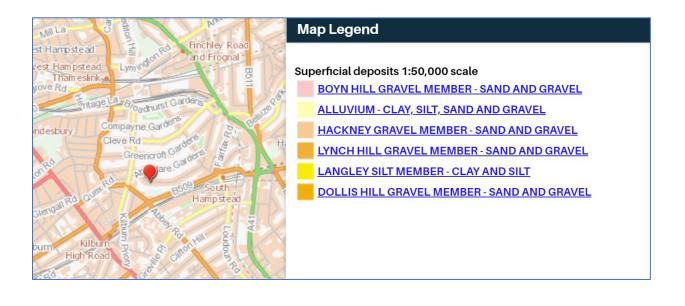


Figure 1- Superficial deposits at the site. (Source: British Geological Society Website (contains British Geological Survey materials © NERC2025)).

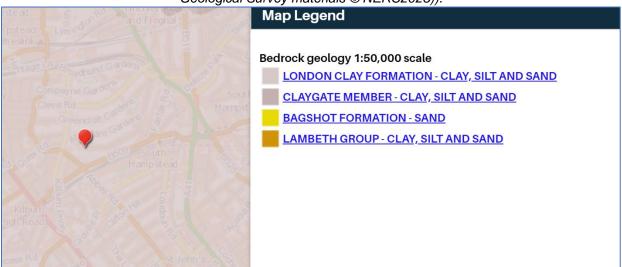


Figure 2 - Bedrock at the site. (Source: British Geological Society Website (contains British Geological Survey materials © NERC2025)).

Historic boreholes within the vicinity of the site were consulted in order to determine groundwater levels within the vicinity of the site. The location of these boreholes can be found in figure 3 below, and the results of boreholes can be found in Appendix B.

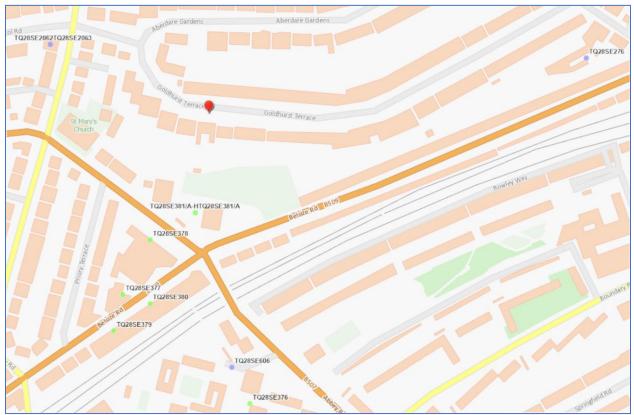


Figure 3 - Historic Boreholes at the site. (Source: British Geological Society Website (Contains_British Geological Survey materials © URKI [2023]. Base mapping is provided by ESRI)).

The results of these historic boreholes show that no groundwater was encountered, and the Groundwater vulnerability MAGIC maps from DEFRA shown overleaf, also show the site to be in an area of unproductive strata, with a soluble rock risk.

Groundwater Vulnerability Map (England)	()
📶 Local Information	
Soluble Rock Risk	
High	
Medium - High	
Medium	
Medium - Low	
Low	
Unproductive	
Geological Places to Visit (England)	()
Geological Descriptions (England	i) 🚺
📄 ∓ Soilscape (England)	(i)
+ Landscape Classifications	

Figure 4 – Groundwater Vulnerability Map – Magic Maps (DEFRA)

2. FLOOD RISK ASSESSMENT

The possible causes of flooding set out in NPPF's technical guidance are considered in this section in relation to the flood risk to the site itself and the effects of the development of the site on flood risk elsewhere.

The Camden Local Plan states: The Council will require the submission of a developmentspecific flood risk assessment with applications for basements within flood risk areas identified on Map 6: Historic flooding and Local Flood Risk Zones, in the Flood Risk Strategy, or in any future updated Strategic Flood Risk Assessment in line with the criteria set out in the National Planning Practice Guidance on Flood Risk, unless it can be demonstrated to the Council's satisfaction that the scale of the scheme is such that there is no, or minimal, impact on drainage conditions (refer to our supplementary planning document Camden Planning Guidance on sustainability for further information). Figure 5, is shown overleaf:

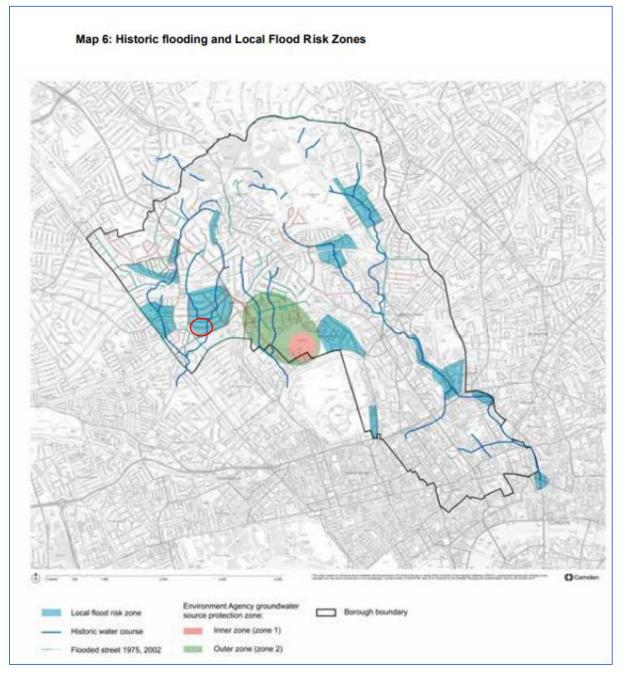


Figure 5: Historic Flood and Local Flood Risk Zones

The proposed development site is within a local flood zone, where there have been instances of flooding, however this will be discussed in detail, further on in this report.

2.1 Fluvial or Tidal Flooding

The Environment Agency's Flood Map for Planning (Rivers and Sea), shown below, indicates the site is in Flood Zone 1, and not at risk of flooding from rivers or the sea.

The site is also not at risk of tidal flooding, this can also be confirmed by the Environment Agency's Flood map, below.

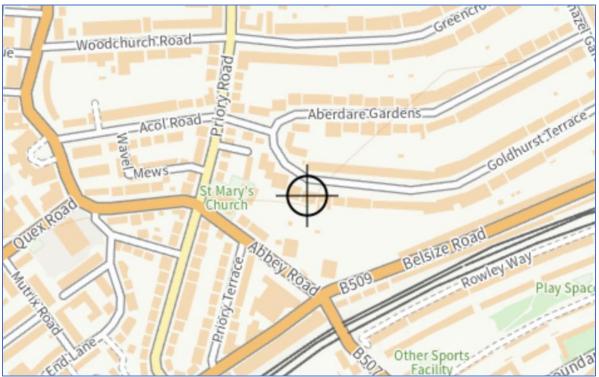


Figure 6 – Environment Agency Flood Map (from Rivers and the Sea) for the proposed development

2.2 Flooding from Land (Overland Flow)

The proposed development site is not at risk of surface water flooding, this can be confirmed by the Environment Agency's Flood map shown below.

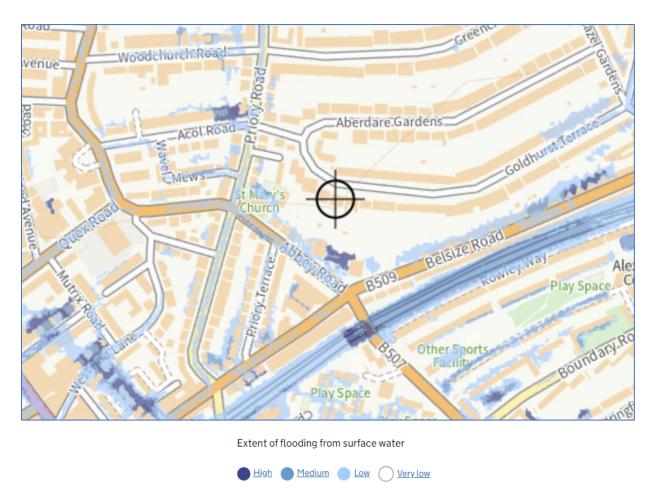


Figure 7 – Environment Agency Flood Map (from surface water) for the proposed development.

However, the site is within a local flood risk zone, as shown in Figure 4. Goldhurst Terrace has flooded during flooding events of 1975, 2002 and 2021. Therefore, this localised flooding is caused by the combined sewer in this area being surcharged during extreme storm events, caused by surface water combined sewer network.

Furthermore, the London Borough of Camden Section 19 Flood Investigation Report Flood Incidents on the 12th and 25th July 2021 states that the flooding during these dates was caused by surface water sources causing a surcharging of assets.

This report identified six flooding hotspots in the area, as shown below, which do not include the proposed development site, as shown in figure 8 overleaf:

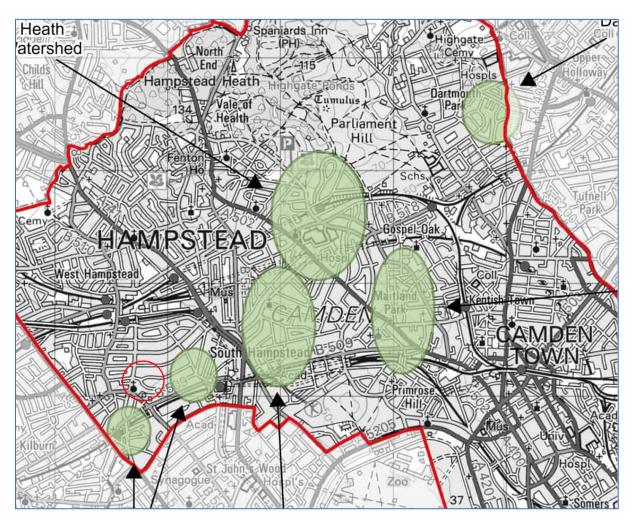


Figure 8 – Section 19, Flood Investigation Focus Area – Camden SFRA Report (2024)

The July 2021 flooding event was classed as exceptionally high, and the rainfall totals represented the fifth wettest three-month combined May, June and July rainfall totals, since 1891.

The flood area outlined in Figure 7, is in line with the 'Floods in Camden' report, which was published in 2003, following the flooding events of 2002. Which states that the

London Fire Brigade particularly had to assist residents in the Fairhazel Gardens/Goldhurst Terrace area.

It is clear from all of these reports that the majority of the flooding in this local flood risk area, pertaining to 253 Goldhurst Terrace, did not affect the proposed development site itself and was contained within the street.

However, due to the concerns and possible future flooding caused by the overloading of the combined sewer network in extreme storms, we have proposed a 400mm high glass wall to surround the lightwell, and this will ensure that no flood water will enter the basement floor or lightwell during any future flooding. Non return valves have also been proposed to ensure that there is no back of flow causing sewer flooding at the site.

Furthermore, the Camden Level 1 SFRA (2024) states:

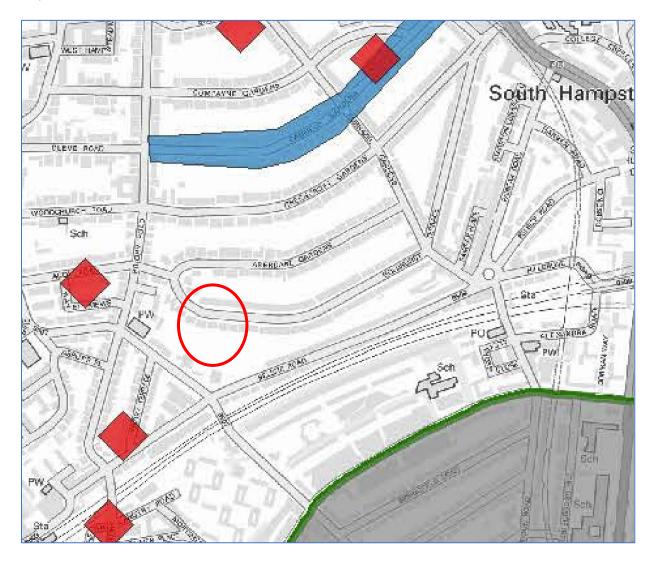
- For proposed developments located on a Previously Flooded Street, as presented within Appendix A (Figure 4), Camden Council should consider setting as a requirement a minimum reduction in surface water runoff rates post-development to greenfield runoff rates The intention of such a requirement would be to reduce surface water runoff and also reduce the strain on the combined sewer network.
- When re-developing existing buildings in areas at risk from flooding, especially when identified on a Previously Flooded Street, the use of flood resilient measures should be promoted at the individual property level. Measures introduced for basement dwellings may need to be more robust, to protect from potential groundwater flood risk. Measures could include non-return valves.

Our SuDS proposals will ensure that any surface water run off proposed by the proposals, will restrict the flow to 0.5 l/s, and therefore reducing the load on the existing combined sewer system.

2.3 Flooding from Groundwater

We have consulted historic boreholes at the site and have also consulted the DEFRA Magic Maps and both show that the groundwater is very low at this site and there is no risk of groundwater flooding.

Furthermore, we have consulted the Camden Borough Council, Level 1, Strategic Flood Risk Assessment's Geo Flood map, as shown in figure 9 overleaf, and this shows the proposed development site to be in an area with no risk of groundwater flooding, therefore there will be no risk of groundwater flooding to this proposed basement.



LEGEND

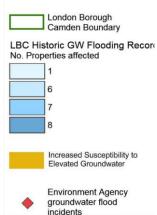


Figure 9 – Increased Susceptibility to Elevated Groundwater Map – Extracted from London Borough of Camden Level 1 Strategic Flood Risk Assessment Report

The client will undertake long term groundwater monitoring to ascertain the depth of any standing groundwater, and also provide a waterproofing membrane to ensure that any perched water has been dealt with and therefore the basement will be waterproof and will be designed as a watertight element. It should be noted that as the groundwater levels will be below the basement level, that the basement structure will not be adversely affected, and other than the waterproofing membrane, no other mitigation measures are required. As it is that the soils at likely foundation/basement depth will deteriorate rapidly in the prolonged presence of water, although there will be no groundwater ingress, other than the unlikely possibility of perched water, a waterproof membrane such as delta membrane or equivalent has been proposed. Consequently, a blinding layer of lean-mix concrete will be applied to all excavations if continuous working cannot be achieved. Fixtures and fittings for the basement will be located to ensure that if any flood water from perched water, does enter the building, the impact of floodwater on the property will be minimal.

It should also be noted that a separate basement impact assessment report has been produced and accompanies this application.

2.4 Flooding from Sewers

The Level 1 SFRA (2024) reported 60+ incidents of sewer flooding between January 2013 and April 2023, the map is shown below and shows the incidents of sewer flooding in the vicinity of the proposed development site.

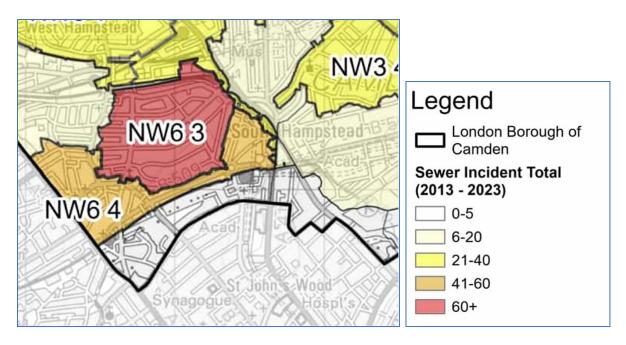


Figure 10 – Reported incidents of sewer flooding (January 2013 to April 2023) map – Extracted from the Camden SFRA (2024)

The sewerage system within the vicinity of the site is a combined system, so this flooding is caused by the sewers surcharging during extreme storm events. Due to the extreme flooding in 2021, even though the surface water flooding did not extend to the proposed development site, the main concerns of the council are that the combined sewer in the street surcharging due to extreme rainfall, and essentially extending and flooding the proposed basement extension and lightwell area.

Therefore, they have requested that we focus on solutions that will prevent this sewer flooding from entering the lightwell and basement floor of the proposed basement extension.

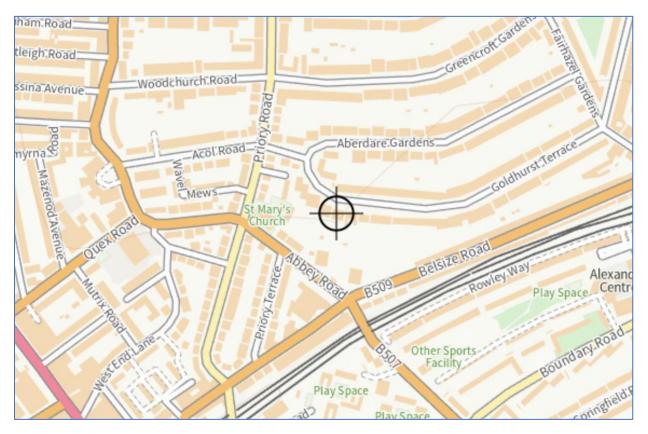
In order to mitigate against this, we have proposed 400mm high glass walls to surround the lightwell, as this will prevent any sewer flooding extending to the lightwells. We have also proposed flood proof windows and doors at the new basement extension as a secondary safety measure.

The Thames Tideway Tunnel super sewer is almost complete and will alleviate the strain on this combined sewer and others in London, reducing the risk of flooding at this site and elsewhere.

2.5 Flooding from Reservoirs, Canals, or Other Artificial Sources

The Environment Agency's Flood map shown below, shows the site not to be at risk of

reservoir flooding.



Extent of flooding from reservoirs

	Maximum extent of flooding	🕀 Location you selected
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Figure 11 – Environment Agency Flood Map (from reservoirs) for the proposed development

6. SUSTAINABLE URBAN DRAINAGE SYSTEMS

The total area of the proposed basement extension is 59m², prior to any mitigation by using Sustainable Urban Drainage Systems (SuDS).

Surface water arising from a developed site should, as far as practicable, be managed in a sustainable manner to mimic the surface water flows arising from the site prior to the proposed development, while reducing the flood risk to the site itself and elsewhere, taking climate change into account.

Reducing the rate of surface water discharge from Urban Sites is one of the most effective ways of reducing and managing flood risk.

Traditional piped surface water systems work by removing the surface water from our developments as quickly as possible, however this can cause various adverse impacts:

- Increased downstream flooding, and sudden rises in flow rates and water levels in local water courses.
- Reduction in groundwater levels dry weather flows in watercourses.
- Reduce amenity and adversely affect biodiversity due to the surface water run-off containing contaminants such as oil, organic matter and toxic materials.

SuDS are defined as a sequence of management principles and control structures designed to drain surface water in a more sustainable fashion than conventional piped drainage techniques. SuDS should utilise the environmental, ecological and social benefits.

These include:

- Protection and enhancement of water quality As well as providing on-site attenuation, SuDS treat the water, resulting in an improved quality of water leaving the site. This is achieved when the water passes through the fine soils and the roots of specially selected plants, pollutants washed off the hard landscaping by rainfall will be safely removed before the water reaches the natural water course.
- A sympathetic approach to the environmental setting by providing the opportunities to create habitats for flora and fauna in urban watercourses and open spaces.
- Meeting the amenity and social needs of the local community and residents in the creation of attractive green spaces.

The various types of SuDS include:

Permeable paving;	
Soakaways;	
Swales and basins;	
Bioretention/ rain gardens;	
Green roofs and rainwater re-use;	
Infiltration trenches and filter drains	



Preferably a combination of these techniques should be used as part of the surface water management train, and it is important for all stakeholders; such as developers, architects, landscape architects and engineers, to work together at the planning stage in order to determine a feasible solution.

The SuDS management train is shown in Figure 12 below, this has been followed when proposing the proposed Sustainable Urban Drainage Systems for this site.

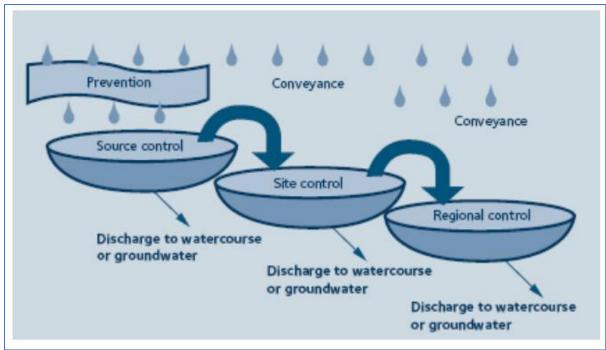


Figure 12 – SuDS Management Train

7. SuDS PROPOSALS FOR DEVELOPMENT

In accordance with the CIRIA SuDS Manual C753, the London Plan and Local Plan, we have considered the SuDS hierarchy in relation to the site-specific constraints and its

surroundings. Table 1 below outlines the hierarchical approach we followed to

develop the SUD proposals at 253 Goldhurst Terrace.

Sustainable Drainage Proposal	Description	Constraints/Comments	Appropriate
Rainwater Use as a Resource	Use of rainwater runoff for reuse, e.g. Rainwater harvesting tanks, Blue Roofs for irrigation	One wall mounted rainwater harvesting tanks has been proposed	Yes
Rainwater Full Infiltration to Ground (Source Control)	Infiltration devices and/or soakaways. Surface water runoff stored on site gradually percolating into the receiving ground	Due to underlying geology, which is consisting of clay, this has been deemed unfeasible.	No
Rainwater Partial Infiltration to Ground (Source Control)	Installation of permeable/porous surfacing	N/A	N/A
Rainwater attenuation in green infrastructure features for gradual release	The onsite storage of all surface water runoff can then be gradually conveyed to a nearby watercourse, sewer, or infiltration into the ground. Forms of green infrastructure features: Green	There is no available space for green or sedum roofs or any other above ground SuDS element	No

	Roofs, Raingardens, Ponds, Swales, Detention basins, Infiltration Trenches, Raingarden Planters		
Rainwater discharge directly to a watercourse	All surface water runoff on-site discharged at a restricted rate to a nearby watercourse.	No nearby watercourses to discharge to.	No
Controlled rainwater discharge to a surface water sewer or drain	All surface water runoff on-site is discharged at a restricted rate to a nearby surface water sewer or drain, and all rainwater runoff is stored in below- ground attenuation features. E.g. oversized pipes or geo-cellular tanks	Thames Water Asset plans show no surface water assets to discharge to.	No
Controlled rainwater discharge to a combined sewer	All surface water runoff on site is discharged at a restricted rate to a nearby combined sewer. All rainwater runoff is stored in below-ground attenuation features. E.g. oversized pipes or geo-cellular tanks	On site run-off will be attenuated and discharged at a restricted rate of 0.5l/s to the existing combined sewer system at the site.	Yes

Table 1: SuDS Control Measures for Development

8. PROPOSED SuDS SOLUTION

In order to ensure that the SuDS management train has been followed, onewall mounted rainwater harvesting tanks have been proposed at the site to encourage rainwater re-use.

The preferred method of dealing with remaining surface water from this basement extension would be to treat and deal with it at source using soakaways. However, due to the underlying geology consisting of clay, this has been discounted as an option.

Therefore, our proposed solution involves attenuated the remaining surface water runoff, from the basement extensions and attenuating this for a 1 in 100 year plus 45% CC storm event, with restricted flow leaving the site set to the 0.5 l/s, in order to avoid blockages. The flow control to be utilised with be an orifice system, which will achieve self cleansing.

The storage volume required is 2.32 m³, and this will be stored in an underground crate system, then conveyed at a restricted rate of 0.5 l/s to the existing combined sewer system at the site. All surface water run off calculations can be found in Appendix C, and the water authority asset plans can be found in Appendix D.

A proposed drainage layout plan has been provided in Appendix A.

We believe the Sustainable Urban Drainage System hierarchy has been considered fully and is proportionate to the nature and scale of the development.

9. TIMESCALE AND MAINTENANCE OF DRAINAGE WORKS

All drainage works shall be completed prior to first occupation and there shall be no adoption of any of the drainage works within the site, and the homeowners will be responsible to oversee the long-term maintenance of the communal drains.

The following outline maintenance strategy sets out recommended timescales for maintenance of the proposed drainage works, in line with CIRIA SuDS Design Guide:

- Regular inspection will comprise the inspection and cleaning of catchment, gutters, filters and tanks to reduce the likelihood of contamination, this is recommended to be carried out every 3 to 6 months.
- The catchpit chamber and flow controls should be checked and cleaned every 3 months for the accumulation of debris/ silt, in order to ensure that there are no blockages.
- Regular jet-washing of permeable block paving can be used to keep joints and voids clear; this should be carried out every 3 to 6 months.

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspection of the tank for debris and sediment build- up, inlets/outlets/withdraw devices, overflow areas, pumps, filters.	Annually (and following poor performance)
	Cleaning of tank, inlets, outlets, gutters. Withdrawal devices and roof drain filters of silts and other debris	Annually (and following poor performance)
Occasional maintenance	Cleaning and/ or replacement of any filters	Three monthly (or as required)
Remedial	Repair of overflow erosion damage or damage to tank	As required
actions	Pump repairs	As required

Table 2: Operation and maintenance requirement for RWH systems.

Maintenance schedule	Required action	Typical frequency
	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
Regular	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
maintenance	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockages by sediment, algae or other matter: remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from pre-treatment structures and/ or internal forebays	Annually, or as required
Remedial actions	Repair/ rehabilitate inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

Table 3: Operation and maintenance requirements for attenuation storage tanks.

Maintenance schedule	Required action	Typical frequency
	Inspect from surface and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then 6 monthly intervals
Regular	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
maintenance	Orifice plates within plastic chambers or vortex controls to be jetted from the surface after heavy rainfall events to remove any debris or silt	As required
	Empty catchpits upstream of SuDS features to ensure no debris is passed downstream	3 months or as required
Remedial actions*	In the event of a blockage, a vortex flow control can be removed from the chamber via the lifting cabled located at the access, this will be cleaned at surface level and reinstalled into its original location	As required
	In the event of a blockage, the orifice plate should be jetted from surface, and if blockage is not cleared the orifice plate can be removed by removing fixing bolts. These fixing bolts should be checked and replaced if needed.	As required
Monitoring	Following installation, it is important that any extraneous materials i.e. building materials: granular backfill, in-situ pour concrete etc are removed from the unit and the new flow control chamber is fully jetted down	Upon installation
	Inspect/check chamber channel for any debris or silt build-up. Upstream chambers should be checked at the same time as these monitoring works to ensure network is operating at full capacity.	Annually

Table 4: Operation and maintenance requirements for flow control chambers

*All Remedial Works should be carried out by a competent and certified contractor, with

no access to chambers or removal of parts to be undertaken by homeowners

If upstream network of flow control chamber is regularly maintained, little maintenance is

required within the chamber as there are no moving parts.

3. SUMMARY AND CONCLUSIONS

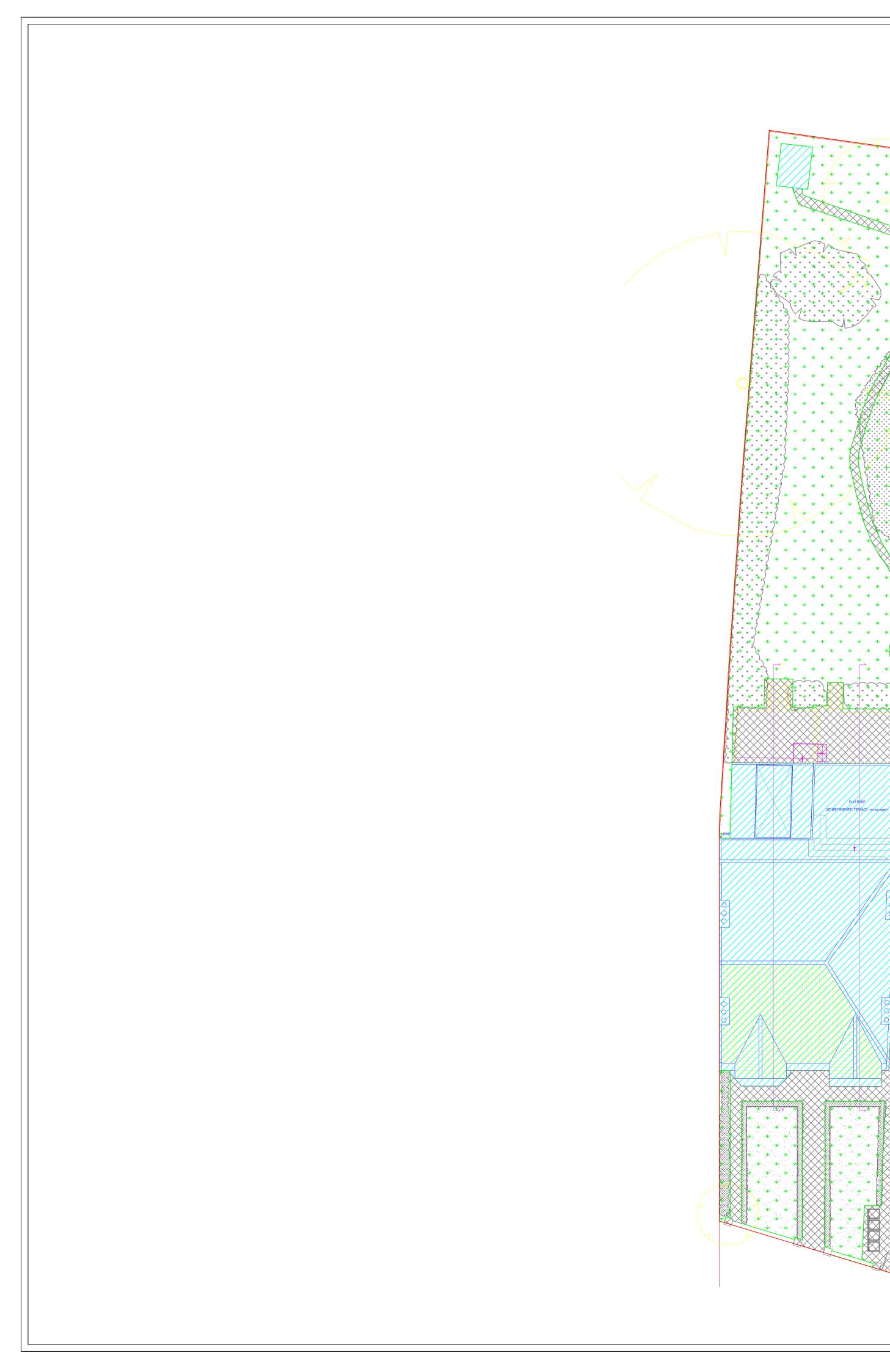
The site is at a very low risk from flooding from groundwater, tidal, fluvial, surface water, and reservoir flooding, and although there have been instances of sewer flooding within the vicinity of the site the clients confirms that there has been no history of sewer flooding at their site.

The groundwater levels are well below the proposed basement level; however the basement will still be designed as a watertight element in the unlikely event that there is any groundwater ingress from perched water.

The proposals will not impact on any known flood flow route or flood storage area.

The surface water run off produced as a result of the basement extension will be attenuated in a below ground crate system attenuation tank, with restricted flow discharging into the existing Thames Water Combined Sewer, via gravity, at a rate of 0.5l/s.

APPENDIX A – DRAWINGS



Total Site Area is Approx.798m²

Existing Impermeable Total Area is Approx. 341m²

Existing Permeable Total Area is Approx. 457m²

Existing Impermeable Area Represents Approx. 43% From The Total Considered Area.

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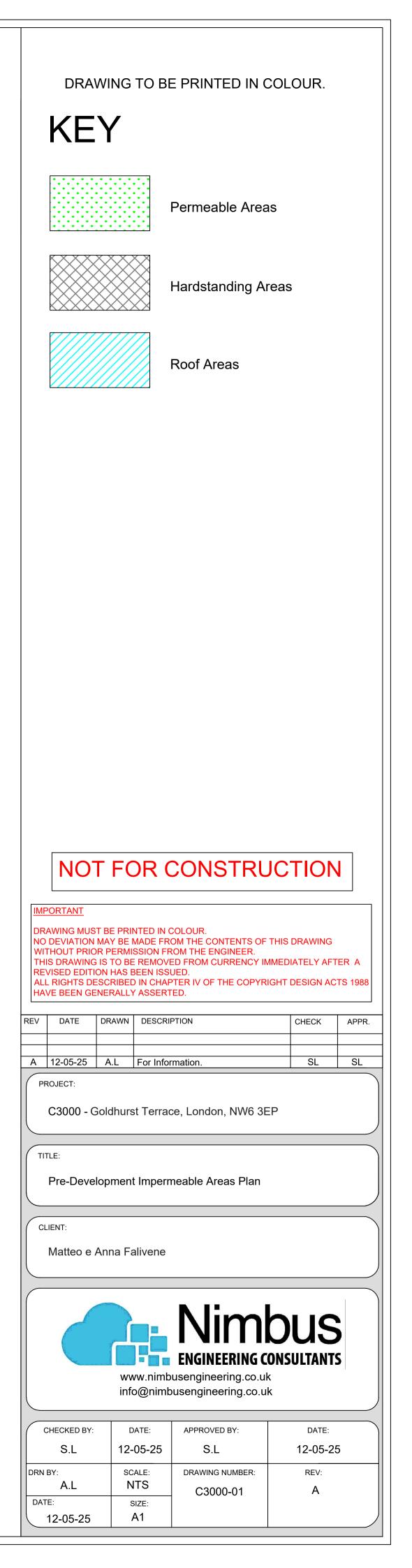
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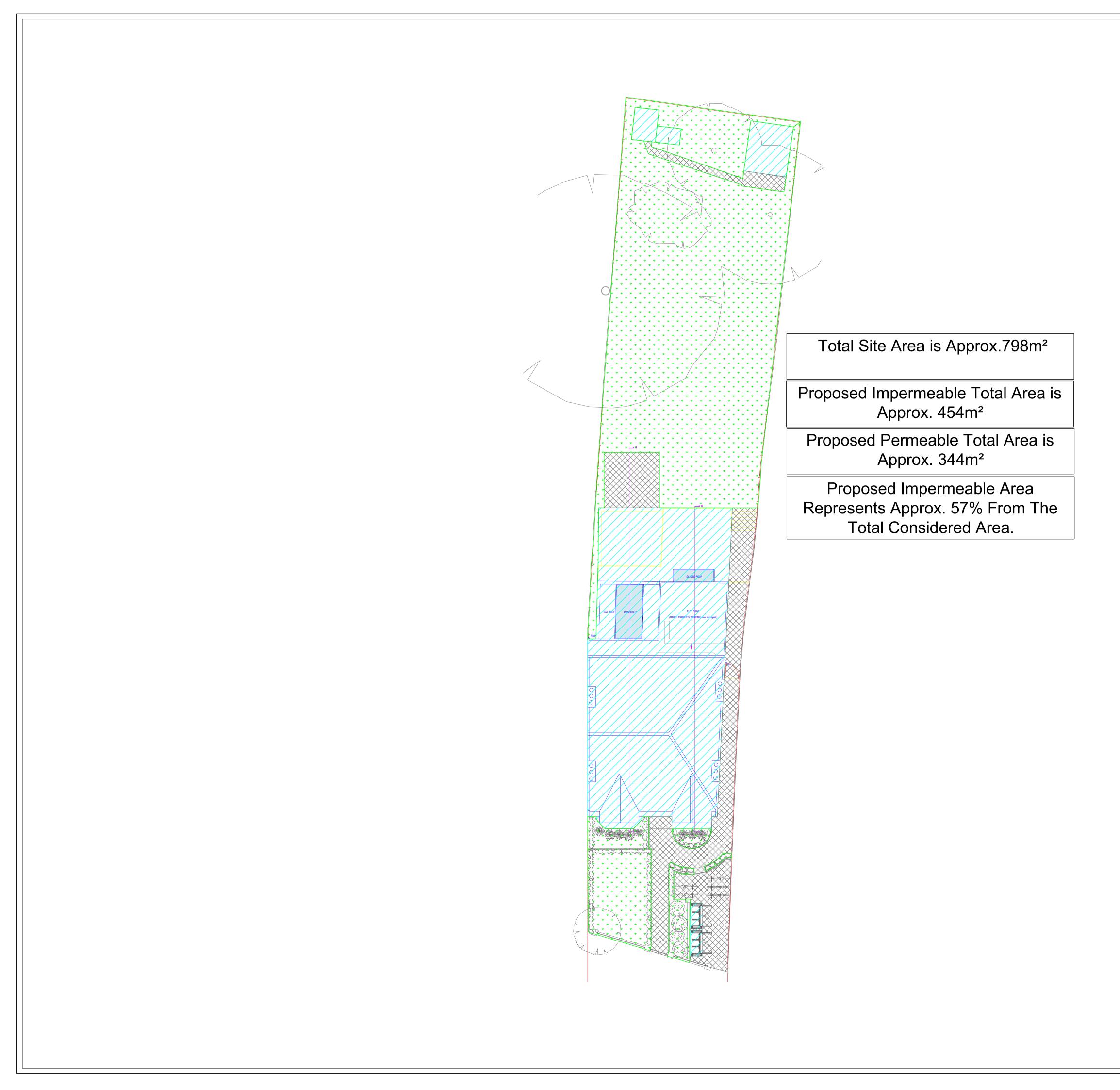
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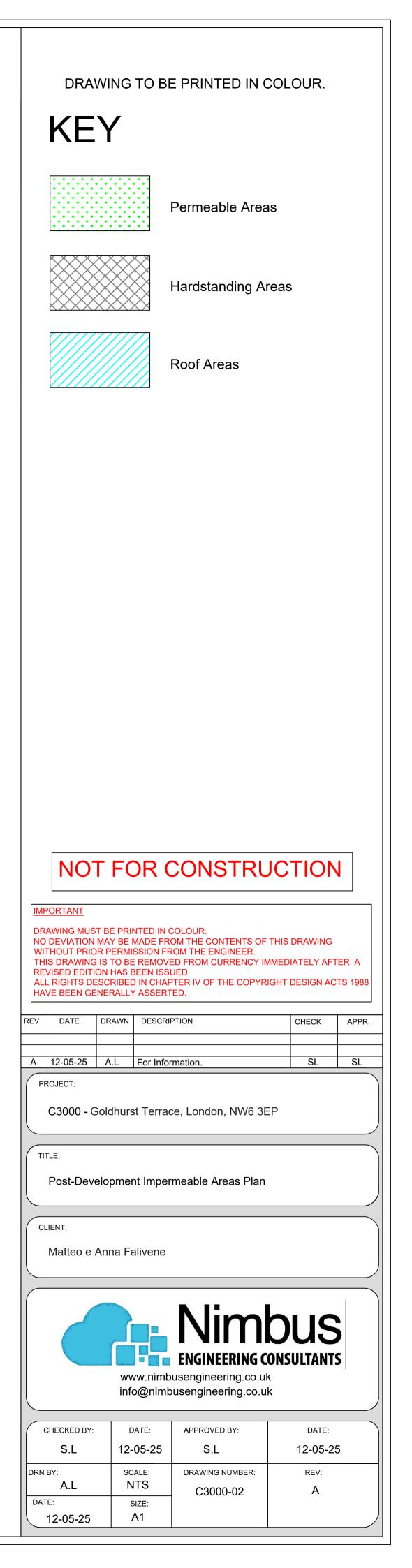
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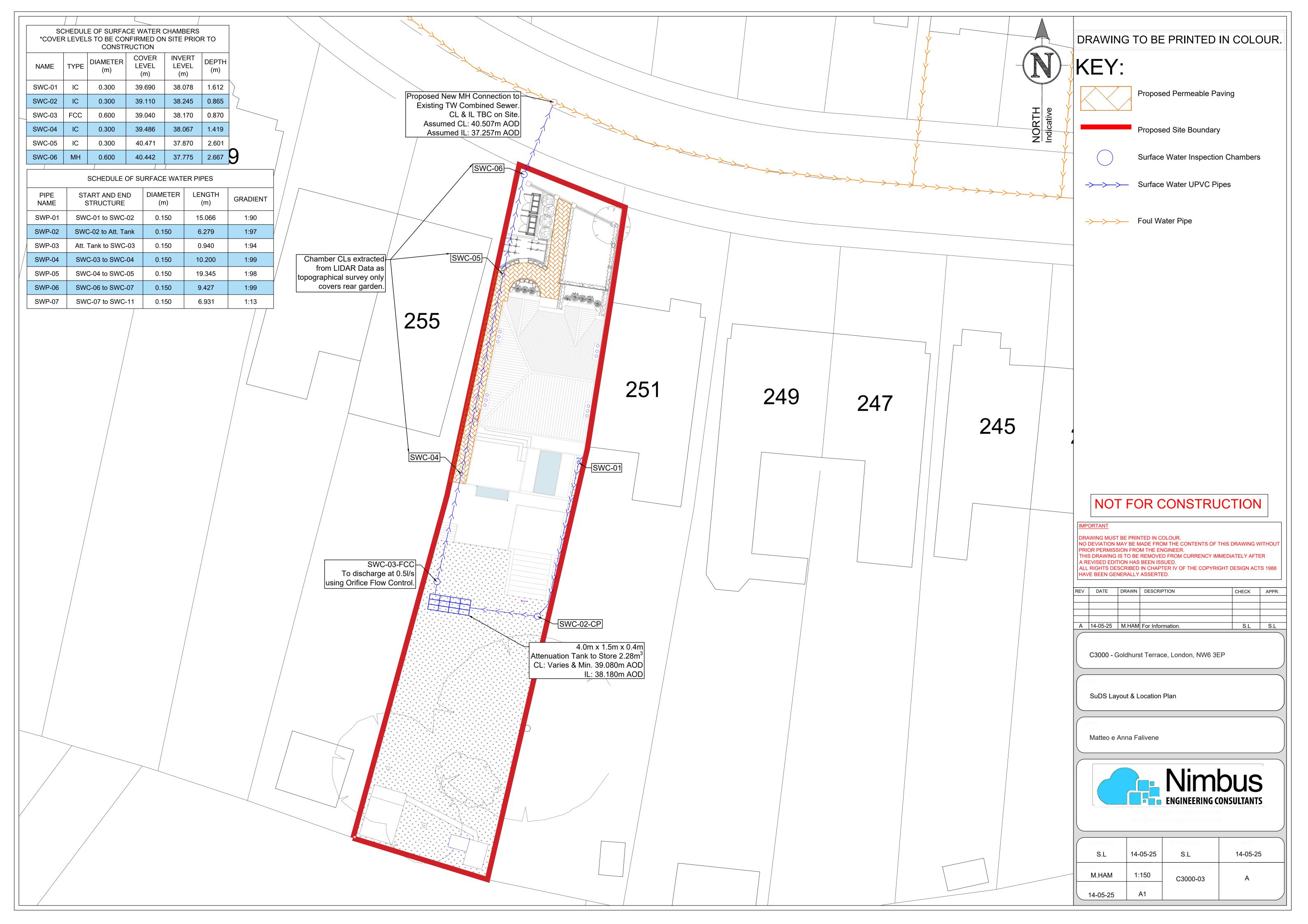
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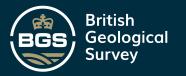




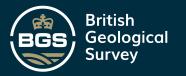




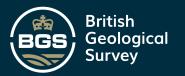
APPENDIX B – HISTORIC BOREHOLES



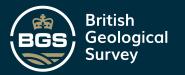
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RECORD OF SHA Name of Shaft or Bore given by	SURVEY OF GREAT BRITAIN FT OR BORE FOR MINERALS Geological Survey:	6-inch Map	Registered $0.85 \in 10^{-8}$				
Name and Number given by ow Aben est	ner:te no.16.	Nat. Grid R					
For whom made	L.C.C.	25	5758390				
Exact site See fla under 762850	$\frac{1}{2} \frac{1}{2} \frac{1}$	1" N.S.Map No. 2 56.	1" O.S.Map No.	Confidential or not			
Purpose for which made.	nau		, shaf	<u> </u>			
	to O.D If not ground level giv						
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(For Survey use only) Geological Classification	DESCRIPTION OF STRATA	THICKN FT.		DEPTH FT. IN.			
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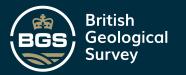
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Made by		Date of	sinking	-
Information from			eived	
Examined by	There and additional	NOTE		
(For Survey use only) GEOLOGICAL	DESCRIPTION OF STRATA	Тніск	NESS	Двртн
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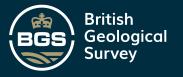
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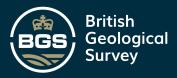
RECORD OF SH Name of Shaft or Bore given	IAFT OR BORE FOR MINERALS by Geological Survey:		p Registered		80
Name and Number given by Abbey est	E IN	Nat. Grid I 2-	Reference 575.	8383	3
Exact site See fla T @ 28 50 / 3	Attach a tracing from Attach a tracing from a map, or a sketch- map, if possible.	1" N.S.Map No. 256	1" O.S.Map No.	Confiden or not	
Purpose for which made	ive to O.D	O.D. of begin	nning of sha	.ft re	
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			ceived		
Examined by	SPECIMEN NUMBERS AND ADDITIONAL N				
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(For Survey use only) Geological Classification	DESCRIPTION OF STRATA	Тиісі Fr.	KNESS IN.	Depth Ft.	
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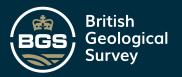
RECORD OF S Name of Shaft or Bore give	HAFT OR BORE FOR MINERALS en by Geological Survey:		Registered	
For whom made	estate no17	Nat. Grid H	Reference	380
Fown or Village He	ampshead county London plancith Attach a tracing from	1" N.S.Map No. 256	1" O.S.Map No,	Confidential or not
•	ative to O.D. If not ground level give	ve O.D. of begin	ning of shaf	i it
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(For Survey use only) Geological Classification	DESCRIPTION OF STRATA	Тніскі Fr.		Depth Ft. IN.
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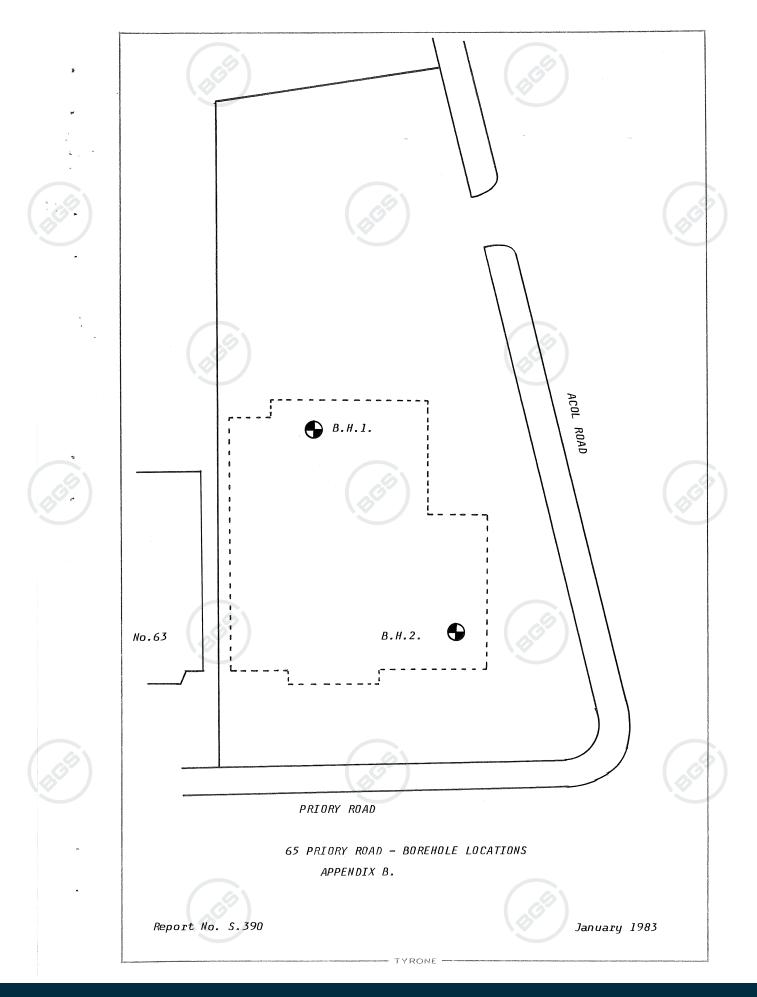


DOREHOLE SECTION SHEET Dore 19. 35 Contract Name Description Bord for: Subsets Contages Bord for: Subsets Contages Address of Str: Colstate Stream Ditics or Town Sites Contages Contract Name Sites Contages Contract Name Sites Contages Ditics or Town Sites Contages Contract Name Sites Contages Dir Samples: Sites Contages Sites Contages Sites Contages Dir Samples: Sites Contages Sites Contages Sites Contages Sites Contages Sites Contages Dir Scale Stream Sites Contages Sites Contages Sites Contages Sites Contages Sites Contages Sites Contages Sites Contages Sites Contages			GROUND EX	PLORATIONS LIMIT	SE/ 276 2623,840 256 ED	
CONTEXACT NAME Orders Contrage. Bored for: Massace. Coolinati-Jeadel & Fastacers. Address of Site : Colindade Gastless District of Town : Beins Cottage Standing Weter Level : below surface Dia. of Borchols : & Inches. Water Strack (1) Rose (2) (3) Boring Commenced : 5,15,55 Boring Completed : 6,122,55 Special Remarks : Jar Samples : 2073 2074 2079 2075 2070 2076 1310°, 2072 13°0°, 2072 2000 22°0°, Core Samples : 2073 2074 2075 2070 2076 1310°, 2073 13°0°, 2070 2001 23'6° - 55'0°, Sand(Gravel Samples : Discontrol of Strakta No & Boring : Descriptions are given in anoschare with the Civit Ragingening Code of Predice No. 1 'Ste Leveling to the for surface in the sample monitod. No & Boring : The descriptions are given in anoschare with the Civit Ragingening Code of Predice No. 1 'Ste Leveling to the institute of these baseling stary 12 'S', 20 'S',		В	OREHOLE	SECTION	SHEET	
Define Gestage. Bored for : Secrets. Gestage Gestage Address of Site : Colstage Gestage District or Town :: Brites Cottage Standing Water Level : below surface Water Struck (1) Bone (2) Boring Commenced 9.13,555 Special Remarks : Jar Samples: Jar Samples: 2071 200" 2072 3000 2210" Core Samples: 2073 3055 2210" Standifyrawd Samples: 2073 1316" + 3000 2210" Stand/Gravel Samples: 2073 1316" + 300" 2075 1010" + 1114" + 3077 14450 + 1450" + 1500" Stand/Gravel Samples: 2073 1316" + 2510" Discritterion Peet Index No. * Boring Discritterion Peet Index Peet Index Peet Index Samples: No. * Discritterion 20 0 7 0,935 Discritterion 20 0 7 0,935 Discritterion 20 0 7 0,935 Discretion 20 0 7 0,935				Date	그는 말을 가 있는 것 않았는 것 같이 있는 것이 없다.	
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Boring Commenced: \$,12,55 Boring Completed: 6,12,55 Special Remarks: Image: Imag						- ALLER AND A A
Special Remarks : Jar Samples : 2071 2'00", 2572 5'0", 2079 9'0", 2075 13'0", 2078 17'0", 9800 22'0", Core Samples : 2079 13'4" - 20'0", 2573 10'0" - 11'6", 2577 14'6" - 16'0", 2079 13'4" - 20'0", 2587 25'0", 2007 20'1", 2007 25'5", 25'0", 2007 20'1", 2007 25'5", 2000 - 20'1", 2007 20'1", 2007 25'5", 2000 - 20'1", 2007 20'1", 2007 25'5", 2000 - 20'1", 2007 20'1"	n fan Deberen. Sjock	and the second			1: • • • • • • • • • • • • • • • • • • •	
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	Lining tubes : 200 mm to 1	<u>,5 m</u>			Ground	Level	_	1	<u> </u>
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	Description of Strata	Legend	Depth	Reduced Level	N-value	Pepth	Д).Þe	Leve)	C.ª
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	MÄDE GROUND Soft to firm brown clay with many broken bricks and de-composed mortar		1.00						
	LONDON CLAY Firm slightly silty brown mottled grey CLAY with extensive close fissuring. Occassional clay stones.		1		SPT 5	1.50 2.50	J U100		1
	Becoming firm to stiff Very stiff slightly silty		1.00 1.00			-2.95	U100		
	dark brown slightly mottled grey CLAY with some fissures and thin partings of grey fine silt		4.00			-3.95 4.50	U100		
	Gypsum crystals from 5.00m		5.00			-4.95			
			6.00		SPT27	6.00	J		
_			7.00		SPT33	7.50	J		
	Very stiff to hard slightly silty blue-grey CLAY with many large fissures. Some silty and sandy partings		9.00			8.75	J		
	Becoming hard					9.50 -9.95	<i>U100</i>	B.H. Dry	



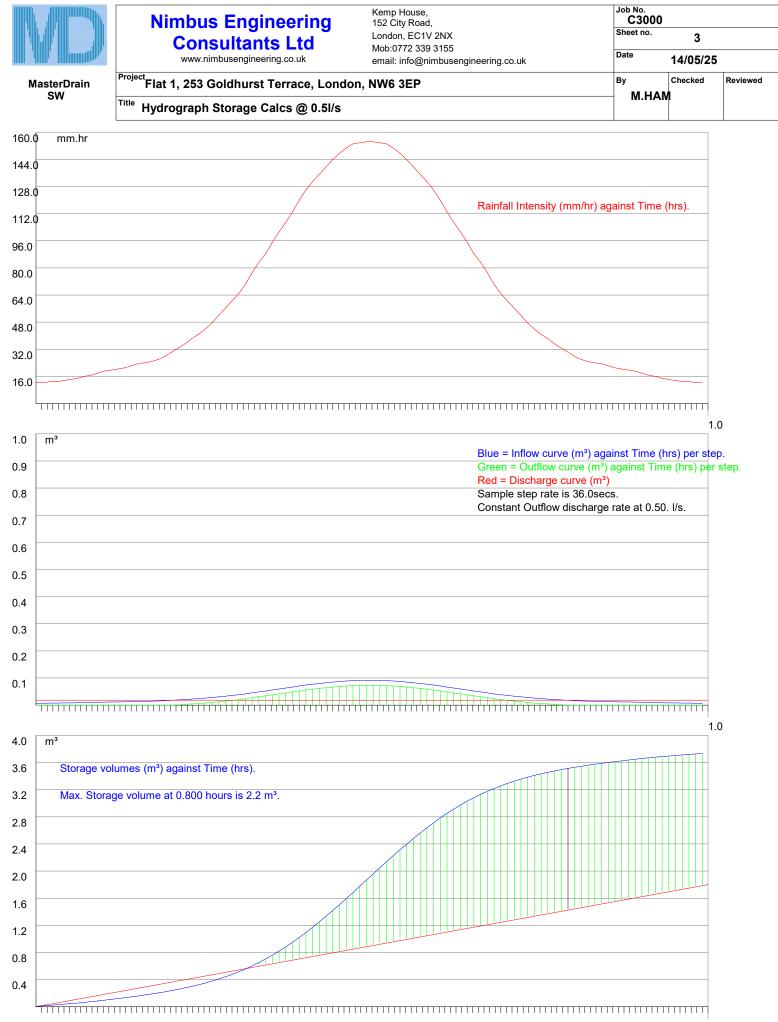


Flat 1, 253 Goldhurst Terrace, London, NW6 3EP Nimbus Engineering Consultants Ltd Flood Risk Assessment and SuDS Report May 2025

APPENDIX C – SURFACE WATER RUN OFF CALCULATIONS

Nimbus Engineering Consultants Lid Usering for the first with the										
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				Kemp House,			Job No.		
	Nimb	us Engin	eering	152 City Road,			C3000 Sheet no.		
		nsultants	_	London, EC1V 2NX Mob:0772 339 3155				2	
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MasterDrain	Flat 1, 25	3 Goldhurst Te	errace, Londo	n, NW6 3EP			Ву	Checked	Reviewed
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Time (hrs)	%Mean intens	Rain mm/hr	Inflow (m3)	Outflow (m3)	Balance (m3)	Cumula (mi			
0.410	204.0	125.9	0.074	0.018	0.056	-	.497		
0.420	212.0	130.9	0.077	0.018	0.059		.556		
0.430	219.0	135.2	0.080	0.018	0.062		.618		
0.440	226.0	139.5	0.082	0.018	0.064	0	. 682		
0.450	233.0	143.8	0.085	0.018	0.067	0	.749		
0.460	239.0	147.6	0.087	0.018	0.069	0	.818		
0.470	244.0	150.6	0.089	0.018	0.071		.889		
0.480	248.0	153.1	0.090	0.018	0.072		.962		
0.490	249.0	153.7	0.091	0.018	0.073		.034		
0.500	250.0	154.3	0.091	0.018	0.073		.107		
0.510 0.520	250.0 249.0	154.3 153.7	0.091 0.091	0.018 0.018	0.073 0.073		.180 .253		
0.520	249.0	153.1	0.091	0.018	0.072		. 325		
0.540	243.0	150.6	0.089	0.018	0.072		. 396		
0.550	239.0	147.6	0.087	0.018	0.069		.465		
0.560	233.0	143.8	0.085	0.018	0.067		. 532		
0.570	226.0	139.5	0.082	0.018	0.064	1	. 597		
0.580	219.0	135.2	0.080	0.018	0.062	1	.658		
0.590	212.0	130.9	0.077	0.018	0.059		.718		
0.600	204.0	125.9	0.074	0.018	0.056		.774		
0.610	194.0	119.8	0.071	0.018	0.053		.827		
0.620	183.0	113.0	0.067	0.018	0.049		.875		
0.630 0.640	173.0 164.0	106.8 101.3	0.063 0.060	0.018 0.018	0.045 0.042		.920 .962		
0.650	154.0	95.1	0.056	0.018	0.042		.000		
0.660	143.0	88.3	0.052	0.018	0.034		.034		
0.670	135.0	83.3	0.049	0.018	0.031		.065		
0.680	125.0	77.2	0.046	0.018	0.028		.093		
0.690	114.0	70.4	0.042	0.018	0.024	2	.116		
0.700	105.0	64.8	0.038	0.018	0.020	2	.137		
0.710	98.0	60.5	0.036	0.018	0.018		.154		
0.720	91.0	56.2	0.033	0.018	0.015		.169		
0.730	84.0	51.9	0.031	0.018	0.013		.182		
0.740	77.0	47.5	0.028	0.018	0.010		.192		
0.750 0.760	71.0 66.0	43.8 40.7	0.026 0.024	0.018 0.018	0.008 0.006		.200 .206		
0.780	62.0	38.3	0.024	0.018	0.005		.208 .211		
0.780	57.0	35.2	0.023	0.018	0.003		.213		
0.790	53.0	32.7	0.019	0.018	0.001		.215		
0.800	49.0	30.3	0.018	0.018	0.000		.214		
0.810	45.0	27.8	0.016	0.018	0.000	2	.213		
0.820	42.0	25.9	0.015	0.018	0.000	2	.210		
0.830	40.0	24.7	0.015	0.018	0.000		.207		
0.840	39.0	24.1	0.014	0.018	0.000		.203		
0.850	38.0	23.5	0.014	0.018	0.000		.199		
0.860	36.0	22.2	0.013	0.018	0.000		.194		
0.870 0.880	34.0 33.0	21.0 20.4	0.012 0.012	0.018 0.018	0.000 0.000		.188 .182		
0.890	32.0	19.8	0.012	0.018	0.000		.182		
0.900	31.0	19.0	0.012	0.018	0.000		.169		
0.910	29.0	17.9	0.011	0.018	0.000		.162		
0.920	27.0	16.7	0.010	0.018	0.000		.154		
0.930	26.0	16.1	0.009	0.018	0.000		.145		
0.940	24.0	14.8	0.009	0.018	0.000		.136		
0.950	23.0	14.2	0.008	0.018	0.000		.126		
0.960	22.0	13.6	0.008	0.018	0.000		.116		
0.970	21.0	13.0	0.008	0.018	0.000		.106		
0.980	21.0	13.0	0.008	0.018	0.000		.096		
0.990	20.0	12.3	0.007	0.018	0.000		.085		
1.000	20.0	12.3	0.007	0.018	0.000	2	.074		





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MasterDrain SW

^{Project}Flat 1, 253 Goldhurst Terrace, London, NW6 3EP

Title Hydrograph Storage Calcs @ 0.5l/s

Maximum storage volumes for varying duration storms.

Kemp House, 152 City Road,

London, EC1V 2NX

Mob:0772 339 3155

email: info@nimbusengineering.co.uk

Storm length	Max. Vol	Max. Vol	Mean intens	Step time.	Peak found
(hrs)	(m³)	time	(mm/hr)	(mins)	
0.25	1.89	0.25	154.79	0.2	
0.5	2.17	0.50	100.26	0.3	
1	2.21	1.00	61.74	0.6	Peak found
2	1.88		36.70	1.2	
3	1.46		26.71	1.8	
4	1.03		21.20	2.4	
5	0.67		17.72	3.0	
6	0.36		15.31	3.6	
7	0.12		13.53	4.2	
8	0.00		12.14	4.8	
9	0.00		11.04	5.4	
10	0.00		10.14	6.0	
12	0.00		8.75	7.2	
15	0.00		7.29	9.0	
18	0.00		6.29	10.8	
20	0.00		5.77	12.0	
24	0.00		4.97	14.4	
30	0.00		4.14	18.0	
36	0.00		3.56	21.6	
42	0.00		3.14	25.2	
48	0.00		2.81	28.8	
54	0.00		2.55	32.4	
60	0.00		2.34	36.0	
66	0.00		2.16	39.6	
72	0.00		2.01	43.2	
84	0.00		1.77	50.4	
96	0.00		1.58	57.6	
120	0.00		1.32	72.0	
150	0.00		1.09	90.0	
175	0.00		0.96	105.0	
200	0.00		0.86	120.0	
250	0.00		0.71	150.0	
300	0.00		0.61	180.0	
375	0.00		0.51	225.0	
500	0.00		0.40	300.0	
750	0.00		0.29	450.0	
1000	0.00		0.23	600.0	
1250	0.00		0.19	750.0	
1500	0.00		0.16	900.0	
1570	0.00		0.16	942.0	
2000	0.00		0.13	1200.0	
2500	0.00		0.11	1500.0	
3000	0.00		0.09	1800.0	
3500	0.00		0.08	2100.0	
4000	0.00		0.07	2400.0	

Job No. C3000 Sheet no. 4 Date 14/05/25 Checked Reviewed M.HAM

Ву

MD			Ni	С	on	su	Engineering Iltants Ltd sengineering.co.uk		Mob:	City R on, E 0772	load C1V 339	l, / 2NX) 3155 imbusengineerii							Job N C: Sheet Date	o. 3000 no.	5 14/05/	
MasterDrain SW	P	roject	Flat	1, 2	253 (Gole	dhurst Terrace, Lond	don				Indusengineen	ig.co.uk						Ву	I.HAM	Checked	Review
3₩	Ті	^{itle} H	lydr	ogr	aph	Sto	orage Calcs @ 0.5l/s												IV			
	Se	anie	nti	al	stor	age	e volume at specifi	C S	storm	dur	at	ions.										
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30

50 70 100

300

500 700 1000

3000

5 7 10

.3 .5 .7 1 3 Storm duration (hours)

0.0.0



Nimbus Engineering Consultants Ltd

www.nimbusengineering.co.uk

MasterDrain SW

Job No Kemp House, C3000 152 City Road, Sheet no. London, EC1V 2NX 6 Mob:0772 339 3155 Date 14/05/25 email: info@nimbusengineering.co.uk ^{Project}Flat 1, 253 Goldhurst Terrace, London, NW6 3EP By Checked M.HAM

Reviewed

Title Hydrograph Storage Calcs @ 0.5l/s

Explanatory notes for Peak Flow Storage

- 1) This system uses the rainfall intensity/ duration curve calculated using either the Wallingford or FEH method as selected.
- 2) The balance is calculated from the inflow minus the outflow.
- 3) The storage volume is the maximum value of the balance curve.
- 4) This method was described by Davis (1963) see Butler & Davies, 2nd edition, p294
- 5) References to 'storm duration' relate only to the hydrograph method (qv).
- 6) There are always 600 steps in the calculation process, thus a 'run' time of 10 hours will be sampled every minute.

Explanatory notes for Hydrograph Storage

- 1) The user has the choice of Summer or Winter curves
- 2) The mean intensity varies with the duration of the storm curve
- 3) There are always 120 steps in the calculation process, irrespective of storm duration.
- 4) The balance is calculated from the inflow minus the outflow.
- 5) The storage volume is the sum of the balance values for each step.
- 6) Varying durations should be tried to find the maximum storage value this can be narrowed down very closely.

*Modelling using the flow characteristics of the restrictor is available using Vortex Control modelling function. Please be aware that this function needs the full design data file to function.

Why do the two methods give different results?

The rainfall characteristics for each method are very different.

The Peak flow (using the Intensity/Duration/Frequency curve) does not model the actual rainfall. This curve is joined points which represent the mean intensity of a storm at a given duration i.e. a value of 19.5 mm/hr for a 60 minute storm indicates that over the sixty minute period, the mean intensity was 19.5 mm/hr. The calculation method samples the IDF curve for a given location and frequency (Return Period) and calculates the storage for that rate and duration less the outflow volume. The maximum value is displayed as the 'worst case' storage.

The hydrograph method uses a standard curve for either Winter or Summer storms. Traditionally these are symmetrical about the central peak. UK rainfall does not fit into this convenient curve, so the calculations are dealing with a stylised set of data. The mean intensity for the storm is calculated from the IDF curve and applied to the curve data, calculating the storage for that step less the outflow volume. The final storage volume is the sum of the storage for all the steps.

It can be seen that these two methods are very different, and the user may have the choice of which result to use. This is not an exact science, though is often treated as such by those that do not understand the principles of the calculations.

MD	Nimbus Engineering Consultants Ltd www.nimbusengineering.co.uk	Kemp House, 152 City Road, London, EC1V 2NX Mob:0772 339 3155 email: info@nimbusengineering.co.uk	Job No. C3000 Sheet no. Date	C3000 Sheet no. 1				
MasterDrain	^{Project} Flat 1, 253 Goldhurst Terrace, Londor		Checked	Reviewed				
HY 10.01	Title Pre & Post Development Surface Wate	r Runoff Calcs	M.HAN					

Data:-

Hydrology (FSR):-Location = Camden Long reference = 516119 M5-60 (mm) = 21 r = 0.43 Hyd. area = 6 Hydrograph = Winter

WRAP = 4 Grid reference = TQ1619 SAAR (mm/yr) = 640 Soil =0.47 Hyd. zone = 8 Area = England & Wales

Site values used in design:-

Total site area	= 0.0798 ha	Climate change factor	= 45 %
Pre-dev area drained	= 0.0341 ha	Post-dev area drained	= 0.0454 ha
Imperm runoff factor	= 100%	Perm runoff factor	= 20%
Pre-development			
-			
Area to soakaways	= 0.0000 ha	Area to other SUDS	= 0.0000 ha
Perv. area to SUDS	= 0.0000 ha	Pre-dev flow to drain	$= 0.00 \ 1/s$
Post-development			
Area to soakaways	= 0.0000 ha	Area to other SUDS	= 0.0000 ha
Perv. area to SUDS	= 0.0000 ha	Post-dev flow to drain	$1 = 0.00 \ 1/s$

Calculations:-

Revised Post-dev Imperm. area = 0.045 ha Equiv. Post-dev Imperm. area = 0.045 ha Equiv. Post-dev Perm. area = 0.007 ha Total Pre-dev equiv. area ha = 0.043 ha Total Post-dev equiv. area ha = 0.052 ha 100 yr 6 hour mean intensity = 10.56mm/hr

Results:-

peakflo	w runo:	ff (l/s	s) (m³/s)							
15	30	60	120	240	360	480	600	Max	CCF	Final	R.P.
10.1	6.6	4.2	2.6	1.5	1.1	0.9	0.8	10.1	N/A	10.1	1
24.6	15.8	9.7	5.8	3.4	2.4	1.9	1.6	24.6	N/A	24.6	30
32.1	20.8	12.8	7.6	4.4	3.2	2.5	2.1	32.1	N/A	32.1	100
-		• •	•								
15	30	60	120	240	360	480	600	Max	CCF	Final	R.P.
12.2	8.0	5.0	3.1	1.8	1.4	1.1	0.9	12.2	45	17.7	1
29.8	19.1	11.8	7.0	4.1	3.0	2.4	2.0	29.8	45	43.2	30
38.8	25.1	15.5	9.2	5.3	3.8	3.0	2.5	38.8	45	56.2	100
	15 10.1 24.6 32.1 peakfl 15 12.2 29.8	15 30 10.1 6.6 24.6 15.8 32.1 20.8 peakflow run 15 30 12.2 8.0 29.8 19.1	15 30 60 10.1 6.6 4.2 24.6 15.8 9.7 32.1 20.8 12.8 peakflow runoff (1/ 15 30 60 12.2 8.0 5.0 29.8 19.1 11.8	15 30 60 120 10.1 6.6 4.2 2.6 24.6 15.8 9.7 5.8 32.1 20.8 12.8 7.6 peakflow runoff (1/s) 15 30 60 120 12.2 8.0 5.0 3.1 29.8 19.1 11.8 7.0	10.1 6.6 4.2 2.6 1.5 24.6 15.8 9.7 5.8 3.4 32.1 20.8 12.8 7.6 4.4 peakflow runoff (1/s) 15 30 60 120 240 12.2 8.0 5.0 3.1 1.8 29.8 19.1 11.8 7.0 4.1	15 30 60 120 240 360 10.1 6.6 4.2 2.6 1.5 1.1 24.6 15.8 9.7 5.8 3.4 2.4 32.1 20.8 12.8 7.6 4.4 3.2 peakflow runoff (1/s) 15 30 60 120 240 360 12.2 8.0 5.0 3.1 1.8 1.4 29.8 19.1 11.8 7.0 4.1 3.0	15 30 60 120 240 360 480 10.1 6.6 4.2 2.6 1.5 1.1 0.9 24.6 15.8 9.7 5.8 3.4 2.4 1.9 32.1 20.8 12.8 7.6 4.4 3.2 2.5 peakflow runoff (1/s) 15 30 60 120 240 360 480 12.2 8.0 5.0 3.1 1.8 1.4 1.1 29.8 19.1 11.8 7.0 4.1 3.0 2.4	15 30 60 120 240 360 480 600 10.1 6.6 4.2 2.6 1.5 1.1 0.9 0.8 24.6 15.8 9.7 5.8 3.4 2.4 1.9 1.6 32.1 20.8 12.8 7.6 4.4 3.2 2.5 2.1 peakflow runoff (1/s) 15 30 60 120 240 360 480 600 12.2 8.0 5.0 3.1 1.8 1.4 1.1 0.9 29.8 19.1 11.8 7.0 4.1 3.0 2.4 2.0	15 30 60 120 240 360 480 600 Max 10.1 6.6 4.2 2.6 1.5 1.1 0.9 0.8 10.1 24.6 15.8 9.7 5.8 3.4 2.4 1.9 1.6 24.6 32.1 20.8 12.8 7.6 4.4 3.2 2.5 2.1 32.1 peakflow runoff (1/s) 15 30 60 120 240 360 480 600 Max 12.2 8.0 5.0 3.1 1.8 1.4 1.1 0.9 12.2 29.8 19.1 11.8 7.0 4.1 3.0 2.4 2.0 29.8	15 30 60 120 240 360 480 600 Max CCF 10.1 6.6 4.2 2.6 1.5 1.1 0.9 0.8 10.1 N/A 24.6 15.8 9.7 5.8 3.4 2.4 1.9 1.6 24.6 N/A 32.1 20.8 12.8 7.6 4.4 3.2 2.5 2.1 32.1 N/A peakflow runoff (1/s) 15 30 60 120 240 360 480 600 Max CCF 12.2 8.0 5.0 3.1 1.8 1.4 1.1 0.9 12.2 45 29.8 19.1 11.8 7.0 4.1 3.0 2.4 2.0 29.8 45	15 30 60 120 240 360 480 600 Max CCF Final 10.1 6.6 4.2 2.6 1.5 1.1 0.9 0.8 10.1 N/A 10.1 24.6 15.8 9.7 5.8 3.4 2.4 1.9 1.6 24.6 N/A 24.6 32.1 20.8 12.8 7.6 4.4 3.2 2.5 2.1 32.1 N/A 32.1 peakflow runoff (1/s) 15 30 60 120 240 360 480 600 Max CCF Final 12.2 8.0 5.0 3.1 1.8 1.4 1.1 0.9 12.2 45 17.7 29.8 19.1 11.8 7.0 4.1 3.0 2.4 2.0 29.8 45 43.2

```
Q_{BAR(rural)} = 0.347 \ 1/s or 4.347 \ 1/s/ha or 0.000 \ cumecs - from IoH \ 124.
```

The rainfall rates are calculated using the location specific values above in accordance with the Wallingford procedure.

	Nimbus Engineering	Kemp House, 152 City Road,	Job No. C3000			
	Consultants Ltd London, EC1V 2NX Mob:0772 339 3155		Sheet no.	2		
	www.nimbusengineering.co.uk	Date	14/05/25			
MasterDrain HY 10.01	Project Flat 1, 253 Goldhurst Terrace, Londo	on, NW6 3EP	^{ву} М.НАМ	Checked	Reviewed	
111 10.01	Title Pre & Post Development Surface Wat	ter Runoff Calcs				
		Data summary.				
Use the data	below for the SUR1 form					
Site areas:-						
Total si		0.0798 ha ;798.0 m² [3,	A]			
	velopment impermeable area =	0.0341 ha [3B]				
	velopment permeable area =	0.0457 ha 0.0454 ha [3C]				
	velopment permeable area =	0.0454 ha [50] 0.0344 ha				
P USI-ue	velopment permeable area –	0.0344 11a				
Peak runoff:-						
	velopment 1 year storm (15min) =	10.1 l/s [6A]				
	velopment 100 year storm (15min) =	32.1 l/s [6C]				
	evelopment 1 year storm (15min) =	12.2 l/s [6B]				
Post-de	evelopment 100 year storm (15min)=	38.76 l/s [6D]				
Greenfield ru	noff:-					
Q _{BAR(rural}	$_{0} = 0.347 $ l/s or 4.347 l/s/ha	or 0.000 cumecs - from IoH 124.				
	ange factor:-					
L L	CF = 45%					
Volumes:-						
	Pre-development 100 yr/6hr sto					
		orm (add. volume with no SUDS)				
	Post-development 100 yr/6hr sto			8.0m ³		
F	Post-development add. predicted	d volume (No SUDS) [12C]	= 8	. 3m³		
You may al	.so require					
_	-	ion test calculations (if applica	able)			
	vidence to show runoff reduct					
I	information on calculation mether	hods (if applicable see next shee	et)			
Note						
N	Numbers in equane brackets rela	ata ta tha				

Numbers in square brackets relate to the Nov. 2010 v1.1 / issued 11/02/10 copy of SUR1



MasterDrain HY 10.01

^{Title} Pre & Post Development Surface Wat	er Runoff Calcs			
^{Project} Flat 1, 253 Goldhurst Terrace, Londo	^{ву} М.НАМ	Checked	Reviewed	
www.nimbusengineering.co.uk	email: info@nimbusengineering.co.uk	Date	14/05/25	_
Consultants Ltd	London, EC1V 2NX Mob:0772 339 3155	Sheet no.	3	
Nimbus Engineering	Kemp House, 152 City Road,	Job No. C3000		

Job No.

Definitions and methods

Hydrology

The hydrological constants are derived from the Wallingford maps. They are used to calculate location specific rainfall figures.

Site values and factors

Areas of the site should be entered in hectares (10000 m²). If the Pre-development site is a green field, this box is blank.

Climate Change Factor is initially set at 20% - this may be changed as required.

Greenfield runoff is calculated using the method described in IoH 124.

Runoff factors

The impermeable runoff factor is initially set at 98%

The permeable runoff factor is initially set at 20%

Note: the CCF and the runoff factors may be changed by the user to suit the development The areas draining to soakaways and other SUDS are entered in the appropriate box (in hectares)

Calculations

The post-development area is reduced by subtracting the areas that drain to soakaways or other SUDS, to give a revised figure.

All areas are then multiplied by the appropriate runoff factor to give an equivalent area with 100% runoff. These are then summated.

This gives a total pre-development equivalent area, and a similar figure for the post-development area. The 'Post-dev volume to drain (no SUDS)' gives the total runoff to drain if no SUDS were used.

Results

The pre- and post-development areas are subjected to 1,30 and 100 year return period storms with a duration of 15 to 600 minutes.

The Revised Post-dev Imperm. area is the area (in ha) that is not going to SUDS x impervious runoff factor.

The runoff rates are calculated for the chosen hydrograph (Summer or Winter) as I/s. Figures in red indicate m³/s The peak value is measured, multiplied by the CCF and the total maximum rate is shown.

The pre- and post-development volumes for a 100 year / 6 hour storm are calculated from the area under the hydrograph curve.

Post-dev volume (i.e. excess above SUDS) is that volume produced by the drained area that does not go to SUDS. Qbar(rural) is calculated in accordance with the procedure laid down in IoH 124

	Nimbus Engineer	Kemp Ho 152 City		Job (No.		
	Consultants Lt	London, I	EC1V 2NX	Shee	et no.	1	
	www.nimbusengineering.co.ul	k email: inf	2 339 3155 o@nimbusengineering.co.uk	Date	•	14/05/25	
MasterDrain HY 10.01	Project Flat 1, 253 Goldhurst Terrac	e, London, NW6 3E	EP	Ву	M.HAM	Checked	Reviewed
	Title IoH 124 (Qbar(urban))Runoff	Calcs					
Hydrological FSR Hydrol							
Location		Grid	reference = TQ1619				
M5-60 (mm)		r	= 0.43				
Soil runof			(mm/yr) = 640				
WRAP Hydrologic	= 4 cal area = 6		= England & Wales blogical zone = 8				
		_	-				
	sification for WRAP type c loamy over clayey soils		ermeable laver at sha	allow der	oth.		
		· ····································					
Design data: Area = 0.0		Ha - 798	m² % Urbanisa	ation = 4	13 009		
						0	
Calculation	mothod.						
	calculated from:-						
Q _{BAR(}	$_{urban}$; = $Q_{BAR(rural)}$ (1 + URBAN)	$2NC[1 + URBAN{$	(21/CIND) -0.3}]				
where:-							
NC	varies with the value of	-	0.00 0.000040335				
			= 0.92 - 0.00024SAAR = 0.74 - 0.000082SAAB	.			
	IOI IIUUNSAAKNOUU		- 0.74 - 0.0000823AAF	x			
CIN	ND = 102.4SOIL + 0.28(CW)	I – 125) C	CWI = Catchment Wetne	ess Index	C C		
so							
CIN	ND =29.732 CV	WI =66.615	NC =0.766				
	For areas less than 5	OHa a modifi	ad calculation which	multipl	ios		
	the 50Ha runoff value	by the ratio		50Ha is			
	-						
Q _{BAI}	$_{R(rural)} = 0.316 (1/s)$						
	$R_{(rural)} = 0.316 (1/s)$ $R_{(urban)} = 0.642 (1/s)$						
Q _{BAI}					t sto	rm	

MD	Nimbus Engineering Consultants Ltd www.nimbusengineering.co.uk	Kemp House, 152 City Road, London, EC1V 2NX Mob:0772 339 3155 email: info@nimbusengineering.co.uk	Job No. C3000 Sheet no. Date	2 14/05/25	
MasterDrain HY 10.01	^{Project} Flat 1, 253 Goldhurst Terrace, Londo	By M.HAN	Checked	Reviewed	
Calculated data:-	^{Title} IoH 124 (Qbar(urban))Runoff Calcs				

Mean Annual Peak Flow $Q_{BAR(urban)} = 0.64 \ 1/s$

Values	for	Q _{BAR(urban)}
--------	-----	-------------------------

Ret. per. 1yr	m³/hr 0.001	1/s 0.545	l/s/ha 6.834	Ret. per. 100yr	m³/hr 0.002	1/s 2.021	1/s/ha 25.327
2yr	0.001	0.565	7.075	100yr+20%	0.002	2.425	30.392
5yr	0.001	0.821	10.291	100yr+30%	0.003	2.627	32.925
10yr	0.001	1.039	13.025	200yr	0.002	2.374	29.749
30yr	0.001	1.431	17.930	200yr + 30%	0.003	3.086	38.674
50yr	0.002	1.681	21.065	500yr	0.003	2.881	36.101
				1000yr	0.003	3.311	41.488

Growth factors -

lyr	2yr	5yr	10yr	30yr	50yr	100yr	200yr	500yr	1000yr
0.85	0.88	1.28	1.62	2.23	2.62	3.15	3.70	4.49	5.16

The above is based on the Institute of Hydrology Report 124 to which you are referred for further details (see Sect 7). Note that the 200 year growth curve was taken from W5-074/A.

For WRAP type 1 soils, CIND can become negative for lower values of SAAR. In this case the CIND value is multiplied by -1 to return a positive value (CIND is very small at this point).

Flat 1, 253 Goldhurst Terrace, London, NW6 3EP Nimbus Engineering Consultants Ltd Flood Risk Assessment and SuDS Report May 2025

APPENDIX D – WATER AUTHORITY ASSET PLANS

Asset location search



Nimbus Engineering Consultants LTD Michealson Square,Office 8 Michealson Square

LIVINGSTON EH54 7DP

Search address supplied

194 Goldhurst Terrace London NW6 3HN

Your reference

C3146

Our reference

ALS/ALS Standard/2023_4925852

Search date

19 December 2023

Notification of Price Changes

From 1st April 2023 Thames water Property Searches will be increasing the prices of its CON29DW, CommercialDW Drainage & Water Enquiries and Asset Location Searches. Historically costs would rise in line with RPI but as this currently sits at 14.2%, we are capping it at 10%.

Customers will be emailed with the new prices by January 1st 2023.

Any orders received with a higher payment prior to the 1st April 2023 will be non-refundable. For further details on the price increase please visit our website at <u>www.thameswater-propertysearches.co.uk</u>



Thames Water Utilities Ltd Property Searches, PO Box 3189, Slough SL1 4WW



searches@thameswater.co.uk www.thameswater-propertysearches.co.uk



0800 009 4540





Search address supplied: 194, Goldhurst Terrace, London, NW6 3HN

Dear Sir / Madam

An Asset Location Search is recommended when undertaking a site development. It is essential to obtain information on the size and location of clean water and sewerage assets to safeguard against expensive damage and allow cost-effective service design.

The following records were searched in compiling this report: - the map of public sewers & the map of waterworks. Thames Water Utilities Ltd (TWUL) holds all of these.

This searchprovides maps showing the position, size of Thames Water assets close to the proposed development and also manhole cover and invert levels, where available.

Please note that none of the charges made for this report relate to the provision of Ordnance Survey mapping information. The replies contained in this letter are given following inspection of the public service records available to this company. No responsibility can be accepted for any error or omission in the replies.

You should be aware that the information contained on these plans is current only on the day that the plans are issued. The plans should only be used for the duration of the work that is being carried out at the present time. Under no circumstances should this data be copied or transmitted to parties other than those for whom the current work is being carried out.

Thames Water do update these service plans on a regular basis and failure to observe the above conditions could lead to damage arising to new or diverted services at a later date.

Contact Us

If you have any further queries regarding this enquiry please feel free to contact a member of the team on 0800 009 4540, or use the address below:

Thames Water Utilities Ltd Property Searches PO Box 3189 Slough SL1 4WW

Email: <u>searches@thameswater.co.uk</u> Web: <u>www.thameswater-propertysearches.co.uk</u>

Asset location search



Waste Water Services

Please provide a copy extract from the public sewer map.

Enclosed is a map showing the approximate lines of our sewers. Our plans do not show sewer connections from individual properties or any sewers not owned by Thames Water unless specifically annotated otherwise. Records such as "private" pipework are in some cases available from the Building Control Department of the relevant Local Authority.

Where the Local Authority does not hold such plans it might be advisable to consult the property deeds for the site or contact neighbouring landowners.

This report relates only to sewerage apparatus of Thames Water Utilities Ltd, it does not disclose details of cables and or communications equipment that may be running through or around such apparatus.

The sewer level information contained in this response represents all of the level data available in our existing records. Should you require any further Information, please refer to the relevant section within the 'Further Contacts' page found later in this document.

For your guidance:

- The Company is not generally responsible for rivers, watercourses, ponds, culverts or highway drains. If any of these are shown on the copy extract they are shown for information only.
- Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an 'as constructed' record. It is recommended these details be checked with the developer.

Clean Water Services

Please provide a copy extract from the public water main map.

Enclosed is a map showing the approximate positions of our water mains and associated apparatus. Please note that records are not kept of the positions of individual domestic supplies.

For your information, there will be a pressure of at least 10m head at the outside stop valve. If you would like to know the static pressure, please contact our Customer Centre on 0800 316 9800. The Customer Centre can also arrange for a full flow and pressure test to be carried out for a fee.

<u>Thames Water Utilities Ltd</u>, Property Searches, PO Box 3189, Slough SL1 4WW T 0800 009 4540 E <u>searches@thameswater.co.uk</u> I <u>www.thameswater-propertysearches.co.uk</u>





For your guidance:

- Assets other than vested water mains may be shown on the plan, for information only.
- If an extract of the public water main record is enclosed, this will show known public water mains in the vicinity of the property. It should be possible to estimate the likely length and route of any private water supply pipe connecting the property to the public water network.

Payment for this Search

A charge will be added to your suppliers account.





Further contacts:

Waste Water queries

Should you require verification of the invert levels of public sewers, by site measurement, you will need to approach the relevant Thames Water Area Network Office for permission to lift the appropriate covers. This permission will usually involve you completing a TWOSA form. For further information please contact our Customer Centre on Tel: 0845 920 0800. Alternatively, a survey can be arranged, for a fee, through our Customer Centre on the above number.

If you have any questions regarding sewer connections, budget estimates, diversions, building over issues or any other questions regarding operational issues please direct them to our service desk. Which can be contacted by writing to:

Developer Services (Waste Water) Thames Water Clearwater Court Vastern Road Reading RG1 8DB

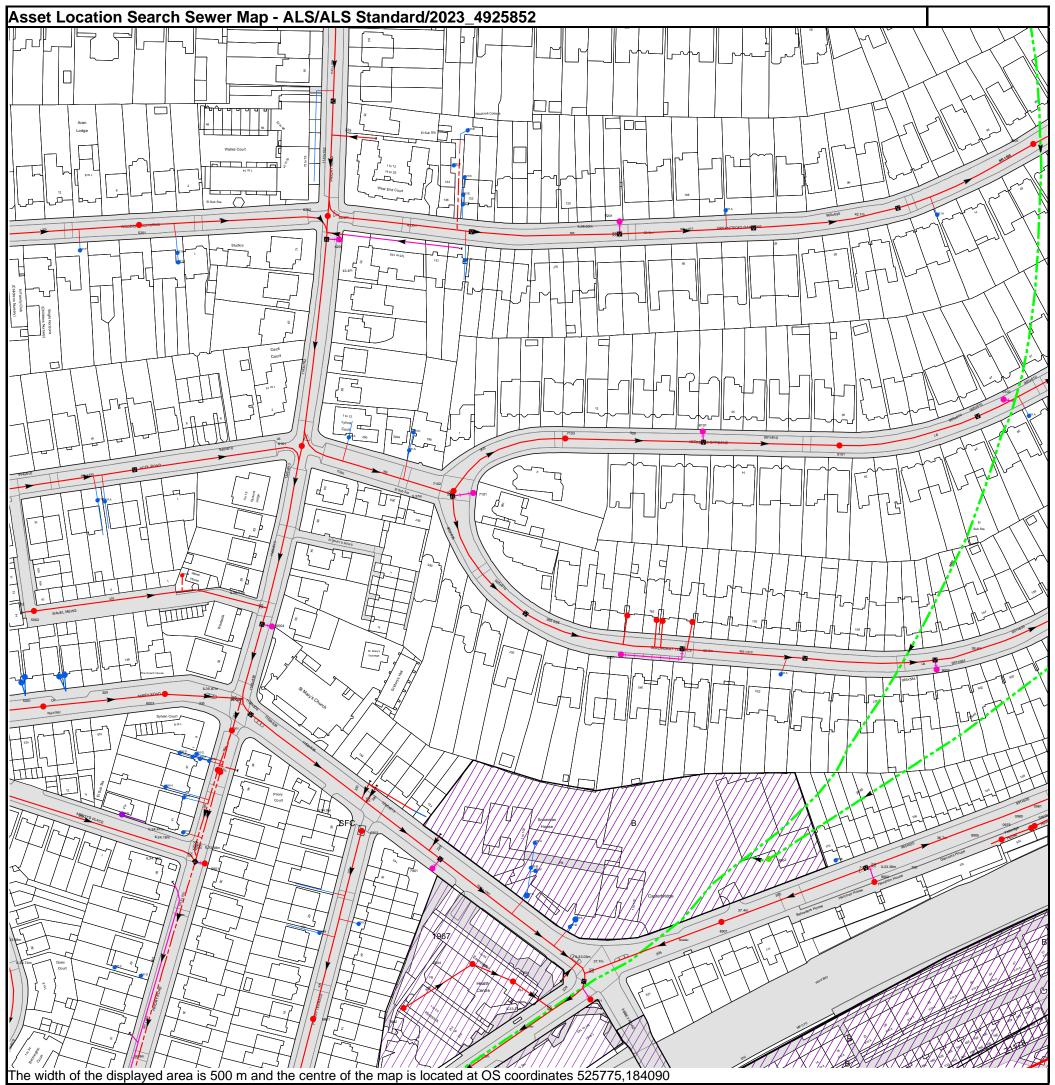
Tel: 0800 009 3921 Email: developer.services@thameswater.co.uk

Clean Water queries

Should you require any advice concerning clean water operational issues or clean water connections, please contact:

Developer Services (Clean Water) Thames Water Clearwater Court Vastern Road Reading RG1 8DB

Tel: 0800 009 3921 Email: developer.services@thameswater.co.uk



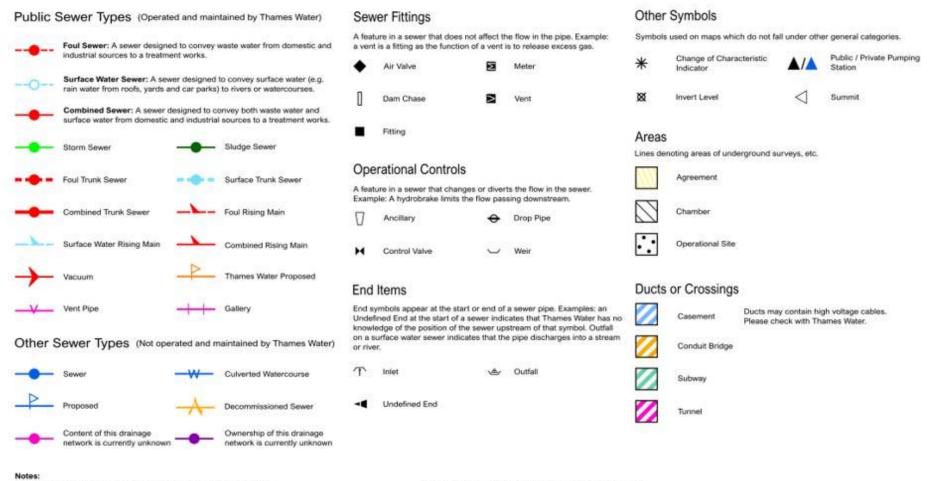
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Thames Water Utilities Ltd, Property Searches, PO Box 3189, Slough SL1 4W, T 0800 009 4540 E searches@thameswater.co.uk I www.thameswater-propertysearches.co.uk

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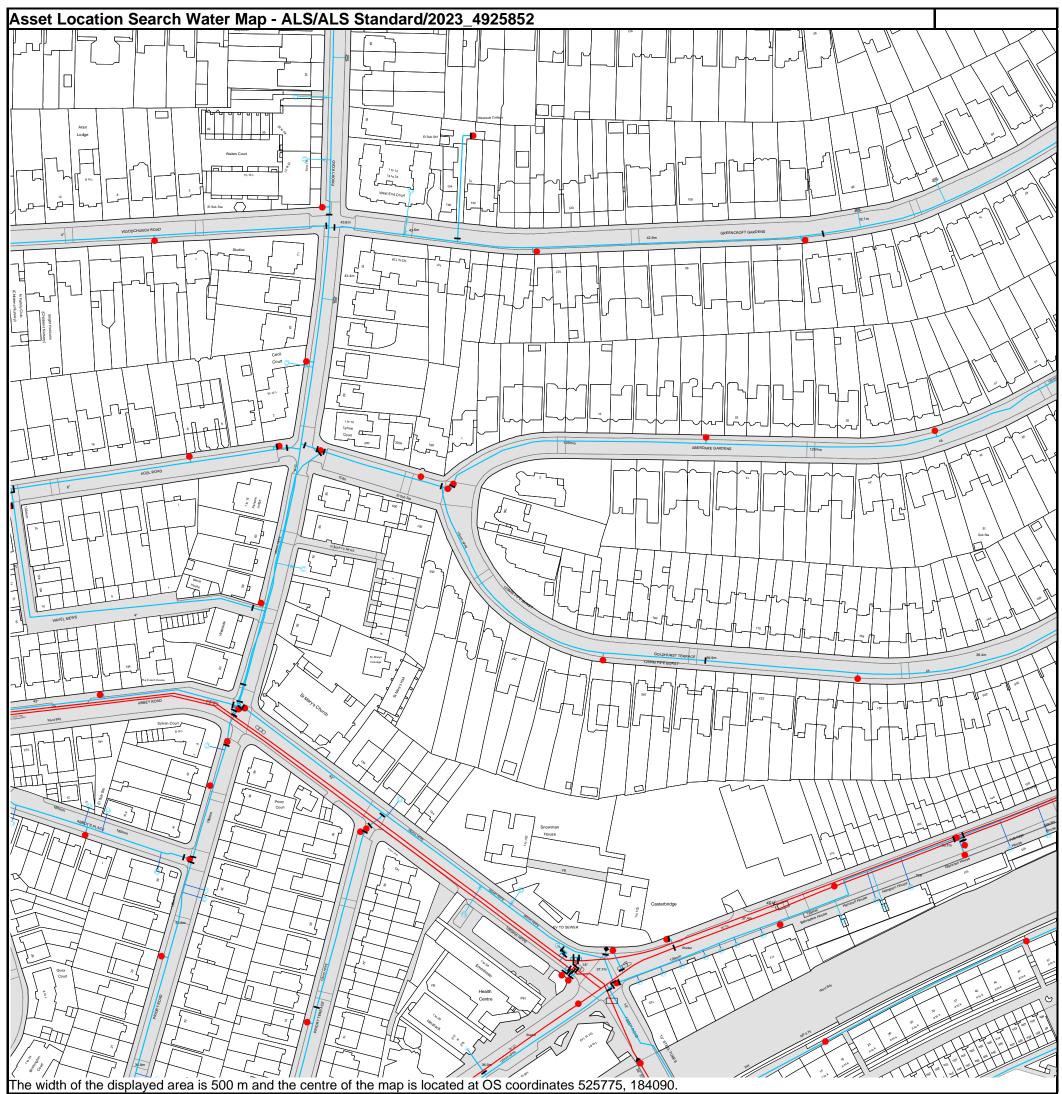
Asset Location Search - Sewer Key



- 1) All levels associated with the plans are to Ordnance Datum Newlyn.
- 2) All measurements on the plan are metric.
- 3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate the direction of flow.
- 4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.

5) 'na' or '0' on a manhole indicates that data is unavailable.

6) The text appearing alongside a server line indicates the internal diameter of the pipe in millimeters. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology, please contact Property Searches on 0800 009 4540.



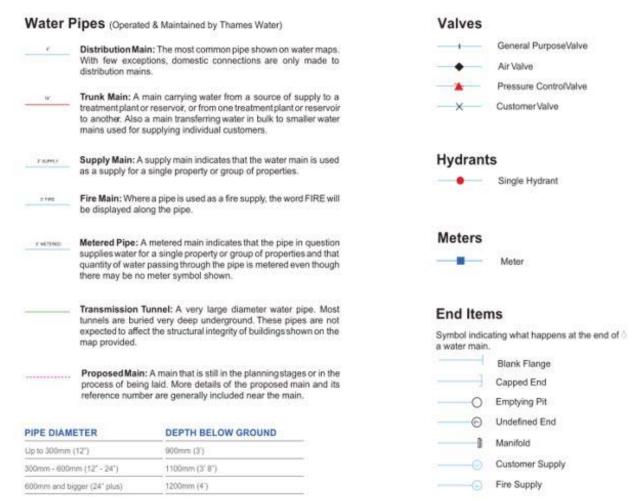
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

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<u>Thames Water Utilities Ltd</u>, Property Searches, PO Box 3189, Slough SL1 4W, T 0800 009 4540 E <u>searches@thameswater.co.uk</u> I <u>www.thameswater-propertysearches.co.uk</u>

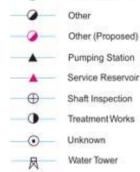


Asset Location Search - Water Key



Operational Sites

Meter



Booster Station

Other Symbols

Data Logger



Casement: Ducts may contain high voltage cables. Please check with Thames Water.

Other	Water Pipes (Not Operated or Maintained by Thames Water)
	Other Water Company Main: Occasionally other water company water pipes may overlap the border of our clean water coverage area. These mains are denoted in purple and in most cases have the owner of the pipe displayed along them.
	 Private Main: Indiates that the water main in question is not owned by Thames Water. These mains normally have text associated with them indicating the diameter and owner of the pipe.

Payment Terms and Conditions

All sales are made in accordance with Thames Water Utilities Limited (TWUL) standard terms and conditions unless previously agreed in writing.

- 1. All goods remain in the property of Thames Water Utilities Ltd until full payment is received.
- 2. Provision of service will be in accordance with all legal requirements and published TWUL policies.
- 3. All invoices are strictly due for payment within 14 days of the date of the invoice. Any other terms must be accepted/agreed in writing prior to provision of goods or service or will be held to be invalid.
- 4. Penalty interest may be invoked by TWUL in the event of unjustifiable payment delay. Interest charges will be in line with UK Statute Law 'The Late Payment of Commercial Debts (Interest) Act 1998'.
- 5. Interest will be charged in line with current Court Interest Charges, if legal action is taken.
- 6. A charge may be made at the discretion of the company for increased administration costs.

A copy of Thames Water's standard terms and conditions are available from the Commercial Billing Team (cashoperations@thameswater.co.uk).

We publish several Codes of Practice including a guaranteed standards scheme. You can obtain copies of these leaflets by calling us on 0800 316 9800.

If you are unhappy with our service, you can speak to your original goods or customer service provider. If you are still not satisfied with the outcome provided, we will refer the matter to a Senior Manager for resolution who will provide you with a response.

If you are still dissatisfied with our final response, and in certain circumstances such as you are buying a residential property or commercial property within certain parameters, The Property Ombudsman will investigate your case and give an independent view. The Ombudsman can award compensation of up to $\pounds 25,000$ to you if he finds that you have suffered actual financial loss and/or aggravation, distress, or inconvenience because of your search not keeping to the Code. Further information can be obtained by visiting www.tpos.co.uk or by sending an email to admin@tpos.co.uk.

If the Goods or Services covered by this invoice falls under the regulation of the 1991 Water Industry Act, and you remain dissatisfied you can refer your complaint to Consumer Council for Water on 0300 034 2222 or write to them at Consumer Council for Water, 1st Floor, Victoria Square House, Victoria Square, Birmingham, B2 4AJ.

Ways to pay your bill

Credit Card	BACS Payment	Telephone Banking
Please Call 0800 009 4540 quoting your invoice number starting CBA or ADS	Account number 90478703 Sort code 60-00-01 A remittance advice must be sent to: Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW. or email ps.billing@thameswater.co.uk	By calling your bank and quoting: Account number 90478703 Sort code 60-00-01 and your invoice number

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