5 THE GROVE,
HIGHGATE VILLAGE
LONDON, N6 6JU

FLOOD RISK ASSESSMENT

REF : 230821
DATE : September 2021
STATUS PLANNING APPLICATION

Prepared by
J.M.Burgess
Hull Raiser Ltd
Dagmar House
Mill Hill Road
Cowes
Isle of Wight

e-mail :
Technical@Hullraiser.co.uk

Contents

ACRONYMS AND ABBREVIATIONS

AEP	Annual Exceedance Probability
CIRIA	Construction Industry Research and Information Association
DEFRA	Department for Environment, Food and Rural Affairs
EA	Environment Agency
ha	Hectares
LLFA	Lead Local Flooding Authority
LPA	Local Planning Authority
NPPF	National Planning Policy Framework
NPPG	National Planning Policy Guidance to the National Planning Policy Framework
NTS	Non-statutory Technical Standards
LFRA	Local Flood Risk Assessment
LBC	London Borough of Camden
SuDS	Sustainable Drainage Systems
PPG	Planning Practise Guide
BGS	British Geological Society
TE2100	Thames Estuary 2100
SFRA	Strategic Flood Risk Assessment
SPZ	Source Protection Zone
SWMP	Surface Water Management Plan
CDA	Critical Drainage Area

Revision Control Schedule

-	08/09/21	Draft Issue	JMB	AL	-
Rev	Date	Revision Details	Prepared by	Checked by	Approved by

1.0 Introduction

1.1 This Flood Risk Assessment (FRA) has been commissioned by SM Planning Ltd, 80-83 Long Lane, London, N6 6JU. It is to form part of the Planning Application made to the London Borough of Camden for the extension of the lower ground floor to form a new basement beneath the front garden

1.2 The property is an historic substantial terraced building with existing lower ground floor levels.

1.3 The FRA has been prepared in accordance with the requirements of National Planning Policy Framework (NNPF) and the adopted London Borough of Camden Strategic Flood Risk Assessment – July 2014 Sections 4 and 6.

1.4 The Site is designated within a Flood Zone 1 floodplain as classified by the Environment Agency (EA),

1.5 The purposes of this report are as follows:

- To confirm that the proposed development will not be subject to unacceptable risk or to show that flood risk can be managed acceptably;
- To establish any other possibilities of sources of flooding and if any remediation can be considered to minimise or alleviate such effects;
- To demonstrate that the proposed development will not increase risk of flooding elsewhere; and
- To confirm that satisfactory strategies, incorporating Sustainable Drainage techniques, are achievable for the disposal of surface water runoff and wastewater from the proposed development.

1.6 The report presents an independent assessment of the flood risk in accordance with the National Planning Policy Framework (NPPF) published in July 2018 and revised in February 2019, and the supporting Planning Practice Guidance (NPPG), March 2014, published by the Department of Communities and Local Government.

1.7 NPPG provides advice on how flood risk should be considered during planning and development processes. The requirement to protect both new and established development from increased risk of flooding forms an essential part of this Guidance. Moreover, implementation of Sustainable Drainage Systems (SuDS) for new development is encouraged, even if minor.

1.8 The Department for Environment, Food and Rural Affairs. (2015). Non-Statutory Technical Standards for Sustainable Drainage Systems state that the peak rate of discharge from areas of development during the 1:1 year and 1:30 year rainfall events should be as close as reasonably practical to the corresponding greenfield runoff rate but should never exceed that of the pre-development state. The standards also recommend that, where reasonably practicable, the runoff volume generated from the 1:100year, 6hour rainfall event should be constrained to the corresponding greenfield runoff volume.

1.9 Rainfall-runoff management for the Site will follow the procedures laid down by the Non-statutory Technical Standards (NTS) for Sustainable Drainage Systems (SuDS), which were published by the Department for Environment, Food and Rural Affairs (DEFRA) in March 2015.

1.10 The London Borough of Camden (LBC) is the Local Planning Authority (LPA) controlling flood risk and water environment issues through policies and guidance presented in their Strategic Flood Risk Assessment (SFRA) July 2014.

1.11 Under the Flood and Water Management Act 2010, The London Brough of Camden has new powers and responsibilities for coordinating local flood risk management. They are the Lead Local Flood Authority (LLFA) unless assigned or shared with another Authority and have a responsibility to work with local partners to better manage local flooding issues across the Borough's catchment area.

2.0 **Limitations**

2.1 A capacity check will probably not be required from Thames Water, the Sewerage Authority for the area, during the design phase, to establish whether there is spare capacity within their system. This is because there is only likely a minor increase over existing flows as a result of this proposal. No consultation has been had with the Highway Authority to ascertain if any flooding incidences have occurred in The Grove. However, according to the Local Flood Plan, flooding in this area is mainly due to overland flows contained within the back garden. Thames confirms that there is no overloading of their sewers in this area, see appendices J & L.

2.2 No on site infiltration testing, but a borehole (BH1) in the front garden was drilled and established ground water levels at approximately 12.0m below existing ground level.

3.0 Site Details

3.1 Location

3.2 The Site is in The Grove, Highgate Village, N6 6JU with a grid reference of 528194, 187259 and is in a residential area of similar sized and aged properties. This area of North London is close to the Highgate Cemetery, Waterflow Park and Hampstead Heath. Ponds exist at Hampstead Heath and Waterflow Park, the former being the source of the River Fleet.

3.3 The area has a north south slope of no significant gradient. However, the general level is between 118-122m above sea level. A location plan is included as Appendix A. The application area is shown as a red boundary.

3.4 The Flood Map prepared by the EA shows the Site to be within a Flood Zone 1 See Appendix B for the Environment Agency's (EA) flood map.

3.5 Description

3.6 The Site currently consists of a four-storey structure that has both a lower and upper ground floors.

3.7 Appendix C provides a proposed Architectural layout of the development showing the likely locations for the sanitary ware.

Area	Approximately 835m² (0.084ha)
General Topography	The Site exists within a well-established residential area of detached houses
Existing Surfacing	Typical roof and gardens
Current use	Residential
Boundaries	North Similar style residential South Similar Style residential East The Grove Carriageway and residential opposite West Rear gardens and further properties
	Access Vehicular: Off of The Grove Pedestrian: Off of The Grove

3.8 **Geology & Hydrogeology**

3.9 The British Geological Society (BGS) maps show the Site is underlain by the bedrock Bagshot formation that consists of sand, no superficial deposits are recorded, see Appendix D.

3.10 The EA's Groundwater Source Protection Zones map for this area shows that the Site is not located within a Source Protection Zone, see Appendix E.

3.11 The EA's Groundwater Vulnerability Zone map shows the Site to be at a high risk, due to the existence of the Sands, a material that may have a high volumes of ground water moving through natural flow networks.

3.12 **Greenfield Runoff Rates**

3.13 Greenfield runoff rates have been estimated for the site using the Institute of Hydrology Report 104 method in accordance with the latest Environment Agency Guidance as summarised below and included within the appendices of this study:

CATCHMENT	AREA	1:1 AEP EVENT	1:30 AEP EVENT	1:100 AEP EVENT
Total Site	0.084 Ha	0.3 l/s	0.7 l/s	0.9 l/s

3.14 **Peak Existing Runoff Rates**

3.15 Peak existing runoff rates have been calculated using the Modified Rational Method and obtained from the Flow simulation model for the 1:1 AEP, 1:30 AEP and 1:100 AEP events respectively, 40 % climate change allowances has not been included to the 1:100 AEP event, as existing systems were never designed for such events. The worst case of 100% impermeable has been applied. Flooding occurred when the 1:30 & 1:100yr events were applied, see 3.22 below.

3.16 The following design inputs were adopted in accordance with guidance contained within the Flow Drainage software

- Storm Duration: Varies (see results).
- Volumetric Runoff Coefficient (Cv): 0.75
- Routing Coefficient (Cr): 1.30

Findings as summarised below and included within the appendices of this study:

CATCHMENT	AREA	% IMPERMEABLE	1:1 AEP EVENT	1:30 AEP EVENT	1:100 AEP EVENT	1:100 AEP + 1.4 CC
Total Site Ha	0.084	100 %	7.1 l/s	9.6 l/s	9.6/s	- l/s

3.17 **Existing Water Management**

3.18 **Foul**

3.19 Thames Water is the Sewerage Authority for this area. Public sewer records have been obtained that show a combined sewer running north/south within The Grove. A comprehensive CCTV survey of the site is available, showing that the Site benefits from a connection to the local sewer in The Grove. A combined sewer type takes both foul wastewater and surface (rain) water as is usual for an area of this age in London.

3.20 **Surface Water**

3.21 Due to the period in which this area was first developed, it is unlikely that any infiltration systems will even have been considered in the past for the disposal of surface water such as roof and hardstanding run off. Therefore, the existing rainwater pipes and gullies within any hardstanding areas, parking etc, will also be combined with the properties foul system and connected to the sewer in The Grove.

3.22 In providing calculations for the existing runoff (appendix G), it is noted that flooding occurs for storms of greater intensity than 1:30 due mainly to the diameter of the pipes. This is borne out with the recorded flooding shown on the Highway Flooding plan (appendix L) that shows it to the rear garden.

3.23 According to London Borough of Camdens' plan No. 47070547 British Geological Society SuDS Drainage Potential, contained in the SFRA, The Grove is within a highly compatible area for infiltration. However, 3.11 above mentions the likelihood of ground water flooding or high ground water table. Further investigation was carried out at BH's 2 & 3 in the rear garden and struck water at 6.0m below existing ground. This corroborates with BH1 due to the difference in levels from the front to the rear of the site.

3.24 The proposal has vey little impact to the existing overall discharge to the Public sewer network in that there is no increase in impermeable area within the proposal. The issue is that the requirement for 1.0m of top-soil is unlikely to be met. However, the provision of a thin stone infiltration blanket wrapped in a geotextile will enable the rainwater to find the edge of

the basement and dissipate away at the sides. Its thickness will be determined by the depth of insulation necessary to comply with current requirements.

3.25 **Existing Flood Risk**

3.26 The EA indicative floodplain maps identify areas in England & Wales at risk of flooding by allocating them into Flood Risk Zones. These Zones are defined in Table 1 of the Technical Guidance to the National Planning Policy Framework (Published March 2012).

- Zone 1 : Low Probability

Land within a Flood Zone 1 floodplain as classified by the Environment Agency, has been shown to be less than 1:1000yr probability from river or sea flooding, in any year.

3.27 **Strategic Flood Risk Assessment and Sources of Flooding**

3.28 There are a number of key potential sources of flooding that can put Sites at risk. These include fluvial (rivers), tidal (the sea), ground water, sewer, surface water and infrastructure failure (including reservoirs, canals industrial process, burst water mains and blocked sewers or failed pumping stations). Each of these will now be considered in turn and the risk posed to the Site considered.

Definition of the flood Hazard source	LIKELIHOOD - Very Likely, Possible, Negligible, Very Unlikely
Fluvial	The Site is within a flood zone 1 and as stated in 4.2.1 of the SFRA there is no risk Flood Risk – Very unlikely
Coastal - Sea	This area is not near any tidal section of the River Roding which becomes tidal near Ilford Flood Risk – Very unlikely
Coastal- Estuarine	This area is not near the coast Flood Risk – Very unlikely
Pluvial/ Sheet run off	The Highway Drainage belonging to The Grove is connected to Combined Sewer. However, flooding appears in the rear garden likely due to undersized existing pipework

	Flood Risk - Negligible
Sewer – SWS, FWS, CS	Thames Water have indicated no surcharge within their network locally Flood Risk - Negligible
Groundwater	Bagshot formation - Sands Flood Risk – Likely
Dam Breach	Hamstead Heath Ponds would discharge away if topped Flood Risk – Very Unlikely
Canal	Regents Canal too far south Flood Risk – Very unlikely
Major Water Main	Thames Water shows no major trunk water mains in The Grove only a 4" (100mm) Flood Risk – Possible if road gullies are blocked at the time of a localised burst

3.29 **Climate Change Uncertainty**

3.30 NPPG – Climate Change sets out precautionary sensitivity ranges for peak rainfall and contingency allowances for net sea level rise. It states that:

"In making an assessment of the impacts of climate change in flooding from land, rivers and sea as part of a flood risk assessment, the sensitivity ranges in Table 5 may provide an appropriate precautionary response to the uncertainty about climate change impacts on rainfall intensities, river flow, wave height and wind speed".

3.31 Table 2 of 'Climate Change for Planners', published by the EA provides guidance to support the NPPF. 'Flood risk', indicates that for the period up to 2115, peak rainfall intensities could increase up to 40% and peak river flows might increase by 20%

3.32 A figure of 40% has been used for Climate Change in the calculations to replicate the worst case scenario.

4.0 Drainage Strategy

4.1 General

4.2 This report is not to provide a design strategy as such for the proposed development but to highlight where potential areas of risk could be in accordance with the NPPF.

4.3 Any new development gives an opportunity to implement SuDS techniques, no matter how small, to enhance the environment and neighbouring surroundings. It is proposed to provide several within this new development, as appropriate and practical. (Certain SuDS drainage elements are not suitable for this development including swales or ponds where a greater land take is required).

4.4 The implementation of the London Plan requires a reduction of the existing sites discharge of surface water to 50% of the pre-development rate. The figures in 4.12 show that by using attenuation techniques it is possible to store all runoff and discharge at a vastly reduced rate of under 0.9 l/s to the Public system.

4.5 Should testing prove that infiltration can be used without issue, this would be a zero discharge removing all future surface water from the combined sewer and providing the maximum benefit. No testing is planned as this proposal is limited to a small basement under the front driveway.

4.6 Due to the extent of the basement forwards and the depth of the cover available, it is unlikely that any form of attenuation other than that mentioned in 3.24 earlier can be constructed.

4.7 Foul Water Drainage

4.8 The Site's layout will remain mainly as existing, any drainage additions within the basement is able t be connected to the existing via gravity, without the need for pumping, usual for basement developments.

4.9 Storm Water Drainage

4.10 Any development presents an opportunity to incorporate Sustainable Surface Water Drainage Systems. These might include infiltration techniques or attenuation of flows to protect receiving sewers or watercourses. The choice of methods is dependant upon ground conditions and availability of suitable areas to site the requisite equipment within the scheme layout.

4.11 The guidance given in the CIRIA report C753 'The SuDS Manual' should be followed during the design of the proposed sustainable drainage solutions to dispose of surface water runoff. However, the infiltration rate of the Bagshot Sand together with and standing ground water will determine the method.

4.12 Proposed discharge rates for the various storm conditions are identified in Appendix G. As an indication these are provided below

These are estimated as:

STORM EVENT	CONTRIBUTING AREA	MAXIMUM DISCHARGE	ATTENUATION VOL (DETAILED)
1:1 AEP	0.084 Ha	0.9 l/s	11.9 m^3
1:30 AEP	0.084 Ha	0.9 l/s	20.4 m^3
1:100 AEP	0.084 Ha	0.9 l/s	11.2 m^3
1:100 AEP + 40% CC	0.084 Ha	0.9 l/s	23.2 m^3

4.13 Requirement H3 Part 3 of the Building Regulations Approved Document H (2010 Edition) states:

(3) Rainwater from a system provided pursuant to sub-paragraph (1) and (2) should discharge to one of the following, listed in order of priority:

(a) an adequate soakaway or some adequate infiltration system; or, where this is not reasonably practicable:

(b) a watercourse; or, where this is not reasonably practicable:

(c) a sewer.

This is the approach we have taken, as discussed in this report.

4.14 Summary of Surface Water hierarchy:

Item	Feasible (Y/N/TBC)	Comments
1.Store rainwater for later use	TBC	This is to be assessed in the detailed design, eg. the use of water butts as a source of rainwater harvesting

2.Use infiltration techniques	N	Bagshot Sand and high vulnerability to ground water flooding
3.Attenuate rainwater in ponds or open water features for gradual release	N	This is a small satellite site in which there is no room for such features
4.Attenuate rainwater by storing in tanks or sealed water features for gradual release.	N	There is no room available to locate such a tank needed to discharge at greenfield rates
5.Discharge rainwater direct to a watercourse	N	There is no watercourse near by
6.Discharge rainwater to a surface water sewer/drain	N	There is no surface water sewer
7.Discharge rainwater to the combined sewer	Y	Only a combined sewer available

4.15 **Potable Water**

4.16 According to the EA studies Londoners consume on average 156 litres of water per person per day – around 17 litres above the national average. Therefore, thought should be given to try to minimise excess water consumption by persuading purchasers in the fitting of white goods that use recycled water in their processes, thus reducing the volume consumed.

4.17 Grey water systems are not being considered for a proposal of this type.

4.18 **Source Control**

4.19 CIRIA C753 promotes the use of the drainage structures that have been proposed and lists amongst their advantages:

- Effective in removing urban runoff pollutants
- Significant reductions in volumes and rates of surface water runoff
- Suitable for installation within high density developments
- Low maintenance

5.0 Strategic Flood Risk Assessments

5.1 The London Borough of Camden do not generally prevent any development taking place as the Lead Local Flood Authority (LLFA) due to flooding. They do however require that all proposals are suitable for their purpose in their intended location. Sections 4 and 6 set out their requirements which this report has broadly followed.

5.2 The Grove and its surrounding area is within a Flood Zone 1. This means that flooding is only likely to occur for storm events that are greater than a 1:1000yr AEP..

6.0 Calculations including Climate Change

6.1 Calculations have been provided as discussed below, to demonstrate the volumes of water that would need to be attenuated to satisfy current requirements. Obviously that this volume cannot be accommodated within the scheme and the disposal of rainwater will be direct to the Combined sewer as it currently does. It must be remembered that this basement is beneath hard landscaping and so does not increase the catchment area or volume of flows.

6.2 The SuDS structures included in the proposed calculations have been designed to detain and prevent flooding during a 1:100year storm event plus 40% climate change. The total volume stored in an attenuation tank exceeds the volume of run off generated from a Greenfield rate of run off or 50% of the existing as per the London Plan. The rate of discharge will need to be agreed with Thames Water during the final design process.

6.3 HR Wallingford is the National Institute that undertakes hydraulic studies from coastal, estuaries, rivers and provides guidance to the water industry. Appendix H, using their on-line tool, provides the calculation of the volume of storage for this Greenfield site. It is generic in that it provides a broad approach to the Engineer as a guide to the likely volume required given the Q-bar value. This is a value calculated based on the Site's location and sub-strata and is the point before flooding would occur.

6.4 The final design will hone the actual values and may increase or decrease this value depending on such factors as infiltration rates, actual times of entry, and other SuDS structures that may be considered.

6.5 Based on this, Appendix G provides a set of calculations confirming the during the 1:100yr + 40% cc for the 360min storm as is currently required.

7.0 **Conclusions**

7.1 This Report presents an independent assessment of flood risk in accordance with the guidelines set out in National Planning Policy Framework (Published July 2018 revised February 2019) and Planning Practice Guidance, March 2014.

7.2 The proposed development is located in a Flood Zone 1 and within the London Borough of Camden boundary as LLFA.

7.3 The use of water butts to allegedly attenuate water is both ugly and fails to work after the first storm, when it becomes full. Landscape designer do propose to provide a number of raised planters within the front garden which, apart from being more aesthetically pleasing will provide some absorption and benefit biodiversity.

7.4 This report confirms that the proposed development will not exacerbate any existing flood risk elsewhere, but is not able to take the opportunity to capture, attenuate or discharge at reduced rates within its boundaries and as such cannot provide any major benefit to the local area, but provides what it can.

7.5 With the above in mind, we have confirmed that we have met the objectives set out in Section 1.4; namely:

- To confirm that the proposed development will not be subject to unacceptable risk or to show that flood risk can be managed acceptably;

- To demonstrate that the proposed development will not increase risk of flooding elsewhere; and

- To confirm that satisfactory strategies, incorporating Sustainable Drainage Techniques, are achievable for disposal of surface water runoff and wastewater from the proposed development.

8.0 **Comments**

8.1 A public combined sewer exists in The Grove to which it is proposed to discharge the foul and surface water drainage of the proposal directly to. A capacity check may be required to ensure spare capacity exists within the system for the proposed discharge imposed and confirm that new connections will be made. It is suggested that this is discussed at the earliest opportunity, but it is not expected to be an issue as flow rates are generally low.

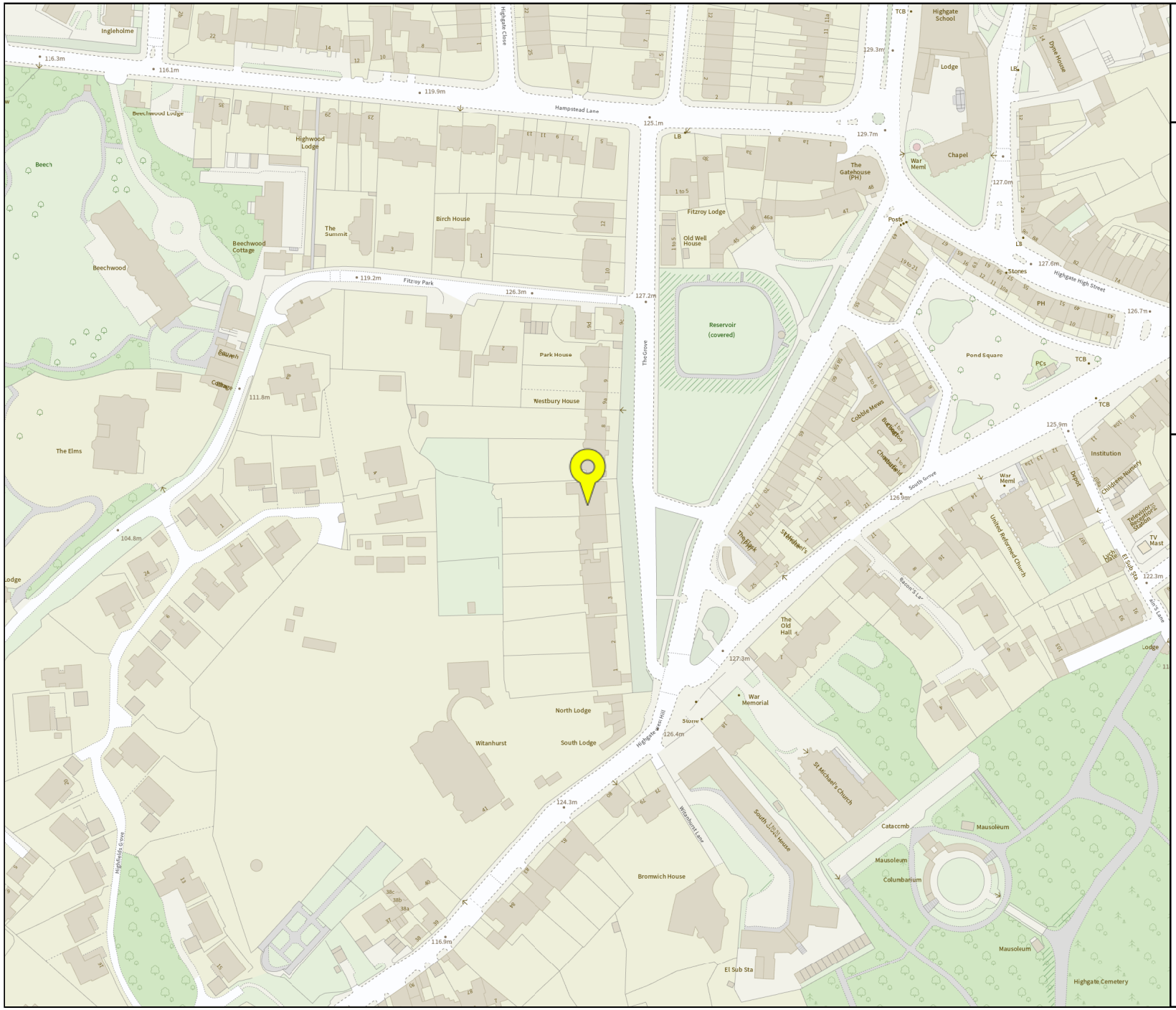
8.2 Surface water cannot be dealt with by SUDs techniques due to the lack of space available within the works being carried out within the front garden. 52.8m³ of storage cannot be accommodated.

8.3 Whilst sewer records have been obtained, invert levels are not shown and an assumption has been made that the sewers are approximately >4.0m road level. This assumption is because the lower ground floor is 3.0m below ground level and connects via gravity.

Appendix A Site Location

Site Location Plan

Appendix B Environment Agency's Flood Map



Environment Agency

Flood map for planning

Your reference
5 The Grove

Location (easting/northing)
528177/187307

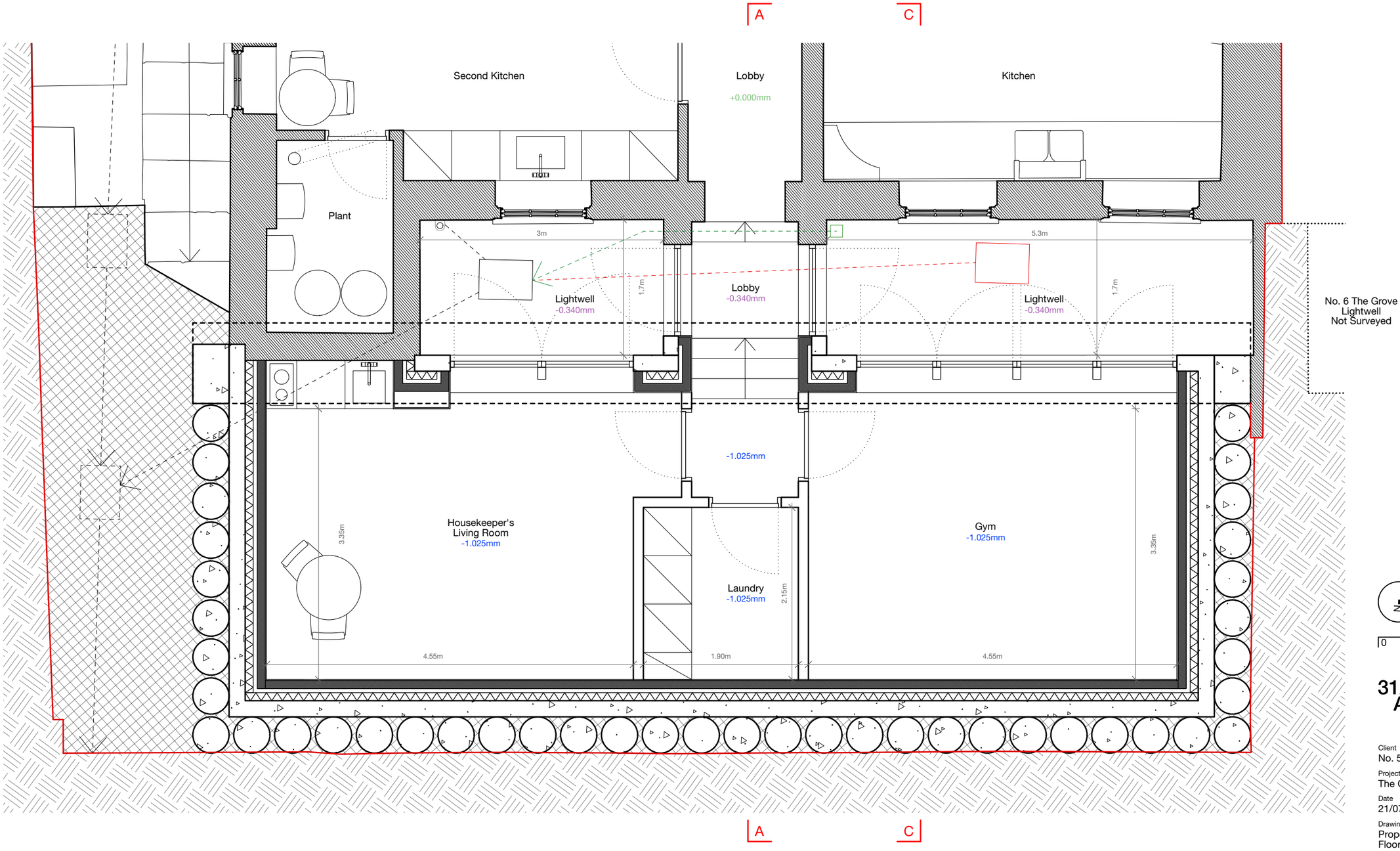
Scale
1:2500

Created
25 Aug 2021 19:34

- Selected point
- Flood zone 3
- Flood zone 3: areas benefitting from flood defences
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Flood storage area

0 20 40 60m

Appendix C Architectural Layouts



N

0 0.5 1 2.5m

31/44 Architects

6 Osborn Street
London
E1 6TD
United Kingdom
+44 (0)20 3735 7820

London@
3144architects.com

Client
No. 5 The Grove

Project
The Grove

Status

Date
21/07/2021

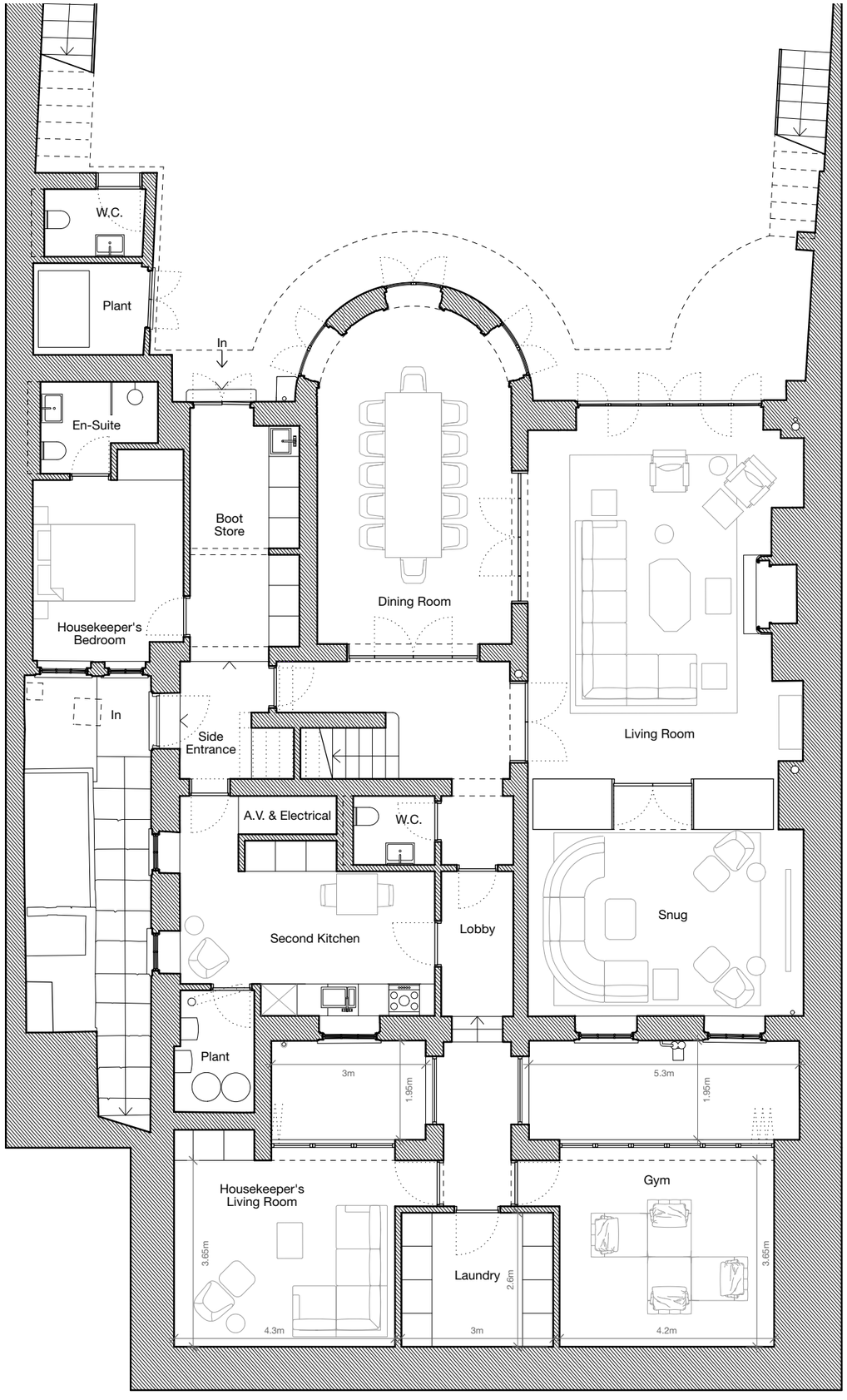
Drawn FG
Checked SD

Drawing name
Proposed Basement Lower Ground Floor Plan

Scale / Format
1:50 / A3

Drawing number
44/2022/SK 3001

Rev.	Date	Description	Drawn / Checked



N

0 1 2.5 5m

31/44
Architects

6 Osborn Street
London
E1 6TD
United Kingdom
+44 (0)20 3735 7820

London@
3144architects.com

Client
No. 5 The Grove

Project
The Grove

Status

Date
02/06/2021

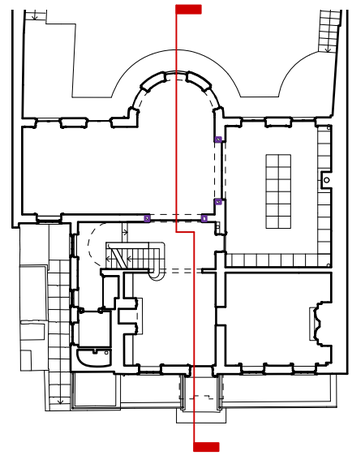
Drawn Checked
FG SD

Drawing name
Proposed Lower Ground Floor Plan
Large Basement

Scale / Format
1:100 / A3

Drawing number
44/2022/PL 2002A

Rev.	Date	Description	Drawn / Checked



0 1 2.5 5m

31/44 Architects

6 Osborn Street
London
E1 6TD
United Kingdom
+44 (0)20 3735 7820

London@
3144architects.com

Client
No. 5 The Grove

Project
The Grove

Status

Date
02/06/2021

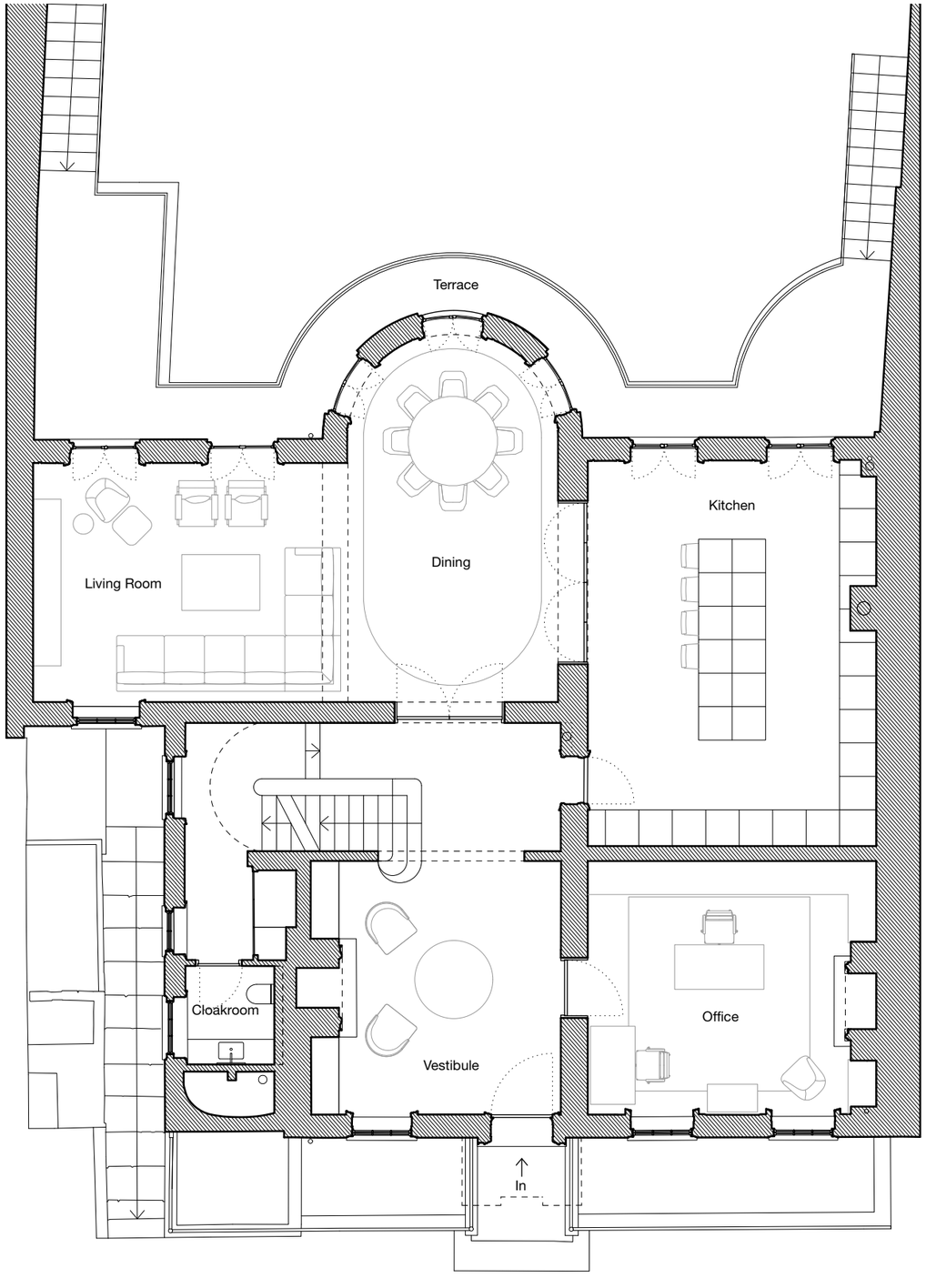
Drawn Checked
FG SD

Drawing name
Proposed Section CC Large Basement

Scale / Format
1:100 / A3

Drawing number
44/2022/PL 2012A

Rev.	Date	Description	Drawn / Checked



N

0 1 2.5 5m

31/44 Architects

6 Osborn Street
London
E1 6TD
United Kingdom
+44 (0)20 3735 7820

London@
3144architects.com

Client
No. 5 The Grove

Project
The Grove

Status

Date
30/06/2021

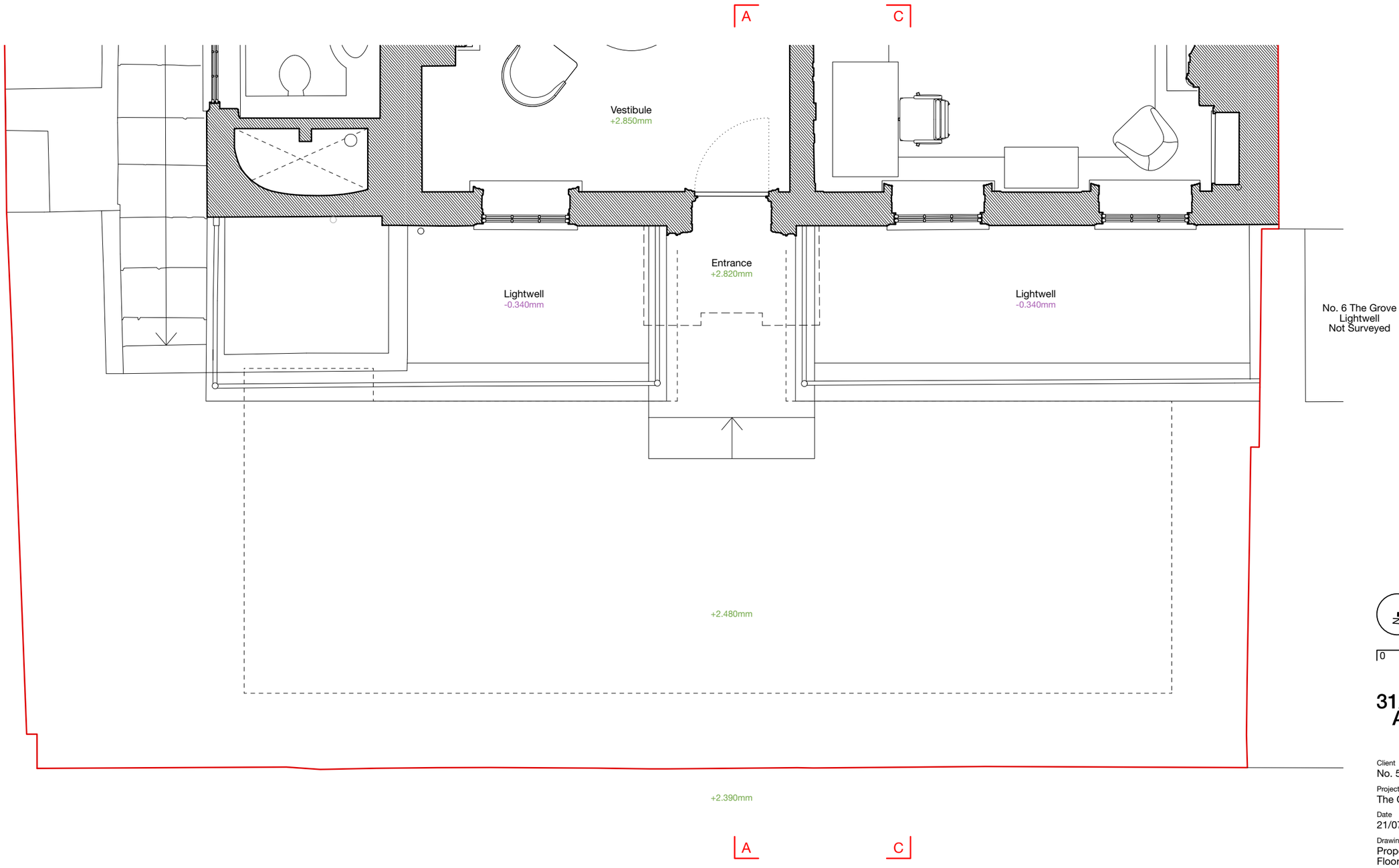
Drawn Checked
FG SD

Drawing name
Proposed Upper Ground Floor Plan

Scale / Format
1:100 / A3

Drawing number
44/2022/PL 2003

Rev.	Date	Description	Drawn / Checked



N

0 0.5 1 2.5m

31/44 Architects

6 Osborn Street
London
E1 6TD
United Kingdom
+44 (0)20 3735 7820

London@
3144architects.com

Client
No. 5 The Grove

Project
The Grove

Status

Date
21/07/2021

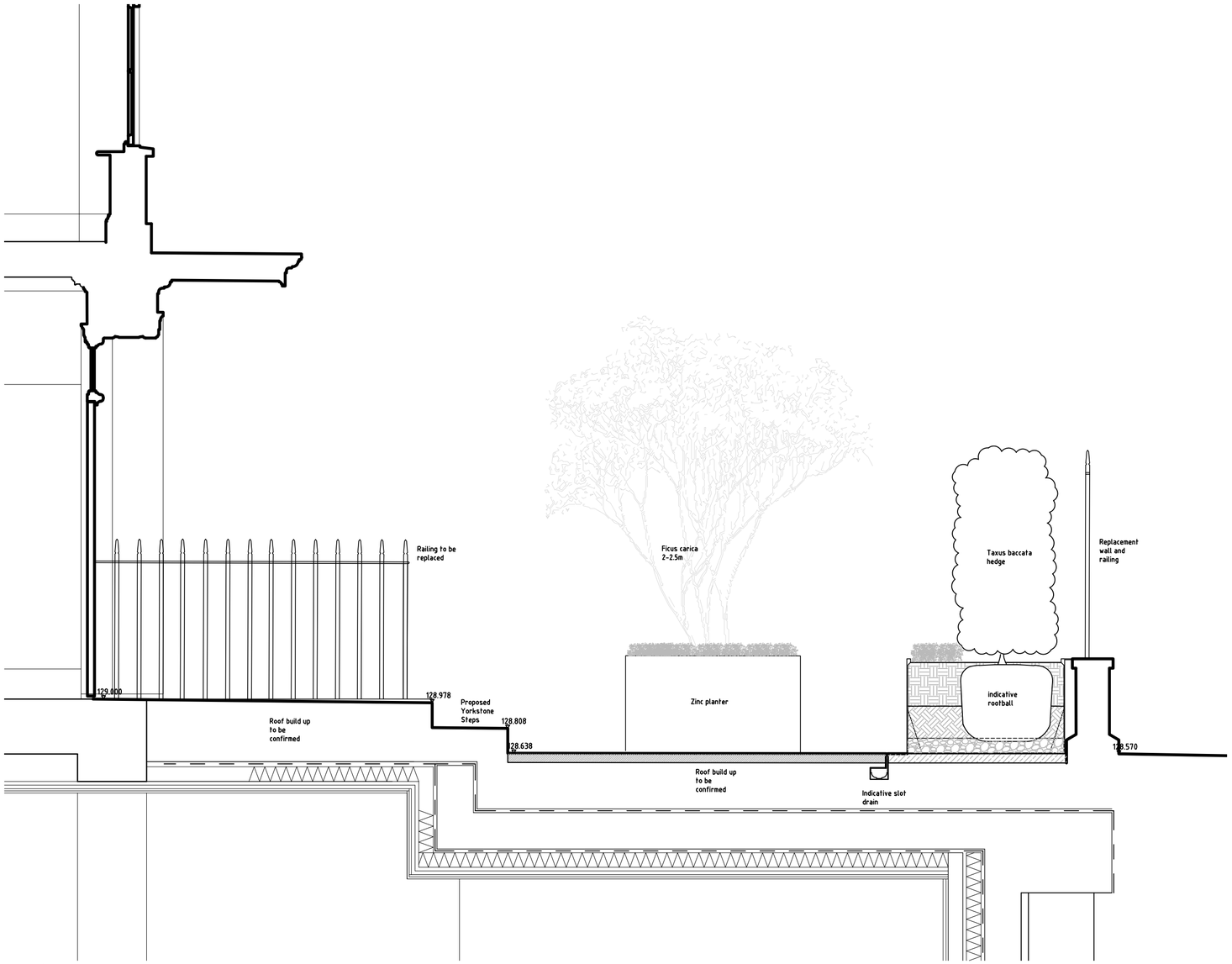
Drawn FG
Checked SD

Drawing name
Proposed Basement Upper Ground Floor Plan

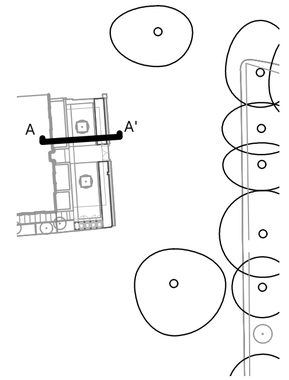
Scale / Format
1:50 / A3

Drawing number
44/2022/SK 3002

Rev.	Date	Description	Drawn / Checked



Section AA'
Scale 1:25



Garden Reference Plan
Scale 1:500

Rev	Comment	Date
P01	Planning - Preliminary issue	25/08/2021

Tom Stuart-Smith Ltd
90/93 Cowcross Street
London EC1M 6BF
Tel: +44 (0)207 253 2100

Status: For Planning

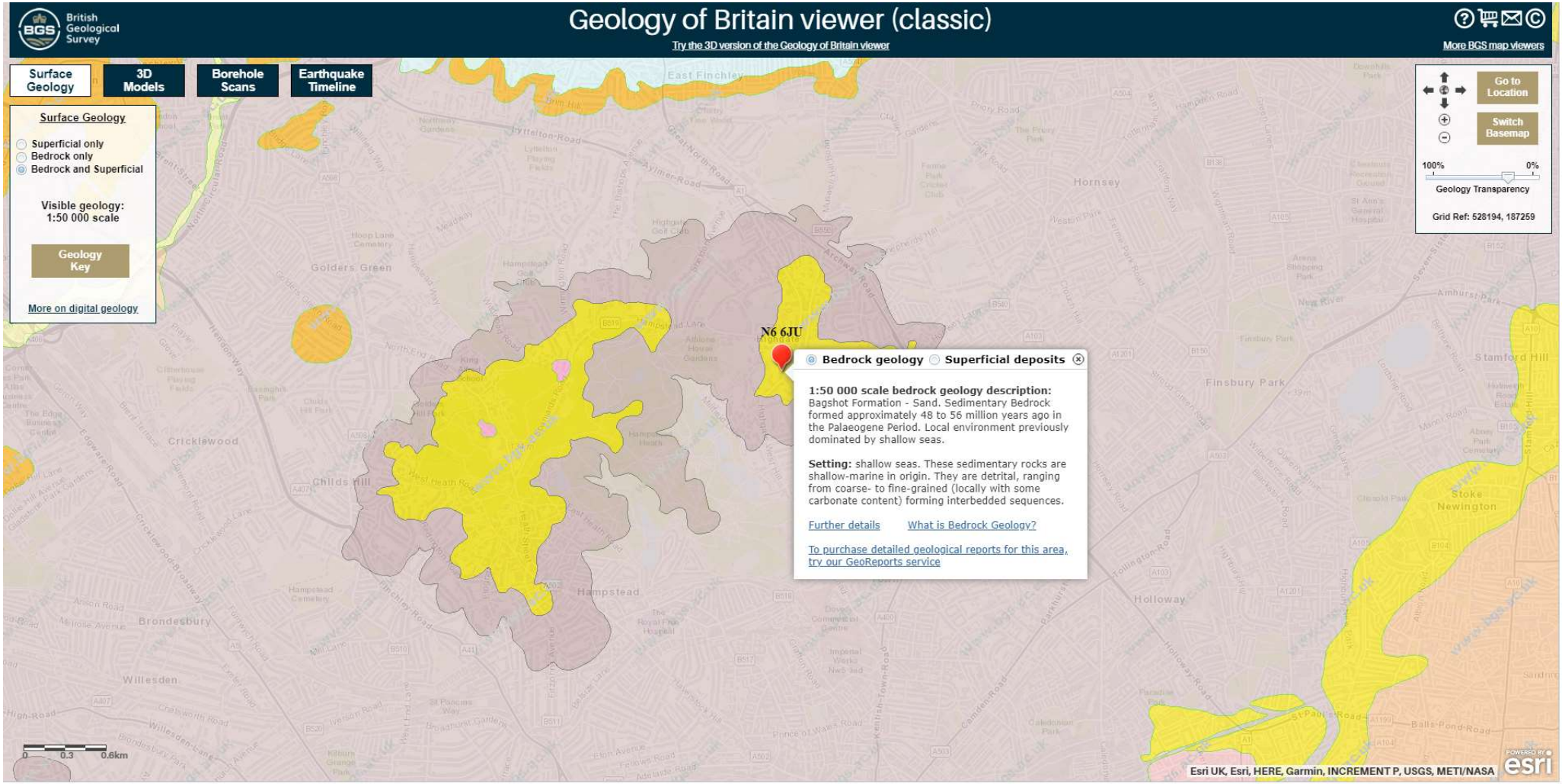
Project:
5 The Grove

Drawing:
Front Garden
Section

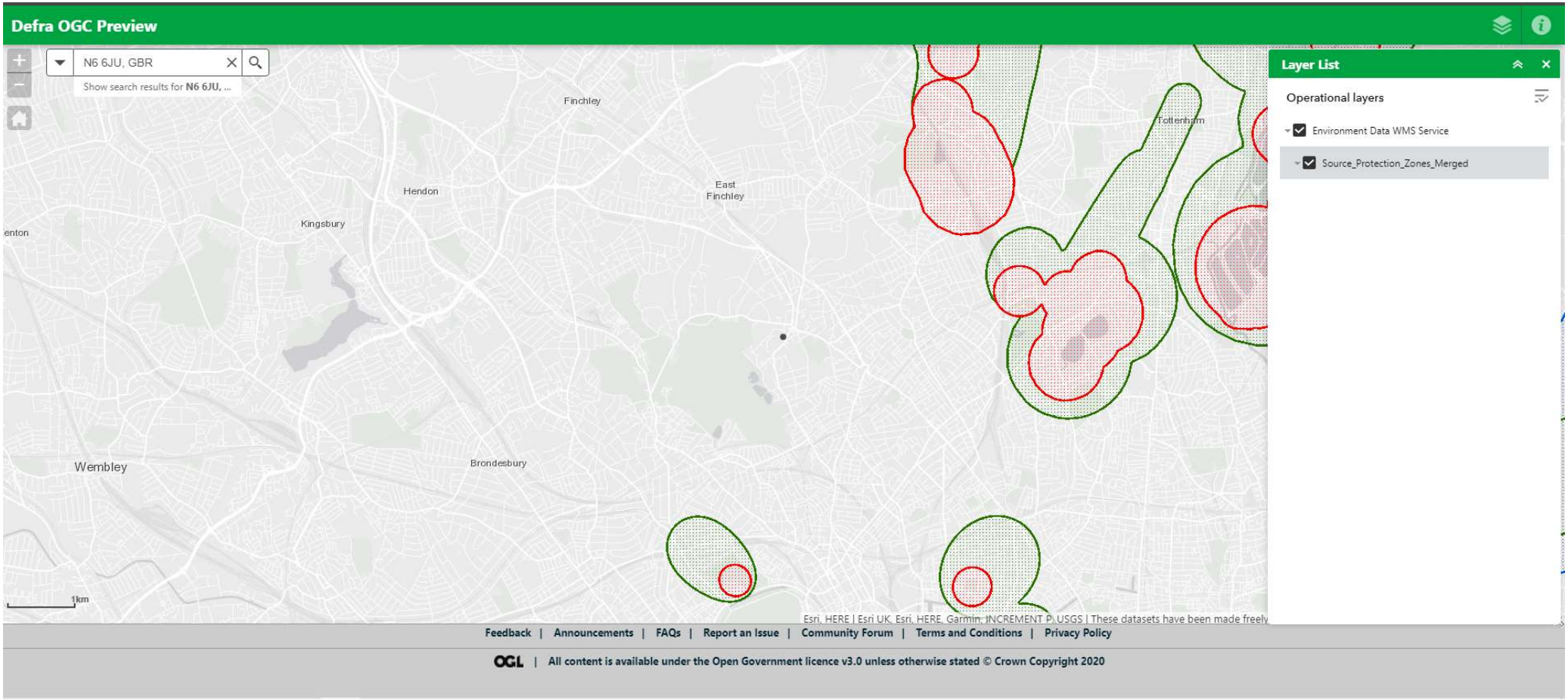
Scale: 1:25 @ A2
Dwg: 381-L-S-211 Rev: P01

Drawn: JT
Date: 25/08/2021 ref:
H:\381 5 The Grove\Drawings\381-5 The Grove-L-S.dwg

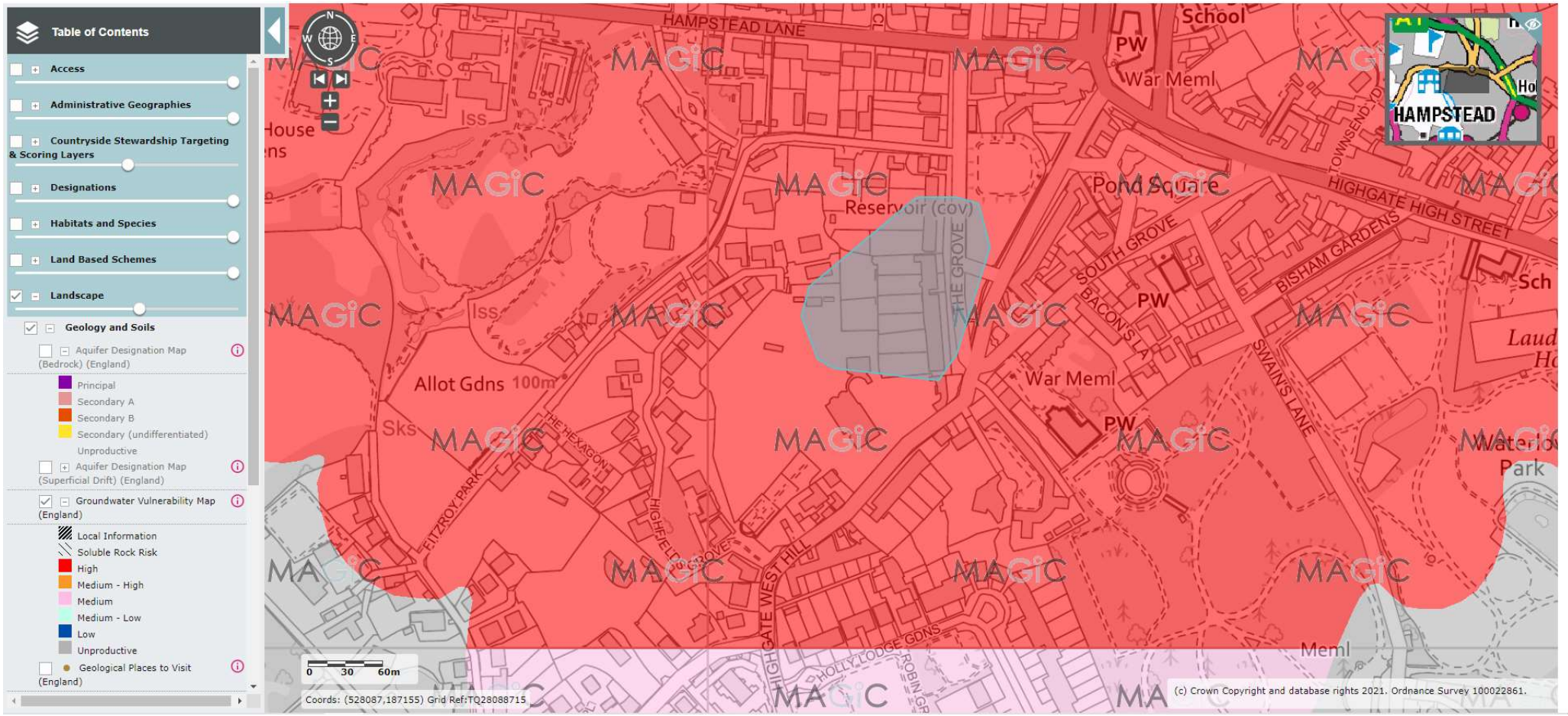
Appendix D British Geological Society Map


British Geological Survey
Geology of Britain viewer (classic)
Try the 3D version of the Geology of Britain viewer
More BGS map viewers
Surface Geology
3D Models
Borehole Scans
Earthquake Timeline
Surface Geology
Superficial only
Bedrock only
Bedrock and Superficial
Visible geology: 1:50 000 scale
Geology Key
More on digital geology
Go to Location
Switch Basemap
100%
0%
Geology Transparency
Grid Ref: 528194, 187259
N6 6JU
Bedrock geology
Superficial deposits
1:50 000 scale bedrock geology description:
Bagshot Formation - Sand. Sedimentary Bedrock formed approximately 48 to 56 million years ago in the Palaeogene Period. Local environment previously dominated by shallow seas.
Setting: shallow seas. These sedimentary rocks are shallow-marine in origin. They are detrital, ranging from coarse- to fine-grained (locally with some carbonate content) forming interbedded sequences.
Further details
What is Bedrock Geology?
To purchase detailed geological reports for this area, try our GeoReports service
East Finchley
Hornsey
Golders Green
Finsbury Park
Stamford Hill
Cricklewood
Childs Hill
Hampstead
Stoke Newington
Holloway
Brondesbury
Willesden
0 0.3 0.6km
Esri UK, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA
POWERED BY esri

Appendix E Source Protection Zones


Defra OGC Preview
N6 6JU, GBR
Show search results for N6 6JU, ...
Finchley
Hendon
East Finchley
Kingsbury
Tottenham
Wembley
Brondesbury
1km
Layer List
Operational layers
Environment Data WMS Service
Source_Protection_Zones_Merged
Esri, HERE | Esri UK, Esri, HERE, Garmin, INCREMENT P, USGS | These datasets have been made freely
Feedback | Announcements | FAQs | Report an Issue | Community Forum | Terms and Conditions | Privacy Policy
OGL | All content is available under the Open Government licence v3.0 unless otherwise stated © Crown Copyright 2020

Appendix F Groundwater Vulnerability Map



Groundwater Vulnerability Map

(High)

Appendix G Flow Calculations

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	2.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Width (mm)	Easting (m)	Northing (m)	Depth (m)
1	0.041	2.00	10.000	675	470	-10.387	58.934	1.350
2	0.042	2.00	9.800	675	470	25.664	58.307	1.583
3			9.700	675	470	57.952	57.837	1.674
4			9.500			94.943	57.523	1.692

Links (Input)

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	1	2	36.056	0.600	8.650	8.292	0.358	100.7	100	2.78	50.0
1.001	2	3	32.291	0.600	8.217	8.026	0.191	169.1	100	3.70	50.0
1.002	3	4	36.992	0.600	8.026	7.808	0.218	169.7	100	4.75	50.0

Simulation Settings

Rainfall Methodology	FSR	Drain Down Time (mins)	240
FSR Region	England and Wales	Additional Storage (m³/ha)	1.0
M5-60 (mm)	20.000	Check Discharge Rate(s)	✓
Ratio-R	0.400	1 year (l/s)	0.3
Summer CV	0.750	30 year (l/s)	0.7
Winter CV	0.840	100 year (l/s)	0.9
Analysis Speed	Normal	Check Discharge Volume	✓
Skip Steady State	x	100 year +40% 360 minute (m³)	6

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	0	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Region	6
Greenfield Method	IH124	Growth Factor 1 year	0.85
Positively Drained Area (ha)	0.084	Growth Factor 30 year	1.95
SAAR (mm)	661	Growth Factor 100 year	2.48
Soil Index	4	Betterment (%)	0
SPR	0.47	QBar	0.4

Pre-development Discharge Rate

Q 1 year (l/s)	0.3	Q 100 year (l/s)	0.9
Q 30 year (l/s)	0.7		

Pre-development Discharge Volume

Site Makeup	Greenfield	Return Period (years)	100
Greenfield Method	FSR/FEH	Climate Change (%)	40
Positively Drained Area (ha)	0.084	Storm Duration (mins)	360
Soil Index	4	Betterment (%)	0
SPR	0.47	PR	0.473
CWI	99.407	Runoff Volume (m^3)	35

Results for 1 year Critical Storm Duration. Lowest mass balance: 97.42%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	11	9.133	0.483	6.8	0.1682	0.0000	SURCHARGED
15 minute winter	2	11	8.964	0.747	11.0	0.2569	0.0000	SURCHARGED
15 minute winter	3	12	8.379	0.353	8.0	0.1121	0.0000	SURCHARGED
15 minute winter	4	12	7.893	0.085	7.1	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	2	4.6	0.727	0.766	0.2821	
15 minute winter	2	1.001	3	8.0	1.022	1.731	0.2527	
15 minute winter	3	1.002	4	7.1	0.915	1.543	0.2764	5.5

Results for 30 year Critical Storm Duration. Lowest mass balance: 97.42%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	1	16	10.000	1.350	11.7	0.4698	1.7290	FLOOD
30 minute summer	2	17	9.800	1.583	19.8	0.5446	1.2514	FLOOD
60 minute winter	3	38	8.869	0.843	10.2	0.2672	0.0000	SURCHARGED
60 minute winter	4	38	7.902	0.094	9.6	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute winter	1	1.000	2	4.7	0.735	0.773	0.2821	
30 minute summer	2	1.001	3	11.3	1.445	2.447	0.2527	
60 minute winter	3	1.002	4	9.6	1.227	2.081	0.2856	20.6

Results for 100 year Critical Storm Duration. Lowest mass balance: 97.42%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	1	14	10.000	1.350	15.4	0.4698	3.9869	FLOOD
15 minute winter	2	8	9.800	1.583	26.5	0.5446	3.0164	FLOOD
60 minute winter	3	40	8.875	0.849	10.5	0.2690	0.0000	SURCHARGED
60 minute winter	4	40	7.902	0.094	9.6	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute winter	1	1.000	2	4.7	0.744	0.779	0.2821	
15 minute winter	2	1.001	3	11.2	1.435	2.428	0.2527	
60 minute winter	3	1.002	4	9.6	1.230	2.087	0.2856	23.6

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	2.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Width (mm)	Easting (m)	Northing (m)	Depth (m)
1	0.042	2.00	10.000	675	470	-10.387	58.934	1.350
2	0.042	2.00	9.800	675	470	25.664	58.307	1.583
3			9.700	1200		57.952	57.837	1.974
4			9.500			94.943	57.523	1.692

Links (Input)

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	1	2	36.056	0.600	8.650	8.292	0.358	100.7	150	2.60	50.0
1.001	2	3	32.291	0.600	8.217	8.026	0.191	169.1	225	3.14	50.0
1.002	3	4	36.992	0.600	8.026	7.808	0.218	169.7	100	4.19	50.0

Simulation Settings

Rainfall Methodology	FSR	Drain Down Time (mins)	240
FSR Region	England and Wales	Additional Storage (m³/ha)	1.0
M5-60 (mm)	20.000	Check Discharge Rate(s)	✓
Ratio-R	0.400	1 year (l/s)	0.3
Summer CV	0.750	30 year (l/s)	0.7
Winter CV	0.840	100 year (l/s)	0.9
Analysis Speed	Normal	Check Discharge Volume	✓
Skip Steady State	x	100 year +40% 360 minute (m³)	6

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	40	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Region	6
Greenfield Method	IH124	Growth Factor 1 year	0.85
Positively Drained Area (ha)	0.084	Growth Factor 30 year	1.95
SAAR (mm)	661	Growth Factor 100 year	2.48
Soil Index	4	Betterment (%)	0
SPR	0.47	QBar	0.4

Pre-development Discharge Rate

Q 1 year (l/s)	0.3	Q 100 year (l/s)	0.9
Q 30 year (l/s)	0.7		

Pre-development Discharge Volume

Site Makeup	Greenfield	Return Period (years)	100
Greenfield Method	FSR/FEH	Climate Change (%)	40
Positively Drained Area (ha)	0.084	Storm Duration (mins)	360
Soil Index	4	Betterment (%)	0
SPR	0.47	PR	0.473
CWI	99.407	Runoff Volume (m^3)	35

Node 3 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	8.026	Product Number	CTL-SHE-0049-1000-0800-1000
Design Depth (m)	0.800	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.0	Min Node Diameter (mm)	1200

Node 3 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	8.026
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m^2)	Inf Area (m^2)	Depth (m)	Area (m^2)	Inf Area (m^2)	Depth (m)	Area (m^2)	Inf Area (m^2)
0.000	65.0	0.0	0.800	65.0	0.0	0.801	0.0	0.0

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.21%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	9	8.721	0.071	7.9	0.0246	0.0000	OK
15 minute summer	2	9	8.329	0.112	15.6	0.0384	0.0000	OK
180 minute winter	3	136	8.146	0.120	3.0	7.5152	0.0000	SURCHARGED
15 minute summer	4	1	7.808	0.000	0.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	7.7	0.957	0.434	0.2895	
15 minute summer	2	1.001	3	15.7	1.438	0.395	0.3737	
180 minute winter	3	Hydro-Brake®	4	0.9				11.9

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.21%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	9	8.790	0.140	19.2	0.0489	0.0000	OK
15 minute summer	2	9	8.401	0.184	37.5	0.0633	0.0000	OK
180 minute winter	3	172	8.351	0.325	6.8	20.4239	0.0000	SURCHARGED
15 minute summer	4	1	7.808	0.000	0.9	0.0000	0.0000	OK

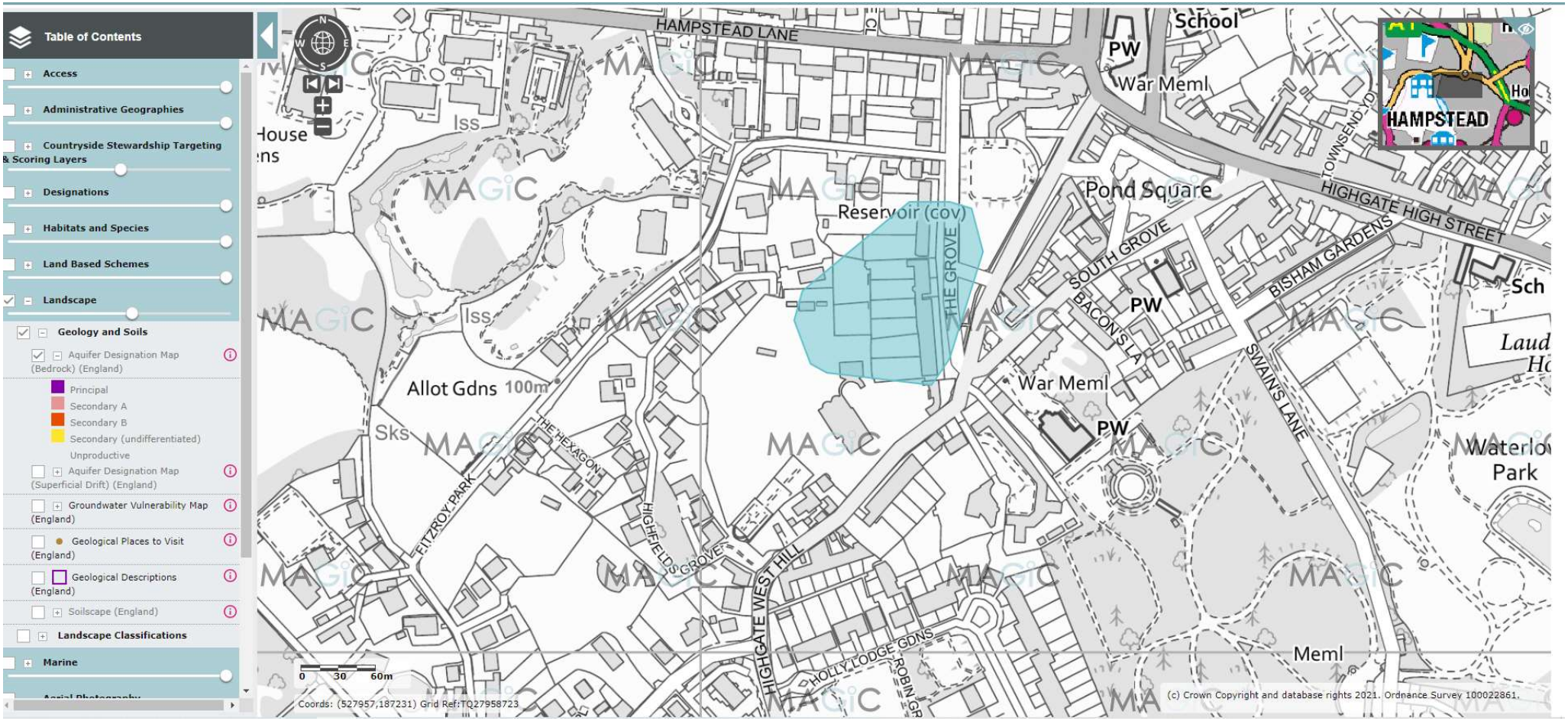
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	18.2	1.142	1.032	0.5904	
15 minute summer	2	1.001	3	37.8	1.570	0.949	0.7805	
180 minute winter	3	Hydro-Brake®	4	0.9				20.4

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.21%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	9	9.777	1.127	34.9	0.3921	0.0000	FLOOD RISK
15 minute summer	2	9	8.718	0.501	63.1	0.1723	0.0000	SURCHARGED
240 minute winter	3	236	8.716	0.690	9.1	43.3767	0.0000	SURCHARGED
15 minute summer	4	1	7.808	0.000	0.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	29.0	1.647	1.639	0.6348	
15 minute summer	2	1.001	3	58.5	1.601	1.468	1.2724	
240 minute winter	3	Hydro-Brake®	4	0.9				23.2

Appendix H Aquifer Designation Map



Aquifer Designation Map

(no aquifers present in Bedrock or superficial drift)

Appendix J Sewer Flooding History

Sewer Flooding
History Enquiry

Property Searches

Hull Raiser Ltd

Search address supplied	5 The Grove London N6 6JU
Your reference	The Grove
Our reference	SFH/SFH Standard/2021_4494518
Received date	**25 August 2021**
Search date	**25 August 2021**

Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW
DX 151280 Slough 13

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

0800 009 4540

Sewer Flooding
History Enquiry

Property Searches

Search address supplied: 5,The Grove,London,N6 6JU

This search is recommended to check for any sewer flooding in a specific address or area

TWUL, trading as Property Searches, are responsible in respect of the following:-

(i) any negligent or incorrect entry in the records searched;

(ii) any negligent or incorrect interpretation of the records searched;

(iii) and any negligent or incorrect recording of that interpretation in the search report

(iv) compensation payments

Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW
DX 151280 Slough 13

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

0800 009 4540

Sewer Flooding
History Enquiry

Thames Water Property Searches

History of Sewer Flooding

Is the requested address or area at risk of flooding due to overloaded public sewers?

The flooding records held by Thames Water indicate that there have been no incidents of flooding in the requested area as a result of surcharging public sewers.

For your guidance:

- A sewer is "overloaded" when the flow from a storm is unable to pass through it due to a permanent problem (e.g. flat gradient, small diameter). Flooding as a result of temporary problems such as blockages, siltation, collapses and equipment or operational failures are excluded.
- "Internal flooding" from public sewers is defined as flooding, which enters a building or passes below a suspended floor. For reporting purposes, buildings are restricted to those normally occupied and used for residential, public, commercial, business or industrial purposes.
- "At Risk" properties are those that the water company is required to include in the Regulatory Register that is presented annually to the Director General of Water Services. These are defined as properties that have suffered, or are likely to suffer, internal flooding from public foul, combined or surface water sewers due to overloading of the sewerage system more frequently than the relevant reference period (either once or twice in ten years) as determined by the Company's reporting procedure.
- Flooding as a result of storm events proven to be exceptional and beyond the reference period of one in ten years are not included on the At Risk Register.
- Properties may be at risk of flooding but not included on the Register where flooding incidents have not been reported to the Company.
- Public Sewers are defined as those for which the Company holds statutory responsibility under the Water Industry Act 1991.
- It should be noted that flooding can occur from private sewers and drains which are not the responsibility of the Company. This report excludes flooding from private sewers and drains and the Company makes no comment upon this matter.
- For further information please contact Thames Water on Tel: 0800 316 9800 or website www.thameswater.co.uk

Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW
DX 151280 Slough 13

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

0800 009 4540

Appendix K Asset Location Search

Asset location search

Property Searches

Hull Raiser Ltd

COWES
PO31 7EJ

Search address supplied

5
The Grove
London
N6 6JU

Your reference The Grove

Our reference ALS/ALS Standard/2021_4494517

Search date 25 August 2021

Knowledge of features below the surface is essential for every development

The benefits of this knowledge not only include ensuring due diligence and avoiding risk, but also being able to ascertain the feasibility of any development.

Did you know that Thames Water Property Searches can also provide a variety of utility searches including a more comprehensive view of utility providers' assets (across up to 35-45 different providers), as well as more focused searches relating to specific major utility companies such as National Grid (gas and electric).

Contact us to find out more.

Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW
DX 151280 Slough 13

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

0800 009 4540

Asset location search

Property Searches

Search address supplied: 5, The Grove, London, N6 6JU

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

Asset location search

Thames Water Property Searches

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.

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

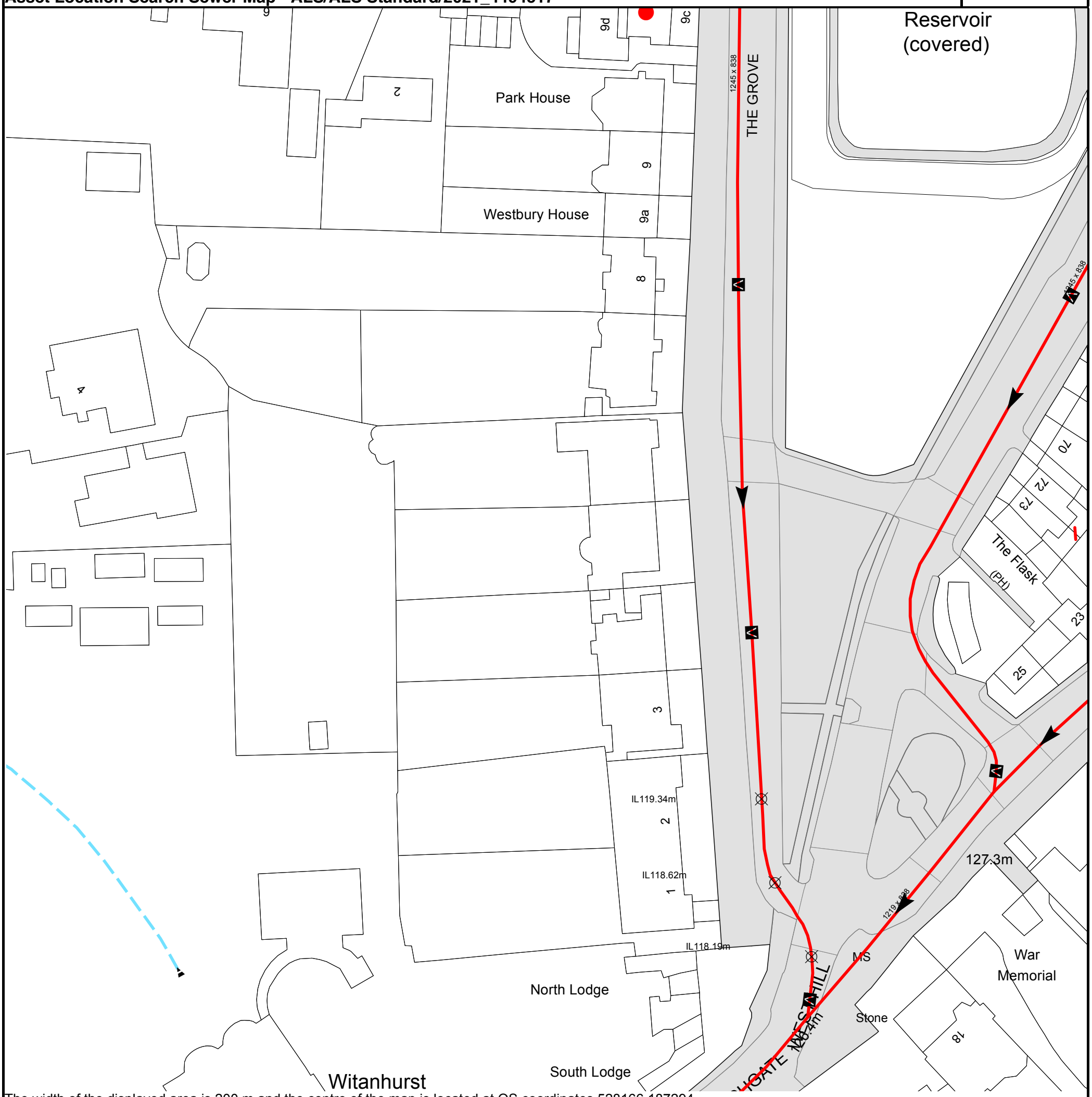
Clean Water queries

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

Asset Location Search Sewer Map - ALS/ALS Standard/2021_4494517



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 528166,187294

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.

Based on the Ordnance Survey Map with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
1301	n/a	n/a

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.

ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

Foul: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.

Surface Water: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.

Combined: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.

Trunk Surface Water

Trunk Foul

Storm Relief

Trunk Combined

Vent Pipe

Bio-solids (Sludge)

Proposed Thames Surface Water Sewer

Proposed Thames Water Foul Sewer

Gallery

Foul Rising Main

Surface Water Rising Main

Combined Rising Main

Sludge Rising Main

Proposed Thames Water Rising Main

Vacuum

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

Air Valve

Dam Chase

Fitting

Meter

Vent Column

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

Control Valve

Drop Pipe

Ancillary

Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol, Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

Outfall

Undefined End

Inlet

Other Symbols

Symbols used on maps which do not fall under other general categories

Public/Private Pumping Station

Change of characteristic indicator (C.O.C.I.)

Invert Level

Summit

Areas

Lines denoting areas of underground surveys, etc.

Agreement

Operational Site

Chamber

Tunnel

Conduit Bridge

Other Sewer Types (Not Operated or Maintained by Thames Water)

Foul Sewer

Surface Water Sewer

Combined Sewer

Gulley

Culverted Watercourse

Proposed

Abandoned Sewer

Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.

2) All measurements on the plans are metric.

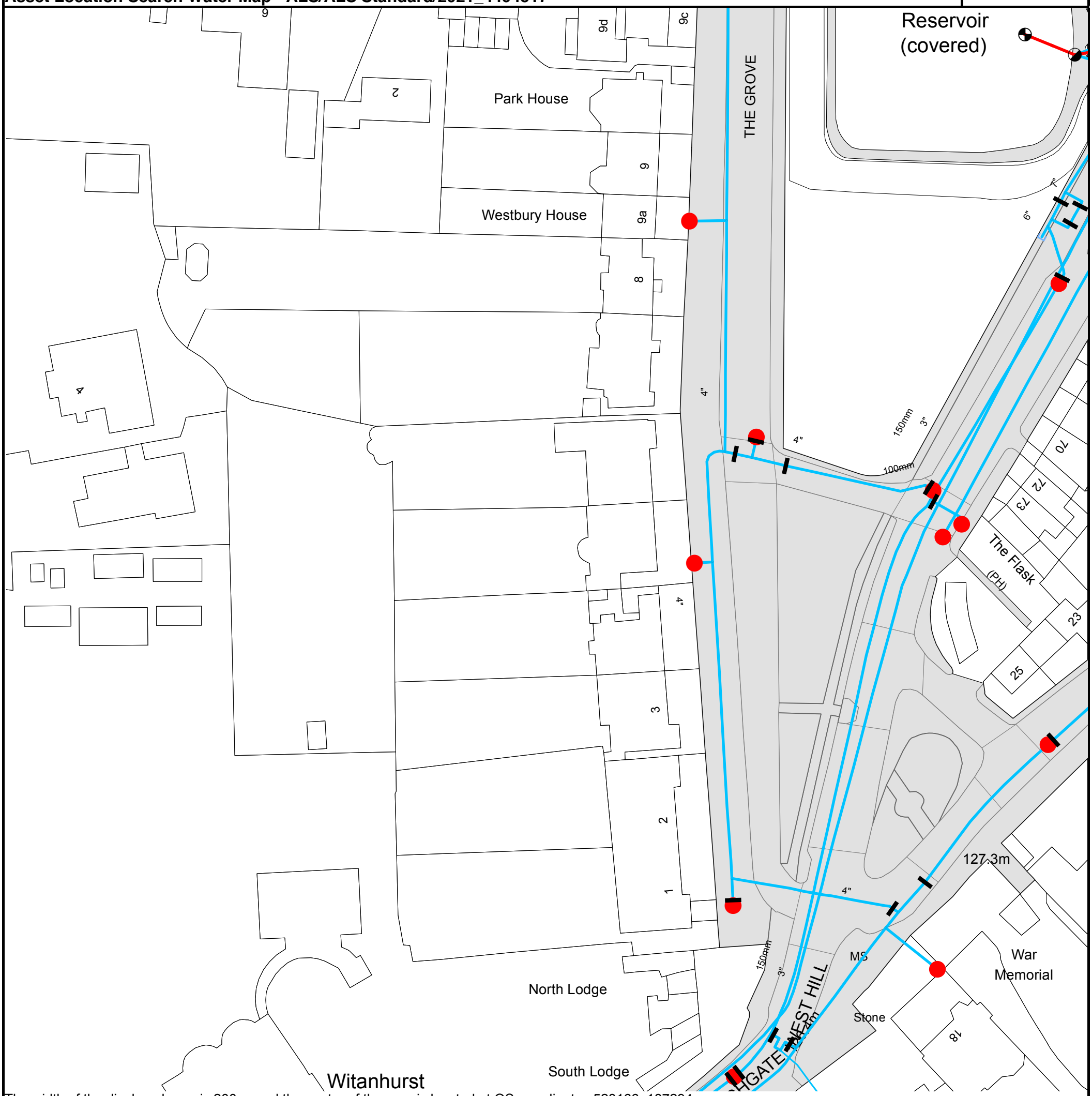
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.

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 level indicates that data is unavailable.

6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in milimetres. 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 present on the plan, please contact a member of Property Searches on 0800 009 4540.

Asset Location Search Water Map - ALS/ALS Standard/2021_4494517



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 528166, 187294.

ALS Water Map Key

Water Pipes (Operated & Maintained by Thames Water)

4"

Distribution Main: The most common pipe shown on water maps. With few exceptions, domestic connections are only made to distribution mains.

16"

Trunk Main: A main carrying water from a source of supply to a treatment plant or reservoir, or from one treatment plant or reservoir to another. Also a main transferring water in bulk to smaller water mains used for supplying individual customers.

3" SUPPLY

Supply Main: A supply main indicates that the water main is used as a supply for a single property or group of properties.

3" FIRE

Fire Main: Where a pipe is used as a fire supply, the word FIRE will be displayed along the pipe.

3" METERED

Metered Pipe: A metered main indicates that the pipe in question supplies water for a single property or group of properties and that quantity of water passing through the pipe is metered even though there may be no meter symbol shown.

Transmission Tunnel: A very large diameter water pipe. Most tunnels are buried very deep underground. These pipes are not expected to affect the structural integrity of buildings shown on the map provided.

Proposed Main: A main that is still in the planning stages or in the process of being laid. More details of the proposed main and its reference number are generally included near the main.

Valves

- General Purpose Valve
- Air Valve
- Pressure Control Valve
- Customer Valve

Hydrants

- Single Hydrant

Meters

- Meter

End Items

Symbol indicating what happens at the end of a water main.

- Blank Flange
- Capped End
- Emptying Pit
- Undefined End
- Manifold
- Customer Supply
- Fire Supply

Operational Sites

- Booster Station
- Other
- Other (Proposed)
- Pumping Station
- Service Reservoir
- Shaft Inspection
- Treatment Works
- Unknown
- Water Tower

Other Symbols

- Data Logger

PIPE DIAMETER	DEPTH BELOW GROUND
Up to 300mm (12")	900mm (3')
300mm - 600mm (12" - 24")	1100mm (3' 8")
600mm and bigger (24" plus)	1200mm (4')

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.

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 14 days from due 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. Thames Water does not accept post-dated cheques-any cheques received will be processed for payment on date of receipt.
5. In case of dispute TWUL`s terms and conditions shall apply.
6. 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'.
7. Interest will be charged in line with current Court Interest Charges, if legal action is taken.
8. 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 not satisfied with the response, your complaint will be reviewed by the Customer Services Director. You can write to her at: Thames Water Utilities Ltd. PO Box 492, Swindon, SN38 8TU.

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 0121 345 1000 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**	**Cheque**
Call **0800 009 4540** quoting your invoice number starting CBA or ADS / OSS	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	Made payable to '**Thames Water Utilities Ltd**' Write your Thames Water account number on the back. Send to: **Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW** or by DX to **151280 Slough 13**

Thames Water Utilities Ltd Registered in England & Wales No. 2366661 Registered Office Clearwater Court, Vastern Rd, Reading, Berks, RG1 8DB.

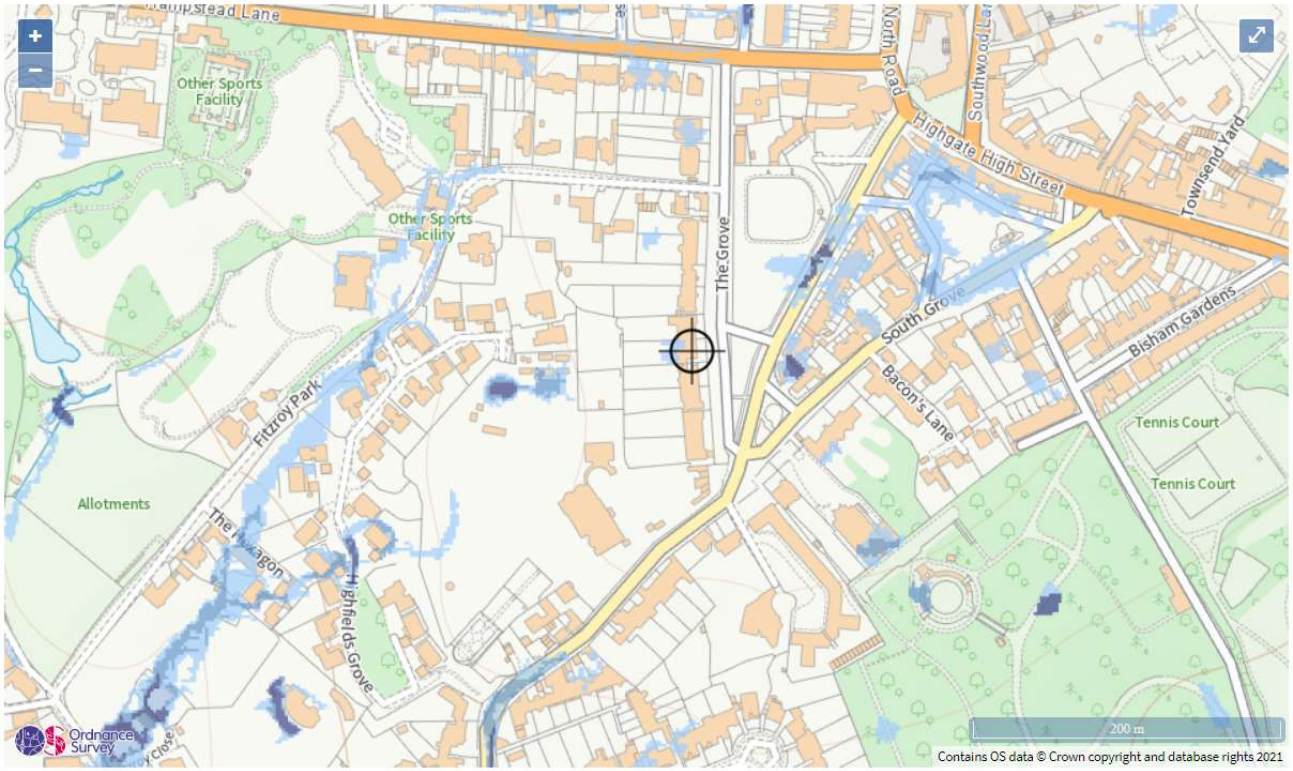
Appendix L Highway Flooding

Flood risk

Extent of flooding

Location

Enter a place or postcode



Extent of flooding from surface water

High Medium Low Very low Location you selected