F Surface Water & Flood Risk Assessment

Surface water and flood risk assessment

elliottwood

50 Avenue Road

Camden

NW8 6HS

Surface Water and Flood Risk Assessment

project no. WE13066

revision: P2

Document Control

issue no.	01	remarks:	Planning application for development at 50 Avenue Road				
revision:	P1	prepared by:	Niall Greenan	checked by:	Guy Laister	approved by:	Guy Laister
date:	August 2013	signature:		signature:		signature:	
revision:	P2	prepared by:	Guy Laister	checked by:		approved by:	Guy Laister
date:	July 2014	signature:		signature:		signature:	

Contents

Executive Summary 1

1.0 Introduction 2
- General Information 2
- Planning Policy 2
- Location 3
- Existing Development 3
- Proposed Development 3

2.0 Surface Water and Flooding Impact Assessment 4
- Stage 1: Screening 4
- Stage 2: Scoping 5

3.0 Potential Flooding on Site 6
- Historic Information 6
- Tidal and Fluvial Flooding 6
- Flooding from Sewers and Overland Flow 7
- Flooding from Groundwater 7
- Flooding from Reservoirs, Canals and Other Artificial Sources 8

4.0 Conclusions and Recommendations 9

Appendix 10

List of Figures

Figure 1 – Site Location 3
Figure 2 – Environment Agency Flood Zone Maps 6

Appendix

Drawing 1 - Surface Flow and Flooding Screening Flowchart
Drawing 2 - Topographic Survey
Drawing 3 - Proposed Development
Drawing 4 - JBA (Pluvial) Surface Water Flooding Map
Drawing 5 - Asset Location Map

Executive Summary

The site located at 50 Avenue Road is currently occupied by a detached dwelling and associated landscaped gardens. Proposals are to retain the existing building and construct a new two storey basement under the building extending under the existing rear garden area.

The Environment Agency flood zone maps indicate that the site is located in Flood Zone 1 (Low Risk). In accordance with the technical guidance document to the National Planning Policy Framework (NPPF), this zone comprises land assessed as having a less than 1 in 1000 annual probability of fluvial or tidal flooding (<0.1%). Local planning guidance on basement developments specifies that all new basement developments located in borough-defined areas at risk of surface water and sewer flooding need to be accompanied by a Flood Risk Assessment.

Avenue Road flooded in 2002 from surface water however the site itself is raised above surrounding road levels of Avenue Road. Therefore the risk of surface water and sewer flooding to the site are considered to be low. All other sources of flooding have been assessed in accordance with the NPPF and are considered to pose a low risk to the site.

The proposed basement extension is at low risk of flooding from all sources and is considered acceptable in the context of flood risk. Although the impermeable area on site will increase following development, SUDS such as a brown roof, underground storage and a flow restrictor will be introduced to attenuate surface water runoff from all these areas. The development will therefore not increase surface water runoff rates from the site thereby ensuring no increase in risk from this source.

1.0 Introduction

General Information

1.1 The site is located at 50 Avenue Road in the London Borough of Camden and is currently occupied by a single, detached dwelling. The site is less than 1ha in size and in its existing state comprises the building footprint and associated gardens.

1.2 The Environment Agency flood zone maps indicate that the site is located in Flood Zone 1. This zone comprises land assessed as having a less than 1 in 1000 annual probability of fluvial or tidal flooding (<0.1%).

1.3 The London Borough of Camden policy dictates that surface water and flood risk is considered in this case primarily due to basement construction. This Surface Water and Flooding Impact Assessment has been produced to assess the risks of flooding from other potential sources such as overland flow, groundwater, artificial water bodies and underground sewers. The impact of the proposed development on surface water infrastructure is considered, to form part of the Basement Impact Assessment.

Planning Policy

1.4 As part of the Local Development Framework (LDF), Camden adopted the Core Strategy and Development Policies in November 2010. Policy CS13 relates to flood risk and states:

"Water and surface water flooding"

We will make Camden a water efficient borough and minimise the potential for surface water flooding by:

- *protecting our existing drinking water and foul water infrastructure, including Barrow Hill Reservoir, Hampstead Heath Reservoir, Highgate Reservoir and Kidderpore Reservoir;*
- *making sure development incorporates efficient water and foul water infrastructure;*
- *requiring development to avoid harm to the water environment, water quality or drainage systems and prevents or mitigates local surface water and down-stream flooding, especially in areas up-hill from, and in, areas known to be at risk from surface water flooding such as South and West Hampstead, Gospel Oak and King's Cross.'*

1.5 The Development Policies also include a policy specific to basements as follows:

DP27 – Basements and Lightwells

"...The Council will only permit basement and other underground development that does not cause harm to the built and natural environment and local amenity and does not result in flooding or ground instability...."

1.6 The London Borough of Camden has strict policies with regards to basement development within the Borough, therefore they have provided guidelines for 'New basement developments and extensions to existing basement accommodation[1]'. Formal planning guidance has also been released[2] setting out specific criteria for assessing the impact of basement construction. As part of the Basement Impact Assessment (BIA), it is necessary to consider 'Surface flow and flooding'. A screening flowchart (Drawing 1) addresses individual sources of potential flooding, and where a risk of flooding is present, a scoping and impact assessment need to be undertaken as appropriate. This report covers this component of the BIA.

[1] London Borough of Camden, Shaping Camden – Guidelines – New Basement Development and Extensions to Existing Basement Accommodation, February 2009

[2] London Borough of Camden – Camden Planning Guidance (CPG4) Basements and Lightwells.

1.7 In conjunction with ARUP, the London Borough of Camden produced a 'geological, hydrogeological and hydrological study for guidance on subterranean development[3]'.

Location

1.8 The site is situated on Avenue Road in the London Borough of Camden as shown in Figure 1.

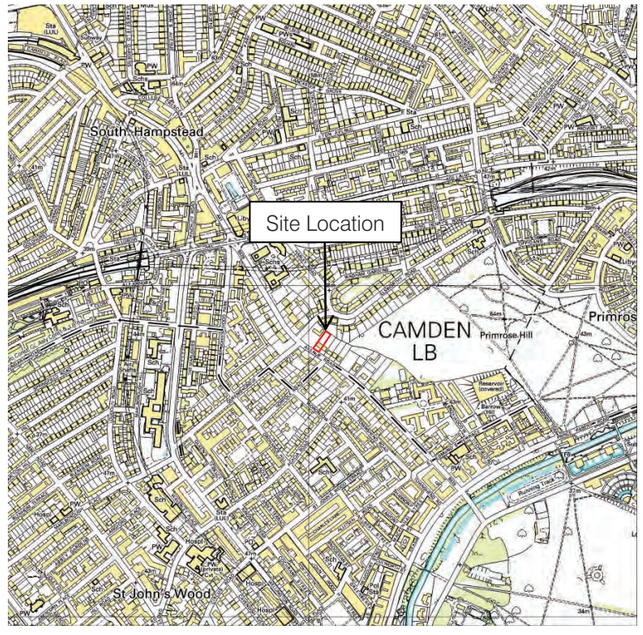


Figure 1 – Site Location

Existing Development

1.9 The existing site has an area of 1,246m^2 (0.1246ha) which comprises of a residential dwelling and associated gardens.

1.10 A topographic survey of the site has been carried out by Matrix Surveys in March 2013 and is included as Drawing 2. The survey shows the site falling in a south westerly direction towards Avenue Road, from 45.85m AOD at the rear of the site to 43.90m AOD in the front of the site.

Proposed Development

1.11 Proposals are to retain the existing building. A new two storey basement will be constructed under the building extending under the existing rear garden area. The first basement floor level below ground will have a car stacker, a cinema, ancillary rooms, laundry room, store room, salon, bar and games room with the second basement floor level below ground containing an indoor swimming pool, sauna, steam room, gym, relaxation area and plant rooms (Drawing 3).

1.12 The new development will consist of landscaped rear garden over the proposed basement extension area and new lightwells to the front of the principal house.

[3] ARUP Geological, Hydrogeological and Hydrological Study – Guidance for Subterranean Development, November 2010

2.0 Surface Water and Flooding Impact Assessment

Stage 1: Screening

2.1 CPG4 includes a surface flow and flooding screening flowchart for assessing the impact of potential sources of flooding, as well as the impact of the development on flood risk elsewhere.

2.2 The flow chart is set out with six questions, which are addressed with reference to the site and proposed development at 50 Avenue Road as follows:

- Question 1: Is the site within the catchment of the pond chains on Hampstead Heath?

  Answer: No – The site is more than 2km from Hampstead Heath and not shown within the catchment area of the pond chains.

- Question 2: As part of the proposed site drainage, will surface water flows (e.g. volume of rainfall and peak runoff) be materially changed from the existing route?

  Answer: No – The current proposal is to re-use the existing connections to the Thames Water combined public sewer located in Avenue Road.

- Question 3: Will the proposed basement development result in a change in the proportion of hard surfaced/paved external areas?

  Answer: Yes – The proposed development will have an increase in the impermeable area post-development.

- Question 4: Will the proposed basement result in changes to the profile of the inflows (instantaneous and long-term) of surface water being received by adjacent properties or downstream watercourse?

  Answer: No – The proposed development is deemed not to affect the profile of inflows to adjacent properties.

- Question 5: Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?

  Answer: No – The proposed basement will not result in any changes to the quality of surface water being received by adjacent properties or downstream watercourses.

2.3 According to CPG4, it is necessary to carry forward to the scoping stage of the Basement Impact Assessment those matters of concern where the response is 'yes'. Therefore, as Question 3 has a response of 'yes', the scoping stage is required.

2.4 In addition:

- Question 6: Is the site in an area known to be at risk from surface water flooding, such as South Hampstead, West Hampstead, Gospel Oak and King's Cross, or is it at risk from flooding, for example because the proposed basement is below the static water level of a nearby surface water feature?

  Reference: The principles outlined in the NPPF should be followed to ensure that flood risk is not increased.

  Answer: Yes – see chapter 3 for details. **Developer to undertake a Flood Risk Assessment in accordance with the NPPF.**

Stage 2: Scoping

2.5 Increasing the area of hard standing on site as a result of development will increase the volume and peak flow rate of surface water generated. In order to ensure that development does not increase flood risk elsewhere, mitigation needs to be provided in the form of SUDS on site to attenuate the peak rate and volume of surface water runoff.

2.6 A new drainage system is proposed for the development, which will capture runoff from all hard standing surfaces post-development. The development will result in a minor increase in surface water runoff rates resulting from a 31m^2 increase in impermeable area (697m^2 in the existing scenario to 728m^2 in the proposed case out of a total site area of 1,238.4m^2). SUDS will be used to attenuate flows before discharging to the public sewer at rates to be agreed with Thames Water. SUDS on the development will include a 22.5m^2 extensive brown roof to slow the rate of water entry into the drainage system combined with underground storage and a flow control to restrict peak flows. This will ensure that the peak rate of runoff does not increase following development and the development will therefore not increase flood risk elsewhere.

3.0 Potential Flooding on Site

Historic Information

3.1 No records have been found of the site flooding in the past from any of the sources identified in the NPPF.

3.2 It is noted in the North London SFRA[4] that a large area in the north of Camden was affected by surface water flooding in August 2002, which was the result of heavy rainfall inundating the public sewer system. A similar region of Camden was affected by surface water/sewer flooding in 1975. In both instances, the floods that occurred are understood to have been the result of high intensity rainfall inundating the main sewer and causing manholes and gullies to surcharge.

3.3 Map 22 of the SFRA, and Figure 15 of the ARUP study show that Avenue Road has been recorded to have flooded in 2002.

Tidal and Fluvial Flooding

3.4 In October 2004, the Environment Agency released updated floodplain maps for the UK based on the 'JFLOW' project, a two-dimensional hydraulic modelling project. Figure 1 shows the latest 'Flood Zone Map' for the River Thames in central London.

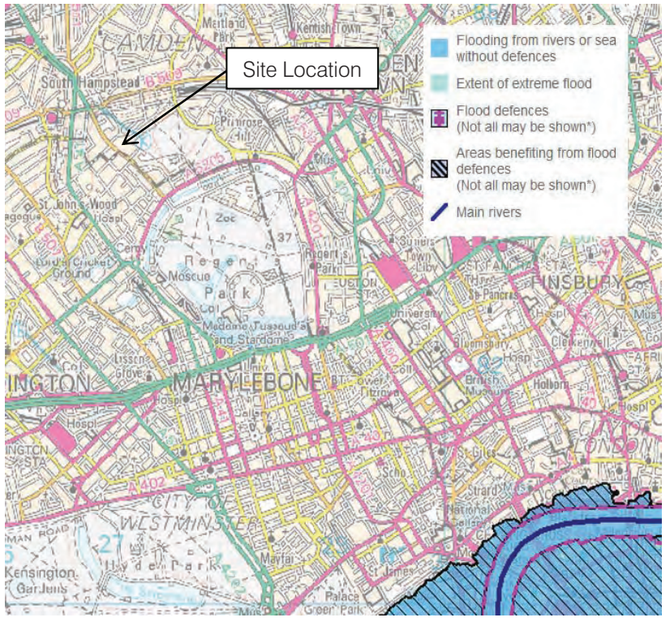


Figure 2 – Environment Agency Flood Zone Maps

3.5 The site is located in Flood Zone 1 and is approximately 5km north of the River Thames at its nearest location. As stated in the NPPF, "*this zone comprises land assessed as having a less than 1 in 1000 annual probability of fluvial and tidal flooding (<0.1%)".* Therefore the risk of flooding from tidal and fluvial sources is considered low.

[4] North London Strategic Flood Risk Assessment, (August 2008)

Flooding from Sewers and Overland Flow

3.6 Surface water flooding is typically the result of high intensity rainfall that is unable to infiltrate into the ground or enter the drainage system, ultimately following overland flow paths. In an urban environment such as Camden, surface water runoff is disposed of almost entirely via formal drainage systems, and consequently sewer flooding and surface water flooding (overland flow) need to be considered in tandem in this instance.

3.7 It is reasonable to assume that adopted sewers have been designed to the 1 in 30 year return period (in accordance with Sewers for Adoption 6th Edition[5]), which is considerably lower than the 100 year standard considered for fluvial flooding. As such, sewer flooding is often more frequent but less severe than fluvial flooding.

3.8 The North London SFRA has collected data from flooding events in 1975 and 2002 which have been used by Camden to map areas of the borough that are more susceptible to surface water flooding. This information was subsequently used to inform Camden's supplementary guidance document on basement developments[6]. In this document, roads having flooded in 1975 and 2002 are known as "primary areas" and those that flooded in only the 1975 or 2002 are known as 'secondary areas'. Any proposals for a basement development located in a primary or secondary area must include a flood risk assessment.

3.9 The London Borough of Camden experienced flooding in 1975 and 2002, which was attributed to overland flow and sewer flooding. Avenue Road is recorded as having flooded in the 2002 event, and the site is therefore located in a "secondary area". However the records are not detailed and entire roads have been highlighted without reference to specific locations or to which (if any) properties were flooded on these roads.

3.10 Drawing 4 shows a map produced by simulating a 1 in 200-year rainfall event over a 6.5 hour duration. The hydraulic modelling techniques used were to identify overland flow routes and areas where surface water will pond. The site lies outside an area of surface water flooding.

3.11 The Thames Water asset plan confirms that the site is connected to the combined public sewer located in Avenue Road with road levels falling from north west (approx. 47.5m AOD) to south east (approx. 42.8m). Drawing 5 shows the Thames Water asset plans with manhole 9801 located north of the site on Avenue Road. The manhole has a cover level of 44.68m AOD, however the road falls by approximately 3m from the manhole to the site. The topographic survey of the site shows that kerb levels (approx. 43.5m AOD) in Avenue Road are lower than ground levels on site (approx. 44.5m AOD), therefore any sewer surcharge will be contained in the carriageway of the road and pass the site in a south-easterly direction.

3.12 Therefore, despite the record of flooding on Avenue Road in 2002, the risk of flooding from sewers and overland flow is considered low.

Flooding from Groundwater

3.13 The online 1:50,000 BGS map indicates the site to be underlain by the London Clay formation. However, superficial head deposits are located to the east and west of the site.

3.14 A site investigation[7] was undertaken in June 2013 where groundwater seepage was encountered in BH1 at 12m b.g.l. The proposed basement will be approximately 10m b.g.l. The underlying geology of Camden and the majority of North London consists of London Clay, which typically has a very low infiltration rate. The North London SFRA notes that this clay is over 100m deep in high lying parts of Camden.

[5] WRc7 plc (March 2006) Sewers for Adoption – A Design and Construction Guide for Developers. 6th Edition.

[6] 3 London Borough of Camden, Shaping Camden – Guidelines – New Basement Development and Extensions to Existing Basement Accommodation, February 2009

[7] Site Analytical Services Ltd, Ground Investigation Report, Ref No. 13/20821, June 2013

3.15 The North London SFRA also notes that there have been very few recorded incidents of groundwater flooding in North London, none of which are located in Camden. The risk of flooding from groundwater is therefore considered to be low.

Flooding from Reservoirs, Canals and Other Artificial Sources

3.16 The Regent's Canal and Regent's Park Lake are the nearest artificial water bodies to the site (reference Figure 12 of the ARUP Study). However at both locations water is not retained above natural ground level and flooding as a result of infrastructure failure is therefore not possible.

3.17 Figure 14 of the ARUP study shows the Hampstead Heath Surface Water Catchments and Drainage including the pond chains, in greater detail. The site is not located within the catchment of the pond chains on Hampstead Heath.

3.18 The risk of flooding from artificial water bodies is therefore considered extremely unlikely.

4.0 Conclusions and Recommendations

4.1 The site is located at 50 Avenue Road in the London Borough of Camden and is currently occupied by a detached dwelling and associated landscaped gardens. Proposals are to retain the existing building and construct a new two storey basement under the existing house extending under the existing rear garden. The first basement floor level below ground will have a car stacker, a cinema, ancillary rooms, laundry room, store room, salon, bar and games room with the second basement floor level below ground containing an indoor swimming pool, sauna, steam room, gym, relaxation area and plant rooms.

4.2 The Environment Agency flood zone maps indicate that the site is located in Flood Zone 1 (Low Risk). In accordance with the technical guidance document to the National Planning Policy Framework (NPPF), this zone comprises land assessed as having a less than 1 in 1000 annual probability of fluvial or tidal flooding (<0.1%). Local planning guidance on basement developments specifies that all new basement developments located in borough-defined areas at risk of surface water and surface flooding need to be accompanied by a Flood Risk Assessment.

4.3 The North London SFRA has collected data from flooding events in 1975 and 2002 which have been used by Camden to map areas of the borough that are more susceptible to surface water flooding. This information was subsequently used to inform Camden's supplementary guidance document on basement developments. Any proposals for a basement development located in a primary or secondary area must include a flood risk assessment.

4.4 The site is located in a "secondary area" and therefore this surface water and flood risk assessment has been prepared to assess all the risks. The London Borough of Camden experienced flooding in 1975 and 2002, which was attributed to overland flow and sewer flooding. Avenue Road is recorded as having flooded in the 2002 event. Avenue Road flooded in 2002 from surface water however the site itself is raised above surrounding road levels of Avenue Road. Therefore the risk of surface water and sewer flooding to the site are considered to be low.

4.5 All other sources of flooding have been assessed in accordance with the NPPF and are considered to pose a low risk to the site.

4.6 The proposed basement extension is at low risk of flooding from all sources and is considered acceptable in the context of flood risk. Although the impermeable area on site will increase following development, SUDS such as a brown roof, underground storage and a flow restrictor will be introduced to attenuate surface water runoff from all these areas. The development will therefore not increase surface water runoff rates from the site thereby ensuring no increase in risk from this source.

Appendix

Drawing 1 - Surface Flow and Flooding Screening Flowchart

ARUP, Job No. 213923/KM
This flowchart is a guidance tool from the Camden geological, hydrogeological and hydrological study on subterranean development on how to complete a surface flow and flooding assessment.

Drawing 2 - Topographic Survey

Drawing Number 01
This drawing shows a topographic survey of the existing site.

Drawing 3 - Proposed Development

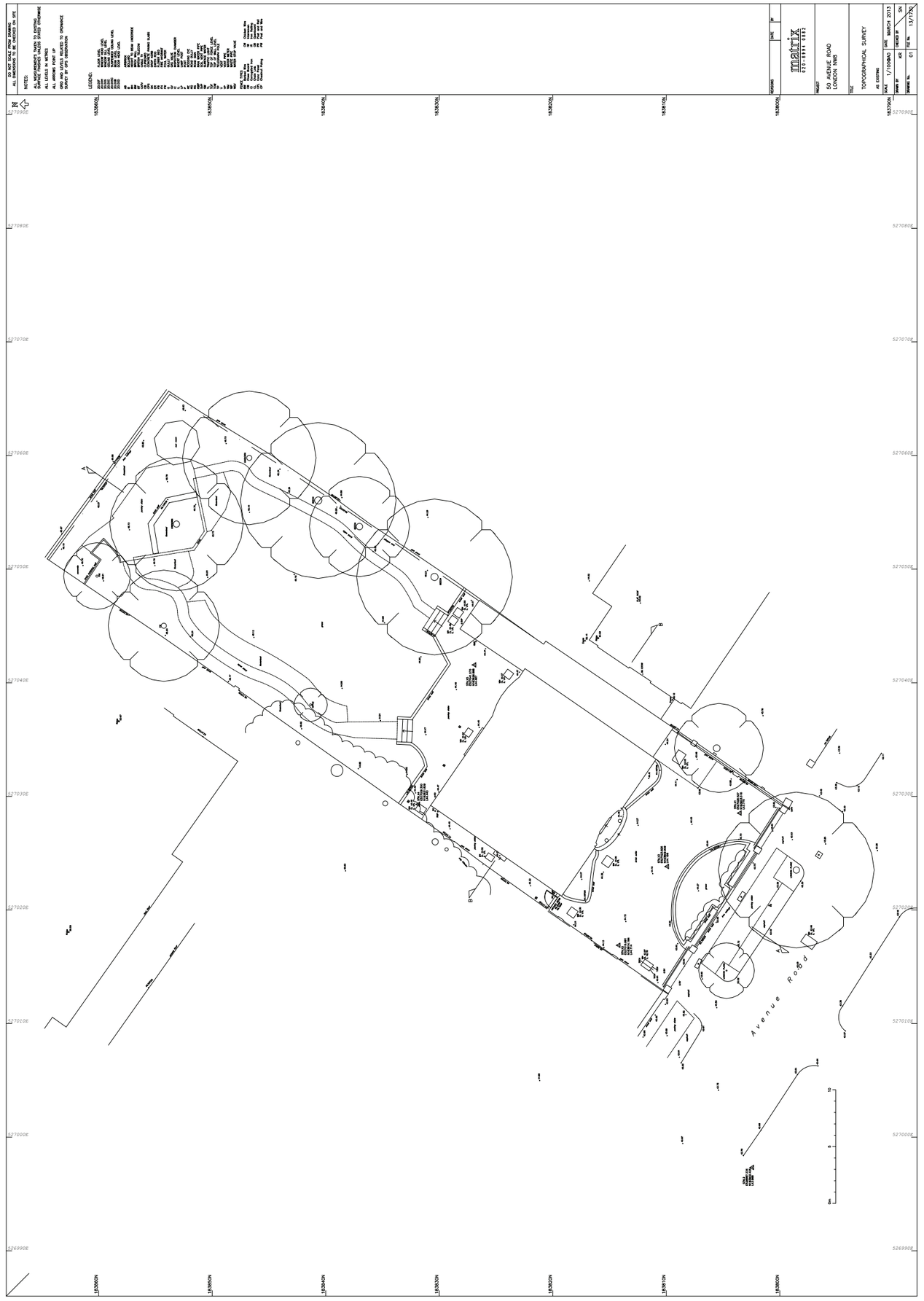
Section AA, Drawing Number AND – 200 P1
This drawing shows the proposed development in side elevation.

Drawing 4 - JBA (Pluvial) Surface Water Flooding Map

JBA (Pluvial) Surface Water Flooding Map, Report Reference: 10384517
This map shows the 1 in 200-year rainfall event over a 6.5 hour duration.

Drawing 5 - Asset Location Map

Thames Water, Ref No. 212099
This map shows the Thames Water asset locations near the site.



241 the broadway, london sw19 1sd • t: (020) 8544 0033 • **www.elliottwood.co.uk**

3. JBA Surface Water Flooding Map

Flood Risk Legend

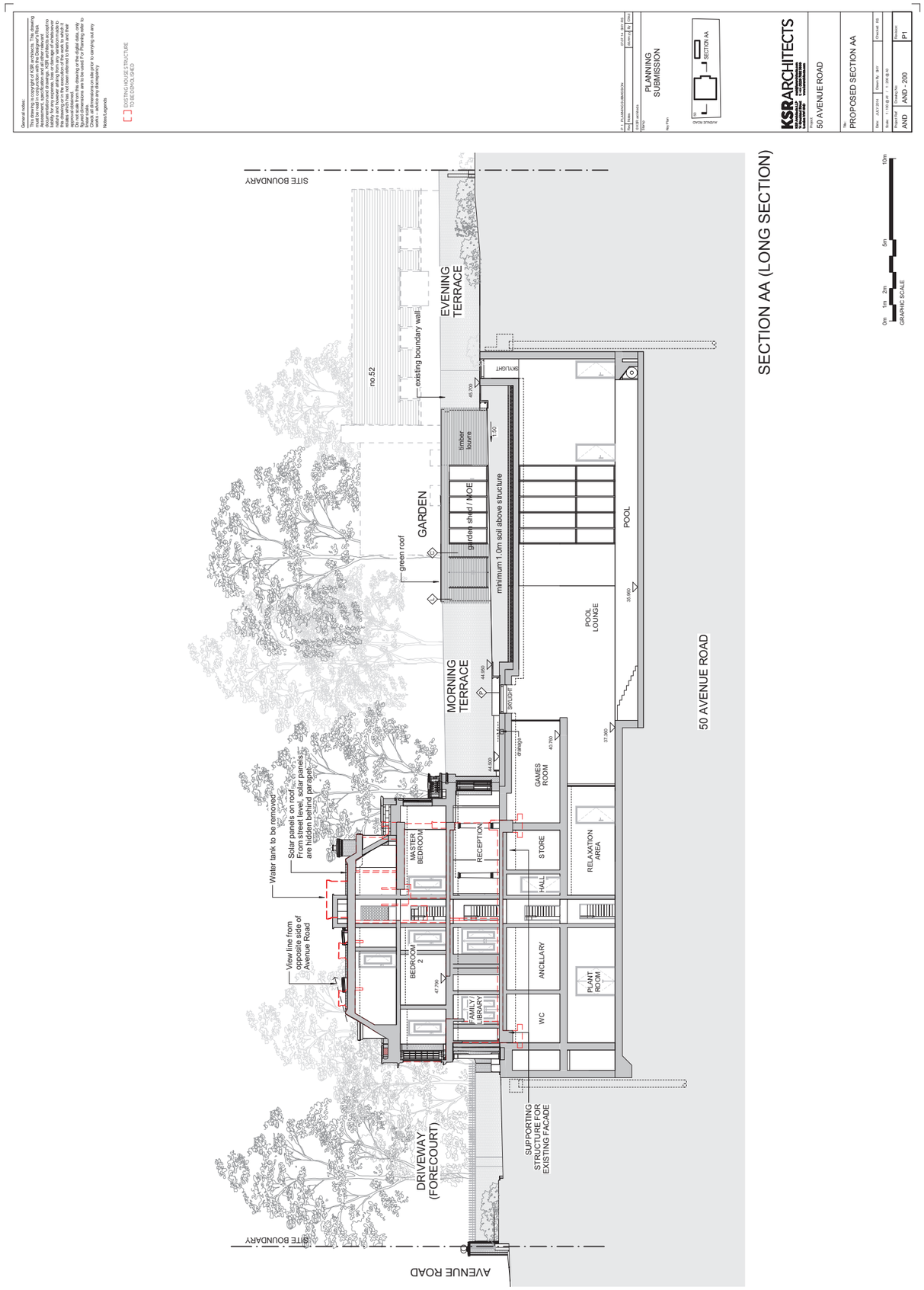
The data is provided by JBA Risk Management Limited, © Jeremy Benn Associates Limited and JBA Risk Management Limited 2008, 2009, 2010, 2011.

Site Outline

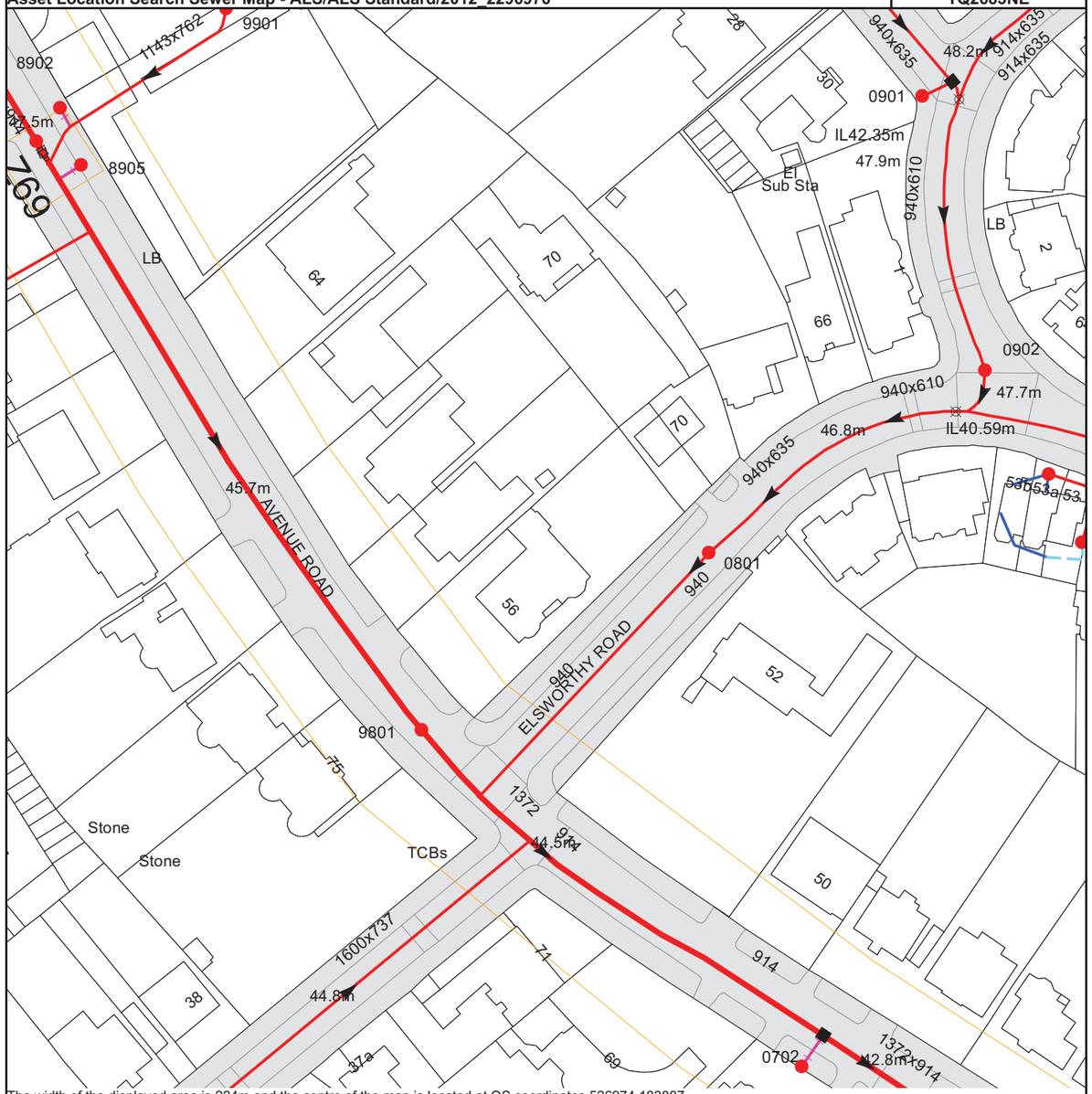
125
250
Search Buffers (m)

Significant
High
Moderate
Low to Moderate
Low

Report Reference: 10384517



Asset Location Search Sewer Map - ALS/ALS Standard/2012_2296976 | **TQ2683NE**



The width of the displayed area is 224m and the centre of the map is located at OS coordinates 526974,183887

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. WU298557 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
N/a	47.31	43.37
n/a	n/a	n/a
n/a	n/a	n/a
n/a	n/a	n/a
n/a	n/a	n/a
n/a	n/a	n/a
n/a	44.68	39.4
n/a	46.29	40.07
n/a	n/a	n/a
-	-	-
n/a	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

Storm Relief

Vent Pipe

Proposed Thames Surface Water Sewer

Gallery

Surface Water Rising Main

Sludge Rising Main

Vacuum

Trunk Foul

Trunk Combined

Bio-solids (Sludge)

Proposed Thames Water Foul Sewer

Foul Rising Main

Combined Rising Main

Proposed Thames Water Rising Main

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

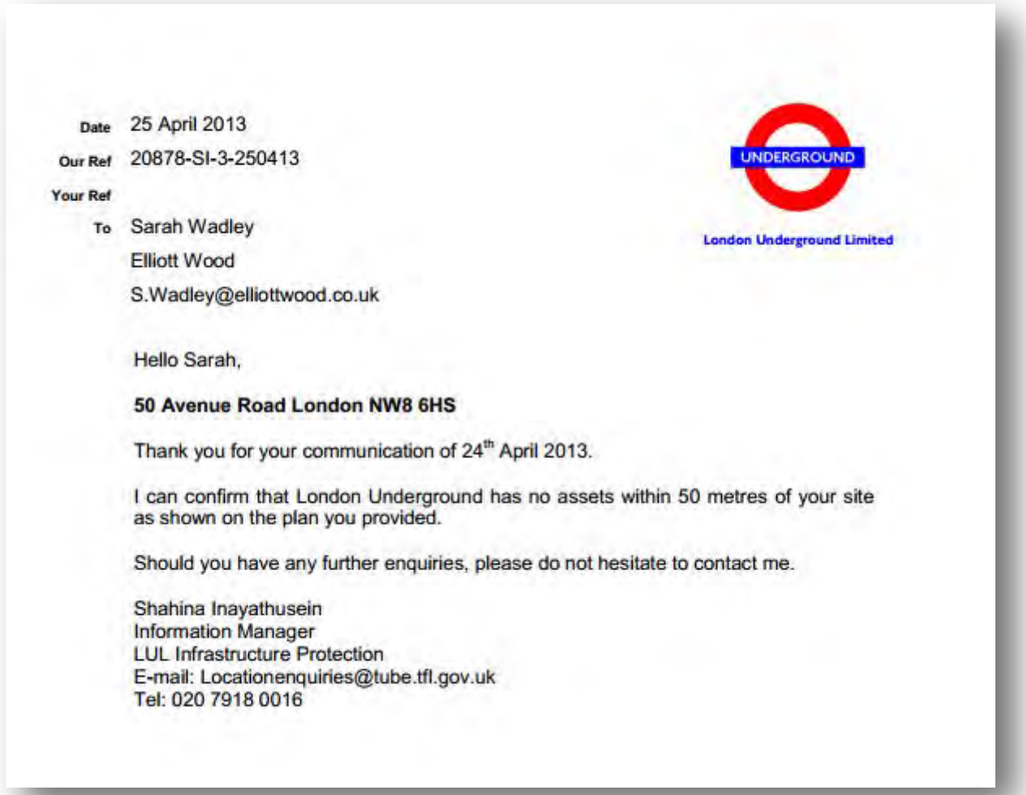
Other Sewer Types (Not Operated or Maintained by Thames Water)

- Foul Sewer
- Combined Sewer
- Culverted Watercourse
- Surface Water Sewer
- Gulley
- 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 Insight on 0118 925 1504.

G London Underground Asset Location Confirmation



Date 25 April 2013

Our Ref 20878-SI-3-250413

Your Ref

To Sarah Wadley
Elliott Wood
S.Wadley@elliottwood.co.uk

UNDERGROUND
London Underground Limited

Hello Sarah,

50 Avenue Road London NW8 6HS

Thank you for your communication of 24th April 2013.

I can confirm that London Underground has no assets within 50 metres of your site as shown on the plan you provided.

Should you have any further enquiries, please do not hesitate to contact me.

Shahina Inayathusein
Information Manager
LUL Infrastructure Protection
E-mail: Locationenquiries@tube.tfl.gov.uk
Tel: 020 7918 0016

London Underground Asset Location Confirmation

Wimbledon
241 The Broadway
London
SW19 1SD

tel. (020) 8544 0033
fax. (020) 8544 0066

Central London
4 John Prince's Street
London
W1G 0JL

tel. (020) 7499 5888
fax. (020) 7499 5444

Nottingham
Halifax House
Halifax Place
Nottingham
NG1 1QN

tel. 0870 460 0061
fax. 0870 460 0062

email: info@elliottwood.co.uk
www.elliottwood.co.uk

elliott wood partnership llp
structural and civil engineers