
The Hall School,
3 Crossfield Road,
Hampstead,
NW3 4NU

Flood Risk Assessment

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1.0 Executive Summary

The proposed Hall School development is located between Crossfield Road and Strathray Gardens, in South Hampstead, London. This area lies within the London Borough of Camden (LBC). The site is located within a Critical Drainage Area (CDA) as identified in the LBC Strategic Flood Risk Assessment (SFRA).

The existing site comprises of existing school buildings and an external area which is primarily used as a multi-use games area (MUGA). Pedestrian access to the site is achieved via Crossfield Road. The entire site area is approximately 2180m², and is considered to be 100% impermeable in the existing state.

The proposals are to retain and refurbish the older buildings on site, and demolish the newer Wathen Hall and Centenary Building. This will allow for the construction of a new school building, which will include a new two storey basement (linked into the older existing buildings).

The site has been assessed for all forms of flood risk and is considered to be at low risk. The below ground drainage proposals are outlined in Chapter 6 of this report. The final drainage design is subject to agreement with the LBC and Thames Water (TW).

2.0 Introduction

2.1 General Information

Elliott Wood has been commissioned to undertake a Flood Risk Assessment (FRA) in support of a development at The Hall School in Hampstead. The National Planning Policy Framework requires a Flood Risk Assessment to assess the flood risk to both the proposed development and the impact on surrounding properties. This FRA has been prepared in accordance with the Environment Agency's (EA) Flood Risk Assessment Guidance Note 1: Development within a Critical Drainage Area or greater than 1 hectare in Flood Zone 1.

2.2 Scope of Study

The site will be assessed for potential flood risk over its expected lifetime from all sources of flooding. There will also be a consideration to flood risk in the surrounding sites, in terms of the site's effect on surface water runoff and potential flood flows, to ensure the proposed development will not increase the risk of flood elsewhere.

3.0 Site Description

3.1 Location

The Hall School is located in South Hampstead, London, and lies within the London Borough of Camden (LBC). The National Grid reference for the site is 526932E, 184533N. (Refer to Figure 1 for the site location map.)

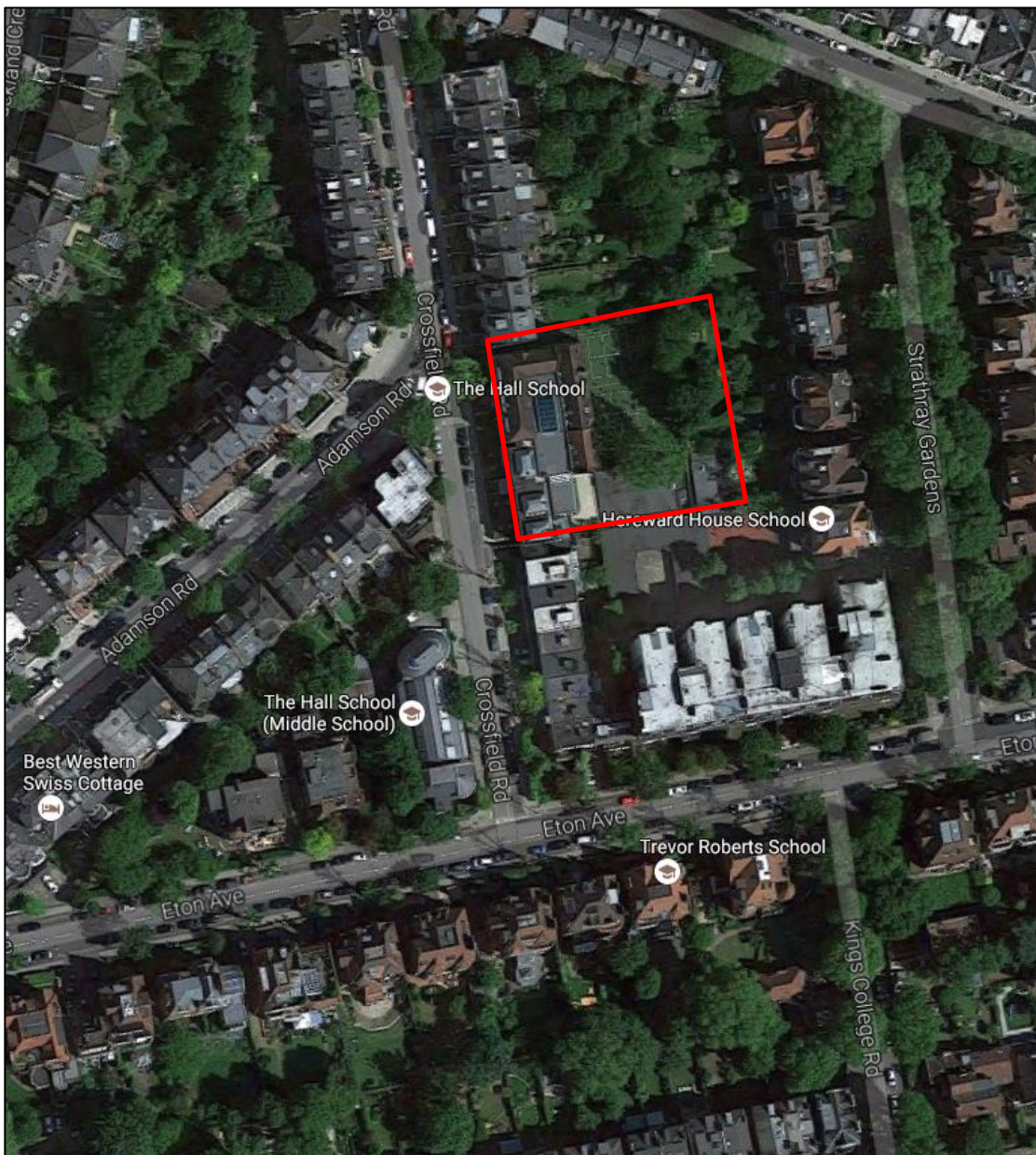


Figure 1 – Site Location Plan (Microsoft product screen shot reprinted with permission from Microsoft Corporation)

3.2 Existing Development

The existing site comprises of existing school buildings (of varying ages) and an external area which is primarily used as a multi-use games area (MUGA). Pedestrian access to the site is via Crossfield's Road. The entire site is approximately 2180m² and is considered to be 100% impermeable in the existing state.

3.3 Topographic Survey

A topographic survey has been completed by Metrix Surveys Ltd in October 2015; this can be found in Appendix 1. The site broadly consists of a shallow slope from northwest to southeast, with the external playing space being approximately 1.5m below the level of Crossfield Road.

3.4 Ground Investigation

A Ground investigation report has been prepared by GEA Ltd in August 2016. Boreholes between 5 & 25m below ground level (bgl) were undertaken as part of the survey works. The boreholes found the ground conditions to be Made Ground (general depth of made ground was found to be 1-2m bgl) with underlying London Clay, which extended the full extent of the 25m deep borehole. British Geological Survey (BGS) maps show that the clay may extend to a depth of up to 95m bgl.

Ground water seepage was encountered on site (approximately 1-3m bgl); however this was thought to be perched water. Data from BGS indicates that the continuous standing groundwater level is approximately 90m below ground level.

3.5 Proposed Development

The proposals are to retain and refurbish the older buildings on site, and demolish the newer Wathen Hall and Centenary Building. This will allow for the construction of a new school building, which will include a new two storey basement (linked into the older existing buildings). Refer to Figure 2 for a plan of the existing buildings on site.

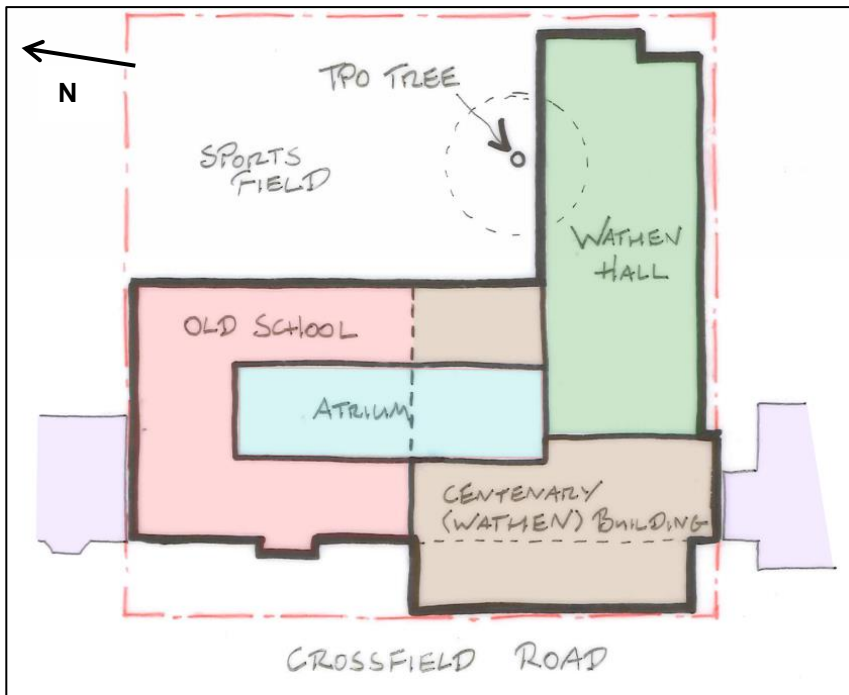


Figure 2 – Existing Buildings on Site

4.0 Planning and Flood Risk Management Policy

4.1 Camden Strategic Flood Risk Assessment

The LBC Strategic Flood Risk Assessment (SFRA) was completed by URS in July 2004. This report aims to provide a reference and policy document to inform the local development framework and any subsequent plans.

4.2 Sequential Test and Exception Test

The Sequential and Exception Tests should be applied when choosing the location of new development and the layout of the development site. The aim of the Sequential Test is to steer new development to areas with the lowest probability of flooding. The Exception Test is utilised if no suitable development areas can be found in low risk areas. As the proposed development is located within Flood Zone 1, both the sequential test and the exception test are not required.

5.0 Potential Flooding on Site

5.1 Flooding from Rivers and Sea

Flood Zone information published by the EA shows that the proposed school site lies within Flood Risk Zone 1 (low risk). Sites within Flood Zone 1 have a chance of flooding of less than 1 in 1000 years (0.1%) due to coastal or river flooding. The flood risk in the surrounding area can be found in Figure 3.

A review of the Flood Maps found within the LBC SFRA confirms that this site is located within Flood Zone 1, and as noted within the LBC SFRA, no historic flooding has occurred within the borough as a result of fluvial or tidal sources.

This development is considered to be at low risk of flooding from rivers and seas.

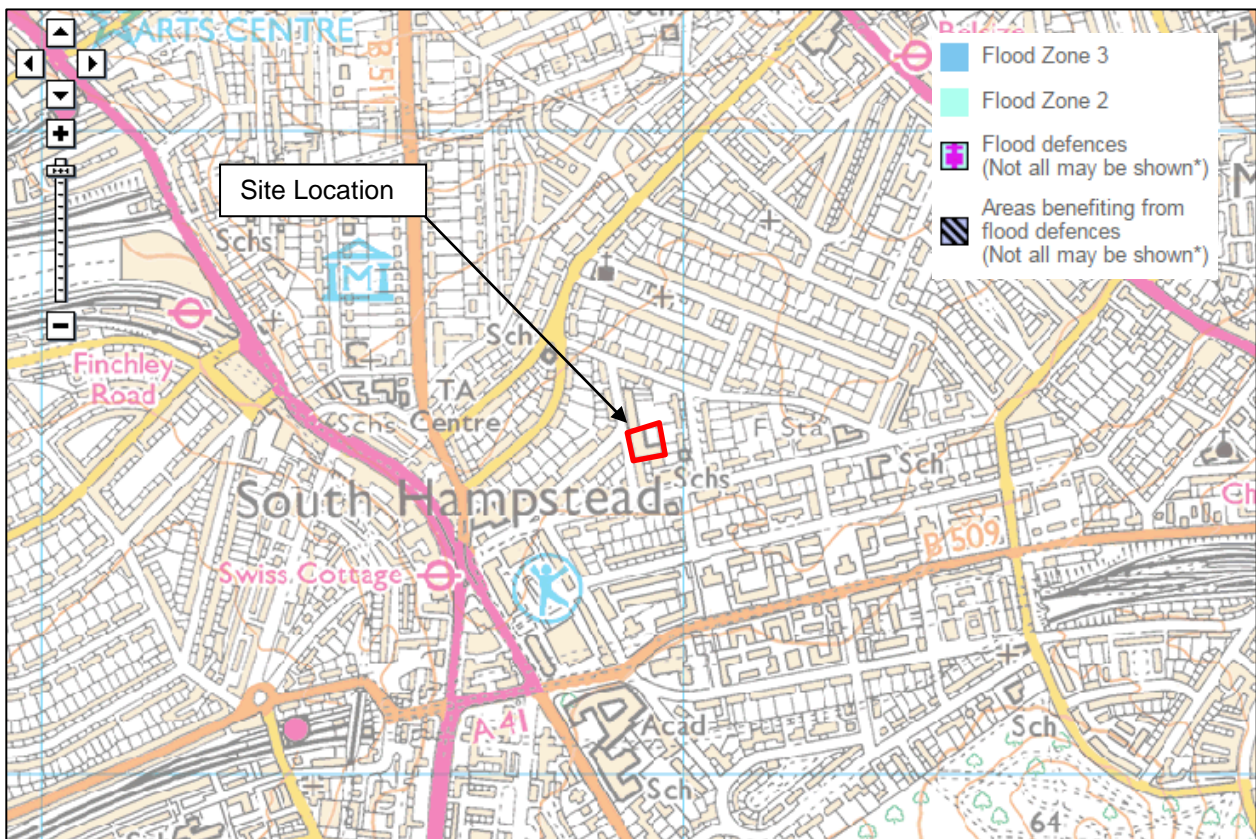


Figure 3 - Flood Zones in Surrounding Area (Contains Environment Agency information © Environment Agency and/or database rights. Based on information © Local Authorities)

5.2 Flooding from Overland Surface Water Flow

Overland rainwater flows occur when the infiltration capacity of land or the drainage capacity of a local sewer network is exceeded. The extents of overland flooding will depend upon the rainfall event, the degree of saturation of the soil, the permeability of soils and the topography of the site.

Following review of the 'Risk of Flooding from Surface Water' map (refer to Figure 4), this site is considered to be at very low risk of flooding from overland flow i.e. less than 1 in 1000 chance of flooding any given year. The site is also shown to be located in a low risk area in the LBC SFRA 'Updated Flood Maps for Surface Water Flooding' map (uFMfSW) as shown in Figure 5.

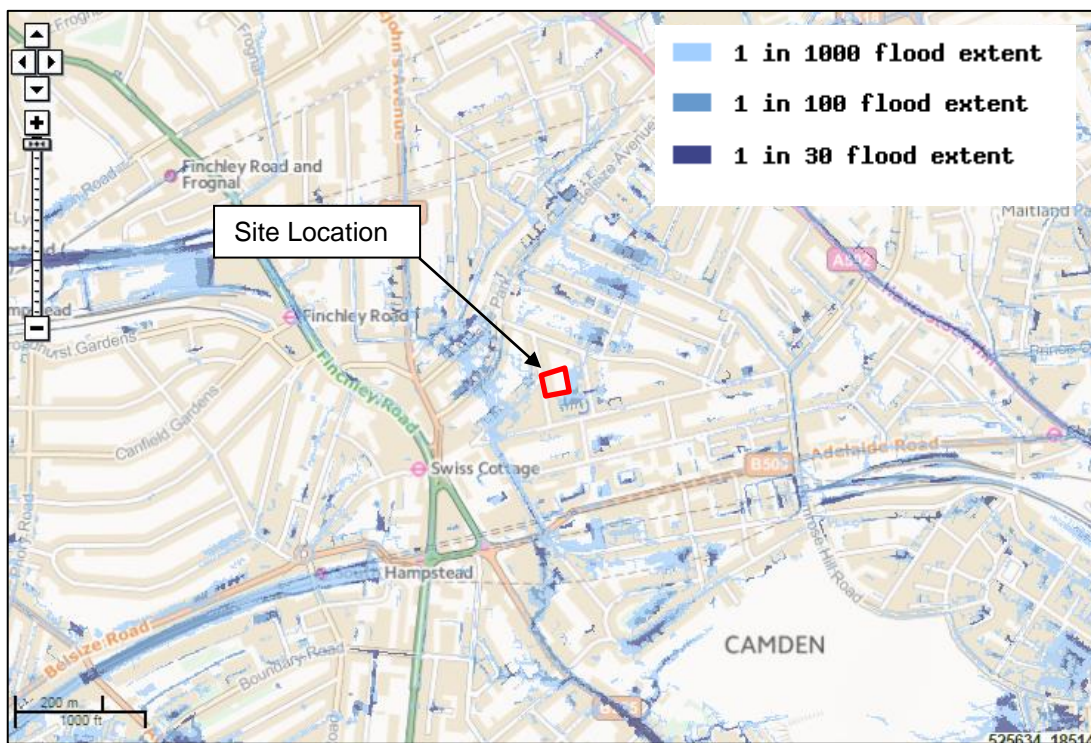


Figure 4 - Risk of surface water flooding (Contains Environment Agency information © Environment Agency and/or database rights. Based on information © Local Authorities)

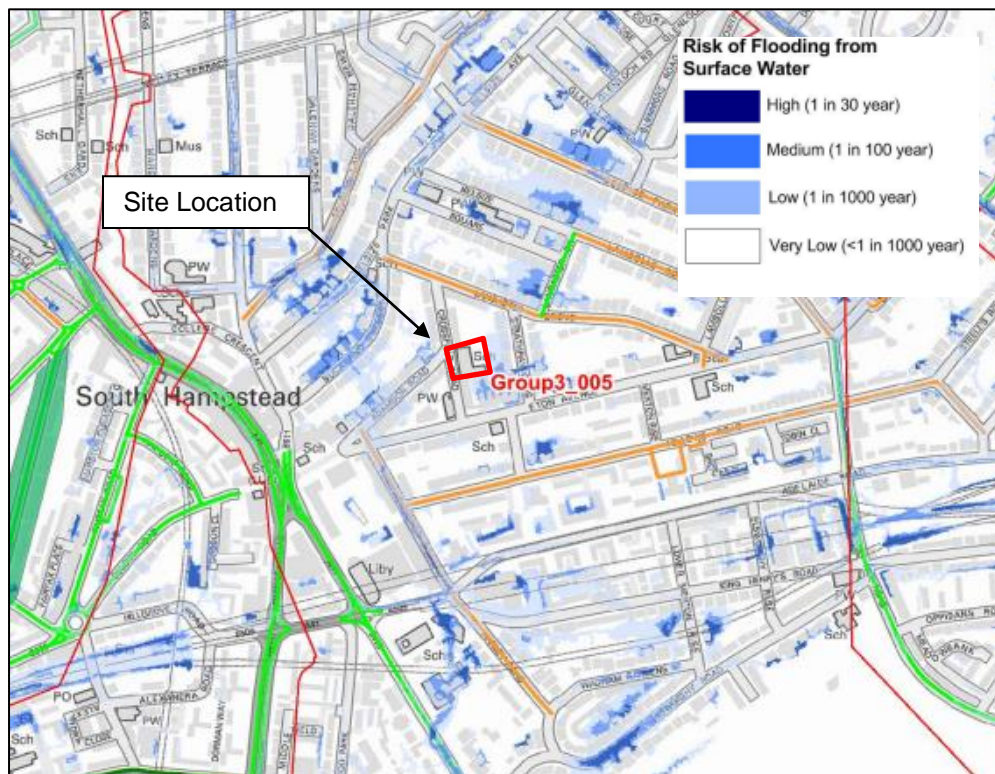


Figure 5 – LBC SFRA Figure 3v uFMfSW

In general the levels along the western boundary of the site are above those along the pavement of Crossfield Road. Therefore surface water within the road will ultimately flow away from the site, towards Eton Avenue, discharging into local highway gullies. Refer to Appendix 1 for the site topographical survey.

This development is considered to be a low risk from overland flow.

5.3 Flooding from Sewers

Public sewer records have been obtained from Thames Water and are included in Appendix 4. Sewer records show that the offsite sewer network is combined (sewers carry both foul and surface water flows). Records show that a 300mm diameter combined water sewer is located in Crossfield Road.

Thames Water are responsible for operating and maintaining their sewer infrastructure, therefore the likelihood of sewer surcharging is expected to be low.

The LBC SFRA shows that the site is located within an area which has had one reported incidence of internal sewer flooding. Refer to Figure 6 for an extract of the SFRA 'DG5 Internal Sewer Flooding' map.

The LBC SFRA also shows that the site is located outside of areas which have previously had reported issues as a result of external sewer flooding. Refer to Figure 7 for an extract of the SFRA 'DG5 External Sewer Flooding' map.

All new drainage on site will be designed to protect the local drainage network against public sewer surcharge. Appliances at basement levels will be routed to submersible packaged pumping stations which will incorporate non-return valves (to help protect the lower levels from public sewer surcharge). Anti-flood valves will also be considered as part of the proposed below ground drainage strategy.

This development is considered to be a low risk from flooding from sewers.

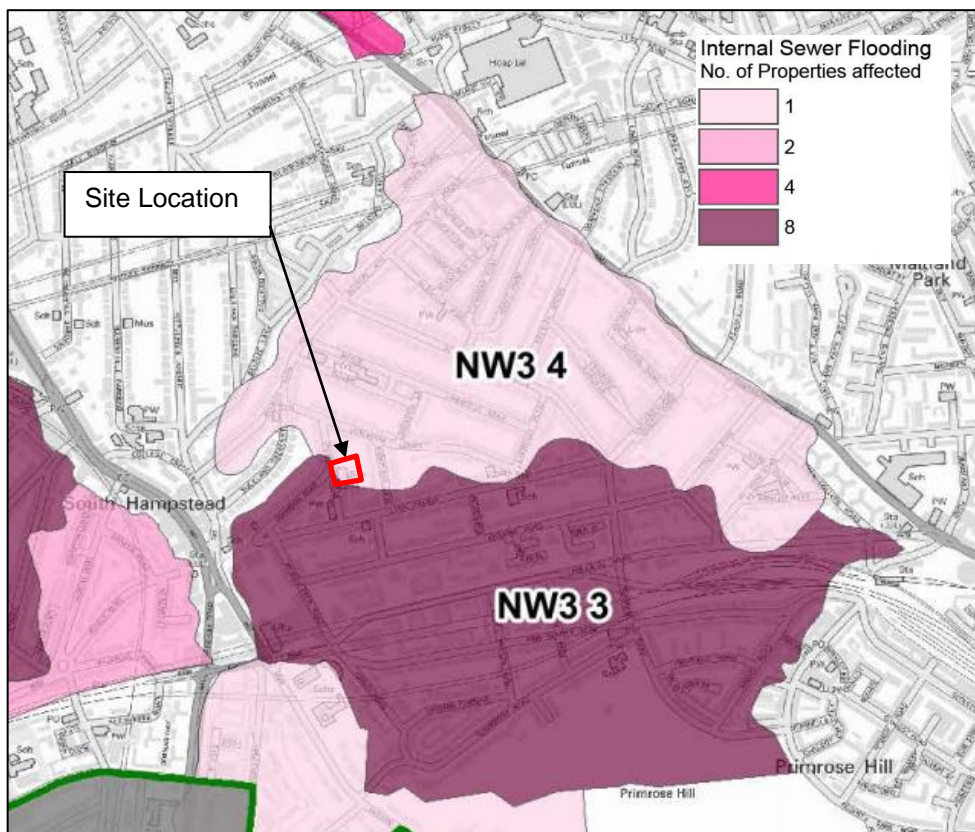


Figure 6 – LBC SFRA DG5 Internal Sewer Flooding Map

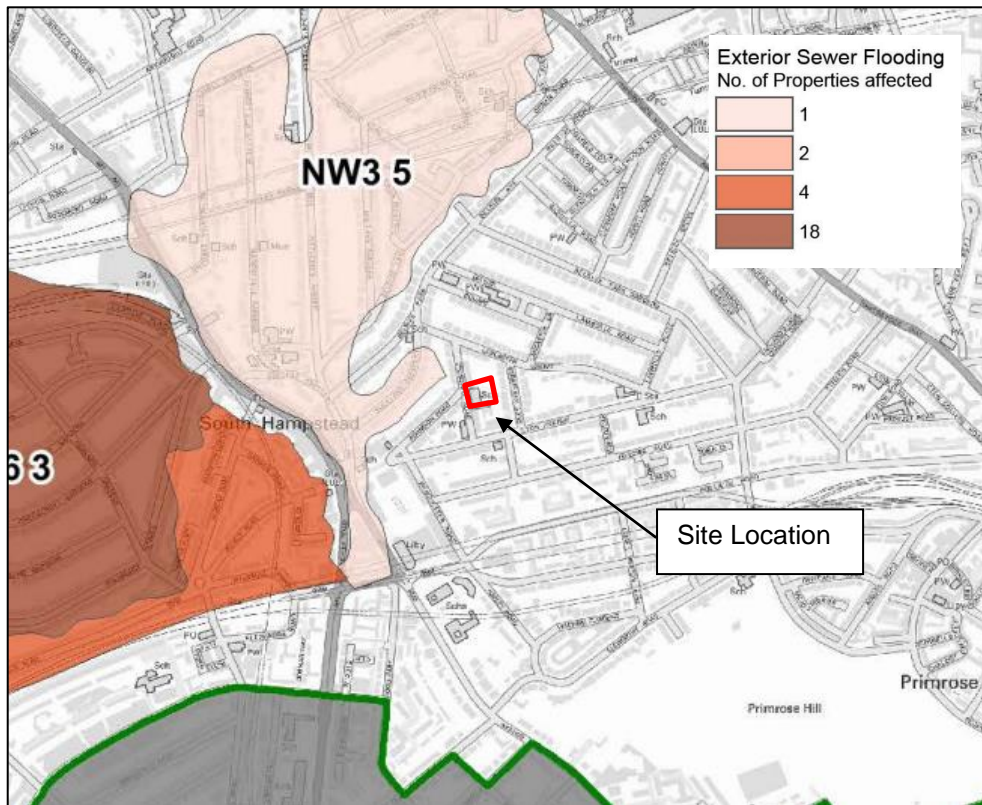


Figure 7 – LBC SFRA DG5 External Sewer Flooding Map

5.4 Flooding from Groundwater

Groundwater flooding can occur following an extended prolonged period of low intensity rainfall. The future risk from this source is more uncertain than surface water as the climate change predictions indicate that although sea levels will rise, thus possibly raising groundwater levels, overall summer rainfall will decrease, therefore having a long-term effect of lowering the groundwater levels. However, long periods of wet weather are predicted to increase and these are the type of weather patterns that can cause groundwater flooding to occur.

A Ground investigation report has been prepared by GEA Ltd in August 2016. Boreholes between 5 & 25m below ground level (bgl) were undertaken as part of the survey works. The boreholes found the ground conditions to be Made Ground (general depth of made ground was found to be 1-2m bgl) with underlying London Clay, which extended the full extent of the 25m deep borehole. British Geological Survey (BGS) maps show that the clay may extend to a depth of up to 95m bgl.

Ground water seepage was encountered on site (approximately 1-3m bgl); however this was thought to be perched water, refer to Appendix 3 for the SI Borehole Logs. Data from BGS indicates that the continuous standing groundwater level is approximately 90m below ground level.

The EA does not have any historic evidence of flooding in the area arising from groundwater.

The LBC SFRA shows areas within the borough that are susceptible to elevated ground water (refer to Figure 8); the development site is not located within one of these areas.

The site itself and majority of the surrounding area is paved which reduces the risk of ground water at the surface. Flooding due to ground water elsewhere in the area would follow localised flow paths, similar to those shown on the EA's 'Surface Water Flood Risk' map, and would then discharge into the local sewer system.

This development is considered to be a low risk from ground water flooding.



Figure 8 – LBC SFRA Increased Susceptibility to Elevated Groundwater Map

5.5 Flooding from Artificial Water Bodies

The closest watercourses to the site are the Hampstead Ponds (which are located approximately 1250m north of the site) and the Regents Canal (which is located approximately 1350m south of the site). Refer to Figure 9 which shows the 'Risk of Flooding from Reservoirs' map found on the EA's website.

The LBC SFRA confirms that no flooding incidents associated with the Regents Canal have been recorded within the borough, and that the risk of flooding as a result of overtopping or breaching of the canal is considered to be low.

The LBC SFRA also notes that inspection of the Hampstead Ponds is carried out as required under the Reservoirs Act 1975, routine maintenance is carried out as and when required.

This development is considered to be a low risk from flooding from artificial water bodies.

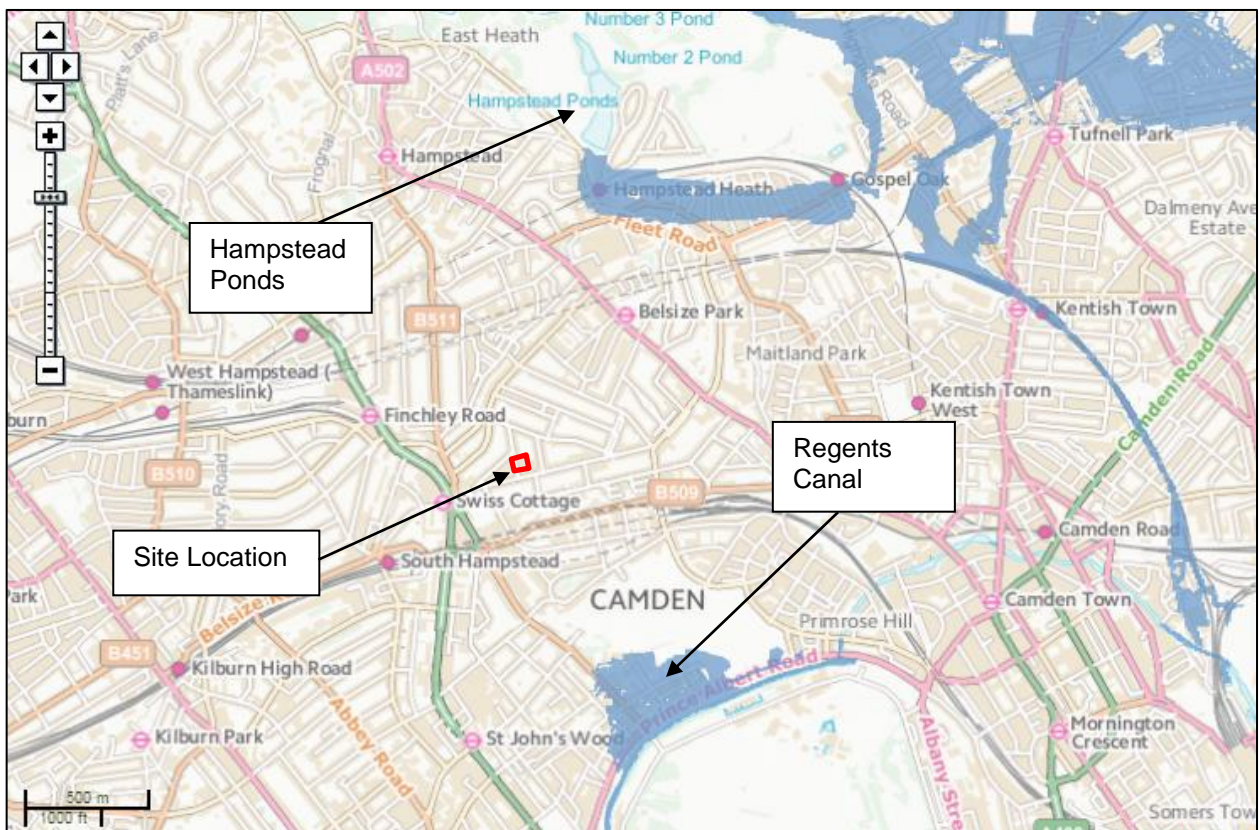


Figure 9 – Risk of Flooding from Reservoirs Map(Contains Environment Agency information © Environment Agency and/or database rights. Based on information © Local Authorities)

5.6 Summary of Flood Risk

A review of all potential sources of flooding has found the site be at low risk providing a suitable drainage scheme is in place. The new proposed drainage network should ensure that the building remains safe from flooding in the event of a localised drainage failure. In addition, levels across the site should ensure that surface water is directed away from building entrances.

6.0 Surface Water Management

6.1 Existing Site Drainage

Following a review of the Thames Water sewer records, there is an offsite combined water sewer located in Crossfield Road which is 300mm diameter. Refer to Appendix 4 for a copy of the sewer records.

A CCTV survey of the existing below ground drainage has been conducted on the site which demonstrates the existing property drains via two combined water connections at lower ground floor level. One connection is for the existing older (retained building) and the other connection is for the buildings which are being demolished and replaced. Refer to Appendix 5 for the CCTV survey report plan.

6.2 Existing Surface Water Discharge

The existing surface water runoff rate associated with the demolished and reconstructed building has been calculated as follows, based on an area of 720m² and a rainfall intensity of 50mm/hr.

$$Q = 2.78 \times 1 \times 50\text{mm/hr} \times 0.072$$

$$\underline{\underline{Q_{\text{Total}} = 10.0 \text{ l/s}}}$$

If considering the whole site (which includes the existing old retained building and MUGA), the surface water runoff rate has been calculated as follows, based on an area of 2180m² and a rainfall intensity of 50mm/hr.

$$Q = 2.78 \times 1 \times 50\text{mm/hr} \times 0.218$$

$$\underline{\underline{Q_{\text{Total}} = 30.3 \text{ l/s}}}$$

6.3 Sustainable Drainage Systems (SuDS)

The surface water drainage system has been designed in accordance with the London Plan Policies 5.12 (Flood Risk Management) and 5.13 (Sustainable Drainage). The following drainage hierarchy has therefore been considered:

1. Store rainwater for later use
2. Use infiltration techniques, such as porous surfaces in non-clay areas
3. Attenuate rainwater in ponds or open water features for gradual release
4. Attenuate rainwater by storing in tanks or sealed water features for gradual release
5. Discharge rainwater direct to a watercourse
6. Discharge rainwater to a surface water sewer/drain
7. Discharge rainwater to the combined sewer.

Drainage via infiltration has been considered for the site however following a review of the ground conditions (i.e. underlying clay) it is considered that soakaways are not viable for this project

There are no nearby accessible water courses and the existing Thames Water sewer network in the vicinity is combined use. Therefore, the foul and surface water generated by the development will aim to re-use the existing gravity connections from the development.

The evaluation of SuDS is demonstrated in Table 1 overleaf.

SUDS technique	Y/N	Comment
Green Roofs	N	A green roof will not be incorporated within the scheme.
Rainwater reuse	N	Rainwater reuse is not considered appropriate for this site.
Basins and ponds	N	The site is very limited for space and is located within an urban area; as such there is no feasible location or space for a detention basin or pond.
Filter strips and swales	N	Filter strips and swales are not appropriate due to the spatial restrictions on site and unsuitable ground conditions.
Infiltration devices	N	Spatial restrictions and unsuitable ground conditions preclude the use of soakaways.
Permeable surfaces	N	There are no new external surfaces associated with this project, therefore the use of permeable surfaces is not applicable.
Filter drains	N	Infiltration is not feasible for this site due to space constraints and the ground conditions
Tanked systems	N	It is not possible to incorporate a tanked attenuation system due to a lack of space. An attenuation tank cannot be installed in the courtyard due to the TPO tree and the inability to be able to get drainage back via gravity to the outfall. It is also considered inappropriate to install an attenuation tank below the Basement -2 level of the building as this will result in the need to pump surface water which leads to an increase in flood risk to the building.

6.4 Proposed Site Drainage

The London Plan policy 5.13 states that developers should aim for a greenfield runoff rate from their developments. However for brownfield sites, the supplementary planning guidance notes that there may be situations where it is not appropriate to discharge to greenfield runoff rates, a 50 percent reduction of surface water discharge is the minimum attenuation expectation where possible.

For this development, 67% of the site consists of the existing old retained building and existing MUGA which drain via a separate combined water outlet. The remaining 33% is the building which is to be demolished and reconstructed with a double level basement.

When considering the existing buildings to be retained, it is not considered feasible to implement a restriction on surface water run-off, due to the extreme complexities associated with separating the existing drainage network on site (in order to install the appropriate flow controls and attenuation devices).

When considering the new build element of the development, it is again not considered feasible to implement a restriction on surface water run-off, as there is no suitable location for the inclusion of an attenuation tank. It is not possible to install a tank underneath the existing MUGA due to the damage it would cause, the implications with the TPO and it is considered unlikely that drainage would be able to discharge via gravity this way. Surface water would therefore require pumping, which is not deemed feasible, as this would increase the flood risk to the building.

Due to the restrictions noted above it is proposed to maintain existing rates of surface water discharge from this development.

7.0 Conclusions and Recommendations

A review of risk of flooding from all sources has found the site to be at low risk providing a suitable surface water drainage strategy is in place.

Proposed levels across the site must direct water away from the building and the existing overland surface water flooding path from Crossfield Road should be considered.

8.0 Appendices

Appendix 1

Topographic Survey

Appendix 2

Proposed Architectural Plans

Appendix 3

Site Investigation Borehole Logs

Appendix 4

Thames Water sewer records

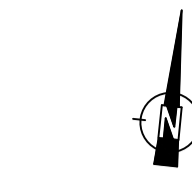
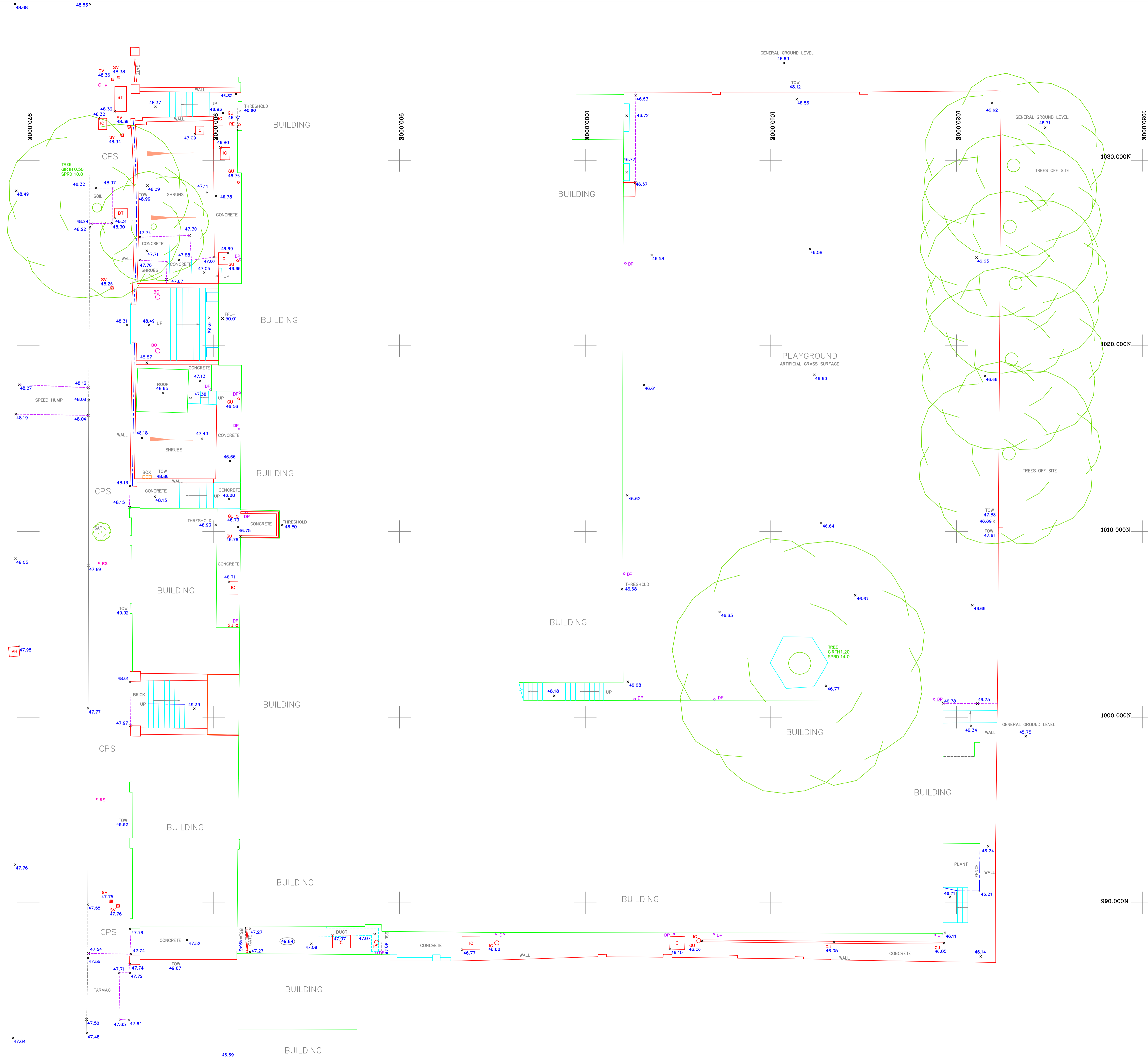
Appendix 5

CCTV Survey Report Plan

A11
48.61

A10
47.88

CROSSFIELD ROAD



INDICATIVE ONLY

Topographical Abbreviations

A/R	Assumed Route	MKR	Marker
BH	Borehole	MT	Mercury Telecom Cover
BOL	Bollard	OHC	Overhead Cable
BT	British Telecom Cover	OHF	Overhead Pipe
BW	Barbed Wire Fence	OSBM	Ordinance Survey Bench Mark
BWK	Brickwork	PB	Post Box
CATV	Cable TV Cover	PGM	Permanent Ground Marker
CB	Close Boarded Fence	PR	Post & Rail Fence
CCTV	Closed Circuit TV	PW	Post & Wire Fence
CHLK	Chainlink Fence	PWM	Post & Wire Mesh Fence
CHPL	Chestnut Paling Fence	RE	Rodding Eye
CL	Cover Level	RG	Road Gully
CM	Cable Marker	RN	Road Name
CP	Catch Pit	RS	Road Sign
CPL	Catch Pit Base Level	RW	Retaining Wall
DIA	Diameter	RWP	Rain Water Pipe
DK	Drop Kerb	SAP	Sapling
DP	Down Pipe	SC	Stop Cock
EJB	Electricity Junction Box	SPR	Spread
EC	Electricity Cover	STA	Traverse Station
EP	Electricity Pole	SV	Stop Valve
ER	Earthing Rod	SVP	Soil Vent Pipe
FH	Fire Hydrant	SW	Storm Water
FIG	Feed into Ground	TB	Telephone Box
FW	Foul Water	TBM	Temporary Bench Mark
GU	Gully	TFR	Taken From Records
GV	Gas Valve	TJB	Telephone Junction Box
H	Height	TPT	Trial Pit
IC	Inspection Cover	TL	Traffic Light
IL	Invert Level	TP	Telephone Pole
IR	Iron Railing Fence	UTL	Unable To Lift
KO	Kerb Outlet	UTT	Unable To Trace
LB	Liter Bin	VP	Vent Pipe
LC	Lamp Column	WKH	Water Key Hole
LP	Lamp Post	WM	Water Meter
MH	Manhole	WV	Water Valve
		---	Approximate

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Survey Station Information

STA No.	Easting	Northing	Level	Type
STN A10	964.512	996.550	47.88	Nail
STN A11	963.033	1037.480	48.61	Nail

Notes

The Grid is Arbitrary
All Levels are related to Station A1 given value 50.00m (Previous survey)

5	-	-	-
4	-	-	-
3	-	-	-
2	-	-	-
1	-	-	-

0	GR	First Complete Issue	26-10-2015
Prelim	-	Preliminary - Not Complete	-

Rev	QA Check	Description	Date

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METRIX SURVEYS LTD
7 WEST END
SHERBORNE ST JOHN
BASINGSTOKE
HAMPSHIRE
RG24 9LB

TEL 01256 851672
CELL 07734 233459
E-MAIL postbox@metrixsurveys.com
www.metrixsurveys.com

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TOPOGRAPHICAL SURVEY

ADDRESS:
**THE HALL SCHOOL
CROSSFIELD ROAD
LONDON NW3**

JOB No	DRAWING NUMBER
14064B / 15085T	15085T/100

A1 Sheet - 841mm X 594mm

Appendix 2
Proposed Architectural Plans

Appendix 3
Site Investigation Borehole Logs

Boring Method Dismantlable Cable Percussion Rig	Casing Diameter		Ground Level (mOD)	Client The Hall School	Job Number J15302
	Depth	Diameter			
	2.00	150			
Location 526946.00E 184515.00N			Dates 28/10/2015	Engineer Elliott Wood	Sheet Sheet 1 of 3

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20	D1	1.00				0.10	Astro Turf surface over foam underlay and asphalt		
0.30	D2					0.20	Lean-mix concrete over stone chippings		
0.50	B3					0.30	Asphalt		
0.75	D4					0.40	Made Ground (brownish grey silty clay with rootlets, gravel, brick, coal and concrete fragments)		
1.20 - 1.65	B5	2.00		N=11 (1,2/2,2,3,4)		1.35	Medium to firm fissured brown silty CLAY with pockets of orange-brown silt and fine sand and fine selenite, has blocky fissuring.		
1.20 - 1.65	SPT (C)N=11					1.65			
1.75	D6					2.00			
2.00 - 2.45	U7					3.00	Stiff high strength locally fissured brown silty laminated CLAY with partings and pockets of orange-brown and grey silt and fine to coarse selenite crystals.		
2.75	D8	2.00		N=15 (1,2/3,3,4,5)		3.00			
3.00 - 3.45	D9					3.75			
3.00 - 3.45	SPT (S)N=15					4.00 - 4.45			
3.75	D10					4.75			
4.00 - 4.45	U11	2.00		N=16 (1,2/3,3,4,6)		4.75			
4.75	D12					5.00 - 5.45			
5.00 - 5.45	D13					6.00			
5.00 - 5.45	SPT (S)N=16					6.50 - 6.95			
6.00	D14	2.00		N=19 (4,3/4,5,5,5)		6.50			
6.50 - 6.95	U15					7.50			
7.50	D16					8.00 - 8.45			
8.00 - 8.45	D17					8.00 - 8.45			
8.00 - 8.45	SPT (S)N=19	2.00		N=19 (4,3/4,5,5,5)		9.00	abundant partings of orange-brown silty sand.		
9.00	D18					9.50			
9.50 - 9.95	U19					9.50	Very stiff high strength to very high strength dark grey silty CLAY, locally very laminated with fine selenite, occasional white shells, occasional pale grey veins and white		
9.50 - 9.95									

Continued on Next Page

Remarks 4 hrs spent moving rig and all equipment to borehole location. Services inspection pit excavated from GL to 1.2 m for 1 hr. Chiselling on claystone between 17.0 m to 17.30 m for 30 mins. 5hrs spent removing rig and equipment off of site. Groundwater monitoring standpipe installed in borehole to 8.00 m.	Scale (approx) 1:50	Logged By ML
---	-------------------------------	------------------------

Boring Method Dismantlable Cable Percussion Rig	Casing Diameter		Ground Level (mOD)	Client The Hall School	Job Number J15302
	Depth 2.00	Diameter 150			
Location 526946.00E 184515.00N			Dates 28/10/2015	Engineer Elliott Wood	Sheet Sheet 2 of 3

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
10.50	D20	2.00					foraminifera.			
11.00 - 11.45	D21									
11.00 - 11.45	SPT (S)N=24									N=24 (3,4/5,6,6,7)
12.00	D22	2.00								
12.50 - 12.95	U23									
13.50	D24									
14.00 - 14.45	D25	2.00								
14.00 - 14.45	SPT (S)N=27									N=27 (3,5/5,6,7,9)
15.00	D26									(15.50)
15.50 - 15.95	U27	2.00								
16.50	D28									
17.00 - 17.45	D29									
17.00 - 17.45	SPT (S)N=33	N=33 (14,15/11,8,6,8)					claystone at 17.00 m			
18.00	D30	2.00								
18.50 - 18.95	U31									
19.50	D32									
20.00 - 20.45	D33									

Continued on Next Page

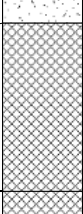
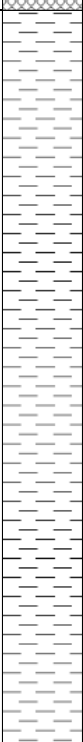
Remarks 4 hrs spent moving rig and all equipment to borehole location. Services inspection pit excavated from GL to 1.2 m for 1 hr. Chiselling on claystone between 17.0 m to 17.30 m for 30 mins. 5hrs spent removing rig and equipment off of site. Groundwater monitoring standpipe installed in borehole to 8.00 m.	Scale (approx) 1:50	Logged By ML
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Boring Method		Casing Diameter		Ground Level (mOD)	Client		Job Number		
		Depth	Diameter						
Dismantlable Cable Percussion Rig		2.00	150	28/10/2015	Elliott Wood		J15302		
		Location						Dates	Engineer
		526946.00E 184515.00N					Sheet 3 of 3		
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
20.00 - 20.45	SPT (S)N=34	2.00		N=34 (5,6/7,8,8,11)					
21.00	D34								
21.50 - 21.95	U35								
22.50	D36								
23.00 - 23.45	D37	2.00		N=35 (5,6/8,8,9,10)					
23.00 - 23.45	SPT (S)N=35								
24.00	D38						claystone at 23.70 m		
24.55 - 25.00	D40	2.00		N=37 (7,6/7,8,9,13)		25.00			
24.55 - 25.00	SPT (S)N=37								
24.55 - 25.00	U39						Complete at 25.000m		

Remarks 4 hrs spent moving rig and all equipment to borehole location. Services inspection pit excavated from GL to 1.2 m for 1 hr. Chiselling on claystone between 17.0 m to 17.30 m for 30 mins. 5hrs spent removing rig and equipment off of site. Groundwater monitoring standpipe installed in borehole to 8.00 m.	Scale (approx)	Logged By
	1:50	ML


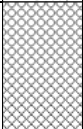
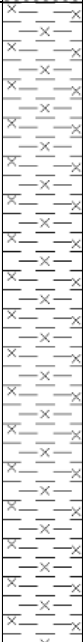
Boring Method Drive-in Window Sampler		Casing Diameter			Ground Level (mOD)		Client The Hall School	Job Number J15302	
		Depth	Diameter						
Location 526939.00E 184539.00N		Dates 30/10/2015		Engineer Elliott Wood		Sheet Sheet 1 of 1			
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
2.00	D1			Seepage		(0.20)	Concrete		▼
						(0.20)	Made Ground (dark brown and black silty sandy gravel with ash)		
						(0.40)	Made Ground (brown silty clay with gravel and fine brick fragments)		
4.00	D2					(2.00)			
4.50	D3					2.40 (0.40)	Made Ground (crushed brick and gravel)		
5.00	D4					2.80 (1.00)	Made Ground (greyish brown loosely cemented gravel and brick)		
						3.80	Firm fissured locally very thinly laminated silty CLAY with partings of bluish grey silt occasional pockets of dark orange-brown fine sand, coarse selenite and fine white shells		
						(1.50)			
						5.30	Complete at 5.30m		

Remarks Borehole advanced through the base of TRial Pit 1 at a depth of 1.80 m. Groundwater monitoring standpipe installed in borehole to 5.00 m.	Scale (approx) 1:50	Logged By ML

Boring Method		Casing Diameter			Ground Level (mOD)		Client	Job Number
		Depth	Diameter					
Drive-in Window Sampler							The Hall School	J15302
Depth (m)		Location			Dates		Engineer	Sheet
		526964.00E 184508.00N			30/10/2015			
Sample / Tests		Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend
0.90	D1			Seepage		0.15 (0.15)	Concrete with 6 mm reinforcement Made Ground (dark brown silty clay with gravel, decayed roots, brick and coal fragments)	
1.60	D2					1.20 (0.20) (1.40)	Made Ground (brown silty clay with gravel)	
2.60	D3						Soft rapidly becoming firm fissured brown CLAY with bluish grey veins, occasional small pockets of orange-brown fine sand and fine selenite	
3.60	D4					(4.60)		
4.60	D5						coarse selenite and pockets of pale grey silt below 4.50 m	
5.60	D6					6.00	Complete at 6.000m	

Remarks Borehole advanced through the base of Trial Pit No 2 at a depth of 0.70 m.							Scale (approx) 1:50	Logged By ML
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Boring Method Drive-in Window Sampler	Casing Diameter		Ground Level (mOD)	Client The Hall School	Job Number J15302
	Depth	Diameter			
	Location 526920.00E 184520.00N				
			Dates 30/10/2015	Engineer Elliott Wood	Sheet Sheet 1 of 1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.20) 0.20	Concrete		
						(0.80)	Made Ground (brown silty clay with gravel and brick fragments)		
						1.00	Firm fissured locally very thinly laminated silty CLAY with partings of bluish grey silt occasional pockets of dark orange-brown fine sand, coarse selenite and fine white shells		
						(4.00)			
						5.00	Complete at 5.000m		

Remarks Groundwater monitoring standpipe installed in borehole to a depth of 5.00 m.	Scale (approx) 1:50	Logged By ML
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Appendix 4
Thames Water Sewer Records

Asset Location Search



Elliott Wood Partnership LLP
241

LONDON
SW19 1SD

Search address supplied The Hall School Charitable Trust
23
Crossfield Road
London
NW3 4NU

Your reference 2150206 The Hall School Hampstead

Our reference ALS/ALS Standard/2015_3055369

Search date 29 May 2015

You are now able to order your Asset Location Search requests online by visiting
www.thameswater-propertysearches.co.uk



Asset Location Search



Search address supplied: The Hall School Charitable Trust, 23, Crossfield Road, London, NW3 4NU

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 search provides 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 0845 070 9148, 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



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

Asset Location Search



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.

Asset Location Search



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: 0845 850 2777
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: 0845 850 2777
Email: developer.services@thameswater.co.uk

Asset Location Search Sewer Map - ALS/ALS Standard/2015 3055369



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 526933,184521
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
17CC	n/a	n/a
17CB	n/a	n/a
7701	64.11	59.55
7601	n/a	n/a
75AI	n/a	n/a
7605	62.39	54.49
76CB	n/a	n/a
75BC	n/a	n/a
761A	n/a	n/a
8602	60.58	52.1
8702	n/a	n/a
86BD	n/a	n/a
86BC	n/a	n/a
87BB	n/a	n/a
87AJ	n/a	n/a
861B	n/a	n/a
861A	n/a	n/a
851D	n/a	n/a
86AB	n/a	n/a
8503	58.09	52.29
96AF	n/a	n/a
96AE	n/a	n/a
9601	n/a	n/a
9702	60.11	54.16
9703	60.69	54.89
07BJ	n/a	n/a
0601	n/a	n/a
0502	n/a	n/a
0602	n/a	n/a
0701	59.18	54.13
151A	n/a	n/a
941A	n/a	n/a
9401	n/a	n/a
941B	n/a	n/a
8401	n/a	n/a
74BA	0	0
9501	57.16	52.81
851A	n/a	n/a
851B	n/a	n/a
85BA	n/a	n/a
851C	n/a	n/a
7501	n/a	n/a
65CG	n/a	n/a
75BI	n/a	n/a
65CH	n/a	n/a
65CI	n/a	n/a
0501	57.19	n/a
8203	n/a	n/a
7301	54.25	52.42
7302	57.15	54.52
7304	n/a	n/a
9301	n/a	n/a
931A	n/a	n/a
021A	50.62	49.35
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
-  Gully
-  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 millimetres. 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 0845 070 9148.

Asset Location Search Water Map - ALS/ALS Standard/2015 3055369



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 526933, 184521.
 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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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.

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')

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

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:** Indicates 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 him 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 0845 070 9148 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	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.



Search Code

IMPORTANT CONSUMER PROTECTION INFORMATION

This search has been produced by Thames Water Property Searches, Clearwater Court, Vastern Road, Reading RG1 8DB, which is registered with the Property Codes Compliance Board (PCCB) as a subscriber to the Search Code. The PCCB independently monitors how registered search firms maintain compliance with the Code.

The Search Code:

- provides protection for homebuyers, sellers, estate agents, conveyancers and mortgage lenders who rely on the information included in property search reports undertaken by subscribers on residential and commercial property within the United Kingdom
- sets out minimum standards which firms compiling and selling search reports have to meet
- promotes the best practise and quality standards within the industry for the benefit of consumers and property professionals
- enables consumers and property professionals to have confidence in firms which subscribe to the code, their products and services.

By giving you this information, the search firm is confirming that they keep to the principles of the Code. This provides important protection for you.

The Code's core principles

Firms which subscribe to the Search Code will:

- display the Search Code logo prominently on their search reports
- act with integrity and carry out work with due skill, care and diligence
- at all times maintain adequate and appropriate insurance to protect consumers
- conduct business in an honest, fair and professional manner
- handle complaints speedily and fairly
- ensure that products and services comply with industry registration rules and standards and relevant laws
- monitor their compliance with the Code

Complaints

If you have a query or complaint about your search, you should raise it directly with the search firm, and if appropriate ask for any complaint to be considered under their formal internal complaints procedure. If you remain dissatisfied with the firm's final response, after your complaint has been formally considered, or if the firm has exceeded the response timescales, you may refer your complaint for consideration under The Property Ombudsman scheme (TPOs). The Ombudsman can award compensation of up to £5,000 to you if he finds that you have suffered actual loss as a result of your search provider failing to keep to the Code.

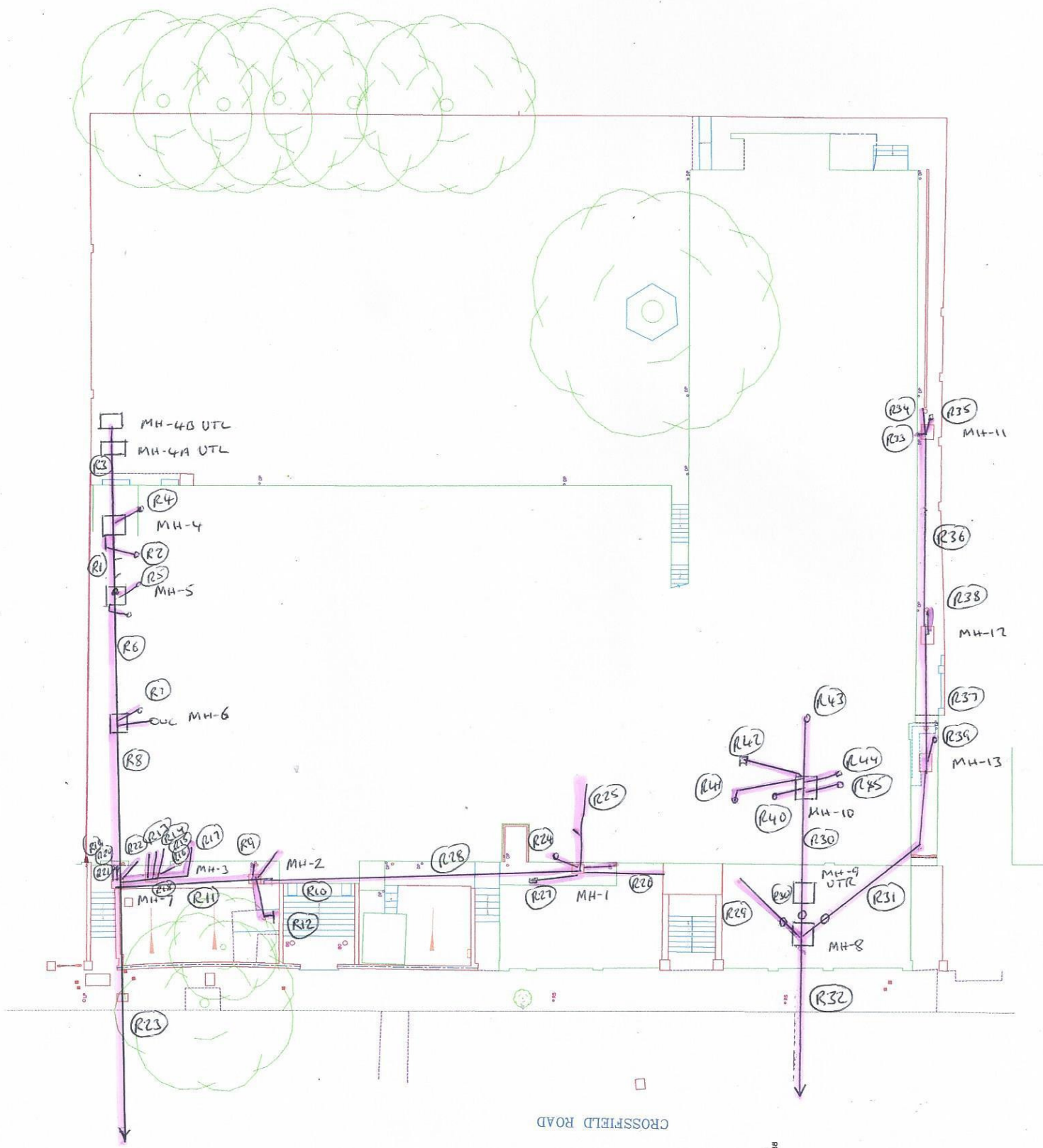
Please note that all queries or complaints regarding your search should be directed to your search provider in the first instance, not to TPOs or to the PCCB.

TPOs Contact Details

The Property Ombudsman scheme
Milford House
43-55 Milford Street
Salisbury
Wiltshire SP1 2BP
Tel: 01722 333306
Fax: 01722 332296
Email: admin@tpos.co.uk

You can get more information about the PCCB from www.propertycodes.org.uk

PLEASE ASK YOUR SEARCH PROVIDER IF YOU WOULD LIKE A COPY OF THE SEARCH CODE



A10
 47.86

A10
 47.86

Wimbledon

241 The Broadway
London
SW19 1SD

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

Central London

46-48 Foley Street
London
W1W 7TY

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

Nottingham

1 Sampson's Yard
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 Ltd
Structural and Civil Engineers

