Basement impact assessment: 10a Oakhill Avenue.

ESI Report Reference 61458R1Rev1

Basement impact assessment: hydrology and hydrogeology. 10a Oakhill Avenue NW3 7RE.

Prepared for

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Basement Impact Assessment: Hydrology And Hydrogeology. 10a Oakhill Avenue NW3 7RE.

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Environmental Consultants

61458R1Rev1. Final Report

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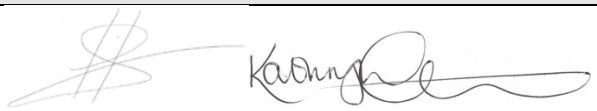
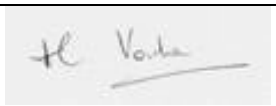
Author	Henry Kelly Kathryn Mair	
Checked by	Helen Vonka C.IWEM	
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1	61458R1	Draft for external review	HJK	HCV	SRB	30/05/2013	Martin Evans Architects
2	61458R1Rev 1D1	Draft for external review	HJK/KXM	HCV	PAE	06/02/2014	Martin Evans Architects
3	61458R1Rev 1	Final Report	HJK/KXM	HCV	PAE	06/02/2014	Martin Evans Architects
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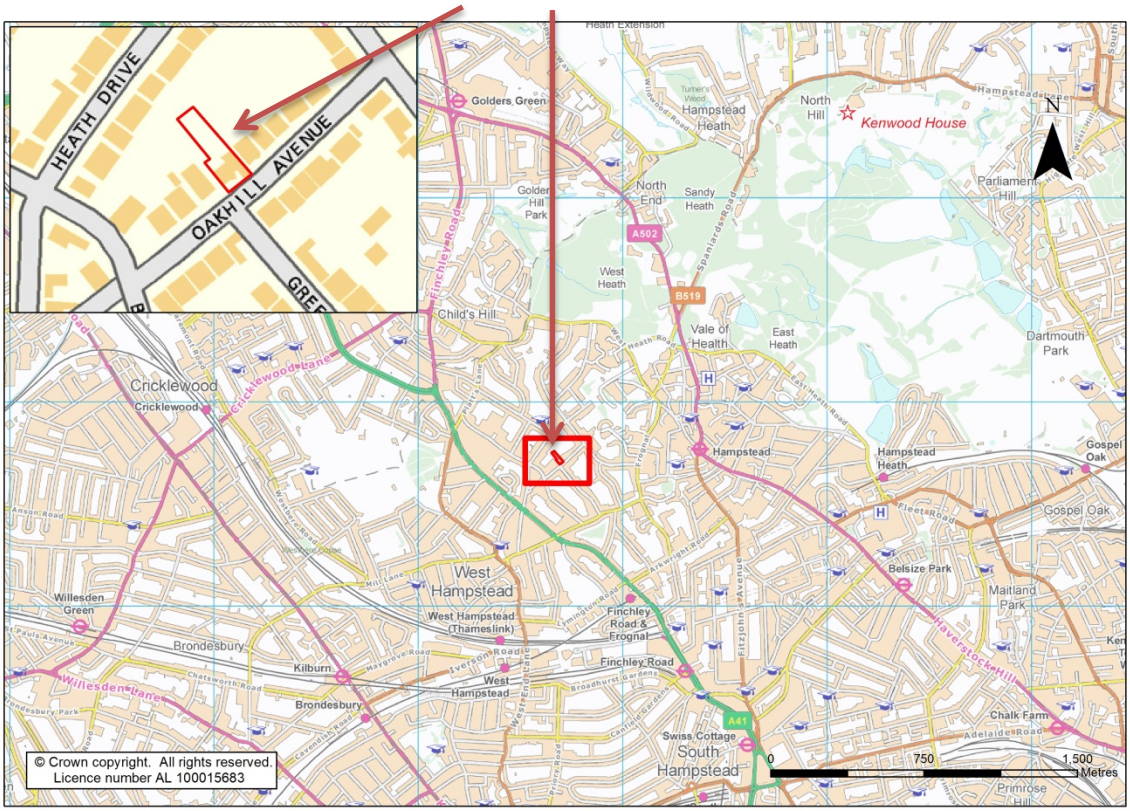
1 INTRODUCTION

1.1 This Document

ESI Ltd (ESI) was commissioned by Martin Evans Architects in January 2014 to undertake a Basement Impact Assessment for the proposed development at 10a Oakhill Avenue NW3 7RE, (at approximate grid reference TQ 256 857) in the Frognal and Fitzjohns Ward of the London Borough of Camden (Figure 1.1).

Figure 1.1 Site location.

10a Oakhill Avenue



This document is a desk study which considers the potential impact relating to the proposed basement development in terms of surface water and groundwater flow and flooding.

1.2 Scope of Works

The following scope of works was requested: an assessment of the impacts of the proposed development on ground water flow, levels and drainage, as well as surface water flow and flooding.

The London Borough of Camden currently has comprehensive guidance on planning applications for basement extensions. These guidelines for basement impact assessments (ARUP (2010), Camden Borough Council, (2011)) have been consulted in order to complete a screening analysis of key hydrological and hydrogeological issues that will satisfy the relevant planning requirements.

The site is also the subject of further reports conducted by Soil Consultants Limited: A Factual Ground Investigation (Soil Consultants Ltd, 2013) and a Slope Stability Report (Soil Consultants Ltd, 2014).

1.3 Proposed Basement Works

The proposed development is for the excavation of a new, single storey basement for a residential property. Being set into the slope of the site, the total depth of the completed basement is expected to be approximately 5.36m below the base of the lower ground floor at both the south east and northwest extents of the development (to a level of approximately 87maOD). This incorporates the two swimming pools which lie 2m below the floor of basement. The basement has an external area of 506 m^2 (Appendix A). Almost all the basement will be beneath the footprint of the existing building, with the exception of the northern and western corners which will be covered by roof lights (approximately 24.75 m^2).

2 IMPACT ASSESSMENT

The screening stage for Impact Assessment has been considered as set out in CPG4 (Camden Council, 2011) as follows.

2.1 SURFACE WATER (Surface flow and flooding screening flowchart (Figure 3, CPG4 (Camden Council, 2011))			
Impact question	**Answer**	**Justification**	**Reference**
1) Is the site within the catchment of the pond chains on Hampstead Heath?	**No**	The site is not located within the catchment for any of the Hampstead Heath ponds.	Arup, 2008.
2) As part of the proposed site drainage, will surface water flows (e.g. volume of rainfall and peak run-off) be materially changed from the existing route?	**No**	The site drainage is not expected to be changed from its existing setup.	Site Plans.
3) Will the proposed basement development result in a change in the proportion of hard surfaced / paved external areas?	**No**	The proposed basement will be located almost entirely beneath the footprint of the existing building. The northern and western corners of the basement will protrude into the garden area. As this area was impermeable paved ground prior to any development, no increase in impermeable surfaces will occur.	Site plans.
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 watercourses?	**No**	As there is no significant change in the proportion of impermeable surfaces on the site, there is not expected to be any change in surface water quantity leaving the site. A culverted tributary of the "lost" river Westbourne exists approximately 105 m to the north of the proposed basement (at their closest point) and flows in a SW direction. No other surface water bodies are known to exist within 500 m of the site.	Ordnance Survey Mapping. Barton, 1992.
5) Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?	**No**	The "lost" river Westbourne runs approximately to the north of the site as stated above. It is possible that the site falls within the catchment of this underground river; however, the size and position of the proposed development mean it is highly unlikely to impact on the quality of this water course or the receiving waters of adjacent properties.	Ordnance Survey Mapping. Barton, 1992.
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?	**No**	Oakhill Avenue is not a road which has previously experienced surface water flooding nor is it at risk from surface water flooding according to Arup (2008). The area is not at risk from flooding from rivers or reservoirs as defined by the Environment Agency (2013). The site has no history of sewer flooding (appendix C).	Arup, 2008. Environment Agency, 2013.

2.2 GROUND WATER (Subterranean (ground water) flow screening chart (Figure 1, CPG4 (Camden Council, 2011))			
Impact question	**Answer**	**Justification**	**Reference**
1a) Is the site located directly above an aquifer?	**Yes**	The site is located upon the Claygate Member; a sedimentary bedrock comprising chiefly low permeability clay, with pockets of silt and sand. This may contain permeable horizons within the generally low permeability material and is classified as a Secondary A aquifer by the Environment Agency. Beneath the Claygate Member lies the London Clay (an aquitard) at a depth of around 5 mBGL according to on site window sample logs (Appendix B). There are no superficial deposits recorded at the site.	British Geological Survey, 2013 (A). Environment Agency, 2012.
1b) Will the proposed basement extend beneath the water table surface?	**Yes**	Monitoring of window samples installed 02/05/13 was conducted on 16/05/13 and 24/05/13; this established ground water levels to be between 4.55 mBGL – 1.07 mBGL (90.2 mAOD - 92.6 mAOD). The proposed basement will extend down below these water table elevations by approximately 5.6 m (calculated from the difference between the maxiumum recorded water level (92.6maOD) and the maximum proposed depth of the basement (87mAOD)). As stated before the groundwater will be confined to thin layers of higher permeability sediment.	British Geological Survey, 2013 (A). British Geological Survey, 2013 (B). Soil Consultants Ltd, 2013.
2) Is the site within 100m of a watercourse, well (used/disused) or potential spring line?	**No**	As stated, a culverted tributary of the river Westbourne runs 105 m to the north of the proposed basement. The nearest surface watercourse is 800 m to the north; this is a small stream originating from the Leg of Mutton Pond. This watercourse is up gradient from the site and will not be affected by the development. There are no wells within 100m of the site. The change in geological strata from Claygate to London Clay occurs to the west of the site and has the potential to produce springs; the distance of this is thought to be greater than 100m. The Claygate Member does have the potential to produce springs where permeable horizons crop out. No springs were identified at the site during the site investigation	British Geological Survey, 2013 (A). British Geological Survey, 2013 (B). Barton, 1992. Soil Consultants Ltd, 2013
3) Is the site within the catchment of the pond chains on Hampstead Heath?	**No**	The site is not located within the catchment for any of the Hampstead Heath ponds.	Arup, 2008.
4) Will the proposed basement development result in a change in the proportion of hard surfaced / paved external areas?	**No**	The proposed basement will be located almost entirely beneath the footprint of the existing building. The northern and western corners of the basement will protrude into the garden area. As this area was impermeable paved ground prior to any development, no increase in impermeable surfaces will occur.	Site Plans.

5) As part of the site drainage, will more surface water (e.g. rainfall and run-off) than at present be discharged to the ground (e.g. via soakaways and/or SUDS)?	**No**	There are no known changes to the site drainage.	Site Plans.
6) Is the lowest point of the proposed excavation (allowing for any drainage and foundation space under the basement floor) close to, or lower than, the mean water level in any local pond or spring line.	**No**	There are no known ponds or spring lines within close proximity of the site.	Ordnance Survey Mapping.

3 SITE CONCEPTUAL MODEL

3.1 CONCEPTUAL UNDERSTANDING		
Geology	Superficials	No superficial deposits are known to exist at the site.
	Bedrock	The site is located directly upon the Claygate Member; a sedimentary bedrock comprising clay, silt and sand. The depth of the strata beneath the site is around 5 m according to a site investigation carried out in 02/05/2013 (Appendix B & D)). This is supported by historical boreholes 280 m to the west of the site gave depth of between 4.15 m – 4.45 m (appendix B). Window sample logs state that the strata comprise chiefly sandy silty clay, with partings of silty sand. The site investigation determined that the partings were no thicker than a few millimetres and no discrete water bearing horizons were encountered. Beneath the Claygate Member lies the London Clay aquiclude, proven to a thickness of at least 22.27 by borehole TQ28NE103 approximately 500 m to the north east (Appendix B) and to a thickness of around 50 m by other boreholes within 1.5 km of the site (TQ28SW73, TQ28SE1490, TQ28NE48). This is a hydrogeologically unproductive strata overlying the principal chalk aquifer beneath.
Aquifers	The Claygate Member is classified as a Secondary A aquifer by the Environment Agency. The definition of this is as follows: "Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers." The generally low permeability Claygate member is known to contain horizons of higher permeability material capable of transmitting water. BH logs from the site included in Appendix B indicate that the Claygate at this location comprised homogenous material containing numerous thin (several mm) partings of silty sand. The pockets and partings of sand that are present do not form continuous horizons of permeable material. Based upon the changes in groundwater elevation recorded over the observed period, migration of groundwater through the site appears to be occurring. The Claygate member was proven to a thickness of around 5 m during the site investigation and shown to be underlain by London Clay.	

Groundwater levels	The presence of groundwater beneath the Site was confirmed during site investigation at a maximum level of 92.6 mAOD. This is based on the recorded dip measurements from three separate locations and presents the most conservative (worst case) scenario (the details of all recorded water levels for each dip location are presented in Appendix B). The water levels will be subject to seasonal variation beyond what has been observed in response to rainfall recharge. This indicates that the basement would extend approximately 5.6 m below the water table at its deepest part (at the base of the swimming pool). Dewatering of the site will need to be conducted during construction to lower the water table by a minimum of 6 or 7 m. The highest elevations were found to the north of the site (WS1) with WS2 to the east and WS3 to the south both having similar values on both days signifying a preferential flow direction of approximately north to south across the site. Due to the proposed depth of the development, the Claygate member may be intersected by the entire basement (figure 3.1). This means that the groundwater flow would be diverted around the proposed basement. This is likely to cause a slight increase in groundwater levels on the up-gradient side of the property and a corresponding decrease on the down gradient side. Usually with a basement of this scale the impact is restricted to a few centimetres over a distance of a few metres; however groundwater modelling would be required to determine the likely extent of the impact in this instance.

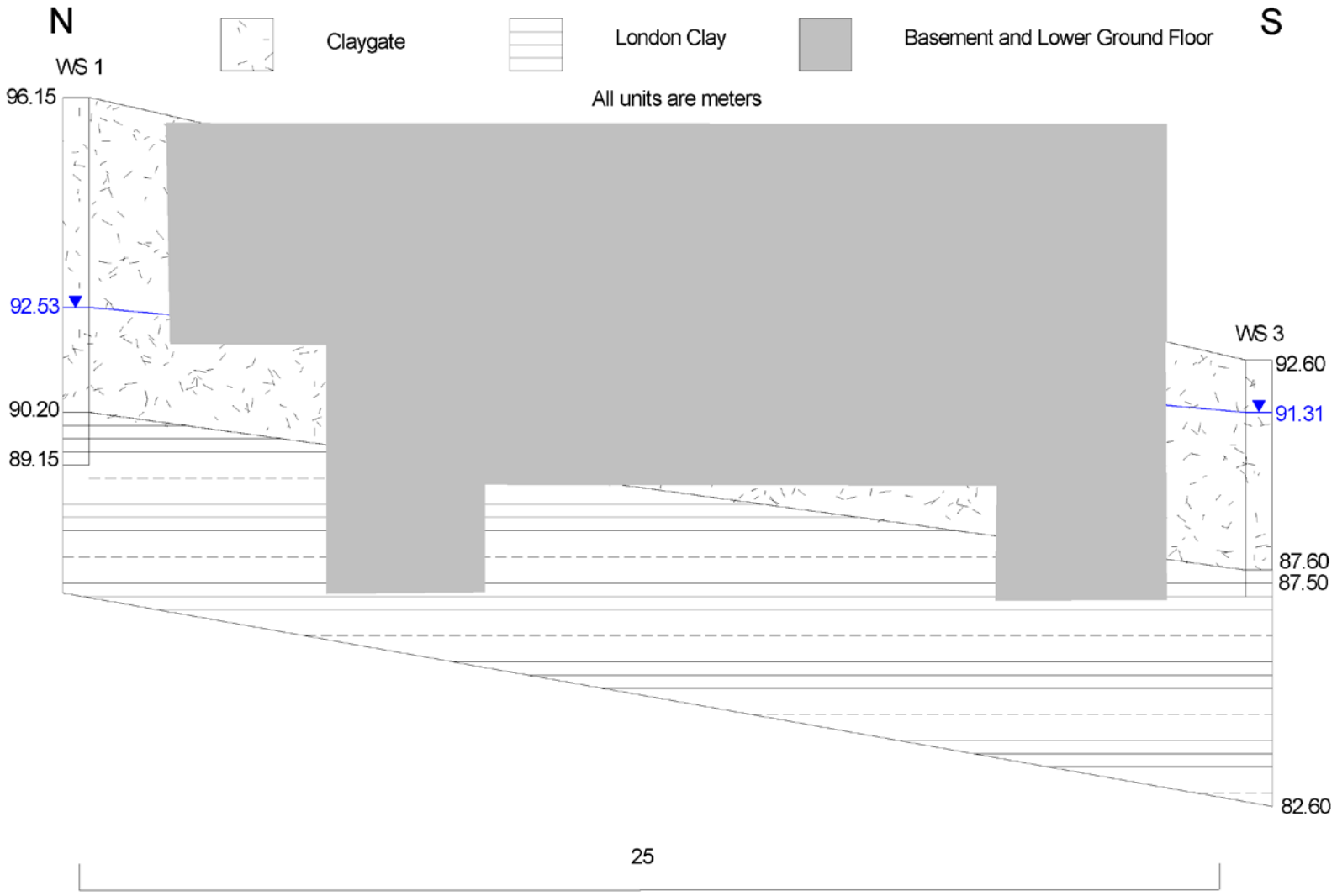


Figure 3.1 Cross section A – Generalised cross section from north to south across the site (not to scale). Water levels shown were recorded on the 24/05/2013.

3.2 IMPACTS ON GROUNDWATER FLOWS

As the proposed basement is likely to protrude below the recorded groundwater elevations, there will likely be some interference to groundwater flow. As stated previously, the Claygate Member comprises chiefly low permeability clay. This means the overall magnitude of water passing through the site is likely to be relatively low (as stated in section 3.1). Using Darcy's law an estimate of the volume passing beneath the site has been made assuming that the permeable horizons make up a total of 1 % of the Claygate Member thickness, and using a hydraulic conductivity of 10 m/day (within the range commonly ascribed to fluvial deposits (Hiscock 2009)). This yielded an estimate of 0.75 m^3/day (0.009 l/s), assuming the presence of a continuous aquifer.

The up gradient adjacent property (to the NE) has a single storey basement. It is 5 m distance from the proposed basement and the lowest point is approximately 3 m above the estimated lowest point of the proposed basement. Given that the adjacent basement exists up gradient of the site it is probable that transmissive horizons of permeable material would be intersected up gradient the proposed development. In this case the volume of water transmitted through this body would be greatly reduced and the estimate of 0.75 m/day could, in reality, be negligible.

The Claygate member may be intersected by the entire development (figure 3.1). This means that the groundwater flow will be diverted around the proposed basement.

Based upon the points above the site is expected to cause a relatively minor obstruction of groundwater flow leading to slightly increased flows around the proposed basement and a negligible increase in groundwater elevation on the up gradient side of the site. This is not expected to be more than a few centimetres at most. Groundwater modelling would be required to determine the exact scale of the impact

As the development is not expected to cause a significant rise in groundwater height up gradient from the property, the adjacent property is not expected to be affected. Down gradient properties are also not expected to be affected by the development.

3.2 IMPACTS ON SURFACE WATER FLOWS AND FLOODING

As the site is not expected to alter the extent of impermeable surfaces in the exterior of the site, no change is expected in the quantity, or quality, of surface water leaving the site. This also means that there will be no material change in surface flooding or flood risk in the surrounding area resulting from the development.

4 CONCLUSIONS

Potential impacts of the proposed basement development at 10a Oakhill Avenue have been considered as set out in the scope of works. The following summary conclusions are made:

- 10a Oakhill Avenue is not within a designated flood plain, nor is it a street which is at risk of significant of localised tidal flooding or reservoir failure as defined by the Environment Agency.
- There are no surface water features in the vicinity of the site and therefore no risk to the proposed development of flooding from this source, or risk to the water quality of surface water bodies.
- It is thought that the new development will cause no change in impermeable surface area Therefore it is considered that peak runoff and related flooding risk from the proposed development will remain unchanged.
- There is likely to be a minor impact on groundwater flow within the shallow Claygate Member strata. Groundwater modelling would be required to determine the scale of the impact. Given that the overall magnitude of flow beneath the existing property is thought to be low, the overall impact of the basement on groundwater flow is expected to be low and adjacent properties are not likely to be affected.
- There is no history of sewer flooding at the site (Appendix C).

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Hiscock, 2009. Hydrogeology: principles and practice. Blackwell Science Ltd. Oxford.

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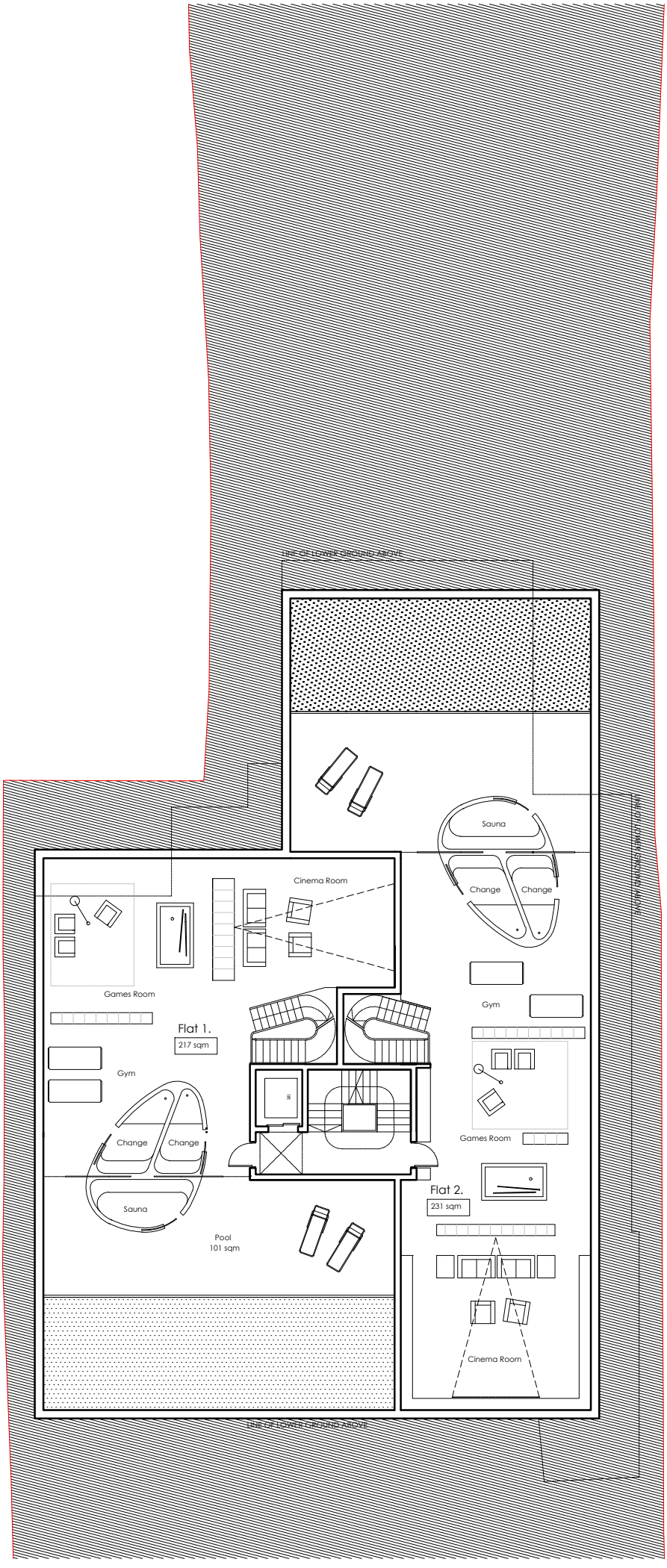
APPENDICES

APPENDIX A

Site Plans


LINE OF LOWER GROUND ABOVE
Sauna
Change
Change
Cinema Room
Games Room
Flat 1.
217 sqm
Gym
Change
Change
Sauna
Pool
101 sqm
Gym
Games Room
Flat 2.
231 sqm
Cinema Room
LINE OF LOWER GROUND ABOVE

Bed 4
28 sqm

Bed 3
25 sqm

En-suite
5 sqm

En-suite
5 sqm

Bed 4
12 sqm

Bed 2
33 sqm

Bed 3
19 sqm

36 sqm

En-suite
4 sqm

29 sqm

Bed 2
31 sqm

Flat 1.
139 sqm

Flat 2.
129 sqm

En-suite
17 sqm

Recycling
6 sqm

En-suite
9 sqm

Parking
Flat 1

Parking
Flat 2

Parking
Flat 3

Parking
2nd space
No. 8

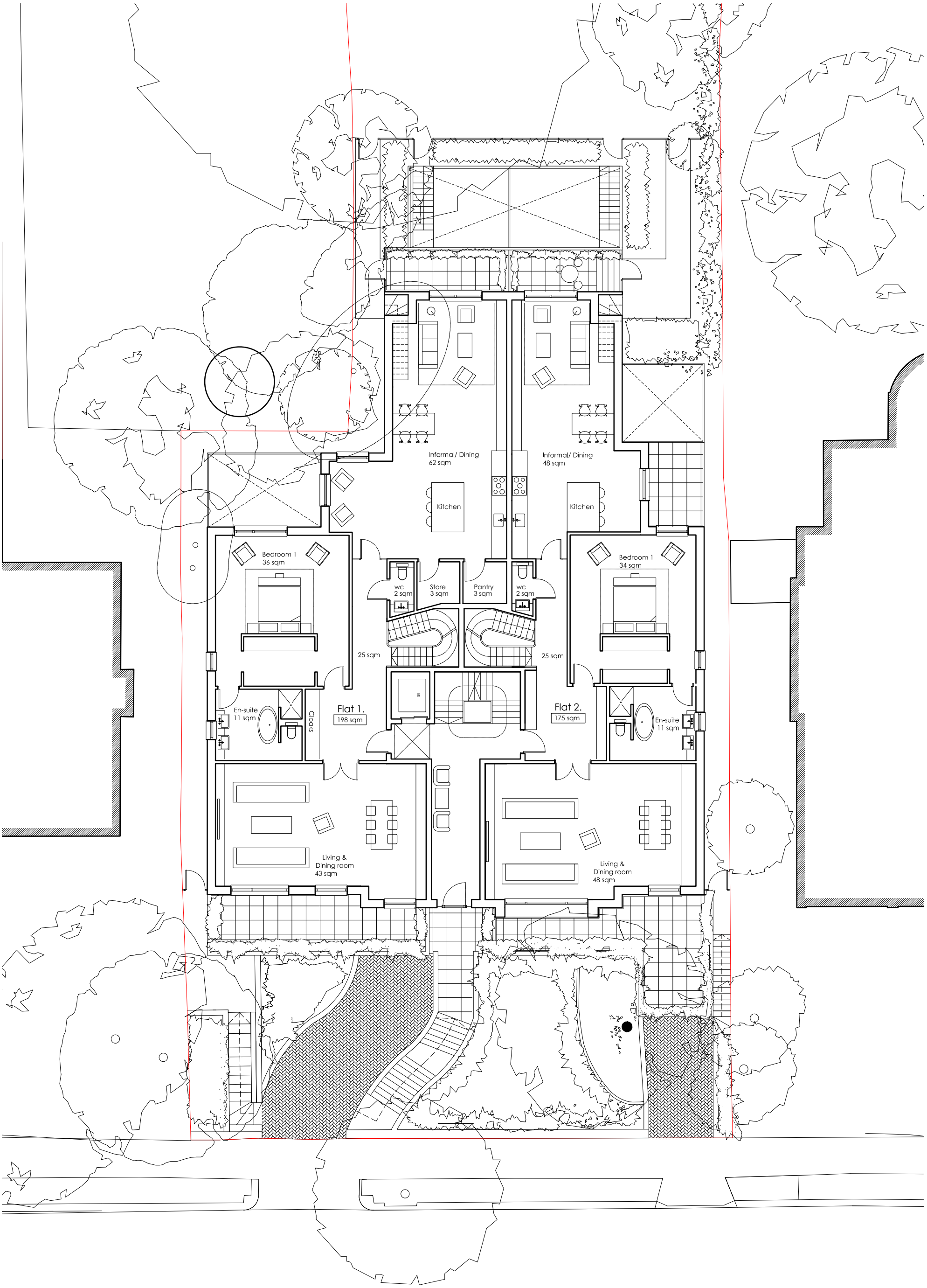
Store
13 sqm

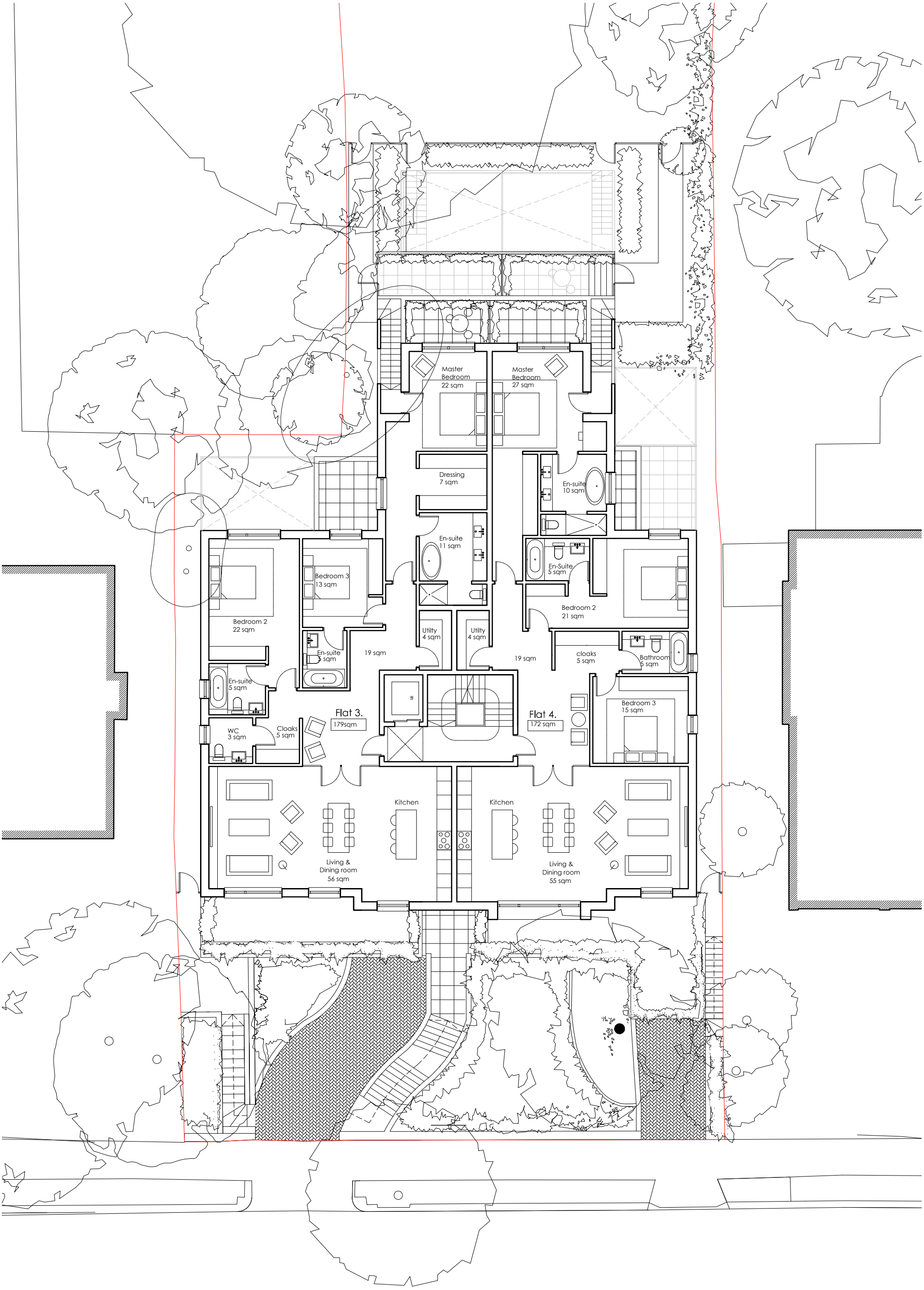
Parking
Flat 5

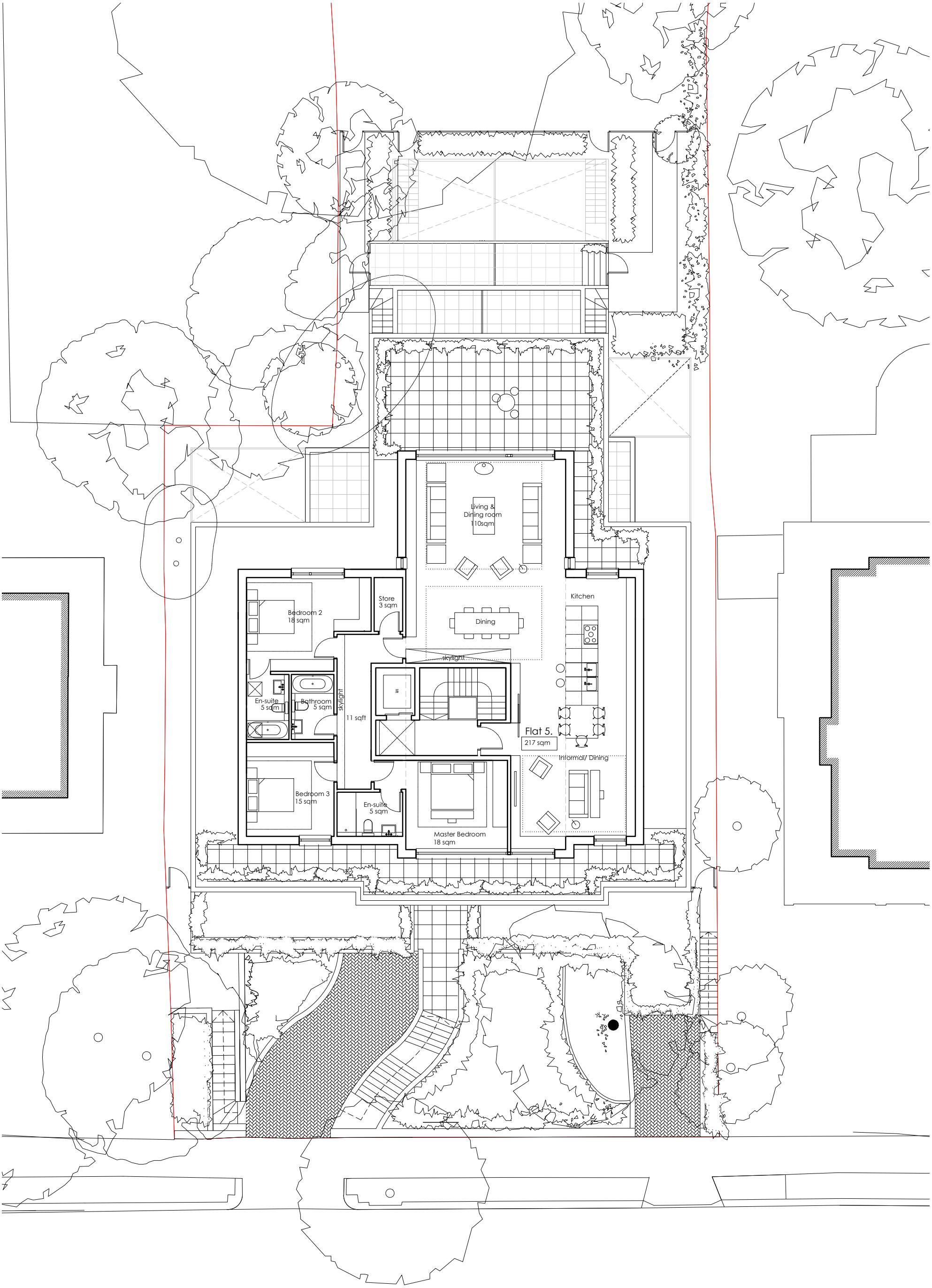
Parking
Flat 4

Parking
1st space
No. 8

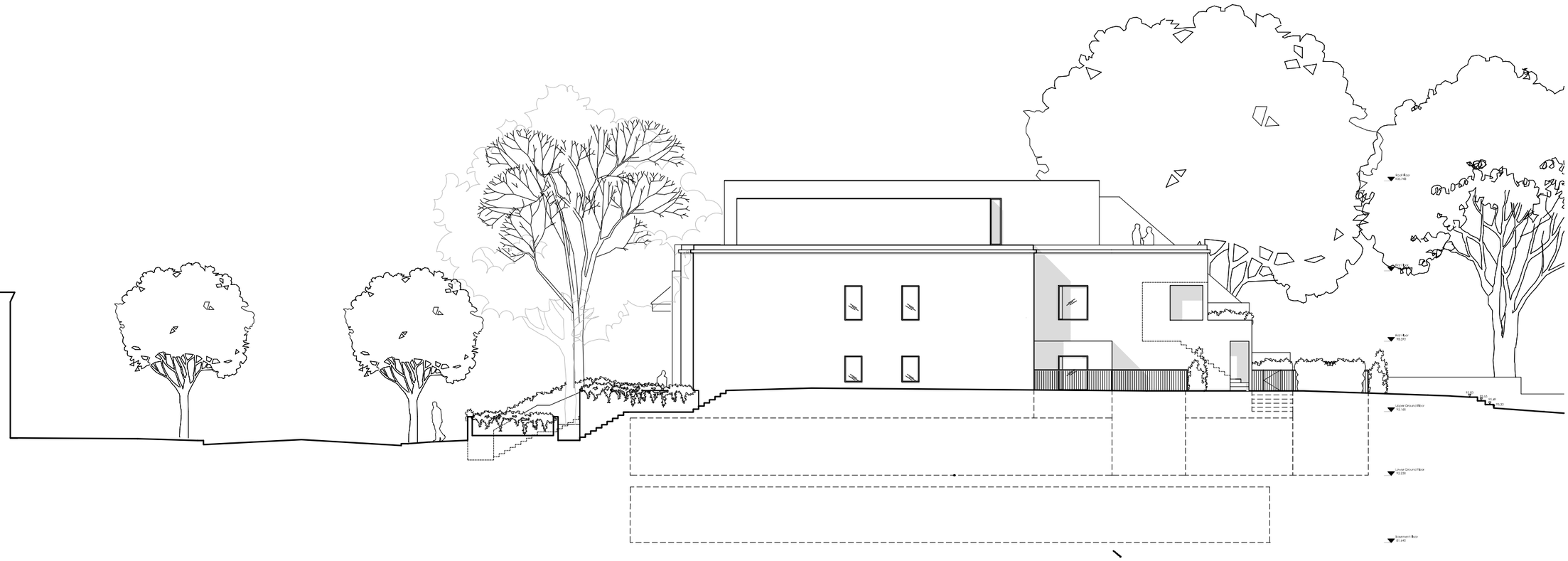
Bins

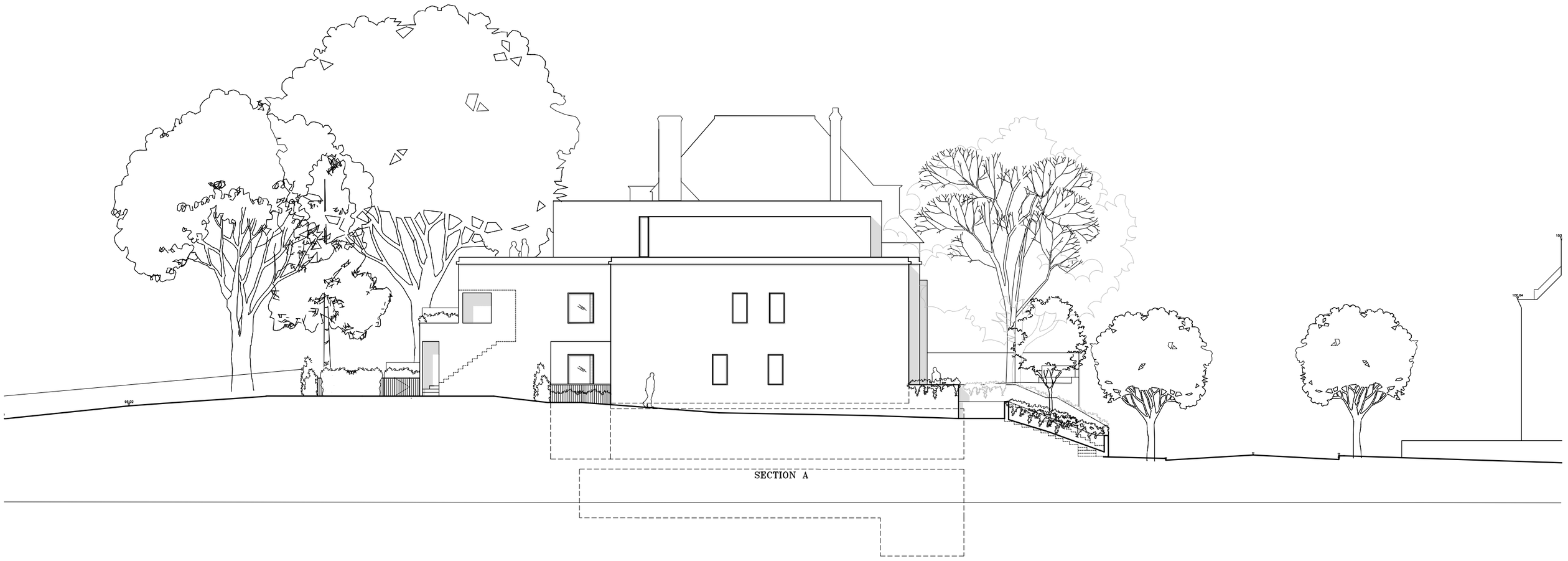

Informal/ Dining
62 sqm
Informal/ Dining
48 sqm
Kitchen
Kitchen
Bedroom 1
36 sqm
Bedroom 1
34 sqm
wc
2 sqm
Store
3 sqm
Pantry
3 sqm
wc
2 sqm
25 sqm
25 sqm
En-suite
11 sqm
Cloaks
Flat 1.
198 sqm
Flat 2.
175 sqm
En-suite
11 sqm
Living &
Dining room
43 sqm
Living &
Dining room
48 sqm


Master
Bedroom
22 sqm
Master
Bedroom
27 sqm
Dressing
7 sqm
En-suite
10 sqm
En-suite
11 sqm
En-Suite
5 sqm
Bedroom 3
13 sqm
Bedroom 2
22 sqm
Bedroom 2
21 sqm
Utilty
4 sqm
Utilty
4 sqm
19 sqm
19 sqm
En-suite
5 sqm
cloaks
5 sqm
Bathroom
5 sqm
En-suite
5 sqm
Flat 3.
179sqm
Flat 4.
172 sqm
Bedroom 3
15 sqm
WC
3 sqm
Cloaks
5 sqm
Kitchen
Kitchen
Living &
Dining room
56 sqm
Living &
Dining room
55 sqm

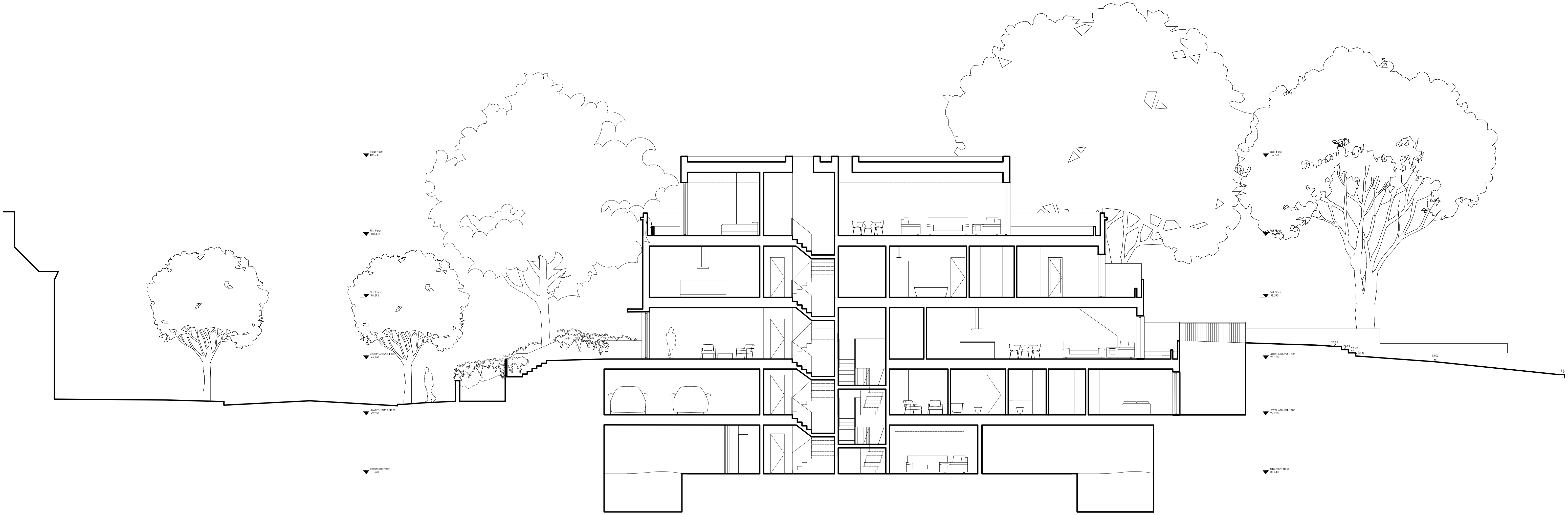

Living &
Dining room
110sqm
Kitchen
Dining
Store
3 sqm
Bedroom 2
18 sqm
skylight
En-suite
5 sqm
Bathroom
5 sqm
skylight
11 sqft
Flat 5.
217 sqm
Informal/ Dining
Bedroom 3
15 sqm
En-suite
5 sqm
Master Bedroom
18 sqm


TIMBER
TILES
TILES
WINDOW
WINDOW
WINDOW
BRICK
BRICK
WINDOW
BRICK
OPENING
BRICK
Roof Floor
105.743
First Floor
101.818
First Floor
98.393
Upper Ground Floor
Lower Ground Floor
92.288
BRICK
TILES
WINDOW
WINDOW
WINDOW
WINDOW
BRICK
BRICK
BRICK
BRICK
BRICK
BRICK

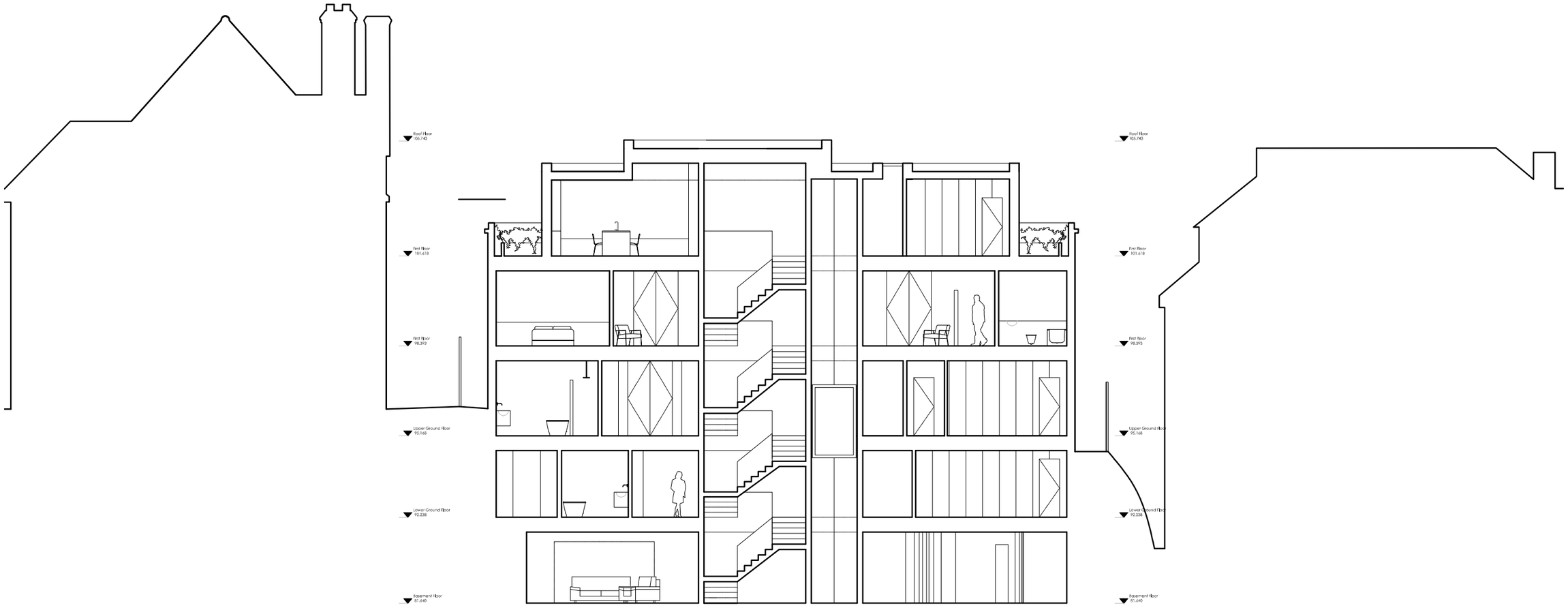

First Floor
99.370
Upper Ground Floor
93.168
Lower Ground Floor
92.238
Basement Floor
91.640



SECTION A



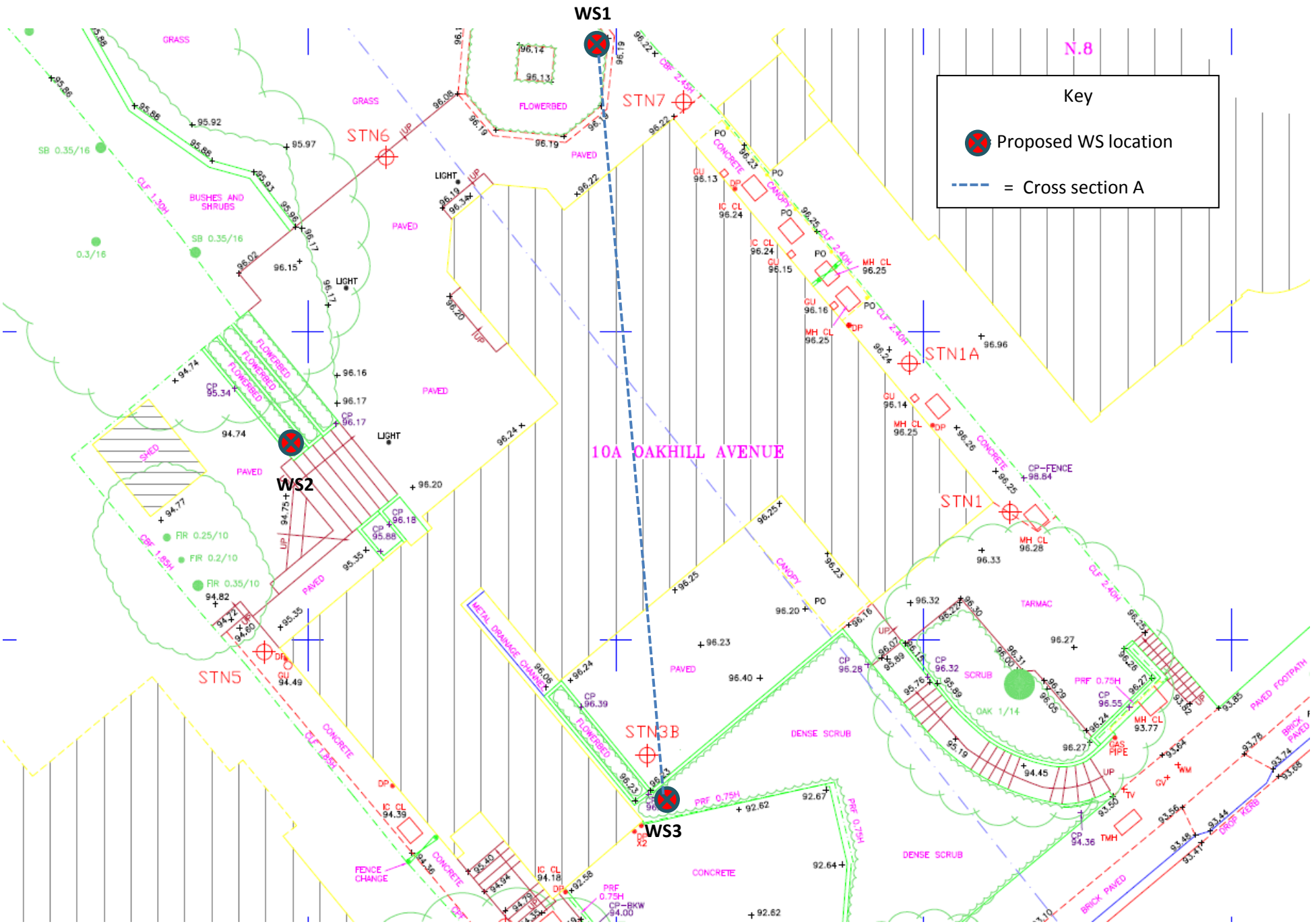
Roof Floor
105.743
First Floor
101.618
First Floor
98.393
Upper Ground Floor
95.168
Lower Ground Floor
92.238
Basement Floor
81.640
Roof Floor
105.743
First Floor
First Floor
98.393
95.83
Upper Ground Floor
95.168
Lower Ground Floor
92.238
Basement Floor
81.640


Roof Floor
105.743
First floor
101.618
First floor
98.393
Upper Ground Floor
95.168
Lower Ground Floor
92.238
Basement Floor
81.640
Roof Floor
105.743
First floor
101.618
First floor
98.393
Upper Ground Floor
95.168
Lower Ground Floor
92.238
Basement Floor
81.640

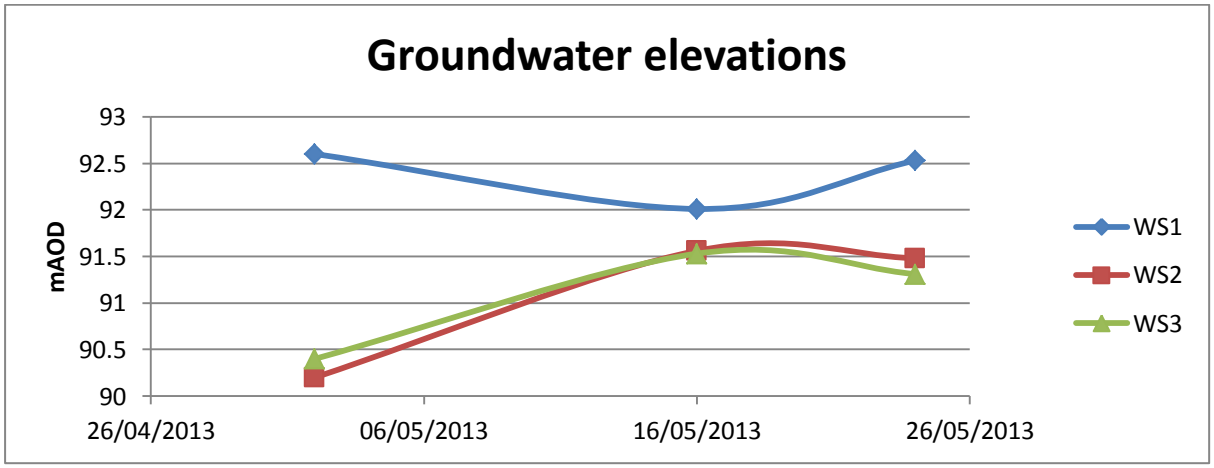
21 Oak A2
23 Hawthorn U
20 Beech B2
19 Beech B2
18 Beech B2
24 Cypress C1
25 Maple C/U2
17 Laurel C2
26 Cypress C1
27 Oak B3
16 Birch B2
15 Sycamore B2
14 Birch U
13 Birch C2
12 Western Red Cedar C2
Elder
11 Oak B2
G10 Cypress C2
H9 Leyland / Privet C2
Mixed shrubs
8 Oak B3
1 Oak B3
View
2 Cypress C2
7 Oak C2
3 Oak B3
5 Magnolia C2
4 Ash C2
6 Birch C2
PANEL FENCE 1.50H
SHED
DENSE SCRUB & ROCKS
BUSHES AND SHRUBS
CLF 1.30H
CBF 1.90H
STONE PATH
STONE RETAINING WALL
BRICK WALL 0.10H
GRASS
PAVED
FLOWERBED
PLANTED
LIGHT
CONCRETE
CANOPY
METAL DRAINAGE CHANNEL
CLF 1.85H
CPT 1.25H
PRF 0.75H
CLF 2.40H
CBF 2.45H
SCRUB
TARMAC
BRICK PAVED
PAVED FOOTPATH
N.10
N.8
10A OAKHILL AVENUE
OAKHILL AVENUE
TARMAC ROAD
1/14

APPENDIX B

BGS Borehole log data


WS1
WS2
WS3
Key
Proposed WS location
= Cross section A
10A OAKHILL AVENUE
N.8
STN1
STN1A
STN3B
STN5
STN6
STN7
GRASS
PAVED
FLOWERBED
CONCRETE
TARMAC
DENSE SCRUB
SCRUB
BUSHES AND SHRUBS
METAL DRAINAGE CHANNEL
FENCE CHANGE
BRICK PAVED
PAVED FOOTPATH
DROP KERB
CANOPY
SHED
LIGHT
OAK 1/14
FIR 0.25/10
FIR 0.2/10
FIR 0.35/10
SB 0.35/16
0.3/16
CP-FENCE
CP-BKW
GAS PIPE
TWH

Groundwater data						
	02/05/2013		16/05/2013		24/05/2013	
	GW Strike (mAOD)	Rest water Level (mAOD)	Rest water Level (mAOD)	Change (m)	Rest water Level (mAOD)	Change (m)
WS1	91.75	92.6	92.01	-0.59	92.53	0.52
WS2		90.2	91.56	1.36	91.48	-0.08
WS3		90.4	91.53	1.13	91.31	-0.22



Groundwater data from site investigation report (Soil Consultants Ltd 2013 (B))

Site	**10a Oakhill Avenue**	Borehole No:	**WS1**
Location	**London NW3 7RE**		
Client:	**Eli Nathenson**	Sheet	**1 of 3**
Engineer:	**ESI Ltd**	Report No:	**9374/MC**

Comments	Samples Type	Samples Depth[m]	Field Test	Strata Depth[m]		Strata Level[mOD]	Strata Description	Legend
Borehole conducted: 02 May 2013				0.00	0	+96.15	Grey stone dressing over TOPSOIL: Soft, very dark grey-brown, slightly sandy and gravelly, organic silt. Gravel is of ash, glass and slate.	0
	D	0.20		0.30		+95.85	Soft, locally firm, becoming stiff, locally soft and firm, below 2.7m, orange-brown and light orange-brown, sandy silty CLAY, with pockets and partings of silty sand.	
	D	0.50						
	D	0.90			1			1
	D	1.20						
	D	1.50						
	D	1.80			2			2
	D	2.10						
	D	2.40						
	D	2.70			3			3
	D	3.00						
	D	3.30						
Groundwater depth 3.55m [60 minutes after completion].								
	D	3.80			4			4
	D	4.30						
Groundwater strike around 4.4m depth								
	D	4.80						
					5			5

Constructed using tracked rig with cased percussive sampling system [plastic liner]

Key: U = Undisturbed B = Bulk D = Small disturbed W = Water S = SPT 'N' [split spoon sampler] C = SPT 'N' [solid cone] HV = Hand Vane [kPa] PP = Pocket Penetrometer [kg/cm^2]

Remarks :- Groundwater monitoring well installed on completion - see Sheet 3 for details

Ground level interpolated from Kings Land and Architectural Surveyors' survey drawing (ref. 95274.0001)

Borehole No: **WS1**

[* = extrapolated SPT 'N' value]

Soil Consultants

Site	**10a Oakhill Avenue**	Borehole No:	**WS1**
Location	**London NW3 7RE**		
Client:	**Eli Nathenson**	Sheet	**2 of 3**
Engineer:	**ESI Ltd**	Report No:	**9374/MC**

Comments	Samples Type	Samples Depth[m]	Field Test	Strata Depth[m]		Strata Level[mOD]	Strata Description	Legend
					5		*...continued from previous* Stiff, locally soft and firm, orange-brown and light orange-brown, sandy silty CLAY, with pockets and partings of silty sand.	5
	D	5.30						
	D	5.80		5.95	6	+90.20	Stiff, fissured, dark grey-brown, slightly sandy silty CLAY, with occasional pockets and partings of silty sand.	6
	D	6.30						
	D	6.80		7.00	7	+89.15	End of borehole at 7.00m.	7
					8			8
					9			9
					10			10

Constructed using tracked rig with cased percussive sampling system [plastic liner]

Key: U = Undisturbed B = Bulk D = Small disturbed W = Water S = SPT 'N' [split spoon sampler] C = SPT 'N' [solid cone] HV = Hand Vane [kPa] PP = Pocket Penetrometer [kg/cm^2]

Remarks :-

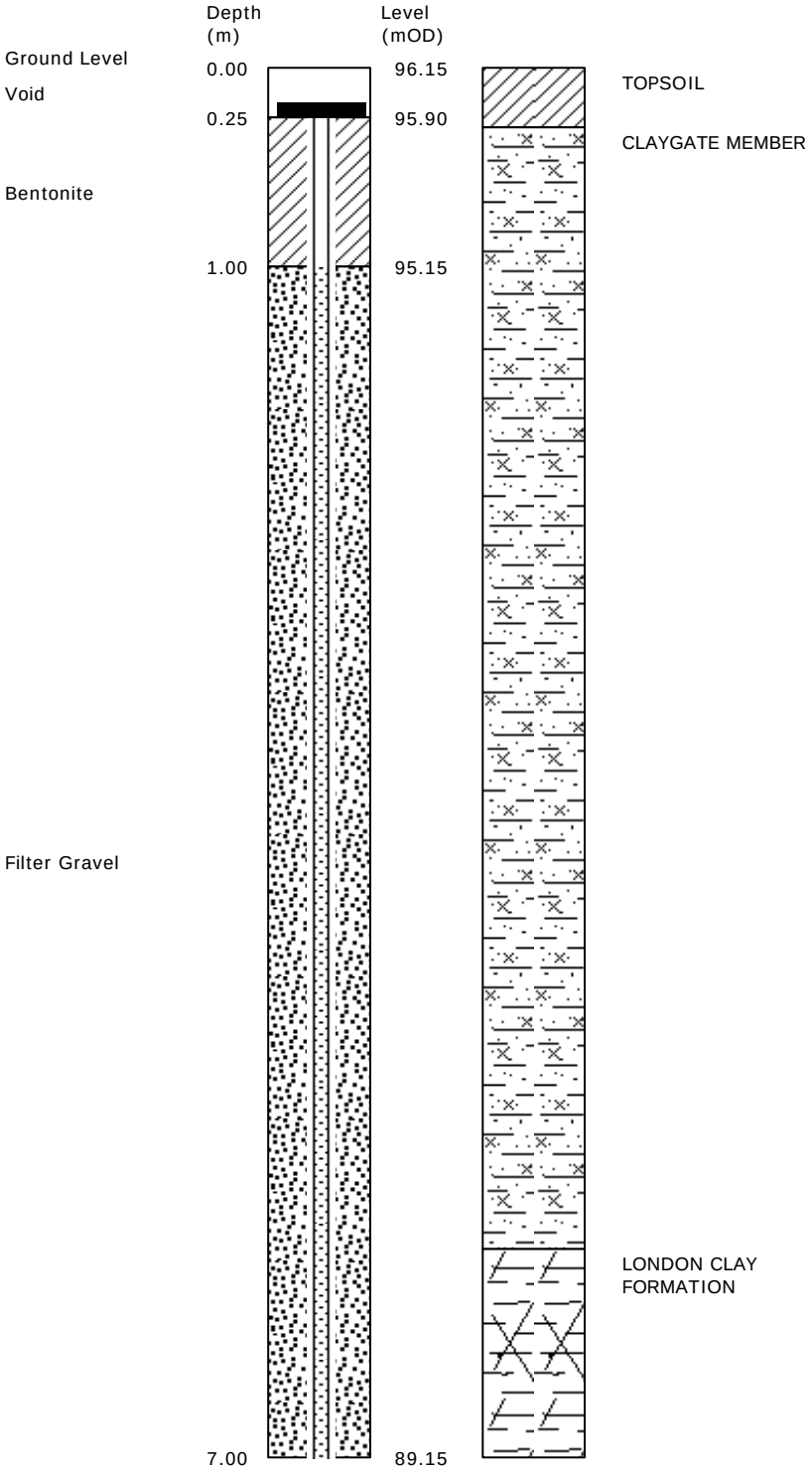
Borehole No: **WS1**

[* = extrapolated SPT 'N' value]

Soil Consultants

Site	**10a Oakhill Avenue**	Borehole No:	**WS1**
Location	**London NW3 7RE**		
Client:	**Eli Nathenson**	Sheet	**3 of 3**
Engineer:	**ESI Ltd**	Report No:	**9374/MC**

Borehole Installation and Backfill Details



Constructed using tracked rig with cased percussive sampling system [plastic liner]

Remarks :- [i] Pipe diameter: 19mm
[ii] Tip at 7m depth [89.15m OD approx]
[iii] Bung fitted

Borehole No: **WS1**

Site	**10a Oakhill Avenue**	Borehole No: **WS2**
Location	**London NW3 7RE**	
Client:	**Eli Nathenson**	Sheet **1 of 2**
Engineer:	**ESI Ltd**	Report No: **9374/MC**

Comments	Samples Type	Samples Depth[m]	Field Test	Strata Depth[m]		Strata Level[mOD]	Strata Description	Legend
Borehole conducted: 02 May 2013				0.00	0	+94.75	MADE GROUND: Paving slab over light orange-brown, slightly silty sand.	0
				0.10		+94.65		
	D	0.25					TOPSOIL: Soft, very dark grey-brown, slightly sandy and gravelly, organic silt. Gravel is of brick and flint.	
	D	0.50						
				0.70		+94.05	Soft, locally firm, becoming stiff, locally soft and firm, below 3.4m, orange-brown and light orange-brown, sandy silty CLAY, with pockets and partings of silty sand.	
	D	0.80			1			1
	D	1.10						
	D	1.40						
	D	1.70			2			2
	D	2.00						
	D	2.30						
Rootlets at 2.5m depth.	D	2.60						
	D	2.90			3			3
	D	3.40						
	D	3.90			4			4
	D	4.40						
Groundwater depth 4.55m [10 minutes after completion].								
Borehole dry throughout boring	D	4.90						
				5.00	5	+89.75	End of borehole at 5.00m.	5

Constructed using tracked rig with cased percussive sampling system [plastic liner]

Key: U = Undisturbed B = Bulk D = Small disturbed W = Water S = SPT 'N' [split spoon sampler] C = SPT 'N' [solid cone] HV = Hand Vane [kPa] PP = Pocket Penetrometer [kg/cm^2]

Remarks :- Groundwater monitoring well installed on completion - see Sheet 2 for details

Ground level interpolated from Kings Land and Architectural Surveyors' survey drawing (ref. 95274.0001)

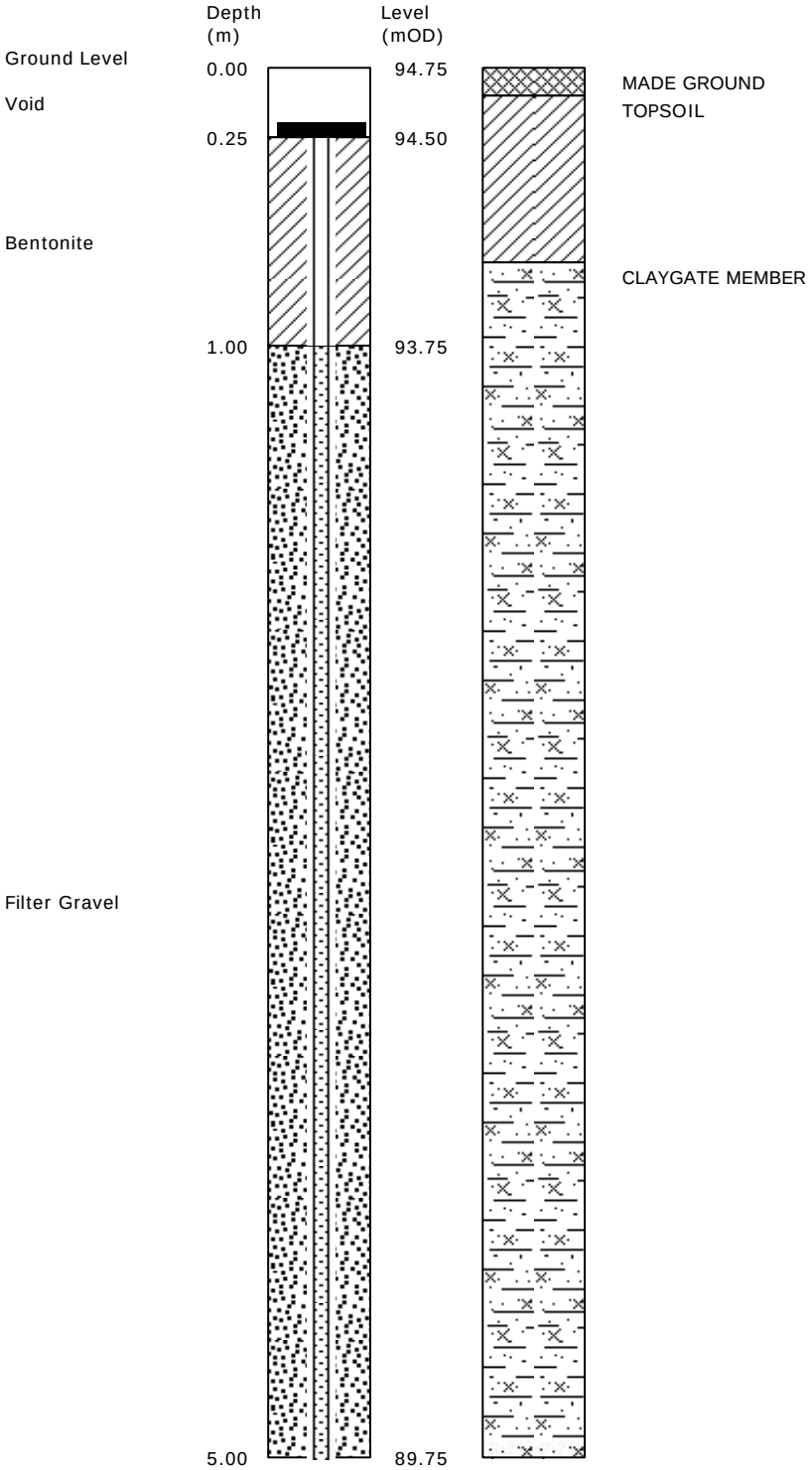
Borehole No: **WS2**

[* = extrapolated SPT 'N' value]

Soil Consultants

Site	**10a Oakhill Avenue**	Borehole No:	**WS2**
Location	**London NW3 7RE**		
Client:	**Eli Nathenson**	Sheet	**2 of 2**
Engineer:	**ESI Ltd**	Report No:	**9374/MC**

Borehole Installation and Backfill Details



Constructed using tracked rig with cased percussive sampling system [plastic liner]

Remarks :- [i] Pipe diameter: 35mm
[ii] Tip at 5m depth [89.75m OD approx]
[iii] Bung fitted

Borehole No: **WS2**

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