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GROUND INVESTIGATION & BASEMENT IMPACT ASSESSMENT REPORT

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APPENDICES

EXECUTIVE SUMMARY

Zoe Moore commissioned Jomas Associates Ltd to prepare a Geotechnical Ground Investigation and Basement Impact Assessment at the site located at 84 South Hill Park, London, NW3 2SN.

The principal objectives of the study were as follows:

- To establish the geotechnical conditions pertaining to the site
- To assess the data from the investigation to inform preliminary design advice with respect to foundation design, concrete specification and excavation stability
- To undertake a Basement Impact Assessment (BIA) based the methodology of the on the guidance given in the London Borough of Camden document "Camden Planning Guidance Basements" (CPGB) (January 2021)

It should be noted that the table below is an executive summary of the findings of this report and is for briefing purposes only. Reference should be made to the main report for detailed information and analysis.

Site Information	
Current Site Use	The site currently comprises an occupied, three-storey terraced residential building fronting onto South Hill Park. The building has an associated front drive, which features steps leading down to an existing basement level.
Proposed Site Use	The proposed development is to comprise the refurbishment of the terraced property, including an extension of the existing basement beneath the current driveway.
Summary of Stage 1 & 2 BIA	On the earliest available maps (1870s), the site was shown as undeveloped land located to the east of Hampstead Ponds No.1 and No.2. Cuttings associated with these ponds were also evident on historic maps at this time. By the maps dated 1890s, extensive residential development of the surrounding area had taken place, with the site forming a small part of a larger residential plot comprising a terraced house and gardens along South Hill Park. This residential plot appeared to have been demolished (or damaged beyond repair as a result of WWII aerial bombardment) by the maps dated 1951. By 1968, the site was shown to have been redeveloped into the terraced property as observed during Jomas' walkover in 2025. No other significant changes were observed for the site or surrounding area. The British Geological Survey indicated that the site is directly underlain by solid deposits of the London Clay Formation, with no artificial or superficial deposits reported in the vicinity. The underlying London Clay Formation was identified as an unproductive stratum. A review of the EnviroInsight Report indicated that the site lies within EA Flood Zone 1. 6No water networks and 3No surface water features were reported within 250m of site, including the Hampstead Ponds No.1 and No.2 located 50m west. The site is located within South End Local Flood Risk Zone, as well as the Hampstead Chain Catchment.

<table>
<tr><th colspan="2">Site Information</th></tr>
<tr><td></td><td>Groundsure reported the highest risk for both surface water and groundwater flooding on site to be "negligible".
The following issues were noted during the scoping works:
The screening and scoping assessments concluded the following:
• A ground investigation was recommended to confirm the ground conditions and groundwater levels (if any) beneath the site, as well as to inform foundation design.
• The data from the ground investigation could then be used to confirm the relative depths of the basement to the groundwater levels (if any), and whether there is hydraulic continuity with the nearby Hampstead Ponds.
• The ground investigation should then also determine the presence of Made Ground and/or clay. Atterberg Limits of the underlying clay should be determined by the ground investigation to establish shrink/swell potential.
• The proposed basement will underlie the existing building on site; there will be no significant change in surface water run-off.
• The site was reported to be located within South End Local Flood Risk Zone, as well as the Hampstead Chain Catchment . A site-specific FRA and SuDS/drainage strategy report was considered likely to be required in order to demonstrate how the development of site and implementation of SuDS will not increase flood risk locally.
• A Ground Movement Assessment was also recommended.</td></tr>
<tr><th colspan="2">Ground Investigation</th></tr>
<tr><td>Scope of Works</td><td>The ground investigation was undertaken on 15 April 2025, and consisted of the following:
• 1No windowless sampler borehole, drilled to 8m below ground level (mbgl) with associated in-situ testing and sampling
• 1No hand-excavated trial pits to inspect existing foundations
• 1No groundwater monitoring well installed to 5mbgl
• Laboratory analysis for chemical and geotechnical purposes
• 2No return visits to monitor groundwater levels</td></tr>
<tr><td>Ground Conditions</td><td>The results of the ground investigation revealed a ground profile comprising Made Ground to 3mbgl, overlying the London Clay Formation to a maximum proven depth of 8mbgl.
During the intrusive investigation, groundwater was not reported within the exploratory holes.
During return monitoring, groundwater was not present within the well on 1No occasion and at a depth of 4.65mbgl on the other.</td></tr>
</table>

Site Information	
Foundations	Based on drawings provided, it is anticipated that the finished floor level of the basement would be approximately 3m below existing ground level and therefore formation level is anticipated to be ~3.5mbgl. Based upon the information obtained to date, it is considered that a cast in-situ cantilever retaining wall formed at approximately 3.5m below the existing ground level could be designed with an allowable bearing capacity of 60kPa. Total and differential settlements should be contained within tolerable limits. Where applicable, foundations must be deepened further to found beneath Made Ground and where building near trees in accordance with NHBC Standards Chapter 4.2, for soils of medium volume change potential.
Sulphates	Based on the results of chemical testing, for foundations formed with the London Clay Formation, the recommended concrete class for the site is DS-2 assuming an Aggressive Chemical Environment for Concrete classification of AC-1s in accordance with the procedures outlined in BRE Special Digest 1
Ground Floor Slabs	If a cantilever retaining wall is utilised, then a ground bearing floor slab could be used. If a piled option is utilised, then suspended floor slabs will be required.
Excavations	Temporary excavations are unlikely to remain stable and some form of temporary support or battering back to a safe angle and dewatering are likely to be required. Subject to seasonal variations, surface water/groundwater encountered during site works could likely be dealt with by conventional pumping from a sump used to collate waters.
Basement Impact Assessment	
Conclusions	Impacts such as changes to areas of external hardstanding, past flooding, and impacts to adjacent properties and pavement are addressed within the Stage 1 & 2 Basement Impact Assessment (Screening and Scoping) for 84 South Hill Park, London, NW3 2SN (Jomas Associates Ltd, P6393J3163/JRO, 25 March 2025). The overall assessment of the site is that the extension of the existing basement will not adversely impact the site or its immediate environs, providing measures are taken to protect surrounding land and properties during construction. The proposed development is not expected to cause significant problems to the subterranean drainage.
Recommended Further Works	
Recommendations	A FRA and SuDS/drainage strategy report is likely to be required in order to demonstrate how the development of site and implementation of SuDS will not increase flood risk locally. A Ground Movement Assessment is also recommended. It should be noted that the following items are usually required as part of Camden Planning Guidance Basements (January 2021): • Plans and sections to show foundation details of adjacent structures.

Site Information	
	• Programme for enabling works, construction and restoration. • Construction Sequence Methodology. • Proposals for monitoring during construction. • Evidence of consultation with neighbours. • Ground Movement Assessment (GMA). • Drainage Assessment.

1 INTRODUCTION

1.1 Terms of Reference

1.1.1 Zoe Moore ("The Client") has commissioned Jomas Associates Ltd ('Jomas'), to undertake an investigation of the geotechnical factors pertaining to the proposed redevelopment and to prepare a Basement Impact Assessment at a site referred to as 84 South Hill Park, London, NW3 2SN.

1.1.2 To this end a Stage 1 & 2 (Screening and Scoping) Basement Impact Assessment has been produced for the site and issued separately (detailed in Table 1.1 below), followed by an intrusive investigation (detailed in this report).

Table 1.1: Previous Reports

Title	Author	Reference	Date
Stage 1 & 2 Basement Impact Assessment (Screening and Scoping) for 84 South Hill Park, London, NW3 2SN	Jomas Associates Ltd	P6393J3163/JRO	25 March 2025

1.1.3 At the time of writing, Jomas Associates have not been supplied with any reports previously produced by others.

1.1.4 The intrusive investigation was undertaken in accordance with Jomas' proposal dated 24 January 2025.

1.2 Proposed Development

1.2.1 It is understood that the proposed development will comprise the refurbishment of the terraced property, including an extension of the existing basement beneath the current driveway.

1.2.2 Plans of the proposed development are included in Appendix 1.

1.2.3 For the purpose of geotechnical assessment, it is considered that the project could be classified as a Geotechnical Category (GC) 2 site in accordance with BS EN 1997.

1.3 Objectives

1.3.1 An intrusive investigation is proposed to establish geotechnical conditions pertaining to the site.

1.3.2 The data from the geotechnical investigation is to form the basis of preliminary design advice with respect to foundation design, concrete specification and excavation stability.

1.3.3 A Basement Impact Assessment will assess the potential impacts that the proposal may have on ground stability, the hydrogeology and hydrology on the site and its environs.

1.4 Scope of Works

1.4.1 The following tasks were undertaken to achieve the objectives listed above:

- An intrusive investigation to assess the underlying ground conditions;
- Undertaking of laboratory chemical and geotechnical testing upon samples obtained;
- Return groundwater monitoring;
- Carrying out a Basement Impact Assessment (BIA);
- The compilation of this report, which collects and discusses the above data, and presents an assessment of the site conditions, conclusions and recommendations.

1.5 Scope of Basement Impact Assessment

1.5.1 The site lies within the remit of the London Borough of Camden. The council has published a document "Camden Planning Guidance Basements" (CPGB) (January 2021).

1.5.2 Jomas' BIA covers most items required under CPGB, with the exception of:

- Plans and sections to show foundation details of adjacent structures
- Programme for enabling works, construction and restoration
- Evidence of consultation with neighbours
- Ground Movement Assessment (GMA), to include assessment of significant adverse impacts and specific mitigation measures required, as well as confirmatory and reasoned statement identifying likely damage to nearby properties according to Burland Scale
- Construction Sequence Methodology
- Proposals for monitoring during construction
- Drainage assessment

1.5.3 This Jomas BIA also takes into account the Campbell Reith pro-forma BIA produced on behalf of and published by the London Borough of Camden as guidance for applicants to ensure that all of the required information is provided.

1.5.4 A number of the requirements set out in the London Borough of Camden document CPGB will need to be addressed in a construction management plan, this stage is not within the scope of work that Jomas Associates have been commissioned.

1.6 Limitations

1.6.1 Jomas Associates Ltd ('Jomas') has prepared this report for the sole use of Zoe Moore, in accordance with the generally accepted consulting practices and for the intended purposes as stated in the agreement under which this work was completed. This report may not be relied upon by any other party without the explicit written agreement of Jomas. No other third-party warranty, expressed or implied, is made as to the professional advice included in this report. This report must be used in its entirety.

1.6.2 The records search was limited to information available from public sources; this information is changing continually and frequently incomplete. Unless Jomas has actual knowledge to the contrary, information obtained from public sources or provided to Jomas by site personnel and other information sources, have been assumed to be correct. Jomas does not assume any liability for the misinterpretation of information or for items not visible, accessible or present on the subject property at the time of this study.

1.6.3 Whilst every effort has been made to ensure the accuracy of the data supplied, and any analysis derived from it, there may be conditions at the site that have not been disclosed by the investigation, and could not therefore be taken into account. As with any site, there may be differences in soil conditions between exploratory hole positions. Furthermore, it should be noted that groundwater conditions may vary due to seasonal and other effects and may at times be significantly different from those measured by the investigation. No liability can be accepted for any such variations in these conditions.

1.6.4 This report is not an engineering design and the figures and calculations contained in the report should be used by the Structural Engineer, taking note that variations may apply, depending on variations in design loading, in techniques used, and in site conditions. Our recommendations should therefore not supersede the Engineer's design.

2 EXISTING INFORMATION

2.1 Site Information

2.1.1 The site location plan is appended to this report in Appendix 1.

Table 2.1: Site Information

Name of Site	-
Address of Site	84 South Hill Park, London, NW3 2SN
Approx. National Grid Ref.	527344 185981
Site Area (Approx.)	0.01 hectares
Site Occupation	Residential
Local Authority	London Borough of Camden

2.2 Summary of Stage 1 & 2 Basement Impact Assessment

2.2.1 As detailed in Table 1.1, a report has been produced for the site by Jomas, dated 25 March 2025, and issued separately. A brief overview of the findings is presented below. Reference should be made to the full report for detailed information.

Site Setting

2.2.2 On the earliest available maps (1870s), the site was shown as undeveloped land located to the east of Hampstead Ponds No.1 and No.2. Cuttings associated with these ponds were also evident on historic maps at this time. By the maps dated 1890s, extensive residential development of the surrounding area had taken place, with the site forming a small part of a larger residential plot comprising a terraced house and gardens along South Hill Park. This residential plot appeared to have been demolished (or damaged beyond repair as a result of WWII aerial bombardment) by the maps dated 1951. By 1968, the site was shown to have been redeveloped into the terraced property as observed during Jomas' walkover in 2025. No other significant changes were observed for the site or surrounding area.

2.2.3 The British Geological Survey indicated that the site is directly underlain by solid deposits of the London Clay Formation, with no artificial or superficial deposits reported in the vicinity.

2.2.4 The underlying London Clay Formation was identified as an unproductive stratum.

2.2.5 A review of the EnviroInsight Report indicated that the site lies within EA Flood Zone 1.

2.2.6 6No water networks and 3No surface water features were reported within 250m of site, including the Hampstead Ponds No.1 and No.2 located 50m west.

2.2.7 The site is located within South End Local Flood Risk Zone, as well as the Hampstead Chain Catchment.

2.2.8 Groundsure reported the highest risk for both surface water and groundwater flooding on site to be “negligible”.

Basement Impact Assessment (Screening and Scoping)

2.2.9 Screening identifies the area that require further (usually intrusive) investigation whilst scoping is the activity of defining in further detail the matters to be investigated as part of the BIA process. Scoping comprises of the definition of the required investigation needed in order to determine in detail the nature and significance of the potential impacts identified during screening.

2.2.10 These issues are summarised below:

- A ground investigation was recommended to confirm the ground conditions and groundwater levels (if any) beneath the site, as well as to inform foundation design.
- The data from the ground investigation could then be used to confirm the relative depths of the basement to the groundwater levels (if any), and whether there is hydraulic continuity with the nearby Hampstead Ponds.
- The ground investigation should then also determine the presence of Made Ground and/or clay. Atterberg Limits of the underlying clay should be determined by the ground investigation to establish shrink/swell potential.
- The proposed basement will underlie the existing building on site; there will be no significant change in surface water run-off.
- The site was reported to be located within South End Local Flood Risk Zone, as well as the Hampstead Chain Catchment . A site-specific FRA and SuDS/drainage strategy report was considered likely to be required in order to demonstrate how the development of site and implementation of SuDS will not increase flood risk locally.
- A Ground Movement Assessment was also recommended.

2.3 Previous Ground Investigations

2.3.1 Jomas is not aware of any previous intrusive works that have been undertaken on the site.

3 GROUND INVESTIGATION

3.1 Scope of Works

3.1.1 The intrusive investigation was undertaken on 15 April 2025.

3.1.2 A summary of the fieldwork carried out at the site is presented in Table 3.1 below.

Table 3.1: Scope of Intrusive Investigation

Investigation Type	Number of Exploratory Holes Achieved	Exploratory Hole Designation	Depth Achieved	Justification
Windowless Sampler Borehole	1	WS1	8mbgl	Obtain samples for laboratory geotechnical testing. To allow in-situ geotechnical testing.
Hand-excavated Trial Pit	1	TP1	1.25mbgl	To allow the inspection of the existing building/wall foundations.
Monitoring Well	1	WS1	5mbgl	Groundwater monitoring well.

3.1.3 The ground investigation was undertaken in accordance with British Standard BS5930:2015+A1:2020 "Code of practice for ground investigations", British Standard BS10175:2011+A2:2017 "Investigation of potentially contaminated sites - code of practice", NHBC Standards, Chapter 4.1 and AGS Guidelines for Good Practice in Site Investigations.

3.1.4 Where monitoring well installations were not installed, the exploratory holes were backfilled with the arisings (in the reverse order in which they were excavated) and the ground surface was reinstated so that no depression was left.

3.1.5 Exploratory hole positions are shown on the exploratory hole location plan presented in Figure 2, Appendix 1. The exploratory hole records are included in Appendix 2.

3.2 Geotechnical Testing

In-situ

3.2.1 In-situ geotechnical testing included Standard Penetration Tests (SPTs). The determined N-values have been used to determine the relative density of granular materials and have been used with standard correlations to infer various other derived geotechnical parameters including the undrained shear strength of the cohesive strata. The results of the individual tests are on the appropriate exploratory hole logs in Appendix 2.

Laboratory

3.2.2 Soil samples were obtained and submitted to the UKAS accredited laboratories of K4 Soils Ltd and Construction Testing Solutions Limited for a series of analyses.

3.2.3 This testing was designed to classify the samples; and to obtain parameters (either directly or sufficient to allow relevant correlations to be used) relevant to the technical objectives of the investigation.

3.2.4 The following laboratory geotechnical testing was carried out:

Table 3.2: Laboratory Geotechnical Analysis

Methodology	Test Description	Number of tests
BS1377:1990	Moisture Content Determination	3
BS1377:1990	Liquid and Plastic Limit Determination (Atterberg Limits)	3

3.2.5 In addition, 3No soil samples were analysed for a modified BRE Special Digest 1 suite (acid and water-soluble sulphate, total sulphur and pH) to assist with the ACEC classification for buried concrete.

3.2.6 The geotechnical laboratory test results are included in Appendix 3 and chemical laboratory test results in Appendix 4.

4 ENCOUNTERED CONDITIONS

4.1 General

4.1.1 A factual record of the conditions encountered during the physical investigation of the site is presented in the following section.

4.1.2 For further details of the ground conditions, reference should be made to the exploratory hole location plan presented in Appendix 1, exploratory hole logs presented in Appendix 2, and the laboratory testing results in Appendix 3 and 4.

4.2 Ground Conditions

4.2.1 The ground conditions encountered were broadly consistent with those anticipated, i.e. a thickness of Made Ground overlying the London Clay Formation and are summarised in Table 4.1 below.

Table 4.1: Ground Conditions Encountered

Stratum and Description	Encountered from (mbgl)	Base of strata (mbgl)	Thickness range (m)
Concrete/brick over brown sandy gravelly clay. Sand is fine to coarse. Gravel consists of fine to coarse, angular to rounded flint, concrete and brick. *No recovery reported from 1.3mbgl-1.9mbgl and 2.4mbgl-3mbgl.* (MADE GROUND)	0.00	3.00	3.00
Soft becoming firm consistency** brown/grey CLAY. (LONDON CLAY FORMATION)	3.00	>8.00 [base not proven]	>5.00 [thickness not proven]

***Consistency estimated using semi-empirical correlations with SPT N-values, Plasticity Indices and published literature*

4.2.2 No visual or olfactory evidence of potential contamination was identified within the investigation positions.

4.3 Existing Foundations

4.3.1 Details of the observed foundations as exposed by the inspection pits are summarised in Table 4.2.

Table 4.2: Foundation Inspection Pit Summary

Hole	Location	Total Step Out (m)	Assumed Width (m)	Proven Depth (mbgl)	Founding Strata
TP1	Northern boundary wall	0	≥ 0.3	>1.25	Depth of foundation in excess of 1.2mbgl and could not be proven

4.3.2 The following has been assumed:

- Walls were constructed symmetrically and centrally on the strip footing to prevent overturning and eccentric loading.
- Where the width of the wall is not known, it is assumed to be 0.30m wide to take into account the walls and any cavity.

4.4 Hydrogeology

4.4.1 Groundwater was not encountered during the intrusive investigation.

4.4.2 2No return groundwater monitoring visits were undertaken on 14 and 20 May 2025, the results are presented in Appendix 5 and are summarised below.

Table 4.3: Groundwater Monitoring Summary

Exploratory Hole ID	Depth Encountered (mbgl)	Well response zone as installed (mbgl)	Depth base of well (mbgl)	Stratum targeted by response zone
WS1	4.65 – Dry	0.50 to 5.00	4.85 – 4.88	Made Ground and London Clay Formation

4.4.3 Given that the London Clay Formation is reported to be an unproductive stratum, the water encountered during the post-investigation monitoring is considered likely to represent surface water having flowed into and collected in the well, rather than being representative of a groundwater table.

4.4.4 It should be noted that changes in groundwater levels can occur for a number of reasons including seasonal effects and variations in drainage. Such fluctuations may only be recorded by the measurement of the groundwater level within a standpipe or piezometer installed within appropriate response zones. Changes in groundwater level can have a direct effect on excavation stability and dewatering requirements, and cohesive soils can soften under rising or high groundwater levels.

4.5 Limitations

4.5.1 2No trial pits were proposed to be excavated to prove the base of the existing foundations. Once the first pit had been completed, it was confirmed by the structural engineer, who was present on site, that a second trial pit would not be required.

4.5.2 TP1 was excavated to 1.25mbgl and terminated at this depth, as it was not possible to safely dig any deeper than this without shoring equipment. As such, the base of the foundation could not be proven.

4.5.3 During the intrusive ground investigation, no impenetrable obstructions were encountered. However, the possible presence of natural and/or manmade obstructions on site cannot be discounted.

5 DERIVATION OF GEOTECHNICAL PARAMETERS

5.1 Introduction

5.1.1 A summary of ground conditions obtained from the ground investigation and the derived geotechnical parameters is provided below.

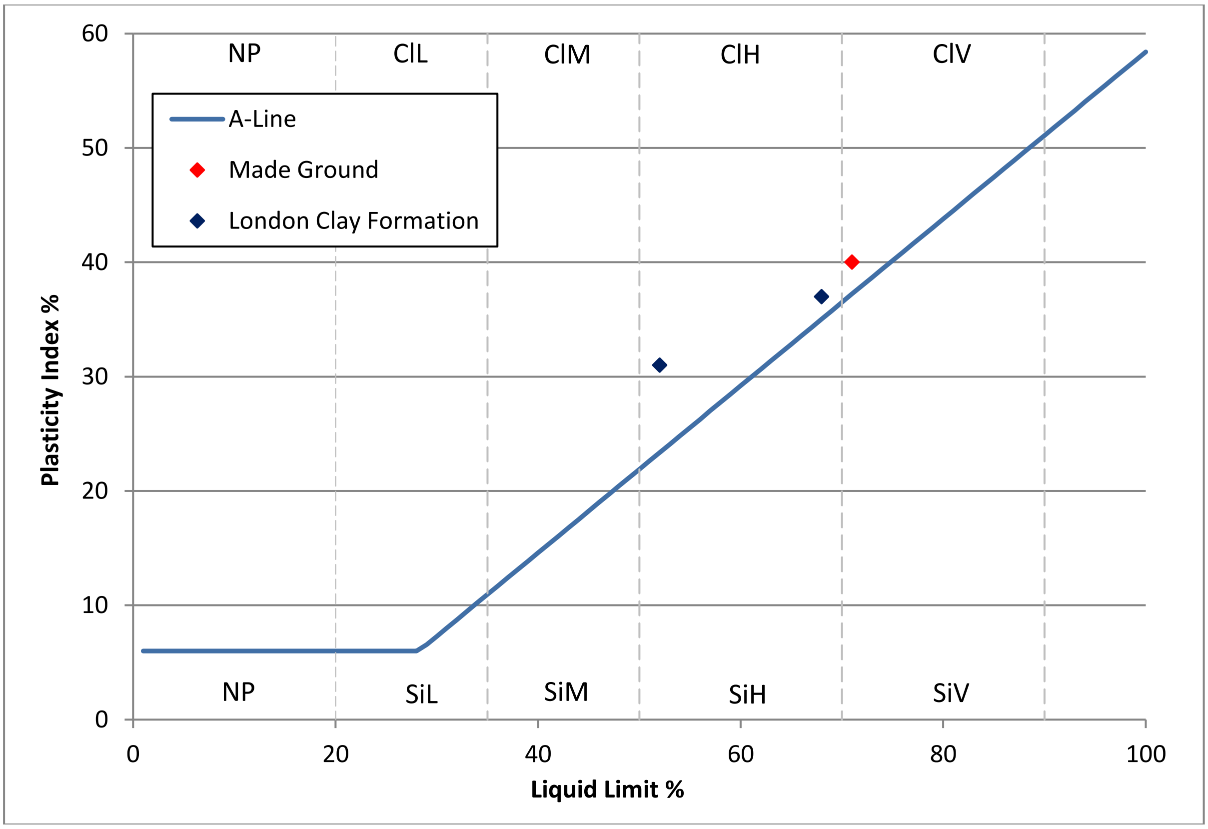
5.2 Plasticity of Cohesive Materials

5.2.1 Atterberg Limit determination was undertaken on 1No sample of the Made Ground at a depth of 2.2mbgl, and 2No samples of the London Clay Formation at depths of 3.5mbgl and 5.5mbgl. The results of the analysis are shown in Figure 5.1.

5.2.2 Within the Made Ground, the plasticity index value was 40% and was indicative of very high plasticity. The modified plasticity index value was 32%, indicating soils with medium volume change potential.

5.2.3 The plasticity index values within the London Clay Formation were 31% and 37%, and were indicative of high plasticity. The modified plasticity index values were 31% and 35.9%, indicating soils with medium volume change potential.

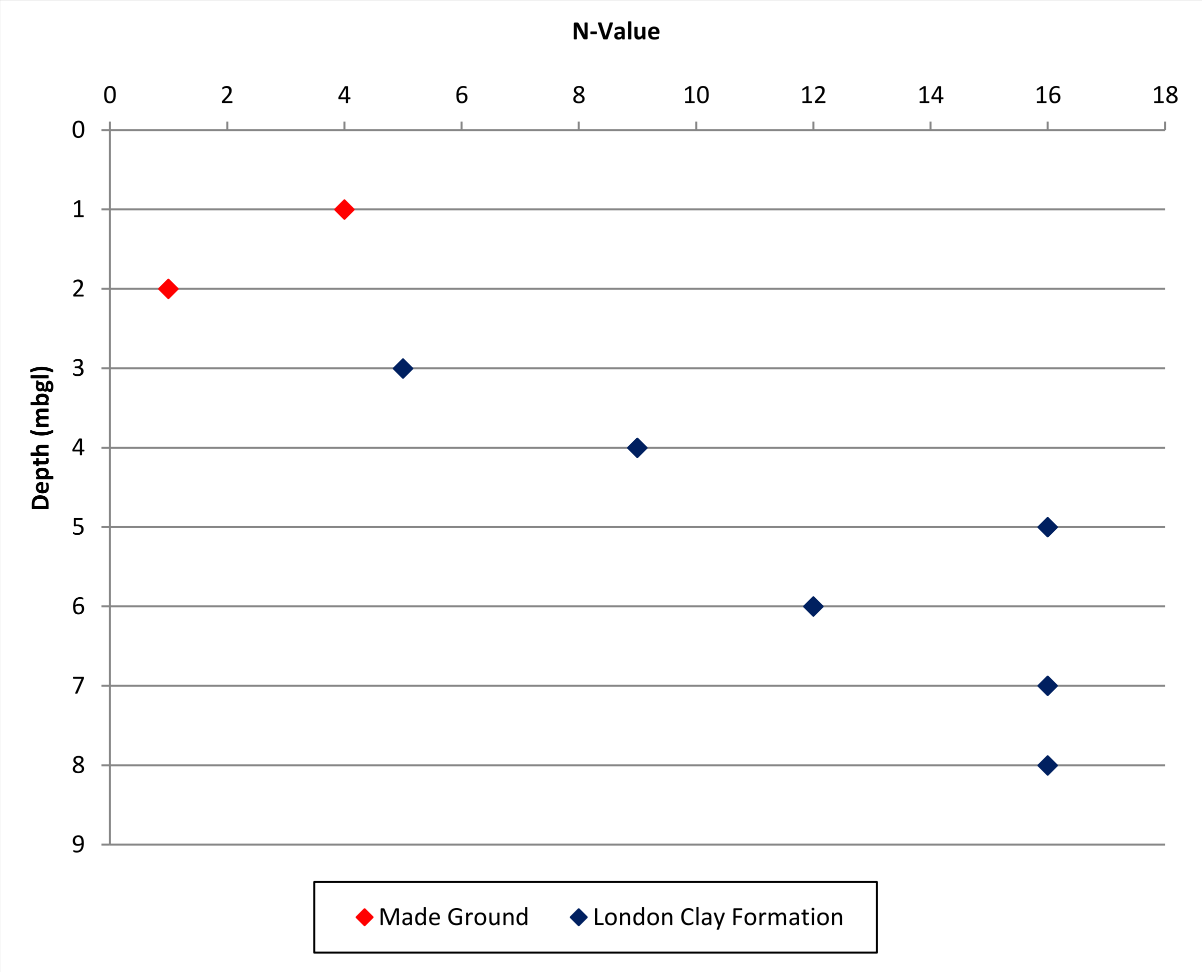
Figure 5.1: Plasticity Chart



5.3 Standard Penetration Tests

5.3.1 Standard Penetration Tests were undertaken at regular intervals throughout the windowless sample borehole. The results of the SPTs are plotted against depth in Figure 5.2 below.

Figure 5.2: SPT N-Value v Depth



5.3.2 A general trend of increasing SPT N-value with depth can be seen in the results.

5.4 Undrained Shear Strength

5.4.1 As discussed above, the N-values recorded in the clay vary with depth, from which we can infer that the undrained shear strength of the clay similarly varies. Figure 5.3 below shows the undrained shear strength inferred by the correlation suggested by Stroud (1974);

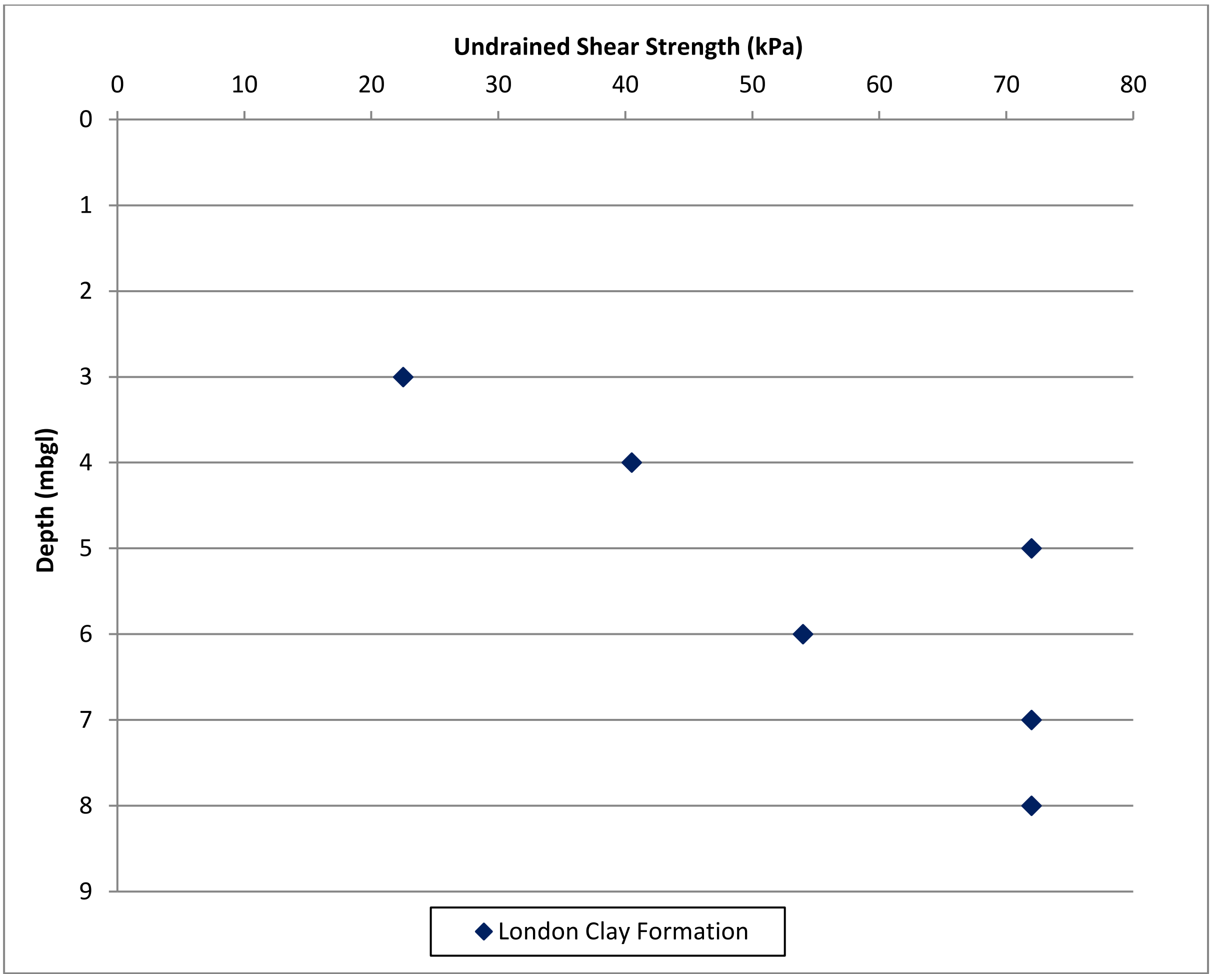
$c_u = f_1 \times N$ can be applied,

in which
c_u= mass shear strength (kN)

f_1 = constant
N= SPT value achieved during boring operations

5.4.2 In the above equation f_1 is dependent on the plasticity of the material that the SPT is being carried out in. As the plasticity indices were shown to be greater than 25% a value for f_1 of 4.5 has been adopted after Tomlinson (2001).

Figure 5.3: Undrained Shear Strength v Depth



5.4.3 As shown above, the undrained shear strength of the London Clay Formation inferred from SPTs shows the same general trend of increasing with depth.

5.5 Coefficient of Compressibility

5.5.1 Stroud and Butler (1974) developed a relationship between the coefficient of compressibility (m_v) and SPT N-value.

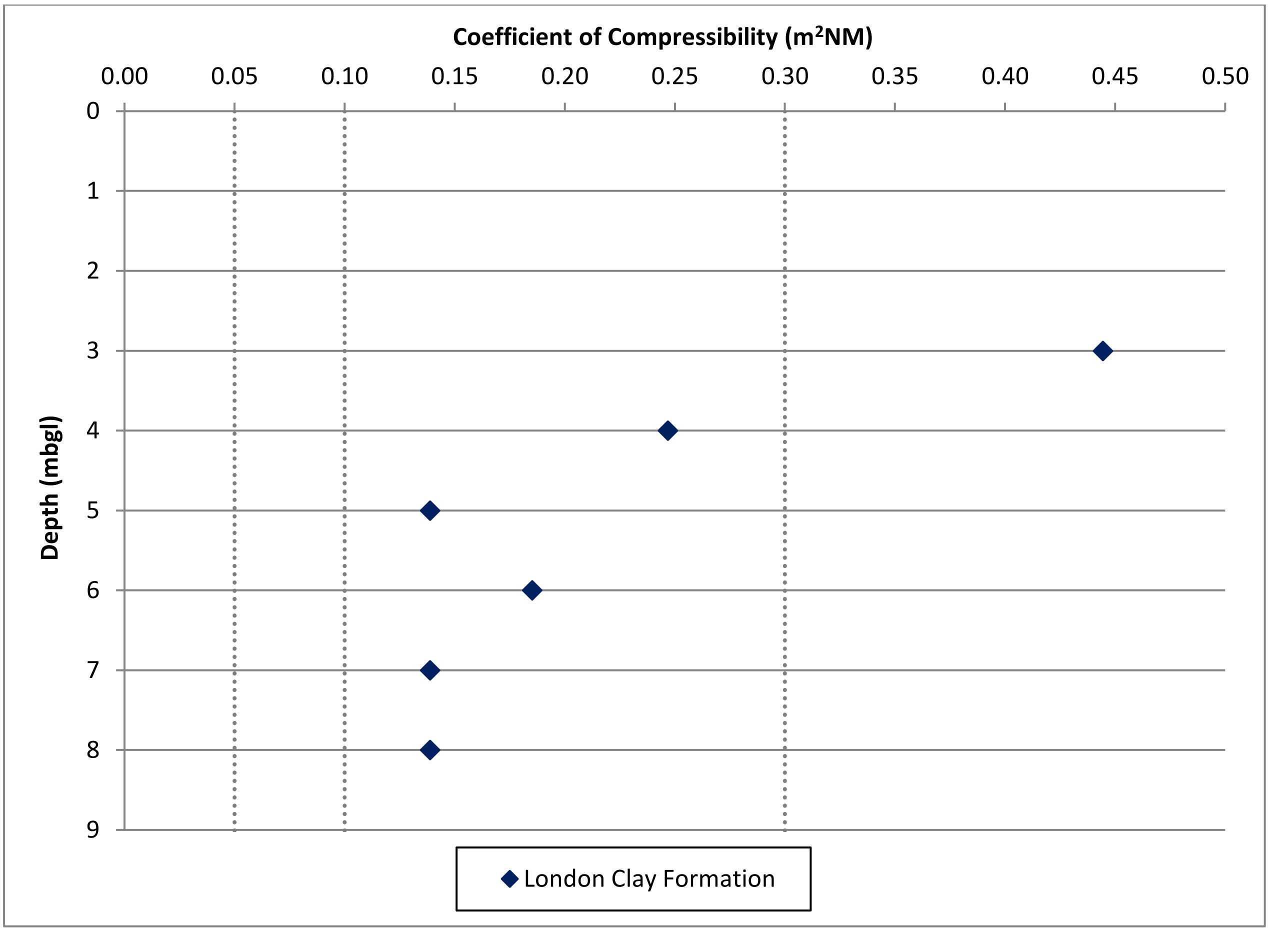
$m_v = 1/ f_2 \times N$ can be applied,

in which
m_v = coefficient of compressibility (m^2/MN)

f_2 = constant dependent on the plasticity index
N = SPT value achieved during boring operations

5.5.2 Using the plasticity indices obtained and the graphs provided in Tomlinson (2001) a value of f_2 of 0.45 has been taken and used with the SPT N-values to infer coefficient of compressibility (m_v).

Figure 5.4: Coefficient of Volume Compressibility (m_v) v Depth



5.5.3 The deposits of the London Clay Formation are generally of “medium compressibility”, with near surface clays shown to be of “high compressibility”. This is considered to be due to a combination of weathering and softening of the upper horizon of the London Clay Formation, and the lack of overburden pressure at shallow depth allowing the clays to relax and so compress slightly when loaded

5.6 Density

5.6.1 In the absence of geotechnical laboratory test results, the correlations and suggested values for both materials given in BS8004:2015 have been used.

5.6.2 The derived unit weights are summarised below in Table 5.1.

Table 5.1: Derived Unit Weights

Strata	Unit Weight (kN/m^3)
Made Ground	17
London Clay Formation	18.5

5.7 Effective Angle of Shearing Resistance / Angle of Friction

5.7.1 In cohesive soils, the effective angle of shearing resistance can be derived from the plasticity index of the soil, using the following equation presented in BS8004:2015.

$$\emptyset' = 42 - (12.5xLOG10(PI))$$

Where PI = plasticity index

5.7.2 Values have been calculated for all available plasticity index results and are presented in Table 5.2.

Table 5.2: Derived Angles of Shearing Resistance

Sample	Stratum	Derived Angle of Shearing Resistance (°)
WS1 – 2.2m	Made Ground	22.0
WS1 – 3.5m	London Clay Formation	22.4
WS1 – 5.5m	London Clay Formation	23.4

5.8 Stiffness Moduli

5.8.1 In cohesive soils of the London Clay Formation, the undrained stiffness modulus (Young's Modulus) can be derived using the correlation with undrained shear strength as postulated by Jardine et al. (1985):

$$\underline{Eu\ (MPa) = 0.4 * Cu(kPa)}$$

5.8.2 The drained Young's Modulus for the London Clay Formation can then be derived from Eu, as follows:

$$\underline{E' = 0.6 * Eu}$$

5.9 Summary of Derived General Properties

5.9.1 Based on the analysis of the ground investigation data and past experience with similar deposits, the following derived general parameters are given in Table 5.3.

Table 5.3: Derived General Parameters

Property	Made Ground	London Clay Formation
Unit Weight[1)]	17	18.5
Drained Friction, ϕ' (◦)[2)]	22.0	22.4 – 23.4
Drained Cohesion, c' (kPa)	-	0
SPT N-value	1 – 4	5 – 16
Undrained Young's Modulus, E_u (MPa)[3)]	-	9 – 28.8
Drained Young's Modulus E' (MPa)[4)]	-	5.4 – 17.3
Undrained Shear Strength, c_u (kPa)[5)]	-	22.5 – 72
Plasticity Index (%)	40	31 – 37
Modified Plasticity Index (%)	32	31 – 35.9
Volume Change Potential [NHBC]	Medium	Medium
Modulus of Volume Compressibility, m_v (m^2/MN)[6)]	-	0.139 – 0.444

[1)] Derived from Figures 1 and 2 of BS8004:2015
[2)] Calculated from: $\phi' = (42° - 12.5\log10 I_p)$ for $5\% \leq I_p \leq 100\%$ Where, I_p is the soil's plasticity index (BS8004:2015)
[3)] Calculated from E_u = 0.4 Cu MPa, based on the guidance given in Jardine et al 1985
[4)] Calculated from E' = 0.6 Eu MPa, based on the guidance given in Jardine et al 1985
[5)] The undrained shear strength (c_u) of the cohesive soils was correlated to the SPT N-values using Stroud (1974), where $c_u = f_1 N$ and f_1 is factor related to the Plasticity Index (PI) of the clay (a value of f_1 equal to 5.0 for PI ≤ 25% and a value of f_1 value equal to 4.5 for PI>25)
[6)] Calculated from: $m_v = 1/f_2$ N m^2/MN, f_2 is a coefficient proposed by Stroud and Butler (1975) and varies with Plasticity Index (PI) as presented in Figure 27 of CIRIA Report 27 or $10/c_u$

6 GEOTECHNICAL ENGINEERING RECOMMENDATIONS

6.1 General

6.1.1 Subsequent to intrusive investigation of the site and receipt of the laboratory test results, the following geotechnical assessments have been made.

6.2 Proposed Foundations

General

6.2.1 The Made Ground is not considered to provide suitable bearing strata due to its variability and the unacceptable risk of total and differential settlement.

6.2.2 All foundations should be deepened beneath these deposits, soft clay, root or desiccated zones, or disturbed ground, and founded within underlying competent strata.

6.2.3 As soils of medium volume change potential are present, heave precautions will be required against the side of foundations and ground beams in accordance with the requirements set out in NHBC Standards Chapter 4.2.

Conventional Foundations

6.2.4 Based on drawings provided, it is anticipated that the finished floor level of the basement would be approximately 3m below existing ground level and therefore formation level is anticipated to be ~3.5mbgl.

6.2.5 Based upon the information obtained to date, it is considered that a cast in-situ cantilever retaining wall formed at approximately 3.5m below the existing ground level could be designed with an allowable bearing capacity of 60kPa. Total and differential settlements should be contained within tolerable limits.

6.2.6 It is unlikely that the foundations would need to be deepened further due to NHBC building near trees requirements.

6.2.7 Where foundations need to change levels, the foundations should be stepped and reinforced. These steps should be no deeper than half of the width of the foundation and each step should not exceed 0.5m.

6.2.8 Foundations greater than 2.5m deep require structure-specific design by a structural engineer.

6.2.9 Where any unexpected or soft ground conditions are encountered during the groundworks, works in that area should cease and the advice of a suitably qualified geotechnical engineer sought.

6.3 Retaining Walls

6.3.1 It is anticipated that retaining structure(s) will be required.

6.3.2 Based on the analysis of the available site investigation data and past experience with similar deposits the parameters in Table 6.1 are considered appropriate for the potential retaining structure(s).

Table 6.1: Geotechnical Parameters for Retaining Wall Design

	London Clay Formation
Critical state angle of shearing resistance (ϕ')°	22
Effective Cohesion kN/m^2	0
Saturated Bulk Weight (γ_{sat}) kN/m^3	18.5

6.3.3 In addition, the specialist contractor should ensure the stability of the cut-face during the temporary works.

6.3.4 As an alternative to cantilever retaining walls, fully embedded retaining walls comprising a contiguous/secant piled basement box could be formed. The piles would need to act as retaining walls as well as carry the structural loadings. The piles should be designed to withstand the earth pressures and still meet the required structural requirements regarding issues such as deflection, deformation and bending.

6.3.5 To provide sufficient support for the excavation, it is recommended that un-propped piles are formed to at least three times the depth of excavation.

6.3.6 If these piles can be suitably propped, then this depth may be reduced. Suitable propping could be provided by the basement floor and the ground floor if they are suitably tied into the piles and suitably reinforced. This may require specialist construction techniques

6.4 Aggressive Ground Conditions

6.4.1 Sulphate attack on building foundations occurs where sulphate solutions react with the various products of hydration in Ordinary Portland Cement (OPC) or converted High-Alumina Cement (HAC). The reaction is expansive, and therefore disruptive, not only due to the formation of minute cracks, but also due to loss of cohesion in the matrix.

6.4.2 In accordance with BRE Special Digest 1, the characteristic values of sulphate used to determine the concrete classification are determined using the methodology summarised in the table below.

Table 6.2: Concrete in the Ground Characteristic Value Determination

No Samples in the dataset	Method for determining the sulphate characteristic value
1 - 4	Highest value
5 - 9	Mean of the top 2No highest results
10 or greater	Mean of the top 20% highest results

6.4.3 Table 6.3 summarises the analysis of the aggressive nature of the ground for each of the strata encountered within the ground investigation.

Table 6.3: Concrete in the Ground Classes

Stratum	No Samples	pH range	Characteristic WS Sulphate (mg/l)	Characteristic Total Potential Sulphate (%)1)	Design Sulphate Class	ACEC Class
Made Ground	1	6.3	1400	n/a	DS-2	AC-1s
London Clay Formation	2	6.8 – 7.0	260	n/a	DS-2	AC-1s

1) Applies to soils containing more than 0.3% of oxidisable sulphides, calculated in accordance with BRE SD-1

6.4.4 Analysis of the results indicates that the underlying soils do not contain appreciable concentrations of oxidisable sulphates and therefore the Design Class is dependent on the soluble sulphate content and pH only.

6.4.5 It should be noted that the BGS description of the London Clay Formation notes that it includes “disseminated pyrite”. It is therefore common practice to ensure that buried concrete formed in London Clay Formation has a Design Sulphate Class of at least DS-2.

6.4.6 The concrete structures, including foundations, will need to be designed in accordance with BS EN 1992-1-1:2004+A1:2014. It is recommended that the advice of this publication be taken for the design and specification of all sub-surface concrete.

6.5 Floor Slabs

6.5.1 It is anticipated that finished floor level of the proposed basement will be approximately 3m below the existing ground floor level.

6.5.2 If a cantilever retaining wall is utilised, then a ground bearing floor slab could be used. Any loose or soft material should be removed and replaced with well-graded, properly compacted granular fill or lean mix concrete. The formation should be blinded if left exposed for more than a few hours or if inclement weather is experienced. Formations of the structures should be inspected by a competent person.

6.5.3 If a piled option is utilised, then suspended floor slabs will be required. The loadings from the suspended floor slab will need to be carried by the foundations, which will need to be designed to not only carry the structural loadings but the additional floor loadings.

6.5.4 All floor slabs would also need to be suitably reinforced, not only to distribute the structural loading but also to ensure that the floor slab can prop the retaining walls and does not buckle from the lateral pressures imposed by the cantilever retaining walls.

6.5.5 The floor slab (and basement walls) would need to be constructed to conform to BS: 8102 (2009).

6.6 Excavations

6.6.1 Temporary excavations within the Made Ground are unlikely to remain stable and some form of temporary support or battering back to a safe angle and dewatering are likely to be required.

6.6.2 Temporary excavations within the cohesive soils are likely to remain relatively stable in the short term though some spalling may be anticipated.

6.6.3 Cantilever retaining walls should be installed in short sections to aid stability of the excavation during construction of the basement.

6.6.4 Groundworks should always be designed in such a manner to avoid entry into excavations by construction or maintenance personnel. However, in the event that such works cannot be avoided or designed out, they should only be undertaken in accordance with a safe system of work, following an appropriate risk assessment and in accordance with any legislative requirements, e.g. Confined Spaces Regulations.

6.7 Groundwater Control

6.7.1 During the intrusive investigation, groundwater was not reported within the exploratory holes.

6.7.2 During return monitoring, groundwater was not present within the well on 1No occasion and at a depth of 4.65mbgl on the other.

6.7.3 Given this variance, and that the London Clay Formation is reported as an unproductive stratum, it is unlikely that significant quantities of groundwater would be encountered during construction, though surface water/rainfall ingress into excavations is unlikely to drain away quickly. The groundwater encountered during post-investigation monitoring is considered to represent such an occurrence.

6.7.4 Subject to seasonal variations, groundwater/surface water encountered during site works could be readily dealt with by conventional pumping from a sump used to collate waters.

7 BASEMENT IMPACT ASSESSMENT

7.1 Geological Impact

7.1.1 The published geological maps indicate that the site is directly underlain by solid deposits of the London Clay Formation.

7.1.2 This was confirmed by the ground investigation which reported Made Ground to 3mbgl, overlying the London Clay Formation to a maximum proven depth of 8mbgl. The proposed basement will be founded within the London Clay Formation at a depth of circa 3.5mbgl.

7.1.3 Laboratory testing indicates that the Made Ground and London Clay Formation strata are of medium volume change potential. Heave precautions will be required in accordance with the guidance set out in NHBC Standards Chapter 4.2.

7.2 Hydrology and Hydrogeology Impact

7.2.1 The groundwater table is considered likely to be below the London Clay Formation at greater depth (in the Lambeth Group). The basement will therefore sit above the groundwater table. Additionally, as water considered to represent a natural groundwater table has not been encountered beneath the site, it is not considered that creation of the basement will have an impact on water that is in hydraulic continuity with the nearby Hampstead Ponds.

7.2.2 Based on all the information available at the time of writing, the risk of flooding from groundwater is considered to be low. The proposed basement is unlikely to have a detectable impact on the local groundwater regime.

7.2.3 Appropriate waterproofing measures should be included within the whole of the proposed basement wall/floor design as a precaution.

7.2.4 The site is located within the South End Local Flood Risk Zone. It is also within the Hampstead Chain Catchment. Therefore, a site-specific FRA and SuDS/drainage strategy report is likely to be required in order to demonstrate how the development of the basement and implementation of SuDS will not increase flood risk locally.

7.2.5 The proposed development will lie outside of EA flood risk zones and is therefore assessed as being at a low probability of fluvial flooding.

7.2.6 The proposed basement construction is considered unlikely to create a reduction of impermeable area in the post development scenario.

7.2.7 No risk of flooding to the site from artificial sources has been identified.

7.3 Other Impacts

7.3.1 Impacts such as changes to areas of external hardstanding, past flooding, and impacts to adjacent properties and pavement are addressed within the Stage 1 & 2 Basement

Impact Assessment (Screening and Scoping) for 84 South Hill Park, London, NW3 2SN (Jomas Associates Ltd, P6393J3163/JRO, 25 March 2025).

7.3.2 Full details of the suitable engineering design of the scheme in addition to an appropriate construction method statement should be submitted by the developer to the London Borough of Camden.

7.4 Cumulative Impacts

7.4.1 The above individual effects could potentially interact to form a greater issue.

7.4.2 The site has been identified as being directly underlain by very low permeability London Clay Formation.

7.4.3 Such materials would prevent the movement of groundwater and the ingress of surface water into the ground.

7.4.4 The development of the basement will therefore not significantly affect the groundwater flow on site or in the surrounding area.

7.5 Conclusion

7.5.1 The overall assessment of the site is that the extension of the existing basement will not adversely impact the site or its immediate environs, providing measures are taken to protect surrounding land and properties during construction.

7.5.2 The proposed development is not expected to cause significant problems to the subterranean drainage.

8 REFERENCES

AGS Guidelines for Good Practice in Geotechnical Ground Investigation, 2016

BRE Report BR 470: Working platforms for tracked plant, 2004. BRE: Watford

BRE Special Digest 1: Concrete in Aggressive Ground, 2005. BRE: Watford

British Standards Institution BS 10175:2011+A2:2017 Code of practice for the investigation of potentially contaminated sites. BSI: London

British Standards Institution BS 5930:2015+A1:2020 Code of practice for ground investigations. BSI:London

British Standards Institution BS 8002:2015 Code of practice for earth retaining structures. BSI: London

British Standards Institution BS 8004:2015 Code of practice for foundations. BSI: London

British Standards Institution BS EN 1997-1:2004+A1:2013 Eurocode 7. Geotechnical design. General rules. BSI: London

CIRIA Report R143 The standard penetration test (SPT): methods and use, 1995: CIRIA: London

Ministry of Housing, Communities & Local Government: National Planning Policy Framework. February 2019.

NHBC Standards 2023. NHBC, Milton Keynes

Tomlinson M.J (2001): Foundation Design and Construction 7th Edition. Pearson prentice Hall: Harlow

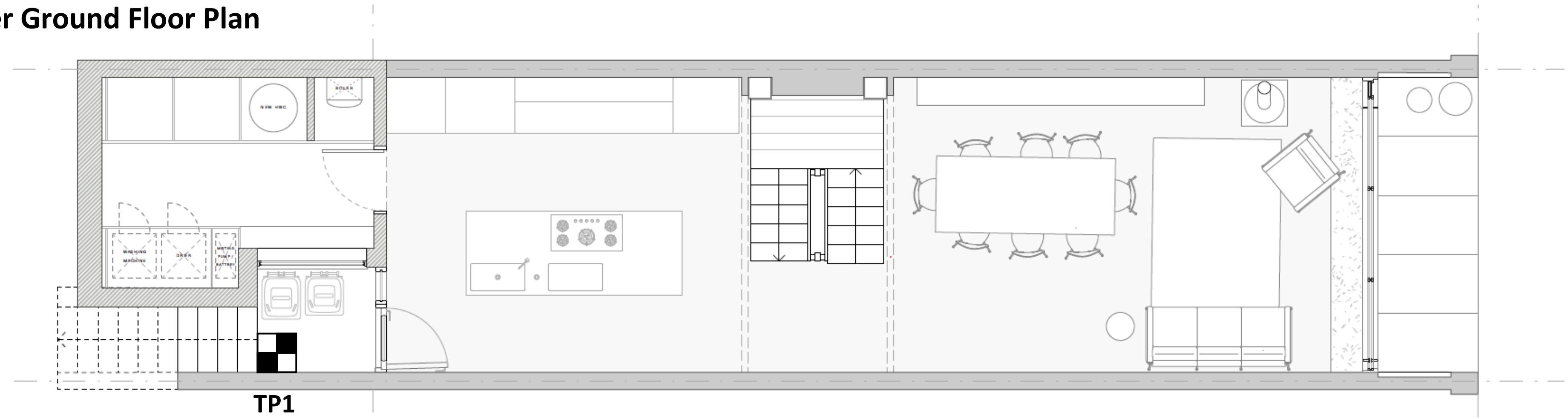
APPENDICES

APPENDIX 1 – FIGURES

PROJECT NAME	84 South Hill Park, London, NW3 2SB	CLIENT	Zoe Moore
TITLE	Site Location Plan	PROJECT NO.	P6393J3163
DATE	March 2025	FIGURE NO.	1

PROJECT NAME	84 South Hill Park, London NW3 2SN	**CLIENT**	Zoe Moore
TITLE	Completed Exploratory Hole Plan	**PROJECT NO.**	P6393J3163
DATE	April 2025	**FIGURE NO.**	2

Lower Ground Floor Plan



Ground Floor Plan

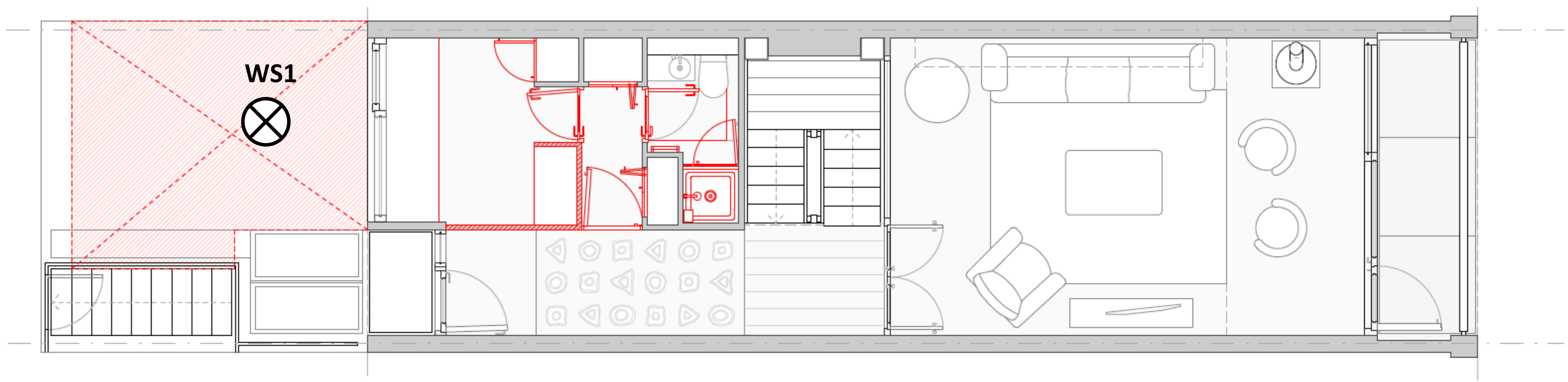


Figure 3: Proposed Development Plan (Floor Plans)

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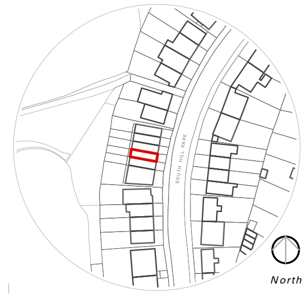
This Drawing is not for construction.
Contractor to check all dimensions on site, report any discrepancies immediately and prior to commencement of setting or any out execution of relevant works.
Do not scale from drawings.



Lower Ground Floor Plan
As Proposed 1:100

Ground Floor Plan
As Proposed 1:100

First Floor Plan
As Proposed 1:100

Second Floor Plan
As Proposed 1:100

Roof Plan
As Proposed 1:100

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Revision History
Rev Date Description

Orientation & Scale
North
0 .5m 1m 2m 3m
1:100

Project	84 South Hill Park - NW3 2SN
Drawing Title	General Arrangement Plans _ As Proposed
Drawing No.	23_SHPII_A_GA_20.01
Drawn by	RG
Date	16.06.23
Scale	1:100 @ A3

Figure 4: Proposed Development Plan (Front Elevation/Section)

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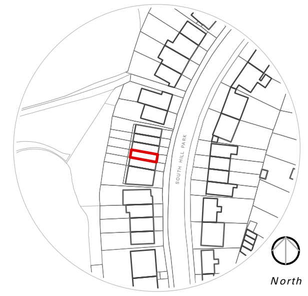
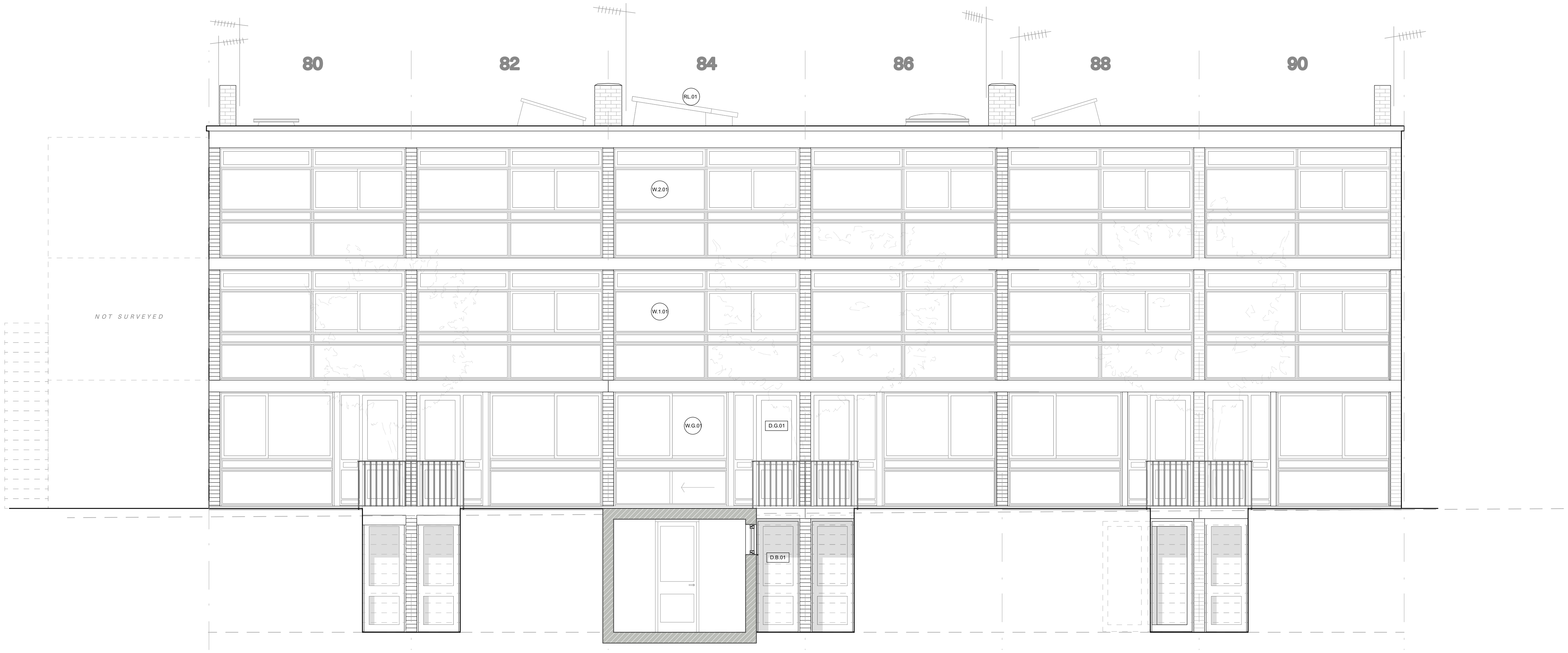
Do not scale from drawings.





Front Elevation / Section

As Proposed 1:100

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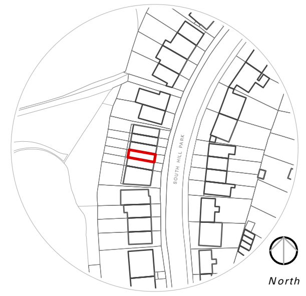
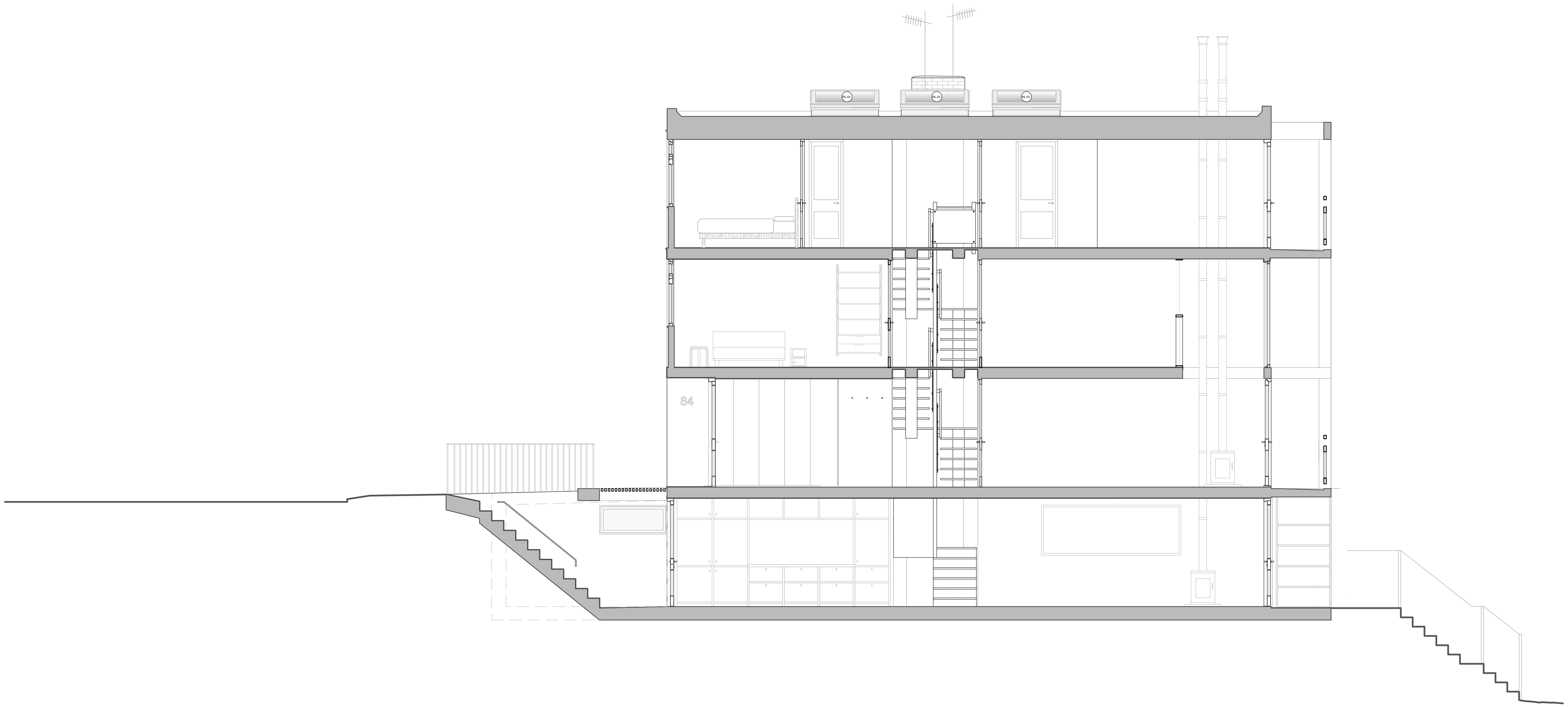
Revision History
Rev Date Description

Orientation & Scale
North
0 .5 m 1 m 2 m 3 m
1:100

Project	84 South Hill Park - NW3 2SN	Drawn by	RG
Drawing Title	Front Elevation _ As Proposed	Date	16.06.23
Drawing No.	23_SHPII_A_E_20.07	Scale	1:100 @ A3

Figure 5: Proposed Development Plan (Section)





Section

As Proposed 1:100

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Revision History

Rev	Date	Description

Orientation & Scale

North

0 .5m 1 m 2 m 3 m 1:100

Project	84 South Hill Park - NW3 2SN	Drawn by	RG
Drawing Title	Section _ As Proposed	Date	16.06.23
Drawing No.	23_SHPII_A_S_20.09	Scale	1:100 @ A3

APPENDIX 2 – EXPLORATORY HOLE RECORDS

JOMAS ENGINEERING ENVIRONMENTAL LAND REMEDIATION

WINDOWLESS SAMPLER RECORD

Borehole Number **WS1**

Project Name: 84 South Hill Park	Client: Zoe Moore	Date: 15/04/2025
Location: London, NW3 2SN	Logged by: YAB	Co-ords: E527353.62 N185980.23
Project No. : P6393J3163	Crew Name: KR	Drilling Equipment: Windowless sampler

Log Status	Hole Type	Level	Approved By	Scale	Page Number
FINAL	WLS	78.68m AoD	SC	1:30	Sheet 1 of 2

Water Strikes	Sample and In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m)	Stratum Description
						Concrete and brick. (MADE GROUND)
				0.30	78.38	Brown sandy gravelly clay. Sand is fine to coarse. Gravel consists of fine to coarse, angular to rounded flint, concrete and brick. (MADE GROUND)
	0.50	ES				
	0.90	ES				
	1.00	SPT	N=4 (1,0/0,1,1,2)			
	1.20	ES				
				1.30	77.38	Possible void, no recovery.
				1.90	76.78	Brown slightly sandy gravelly clay. Sand is fine to coarse. Gravel consists of fine to coarse, angular to sub-angular flint, with occasional brick. (MADE GROUND)
	2.00	SPT	N=1 (1,0/0,0,1,0)			
	2.20	D				
				2.40	76.28	Possible void, no recovery.
	3.00	SPT	N=5 (1,0/1,1,2,1)	3.00	75.68	Soft consistency** brown CLAY. (LONDON CLAY FORMATION)
	3.50	D				
	4.00	SPT	N=9 (2,2/2,2,2,3)	4.00	74.68	Firm consistency** grey CLAY. (LONDON CLAY FORMATION)
	4.50	D				
	5.00	SPT	N=16 (2,3/2,4,5,5)	5.00	73.68	Firm consistency** brown CLAY. (LONDON CLAY FORMATION)
	5.50	D				
	6.00	SPT	N=12 (2,3/2,3,3,4)			

Remarks:
**Consistency estimated using semi-empirical correlations with SPT N-values, plasticity indices and published literature.
No groundwater reported.
Possible voids reported due to no recovery and lack of resistance on rods.

Key:
ES - Environmental Sample
D - Small Disturbed Sample
B - Bulk Disturbed Sample
PID - Photo-ionisation Detector Reading

WINDOWLESS SAMPLER RECORD

JOMAS ENGINEERING ENVIRONMENTAL LAND REMEDIATION

Project Name: 84 South Hill Park	Client: Zoe Moore	Date: 15/04/2025
Location: London, NW3 2SN	Logged by: YAB	Co-ords: E527353.62 N185980.23
Project No. : P6393J3163	Crew Name: KR	Drilling Equipment: Windowless sampler

Borehole Number: **WS1**

Log Status	Hole Type	Level	Approved By	Scale	Page Number
FINAL	WLS	78.68m AoD	SC	1:30	Sheet 2 of 2

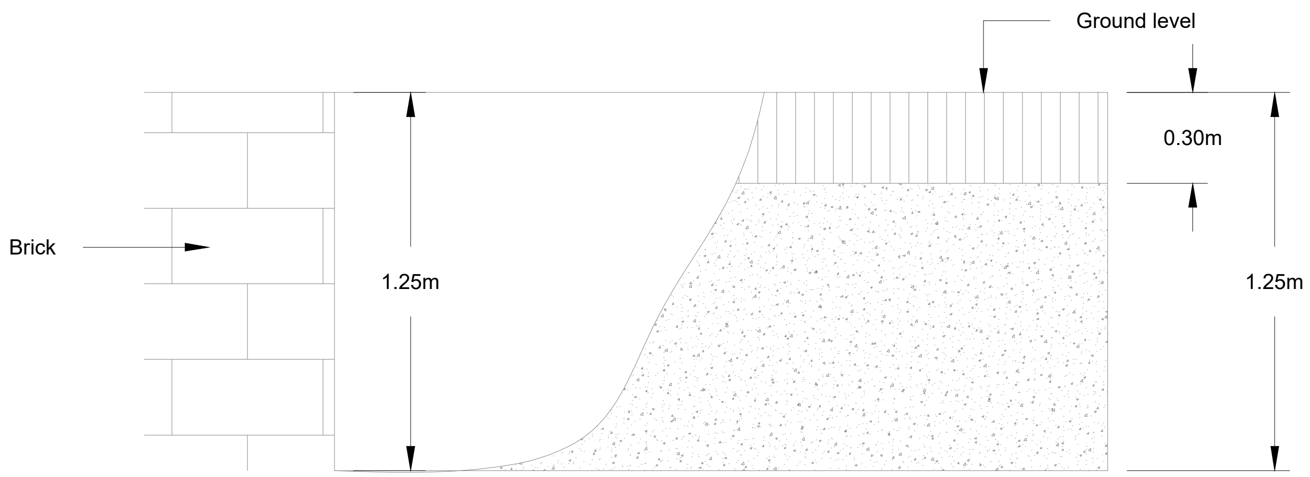
Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
								Firm consistency** brown CLAY. (LONDON CLAY FORMATION)
		6.50	D					
		7.00	SPT	N=16 (2,2/4,4,4,4)				
		7.50	D					
		8.00	SPT	N=16 (3,3/3,4,4,5)	8.00	70.68		End of Borehole at 8.00m

Depth scale: 7, 8, 9, 10, 11, 12

Remarks:
**Consistency estimated using semi-empirical correlations with SPT N-values, plasticity indices and published literature.
No groundwater reported.
Possible voids reported due to no recovery and lack of resistance on rods.

Key:
ES - Environmental Sample
D - Small Disturbed Sample
B - Bulk Disturbed Sample
PID - Photo-ionisation Detector Reading

TP1



0 - 0.3mbgl : Concrete. (MADE GROUND)

0.3 - 1.25mbgl : Brown sandy gravelly clay. Sand is fine to coarse. Gravel consists of fine to coarse, angular to rounded flint, concrete and brick. (MADE GROUND)

Job. No.	P63934J3163	Rev.

Notes.

Key dimensions to be checked by engineer before major structural works commence on site.

Amendments

Rev	Date		By	Chkd

JOMAS ENGINEERING ENVIRONMENTAL LAND REMEDIATION

Jomas Associates Ltd.
Unit 24 Sarum Complex
Salisbury Road
Uxbridge
UB8 2RZ
Tel. 0333 3059054

Client
Zoe Moore

Project
84 South Hill Park, London
NW3 2SN

Drawing

Dwg no	Checked	Surveyor
	JRO	

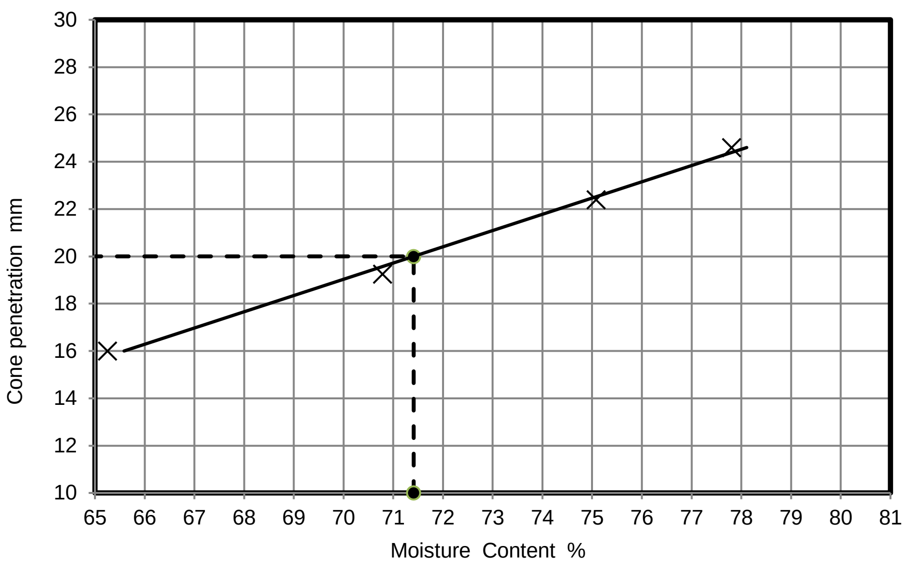
Date 23 APR 2025 | Scale

Job No. P63934J3163 | Rev.

Grid	Contours	Level Datum

APPENDIX 3 – GEOTECHNICAL LABORATORY TEST RESULTS

	LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX			Job No.	37159
				Borehole/Pit No.	WS1
Site Name	84 South Hill Park Road, London NW3 2SN			Sample No.	-
Project No.	J3163	Client	Jomas Associates	Depth Top	2.20 m
Soil Description	Brown slightly mottled grey slightly gravelly slightly sandy silty CLAY (gravel is fm and sub-angular to rounded)			Depth Base	- m
				Sample Type	D
				Samples received	22/04/2025
				Schedules received	23/04/2025
				Project Started	24/04/2025
				Date Tested	09/05/2025

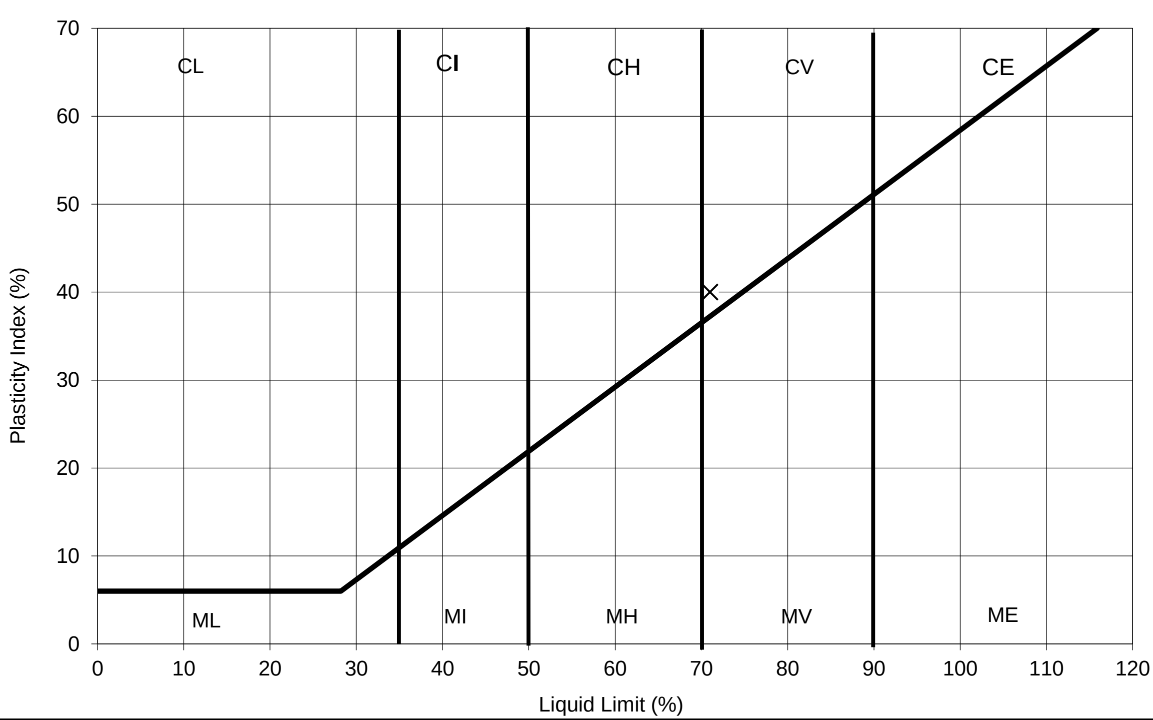


WATER CONTENT	**39.6**	**%**
% PASSING 425µm SIEVE	**80**	**%**
LIQUID LIMIT	**71**	**%**
PLASTIC LIMIT	**31**	**%**
PLASTICITY INDEX	**40**	**%**

Preparation Method	Tested after >425um removed by hand

Remarks

PLASTICITY INDEX



TEST METHODS:
BS EN ISO 17892 Part 1: 2014 + A1:2022 Water Content
BS EN ISO 17892 Part 12: 2018 +A2:2022 Liquid and plastic limit

These results only apply to the items tested. The report shall not be reproduced except in full without authority of the laboratory

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU
Tel: 01923 711 288 Email: James@k4soils.com

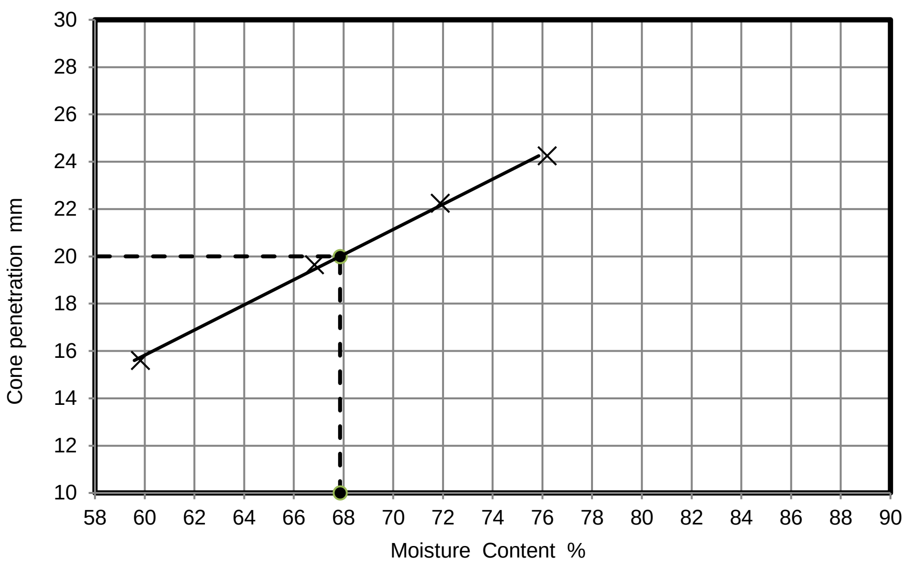
UKAS TESTING 2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

Checked and Approved
Initials: J.P
Date: 12/05/2025

MSF-5 R2

	LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX			Job No.	37159
				Borehole/Pit No.	WS1
Site Name	84 South Hill Park Road, London NW3 2SN			Sample No.	-
Project No.	J3163	Client	Jomas Associates	Depth Top	3.50 m
Soil Description	Brown and occasional grey slightly gravelly silty CLAY (gravel is fm and sub-angular to rounded)			Depth Base	- m
				Sample Type	D
				Samples received	22/04/2025
				Schedules received	23/04/2025
				Project Started	24/04/2025
				Date Tested	09/05/2025

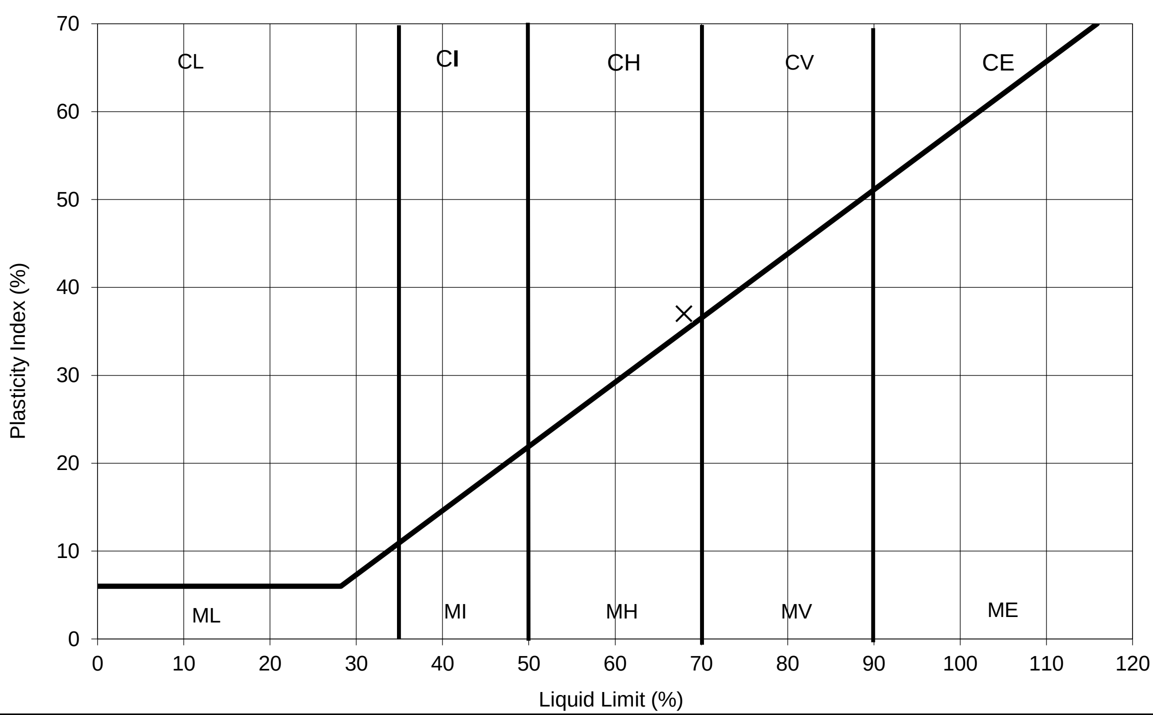


WATER CONTENT	**33.8**	**%**
% PASSING 425µm SIEVE	**97**	**%**
LIQUID LIMIT	**68**	**%**
PLASTIC LIMIT	**31**	**%**
PLASTICITY INDEX	**37**	**%**

Preparation Method	Tested after >425um removed by hand

Remarks

PLASTICITY INDEX



UKAS TESTING

2519

TEST METHODS:

BS EN ISO 17892 Part 1: 2014 + A1:2022 Water Content

BS EN ISO 17892 Part 12: 2018 +A2:2022 Liquid and plastic limit

These results only apply to the items tested. The report shall not be reproduced except in full without authority of the laboratory

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU
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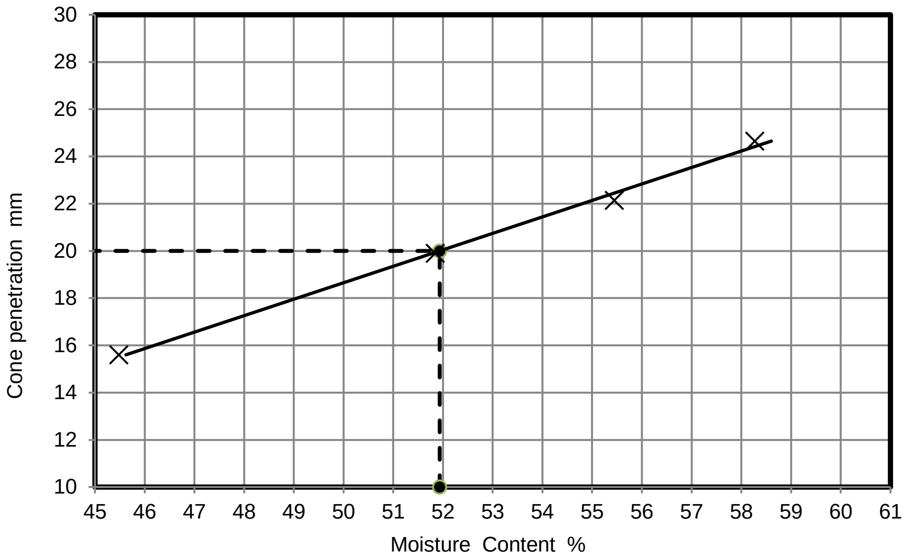
Checked and Approved

Initials: J.P

Date: 12/05/2025

MSF-5 R2

K4 SOILS	**LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX**			Job No.	37159
				Borehole/Pit No.	WS1
Site Name	84 South Hill Park Road, London NW3 2SN			Sample No.	-
Project No.	J3163	Client	Jomas Associates	Depth Top	5.50 m
Soil Description	Brown slightly sandy silty CLAY			Depth Base	- m
				Sample Type	D
				Samples received	22/04/2025
				Schedules received	23/04/2025
				Project Started	24/04/2025
				Date Tested	09/05/2025

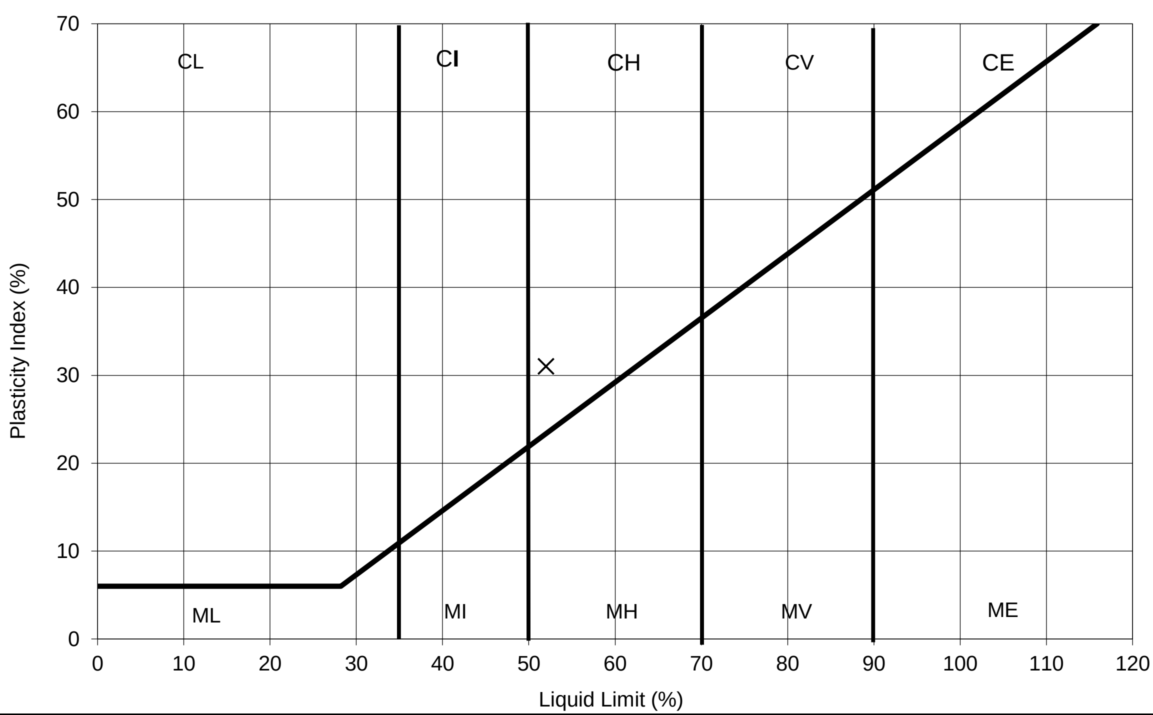


WATER CONTENT	**20.6**	**%**
% PASSING 425µm SIEVE	**100**	**%**
LIQUID LIMIT	**52**	**%**
PLASTIC LIMIT	**21**	**%**
PLASTICITY INDEX	**31**	**%**

Preparation Method	Tested in natural condition

Remarks

PLASTICITY INDEX



UKAS TESTING 2519

TEST METHODS:
BS EN ISO 17892 Part 1: 2014 + A1:2022 Water Content
BS EN ISO 17892 Part 12: 2018 +A2:2022 Liquid and plastic limit

These results only apply to the items tested. The report shall not be reproduced except in full without authority of the laboratory

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU
Tel: 01923 711 288 Email: James@k4soils.com

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

Checked and Approved
Initials: J.P
Date: 12/05/2025

MSF-5 R2

Summary of Water Content, Liquid Limit (4 point) and Plastic Limit Results

Job No.	Project Name	Programme	
37159	84 South Hill Park Road, London NW3 2SN	Samples received	22/04/2025
		Schedule received	23/04/2025
Project No.	Client	Project started	24/04/2025
J3163	Jomas Associates	Testing Started	09/05/2025

Hole No.	Sample				Soil Description	Water Content	Passing 425µm	Preparation	LL	PL	PI	Remarks
	Ref	Top m	Base m	Type		%	%		%	%	%	
WS1	-	2.20	-	D	Brown slightly mottled grey slightly gravelly slightly sandy silty CLAY (gravel is fm and sub-angular to rounded)	39.6	80	Tested after >425um removed by hand	71	31	40	
WS1	-	3.50	-	D	Brown and occasional grey slightly gravelly silty CLAY (gravel is fm and sub-angular to rounded)	33.8	97	Tested after >425um removed by hand	68	31	37	
WS1	-	5.50	-	D	Brown slightly sandy silty CLAY	20.6	100	Tested in natural condition	52	21	31	

80g/300 cone used unless stated otherwise stated.

UKAS TESTING 2519

Test Methods: BS EN ISO 17892
Part 1: 2014+A1:2022 Water content
Part 12: 2018+A2:2022 Liquid & plastic limit

These results only apply to the items tested
NOTE: The report shall not be reproduced except in full without authority of the laboratory

Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU

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Checked and Approved
Initials **J.P**
Date: 12/05/2025

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

APPENDIX 4 – CHEMICAL LABORATORY TEST RESULTS

Jomas Associates
Unit 24 Sarum Complex,
Salisbury Road,
UB8 2RZ

CONSTRUCTION TESTING SOLUTIONS
A PHENNA GROUP COMPANY
7 - 11 Harding Street
Leicester
LE1 4DH

Analytical Test Report: P25/00402/JOM - 25-63485

Your Project Reference:	**84 South Hill Park, London NW3 2SN J3163**		
Your Order Number:	P6393J3163.8	Samples Received / Instructed:	23/04/2025 / 23/04/2025
Report Issue Number:	1	Sample Tested:	23/04 to 29/04/2025
Samples Analysed:	9 sample(s)	Report issued:	29/04/2025

Signed

James Gane
Analytical Services Manager
CTS

Notes:

General

Please refer to Methodologies page for details pertaining to the analytical methods undertaken.

Samples will be retained for 14 days after issue of this report unless otherwise requested.

Moisture Content was determined in accordance with CTS method statement MS - CL - Sample Prep, oven dried at <30˚C.

Moisture Content is reported as a percentage of the dry mass of soil, this calculation is in accordance with BS1377, Part 2, 1990, Clause 3.2

Where specification limits are included these are for guidance only. Where a measured value has been highlighted this is not implying acceptance or failure and certainty of measurement values have not been taken into account.

Uncertainty of measurement values are available on request.

Samples were supplied by customer, results apply to the samples as received.

Deviating Samples

On receipt samples are compared against our sample holding and handling protocols, where any deviations have been noted these are reported on our deviating sample page (if present)

Accreditation Key

This report shall not be reproduce except in full

UKAS = UKAS Accreditation, MCERTS = MCERTS Accreditation, u = Unaccredited, subUKAS - Subcontracted to a laboratory UKAS accredited for this test, subMCERTS - Subcontracted to a laboratory MCERTS accredited for this test

MCERTS Accreditation only covers the SAND, CLAY and LOAM matrices

UKAS accreditation on waters only covers the Ground water and Surface water matrices

Date of Issue: 12.03.25
Issued by: J. Gane
Issue No: 4
Rev No: 26

UKAS TESTING 4161

CONSTRUCTION TESTING SOLUTIONS
A PHENNA GROUP COMPANY

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P25/00402/JOM - 25-63485

Project Reference - 84 South Hill Park, London
NW3 2SN J3163

Analytical Test Results - Chemical Analysis

Lab Reference			**493480**	**493481**	**493482**
Client Sample ID			ES	D	ES
Client Sample Location			WS1	WS1	WS1
Client Sample Type			-	-	-
Client Sample Number			-	-	-
Depth - Top (m)			0.90	3.50	4.50
Depth - Bottom (m)			0.90	3.50	4.50
Date of Sampling			15/04/2025	15/04/2025	15/04/2025
Time of Sampling			-	-	-
Sample Matrix			Clay	Clay	Clay
Determinant	**Units**	**Accreditation**			
Water soluble sulphate (as SO_4)	(mg/l)	u	1400	260	190
Acid Soluble Sulphate	(%)	u	0.53	0.08	0.05
Total Sulphur	(%)	UKAS	0.23	0.03	0.03
pH Value	pH Units	MCERTS	6.3	6.8	7.0

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P25/00402/JOM - 25-63485

Project Reference - 84 South Hill Park, London NW3 2SN J3163

Soils - No Testing Scheduled

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Status
493483	-	WS1	-	-	No Testing Scheduled
493484	-	WS1	-	-	No Testing Scheduled
493485	-	WS1	-	-	No Testing Scheduled
493486	-	WS1	-	-	No Testing Scheduled
493487	-	WS1	-	-	No Testing Scheduled
493488	-	WS1	-	-	No Testing Scheduled

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P25/00402/JOM - 25-63485

Project Reference - 84 South Hill Park, London NW3 2SN J3163

Sample Descriptions

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Description	Moisture Content (%)	Stone Content (%)	Passing 2mm test sieve (%)
493480	ES	WS1	-	-	Made Ground- brown gravelly slightly sandy silty clay with occasional brick fragments	-	-	97
493481	D	WS1	-	-	Brown slightly gravelly silty clay	-	-	100
493482	ES	WS1	-	-	Brown slightly gravelly silty clay	-	-	100

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P25/00402/JOM - 25-63485

Project Reference - 84 South Hill Park, London NW3 2SN J3163

Sample Comments

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Comments
493480	ES	WS1	-	-	
493481	D	WS1	-	-	
493482	ES	WS1	-	-	

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Project Reference - 84 South Hill Park, London NW3 2SN J3163

Analysis Methodologies

Test Code	Test Name / Reference	Sample condition for analysis	Sample Preperation	Test Details
ANIONSS	MS - CL - Anions by Aquakem (2:1Extract)	Oven dried	Passing 2mm test sieve	Determination of Anions (inc Sulphate, chloride etc.) in soils by Aquakem. Analysis is based on a 2:1 water to soil extraction ratio
PHS	MS - CL - pH in Soils	As received	Passing 10mm test sieve	Determination of pH in soils using a pH probe (using a 1:3 soil to water extraction)
ASSO4S	MS - CL - Acid Soluble Sulphate	Oven Dried	Passing 2mm test sieve	Determination of total sulphate in soils by acid extraction followed by ICP analysis
HOLD	No Testing Scheduled	-	-	No Testing Scheduled
SAMPLEPREP	MS - CL - Sample Preparation	-	-	Preparation of samples (including determination of moisture content) to allow for subsequent analysis
1377TS-ELT	BS1377 Total Sulphur Content by HTC	Oven dried	BS1377 : Part 1 : 2016	Total Sulphur Content testing of Soil in accordance with BS 1377 : Part 3 : 2018 + A1 : 2021 Clause 7.10 (using Eltra CS-800 Analyser)

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P25/00402/JOM - 25-63485

Project Reference - 84 South Hill Park, London NW3 2SN J3163

Sample Deviations

Deviations are listed below against each sample and associated test method, where deviation(s) are noted it means data may not be representative of the sample at the time of sampling and it is possible that results provided may be compromised.

Observations on receipt

A - No date of sampling provided

W - No time of sampling provided for water sample

C - Received in inappropriate container

H - Contains headspace

T - Temperature on receipt exceeds storage temperature

R - Sample(s) received with less than 96 hours for testing to commence/complete, any result formally classed as deviating will be marked with an X against the applicable test (i.e. RX)

Observations whilst in laboratory

X - Exceeds sampling to extraction or analysis timescales

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Test	Deviations
493480	ES	WS1	-	-	MS - CL - pH in Soils	RX
493481	D	WS1	-	-	MS - CL - pH in Soils	RX
493482	ES	WS1	-	-	MS - CL - pH in Soils	RX

APPENDIX 5 – GROUNDWATER MONITORING RESULTS

GROUNDWATER MONITORING BOREHOLE RECORD SHEET

Site: 84 South Hill Park	**Operative(s):** YAB	**Date:** 14/05/2025	**Time:** 09:30	**Round:** 1	**Page:** 1

MONITORING EQUIPMENT

Instrument Type	Instrument Make	Serial No.	Date Last Calibrated
Dip Meter – Interface Probe	In-Situ	-	-

MONITORING CONDITIONS

Weather Conditions: Sunny	**Ground Conditions:** Dry	**Temperature:** 15°C
Barometric Pressure (mbar): N/A	**Barometric Pressure Trend (24hr):** Falling	**Ambient Concentration:** N/A

MONITORING RESULTS

Monitoring Point Location	VOC (ppm)		Depth to product (mbgl)	Depth to water (mbgl)	Depth to base of well (mbgl)	Comments
	Peak	Steady				
WS1	0.1	0.0	-	Dry	4.85	-

GROUNDWATER MONITORING BOREHOLE RECORD SHEET					
Site: 84 South Hill Park	**Operative(s):** DJH	**Date:** 20/05/2025	**Time:** 10:30	**Round:** 2	**Page:** 1

MONITORING EQUIPMENT			
Instrument Type	**Instrument Make**	**Serial No.**	**Date Last Calibrated**
Dip Meter – Interface Probe	In-Situ	-	-

MONITORING CONDITIONS		
Weather Conditions: Sunny	**Ground Conditions:** Dry	**Temperature:** 21°C
Barometric Pressure (mbar): N/A	**Barometric Pressure Trend (24hr):** Rising	**Ambient Concentration:** N/A

MONITORING RESULTS						
Monitoring Point Location	**VOC (ppm)**		**Depth to product (mbgl)**	**Depth to water (mbgl)**	**Depth to base of well (mbgl)**	**Comments**
	Peak	**Steady**				
WS1	-	-	-	4.65	4.88	-

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