

WE LISTEN, WE PLAN, WE DELIVER

Geotechnical Engineering and Environmental Services across the UK.

GEOTECHNICAL GROUND INVESTIGATION & BASEMENT IMPACT ASSESSMENT REPORT

36 METHUEN PARK,
LONDON,
N10 2JS



JOMAS ASSOCIATES LTD

Unit 24 Sarum Complex, Salisbury Road, Uxbridge, UB8 2RZ

www.jomasassociates.com 0843-289-2187 info@jomasassociates.com

Report Title: Ground Investigation & Basement Impact Assessment for 36 Methuen Park, London, N10 2JS

Report Status: Final

Job No: P3859J2374/CLP

Date: 18/07/2022

QUALITY CONTROL – REVISIONS

Version	Date	Issued By

Prepared by: JOMAS ASSOCIATES LTD **For:** ALLY AND MATT TANSLEY

Prepared by
Clare Prosser BSc (Hons), MSc,
FGS
Geo-environmental Engineer



Reviewed by
Derek Grange BSc (Hons) MSc
CGeol, FGS, RoGEP - Specialist
Principal Geotechnical Engineer



Approved by
James Field BSc (Hons), CGeol,
FGS, RoGEP - Professional
Associate Director



Should you have any queries relating to this report, please contact

JOMAS ASSOCIATES LTD
www.jomasassociates.com
0843 289 2187
info@jomasassociates.com

CONTENTS

	Page
EXECUTIVE SUMMARY	III
1 INTRODUCTION	1
1.1 Terms of Reference	1
1.2 Proposed Development	1
1.3 Objectives	1
1.4 Scope of Works	1
1.5 Scope of Basement Impact Assessment	2
1.6 Supplied Documentation	2
1.7 Limitations	2
2 SITE SETTING	4
2.1 Site Information	4
2.2 Summary of Phase 1 Desk Study and Stage 1 & 2 BIA (Screening & Scoping) Report	4
3 GROUND INVESTIGATION	6
3.1 Scope of Ground Investigation	6
3.2 In-situ Geotechnical Testing	7
3.3 Sampling Limitations	7
3.4 Laboratory Analysis	7
4 GROUND CONDITIONS	8
4.1 General	8
4.2 Ground Conditions	8
4.3 Hydrogeology	8
4.4 Physical and Olfactory Evidence of Contamination	8
5 GEOTECHNICAL TESTING RESULTS	9

5.2	Summary of Derived General Properties	9
6	GEOTECHNICAL ENGINEERING RECOMMENDATIONS.....	11
6.1	General	11
6.2	Proposed Foundations.....	11
6.3	Retaining Walls	12
6.4	Sulphates	12
6.5	Ground Floor Slabs	13
6.6	Excavations	13
7	BASEMENT IMPACT ASSESSMENT	14
7.1	Proposed Changes to Areas of External Hardstanding	14
7.2	Past Flooding.....	14
7.3	Geological Impact.....	14
7.4	Hydrology and Hydrogeology Impact	14
7.5	Impacts of Basement on Adjacent Properties and Pavement	15
8	REFERENCES	17

APPENDICES

APPENDIX 1 – FIGURES

APPENDIX 2 – EXPLORATORY HOLE RECORDS

APPENDIX 3 – CHEMICAL LABORATORY TEST RESULTS

APPENDIX 4 – GEOTECHNICAL LABORATORY TEST RESULTS

APPENDIX 5 – GROUNDWATER MONITORING TEST RESULT

EXECUTIVE SUMMARY

Ally and Matt Tansley commissioned Jomas Associates Ltd to prepare a Basement Impact Assessment at the site located at 36 Methuen Park, London, N10 2JS.

The principal objectives of the study were as follows:

- To obtain geotechnical parameters to inform preliminary foundation design; and,
- 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) (March 2018).

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 History and Ground Investigation	
Current Site Use	The site currently comprises of a 4-storey residential building with a rear garden. A garage is positioned on the lower ground floor and can be accessed from Methuen Park Road.
Proposed Site Use	The proposed development is to comprise the lateral extension of the existing lower ground level within the existing building footprint.
Desk Study and Stage 1 & 2 BIA Overview	A Desk Study report has been produced for the site and issued separately (Jomas Associated Ltd – August 2021). A brief overview of the desk study findings is presented below. <u>Site Setting</u> On the earliest available map (1865), it can be seen that the site lies within a larger field, by 1913 the site is occupied by a single building in the north east and lies within a row of terraced, residential style buildings on Methuen Park Road. No significant changes occur to the present day as the site is in its current configuration. Ponds were identified from 1865 within 150m of the site, with the closest located 50m to the east. By 1913, the ponds were no longer present and possibly infilled. A railway line located approximately 80m south east of the site was identified from 1894 but by 1967 was identified as a dismantled railway and the train station had been redeveloped into a school. The British Geological Survey indicates that the site is directly underlain by solid deposits of the London Clay Formation. Superficial deposits of the Lowestoft Formation are reported 55m west of the site and underlying superficial deposits of the Dollis Hill Gravel Member are reported 1m west and may encroach onto the site. The Dollis Hill Gravel Member is identified as a Secondary (A) aquifer with the London Clay Formation identified as Unproductive. A review of the EnviroInsight Report indicates that there are no Environment Agency Zone 2 or Zone 3 flood zones within 250m of the site. The site is not located within 500m of a source protection zone. There are no groundwater, potable or surface water abstractions within 1km of the site. There are no detailed river entries or surface water features reported within 250m of the site. Groundsure data identifies a moderate risk for the potential of shrink swell clays beneath the site. The remaining are reported as negligible to very low risks for the potential hazards assessed.

Site History and Ground Investigation	
	Screening and Scoping Screening identifies the areas 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. These issues are summarised below: - The overall assessment of the site is that the creation of a basement for the existing development will not adversely impact the site or its immediate environs, providing measures are taken to protect surrounding land and properties during construction. - An intrusive 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 proposed lower ground floor will underlie the existing footprint of the building presently on site, there will be no significant change in surface water run-off. - It was also recommended that the possible proximity of the culverted Muswell Stream be investigated further ahead of design. Whilst this is not anticipated to cause a significant risk of flooding, it may require diversion or other consideration.
Intrusive Investigation	The ground investigation was undertaken on 16th June 2022, and consisted of the following: • 1 restricted access windowless sampling borehole, drilled up to 4.60m below the base of the existing lower ground level excavation, with associated in situ testing and sampling; • 1No groundwater monitoring well installed to a depth of 4.60m below the base of the existing lower ground level excavation; • Laboratory analysis for chemical and geotechnical purposes; • 1No. return visit to monitor groundwater levels has been completed.
Ground Conditions	The results of the ground investigation revealed a ground profile comprising the London Clay Formation. No groundwater was encountered during the investigation.
Geotechnical Considerations	It is considered that conventional cantilever retaining walls may be formed within the underlying London Clay Formation for an allowable bearing capacity of 55kPa. Total and differential settlements should be contained within tolerable limits. If a greater allowable bearing capacity is required, it may be possible to underpin the cantilever retaining walls with mini piles during construction. The applicability and load carrying capacity of mini piles should be confirmed by a specialist contractor. Alternatively, an embedded retaining wall may present a more suitable option for temporary and permanent retaining, and sufficient load carrying capacity. As soils of high 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. Suspended floor slabs are recommended due to the presence of shrinkable soils. Temporary excavations within the cohesive soils are likely to remain relatively stable in the short term though some spalling may be anticipated.

Site History and Ground Investigation	
	However, it is recommended that the stability of all excavations should be assessed during construction. The sides of any excavations into which personnel are required to enter should be assessed and battered back to a safe angle. Based on the results of chemical testing, the required concrete class for the site is DS-4 assuming an Aggressive Chemical Environment for Concrete classification of AC-3s in accordance with the procedures outlined in BRE Special Digest 1.
Basement Impact Assessment	The overall assessment of the site is that the creation of a lower ground floor for the proposed development should not adversely impact the site or its immediate environs, providing measures are taken to protect surrounding land and properties during construction. The proposed lower ground floor excavation will be within 5m of a public pavement. It is also laterally within 5m of neighbouring properties. Unavoidable lateral ground movements associated with the lower ground floor excavations must be controlled during temporary and permanent works so as not to impact adversely on the stability of the surrounding ground and any associated services. During the construction phase careful and regular monitoring will need to be undertaken to ensure that the neighbouring properties are not adversely affected. This may mean that structures will need to be suitably propped and supported.
Recommended Further Work	The following works are recommended: • Production of a Materials Management Plan (MMP) prior to re-commencement of works to ensure legal compliance of on-site soil movement;

1 INTRODUCTION

1.1 Terms of Reference

1.1.1 Ally and Matt Tansley ("The Client") has commissioned Jomas Associates Ltd, to carry out a ground investigation at a site referred to as 36 Methuen Park, London, N10 2JS, and to prepare a Basement Impact Assessment and provide indicative recommendations for foundation design prior to the redevelopment of the site.

1.1.2 To this end a Desk Study and basement impact assessment has been produced for the site and issued separately (Jomas, August 2021), followed by an intrusive investigation (detailed in this report).

1.1.3 The intrusive investigation was undertaken in accordance with Jomas proposal dated 15th June 2022.

1.2 Proposed Development

1.2.1 The proposed development is to comprise the lateral extension of the existing lower ground floor within the footprint of the existing building on site.

1.2.2 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. GC 2 projects are defined as involving:

1.3 Objectives

1.3.1 The objectives of Jomas' investigation were as follows:

- To conduct an intrusive investigation, to determine the ground conditions present beneath the site;
- To obtain geotechnical parameters to inform preliminary foundation design; and,
- To undertake a Basement Impact Assessment to 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:

- Intrusive ground investigation to determine shallow ground conditions;
- Undertaking of laboratory chemical and geotechnical testing upon samples obtained;
- Carrying out a Basement Impact Assessment;
- 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 Haringey. The council has published a document "Draft basement development guidance note" (June 2012). This gives some guidance relevant to basements within the London Borough of Haringey but does not go into detail as to how these issues should be assessed.
- 1.5.2 Consequently, Jomas has based the methodology of the BIA on the guidance given in the London Borough of Camden document "Camden Planning Guidance Basements" (CPGB) (January 2021). This document has been used as it is generally accepted that this gives the best available guidance on the practicalities regarding how to undertake a BIA.
- 1.5.3 Jomas' BIA covers most items required under CPGB, with the exception of;
- Plans and sections to show foundation details of adjacent structures – no access to adjacent properties was possible.
 - 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
- 1.5.4 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
- 1.5.5 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 Supplied Documentation

- 1.6.1 Jomas Associates have not been supplied with any previously produced reports at the time of writing this report.

1.7 Limitations

- 1.7.1 Jomas Associates Ltd has prepared this report for the sole use of Ally and Matt Tansley, 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 Associates Limited. 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.
- 1.7.2 The records search was limited to information available from public sources; this information is changing continually and frequently incomplete. Unless Jomas Associates Limited has actual knowledge to the contrary, information obtained from public sources or provided to Jomas Associates Limited by site personnel and other information sources, have been assumed to be

correct. Jomas Associates Limited 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.

- 1.7.3 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.
- 1.7.4 Any reports provided to Jomas Associates Limited have been reviewed in good faith. Jomas Associates Limited cannot be held liable for any errors or omissions in these reports, or for any incorrect interpretation contained within them.
- 1.7.5 This investigation and report has been carried out in accordance with the relevant standards and guidance in place at the time of the works. Future changes to these may require a re-assessment of the recommendations made within this report.
- 1.7.6 *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 SITE SETTING

2.1 Site Information

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

Table 2.1: Site Information

Name of Site	-
Address of Site	36 Methuen Park London, N10 2JS
Approx. National Grid Ref.	528986, 189868
Site Area (Approx)	0.03 hectares
Site Occupation	Residential
Local Authority	London Borough of Haringey
Proposed Site Use	Residential with lateral extension of existing lower ground floor located within the footprint of the building

2.2 Summary of Phase 1 Desk Study and Stage 1 & 2 BIA (Screening & Scoping) Report

2.2.1 A Desk Study report has been produced for the site and issued separately (Jomas Associated Ltd – August 2021). A brief overview of the desk study findings is presented below. Reference should be made to the full report for detailed information.

Site Setting

2.2.2 On the earliest available map (1865), it can be seen that the site lies within a larger field, by 1913 the site is occupied by a single building in the north east and lies within a row of terraced, residential style buildings on Methuen Park Road. No significant changes occur to the present day as the site is in its current configuration.

2.2.3 Ponds were identified from 1865 within 150m of the site, with the closest located 50m to the east. By 1913, the ponds were no longer present and possibly infilled. A railway line located approximately 80m south east of the site was identified from 1894 but by 1967 was identified as a dismantled railway and the train station had been redeveloped into a school.

2.2.4 The British Geological Survey indicates that the site is directly underlain by solid deposits of the London Clay Formation. Superficial deposits of the Lowestoft Formation are reported 55m west of the site and superficial deposits of the Dollis Hill Gravel Member are reported 1m west and may encroach onto the site.

2.2.5 The Dollis Hill Gravel Member is identified as a Secondary (A) aquifer with the London Clay Formation identified as Unproductive.

2.2.6 A review of the EnviroInsight Report indicates that there are no Environment Agency Zone 2 or Zone 3 flood zones within 250m of the site.

2.2.7 There are no detailed river entries or surface water features reported within 250m of the site.

2.2.8 The site is not located within 500m of a source protection zone.

2.2.9 There are no groundwater, potable or surface water abstractions within 1km of the site.

- 2.2.10 The site is not within an area benefiting from Flood Defences.
- 2.2.11 Groundsure states that the risk of surface water flooding on site is negligible.
- 2.2.12 Groundsure states that the risk of Groundwater flooding on site is negligible.
- 2.2.13 Groundsure data identifies a moderate risk for the potential of shrink swell clays beneath the site. The remaining are reported as negligible to very low risks for the potential hazards assessed.

Screening and Scoping

- 2.2.14 Screening identifies the areas 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.
- 2.2.15 These issues are summarised below:
- The overall assessment of the site is that the creation of a lower ground floor for the existing development will not adversely impact the site or its immediate environs, providing measures are taken to protect surrounding land and properties during construction.
 - An intrusive 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 proposed lower ground floor will underlie the existing footprint of the building presently on site, there will be no significant change in surface water run-off.
 - It was also recommended that the possible proximity of the culverted Muswell Stream be investigated further ahead of design. Whilst this is not anticipated to cause a significant risk of flooding, it may require diversion or other consideration.
- 2.2.16 In addition, it was noted that the London Borough of Camden's guidance documents requires a Ground Movement Assessment to be undertaken as part of the Basement Impact Assessment. Such an assessment uses a ground model based on a zone of influence equivalent of four times the proposed depth of excavation. Consequently, such a study is recommended, though may not be a requirement of the London Borough of Haringey.

3 GROUND INVESTIGATION

3.1 Scope of Ground Investigation

3.1.1 The ground investigation was undertaken on 16th June 2022.

3.1.2 The work 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.

3.1.3 The investigation focused on collecting data on the following:

- Quality of Made Ground/natural ground within the site boundaries;
- Presence of groundwater beneath the site (if any), perched or otherwise;
- Obtaining geotechnical parameters to allow initial design to take place.
- Obtaining information relevant to the assessment of risk posed to the proposed basement identified during the Screening and Scoping stage of the BIA.

3.1.4 A summary of the fieldwork carried out at the site, with justifications for exploratory hole positions, are offered in Table 3.1 below.

Table 3.1: Scope of Intrusive Investigation

Investigation Type	Number of Exploratory Holes Achieved	Exploratory Hole Designation	Depth Achieved (m BGL)	Justification
Restricted access windowless sampling borehole	1	WS1	4.60m bgl	Obtain shallow samples for laboratory contamination and geotechnical testing. To allow in-situ geotechnical testing. Location of ‘proposed’ lower ground floor.
Monitoring Wells	1	WS1	4.60mbgl	Groundwater monitoring wells. WS1 - response zone in the London Clay Formation

3.1.5 The exploratory hole was completed to allow soil samples to be taken in the areas of interest identified in Table 3.1 above. The borehole was logged in accordance with BS5930.

3.1.6 Jomas were informed that the excavation of the proposed lower ground floor had commenced.

3.1.7 The proposed development comprises the lateral extension of the existing lower ground floor within the footprint of the existing building on site.

3.1.8 Drawing 0201 provided to Jomas shows the proposed finished floor level of the lower ground floor at 3.750m below the raised pre-existing ground level at the site. The street level lies slightly above the finished floor level.

3.1.9 Due to access restrictions at the site, the borehole was drilled within the existing lower ground floor excavation as shown in the exploratory hole location plan presented in Appendix 1. The exploratory hole records are included in Appendix 2.

3.2 In-situ Geotechnical Testing

3.2.1 In-situ geotechnical testing included Standard Penetration Tests. The determined 'N' values 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.

3.3 Sampling Limitations

3.3.1 The borehole was drilled to its proposed depth.

3.4 Laboratory Analysis

3.4.1 A programme of laboratory testing, scheduled by Jomas Associates Limited, was carried out on selected samples of Made Ground and natural strata.

Geotechnical Laboratory Testing

3.4.2 Soil samples were submitted to the UKAS Accredited laboratory of i2 Analytical Ltd. for a series of analyses.

3.4.3 This testing was specifically designed to:

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

3.4.4 The following laboratory geotechnical testing (as summarised in Table 3.2) was carried out:

Table 3.2 Laboratory Geotechnical Analysis

Methodology	Test Description	Number of tests
BS EN 17892	Moisture Content Determination	6
BS1377:1990	Liquid and Plastic Limit Determination (Atterberg Limits)	6

3.4.5 In addition, 4No 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. The results of this testing are presented in Appendix 4.

3.4.6 The results of the geotechnical laboratory testing are presented as Appendix 3 and discussed in Section 5 of this report.

4 GROUND CONDITIONS

4.1 General

4.1.1 Ground conditions were logged in accordance with the requirements of BS5930:2015. Detailed exploratory hole logs are provided in Appendix 2. The ground conditions encountered are summarised in Table 4.1 below, based on the strata observed during the investigation.

4.1.2 'mbgl' in the table below refers to metres below the base of the existing lower ground floor excavation, which is approximately 3.0m below the pre-existing ground level. A drawing of the proposed development is shown in Appendix 1, which shows the pre-existing ground level, finished floor levels of the lower ground level in addition to the street level, which is similar to the existing lower ground level.

4.2 Ground Conditions

4.2.1 The ground conditions were consistent with those anticipated of the London Clay Formation.

Table 4.1: Ground Conditions Encountered

Stratum and Description	Encountered from (mbgl)	Base of strata (mbgl)	Thickness range (m)
Soft becoming firm consistency* brown mottled grey becoming dark brown CLAY. Selenite crystals present.	0.0	>4.60 (encountered to terminal depth)	>4.60
(LONDON CLAY FORMATION)			

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

4.3 Hydrogeology

4.3.1 Groundwater was not encountered during drilling of the borehole.

4.3.2 1No return monitoring visit was undertaken on 22nd June 2022, no groundwater was reported during the visit.

4.4 Physical and Olfactory Evidence of Contamination

4.4.1 Visual or olfactory evidence of contamination was not observed during the course of the investigation.

5 GEOTECHNICAL TESTING RESULTS

5.1.1 Standard Penetration Tests (SPT) were undertaken in the borehole locations to a maximum depth of 4.60m bgl. SPT 'N' values ranged between N=6 and N=14 within the cohesive soils of the London Clay Formation. The blow counts showed a general trend of increasing with depth.

5.1.2 The results of the geotechnical laboratory testing are summarised in Table 5.1.

Table 5.1: Summary of Geotechnical Test Results

Parameter	London Clay Formation
Moisture Content (%)	31 - 35
Liquid Limit (%)	77 - 86
Plastic Limit (%)	31 - 34
Plasticity Index (%)	44 - 52
Modified Plasticity Index (%)	44 - 52
Volume Change Potential [NHBC and BRE]	High
pH	7.5 – 7.9
Water soluble sulphate (g/l)	2.0 – 4.4
SPT (N) values	6 - 14

5.2 Summary of Derived General Properties

5.2.1 Based on the analysis of the ground investigation data and past experience with similar deposits, the following derived general parameters are given in Table 5.2.

Table 5.2: Derived General Parameters

Property*	London Clay Formation
Unit Weight ¹⁾	19
Drained Friction, ϕ' (°) ²⁾	20 – 21
Drained Cohesion, c' (kPa)	0
SPT 'N' Value	6 – 14
Undrained Young's Modulus, E_u (Mpa) ³⁾	7.2 – 16.8
Drained Young's Modulus E' (MPa) ⁴⁾	4.2 – 9.8
Undrained Shear Strength, c_u (kPa) ⁵⁾	27 – 63
Plasticity Index (%)	44 - 52
Modified Plasticity Index (%)	44 - 52

Property*	London Clay Formation
Volume Change Potential [NHBC]	High
Modulus of Volume Compressibility, m_v (m^2/MN) ⁶⁾	0.159 – 0.370

¹⁾ Derived from Figures 1 and 2 of BS8004:2015

²⁾ Calculated from: $\phi' = (42^\circ - 12.5 \log 10 I_p)$ for $5\% \leq I_p \leq 100\%$ Where, I_p is the soil's plasticity index (BS8004:2015).

³⁾ Calculated from: $E_u = 1.2$ N MPa, based on the guidance given in CIRIA Report 143.

⁴⁾ Calculated from $E' = 0.7$ N MPa, based on the guidance given in CIRIA Report 143.

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 $PI \leq 25\%$ 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 Based on the proposed drawings for the development at the site, the lower ground floor is anticipated to be formed at around 3.75m bgl below the raised pre-existing ground level at the site.
- 6.2.2 As previously stated, the excavation of the lower ground floor has commenced and therefore the information and assessment herein have been determined using the borehole drilled from the base of the existing excavation.
- 6.2.3 However, due to the removal of approximately 3.0m of overburden allowing the underlying London Clay Formation to 'relax' and heave, the below assessment has taken the proposed depth of foundations as the proposed finished floor level below the pre-existing ground level, at 3.75m bgl.

Conventional Foundations

- 6.2.4 Based on the ground and groundwater conditions encountered, conventional shallow foundations may be suitable for the proposed development.
- 6.2.5 It is considered that conventional cantilever retaining walls may be formed within the underlying London Clay Formation for an allowable bearing capacity of 55kPa. Total and differential settlements should be contained within tolerable limits.
- 6.2.6 As soils of high 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.
- 6.2.7 Foundations greater than 2.50m deep would require structure-specific design by a structural engineer.
- 6.2.8 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.
- 6.2.9 Alternatively, if a greater allowable bearing capacity is required, it may be possible to underpin the cantilever retaining walls with mini piles during construction. The applicability and load carrying capacity of mini piles should be confirmed by a specialist contractor.

6.3 Retaining Walls

- 6.3.1 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')°	21
Effective Cohesion kN/m ²	0
Saturated Bulk Weight (γ_{sat}) kN/m ³	19

- 6.3.2 In addition, the specialist contractor should ensure the stability of the cut-face during the temporary works.
- 6.3.3 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.
- 6.3.4 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.
- 6.3.5 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 Sulphates

- 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)	Total Potential Sulphate* (%)	Design Sulphate Class	ACEC Class
London Clay Formation	4	7.5 – 7.9	4400	3.27	DS-5	AC-4s

* - Only applicable where soils have oxidisable sulphide content >0.3%

- 6.4.4 Analysis of the results indicates that the London Clay contains appreciable concentration of oxidisable sulphides, which could be oxidised to form additional sulphate if the soils are disturbed and exposed to air. Due to the development involving the excavation of such soils, the Design Sulphate Class is governed by the Total Potential Sulphate content, as illustrated in the above table.

- 6.4.5 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 Ground Floor Slabs

- 6.5.1 Given the presence of shrinkable soils, it is recommended that suspended floor slabs are used with an adequate void designed according to NHBC Standards. As a guide, initial modelling indicates a requirement for a sub-floor void of at least 300mm due to the presence of shrinkable soils of high volume change potential.

6.6 Excavations

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

- 6.6.2 Ground works 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.

- 6.6.3 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.

7 BASEMENT IMPACT ASSESSMENT

7.1 Proposed Changes to Areas of External Hardstanding

7.1.1 Existing areas of hardstanding include the existing building on site and external areas at the front of the site and immediately at the rear. The proposed development will comprise a lower ground level within the existing footprint of the building. As a result, there are unlikely to be changes in hardstanding areas, and so it is not considered necessary to undertake any further investigations, studies or impact assessment in relation to the proposed changes to areas of external hard-standing.

7.1.2 As SUDS will be required by NPPF, PPG and LLFA policy requirements, where practicable, the remaining hard surfaces will likely be replaced with permeable paving.

7.2 Past Flooding

7.2.1 The National Planning Policy Framework sets strict tests to protect people and property from flooding which all local planning authorities are expected to follow.

7.2.2 When assessing the site-specific flood risk and the potential for historic flooding to reoccur the above guidance recommends that historic flooding records and any other relevant and available information including flood datasets (e.g. flood levels, depths and/or velocities) and any other relevant data which can be acquired, are assessed.

7.2.3 The Groundsure EnviroInsight does not report any historical flood events within 250m of the site.

7.2.4 The London Borough of Haringey Surface water management plan reports that there are no historical records of flooding associated with sewage networks within the borough.

7.2.5 The site is therefore considered to be at low risk of flooding based on historic flooding.

7.3 Geological Impact

7.3.1 The published geological maps indicate that the site is underlain by the London Clay Formation. Superficial deposits of the Dollis Hill Gravel Member are reported 1m west of the site, however these were not encountered during the intrusive investigation. Following the intrusive investigation, the London Clay Formation was encountered to the base of the borehole, drilled to a maximum depth of 4.6m below the base of the excavation and approximately 7.6m below the previous existing ground level. The proposed lower ground floor will be founded within the London Clay Formation.

7.3.2 Following laboratory testing of the underlying London Clay Formation, the soils have been classified as high volume change potential. Heave precautions will be required in accordance with the requirements set out in NHBC Standards Chapter 4.2.

7.4 Hydrology and Hydrogeology Impact

7.4.1 Based on all the information available at the time of writing, the risk of flooding from groundwater is considered to be low. The proposed lower ground floor is unlikely to have a detectable impact on the local groundwater regime. Appropriate water proofing measures

should be included within the whole of the proposed lower ground floor wall/floor design as a precaution.

- 7.4.2 Appropriate water proofing measures should be included within the whole of the proposed lower ground floor wall/floor design as a precaution.
- 7.4.3 The London Clay Formation is classed as unproductive strata therefore the creation of the lower ground floor is considered unlikely to have any significant impact upon the hydrogeology of the area.
- 7.4.4 The proposed development will lie outside of flood risk zones and is therefore assessed as being at a low probability of fluvial flooding.
- 7.4.5 There are no surface water features on or within 250m of the site. It is therefore not anticipated that the site will have an impact upon the hydrology of the area.
- 7.4.6 The information available suggests that the site lies in an area that is at low risk of surface water flooding.
- 7.4.7 The proposed lower ground floor construction is considered unlikely to create a reduction of impermeable area in the post development scenario.
- 7.4.8 No groundwater was reported within the installed monitoring well to a depth of 4.6m below the base of the excavation.
- 7.4.9 No evidence of the Muswell Stream was encountered during drilling of the borehole.
- 7.4.10 No risk of flooding to the site from artificial sources has been identified.

7.5 Impacts of Basement on Adjacent Properties and Pavement

- 7.5.1 The proposed lower ground floor excavation will be within 5m of a public pavement. It is also within 5m of neighbouring properties.
- 7.5.2 Unavoidable lateral ground movements associated with the lower ground floor excavations must be controlled during temporary and permanent works so as not to impact adversely on the stability of the surrounding ground, any associated services and structures.
- 7.5.3 It is recommended that the site is supported by suitably designed temporary support with a basement box construction. This will ensure that the adjacent land is adequately supported in the temporary and permanent construction.
- 7.5.4 Careful and regular monitoring of the structure will need to be undertaken during the construction phase to ensure that vertical movements do not adversely affect the above property and neighbouring structures. If necessary, the works may have to be carried out in stages with the above structure suitably propped and supported.
- 7.5.5 It will be necessary to ensure that the lower ground floor is designed in accordance with the NHBC Standards and take due cognisance of the potential impacts highlighted above. This may be achieved by ensuring best practice engineering and design of the proposed scheme by competent persons and in full accordance with the Construction (Design and Management) Regulations. This will include:

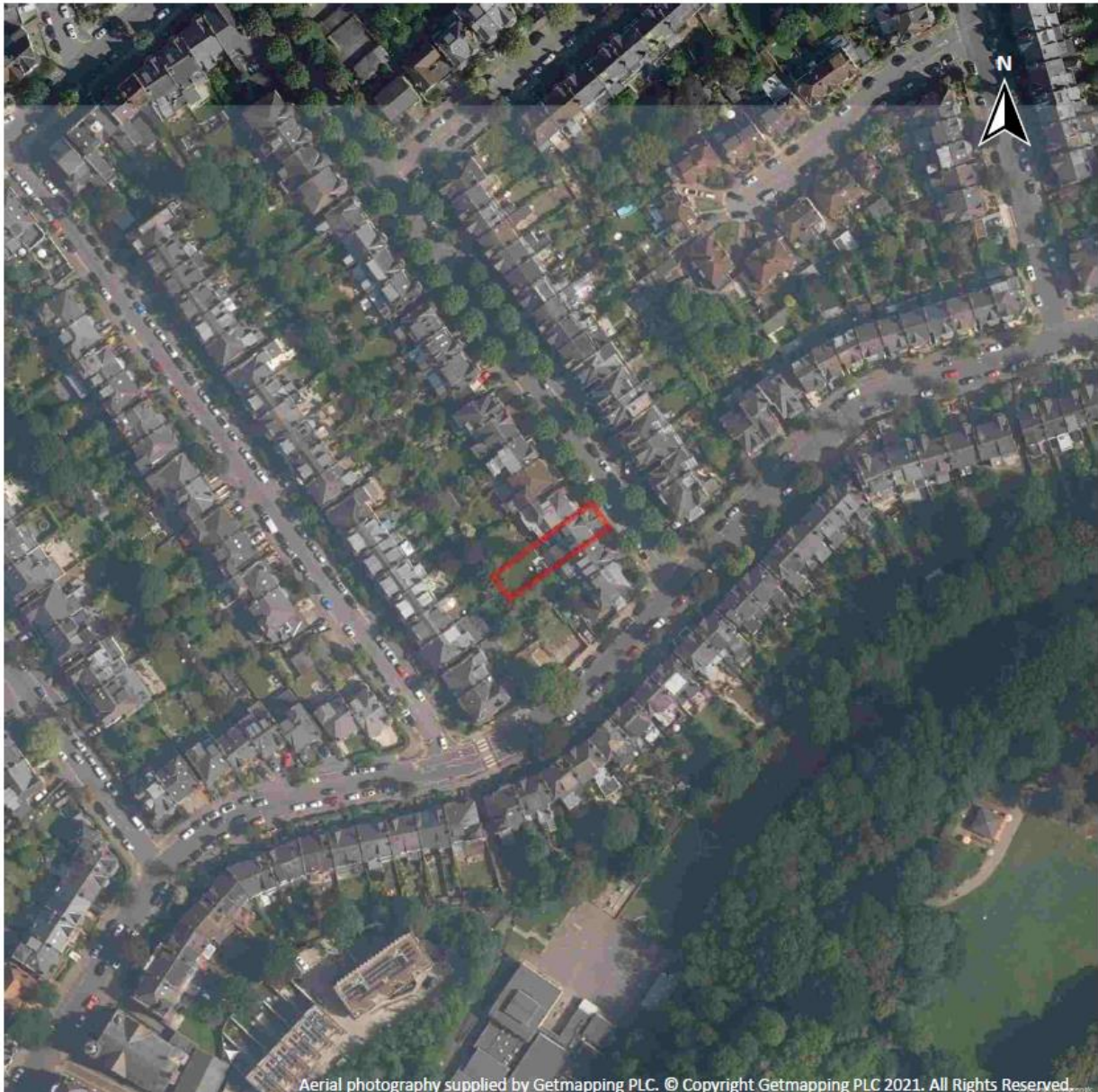
- Establishment of the likely ground movements arising from the temporary and permanent works and the mitigation of excessive movements;
- Assessment of the impact on any adjacent structures (including adjacent properties and the adjacent pavement with potential services);
- Determination of the most appropriate methods of construction of the proposed basements;
- Undertake pre-condition surveys of adjacent structures;
- Monitor any movements and pre-existing cracks during construction;
- Establishment of contingencies to deal with adverse performance;
- Ensuring quality of workmanship by competent persons.

7.5.6 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 Haringey.

8 REFERENCES

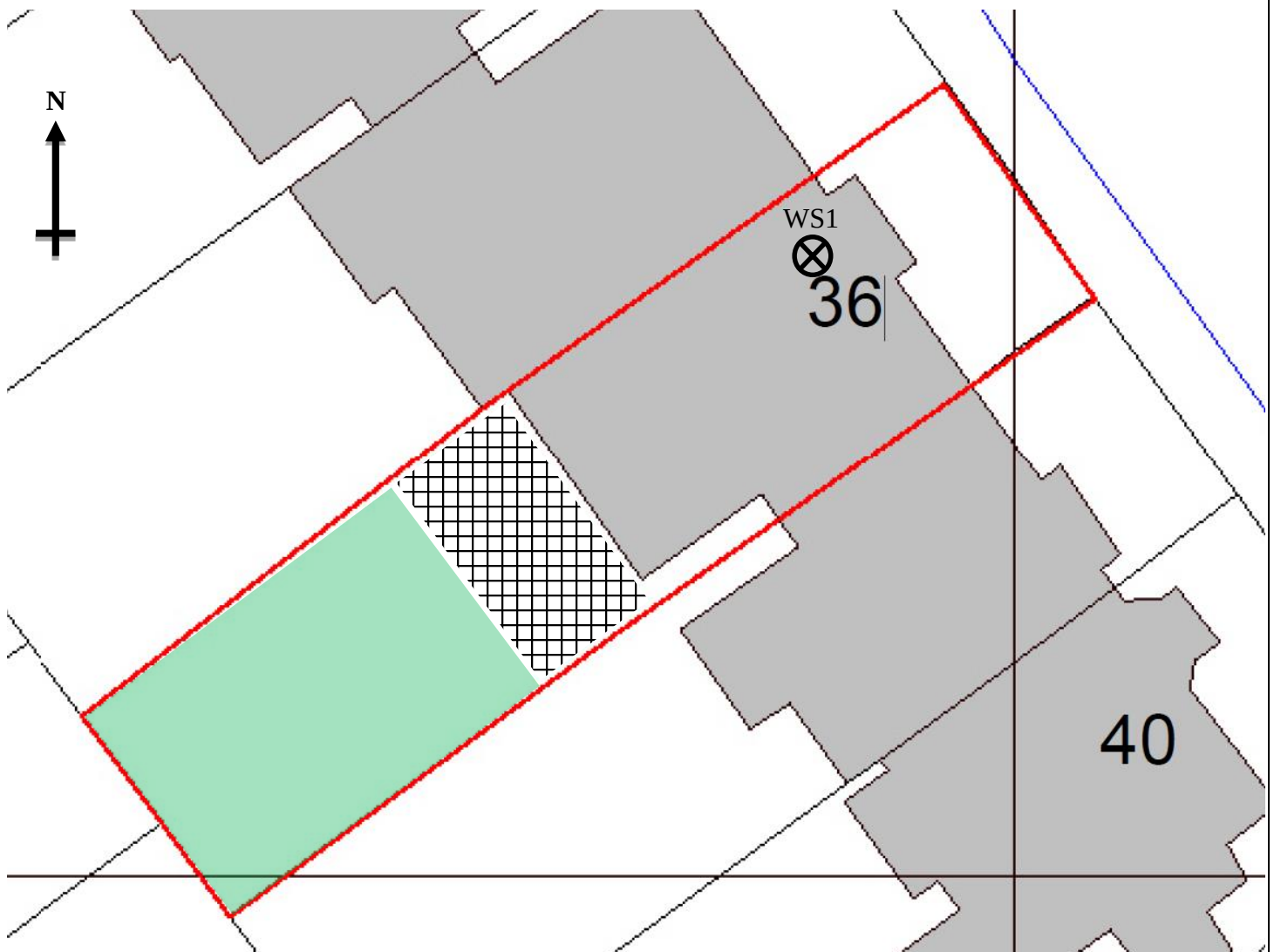
- BRE Report BR211: Radon: Protective measures for new dwellings, 2015
- BRE Special Digest 1: Concrete in Aggressive Ground, 2005
- British Standards Institution (2007) BS 3882:2007 *Specification for topsoil and requirements for use*. Milton Keynes: BSI
- British Standards Institution (2011) BS 10175:2011 *Code of practice for the investigation of potentially contaminated sites*. Milton Keynes: BSI
- British Standards Institution (2013) BS 8576:2013 *Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOC's)*, Milton Keynes: BSI
- British Standards Institution (2015) BS 5930:2015 *Code of practice for ground investigations*. Milton Keynes: BSI
- British Standards Institution (2015) BS 8485:2015 Incorporating corrigendum No.1 *Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings* Milton Keynes: BSI
- Campbell Reith (March 2018) "Pro Forma Basement Impact Assessment", London Borough of Camden*
- CIEH & CL:AIRE (2008) Guidance on comparing soil contamination data with a critical concentration. London: Chartered Institute of Environmental Health (CIEH) and CL:AIRE*
- CIRIA C665 (2007) Assessing risks posed by hazardous ground gases to buildings London, CIRIA*
- Environment Agency (2004) Model procedures for the management of land contamination. CLR11. Bristol: Environment Agency*
- Environment Agency, NHBC & CIEH (2008) Guidance for the safe development of housing on land affected by contamination. R & D Publication 66. London: Environment Agency*
- Environment Agency (2006) Remedial Targets Methodology: Hydrogeological Risk Assessment for Land Contamination Environment Agency*
- London Borough of Camden (March 2018) "Camden Planning Guidance Basements"*
- Ministry of Housing, Communities & Local Government: National Planning Policy Framework. February 2019.*
- M Zohrabi and PL Scott (2003) TRL Report TRL587 The Correlation between the CBR Value and Penetrability of Pavement Construction Materials; Transport Research Laboratory*
- NHBC Standards 2022. NHBC, Milton Keynes
- Jomas Associates Ltd (2021) Stage 1 Basement impact assessment report for 36 Methuen Park, London, N10 2JS

PROJECT NAME:	36 Methuen Park	FIGURE	1
TITLE:	Site location plan	PROJECT	P3859J2374
DATE:	August 2021		

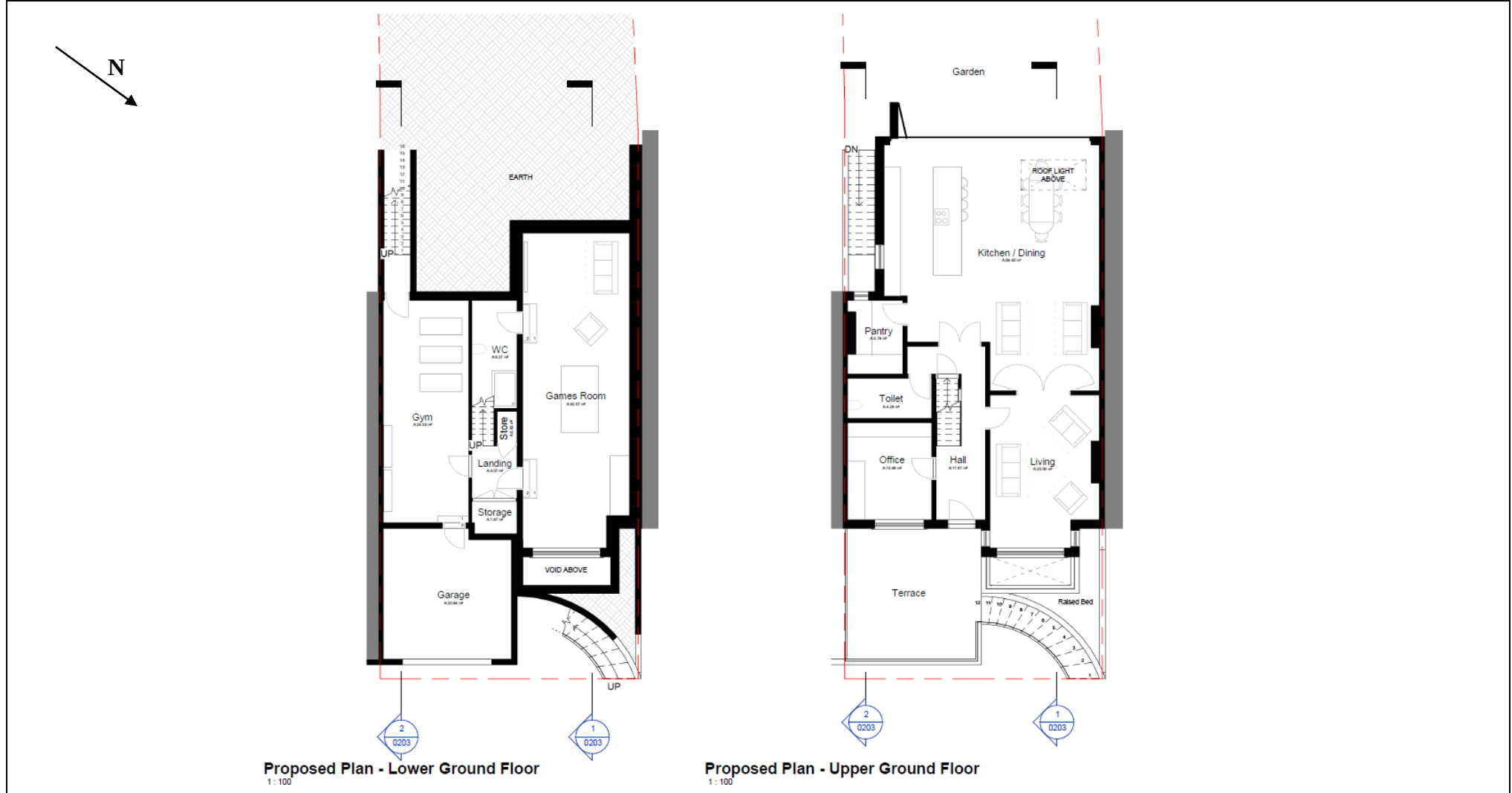


Aerial photography supplied by Getmapping PLC. © Copyright Getmapping PLC 2021. All Rights Reserved.

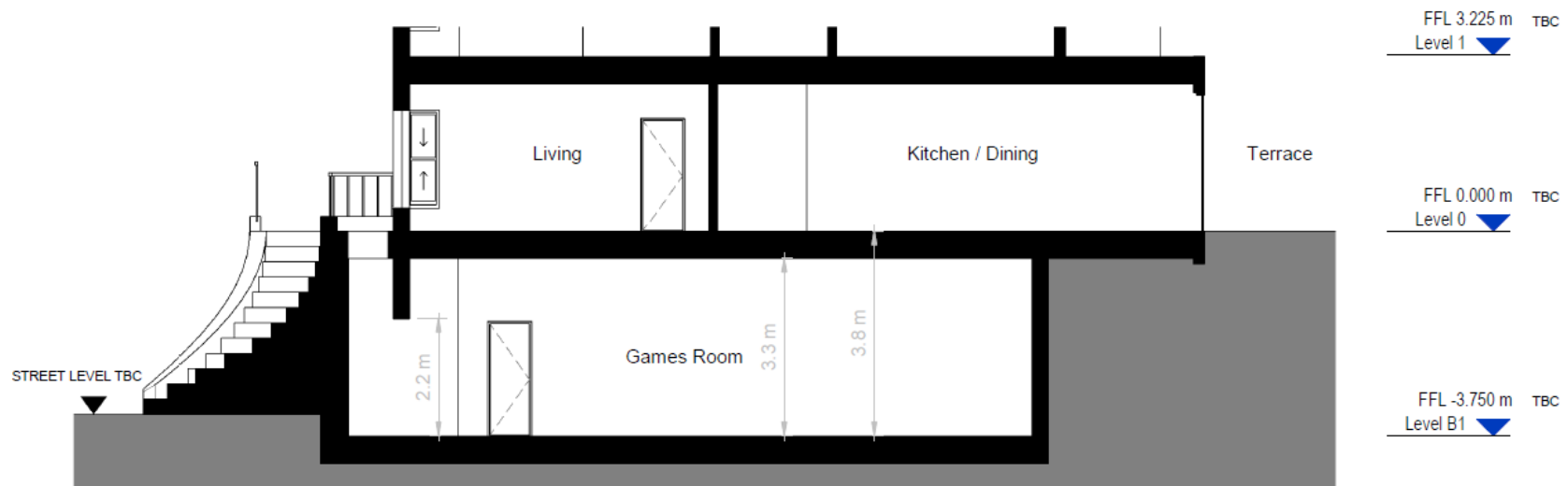
PROJECT NAME:	36 Methuen Park	FIGURE	2
TITLE:	Completed ground investigation plan	PROJECT	P3859J2374
DATE:	June 2022		



PROJECT NAME	36 Methuen Park	CLIENT	Ally and Matt Tansley
TITLE	Proposed development plan	PROJECT NO.	P3859J2374
DATE	August 2021	FIGURE NO.	3

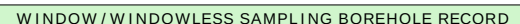


PROJECT NAME	36 Methuen Park	CLIENT	Ally and Matt Tansley
TITLE	Proposed development plan - Section	PROJECT NO.	P3859J2374
DATE	July 2022	FIGURE NO.	4



Proposed Section A-A
1 : 100

APPENDIX 2 – EXPLORATORY HOLE RECORDS



WS1

Project No:	P3859J2374
-------------	------------

Ground Level:

Date Commenced:	16/06/2022
-----------------	------------

Date Completed:	16/06/2022
-----------------	------------

Sheet No:	1 Of 1
-----------	--------

Water Level after 20mins:

4:

Sampling Code: U- Undisturbed B - Large Disturbed D - Small Disturbed W - Water (U*) Non recovery of Sample
 Jomas Associates Ltd - Lakeside House, 1 Furzeground Way, Stockley Park, UB11 1BD
 T: 0843 289 2187 E: info@jomasassociates.com W: www.jomasassociates.com

T: 0843 289 2187 E: info@jomasassociates.com W: www.jomasassociates.com

APPENDIX 3 – CHEMICAL LABORATORY TEST RESULTS

Clare Prosser
Jomas Associates Ltd
Lakeside House
1 Furzeground Way
Stockley Park
UB11 1BD

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

e: Jomas Associates -

Analytical Report Number : 22-66354

Project / Site name:	36 Methuen Park London N10 2JS	Samples received on:	17/06/2022
Your job number:	JJ2374	Samples instructed on/ Analysis started on:	21/06/2022
Your order number:	P3859JJ2374 3	Analysis completed by:	28/06/2022
Report Issue Number:	1	Report issued on:	28/06/2022
Samples Analysed:	4 soil samples		



Signed:
Adam Fenwick
Technical Reviewer
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 22-66354

Project / Site name: 36 Methuen Park London N10 2JS

Your Order No: P3859JJ2374 3

Lab Sample Number				2322025	2322026	2322027	2322028
Sample Reference				WS1	WS1	WS1	WS1
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.50	4.50	0.25	0.50
Date Sampled				16/06/2022	16/06/2022	16/06/2022	16/06/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	16	14	18	21
Total mass of sample received	kg	0.001	NONE	0.6	0.6	0.8	0.8

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.7	7.5	7.6	7.9
Total Sulphate as SO ₄	mg/kg	50	MCERTS	15000	17000	12000	7400
Total Sulphate as SO ₄	%	0.005	MCERTS	1.46	1.67	1.18	0.738
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	2.9	4.4	2	2.5
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	2920	4400	2030	2500
Total Sulphur	mg/kg	50	MCERTS	11000	9700	8700	4100
Total Sulphur	%	0.005	MCERTS	1.09	0.967	0.871	0.41

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 22-66354

Project / Site name: 36 Methuen Park London N10 2JS

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2322025	WS1	None Supplied	2.5	Brown clay.
2322026	WS1	None Supplied	4.5	Brown clay.
2322027	WS1	None Supplied	0.25	Brown clay.
2322028	WS1	None Supplied	0.5	Brown clay.

Analytical Report Number : 22-66354

Project / Site name: 36 Methuen Park London N10 2JS

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total Sulphate in soil as %	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

APPENDIX 4 – GEOTECHNICAL LABORATORY TEST RESULTS

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: Jomas Associates Ltd
Client Address: Lakeside House, 1 Furzeground Way,
Stockley Park, UB11 1BD

Contact: Clare Prosser
Site Address: 36 Methuen Park London N10 2JS

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: JJ2374
Job Number: 22-66357
Date Sampled: 16/06/2022
Date Received: 17/06/2022
Date Tested: 05/07/2022
Sampled By: Not Given

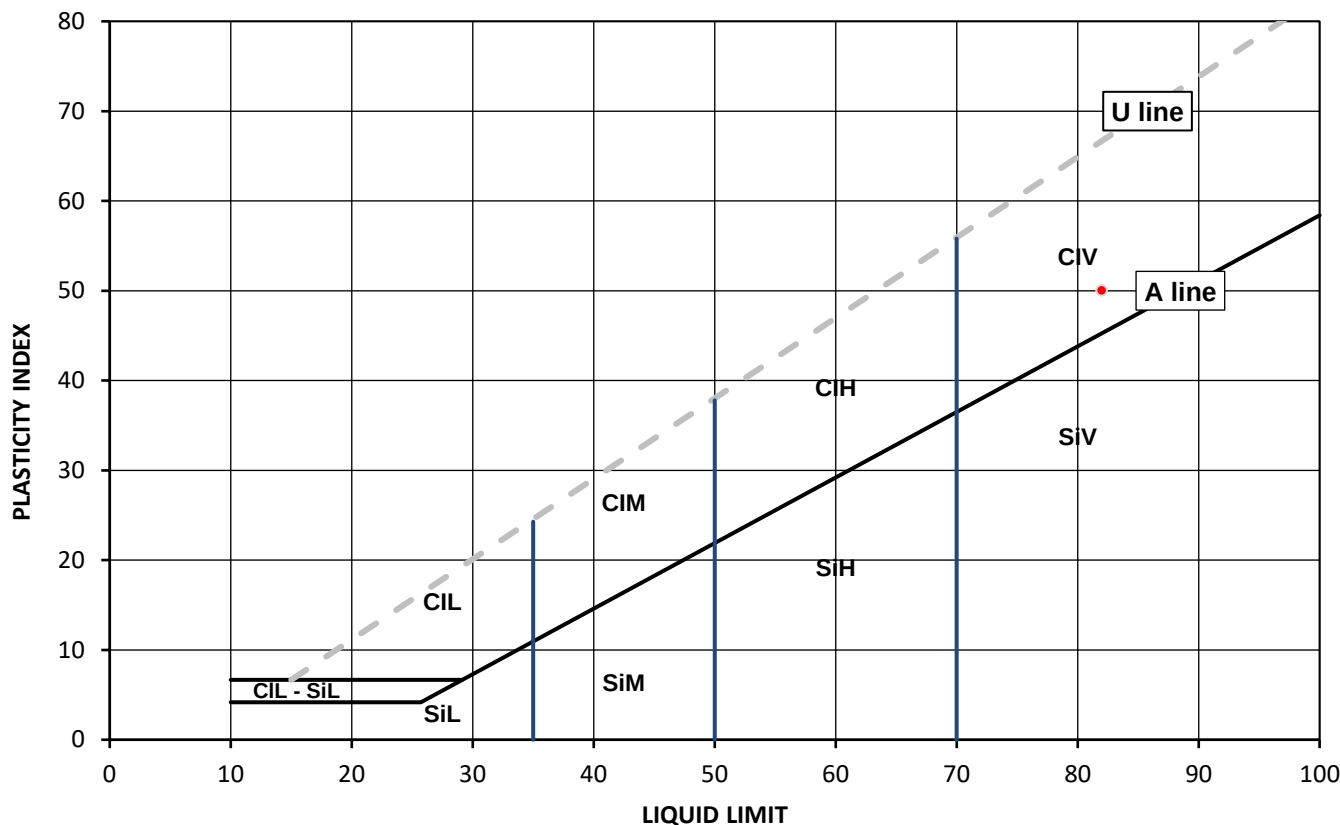
Test Results:

Laboratory Reference: 2322043
Hole No.: WS1
Sample Reference: Not Given
Sample Description: Brown CLAY

Depth Top [m]: 0.50
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
34	82	32	50	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

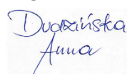
	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks: Replaces Analytical Report Number 22-66357, issue no 1

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

Signed:



Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: Jomas Associates Ltd
Client Address: Lakeside House, 1 Furzeground Way,
Stockley Park, UB11 1BD

Contact: Clare Prosser
Site Address: 36 Methuen Park London N10 2JS

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: JJ2374
Job Number: 22-66357
Date Sampled: 16/06/2022
Date Received: 17/06/2022
Date Tested: 05/07/2022
Sampled By: Not Given

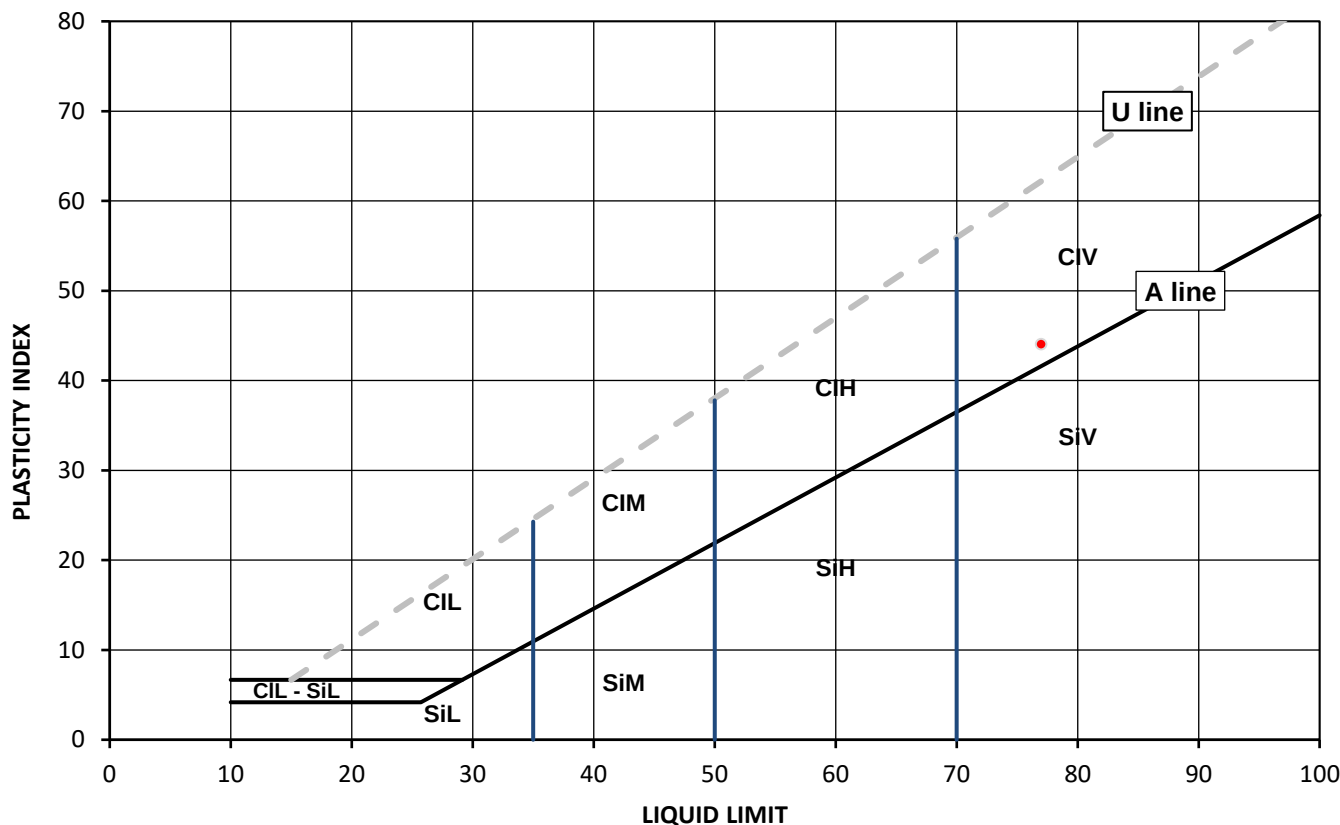
Test Results:

Laboratory Reference: 2322044
Hole No.: WS1
Sample Reference: Not Given
Sample Description: Brown CLAY

Depth Top [m]: 0.10
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
35	77	33	44	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

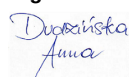
	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks: Replaces Analytical Report Number 22-66357, issue no 1

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

Signed:



Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: Jomas Associates Ltd
Client Address: Lakeside House, 1 Furzeground Way,
Stockley Park, UB11 1BD

Contact: Clare Prosser
Site Address: 36 Methuen Park London N10 2JS

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: JJ2374
Job Number: 22-66357
Date Sampled: 16/06/2022
Date Received: 17/06/2022
Date Tested: 05/07/2022
Sampled By: Not Given

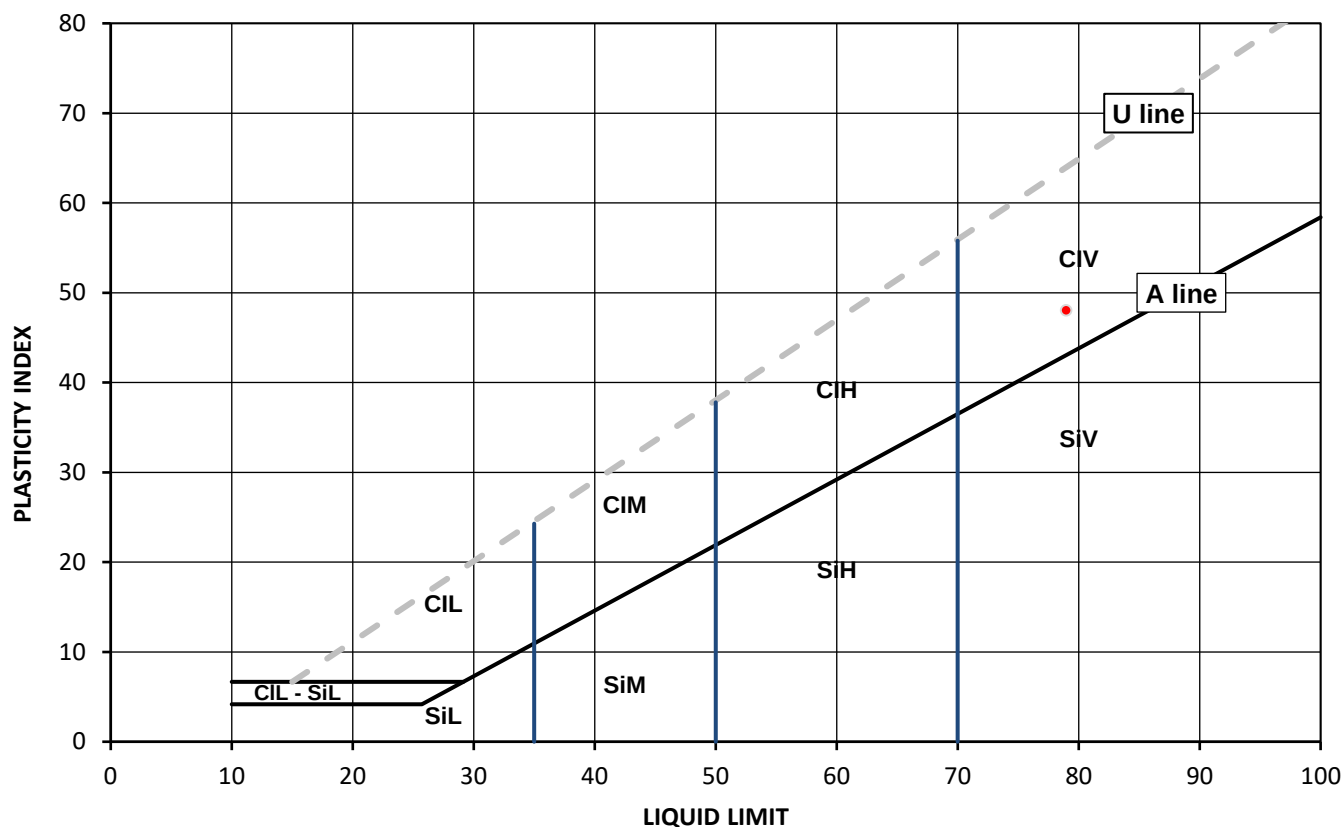
Test Results:

Laboratory Reference: 2322045
Hole No.: WS1
Sample Reference: Not Given
Sample Description: Brown CLAY

Depth Top [m]: 1.00
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
33	79	31	48	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

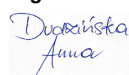
	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L	Low
	M	Medium
	H	High
	V	Very high
	O	Organic
		append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks: Replaces Analytical Report Number 22-66357, issue no 1

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

Signed:



Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: Jomas Associates Ltd
Client Address: Lakeside House, 1 Furzeground Way,
Stockley Park, UB11 1BD

Contact: Clare Prosser
Site Address: 36 Methuen Park London N10 2JS

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: JJ2374
Job Number: 22-66357
Date Sampled: 16/06/2022
Date Received: 17/06/2022
Date Tested: 06/07/2022
Sampled By: Not Given

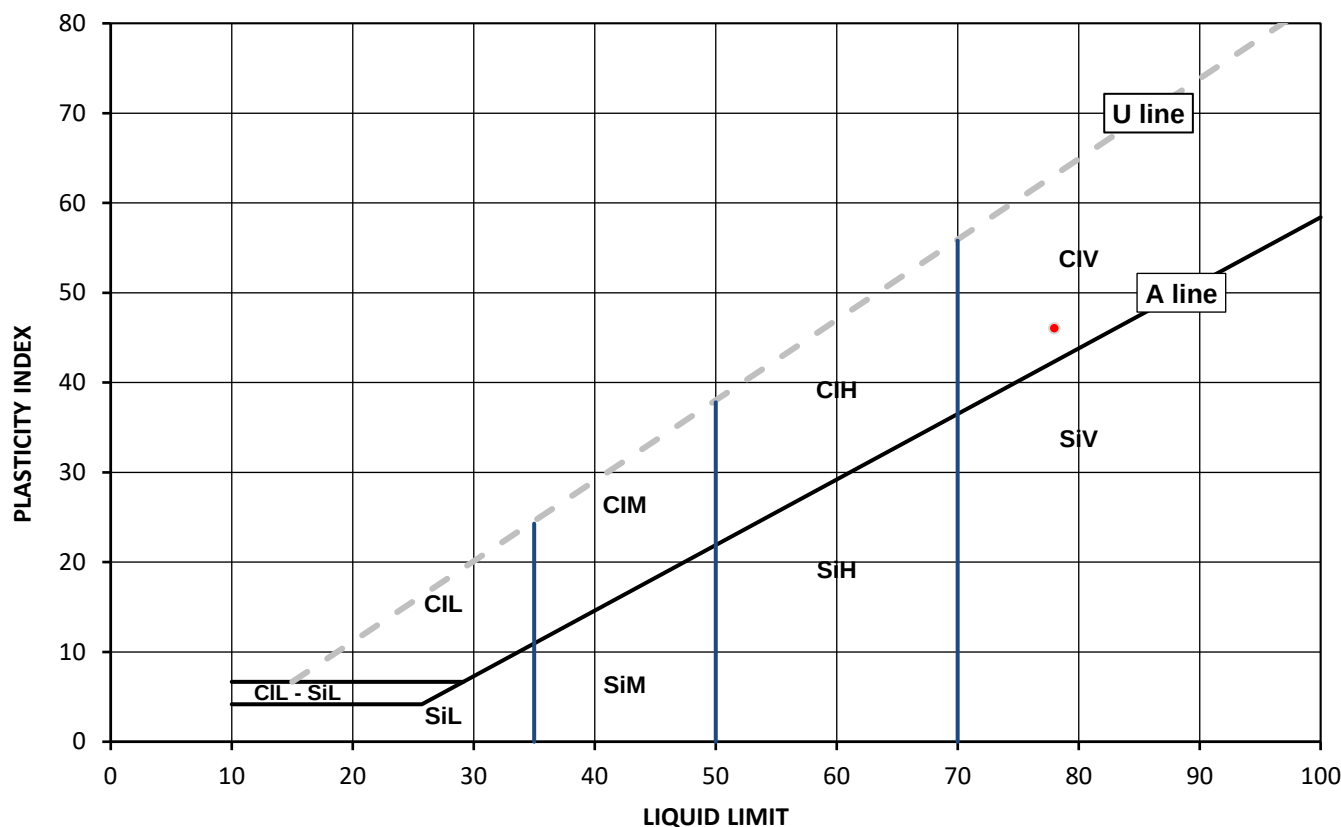
Test Results:

Laboratory Reference: 2322046
Hole No.: WS1
Sample Reference: Not Given
Sample Description: Brown CLAY

Depth Top [m]: 2.50
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
31	78	32	46	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

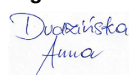
	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks: Replaces Analytical Report Number 22-66357, issue no 1; Additional results of Atterberg

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

Signed:



Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: Jomas Associates Ltd
Client Address: Lakeside House, 1 Furzeground Way,
Stockley Park, UB11 1BD

Contact: Clare Prosser
Site Address: 36 Methuen Park London N10 2JS

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: JJ2374
Job Number: 22-66357
Date Sampled: 16/06/2022
Date Received: 17/06/2022
Date Tested: 05/07/2022
Sampled By: Not Given

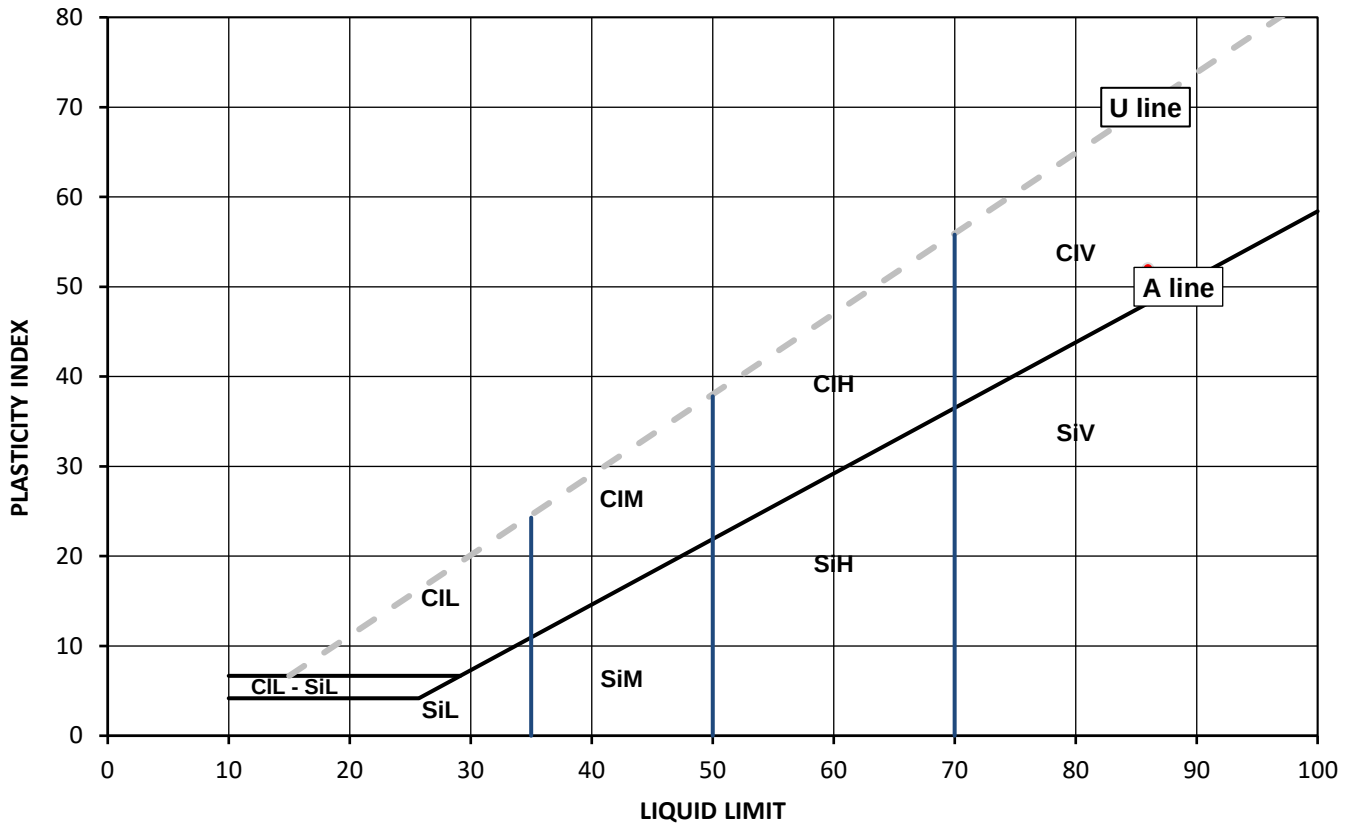
Test Results:

Laboratory Reference: 2322047
Hole No.: WS1
Sample Reference: Not Given
Sample Description: Brown CLAY

Depth Top [m]: 3.50
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
32	86	34	52	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

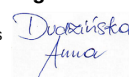
	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L	Low
	M	Medium
	H	High
	V	Very high
	O	Organic
		append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks: Replaces Analytical Report Number 22-66357, issue no 1

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

Signed:



Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: Jomas Associates Ltd
Client Address: Lakeside House, 1 Furzeground Way,
Stockley Park, UB11 1BD

Contact: Clare Prosser
Site Address: 36 Methuen Park London N10 2JS

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: JJ2374
Job Number: 22-66357
Date Sampled: 16/06/2022
Date Received: 17/06/2022
Date Tested: 06/07/2022
Sampled By: Not Given

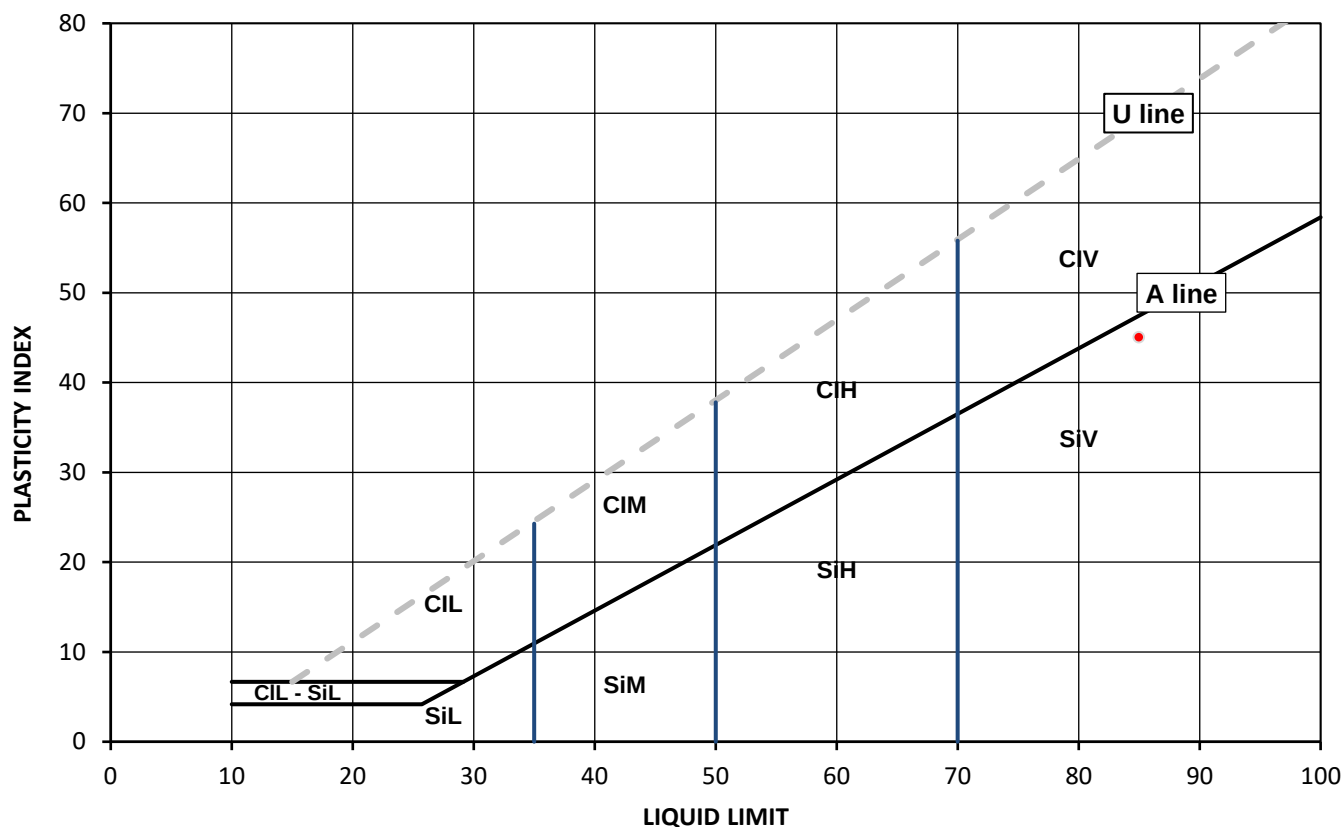
Test Results:

Laboratory Reference: 2322048
Hole No.: WS1
Sample Reference: Not Given
Sample Description: Brown CLAY

Depth Top [m]: 4.50
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
34	85	40	45	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

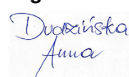
Cl	Clay	Plasticity	L	Low	Liquid Limit	below 35
Si	Silt		M	Medium		35 to 50
			H	High		50 to 70
			V	Very high		exceeding 70
			O	Organic		append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks: Replaces Analytical Report Number 22-66357, issue no 1; Additional results of Atterberg

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

Signed:



Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd



4041

Client: Jomas Associates Ltd
 Client Address: Lakeside House, 1 Furzeground Way,
 Stockley Park, UB11 1BD

Contact: Clare Prosser
 Site Address: 36 Methuen Park London N10 2JS

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

SUMMARY REPORT

SUMMARY OF CLASSIFICATION TEST RESULTS

Tested in Accordance with:

Water Content by BS 1377-2:1990: Clause 3.2; Atterberg by BS 1377-2: 1990:
 Clause 4.3 (4 Point Test), Clause 4.4 (1 Point Test) and 5; PD by BS 1377-2:
 1990: Clause 8.2

i2 Analytical Ltd
 Unit 8 Harrowden Road
 Brackmills Industrial Estate
 Northampton NN4 7EB



Environmental Science

Client Reference: JJ2374
 Job Number: 22-66357
 Date Sampled: 16/06/2022
 Date Received: 17/06/2022
 Date Tested: 05/07 - 06/07/2022
 Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Water Content BS 1377-2 [W] %	Water Content BS EN ISO 17892-1 [W] %	Atterberg				Density			Total Porosity# %		
		Reference	Depth Top m	Depth Base m	Type					% Passing 425um %	WL %	Wp %	Ip %	bulk Mg/m3	dry Mg/m3	PD Mg/m3			
2322044	WS1	Not Given	0.10	Not Given	D	Brown CLAY	Atterberg 1 Point	35		100	77	33	44						
2322043	WS1	Not Given	0.50	Not Given	D	Brown CLAY	Atterberg 1 Point	34		100	82	32	50						
2322045	WS1	Not Given	1.00	Not Given	D	Brown CLAY	Atterberg 1 Point	33		100	79	31	48						
2322046	WS1	Not Given	2.50	Not Given	D	Brown CLAY	Atterberg 1 Point	31		100	78	32	46						
2322047	WS1	Not Given	3.50	Not Given	D	Brown CLAY	Atterberg 1 Point	32		100	86	34	52						
2322048	WS1	Not Given	4.50	Not Given	D	Brown CLAY	Atterberg 1 Point	34		100	85	40	45						

Note: # Non accredited; NP - Non plastic

Comments: Replaces Analytical Report Number 22-66357, issue no 1; Additional results of Atterberg (samples 2322046, 2322048)

Signed:

Dudzinska Anna

Anna Dudzinska
 PL Deputy Head of Reporting Team
 for and on behalf of i2 Analytical Ltd

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.



4041

Client: Jomas Associates Ltd

Client Address: Lakeside House, 1 Furzeground Way,
Stockley Park, UB11 1BD

Contact: Clare Prosser

Site Address: 36 Methuen Park London N10 2JS

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

SUMMARY REPORT**DETERMINATION OF WATER CONTENT**

Tested in Accordance with: BS 1377-2: 1990: Clause 3.2

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Environmental Science

Client Reference: JJ2374

Job Number: 22-66357

Date Sampled: 16/06/2022

Date Received: 17/06/2022

Date Tested: 05/07 - 06/07/2022

Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	WC	Sample preparation / Oven temperature at the time of testing			
		Reference	Depth Top m	Depth Base m	Type							
2322044	WS1	Not Given	0.10	Not Given	D	Brown CLAY		35	Sample was quartered, oven dried at 106.1 °C			
2322043	WS1	Not Given	0.50	Not Given	D	Brown CLAY		34	Sample was quartered, oven dried at 106.1 °C			
2322045	WS1	Not Given	1.00	Not Given	D	Brown CLAY		33	Sample was quartered, oven dried at 106.1 °C			
2322046	WS1	Not Given	2.50	Not Given	D	Brown CLAY		31	Sample was quartered, oven dried at 109 °C			
2322047	WS1	Not Given	3.50	Not Given	D	Brown CLAY		32	Sample was quartered, oven dried at 106.1 °C			
2322048	WS1	Not Given	4.50	Not Given	D	Brown CLAY		34	Sample was quartered, oven dried at 109 °C			

Comments: Replaces Analytical Report Number 22-66357, issue no 1

Signed:

Anna Dudzinska
PL Deputy Head of Reporting Team
for and on behalf of i2 Analytical Ltd

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

APPENDIX 5 – GROUNDWATER MONITORING RESULT

GROUNDWATER MONITORING BOREHOLE RECORD SHEET						
Site: 36 Methuen Park	Operative(s): JAR	Date: 22/06/2022	Time: 09:30am	Round: 1	Page: 1	
MONITORING EQUIPMENT						
Instrument Type	Instrument Make	Serial No.	Date Last Calibrated			
Analog	GA5000	G505801	01/10/2021			
PID	Phocheck tiger	T-106448	01/03/2021			
Dip Meter	GeoTech					
MONITORING CONDITIONS						
Weather Conditions: Overcast		Ground Conditions: Dry		Temperature: 26 °C		
Barometric Pressure (mbar): 1004		Barometric Pressure Trend (24hr): Down				
MONITORING RESULTS						
Monitoring Point Location		VOC (ppm)			Depth to water (mbgl)	Depth to base of well (mbgl)
		Peak	Steady			
WS1		4.2	4		Dry	4.7

GROUNDWATER MONITORING BOREHOLE RECORD SHEET						
Site: 36 Methuen Park	Operative(s): JAR	Date: 22/06/2022	Time: 09:30am	Round: 1	Page: 1	
MONITORING EQUIPMENT						
Instrument Type	Instrument Make	Serial No.	Date Last Calibrated			
Analog	GA5000	G505801	01/10/2021			
PID	Phocheck tiger	T-106448	01/03/2021			
Dip Meter	GeoTech					
MONITORING CONDITIONS						
Weather Conditions: Overcast		Ground Conditions: Dry		Temperature: 26 °C		
Barometric Pressure (mbar): 1004		Barometric Pressure Trend (24hr): Down				
MONITORING RESULTS						
Monitoring Point Location		VOC (ppm)			Depth to water (mbgl)	Depth to base of well (mbgl)
		Peak	Steady			
WS1		4.2	4		Dry	4.7

WE LISTEN, WE PLAN, WE DELIVER

Geotechnical Engineering and Environmental Services across the UK.



JOMAS ASSOCIATES LTD

Unit 24 Sarum Complex

Salisbury Road

Uxbridge

UB8 2RZ

CONTACT US

Website: www.jomasassociates.com

Tel: 0333 305 9054

Email: info@jomasassociates.com