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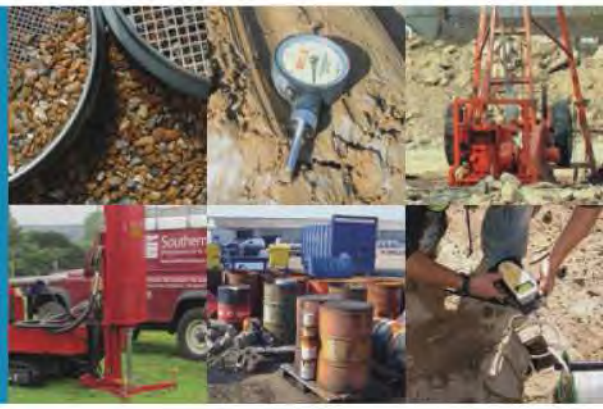
Interpretative Geotechnical Report



Project Name: 46 Inverness Street

Location: 46 Inverness Street, Camden, London, NW1 7HB

Client: Christine Hancock

Planning Reference: 2019/5075/P

STL Project ID: J13674

Report Date: 13th March 2020

Report Issue: 1

SUMMARY

The site comprises a vacant single-storey building which adjoins No. 44 Inverness Street. It is proposed to redevelop the site with a new house, which will comprise a two-storey house with an additional single-level basement.

Geological records indicate the site to be underlain by London Clay.

A Factual Ground Investigation was undertaken by Chelmer Site Investigations in October 2014. It should not be assumed that the same ground conditions would apply across the site.

The soils encountered comprised a covering of Made Ground, over Head, over London Clay Formation.

Groundwater was not encountered.

Hit-and-miss underpinned foundations are proposed for the construction of the basement retaining walls and foundations. An allowable bearing pressure of 120 kN/m^2 is recommended for foundations at a depth of about 3.0 to 3.5m bgl.

The sulphate content of the fill and natural soil was found to fall within Class DS-3. The ACEC classification for the site is AC-3.

No significant groundwater conditions requiring de-watering of excavations are anticipated.

Heave protection measures may be required beneath the basement slab.

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For and on behalf of Southern Testing Laboratories Limited

DOCUMENT HISTORY AND STATUS

Issue No.	Date	Purpose or Status	Author	Check / Review
1	13th March 2020	1st Issue	TRL	JNR

SUPPORTING DOCUMENTS

Document	Date	Version	Producer
J13674 Stage 1 & 2 Report	11th July 2018	1	Southern Testing Laboratories Ltd.
Factual Report (ref. FACT/4792)	October 2014	1	Chelmer Site Investigations
Chemical Interpretative Report (ref. CHEM/4792)	November 2014	1	Chelmer Consultancy Services

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A INTRODUCTION

1 Authority

Our authority for carrying out this work is contained in a Project Order form completed by Christine Hancock, dated 10th March 2020. The order form refers to our quotation ref. Q200524.

2 Location

The site is located on the northern side of Inverness Street, about 20m to the east of the junction with Gloucester Crescent. The site is about 200m west of Camden Town Station. The approximate National Grid Reference of the site is TQ 28633 83906. The site location is indicated on Figure 1 within Appendix A.

3 Proposed Construction

It is proposed to construct a new house, which will comprise of two-storeys above ground, and a single-level basement.

On the basis of the available information the categorization of the proposed structure(s) is considered to fall within Geotechnical Category 2 – conventional types of structures and foundations with no exceptional risk or difficult soil or loading conditions. (Eurocode 7 Ref [1]).

It is understood that the new foundations, including the underpinned sections and new retaining walls, will be formed using sequential hit and miss methods. Sheet piling is proposed along the boundary fronting onto Inverness Street as part of the temporary works design.

4 Object

This is an interpretative report intended to provide characteristic geotechnical parameters for use in the design of the basement elements.

5 Scope

This report presents our interpretation of the existing desk study and ground investigation information. No new intrusive investigation has been undertaken. The report will supplement the information in the existing Basement Impact Assessment, which was undertaken by Southern Testing Laboratories Ltd.

A Factual Ground Investigation was undertaken by Chelmer Site Investigations in 2014. A Chemical Interpretative Report was undertaken by Chelmer Consultancy Services. No geotechnical interpretation was included within either report.

As with any site there may be differences in soil conditions between exploratory hole positions.

This report is not an engineering design and the figures and calculations contained in the report should be used by the Engineer, taking note that variations will apply, according to variations in design loading, in techniques used, and in site conditions. Our figures therefore should not supersede the Engineer's design.

Contamination issues are not considered in this report.

The findings and opinions conveyed via this investigation report are based on information obtained from a variety of sources as detailed within this report, and which Southern Testing Laboratories Ltd. believes are reliable. Nevertheless, Southern Testing Laboratories Ltd. cannot and does not guarantee the authenticity or reliability of the information it has obtained from others.

The investigation was conducted and this report has been prepared for the sole internal use and reliance of Christine Hancock and their appointed Engineers. This report shall not be relied upon or transferred to any other parties without the express written authorisation of Southern Testing Laboratories Ltd. If an unauthorised third party comes into possession of this report they rely on it at their peril and the authors owe them no duty of care and skill.

The recommendations contained in this report may not be appropriate to alternative development schemes.

Detailed information on the proposed development, such as detailed final layout, loadings and serviceability limits was not provided. Accordingly, where geotechnical design advice is provided it is on the prescriptive basis allowed for by Eurocode 7: employing conventional and conservative design rules.

The contamination screening values used are valid at the time of writing but may be subject to change and any such changes will have implications for the assessments based on them. Their validity should be confirmed at the time of site development.

B SUMMARY OF GROUND CONDITIONS

6 Ground Investigation

The 2014 Chelmer Site Investigations (Chelmer) investigation comprised:

- Two boreholes drilled to 10m below the existing site level (ground level) using a CFA rig. Hand shear vane testing was undertaken at 0.5m to 1.0m intervals within the boreholes. Groundwater monitoring wells were installed.
- Three hand excavated trial pits, intended to inspect the existing foundations of adjoining buildings/party walls.

The rationale behind the locations of the boreholes and trial pits is not known.

It is noted that there are limitations to the CFA drilling method as follows:

- It is not possible to undertake SPT tests
- Recovered samples are likely to be disturbed (Category B / Class 3 to Class 4).
- The depths of changes within the encountered strata is not certain, except in certain conditions.

6.1 Soils as Found

From the Chelmer boreholes, the soils as found comprised a covering of Made Ground, over Head, over London Clay Formation. A summary is included in the table below. Full details are available in the borehole logs within the Chelmer report.

Depth to base of strata (m)	Thickness (m)	Soil Type	Description
0.8 - 1.8	0.8 – 1.8	MADE GROUND	Reworked silty clays with anthropogenic material (e.g. bricks, concrete) and flint gravel.
2.5 – 3.7	1.7 – 1.9m	HEAD	Firm becoming stiff silty clay, with partings of silt and fine sand.
Base not reached (>10m)	Base not reached	LONDON CLAY	Very stiff silty clay, with partings of silt and fine sand.

Roots were noted within the boreholes to depths of 1.6 – 1.8m bgl.

6.2 Groundwater Observations

Groundwater was not encountered within the Chelmer boreholes. In subsequent monitoring visits, undertaken in Autumn 2014, the wells were dry.

C DISCUSSION OF GEOTECHNICAL TEST RESULTS AND RECOMMENDATIONS

7 Geotechnical Laboratory Tests

The following geotechnical laboratory testing was carried out by Chelmer on selected samples from their two boreholes. The test results are included within the Factual Report.

Laboratory Test	Number of Samples Tested	Stratum
Moisture Content	7	London Clay Formation
Atterberg Limit	7	London Clay Formation
BRE SD1 Suite	7	London Clay Formation

8 Soil Classification and Properties

8.1 Made Ground

The Made Ground soils, present across the site, generally comprised reworked clays with variable abundances of gravel. The gravel comprised flint, and anthropogenic materials (concrete, brick).

No geotechnical laboratory testing was undertaken by Chelmer within the Made Ground soils.

8.2 Head

The Head soils were generally recorded by Chelmer as firm, becoming stiff, silty clays with partings of silt and fine sand.

The Atterberg limit results for this material indicates clays of very high plasticity. Liquid Limit results were within the range 81 to 82%. Plastic Limit results between 16 to 18% and Plasticity Indices between 64 to 65%, indicating a High Volume Change Potential.

Standard Penetration Tests were not undertaken. No samples were collected for laboratory shear strength or effective stress testing.

Hand shear vane testing was undertaken within the Head soils. The undrained shear strength values increased from about 62 kN/m^2 at the top of the stratum (0.8 / 1.8m bgl) to 84 kN/m^2 at the base of the Head.

8.3 London Clay Formation

The London Clay Formation soils at this site were generally recorded by Chelmer as firm, becoming very stiff, silty clays with partings of silt and fine sand.

The Atterberg limit results for this material indicates clays of very high plasticity. Liquid Limit results were within the range 75 to 81%. Plastic Limit results between 15 to 19% and Plasticity Indices between 56 to 64%, indicating a High Volume Change Potential.

Standard Penetration Tests were not undertaken. No samples were collected for laboratory shear strength or effective stress testing.

Hand shear vane testing was undertaken within the London Clay Formation soils. The testing apparatus used was limited to undrained shear strength values of 140 kN/m^2. In the very stiff London Clay Formation soils, the undrained shear strength was in excess of 140 kN/m^2.

8.4 Summary of Geotechnical Parameters

Soil Type: Made Ground

Parameters	Range	Suggested Characteristic Value
SPT (N-Value)	Not tested	N/A
Effective Angle of Friction, ϕ' (degrees)	Not tested	26(1)
Bulk Density (Mg/m^3)	Not tested	1.8(1)

1. Value based on our experience of similar soils only.

Soil Type: Head

Parameters	Range	Suggested Characteristic Value
Plasticity Index (%)	64 to 65	65
Effective long term cohesion (kN/m^2)	Not tested	0
Undrained Shear Strength (C_u) (kN/m^2)(1)	62 to 84	55(1)
Bulk Density (Mg/m^3)	Not tested	1.90(2)
Coefficient of Compressibility, M_v (m^2/MN)	Not tested	0.3(2)
Long term effective internal friction angle ϕ' (degrees)	Not tested	26(2)

2. C_u is based upon the hand shear vane values only. A reduction factor has been applied.
3. Value based on our experience of similar soils only.

Soil Type: London Clay Formation

Parameters	Range	Suggested Characteristic Value
Plasticity Index (%)	56 to 64	60
Effective long term cohesion (kN/m^2)	Not tested	0
Undrained Shear Strength (C_u) (kN/m^2)(1)	140+	110(1)
Bulk Density (Mg/m^3)	Not tested	2.00(2)
Coefficient of Compressibility, M_v (m^2/MN)	Not tested	0.2(2)
Long term effective internal friction angle ϕ' (degrees)	Not tested	26(2)

1. C_u is based upon the hand shear vane values only. A reduction factor has been applied.
2. Value based on our experience of similar soils only.

9 Groundwater Levels

Groundwater levels vary considerably from season to season and year to year, often rising in wet or winter weather, and falling in periods of drought. Long-term monitoring from boreholes or standpipes is required to assess the ground water regime and this was not undertaken during the Chelmer ground investigation.

Groundwater was not encountered during the ground investigation, or in the monitoring visits undertaken on 25th September and 1st October 2014.

Groundwater levels should be checked on site prior to the onset of construction activities. If groundwater is present, the effects of hydrostatic uplift will need to be considered in the design of the basement.

10 Swelling and Shrinkage

The Head and London Clay Formation soils would be susceptible to seasonal swelling and shrinkage. However, the proposed development includes a basement. The depth of the proposed foundations is greater than the depth of influence for seasonal swelling and shrinkage. Therefore, no additional foundation deepening would be required.

Changes in the vertical stress resulting from the removal of soils to form the basement and construction of the new building may lead to swelling beneath the basement slab. Consideration will need to be given to the incorporation of compressible buffer materials.

11 Sulphates and Acidity

Chemical analysis of the underlying soils was undertaken by Chelmer. Testing was in accordance with the BRE Special Digest 1, Ref [1].

The site category determined is that of a brownfield location that contain pyrites (or potential pyrites), as the underlying soils form part of the London Clay Formation.

Given the sample numbers tested the characteristic value for sulphate concentration has been determined from the highest measured concentration.

The recorded pH values of the Head and London Clay Formation soils were in the range 7.5 to 8.3.

The recorded concentration of water-soluble sulphates was in the range to 170 to 2,900 mg/kg.

The Design Sulphate Class is DS-3. Groundwater should be assumed to be mobile as flow would be possible through the silt/sand partings within the soils. The ACEC site classification is AC-3.

12 Foundation and Bearing Capacity

Conventional hit-and-miss underpinned foundations are proposed for this site. All loadings should be transferred below the Made Ground and superficial soils, and onto the London Clay Formation.

The proposed formation level of the basement is about 3.1m below existing ground levels.

Based upon the results of the Chelmer Investigation, and allowable bearing pressure of 120 kN/m^2. Is recommended at this level.

13 Excavations and Dewatering

Statutory support will be required in all excavations where personnel must work.

Allowances should be made for seepages within the excavations. Where seepages occur, the soils will soften rapidly. If left exposed, the London Clay Formation soils will also soften rapidly.

Based on the available ground investigation information, it is not anticipated that excavations will encounter significant inflows of water. Seepages should be controllable using localised sumps and pumps. Specialist dewatering activities should not be required.

Where excavation is proposed in close proximity to existing structures care will need to be taken to avoid undermining existing foundations.

Hard ground, such as rock (claystone) bands may be encountered during excavations (particularly piling), and, where necessary, allowance should be made for breaking these using suitable equipment.

14 Basement Construction

14.1 Land Stability

The construction of the basement will lead to vertical and horizontal ground movements caused by a combination of:

- Net changes in vertical soil loading, including both new structural loadings and removal of overburden loading due to soil removal.
- Installation of retaining walls.

- Excavation in front of the retaining walls.

It is likely that any retaining walls would need to be propped at both the top of the wall, and at the basement slab level to help reduce the ground movements associated with the installation of the wall and subsequent excavation in front of it. This would include both temporary and permanent propping. Consideration should be given to a top-down construction sequence, which would allow early installation of robust permanent propping.

14.2 Hydrogeology

The site is underlain by Made Ground, over Head, over London Clay Formation. The top of the London Clay Formation is at about 2.5 to 3.7m below existing site levels. Groundwater was not encountered in the ground investigations or subsequent monitoring.

Groundwater flow is likely to follow local topography, which in this instance slopes very shallowly down towards the east. The hydraulic gradient is, therefore, likely to be small, and groundwater flow slow as a result. The potential for any 'damming' effect from the proposed basement would be low.

No detailed groundwater flow assessment has been undertaken.

REFERENCES

[1] Building Research Establishment (BRE), “SD1 Concrete in aggressive ground,” 2005.

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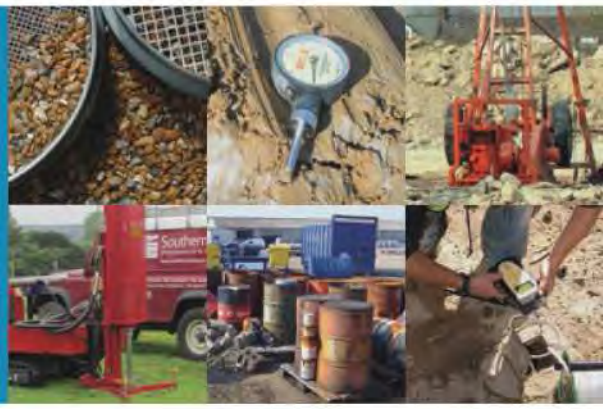
APPENDIX A

Site Plans



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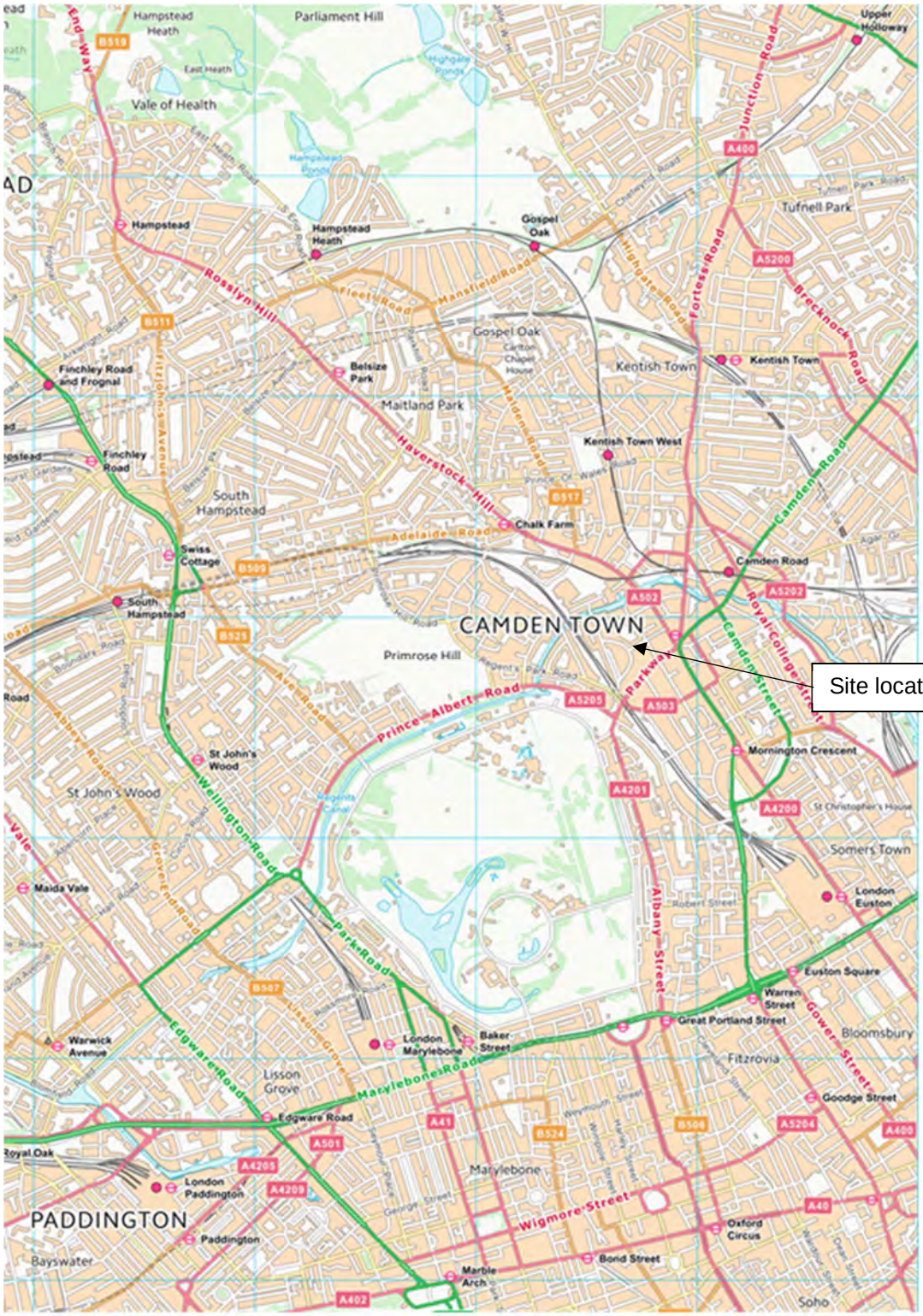

Site:	46 Inverness Street, London, NW1 7HB	Project ID	J13674
Figure 1	Site Location Plan	Date:	11th March 2020

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