Project: **10 Glenmore Road, London, NW3 4DB**

Title: **Basement Impact Assessment**

Rep no: 19029.R01.P1

Date: 30.08.2019

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EXECUTIVE SUMMARY

This basement impact assessment is intended to accompany a planning submission by Studio Mark Ruthven for works proposed to 10 Glenmore Road, London, NW3 4DB. The proposed works comprise the deepening and extension of an existing unlined half-height basement beneath a Victorian terraced house in order to make it fit for residential use.

This report has been written by William Wheeler (MEng) and approved by Sam Riley (MEng CEng MIStructE).

The information provided outlines the impact of the proposed subterranean development in order to satisfy planning guidelines provided by the Borough of Camden. The report is intended to be read in conjunction with all other consultants' drawings and reports submitted with the planning application.

A site investigation has been undertaken to inform the design, establish the position and nature of existing footings and to document the underlying ground conditions. The ground conditions have been found to be MADE GROUND to 1.6m below ground level (BGL), firm medium strength CLAY to 3.0m, high strength CLAY to 5.0m underlain by very dense / hard CLAYSTONE. The site investigation report by Connaughts Site Investigation Ltd. has been appended to this report for reference. Site investigation works included: 8 trial pits including in-situ strength testing, and a single window sample borehole located in the garden to the rear of the property.

No water inflows were encountered within any of the trial pits or the borehole, all of which were noted as dry on completion. A standpipe has been installed to allow future measurements of groundwater level. It is intended to be measured throughout the year to record seasonal variations in groundwater level. The waterproofing strategy comprises a cavity drain along with structurally integral waterproofing by limiting crack widths in concrete and provision of water bars where necessary. These two methods are referred to as "Type B" and "Type C" waterproofing systems respectively. In combination the two systems will achieve Grade 3 basement conditions.

The initial desk study has found the site to be free from any aquifers in superficial deposits, bedrock aquifers, or other hydrogeological considerations. The site is not located near to any significant bodies of water or reservoirs. The site is approximately 5.5km north-west of the river Thames. The site is approximately 74m above sea level, and 70m above the level of the river Thames at its nearest point. Due to its distance from the site, the river it is not expected to cause significant groundwater flow beneath the site. The site is outside of all flood risk zones (designated "very low risk" which means that each year this area has a chance of flooding of less than 0.1%, according to information freely available from the Environment Agency and from gov.uk). There remains the possibility of localised flooding from extreme rainfall events or from burst water mains, and the basement waterproofing strategy has been designed to resist water pressures resulting from these worst-case scenarios.

The existing half-height basement is to be deepened and extended to the rear of the building. All existing footings around the basement perimeter are to be underpinned to facilitate the deepening. Underpins are to be formed with adequate toe lengths to retain earth pressures from both neighbouring properties and will be designed to prevent any detrimental ground movement around the perimeter. The lightwell in front of the building will also be deepened, and a new retaining wall will be cast around its perimeter to resist lateral soil pressures and prevent detrimental ground movement in the adjacent road and neighbouring properties. A propped sheet pile wall will be installed around the perimeter of the lightwell to resist earth pressures in the temporary case before the permanent retaining wall is cast against it. A new retaining wall will be formed in an underpinning sequence along the rear boundary of the extended basement to withstand soil pressures and provide support to the ground floor structure and rear elevation above. The underpins and retaining walls to the front and rear of the basement will be tied together to form the walls of a concrete retaining structure surrounding the whole basement, with a new concrete slab forming the base. The weight of the modified building will resist global uplift forces from worst-case ground water pressures. The basement slab will likewise be designed to resist uplift pressures from ground water. Load-bearing blockwork walls will be constructed in the basement supporting an arrangement of steel beams which in turn support the ground floor structure. A box frame

will be installed at ground floor level, above the new rear retaining wall, to provide lateral stability in place of the demolished rear elevation wall along gridline 4. An allowance for dewatering may be required during construction, however the site investigation has recorded that the water table was not encountered at any depth reached by the borehole nor in any of the trial pits. The standpipe will be monitored during future design stages to confirm the ground water level.

The proposed extension of the basement will not impact on the existing sewer which runs beneath the road to the front of the property. Existing drainage runs servicing the house will be re-routed within the house to facilitate the excavation of the basement.

The basement underpins, retaining walls, and slabs will be constructed from in-situ reinforced concrete. A construction sequence has been developed to demonstrate that the proposals are achievable using well established construction methods. Indicative temporary works proposals are also included to demonstrate where support will be required in order to limit ground and building movement.

Movement monitoring is proposed for the party walls to both neighbouring properties, no.8 and no.12 Glenmore Road, as well as for the retaining wall around the lightwell to check for movement along the boundary with the road. All other properties are considered to be at a sufficient distance from the works that they will not experience movements associated with the excavations. During construction, noise, vibration and dust will be managed and monitored to ensure that they are kept to acceptable levels for the duration of the works.

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1 INTRODUCTION

The purpose of this assessment is to consider the effects of a proposed basement development by Studio Mark Ruthven at 10 Glenmore Road, London, NW3 4DB on the local hydrology, geology and hydrogeology, and potential impacts to neighbours and the wider environment. The site location is presented in *Figure 1*.

This report is to be read in conjunction with all Architect's and other consultants' drawings and reports submitted with the planning application.

The BIA approach follows current planning procedure for basements adopted by the Borough of Camden.

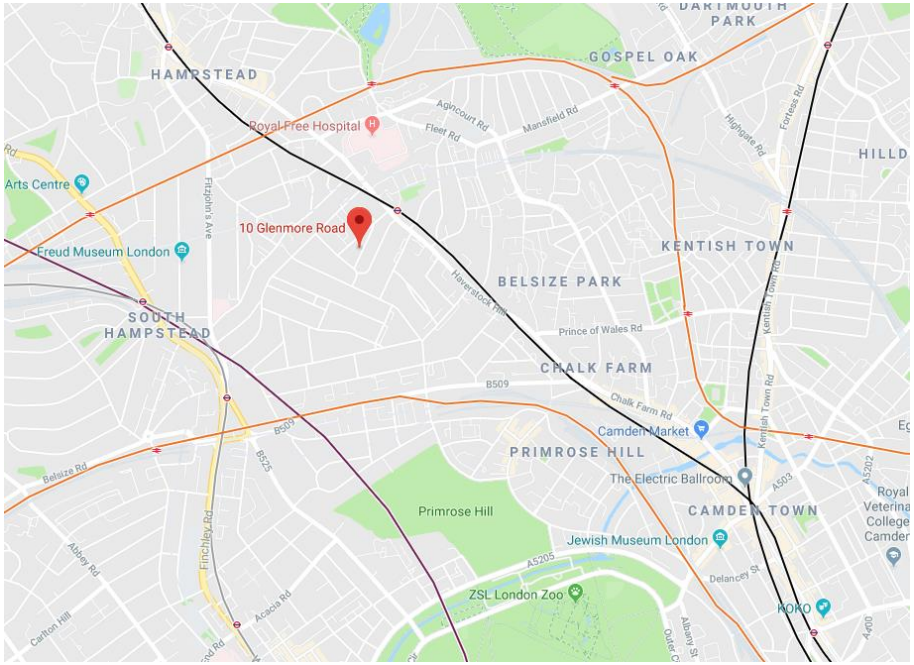

Figure 1: Location of site

2 EXISTING STRUCTURAL ARRANGEMENT

2.1 Site Overview

The property is assumed to have been constructed between 1896 and 1914, from historical Ordinance Survey maps presented in *Figures 2 & 3*. The site is assumed to have been solely in residential use since the terrace was initially constructed. There is no recorded unexploded ordinance in the surrounding area.

The road has a gradient which falls downhill to the South.

The existing Victorian terrace, of which the property is a part, is constructed from brickwork with timber roofs and internal partitions. The houses are expected to include masonry spine walls up to first floor level for lateral stability. The terrace appears to be in good condition structurally with no evidence of settlement or other deterioration.

Neighbouring buildings (8 and 12 Glenmore Road) are not believed to be listed. Neighbouring gardens and trees will be protected during the works. There is no apparent adjacent infrastructure other than the road itself, and consequently there is no requirement to contact asset owners. The Highways Agency will be contacted in order to agree a suitable surcharge value for the road.

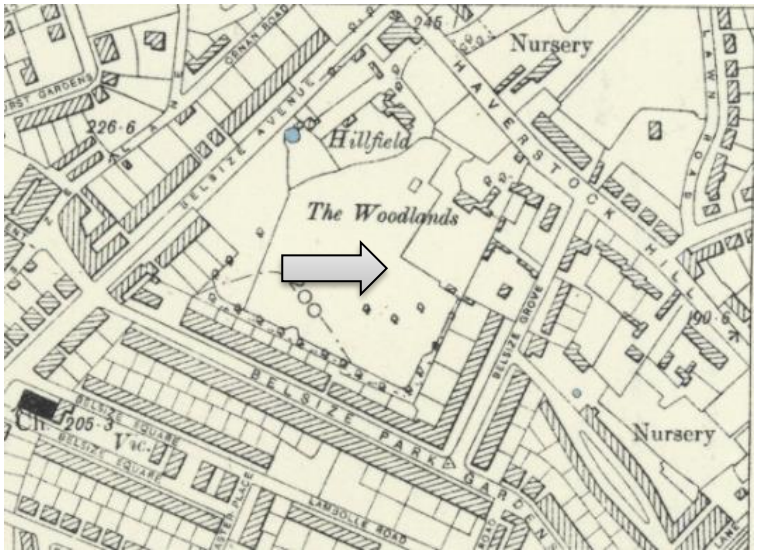

Figure 2: OS map from 1896 indicating absence of the terrace

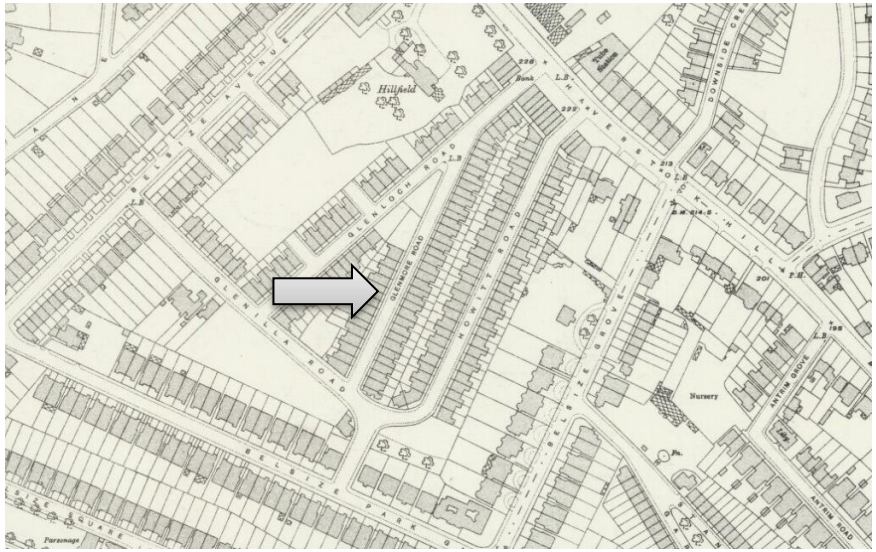

Figure 3: OS map from 1914 indicating presence of the terrace

2.2 Geology

A preliminary desktop study of the site and the surrounding area has been undertaken with reference made to information freely available from the British Geological Survey (BGS) and the Environment Agency.

A 1:50,000 scale map from the BGS indicated that the site is underlain by the London Clay Formation. No superficial deposits are recorded. A site investigation has been undertaken to confirm and augment the findings from the desk study.

The site investigation report, by Connaught's Site Investigation Ltd., is included as an appendix to this report.

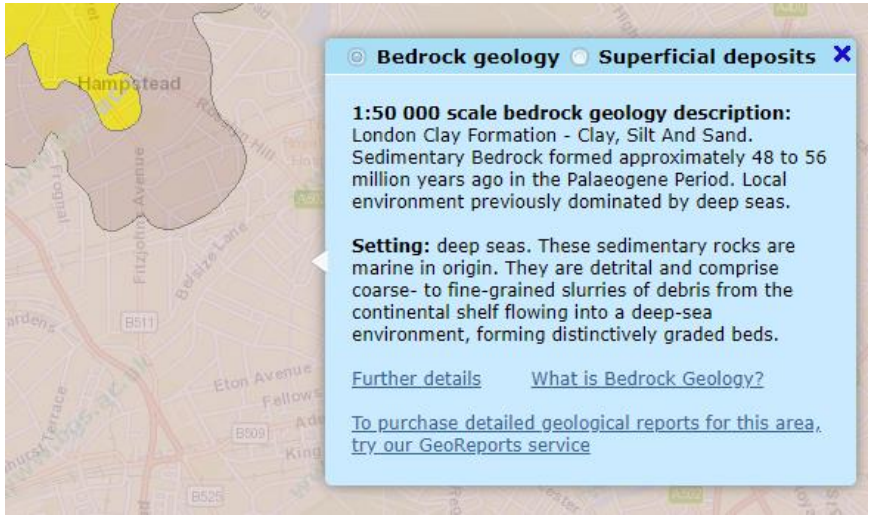

Figure 4: BGS Bedrock geology

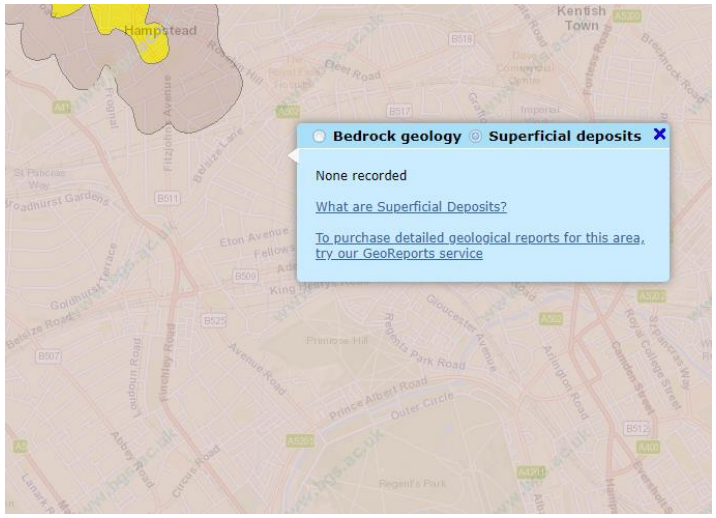

Figure 5: BGS Superficial deposits

In summary of the site investigation borehole log (all depths provided from rear garden level of +65.40m):

MADE GROUND: 0.0m – 1.60m BGL.
No strength tests were carried out in the MADE GROUND stratum.

Firm to stiff brown CLAY: 1.60m – 5.00m BGL.
Dynamic probe SPT tests indicate an allowable bearing pressure of between 90kPa – 200kPa increasing monotonically with depth. At founding level of 62.900m the allowable bearing pressure is assumed to be 120kPa from linear interpolation and from back analysis of the existing footings.

Hard/very dense CLAYSTONE: 5.00m – END.
Dynamic probe results show this to be a very high strength stratum.

No groundwater was encountered during the drilling of the borehole, which was recorded as dry on completion. A standpipe has been installed to allow future measurements of groundwater level throughout the year to assess the seasonal variation in height.

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Appendix No. 3
Sheet No. 1
Job No. 0762
Date. July 2019

Borehole 1

LOCATION **10 Glenmore Road, London, NW3 4DB**

Method: Window sampler

Description of Stratum	(m)	Legend	Depth (m)	Samples Type	Samples Depth	Tests Type	Tests Value	Field Observations
Astriturf over orange brown, coarse sand			0.20m	U1	0.00			87mm dia. 90% recovery
Soft to firm, brpwn and brownish grey, slightly gravelly, slightly sandy clay with gravel fine, angular, red brick and rare ash fragments (MADE GROUND).	0.5							
	1.0			U2	1.00	N	8 blows	87mm dia 90% recovery Borehole cased to 1.00m
	1.5		1.60m					
Firm becoming stiff, medium strength, brown with some light grey veining, CLAY								
	2.0			U3	2.00	N	9 blows	77mm dia 100% recovery
	2.5							
Becoming high strength from 3.00m	3.0			U4	3.00	N	12 blows	77mm dia 100% recovery
	3.5							
	4.0			U5	4.00	N	19 blows	77mm dia 100% recovery
	4.5							
	5.0		5.00m					
Hard / vey dense light brown CLAYSTONE			5.10m	*	5.00	N	75+ blows	for 100mm travel
WS1 closed at 5.10m due to impenetrable nature of claystone band.								

Figure 6: Excerpt from site investigation borehole log

3 HYDROGEOLOGY AND HYDROLOGY

3.1 Hydrogeology

Information regarding the hydrogeology of the site is readily available from the British Geological Society and the Environment Agency allowing the hydrogeological characteristics of the site to be preliminarily defined. From *Figures 7 & 8* it is reasonable to assume that the site is unaffected by any aquifers and is outside of groundwater vulnerability zones.

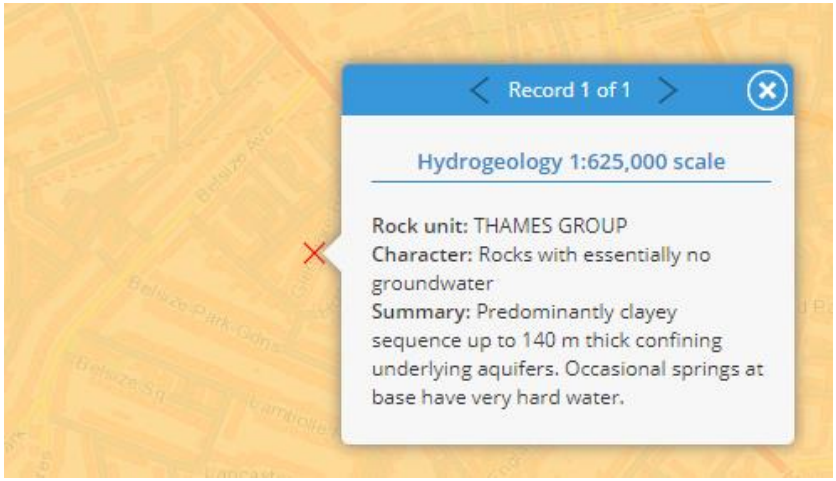


Figure 7: BGS Hydrogeology map of site and surroundings

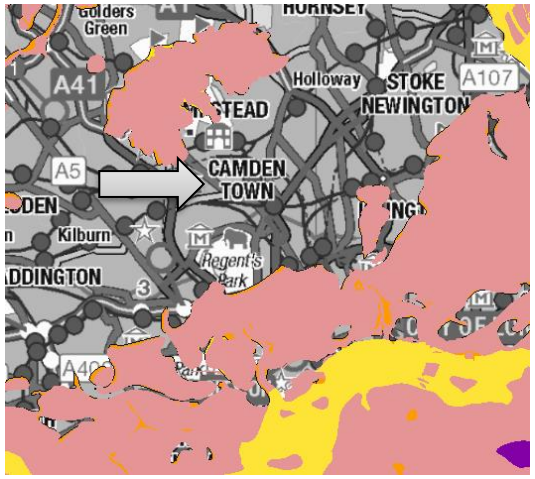


Figure 8: DEFRA map showing bedrock aquifers, superficial drift aquifers, and groundwater vulnerability zones

Further measurements of groundwater level will be taken from the standpipe at intervals throughout the design process. From the current information it is reasonable to conclude that the water table is likely to be below the founding level of the proposed basement. Consequently, the proposed basement is not likely to interfere with the hydraulic gradient and groundwater flow in the area.

3.2 Hydrology

3.2.1 Surface water features

The site is approximately 5.5km north-west of the river Thames. The site is approximately 70m above the level of the river Thames at its nearest point. Due to its distance from the site, the river it is not expected to cause significant groundwater flow beneath the site. The site is outside of all flood risk zones (designated “very low risk” which means that each year this area has a chance of flooding of less than 0.1%, according to information freely available from the Environment Agency and from gov.uk). The site is approximately 60km from the sea and 74m above sea level.
From this evidence is may be assumed that the site will be unaffected by surface water features.

3.2.2 Flooding

A review of the information available from the Environment Agency indicates that the site is outside of any flood risk zones. It is designated “Very low risk” which means that each year this area has a chance of flooding of less than 0.1%, according to information from the flood warning information service on gov.uk.

The site is at an altitude of 74m above sea level, significantly higher than nearby bodies of water, most significant of which is the river Thames at approx. 3m above sea level. It can be assumed that the site is not at risk of flooding.

In the unlikely event of localised flooding due to a burst water main, the waterproofing strategy of structural concrete and a cavity drain is adequate to alleviate the risk of the basement flooding.

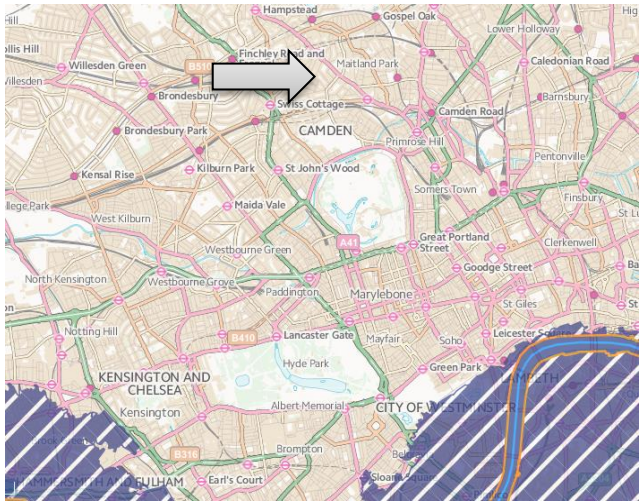


Figure 9: flood risk map from Environment Agency

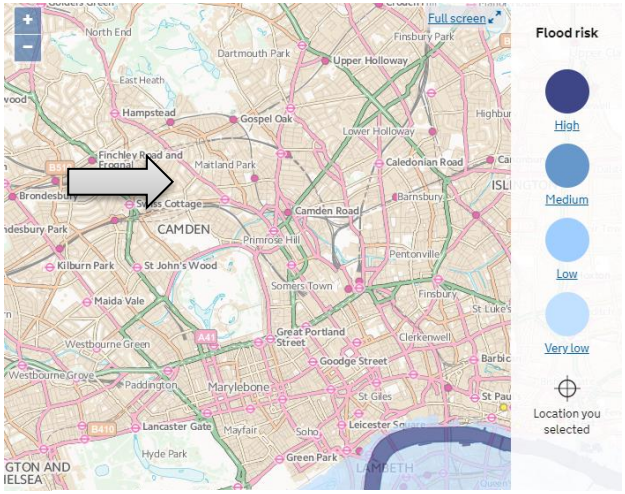


Figure 10: flood risk map from gov.uk

4 IMPACT ON UNDERGROUND STRUCTURES

The closest significant infrastructure is the Northern underground train line, approximately 500m north-west of the site. The proposed works are not expected to impact this structure, and vice versa.

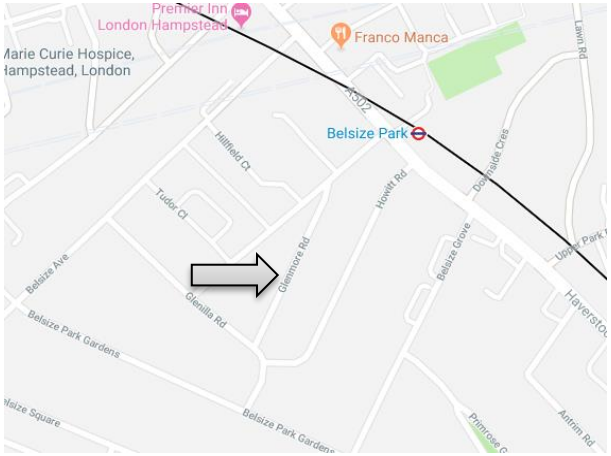


Figure 11: Location of Northern Line

5 ARCHAEOLOGY

From information publicly available on the Museum of London Archaeology's website, there have been no major archaeological finds close to the site. This suggests that it is unlikely for the presence of archaeological artefacts to hinder the proposed development. No archaeological surveys are planned during the works.

6 PROPOSED STRUCTURAL WORKS

The Architect's proposal provides an enlarged and upgraded single storey basement that is suitable for domestic use. The existing half-height basement is to be deepened and extended to the rear of the building. The existing basement floor is approximately 1.2m below pavement level, and the proposed basement floor level is approximately 2.2m below ground level. Therefore, the required excavation is in the order of 1.5m allowing for an increased floor build-up, sand blinding and hardcore.

The internal walls and rear retaining wall of the existing basement will be demolished during the works. Where existing load bearing walls are demolished, they will be replaced with either steel beams or new load bearing blockwork walls constructed on the new basement slab.

Trial pit logs from the site investigation reveal the existing footings to all party and perimeter walls to be formed from corbelled masonry over mass concrete strip footings. Depths below existing basement floor level vary between approximately 500mm and 1120mm. All existing footings around the basement perimeter are to be underpinned to facilitate the required deepening. Underpins are to be formed with adequate toe widths to retain earth pressures from both neighbouring properties and will be designed to prevent any detrimental ground movement around the perimeter. All footings, existing and proposed, are founded in the CLAY stratum.

The lightwell in front of the building will be deepened to suit the proposed basement floor level, and a new retaining wall will be cast around its perimeter to resist lateral soil pressures and prevent detrimental ground movement in the adjacent road and neighbouring properties. A new retaining wall will be formed along the rear boundary of the extended basement to withstand soil pressures and provide support to the ground floor structure and rear elevation above. The underpins and retaining walls to the front and rear of the basement will be tied together to form the walls of a concrete retaining structure surrounding the whole basement, with a new concrete slab forming the base. The weight of the modified building will resist global uplift forces from worst-case ground water pressures. The basement slab will likewise be designed to resist uplift pressures from ground water. Load-bearing blockwork walls will be constructed in the basement supporting an arrangement of steel beams which in turn support the ground floor structure. Party wall loads are safely transferred to ground by the underpins, which in the permanent case will act monolithically with the basement slab to spread loads across the base of the concrete retaining structure.

To maintain lateral stability a steel box frame will be installed at ground level. This is supported on the proposed concrete retaining wall at the rear boundary of the enlarged basement, which will then carry racking loads from the box frame to ground.

6.1 Below ground drainage

The detailed design of the below ground drainage will be developed in future stages by specialist consultants and the contractor. There is a single existing drainage run from the back of the building to an existing manhole in the front lightwell which requires re-routing in order to form the lowered basement. This may either run through the proposed basement within wall finishes, be re-routed at higher level (e.g. within basement ceiling finishes) or be re-routed into the proposed sumps (beneath the basement slab) and pumped out into the existing manhole. It is possible that other options are also available, and this will be developed in future stages of the design.

Since the existing building covers the full footprint of the site there is no increase in impermeable hard standings and therefore no increase in the water runoff from the site and no alterations to the external sewers will be required.

7 PROPOSED TEMPORARY WORKS

In order to demonstrate buildability, a proposed construction sequence has been developed (see drawings 19029.601-602 appended). The sequence has been developed with the aim of minimising movement of the ground, movement of the existing buildings, and requirement for temporary works in order to reduce construction time and minimise risk during construction.

If performed to the correct sequence and methodology by a competent contractor, the proposed underpins will not require any temporary works. Throughout the works, underpins are to be installed before the adjacent areas are excavated to ensure no existing footings are undermined.

The retaining wall to the rear of the proposed basement will be constructed using an underpinning sequence and therefore, if performed to the correct sequence and methodology by a competent contractor, will not require any temporary support.

A propped sheet pile wall will be installed around the perimeter of the lightwell to resist earth pressures in the temporary case before the permanent retaining wall is cast against it.

Before demolition of the internal walls in the existing basement, props will be installed to provide vertical support to the existing ground floor structure. These will be kept in place until the full works are completed, by which time the permanent load bearing walls and steelwork arrangement will be in place to support the existing ground floor and structure above.

8 CONSTRUCTION SEQUENCE

The following sequence is to be read in conjunction with drawings 19029.601-602 (appended).

Stage 1: Existing site
To enable access, all non-load bearing internal walls and windows etc. will be removed prior to commencing the works.

Stage 2: Lightwell preliminaries
a) Install sacrificial sheet piles around perimeter of proposed lightwell.
b) Install temporary drainage to main house.
c) Install beam to front elevation to span over proposed new opening between basement and lightwell.

Stage 3: Lightwell construction
a) Form opening in front wall onto lightwell.
b) Underpin remainder of front wall.
c) Break out existing lightwell slab and manhole structure down to proposed formation level.
d) Install reinforced concrete retaining walls around lightwell.

Stage 4: Underpinning and retaining wall construction
a) Prop existing ground floor structure.
b) Remove internal load bearing basement walls.
c) Break out local sections of existing retaining wall along rear boundary. Allow for local battering back of soil behind wall.
d) Install underpins beneath both party walls and new rear retaining wall to proposed underpinning sequence.

Stage 5: Basement extension
a) Excavate remaining soil in rear area of basement.
b) Remove existing rear retaining wall.

Stage 6: Basement excavation and slab formation
a) Excavate whole basement to new founding level.
b) Install new drainage runs and sumps.
c) Form new reinforced concrete slabs to basement and lightwell, tied in to underpins and retaining walls.

Stage 7: Construction of internal structure
a) Construct new load-bearing blockwork walls in basement.
b) Install new steel arrangement to provide support to ground floor.
c) Install box frame at ground floor level seated on new retaining wall at rear boundary of basement.

Stage 8: Completion
a) Remove props from basement.
b) Install cavity drain and finishes.

9 FOUNDATIONS

9.1 Suitability of the ground for the proposed structure

The proposed basement formation level is within the firm to stiff CLAY stratum which, from information supplied by the site investigation, is estimated to provide an allowable bearing pressure of 120kPa. Based on this information it is anticipated that a “toe” length of 1.4m for all underpins will spread building loads over an adequate area.

The formation stratum is reported to be highly plastic, leading to a necessary consideration of heave pressures on the basement slab. The slab will consequently be designed with sufficient strength in hogging to resist heave pressures.

9.2 Impact on surrounding structures and infrastructure

The property is bounded by buildings on both sides by no. 8 and no. 12 Glenmore Road in a terraced arrangement. During the construction of the basement, both party walls will be underpinned. A movement monitoring strategy will therefore be developed to ensure that building movements relating to the construction of the basement are within acceptable limits.

The garden to the rear of the property backs on to the garden of 19 Glenloch Road. Due to the distance from the proposed basement it is not anticipated that there will be any resulting ground movement along this boundary.

No.8, No.12, and the retaining wall adjacent to Glenmore Road will be monitored for movement throughout the project. This will consist of a system of targets, monitored and logged at regular interval by an independent surveying specialist. Should structural movement exceed that agreed with the Party Wall Surveyor it will be identified early, enabling contributory causes to be investigated and addressed before any significant damage occurs.

The anticipated damage to the surrounding properties is Category 1 or less, as defined in CIRIA 580 and reproduced Table 9.1 below.

Category of Damage	Description of Typical Damage	Approximate Crack Width (mm)
0 Negligible	Hairline cracks of less than 0.1mm are classed as negligible	< 0.1
1 Very Slight	Fine cracks that can be easily treated during normal decoration. Perhaps isolated slight fracture in building. Cracks in external brickwork on inspection.	< 1
2 Slight	Cracks easily filled. Redecoration probably required. Several slight fractures showing inside of building. Cracks are visible externally and some repointing may be required externally to ensure weathertightness. Doors and windows may stick slightly.	< 5
3 Moderate	The cracks require some opening up and can be patched by a mason. Recurrent cracks can be masked by suitable linings. Repointing of external brickwork and possibly a small amount of brickwork to be replaced. Doors and windows sticking.	5 – 15

Table 9.1: Classification of visible damage to walls (from CIRIA 580)

9.3 Slope stability

Generally, in the permanent case, soil will be supported by existing masonry walls, new concrete underpins, and new concrete retaining walls. Sacrificial sheet piling will withstand soil pressures around the lightwell in the temporary case. Soil will be battered back within the basement to facilitate installation of underpins and the new rear retaining wall in an underpinning sequence. Slope stability calculations have not been carried out as part of the initial design. However, slope stability information will be obtained from the site investigation company to allow the contractor to batter back the slopes to safe working angles.

9.4 Ground movement

The new basement will be founded on a clay stratum which has been reported as highly plastic by the site investigation. Therefore, consideration will be made for ground movement due to removal of overburden from excavation, as well as ground movement from heave due to cyclic annual hydration/dehydration of the clay. Further measurements of the position of groundwater will be made during the design period to assess the significance of the latter movement. The clay stratum is approximately 2.5m thick beneath the proposed basement slab and the underlying CLAYSTONE bedrock, which may be assumed to be comparatively rigid and unexpansive. As previously described, the ground bearing slab will be designed with adequate strength to resist heave pressures from the expansion of the clay. The ground bearing slab will also be designed for a separate load case of buoyancy pressures resulting from localised flooding.

9.5 Impact on existing and proposed trees

There are no trees within the garden of the property. There are some trees present in gardens further down the terrace which are greater than 10m away from the proposed development. Additionally, the basement founding level is approximately 2.5m below the base of the trees. Therefore, the proposed development will have no impact on any existing trees.

10 BASEMENT WATERPROOFING

The basement is a ventilated residential space and is therefore classified as Grade 3 to BS 8102. Waterproofing will be provided by means of a drain cavity system applied in front of the underpins and retaining walls. The drained cavity protection would be provided by means of non-loadbearing metal stud walls around the full basement perimeter and a traditional raised screed across the floor. Sumps in the basement slab will be constructed to house pumps to remove any water ingress through the primary concrete structure. Ventilation will be provided by means of a mechanical ventilation system.

11 ENVIRONMENT – NOISE, VIBRATION AND DUST

During the construction works the Contractor will manage dust, air pollution, odour and exhaust emissions.

12 TRAFFIC MANAGEMENT STATEMENT

Construction traffic will be carefully managed throughout with the contractor producing a construction management plan.

Construction vehicles will need to deliver and remove materials from site. Two of the main processes that will require vehicles are the removal of rubble and spoil during demolition and excavation, and the delivery of concrete. These are summarised below.

It is envisaged that to accommodate the construction traffic two parking spaces on Glenmore Road directly in front of no. 10 will need to be suspended throughout construction.

12.1 Demolition and Excavation Traffic

The demolition and excavation will produce rubble and spoil which will need to be removed from site. The material will be stored at the front of the site behind a secure hoarding and removed by grab lorries. Site operatives will ensure protection of the pavement and manage pedestrian and vehicular traffic as required during the removal of spoil. It is estimated that excavation will take 5-6 weeks to complete with one grab lorry per day.

12.2 Concreting Traffic

Concrete deliveries will be required intermittently throughout construction. Following completion of the basement excavation, the substructure will require concrete to pour the underpins, slabs and retaining walls. The first key stage will be casting the underpins and retaining walls to the front and rear of the basement. Concreting will require both a concrete pump and concrete mixing lorry.

13 SUPPORTING DOCUMENTS

13.1 Structural Drawings

This report should be read in conjunction with the following structural engineering drawings – see Appendix A:

19029.201.P2	Proposed Basement Plan
19029.202.P1	Proposed Ground Floor Plan
19029.301.P1	Proposed Typical Sections
19029.601.P2	Construction Sequence Plans
19029.602.P2	Construction Sequence Sections

14 APPENDIX A – Structural drawings

19029.201.P2	Proposed Basement Plan
19029.202.P1	Proposed Ground Floor Plan
19029.301.P1	Proposed Typical Sections
19029.601.P2	Construction Sequence Plans
19029.602.P2	Construction Sequence Sections

NOTES:

This drawing is to be read in conjunction with all other Architects and Engineers drawings, details and specifications.

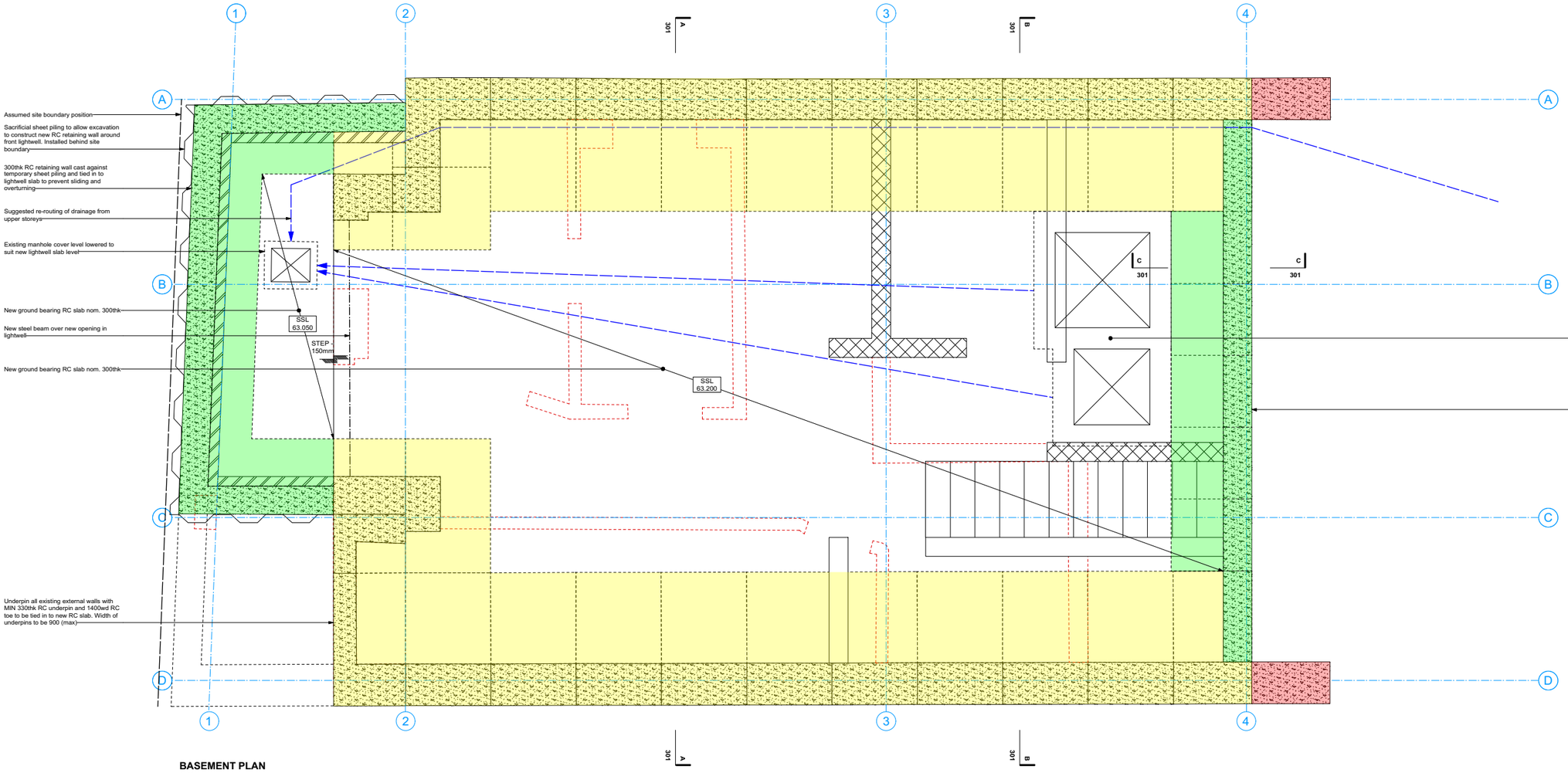
Any discrepancies in the arrangement and details discovered on site, or otherwise, are to be reported to the Architect or Engineer immediately.

All dimensions in mm.

Do not scale from this drawing. Setting out to Architect's details.

All drawings to be printed in colour.

No. 12



BASEMENT PLAN
1:25

No. 8

KEY:

- Foundations
- Existing structure
- Existing structure demolished
- Brickwork
- Reinforced concrete
- Timber
- Hidden structure over
- Hidden structure under
- Non-structural partitions
- Finishes
- Load bearing blockwork wall
- Padstone
- Hardcore
- Steelwork Arrangement
- N
- Reinforced Concrete Underpins
- Half-Height Transition Underpins
- Reinforced Concrete Retaining Walls

PRELIMINARY

rev.	description	date
P2	Sumps relocated	03.09.2019
P1	First Issue	30.08.2019

STRUCTURE WORKSHOP
Engineering & Technical Design
4 Iliffe Yard
London SE17 3QA
020 7701 2616
www.structureworkshop.co.uk

project: Glenmore Road	scale: 1:25 @ A1
	drawn: WW
	appr.: SR
title: Proposed Basement Plan	drg. no.: 19029.201
	rev.: P2

NOTES:

This drawing is to be read in conjunction with all other Architects and Engineers drawings, details and specifications.

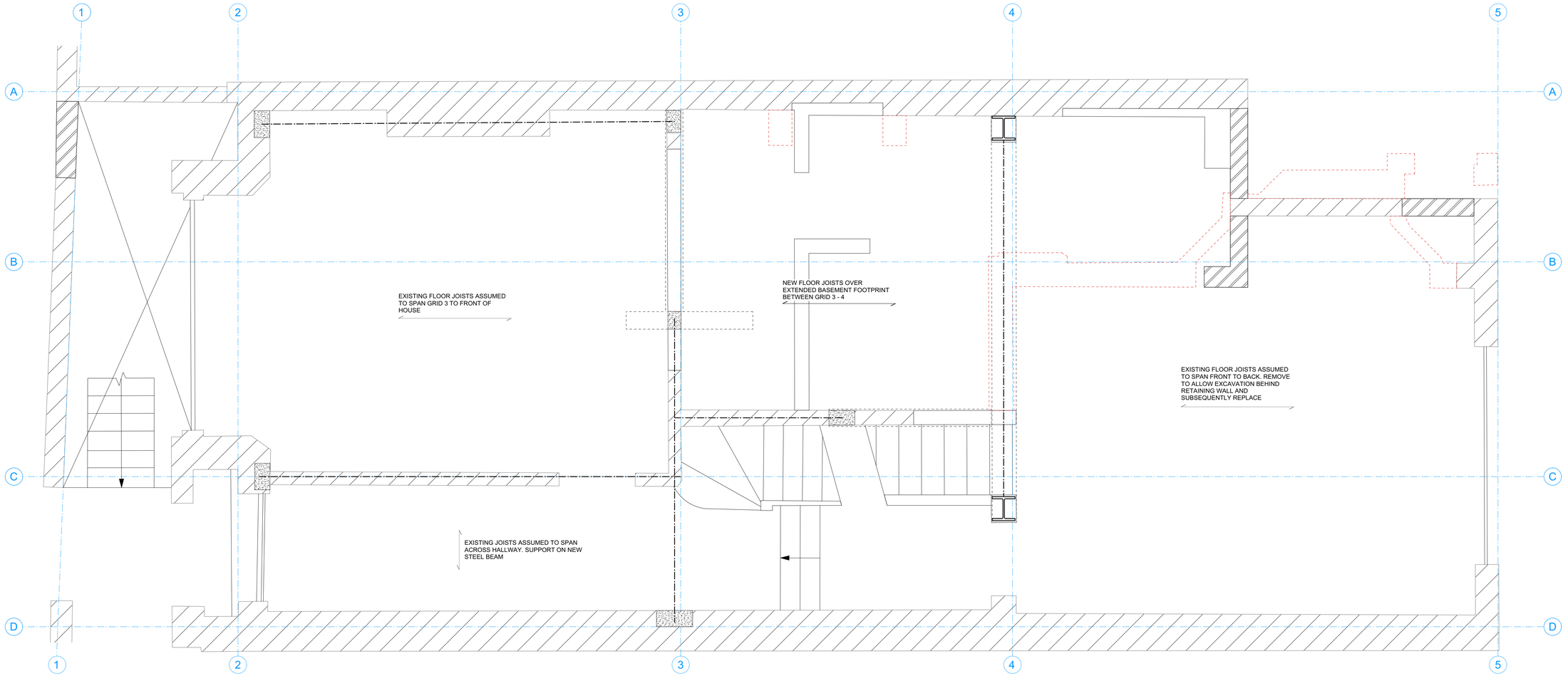
Any discrepancies in the arrangement and details discovered on site, or otherwise, are to be reported to the Architect or Engineer immediately.

All dimensions in mm.

Do not scale from this drawing. Setting out to Architect's details.

All drawings to be printed in colour.

No. 12



GROUND FLOOR PLAN
1:25

No. 8

KEY:

- Foundations
- Existing structure
- Existing structure demolished
- Brickwork
- Reinforced concrete
- Timber
- Hidden structure over
- Hidden structure under
- Non-structural partitions
- Finishes
- Load bearing blockwork wall
- Padstone
- Hardcore
- Steelwork Arrangement
- N

PRELIMINARY

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rev.	description	date
P1	First Issue	30.08.2019

project: Glenmore Road	scale: 1:25 @ A1
	drawn: WW
	appr.: SR
title: Proposed Ground Floor Plan	drg. no.: 19029.202
	rev.: P1

NOTES:

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All dimensions in mm.

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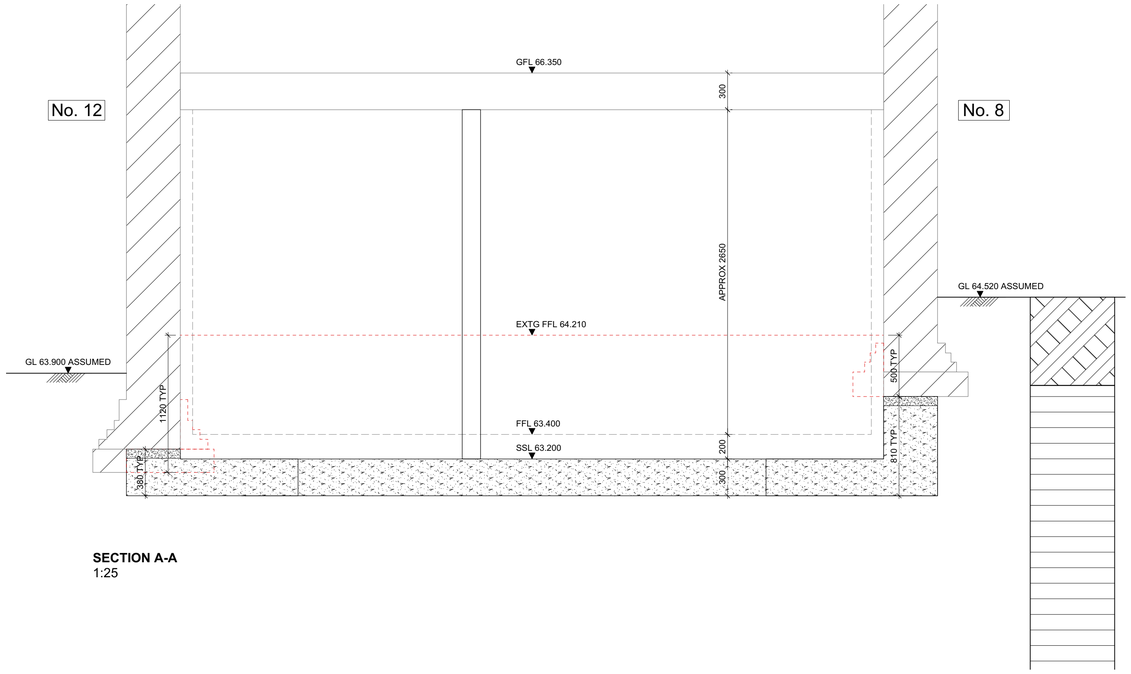
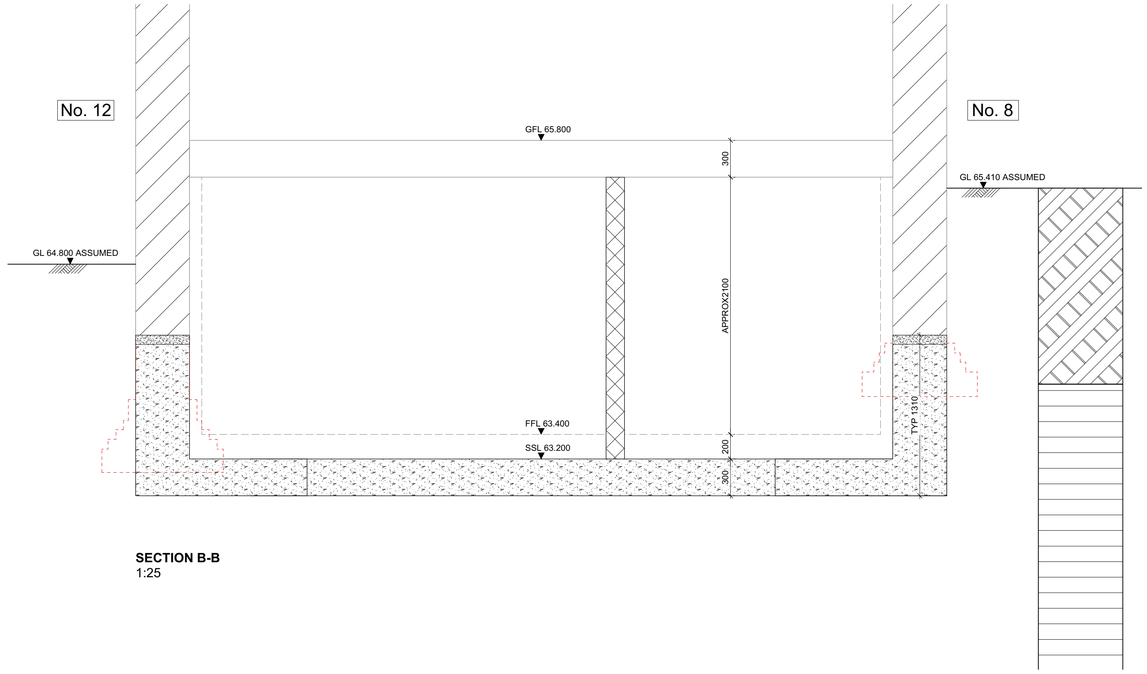
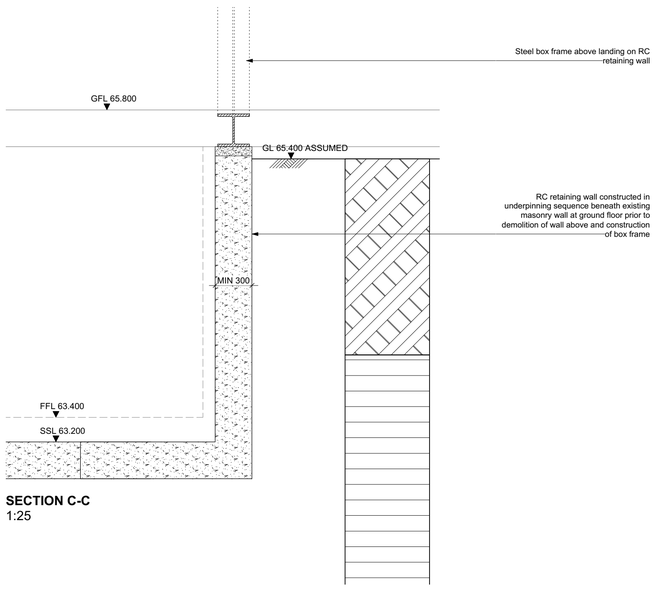


SECTION A-A
1:25



SECTION B-B
1:25



SECTION C-C
1:25

KEY:

- Existing masonry
- Existing timber
- Hidden structure under
- Finishes
- Reinforced concrete
- Steel section
- Dry pack
- Load bearing blockwork
- Load bearing blockwork (section)
- Existing structure demolished
- Ground (MADE GROUND)
- Ground (firm/stiff CLAY)

NOTE:

GROUND WATER NOT ENCOUNTERED DURING SITE INVESTIGATION AND CONSEQUENTLY NOT SHOWN ON SOIL PROFILE. FURTHER GROUND WATER MEASUREMENTS TO BE TAKEN DURING FUTURE DESIGN STAGES.

rev.	description	date
P1	First Issue	30.08.2019

PRELIMINARY

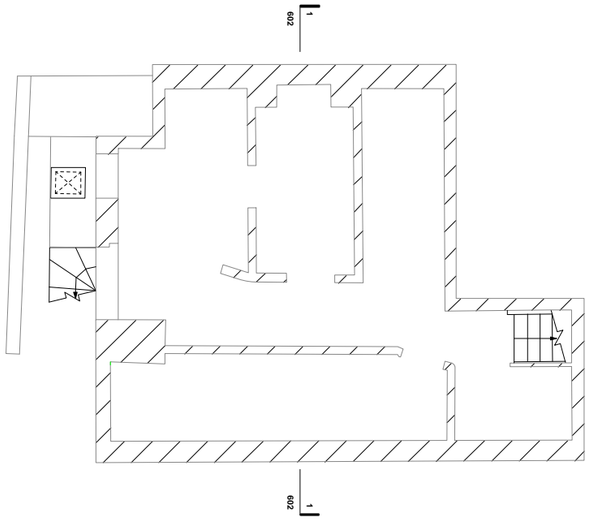
STRUCTURE WORKSHOP
Engineering & Technical Design
4 Iliffe Yard
London SE17 3QA
020 7701 2616
www.structureworkshop.co.uk

project: **Glenmore Road**

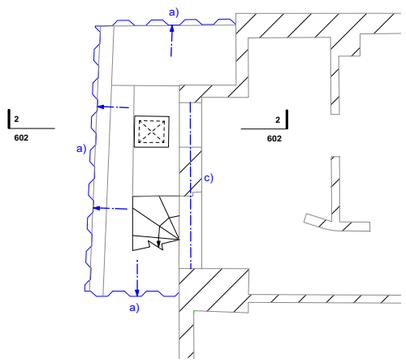
title: **Proposed Basement Sections**

scale	1:25 @ A1
drawn	WW
appr.	SR
drg. no.	19029.301
rev.	P1

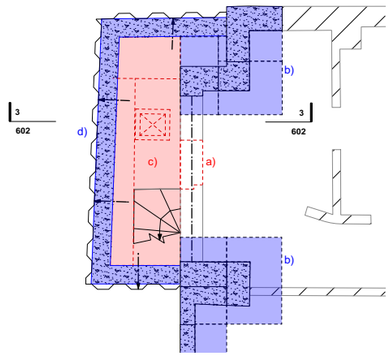
1. Existing arrangement



2. a) Install sheet piles
b) Install temporary drainage
c) Install beam over proposed lightwell opening



3. a) Form opening in front wall
b) Underpin remaining runs of front wall
c) Break out existing slab in lightwell, excavate and lower manhole cover level
d) Install RC retaining walls against sheet piles



NOTES:

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All dimensions in mm.

Do not scale from this drawing. Setting out to Architect's details.

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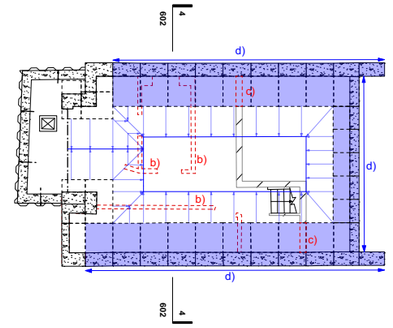
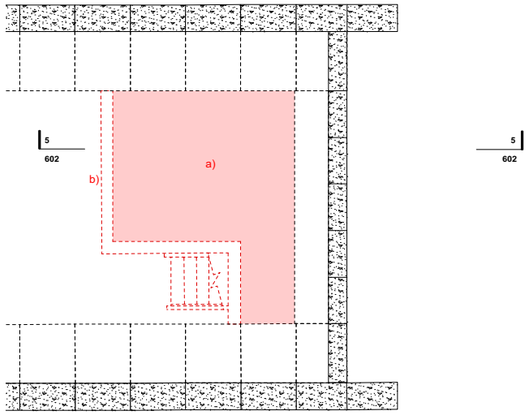
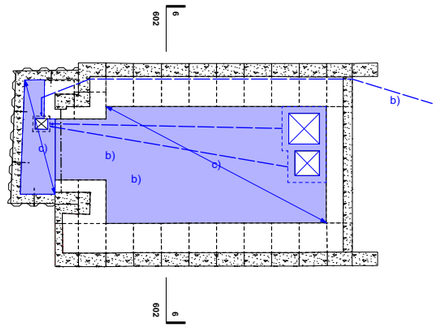
4. a) Prop existing ground floor structure
b) Remove internal basement walls
c) Break out local sections of existing rear retaining walll
d) Install underpins beneath both party walls and construct new rear retaining wall to proposed underpinning sequence



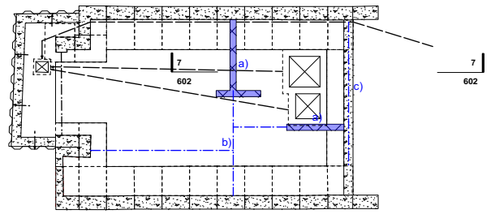
5. a) Excavate rear area of extended basement
b) Remove existing retaining wall along rear of existing basement



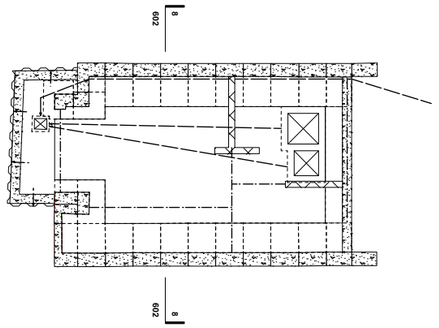
6. a) Excavate whole basement to new founding level
b) Install new drainage runs and sumps
c) Install new basement slabs



7. a) Construct new load-bearing blockwork walls in basement
b) Install new steelwork to support ground floor
c) Install box frame seated on new retaining wall



8. a) Remove props
b) Install cavity drain and finishes



rev.	description	date
P2	Sumps relocated	03.09.2019
P1	First Issue	30.08.2019

PRELIMINARY

STRUCTURE WORKSHOP
Engineering & Technical Design
4 Iliffe Yard
London SE17 3QA
020 7701 2616
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project: **10 Glenmore Road**

title: **Construction Sequence Plans**

scale	NTS
drawn	WW
appr.	SR
drg. no.	19029.601
rev.	P2

NOTES:

This drawing is to be read in conjunction with all other Architects and Engineers drawings, details and specifications.

Any discrepancies in the arrangement and details discovered on site, or otherwise, are to be reported to the Architect or Engineer immediately.

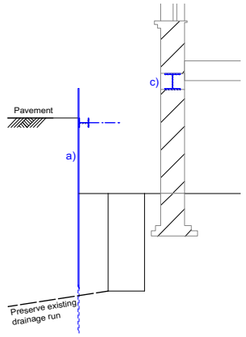
All dimensions in mm.

Do not scale from this drawing. Setting out to Architect's details.

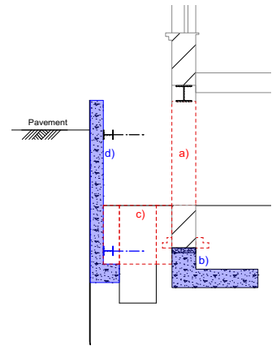
All drawings to be printed in colour.

1. Existing arrangement

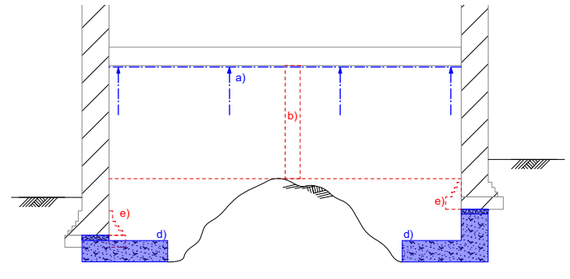
2. a) Install sheet piles
b) Install temporary drainage
c) Install beam over proposed lightwell opening



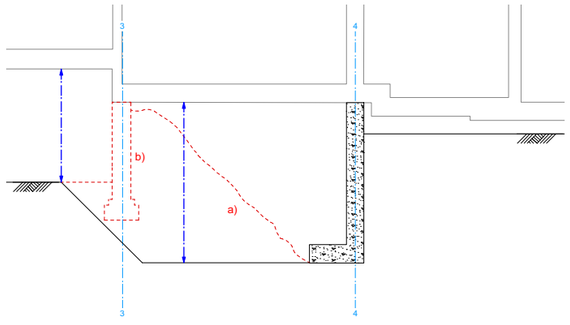
3. a) Form opening in front wall
b) Underpin remaining runs of front wall
c) Break out existing slab in lightwell, excavate and lower manhole cover level
d) Install RC retaining walls against sheet piles



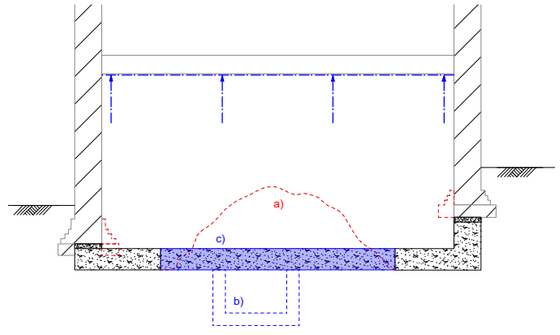
4. a) Prop existing ground floor structure
b) Remove internal basement walls
c) Break out local sections of existing rear retaining walll
d) Install underpins beneath both party walls and construct new rear retaining wall to proposed underpinning sequence
e) Cut back masonry corbels



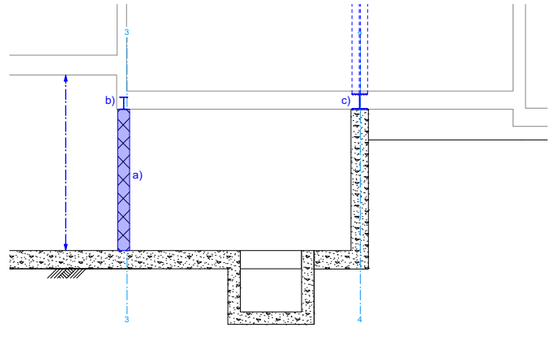
5. a) Excavate rear area of extended basement
b) Remove existing retaining wall along rear of existing basement



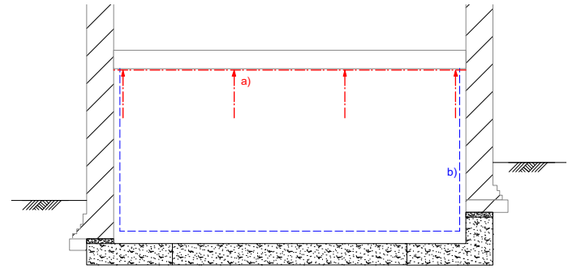
6. a) Excavate whole basement to new founding level
b) Install new drainage runs and sumps
c) Install new basement slabs



7. a) Construct new load-bearing blockwork walls in basement
b) Install new steelwork to support ground floor
c) Install box frame seated on new retaining wall



8. a) Remove props
b) Install cavity drain and finishes



rev.	description	date
P2	Sumps relocated	03.09.2019
P1	First Issue	28.08.2019

PRELIMINARY

STRUCTURE WORKSHOP
Engineering & Technical Design
4 Iliffe Yard
London SE17 3QA
020 7701 2616
www.structureworkshop.co.uk

project	10 Glenmore Road
title	Construction Sequence Sections
scale	NTS
drawn	WW
appr.	SR
drg. no.	19029.602
rev.	P2

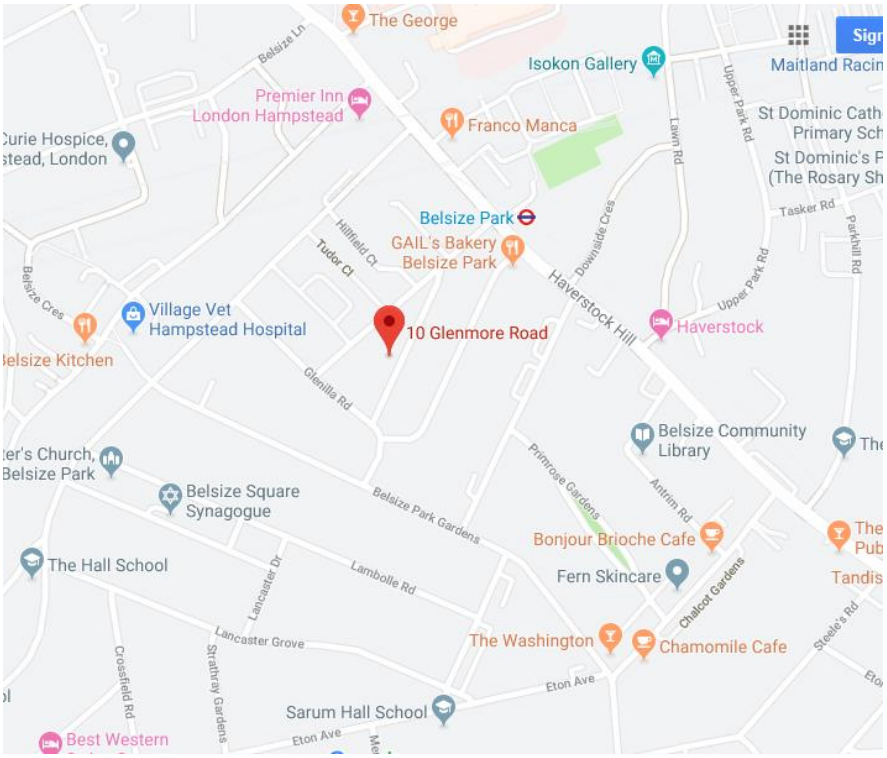
15 APPENDIX B – Site Investigation Report by Connaught Site Investigation Ltd.

Site Investigation Report no. 0762

Dated 7th August 2019

10 Glenmore Road, London, NW3 4DB

CONNAUGHTS
SITE INVESTIGATION LTD



Site Investigation Report
10 Glenmore Road
London
NW3 4DB

Report No.: 0762

Date: 7th August 2019

Engineers: Structure Workshop
(Sam Riley)

Connaughts
Site
Investigation Ltd

35 Green Lane
Leigh on Sea
Essex SS9 5AP
Phone: 01702 528098
Email: connaughts@aol.com
Web: www.connaughtssiteinvestigation.com

Structure Workshop
4 Illiffe Yard
Walworth
London
SE17 3QA

Our Ref: SW/JW/0762
Date: 7th August 2019

F.A.O: Sam Riley (Engineer)

Dear Sir

Re: 10 Glenmore Road, London, NW3 4DB: Site Investigation Report

1.0 INTRODUCTION

In accordance with your instructions, we visited the above site on the 10th, 11th and 12th July 2019 to excavate trial pits, drill shallow hand augered boreholes and a deeper mechanical borehole. The purpose of our site investigation was to provide information on the foundations to the property in order for designs to be finalised for a proposed construction at this property. In addition to these works, contamination samples were taken in order for a preliminary contamination assessment report to be produced by Terragen Ltd. This report will be sent separately but should be read alongside this report.

The property 10 Glenmore Road is a large mid-terrace four storey residential property of estimated 1900 age. The property contained a partial basement which was 1.10m below the internal first floor level and 1.40m below the front pavement level and 1.20m below the rear garden level. It is understood that the proposed development comprises the lowering of the existing basement by approximately 1.50m to create a full habitable basement level and for this basement to be extended beneath the footprint of the property to the rear as the existing basement is only situated to the front half of the property.

2.0 GEOLOGICAL INFORMATION

The geological survey map of the area shows the site to be situated in a relatively simple geological area with the site and surrounding area underlain by the London Clay Formation of Eocene age. No other deposits were noted in close proximity to the site.

The London Clay Formation of Eocene age (34-56 million years) comprises a series of silty clays which can become clayey silts and sands. The upper sections of the London Clay is typically an orange brown colour due to oxidisation of the iron within the clay and becomes stiffer and a dark brown grey colour with depth signifying less weathering.

The London Clay Formation contains silt and fine sand partings along with shell layers and also concretions of cementstone nodules and pyrite and selenite crystals. Where compaction and dewatering has occurred to a greater level, the clay can become an extremely weak mudstone. The top of the London Clay Formation can contain an overlying head deposit comprising a reworked clay mixed with locally derived flint gravels. This deposit rarely extends much beyond 2.00m and the base tends to be signified by a lack of gravels.

A borehole record search revealed two boreholes drilled close to the east of the site with both encountering made ground over the London Clay Formation. A borehole drilled in 1941 encountered MADE GROUND over a soft mud MADE GROUND to 2.43m over what appeared to be a reworked clay (MADE GROUND) to 3.84m. Below this a natural yellow CLAY (Upper weathered London Clay Formation) was encountered which became a blue CLAY (Lower less weathered London Clay Formation) below 7.62m with this clay then present to the close of the borehole at 44.19m.

3.0 FIELDWORK

The site investigation works comprised the excavation of eight trial pits internally within the house (TP1, TP2, TP3) and within the basement area (TP4, TP5, TP6, TP7, TP8) to the property.

The trial pits exposed the foundations to the property which were then logged with measurements taken along with sampling and insitu strength testing using the hand held shear vane within the base of the trial pits. The findings from the trial pit excavations is discussed within Chapter 5.0 and are held as scaled foundation diagrams within Appendix 2. The location of the trial pits are also marked on the site plan within Appendix 1.

In addition to this, a single window sample borehole was drilled to the rear of the building using a light weight, restricted access, Competitor Window Sampling drilling rig with the borehole drilled within the rear garden. The borehole was progressed by the hammer drilling of 1m long steels cutting tubes within which are held a 1m long clear plastic liner which collects undisturbed samples. The diameter of the cutting tube is reduced regularly to allow for drilling to depths. This borehole was drilled to a depth of 5.00m where an impenetrable claystone layer prevented any further progress. Within the deep borehole a water monitoring standpipe was installed within the borehole at a depth of 5.00m.

Insitu strength testing was conducted within the borehole using the dynamic probe test which was set up to use the same drop weight and height as the Standard Penetration Testing (SPT). This test comprises the recording of the number of blows taken to drive a steel cone into the soil from the drop of a 63.5kg hammer of a distance of 760mm. For the dynamic probe test blow counts are taken at 100mm intervals throughout. To determine the SPT N Value, three of these increments are added together. To convert into an estimated shear strength a factor of 6.5 is used. The findings of the borehole drilling is discussed within Chapter 6.0 and held as a borehole log within Appendix 3. The location of the borehole is marked on the site plan within Appendix 1.

4.0 LABORATORY TESTING

Selected soil samples taken from the window sample boreholes were sent to Soil Property Testing for UKAS accredited soils testing in accordance with British Standards 1377: Testing of soils for civil engineering purposes.

Six samples were tested for their moisture content with three samples also tested for their plasticity using the Atterberg limits test. A single undisturbed sample was tested for its undrained shear strength using the triaxial compression test with another sample tested for its one dimensional consolidation properties using the oedometer test. Four samples were tested for their soluble sulphate and pH value. The results of the soil laboratory testing is discussed within Chapter 5.0 and held as results summaries and test sheets within Appendix 4.

5.0 TRIAL PIT FINDINGS

i. Trial pits excavated within the main house

Trial pit 1 was excavated internally on the right hand party wall and exposed the party wall foundation (A-A) and the small internal return wall (B-B). The party wall foundation (A-A) comprised brickwork which extended to 1.64m below the first floor level where a projection was encountered. Unfortunately, due to the depth of the foundation and the collapse of trial pit sides, it was not possible to expose or locate by probing the extent of the projection or the base of the foundation.

The internal return wall foundation comprised brickwork which appeared to follow the party wall foundation with the brickwork continuing below 1.00m. A sleeper wall was constructed in front of this wall which was seated onto the oversite concrete. Again, the base of this foundation could not be exposed due to the depths involved and collapse of the excavations.

Trial pit 2 was excavated internally on the left hand party wall and exposed the party wall foundation (A-A) and the small internal return wall (B-B). The party wall foundation (A-A) comprised brickwork which extended to 1.50m (proved by full excavation) and then continued to a depth in excess of 2.00m (proved by probing). Unfortunately, due to the depth of the foundation and the collapse of trial pit sides, it was not possible to expose or locate by probing the extent of the projection or the base of the foundation.

The internal return wall foundation comprised brickwork which appeared to follow the party wall foundation with the brickwork continuing below 1.85m where a possible step out of the brickwork was present, although this was difficult to determine accurately due to the depths involved and collapse of the excavations.

Trial pit 3 was excavated internally on the left hand party wall and exposed the party wall foundation (A-A) and the small internal return wall (B-B). Both foundation profiles (A-A & B-B) comprised brickwork which extended to 1.60m below the first floor level. Unfortunately, due to the depth of the foundation, the collapse of trial pit sides and lack of space available, it was not possible to expose or locate by probing the extent of the projection or the base of the foundation.

ii. Trial pits excavated within the basement

Trial pit 4 was excavated in the rear right hand corner of the basement to the property and exposed the foundations to the rear wall (A-A) and right hand flank wall (B-B). The rear wall foundation (A-A) comprised brickwork with a single step out onto a concrete strip. The total projection of this foundation was 240mm with the concrete 100mmm thick and the foundation seated at a depth of 0.34m below the basement level. The foundation was seated onto soft to firm, medium strength (V: 48-54kPa), orange brown, silty CLAY.

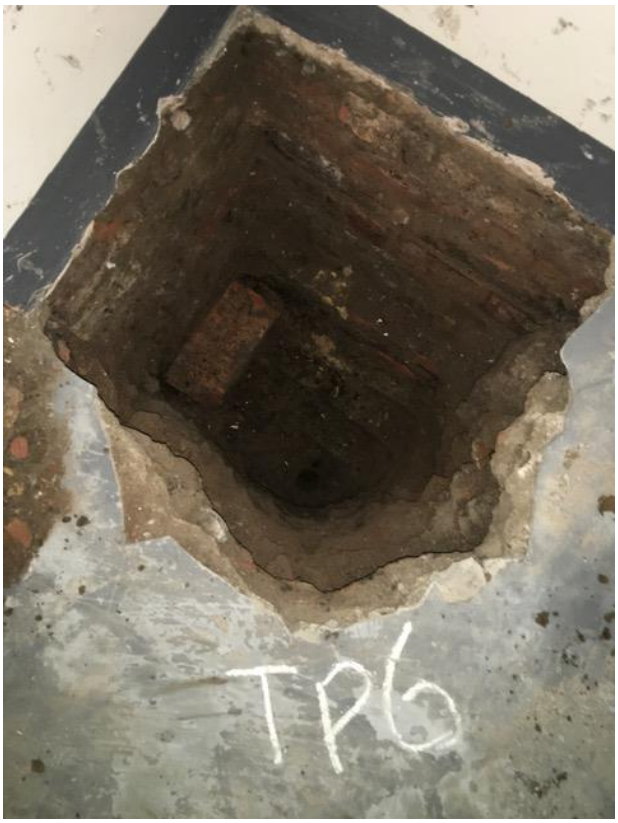
The right hand flank wall foundation (B-B) comprised brickwork with three step outs onto a concrete strip. The total projection of this foundation was 250mm with the concrete 200mmm thick and the foundation seated at a depth of 0.50m below the basement level. The foundation was seated onto soft to firm, medium strength (V: 46-58kPa), orange brown, silty CLAY. This trial pit was extended slightly with a hand augered borehole which found the clay to remain medium strength (V: 56-62kPa) at 1.00m.

Trial pit 5 was excavated in the rear left hand corner of the basement to the property and exposed the foundations to the left hand flank wall (A-A) and the rear wall (B-B). The left hand flank wall foundation (A-A) comprised brickwork with three step outs onto a concrete strip. The total projection of this foundation was 240mm with the concrete 200mmm thick and the foundation seated at a depth of 1.12m below the basement level. The foundation was seated onto soft to firm, medium strength (V: 42-44kPa), orange brown, silty CLAY.

The rear wall foundation (B-B) comprised brickwork with a single step out onto a concrete strip. The total projection of this foundation was 130mm with the concrete 250mmm thick and the foundation seated at a depth of 0.54m below the basement level. The foundation was seated onto soft to firm, low to medium strength (V: 38-40kPa), orange brown, silty CLAY.

Trial pit 6 was excavated on the right hand flank wall to the basement and exposed the flank wall (A-A) and a small internal return wall (B-B). The right hand flank wall foundation (A-A) comprised brickwork with four step outs onto a concrete strip. The total projection of this foundation was 270mm with the concrete 190mmm thick and the foundation seated at a depth of 1.05m below the basement level. The foundation was seated onto soft to firm, medium strength (V: 40-42kPa), orange brown, silty CLAY. This clay was found to remain medium strength (V: 52-54kPa) at 1.50m.

The internal wall foundation (B-B) comprised brickwork with a single step out (projection 75mm) seated directly onto the subsoil at a depth of 0.69m. This foundation was seated onto soft, low strength (V: 32-36kPa), orange brown, silty CLAY.



Trial pit 7 was excavated in the front right hand corner of the basement to the property and exposed the foundations to the front wall (A-A) and the right hand flank wall (B-B). The front wall foundation (A-A) comprised brickwork with two step outs onto a concrete strip. The total projection of this foundation was 380mm with the concrete 270mmm thick and the foundation seated at a depth of 0.565m below the basement level. The foundation was seated onto soft, low strength (V: 34-38kPa), orange brown, silty CLAY.

The right hand flank wall foundation (B-B) comprised brickwork with three step outs onto a concrete strip. The total projection of this foundation was 245mm with the concrete 260mmm thick and the foundation seated at a depth of 0.545m below the basement level. The foundation was seated onto soft, low strength (V: 34-38kPa), orange brown, silty CLAY.

Trial pit 8 was excavated in the front lightwell and exposed the foundations to the rear wall to the lightwell structure (A-A) and a return wall at the bottom of the lightwell (B-B). The rear wall to the lightwell comprised brickwork with a single step out (projection 60mm) onto a weak concrete and brick footing which was 350mm thick and seated at a depth of 0.88m onto a soft, low strength (V: 28-32kPa), orange brown, silty CLAY. The side wall to the lightwell (B-B) foundation comprised brickwork onto weak brick concrete which was 800mm thick and appeared to be seated onto dense clinker / concrete which may be drain benching associated with the drainage running across the front of the house in this location.

No root activity was encountered within any of the trial pits.

No water inflows were encountered within any of the trial pits which were found to be dry on completion of the site works.

6.0 BOREHOLE FINDINGS

The borehole was drilled in the rear garden at a level approximately 200mm below the front pavement level, 200mm above the basement level and 900mm below the first floor level. This borehole encountered astroturf over a sand layer to 0.20m over a soft to firm, brown and brownish grey, slightly gravelly slightly sandy clay with red brick, coal and charcoal fragments (MADE GROUND). This was present to a depth of 1.60m where a firm, medium strength, brown with some light grey veining CLAY was encountered. This stratum was found to become high strength by 3.00m and was present to a depth of 5.00m where a very dense / hard, CLAYSTONE layer was encountered. This stratum was found to be impenetrable with the window sampling drilling rig and the borehole was closed at 5.10m due to a lack of progress.

No water inflows were encountered within this borehole which was found to be dry on completion of the site works and on removal of the borehole casing. A water monitoring standpipe was installed within this borehole at a depth of 5.00m with a gravel pack from 5.00-1.00m followed by a one metre bentonite seal and a steel security cover.

Depth	N Value (conversion to undrained shear strength)	Strength description
1.15m	8 blows (52kPa)	Medium strength
2.15m	9 blows (58.5kPa)	Medium strength
3.15m	12 blows (78kPa)	High strength
4.15m	19 blows (123.5kPa)	High strength
5.15m	75+ blows	Very dense

7.0 LABORATORY TESTING RESULTS

The **moisture content** and the **plasticity** of samples of the underlying silty, shelly CLAYS was tested using the Atterberg limits test. This testing found the samples to be of high to very high plasticity with a plasticity indices ranging from **40% to 55%** which indicates that this clay has a high volume change potential.

BH	Depth	Soil Type	MC	LL	PL	PI	Class	Ret	Comments
WS1	1.00m	MADE GROUND	38.6%						
	1.50m	MADE GROUND	35.5%						
	2.00m	CLAY	36.5%	85	26	59	CVO	0%	1. No Des 2. No Des
	2.50m	CLAY	32.9%						
	3.00m	CLAY	33.5%	83	25	58	CV	0%	1. No Des 2. No Des
	4.00m	CLAY	30.1%	84	26	58	CV	0%	
	4.50m	CLAY	31.0%						
MC: moisture content (MC): Corrected moisture content due to gravel content LL: Liquid Limit PL: Plastic limit PI: Plastic Index									

Desiccation analysis of the clay samples showed no evidence for significant levels of desiccation when applying the moisture content relationships devised by Professor Driscoll's involving the liquid limit[1] and plastic limit[2]. This would indicate that the clay underlying this site has not been affected by desiccation by removal of moisture.

Triaxial compression testing was conducted on an undisturbed sample extracted from the boreholes at a depth of 3.50m in order to determine the undrained shear strength of the cohesive soil at this depth. This testing was conducted at overburden pressures to replicate the pressure conditions the samples would have been in within the ground. This testing finds the CLAY present at the anticipated foundation level for the proposed new basement to be of high strength (92kPa) which is consistent with the insitu strength testing which found this soil to be high strength at 3.15m (78kPa).

BH	Depth	MC	Wet Density Mg/m3	Dry Density Mg/m3	Deviator Stress (kPa)	Shear Stress (cu)	Soil Strength Descriptions using BS5930 and (BS 14688)
WS1	3.50m	32.2	1.96	1.48	182	92kPa	High strength

A single undisturbed soil sample from 3.50m was tested for its consolidation properties using the one dimensional oedemeter test. This test involves applying increasing pressure to a prepared specimen of soil and measuring the amount of compaction (settlement) followed by removal of the loading and measuring the uplift. This provides information to enable an assessment to be made regarding the effect on the soil of increased loadings and removal of loading.

DETERMINATION OF THE ONE-DIMENSIONAL CONSOLIDATION PROPERTIES

Borehole/ Pit No.	Depth (m)	Type	Ref.	Specimen Depth (m) and Orientation	Water Content (%)	Description	Remarks
WS1	3.50	L	4	3.50 Horizontal	30.9	Stiff (high strength) fissured orangish brown CLAY with occasional brown mottling, and selenite crystals.	Specimen dried at 80°C due to the presence of selenite.

Initial Conditions			Increment No.	Load (kN/m²)	Change in Height (mm)	Void Ratio	Cv (m²/yr)	Mv (m²/MN)	Temp (°C)	Corrected Cv
Height	mm	17.52	1	80	0.070	0.902			22	
Diameter	mm	50.02	2	4	-0.266	0.939		0.25	22	
Wet Weight	g	66.51	3	80	-0.008	0.911	0.37	0.19	22	0.35
Water Content	%	30.9	4	200	0.363	0.870	0.34	0.18	22	0.32
Bulk Density	Mg/m³	1.93	5	400	0.803	0.823	0.26	0.13	21	0.25
Particle Density		Assumed 2.82	6	800	1.325	0.766	0.24	0.08	21	0.23
Voids Ratio		0.910	7	80	0.620	0.842		0.06	21	
Degree of Saturation	%	96								
Swelling Pressure	kN/m²	80								
Dry Density	Mg/m³	1.48								

Four samples were also tested for their **soluble sulphate content and pH value**. British Standards guidelines for assessing the aggressive chemical environment provide classification of sites based on SO_4 levels. To convert SO_3 to SO_4 levels a factor of 1.2 must be applied followed by multiplying by 1000 to convert from g/l to mg/kg.

BH	Depth	Soil type	Water soluble sulphate 2:1 (g/l)	Calculated Concentration So4 (g/l)	Calculated total So4 result	pH Value	Concrete Class
WS1	1.00m	MG	0.34	0.41	408mg/kg	7.7	DS1
	1.50m	MG	0.31	0.38	372mg/kg	7.7	DS1
	2.50m	CLAY	0.18	0.22	216mg/kg	8.1	DS1
	4.50m	CLAY	2.37	2.84	2844mg/kg	7.5	DS3

Applying these results to the standards chart indicates that the underlying CLAY soils at shallower depths have a low level of sulphates with three of the samples falling within the concrete class DS1 which indicate that no precaution against sulphate attack is required. However, the deeper sample tested at 4.50m fell within the concrete class DS3 which indicates that deeper concrete may require special precautions. We would note that further testing may be required if deeper concrete is to be installed.

8.0 COMMENTS

i. Ground Conditions

The geological survey map of the area suggested that the site was situated within an area underlain by a variable amount of MADE GROUND over the London Clay Formation. This is consistent with the findings from the trial pit and borehole drilling which found MADE GROUND to 1.60m and then beneath this, a brown CLAY with a very dense claystone layer present at 5.00m.

We would note that the laboratory testing revealed the sample of clay at 2.00m to be an organic clay which may mean that this could be reworked ground with the natural soil coming in slightly deeper at between 2.00-2.50m.

Laboratory testing did not reveal any significant desiccation was present within the soil although allowances will need to be made for the mature tree present in the neighbouring rear garden with foundations taken below the influence of this tree. A useful guide is provided by the NHBC Chapter 4.2 – building near trees which gives recommended foundation depths based on the size species and proximity of the tree within either a low, medium or as in this case high volume change potential soil.

No water inflows were encountered within any of the trial pits or boreholes which were all found to be dry on completion of site works. The water monitoring standpipe will provide longer term information but it would appear that groundwater will not significantly affect the proposed construction with any inflows likely to be localised and should be controllable with pumping. As with all basements, longer term waterproofing will be needed as part of the design.

Trial pit excavations found the original foundations to the property to be seated at a substantial depth in excess of 1.60-2.00m in trial pits 1, 2 and 3 excavated on the walls to the rear part of the property which was not underlain by the basement. Given the depth of these foundations, the base of these could not be revealed or detected by probing but from the foundations exposed within the basement it would be reasonable to assume a similar founding depth.

The borehole drilled to the rear found MADE GROUND to 1.60m with possible reworked ground to 2.00-2.50m (based only on the laboratory testing). Below this the natural very highly plastic silty CLAY (London Clay Formation) was encountered. In terms of foundations for the new rear basement extension and the deepened basement to the front of the house, then foundations should be taken into the natural London Clay formation where suitable bearing capacity exists and at a depth below the influence of the mature tree to the rear of the site.

We would envisage that given the limited access then the most likely foundation solution would be sectional underpinning of the existing foundations using mass concrete footings. Although a piled solution could be considered, the need for specialist plant and difficulty in gaining access may mean this is problematical. In order to provide a full basement height it is understood that the existing basement is to be lowered by 1.50m which would mean a basement level of approximately 1.90m below the pavement level, 2.60m below the internal first floor level and 2.10m below the borehole location. This will mean foundations taken into the underlying London Clay Formation and seated at an estimated depth of around 3.00-3.50m below the borehole level.

Figures have been provided to give a guide to the anticipated bearing capacities of the soil based on the SPT N values and corresponding conversions to undrained shear strengths and also from the triaxial strength testing. We would note that all figures provided should be used as a guide to soil bearing capacities but should be verified by a structural engineer with knowledge of the design criteria and loadings. All bearing capacity figures provided are based on an assumed 1.00m wide strip foundation unaffected by groundwater with clearly greater bearing capacities achievable with wider foundations.

Test Depth	Soil Type	SPT & Shear strength	Approximate Bearing Capacity
WS1 at 2.15m	CLAY (reworked?)	9 blows (52kPa)	100kN/m^2
WS1 at 3.15m	London Clay Fm	12 blows (78kPa)	150kN/m^2
WS1 at 3.50m	London Clay Fm	92kPa (triaxial test)	180kN/m^2
WS1 at 4.15m	London Clay Fm	19 blows (123.5kPa)	200+kN/m^2

Sufficient information is held in the report for the initial design assessment for foundations for the proposed basement construction. From the bearing capacities stated above, it would appear on initial assessment to possess adequate bearing for the use of mass concrete foundations seated into the underlying London Clay Formation, especially at 3.00m and below. If additional bearing capacity is required, then it is possible to incorporate the basement floor into the design almost creating a box type structure with the floor acting like a reinforced raft tied into the footings. The results of the oedemeter testing should provide sufficient information to determine the possible extent of any settlement associated with adding addition loadings along with any uplift caused when removing overburden pressures as the soil is removed.

If a piled foundation solution is to be chosen, then it is likely that a deeper borehole will be required to provide information on subsoil conditions at depth. In order to penetrate through any claystone layers then a larger window sample rig will be needed and would most likely need to be drilled within the front garden.

As with all such basement developments, care will need to be taken to ensure that the adjacent buildings and structures are not adversely impacted by the proposed works.

9.0 CERTIFICATION

The conclusions and recommendations given within this report, are based upon the stated development plans for the site. If the site is to be developed for a more or less sensitive use then a different interpretation may be appropriate. This report relies upon the co-operation of other organisations and the free availability of information and total access. Therefore, no responsibility can be accepted for conditions arising from information, which was not available to the investigation team as a result of information being withheld or access prevented.

The analyses and opinions expressed in the report are based upon data obtained from the site investigation. Responsibility cannot be accepted for variation in ground conditions between and around exploratory points not revealed by the data or at the time of the investigation.

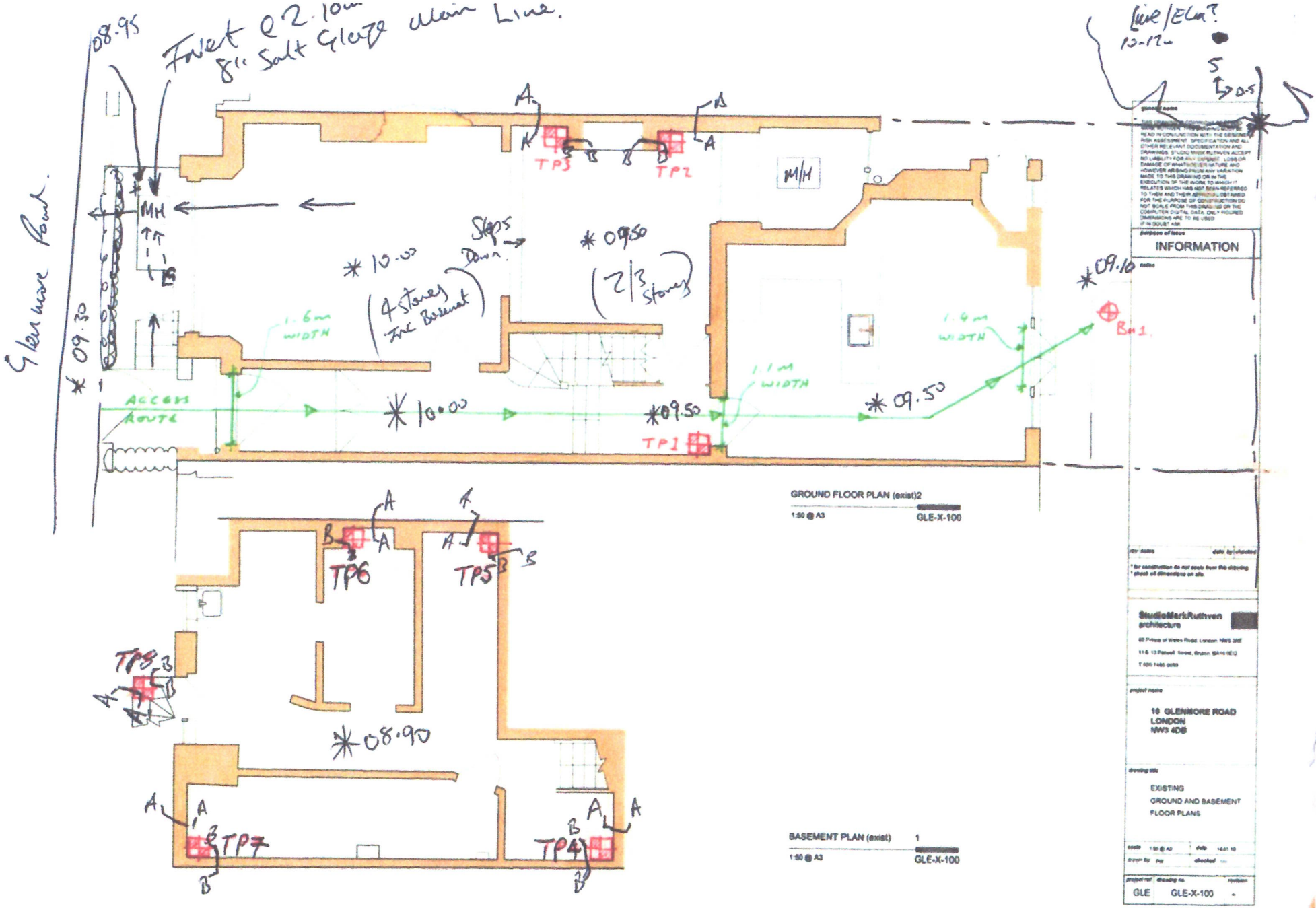
The report may suggest an opinion on the nature of the strata or conditions between exploratory points and below the maximum depth of investigation. However, this is for guidance only and no liability can be accepted for its accuracy.

Signed

James Woodward BSc(Hons) DipHE
For and on behalf of
CONNAUGHTS SITE INVESTIGATION LTD

Signed

Mark Pickering FGS
For and on behalf of
CONNAUGHTS SITE INVESTIGATION LTD


Glenmore Road.
08.95
Invert @ 2.10m
8" Salt Glaze Main Line.
Line/Elev?
10-12m
MH
09.30
10.00
(4 Storey Inc Basement)
Steps Down
09.50
(2/3 Storey)
09.10
1.6m WIDTH
1.1m WIDTH
ACCESS ROUTE
TP1
TP2
TP3
TP4
TP5
TP6
TP7
08.90
BM1
M/H
GROUND FLOOR PLAN (exist)2
1:50 @ A3
GLE-X-100
BASEMENT PLAN (exist) 1
1:50 @ A3
GLE-X-100
INFORMATION
StudioMarkRuthven architecture
10 GLENMORE ROAD
LONDON
NW3 4DB
EXISTING
GROUND AND BASEMENT
FLOOR PLANS
GLE
GLE-X-100

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Date:	July 2019
Scale:	1:20

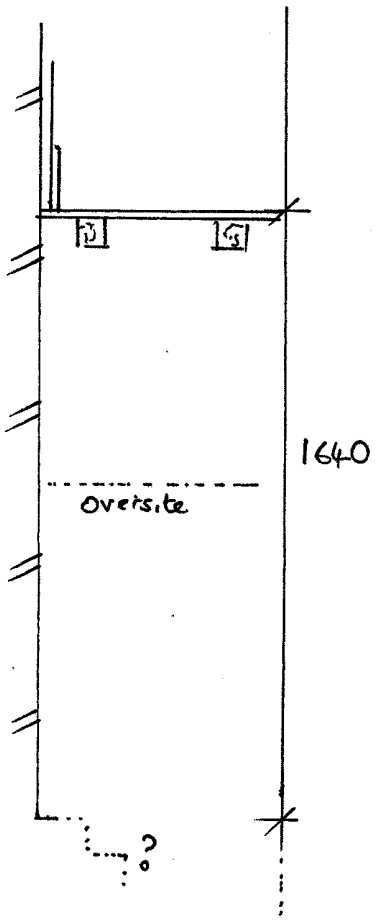
LOCATION 10 Glenmore Road, London, NW3 4DB

Trial Pit 1

No roots encountered

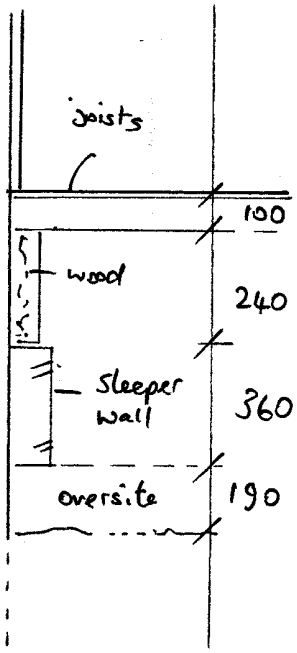
No water inflows encountered trial pit dry on completion.

Profile A-A



Unable to locate base of foundtion due to depth and collpase of trial pit sides.

Profile B-B



This foundation was difficult to expose due to the sleeper wall obstructing the excavation. Probing showed it was present at 1.00m+

0.00
Decorative flooring over floor boards onto 3x21/2' joists,

0.04
VOID

0.72
Lime and flint oversite concrete

0.91
Brown, clayey topsoil gravel with much brick, flint, ash and slate pieces (MADE GROUND)

D= small disturbed sample, B= large bulk sample, U= Undisturbed sample, MP= Mackintosh probe blow counts, V= Shear Vane Reading (kPa)

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LOCATION 10 Glenmore Road, London, NW3 4DB

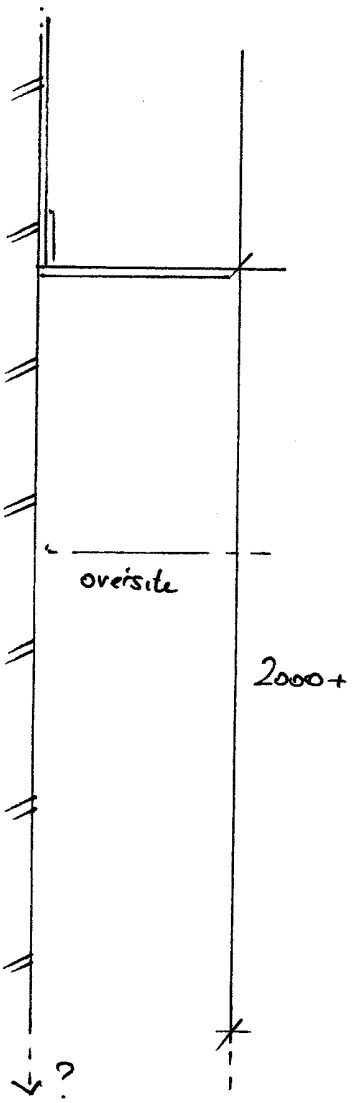
Scale: 1:20

Trial Pit 2

No roots encountered

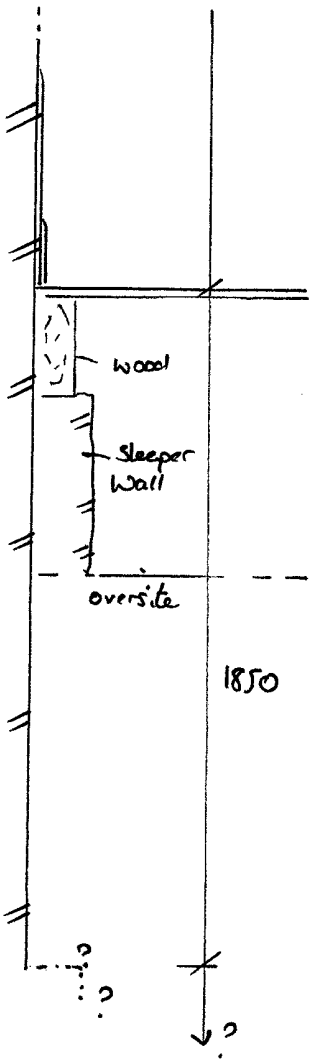
No water inflows encountered trial pit dry on completion.

Profile A-A



Unable to locate base of foundation due to depth and collpase of trial pit sides - stopped at 2.00m

Profile B-B



Possible step out at 1.85m but unable to determine projection or depth of foundation due to the depth and collpase of trial pit sides

0
Carpet over floorboards onto joists (3'x3')

0.08
VOID

0.75
Dry, grey, ash, lime and brick rubble oversite

0.86
Brown, clayey topsoil gravel with much brick and flint rubble (MADE GROUND)

Present to 2.00m+

D= small disturbed sample, B= large bulk sample, U= Undisturbed sample, MP= Mackintosh probe blow counts, V= Shear Vane Reading (kPa)

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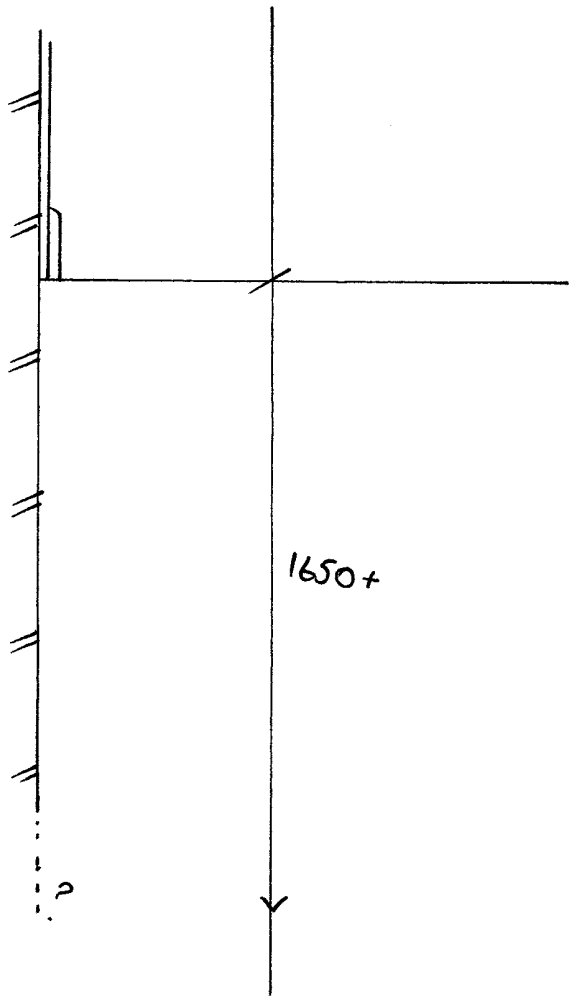
LOCATION 10 Glenmore Road, London, NW3 4DB

Trial Pit 3

Profile A-A & B-B

No roots encountered

No water inflows encountered
trial pit dry on completion.



0
Carpet over floorboards onto joists (3'x3')

0.18
VOID

0.75
Very dry concrete, lime and hardcore (MADE GROUND)

1.20
Brown, clayey topsoil hardcore (MADE GROUND)

Present to 1.60m+

Unable to work in the space available very easily - the steps amd floor joists meant little access was available. Excavavted and probed to 1.60m but with both profiles continuing below this depth. Unble to excavate further with collapse of trial pit sides.

D= small disturbed sample, B= large bulk sample, U= Undisturbed sample, MP= Mackintosh probe blow counts, V= Shear Vane Reading (kPa)

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LOCATION 10 Glenmore Road, London, NW3 4DB

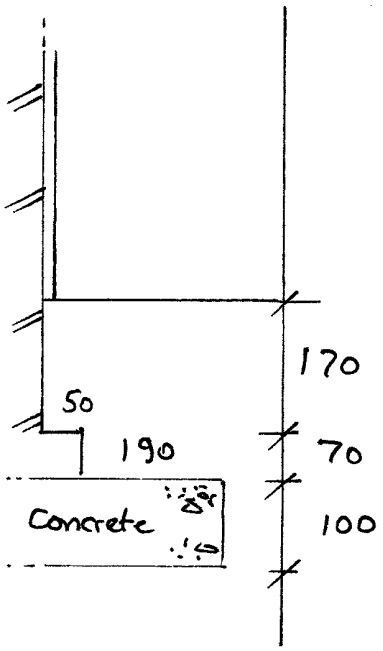
Scale: 1:10

Trial Pit 4

No roots encountered

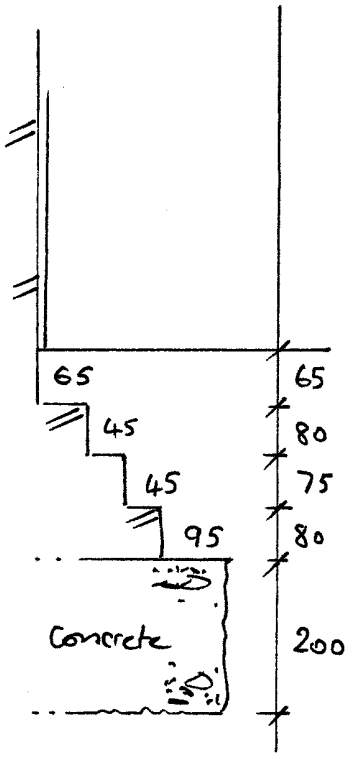
No water inflows encountered
trial pit dry on completion.

Profile A-A



D1 at F.L(0.34m)
V: 48-54kPa

Profile B-B



D1 at F.L(0.50m)
V: 46-58kPa

0	Concrete
0.38	Mid brown, hardcore within a silty, sandy matrix with much slate, brick, flint and ash pieces (MADE GROUND).
0.34	Soft to firm / firm, medium medium strength, orange brown silty CLAY

Founding stratum: Soft to firm / firm, medium strength, orange brown silty CLAY

D= small disturbed sample, B= large bulk sample, U= Undisturbed sample, MP= Mackintosh probe blow counts, V= Shear Vane Reading (kPa)

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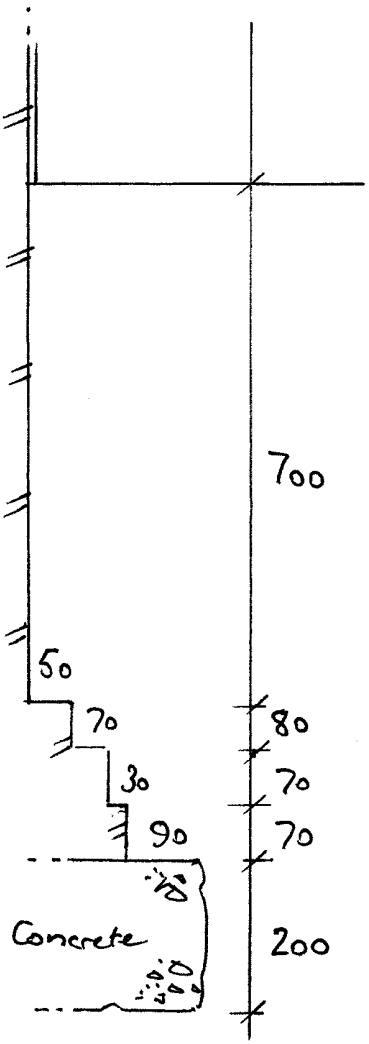
LOCATION 10 Glenmore Road, London, NW3 4DB Scale: 1:10

Trial Pit 5

No roots encountered

No water inflows encountered trial pit dry on completion.

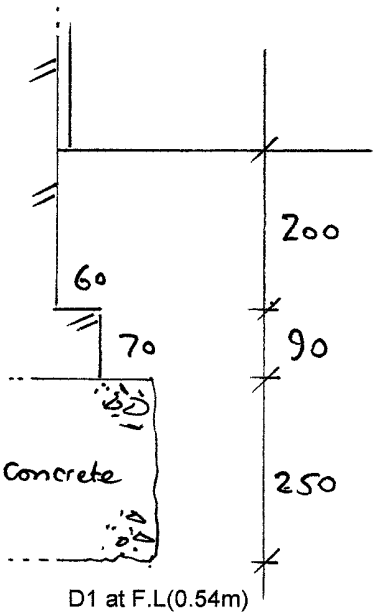
Profile A-A



D1 at F.L(1.12m)
V: 42-44kPa

Founding stratum:
Soft to firm, medium strength, orange brown,silty CLAY

Profile B-B



D1 at F.L(0.54m)
V: 38-40kPa

Founding stratum:
Soft to firm, low tomedium strength, orange brown,silty CLAY

0
Concrete
0.12
Mid brown, hardcore within a silty, sandy matrix with much slate, brick, flint and ash pieces (MADE GROUND).

0.50
Soft to firm, low to medium strength, orange brown, silty CLAY

Note: *Profile A-A had a 200mm projection which stepped up into profile B-B*

D= small disturbed sample, B= large bulk sample, U= Undisturbed sample, MP= Mackintosh probe blow counts, V= Shear Vane Reading (kPa)

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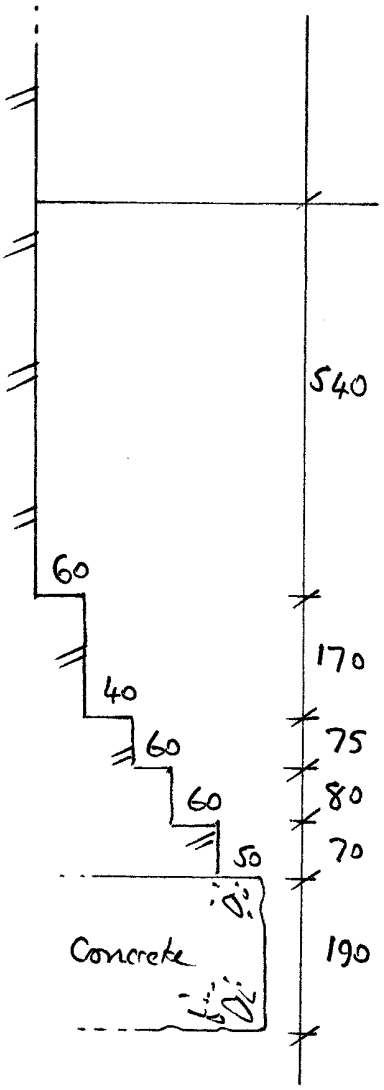
LOCATION 10 Glenmore Road, London, NW3 4DB Scale: 1:10

Trial Pit 6

No roots encountered

No water inflows encountered trial pit dry on completion.

Profile A-A

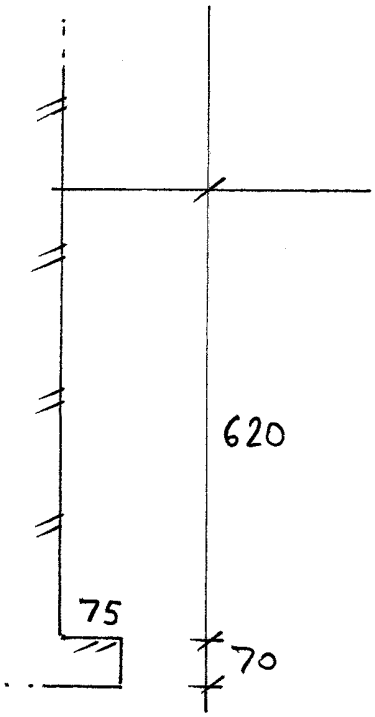


D1 at F.L (1.05m)
V: 40-42kPa

Founding stratum:
Soft to firm, medium strength, orange brown,silty CLAY

D2 at 1.50m. V: 52-54kPa

Profile B-B



D1 at F.L(0.69m)
V: 32-36kPa

Founding stratum:
Soft to firm, low strength, orange brown,silty CLAY

0
Concrete
0.13
Mid brown, hardcore within a silty, sandy matrix with much slate, brick, flint and ash pieces (MADE GROUND).

0.63
Soft to firm, low to medium strength, orange brown, silty CLAY

D= small disturbed sample, B= large bulk sample, U= Undisturbed sample, MP= Mackintosh probe blow counts, V= Shear Vane Reading (kPa)

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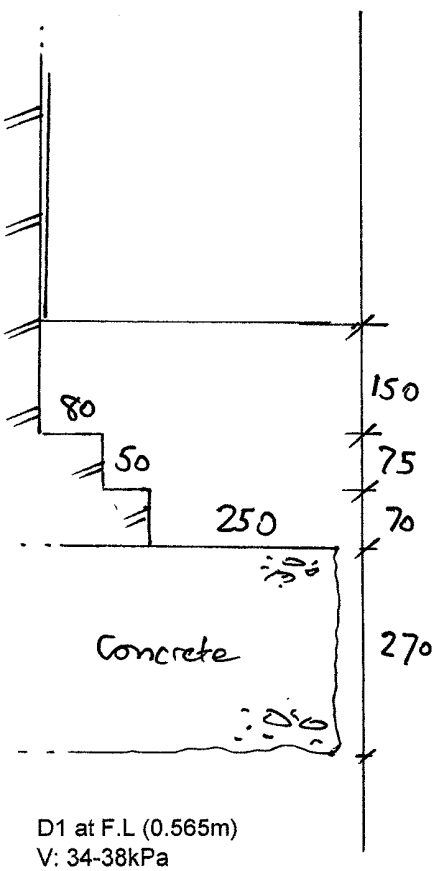
LOCATION 10 Glenmore Road, London, NW3 4DB | Scale: 1:10

Trial Pit 7

No roots encountered

No water inflows encountered
trial pit dry on completion.

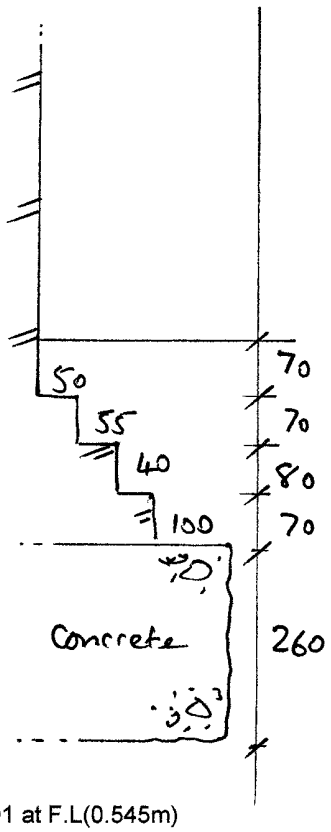
Profile A-A



D1 at F.L (0.565m)
V: 34-38kPa

Founding stratum:
Soft to firm, medium strength, orange brown,silty CLAY

Profile B-B



D1 at F.L(0.545m)
V: 34-38kPa

Founding stratum:
Soft to firm, low strength, orange brown,silty CLAY

0 — Concrete

0.13 — Mid brown, hardcore within a silty, sandy matrix with much lime, ash, flint and clay pipe (MADE GROUND).

Contam 1 at 0.30m

0.54 — Soft to firm, low to medium strength, orange brown, silty CLAY

Contam 2 at 0.70m

D= small disturbed sample, B= large bulk sample, U= Undisturbed sample, MP= Mackintosh probe blow counts, V= Shear Vane Reading (kPa)

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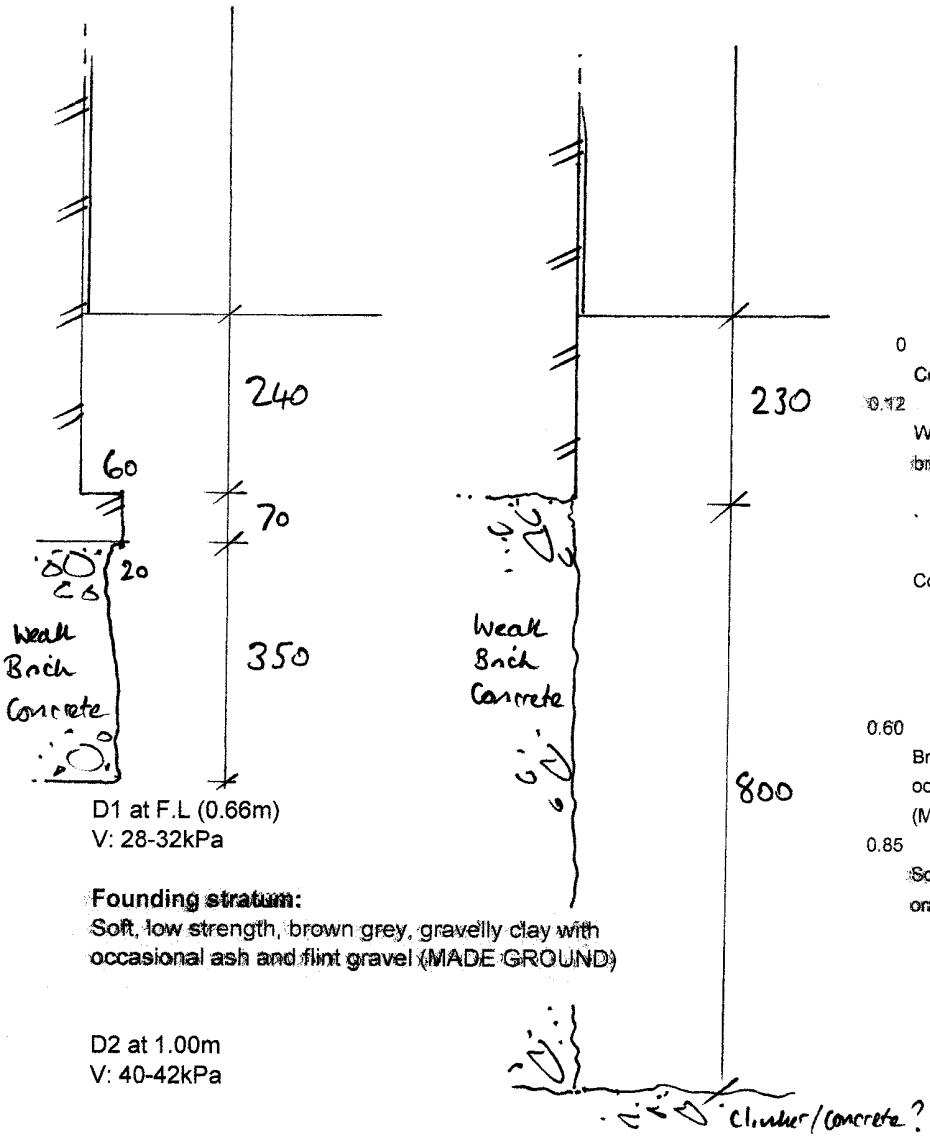
LOCATION 10 Glenmore Road, London, NW3 4DB

Trial Pit 8 (through bottom step)

No roots encountered

No water inflows encountered
trial pit dry on completion.

Profile A-A **Profile B-B**



0
Concrete
0.12
Weak leanmix clinker, flint and brick rubble FILL

Contam 1 at 0.30m

0.60
Brown grey, gravelly clay with occasional ash and flint gravel (MADE GROUND).
0.85
Soft to firm, medium strength, orange brown, silty CLAY

D1 at F.L (0.66m)
V: 28-32kPa

Founding stratum:
Soft, low strength, brown grey, gravelly clay with occasional ash and flint gravel (MADE GROUND)

D2 at 1.00m
V: 40-42kPa

Notes: *Layer of hard clinker / concrete possibly benching associated with drainage entering manhole?*

D= small disturbed sample, B= large bulk sample, U= Undisturbed sample, MP= Mackintosh probe blow counts, V= Shear Vane Reading (kPa)

Connaughts Site Investigation Ltd

35 Green Lane, Leigh on Sea, Essex, SS9 5AP
Tel: 01702 528098
Fax: 01702 528098

Appendix No. 3
Sheet No. 1
Job No. 0762
Date. July 2019

Borehole 1

LOCATION **10 Glenmore Road, London, NW3 4DB**

Method: Window sampler

Description of Stratum	(m)	Legend	Depth (m)	Samples Type	Samples Depth	Tests Type	Tests Value	Field Observations
Astriturf over orange brown, coarse sand			0.20m	U1	0.00			87mm dia. 90% recovery
Soft to firm, brpwn and brownish grey, slightly gravelly, slightly sandy clay with gravel fine, angular, red brick and rare ash fragments (MADE GROUND).	0.5							
	1.0			U2	1.00	N	8 blows	87mm dia 90% recovery Borehole cased to 1.00m
	1.5		1.60m					
Firm becoming stiff, medium strength, brown with some light grey veining, CLAY								
	2.0			U3	2.00	N	9 blows	77mm dia 100% recovery
	2.5							
Becoming high strength from 3.00m	3.0			U4	3.00	N	12 blows	77mm dia 100% recovery
	3.5							
	4.0			U5	4.00	N	19 blows	77mm dia 100% recovery
	4.5							
	5.0		5.00m					
Hard / vey dense light brown CLAYSTONE			5.10m	*	5.00	N	75+ blows	for 100mm travel
WS1 closed at 5.10m due to impenetrable nature of claystone band.								
	5.5							
	6.0							

Remarks:

No water inflows encountered in trial pit or borehole - dry on completion of site works. Water monitoring standpipe installed at 5.00m with gravel pack from 1.00-5.00m and a bentonite seal from G.L to 1.00m. Steel security cover fitted to standpipe.

Engineers: Structure Workshop

Key

U Undisturbed Sample
D Small disturbed sample
B Bulk distured sample
W Water sample
N Standard Penetration Test (C / S)
N* SPT test as a dynamic probe
V Shear vane test
MP Nackintosh probe (blows/0.3m)
BL No. blows to obtain U100 sample

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 02/08/2019

0998

Contract	**10 Glenmore Road, London, NW3 4DB**
Serial No.	**35570**

Client:

Connaughts Site Investigation Ltd

35 Green Lane
Leigh on Sea
Essex
SS9 5AP

Soil Property Testing Ltd

15, 16, 18 Halcyon Court, St Margaret's Way, Stukeley Meadows, Huntingdon, Cambridgeshire, PE29 6DG

Tel: 01480 455579
Email: enquiries@soilpropertytesting.com
Website: www.soilpropertytesting.com

Samples Submitted By:

Connaughts Site Investigation Ltd

Samples Labelled:

10 Glenmore Road, London, NW3 4DB

Approved Signatories:

- ☑ **J.C. Garner B.Eng (Hons) FGS** — Technical Director
- ☐ **S.P. Townend FGS** — Quality Manager
- ☐ **W. Johnstone** — Materials Lab Manager
- ☐ **D. Sabnis** — Operations Manager

Date Received: 19/07/2019

Samples Tested Between: 19/07/2019 **and** 02/08/2019

Remarks:

For the attention of Mark Pickering

Notes:

1. All remaining samples or remnants from this contract will be disposed of after 21 days from today, unless we are notified to the contrary.

2. (a) UKAS - United Kingdom Accreditation Service
   (b) Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

3. Tests marked "NOT UKAS ACCREDITED" in this test report are not included in the UKAS Accreditation Schedule for this testing laboratory.

4. This test report may not be reproduced other than in full except with the prior written approval of the issuing laboratory.

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 02/08/2019

0998

Contract	**10 Glenmore Road, London, NW3 4DB**		
Serial No.	**35570**	**Target Date**	01/08/2019
Scheduled By	Connaughts Site Investigation Ltd		

SCHEDULE OF LABORATORY TESTS

Schedule Remarks

Bore Hole No.	Type	Sample Ref.	Top Depth	Sulphate Content/pH Value	Water Content (BSEN)	Liquid/Plastic Limits	Triaxial Test	One Dimensional Consolidation														Sample Remarks
TP4	D	-	1.00	1																		
TP6	D	-	1.50	1																		
WS1	L	1	1.00		1																	
WS1	L	2	1.50		1																	
WS1	L	2	2.00			1																
WS1	L	3	2.50	1	1																	
WS1	L	3	3.00		1	1																
WS1	L	4	3.50				1	1														
WS1	L	4	4.00		1	1																
WS1	L	5	4.50	1	1																	
Totals				**4**	**6**	**3**	**1**	**1**														**End of Schedule**

TEST REPORT

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DATE ISSUED: 02/08/2019

0998

Contract	**10 Glenmore Road, London, NW3 4DB**
Serial No.	**35570**

SUMMARY OF WATER CONTENT

Borehole /Pit No.	Depth (m)	Type	Ref.	Water Content (%)	Description	Remarks
WS1	1.00	L	1	**38.6**	Firm yellowish brown CLAY.	
WS1	1.50	L	2	**35.5**	Firm dark grey organic CLAY locally oxidised to brown with rare black fine to medium angular chert, and recently active and decayed roots.	Dried at 50°C due to high organic content.
WS1	2.00	L	2	**36.5**	Firm olive grey slightly organic CLAY with occasional dark grey mottling, and rare recently active and decayed roots.	
WS1	2.50	L	3	**32.9**	Firm yellowish brown CLAY.	
WS1	3.00	L	3	**33.5**	Firm closely fissured yellowish brown CLAY with rare bluish grey veins, and decayed roots.	
WS1	4.00	L	4	**30.1**	Stiff fissured orangish brown CLAY with occasional brown mottling, and selenite crystals.	Dried at 80°C due to the presence of selenite.
WS1	4.50	L	5	**31.0**	Stiff yellowish brown CLAY with rare grey veins, decayed roots, and selenite crystals.	Dried at 80°C due to the presence of selenite.

Method Of Preparation: BS EN ISO: 17892-1: 2014
Method of Test: BS EN ISO: 17892-1: 2014
Type of Sample Key: U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:

Remarks to Include: Sample disturbance, loss of moisture, variation from test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110C

TEST REPORT

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Contract	**10 Glenmore Road, London, NW3 4DB**
Serial No.	**35570**

SUMMARY OF WATER CONTENT, LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole /Pit No.	Depth (m)	Type	Ref.	Water Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasti-city Index (%)	Liquid-ity Index (%)	SAMPLE PREPARATION				Description	CLASS
									Method	Ret'd 0.425mm (%)	Corr'd W/C <0.425mm	Curing Time (hrs)		
WS1	2.00	L	2	**36.5**	85	26	59	0.18	From Natural	0 (A)		26	Firm olive grey slightly organic CLAY with occasional dark grey mottling, and rare recently active and decayed roots.	CVO
WS1	3.00	L	3	**33.5**	83	25	58	0.15	From Natural	0 (A)		26	Firm closely fissured yellowish brown CLAY with rare bluish grey veins, and decayed roots.	CV
WS1	4.00	L	4	**30.1**	84	26	58	0.07	From Natural	0 (A)		26	Stiff fissured orangish brown CLAY with occasional brown mottling, and selenite crystals.	CV

Method Of Preparation: BS EN ISO: 17892-1: 2014 & BS 1377: Part 2:1990:4.2
Method of Test: BS EN ISO: 17892-1: 2014 & BS 1377: Part 2:1990:3.2, 4.4, 5.3, 5.4
Type of Sample Key: U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:

Remarks to Include: Sample disturbance, loss of water, variation from test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110C

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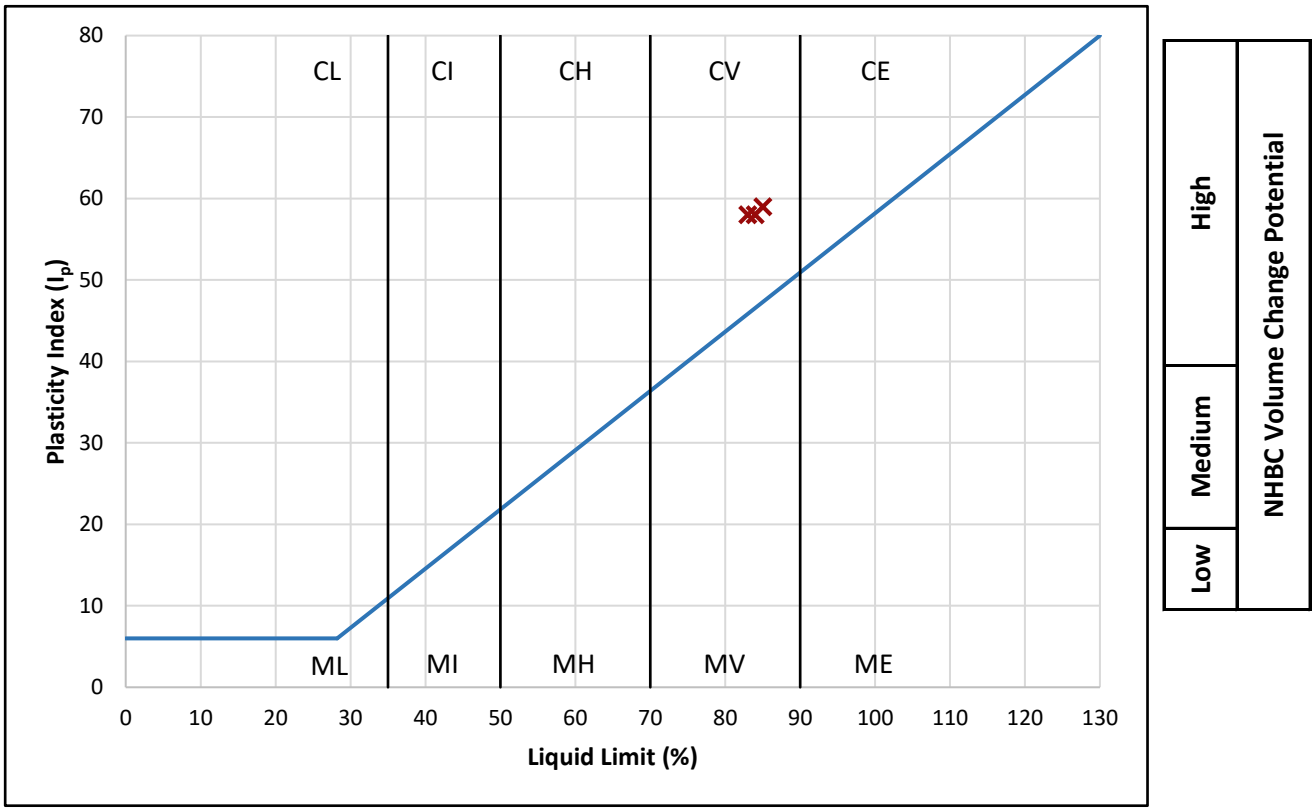
Contract	10 Glenmore Road, London, NW3 4DB
Serial No.	35570

PLOT OF PLASTICITY INDEX AGAINST LIQUID LIMIT USING CASAGRANDE CLASSIFICATION CHART

Plasticity				
Low	Medium	High	Very High	Extremely High



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS1377: Part 2: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	Volume Change Potential: NHBC Standards Chapter 4.2 Unmodified Plasticity Index

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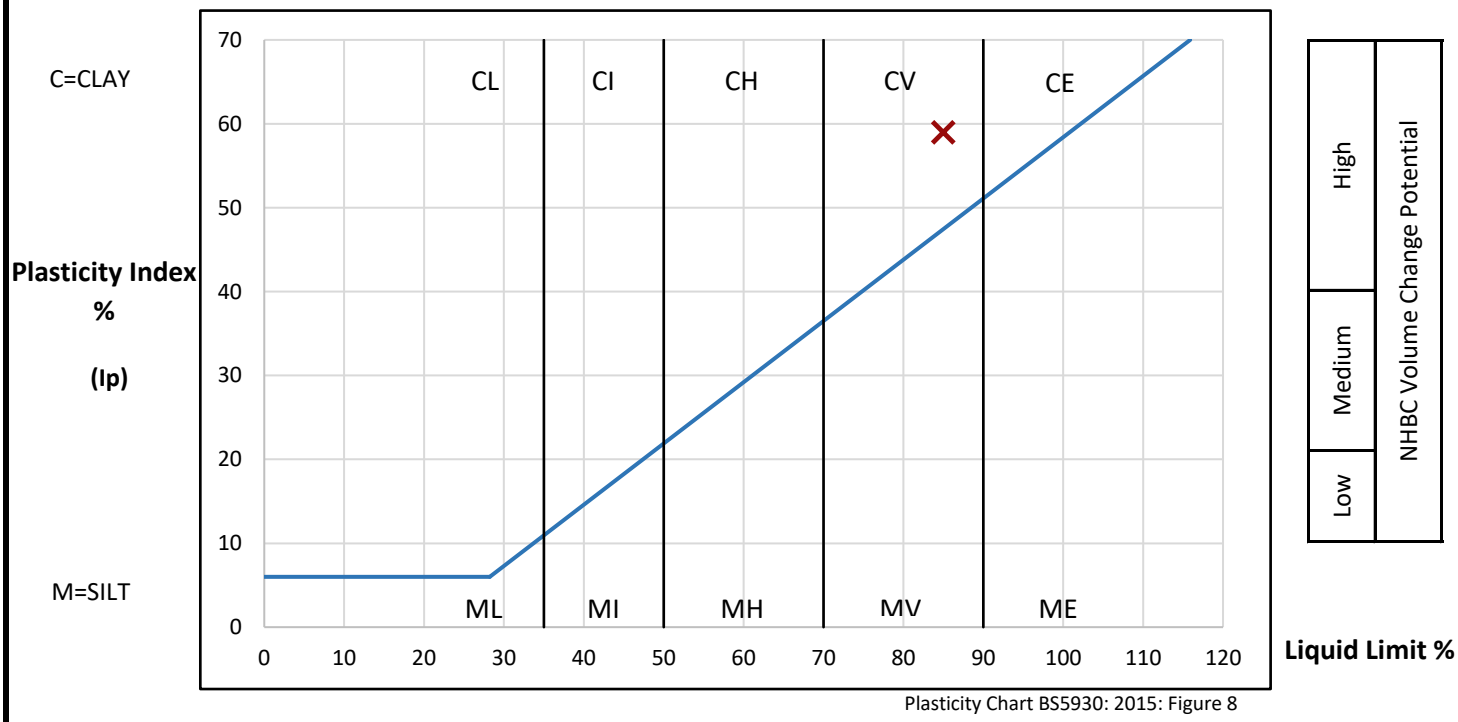
Serial No.	**35570**

DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
WS1	2.00	L	2	36.5	Firm olive grey slightly organic CLAY with occasional dark grey mottling, and rare recently active and decayed roots.	

PREPARATION			Liquid Limit	85 %
Method of preparation		From natural	Plastic Limit	26 %
Sample retained 0.425mm sieve	(Assumed)	0 %	Plasticity Index	59 %
Corrected water content for material passing 0.425mm			Liquidity Index	0.18
Sample retained 2mm sieve	(Assumed)	0 %	NHBC Modified (I'p)	n/a
Curing time	26 hrs	Clay Content Not analysed	Derived Activity	Not analysed



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:	

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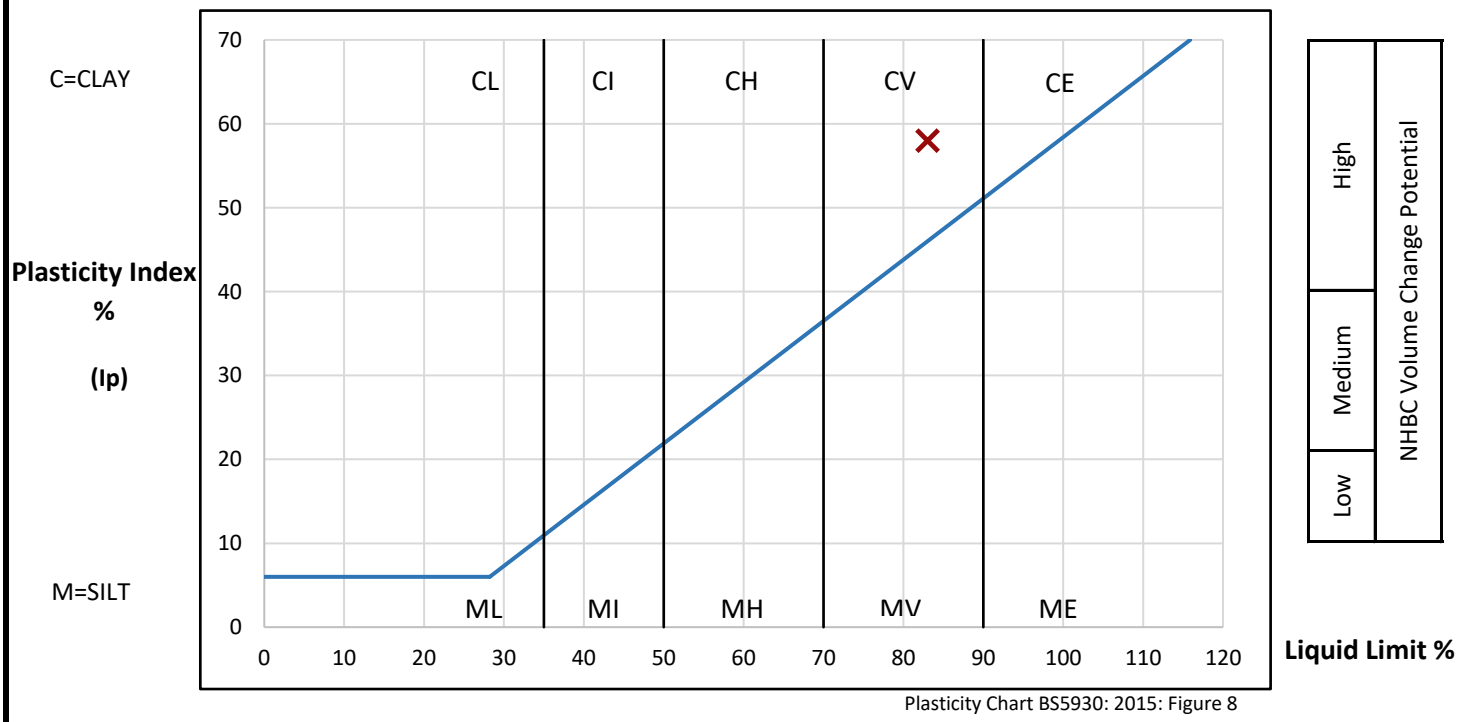
DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
WS1	3.00	L	3	33.5	Firm closely fissured yellowish brown CLAY with rare bluish grey veins, and decayed roots.	

PREPARATION				Liquid Limit	83 %
Method of preparation		From natural		Plastic Limit	25 %
Sample retained 0.425mm sieve	(Assumed)	0 %		Plasticity Index	58 %
Corrected water content for material passing 0.425mm				Liquidity Index	0.15
Sample retained 2mm sieve	(Assumed)	0 %		NHBC Modified (I'p)	n/a
Curing time	26 hrs		Clay Content Not analysed	Derived Activity	Not analysed



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:	

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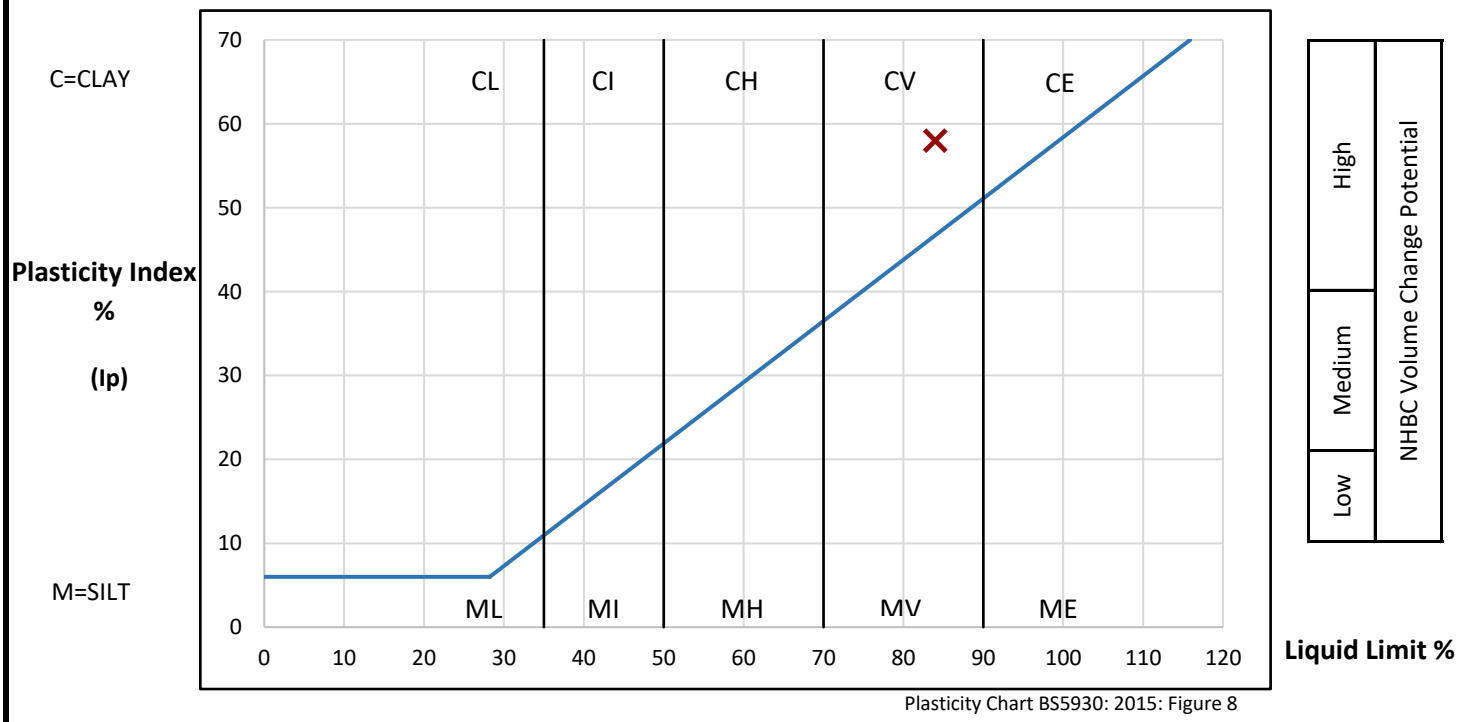
Serial No.	**35570**

DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
WS1	4.00	L	4	30.1	Stiff fissured orangish brown CLAY with occasional brown mottling, and selenite crystals.	Specimen dried at 80°C due to the presence of selenite.

PREPARATION				Liquid Limit	84 %
Method of preparation		From natural		Plastic Limit	26 %
Sample retained 0.425mm sieve	(Assumed)	0 %		Plasticity Index	58 %
Corrected water content for material passing 0.425mm				Liquidity Index	0.07
Sample retained 2mm sieve	(Assumed)	0 %		NHBC Modified (I'p)	n/a
Curing time	26 hrs	Clay Content	Not analysed	Derived Activity	Not analysed



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:	

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 02/08/2019

UKAS TESTING 0998

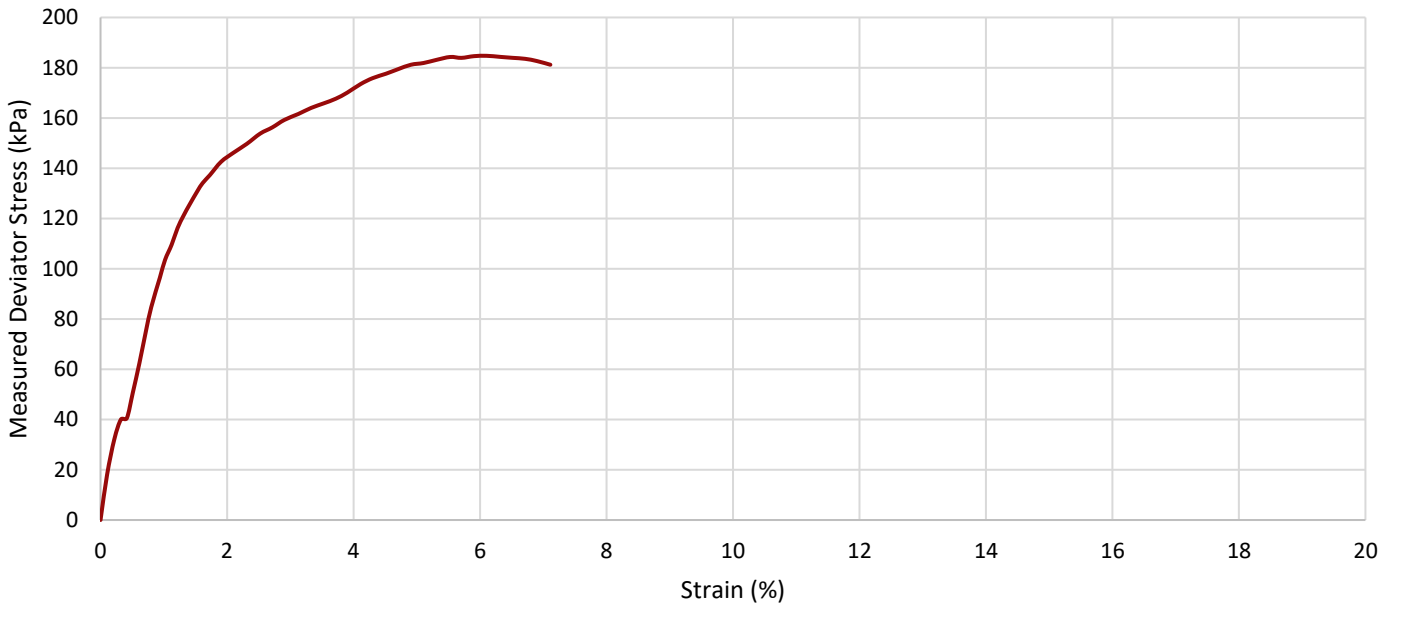
Contract	**10 Glenmore Road, London, NW3 4DB**
Serial No.	**35570**

DETERMINATION OF UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

Borehole /Pit No.	Depth (m)	Type	Reference	Description	Remarks
WS1	3.50	L	4	Stiff (high strength) fissured orangish brown CLAY with occasional brown mottling, and selenite crystals.	Specimen oven dried at 80°C due to the presence of selenite.

Initial Specimen	Height (mm)	Diameter (mm)	Weight (g)	Water Content (%)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)
Depth of Top of Specimen (m) 3.54	121.0	62.7	730	32.2	1.96	1.48

TEST INFORMATION — Rate of Strain 1.1 % per Min — Rubber Membrane Thickness 0.3 mm



Specimen at failure	Measured Cell Pressure, σ3 (kPa)	Strain at Failure (%)	Stress Corrections (kPa)		Corrected Max. Deviator Stress, (σ1-σ3)f (kPa)	Shear Stress Cu, ½(σ1-σ3)f (kPa)	Mohrs Circle Analysis	
			Rubber Membrane	Piston Friction			Cu (kPa)	PHI (degrees)
	68	6.1	0.8	\	184	92		

Method of Preparation:	BS 1377: Part 1: 1990
Method of Test:	BS 1377: Part 7: 1990: 8 Definitive Method, 1990: 9 Multi-stage loading
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	Tested in Vertical Condition
	UKAS Calibration - loads from 0.2 to 10kN
Remarks to Include:	Sample disturbance, loss of moisture, variation form test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110°C

TEST REPORT

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DATE ISSUED: 02/08/2019

0998

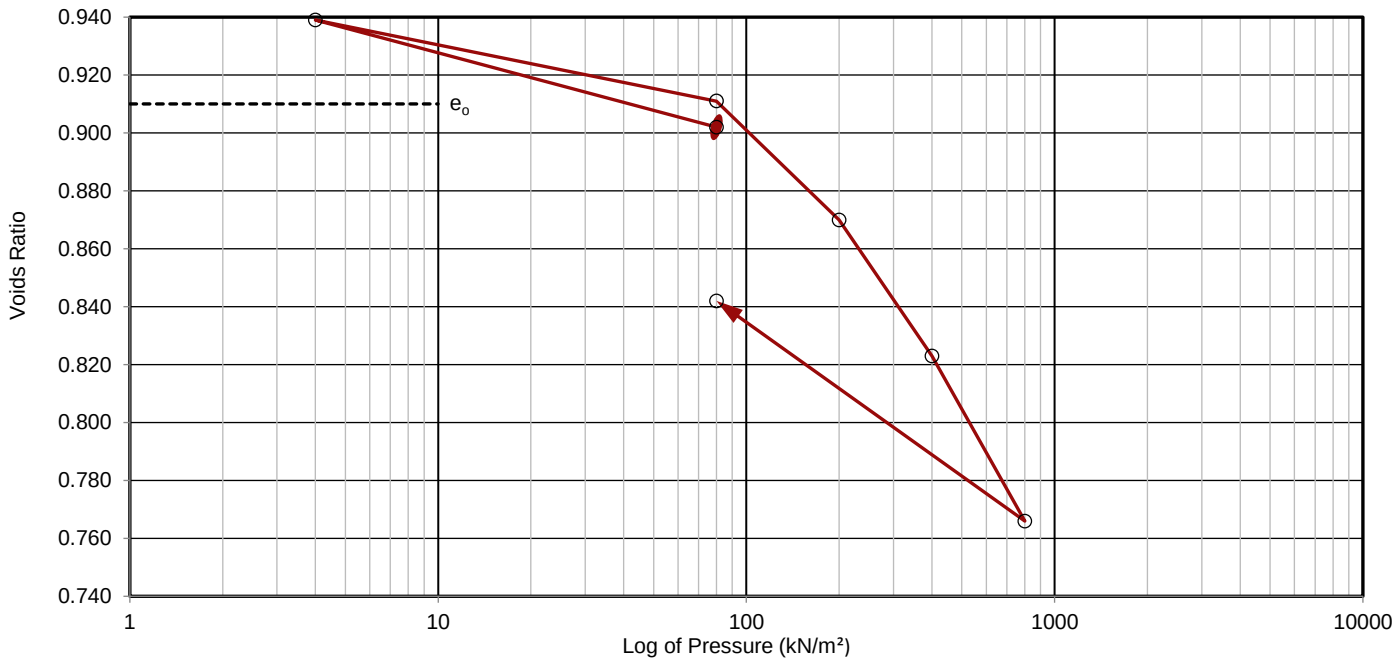
Contract	**10 Glenmore Road, London, NW3 4DB**
Serial No.	**35570**

DETERMINATION OF THE ONE-DIMENSIONAL CONSOLIDATION PROPERTIES

Borehole/ Pit No.	Depth (m)	Type	Ref.	Specimen Depth (m) and Orientation	Water Content (%)	Description	Remarks
WS1	3.50	L	4	3.50 Horizontal	30.9	Stiff (high strength) fissured orangish brown CLAY with occasional brown mottling, and selenite crystals.	Specimen dried at 80°C due to the presence of selenite.

Initial Conditions			
Height	mm	17.52	
Diameter	mm	50.02	
Wet Weight	g	66.51	
Water Content	%	30.9	
Bulk Density	Mg/m³	1.93	
Particle Density		Assumed	2.82
Voids Ratio		0.910	
Degree of Saturation	%	96	
Swelling Pressure	kN/m²	80	
Dry Density	Mg/m³	1.48	

Increment No.	Load (kN/m²)	Change in Height (mm)	Void Ratio	Cv (m²/yr)	Mv (m²/MN)	Temp (°C)	Corrected Cv
1	80	0.070	0.902			22	
2	4	-0.266	0.939		0.25	22	
3	80	-0.008	0.911	0.37	0.19	22	0.35
4	200	0.363	0.870	0.34	0.18	22	0.32
5	400	0.803	0.823	0.26	0.13	21	0.25
6	800	1.325	0.766	0.24	0.08	21	0.23
7	80	0.620	0.842		0.06	21	



Method of Preparation:	BS 1377: Part 5: 1990: 3.3 & 3.4
Method of Test:	BS 1377: Part 5: 1990: 3.5
Method of Time Fitting Used:	Square root
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	
Remarks to Include:	Sample disturbance, loss of water, variation from test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110 °C.

TEST REPORT

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Contract:	**10 Glenmore Road, London, NW3 4DB**
Serial No:	**35570**

DETERMINATION OF THE SULPHATE CONTENT AND pH OF SOIL AND GROUNDWATER

Borehole / Pit No.	Depth (m)	Sample		Conc. of Soluble SO3		Calc'd Conc. Of SO4 (g/L)	pH Value	% Sample Passing 2mm Sieve	Description	Remarks
		Type	Ref.	Water Soluble 2:1 (g/L)	Ground Water (g/L)					
TP4	1.00	D	-	0.34		0.41	7.7	100	Firm yellowish brown CLAY	
TP6	1.50	D	-	0.31		0.38	7.7	100	Firm yellowish brown CLAY	
WS1	2.50	L	3	0.18		0.22	8.1	100	Firm yellowish brown CLAY.	
WS1	4.50	L	5	2.37		2.84	7.5	100	Stiff yellowish brown CLAY with rare grey veins, decayed roots, and selenite crystals.	

Method of Preparation:	BS1377: Part 1: 2016: 8.5, BS1377: Part 3: 1990: 5.3 Soil/Water Extract, 5.4 Groundwater
Method of Test:	BS1377: Part 3: 1990: 5.5
Type of Sample Key:	U= Undisturbed, B= Bulk, D= Disturbed, J= Jar, W= Water, SPT= Split Spoon Sample, C= Core Cutter
Comments:	**Test not UKAS accredited**
Remarks to Include:	Sample disturbance, loss of moisture, variation from test procedure, location, and origin of test specimen within original sample. Oven drying temperature if not 105-110C.