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

Title: **Basement Impact Assessment**

Rep no: 19029.R01.P2

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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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1.0 NON TECHNICAL SUMMARY

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.

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.

1.1.1. The site location is 10 Glenmore Road, London, NW3 4DB. Refer to Figure 1, Appendix D.

1.1.2. The current site arrangement comprises a three storey (plus partial basement), mid-terraced, Victorian property in North London. The property is assumed to have been constructed between 1896 and 1914, from historical Ordinance Survey maps presented in Figures 2 & 3, Appendix D. 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 existing partial basement is located beneath the front third of the property, comprises the full width of the building, and includes a lightwell to the front and access to the street.

The road to the front of the property has a slight 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.

Refer to Appendix C for Existing site measured survey drawings.

1.1.3. The proposed development comprises the deepening and extension of an existing unlined basement beneath a Victorian terraced house in order to make it fit for residential use. There will also be a rearrangement of the walls at ground floor level and small alterations to floor spaces above.

The existing 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.

Refer to Appendix A for Structural drawings.

1.1.4. The following assessments are presented:

- Desk Study
- Screening
- Scoping
- Additional evidence/assessments:
    - *Site investigation*
- *Impact Assessment*

1.1.5. The authors of the assessments are:

Sam Riley (Associate) - MEng CEng MIStructE

Peter Laidler (Director) - BEng CEng MICE

1.1.6. The ground and groundwater conditions beneath the site have been found 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.

1.1.7. The construction methods proposed include deepening and extending the existing half-height basement toward 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.

1.1.8. A structural monitoring strategy to control the works and impacts to neighbouring structures will comprise movement monitoring of the front elevations to no.8,10,12, 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. The structural movement monitoring strategy will consist of survey monitoring points that we be agreed with the Party Wall surveyors, as well as an agreed frequency of readings during construction and set limits on movements corresponding to a clear traffic light system. Should the survey reveal that the structure has moved more than the agreed limits then work on site will stop whilst the readings are assessed and until a conclusion regarding the cause of the movement has been reached. If necessary, then a solution to prevent any further movement will be provided and utilised prior to the works re-commencing.

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.

1.1.9. The BIA has assessed land stability and the impacts of the proposed development on neighbouring structures will be minimal and no greater than 1 on the Burland Scale.

1.1.10. The BIA has identified that there are no potential slope stability impacts.

1.1.11. The BIA has identified that there are no potential hydrological impacts.

1.1.12. The BIA has identified that there are no hydrogeological impacts.

1.1.13. The BIA has identified a very low flood risk for the proposed development. 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.

2.0 INTRODUCTION

The purpose of this assessment is to consider the effects of a proposed basement development 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, Appendix D.

The BIA approach follows current planning procedure for basements and lightwells adopted by LB Camden and comprises the following elements (CPG Basements):

- Desk Study;
- Screening;
- Scoping;
- Site Investigation,
- Impact Assessment

2.1 AUTHORS

The BIA has been:

Authored by: Sam Riley (Associate) MEng CEng MIStructE
Approved by: Peter Laidler (Director) BEng CEng MICE

2.2. SOURCES OF INFORMATION

The following baseline data have been referenced to complete the BIA in relation to the proposed development:

- Site walkover and discussion with residents 16th May 2019;
- Current/historical mapping: OS Map 1896, 1914 (Figures 2 and 3, Appendix D);
- Geological mapping: BGS Bedrock geology map, BGS Superficial deposits map (Figures 4 and 5, Appendix D);
- Hydrogeological data BGS Hydrogeology map of site and surroundings, DEFRA Map showing bedrock aquifers, superficial drift aquifers, and groundwater vulnerability zones (Figures 7 and 8, Appendix D);
- Current/historical hydrological data Environment Agency Flood risk map, GOV.UK Flood risk map (Figures 10 and 11, Appendix D);
- Flood risk mapping Environment Agency Flood risk map, GOV.UK Flood risk map (Figures 10 and 11, Appendix D);

- LB Camden, Strategic Flood Risk Assessment (produced by URS, 2014);
- LB Camden, Floods in Camden, Report of the Floods Scrutiny Panel (2013);
- LB Camden, Planning Guidance (CPG) – Basements (March 2018);
- LB Camden, Camden Geological, Hydrogeological and Hydrological Study – Guidance for Subterranean Development (produced by Arup, 2010);
- LB Camden, Local Plan Policy A5 Basements (2017);
- LB Camden's Audit Process Terms of Reference;

2.3. EXISTING AND PROPOSED DEVELOPMENT

2.3.1. The Application site is located 10 Glenmore Road, London, NW3 4DB. The site is not within a wider hillside setting.

2.3.2. The site is situated in north London, approximately 1000m south of Hampstead Heath. The site forms part of several terraced Victorian properties located on a shallow sloping topography toward the south. The site is approximately 73m above sea level and 70m above the river Thames. The site slope angle is less than 7 degrees (Figure 13-Slope Angle Map, Appendix D).

2.3.3. The existing building is a mid-terraced Victorian property over three storeys plus a basement below the front third of the plan area. The structure consists of a timber roof supported on timber internal walls at the upper levels and masonry internal walls at the lower levels. The perimeter walls are of masonry of increasing thickness toward the lower storeys. The floor joists are timber and span front-to-back throughout. The existing basement is formed from masonry external walls. Generally, the property is in good condition, with only some minor, historical cracking to the internal timber walls of the upper storeys of the house.

2.3.4. The adjacent properties are of a similar construction to 10 Glenmore Road, as described in section 2.2.3 above. It is understood that the adjacent properties also have basements to a similar depth and construction as the basement to 10 Glenmore Road. The masonry party walls form the sides of these basements and are shared with the building in question. Access has not been granted to the adjacent structures, however a visual inspection of the external front and rear elevations suggest that they are in good condition.

2.3.5. Neighbouring buildings do not include any Listed buildings.

2.3.6. Neighbouring gardens and trees are present at no.8 and 12 Glenmore Road. However, it is considered that these are far away enough from the development such that they will not be affected.

2.3.7. Adjacent infrastructure includes the public highway and footpath to the front of the property. The asset owners have not been contacted at this stage.

2.3.8. 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.

2.3.9. Existing and Proposed development drawings are presented in Appendix C and A respectively.

2.3.10. The proposed development will utilise the following construction techniques:

- Sheet piling to form front lightwell;
- Reinforced concrete underpinning to party walls:
- Vertical and horizontal temporary propping to ground floor and basement walls respectively

2.3.11. The outline construction programme for the proposed development has not been produced. It is anticipated that the basement will take 6 months to construct.

3.0 DESK STUDY

3.2. SITE HISTORY

3.2.1. 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. There is no evidence that the ground beneath the property has ever been reworked. There is no evidence that the existing basement has ever been altered structurally or extended since it was first constructed.

3.3. GEOLOGY

3.3.1. The British Geology Survey (BGS) map of the area (Figures:4 and 5, Appendix D) indicates 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 (0762), by Connaught's Site Investigation Ltd. Confirms the presence of London Clay beneath the site. The SI report is included in appendix B of this report.

3.4. HYDROGEOLOGY

3.4.1. The geology underlying the site is the Thames Group, classified as unproductive strata (Figure7, Appendix D).

3.4.2. LB Camden data indicates the site is not within a groundwater source protection zone.

3.5. HYDROLOGY, DRAINAGE AND FLOOD RISKS

3.5.1. The site is located south 1000m of surface water features (Hampstead chain catchment) (Figure 14-Hampstead Heath Surface Water Catchments and Drainage, Appendix D). The site slopes in a southerly direction. No potential impact to the surface water catchment zone is considered likely

3.5.2. The site is located approximately 50m south east of a tributary arm of the River Tyburn (Figure 12-Watercourses, Appendix D). The site slopes in a southerly direction. Due to the site topography and the scale of the development, no potential impact to the watercourse is considered likely

3.5.3. The site is not within the catchment of the Hampstead Heath Pond Chain, which is 1000m to the north (Figure 14-Hampstead Heath Surface Water Catchments and Drainage, Appendix D).

3.5.4. The site surface area is currently 13% permeable. The majority of the site is occupied by the house which collects rain water via a series of gutters to the roofs. The surface water is collected at the rear of the property and directed beneath the house toward the public sewer beneath Glenmore Road. The surface water landing in the front lightwell is captured via floor gulleys and is also directed toward the public sewer beneath Glenmore Road. The rear garden consists of paving and astro turf. The surface water falling onto the garden appears to seep into the ground.

3.5.5. The proposed site surface area will be 13% permeable. The majority of the site will be occupied by the house which collects rain water via a series of gutters to the roofs. The surface water will be collected at the rear of the property and directed beneath the house toward the public sewer beneath Glenmore Road. The surface water landing in the front lightwell will be captured via floor gulleys and will also directed toward the public sewer beneath Glenmore Road. The rear garden will consist of paving and astro turf. The surface water falling onto the garden will continue to seep into the ground.

3.5.6. The site is classified as.very low risk of surface water flooding/reservoir flooding / sewer flooding and is within a Local Flood Risk Zone 1

3.5.7. The site is not within a Critical Drainage Area.

3.6. OTHER INFORMATION

None provided.

4.0 SCREENING

4.2.1. A screening process has been undertaken and the findings are described below.

Question	Response	Details
1a. Is the site located directly above an aquifer?	No	DEFRA map showing bedrock aquifers, superficial drift aquifers, and ground water vulnerability zones (Figure:8, Appendix D)
1b. Will the proposed basement extend beneath the water table surface?	No	Site Investigation Report 0762 by Connaught Site Investigation Ltd. (7th August 2019). See appendix B.
2. Is the site within 100m of a watercourse, well (used / disused) or potential spring line?	No	Environment Agency maps show that the site is not within 100m of a watercourse.
3. Is the site within the catchment of the pond chains on Hampstead Heath?	No	The site is approximately 1km south from the pond chains of Hampstead Heath.
4. Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas?	No	The proposed development consists of extending the basement beneath the existing plan footprint of the building only.
5. As part of site drainage, will more surface water (e.g. rainfall and run-off) than at present be discharged to the ground (e.g. via soakaways and/or SUDS)?	No	The proposed development consists of extending the basement beneath the existing plan footprint of the building only.
6. Is the lowest point of the proposed excavation (allowing for any drainage and foundation space under the basement floor) close to, or lower than, the mean water level in any local pond (not just the pond chains on Hampstead Heath) or spring line?	No	Environment Agency maps show that here are no local ponds in the immediate vicinity of the proposed development.

4.3. SLOPE STABILITY

Question	Response	Details
1. Does the existing site include slopes, natural or man-made greater than 7 degrees (approximately 1 in 8)?	No	Site visit by structural engineer on 16th May 2019. The topography of the site follows a gentle slope (less than 7 degress) across a large area. The rest of the site does not have any noticeable slopes relative to the topographical datum.
2. Will the proposed re-profiling of landscaping at the site change slopes at the property boundary to more than 7 degrees (approximately 1 in 8)?	No	Re-profiling of landscaping is not proposed.
3. Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7 degrees (approximately 1 in 8)?	No	Site visit by structural engineer on 16th May 2019. There is no noticeable change in topography to the sites neighbouring the proposed development.
4. Is the site within a wider hillside setting in which the general slope is greater than 7 degrees (approximately1 in 8)?	No	Site visit by structural engineer on 16th May 2019.
5. Is the London Clay the shallowest strata at the site?	Yes	Site Investigation Report (0762) 7th August 2019. A layer of Made Ground is present over the Clay strata.
6. Will any trees be felled as part of the development and/or are any works proposed within any tree protection zones where trees are to be retained?	No	Trees are present in the neighbouring gardens to the rear of the property. These trees will not be felled as part of the development.
7. Is there a history of seasonal shrink-swell subsidence in the local area and/or evidence of such effects at the site?`	No	Site visit by structural engineer on 16th May 2019. A visual inspection of the adjacent building elevations suggested that the subsidence cracking had not occurred. The client was not aware of any subsidence issues in the area.
8. Is the site within 100m of a watercourse or a potential spring line?	No	Environment Agency maps show that the site is not within 100m of a watercourse
9. Is the site within an area of previously worked ground?	No	Ordinance Survey maps (1896 and 1914) show that the Victorian property was the first development on the site.
10. Is the site within an aquifer. If so, will the proposed basement extend beneath the water table such that dewatering may be required during construction?	No	DEFRA map showing bedrock aquifers, superficial drift aquifers, and ground water vulnerability zones (Figure:8, Appendix D)
11. Is the site within 50m of the Hampstead Heath Ponds?	No	The site is approximately 1km south from the pond chains of Hampstead Heath.
12. Is the site within 5m of a highway or pedestrian right of way?	Yes	There is a public highway and a pedestrian right of way to the front of the property.
13. Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	No	The proposal includes deepening the Party Wall footings to form the proposed basement. Therefore, there is not a foundation depth differential between the properties.
14. Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines?	No	Google maps. The closest below ground infrastructure is the northern line, approximately 500m north-west of the site.

4.4. SURFACE WATER AND FLOODING

Question	Response	Details
1. Is the site within the catchment of the ponds chains on Hampstead Heath?	No	The site is approximately 1km south from the pond chains of Hampstead Heath.
2. As part of the proposed site drainage, will surface water flows (e.g. volume of rainfall and peak run-off) be materially changed from the existing route?	No	The proposed development consists of extending the basement beneath the existing plan footprint of the building only. There will be no significant increase in the amount of hard standing.
3. Will the proposed basement development result in a change in the proportion of hard surfaced / paved external areas?	No	The proposed development consists of extending the basement beneath the existing plan footprint of the building only. There will be no significant increase in the amount of hard standing.
4. Will the proposed basement result in changes to the profile of the inflows (instantaneous and long-term) of surface water being received by adjacent properties or downstream watercourses?	No	The proposed development consists of extending the basement beneath the existing plan footprint of the building only. There will be no significant increase in the amount of hard standing. The surface water landing directly on the site catchment area will be dealt with by the surface water drainage system.
5. Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?	No	The proposed development consists of extending the basement beneath the existing plan footprint of the building only. There will be no significant increase in the amount of hard standing. The surface water landing directly on the site catchment area will be dealt with by the surface water drainage system.
6. Is the site in an area identified to have surface water flood risk according to either the Local Flood Risk Management Strategy or the Strategic Flood Risk Assessment or is it at risk from flooding, for example because the proposed basement is below the static water level of nearby surface water feature.	No	Environment Agency flood risk map

4.5. NON-TECHNICAL SUMMARY OF SCREENING PROCESS

4.5.1. The screening process identifies the following issues to be carried forward to scoping for further assessment:

- The proposed development is within 5m from the highway and pedestrian right of way. The construction methodology and sequence must be carefully considered to ensure that these assets are not damaged, and to avoid health and safety risks to the general public.
- The shallowest strata on the site is London Clay, which is a highly shrinkable material. This means that it is subject to seasonal shrinking and swelling with changes in loading and water content, which can subsequently cause damage to buildings.

4.5.2. The other potential concerns considered within the screening process have been demonstrated to be not applicable or not significant when applied to the proposed development.

5.0 SCOPING

The following issues have been brought forward from the Screening process for further assessment:

5.1. PROXIMITY TO HIGHWAY AND PUBLIC FOOTPATH

5.1.1. The proposed development is within 5m from the highway and pedestrian right of way. The construction methodology and sequence must be carefully considered to ensure that these assets are not damaged, and to avoid health and safety risks to the general public.

5.1.2. With reference to our construction sequence drawings in appendix A, it can be demonstrated that the deepening of the lightwell to the front of the property can be achieved whilst maintaining lateral support to both the highway and the public footpath. A movement monitoring strategy will also be developed and agreed with the adjoining Party Wall Surveyors and owners of the highway/public footpath to ensure that excessive movement does not occur to these assets as a result of the proposed works.

5.1.3. It is considered that the above steps will be sufficient to adequately address the potential risks associated with excavating within 5m of the highway/public footpath. No further assessment is considered necessary.

5.2. FOUNDING ON LONDON CLAY STRATA

5.2.1. The shallowest strata on the site is London Clay, which is a highly shrinkable material. This means that it is subject to seasonal shrinking and swelling with changes in loading and water content, which can subsequently cause damage to buildings if not manages correctly. The additional excavation associated with the proposals will temporarily reduce the loads on the clay strata, and it is likely to swell a small amount during the construction stage until loads are reapplied. The proposed basement slab has been designed to spread the proposed building's weight over the plan area of the new basement. This will ensure that long term heave does not occur. The basement slab has been designed to resist upward forces associated with clay heave. A movement monitoring strategy will also be developed and agreed with the adjoining Party Wall Surveyors and owners of the highway/public footpath to ensure that excessive movement does not occur to these assets as a result of the proposed works.

5.2.2. The structural design has taken into account the possible effects of founding on the clay strata. A movement monitoring strategy will also be implemented to assess any building movement during construction. No further assessment is considered necessary.

6.0 SITE INVESTIGATION/ADDITIONAL ASSESSMENT

6.1. SITE INVESTIGATION

A development specific site investigation has been carried out by Connaught Site Investigation Ltd. on 10th, 11th and 12th July 2019. The site investigation report (0762, 7th August 2019) has been provided in Appendix B.

6.2. ADDITIONAL ASSESSMENTS

No further assessments have been carried out as part of this basement impact assessment.

7.0 CONSTRUCTION METHODOLOGY/ENGINEERING STATEMENTS

7.1. OUTLINE GEOTECHNICAL DESIGN PARAMETERS

7.1.1. The following outline, reasonably conservative geotechnical parameters have been determined, based on the site investigation data presented *(in Appendix B)* and relevant technical guidance (as referenced in para 2.2 of this BIA).

7.2. OUTLINE TEMPORARY AND PERMANENT WORKS PROPOSALS

7.2.1. The works proposals include*:*

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.

In order to demonstrate buildability, a proposed construction sequence has been developed (see drawings 19029.601-602, Appendix A). 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.

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.

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.

7.3. GROUND MOVEMENT AND DAMAGE IMPACT ASSESSMENT

7.3.1. An analytical model to calculate the possible ground movements due to the construction of the proposed basement has not been carried out. The scale of the development, the ground conditions encountered, depth to the water table, the construction methods employed, and the time scales involved to construct the basement have all been taken into account and it is considered that an analytical method is inappropriate for this development.

Traditional reinforced concrete underpins will be used to extend the depth of the existing basement masonry walls and to also for the new retaining wall to the rear of the basement. A temporary/sacrificial sheet piled wall will be installed at the front of the property to allow a reinforced concrete wall to be installed and support the highway and public footpath. A construction sequence has been provided to ensure that adjacent structures are supported at all times (Appendix A).

The new basement will be founded in medium strength clay according to the site-specific ground investigation (Appendix B). The ground water level has been found to be below the formation level of the basement.

During the works a movement monitoring strategy will be carried out by an independent surveyor to ensure that excessive movement/damage is not experienced by the adjacent structures. The movement monitoring strategy will limit damage to the surrounding properties to Category 1 or less, as defined in CIRIA 580 and reproduced Table 9.1 below. This is described further in section 7.4 below.

7.4. CONTROL OF CONSTRUCTION WORKS

7.4.1. The construction works will be closely controlled through regular site visits to inspect each stage of the works being carried out. These site visits will be coordinated with the contractor to ensure that each stage of the suggested construction sequence (Appendix A) is reviewed and commented on by the structural engineer who designed the basement. A site report will also be written to capture site observations and ensure that construction is proceeding as designed. In addition, a movement monitoring report will be produced by an independent surveyor for review by the structural engineer to ensure that the damage category does not exceed 1 according to the Burland scale, this is discussed further below.

7.4.2. An outline structural monitoring strategy has been developed to control construction works and maintain movements/damage impacts within the predicted limits, and is described below. In the event of a successful Planning Application the details of the strategy will be confirmed with the appointed Party Wall Surveyor.

No.8, No.12, and the retaining wall adjacent to Glenmore Road will be monitored for movement throughout the project, with more frequent readings during the construction of the basement. 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. A 'traffic light' system will be developed in line with agreed limits to dictate when work should stop in the event of excessive structural movement.

The movement monitoring strategy will limit damage to the surrounding properties to Category 1 or less, as defined in CIRIA 580 and reproduced Table 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 1: Classification of visible damage to walls (from CIRIA 580)

8.0 BASEMENT IMPACT ASSESSMENT

8.1.1. The Conceptual Site Model (CSM) is described below:

- The proven ground conditions are 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 (Appendix B).
- Monitored groundwater level - 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 site slopes with a gradient of less than 7 degrees.
- The existing building is founded at varying depths. The party wall with no.8 is founded 2.64m (63.710) below the ground floor FFL, the party wall with no.12 is founded 3.26m (63.090) below the ground floor FFL. The widths of the existing footings beneath the retaining walls are 940mm and 920mm respectively (19029.301.P1 Proposed Typical Sections, Appendix A).
- The proposed development will be founded at 3.65m (62.700) below existing ground floor FFL respectively (19029.301.P1 Proposed Typical Sections, Appendix A).
- The depths of neighbouring foundations/basements are assumed to be 64.520 to no.8 and 63.900 to no. 12. The depths of any adjacent basements will be verified in the next stage and the retaining wall calculations updated if required respectively (19029.301.P1 Proposed Typical Sections, Appendix A).
- The distance to the highway/footpath is 0.5m to the front of the property.
- Adjacent utilities existing beneath the highway to the front of the property. The utilities beneath the road are not likely to be affected by the proposed development.
- Potential impacts include risk of movement to adjacent buildings during construction of extended basement.
- Proposed mitigation include the development of a construction sequence to minimise anticipate movement, regular site visits to manage the transition between stages of the construction sequence, and a movement monitoring regime to inform of any undue movements to the adjacent structures with pre-agreed limits and actions.
- Residual impacts are greatly reduced and controlled.

8.2. LAND STABILITY/SLOPE STABILITY

8.2.1. The site investigation has identified a suitable founding stratum of London Clay

8.2.2. The risk of movement and damage to this development due to shrink and swell of the London Clay) is low considering that the primary load path from the building to the supporting ground (the party wall foundations) is being maintained without being unloaded. In addition, the majority of the proposed basement is situated beneath an existing basement. The resulting unloading of overburden will only be in the order of 1.3m of clay, and the short-term heave owing to this is therefore likely to be small.

8.2.3. A Ground Movement Assessment has not been carried out as it is considered onerous for a development of this scale and simplicity.

The Damage Impact to surrounding structures will be limited to 1 in accordance with the Burland Scale.

8.2.4. The BIA has concluded that there will not be risks or stability impacts to the development and/or adjacent sites due to slopes.

8.3. HYDROGEOLOGY AND GROUNDWATER FLOODING

8.3.1. The BIA has concluded there is a very low risk of groundwater flooding. 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.

8.3.2. The BIA has concluded *there are no impacts* to the wider hydrogeological environment.

9.0 SUPPORTING DOCUMENTS

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

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.

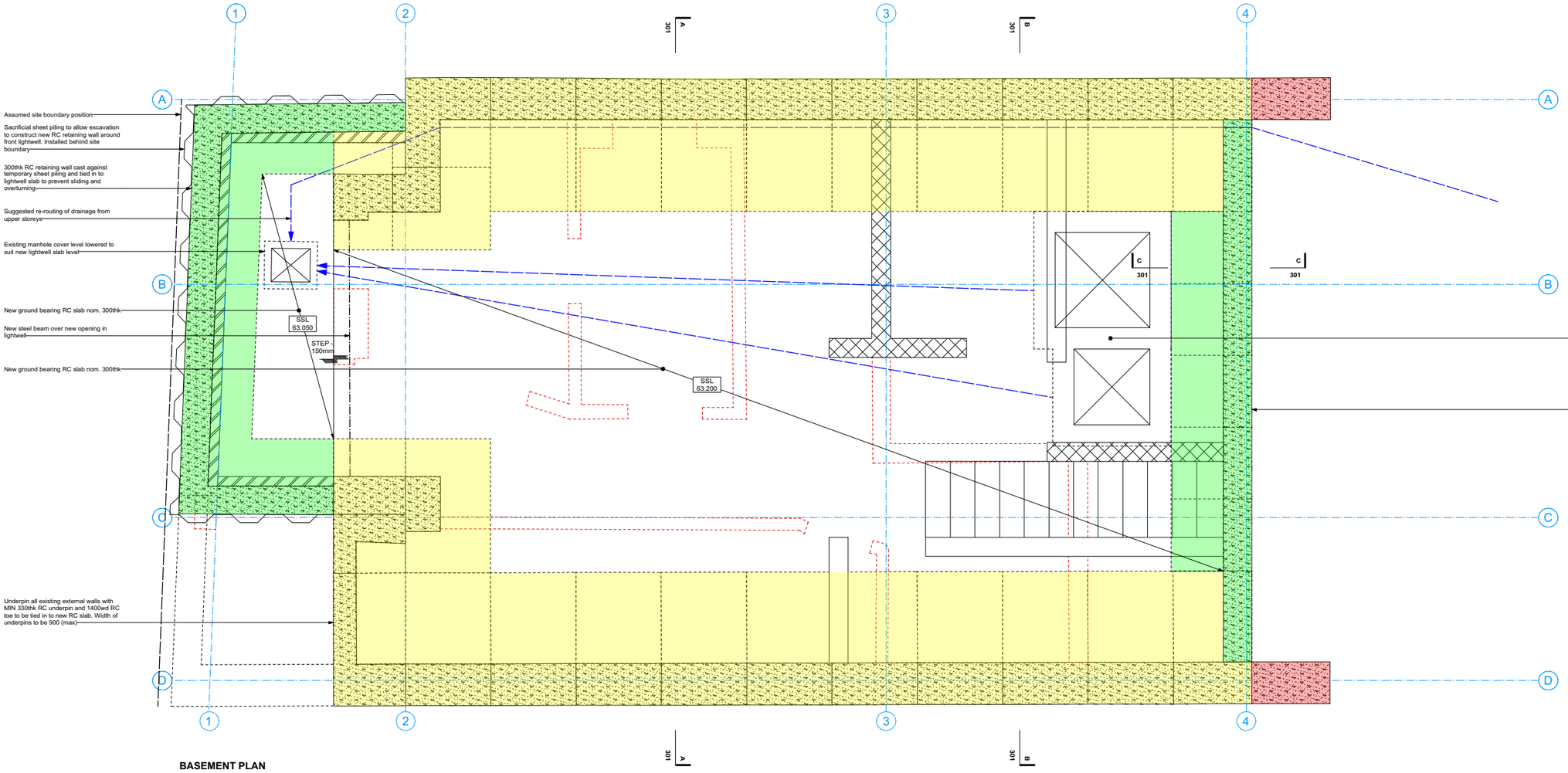
Any discrepancies in the arrangement and details discovered on site, or otherwise, are to be reported to the Architect or Engineer immediately.

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

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020 7701 2616
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project: Glenmore Road	scale: 1:25 @ A1
	drawn: WW
	appr.: SR
title: Proposed Basement Plan	drg. no.: 19029.201
	rev.: P2

NOTES:

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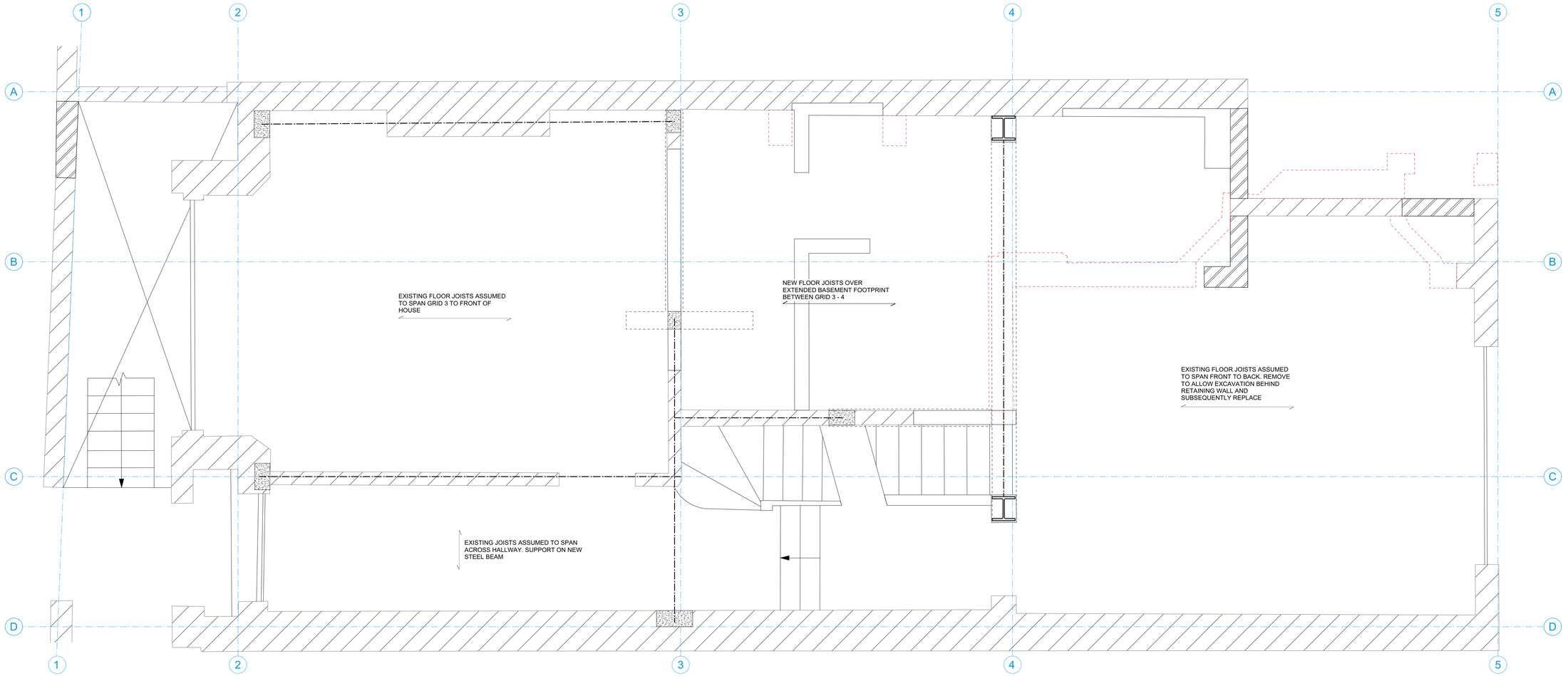
All drawings to be printed in colour.

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

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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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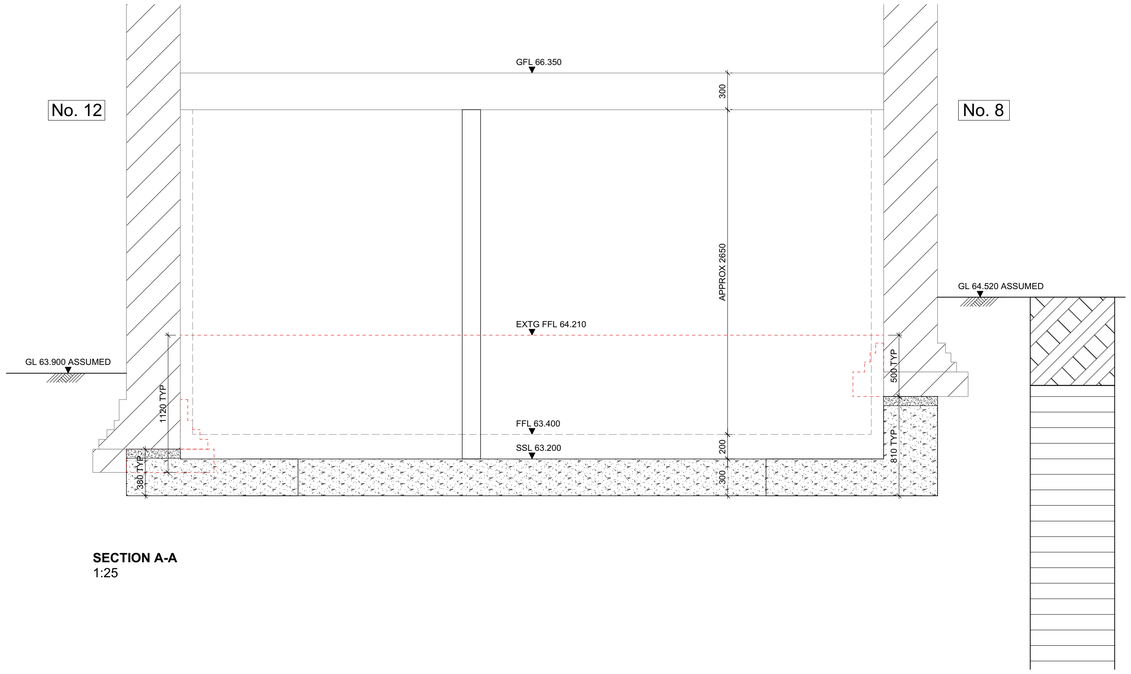
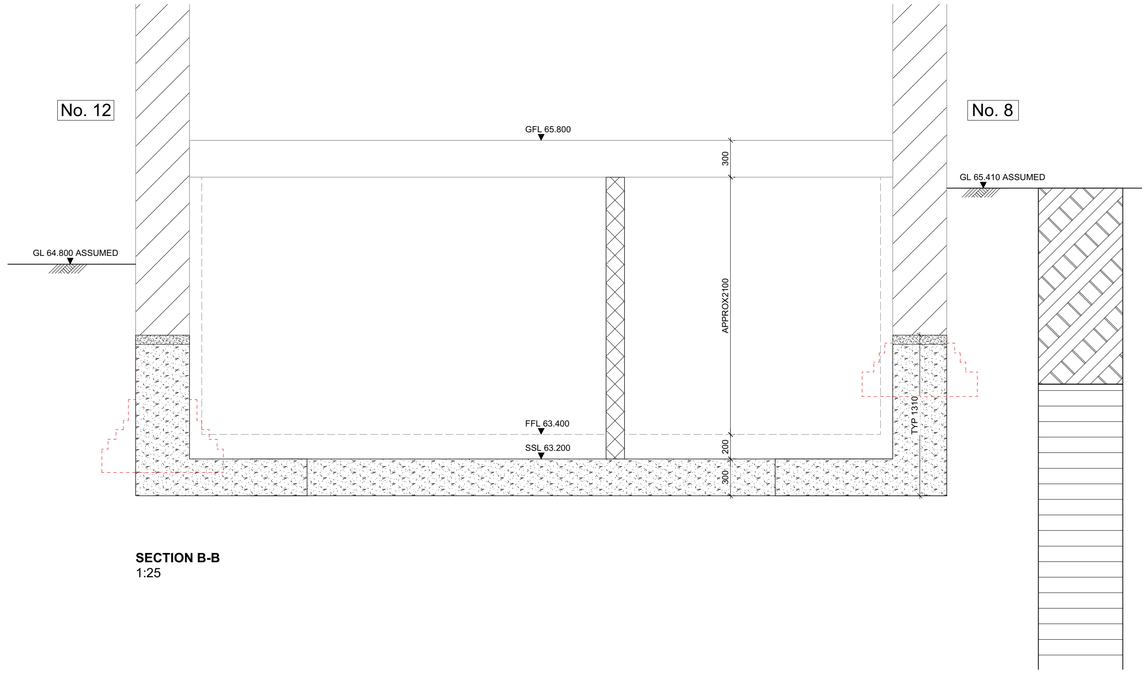
All drawings to be printed in colour.



SECTION A-A
1:25



SECTION B-B
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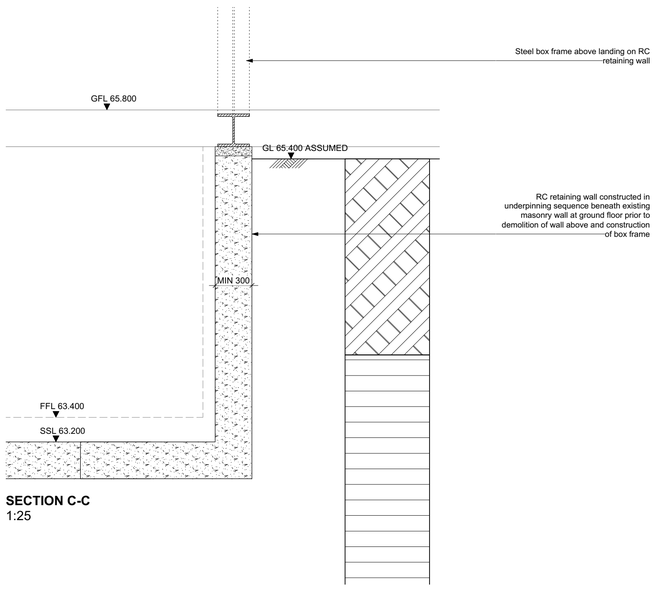

SECTION C-C
1:25

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
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4 Iliffe Yard
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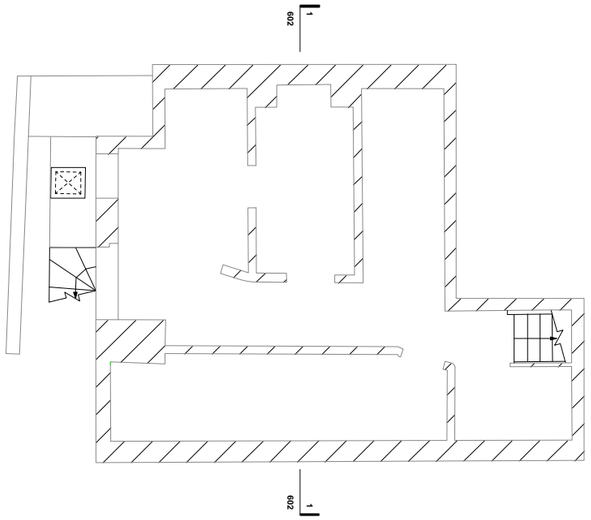
project: **Glenmore Road**

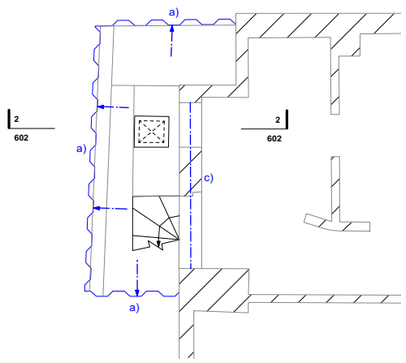
title: **Proposed Basement Sections**

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

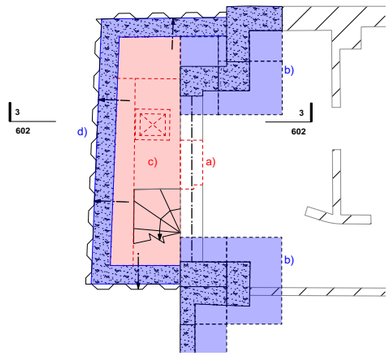
1. Existing arrangement



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



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All dimensions in mm.

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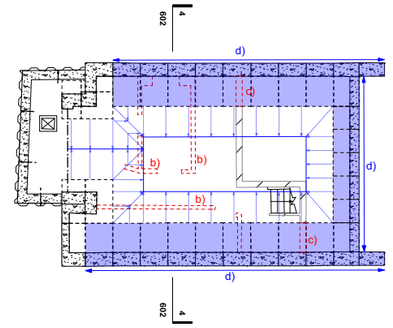
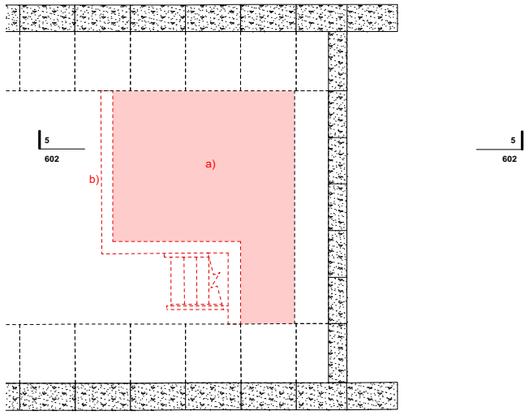
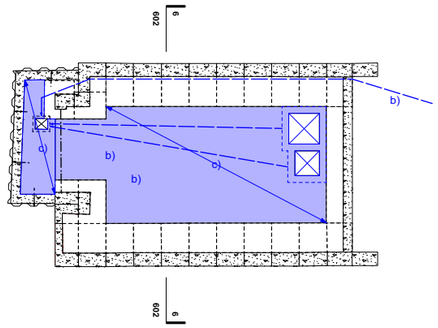
4. a) Prop existing ground floor structure
b) Remove internal basement walls
c) Break out local sections of existing rear retaining walll
d) Install underpins beneath both party walls and construct new rear retaining wall to proposed underpinning sequence



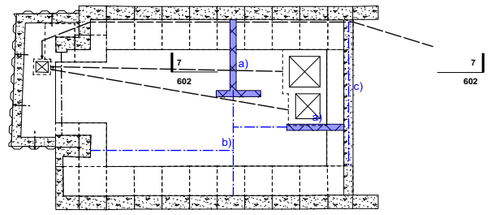
5. a) Excavate rear area of extended basement
b) Remove existing retaining wall along rear of existing basement



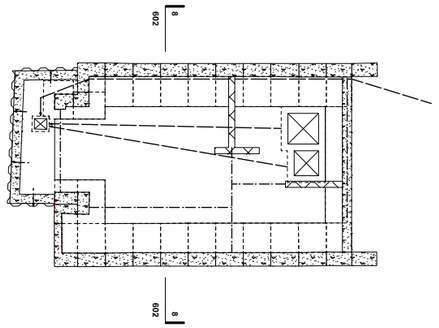
6. a) Excavate whole basement to new founding level
b) Install new drainage runs and sumps
c) Install new basement slabs



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
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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:

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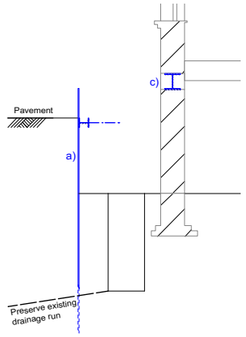
All dimensions in mm.

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

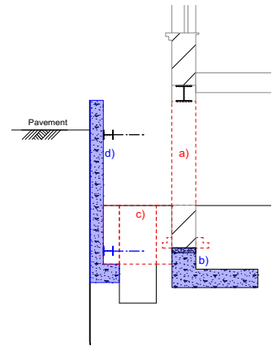
All drawings to be printed in colour.

1. Existing arrangement

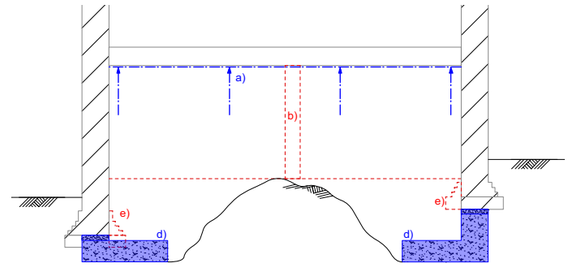
2. a) Install sheet piles
b) Install temporary drainage
c) Install beam over proposed lightwell opening



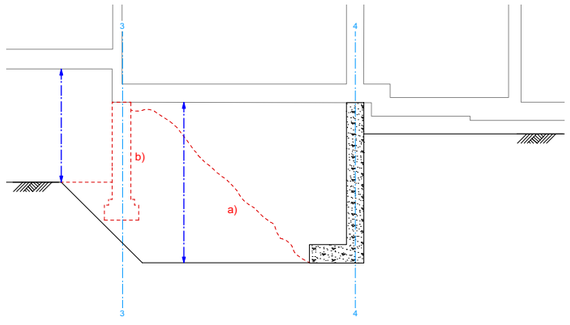
3. a) Form opening in front wall
b) Underpin remaining runs of front wall
c) Break out existing slab in lightwell, excavate and lower manhole cover level
d) Install RC retaining walls against sheet piles



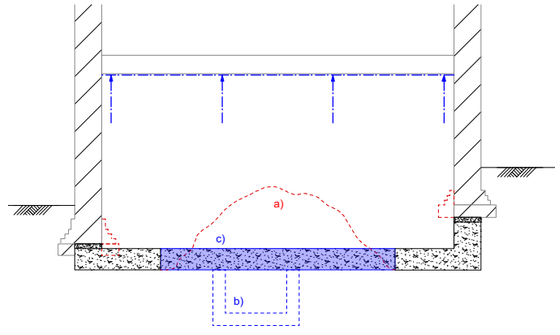
4. a) Prop existing ground floor structure
b) Remove internal basement walls
c) Break out local sections of existing rear retaining walll
d) Install underpins beneath both party walls and construct new rear retaining wall to proposed underpinning sequence
e) Cut back masonry corbels



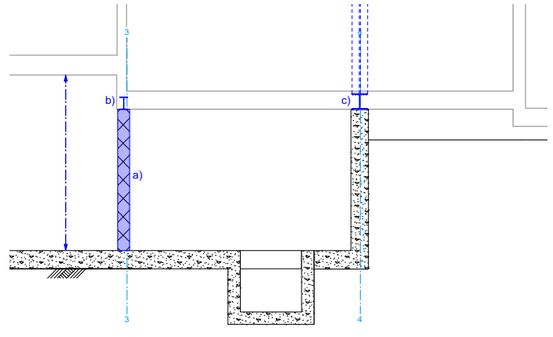
5. a) Excavate rear area of extended basement
b) Remove existing retaining wall along rear of existing basement



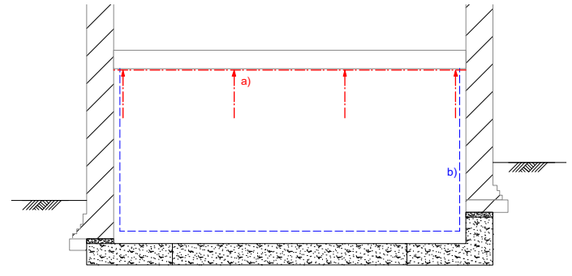
6. a) Excavate whole basement to new founding level
b) Install new drainage runs and sumps
c) Install new basement slabs



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
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project: **10 Glenmore Road**

title: **Construction Sequence Sections**

scale	NTS
drawn	WW
appr.	SR
drg. no.	**19029.602**
rev.	**P2**

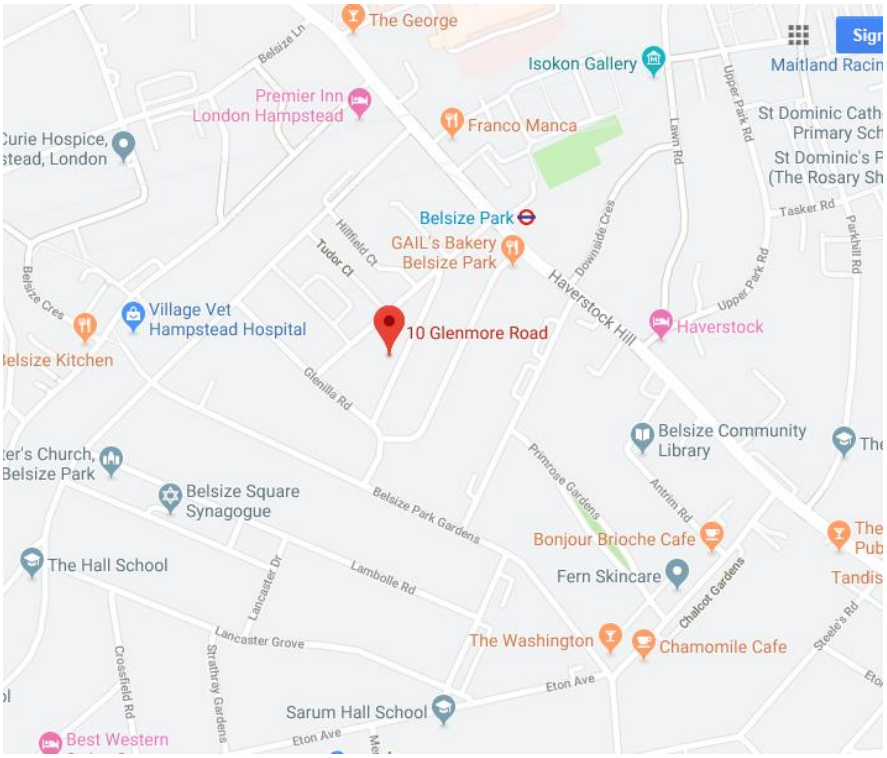
APPENDIX B – Site Investigation Report by Connaught Site Investigation Ltd.

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.

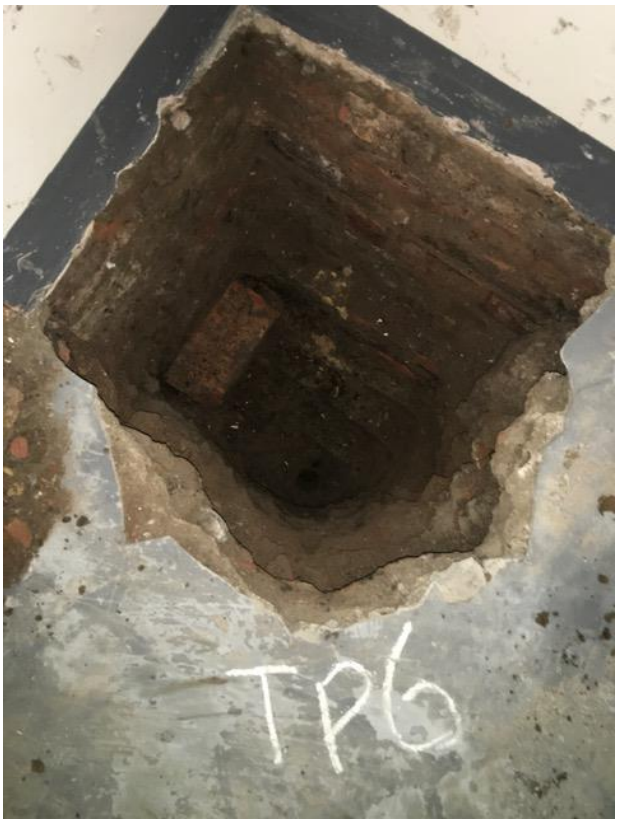
The right hand flank wall foundation (B-B) comprised brickwork with three step outs onto a concrete strip. The total projection of this foundation was 250mm with the concrete 200mmm thick and the foundation seated at a depth of 0.50m below the basement level. The foundation was seated onto soft to firm, 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.

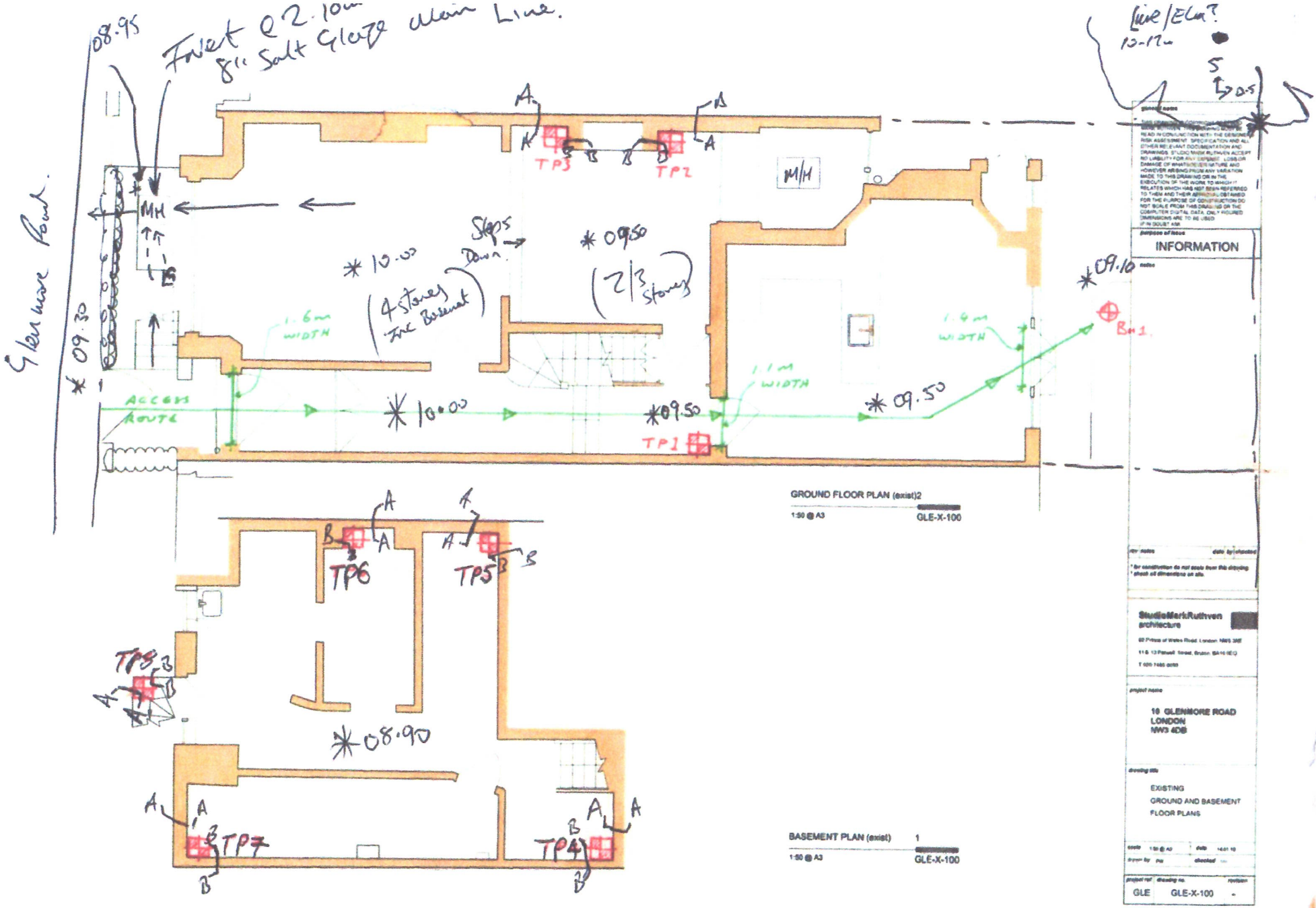
The report may suggest an opinion on the nature of the strata or conditions between exploratory points and below the maximum depth of investigation. However, this is for guidance only and no liability can be accepted for its accuracy.

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

Connaughts Site Investigation Ltd

35 Green Lane, Leigh on Sea, Essex, SS9 5AP
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Appendix No.	2
Sheet No.	1
Job No.	0762
Date:	July 2019
Scale:	1:20

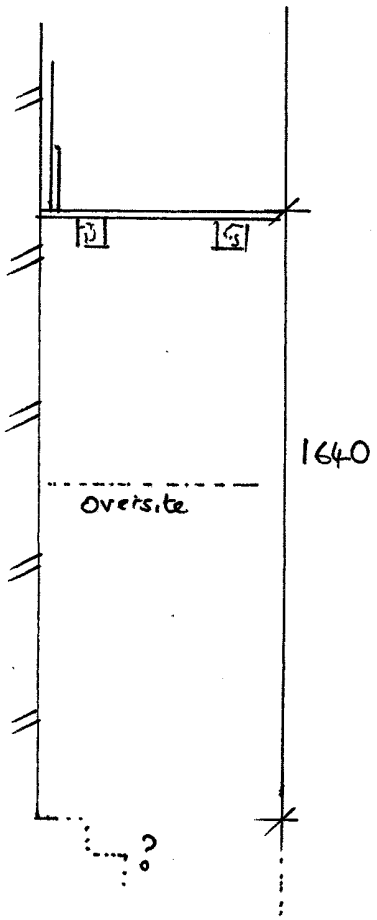
LOCATION 10 Glenmore Road, London, NW3 4DB

Trial Pit 1

No roots encountered

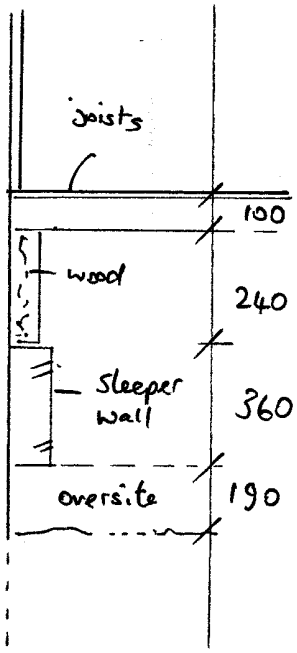
No water inflows encountered trial pit dry on completion.

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)

Connaughts Site Investigation Ltd

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Appendix No.	2
Sheet No.	2
Job No.	0762
Date	July 2019

LOCATION 10 Glenmore Road, London, NW3 4DB

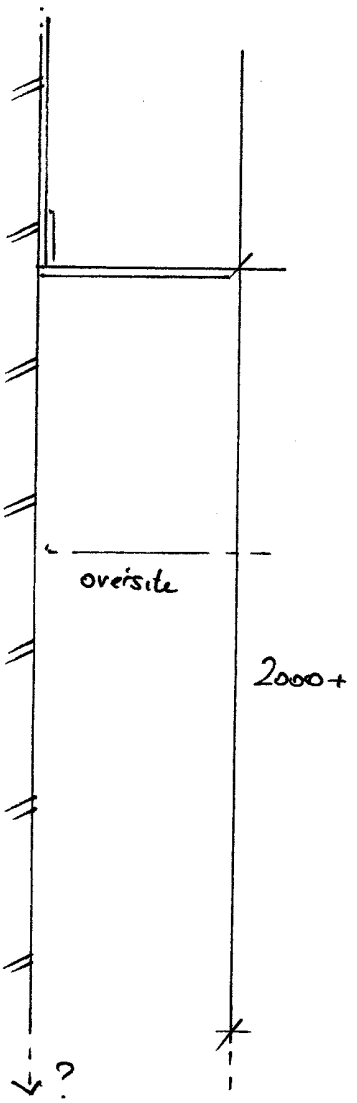
Scale: 1:20

Trial Pit 2

No roots encountered

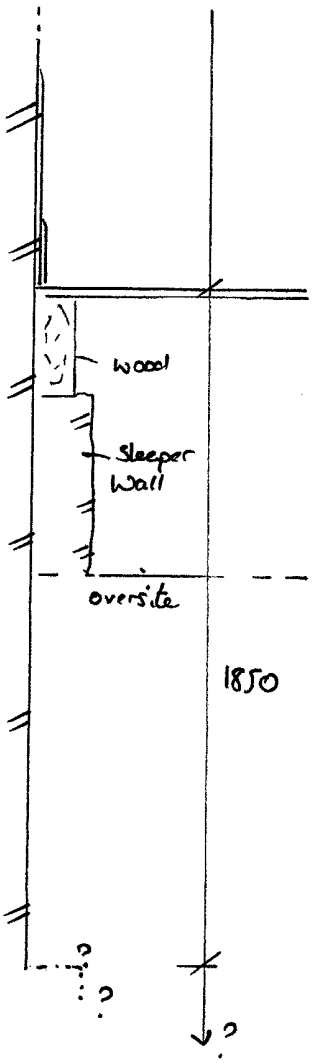
No water inflows encountered trial pit dry on completion.

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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Appendix No.	2
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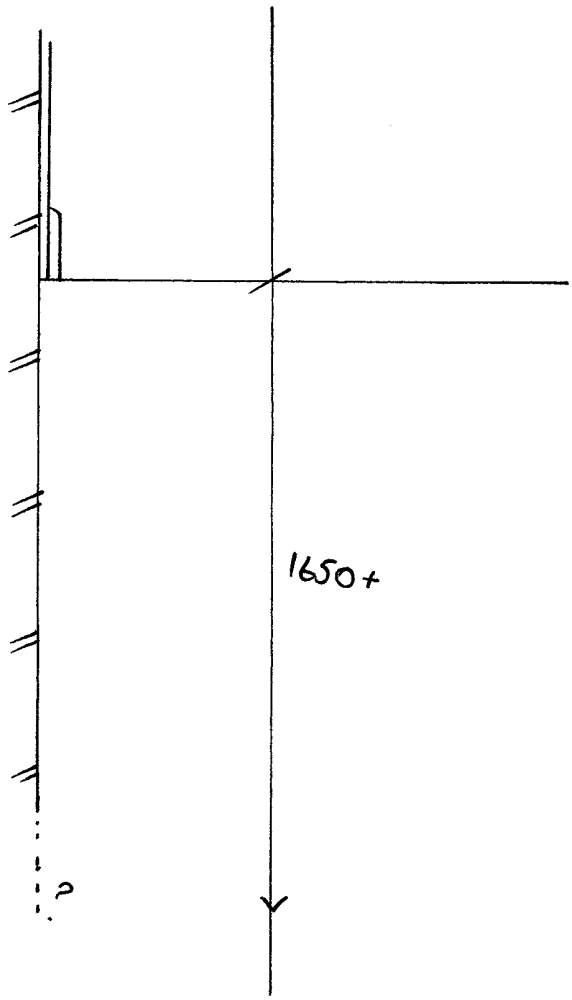
LOCATION 10 Glenmore Road, London, NW3 4DB

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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Fax: 01702 528098

Appendix No.	2
Sheet No.	4
Job No.	0762
Date:	July 2019

LOCATION 10 Glenmore Road, London, NW3 4DB

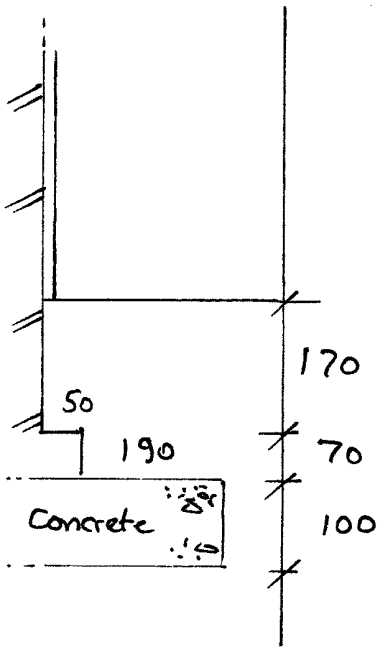
Scale: 1:10

Trial Pit 4

No roots encountered

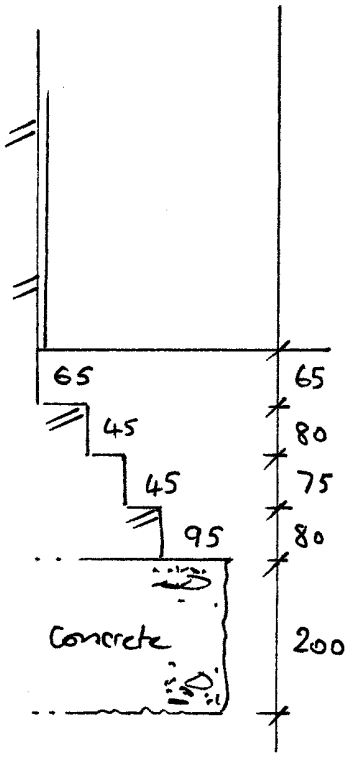
No water inflows encountered
trial pit dry on completion.

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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Appendix No.	2
Sheet No.	5
Job No.	0762
Date.	July 2019

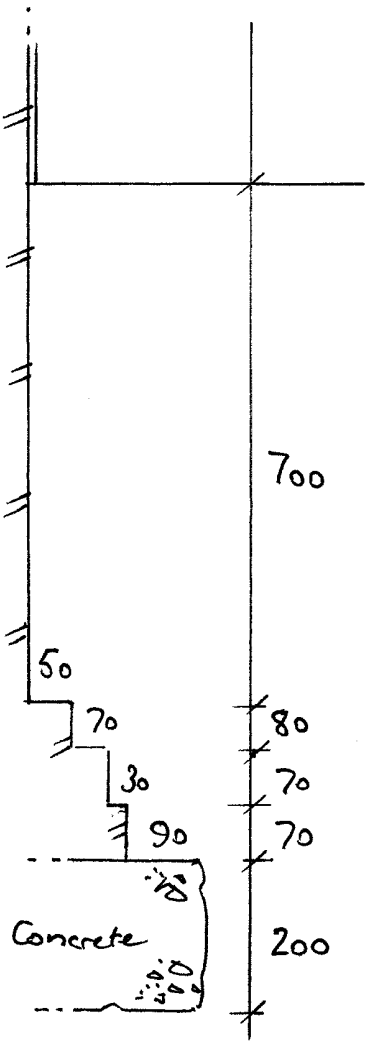
LOCATION 10 Glenmore Road, London, NW3 4DB Scale: 1:10

Trial Pit 5

No roots encountered

No water inflows encountered trial pit dry on completion.

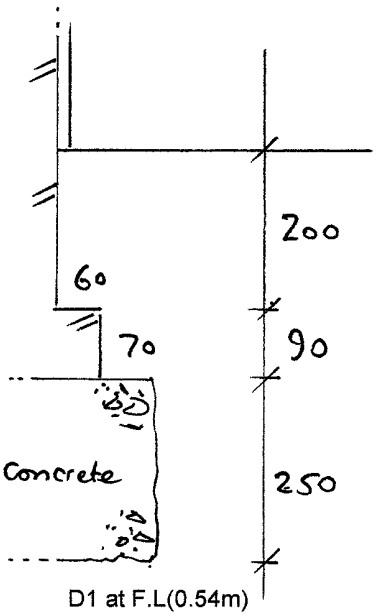
Profile A-A



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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Appendix No.	2
Sheet No.	6
Job No.	0762
Date.	July 2019

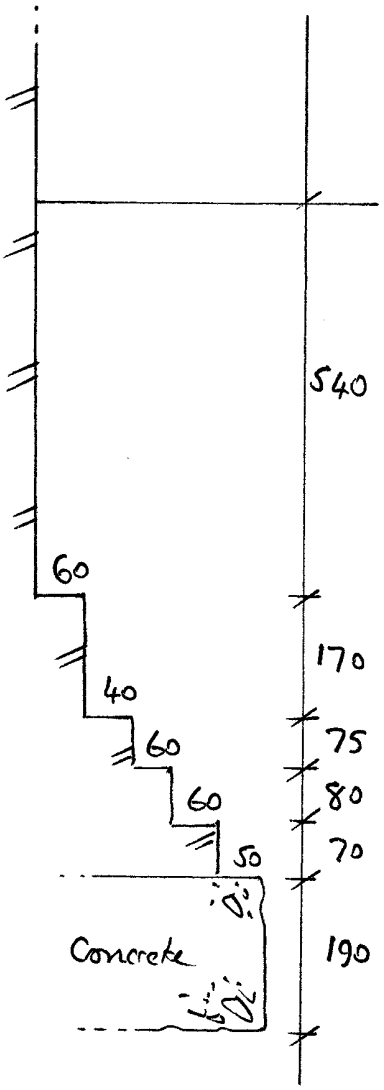
LOCATION 10 Glenmore Road, London, NW3 4DB Scale: 1:10

Trial Pit 6

No roots encountered

No water inflows encountered trial pit dry on completion.

Profile A-A

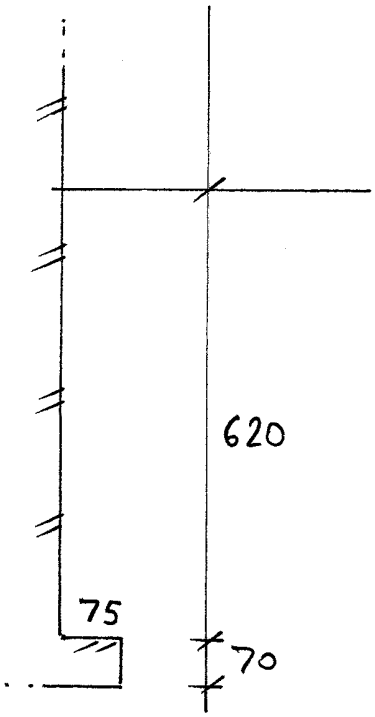


D1 at F.L (1.05m)
V: 40-42kPa

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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Appendix No.	2
Sheet No.	7
Job No.	0762
Date.	July 2019

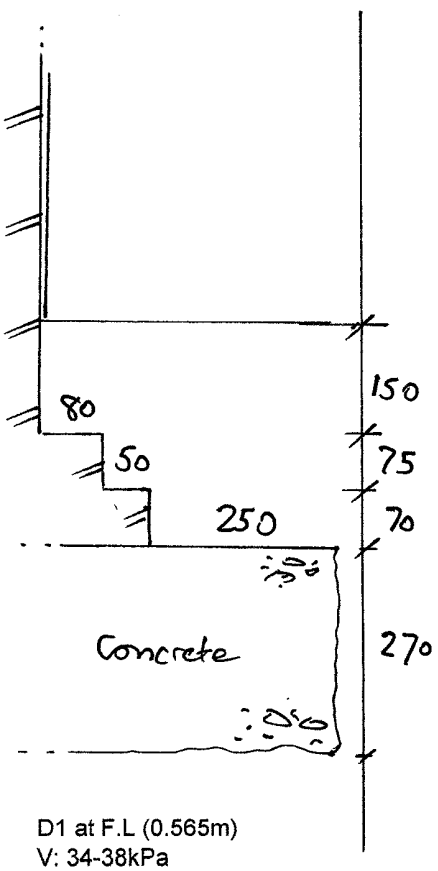
LOCATION 10 Glenmore Road, London, NW3 4DB | Scale: 1:10

Trial Pit 7

No roots encountered

No water inflows encountered
trial pit dry on completion.

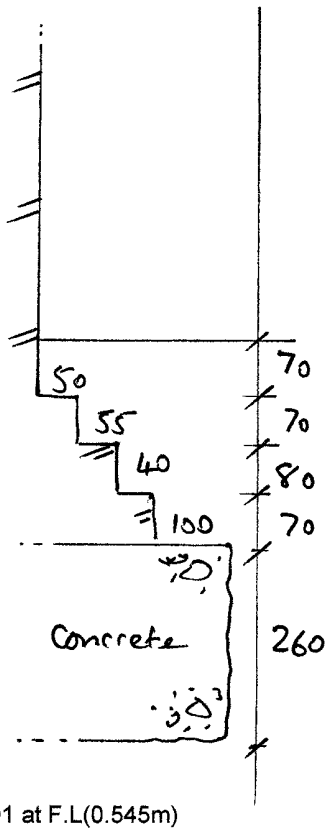
Profile A-A



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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Appendix No.	2
Sheet No.	8
Job No.	0762
Date:	July 2019
Scale:	1:10

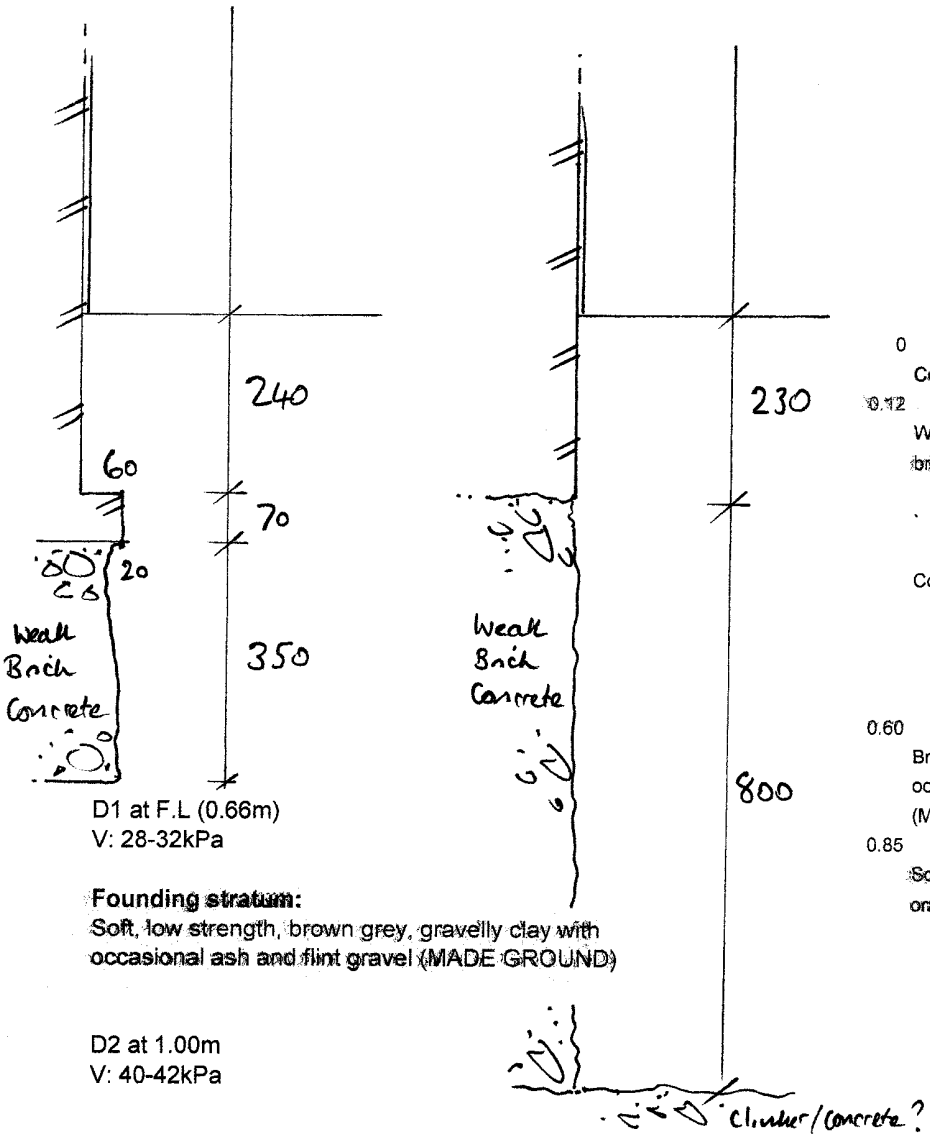
LOCATION 10 Glenmore Road, London, NW3 4DB

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)

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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.								
	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

ISSUED BY SOIL PROPERTY TESTING LTD

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

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 02/08/2019

0998

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

TEST REPORT

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DATE ISSUED: 02/08/2019

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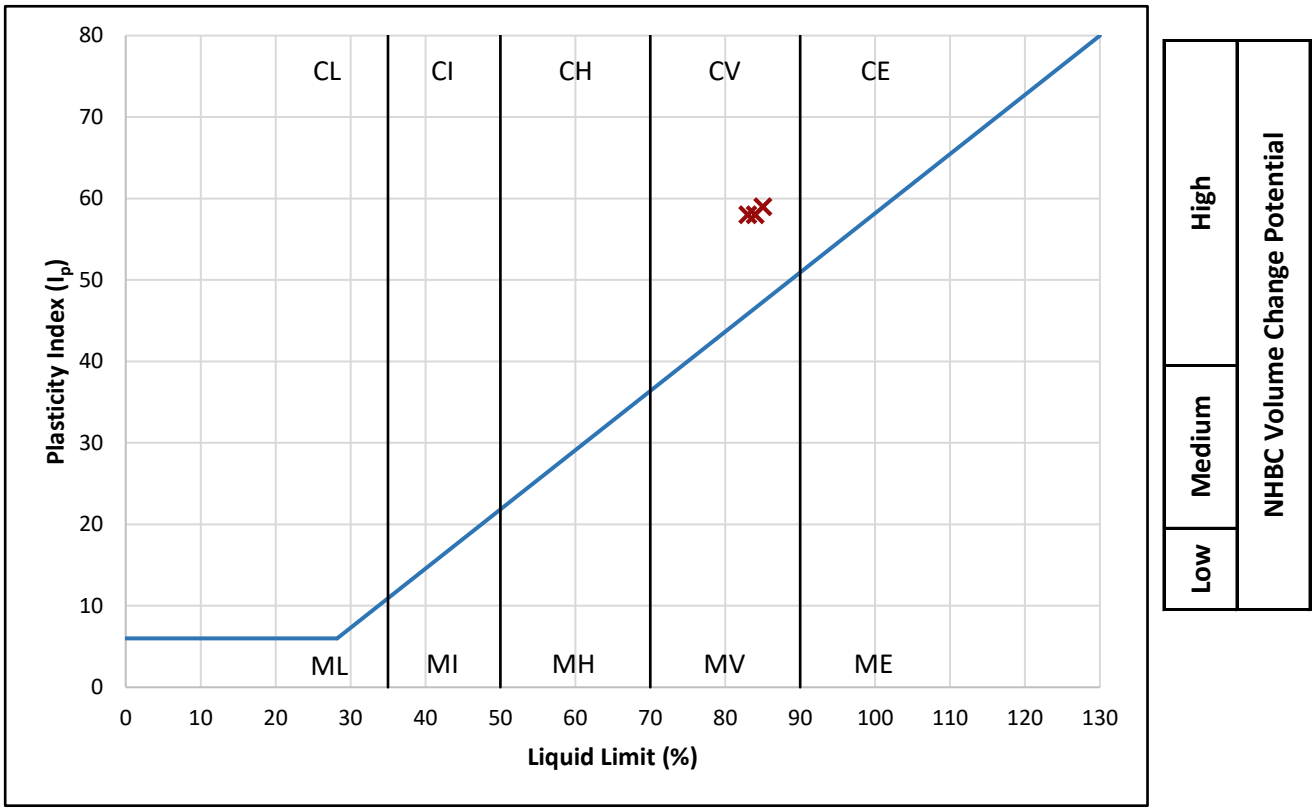
Contract	10 Glenmore Road, London, NW3 4DB
Serial No.	35570

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

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 02/08/2019

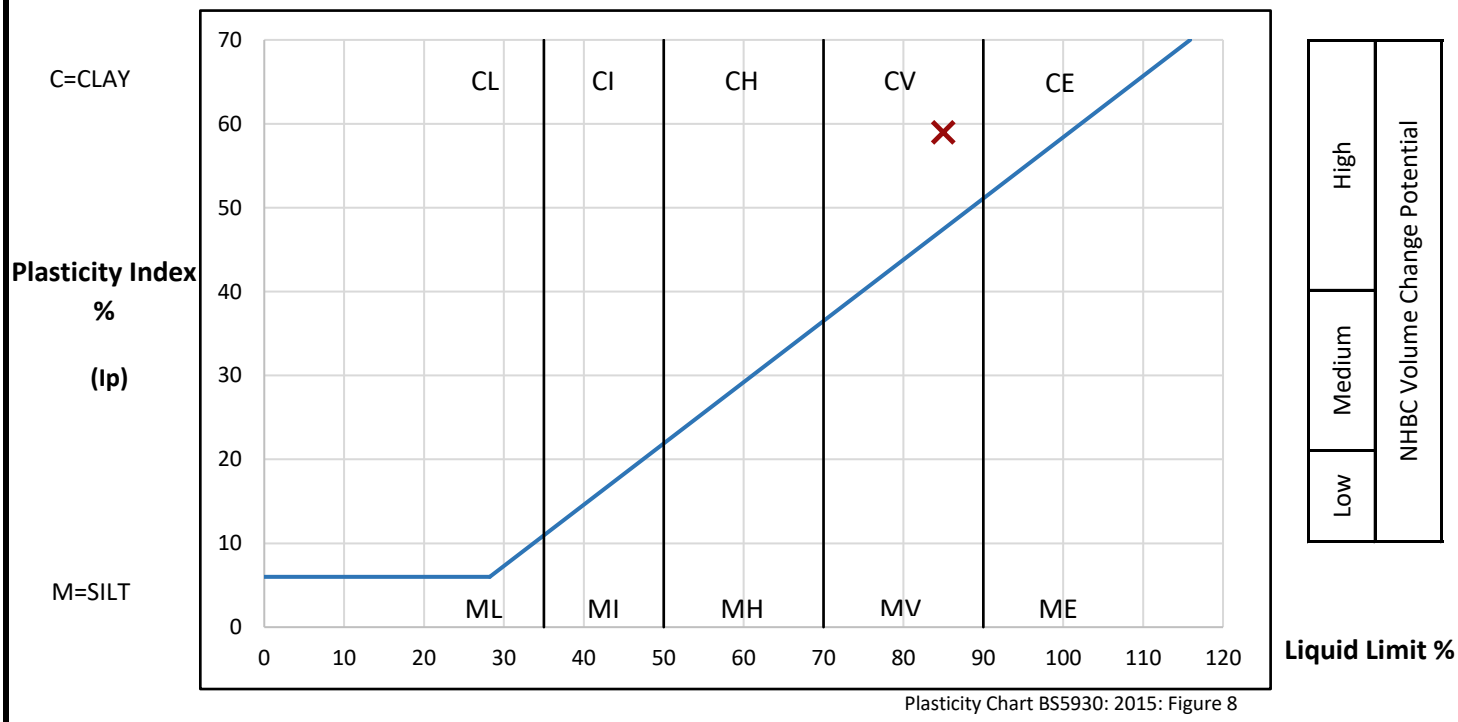
0998

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

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 02/08/2019

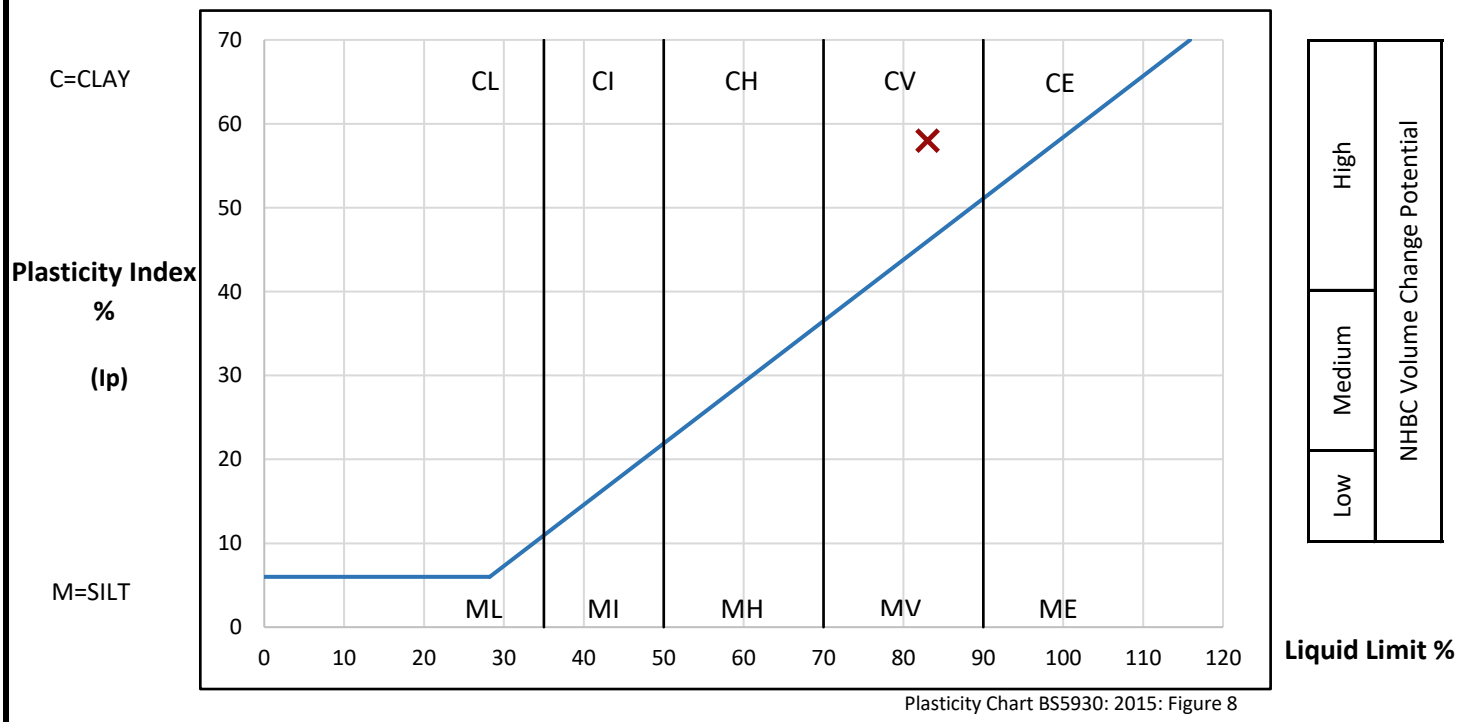
0998

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

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 02/08/2019

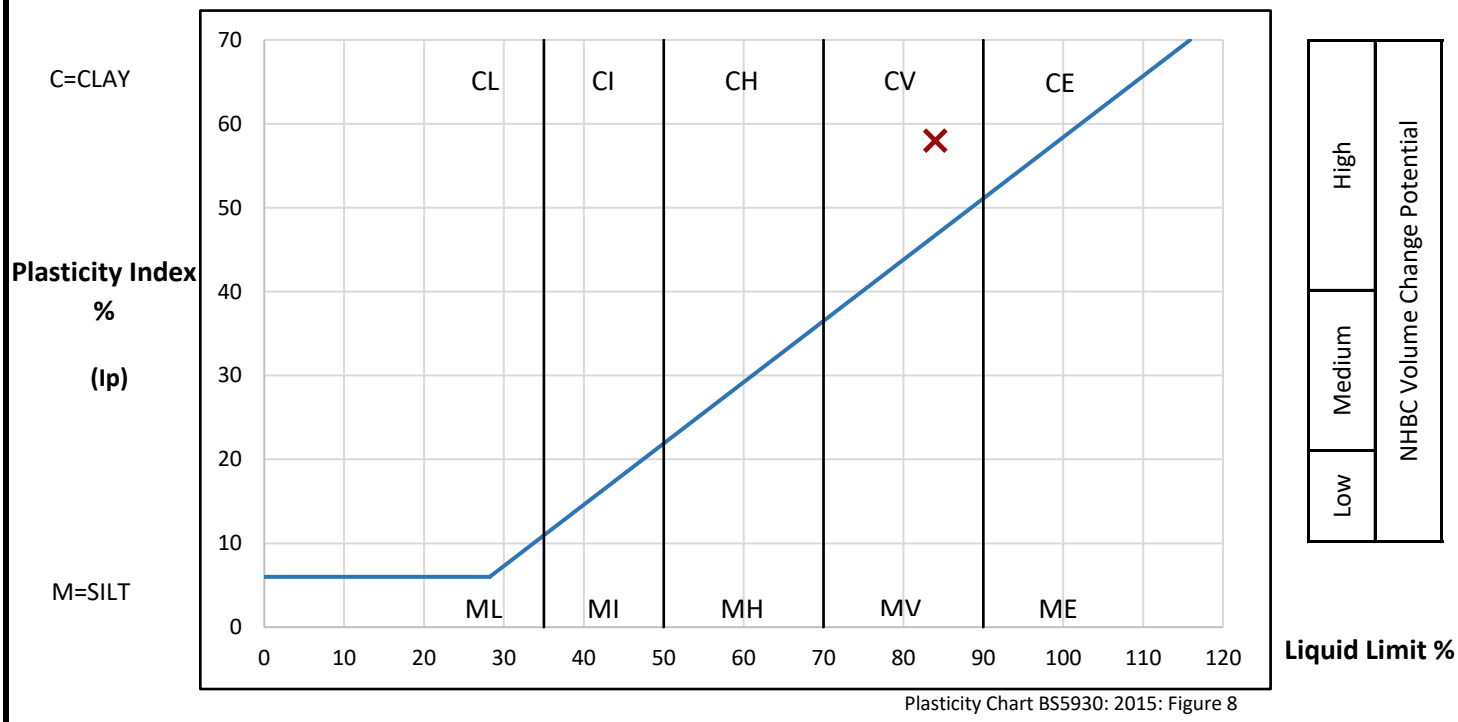
0998

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

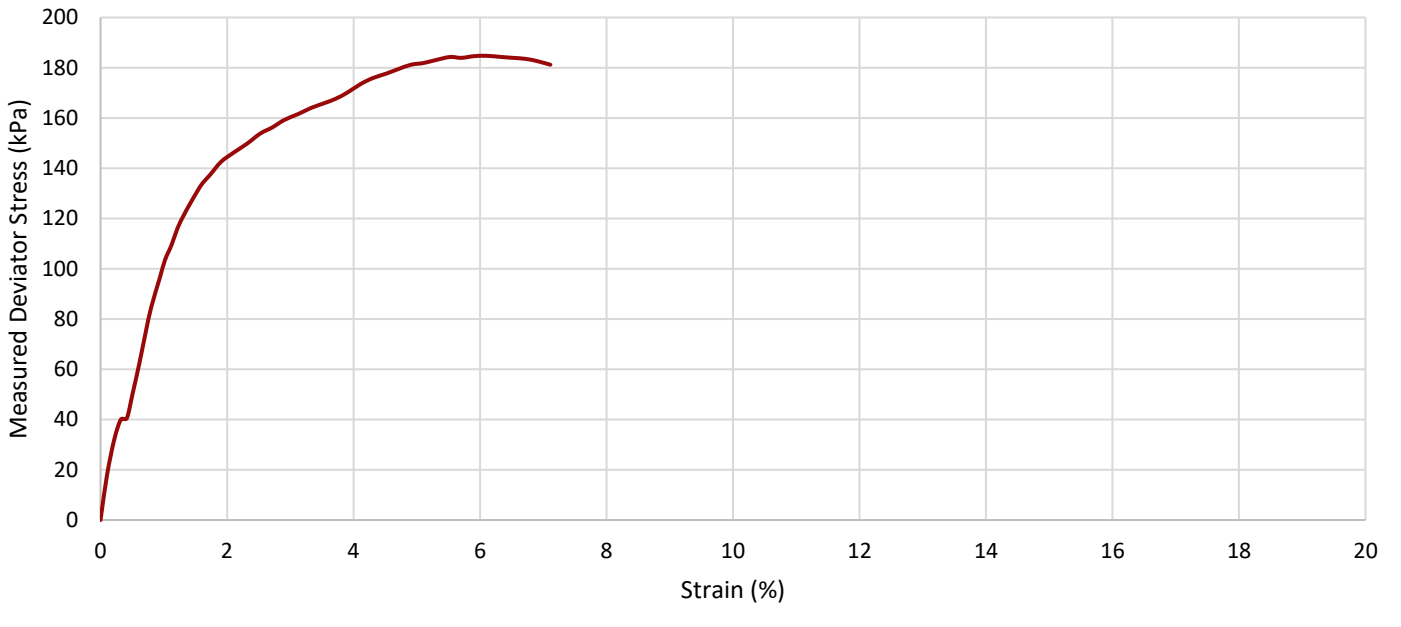
Contract	**10 Glenmore Road, London, NW3 4DB**
Serial No.	**35570**

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

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 02/08/2019

0998

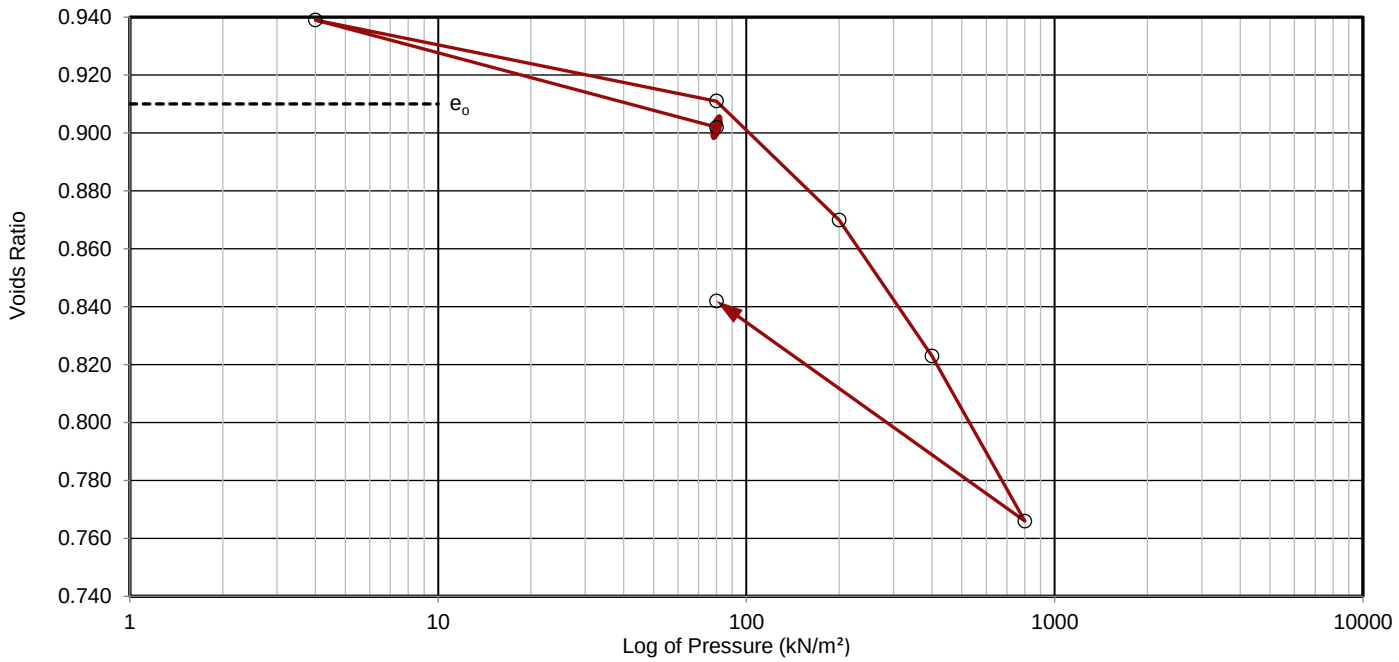
Contract	**10 Glenmore Road, London, NW3 4DB**
Serial No.	**35570**

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

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 02/08/2019

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

DETERMINATION OF THE SULPHATE CONTENT AND pH OF SOIL AND GROUNDWATER

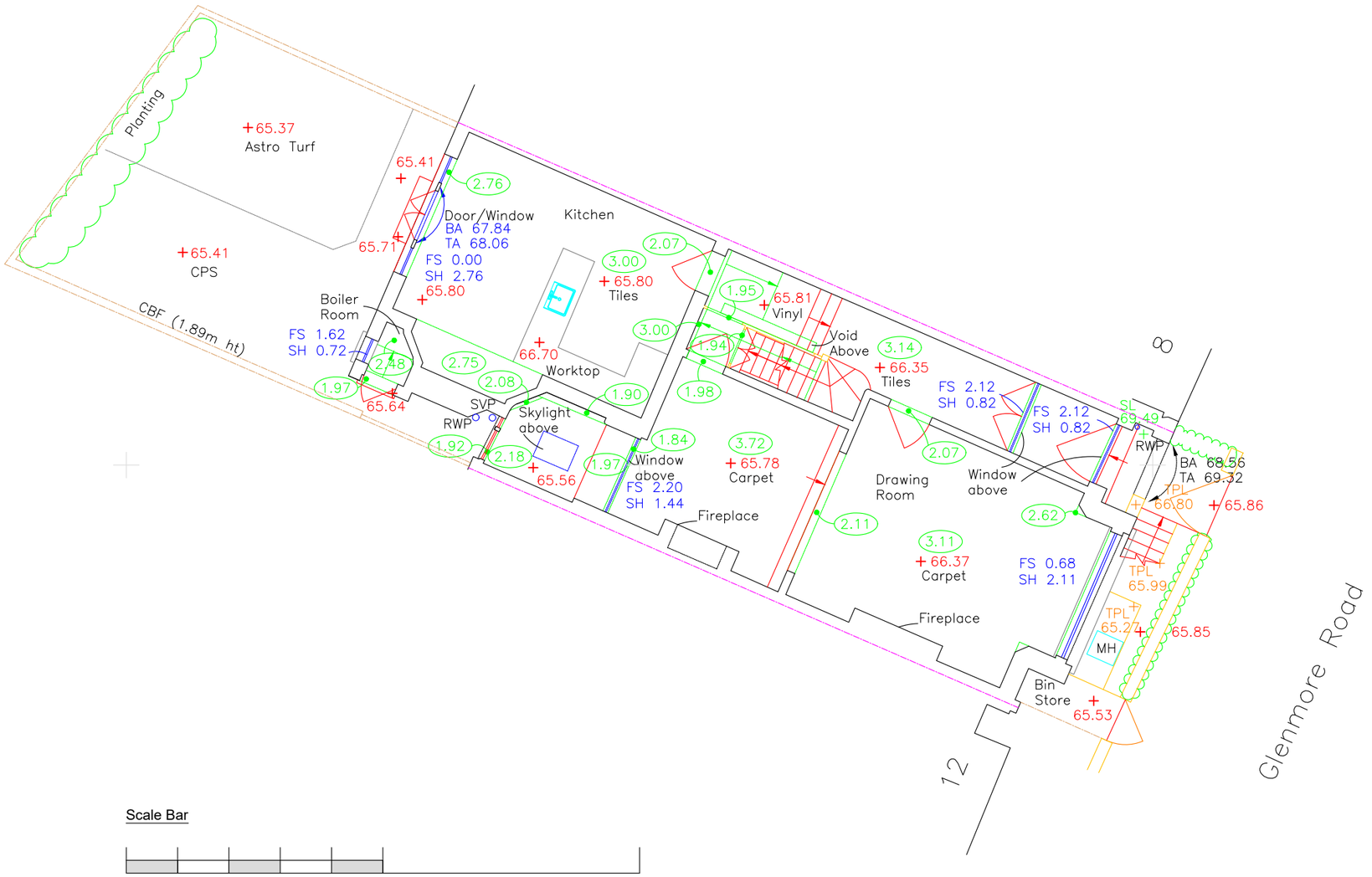
Borehole / Pit No.	Depth (m)	Sample		Conc. of Soluble SO3		Calc'd Conc. Of SO4 (g/L)	pH Value	% Sample Passing 2mm Sieve	Description	Remarks
		Type	Ref.	Water Soluble 2:1 (g/L)	Ground Water (g/L)					
TP4	1.00	D	-	0.34		0.41	7.7	100	Firm yellowish brown CLAY	
TP6	1.50	D	-	0.31		0.38	7.7	100	Firm yellowish 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.

APPENDIX C – Existing site measured survey drawings

18495-G
18495-B
18495-1
18495-2
18495-S
18495-E
18494-ENV/700

By Delver Patman Radler Chartered Surveyors



Scale Bar

0m 5m 10m

STANDARD ABBREVIATIONS

A/C	AIR CON UNIT	O/H	OVERHEAD
B	BOLLARD	OBF	OPEN BOARDED FENCE
BB	BELISHA BEACON	P	POST/POLE
BW	BRICK WALL	PB	POST BOX
BP	BRICK PAVING	PFC	PANEL FENCE–CONC.
BS	BUS STOP	PFW	PANEL FENCE–WOOD
BWF	BARBED WIRE FENCE	PL	PAVEMENT LIGHT
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CLF	CHAIN LINK FENCE	RAD	RADIATOR
COL	COLUMN	RL	RIDGE LEVEL
CONC	CONCRETE	RS	ROAD SIGN
CPS	CONC PAVING SLAB	RTW	RETAINING WALL
(dilap)	DILAPIDATED	RWP	RAIN WATER PIPE
(dis)	DISUSED	SAPL	SAPLING
DCH	DRAINAGE CHANNEL	SB	SIGN BOARD
DK	DROP KERB	SCL	SLOPING CEILING
DMR	DORMER WINDOW	SKL	SKYLIGHT
DP	DOWN PIPE	SL	SOFFIT LEVEL
ELIC	ELECTRIC IC	SO	SMOKE OUTLET
ER	EARTHING ROD	SUSP	SUSPENDED CEILING
FB	FLOWER BED	SV	STOP VALVE
FH	FIRE HYDRANT	SVP	SOIL VENT PIPE
FL	FLOOR LEVEL	T	TELEPHONE (MISC.)
FP	FLAG POLE	TCB	TELEPHONE CALL BOX
GY	GULLY	TIC	TELECOMS IC
GV	GAS VALVE	TL	TRAFFIC LIGHT
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IRF	IRON RAILING FENCE	(U)	UNIDENTIFIED
JB	JUNCTION BOX	(UTL)	UNABLE TO LIFT
KO	KERB OUTLET GULLY	VP	VENT PIPE
LB	LETTER BOX	W	WATER
LP	LAMP POST	WM	WATER METER
MH	MAN HOLE	WV	WATER VALVE
MKR	MARKER		

General Notes

All units are Metric.

Co-ordinate System

This survey is produced relative to Ordnance Survey National Grid (OSGB36)
derived from multiple RTK GPS observations with scale factor removed (s.f.=1)

Survey Accuracy

This survey has been carried out to an accuracy consistent with a scale of presentation of that listed in title below. Interrogated dimensions will be within the tolerance associated with this and smaller scales only.

Benchmark / Level Details

All levels are relative to Ordnance Survey National Datum (Newlyn) derived from multiple RTK GPS observation and cross checked against local benchmarks where available.

Rev	Date	By	Revision Details

Client

Ben Walford
10 Glenmore Road
London
NW3 4DB

Title

10 Glenmore Road
London
NW3 4DB

Measured Survey - Ground Floor

Scale 1 to 100	Date November 2018	
File:18495 - 10 Glenmore Rd - G	Drawn KB	A3
Sheet Number 1 of 1	Job No. 18495	

DELVA PATMAN REDLER
Chartered Surveyors

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The Plaza
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Liverpool L3 9QJ
0151 242 0980
info@delvapatmanredler.co.uk

Drawing No.

18495 - 10 Glenmore Rd - G

Rev.

527200mE

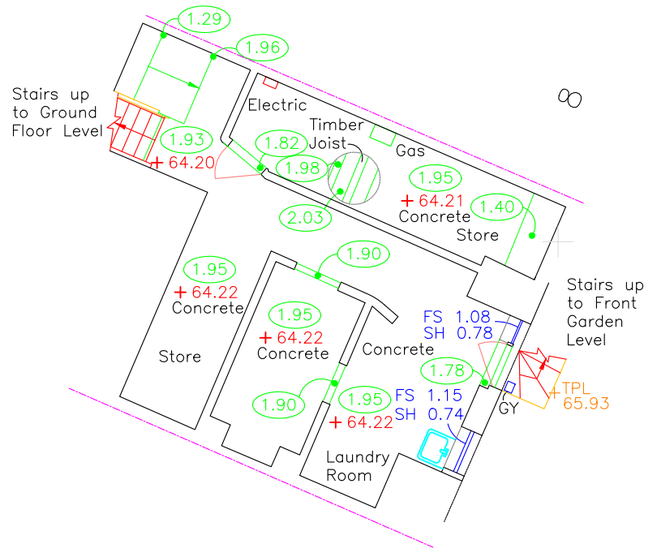
527210mE

527220mE

184940mN

184930mN

184920mN



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0m 5m 10m

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Rev	Date	By	Revision Details

Client

Ben Walford
10 Glenmore Road
London
NW3 4DB

Title

10 Glenmore Road
London
NW3 4DB

Measured Survey - Basement

Scale 1 to 100	Date November 2018	
File:18495 - 10 Glenmore Rd - B	Drawn KB	A3
Sheet Number 1 of 1	Job No. 18495	

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Liverpool L3 9QJ
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info@delvapatmanredler.co.uk

Drawing No.

18495 - 10 Glenmore Rd - B

Rev.

Scale Bar

0m 5m 10m

STANDARD ABBREVIATIONS

A/C	AIR CON UNIT	O/H	OVERHEAD
B	BOLLARD	OBF	OPEN BOARDED FENCE
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Co-ordinate System

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Rev	Date	By	Revision Details

Client

Ben Walford
10 Glenmore Road
London
NW3 4DB

Title

10 Glenmore Road
London
NW3 4DB

Measured Survey - First Floor

Scale 1 to 100	Date November 2018	
File:18495 - 10 Glenmore Rd - 1	Drawn KB	A3
Sheet Number 1 of 1	Job No. 18495	

DELVA PATMAN REDLER
Chartered Surveyors

Thavies Inn House
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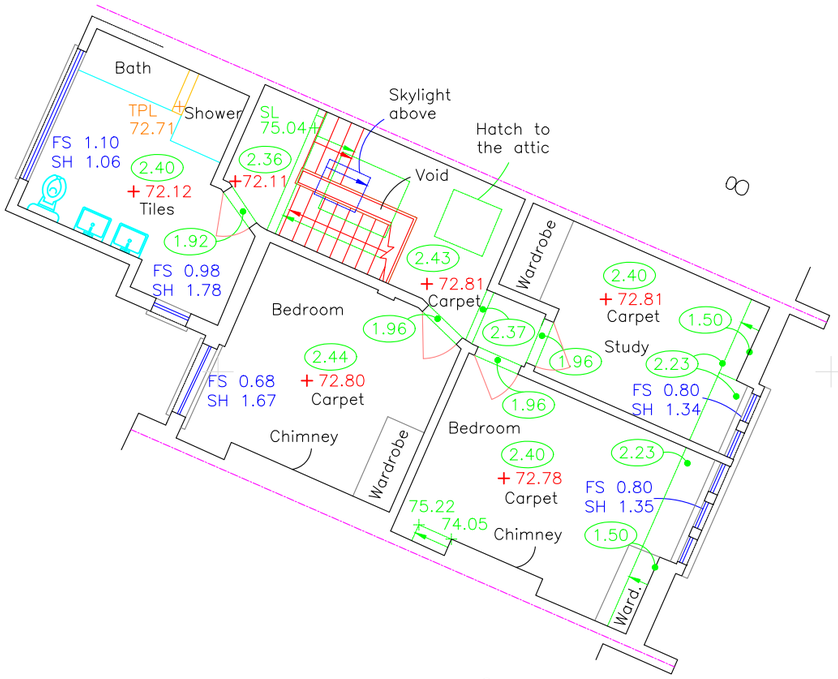
Drawing No.

18495 - 10 Glenmore Rd - 1

Rev.



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Rev	Date	By	Revision Details

Client

Ben Walford
10 Glenmore Road
London
NW3 4DB

Title

10 Glenmore Road
London
NW3 4DB

Measured Survey - Second Floor

Scale 1 to 100	Date November 2018	
File:18495 - 10 Glenmore Rd - 2	Drawn KB	A3
Sheet Number 1 of 1	Job No. 18495	

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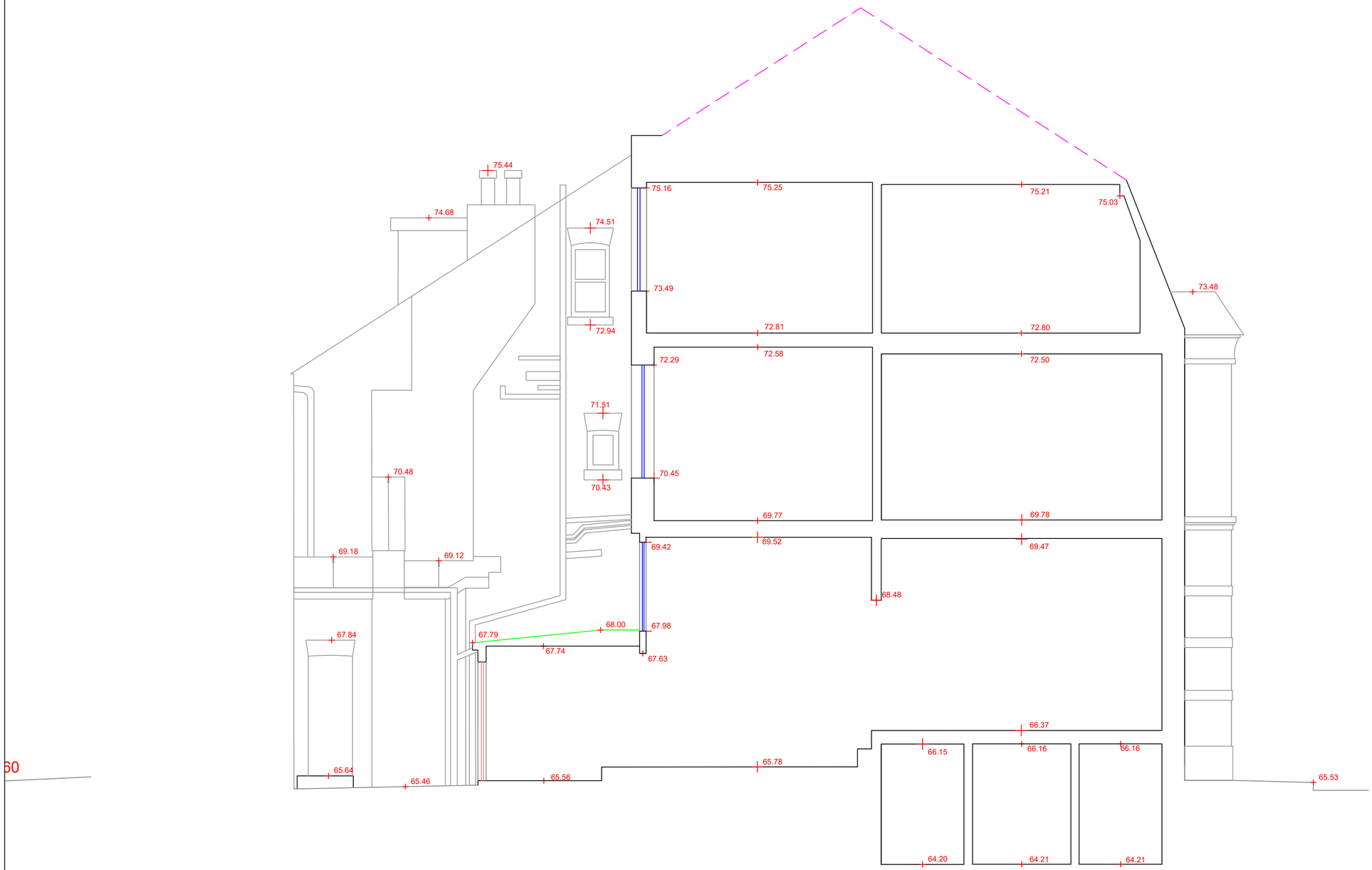
Drawing No.

18495 - 10 Glenmore Rd - 2

Rev.



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MH	MAN HOLE	WV	WATER VALVE
MKR	MARKER		

TREE — DIAMETER OF TRUNK (AT 1m ABOVE GROUND) 0.5 / HEIGHT (APPROX.) 20 / SPREAD (GENERALISED) 5

SINGLE DOOR

DOUBLE DOORS

GATE

SLOPE SYMBOL (BOTTOM - TOP)

3333A — SURVEY STATION

26.34 — SPOT LEVEL

2.50 — CLEARANCE HEIGHT & TAG

FS 1.00 — FLOOR TO WINDOW SILL HEIGHT
SH 1.50 — WINDOW SILL TO WINDOW HEAD HEIGHT

FLOOR TO BOTTOM OF ARCH
FLOOR TO TOP OF ARCH

Sheet Layout

General Notes
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Co-ordinate System
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Rev	Date	By	Revision Details

Client

Mithra Projects Ltd
2 Angel Square
London
EC1N 1NY

Title

134 Old Street
London
EC1V 9BJ

Measured Survey - Sections

Scale: 1 to 50 | **Date**: December 2018

File:18495 - 10 Glenmore Rd - S | Drawn KB-LP | A2

Sheet Number: 2 of 2 | **Job No**: 18495

DELVA PATMAN REDLER
Chartered Surveyors

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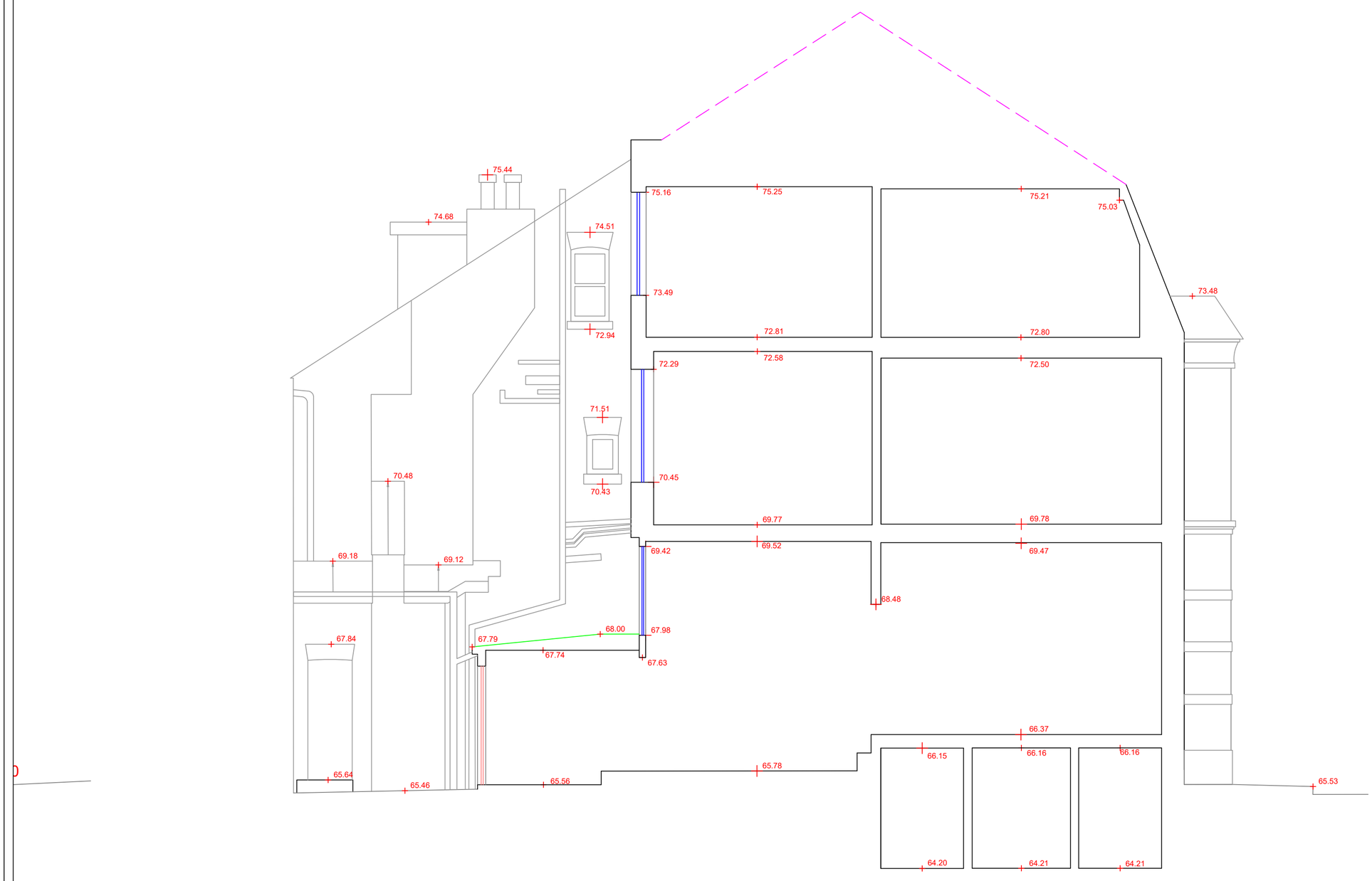
Drawing No. 18495 - 10 Glenmore Rd - S

Rev.



Datum 62m A.O.D.

Section 2

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CBF	CLOSE BOARD FENCE	PWF	POST & WIRE FENCE
CL	COVER LEVEL	(R)	FROM RECORDS
CLF	CHAIN LINK FENCE	RAD	RADIATOR
COL	COLUMN	RL	RIDGE LEVEL
CONC	CONCRETE	RS	ROAD SIGN
CPS	CONC PAVING SLAB	RTW	RETAINING WALL
(dilap)	DILAPIDATED	RWP	RAIN WATER PIPE
(dis)	DISUSED	SAPL	SAPLING
DCH	DRAINAGE CHANNEL	SB	SIGN BOARD
DK	DROP KERB	SCL	SLOPING CEILING
DMR	DORMER WINDOW	SKL	SKYLIGHT
DP	DOWN PIPE	SL	SOFFIT LEVEL
ELIC	ELECTRIC IC	SO	SMOKE OUTLET
ER	EARTHING ROD	SUSP	SUSPENDED CEILING
FB	FLOWER BED	SV	STOP VALVE
FH	FIRE HYDRANT	SVP	SOIL VENT PIPE
FL	FLOOR LEVEL	T	TELEPHONE (MISC.)
FP	FLAG POLE	TCB	TELEPHONE CALL BOX
GY	GULLY	TIC	TELECOMS IC
GV	GAS VALVE	TL	TRAFFIC LIGHT
HT	HEIGHT	TP	TELEGRAPH POLE
IC	INSPECTION COVER	TPL	TOP LEVEL
IL	INVERT LEVEL	TPV	TACTILE PAVING
IRF	IRON RAILING FENCE	(U)	UNIDENTIFIED
JB	JUNCTION BOX	(UTL)	UNABLE TO LIFT
KO	KERB OUTLET GULLY	VP	VENT PIPE
LB	LETTER BOX	W	WATER
LP	LAMP POST	WM	WATER METER
MH	MAN HOLE	WV	WATER VALVE
MKR	MARKER		

TREE — DIAMETER OF TRUNK (AT 1m ABOVE GROUND) 0.05 / HEIGHT (APPROX.) 20 / SPREAD (GENERALISED) 8

SINGLE DOOR

DOUBLE DOORS

GATE

SLOPE SYMBOL (BOTTOM - TOP)

3333A — SURVEY STATION

26.34 — SPOT LEVEL

2.50 — CLEARANCE HEIGHT & TAG

FS 1.00 / SH 1.50 — FLOOR TO WINDOW SILL HEIGHT / WINDOW SILL TO WINDOW HEAD HEIGHT

FLOOR TO BOTTOM OF ARCH
FLOOR TO TOP OF ARCH

Sheet Layout

General Notes

All units are Metric.

Co-ordinate System

This survey is produced relative to Ordnance Survey National Grid (OSGB36) derived from multiple RTK GPS observations with scale factor removed (s.f.=1)

Survey Accuracy

This survey has been carried out to an accuracy consistent with a scale of presentation of that listed in title below. Interrogated dimensions will be within the tolerance associated with this and smaller scales only.

Benchmark / Level Details

All levels are relative to Ordnance Survey National Datum (Newlyn) derived from multiple RTK GPS observation and cross checked against local benchmarks where available.

Rev	Date	By	Revision Details

Client

Mithra Projects Ltd
2 Angel Square
London
EC1N 1NY

Title

134 Old Street
London
EC1V 9BJ

Measured Survey - Sections

Scale: 1 to 50 | **Date**: December 2018

File:18495 - 10 Glenmore Rd - S | Drawn KB-LP | A2

Sheet Number: 2 of 2 | **Job No**: 18495

DELVA PATMAN REDLER
Chartered Surveyors

Thavies Inn House
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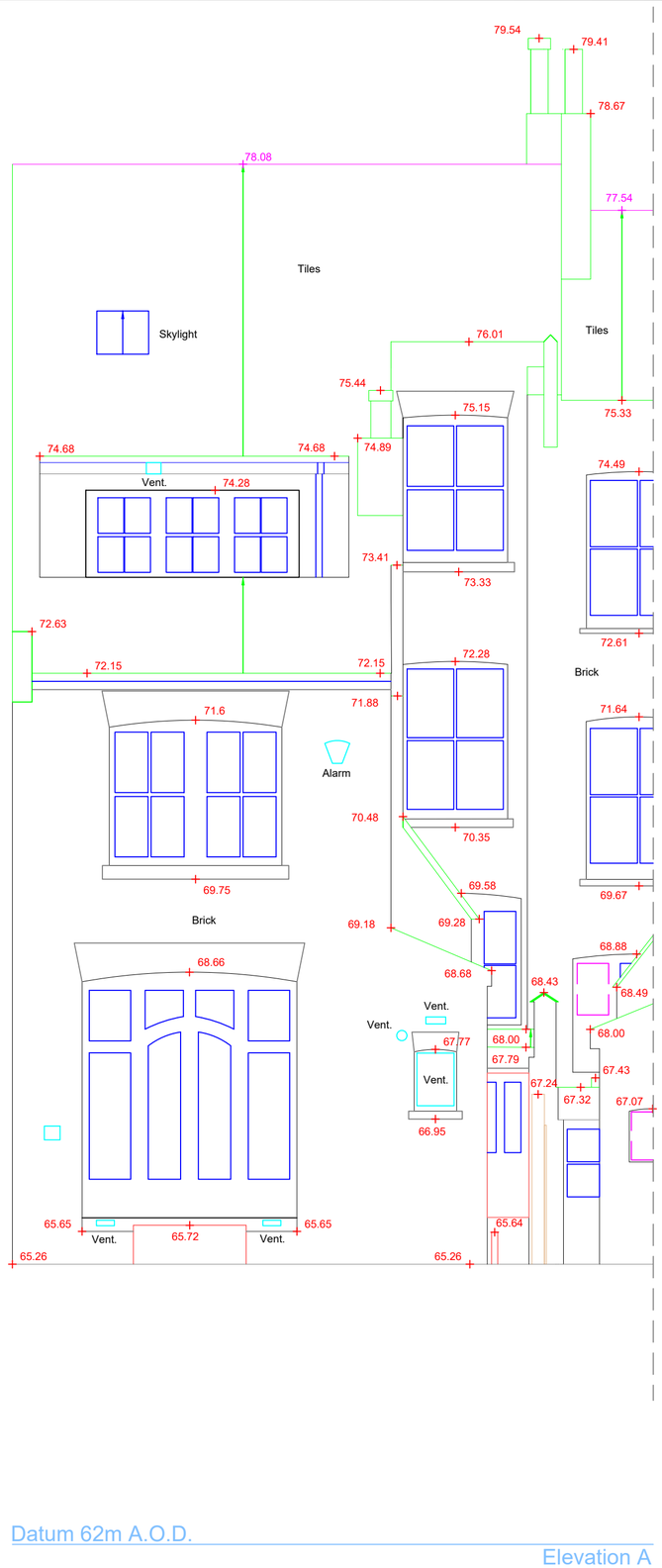
London EC1N 2HA
020 7936 3668
www.delvapatmanredler.co.uk

The Plaza
100 Old Hall Street
Liverpool L3 9QJ
0151 242 0980
info@delvapatmanredler.co.uk

Drawing No. 18495 - 10 Glenmore Rd - S

Rev.



Datum 62m A.O.D.

Elevation A

STANDARD ABBREVIATIONS

A/C	AIR CON UNIT	O/H	OVERHEAD
B	BOLLARD	OBF	OPEN BOARDED FENCE
BB	BELISHA BEACON	P	POST/POLE
BW	BRICK WALL	PB	POST BOX
BP	BRICK PAVING	PFC	PANEL FENCE-CONC.
BS	BUS STOP	PFW	PANEL FENCE-WOOD
BWF	BARBED WIRE FENCE	PL	PAVEMENT LIGHT
CB	CRASH BARRIER	PRF	POST & RAIL FENCE
CBF	CLOSE BOARD FENCE	PWF	POST & WIRE FENCE
CL	COVER LEVEL	(R)	FROM RECORDS
CLF	CHAIN LINK FENCE	RAD	RADIATOR
COL	COLUMN	RL	RIDGE LEVEL
CONC	CONCRETE	RS	ROAD SIGN
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MH	MAN HOLE	WV	WATER VALVE
MKR	MARKER		

TREE — DIAMETER OF TRUNK (AT 1m ABOVE GROUND) / HEIGHT (APPROX.) / SPREAD (GENERALISED)

SINGLE DOOR

DOUBLE DOORS

GATE

SLOPE SYMBOL (BOTTOM - TOP)

3333A — SURVEY STATION

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FS 1.00 / SH 1.50 — FLOOR TO WINDOW SILL HEIGHT / WINDOW SILL TO WINDOW HEAD HEIGHT

BA 1.50 / TA 2.50 — FLOOR TO BOTTOM OF ARCH / FLOOR TO TOP OF ARCH

Sheet Layout

General Notes

All units are Metric.

Co-ordinate System

This survey is produced relative to Ordnance Survey National Grid (OSGB36) derived from multiple RTK GPS observations with scale factor removed (s.f.=1)

Survey Accuracy

This survey has been carried out to an accuracy consistent with a scale of presentation of that listed in title below. Interrogated dimensions will be within the tolerance associated with this and smaller scales only.

Benchmark / Level Details

All levels are relative to Ordnance Survey National Datum (Newlyn) derived from multiple RTK GPS observation and cross checked against local benchmarks where available.

Rev	Date	By	Revision Details

Client

Ben Walford
10 Glenmore Road
London
NW3 4DB

Title

10 Glenmore Road
London
NW3 4DB

Measured Survey - Elevation

Scale: 1 to 50 | **Date**: December 2018

File: 18495 - 10 Glenmore Rd - E | Drawn KB | A2

Sheet Number: 1 of 1 | **Job No**: 18495

DELVA PATMAN REDLER
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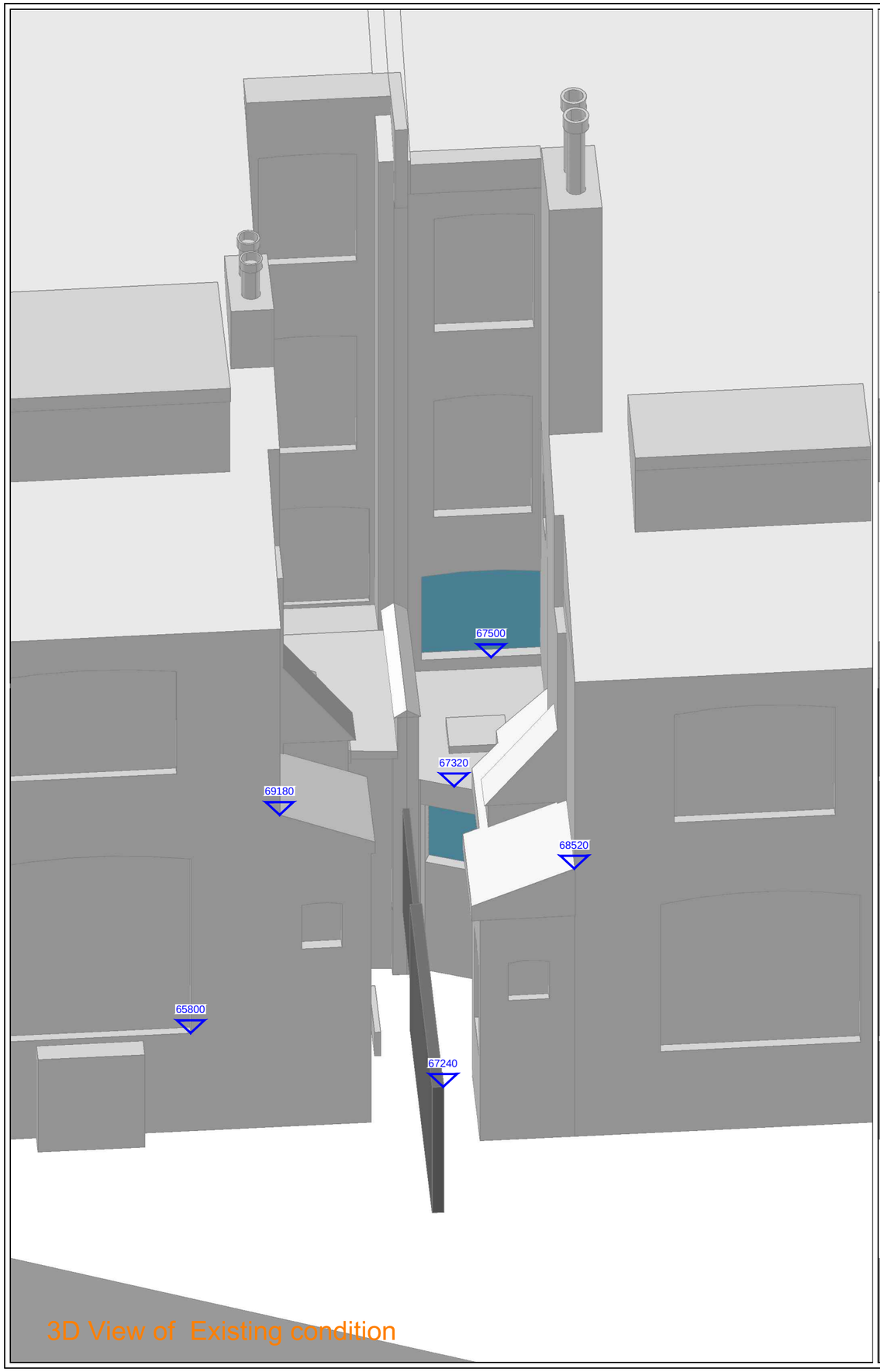
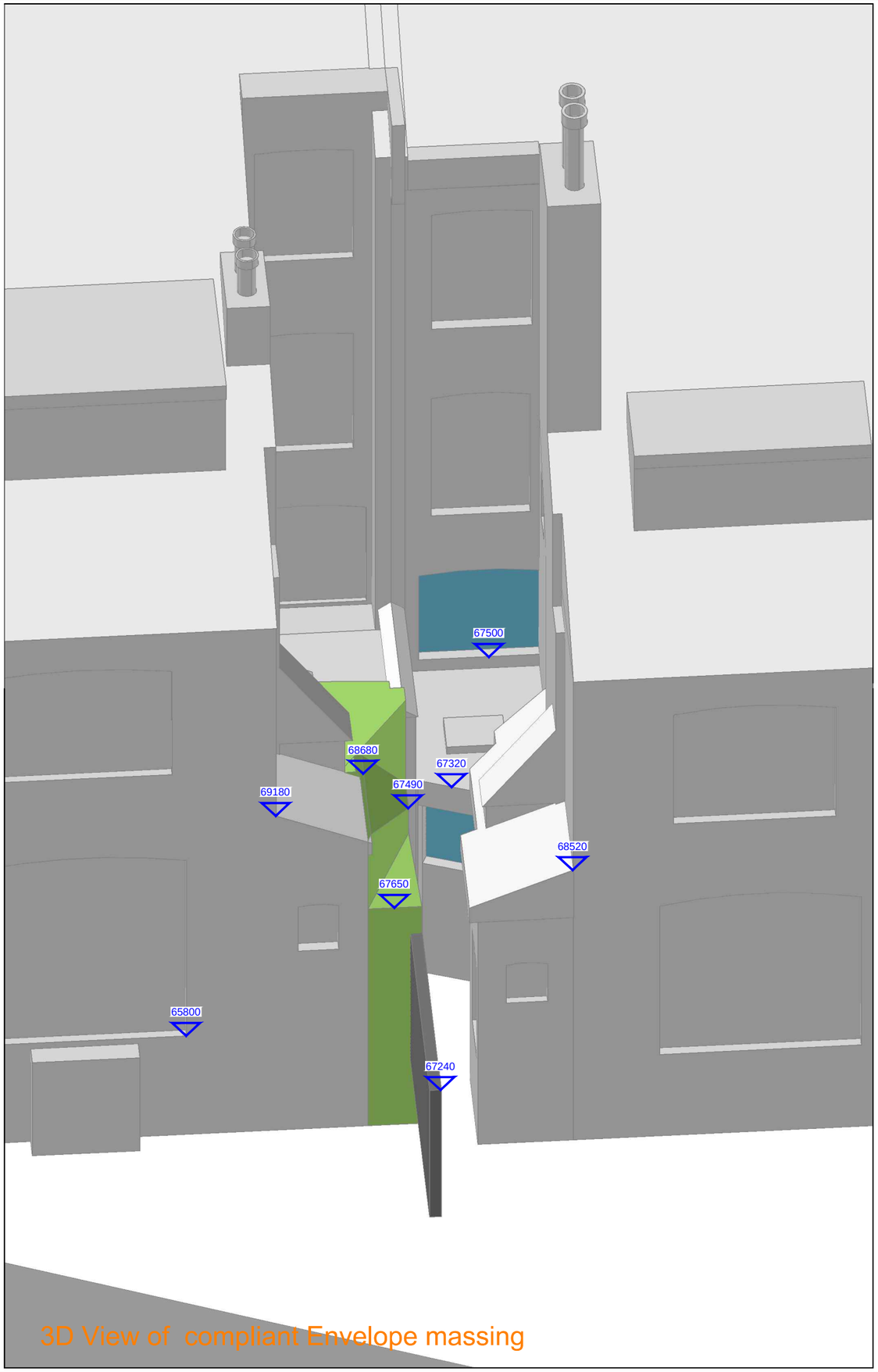
100 Old Hall Street
Liverpool L3 9QJ
0151 242 0980
info@delvapatmanredler.co.uk

Drawing No. 18495 - 10 Glenmore Rd - E

Rev.



3D View of Existing condition



3D View of compliant Envelope massing

NO DIMENSIONS TO BE SCALED FROM THIS DRAWING:

Indicative

Compliant envelope massing

Surrounding

SOURCE DATA

Drawings Used:
Existing and surrounding buildings:
DPR Surveyors:
- 2018.02_ Model of neighbouring surrounding generated from 3D Point Cloud data derived from 3D High Definition Laser Scan

NOTES

MAINTAINING THE LIGHT TO AT LEAST 50% (OR WITHIN 1% OF EXISTING IF ALREADY BELOW) WITHIN ROOMS AT NEIGHBOURING 12 GLENMORE ROAD.

Insert Hyperlink

REV	Description	Drawn	Ch'kd	Date

DELVA PATMAN REDLER
Chartered Surveyors

Thavies Inn House
3-4 Holborn Circus
London EC1N 2HA
020 7936 3668
www.delvapatmanredler.co.uk

The Plaza
100 Old Hall Street
Liverpool L3 9QJ
0151 242 0980
info@delvapatmanredler.co.uk

TITLE:
10 GLENMORE ROAD,
LONDON, NW3 4DB.

DRAWING:
Maximum RoL Development Envelope
Respecting the light to 12 Glenmore Rd

DRAWN:	VK
SCALE:	NTS
DATE:	15/11/2018

JOB NO: 18494

DWG NO: ENV/700

REV: -

APPENDIX D – Figures

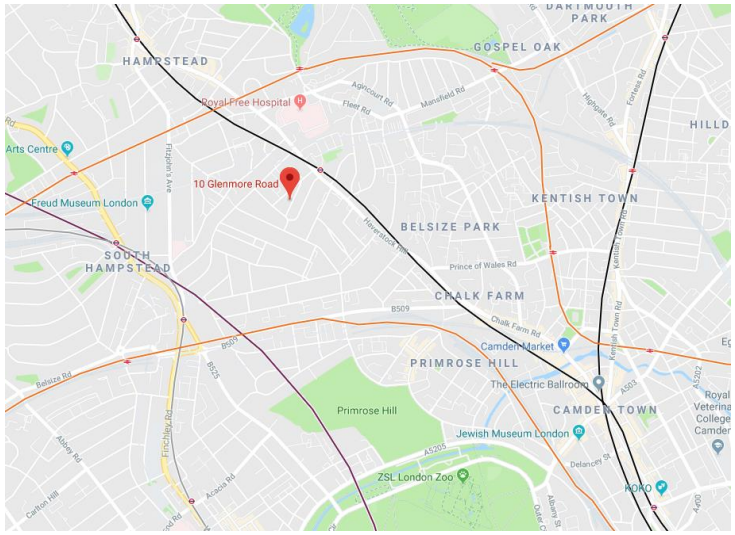


Figure 1: Location of site

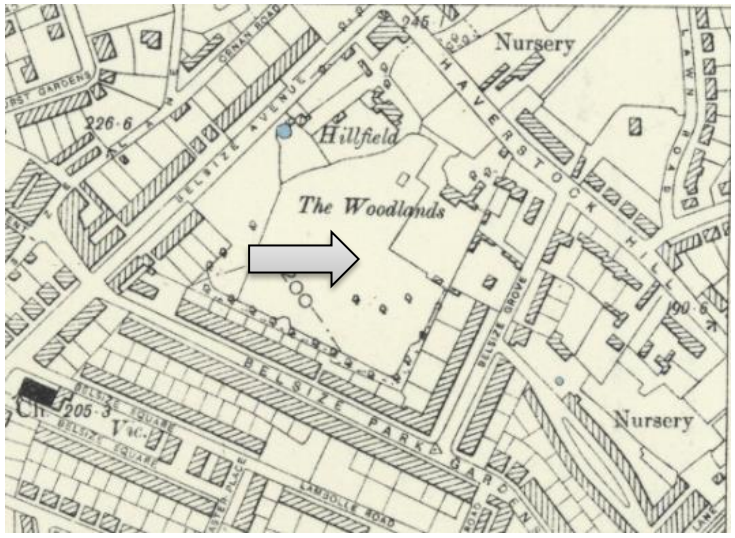


Figure 2: OS map from 1896 indicating absence of the terrace

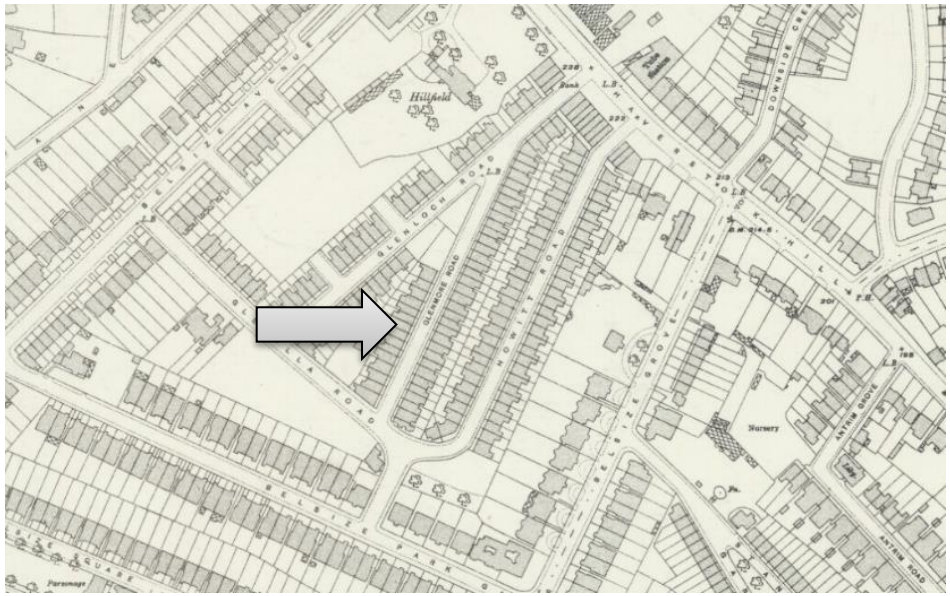


Figure 3: OS map from 1914 indicating presence of the terrace

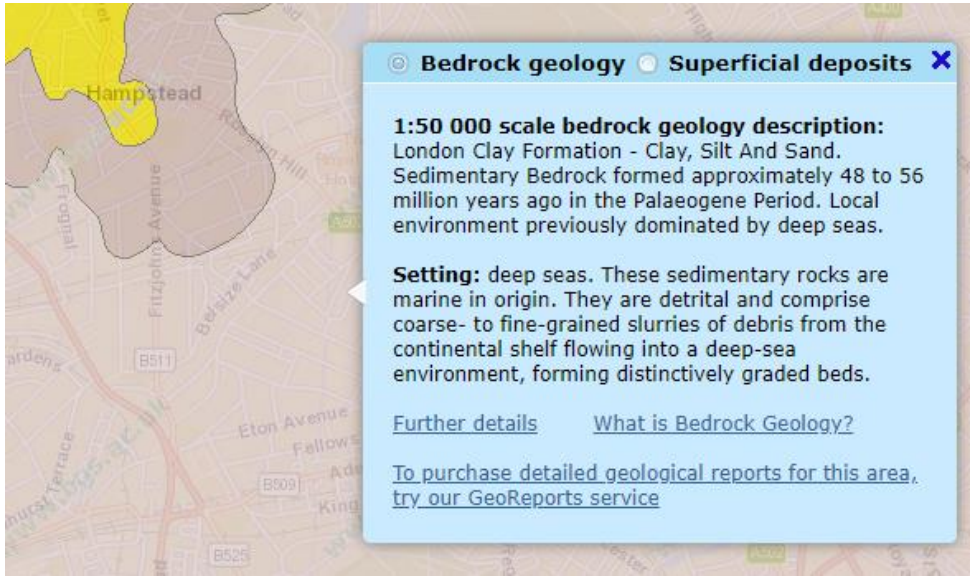


Figure 4: BGS Bedrock geology

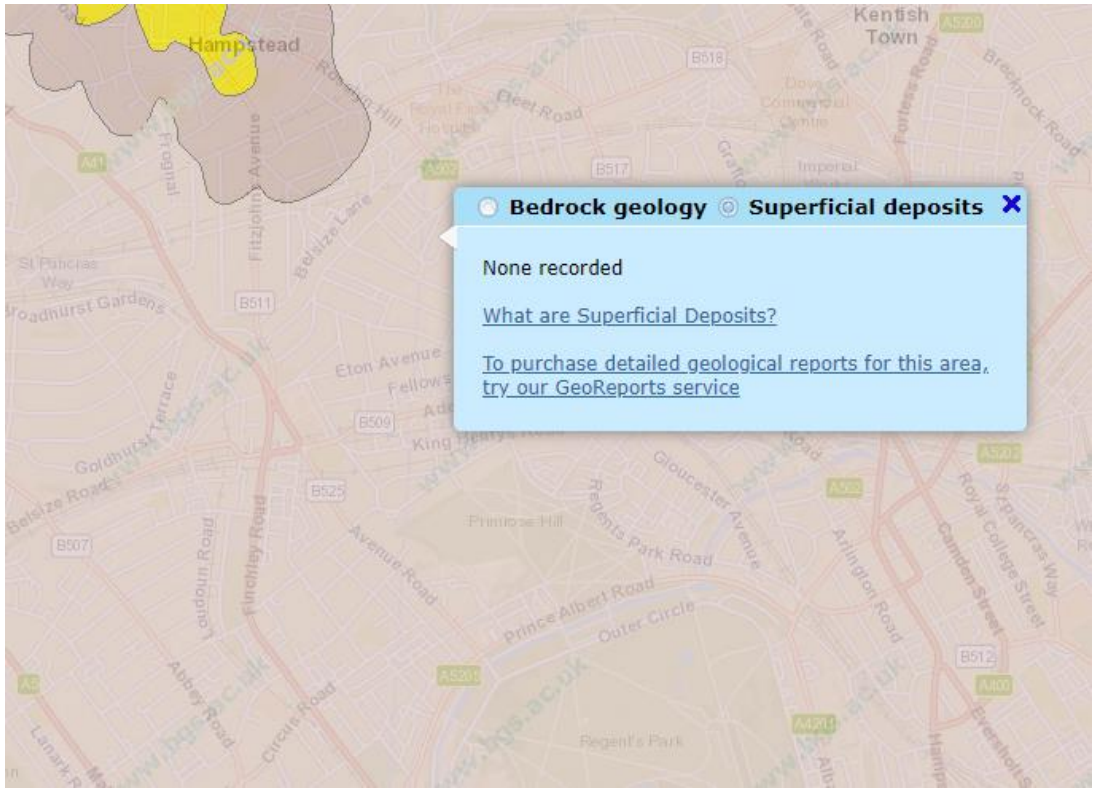


Figure 5: BGS Superficial deposits

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.								

Figure 6: Excerpt from site investigation borehole log

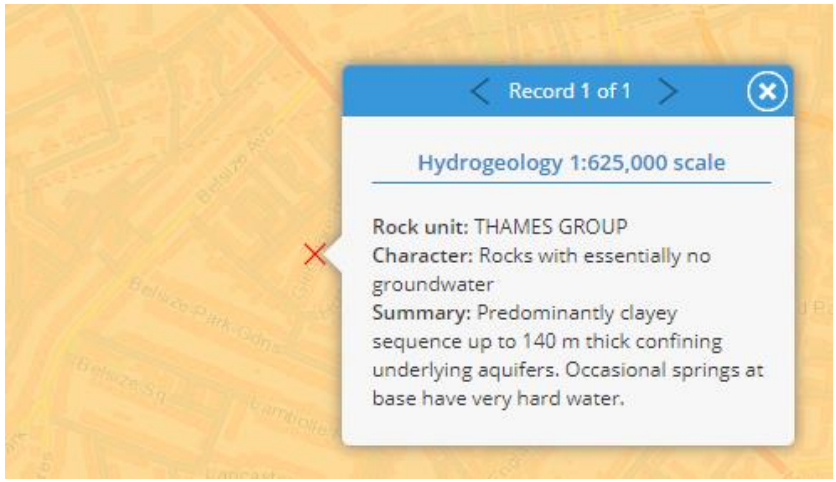


Figure 7: BGS Hydrogeology map of site and surroundings

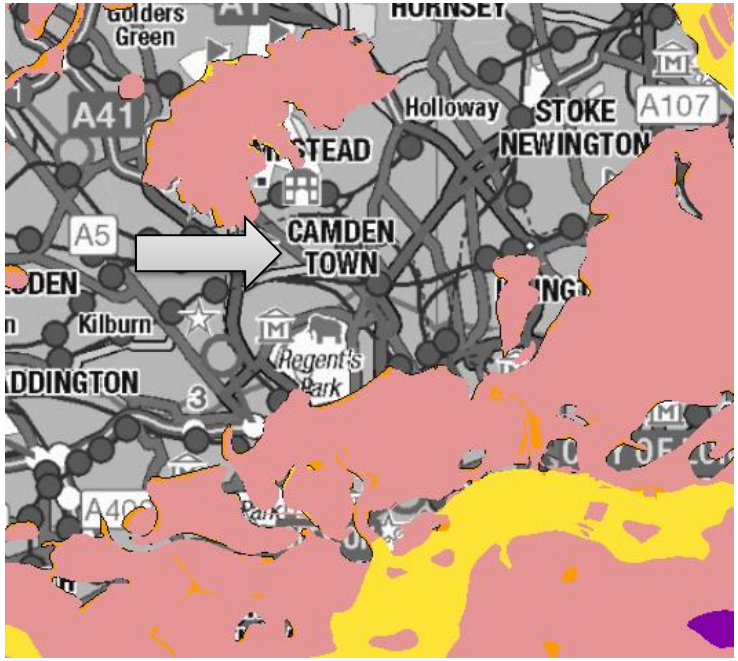


Figure 8: DEFRA map showing bedrock aquifers, superficial drift aquifers, and groundwater vulnerability zones

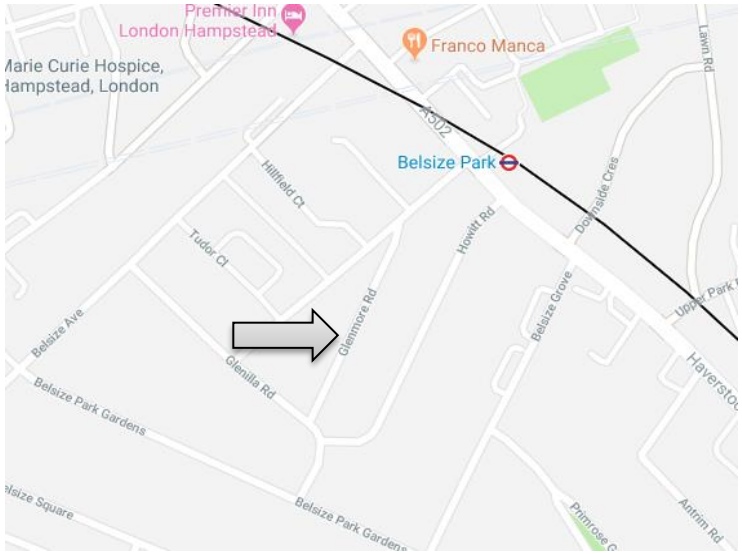


Figure 9: Location of Northern Line

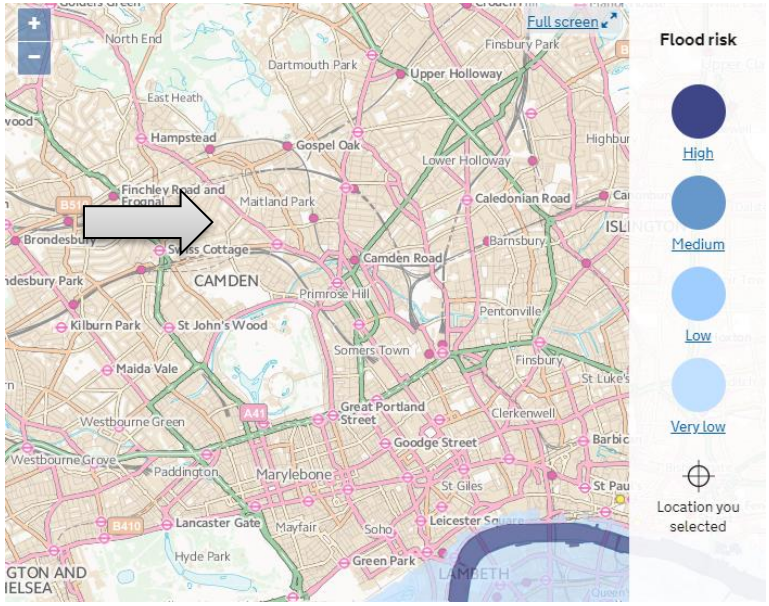


Figure 10: flood risk map from gov.uk

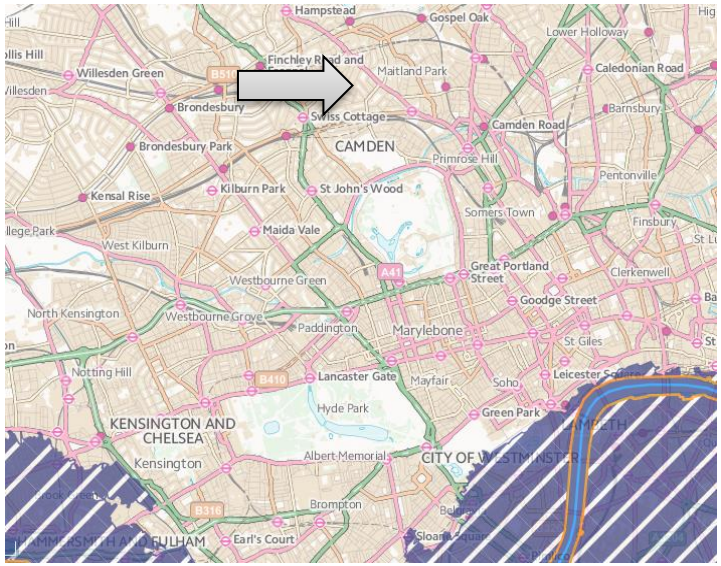
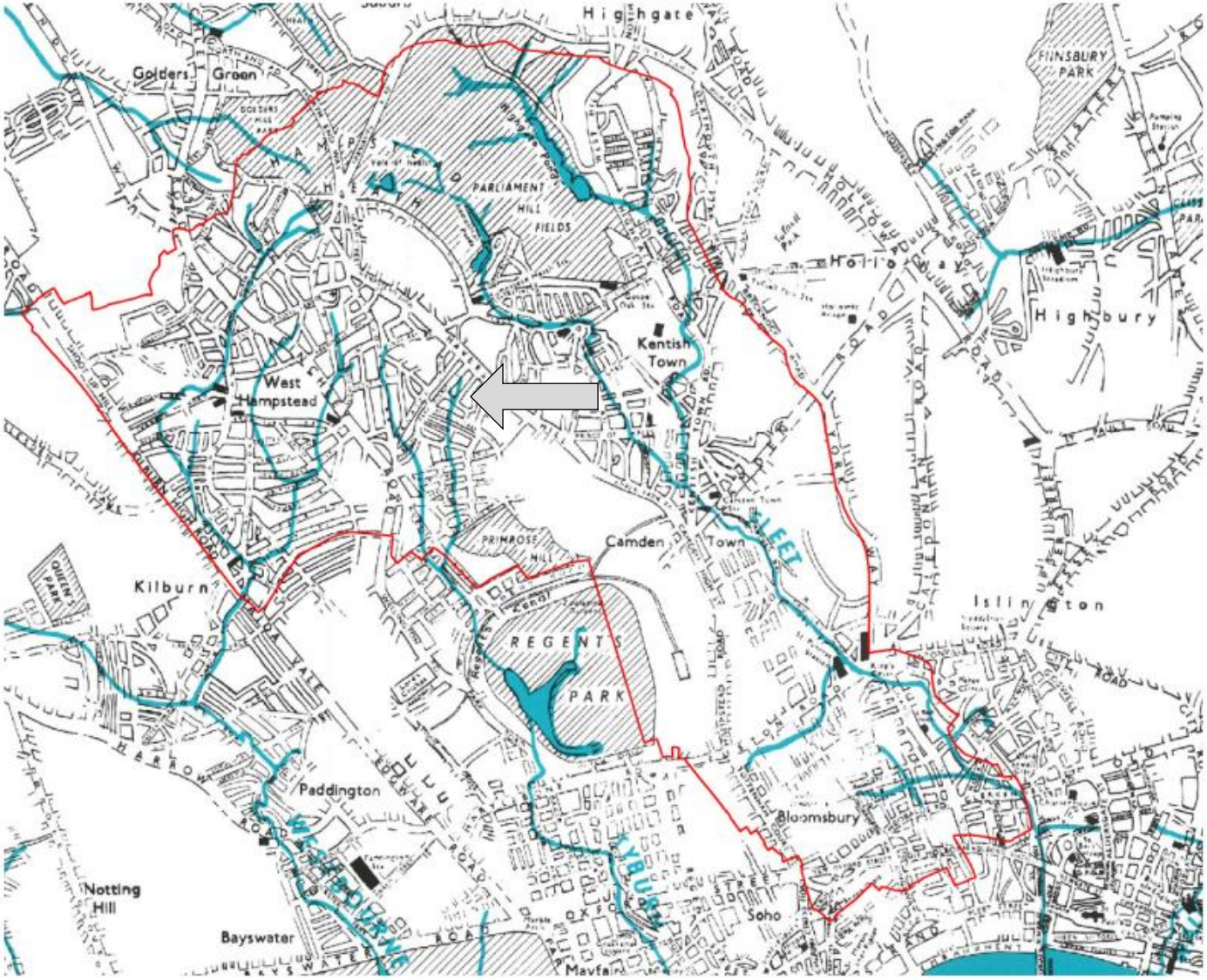


Figure 11: Flood risk map from Environment Agency



Camden Geological, Hydrogeological and Hydrological Study
Watercourses

Figure 12-Watercourses

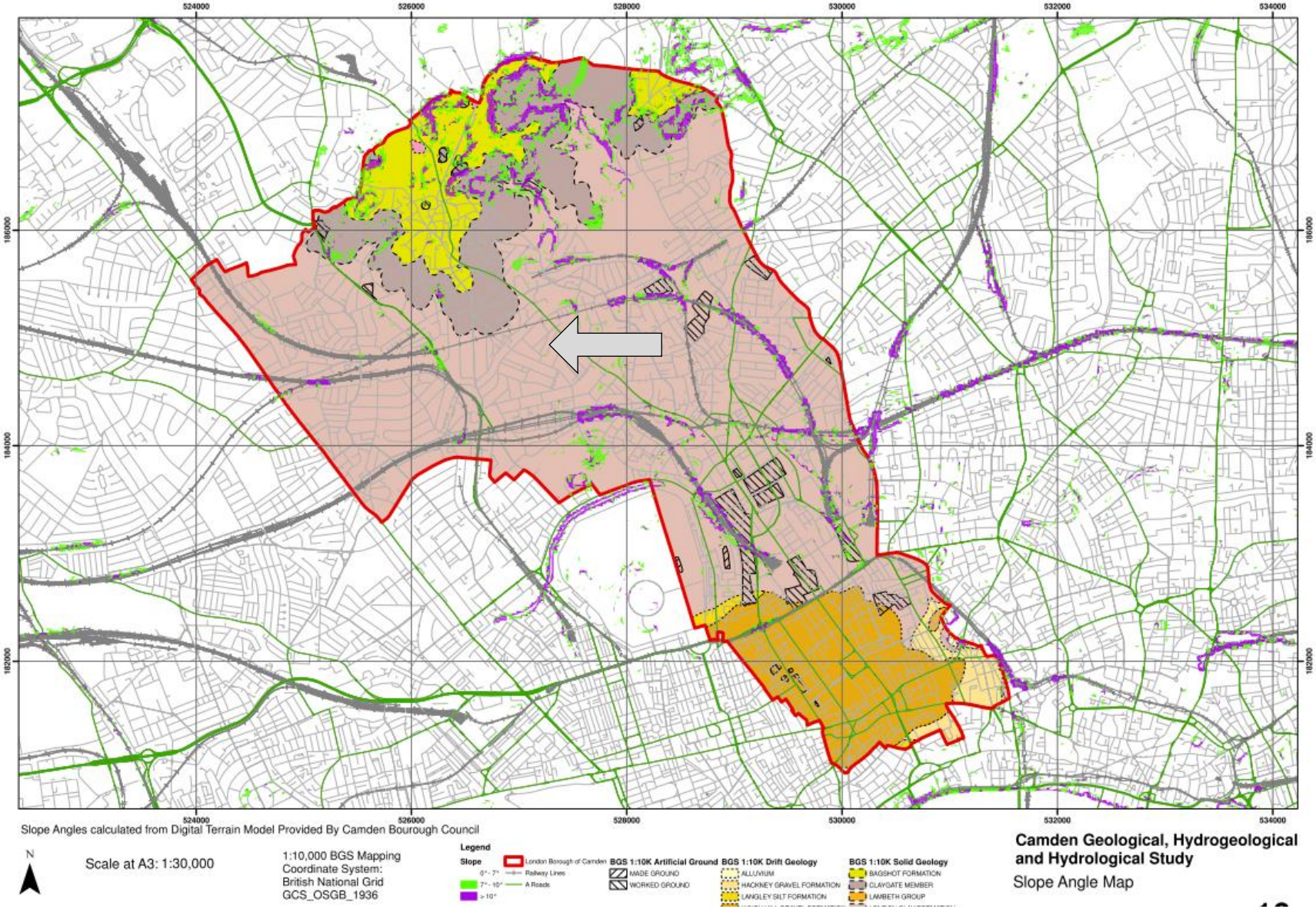


Figure 13-Slope Angle Map

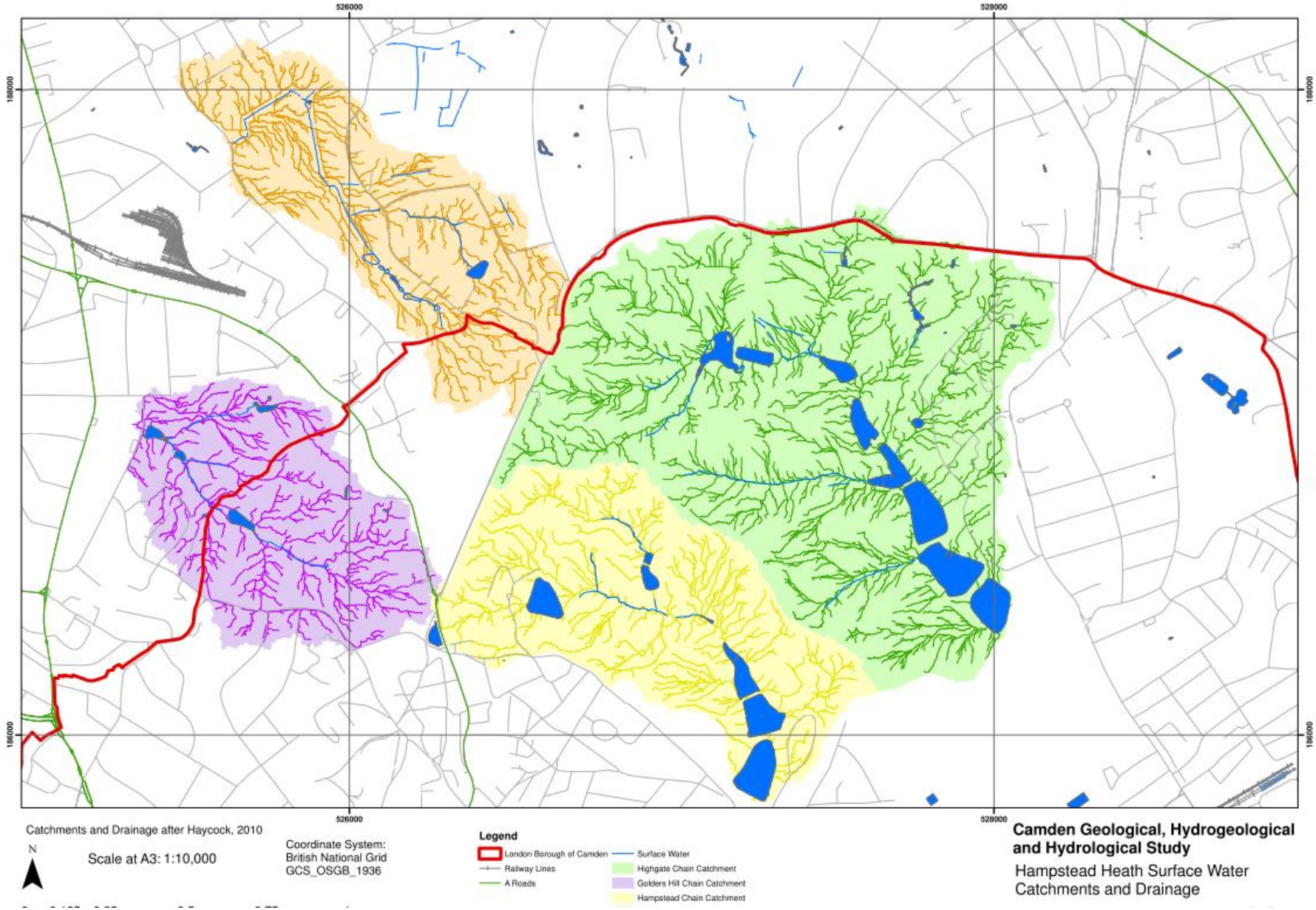


Figure 14-Hampstead Heath Surface Water Catchments and Drainage

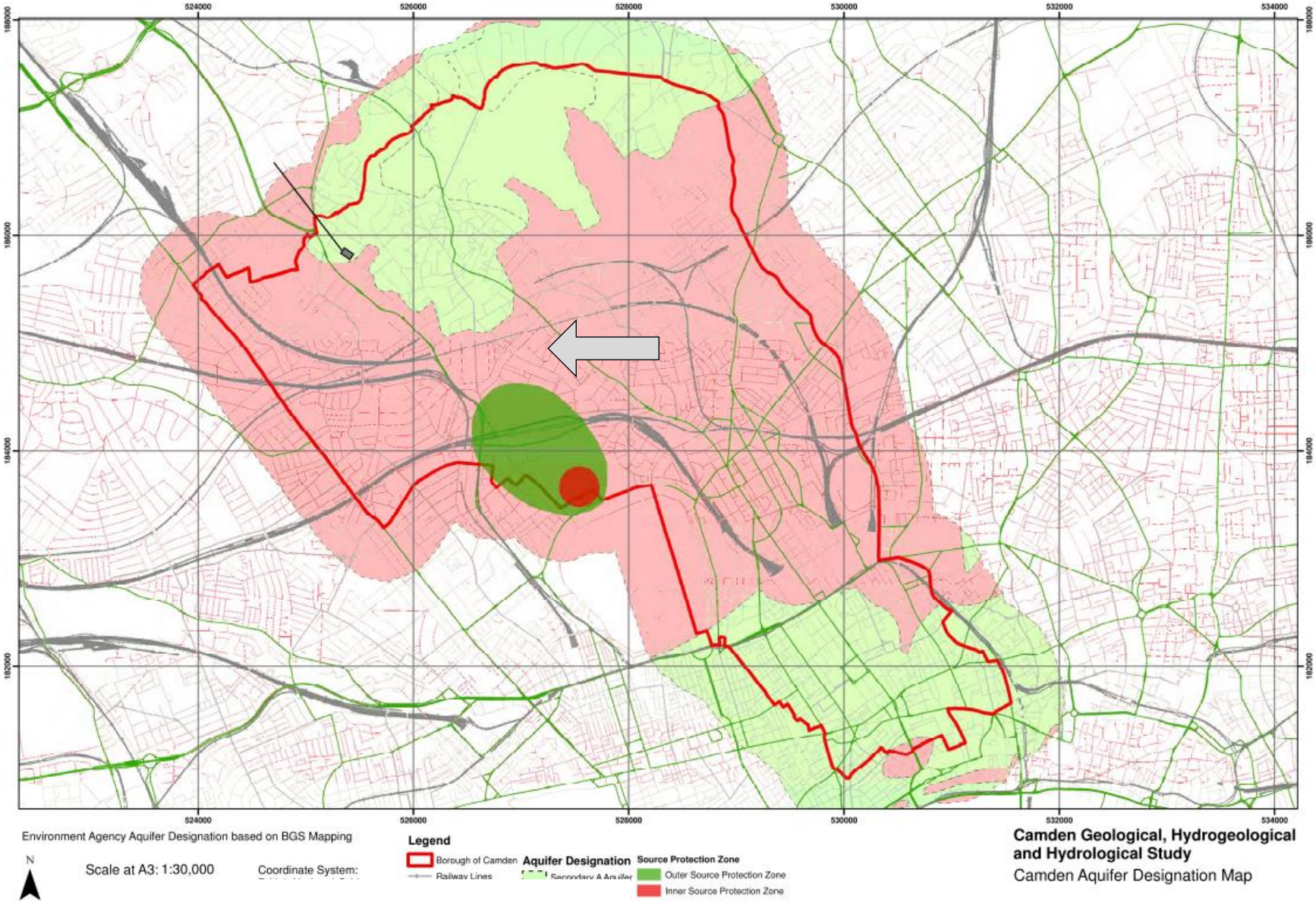


Figure 15 – Camden Aquifer Designation Map