3.9 Non Technical Summary of Chapter 3.0

The site is located on the north-western side of Eton Road with residential properties to the north-east and west and a roadway to the south and east.

The property is constructed on slightly sloping ground to the south-east.

The 1:50000 Geological Survey of Great Britain (England and Wales) covering the area indicates the site to be underlain by the London Clay Formation. The London Clay Formation is classed as unproductive strata or a non-aquifer.

With reference to Camden Geological, Hydrogeological and Hydrological Study (1999), Talling (2011) and Barton (1992) one tributary of the 'lost rivers' River Tyburn was located approximately 800m west of the site respectively (Figure 5).

Envirocheck indicates that the closest surface water feature is a canal located 597m south-east of the site.

According to Environment Agency Flood maps there are no flood risk zones within 1 kilometre of the site. The EA's website also shows that this area does not fall within an area at risk of flooding from reservoirs.

Based on this information a flood risk assessment will not be required. Eton Road did not during either the 1975 or 2002 flood events. Modelling of surface water flooding by the Environment Agency shows a 'Very Low' risk of flooding (the lowest category for the national background level of risk) for No.14 and the surrounding area.

The Screening Exercise has identified the following potential issues which will be carried forward to the Scoping Phase

Subterranean Groundwater Flow

- Will the proposed basement extend beneath the water table surface.

Slope Stability

- 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.
- Is the London Clay the shallowest strata at the site.
- Is there a history of seasonal shrink-swell subsidence in the local area and/or evidence of such effects at the site.
- Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties.

Surface Water and Flooding

- Will the proposed basement development result in a change in the proportion of hard surfaced / paved external areas.

4.0 SCOPING PHASE

4.1 Introduction

This purpose of the scoping phase is to assess in more detail the factors to be investigated in the impact assessment. Potential impacts are assessed for each of the identified impact factors and recommendations are stated.

A conceptual ground model is usually complied at the scoping stage however, because the ground investigation has already been undertaken for this project, the conceptual ground model including the findings of the ground investigation is described under Chapter 4.

Subterranean (Groundwater Flow)

Potential Issue (Screening Question)		**Potential impacts and actions**
1b	Will the proposed basement extend beneath the water table surface?	**Potential impact:** Local restriction of groundwater flows (perched groundwater or below groundwater table). **Action:** Ground investigation required, then review.

Slope Stability

5	Is the London Clay the shallowest strata at the site?	**Potential impact:** The London Clay is prone to seasonal shrink-swell (subsidence and heave). **Action:** Ground investigation required, then review.
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?	**Potential Impact:** Ground movements will occur during and after the basement construction. **Action:** Following the results of the ground investigation an approved Arboriculturalist should be appointed.
7	Is there a history of seasonal shrink-swell subsidence in the local area and/or evidence of such effects at the site?	**Potential Impact:** Ground movements will occur during and after the basement construction. **Action:** Ground investigation required, then review.

12	Will the proposed basement substantially increase the differential depth of foundations relative to neighbouring properties?	**Potential impact:** Loss of support to the ground beneath the new foundations to neighbouring properties if basement excavations are inadequately supported. **Action:** Ensure adequate temporary and permanent support by use of best practice methods.

Surface Water and Flooding

Potential Issue (Screening Question)		Potential impacts and actions
3	Will the proposed basement development result in a change in the proportion of hard surfaced / paved external areas.	**Potential impact:** No impact due to a decrease in impermeable areas **Action:** No Action Required.

These potential impacts have been further assessed through the ground investigation, as detailed in Section 4 below.

4.2 Non-Technical Summary of Chapter 4.0

The scoping exercise has reviewed the potential impacts for each of the items carried forward from Stage 1 screening, and has identified the following actions to be undertaken:

- A ground investigation is required (which has already been undertaken).

All these actions are covered in Stage 4 or Stage 3 for the ground investigation.

5.0 SITE INVESTIGATION DATA

5.1 Records of site investigation

A site-specific ground investigation was undertaken by Site Analytical Services Limited (SAS) in august 2017 and included three Continuous Flight Auger boreholes (Boreholes 1, 2 and 3) and nine hand dug trial pits (Trial Pits 1 to 11 inclusive, excluding Trial Pits 3 and 6) excavated to 1.5m depth.

The factual findings from the investigation are presented in Appendix B, including a site plan, exploratory hole logs, groundwater monitoring and laboratory test results.

5.2 Ground conditions

The boreholes and trial pits revealed ground conditions that were consistent with the geological records and known history of the area and comprised Made Ground up to 0.75m in thickness resting on deposits of the London Clay Formation.

5.2.1 Made Ground

The Made Ground extended down to depths of between 0.13m and 0.75m (46.32mSD to 43.14mSD) in the boreholes and trial pits and the material generally comprised a surface pea shingle or concrete overlying silty sandy gravelly clay with brick fragments.

5.2.2 London Clay Formation

The London Clay Formation was encountered below the Made ground and consisted of soft to firm then stiff becoming very stiff silty clay with occasional pockets and partings of silty fine sand and scattered gypsum crystals. These deposits extended down to the full depths of investigation of 6.00m below ground level in Boreholes 1, 2 and 3 (39.27 to 37.66mSD).

5.3 Groundwater

Groundwater was not encountered within the boreholes or trial pits and the soils remained essentially dry throughout.

It must be noted that the speed of excavation is such that there may well be insufficient time for further light seepages of groundwater to enter the boreholes and trial pits and hence be detected, particularly within more cohesive soils.

Isolated pockets of groundwater may also be present perched within any less permeable material found at shallower depth on other parts of the site especially within any Made Ground.

Following drilling operations groundwater monitoring piezometers were installed in Boreholes 1, 2 and 3 to approximately 5.00m depth.

Water was encountered at respective depths of 3.89m (41.38mSD), 1.09m (43.95mSD) and 1.98m (41.68mSD) within Boreholes 1, 2 and 3 on the return monitoring visit, approximately five weeks after site works. Due to the nature of the geology on site, this is likely to be surface water entering into the pipe, which is then unable to filter out into the impermeable clay.

It should be noted that the comments on groundwater conditions are based on observations made at the time of the investigation (July and August 2017) and that changes in the groundwater level could occur due to seasonal effects and also changes in drainage conditions.

5.4 Foundations

Trial Pits 1 to 11 inclusive, excluding Trial Pits 3 and 6, were excavated adjacent to the wall of the existing and surrounding properties in order to expose the foundations and founding soils. The trial pits showed the walls are supported on outstepped brick and concrete foundations resting on the London Clay Formation.

5.5 In-Situ and Laboratory Testing

The results of the laboratory and in-situ tests are presented in the factual report contained in Appendix A.

5.5.1 In-situ Vane Tests

In the essentially cohesive natural soils encountered at the site, in-situ shear vane tests were made at regular depth increments in order to assess the undrained shear strength of the materials. The results indicate that the natural soils are of a generally high strength in accordance with BS 5930 (2015).

The results of the in-situ tests are shown on the appropriate exploratory hole records contained in Appendix A.

5.5.4 Classification Tests

Atterberg Limit tests have been conducted on four selected samples taken from Boreholes 1, 2 and 3, and showed the samples tested to fall into Classes CH and CV according to the British Soil Classification System.

These are fine grained silty clay soils of high to very high plasticity and as such generally have a low permeability and a medium to high susceptibility to shrinkage and swelling movements with changes in moisture content, as defined by the NHBC Standards, Chapter 4.2. The results indicated Plasticity Index values of between 37% and 48%, with one of the samples being above the higher 40% boundary between soils assessed as being of medium swelling and shrinkage potential and those assessed as being of high swelling and shrinkage potential.

5.5.5 Sulphate and pH Analyses

The results of the sulphate and pH analyses show the natural soil samples to have water soluble sulphate contents of up to 1.84g/litre associated with near neutral pH values.

5.6 Non-Technical Summary of Chapter 5.0

A site-specific ground investigation was undertaken by Site Analytical Services Limited (SAS) in July 2017 and included three continuous flight auger boreholes (Boreholes 1, 2 and 3) drilled to 6m below ground level and nine hand dug trial pits (Trial Pits 1 to 11 inclusive, excluding Trial Pits 3 and 6) excavated to 1.5m depth.

The boreholes and trial pit revealed ground conditions that were consistent with the geological records and known history of the area and comprised Made Ground up to 0.75m in thickness resting on deposits of the London Clay Formation.

Following drilling operations groundwater monitoring piezometers were installed in Boreholes 1 and 2 to approximately 5.00m depth.

Water was encountered at respective depths of 3.89m (41.38mSD), 1.09m (43.95mSD) and 1.98m (41.68mSD) within Boreholes 1, 2 and 3 on the return monitoring visit, approximately five weeks after site works. Due to the nature of the geology on site, this is likely to be surface water entering into the pipe, which is then unable to filter out into the impermeable clay.

6.0 FOUNDATION DESIGN

6.1 Introduction

It is proposed to extend the rear of the lower ground floor level and lower the garden house floor level by 0.70m.

It is understood that the proposed floor level is at approximately 43.75mSD (0.70m below proposed ground level).

6.2 Site Preparation Works

The main contractor should be informed of the site conditions and risk assessments should be undertaken to comply with the Construction Design Management (CDM) regulations. Site personnel are to be made aware of the site conditions. It is recommended that extensive searches of existing man-made services are undertaken over the site prior to final design works.

6.3 Ground Model

On the basis of the fieldwork, the ground conditions at the site can be characterised as follows:

- Made Ground extends to depths of between 0.13m to 0.75m depth below ground level (46.32 to 43.14mOD).

- The London Clay Formation comprising stiff silty sandy clay with gypsum crystals to the full depths of investigation of 6.00m below ground level (39.27 to 37.66mSD).

- Water was encountered at respective depths of 3.89m (41.38mSD), 1.09m (43.95mSD) and 1.98m (41.68mSD) within Boreholes 1, 2 and 3 on the return monitoring visit, approximately five weeks after site works. Due to the nature of the geology on-site, this is likely to be surface water entering into the pipe, which is then unable to filter out into the impermeable clay.

6.4 Basement Excavation

Groundwater is not expected to be encountered in the basement excavation, but it would be prudent for the chosen contractor to have a contingency plan in place to deal with any perched groundwater inflows as a precautionary measure. Trial excavations to the proposed basement depth could be carried by the main contractor to confirm the stability of the soil and to further investigate the presence of any groundwater inflows.

6.5 Conventional Spread Foundations

A result of the inherent variability of uncontrolled fill, (Made Ground) is that it is usually unpredictable in terms of bearing capacity and settlement characteristics. Foundations should therefore, be taken through any Made Ground and either into, or onto a suitable underlying natural stratum of adequate bearing characteristics.

Based on the ground and groundwater conditions encountered in the boreholes and trial pits, it should be possible to support the proposed new development on conventional strip or basement raft foundations taken down below the Made Ground and any weak superficial soils and placed in the natural firm sandy silty clay deposits which occur at depths of between approximately 0.13m and 0.75m below ground level over the site. Foundations should be placed in the natural deposits at a minimum depth of 1.00m below final ground level in order to avoid the zone affected by seasonal moisture content changes.

Using theory from Terzaghi (1943), strip foundations placed within natural soils may be designed to allowable net bearing pressures of approximately 220kN/m^2 at 1.00m depth in order to allow for a factor of safety of 2.5 against general shear failure. The actual allowable bearing pressure applicable will depend on the form of foundation, its geometry and depth in accordance with classical analytical methods, details of which can be obtained from "Foundation Design and Construction", Seventh Edition, 2001 by M J Tomlinson (see references) or similar texts.

Any soft or loose pockets encountered within otherwise competent formations should be removed and replaced with well compacted granular fill.

In addition, foundations may need to be taken deeper should they be within the zones of influence of both existing or recently felled trees and any proposed tree planting. The depth of foundation required to avoid the zone likely to be affected by the root systems of trees is shown in the recommendations given in NHBC Standards, Chapter 4.2, April 2010, "Building near Trees" and it is considered that this document is relevant in this situation.

6.6 Piled Foundations

In the event that the use of conventional spread foundations proves either impracticable or uneconomical due to the size and depth of foundation required, then a piled foundation will be required. In these ground conditions, it is considered that some form of bored and in-situ cast concrete piled foundation with reinforced concrete ground beams should prove satisfactory.

The construction of a piled foundation is a specialist activity and the advice of a reputable contractor, familiar with the type of soil and groundwater conditions encountered at this site should be sought prior to finalising the foundation design. The actual pile working load will depend on the particular type of pile chosen and method of installation adopted.

To achieve the full bearing value a pile should penetrate the bearing stratum by at least five times the pile diameter.

Where piles are to be constructed in groups the bearing value of each individual pile should be reduced by a factor of about 0.8 and a calculation made to check the factor of safety against block failure.

Driven piles could also be used and would develop much higher working loads approximately 2.5 to 3 times higher than bored piles of a similar diameter at the same depth. However, the close proximity of adjacent buildings will in all probability preclude their use due to noise and vibration.

6.7 Retaining Walls

Several methods of retaining wall construction could be considered. These may include retaining structures cast in an underpinning sequence, or the use of temporary or sacrificial works to facilitate the retaining structure's construction. The excavation of the basement must not compromise the integrity of adjacent structures.

The full design of temporary and permanent retaining structures is beyond the scope of this report. However, the following design parameters for each element of soil recorded in the relevant exploratory holes are provided in Table 3 below to assist the design of these structures.

Stratum	**Depth to top (mSD)**	**Bulk Density (Mg/m3) (ɣ)**	**Effective Angle of Internal Friction (Φ)**
Made Ground	46.60 to 43.66	2.00	28
London Clay Formation	46.32 to 43.14	2.00	23

Table 3. Retaining Wall Design Parameters

The designer should use these parameters to derive the active and passive earth pressure coefficients ka and kp. The determination of appropriate earth pressure coefficients, together with factors such as the pattern of the earth pressure distribution, will depend upon the type/geometry of the wall and overall design factors.

6.8 Chemical Attack on Buried Concrete

The results of the chemical analyses show the natural soil samples tested to have water soluble sulphate contents of up to 1.84g/litre associated with near neutral pH values.

In these conditions, it is considered that deterioration of buried concrete due to sulphate or acid attack is likely to occur. The final design of buried concrete according to Tables C1 and C2 of BRE Special Digest 1:2005 should be in accordance with Class DS-3 conditions.

In addition, segregations of gypsum were noted within the London Clay and also are well known to occur within London Clay deposits. Consequently, it is considered that any buried concrete at depth may be attacked by such sulphates in solution and that it would be prudent to design any such concrete in accordance with full Class DS-3 conditions.

6.9 Non-Technical Summary of Chapter 6.0

On the basis of the fieldwork, the ground conditions at the site can be characterised as follows: Made Ground extends to depths of between 0.13m to 0.75m depth below ground level (46.32 to 43.14mOD). The London Clay Formation comprising stiff silty sandy clay with gypsum crystals to the full depths of investigation of 6.00m below ground level (39.27 to 37.66mSD). Water was encountered at respective depths of 3.89m (41.38mSD), 1.09m (43.95mSD) and 1.98m (41.68mSD) within Boreholes 1, 2 and 3 on the return monitoring visit, approximately five weeks after site works. Due to the nature of the geology on-site, this is likely to be surface water entering into the pipe, which is then unable to filter out into the impermeable clay.

Groundwater is not expected to be encountered in the basement excavation, but it would be prudent for the chosen contractor to have a contingency plan in place to deal with any perched groundwater inflows as a precautionary measure.

Several methods of retaining wall construction could be considered. These may include retaining structures cast in an underpinning sequence, or the use of temporary or sacrificial works to facilitate the retaining structure's construction. The excavation of the basement must not compromise the integrity of adjacent structures.

Based on the water soluble sulphate tests carried out as part of these works, it is considered that deterioration of buried concrete due to sulphate or acid attack is likely to occur. The final design of buried concrete according to Tables C1 and C2 of BRE Special Digest 1:2005 should be in accordance with Class DS-3 conditions.

In addition, segregations of gypsum were noted within the London Clay and also are well known to occur within London Clay deposits. Consequently, it is considered that any buried concrete at depth may be attacked by such sulphates in solution and that it would be prudent to design any such concrete in accordance with full Class DS-3 conditions.

7.0 BASEMENT IMPACT ASSESSMENT

7.1 Summary

The screening identified a number of potential impacts. The table below summarises the previously identified potential impacts and the additional information that is now available from the site investigation in consideration of each impact.

Potential Impact	Site Investigation conclusions	Impact sufficiently addressed without further justification?
The proposed basement extends beneath the water table surface.	The maximum proposed dig level for the basement excavation (understood to be 42.80mSD) lies below the minimum indicated groundwater level of 43.95mSD in BH2. Due to the nature of the geology on-site, this is likely to be surface water entering into the pipe, which is then unable to filter out into the impermeable clay.	Yes
There a history of seasonal shrink-swell subsidence in the local area and/or evidence of such effects at the site.	The London Clay was proven below the site and was recorded as having a high susceptibility to shrinkage and shrinkage. However, it is recommended that the base of proposed basement will extend well below the potential depth of root action.	Yes
Trees will be felled as part of the development	It is understood that two trees will be felled as part of the development, however as the trees are mainly on flat land they will not present a significant negative impact on slope stability. Desiccation of the shallow soils has not been found in the investigation and an Arboricultural report has been completed by ACS Consulting	Yes
The proposed basement will significantly increase the differential depth of foundations relative to neighbouring properties.	The development will result in the extension of the foundation depth of the basement relative to neighbouring properties.	No – see below for further details.

7.2 Outstanding risks and issues

The proposed basement will significantly increase the differential depth of foundations relative to neighbouring properties.

The excavation and construction of the basement at the site has the potential to cause some movements in the surrounding ground if not properly managed. However, it is understood that ground movements and/or instability will be managed through the proper design and construction of mitigation measures during the works. This will require close collaboration with the appointed contractor's temporary works coordinator.

The Party Wall Act (1996) will apply to this development because neighbouring houses lie within a defined space around the proposed building works. The party wall process should be followed and adhered to during this development.

A ground movement assessment was carried out at the site by Fairhurst under the instruction of Site Analytical Services Limited (Report Reference 122183-R1). The report is provided as Appendix C to this report and concludes that the predicted level of damage to the surrounding properties is negligible. This conclusion assumes a high standard of workmanship and adequate propping of the basement excavation.

A monitoring plan should be set out at design stage and should include a monitoring strategy, instrumentation and monitoring plans and action plans. Trigger levels on movements will need to be defined. Precise levelling or reflective survey targets should be installed at the garden walls and neighbouring buildings. Monitoring should take place in advance of the proposed works as a base-line survey, during the works and for a period following the completion of the works, to understand the long term effects.

- The proposed basement construction does not change the impermeable proportion at the site (this remains essentially the same). As such, the basement will not have an adverse impact on the site's surface water run-off.

- Intrusive investigation indicated that the groundwater table is below the proposed basement level. Groundwater is therefore unlikely to adversely impact the site as a result of the development.

- At the time of writing this report, the drainage details had not been finalised; however it is our understanding that the drainage details will incorporate a pumping device to protect the property from sewer flooding.

The proposed development will not increase flood risk at the site or the surrounding area. Also since the development is on already developed land, it will not adversely impact the Council's sustainability objectives.

7.3 Advice on Further Work and Monitoring

A monitoring plan should be set out at design stage and should include a monitoring strategy, instrumentation and monitoring plans and action plans. Trigger levels on movements will need to be defined. Precise levelling or reflective survey targets should be installed at the garden walls and neighbouring buildings. Monitoring should take place in advance of the proposed works as a base-line survey, during the works and for a period following the completion of the works, to understand the long term effects.

It would be prudent to continue to monitor the standpipes for as long as possible in order to determine equilibrium level and the extent of any seasonal variations. The chosen contractor should also have a contingency plan in place to deal with any perched groundwater inflows as a precautionary measure.

7.4 Non-Technical Summary of Chapter 7.0

The excavation and construction of the basement at the site has the potential to cause some movements in the surrounding ground if not properly managed. However, it is understood that ground movements and/or instability will be managed through the proper design and construction of mitigation measures during the works. It is not considered that the proposed basement would result in a significant change to the groundwater flow regime in the vicinity of the proposal. Also, given limited scope of the scheme and limited increase in impermeable areas, the scheme is also considered compliant with the surface water management and flood risk elements of NPPF and Camden policy.

Given good workmanship, the development at 14 Eton Road Road can be constructed without imposing more than negligible damage on the adjoining properties. The development is not likely to significantly affect the existing local groundwater regime.

It would be prudent to continue to monitor the standpipes for as long as possible in order to determine equilibrium level and the extent of any seasonal variations.

8.0 REFERENCES

1. CIRIA Special Publication 69, 1989. The engineering implications of rising groundwater levels in the deep aquifer beneath London

2. Environment Agency, 2006. Groundwater levels in the Chalk-Basal Sands Aquifer in the London Basin

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6. British Standards Institution, 2009. Code of Practice for Protection of Below Ground Structures Against Water from the Ground. BS 8102, BSI, London

7. CIRIA, 2000. Sustainable Urban Drainage Systems: Design Manual for England and Wales. CIRIA C522, Construction Industry Research and Information Association, London

8. Environment Agency Status Report 2010. Management of the London Basin Chalk Aquifer. Environment Agency

9. NHBC Standards, Chapter 4.1, "Land Quality - managing ground conditions", September 1999.

10. NHBC Standards, Chapter 4.2, "Building near Trees", April 2010.

Appendix A. Ground Investigation Factual Report

Site Analytical Services Ltd.

Site Investigations, Analytical & Environmental Chemists, Laboratory Testing Services.

Units 14 + 15, River Road Business Park,
33 River Road, Barking, Essex IG11 0EA

Tel: 0208 594 8134
Fax: 0208 594 8072
E-Mail: services@siteanalytical.co.uk

Directors: J. S. Warren, M.R.S.C., P. C. Warren, J. I. Pattinson, BSc (Hons), MSc
Consultants: G. Evans, BSc., M.Sc., P.G. Dip., FGS., MIEnvSc. A. J. Kingston, BSc C.Eng. MIMM
F. J. Gibbs, F.I.B.M.S. F.I.F.S.T., F.R.S.H. K. J. Blanchette

Your Ref:

Our Ref: **Ref: 17/27107-1**
September 2017

14 ETON ROAD,

LONDON, NW3 4SS

FACTUAL REPORT ON A GROUND INVESTIGATION

Prepared for

StructureMode

Acting on behalf of

Mr Robert Leeming

CONTENTS

1.0 INTRODUCTION

1.1 Outline and Limitations of Report

At the request of StructureMode, working on behalf of Mr Robert Leeming, a ground investigation was carried out in connection with a proposed residential basement development at the above site. A Phase 1 Preliminary Risk Assessment (Desk Study) is presented under separate cover in Site Analytical Services Limited Report Reference 17/27107.

The information was required for the design and construction of foundations and infrastructure for the proposed development at the existing site.

The recommendations and comments given in this report are based on the ground conditions encountered in the exploratory holes made during the investigation and the results of the tests made in the field and the laboratory. It must be noted that there may be special conditions prevailing at the site remote from the exploratory hole locations which have not been disclosed by the investigation and which have not been taken into account in the report. No liability can be accepted for any such conditions.

2.0 SITE DETAILS

(National Grid Reference: TQ 277 844)

2.1 Site Location

14 Eton Road is a residential property, located on the north-western side of Eton Road, Belsize Park at approximate postcode NW3 4SS. The residential dwelling has four levels of accommodation; lower ground, ground, first and second floor. The residential property also comprises a single storey garden room within the rear garden of the property. The site covers an approximate area of 0.05 Hectares with the general area being under the authority of the London Borough of Camden.

The site is located on the north-western side of Eton Road with residential properties to the north-east and west and a roadway to the south and east.

2.2 Geology

The 1:50000 Geological Survey of Great Britain (England and Wales) covering the area (Sheet 256, ‘North London’, Solid and Drift Edition) indicates the site to be underlain the London Clay Formation at depth.

The British Geological Survey maintains an archive of historical exploratory borehole logs throughout the UK. SAS Limited has searched the database and has found that there is one borehole located within 150m of the site. This is located 75m to the south-east of the site and reveals Made Ground to a depth of 1.50m with the London Clay to the full depth of excavation at 10.0m.

2.3 Previous Investigations

A Phase 1 Preliminary Risk Assessment (PRA) (SAS Report Ref: 17/27107, dated September 2017) has been undertaken across the site by Site Analytical Services Limited.

3.0 SCOPE OF WORK

3.1 Site Works

The proposed scope of works was agreed by the client prior to the commencement of the investigations. To achieve this, the following works were undertaken:-

- The drilling of three continuous flight auger boreholes to a depth of 6.00m below ground level (Boreholes 1, 2 and 3).
- The excavation of eleven trial pits to 1.50m maximum depth to expose existing foundations at the site (Trial Pits 1 to 11 inclusive). In the event, Trial Pits 3 and 6 were cancelled on-site.
- Sampling and in-situ testing as appropriate to the ground conditions encountered in the boreholes and trial pits.
- Laboratory testing to determine the engineering properties of the soils encountered in the exploratory holes.
- Factual reporting on the results of the investigation.

3.2 Ground Conditions

The locations of the exploratory holes are shown on the site sketch plan, Figure 1.

The boreholes and trial pits revealed ground conditions that were consistent with the geological records and known history of the area and comprised Made Ground up to 0.75m in thickness resting on deposits of the London Clay Formation.

These ground conditions are summarised in the following table. For detailed information on the ground conditions encountered in the boreholes and trial pits, reference should be made to the exploratory hole records presented in Appendix A.

Strata	Depth to top of strata (mbgl)	Level to top of strata (mSD)	Depth to base of strata (mbgl)	Level to base of strata (mSD)	Description
Made Ground	0.00	46.60 to 43.66	0.13 to 0.75	46.32 to 43.14	Pea shingle or concrete over brown silty sandy gravelly clay containing brick fragments.
London Clay Formation	0.13 to 0.75	46.32 to 43.14	6.00 (base of BH's 1, 2 & 3)	39.27 to 37.66	Stiff becoming very stiff silty sandy clay with gypsum crystals

Table A: Summary of Ground Conditions in Exploratory Holes

3.3 Groundwater

Groundwater was not encountered within any of the boreholes and trial pits and the soils remained essentially dry throughout.

It must be noted that the speed of excavation is such that there may well be insufficient time for further light seepages of groundwater to enter the boreholes and trial pits and hence be detected, particularly within more cohesive soils.

Isolated pockets of groundwater may also be present perched within any less permeable material found at shallower depth on other parts of the site especially within any Made Ground.

Water was encountered at respective depths of 3.89m (41.38mSD), 1.09m (43.95mSD) and 1.98m (41.68mSD) within Boreholes 1, 2 and 3 on the return monitoring visit, approximately five weeks after site works. Due to the nature of the geology on site, this is likely to be surface water entering into the pipe, which is then unable to filter out into the impermeable clay.

It should be noted that the comments on groundwater conditions are based on observations made at the time of the investigation (July to August 2017) and that changes in the groundwater level could occur due to seasonal effects and also changes in drainage conditions.

4.0 IN-SITU TESTING AND LABORATORY TESTS

4.1 In-situ Tests

In the essentially cohesive natural soils encountered at the site, in-situ shear vane tests were made at regular depth increments in order to assess the undrained shear strength of the materials. The results indicate that the natural soils are of a generally high strength in accordance with BS 5930 (2015).

The results of the in-situ tests are shown on the appropriate exploratory hole records contained in Appendix A.

4.2 Classification Tests

Atterberg Limit tests were conducted on four samples taken at depth in Boreholes 1, 2 and 3 and showed the samples tested to fall into Classes CH and CV according to the British Soil Classification System.

The test results are given in Table 1, contained in Appendix B.

4.3 Sulphate and pH Analyses

The results of the sulphate and pH analyses made on four samples are presented on Table 2, contained in Appendix B.

5.0 WASTE ACCEPTANCE CRITERIA TESTING

5.1 Waste Acceptance Criteria Analysis

A sample was obtained from 0.50m depth below ground level in Borehole 1 made at the location indicated on the site sketch plan (Figure 1).

The sample selected for analysis was sub-contracted to QTS Environmental Limited (a UKAS and MCERTS accredited laboratory) and their report is contained in Appendix B.

The sample was analysed using the Catwastesoil assessment tool, which concluded that the sample was not hazardous in nature.

The sample was analysed for Waste Acceptance Criteria Testing in order to classify soils on site for disposal purposes.

For the purpose of waste disposal, the soil sample would be classified as:

BH1 @ 0.50m ***Inert Waste***

p.p. SITE ANALYTICAL SERVICES LIMITED

T P Murray MSc BSc (Hons) FGS
Geotechnical Engineer

Aubrey Davidson BSc MSc DIC.
Senior Environmental Engineer

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1. British Standards Institution, 1986. Code of practice for foundations, BS 8004, BSI, London.

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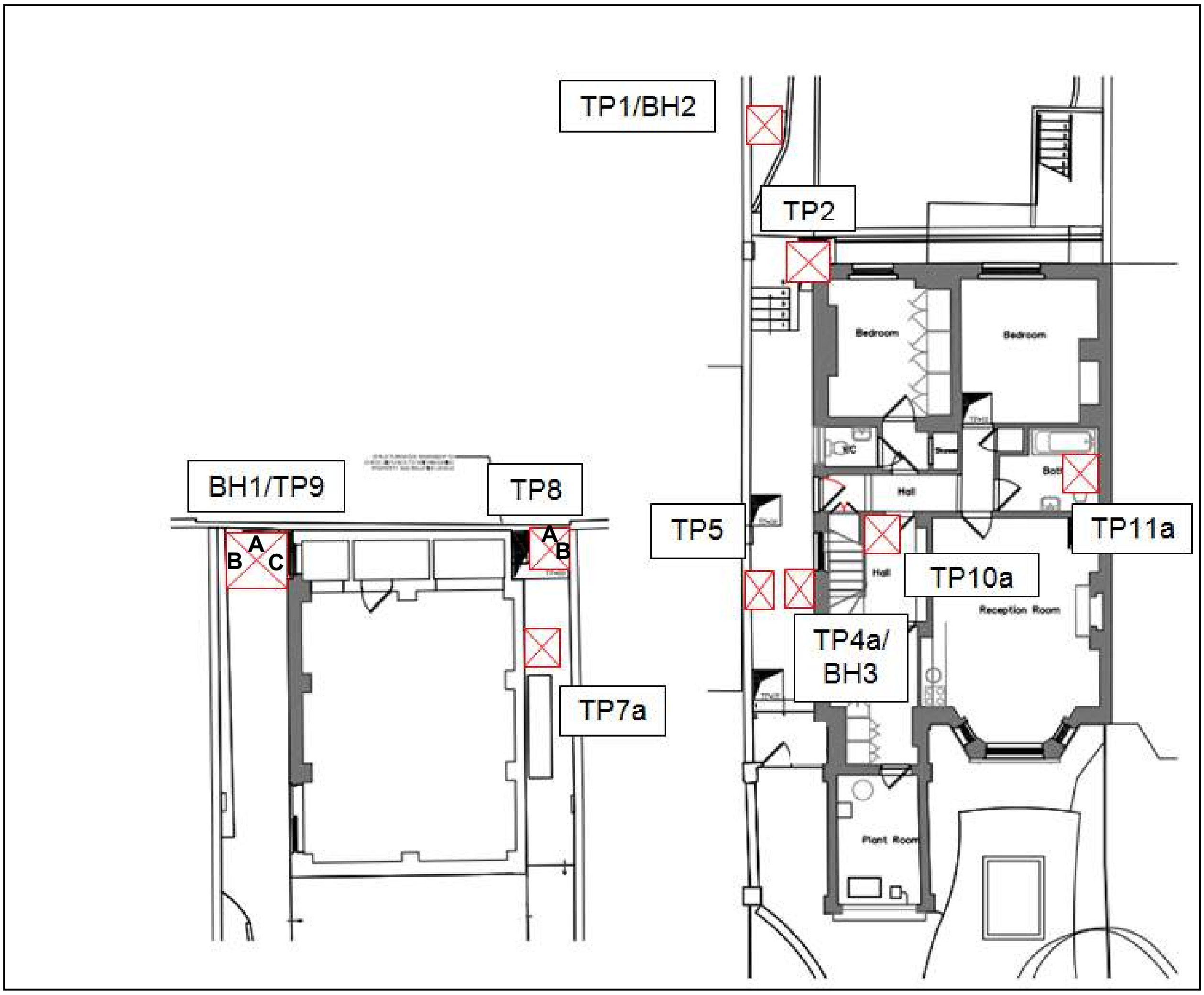
LOCATION:	14 Eton Road, London, NW3 4SS		
TITLE:	Site Sketch Plan	DATE:	Sept' 2017

REF: 17/27107-1

FIG: 1

SCALE: NTS



Site Analytical Services Ltd.				REF: 17/27107-1
LOCATION:	14 Eton Road, London, NW3 4SS			FIG: 2
TITLE:	Proposed Plan	DATE:	Sept' 2017	SCALE: NTS