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**LAND TO THE REAR OF 10-12 BIDWELL GARDENS,
LONDON, N11 2AX**

BASEMENT IMPACT ASSESSMENT

Prepared for

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1.0 INTRODUCTION

1.1 Project Objectives

The purpose of this assessment is to consider the effects of a proposed basement construction on the local slope stability, surface water and groundwater regime at the proposed residential property at the Land to the rear of 10-12 Bidwell Gardens, London, N11 2AX.

The recommendations and comments given in this report are based on the information contained from the sources cited and may include information provided by the Client and other parties, including anecdotal information. It must be noted that there may be special conditions prevailing at the site 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.

This report does not constitute a full environmental audit of either the site or its immediate environs.

1.2 Planning Policy Context

With the absence of specific guidance on basements from Haringey Council this document follows current planning procedure for basements and lightwells adopted by other London Boroughs including Camden, Westminster, Kensington and Chelsea and Islington. Basement Guidance notes were drafted in June 2012, but were subsequently removed in July 2014. Haringey do note the requirement for a Basement Impact Assessment with Policy DM18 of the development Management Plan (January 2016).

These policies require proposed subterranean developments to mitigate against the effects of ground and surface water flooding and to include drainage systems that do not impact neighbouring property of the site or the water environment by way of changing the groundwater regime.

This report is intended to address the issues set out in the planning policies by the other London boroughs. It will review existing site investigation data and provide a preliminary assessment of the issues identified by the Site Analytical Services Limited screening process.

This report also provides an impact assessment of the geo-environmental impacts on adjacent structures and the surrounding area based on available site investigation data.

As part of this guidance a subterranean (groundwater) flow screening chart is provided.

1.3 Qualifications

The report has been prepared by Mr Thomas Murray, a Fellow of the Geological Society (FGS).

2.0 SITE DETAILS

(National Grid Reference: TQ 295 910)

2.1 Site Location

The site is located on the land to the rear of the residential properties on the northern side of Bidwell Gardens. The site is situated in Haringey, in the north of central London, at an approximate postcode N11 2AX. It is immediately bound by Wroxham Gardens to the north-east and residential properties to all other directions. The site is roughly pentagonal in shape covers an approximate area of 0.04 Hectares with the general area being under the authority of the London Borough of Haringey.

The site mostly comprises undeveloped land which is currently not in use. A derelict greenhouse is located in the north of the site. The nearby surrounding areas to the site are residential in all directions.

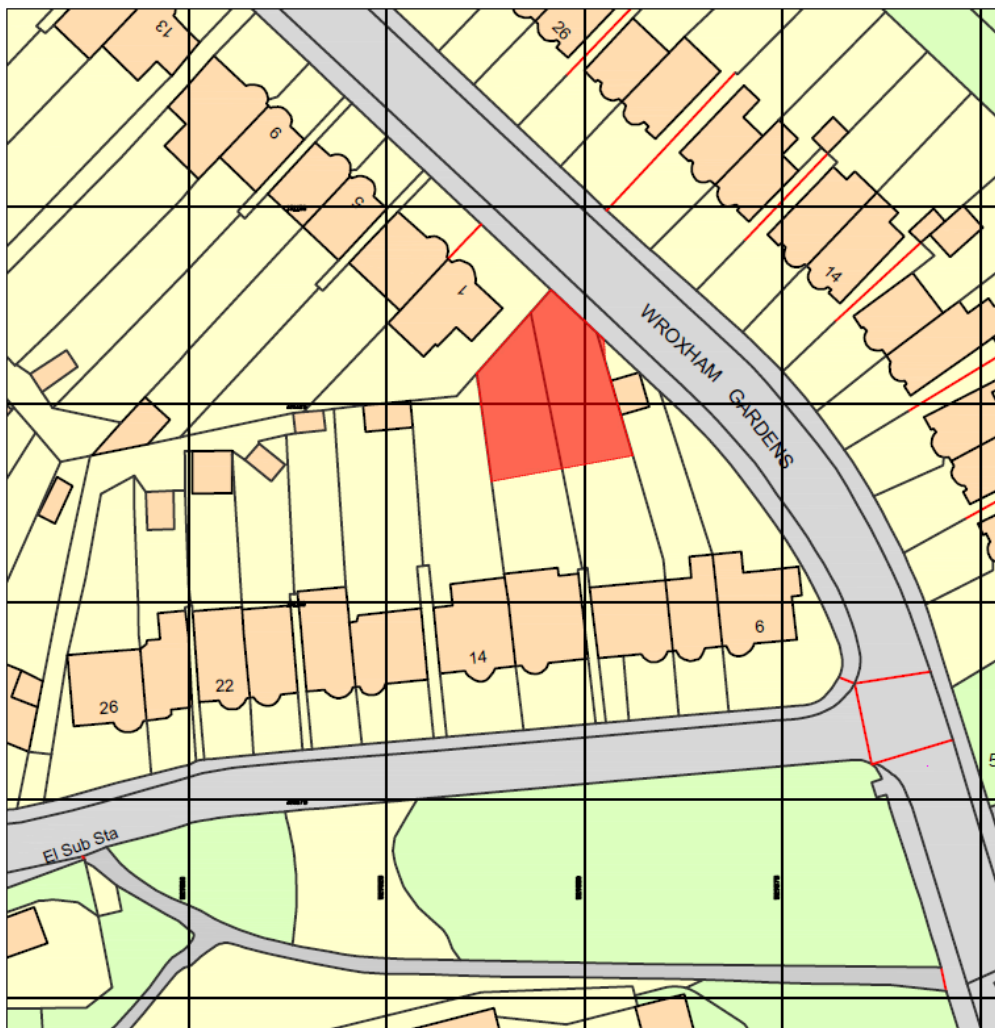


Figure 1. Site Location Plan



2.2 Site Layout

The site was attended on 15th September 2020 for the purposes of conducting the site walkover.

The site is located on the western side of Wroxham Gardens in Camden, North London.

The site comprises a derelict greenhouse in the north, located to the rear of 10-12 Bidwell Gardens.

The majority of the site covering is soft-landscaped in the form of overgrown grass lawns. There are concrete slabs located around the perimeter of the derelict greenhouse.

Vegetation exists across the site. Mature trees, overgrown grass, weeds and shrubs are located predominantly around the borders of the site. Bamboo may be present in the north-east of the site. A neglected area of home-grown produce (including tomato plants) is located in front of the derelict greenhouse.

The site slopes gently from north to south.

From the site walkover, there were no obvious potentially contaminating activities on the site.

From historical map evidence it would appear that the site has remained undeveloped since prior 1879.

2.3 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 London Clay mainly comprises bioturbated or poorly laminated, blue-grey or grey-brown, slightly calcareous, silty to very silty clay, clayey silt and sometimes silt, with some layers of sandy clay. It commonly contains thin courses of carbonate concretions ('cementstone nodules') and disseminated pyrite. It also includes a few thin beds of shells and fine sand partings or pockets of sand, which commonly increase towards the base and towards the top of the formation. At the base, and at some other levels, thin beds of black rounded flint gravel occur in places. Glauconite is present in some of the sands and in some clay beds, and white mica occurs at some levels.

The British Geological Survey maintains an archive of historical exploratory borehole logs throughout the UK. SAS Limited has searched the database and have found a borehole located 540m to the south-west of the site at 'Muswell Hill Golf Club' and shows 16.0m of grey and brown clay over 18.0m of brown clay over 13.0m of grey, blue clay mudstone over 7.0m of hard grey silty clay over 11.5m of red green clay over chalk and flints to 120.0m.

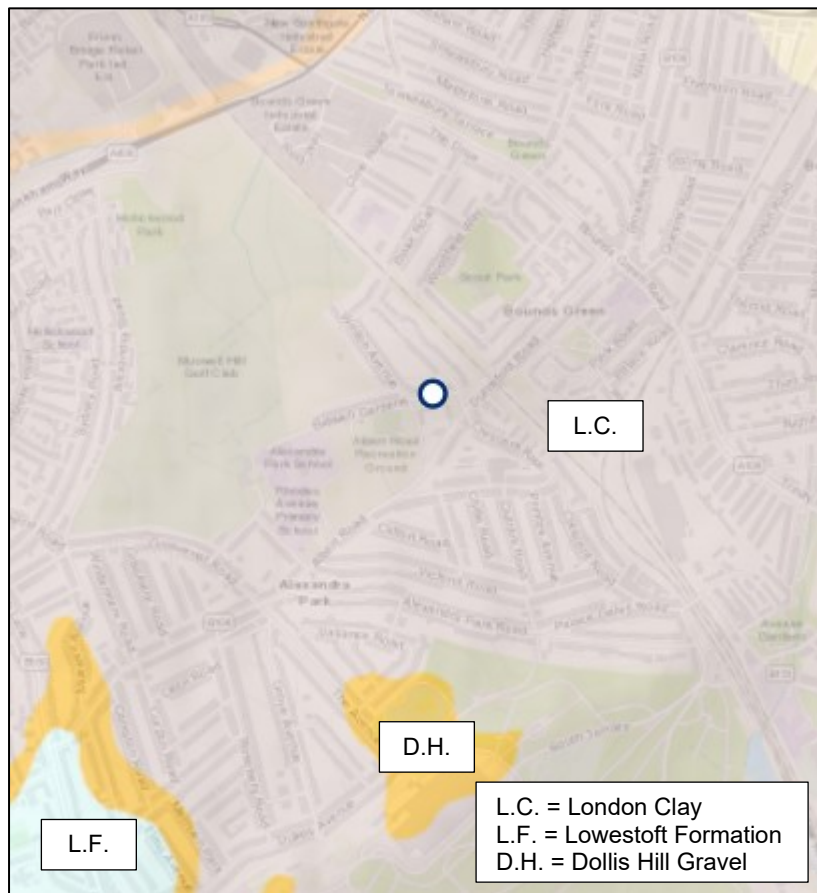


Figure 2. Geology of the Site (Ref. BGS Geoindex)

2.4 Hydrology and drainage

2.4.1 Rainfall and run-off

According to Mayes (1997) rainfall in the local area averages around 610mm/year and is significantly less than the national average of around 900mm/year. Evapotranspiration is typically 450mm/year resulting in about 160mm/year as 'hydrologically effective' rainfall which is available to infiltrate into the ground or run-off as surface water flow.

With reference to Camden Geological, Hydrogeological and Hydrological Study (1999), Talling (2011) and Barton (1992) the site is not located within 100m of a former 'lost river'. The closest surface water feature is a pond located 195m to the north of the site

The area located immediately around the site is highly developed with approximately 60% of the surface covered with hardstanding. Most of the rainfall in the area will run-off hard surface areas and be collected by the local sewer network.

2.4.2 Drainage

Surface drainage from the site is assumed to be directed to drains flowing to the south-east along Wroxham Gardens.

2.4.3 Flood Risk

River or Tidal flooding

The site is currently not located within 1 kilometre of an area at risk from extreme flooding from rivers or sea without defences (Zone 2) or an area at risk from rivers or sea without defences (Zone 3).

Surface water flooding

According to the Envirocheck Surface Water Flood maps of the area (obtained from data supplied by the Environment Agency) Wroxham Gardens to the north east is at low risk, but this does not extend to the site itself and as such the site is at very low risk from surface water flooding, (Figure 3).

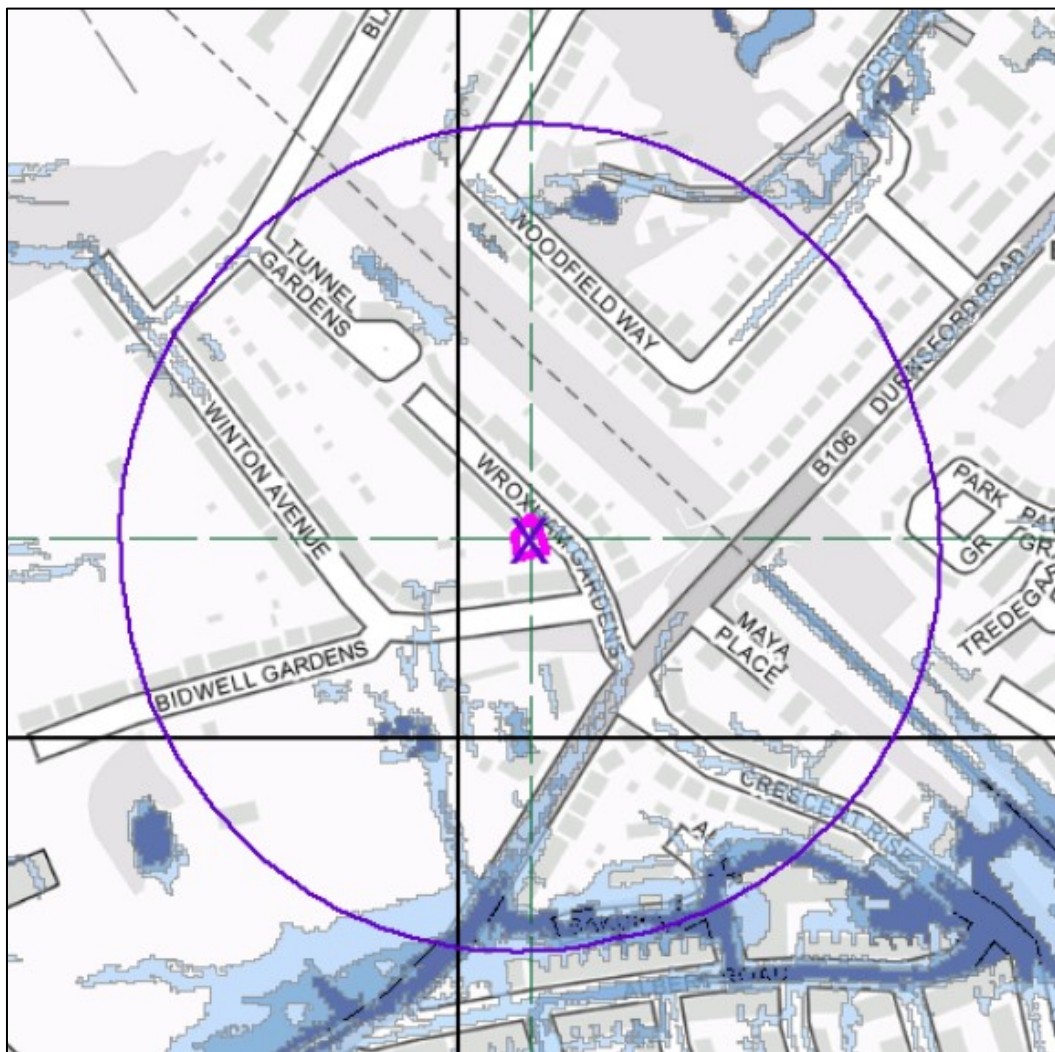


Figure 3. Extract from the Environment Agency's 'Risk of Flooding from Surface Water'. Ordnance Survey Crown copyright 2015. All rights reserved.

Sewer flooding

The London Regional Flood Risk Appraisal (2009) advises that foul sewer flooding is most likely to occur where properties are connected to the sewer system at a level below the hydraulic level of the sewage flow, which in general are often basement flats or premises in low lying areas. There is no record of sewer flooding having occurred at Bidwell Gardens or Wroxham Gardens and therefore the risk of sewer flooding is considered low.

2.5 Hydrogeology

The Environment Agency Groundwater Protection Policy uses aquifer designations that are consistent with the Water Framework Directive. These designations reflect the importance of aquifers in terms of groundwater as a resource (drinking water supply) and also their role in supporting surface water flows and wetland ecosystems.

The Bedrock geology underlying the site (London Clay) has been classified as Unproductive Strata; rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

Other hydrogeological data obtained from the Phase 1 Preliminary Risk Assessment (PRA) (SAS Report Ref: 20/32436) for the site include:

- A Zone II (Outer) Groundwater Source Protection Zone is located 493m to the east of the site. Two Zone I (Inner) Groundwater Source Protection Zones are located 558m to the south-east and 724m to the east of the site.
- There are 2 water abstraction licences within 1 kilometre of the site. The closest is a non-potable water abstraction license located 521m to the south-west of the site at with the abstraction for 'Golf Courses: Spray Irrigation' direct from groundwater. The permitted start date for this licence is 31st August 2016. Due to the distances of the abstractions from the site, they are not considered to be risks of potential contamination on- site.

2.6 Previous Reports

The results from a Phase 1 Preliminary Risk Assessment and Factual Intrusive Investigation are presented under separate cover in Site Analytical Services Limited report (Project Nos. 20/32436 and 20/32436-1 respectively, both dated September 2020. The findings from the Factual Report are described in this basement impact assessment, whilst a copy of the report is included as Appendix A.

2.7 Proposed Development

It is proposed to construct a single storey residential property with a single storey basement to approximately 3.00m maximum depth.

2.8 Results of Basement Impact Assessment Screening

A screening process has been undertaken for the site and the results are summarised in Table 1 below:

Table 1: Summary of screening results

Item	Description	Response	Comment
Sub-terranean (Ground water Flow)	1a. Is the site located directly above an aquifer.	No	The site has been classified as being situated above an unproductive (negligibly permeable) formation (London Clay) that is generally regarded as containing insignificant quantities of groundwater.
	1b. Will the proposed basement extend beneath the water table surface.	Unlikely – to be confirmed by Ground Investigation	Given the presence of a non-aquifer below the site it is unlikely that groundwater will be encountered during any excavations for the proposed basement, however this will be confirmed by the ground investigation.
	2. Is the site within 100m of a watercourse, well (used / disused) or potential spring line.	No	With reference to Camden Geological, Hydrogeological and Hydrological Study (1999), Talling (2011) and Barton (1992) the site is not located within 100m of a former 'lost river'. The closest surface water feature is a pond located 195m to the north of the site.
	3. Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas.	Yes	The amount of hardstanding on-site is expected to increase due to the footprint of the proposed development.
	4. 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	Existing drainage paths are to be utilised where possible. Whether soakaways/SUDS are used on the proposed development is to be confirmed (beyond the scope of this report). An appropriately qualified engineer should be engaged to ensure mandatory requirements are met.
Slope Stability	5. 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 or spring line.	No	With reference to Camden Geological, Hydrogeological and Hydrological Study (1999), Talling (2011) and Barton (1992) the site is not located within 100m of a former 'lost river'. The closest surface water feature is a pond located 195m to the north of the site.
	1. Does the existing site include slopes, natural or man-made greater than 7 degrees (approximately 1 in 8).	No	A gentle slope towards the south-east was noted, however this is considerably less than 7 degrees.
	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 at the site is not proposed.

Item	Description	Response	Comment
	3. Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7 degrees (approximately 1 in 8).	No	The immediate surrounding area is gently (below 7 degrees) sloping towards the south-east.
	4. Is the site within a wider hillside setting in which the general slope is greater than 7 degrees (approximately 1 in 8).	No	There is a general slope across the surrounding area from north-east to south-west, but this is less than 1 in 8.
	5. Is the London Clay the shallowest strata at the site.	Yes	With reference to available BGS records, the London Clay Formation is expected to be encountered from ground level.
	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	It is understood that trees are to be felled as part of this development. However an Arboriculturists report has not been carried out as there are no protected trees within the vicinity of the site.
	7. Is there a history of seasonal shrink-swell subsidence in the local area and/or evidence of such effects at the site.	Yes	The site lies above the London Clay Formation, well known as having a high tendency to shrink and swell.
	8. Is the site within 100m of a watercourse or a potential spring line.	No	The closest surface water feature is a pond located 195m to the north of the site.
	9. Is the site within an area of previously worked ground.	No	According to the records held by the BGS the site is not underlain by any worked ground, Made Ground, infilled ground or landscaped ground.
	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.	Unknown – to be confirmed by Ground Investigation	The site has been classified as being situated above an unproductive (negligibly permeable) formation (London Clay) that is generally regarded as containing insignificant quantities of groundwater.
	11. Is the site within 5m of a highway or pedestrian right of way.	Yes	The site lies within 5m from Wroxham Gardens.
	12. Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties.	Yes	The development will increase the depths of foundation at the site, although the foundation depths of adjacent properties are unknown.

Item	Description	Response	Comment
	13. Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines.	Unknown / outside scope of report	A full statutory service search was outside the scope of this report and must be completed prior to any excavations.
Surface Water and Flooding	1. 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	No – any additional surface water generated from an increased hardstanding area will be attenuated to ensure they are not increased or altered. The basement will be beneath the footprint of the new dwelling therefore the 1m distance between the roof of the basement and ground surface as recommended by Chapter 5 of the Arup report, does not apply across these areas.
	2. Will the proposed basement development result in a change in the proportion of hard surfaced / paved external areas.	Yes	The amount of hardstanding on-site is expected to increase.
	3. 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	All surface water for the site will be contained within the site boundaries and collected as described above; hence there will be no change from the development on the quantity or quality of surface water being received by adjoining sites. The basement will be beneath the footprint of the dwelling therefore the 1m distance between the roof of the basement and ground surface as recommended by Chapter 5 of the Arup report does not apply across these areas.
	4. Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses.	No	The surface water quality will not be affected by the development, as in the permanent condition collected surface water will be generally be from roofs, domestic hard landscaping or collected from beneath the landscaping layer over the basement.
	5. Is the site in an area known to be at risk from surface water flooding.	No	According to Environment Agency Surface Water Flood maps the site is not at risk from surface water flooding.

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

- 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.
- Is the site within 5m of a highway or pedestrian right of way.
- 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.

3.0 SCOPING PHASE

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 compiled 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.
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.
11	Is the site within 5m of a highway or a pedestrian right of way?	Potential impact: Excavation of basement causes loss of support to footway/highway and damage to the services beneath them. Action: Ensure adequate temporary and permanent support by use of best practice working methods.
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 foundations to the surrounding properties if basement excavations are inadequately supported. Action: Ensure adequate temporary and permanent support by use of best practice methods.

Surface Water and Flooding

2	Will the proposed basement development result in a change in the proportion of hard surfaced / paved external areas.	Potential impact: May increase flow rates to sewer, and thus increase the risk of flooding Action: Assess net change in hard surfaced/paved areas and, if required, recommend appropriate types of SUDS for use as site-specific mitigation.
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These potential impacts have been further assessed through the ground investigation, as detailed in Section 4 below.

4.0 EXISTING SITE INVESTIGATION DATA

4.1 Records of site investigations

Ground conditions at the site were investigated by Site Analytical Services Limited in August and September 2020 (Report Reference 20/32436-1). The ground conditions revealed by the investigation are summarised in the following table.

Strata	Depth to top of strata (mbgl)	Depth to base of strata (mbgl)	Description
Made Ground	0.00	0.60	Brown silty sandy clay (Topsoil) containing occasional brick fragments.
London Clay	0.60	12.00 (Base of BH1)	Firm becoming stiff silty sandy clay containing partings of silty fine sand and occasional gypsum crystals.

Table A: Summary of Ground Conditions in Exploratory Holes

Groundwater was not encountered in the borehole 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 borehole 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.

Groundwater was not encountered in the monitoring standpipe after a period of approximately four weeks. 30mm of water was encountered within the standpipe during the second monitoring visit, however, this is purely surface water which as drained into the pipe and does not indicate a ground water level.

It should be noted that the comments on groundwater conditions are based on observations made at the time of the investigation (August and September 2020) and that changes in the groundwater level could occur due to seasonal effects and also changes in drainage conditions.

Groundwater is by its nature, hidden from view and unforeseen ground conditions can occur. It is therefore recommended that the water levels in the monitoring borehole be periodically measured immediately prior to, and during construction. Should groundwater levels rise to within the excavation volume, or should significant groundwater inflow be observed during excavation, professional advice should be sought.

The results of the in-situ permeability test indicated an apparent permeability or soil infiltration rate of 1.67×10^{-9} m/sec within Borehole 1. This soil infiltration rates lie within the range of published data of intact clays and are classed as practically impermeable material practically impervious drainage characteristics.

5.0 FOUNDATION DESIGN

5.1 General

It is proposed to construct a single storey rear extension as well as lowering of the existing cellar by an additional 0.95m to 1.50m. The proposed basement will be approximately 3.00m below ground floor level. It is proposed to construct a single storey residential property with a single storey basement to approximately 3.00m maximum depth. Details of the structure and layout were provided; however, loadings were not available at the time of preparation of this report.

5.2 Site Preparation Works

The main contractor should be informed of the site conditions and risk assessment 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.

5.3 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 borehole, 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 stiff silty sandy clay deposits which occur at depths of approximately 0.60m below ground level.

Using theory from Terzaghi (1943), strip foundations placed within natural soils may be designed to allowable net bearing pressures of approximately 90kN/m² at 3.00m 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.

5.4 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.

5.5 Retaining Walls

5.5.1 General

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 B below to assist the design of these structures.

Stratum	Depth to top (m)	Bulk Density (Mg/m ³) (γ)	Effective Angle of Internal Friction (Φ)
London Clay Formation	0.60	2.00	21

Table B. Retaining Wall Design Parameters

The designer should use these parameters to derive the active and passive earth pressure coefficients k_a and k_p . 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.

5.5.2 Ground Movement

The upward movement of the base of an excavation occurs as a result of unloading and may be considered as consisting of two parts:

1. A short term movement called heave which occurs as a result of elastic rebound and may typically occur during the construction period
2. A long term movement called swell which occurs as a result of the absorption of water into the pores of the soils as the ground adjusts to new stress conditions.

The site lies above the London Clay Formation which has a high susceptibility to shrinkage and swelling movements with changes in moisture content, as defined by the NHBC Standards, Chapter 4.2 (2010).

Excavations will encounter the London Clay and the contractor should account for these upward ground movements such as providing heave protection measures to the floor slab.

The actual amount of movement will depend upon a number of factors including the construction timetable, ultimate loads and critically, the depth of the final excavation.

5.6 Chemical Attack on Buried Concrete

The results show the soil samples tested to have water soluble sulphate contents of up to 0.42g/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 unlikely 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-1 conditions.

However, segregations of gypsum were noted within the London Clay Formation. 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-2 conditions.

6.0 BASEMENT IMPACT ASSESSMENT

6.1 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.	Groundwater was not encountered in the monitoring standpipe after a period of approximately four weeks. 30mm of water was encountered within the standpipe during the second monitoring visit, however, this is purely surface water which as drained into the pipe and does not indicate a ground water level.	Yes
The London Clay the shallowest strata at the site.	The London Clay has been proven to be the shallowest strata at the site.	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, the base of proposed basement will extend well below the potential depth of root action.	Yes
The site is within 5m of a highway or pedestrian right of way.	The proposed basement is not to be extended below Bidwell gardens or Wroxham Gardens and therefore it is suggested that the impact on these access roads is likely to be minimal. There is nothing unusual in the proposed development that would give rise to any concerns with regard to the stability of public highways.	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.

6.2 Outstanding Risks and Issues

The significant impacts which require further information have been described in detailed below in order to assess the likelihood of them occurring and the scope for reasonable engineering mitigation.

- a. 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 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.

7.0 BIA CONCLUSIONS

1. It is proposed to construct a single storey residential property with a single storey basement to approximately 3.00m maximum depth.
2. Conditions at the site were investigated by Site Analytical Services Limited in August and September 2020 (SAS Report Reference 20/32436-1). The borehole revealed ground conditions that were generally consistent with the geological records and known history of the area and comprised up to 0.60m thickness of Made Ground, underlain by the London Clay Formation.
3. As proven from the site investigation, the Bedrock geology underlying the site (solid permeable formations) has been classified as Unproductive Strata; rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.
4. Groundwater was not encountered in the monitoring standpipe after a period of approximately four weeks. 30mm of water was encountered within the standpipe during the second monitoring visit, however, this is purely surface water which as drained into the pipe and does not indicate a ground water level.
5. A monitoring plan will be set out at design stage and will include a monitoring strategy, instrumentation and monitoring plans and action plans.
6. 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.
7. The proposed development will not increase flood risk at the site or the surrounding area. Also, since the development is on already developed land covered in hardstanding, it will not adversely impact the Council's sustainability objectives.

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
3. British Standards Institution, 1999+A2. Code of Practice for Site Investigations, BS5930, BSI, London
4. British Standards Institution, 1986. Code of practice for foundations, BS 8004, BSI, London.
5. British Standards Institution, 2009. Code of Practice for Protection of Below Ground Structures Against Water from the Ground. BS 8102, BSI, London
6. CIRIA, 2000. Sustainable Urban Drainage Systems: Design Manual for England and Wales. CIRIA C522, Construction Industry Research and Information Association, London
7. Environment Agency Status Report 2010. Management of the London Basin Chalk Aquifer. Environment Agency
8. NHBC Standards, Chapter 4.1, "Land Quality - managing ground conditions", September 1999.
9. Mayles, J. 1997. Regional climates of the British Isles, p74: Average precipitation for the period 1961-1990 St James Park, London = 611mm. Routledge
10. NHBC Standards, Chapter 4.2, "Building near Trees", April 2010.
11. Environment Agency. (n.d.). Flood risk map. From <http://maps.environment-agency.gov.uk/>



9.0 APPENDIX A – FACTUAL GROUND INVESTIGATION REPORT



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Your Ref:

Our Ref:

**Ref: 20/32436-1
September 2020**

LAND TO THE REAR OF 10-12 BIDWELL GARDENS, LONDON, N11 2AX

FACTUAL REPORT ON A GROUND INVESTIGATION

Prepared for

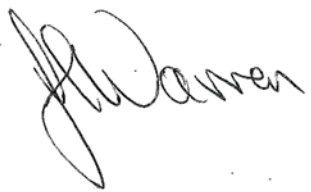
Elena Cristou



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Business Reg. No. 2255616



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Author: T Murray BSc (Hons) MSc FGS Geotechnical Engineer 
Checked: Jim Warren MRSC. Managing Director 

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1.0 INTRODUCTION

1.1 Outline and Limitations of Report

At the request of Elena Cristou, a ground investigation was carried out in connection with a proposed residential development at the above site.

The information was required for the design and construction of foundations and infrastructure for the proposed development at the existing site, which includes the construction of a new single storey property with a single storey basement to approximately 3.00m depth below ground level.

The recommendations and comments given in this report are based on the ground conditions encountered in the exploratory hole 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 location 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 295 910)

2.1 Site Location

The site is located on land to the rear of the residential properties on the northern side of Bidwell Gardens. The site is situated in Haringey, in the north of Central London, at approximate postcode N11 2AX. It is immediately bound by Wroxham Gardens to the north-east and residential properties to all other directions. The site is roughly pentagonal in shape covers an approximate area of 0.04 Hectares with the general area being under the authority of the London Borough of Haringey.

The site mostly comprises undeveloped land which is currently not in use. A derelict greenhouse is located in the north of the site. The nearby surrounding areas to the site are residential in all directions.

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 by the London Clay Formation at depth.

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 one rotary percussive borehole to 12.00m maximum depth below ground level (Borehole 1).
- Sampling and in-situ testing as appropriate to the ground conditions encountered in the borehole.
- Laboratory testing to determine the engineering properties of the soils encountered in the exploratory hole.
- Factual reporting on the results of the investigation.

3.2 Ground Conditions

The location of the exploratory hole is shown on the site sketch plan, Figure 1.

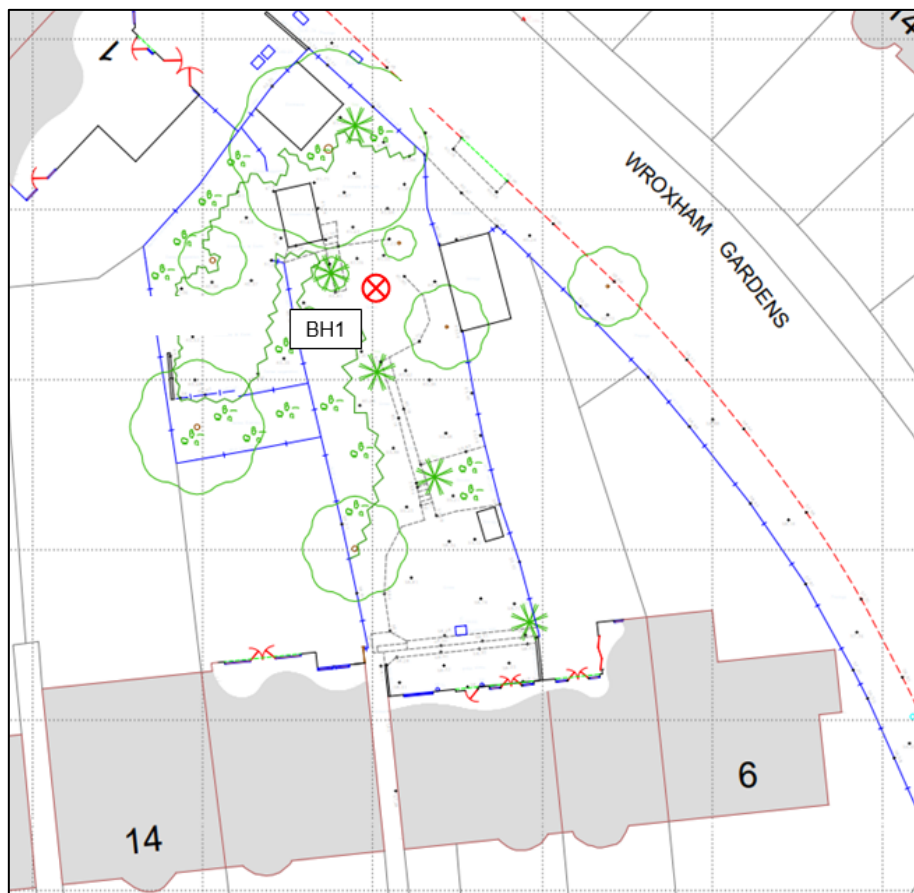


Figure 1 – Site Sketch Plan

The borehole revealed ground conditions that were generally consistent with the geological records and known history of the area and comprised Made Ground up to 0.60m in thickness resting on the London Clay Formation at depth.

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

Strata	Depth to top of strata (mbgl)	Depth to base of strata (mbgl)	Description
Made Ground	0.00	0.60	Brown silty sandy clay (Topsoil) containing occasional brick fragments.
London Clay	0.60	12.00 (Base of BH1)	Firm becoming stiff silty sandy clay containing partings of silty fine sand and occasional gypsum crystals.

Table A: Summary of Ground Conditions in Exploratory Holes

3.3 Groundwater

Groundwater was not encountered in the borehole 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 borehole 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.

Groundwater was not encountered in the monitoring standpipe after a period of approximately four weeks. 30mm of water was encountered within the standpipe during the second monitoring visit, however, this is purely surface water which as drained into the pipe and does not indicate a groundwater level.

It should be noted that the comments on groundwater conditions are based on observations made at the time of the investigation (August and September 2020) 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 Standard Penetration Tests

The results of the Standard Penetration Tests carried out in the natural soils are shown on the exploratory hole records in Appendix A.

4.2 Undrained Triaxial Compression Test Results

Undrained Triaxial Compression tests were carried out on four undisturbed 100mm diameter samples taken from within Borehole 1.

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

4.3 Classification Tests

Atterberg Limit tests were conducted on three soil samples taken from Borehole 1 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 2, contained in Appendix B.

4.4 Sulphate and pH Analyses

The results of the sulphate and pH analyses made on three soil samples selected to give a range of depth are presented within the i2 Analytical Limited Report (Ref: 20/28468), contained in Appendix B.

4.5 In-situ Falling Head Permeability Tests

In order to assess the soil infiltration characteristics of the natural superficial soils at the site, an in-situ falling head permeability test was carried out in Borehole 1, using the procedure recommended in BS 5930:1999 (Amendment 3: 2010).

The results of the in-situ permeability test indicated an apparent permeability or soil infiltration rate of 1.67×10^{-9} m/sec within Borehole 1. This soil infiltration rate lies within the range of published data of intact clays and are classed as practically impermeable material practically impervious drainage characteristics.

The results are presented on the exploratory hole records, contained in Appendix B.

5.0 REFERENCES

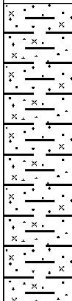
1. British Standards Institution, 1986. Code of practice for foundations, BS 8004, BSI, London.
2. British Standards Institution, 1990. Methods for test for soils for civil engineering purposes, BS1377, BSI, London
3. British Standards Institution, 1994. Code of practice for earth retaining structures, BS8002, BSI, London
4. British Standards Institution, 2015. Code of Practice for Site Investigations, BS5930: 2015, BSI, London
5. British Standards Institution, 2004. Geotechnical Design, BS EN 1997-1 BSI, London
6. Building Research Establishment Special Digest 1, 2005, "Concrete in Aggressive Ground – Third Edition."
7. Driscoll, R (1983) "The influence of vegetation on the shrinking and swelling of clay soils in Great Britain", Geo-technique 33, 93-107
8. Eurocode 1: Actions on structures – BS EN 1991-1-1:2002: General actions – Densities, self weight and imposed loads, BSI, London
9. NHBC Standards, Chapter 4.1, "Land Quality - managing ground conditions", September 1999.
10. NHBC Standards, Chapter 4.2, "Building near Trees", April 2010.
11. Stroud M.A. and Butler F.G. (1975) Symposium on the Engineering Behaviour of Glacial Materials; the Midland Soil Mechanics and Foundation Engineering Society; pgs 124 et seq.
12. Tomlinson, M J, 2001. "Foundation Design and Construction", Seventh Edition, Prentice Hall (ISBN 0-13-031180-4).



APPENDIX A

Borehole Logs

Site Analytical Services Ltd.							Site	Borehole Number		
							LAND TO THE REAR OF 10-12 BIDWELL GARDENS, LONDON, N11 2AX	BH1		
Boring Method		Casing Diameter			Ground Level (mOD)		Client		Job Number	
ROTARY PERCUSSIVE		128mm cased to 0.00m					ELENA CRISTOU		2032436	
		Location			Dates		Engineer		Sheet	
		TQ295910			27/08/2020		HALSTEAD ASSOCIATES		1/2	
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
0.25	D1					(0.20)	MADE GROUND: Topsoil containing occasional brick fragments			
0.50	D2					(0.40)	MADE GROUND: Dark brown silty sandy clay			
0.75	D3					0.60	Firm, brown silty sandy CLAY			
1.00	D4									
1.20-1.65	SPT(C) N=7		DRY	1,1/2,1,2,2						
1.20	D5									
1.85	D6									
2.00-2.45	U1			40 blows						
						(3.90)				
2.75	D7									
3.00-3.45	SPT N=10		DRY	2,2/3,2,3,2						
3.00	D8									
3.75	D9									
4.00-4.45	U2			55 blows						
						4.50				
4.75	D10						Firm becoming stiff, dark brown silty sandy CLAY			
5.00-5.45	SPT N=13		DRY	3,3/3,3,4,3						
5.00	D11									
6.00	D12									
6.50-6.95	U3			75 blows						
						(5.50)				
7.50	D13									
8.00-8.45	SPT N=18		DRY	3,4/3,4,5,6						
8.00	D14									
9.00	D15									
9.50-9.95	U4			100 blows						
										
										
										
										
										
										
										
										
										
										
										
Remarks D= Disturbed Sample U= Undisturbed 100mm Diameter Sample C= Dynamic Penetration Test - Cone S= Standard Penetration Test - Cone Groundwater was not encountered during boring/excavation Excavating from 0.00m to 1.00m for 1 hour.								Scale (approx)	Logged By	
								1:50	EW	
								Figure No. 2032436.BH1		

Site Analytical Services Ltd.							Site LAND TO THE REAR OF 10-12 BIDWELL GARDENS, LONDON, N11 2AX		Borehole Number BH1	
Boring Method ROTARY PERCUSSIVE		Casing Diameter 128mm cased to 0.00m			Ground Level (mOD)		Client ELENA CRISTOU		Job Number 2032436	
		Location TQ295910			Dates 27/08/2020		Engineer HALSTEAD ASSOCIATES		Sheet 2/2	
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
10.75	D16					10.00	Stiff, dark brown silty sandy CLAY			
11.55-12.00 11.55	SPT N=26 D17		DRY	4,6/6,6,7,7		(2.00)				
						12.00	Complete at 12.00m			
Remarks D= Disturbed Sample U= Undisturbed 100mm Diameter Sample C= Dynamic Penetration Test - Cone S= Standard Penetration Test - Cone Groundwater was not encountered during boring/excavation								Scale (approx) 1:50	Logged By EW	
								Figure No. 2032436.BH1		

Standard Penetration Test Results

Job Number
2032436

Sheet

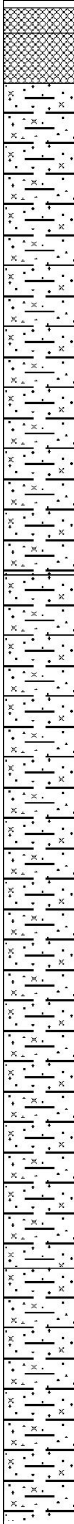
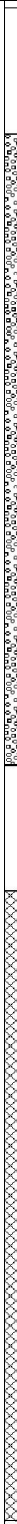
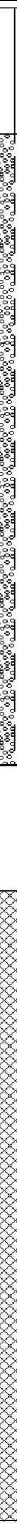
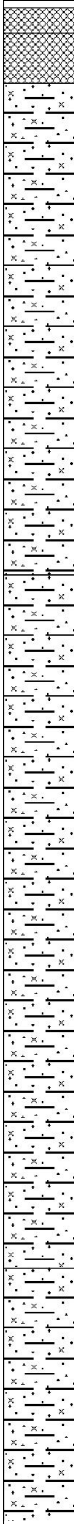
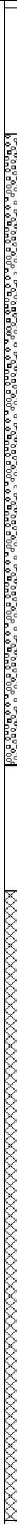
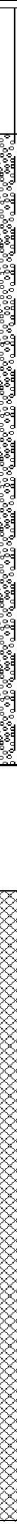
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1 / 1

Borehole Number	Base of Borehole (m)	End of Seating Drive (m)	End of Test Drive (m)	Test Type	Seating Blows per 75mm		Blows for each 75mm penetration				Result	Comments
					1	2	1	2	3	4		
BH1	1.20	1.35	1.65	CPT	1	1	2	1	2	2	N=7	
BH1	3.00	3.15	3.45	SPT	2	2	3	2	3	2	N=10	
BH1	5.00	5.15	5.45	SPT	3	3	3	3	4	3	N=13	
BH1	8.00	8.15	8.45	SPT	3	4	3	4	5	6	N=18	
BH1	11.55	11.70	12.00	SPT	4	6	6	6	7	7	N=26	

Site Analytical Services Ltd.

Site LAND TO THE REAR OF 10-12 BIDWELL GARDENS, LONDON, N11 2AX	Borehole Number BH1
Client ELENA CRISTOU	Job Number 2032436
Engineer HALSTEAD ASSOCIATES	Sheet 1/1

Installation Type Single Installation				Dimensions Internal Diameter of Tube [A] = 50 mm Diameter of Filter Zone = 128 mm		Client ELENA CRISTOU		Job Number 2032436							
Location TQ295910				Ground Level (mOD)		Engineer HALSTEAD ASSOCIATES				Sheet 1/1					
Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description	Groundwater Strikes During Drilling									
				1.00	Bentonite Seal	Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings				Depth Sealed (m)
											5 min	10 min	15 min	20 min	
				Groundwater Observations During Drilling											
				Date	Start of Shift					End of Shift					
					Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)	Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)	
				Instrument Groundwater Observations											
				Inst. [A] Type : Slotted Standpipe											
				Date	Instrument [A]			Remarks							
					Time	Depth (m)	Level (mOD)								
				6.00	Slotted Standpipe										
				7.00	Bentonite Seal										
				12.00	General Backfill										

Remarks
Lockable cover set in cement



APPENDIX B

In-Situ, Laboratory Test and Groundwater Monitoring Data

Site Analytical Services Ltd.

Site LAND TO THE REAR OF 10-12 BIDWELL GARDENS, LONDON, N11 2AX			Borehole Number BH1
In Situ Permeability Type Falling Head	Test No. 1	Ground Level (mOD)	Client ELENA CRISTOU
	Location TQ295910	Dates 27/08/2020	Engineer HALSTEAD ASSOCIATES
			Job Number 2032436
			Sheet 1/1

Height of Standpipe above ground level:	0.00 m
Depth to Base of Filter:	6.02 m bgl
Depth to Top of Filter:	1.00 m bgl
Depth to equilibrium water level:	5.99 m btoc
Test Length L:	5.02 m
Diameter of Test Length D:	0.05 m
Area of Test Section:	0.0020 m ²
Intake Factor F: (after BS 5930, figure 7)	6.8083

PERMEABILITY (after Hvorslev, 1951)

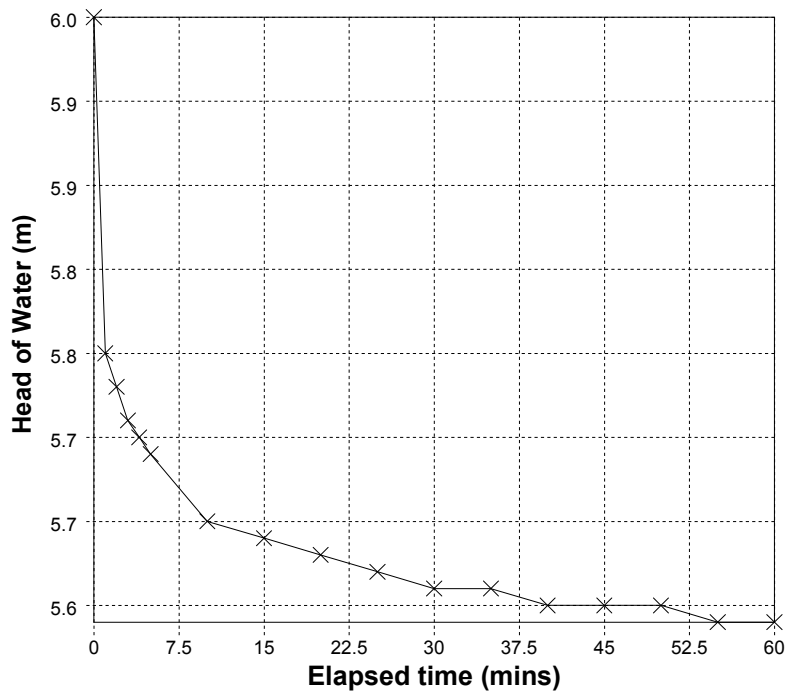
General Approach

H1 selected at t= 5.74 mins (=t1 = 154.8 secs)

H2 selected at t= 5.627 mins (=t2 = 3594 secs)

k = 1.67E-09 ms⁻¹

Elapsed time (mins)	Depth to water (m btoc)	Head of Water, H (m)	Ht / Ho
0.0	0.000	5.990	1.000
1.0	0.200	5.790	0.967
2.0	0.220	5.770	0.963
3.0	0.240	5.750	0.960
4.0	0.250	5.740	0.958
5.0	0.260	5.730	0.957
10.0	0.300	5.690	0.950
15.0	0.310	5.680	0.948
20.0	0.320	5.670	0.947
25.0	0.330	5.660	0.945
30.0	0.340	5.650	0.943
35.0	0.340	5.650	0.943
40.0	0.350	5.640	0.942
45.0	0.350	5.640	0.942
50.0	0.350	5.640	0.942
55.0	0.360	5.630	0.940
60.0	0.360	5.630	0.940



Remarks

Key: bgl = Below Ground Level btoc = Below Top of Casing

UNDRAINED TRIAXIAL COMPRESSION TEST

BH/TP No.	Moisture Content (%)	Bulk Density (Mg/m ³)	Lateral Pressure (kN/m ²)	Compressive Strength (kN/m ²)	Cohesion (kN/m ²)	Angle of Shearing Resistance (degrees)	Depth (m)
BH1	29	1.95	50	191	95		2.25
	29	1.97	80	285	142		4.25
	27	1.98	130	331	165		6.75
	27	2.01	190	337	169		9.75

Table 1

PLASTICITY INDEX & MOISTURE CONTENT DETERMINATIONS

BH/TP No.	Depth (m)	Natural Moisture (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 µm (%)	Modified Plasticity Index (%)	Class
BH1	1.00	26	74	23	51	100	51	CV
	1.85	26	71	22	49	100	49	CV
	3.75	25	69	22	47	100	47	CH

Table 2

GROUNDWATER MONITORING

GROUNDWATER MONITORING RECORD			
Date	Weather Conditions	Ground Conditions	Temperature (°C)
15/09/2020	Sunny	Dry	20.0
Monitoring Point Location	Monitoring Point Location		Monitoring Point Location
BH1	Dry		6.02

Table 3

GROUNDWATER MONITORING RECORD			
Date	Weather Conditions	Ground Conditions	Temperature (°C)
24/09/2020	Sunny with clouds	Dry	14.4
Monitoring Point Location	Depth to water (mBGL)		Depth to Base of well (mBGL)
BH1	5.99		6.02

Table 3a



Aubrey Davidson
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Analytical Report Number : 20-28468

Project / Site name:	10-12 Bidwell Gardens, London N11 2AX	Samples received on:	04/09/2020
Your job number:	20-32436	Sample instructed/ Analysis started on:	04/09/2020
Your order number:	7516	Analysis completed by:	14/09/2020
Report Issue Number:	1	Report issued on:	14/09/2020
Samples Analysed:	3 soil samples		

Signed:

Joanna Wawrzeczko
Technical Reviewer (Reporting Team)

For & on behalf of i2 Analytical Ltd.

Other office located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland

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

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

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

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

Analytical Report Number: 20-28468

Project / Site name: 10-12 Bidwell Gardens, London N11 2AX

Your Order No: 7516

Lab Sample Number				1612496	1612497	1612498		
Sample Reference				BH1	BH1	BH1		
Sample Number				7	11	14		
Depth (m)				2.75	5.00	8.00		
Date Sampled				27/08/2020	27/08/2020	27/08/2020		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)								
	Units	Limit of detection	Accreditation Status					
Moisture Content	%	N/A	NONE	19	18	16		
Total mass of sample received	kg	0.001	NONE	1.2	0.80	0.70		
Whole Sample Crushed				N/A	NONE	Crushed	Crushed	Crushed

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.9	7.9	7.8		
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.17	1.8	4.2		



Analytical Report Number : 20-28468

Project / Site name: 10-12 Bidwell Gardens, London N11 2AX

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1612496	BH1	7	2.75	Brown clay.
1612497	BH1	11	5.00	Brown clay.
1612498	BH1	14	8.00	Brown clay.

Analytical Report Number : 20-28468

Project / Site name: 10-12 Bidwell Gardens, London N11 2AX

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Crush Whole Sample	Either: Client specific preparation instructions - sample(s) crushed whole prior to analysis; OR Sample unsuitable for standard preparation and therefore crushed whole prior to analysis.	In house method, applicable to dry samples only.	L019-UK	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS

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

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

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