A2 Site Investigation

50 Maresfield Gardens

Interpretive Report

March 2023

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Appendices

1. Introduction

A2 Site Investigation Limited (A2SI) has been instructed by Webb Yates Engineers Limited (Webb Yates) to prepare an Interpretive Report (IR) for the proposed development at 50 Maresfield Gardens, London, NW5 3RX.

1.1. Study Aims and Objectives

The scope of this report comprises the following elements:

- Technical assessment and interpretation of ground investigation data carried out for geotechnical design parameters.
- Outline assessment of shallow and deep foundations (ULS and SLS performance, and groundwater considerations, including uplift and heave mitigation).
- Earth retention system topology assessment.
- General buildability and earthworks considerations.
- Geo-environmental assessment (generic quantitative risk assessment – GQRA) based on the ground investigation results, proposed development plans presented herein and A2SI, *Phase I Desk Study Report* (ref: 26822-A2SI-XX-XX-RP-Y-0001-00), dated January 2023.

The GQRA has been undertaken in general accordance with *Land Contamination Risk Management* (LCRM) guidance, published by the Environmental Agency of the UK Government website, and in the context of *National Planning Policy Framework* (NPPF) requirements and *The Building Regulations 2010, Approved Document C - Site preparation and resistance to contaminants and moisture (2004 Edition incorporating 2010 and 2013 amendments)*. The assessments have been undertaken specifically for the proposed development to assess whether there are any unacceptable risks which require either further assessment or remediation.

The recent ground investigation and reporting has been undertaken in general accordance with *BS10175:2011 Investigation of Potentially Contaminated Sites – Code of Practice*.

1.2. Information Sources

- *Phase I Desk Study* prepared by A2SI, dated January 2023 (ref. 26822-A2SI-XX-XX-RP-Y-0001-00).
- *Factual Report* prepared by A2SI, dated February 2023 (ref. 26822-A2SI-XX-XX-RP-X-0002-00).
- *Basement Feasibility Report* prepared by Webb Yates, dated September 2022 (ref. J5106-S-RP-0001).
- Basement construction drawings prepared by Webb Yates.
- British Geological Survey (BGS) (available at https://www.bgs.ac.uk/).

2. The Site and Proposed Development

2.1. Development Site and Current Use

The development site is located at 50 Maresfield Gardens, London, NW3 5RX, as shown in Figure 2.1. The approximate National Grid reference for the site is TQ 26471 85059 and the site footprint covers approximately 0.1 hectares. The approximate ground surface elevation at the site is 80m above Ordnance Datum and ground surface levels in the surrounding area rise towards the north. The development site falls within the administrative boundaries of the London Borough of Camden and currently includes a three-storey masonry residential building, with a garden to the rear of the property.

Approximate site boundary marked by **red** line.

Figure 2.1 Location of the proposed development

2.2. Proposed Development

The proposed development comprises the refurbishment of some internal floors, and extension of a single-storey basement which generally aligns with the footprint of the superstructure. The basement will be formed by cutting down existing piles, underpinning the external walls, and will be supported by pile foundations.

2.3. Potential Land Contamination

A Preliminary Risk Assessment (PRA) has already been undertaken for the proposed development (see *Phase I Desk Study*, ref: 26822-A2SI-XX-XX-RP-Y-0001-00). The PRA identifies unacceptable risks so further assessment via GQRA is presented herein.

3. Geological Setting

3.1. Regional Geological Overview

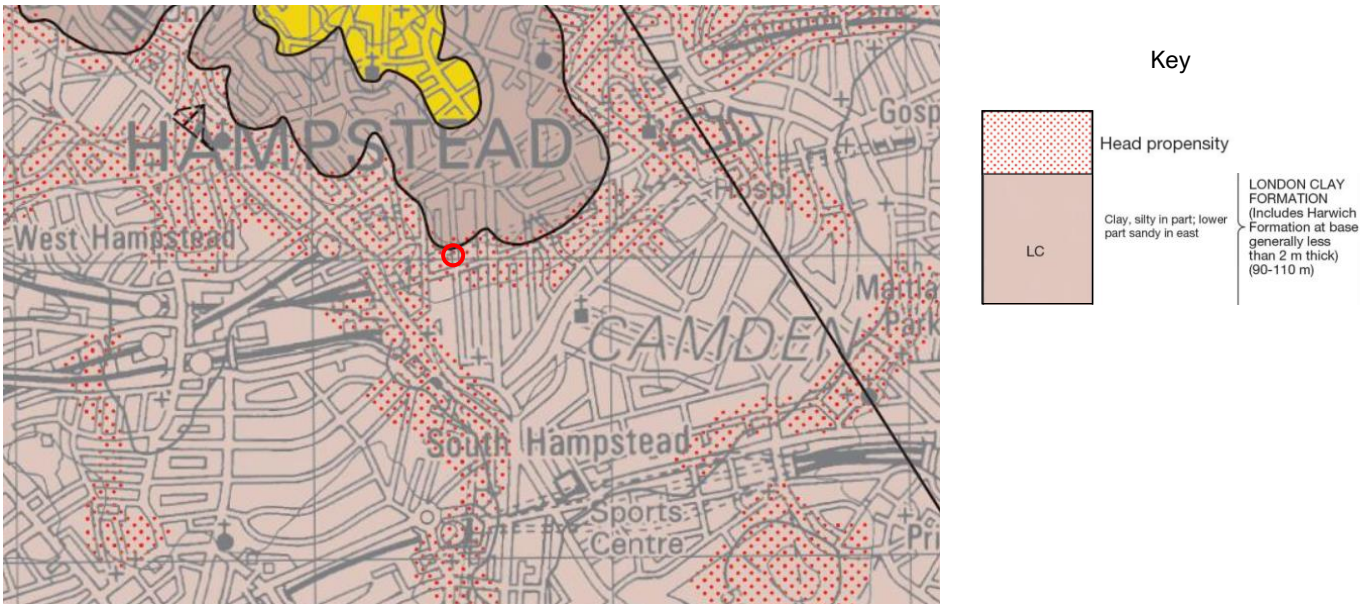
The development site is located within the London Basin, which refers to an approximately triangular synclinal structure in which the sedimentary units underlying London and much of southeast England were deposited. The London Basin is comprised of the following formations, in order of decreasing depth:

- A deep (~200m thick) layer of Chalk, deposited throughout the Upper Cretaceous period, forms the base of the basin and is the principal aquifer of the region.
- The Thanet Beds, which comprise fine, silty glauconitic sands originating in shallow seas.
- The Lambeth Group, a depositionally and geographically complex unit which comprises layers of sands and gravels, shelly and mottled clays, minor limestones and lignites, and occasional sandstone and conglomerate.
- The London Clay Formation, a fine-grained silty clay which is the dominant Thames Group Deposit.
- River Terrace Gravels, deposited by the River Thames and its tributaries on top of the London Clay.

3.2. Site Geology and Anticipated Ground Conditions

Figure 3.1 illustrates the location of the development within the context of a regional geological map. The map illustrates the spatial distribution of superficial (drift) deposits and bedrock outcrops at the ground surface. Made Ground is generally not shown but is assumed to be present on site due to historical demolition and construction works.

The geology map indicates that the site is underlain by Head Propensity over the London Clay Formation.



Approximate location of the site marked by **red** circle.

Figure 3.1 Geological context of the site

4. Geotechnical and Geo-environmental Ground Investigation

4.1. Overview

A site-specific ground investigation was undertaken between 16th – 22nd December 2022 and on 13th January 2023 by A2SI. Details of the ground investigation findings are presented in the *Factual Report* (as referenced in Section 1), which is included as Appendix A. The second phase of investigation in January 2023 was in response to an initial finding of localised vapour impact during the first phase which warranted further targeted investigation.

The primary purpose of the ground investigation works was to inform the management and mitigation of geo-environmental and geotechnical risk associated with the proposed redevelopment of the site, and to achieve the objectives outlined in Section 1.1. The aims of the ground investigation were thus to:

- To obtain a geotechnical profile of the site and identify any contamination and hydrology characteristics to assist in the design of proposed development.
- To collect geo-environmental data to inform GQRA.
- To enable the assessments of the ground conditions for preliminary and detailed foundation design of the proposed development.

The scope of on-site investigation is summarised as follows:

- 1no. cable percussive borehole to 20m (extended to 30m) (BH01) to facilitate parallel seismic testing.
- 2no. cable percussive boreholes to 10m and 20m (BH02 and BH03 respectively) to facilitate sampling and in-situ testing.
- 1no. machine and hand excavated trench to determine the location and geometry of pile foundations, and pile reinforcement using ferro-scanning. The trench was reorganized into 6no. individual trial pits.
- 2no. hand excavated trial pits to determine ground floor beam dimensions.
- 7no. dynamic window samples (WS01-07) to facilitate geo-environmental sampling.
- Installation of 8no. standpipes within BH03 and WS01-07 to facilitate groundwater and ground gas monitoring.
- In-situ and laboratory geotechnical testing.
- In-situ and laboratory geo-environmental testing.
- 7no. return visits for ground water and ground gas monitoring.

An exploratory hole plan is presented in Figure 4.1.

Location ID	Northing	Easting	mOD
BH01	185140.0	526456.0	80.86
BH02	185145.0	526479.0	80.87
BH03	185150.0	526484.0	80.99
TP01 (North)	185150.0	526479.0	80.85
TP01 (FW)	185148.0	526479.0	80.85
TP01 (South)	185147.0	526479.0	80.87
TP02 (North)	185145.0	526479.0	80.87
TP02 (South)	185143.0	526479.0	80.86
TP03	185140.0	526457.0	80.86
WS01	185141.0	526453.0	80.80
WS02	185144.0	526486.0	80.85
WS03	185134.0	526458.0	80.80
WS04	185065.0	526461.0	80.80
WS05	185063.0	526461.0	80.70
WS06	185060.0	526461.0	80.70
WS07	185054.0	526460.0	80.70

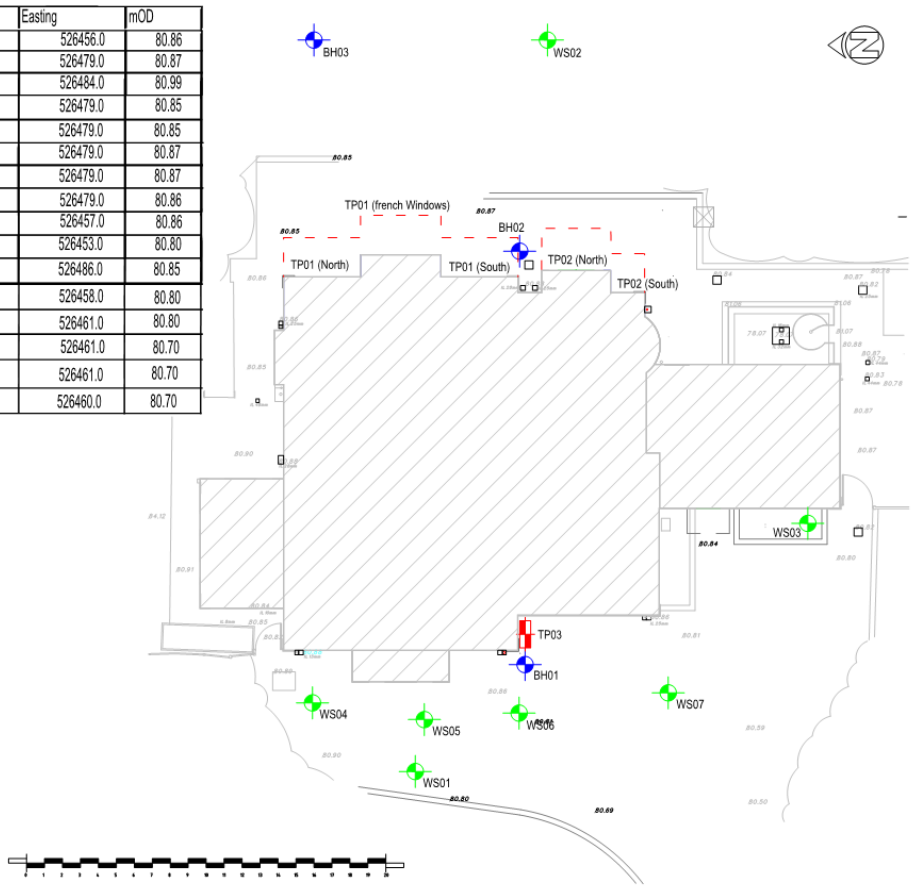


Figure 4.1 Exploratory location plan

4.2. Monitoring

The standpipes installed for groundwater and ground gas monitoring purposes are detailed in Table 4.1. A total of 7no. return monitoring visits were undertaken on 04/01/2023, 19/01/2023, 31/01/2023, 06/02/2023, 09/02/2023, 13/02/2023, 17/02/2023. The return visits included ground gas monitoring of each accessible location using a calibrated Gas Data GFM436 hand-held gas analyser and a calibrated MiniRae Lite ATEX photoionisation detector (PID). Groundwater monitoring included water level monitoring using a calibrated Geotech oil-water interface probe. The data collected included the following:

- Groundwater level gauging.
- Ground gas recordings which included oxygen (O_2), carbon dioxide (CO_2), methane (CH_4), hydrogen sulphide (H_2S), carbon monoxide (CO), VOCs, flow rates and atmospheric pressure.

One round of groundwater sampling was also undertaken on 30/01/2023. Groundwater sampling was undertaken using low-flow methods in accordance with the latest version of *BS5667-11*. The water was passed through a YSI probe to determine in-situ groundwater parameters and to identify when parameters had stabilised so sampling could take place.

Two rounds of vapour sampling were undertaken at WS01 and WS05 on the 30/01/2023 and 06/02/2023. However, the vapour sample collected from WS01 was damaged during transit so a second sample was collected from this location on the 17/02/2023. Sampling was completed using a summa canister which has negative pressure that is connected to a regulator and onto the gas tap. The tap was opened first followed by the canister to extract the gas within the installation.

Table 4.1 Standpipe installation summary

Location	Installation Diameter (mm)	Type of Installation	Level to Top of Response Zone (mbgl)	Level to Bottom of Response Zone (mbgl)	Screened Stratum
BH03	50	SP/G	2.00	5.00	Claygate Member
WS01	50	SP/G	0.50	2.00	Made Ground / Claygate Member
WS02	50	SP/G	3.00	6.00	Claygate Member
WS03	50	SP/G	4.00	6.00	Claygate Member
WS04	50	SP/G	0.50	3.50	Made Ground / Claygate Member
WS05	50	SP/G	0.50	4.50	Made Ground / Claygate Member
WS06	50	SP/G	1.00	5.00	Made Ground / Claygate Member
WS07	50	SP/G	1.00	5.00	Made Ground / Claygate Member

SP/G – Standpipe with gas monitoring valve and protective flush cover fitted.

4.3. Testing

4.3.1. Geotechnical Testing

4.3.1.1. In-situ Testing

- 24no. Standard Penetration Tests (SPTs).

4.3.1.2. Laboratory Testing

- 2no. moisture content test.
- 2no. Atterberg limit 4 point method.
- 6no. Triaxial – 100mm single stage.
- 3 no. BRE suite D.

4.3.2. Geoenvironmental Testing

4.3.2.1. Soils

- 4no. Soil Organic Matter (SOM).
- 4no. Total Organic Carbon (TOC).
- 4no. Fraction Organic Carbon (FOC).
- 4no. pH.
- 11no. Total Petroleum Hydrocarbon Criteria Working Group (TPHCWG).
- 11no. Benzene, toluene, ethylbenzene, xylenes (BTEX) and methyl tert-butyl ether (MTBE).
- 5no. Speciated Polyaromatic Hydrocarbons (PAHs) (EPA16).
- 4no. Asbestos ID (with quantification if asbestos identified).
- 4no. Heavy metals and metalloids suite.
- 8no. Speciated Volatile Organic Compounds (VOCs) suites.

- 8no. Speciated Semi Volatile Organic Compounds (SVOCs) suites.

4.3.2.2. Waters

- 4no. TPHCWG including BTEX and MTBE.
- 4no. Speciated VOCs suites.
- 2no. Speciated SVOCs suites.

4.3.2.3. Vapours

- 4no. TPH suite
- 4no. VOC suite
- 4no. SVOC suite

5. Ground Conditions

5.1. Ground Model

A summary of the ground conditions encountered during the intrusive investigation is presented in Table 5.1.

Table 5.1 Summary of the encountered geological profile

Stratum	Minimum Depth (mbgl)	Maximum Depth (mbgl)	Maximum Thickness (m)	Description
Made Ground	0.0	2.5	2.5	Soft dark brown gravelly slightly sandy silty CLAY with occasional rootlets. Low cobble content of sub-rounded flint approximately 80x20mm. Gravel is sub-rounded fine to coarse flint and rare plastic.
Claygate Member	0.9	9.0	7.9	Soft yellowish brown mottled grey slightly sandy silty CLAY with occasional organic matter and rootlets surrounded by grey staining. Occasional pockets of brownish yellow fine sand approximately 2x10mm.
London Clay	4.5	30.5	26.0	Firm to stiff, slightly micaceous dark grey slightly sandy silty CLAY. Sand is fine.

5.2. Geotechnical Parameters

The characteristic geotechnical parameters derived for the main geological unites are shown in Table 5.2. Upon visual inspection of the SPT plot, the Claygate Member and London Clay are geotechnically similar, and so the strata have been treated as a homogenous layer for design purposes.

Table 5.2 Geotechnical parameters adopted for design

Stratum	Top of strata (mOD)	γ_b (kN/m^3)[2]	φ'_{cv} (°)	c' (kPa)	c_u (kPa)	E' (MPa)	E_u (MPa)	ν	K_0[11]
Made Ground	+80.9	18	30	0	-	10.0	-	$\nu' = 0.2$	0.5
London Clay	+79.7	19	24	-	18.0 + 5.1z	7.2 + 2.1z	9.0 + 2.6z	$\nu' = 0.2$ $\nu_u = 0.5$	1.2

γ_b: bulk unit weight φ'_{cv}: effective critical state angle of shearing resistance c': effective cohesion c_u: undrained shear strength E': drained Young's Modulus E_u: undrained Young's Modulus ν: Poisson's Ratio K_0: in-situ lateral earth pressure coefficient

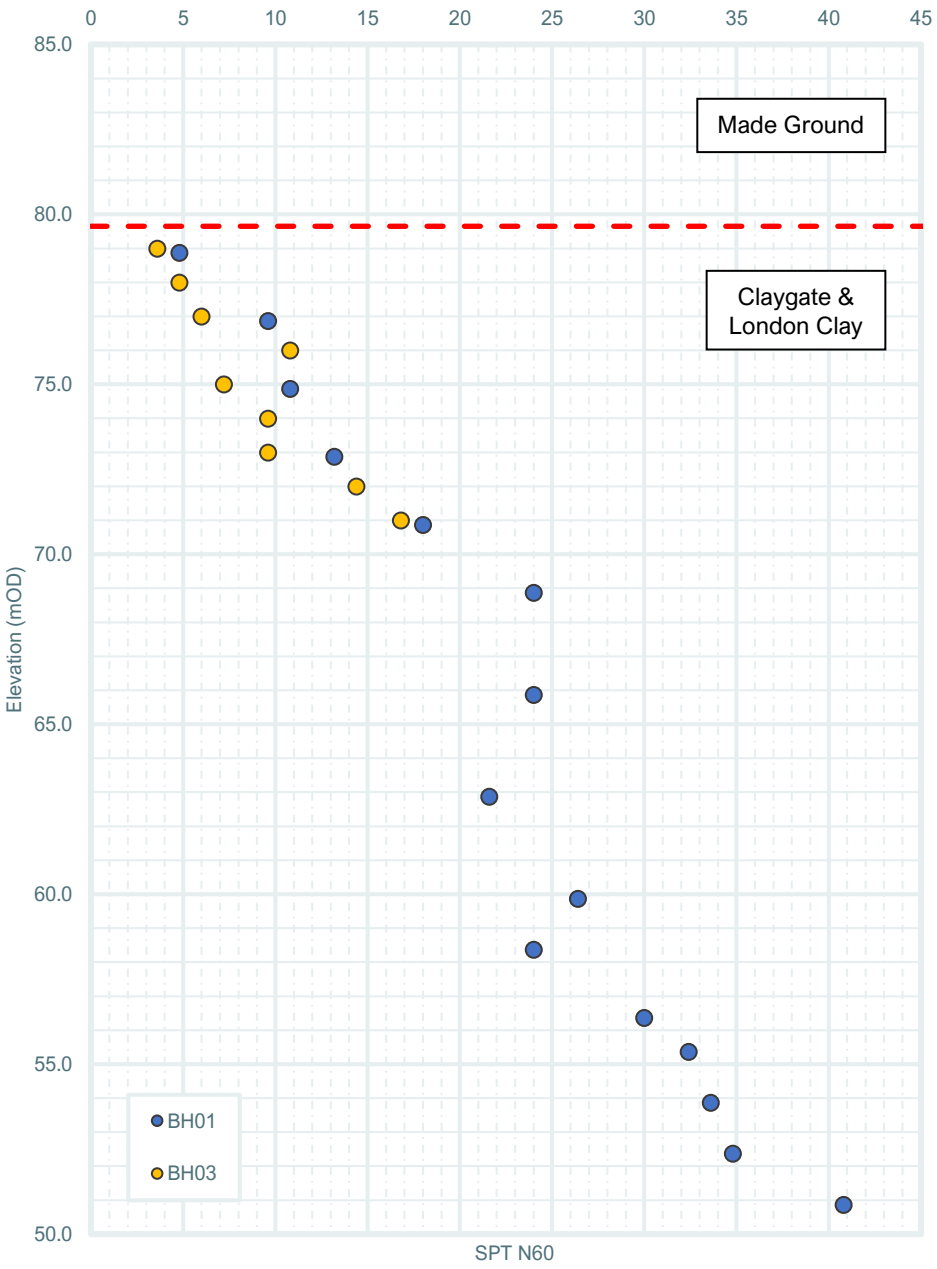


Figure 5.1 SPT N_{60} results

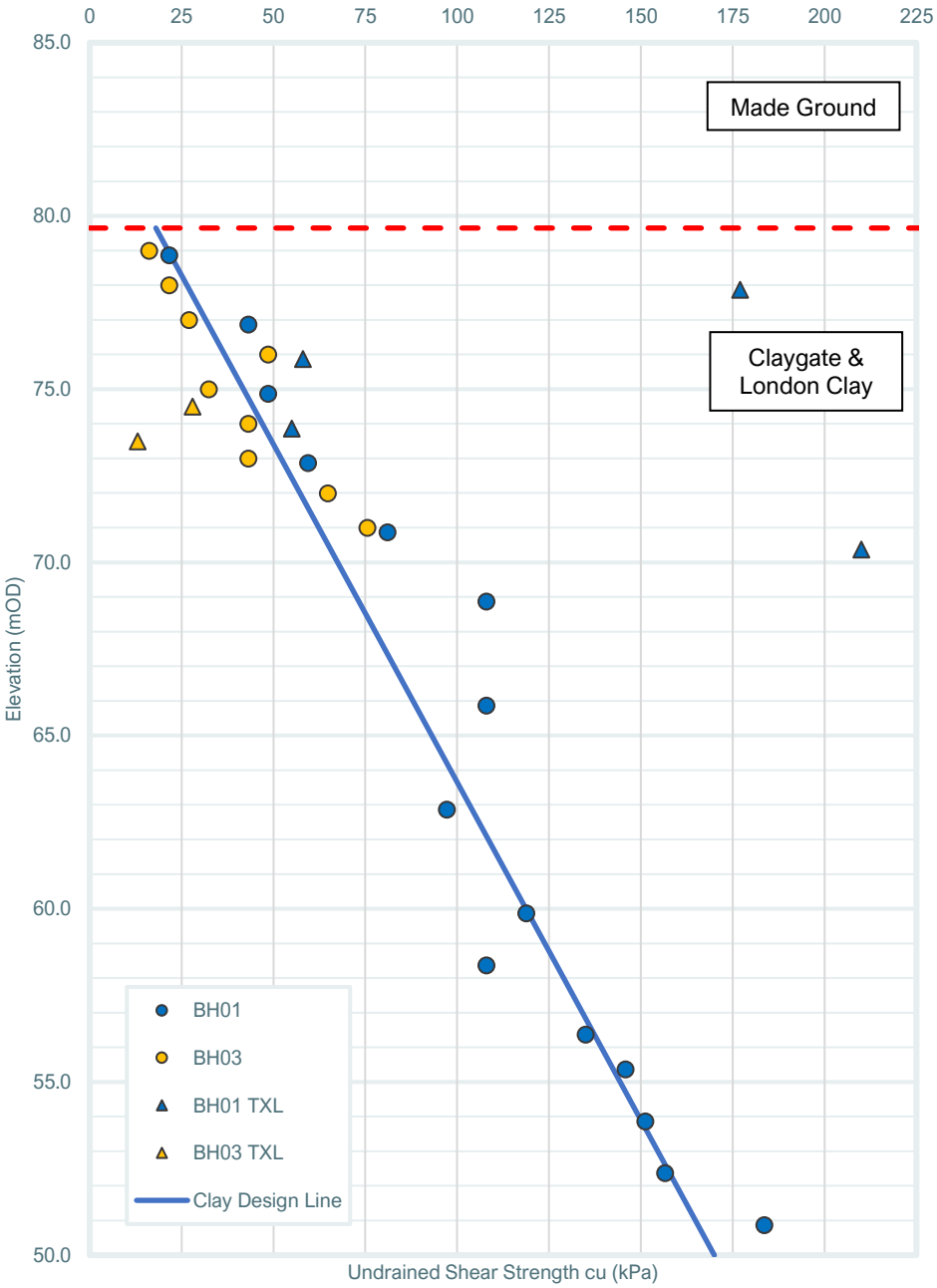


Figure 5.2 Undrained shear strength, c_u (kPa)

5.3. Groundwater

Groundwater level gauging at the monitoring wells has been carried out on 7no. occasions between 04/01/2023 and 17/02/2023. Groundwater was encountered within the Made Ground and sandy pockets of the Claygate Member, perched above the low permeability London Clay Formation. The groundwater monitoring results are presented in Table 5.3.

Table 5.3 Groundwater level monitoring results

Exploratory Hole Reference	Depth of Monitoring Well (mbgl)	04/01/2023 (mbgl)	19/01/2023 (mbgl)	31/01/2023 (mbgl)	06/02/2023 (mbgl)	09/02/2023 (mbgl)	13/02/2023 (mbgl)	17/02/2023 (mbgl)	Notes
BH03	4.93	2.05	1.69	1.72	1.26	1.28	1.30	1.31	No free phase product detected
WS01	1.83	Dry	Dry	Dry	Dry	Dry	Dry	Dry	No free phase product detected
WS02	4.90	1.38	1.26	1.28	2.40	2.42	2.44	2.45	No free phase product detected
WS03	5.71	3.43	3.20	3.22	3.66	3.67	3.69	3.71	No free phase product detected
WS04	3.60	N/A	3.40	3.43	3.50	3.52	3.55	3.56	No free phase product detected
WS05	4.34	N/A	3.51	3.53	3.63	3.64	3.66	3.66	No free phase product detected
WS06	4.44	N/A	3.53	3.55	3.68	3.69	3.72	3.73	No free phase product detected
WS07	4.86	N/A	3.58	3.59	3.75	3.76	3.79	3.80	No free phase product detected

5.4. Visual / Olfactory Evidence of Contamination

Visual / olfactory evidence of contamination was recorded in soil during the ground investigation as summarised in Table 5.4.

Table 5.4 Visual / olfactory evidence of contamination summary (soil)

Exploratory Hole	Depth (mbgl)	Stratum	Evidence	Soil Sample Head-space (ppm)	Laboratory testing?
WS01	2.80	Claygate Member	Slight hydrocarbon odour	0.7	Yes

The soil sample head-space readings recorded in Table 5.5 represent the soil head-space results recorded greater than 5ppm during the investigation.

Table 5.5 Soil sample PID head-space readings >5ppm

Exploratory Hole	Depth (mbgl)	Stratum	Soil Sample Head-space (ppm)	Laboratory testing?
WS01	0.10	Made Ground	9.9	No (The elevated PID readings in Made Ground at WS01 have been suitably targeted by submitting the soil samples from 0.80mbgl for chemical laboratory analysis)
WS01	0.80	Made Ground	31.1	Yes
WS01	1.50	Claygate Member	20.1	Yes
WS02	1.00	Made Ground	5.4	Yes

No visual / olfactory evidence of contamination was recorded during the return monitoring visits such as evidence of groundwater contamination or elevated PID readings.

5.5. Existing Piles

The extent dimensions of one pile was investigated during the parallel seismic testing, and the dimeter was determined through trial pitting. The investigation indicated a pile diameter of 300 – 350mm, and a pile length of 19.0m

6. Geotechnical Engineering Design

The following sections provide an overview of potential earth retention and foundation options for the development taking into account the current proposals, site constraints and geological conditions.

6.1. Excavation Works and Retention

6.1.1. Excavated Material

Based on the proposed scheme information provided, Made Ground and Claygate Member will be excavated to form the new basement space. It is anticipated that this stratum will provide materials suitable for reuse on site. Further classification and contamination testing should be considered to accommodate the proposed earthworks strategy.

6.1.2. Groundwater Cut-off

The proposed basement will be situated within the low permeability Claygate Member and so dewatering is not expected to be required to support the excavation works. However, it is recommended that a provision is made for finite sumping or pumping in order to facilitate the removal of any perched water that may be encountered during the works.

The design of the basement walls should consider long-term waterproofing requirements to ensure water resistance in line with BS 8102:2009 and stability/global equilibrium of the substructure elements.

6.1.3. Retaining Wall Design Earth Pressures

Soil structure interaction (SSI) effects should be considered to obtain an accurate estimate of earth pressures for retaining wall design, or to confirm the applicability of empirical correlations contained within Eurocode 7. SSI effects include considerations of wall type and geometry, hydraulic conditions, overall stiffness of the earth retaining system and anticipated lateral movements.

6.2. Heave and Consolidation

The proposed excavation will remove approximately 4.0m of overburden, causing the underlying soil to heave. The Claygate Member and London Clay will generate negative excess pore pressures as it responds to the unloading in the short-term. The excess pore water pressures will dissipate with time, resulting in long-term heave.

A design value of 25kPa is recommended for long-term heave. Note that this value should only be used for structural and geotechnical design, and not for uplift / buoyancy checks.

Generation of consolidation settlements is anticipated within the Claygate and London Clay strata as a result of the increase in loading associated with the proposed structure. These long-term settlements should be considered for the substructure design.

6.3. Uplift

The long-term hydrostatic uplift anticipated to act on the underside of the basement equates to an unfactored pressure of 30kPa.

The global stabilising action acting across the building footprint will need to be in excess of the uplift force from the water table with appropriate partial factors applied in accordance with Eurocode 7. Further checks of the substructure should be carried out as design develops, incorporating more refined load takedowns to assess both global and local uplift conditions.

6.4. Shallow Foundations

6.4.1. Underpins

The proposed scheme comprises the use of underpins founded in the Claygate Member to support the superstructure above. Assuming an embedded depth of 0.5m and an underpin width of 1m, an indicative allowable bearing pressure of 85kPa is recommended for design development. This may result in settlements in the order of 5mm to 10mm.

It should be noted that footing settlement will depend on the plan geometry and depth of the footing, as well as the applied load. Larger footings will settle more than smaller ones when loaded to the same bearing pressure. A more detailed serviceability check should be undertaken as part of the detailed design, considering structural loading applied to the underpins and associated differential settlements.

6.4.2. Ground-Bearing Raft Foundation

The viability of a raft solution is likely to be governed by the differential settlements across the raft. The serviceability performance of a raft system should be assessed as part of detailed design, considering soil-structure interaction mechanisms and the distribution of loading through the proposed development superstructure and substructure.

6.5. Pile Foundations

Pile foundations may also be considered for the proposed development, where shallow foundations do not have sufficient capacity to support increases in loading from new superstructure elements. Pile construction methods that would suit the site include contiguous flight auger (CFA) piling and rotary bored piling techniques (*dry* boring in the Claygate Member and London Clay). As piles will need to be installed within the existing basement, there will be limited available headroom. This should be considered, and a suitable rig used. Early contractor engagement may be beneficial in de-risking this element of the works.

Equivalent compressive safe working loads in general accordance with EC7 and BS 8004:2015 have been provided in Table 6.1 below for piles of varying diameters and lengths without pile testing.

Table 6.1 Equivalent safe working loads (kN) in axial compression (C) and tension (T) for bored piles

Pile Diameter (mm)		300		350		400	
Pile Type		C	T	C	T	C	T
Pile Length (m)	10.0	120	85	145	95	170	110
	15.0	210	150	250	180	290	205
	20.0	325	240	385	280	445	320
	25.0	460	345	545	400	625	460

1. Pile capacities calculated using EC7 NA Design Approach 1 Combination 2 partial factors.
2. Length taken from the top of the pile at the assumed proposed basement formation level (4.0mbgl).
3. Diameters are tool diameters.
4. Permanent/variable load split taken as 70%/30%.
5. Lateral pile loading has not been considered in the provided capacities.
6. Groundwater taken at +76.9mOD.
7. GEO evaluation only. STR verification to be completed in accordance with BS EN 1992.

6.6. Concrete Aggressivity

The Design Sulphate Class for the Claygate Member is DS-1, and the corresponding Aggressive Chemical Environment for Concrete (ACEC) Class is AC-1s for static groundwater.

The Design Sulphate Class for the London Clay is DS-4, and the corresponding Aggressive Chemical Environment for Concrete (ACEC) Class is AC-3s for static groundwater.

6.7. Other Risks / Further Considerations

- **Below ground obstructions**: No significant obstructions were noted in the ground investigation; however, the project team should consider the presence of potential below ground obstructions across the site (natural and anthropogenic).
- **Groundwater ingress:** It is suggested that appropriate provisions for nominal dewatering via sumps and pumps are made with regards to construction means and methods, temporary works and groundwater control. Any requirements for dewatering and the subsequent ground movement should be considered as part of the design proposals.
- **Site logistics and construction means and methods:** Specialist contractor advice should be sought in relation to plant limitations and constraints.
- **Surrounding buildings and third-party assets**: A ground movement assessment, looking at the impact of the proposed construction of the development on surrounding buildings, has been carried out to support the Planning application. Ground movements may also impact buried services/utilities and surrounding roads and infrastructure, and further ground movement assessments may be required for these assets.
- **Shallow foundations:** The design of shallow foundation is governed by serviceability considerations, such as limiting differential settlements between loading positions, to avoid excessive distortions of the superstructure frame and damage to surrounding structures. This is of particular relevance where significant overburden is removed as a result of basement excavation, and this facet should be explored as part of detailed design.
- **Pile foundations:** Where pile foundations are adopted, appropriate construction methods and means should be considered to facilitate piling from within the confined site footprint.
- **Monitoring:** It is suggested that monitoring of the surrounding assets, buildings and infrastructure is undertaken during the progression of the works in conjunction with a project specific Action Plan.
- **Uplift:** Global uplift stability and differential settlements from local buoyancy forces between support positions should be in line with the project specific design criteria. It is noted that the impact of local hydrostatic forces acting between column and support positions and the potential associated hogging of the slab (or raft if implemented) should be assessed as part of the detailed raft design.
- **Retaining walls:** Selection of earth pressures should consider lateral movements and SSI effects mentioned in Section 6.1.3. The impact of SSI effects and prediction of anticipated lateral movements should be reviewed as part of the detailed design of the underpins.
- **Durability/aggressivity:** The DS and ACEC design classes presented in Section 6.6 should be adopted for both proposed concrete substructure elements. The corresponding Design Sulphate Class may be reduced considering limited expected disturbance or exposure to oxygen of the strata over extended periods of time. The reduction in Design Sulphate Class should be confirmed by the Geotechnical Engineer.

7. Generic Quantitative Risk Assessment (GQRA)

7.1. Targeted Potential Sources of Contamination

GQRA should be based on adequate site investigation which appropriately targets potential sources of contamination and / or exposure pathways. The targeting of potential on-site sources of contamination identified in the Phase I Desk Study is summarised in Table 7.1. All identified potential on-site sources of contamination have been targeted.

Table 7.1 Targeting of Potential On-site Sources of Contamination

Potential Source	Targeted Exploratory Locations
Made Ground	BH01-03, TP01-03 and WS01-07

The installed monitoring well network provides coverage for the on-site sources as well as potential contamination migrating onto the site from off-site sources via the saturated or unsaturated zones e.g. contaminated groundwater, ground gas and / or soil vapour. Potential off-site sources of contamination are identified in the Phase I Desk Study.

A summary of the visual / olfactory evidence of contamination identified and the soil sampling undertaken to target the impact is presented in Section 5.4. Visual / olfactory evidence of localised volatile impact has been identified in soil at WS01.

The results of the GQRA have been considered in view of the risk assessment matrix in Appendix B. Where risk classifications (e.g. low risk, low to moderate risk etc.) are stated herein this is in accordance with the risk assessment matrix.

Risks to site workers and the environment during the construction phase of the proposed redevelopment can be appropriately managed by successful implementation of construction phase risk assessments and method statements (RAMS). Therefore, the associated construction phase land contamination risks are not considered further in this document but should be appropriately considered and mitigated by the Principal Contractor in their preparation and implementation of construction phase RAMS and Construction Phase Plan (CPP).

7.2. Soil Assessment

The soil sample laboratory analytical results have been compared to human health generic assessment criteria (GAC) appropriate for assessing risks for the specifically proposed development. The selected human health GAC include the LQM/CIEH ‘Suitable 4 Use Levels’ (S4ULs). The S4ULs are based on Health Criteria Values that represent minimal or tolerable levels of risks to health as described in the Environment Agency's SR2 guidance, ensuring that the resulting assessment criteria are 'suitable for use' under Planning.

For each chemical substance, S4ULs include individual GAC for 6no. generic land-uses (residential with home grown produce, residential without home grown produce, allotments, commercial and 2no. public open space land uses) and a range of Soil Organic Matter (SOM) contents. All toxicological and physical-chemical parameters used in the derivation of the S4ULs are presented and discussed in the source publication.

In some instances, selected human health GAC used in this report have been applied from the DEFRA ‘Category 4 Screening Levels’ (C4SLs), CL:AIRE GAC, Environment Agency (EA) Soil Guideline Values (SGVs) and Atkins AtRisk Soil Screening Values (SSVs). The human health GAC source reference used for each chemical determinant is presented in the GQRA screening tables included as Appendix D. C4SLs have been used preferentially where available.

The proposed development includes residential premises with gardens. Therefore, a human health GAC has been applied to each chemical determinant based on the ‘residential with home grown produce’ generic land-use scenario. In future, should the site

redevelopment plans change from those considered herein then the geo-environmental risk assessments presented in this report will need to be reconsidered.

The human health GAC for mercury assumes the presence of methyl mercury as a conservative assumption based on the fact that there is no evidence of industrial history on the site.

There is no published human health GAC with respect to asbestos or asbestos containing materials (ACMs) in soil. Industry best practice document '*Asbestos in soil and made ground: a guide to understanding and managing risks', CIRIA C733, 2014*, indicates that soils containing asbestos concentrations of 0.001 % w/w may be able to liberate airborne fibre concentrations that exceed contemporary occupational exposure limits for nuisance dust. However, as detailed in other research, including publications such as the *CAR-SOIL Industry Guidance (2016)*, in circumstances where very low concentrations of asbestos are identified in soils, the associated risks are considered low. In this study an initial asbestos human health GAC of 'no asbestos detected above laboratory detection limit' is adopted i.e. mitigation or further assessment is required if asbestos in soil is detected at or above <0.001 % w/w.

The identified exceedances of the selected human health GAC are summarised in Table 7.2 and spatially orientated on Figure 7.1.

Table 7.2 Human Health GAC Exceedances Summary

Exploratory Location	Depth (m bgl)	Stratum	Determinant	Detected Concentration (mg/kg)	Human Health GAC (mg/kg)
BH02	0.50	Made Ground	Lead	292	200
WS05	2.50	Claygate Member	>C10-C12 Aromatic	83.8	74
			>C12-C16 Aromatic	429	140

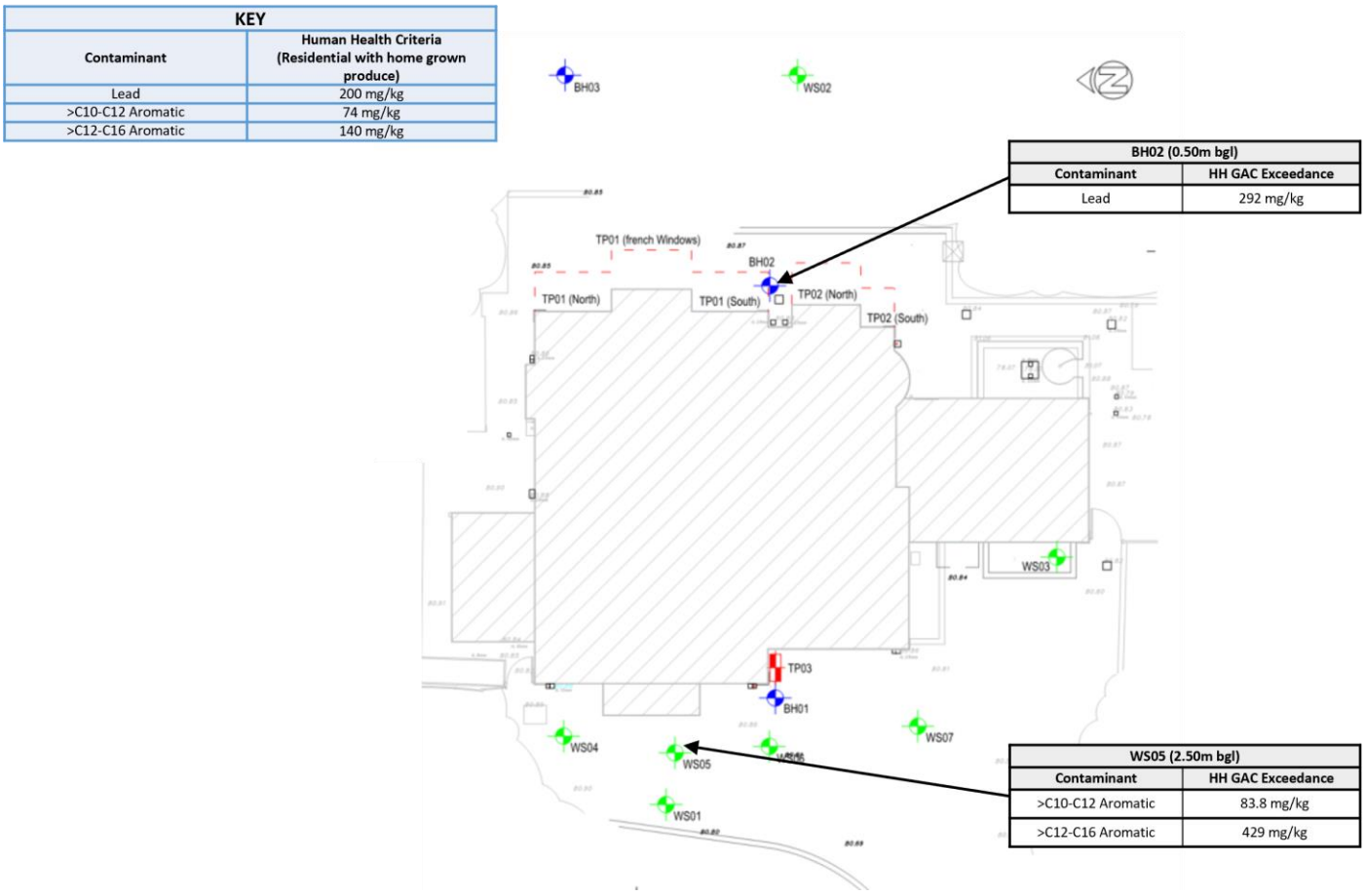


Figure 7.1 Human health GAC exceedances plan

The detected exceedance for lead is most likely representative of the general Made Ground composition beneath the site in the vicinity of BH02. At PRA stage, the same determinant was identified as a potential contaminant within Made Ground.

TPH bands >C10-C12 Aromatic and >C12-C16 Aromatic were found to exceed the selected human health GAC within the Claygate Member at a depth of 2.50m bgl at WS05. However, TPH bands >C10-C12 Aromatic and >C12-C16 Aromatic were found below laboratory detection limits in all other soil samples, including the base of the Made Ground at WS05. WS05 is the closest exploratory location to WS01 where visual / olfactory evidence of contamination was recorded during the ground investigation, so the detected TPH concentrations at WS05 and evidence of contamination at WS01 may be related. There may be some localised hydrocarbon impacts in the vicinity of WS01 and WS05 from past residential use e.g. vehicle(s) leaking. No former industrial uses are known to have occurred at the site.

Areas of proposed hardstanding or building footprint will suitably break the contaminant linkage between the contaminant source and the identified receptors such that no additional mitigation measures are required in these areas. The lead concentration detected in Made Ground at BH02 aligns with proposed hard landscaping patio. Therefore, there is no contaminant linkage here and no additional mitigation is necessary.

At WS05 the depth at which TPHs have been detected by laboratory analysis (within the Claygate Member) indicates a low risk to human health via direct contact, particulate inhalation or ingestion (i.e. no unacceptable risk). This is because the detected concentrations are sufficient depth for site users not to be exposed by these pathways. There is potential for vapours to be released and migrate into the internal areas of the proposed building though, so this exposure pathway is assessed further in Section 7.4.

The soil sample laboratory analytical results have also been screened against GAC appropriate for assessing adverse phytotoxic effects. The source reference for the assessment criteria is *BS3882:2015 Specification for Topsoil.* A summary screening table is

provided as Table 7.3. Since the detected soil pH values range from 8.1-9.6, the assessment criteria have been selected based on the 'criteria for soil with pH >7'.

Table 7.3 Phytotoxicicity Screening Table

Determinant	Minimum Detected Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)	Mean Detected Concentration (mg/kg)	Criteria for soil with pH >7 (mg/kg)
Zinc	63.6	208	118	300
Nickle	12.5	47.9	26.3	110
Copper	15.4	54.4	34.5	200

The results indicate that none of the determinants exceed the assessment criteria. This represents low risk to on-site flora (i.e no unacceptable risk).

The soil chemical laboratory results have been qualitatively assessed for the purposes of understanding risks to controlled waters. The detected chemical concentrations in soil are generally low and indicate that remediation of shallow soils is unlikely to be required to protect controlled waters. Furthermore, the cohesive nature of the Claygate Beds will significantly limit percolation of groundwater through the strata and, therefore, also limit potential migration of chemical species in controlled waters.

7.3. Ground Gas Assessment

A total of 7no. monitoring wells were installed as part of the ground investigation (BH01 and WS01-07). Monitoring well construction details are summarised in Table 4.1. The suitable wells have been used to monitor ground gas from potential on- or off-site sources. The equipment and processes which have been implemented are summarised in Section 4 and in the Factual Report.

The ground gas assessment has been undertaken in general accordance with guidance contained within *CIRIA 665, 'Assessing risks posed by hazardous ground gases to buildings'* and *BS8485:2015+A1:2019 Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings*. The method requires use of both gas concentrations and ground gas well flow rates to calculate a gas screening value (GSV). The GSV is calculated as follows:

$$GSV = \frac{Analyte\ Concentration\ (\%)\ \times Flow\ rate\ (L/hr)}{100}$$

The calculation is carried out for methane (CH_4) and carbon dioxide (CO_2).

7no. rounds of ground gas monitoring have been undertaken. The results of the ground gas monitoring are presented in the Factual Report. Atmospheric pressures ranged from 997 mb to 1036 mb across all monitoring rounds which includes episodes of high and low pressure, atmospheric pressure trends are summaries in Table 7.5. The ground gas monitoring results are summarised in Table 7.4.

Table 7.4 Ground Gas Monitoring Summary Data

Exploratory Hole Reference	Monitoring Round Date	Minimum O_2 (%)	Maximum CO_2 (%l)	Maximum CH_4 (%)	Maximum H_2S (ppm)	Maximum CO (ppm)	Maximum PID (ppm)	Steady-state Flow Rate (l/hr)	Barometric Pressure (mb)
BH03	04/01/2023	12.16	5.00	<0.1	<0.1	<0.1	2.40	<0.1	1004.00
	19/01/2023	15.60	4.70	<0.1	<0.1	<0.1	1.40	<0.1	997.00
	31/01/2023	16.00	4.10	<0.1	<0.1	<0.1	1.50	<0.1	1020.00

Exploratory Hole Reference	Monitoring Round Date	Minimum O_2 (%)	Maximum CO_2 (%l)	Maximum CH_4 (%)	Maximum H_2S (ppm)	Maximum CO (ppm)	Maximum PID (ppm)	Steady-state Flow Rate (l/hr)	Barometric Pressure (mb)
	06/02/2023	14.80	4.90	<0.1	<0.1	<0.1	1.10	<0.1	1031.00
	09/02/2023	16.20	3.90	<0.1	<0.1	<0.1	1.00	<0.1	1034.00
	13/02/2023	19.00	3.50	<0.1	<0.1	<0.1	0.70	<0.1	1036.00
	17/02/2023	18.70	3.30	<0.1	<0.1	<0.1	1.00	<0.1	1013.00
	04/01/2023	18.90	1.60	<0.1	<0.1	<0.1	0.20	<0.1	1004.00
	19/01/2023	19.40	0.40	<0.1	<0.1	<0.1	0.10	<0.1	997.00
	31/01/2023	19.30	0.60	<0.1	<0.1	<0.1	0.10	<0.1	1020.00
WS01	06/02/2023	18.50	0.90	<0.1	<0.1	<0.1	0.10	<0.1	1031.00
	09/02/2023	18.20	0.70	<0.1	<0.1	<0.1	0.10	<0.1	1034.00
	13/02/2023	18.60	0.40	<0.1	<0.1	<0.1	<0.1	<0.1	1036.00
	17/02/2023	18.70	0.50	<0.1	<0.1	<0.1	0.10	<0.1	1013.00
	04/01/2023	16.20	1.80	<0.1	<0.1	<0.1	3.70	<0.1	1004.00
	19/01/2023	20.00	0.10	<0.1	<0.1	<0.1	0.60	<0.1	997.00
	31/01/2023	16.80	1.50	<0.1	<0.1	<0.1	0.80	<0.1	1020.00
WS02	06/02/2023	19.60	0.30	<0.1	<0.1	<0.1	0.30	<0.1	1031.00
	09/02/2023	17.00	0.60	<0.1	<0.1	<0.1	0.50	<0.1	1034.00
	13/02/2023	17.40	0.40	<0.1	<0.1	<0.1	0.60	<0.1	1036.00
	17/02/2023	17.50	0.30	<0.1	<0.1	<0.1	0.40	<0.1	1013.00
	04/01/2023	18.50	1.10	<0.1	<0.1	<0.1	0.20	<0.1	1004.00
	19/01/2023	13.80	3.90	<0.1	<0.1	<0.1	0.20	<0.1	997.00
	31/01/2023	14.80	2.60	<0.1	<0.1	<0.1	0.30	<0.1	1020.00
WS03	06/02/2023	14.60	3.90	<0.1	<0.1	<0.1	0.40	<0.1	1031.00
	09/02/2023	15.00	2.50	<0.1	<0.1	<0.1	0.20	<0.1	1034.00
	13/02/2023	14.80	2.30	<0.1	<0.1	<0.1	0.20	<0.1	1036.00
	17/02/2023	15.10	1.90	<0.1	<0.1	<0.1	0.10	<0.1	1013.00
WS04	04/01/2023	-	-	-	-	-	-	-	-

Exploratory Hole Reference	Monitoring Round Date	Minimum O_2 (%)	Maximum CO_2 (%l)	Maximum CH_4 (%)	Maximum H_2S (ppm)	Maximum CO (ppm)	Maximum PID (ppm)	Steady-state Flow Rate (l/hr)	Barometric Pressure (mb)
	19/01/2023	19.20	1.10	<0.1	<0.1	<0.1	0.20	<0.1	997.00
	31/01/2023	19.30	1.00	<0.1	<0.1	<0.1	0.30	<0.1	1020.00
	06/02/2023	19.10	1.40	<0.1	<0.1	<0.1	0.30	<0.1	1031.00
	09/02/2023	19.30	0.90	<0.1	<0.1	<0.1	0.20	<0.1	1034.00
	13/02/2023	19.30	1.00	<0.1	<0.1	<0.1	0.10	<0.1	1036.00
	17/02/2023	19.60	0.70	<0.1	<0.1	<0.1	0.10	<0.1	1013.00
WS05	04/01/2023	-	-	-	-	-	-	-	-
	19/01/2023	18.60	1.50	<0.1	<0.1	<0.1	0.20	<0.1	997.00
	31/01/2023	18.80	1.10	<0.1	<0.1	<0.1	0.00	<0.1	1020.00
	06/02/2023	17.80	2.40	<0.1	<0.1	<0.1	0.40	<0.1	1031.00
	09/02/2023	18.40	1.50	<0.1	<0.1	<0.1	0.40	<0.1	1034.00
	13/02/2023	18.20	1.60	<0.1	<0.1	<0.1	0.20	<0.1	1036.00
	17/02/2023	18.40	1.30	<0.1	<0.1	<0.1	0.30	<0.1	1013.00
WS06	04/01/2023	-	-	-	-	-	-	-	-
	19/01/2023	18.90	0.80	<0.1	<0.1	<0.1	0.10	<0.1	997.00
	31/01/2023	19.10	0.60	<0.1	<0.1	<0.1	0.20	<0.1	1020.00
	06/02/2023	19.00	1.00	<0.1	<0.1	<0.1	0.10	<0.1	1031.00
	09/02/2023	19.10	0.70	<0.1	<0.1	<0.1	0.10	<0.1	1034.00
	13/02/2023	19.10	0.60	<0.1	<0.1	<0.1	0.10	<0.1	1036.00
	17/02/2023	18.90	0.80	<0.1	<0.1	<0.1	0.20	<0.1	1013.00
WS07	04/01/2023	-	-	-	-	-	-	-	-
	19/01/2023	18.00	1.50	<0.1	<0.1	<0.1	0.10	<0.1	997.00
	31/01/2023	18.50	1.20	<0.1	<0.1	<0.1	0.10	<0.1	1020.00
	06/02/2023	18.40	1.50	<0.1	<0.1	<0.1	0.10	<0.1	1031.00
	09/02/2023	18.60	1.10	<0.1	<0.1	<0.1	0.10	<0.1	1034.00
	13/02/2023	18.90	0.90	<0.1	<0.1	<0.1	0.10	<0.1	1036.00

Exploratory Hole Reference	Monitoring Round Date	Minimum O_2 (%)	Maximum CO_2 (%l)	Maximum CH_4 (%)	Maximum H_2S (ppm)	Maximum CO (ppm)	Maximum PID (ppm)	Steady-state Flow Rate (l/hr)	Barometric Pressure (mb)
	17/02/2023	18.40	1.20	<0.1	<0.1	<0.1	0.10	<0.1	1013.00

Table 7.5 Ground Gas Monitoring Summary Atmospheric Pressure Trends

Monitoring Round Date	Barometric Pressure Trend
04/01/2023	Falling
19/01/2023	Falling
31/01/2023	Falling
06/02/2023	Falling
09/02/2023	Rising
13/02/2023	Rising
17/02/2023	Falling

The atmospheric pressure trends have been determined from on-site pressure readings and can be found within the Appendix C of the A2SI Factual Report (Appendix A).

BS8485 utilises the GSV and categorises the ground gas risk into 6no. different hazard potentials, referred to as Characteristic Situations (CS1 – CS6). These are summarised in Figure 7.2.

CS	Hazard potential	Site characteristic GSV [A)] L/h	Additional factors
CS1	Very low	<0.07	Typically <1% methane concentration and <5% carbon dioxide concentration (otherwise consider an increase to CS2)
CS2	Low	0.07 to <0.7	Typical measured flow rate <70 L/h (otherwise consider an increase to CS3)
CS3	Moderate	0.7 to <3.5	–
CS4	Moderate to high	3.5 to <15	–
CS5	High	15 to <70	–
CS6	Very high	>70	–

[A)] The figures used in this column are empirical.

NOTE The CS is equivalent to the characteristic GSV in CIRIA C665 [6].

Figure 7.2 CS vs. GSV (ref. *BS8485*)

GSV have been calculated to define the gas regime at the site as per *BS8485*. The measured worst-case parameters across all wells have been adopted for the calculation on a conservative basis. The GSV for carbon dioxide and methane have been calculated using the maximum concentrations of carbon dioxide (5.0%) and methane (<0.1%) detected during the return monitoring visits. The maximum detected steady gas flow rate (<0.1 l/hr) has also been used in the calculation. Where parameter values are recorded below

the equipment detection limit then the limit of detection has been assumed for the calculation. The calculated GSV for CO_2 and CH_4 are:

- Carbon dioxide: 0.0049 l/hr
- Methane: 0.00010 l/hr

On the basis of the calculated GSV the site is classified as characteristic situation 1 (CS1) – 'very low risk'.

Therefore, it has been assessed that CS1 is appropriate i.e. no ground gas mitigation required.

7.4. Vapour Assessment

TPH bands >C10-C12 Aromatic and >C12-C16 Aromatic were found to exceed the selected human health GAC within the Claygate Member at a depth of 2.50m bgl at WS05. WS05 is the closest exploratory location to WS01 where visual / olfactory evidence of contamination was recorded during the ground investigation, so the detected TPH concentrations at WS05 and evidence of contamination at WS01 may be related. TPH bands >C10-C12 Aromatic and >C12-C16 Aromatic are volatile so further assessment of the potential pathway into the proposed building has been undertaken, informed by vapour sampling.

The monitoring wells installed at WS01 and WS05 have response zones appropriately targeted at the identified volatile impacts. Vapour samples were collected from WS01 and WS05 on two occasions. The vapour samples underwent laboratory analysis and the results have been screened against criteria derived for assessing vapour risks (the vGAC). The screening exercise is presented in Appendix C and the vGAC derivation is included as Appendix D. The vGAC screening exercise has identified no vapour concentrations exceeding the vGAC, so it is indicated that although volatile contamination is present in soil in the unsaturated zone, the potential for vapours to be released and migrate into the proposed building is low.

The results of the vapour sampling are consistent with soil sample results and head-space data which are elevated but not to a high degree. Furthermore, as summarised in Table 7.4, the PID readings detected in monitoring wells during the return monitoring rounds did not exceed 5 ppm (i.e. relatively low readings).

Groundwater samples were collected from monitoring wells BH03, WS02, WS03 and WS05. Dissolved phase VOC concentrations in groundwater have been tested via laboratory analysis and the results have been screened against assessment criteria presented in SoBRA document '*Development of generic assessment criteria for assessing vapour risks to human health from volatile contaminants in groundwater'* produced in 2017. No contaminant concentrations exceed the residential assessment criteria. A screening table is included as Appendix C.

Taking into consideration the multiple lines of evidence, there is low risk (i.e. no unacceptable risk) to human health and buildings and structures of the proposed development and in the surrounding area due to volatile contamination which may be sourced from the site.

8. Preliminary Waste Assessment

The results of the geo-environmental soil analysis have been considered in view of potential soil waste classification. The waste assessment presented below is preliminary and based on the soil chemical laboratory results only. Any excavation and subsequent disposal of soils from the site should be informed by a full waste assessment for the specific excavation and disposal activities being undertaken in accordance with *Technical Guidance WM3 - Waste Classification: Guidance on the classification and assessment of waste (1st Edition v1.2.GB)*.

The available soil sample analytical results indicate that on-site Made Ground can generally be classified as Non-hazardous waste if excavated and sent for off-site disposal.

At WS05 at 2.50m bgl total TPH is >1,000 mg/kg; so natural soils in the vicinity of WS05 may be Hazardous waste if excavated. The same may be true for some Made Ground in this area of the site.

WAC testing may enable disposal of Non-hazardous Made Ground from the site at a landfill licenced to accept Inert materials.

Please be aware that non-landfill solutions are also potentially available for soils excavated from the site. Should a full waste assessment and appraisal of disposal / recycling / re-use options be required for the construction phase then we can assist once specific details of the required excavation and disposal activities are known. The finalised site cut and fill model would be particularly useful for this exercise.

9. Closing Remarks

A2 Site Investigation Limited was instructed by Webb Yates Engineers Limited to produce an Interpretive Report for the proposed development at 50 Maresfield Gardens, London, NW3 5RX.

The proposed development comprises the refurbishment of some internal floors, and construction of a single-storey basement which generally aligns with the footprint of the superstructure. The proposed basement will be retained by underpinning the existing foundations, with the existing piles cut down to basement formation level.

This report comprises an interpretation of the findings from the recent ground investigation undertaken at the site and provides an assessment of key geotechnical considerations associated with the proposed development. A GQRA has also been undertaken to assess land contamination risks based on the recommendations previously set out within *Phase I Desk Study Report* (ref: 26822-A2SI-00-XX-RP-Y-0001-00), proposed development plans presented herein, and the ground investigation results.

The ground conditions at the site comprise Made Ground overlying Claygate Member and the London Clay Formation. Groundwater was encountered during post-fieldwork monitoring visits within the Made Ground, perched above the underlying clay, and finite volumes within sandy pockets within the Claygate Member.

Trial pitting and parallel seismic testing was undertaken to determine the diameter and length of 1no. pile. It was found that the piles have a diameter of 300 – 350mm, and a length of 19m.

Guidance in relation to the constructability of the development has been provided, alongside key ground engineering risks associated which require project-specific mitigation measures to be developed. Outline considerations and risks associated with other foundation options have also been presented in the context of the scheme. Further recommendations are presented in Section 6.

The geo-environmental assessment has been undertaken in general accordance with *LCRM* guidance. This Interpretive Report presents GQRA for the proposed development in the context of the *NPPF* and *The Building Regulations 2010, Approved Document C - Site preparation and resistance to contaminants and moisture (2004 Edition incorporating 2010 and 2013 amendments)*. The Interpretive Report includes an assessment of whether there are any unacceptable risks (ref. *LCRM* guidance) in relation to the proposed development which need to be further addressed.

Following GQRA, it is considered that there are no unacceptable risks to the proposed development so no remediation is necessary.

Appropriate new water supply pipe construction must be selected in consultation with the utility provider.

The risks to maintenance workers during the operational phase of the proposed development can be managed by preparing a site operational Health & Safety File. This Interpretive Report, along with the Phase I Desk Study, should be made available to those preparing the Health & Safety File.

Risks to site workers and the environment during the construction phase of the proposed redevelopment can be appropriately managed by successful implementation of construction phase RAMS. Therefore, the associated construction phase land contamination risks should be appropriately considered and mitigated by the Principal Contractor in their preparation and implementation of construction phase RAMS and CPP.

Should any changes be made to the proposed development compared to the details presented herein, or should any new information become available, then the assessments included in this Interpretive Report must be updated.

Appendix A: Factual Report

A2 Site Investigation

50 Maresfield Gardens

Factual Report

March 2023

26822-A2SI-XX-XX-RP-X-0002-00

Project Name	50 Maresfield Gardens
Project Number	26822
Client	Chi and June Cheung
Document Name	Factual Report

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Document Reference	Status	Notes	Revision	Issued by	Date
26822-A2SI-XX-XX-RP-X-0002-00	First Issue		00	AB	27.02.2023

Contents

Appendices

1. Introduction

A2 Site Investigation Limited were instructed by Chi and June Cheung to undertake a geotechnical, structural and geo-environmental ground investigation at 50 Maresfield Gardens, London NW3 5RX.

2. Site Location

The site is situated East of Finchley at 50 Maresfield Gardens, London NW3 5RX. The site extent is shown in Figure 2.1. The site is located at National Grid Reference TQ 26475 85093 and falls within the administrative boundaries of the London Borough of Camden. The site is bounded by Maresfield Gardens Road on the west, and by existing residential properties on all other sides. The site is currently a residential property. The remaining area surrounding the site is predominantly residential with commercial properties along Finchley Road approximately 375 m west.

The site is currently used as an unoccupied, cleared residential property.

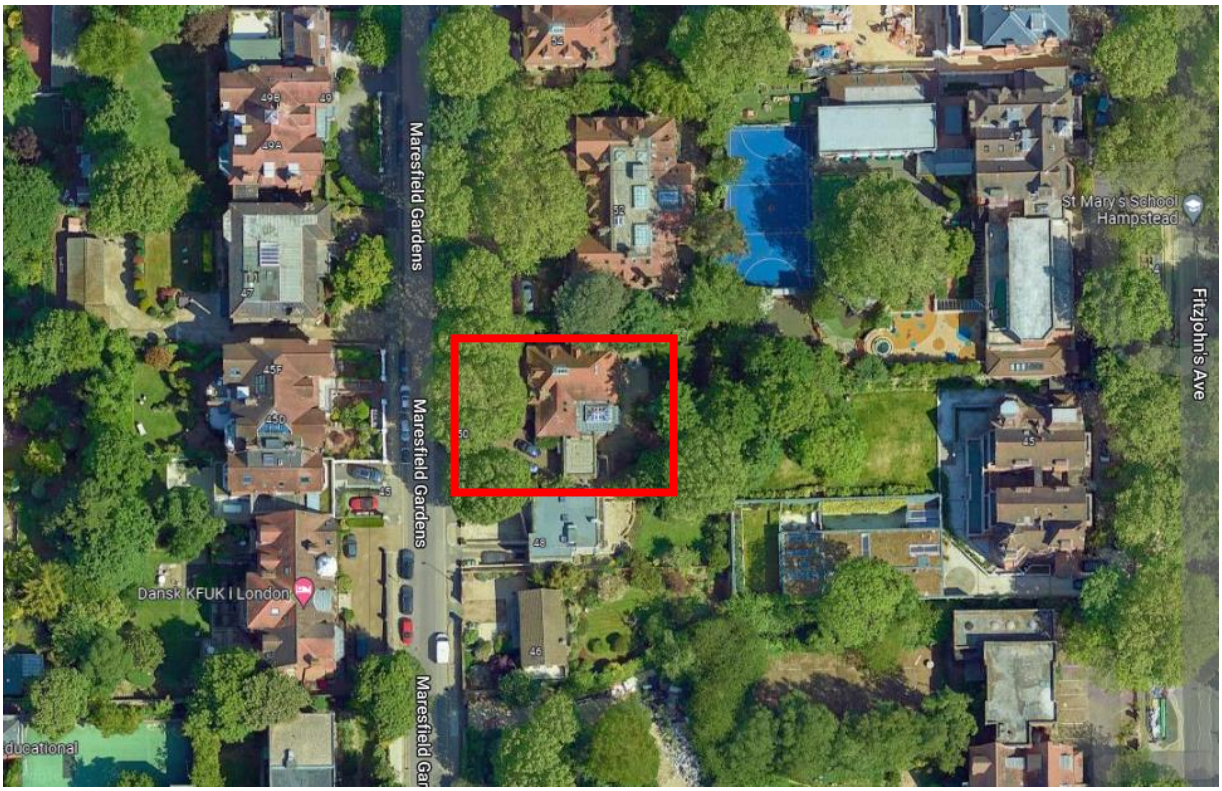


Figure 2.1 Site location and property extent marked in red.

3. Proposed Development

The site is currently occupied by a single three-storey residential house with a small basement with a private brick driveway and garden. The proposed development comprises alterations of the existing structure on site and the extension of s small existing single-storey basement to cover the entire building footprint, which will include a pool and lift pit below basement level.

4. Anticipated Ground Conditions

From a review of available geological maps and memoirs, including the online British Geological Survey “Geology of Britain Viewer”, the following geological sequence was anticipated.

Table 4 Anticipated geological sequence

Unit	Depth[1] (m bgl)	Thickness (m)	Description
Made Ground	0.00	2.00	Soft orange brown slightly sandy slightly gravelly CLAY. Gravel is brick and flint fragments.
Claygate Member	2.00	10.00	Soft orange mottled grey slightly sandy CLAY.
London Clay	12.00	>35.00	Firm brownish grey to dark grey silty fissured CLAY with occasional fine to coarse selenite crystals.

1. Depth refers to top of stratum.
2. Estimated based on BGS mapping of the area.

5. Purpose and Scope of the Investigation

The purpose of the investigation was to recover data on the groundwater and ground conditions at the site relating to geo-environmental and geotechnical risks that may affect the proposed development. Also, to assess the characteristics of the existing foundations across the building.

This investigation initially comprised the drilling of cable percussion boreholes, window samples with soakaway testing and structural trial pits together with sampling and installation of gas/groundwater monitoring wells. However, due to the elevated PID readings of >30ppm noted during the drilling works WS01, an additional phase of ground investigation works was recommended in the form of 4No. window sample boreholes to delineate the extent of the volatile contamination in the vicinity of WS01 and two rounds of vapour sampling and testing . This report covers the initial phase of works and all data relating to the additional window samples.

Phase I – 16th - 22nd December 2022

- 3 no. cable percussion boreholes; 2 no. to 20m bgl and 1 no. to 10m bgl to facilitate sampling and in situ testing for foundation design.
- A machine and hand excavated trench along the eastern boundary of the property up to 1.2m wide to determine the following:
    - Locations of piles.
    - Pile diameters.
    - Pile reinforcement using ferro-scanning.
    - Cover and number of reinforcement bars within the ground floor beam on exposed side and underside. 2 no. at midpoint between piles and 2 no. at point above piles.
- 2 no. hand excavated trial pits to determine ground floor beam dimensions.
- 2 no Infiltration tests within window sample boreholes.
- 3 no dynamic window sampling holes (WS01-WS03) to facilitate geo-environmental sampling and installations for gas and groundwater monitoring.

Several amendments to the initial scope were made during site works and are described below:

- BH01 was extended from 20.00m bgl to 30.00m bgl, after the base of the pile could not be determined using parallel seismic testing at 20.00m bgl.
- The machine excavated trial trench and hand excavated trial pits were reorganised into 6no. individual machine excavated trial pits in order to maintain sufficient space for other concurrent works onsite.

Additional works (Phase II) – 13th January 2023

- 4 no. dynamic window sampler holes (WS04-WS07) to facilitate geo-environmental sampling and installations for gas and groundwater monitoring.
- 2 no. rounds of vapour sampling and vapour testing

6. Limitations of Report

This report has been prepared in accordance with the specification provided by the client. The data reported relates to the specific locations where each exploratory hole was formed and may not represent the ground and groundwater conditions of the site as a whole. Furthermore, it should be considered that groundwater levels may vary throughout the year due to seasonal conditions and other influences such as flooding, leaking mains, storm drainage and foul water systems.

7. Standards

The site investigation, soil descriptions and laboratory testing were undertaken in accordance with following standards

- UK Specification for Ground Investigation 3rd Edition, published by ICE Publishing (2022).
- BGS Geology of Britain Viewer: 2018. www.bgs.ac.uk. British Geological Survey.
- British Standards Institution BS 5930:2015+A1:2020, Code of practice for site investigations.
- British Standards Institution BS 10175:2011+A2:2017, Investigation of potentially contaminated sites – code of practice.
- British Standards Institution BS EN ISO 14688-1:2018, Geotechnical investigation and testing, classification of soil. Identification and description.
- British Standards Institution BS EN ISO 14688-2:2018, Geotechnical investigation and testing. Identification and classification of soil. Principle for a classification.
- British Standards Institution BS EN ISO 22475-1: 2021 : Geotechnical investigation and testing – Sampling methods and groundwater measurements - Part 1 Technical principles for execution.

8. Ground Investigation Summary

8.1. Fieldwork Overview

A site walkover was conducted on 2nd December 2022 and confirmed the anticipated layout of the site.

Following a review of all available service information and site reconnaissance, all locations were scanned using Electromagnetic (CAT & Genny) techniques to check for services within proximity to exploratory hole locations.

A Stage 1 Preliminary Unexploded Ordnance (UXO) Risk Assessment was carried out by Brimstone Site Investigation in accordance with CIRIA C681 Guidelines: 'Unexploded Ordnance, a Guide for the construction Industry' (published in 2009). (report ref: PRA-22-1981 50 Maresfield Gardens, London). Based on the findings of this report no further on site UXO mitigation was required. However, on-site UXO safety briefings and toolbox talks were conducted during the site induction. All works were supervised by a ground engineer.

All works were supervised by a ground engineer.

An exploratory hole location plan is shown in Appendix A.

Photographs of site works can be found in Appendix B.

8.2. Trial Pits

A total of 6 No. hand-excavated trial pits were completed to a maximum depth of 1.60m bgl to determine the extent and Thickness of existing foundation structures and record details of the existing structures.

All trial pits were progressed with a bobcat e10 mini excavator, with specific areas in the trial pits being excavated by hand. A reinforced concrete ground beam was identified in every structural pit with the underside being located at circa 1.35m bgl. The concrete ground beam at TP01 (north) was measured to have a horizontal thickness of 690mm; this was determined using inclined probing. Ferro-scanning was undertaken along the vertical and horizontal faces of the ground beam using a Hilti Multidetector PS50, reinforcement was only detected along the small horizontal section of the beam.

At predetermined points along the building perimeter piles were identified and a pile diameter of 300 – 350mm was approximated using probing techniques. Parallel seismic testing was then completed in BH01 striking the beam TP03, and in BH02 striking the beam at TP01 (south)

Upon the request of WebbYates the surface of the reinforced structural beam within TP01 (south) was broken out in order to visual confirm the presence of reinforcement. 2No. 14 – 16mm Ø reinforcement bars bound together were identified at 120mm below the surface.

Detailed sketches are shown in Appendix B.

8.3. Parallel Seismic Survey

The parallel seismic technique operates by directing an elastic wave through a foundation from the surface and recording its arrival time at different depths below the surface. To perform the test a hydrophone is lowered down through a plastic pipe installed next to a pile in increments of 500mm and 1000mm. At each step, the top of the beam above the pile is struck, and the hydrophone records the resultant signal from the moment of impact. As the hydrophone descends, the signal will resolve itself, and the arrival time will gradually increase linearly with the depth. A constant velocity is expected within a concrete pile; typically, this is faster than the velocity of the surrounding sedimentary deposits.

When the hydrophone reaches the base of the pile, the additional signal path is through soil, not steel or concrete, and the first arrival time (FAT) will increase at a greater rate (i.e. the signal takes longer to arrive). The depth of the foundation is determined by the depth at which the rate of first arrival changes, and analysis of the data allows determination of this inflection point and hence the depth to the toe of the pile.

Parallel seismic (PS) testing was conducted to estimate the depth to the toe at 2No. pile locations. To facilitate the testing 2No. boreholes, BH01 & BH02 were drilled on the western and eastern sides of the property respectively. Each borehole was positioned within 1.00m of the target pile and a sealed HDPE 75mm ID pipe was installed to the base. The pipe was filled with water and the volume surrounding the pipe backfilled with grout, which was introduced to the base of the borehole using a tremie pipe and grout pump.

Testing was carried out on the smooth flat surface of the ground beam directly above the pile with in trial pits adjacent to the borehole. A vibration was induced by striking the ground beam with the hammer whilst the hydrophone was lowered in metre increments for the first test and half-metre increments for the second test.

The test data recovered from site and subsequent interpretation present a good correlation of V1 and V2 response speeds and subsequent intersection point showing pile toe depth.

The first test was conducted on BH02 on 20th December. The test data recovered from site and subsequent interpretation were strong, however there was not a clear difference in the correlated V1 and V2 response speeds. This suggested that the intersection point, which indicates the pile toe depth had yet to be achieved. As a result, the BH01 was extended to 30.00m bgl to ensure the toe of the

pile would be picked up on the second test. The second test yielded more conclusive results with the toe of the pile being identified at circa 19.00m bgl. The results of the parallel seismic test results are presented in summarised in Table 8.3 below, with the full report presented in Appendix F. Geophysical data from the parallel seismic survey at BH01 & BH02 can be found in Appendix F.

Table 8.3 Parallel Seismic Survey

Pile Reference	BH01 (western perimeter)	BH02 (eastern perimeter)
Estimated Intersection (pile toe level (mOD))	61.86	N/A
Estimated Pile length (m)	19 mbgl	No proven

8.4. Modular Cable Percussion Boreholes

Cable percussion boreholes BH01 – BH03 were progressed to a maximum borehole depth of 30.00m using a modular cable percussion rig. Details of individual borehole locations are as follows:

- BH01 was progressed to 30.00m bgl and installed with 75mm plain standpipe and grouted to GL in preparation for parallel seismic testing.
- BH02 was progressed to 20.00m bgl using open hole drilling techniques installed with 75mm plain standpipe and grouted to GL in preparation for parallel seismic testing.
- BH03 was progressed to 10.00m bgl and installed with a combined gas/groundwater monitoring well.

Slow seepage of perched groundwater was encountered within BH01 at 7.5m bgl, at 8.0m bgl in BH02 and 6.9m bgl in BH03.

All soils encountered were logged on site and samples were recovered for geotechnical and geo-environmental laboratory analysis. Detailed exploratory hole logs can be found in Appendix B.

8.5. Dynamic Sampler Boreholes

The dynamic sampler boreholes (WS01 – WS07) were progressed using a tracked Dando Terrier drill rig with sampling to a maximum depth of 6.00 m bgl.

2No. falling head tests were conducted within WS01 and WS02. These were performed at 1.50m bgl and 2.50m bgl, respectively.

All soils encountered were logged on-site and sub-sampled accordingly for geo-environmental laboratory analysis. Geotechnical samples only were collected within cable percussion works.

A standpipe was installed in each borehole to monitor ground gas. Detailed exploratory hole logs can be found in Appendix B. Arisings were photographed and presented in Appendix B.

8.6. Gas and Groundwater Monitoring Installations

Combined gas and groundwater monitoring pipes were installed in 8no. locations, comprising of a 50mm internal diameter HDPE casings and well screen. Details are presented in Table 8.6 below:

Table 8.6 Gas and Groundwater Monitoring Installations

Location Ref	Base of Borehole (m bgl)	Installation Diameter (m bgl)	Type of Installation	Top of Response Zone (m bgl)	Bottom of Response Zone (m bgl)	Strata

WS01	6.00	50	SP/G	0.50	2.00	Made Ground / Claygate Member
WS02	6.00	50	SP/G	3.00	6.00	Claygate Member
WS03	6.00	50	SP/G	4.00	6.00	Claygate Member
BH03	10.00	50	SP/G	2.00	5.00	Claygate Member
WS04	5.00	50	SP/G	0.50	3.50	Made Ground / Claygate Member
WS05	5.00	50	SP/G	0.50	4.50	Made Ground / Claygate Member
WS06	5.00	50	SP/G	1.0	5.0	Reworked Claygate Member / Claygate Member
WS07	5.00	50	SP/G	1.0	5.0	Reworked Claygate Member / Claygate Member

Key

SP – Standpipe

SP/G – Standpipe with Gas Monitoring Valve

8.7. Groundwater

A summary of groundwater conditions encountered within all exploratory hole locations and their positions onsite is presented within the table overleaf.

Table 8.7. Groundwater encountered

Location	Position onsite	Description
WS01 – WS03	Spread across the site	No groundwater encountered.
WS04 -WS07	Linear placement outside front of property	No groundwater encountered.
BH01	Brick driveway along the western boundary of the building onsite	Slow perched groundwater seepage encountered at 7.50 m bgl.
BH02	Patio along the eastern boundary of the building onsite	Slow perched groundwater seepage encountered at 8.00 m bgl.

BH03	Garden to the east of the property.	Slow perched groundwater seepage encountered at 6.90 m bgl.
TP01 – TP02	Spread along the eastern boundary of the building onsite	No groundwater encountered.
TP03	Along the western boundary of the building onsite.	No groundwater encountered.

9. Ground Conditions

9.1. Encountered Geology

The following ground conditions were encountered at the site. The measurements were taken from the top of the existing exploratory holes (m bgl). Details are presented in Table 9.1 below.

Table 9.1 Encountered Ground Conditions

Unit	Minimum Depth (m bgl)	Maximum Depth (m bgl)	Maximum Thickness (m)	Description
Topsoil/Made Ground	0.00	2.00	2.00	Soft dark brown gravelly slightly sandy silty CLAY with occasional rootlets. Low cobble content of sub-rounded flint approximately 80x20 mm. Gravel is sub-rounded fine to coarse flint and rare plastic. (MADE GROUND)
London Clay Formation – Claygate Member	1.00	9.00	7.90	Soft yellowish brown mottled grey slightly sandy silty CLAY with occasional organic matter and rootlets surrounded by grey staining. Occasional pockets of brownish yellow fine sand approximately 2x10 mm.
London Clay Formation	4.50	30.45	25.95	firm to stiff, slightly micaceous dark grey slightly sandy silty CLAY. Sand is fine.

Detailed exploratory hole logs can be found in Appendix B.

10. Laboratory Testing

All laboratory testing was scheduled by A-squared Studio Engineers.

10.1. Geotechnical Testing

Selected soil samples were sent for geotechnical laboratory testing, which was undertaken by GSTL, a United Kingdom Accreditation Service (UKAS) accredited laboratory. ISO17025 and MCERTS accredited methods were specified where applicable and can be seen on the laboratory testing certificate presented in Appendix D. The following type and number of tests scheduled are presented in Table 10.1 below and the results are presented in Appendix D.

Table 10.1 Geotechnical Testing

Test Description	Number of Tests
Atterberg Limit 4 Point Method BS 1377:1990 – Part 2	2
Triaxial - 100mm single stage BS 1377:1990 – Part 7	6
BRE SD1 Suite D	3

10.2. Geo-environmental Testing

Selected soil and groundwater samples were sent for geo-environmental laboratory testing, which was undertaken by The Environmental Laboratory (ELAB), a United Kingdom Accreditation Service (UKAS) accredited laboratory. ISO17025 and MCERTS accredited methods were specified where applicable.

A summary of the scheduled tests are presented in Table 10.2 below. Laboratory testing and results can be found in Appendix E.

Table 10.2 Geo-environmental Testing - Laboratory Analysis – Soils

Test Description	Number of Tests
A2 SI Risk Assessment Soil Testing Suite, including Asbestos ID and quantification	4
VOCs	12
SVOCs	10
TPH CWG	11
PAH 16	1
SC7 vapour suite test	4
+A2 SI Risk Assessment Water Testing Suite, including VOC	

11. Gas and Groundwater Monitoring

Seven monitoring rounds were conducted in total at Maresfield Gardens. With seven sets of results for the boreholes drilled in the first phase of works, and six sets of results of the boreholes drilled in the second phase.

A summary of the groundwater monitoring is provided in Table 11.2 below. The full set of gas and groundwater monitoring results are presented in Appendix C.

11.1. Ground Gas/Vapour

Gas monitoring was undertaken using a calibrated Gas Data GFM436 hand-held gas analyzer and a calibrated MiniRae Lite ATEX Photo Ionisation Detector (PID).

Four vapour samples in total were collected. Samples were taken from the two window sampling holes with the highest PID readings, WS01 and WS05.

Two rounds of vapour sampling were undertaken across WS01 and WS05 on the 30/01/2023 and 06/02/2023. However, the vapour sample collected from WS01 was damaged during transit so a second sample was collected from this location on the 17/02/2023. Gas vapour sampling was completed using a summa canister which has negative pressure that is connected to a regulator and onto the gas tap. The tap was opened first followed by the canister to extract the gas within the installation.

Full results of ground gas monitoring can be found in Appendix C.

11.2. Groundwater

The groundwater levels and any free phase liquids were measured using a calibrated Geotech Oil/Water Interface meter.

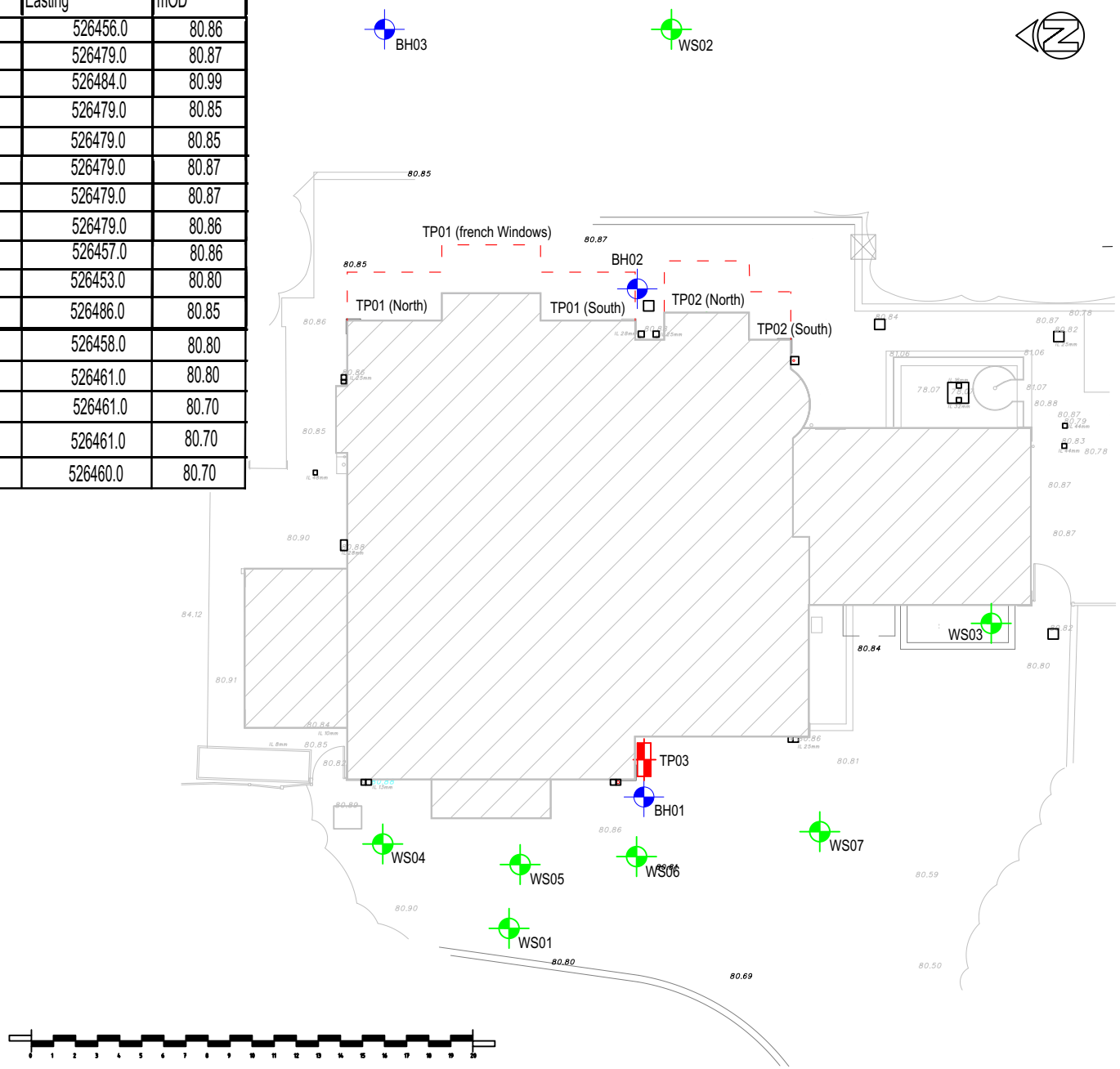
Groundwater levels were recorded in the monitoring wells during the monitoring visits. Seven groundwater monitoring rounds have been completed and are presented in table 11.2. The full set of gas and groundwater monitoring results are presented in Appendix C.

Table 11.2 Groundwater Monitoring Results (m bgl)

Exploratory Hole Reference	Depth of Monitoring Well (m bgl)	Round 1 (04/01/2023) (m bgl)	Round 2 (19/01/2023) (m bgl)	Round 3 (31/01/2023) (m bgl)	Round 4 (06/02/2023) (m bgl)	Round 5 (09/02/2023) (m bgl)	Round 6 (13/02/2023) (m bgl)	Round 7 (17/01/2023) (m bgl)	Notes
BH03	4.93	2.05	1.69	1.72	1.26	1.28	1.30	1.31	No free Phase Product detected
WS01	1.83	Dry	Dry	Dry	Dry	Dry	Dry	Dry	No free Phase Product detected
WS02	4.90	1.38	1.26	1.28	2.40	2.42	2.44	2.45	No free Phase Product detected
WS03	5.71	3.43	3.20	3.22	3.66	3.67	3.69	3.71	No free Phase Product detected
WS04	3.60	N/A	3.40	3.43	3.50	3.52	3.55	3.56	No free Phase Product detected
WS05	4.34	N/A	3.51	3.53	3.63	3.64	3.66	3.66	No free Phase Product detected
WS06	4.44	N/A	3.53	3.55	3.68	3.69	3.72	3.73	No free Phase Product detected
WS07	4.86	N/A	3.58	3.59	3.75	3.76	3.79	3.80	No free Phase Product detected

Appendix A: Exploratory Hole Location Plan

Location ID	Northing	Easting	mOD
BH01	185140.0	526456.0	80.86
BH02	185145.0	526479.0	80.87
BH03	185150.0	526484.0	80.99
TP01 (North)	185150.0	526479.0	80.85
TP01 (FW)	185148.0	526479.0	80.85
TP01 (South)	185147.0	526479.0	80.87
TP02 (North)	185145.0	526479.0	80.87
TP02 (South)	185143.0	526479.0	80.86
TP03	185140.0	526457.0	80.86
WS01	185141.0	526453.0	80.80
WS02	185144.0	526486.0	80.85
WS03	185134.0	526458.0	80.80
WS04	185065.0	526461.0	80.80
WS05	185063.0	526461.0	80.70
WS06	185060.0	526461.0	80.70
WS07	185054.0	526460.0	80.70



Key:

- Borehole
- Trial Pit
- Trial Pit Trench
- Window Sample Borehole

Rev	Date	By	Chkd	Appd
00	23/12/22	JP	AB	DS

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Client
Chi and June Cheung

Project Title
50 Maresfield Gardens

Drawing Title
Exploratory Hole Plan

A2SI Project Number	Rev
26822	00

Drawing Number
26822-A2SI-XX-XX-DR-Y-0001-00

Appendix B: Exploratory Hole Logs, Photographic Record and Trial pit Sketches

A2 Site Investigation

Borehole Log

Project				Borehole No
50 Maresfield Gardens				BH01
Job No	Start / Finish	Ground Level (mOD)	Co-Ordinates	Depth (m)
26822	20-12-22 / 22-12-22	80.86	E 526,456.0 N 185,140.0	30.45m
Client			SPT Energy Ratio	Sheet
Chi and June Cheung			72%	1 of 4

SAMPLES & TESTS			Water	Reduced Level	Legend	Depth (Thickness)	STRATA Description	Instrument/ Backfill
Depth (m)	Type No	Test Result						
				80.77		0.09	Red brick paving. (MADE GROUND)	
				80.66		0.20	Yellowish brown medium builders SAND. (MADE GROUND)	
0.30	ES01							
0.30		VOC 0.2 ppm					Soft, brown gravelly sandy silty CLAY with low cobble content and frequent roots and rootlets (<2mm). Gravel is sub-angular, fine to coarse brick, mortar and occasional concrete and polystyrene. Sand is fine to coarse. Cobbles are angular to subrounded red brick. (MADE GROUND)	
						(1.40)		
1.00	ES02							
1.00		VOC 0 ppm					0.90 - 0.98 ... with concrete encountered at 0.90m bgl, approximately 80 mm thick.	
				79.26		1.60		
							Soft, reddish brown mottled light grey sandy silty CLAY with frequent rootlets and grey gleying along rootlet tracks (<2mm). Sand is fine to medium. (LONDON CLAY FORMATION - CLAYGATE MEMBER)	
2.00-2.45	SPT04							
2.00	SPT (s)	(1, 0, 1, 1, 1, 1) N = 4						
3.00-3.45	UT05	15 blows				(2.90)	3.00 ... becoming orangish brown with occasional pockets of orangish yellow fine sand (20x50mm). Rootlets are no longer present.	
3.50	D06							
			2					
4.00-4.45	SPT07							
4.00	SPT (s)	(1, 1, 1, 2, 2, 3) N = 8						
				76.36		4.50		
							Firm to stiff, dark grey slightly sandy silty slightly micaceous CLAY. Sand is fine. (LONDON CLAY FORMATION)	
5.00-5.45	UT08	20 blows						
5.50	ES03							
5.50	D09							
5.50		VOC 0 ppm						
6.00-6.45	SPT10							
6.00	SPT (s)	(1, 1, 2, 2, 2, 3) N = 9						
7.00-7.45	UT11	25 blows					7.00 ... with white shell fragments (<10mm) and slightly micaceous.	
			▼					
7.50	D12							
8.00-8.45	SPT13							
8.00	SPT (s)	(1, 1, 2, 3, 3, 3) N = 11						

Boring Progress and Water Observations

Date	Hole Depth (m)	Casing Depth	Casing Dia. mm	Water Depth (m)	Remarks
20-12-22	0.00	0.00		Dry	
20-12-22	9.00	1.80			
21-12-22	9.00	1.80		3.80	

Chiselling

From	To	Hours

Water Added

From	To

General Remarks

1. Borehole scanned with CAT & Genny
2. Hand excavated inspection pit to 1.20m bgl
3. Borehole terminated at scheduled depth
4. Slow seepage of perched groundwater at 7.50m bgl, resting at 4.00m bgl overnight.

All dimensions in metres Scale 1:56.25	Contractor	Method/ Plant Used	Logged By	Status
	A2 Site Investigation	Cable Percussion Rig	CM	DRAFT

A2 Site Investigation

Borehole Log

Project				Borehole No
50 Maresfield Gardens				BH01
Job No	Start / Finish	Ground Level (mOD)	Co-Ordinates	Depth (m)
26822	20-12-22 / 22-12-22	80.86	E 526,456.0 N 185,140.0	30.45m
Client			SPT Energy Ratio	Sheet
Chi and June Cheung			72%	2 of 4

SAMPLES & TESTS			Water	Reduced Level	Legend	Depth (Thickness)	STRATA	Instrument/ Backfill
Depth (m)	Type No	Test Result					Description	
9.00 9.00-9.45 9.00-9.50	D14 UT15 B16	22 blows					Firm to stiff, dark grey slightly sandy silty slightly micaceous CLAY. Sand is fine. (LONDON CLAY FORMATION) *(continued)*	
10.00-10.45 10.00	SPT17 SPT (s)	(2, 3, 3, 4, 4, 4) N = 15						
10.50-10.95	UT18	34 blows						
11.00	D19							
12.00-12.45 12.00	SPT20 SPT (s)	(3, 3, 4, 5, 6, 5) N = 20						
13.50-13.95	UT21	35 blows						
14.00	D22						14.00 ... becoming sandy, locally very sandy.	
15.00-15.45 15.00	SPT23 SPT (s)	(2, 4, 4, 5, 5, 6) N = 20					15.00 ... becoming stiff, fissued clay with frequent pockets of dark grey silt and fine sand (<10mm). Fissures are extremely closely spaced.	
16.50-16.95	UT24	45 blows						
17.00	D25					(25.95)		

Boring Progress and Water Observations

Date	Hole Depth (m)	Casing Depth	Casing Dia. mm	Water Depth (m)	Remarks

Chiselling

From	To	Hours

Water Added

From	To

General Remarks

1. Borehole scanned with CAT & Genny
2. Hand excavated inspection pit to 1.20m bgl
3. Borehole terminated at scheduled depth
4. Slow seepage of perched groundwater at 7.50m bgl, resting at 4.00m bgl overnight.

All dimensions in metres Scale 1:56.25	Contractor	Method/ Plant Used	Logged By	Status
	A2 Site Investigation	Cable Percussion Rig	CM	DRAFT

A2 Site Investigation

Borehole Log

Project				Borehole No
50 Maresfield Gardens				BH01
Job No	Start / Finish	Ground Level (mOD)	Co-Ordinates	Depth (m)
26822	20-12-22 / 22-12-22	80.86	E 526,456.0 N 185,140.0	30.45m
Client			SPT Energy Ratio	Sheet
Chi and June Cheung			72%	3 of 4

SAMPLES & TESTS			Water	Reduced Level	Legend	Depth (Thickness)	STRATA	Instrument/ Backfill
Depth (m)	Type No	Test Result					Description	
18.00-18.45 18.00	SPT26 SPT (s)	(3, 3, 4, 4, 5, 5) N = 18					Firm to stiff, dark grey slightly sandy silty slightly micaceous CLAY. Sand is fine. (LONDON CLAY FORMATION) *(continued)*	
							19.00 ... with no pockets of sand, silt and no shell fragments below 19.00m	
19.50-19.95	UT27	81 blows						
20.00	D28							
21.00-21.45 21.00	SPT29 SPT (s)	(4, 5, 5, 5, 6, 6) N = 22						
							22.00 ... becoming no longer micaceous	
22.50-22.95 22.50	SPT30 SPT (s)	(3, 5, 5, 4, 6, 5) N = 20						
24.00-24.45	SPT31							
24.45	SPT (s)	(2, 4, 6, 5, 7, 7) N = 25						
							25.00 ... with occasional bioturbation of pale grey silty clay.	
25.50-25.95 25.50	SPT32 SPT (s)	(3, 5, 6, 6, 7, 8) N = 27						

Boring Progress and Water Observations

Date	Hole Depth (m)	Casing Depth	Casing Dia. mm	Water Depth (m)	Remarks
21-12-22	24.00	9.20			
22-12-22	24.00	9.20		25.30	

Chiselling

From	To	Hours

Water Added

From	To

General Remarks

1. Borehole scanned with CAT & Genny
2. Hand excavated inspection pit to 1.20m bgl
3. Borehole terminated at scheduled depth
4. Slow seepage of perched groundwater at 7.50m bgl, resting at 4.00m bgl overnight.

All dimensions in metres Scale 1:56.25	Contractor A2 Site Investigation	Method/ Plant Used Cable Percussion Rig	Logged By CM	Status DRAFT

A2 Site Investigation

Borehole Log

Project				Borehole No
50 Maresfield Gardens				BH01
Job No	Start / Finish	Ground Level (mOD)	Co-Ordinates	Depth (m)
26822	20-12-22 / 22-12-22	80.86	E 526,456.0 N 185,140.0	30.45m
Client			SPT Energy Ratio	Sheet
Chi and June Cheung			72%	4 of 4

SAMPLES & TESTS			Water	Reduced Level	Legend	Depth (Thickness)	STRATA Description	Instrument/ Backfill
Depth (m)	Type No	Test Result						
27.00-27.45 27.00	SPT33 SPT (s)	(2, 4, 5, 7, 7, 9) N = 28					Firm to stiff, dark grey slightly sandy silty slightly micaceous CLAY. Sand is fine. (LONDON CLAY FORMATION) *(continued)*	
28.50-28.95 28.50	SPT34 SPT (s)	(3, 6, 6, 7, 8, 8) N = 29						
30.00-30.45 30.00	SPT35 SPT (s)	(4, 5, 7, 8, 9, 10) N = 34		50.41		30.45		
							----- *Borehole Terminated at 30.45m* -----	

Boring Progress and Water Observations

Date	Hole Depth (m)	Casing Depth	Casing Dia. mm	Water Depth (m)	Remarks
22-12-22	30.00	9.20			

Chiselling

From	To	Hours

Water Added

From	To

General Remarks

1. Borehole scanned with CAT & Genny
2. Hand excavated inspection pit to 1.20m bgl
3. Borehole terminated at scheduled depth
4. Slow seepage of perched groundwater at 7.50m bgl, resting at 4.00m bgl overnight.

All dimensions in metres Scale 1:56.25	Contractor A2 Site Investigation	Method/ Plant Used Cable Percussion Rig	Logged By CM	Status DRAFT

A2 Site Investigation

Borehole Log

Project				Borehole No
50 Maresfield Gardens				BH02
Job No	Start / Finish	Ground Level (mOD)	Co-Ordinates	Depth (m)
26822	19-12-22 / 20-12-22	80.87	E 526,479.0 N 185,145.0	20.45m
Client			SPT Energy Ratio	Sheet
Chi and June Cheung			%	1 of 3

SAMPLES & TESTS			Water	Reduced Level	Legend	Depth (Thickness)	STRATA Description	Instrument/ Backfill
Depth (m)	Type No	Test Result						
				80.84		0.03	Yellowish brown stone patio slab. (MADE GROUND)	
				80.77		0.10	Light brown LEAN MIX CONCRETE. (20%) aggregate of subangular fine limestone gravel. (MADE GROUND)	
0.50 0.50	ES	VOC 0 ppm				(1.00)		
				79.77		1.10	Soft, brown to dark brown gravelly sandy silty CLAY with occasional roots and rootlets (<2mm). Sand is fine to coarse. Gravel is sub-angular, fine to coarse brick with occasional concrete, polystyrene and flint. (MADE GROUND)	
							Soft, brown mottled grey slightly sandy silty CLAY with occasional pockets of brown fine to coarse sand (10x50 mm) and rootlets with grey gleying (<2mm) along rootlet tracks. (LONDON CLAY FORMATION - CLAYGATE MEMBER)	
						(5.30)		
							4.00 ... with no rootlets below 4.00m depth	
				74.47		6.40		
							Firm to stiff, dark grey slightly sandy silty slightly micaceous CLAY. Sand is fine. (LONDON CLAY FORMATION)	
			▼				8.00 - 15.00 ... with pockets of dark grey fine sand	

Boring Progress and Water Observations

Date	Hole Depth (m)	Casing Depth	Casing Dia. mm	Water Depth (m)	Remarks

Chiselling

From	To	Hours

Water Added

From	To

General Remarks

1. Borehole scanned with CAT & Genny
2. Hand excavated inspection pit to 1.20m bgl
3. Borehole terminated at scheduled depth
4. Slow seepage of perched groundwater at 8.00 m bgl.

All dimensions in metres Scale 1:56.25	Contractor A2 Site Investigation	Method/ Plant Used Cable Percussion Rig	Logged By CM	Status DRAFT

A2 Site Investigation

Borehole Log

Project				Borehole No
50 Maresfield Gardens				BH02
Job No	Start / Finish	Ground Level (mOD)	Co-Ordinates	Depth (m)
26822	19-12-22 / 20-12-22	80.87	E 526,479.0 N 185,145.0	20.45m
Client			SPT Energy Ratio	Sheet
Chi and June Cheung			%	2 of 3

SAMPLES & TESTS			Water	Reduced Level	Legend	Depth (Thickness)	STRATA Description	Instrument/ Backfill
Depth (m)	Type No	Test Result						
						(14.05)	Firm to stiff, dark grey slightly sandy silty slightly micaceous CLAY. Sand is fine. (LONDON CLAY FORMATION) *(continued)* 15.00 ... with rare fragments of white shell (5-10 mm)	

Boring Progress and Water Observations

Date	Hole Depth (m)	Casing Depth	Casing Dia. mm	Water Depth (m)	Remarks

Chiselling

From	To	Hours

Water Added

From	To

General Remarks

1. Borehole scanned with CAT & Genny
2. Hand excavated inspection pit to 1.20m bgl
3. Borehole terminated at scheduled depth
4. Slow seepage of perched groundwater at 8.00 m bgl.

All dimensions in metres Scale 1:56.25	Contractor A2 Site Investigation	Method/ Plant Used Cable Percussion Rig	Logged By CM	Status DRAFT

A2 Site Investigation

Borehole Log

Project				Borehole No
50 Maresfield Gardens				BH02
Job No	Start / Finish	Ground Level (mOD)	Co-Ordinates	Depth (m)
26822	19-12-22 / 20-12-22	80.87	E 526,479.0 N 185,145.0	20.45m
Client			SPT Energy Ratio	Sheet
Chi and June Cheung			%	3 of 3

SAMPLES & TESTS			Water	Reduced Level	Legend	Depth (Thickness)	STRATA Description	Instrument/ Backfill
Depth (m)	Type No	Test Result						
							Firm to stiff, dark grey slightly sandy silty slightly micaceous CLAY. Sand is fine. (LONDON CLAY FORMATION) *(continued)*	
				60.42		20.45		
							----- *Borehole Terminated at 20.45m* -----	

Boring Progress and Water Observations

Date	Hole Depth (m)	Casing Depth	Casing Dia. mm	Water Depth (m)	Remarks

Chiselling

From	To	Hours

Water Added

From	To

General Remarks

1. Borehole scanned with CAT & Genny
2. Hand excavated inspection pit to 1.20m bgl
3. Borehole terminated at scheduled depth
4. Slow seepage of perched groundwater at 8.00 m bgl.

All dimensions in metres Scale 1:56.25	Contractor A2 Site Investigation	Method/ Plant Used Cable Percussion Rig	Logged By CM	Status DRAFT

A2 Site Investigation

Borehole Log

Project				Borehole No
50 Maresfield Gardens				BH03
Job No	Start / Finish	Ground Level (mOD)	Co-Ordinates	Depth (m)
26822	16-12-22 / 17-12-22	80.99	E 526,484.0 N 185,150.0	10.45m
Client			SPT Energy Ratio	Sheet
Chi and June Cheung			72%	1 of 1

SAMPLES & TESTS			Water	Reduced Level	Legend	Depth (Thickness)	STRATA Description	Instrument/ Backfill
Depth (m)	Type No	Test Result						
0.20	ES01						Grass over soft dark brown slightly sandy gravelly silty CLAY with occasional rootlets (<2mm). Gravel is sub-angular to rounded, fine to coarse brick and flint. (MADE GROUND)	
0.30		VOC 0.2 ppm						
0.50-1.00	B02					(1.10)		
				79.89		1.10		
							Firm to stiff, brown silty CLAY with occasional rootlets (<2mm) (LONDON CLAY FORMATION - CLAYGATE MEMBER)	
1.50-1.95	UT03	16 blows						
2.00-2.45	SPT04							
2.00		(1, 1, 1, 1, 1, 0) N = 3						
2.50-2.95	UT05	19 blows						
3.00	D06						3.00 ... becoming soft to firm locally orangish red slightly micaceous with pockets of silt (30x10x20 mm)	
3.00-3.45	SPT07							
3.00		(2, 1, 1, 1, 1, 1) N = 4						
3.50-3.95	UT08	18 blows						
4.00	D09						4.00 ...becoming brown mottled light grey silty sandy clay	
4.00-4.45	SPT10							
4.00		(1, 1, 1, 1, 1, 2) N = 5						
4.50-4.95	UT11	20 blows				(7.90)		
5.00	D12						5.00 ...becoming locally very sandy	
5.00-5.45	SPT13							
5.00		(1, 1, 2, 2, 3, 2) N = 9						
5.50-5.95	UT14	22 blows						
6.00	D15							
6.00-6.45	SPT16							
6.00		(2, 1, 1, 2, 2, 1) N = 6						
6.50-6.96	UT17	22 blows	▼					
7.00	D18						7.00 ... with no mottling below 7.00m	
7.00-7.45	SPT19							
7.00		(2, 2, 2, 2, 2, 2) N = 8						
7.50-8.00	B20							
7.50-7.95	UT21	31 blows						
8.00-8.45	SPT22						8.00 ... becoming very soft. Potentially drilling induced.	
8.00		(2, 2, 2, 1, 2, 3) N = 8						
8.50-8.95	UT23	32 blows						
				71.99		9.00		
9.00	D24						Stiff, grey silty CLAY. (LONDON CLAY FORMATION)	
9.00-9.45	SPT25							
9.00		(2, 1, 2, 3, 3, 4) N = 12						
9.50-9.95	UT26	40 blows				(1.45)		
10.00	D27							
10.00-10.45	SPT28							
10.00		(2, 3, 3, 3, 4, 4) N = 14		70.54		10.45		
							----- *Borehole Terminated at 10.45m* -----	

Boring Progress and Water Observations

Date	Hole Depth (m)	Casing Depth	Casing Dia. mm	Water Depth (m)	Remarks
16-12-22	0.00	0.00	150	dry	
16-12-22	6.90			6.90	
16-12-22	7.45			7.30	
16-12-22	8.00			7.1	
16-12-22	8.45			8.30	
16-12-22	8.95			8.40	
16-12-22	9.45			9	
16-12-22	9.95			9	
16-12-22	10.00	1.50	150	9.70	

Chiselling

From	To	Hours

Water Added

From	To

General Remarks

1. Borehole scanned with CAT & Genny
2. Hand excavated inspection pit to 1.20m bgl
3. Borehole terminated at scheduled depth
4. Slow seepage of perched groundwater at 6.90 m bgl.

All dimensions in metres Scale 1:68.75	Contractor A2 Site Investigation	Method/ Plant Used Cable Percussion Rig	Logged By JP	Status DRAFT

A2 Site Investigation

Borehole Log

Project				Borehole No
50 Maresfield Gardens				WS01
Job No	Start / Finish	Ground Level (mOD)	Co-Ordinates	Depth (m)
26822	16-12-22 / 16-12-22	80.80	E 526,453.0 N 185,141.0	6m
Client			SPT Energy Ratio	Sheet
Chi and June Cheung			%	1 of 1

SAMPLES & TESTS				STRATA				
Depth (m)	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	Description	Instrument/ Backfill
0.10 0.10	ES1	VOC 9.9 ppm				(1.00)	Soft dark brown slightly sandy gravelly silty CLAY with low cobble content and occasional rootlets. Gravel is sub-rounded fine to coarse flint and rare plastic. Cobbles are sub-rounded flint (approximately 80x20 mm) (MADE GROUND)	
0.80 0.80	ES2	VOC 31.1 ppm		79.80		1.00	0.20 ...becoming light yellowish brown. 0.50 - 0.80 ... with frequent sub-angular, fine to coarse gravel of brick.	
1.50 1.50	ES3	VOC 20.1 ppm					Soft yellowish brown mottled grey slightly sandy silty CLAY with occasional pockets of brownish yellow fine sand (approximately 2x10 mm), organic matter and rootlets with grey staining along rootlet tracks. (LONDON CLAY FORMATION - CLAYGATE MEMBER) 2.00 ... becoming yellowish brown mottled light grey and orange.	
2.80 2.80	ES4	VOC 0.7 ppm				(5.00)	2.80 ... with prevalant orange mottling and slight hydrocarbon odour noted.	
4.00 4.00	ES5	VOC 0.3 ppm					4.00 ... becoming reddish brown mottled dark grey.	
5.00 5.00	ES6	VOC 0.5 ppm					5.50 ... becoming orange mottled grey.	
				74.80		6.00	----- *Borehole Terminated at 6m* -----	

Boring Progress and Water Observations

Date	Hole Depth (m)	Casing Depth	Casing Dia. mm	Water Depth (m)	Remarks

Chiselling

From	To	Hours

Water Added

From	To

General Remarks

1. Borehole scanned with CAT & Genny
2. Hand excavated inspection pit to 1.20m bgl
3. Borehole terminated at scheduled depth
4. Falling head test completed at 1.50m bgl.

All dimensions in metres Scale 1:50	Contractor A2 Site Investigation	Method/ Plant Used Window Sampling Rig	Logged By CM	Status DRAFT

A2 Site Investigation

Borehole Log

Project				Borehole No
50 Maresfield Gardens				WS02
Job No	Start / Finish	Ground Level (mOD)	Co-Ordinates	Depth (m)
26822	16-12-22 / 16-12-22	80.85	E 526,486.0 N 185,144.0	6m
Client			SPT Energy Ratio	Sheet
Chi and June Cheung			%	1 of 1

SAMPLES & TESTS			Water	Reduced Level	Legend	Depth (Thickness)	STRATA Description	Instrument/ Backfill
Depth (m)	Type No	Test Result						
0.30		VOC 0 ppm				(1.80)	Grass over soft dark brown slightly sandy gravelly silty CLAY with frequent rootlets and rare roots. Gravel is sub-rounded to angular fine to medium brick, extremely weak chalk fragments, flint and rare wood fragments. (MADE GROUND) 0.20 ... becoming slightly gravelly with no roots or rootlets 0.50 ... becoming orangish brown with rare gravel.	
1.00		VOC 5.4 ppm						
				79.05		1.80		
							Soft to firm orangish brown mottled grey slightly sandy silty slightly micaceous CLAY. Sand is fine. (LONDON CLAY FORMATION - CLAYGATE MEMBER) 2.00 ... with claystone fragment (approximately 200 mm thick)	
							3.00 ...becoming brown mottled dark grey with rare plant matter and rootlets (<10 mm) with grey staining along rootlet tracks	
						(4.20)		
				74.85		6.00		
							----- *Borehole Terminated at 6m* -----	

Boring Progress and Water Observations

Date	Hole Depth (m)	Casing Depth	Casing Dia. mm	Water Depth (m)	Remarks

Chiselling

From	To	Hours

Water Added

From	To

General Remarks

1. Borehole scanned with CAT & Genny
2. Hand excavated inspection pit to 1.20m bgl
3. Borehole terminated at scheduled depth
4. Falling head test completed at 2.50m bgl.

All dimensions in metres Scale 1:50	Contractor	Method/ Plant Used	Logged By	Status
	A2 Site Investigation	Window Sampling Rig	CM	DRAFT

A2 Site Investigation

Borehole Log

Project				Borehole No
50 Maresfield Gardens				WS03
Job No	Start / Finish	Ground Level (mOD)	Co-Ordinates	Depth (m)
26822	16-12-22 / 16-12-22	80.80	E 526,458.0 N 185,134.0	6m
Client			SPT Energy Ratio	Sheet
Chi and June Cheung			%	1 of 1

SAMPLES & TESTS			Water	Reduced Level	Legend	Depth (Thickness)	STRATA Description	Instrument/ Backfill
Depth (m)	Type No	Test Result						
0.50 0.50	ES01	VOC 0.0 ppm					Soft, dark brown gravelly sandy silty CLAY with frequent roots and rootlets (<2mm). Sand is fine to coarse. Gravel is angular to subangular, fine to coarse brick, concrete and occasional flint. (MADE GROUND) 0.20 ... becoming brown	
						(2.00)	1.20 ... becoming yellow mottled grey and slightly firm	
1.50 1.50	ES02	VOC 0.1 ppm						
				78.80		2.00		
							Soft to firm, brown slightly sandy silty CLAY with rare fine, subangular gravel of brick and occasional black and yellow fine to coarse sand pockets (10x20mm). (LONDON CLAY FORMATION - RE-WORKED CLAYGATE MEMBER)	
2.50 2.50	ES03	VOC 0.0 ppm				(1.40)	2.00 ... becoming brownish grey	
				77.40		3.40		
							Soft to firm, yellowish brown mottled grey slightly sandy silty CLAY occasional plant material / roots (<5mm). (LONDON CLAY FORMATION - CLAYGATE MEMBER) 3.60 ... becoming reddish orange mottled grey 4.00 ... with pockets of yellow fine to coarse sand (20x80mm)	
						(2.60)	5.00 ... becoming predominatly grey	
5.50 5.50	ES04	VOC 0.0 ppm						
				74.80		6.00		
							----- *Borehole Terminated at 6m* -----	

Boring Progress and Water Observations

Date	Hole Depth (m)	Casing Depth	Casing Dia. mm	Water Depth (m)	Remarks

Chiselling

From	To	Hours

Water Added

From	To

General Remarks

1. Borehole scanned with CAT & Genny
2. Hand excavated inspection pit to 1.20m bgl
3. Borehole terminated at scheduled depth
4. Slow ingress of perched groundwater at 5.00m bgl.

All dimensions in metres Scale 1:50	Contractor A2 Site Investigation	Method/ Plant Used Window Sampling Rig	Logged By CM	Status DRAFT

A2 Site Investigation

Borehole Log

Project				Borehole No
50 Maresfield Gardens				WS04
Job No: 26822	Start: 13-01-23 / Finish: 13-01-23	Ground Level (mOD): 80,80	Co-Ordinates: E 526.461,0 N 185.065,0	Depth (m): 5m
Client: Chi and June Cheung			SPT Energy Ratio: %	Sheet: 1 of 1

SAMPLES & TESTS			Water	Reduced Level	Legend	Depth (Thickness)	STRATA Description	Instrument/ Backfill
				80,70		0,10	Red brick paving. (MADE GROUND)	
0,30	ES1			80,30		(0,40) 0,50	Soft, brown, silty sandy GRAVEL with frequent rootlets and low cobble content. Sand is fine to coarse. Gravel is fine to coarse sub-rounded to angular concrete, flint and brick. Occasional fragments of wire and plastic. Cobbles are sub-rounded flint (approximately 50x100mm). (MADE GROUND)	
0,30		VOC 0 ppm						
0,80	ES2					(0,60)		
0,80		VOC 0 ppm		79,70		1,10	Soft, yellowish brown mottled grey, silty slightly sandy CLAY. Sand is fine. Rare gravel of sub-angular, fine to medium brick and clinker. (MADE GROUND)	
1,00		VOC 0 ppm					Soft, yellowish brown mottled grey, slightly sandy silty CLAY with occasional pockets of light yellow and grey fine sand (approximately 5x20mm). Sand is fine. (LONDON CLAY FORMATION - CLAYGATE MEMBER)	
1,50	ES3							
1,50		VOC 0 ppm					2,00 ...becoming reddish orange mottled grey.	
2,50	ES4							
2,50		VOC 0 ppm				(3,90)		
3,50		VOC 0 ppm						
4,00	ES5							
4,00		VOC 0 ppm					4,50 ...becoming grey mottled orange and yellow. Sand pockets become yellow and orange.	
				75,80		5,00		
5,00		VOC 0 ppm					----- *Borehole Terminated at 5m* -----	

Boring Progress and Water Observations

Date	Hole Depth (m)	Casing Depth	Casing Dia. mm	Water Depth (m)	Remarks

Chiselling

From	To	Hours

Water Added

From	To

General Remarks

1. Borehole scanned with CAT & Genny
2. Hand excavated inspection pit to 1.20m bgl
3. Borehole terminated at scheduled depth

All dimensions in metres Scale 1:50	Contractor: A2 Site Investigation	Method/ Plant Used: WS Rig	Logged By: CM	Status: DRAFT

A2 Site Investigation

Borehole Log

Project				Borehole No
50 Maresfield Gardens				WS05
Job No	Start / Finish	Ground Level (mOD)	Co-Ordinates	Depth (m)
26822	13-01-23 / 13-01-23	80,70	E 526.461,0 N 185.063,0	5m
Client			SPT Energy Ratio	Sheet
Chi and June Cheung			%	1 of 1

SAMPLES & TESTS			Water	Reduced Level	Legend	Depth (Thickness)	STRATA Description	Instrument/ Backfill
Depth (m)	Type No	Test Result						
0,10 0,10	ES1	VOC 0 ppm		80,60 80,50		0,10 0,20	Red brick paving. (MADE GROUND) Loose, yellow, medium to coarse SAND. (MADE GROUND)	
				80,10		(0,40) 0,60	Soft, brown, very gravelly sandy silty CLAY with occasional rootlets and low concrete cobble content (approximately 50x100mm). Sand is fine to coarse. Gravel is rounded fine to coarse flint and sub-angular concrete. (MADE GROUND) 0,30 ...cobbles no longer present 0,40 ...becomes slightly gravelly	
0,80 0,80	ES2	VOC 0 ppm		79,80		0,90	Soft, orangeish brown mottled grey, slightly gravelly silty sandy CLAY. Sand is fine to coarse. Gravel is rounded fine to medium flint and occasional sub-angular brick. (MADE GROUND)	
1,50 1,50	ES3	VOC 0 ppm					Soft, orangeish brown, mottled grey slightly sandy CLAY with occasional pockets of yellow and grey fine sand (approximately 5x15mm). (LONDON CLAY FORMATION - CLAYGATE MEMBER) 2,00 ...becoming reddish orange mottled grey	
2,50 2,50	ES4	VOC 0 ppm				(4,10)		
3,50 3,50	ES5	VOC 0 ppm					4,00 ...becoming stiff	
4,50		VOC 0 ppm		75,70		5,00		
							----- *Borehole Terminated at 5m* -----	

Boring Progress and Water Observations

Date	Hole Depth (m)	Casing Depth	Casing Dia. mm	Water Depth (m)	Remarks

Chiselling

From	To	Hours

Water Added

From	To

General Remarks

1. Borehole scanned with CAT & Genny
2. Hand excavated inspection pit to 1.20m bgl
3. Borehole terminated at scheduled depth

All dimensions in metres Scale 1:50	Contractor A2 Site Investigation	Method/ Plant Used WS Rig	Logged By CM	Status DRAFT

A2 Site Investigation

Borehole Log

Project				Borehole No
50 Maresfield Gardens				WS06
Job No	Start / Finish	Ground Level (mOD)	Co-Ordinates	Depth (m)
26822	13-01-23 / 13-01-23	80,70	E 526.461,0 N 185.060,0	5m
Client			SPT Energy Ratio	Sheet
Chi and June Cheung			%	1 of 1

SAMPLES & TESTS			Water	Reduced Level	Legend	Depth (Thickness)	STRATA Description	Instrument/ Backfill
Depth (m)	Type No	Test Result						
				80,60		0,10	Red brick paving. (MADE GROUND)	
0,20	ES1			80,55		0,15	Loose, brownish yellow fine to coarse SAND. (MADE GROUND)	
0,20		VOC 0 ppm				(0,55)	Soft, dark brownish grey, gravelly sandy silty CLAY with occasional rootlets and low concrete cobble content (approximately 60x90mm). Sand is fine to coarse. Gravel is sub-rounded to angular fine to coarse flint, brick, clinker and rare plastic and wire. (MADE GROUND)	
				80,00		0,70	0,20 ...cobbles no longer present	
1,00	ES2					(0,80)		
1,00		VOC 0 ppm					Soft, brownish yellow, slightly gravelly sandy silty CLAY. Sand is fine to coarse. Gravel is sub-rounded to angular fine to medium flint and brick. (MADE GROUND)	
				79,20		1,50	Orangeish yellow mottled grey, slightly sandy CLAY with occasional pockets of grey fine sand (approximately 5x15mm). Sand is fine. (LONDON CLAY FORMATION - CLAYGATE MEMBER)	
2,00		VOC 0 ppm					1,90 ...becoming reddish orange mottled grey	
3,00	ES3						3,00 ...becoming reddish brown mottled dark grey	
3,00		VOC 0 ppm				(3,50)		
4,00		VOC 0 ppm					4,00 ...becoming stiff	
				75,70		5,00		
5,00		VOC 0 ppm					----- *Borehole Terminated at 5m* -----	

Boring Progress and Water Observations

Date	Hole Depth (m)	Casing Depth	Casing Dia. mm	Water Depth (m)	Remarks

Chiselling

From	To	Hours

Water Added

From	To

General Remarks

1. Borehole scanned with CAT & Genny
2. Hand excavated inspection pit to 1.20m bgl
3. Borehole terminated at scheduled depth

All dimensions in metres Scale 1:50	Contractor	Method/ Plant Used	Logged By	Status
	A2 Site Investigation	WS Rig	CM	DRAFT

A2 Site Investigation

Borehole Log

Project				Borehole No
50 Maresfield Gardens				WS07
Job No	Start / Finish	Ground Level (mOD)	Co-Ordinates	Depth (m)
26822	13-01-23 / 13-01-23	80,70	E 526.460,0 N 185.054,0	5m
Client			SPT Energy Ratio	Sheet
Chi and June Cheung			%	1 of 1

SAMPLES & TESTS			Water	Reduced Level	Legend	Depth (Thickness)	STRATA Description	Instrument/ Backfill
Depth (m)	Type No	Test Result						
				80,60		0,10	Red brick paving. (MADE GROUND)	
				80,40		0,30	Loose, brownish yellow, medium SAND. (MADE GROUND)	
							Soft, dark blackish brown, gravelly sandy silty CLAY. Sand is fine to coarse. Gravel is sub-rounded to sub-angular fine to coarse flint, concrete, brick and clinker. (MADE GROUND)	
1,00	ES1					(1,50)	0,30 - 0,40 ...between 0.30 and 0.40m bgl, concrete cobbles (approximately 60x90mm)	
1,00		VOC 0 ppm					1,00 ...becoming brown	
				78,90		1,80		
2,00	ES2						Soft, brownish orange mottled grey, slightly gravelly CLAY. Sand is fine to coarse. Gravel is sub-angular fine to coarse flint and occasional brick. (MADE GROUND)	
2,00		VOC 0 ppm				(0,70)		
				78,20		2,50		
							Orangeish yellow mottled grey, slightly sandy CLAY with occasional pockets of light grey and yellow fine sand (approximately 10x20mm). Sand is fine.	
3,00	ES3						2,50 - 3,50 ...crumbly between 2.50 - 3.50m bgl	
3,00		VOC 0 ppm						
							3,50 ...becoming stiff	
						(2,50)		
4,00		VOC 0 ppm					4,00 ...becoming orangeish brown mottled dark grey	
				75,70		5,00		
5,00		VOC 0 ppm					----- *Borehole Terminated at 5m* -----	

Boring Progress and Water Observations

Date	Hole Depth (m)	Casing Depth	Casing Dia. mm	Water Depth (m)	Remarks

Chiselling

From	To	Hours

Water Added

From	To

General Remarks

1. Borehole scanned with CAT & Genny
2. Hand excavated inspection pit to 1.20m bgl
3. Borehole terminated at scheduled depth

All dimensions in metres Scale 1:50	Contractor	Method/ Plant Used	Logged By	Status
	A2 Site Investigation	WS Rig	CM	DRAFT

A2 Site Investigation One Westminster Bridge Road London SE1 7XW	Client CHI AND JUNE CHEUNG	Title WS01		Site 50 Maresfield Gardens		
		Core Run		Created JP	Checked AB	Authorised DS
		Depth From (m) 1.20	Depth To (m) 4.00	Status FINAL	Rev 00	Project No 26822

A2 Site Investigation
One Westminster Bridge Road London SE1 7XW

Client	Title		Site		
CHI AND JUNE CHEUNG	WS02		50 Maresfield Gardens		
	Core Run		Created JP	Checked AB	Core Run DS
	Depth From (m) 1.20	Depth To (m) 6.00	Status FINAL	Rev 00	Project No 26822

A2 Site Investigation One Westminster Bridge Road London SE1 7XW	Client CHI AND JUNE CHEUNG	Title WS03		Site 50 Maresfield Gardens		
		Core Run		Created JP	Checked AB	Authorised DS
		Depth From (m) 0.00	Depth To (m) 6.00	0Status FINAL	Rev 00	Project No 26822

A2 Site Investigation One Westminster Bridge Road London SE1 7XW	Client CHI AND JUNE CHEUNG	Title WS04		Site 50 Maresfield Gardens		
		Core Run		Created JP	Checked AB	Authorised DS
		Depth From (m) 0.00	Depth To (m) 5.00	Status FINAL	Rev 00	Project No 26822

A2 Site Investigation One Westminster Bridge Road London SE1 7XW	Client CHI AND JUNE CHEUNG	Title WS05		Site 50 Maresfield Gardens		
		Core Run		Created JP	Checked AB	Core Run DS
		Depth From (m) 0.00	Depth To (m) 5.00	Status FINAL	Rev 00	Project No 26822

A2 Site Investigation One Westminster Bridge Road London SE1 7XW	Client CHI AND JUNE CHEUNG	Title WS06		Site 50 Maresfield Gardens		
		Core Run		Created JP	Checked AB	Authorised DS
		Depth From (m) 0.00	Depth To (m) 5.00	0Status FINAL	Rev 00	Project No 26822

A2 Site Investigation One Westminster Bridge Road London SE1 7XW	Client CHI AND JUNE CHEUNG	Title WS07		Site 50 Maresfield Gardens		
		Core Run		Created JP	Checked AB	Authorised DS
		Depth From (m) 0.00	Depth To (m) 5.00	0Status FINAL	Rev 00	Project No 26822