

GEOTECHNICAL SITE INVESTIGATION
of a site at
REAR OF 39 SECOND CROSS ROAD, TWICKENHAM,
TW2 5QY
for
ANTHONY C BIANCHI



**Contaminated
Land
Solutions**

**t 020 8291 1354 e ask@gosolve.co.uk
4 De Frene Road, London, SE26 4AB**

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1 BRIEF

Mr Anthony Bianchi instructed GO Contaminated Land Solutions to undertake a geotechnical site investigation of the site at

The exploratory holes carried out during the fieldwork, which investigate only a small volume of the ground in relation to the size of the site, can only provide general indication of site conditions. The comments and opinions expressed within this report are based on the ground conditions revealed by the site works, together with information contained within the laboratory test results. There may be exceptional ground conditions elsewhere on the site which have not been disclosed by this investigation and which therefore have not been taken into account in this report.

All ground water readings relate to short term observations and do not allow for variations due to seasonal or other effects. All depths stated within this report and on the borehole logs are depths below the ground level surrounding the borehole locations.

2 SITE LOCATION & DESCRIPTION

The site is located at approximate grid reference 51°26'34.3"N 0°20'42.8"W, to the rear of 39 Second Cross Road. The site is generally flat and lies approximately 14m above sea level..

The site is rectangular shaped in plan and occupies 0.05 ha.

The site comprises of a gravel drive area, soft landscaping (lawn & plantings), green house, wooden storage sheds and a patio area. Access to the site is gained via a wooden gate from Chestnut Road. The site can also be accessed from the associated property at 39 Second Cross Road.



Photograph 1: View of the site looking NE from the SW border

Towards the southern end of the lawn, where it meets the driveway there is a mound of excavated soil placed against the fence. A wooden shed sits adjacent to the fence on north west side of the driveway.

Beyond the driveway is a lawn which accounts for half of the site area and extends to the patio, greenhouse and second shed at the northeast end of site.

The site is situated in a residential zone. The surrounding area is mostly residential with some commercial activity (shops and restaurants) south & south west of the site.

According to client, 41/43 Second Cross Road was occupied by a War Surplus Yard until approximately 2000 when the area was developed into houses.

3 SITE WORKS

3.1 Programme

The site works were undertaken on 26 March 2024.

3.2 Boreholes

The site investigation work was carried out on 26/03/24 and comprised of the drilling of 2No. boreholes across the site to a maximum depth of 6.00m and the excavation of a single soakaway pit. The locations of the boreholes carried out are marked on the site plan within Appendix B.

Within the boreholes, disturbed samples were taken at depths of 1.00m, 2.00m and then at 1.00m intervals. Insitu strength tests, in the form of handheld shear vane tests and mackintosh probe tests were performed within the Sub soil at 1.00m intervals. The results of all insitu strength tests are recorded on the borehole logs within appendix D.

4 GROUND CONDITIONS

4.1 Geological Survey

Reference to the 1:50,000 scale geological map of the area (270., South London) shows the site to be underlain by the Kempton Gravel Member consisting of SAND and GRAVEL with some local lenses of silt and clay. Typically, the Kempton Gravel Member attains a thickness of around 6.00m but can be much thicker in localised areas. The Kempton Gravel Member is underlain by the London Clay Formation which consists of poorly laminated blueish grey silty clay with some sand lenses throughout. The London Clay Formation forms the bedrock for a large proportion of London and can attain a thickness of up to 150m in some areas.

4.2 Hydrogeology

Prior to visiting site we have no information on the likely depth of the water table beneath the site. The boreholes on site were taken to a maximum depth of 6.00m and water strikes were noted in both the boreholes taken at 3.00m and 2.90m respectively. The groundwater table is therefore assumed to be located at a depth of 2.90m. The site is not located within a groundwater source protection zone as defined within the Environment Agency website. The site is however noted to be situated above an principal aquifer within the Kempton Gravel Member.

4.3 Hydrology

There are water courses located within close proximity of the site. The nearest watercourse on the relevant 1:25,000 OS map is shown approximately 0.5km to the northwest of the site, this is the River Crane. According to the Environment Agency Website the likelihood of flooding in this area is <1%, or 1 in 1000 or less, this is based on current best information on the extent of the extreme flood from rivers or the sea that would occur without the presence of flood defences.

However, the risk of flooding due to surface water is noted to be Medium. Medium risk means that each year this area has a chance of flooding of between 1-3.3%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.

5 PROPOSED DEVELOPMENT

The proposed development comprises a detached residential property and private garden.

6 GEOTECHNICAL INVESTIGATION

6.1 Borehole Findings

- i. Overview

Two boreholes were carried out on site, to establish the geology across the site as a whole. The boreholes were drilled to a maximum depth of 6.00m. All boreholes encountered very similar profiles which matched/ the expected underlying geology of the Kempton Gravel Member. Both Boreholes were drilled utilising a mechanical flight auger drilling rig to provide details on the geology beneath the site.

The strata encountered within each of the boreholes drilled, along with their depth is recorded below:

Stratum	BH1	BH2
TOPSOIL	0.00-0.20m	0.00-0.20m
MADE GROUND	0.20-0.80m	0.20-0.80m
Mid brown silty, sandy CLAY	0.20-1.20m	0.20-1.30m
Orange SAND and GRAVEL	1.20-6.00m	1.20-6.00m

ii. MADE GROUND

Made Ground was encountered on site to a depth of 0.80m in both boreholes 1 and 2 and consisted of silty, sandy clay with brick and concrete fragments. Most of the site was covered with grass and a layer of topsoil noted to be 0.20m thick.

ii. Mid brown silty, sandy CLAY

Mid brown silty, sandy CLAY was encountered within both boreholes and was noted to attain a thickness of 0.40m below the MADE GROUND. This stratum is likely the start of the Kempton Gravel Member.

Insitu mackintosh probe tests within this stratum found it to be loose (Mackintosh probe result = 7-10blows for 75mm travel).

iii. Orange SAND & GRAVEL

Orange SAND and GRAVEL was noted in both boreholes 1 and 2. It was noted to the base off all of the boreholes. It was proved to a maximum depth of 4.80m within borehole 1. This stratum is a continuation of the Kempton Gravel Member.

In situ Mackintosh probe tests within this stratum found it to be medium dense to dense (N Value = 29-42, Mackintosh probe result = 27-37 blows for 75mm travel).

iv. In situ Testing

In situ strength tests, in the form of hand-held shear vane tests were conducted within the cohesive subsoil, and Mackintosh Probe tests within the more granular material. The in situ strength testing was carried out at appropriate intervals throughout the borehole. The results of all in situ strength tests are recorded on the borehole logs within Appendix E.

The hand-held shear vane gives a guide to the undrained shear strength (kPa) of the cohesive soil. The shear vane is considered less accurate than laboratory testing, often giving higher readings, because the vane tests only a very small area of soil, and shears the soil in a horizontal direction.

The Mackintosh probe measures the number of blows taken to drive the probe 300mm into the soil using the drop of a 5kg hammer. The Mackintosh probe gives an indication of soil density. Unfortunately, no published literature exists to convert Mackintosh probe readings with SPT N values.

vi. Root Activity

No roots below grass level were observed within any of the boreholes.

vii. Groundwater

Two boreholes encountered water strikes during drilling. These were at 2.90m below ground level in BH2 and 3.00m below ground level in BH1. In the short term this suggests that the groundwater lies at a depth of 2.90-3.00 m below ground level.

It should be noted that comments on groundwater conditions are based on observations made at the time of the investigation (March 2024) and that changes in groundwater levels are likely to arise due to seasonal affects and changes in drainage conditions.

6.2 Testing

All samples were tested in accordance with BS 1377 1990: method of test of soils for Civil Engineering purposes, the results of which are discussed within Chapter 6 and recorded as test sheets and summaries within Appendix E.

The laboratory testing conducted on the samples taken during this investigation comprised of, natural moisture contents (10No.), classification testing using Atterberg limits testing to determine the plasticity of the fine soils encountered (2No.) or Particle Size Distribution Tests within the non-cohesive subsoil (4No.) and sulphate content and pH (4No.).

6.3 Test Results

i. Moisture Contents and Atterberg Limit Tests

The Moisture Content profiles of the boreholes are that to be expected from the underlying geology. At the top of the profile there is slightly higher moisture content due to the presence of clay reducing the pore spaces and preventing water from escaping the stratum. The SAND and GRAVEL demonstrates relatively high moisture content which is likely due to the standing water found within the stratum at a depth of 2.90-3.00m. Usually it would be expected to see a drop in moisture content within SAND and GRAVEL due to the large pore spaces allowing water to escape the stratum however, due to the Kempton Gravel Member likely being seated above the London Clay Formation which due to its cohesive nature will prevent water from escaping, the moisture content maintains a relatively high level.

Atterberg Limits Testing found that the underlying CLAY falls into soil class CL of the British Soil Classification System. The results show the samples to be of low plasticity. The plastic indices were found to range from 9- 11%, this indicates that the Clay is of generally low susceptibility to shrinkage and swelling with changes in moisture content. The results are presented in appendix E.

ii. Sulphate and pH Tests

Four soil samples were tested for sulphate and pH from the area in which the dwelling is proposed to be built. The soil samples tested gave water soluble sulphate 2:1 results ranging from a minimum of <0.02g/l to a maximum of 0.04g/l. The samples ranged from a pH of 7.8 to a pH of 8.4. Using the BRE digest SD1 (2005) - concrete in Aggressive Ground, the design sulphate class for this site is DS-1, with an ACEC class of AC-1 (Natural Soil).

The results can be seen in appendix E and the test locations are marked on the site plan in appendix B.

iii. Particle Size Distribution Tests

Particle size distribution tests were carried out on samples from BH1 at 2.00m and 3.00m, BH2 at 2.00m and 3.00m. The results of the tests confirm that the stratum above the Kempton Gravel Member is medium SAND and GRAVEL. The results are shown on the graphs in appendix E.

6.4 Recommendations

i. Subsoil Profile

The subsoil profile encountered across the site was generally consistent with the geological survey map of the area, which suggested the site to be underlain by the Kempton Gravel Member. Made Ground was encountered within boreholes to a maximum depth of 0.80m.

ii. Foundation Options

It is understood that the proposed development is for the construction of a two storey dwelling. We would note that we have no information regarding the construction of these buildings or possible loadings and therefore, our comments are general comments based on assumed 'normally' loaded residential building, with no significant point loadings.

The main factors which will control the type of foundation used on this site will be the thickness of Made Ground present across this site and the bearing capacity of the underlying Kempton Gravel Member. Topsoil and Made Ground are inherently variable materials and foundations should not be based in this material as the composition of the soil may vary wildly across the site. The MADE GROUND was encountered to a maximum depth of 0.80m, and foundations should be taken at least 300mm past this to ensure natural ground is encountered, which means a minimum depth of 1.10m.

The underlying Kempton Gravel deposits were found to be reasonably competent and would normally be adequate to support normal strip foundations. However, the main economical factor will be the depth at which any strip footings would have to be based to remove the risk of any movements, associated with clay shrinkage or heave, causing future damage to the new development. Seasonal variations in moisture content can cause significant movements over time, therefore it would be prudent to found the new building at a depth which would not be affected by any shrinkage or heave of the clay. A useful guide to foundation depths is given by the NHBC Guidelines – Chapter 4.2: building near trees, which provides suggested founding depths based on type, size and distance of trees within either a low, moderate or highly shrinkable soil. In addition to this, allowances will need to be made over any new planting, which may affect foundations in the future.

Therefore, in summary, we would suggest that conventional strip foundations could be utilised, but may be economically unviable. The most suitable alternative foundation for this site would be a piled foundation taken down into the underlying London Clay. If a piled foundation is required, then a number of deeper boreholes (minimum 15m) may be required to provide sufficient information for design purposes

iii. Bearing Capacity Assessment

For preliminary design purposes, BS8004 gives presumed bearing values which are the pressures which would normally result in an adequate factor of safety against shear failure for particular soil types, but without consideration of settlement.

These values are as follows:

Category	Types of rocks and soils	Presumed bearing value
Non-cohesive soils	Dense gravel or dense sand and gravel	>600 kN/m ²
	Medium dense gravel, or medium dense sand and gravel	<200 to 600 kN/m ²
	Loose gravel, or loose sand and gravel	<200 kN/m ²
	Compact sand	>300 kN/m ²
	Medium dense sand	100 to 300 kN/m ²
	Loose sand	<100 kN/m ² <i>depends on degree of looseness</i>

Cohesive soils	Very stiff bolder clays & hard clays	300 to 600 kN/m ²
	Stiff clays	150 to 300 kN/m ²
	Firm clay	75 to 150 kN/m ²
	Soft clays and silts	< 75 kN/m ²
	Very soft clay	Not applicable
Peat		Not applicable
Made ground		Not applicable

Within the boreholes at 1.10m-3.00m+ depth, the ground was found to be Silty (Sandy) CLAY (containing Flint Gravel) onto Silty CLAY with a Shear Vane reading of 42-140kPa, indicating the material at 1.10m to 3.00m+ to be Soft-Firm to Stiff with a bearing capacity of <75-300kN/m².

For calculation of the bearing capacities available at 1.10m, 2.00m and 3.00m we have used the lowest Mackintosh probe/shear vane reading at each depth. Based on Hansen (1968) and Tomlinson (2001), for a one-metre-wide foundation, which assumes groundwater will not impact upon the foundations (i.e. groundwater will not be present within the width of the foundation below the foundation) the bearing capacities for each depth are shown below. The calculated bearing capacities allow for settlements up to 25mm.

Depth	1.10m	2.00m	3.00m
Shear Vane	7blows for	7 blows for	27blows for
Bearing capacity	64kN/m ²	104kN/m ²	329kN/m ²

However, water was noted to be present from a depth of 2.90m which could reduce bearing capacities by up to 50%. Therefore, we would recommend using a bearing capacity of 164kN/m² across this site at 2.00-3.00m depth.

iv . Ground Conditions & Construction

The boreholes drilled on this site were all found to be wet on completion of drilling, this would indicate that excavations on this site are likely to be effected by water inflows, with the groundwater levels likely to be at a depth of 2.90m.

The material encountered on this site was found to be of a generally non-cohesive nature, which would indicate that sides of excavations are not likely to be self-supporting, certainly in the long term. Temporary support should be considered for all excavations where collapse is to be avoided, with heavy duty closed shoring in excavations below 1.20m where construction workers access is required.

With regard to desiccation, Driscoll (1983) gives two fairly crude guidelines relating to highly plastic clays at shallow depths (3.00m). The first of these is that desiccation is significant when the natural moisture content is less than or equal to 0.40 times the liquid limit. The second indicates that desiccation is significant when the moisture content is equal to or less than the plastic limit plus 2%. Driscoll's relationships can be used to give guidance on the presence of significantly desiccated clay. These relationships can sometimes give spurious results, especially when applied to clays of lower plasticity as the relationships were devised for highly plastic clays. Therefore, we would recommend that they should be used in conjunction with moisture content profiles, shear strength profiles and field descriptions. The moisture content profiles of the boreholes did not highlight any significant desiccation of the underlying clay sub soil.

6.5 Soakage Testing

One soakaway test were carried out on this site. The test pits were 300mm x 300mm and 900mm to 1000mm deep. Soakaway test pit 1 (SW1) drained 500mm from ground level in 22 minutes and 34 seconds in test 1, 31 minutes and 33 seconds in test 2 and then 38 minutes and 31 seconds in test 3. Using the slowest of the three rates a soil infiltration rate of 28.20×10^{-6} m/s is calculated for this location. The calculation can be seen in appendix C and the test pit locations can be seen on the site plan in appendix B.

*This document has been prepared for the titled project and should not be relied upon or used for any other project without an independent check being carried out as to its suitability and the prior written authority of GO Contaminated Land Solutions Ltd being obtained. No responsibility or liability is accepted for the consequences of this document being used for a purpose other than that for which it was commissioned. Any person using or relying on this document for such other purpose will by such use or reliance be taken to confirm his agreement to indemnify GO Contaminated Land Solutions Ltd for all loss or damage resulting therefrom. GO Contaminated Land Solutions Ltd accepts no responsibility or liability for this document to any party other than **Anthony C Bianchi** by whom it was commissioned.*

The recommendations made and the opinions expressed in this report are based on the borehole records, examination of samples and the results of site and laboratory tests.

The report is issued on the condition that GO Contaminated Land Solutions Ltd will under no circumstances be liable for any loss arising directly or indirectly from ground conditions between the boreholes or trial pits which have not been shown by the boreholes, trial pits or other tests carried out during the investigation.

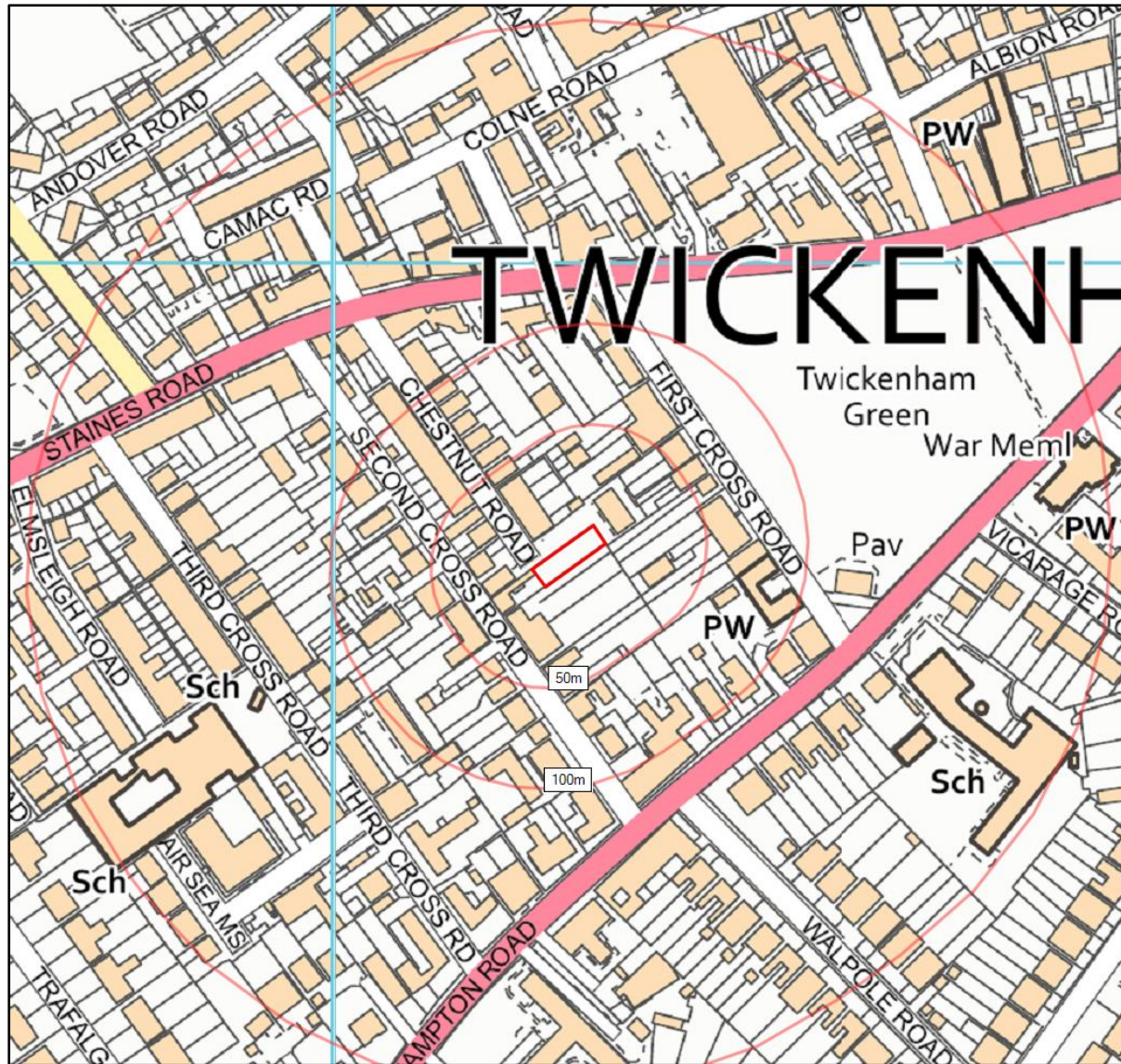
In addition, GO Contaminated Land Solutions Ltd will not be liable for any loss whatsoever arising directly or indirectly from any opinion given on the possible configuration of strata either between the borehole positions or below the maximum depth of the investigation. Such opinions, where given, are for guidance only.

Groundwater levels may also vary with time from those reported during our site investigation due to factors such as tidal conditions, heavy pumping from nearby wells or seasonal changes.

All soil samples will be kept for a period of 28 days after the date of the invoice for this project unless otherwise notified to GO Contaminated Land Solutions Ltd in writing. Should samples be required to be stored for longer than 28 days then a storage charge will be levied.



Appendix A – Site Location Plan



**1985-SI-1: Rear of 39 Second Cross Road, Twickenham
Anthony C Bianchi**



Appendix B – Site Works Plan



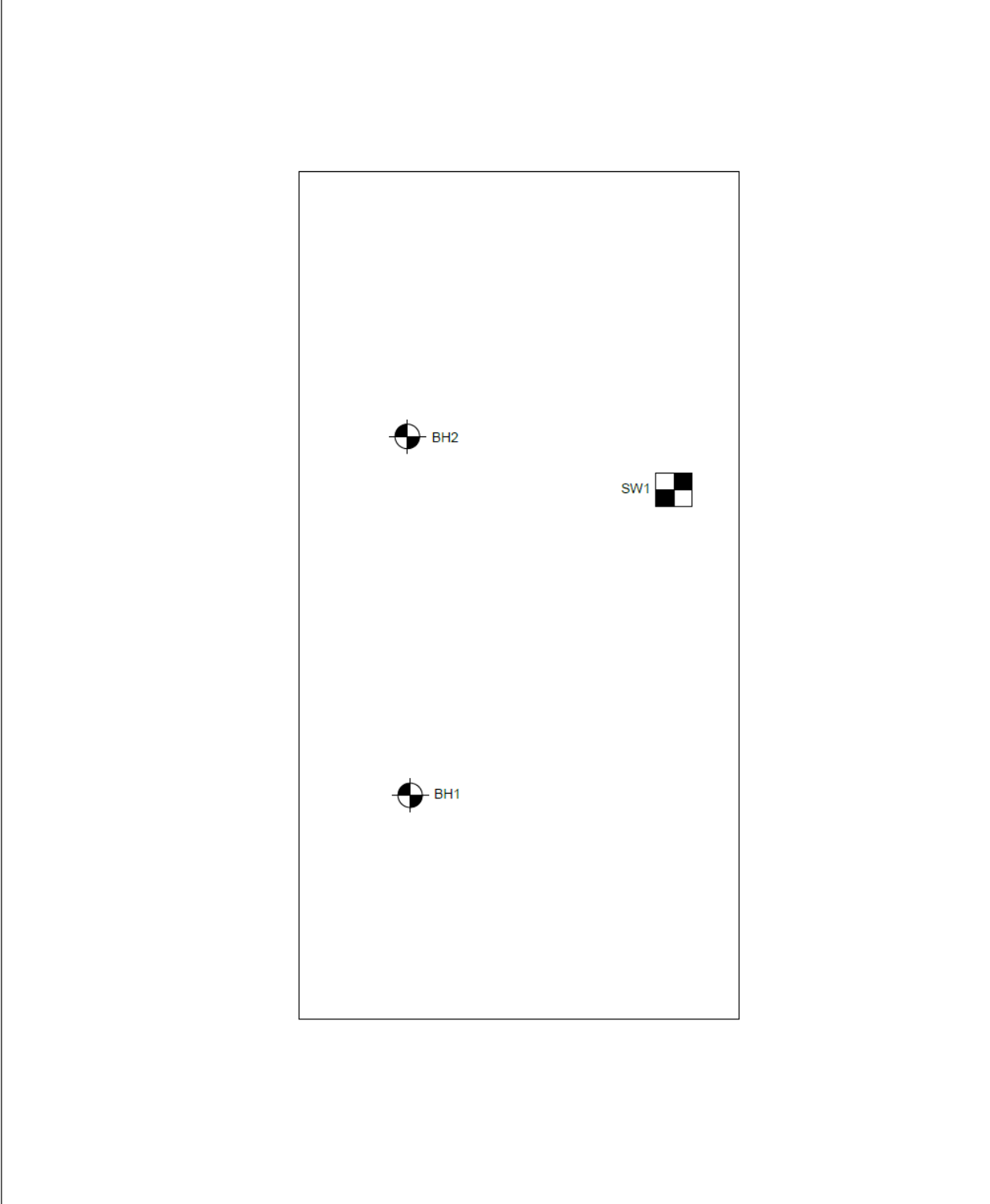
197-199 High Street, Maldon, Essex CM9 5BU

Telephone: 0844 3358908
Fax: 0844 3358907
Email:enquiries@fastrackgroup.co.uk
Web: www.fastrackgroup.co.uk

Appendix No: 1
FSI Ref: 27818

SITE PLAN

Property Address: Rear of 39 Second Cross Road, Twickenham, TW2 5QY
Client Claim Ref: N/A **Survey date:** 26/03/2024 **Operative:** SE1

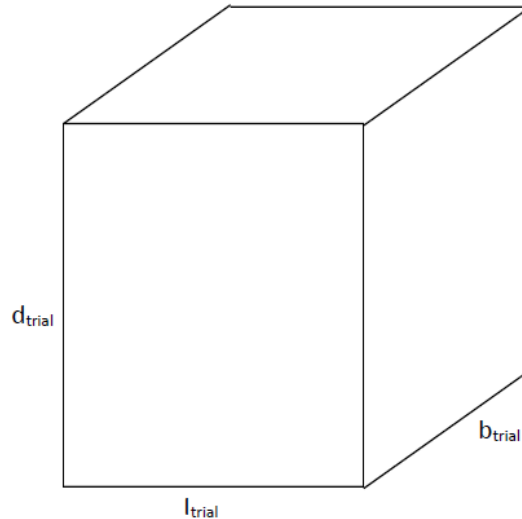


Scale: NTS	Drawn by: TL	Key:	Trial Pit	Manholes	Rain Water Pipe	Surface Water Gully	Shrub	Tree (Conifer)	Tree (Deciduous)
			Borehole		Soil & Vent Pipe	Foul Water Gully			

1985-SI-1: Rear of 39 Second Cross Road, Twickenham
Anthony C Bianchi



Appendix C – Soak Away Results

Soil Infiltration Rate (BRE Digest 365)

SOAK AWAY TEST NO: 1

Length of Trial Pit $l_{\text{trial}} = 0.30\text{m}$

Width of Trial Pit $b_{\text{trial}} = 0.30\text{m}$

Depth of Trial Pit $d_{\text{trial}} = 1.00\text{m}$

Free Volume (if fill used) $V_{\text{trial}} = 35\%$

75% depth of pit: $d_{75}: (d_{\text{trial}} \times 0.75) = 0.75\text{m}$

50% depth of pit: $d_{50}: (d_{\text{trial}} \times 0.50) = 0.50\text{m}$

25% depth of pit: $d_{25}: (d_{\text{trial}} \times 0.25) = 0.25\text{m}$

Test 1 – time to fall from 75% depth to 25% depth = $T_1 = 1354 \text{ Seconds}$

Test 2 – time to fall from 75% depth to 25% depth = $T_2 = 1898 \text{ Seconds}$

Test 3 – time to fall from 75% depth to 25% depth = $T_3 = 2313 \text{ Seconds}$

Longest time to fall from 75% depth to 25% depth = $T_{\text{lg}} = \text{Max}(T_1, T_2, T_3) = 2313 \text{ Seconds}$

Storage Volume from 75% depth to 25% depth = $V_{p75_25} = (l_{\text{trial}} \times b_{\text{trial}} \times (d_{75} - d_{25})) \times V_{\text{trial}} = 0.045\text{m}^3$

Internal surface area to 50% depth = $A_{p50} = ((l_{\text{trial}} \times b_{\text{trial}}) + (l_{\text{trial}} + b_{\text{trial}}) \times 2 \times d_{50}) = 0.69\text{m}^2$

Surface area of soakaway to 50% storage depth $A_{s50} = 2 \times (l_{\text{trial}} + b_{\text{trial}}) \times d_{\text{trial}} / 2 = 0.60\text{m}^2$

Soil infiltration rate = $F = V_{p75_25} / (A_{p50} \times T_{\text{lg}}) = 28.20 \times 10^{-6} \text{ m/s}$



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Appendix D – Borehole Logs



Fastrack Site Investigations Ltd
Unit 9, Tyndales Farm
Southend Road
Maldon CM9 6TQ

Borehole Log

Borehole No.

BH1

Sheet 1 of 1

Project Name: 39 Second Cross Road

Project No.
27818

Site Date:

Hole Type
BH

Location: Rear of 39 Second Cross Road, Twickenham, TW2 5QY

Scale
1:32

Client: GO Contaminated Land Solutions Ltd

Logged By
SE1

Water Strikes	Sample and In Situ Testing			Depth (m)	Legend	Stratum Description
	Depth (m)	Type	Results			
				0.20		TOPSOIL
				0.80		MADE GROUND
	1.00	D	MP = 7/75mm MP = 9/75mm MP = 10/75mm MP = 10/75mm	1.20		Mid brown silty, sandy CLAY
	2.00	D	MP = 29/75mm MP = 31/75mm MP = 31/75mm MP = 31/75mm			Orange SAND and GRAVEL
	3.00	D	MP = 27/75mm MP = 27/75mm MP = 29/75mm MP = 30/75mm			3.00m - Water Strike
	4.00	D	MP = 32/75mm MP = 34/75mm MP = 34/75mm MP = 34/75mm			
	5.00	D	MP = 34/75mm MP = 35/75mm MP = 35/75mm MP = 37/75mm			
	6.00	D		6.00		End of Borehole at 6.000m

Key: D - Disturbed Sample V - Insitu Vane Test MP - Mackintosh Probe Test

Remarks: Borehole closed at 6.00m upon completion.
No roots observed.





Fastrack Site Investigations Ltd
Unit 9, Tyndales Farm
Southend Road
Maldon CM9 6TQ

Borehole Log

Borehole No.

BH2

Sheet 1 of 1

Project Name: 39 Second Cross Road

Project No.
27818

Site Date:

Hole Type
BH

Location: Rear of 39 Second Cross Road, Twickenham, TW2 5QY

Scale
1:32

Client: GO Contaminated Land Solutions Ltd

Logged By
SE1

Water Strikes	Sample and In Situ Testing			Depth (m)	Legend	Stratum Description
	Depth (m)	Type	Results			
				0.20	TOPSOIL	
				0.80	MADE GROUND	
	1.00	D	MP = 8/75mm MP = 8/75mm MP = 9/75mm MP = 9/75mm	1.30	Mid brown silty, sandy CLAY	1
	2.00	D	MP = 27/75mm MP = 27/75mm MP = 29/75mm MP = 30/75mm		Orange SAND and GRAVEL	2
▼	3.00	D	MP = 30/75mm MP = 30/75mm MP = 31/75mm MP = 32/75mm		2.90m - Water Strike	3
	4.00	D	MP = 33/75mm MP = 33/75mm MP = 33/75mm MP = 35/75mm			4
	5.00	D	MP = 34/75mm MP = 35/75mm MP = 35/75mm MP = 36/75mm			5
	6.00	D		6.00	End of Borehole at 6.000m	6

Key: D - Disturbed Sample V - Insitu Vane Test MP - Mackintosh Probe Test

Remarks: Borehole closed at 6.00m upon completion.
No roots observed.





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Appendix E – Geotechnical Test Results

LABORATORY RESULTS

Property Address: 39 Second Cross Road, Twickenham, TW2 5QY

SAMPLE DETAILS

Investigation date: **26/03/2024**
 Sample details: **Bags as received**
 Samples received: **02/04/2024**
 Schedule recieved: **02/04/2024**
 Samples tested: **04/04/2024 - 09/04/2024**
 Results reported: **09/04/2024**

ANALYSIS REQUESTED

Moisture Content	<input checked="" type="checkbox"/>	PSD	<input checked="" type="checkbox"/>
Liquid Limit	<input checked="" type="checkbox"/>	Soil Suction	<input type="checkbox"/>
Plastic Limit	<input checked="" type="checkbox"/>	Shear Strength	<input type="checkbox"/>
Plasticity Index	<input checked="" type="checkbox"/>	Contamination	<input type="checkbox"/>
Root ID	<input type="checkbox"/>	Root/Tree DNA	<input type="checkbox"/>
Other (please state)			<input type="checkbox"/>

TEST DETAILS

General

Sample descriptions were written in accordance with BS 5930:1999.

Samples were prepared in accordance with BS 1377: Part 1: 1990, section 7

Samples from this contract will be retained for 1 calender month following the issue of this report unless otherwise notified

Written approval is required from Fastrack Site Investigations Limited to reproduce report in full. The results shown within this report only relate to the samples tested

Moisture Content

Samples were tested in accordance with BS 1377: Part 2: 1990, section 3.2 (Oven drying method)

In accordance with Note 1 to paragraph 3.2.4 of BS 1377 Part 2 1990; these moisture contents have been corrected to give the equivalent moisture content of the fraction passing the 425µm sieve, to enable comparison with the liquid & plastic limits. (If condition of test is 'natural' the retained percentage is an estimated value, if condition is 'washed' the percentage is a measured value).

Samples are dried at 105-110°C unless otherwise stated.

Atterberg Limits

Samples were tested in accordance with BS 1377: Part 2: 1990, section 4.3 (4 drop LL), 4.4 (1 drop LL), 5.3 (PL) and 5.4 (PI)
 Test results on samples with a sand content, may show less accurate results. If condition of test is 'washed' results relate to the fraction passing the 425µm sieve only.

* *Driscoll's rules deem the soil to be desicated where the moisture content is less than the value calculated using driscoll's rule 1 and/or 2*

Particle Size Distribution

Samples were tested in accordance with BS 1377: Part 2: 1990 section 9.2 (Wet sieving method)

Undrained Shear Stength

Samples were prepared in accordance with BS 1377: Part 7: 1990 section 8.3 and testing in accordance with BS 1377: Part 7: 1990: section 8.4 (undrained shear strength in triaxial compression without measurement of pore pressure (UU))

Soil Suction

Samples were prepared and tested based on the BRE digest No:IP4/93 (Corrected). 'A method of determining the state of desiccation in clay soils.' (Filter paper method).

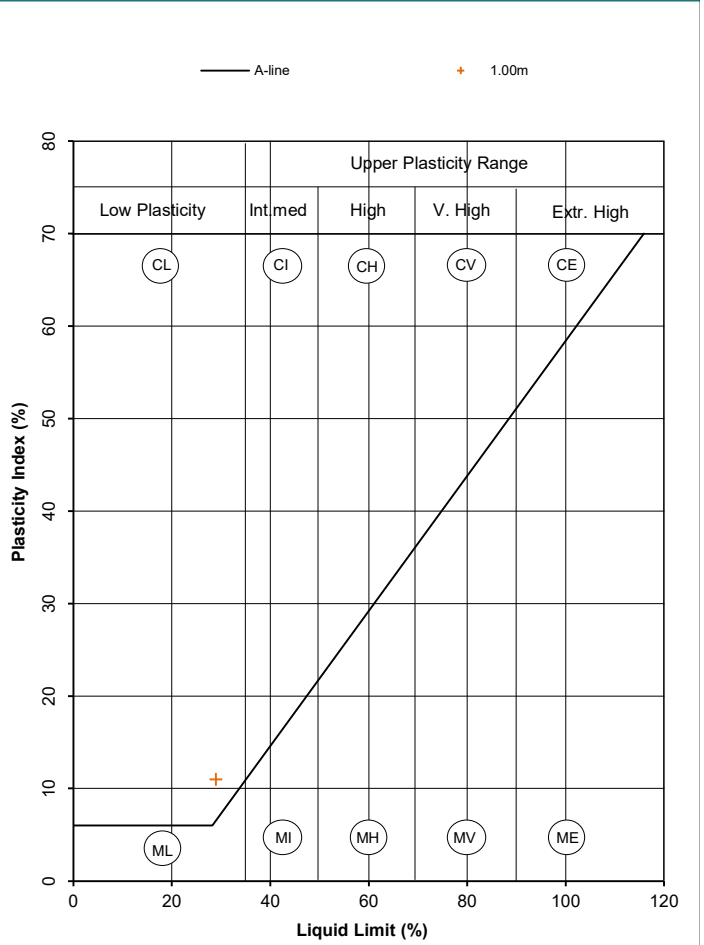
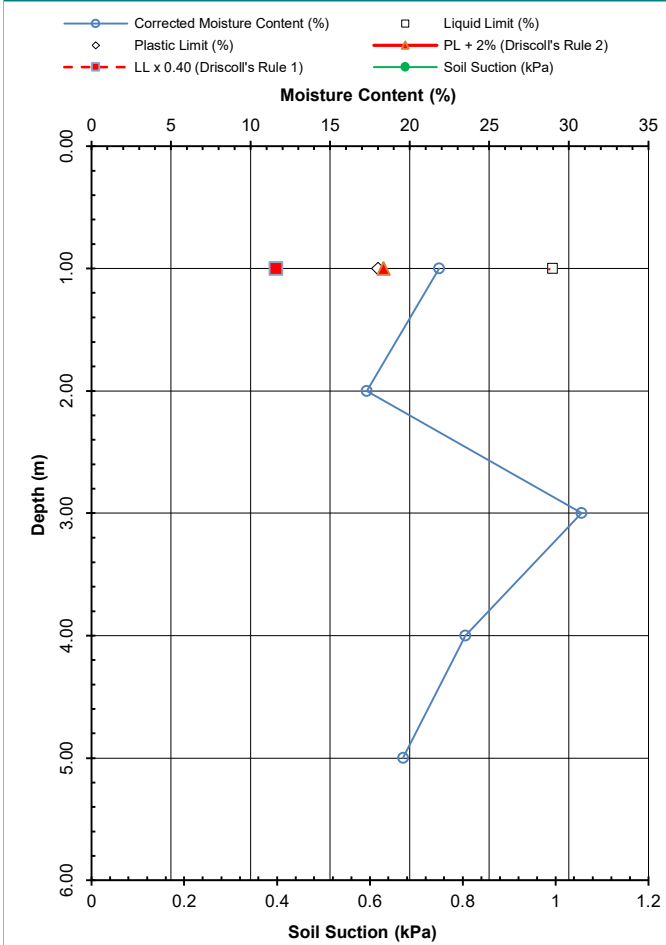
Test results on samples with a sand or silt content, may show less accurate results. Deviation to standard procedure - Polythene bags are not used from weighing filter papers.

LABORATORY RESULTS

Property Address: 39 Second Cross Road, Twickenham, TW2 5QY

BOREHOLE 1

Depth (m)	MC (%)	Corr. MC (%)	LL (%)	PL (%)	PI (%)	Class	% Retained (425µm)	Soil Suction (kPa)	Condition of test	Soil Description
1.00	20.3	21.85	29	18	11	CL	7.1		Natural	Dark brown sandy CLAY containing gravel
2.00	9.6	17.3					44.5		Washed	Brown clayey SAND containing gravel
3.00	22.2	30.79					27.9		Washed	Orange / brown clayey SAND containing gravel
4.00	22.8	23.51					3		Natural	Orange / brown clayey SAND containing gravel
5.00	19	19.59					3		Natural	Orange / brown clayey SAND containing gravel



Comments:

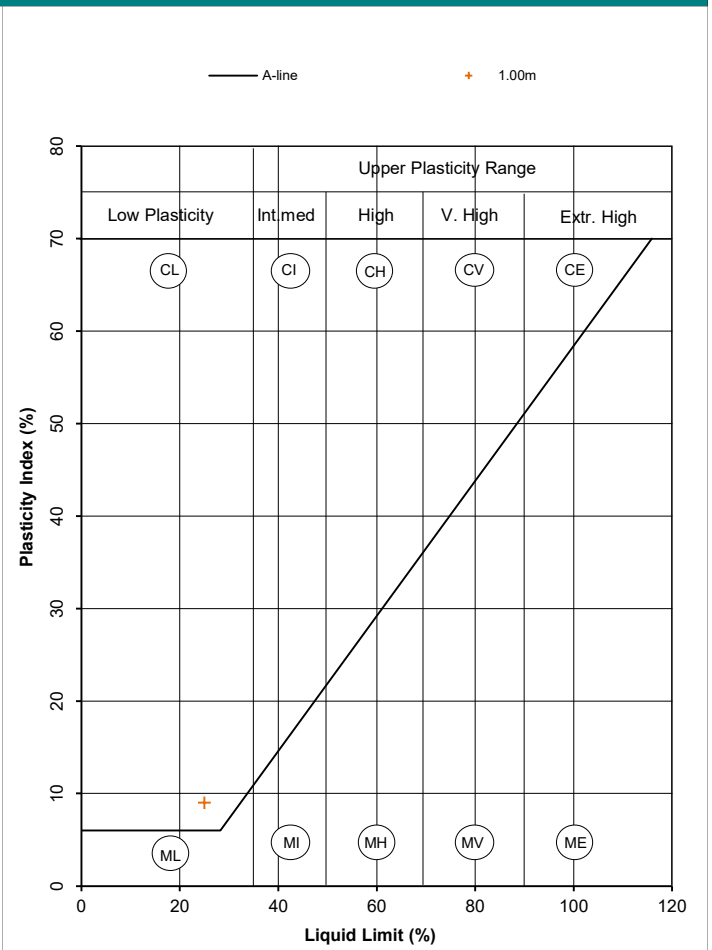
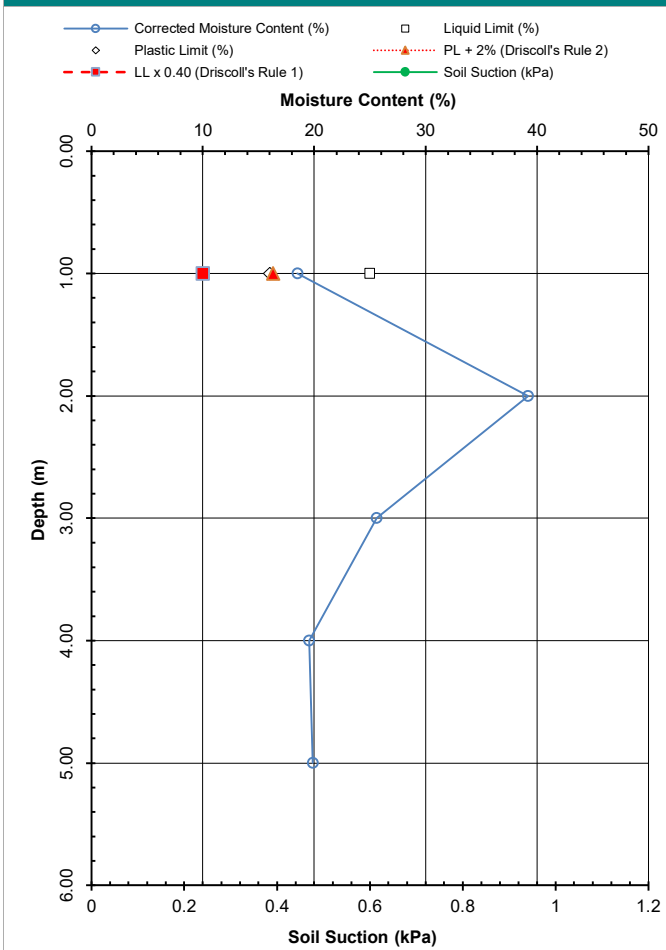
Reported by: Jade McLellan

LABORATORY RESULTS

Property Address: 39 Second Cross Road, Twickenham, TW2 5QY

BOREHOLE 2

Depth (m)	MC (%)	Corr. MC (%)	LL (%)	PL (%)	PI (%)	Class	% Retained (425µm)	Soil Suction (kPa)	Condition of test	Soil Description
1.00	17.7	18.5	25	16	9	CL	4.3		Natural	Brown sandy CLAY containing gravel
2.00	16.4	39.2					58.16		Washed	Orange / brown clayey, sandy GRAVEL
3.00	19	25.61					25.82		Washed	Orange / brown clayey SAND containing gravel
4.00	17.6	19.56					10		Natural	Orange / brown clayey SAND containing gravel
5.00	17.9	19.89					10		Natural	Orange / brown clayey SAND containing gravel



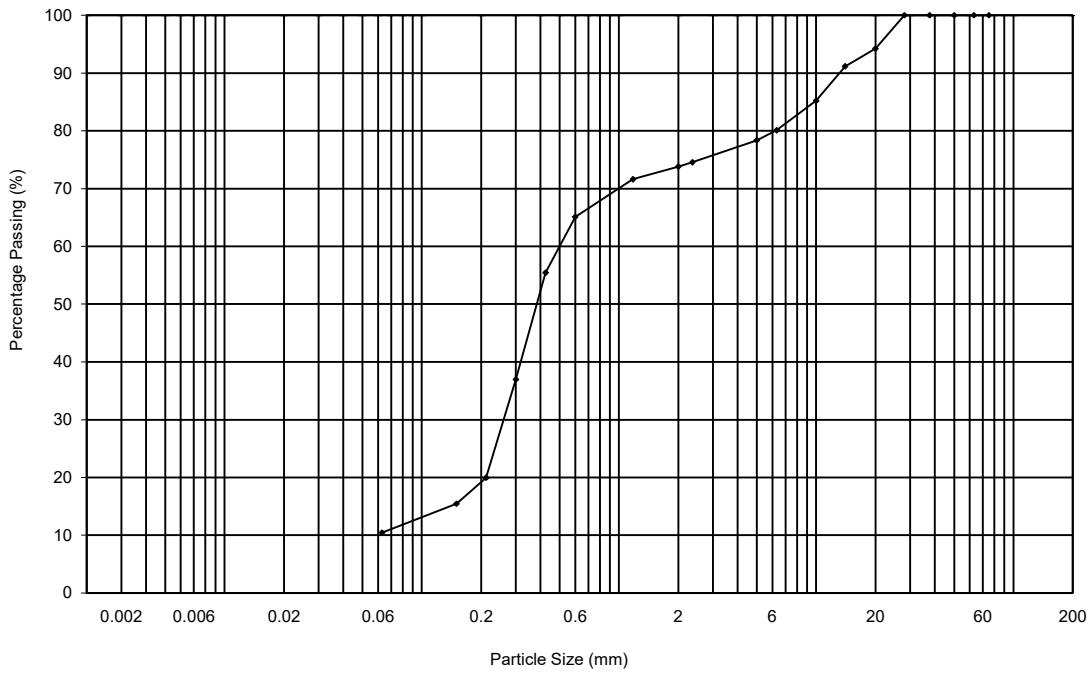
Comments:

Reported by: Jade McLellan

LABORATORY RESULTS

Property Address: 39 Second Cross Road, Twickenham, TW2 5QY

PARTICLE SIZE DISTRIBUTION: BOREHOLE 1 at 2.00m



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES
	SILT			SAND			GRAVEL			

Issued by: Jade McLellan (Laboratory Manager)
 Other



Tel: 01245 223033

Appendix No: 3

Email: enquiries@fastrackgroup.co.uk

FGS Ref: 27818

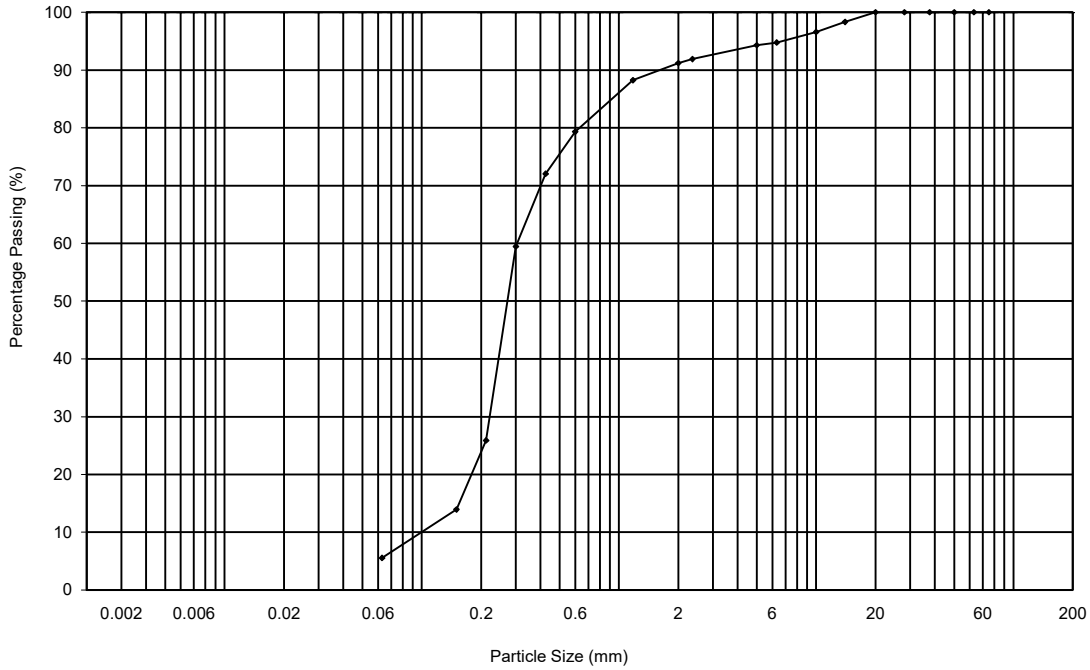
197 - 199 High Street, Maldon, Essex, CM9 5BU

Web: fastracksiteinvestigations.co.uk

LABORATORY RESULTS

Property Address: 39 Second Cross Road, Twickenham, TW2 5QY

PARTICLE SIZE DISTRIBUTION: BOREHOLE 1 at 3.00m



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES
	SILT			SAND			GRAVEL			

Issued by:

- Jade McLellan (Laboratory Manager)
- Other



Tel: 01245 223033

Appendix No: 3

Email: enquiries@fastrackgroup.co.uk

FGS Ref: 27818

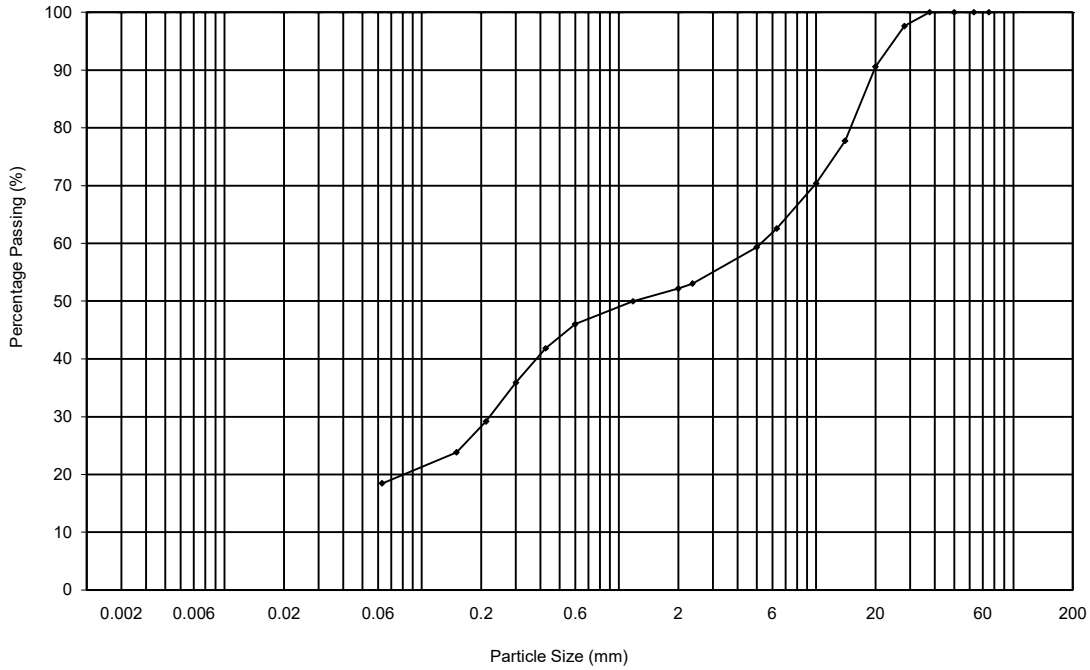
197 - 199 High Street, Maldon, Essex, CM9 5BU

Web: fastracksiteinvestigations.co.uk

LABORATORY RESULTS

Property Address: 39 Second Cross Road, Twickenham, TW2 5QY

PARTICLE SIZE DISTRIBUTION: BOREHOLE 2 at 2.00m



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES
	SILT			SAND			GRAVEL			

Issued by:

- Jade McLellan (Laboratory Manager)
- Other



Tel: 01245 223033

Appendix No: 3

Email: enquiries@fastrackgroup.co.uk

FGS Ref: 27818

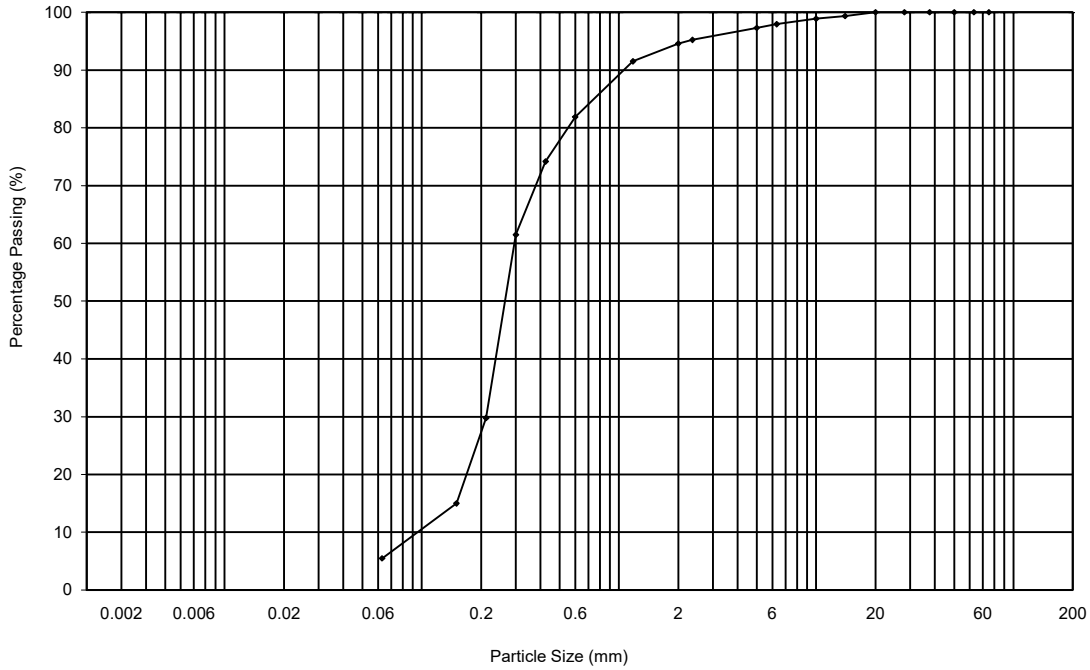
197 - 199 High Street, Maldon, Essex, CM9 5BU

Web: fastracksiteinvestigations.co.uk

LABORATORY RESULTS

Property Address: 39 Second Cross Road, Twickenham, TW2 5QY

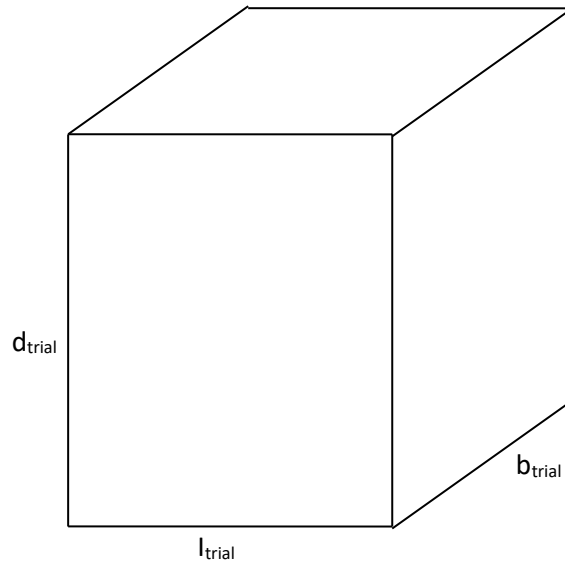
PARTICLE SIZE DISTRIBUTION: BOREHOLE 2 at 3.00m



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES
	SILT			SAND			GRAVEL			

Issued by:

- Jade McLellan (Laboratory Manager)
- Other

Soil Infiltration Rate (BRE Digest 365)

SOAK AWAY TEST NO: 1

Length of Trial Pit $l_{\text{trial}} = 0.30\text{m}$

Width of Trial Pit $b_{\text{trial}} = 0.30\text{m}$

Depth of Trial Pit $d_{\text{trial}} = 1.00\text{m}$

Free Volume (if fill used) $V_{\text{trial}} = 35\%$

75% depth of pit: $d_{75}: (d_{\text{trial}} \times 0.75) = 0.75\text{m}$

50% depth of pit: $d_{50}: (d_{\text{trial}} \times 0.50) = 0.50\text{m}$

25% depth of pit: $d_{25}: (d_{\text{trial}} \times 0.25) = 0.25\text{m}$

Test 1 – time to fall from 75% depth to 25% depth = T1 = **1354 Seconds**

Test 2 – time to fall from 75% depth to 25% depth = T2 = **1898 Seconds**

Test 3 – time to fall from 75% depth to 25% depth = T3 = **2313 Seconds**

Longest time to fall from 75% depth to 25% depth = $T_{\text{lg}} = \text{Max}(T1, T2, T3) = 2313 \text{ Seconds}$

Storage Volume from 75% depth to 25% depth = $V_{p75_25} = (l_{\text{trial}} \times b_{\text{trial}} \times (d_{75} - d_{25})) \times V_{\text{trial}} = 0.045\text{m}^3$

Internal surface area to 50% depth = $A_{p50} = ((l_{\text{trial}} \times b_{\text{trial}}) + (l_{\text{trial}} + b_{\text{trial}}) \times 2 \times d_{50}) = 0.69\text{m}^2$

Surface area of soakaway to 50% storage depth $A_{s50} = 2 \times (l_{\text{trial}} + b_{\text{trial}}) \times d_{\text{trial}} / 2 = 0.60\text{m}^2$

Soil infiltration rate = $F = V_{p75_25} / (A_{p50} \times T_{\text{lg}}) = 28.20 \times 10^{-6} \text{ m/s}$



Unit A2
Windmill Road
Ponswood Industrial Estate
St Leonards on Sea
East Sussex
TN38 9BY
Telephone: (01424) 718618

cs@elab-uk.co.uk
info@elab-uk.co.uk

Certificate of Analysis

THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number: 24-53114

Issue: 1

Date of Issue: 10/04/2024

Contact: Martin Rush

Customer Details: Fastrack Site Investigations Ltd
197-199 High Street
Maldon
EssexCM9 5BU

Quotation No: Q24-04367

Order No: 500/27818

Customer Reference: 27818

Date Received: 04/04/2024

Date Approved: 10/04/2024

Details: 39 Second Cross Road, Twickenham, TW2 5QY

Approved by: 

Ben Rees, Customer Services Assistant



Sample Summary

Report No.: 24-53114, issue number 1

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
357117	BH1 1.00	26/03/2024	04/04/2024	Silty loam	
357118	BH1 3.00	26/03/2024	04/04/2024	Sand	
357119	BH2 1.00	26/03/2024	04/04/2024	Sandy loam	
357120	BH2 3.00	26/03/2024	04/04/2024	Sand	



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Results Summary

Report No.: 24-53114, issue number 1

ELAB Reference	357117	357118	357119	357120
Customer Reference				
Sample ID				
Sample Type	SOIL	SOIL	SOIL	SOIL
Sample Location	BH1	BH1	BH2	BH2
Sample Depth (m)	1.00	3.00	1.00	3.00
Sampling Date	26/03/2024	26/03/2024	26/03/2024	26/03/2024

Determinand	Codes	Units	LOD				
Soil sample preparation parameters							
Moisture Content	N	%	0.1	14.9	16.8	13.2	15.5
Material removed	N	%	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Description of Inert material removed	N		0	None	None	None	None
Anions							
Water Soluble Sulphate	M	g/l	0.02	0.04	< 0.02	< 0.02	< 0.02
Miscellaneous							
pH	M	pH units	0.1	8.3	8.7	7.8	8.4

Report Information

Report No.: 24-53114, issue number 1

Key

U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
*	UKAS accreditation not applicable for sample matrix
S	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
NS	Subcontracted to approved laboratory. UKAS accreditation is not applicable.
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"

LOD LOD refers to limit of detection, except in the case of pH soils and pH waters where it means limit of discrimination.
Soil sample results are expressed on an air dried basis (dried at < 30°C), and are uncorrected for inert material removed.
ELAB are unable to provide an interpretation or opinion on the content of this report.
The results relate only to the sample received.
PCB congener results may include any coeluting PCBs
Uncertainty of measurement for the determinands tested are available upon request
Unless otherwise stated, sample information has been provided by the client. This may affect the validity of the results.

Deviation Codes

-
- | | |
|---|--|
| a | No date of sampling supplied |
| b | No time of sampling supplied (Waters Only) |
| c | Sample not received in appropriate containers |
| d | Sample not received in cooled condition |
| e | The container has been incorrectly filled |
| f | Sample age exceeds stability time (sampling to receipt) |
| g | Sample age exceeds stability time (sampling to analysis) |

Where a sample has a deviation code, the applicable test result may be invalid.

Sample Retention and Disposal

All soil samples will be retained for a period of one month
All water samples will be retained for 7 days following the date of the test report
Charges may apply to extended sample storage

TPH Classification - HWOL Acronym System

HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
2D	GC-GC - Double coil gas chromatography
#1	EH_Total but with humics mathematically subtracted
#2	EH_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry

End of Report