

**PHASE 2 GEO-ENVIRONMENTAL INVESTIGATION
of a site at
LAND ON THE EAST SIDE OF NEWPORT ROAD,
HAYES, UB4 8JX
for
WESTWAY CONSTRUCTION LTD**



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Land
Solutions**

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1 EXECUTIVE SUMMARY

The phase 1 environmental report by Aviron Associates Limited, identified potential sources of contamination to include made ground on-site and former site use as a depot, and a potential risk of ground gas from infilled land and ponds.

The proposed site usage is residential.

In this investigation elevated levels of lead have been recorded within samples taken from boreholes positioned across the site. At these levels there is a potential risk to on-site and off-site receptors and appropriate remediation is required.

Areas where the development is proposed to comprise of buildings and hardstanding do not pose a significant risk to on-site and off-site receptors therefore made ground can remain in these areas. Where areas of communal soft landscaping and private gardens are proposed a barrier should be placed between any remaining contamination and on-site receptors in the form of 300mm of clean soil to communal soft landscaped areas, and 600mm in the more sensitive private garden areas of the site. Alternatively, contaminated material can be removed down to a depth of natural ground, whichever is less.

Monitoring was undertaken for land gas. Comparing the results to the NHBC Traffic Lights Gas Risk Assessment, the site classifies as green or Characteristic Situation 1 when compared to the CIRIA C665 guidance. Therefore, gas protection measures are not necessary.

If any potentially contaminated spoil is to be removed from site, the Waste Acceptance Criteria (WAC) testing should be agreed with the facility to which the spoil is being transported.

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 London Clay bedrock, with superficial Boyn Hill Gravel Member deposits. Made Ground was encountered across the site to a maximum depth of approximately 1.00m with Clayey SAND & GRAVEL underlying the Made Ground.

The Made Ground was encountered to a maximum depth of 1.00m, and foundations should be taken at least 300mm past this to ensure natural ground is encountered, which means a minimum depth of 1.30m.

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 bedrock.

The five boreholes drilled on this site were all found to contain standing water on completion of drilling, at; 3.20m in BH1, 2.60m in BH2, 2.20m in BH3, 2.20m in BH4 and 2.10m in BH5. In the short term this would indicate that excavations on this site are likely to be affected by water inflows, with the groundwater levels likely to be at a depth of 2.10m. However, water monitoring standpipes were installed to assess long term groundwater levels and allow for gas monitoring.

The material encountered on this site at shallow depth was found to be of a generally granular nature, which would indicate that sides of excavations are unlikely to be self-supporting, certainly in the long term. However, 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.

It is recommended that this report is referenced in the site Health and Safety Plan and that normal good hygiene practice is observed during the works and subsequent building and grounds maintenance.

Risk Summary

Very Low	Low	Moderate / Low	Moderate	High
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		Receptors					
Sources		Site Users	Ground Workers	Neighbours	Proposed Building	Aquifer	Watercourse
	Made ground on-site and former site use as a depot (Lead) (On Site)						

2 BRIEF

Mr Jazz Lall of The Property Planner, acting on behalf of Westway Construction Ltd, instructed GO Contaminated Land Solutions to undertake a phase 2 geo-environmental investigation of the site at Land On The East Side Of Newport Road, Hayes, UB4 8JX.

This report should be read in conjunction with the phase 1 geo-environmental risk assessment, ref.17-222.01: V1 by Aviron Associates Limited issued in April 2020.

It is our understanding that the existing industrial units on site are to be demolished and a residential apartment building with undercroft access to a rear carpark developed in their place.

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 desk study provided and of 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. Monitoring wells have been installed, to allow for groundwater samples, gas monitoring and also to assess groundwater levels. All depths stated within this report and on the borehole logs are depths below the ground level surrounding the borehole locations.

3 INVESTIGATION STRATEGY

The phase 1 environmental report identified potential sources of contamination to include made ground on-site and former site use as a depot, and a potential risk of ground gas from infilled land and ponds. Contamination testing and ground gas monitoring was recommended.

The principles of the strategy are to:

- Identify the nature and extent of any contamination in the made ground across the site.
- Assess the ground gas regime across the site.

- Assess the geotechnical characteristics of the site, and inform suitable foundation options.

Non-targeted sampling has been used, as no point sources of contamination have been identified on-site.

Non-targeted sampling has been used where contamination location is unknown.

3.1 Contamination sampling

Location Reference	Rationale for Location	Depth (mbgl)	Sampling, Testing & Monitoring
BH1-BH6	Samples were located to cover the site	0.2/0.3-0.5/0.6	Samples from near surface or immediately below hard surfacing. Tested for metals, hydrocarbons, PAHs & asbestos

3.2 Gas Monitoring

Location Reference	Rationale for Location	Depth (mbgl)	Sampling, Testing & Monitoring
BH3, 4 & 5 WS4*	Boreholes located to cover the site	2.15* – 3.45	Monitoring for gas and groundwater

*WS4 is a borehole discovered on site from a previous investigation. The borehole was monitored for gas on the third and final visit.

3.3 Geotechnical sampling

Location Reference	Rationale for Location	Depth (mbgl)	Sampling, Testing & Monitoring
BH1-BH5	Samples were located to cover the site	5.0-15.0	In situ and laboratory geotechnical testing.

4 SITE DESCRIPTION

The site current comprises an L shape structure located along the southern and eastern boundary and a small structure situated in the north-western corner. The L shape structure houses an IT consultant and an overseas shipping and delivery business.

The site is surrounded by commercial activity within a small industrial estate, with residential properties beyond.

5 SITE WORKS

5.1 Programme

The site works were undertaken on 11 May 2021.

5.2 Boreholes

A total of six boreholes were mechanically drilled to depths of between 5 and 15m below ground level.

One borehole was hand augered to a depth of 0.5m.

Two trial pits were hand dug for percolation testing.

Three monitoring wells were also installed within boreholes 3-5 to provide groundwater and gas readings. The locations of the boreholes carried out are marked on the site plan within Appendix B and the borehole logs included as Appendix D.

Within the boreholes, disturbed samples were taken at 1.00m intervals. Insitu strength tests, in the form of hand-held shear vane tests, mackintosh probe tests and Standard Penetration tests were also performed within the Sub soil at 1.00m & 1.50m intervals. The results of all insitu strength tests are recorded on the borehole logs within Appendix D.

6 GROUND CONDITIONS

6.1 Geological Survey

Reference to the geological survey of Great Britain indicates that beneath made ground, the area generally is underlain by superficial deposits comprising sand and gravel which is described as the Boyn Hill Gravel Member.

The superficial deposits are underlain by bedrock comprising clay and silt described as the London Clay Formation.

6.2 Hydrogeology

The Environment Agency maps show the site to be located over a Secondary A Aquifer in the superficial or drift deposits, in the bedrock they show the site to be over a Unproductive Strata.

Unproductive Strata are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

6.3 Hydrology

The nearest surface water feature, appears to be an unnamed feature, approximately 700 metres to the northeast. This is considered to be too distant to be significantly impacted by the site.

The Environment Agency maps show the site is not located within a flood zone.

The British Geological Society data shows the site lies in an area with of groundwater flooding to occur at surface.

7 PROPOSED DEVELOPMENT

Plan details for the proposed redevelopment of the site are shown on the ON Architecture drawing contained in appendix C.

The drawing shows a development comprising a multi storey block of flats including parking facilities, cycle and bin storage, communal soft landscaping and private external terraces. Access to the property is gained via a dedicated entrance from Newport Road.

8 GEOTECHNICAL INVESTIGATION

8.1 Borehole Findings

i. Overview

Five 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 15.00m and all boreholes encountered very similar profiles which matched the expected underlying geology of superficial Boyn Hill Gravel deposits underlain by London Clay bedrock.

Borehole 1 was drilled utilising a shell and auger drilling rig to provide details on the geology beneath the site, boreholes 2 to 5 were drilled utilising a mechanical flight auger drilling rig to provide details on the geology beneath the site and also allowed monitoring wells to be installed.

The ground conditions encountered are summarised in the following tables. Full records are contained in appendix D.

Stratum	BH1	BH2	BH3
(Reinforced) CONCRETE	G.L. – 0.03m	G.L. – 0.15m	G.L. – 0.15m
Brick and Hardcore/Rubble FILL	0.03m – 1.00m	-	0.15m – 0.30m
Mid-Dark Brown (Silty) Sandy Clayey MADE GROUND	-	0.15m – 0.70m	0.30m – 0.80m
Clayey SAND and GRAVEL	1.00m – 4.50m	0.70m – 4.70m	0.80m – 4.00m
Silty Sandy CLAY containing Gravel	4.50m – 6.00m	4.70m – 5.00m	4.00m – 5.00m
Silty CLAY	6.00m – 15.00m	-	-

Stratum	BH4	BH5
(Reinforced) CONCRETE	G.L. – 0.15m	G.L. – 0.15m
Mid-Dark Brown (Silty) Sandy Clayey MADE GROUND	0.15m – 0.70m	0.15m – 0.70m
Clayey SAND and GRAVEL	0.70m – 4.80m	0.70m – 4.95m
Silty Sandy CLAY containing Gravel	4.80m – 5.00m	4.95m – 5.00m

ii. Made Ground

Made Ground was encountered to a maximum depth of 1.00m and consisted of Brick & Hardcore/Rubble FILL and (Silty) Sandy CLAY with varying amounts of Brick fragments and Flint Gravel. The areas from which the boreholes were drilled was covered with CONCRETE noted to be 0.03m-0.15m thick.

iii. Clayey SAND and GRAVEL

Below the FILL/MADE GROUND, Mid Brown/Orange Clayey SAND & GRAVEL was recorded; this stratum was proved to a depth of 4.95m and is recognised as the superficial Boyn Hill Gravel member. Slight variations in Flint Gravel content were noted throughout this stratum across the site.

Insitu SPT testing and mackintosh probe tests within this stratum found it to be Dense (N Value = 42-54, Mackintosh probe result = 46-97blows for 75mm travel and 100blows for 50mm travel).

iv. Silty Sandy CLAY containing Gravel

Beneath the Clayey SAND & GRAVEL, Mid Brown/Grey Silty Sandy CLAY containing Flint Gravel was encountered. This stratum was noted to the base of boreholes 2-5 and to a maximum depth of 6.00m within borehole 1, it is recognised as the changeover point between the superficial Boyn Hill Gravel member and the London Clay bedrock.

Insitu SPT, Mackintosh Probe and Shear Vane testing within this stratum found it to be Firm-Stiff to Stiff/Medium Dense to Dense (N Value = 10-16, Mackintosh probe result = 40-46blows for 75mm travel, Shear Vane = 130-140kPa).

v. Dark Brown/Blue Silty CLAY

Dark Brown/Blue Silty CLAY was noted to the base of borehole 1, a maximum depth of 15.00m, and is recognised as the London Clay Bedrock.

Insitu SPT testing within this stratum found it to be Stiff (N Value = 21-31).

vi. Insitu Testing

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

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.

The Standard Penetration Test (SPT) measures the number of blows taken to drive the probe 300mm into the soil using the drop of a 63.5kg hammer. The Standard Penetration Test gives an indication of soil density.

vii. Root Activity

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

viii. Groundwater

All boreholes encountered water strikes during drilling, these were at 3.50m below ground level in BH1, 3.10m below ground level in BH2, 3.30m below ground level in BH3, 3.20m below ground level in BH4 and 3.10m below ground level in BH5. On completion of drilling these water levels were noted at 3.20m below ground level in BH1, 2.60m below ground level in BH2, 2.20m below ground level in BH3, 2.20m below ground level in BH4 and 2.10m below ground level in BH5. In the short term this suggests that the groundwater lies at a depth of 2.10m below ground level. Monitoring wells were installed in Boreholes 3 to 5 to allow groundwater levels to be monitored.

It should be noted that comments on groundwater conditions are based on observations made at the time of the investigation (May 2021) and that changes in groundwater levels are likely to arise due to seasonal affects and changes in drainage conditions.

8.2 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 section 8.4 and recorded as test sheets and summaries within Appendix J.

The laboratory testing conducted on the samples taken during this investigation comprised of, natural moisture contents (35No.), classification testing using Atterberg limits testing to determine the plasticity of the fine soils encountered (3No.), Particle Size Distribution testing (16No.) and sulphate content and pH (4No.).

8.3 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 little moisture content due to the SAND and GRAVEL close to the surface having poor ability to retain water within the large pores, the water is able to infiltrate through it. Below the SAND and GRAVEL the moisture content increases, this is due to the pores in the CLAY underlying the SAND and GRAVEL being very small and able to retain the water through its cohesive properties. This causes the pores to remain filled with water unable to drain away, therefore causing higher moisture contents.

Atterberg Limits Testing found that the underlying London Clay falls into soil class CV of the British Soil Classification System. The results show the samples to be very high plasticity. The plastic indices were found to range from 42-45%, this indicates that the Clay is of generally high (>40%) susceptibility to shrinkage and swelling with changes in moisture content.

Borehole	Depth	MC	LL	PL	PI	CLASS
BH1	5.00m	38.27	76	31	45	CV
	7.00m	27.00	74	30	44	CV
	9.00m	28.30	72	30	42	CV

ii. Sulphate and pH Tests

Four soil samples were tested for sulphate and pH from the area in which the new residential appartement building is proposed to be built. The soil samples tested gave water soluble sulphate 2:1 results ranging from a minimum of 0.05g/l to a maximum of 0.18g/l. The samples ranged from a pH of 7.6 to a pH of 8.9. 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 - Mobile Water).

iii. Particle Size Distribution Tests

Particle size distribution tests were carried out on samples from BH1 at 1.00m, 2.00m, 3.00m & 4.00m, BH2 at 1.00m, 2.00m & 3.00m, BH3 at 1.00m, 2.00m & 3.00m, BH4 at 1.00m, 2.00m & 3.00m and BH5 at 1.00m, 2.00m & 3.00m. The results of the tests confirm that the stratum above the London Clay is coarse Clayey SAND and GRAVEL. The results are shown on the graphs in appendix 3.

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

8.4 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 London Clay bedrock, with superficial Boyn Hill Gravel Member deposits. Made Ground was encountered across the site to a maximum depth of approximately 1.00m with Clayey SAND & GRAVEL underlying the Made Ground.

ii. Foundation Options

It is understood that the existing industrial units on site are to be demolished and a residential apartment building with undercroft access to a rear carpark developed in their place. 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 Clayey SAND & GRAVEL and London Clay. Made Ground is an inherently variable material 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 1.00m, and foundations should be taken at least 300mm past this to ensure natural ground is encountered, which means a minimum depth of 1.30m.

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 bedrock.

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 1.30m-3.00m depth, the ground was found to be Clayey SAND and GRAVEL with a Mackintosh probe reading of 46-94 blows for 75mm travel and SPT N-Value of 42-54, indicating the material at 1.30m to 3.00m to be Dense with a bearing capacity of >600kN/m².

For calculation of the bearing capacities available at 1.30m to 3.00m, we have used the lowest Mackintosh probe/SPT reading at each depth. Based on Hansen (1968) and Tomlinson (2001), 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	1.30m	2.00m	3.00m
Mackintosh probe	46 blows for 75mm travel	46 blows for 75mm travel	58 blows for 75mm travel
Bearing capacity	255kN/m ²	492kN/m ²	611kN/m ²

However, water was noted to be present from a depth of 2.10m which could reduce bearing capacities by up to 50%. Therefore, we would recommend using a bearing capacity of 127-305kN/m² across this site at 1.30m-3.00m depth.

iv. Ground Conditions & Construction

The five boreholes drilled on this site were all found to contain standing water on completion of drilling, at; 3.20m in BH1, 2.60m in BH2, 2.20m in BH3, 2.20m in BH4 and 2.10m in BH5. In the short term this would indicate that excavations on this site are likely to be affected by water inflows, with the groundwater levels likely to be at a depth of 2.10m. However, water monitoring standpipes were installed to assess long term groundwater levels and allow for gas monitoring. Ground water during subsequent monitoring visits was identified at a maximum level of 1.95mbgl in BH3. Levels of ground water ranged from 1.95 to 2.45mbgl across all boreholes monitored. No groundwater was detected in BH4 and BH5 on the third and final monitoring visit.

The material encountered on this site at shallow depth was found to be of a generally granular nature, which would indicate that sides of excavations are unlikely to be self-supporting, certainly in the long term. However, 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.

v. Soakaway Testing

Two soakaway tests were carried out on this site, one at the rear and one at the front of the site. The test pits were 300mm x 300mm and 1000mm deep. The soakaway test in test pit 1 (SW1) shows that the water drained from 75% full to 25% full in 432 seconds in the first test, 905 seconds in the second test and 909 seconds in the third test. Using the

slowest of the three rates a soil infiltration rate of 71.75×10^{-6} m/s is calculated for this location. The soakaway test in test pit 2 (SW2) shows that the water drained from 75% full to 25% full in 482 seconds in the first test, 688 seconds in the second test and 1267 seconds in the third test. Using the slowest of the three rates a soil infiltration rate of 51.47×10^{-6} m/s is calculated for this location. The calculation can be seen in appendix I and the test pit locations can be seen on the site plan in appendix B.

9 CONTAMINATION SAMPLING and TESTING

9.1 Laboratory Testing

The chemical testing was carried out in accordance with standard industry methods in a UKAS approved laboratory which is also currently accredited in accordance with MCERTS for the majority of its testing. Further information regarding this accreditation is available on request together with a full list of test methods if required.

All samples were tested for a range of commonly occurring contaminants and indicators of contamination including those given by the Contaminated Land Exposure Assessment (CLEA). These include, heavy metals, aromatic and aliphatic hydrocarbons, in accordance with Environment Agency guidelines, and speciated PolyAromatic Hydrocarbon (PAH) only.

All samples were analysed for the presence of asbestos.

9.2 Test Results

All the results have been compared to the Atkins 2017 ATRISKsoil SSVs for residential without plant uptake, for 1% SOM, where available. These guideline values have been derived using the updated CLEA v1.071 model, previously published Category 4 Screening Levels (C4SLs) by DEFRA and information in the Environment Agency guidance SR2. Where ATRISKsoil SSVs have not been derived, the Category 4 Screening Levels have been used, and for determinands which do not have either of the above, the LQM/CIEH Suitable 4 Use Levels (S4ULs) assessment criteria have been used.

To assess the genotoxic poly-aromatic hydrocarbons (PAHs), the benzo-a-pyrene (BaP) surrogate marker approach has been adopted. The results for genotoxic PAHs have been compared to the soil PAH coal tar mixtures used in the Culp et al 1998 study, to determine if they are sufficiently similar and establish if benzo-a-pyrene is a suitable surrogate marker for PAHs.

The LQM PAH profiling tool has been used to confirm the validity of the surrogate marker approach. The results show that it is appropriate to use benzo-a-pyrene as a surrogate marker for this data set. The results of this profiling are available in appendix I.

TEST RESULTS ABOVE SCREENING VALUES				
Determinand	Reference	Depth	Value (mg/kg)	Screening value (mg/kg)
Lead	BH2	0.20 - 0.50	383	313
	BH6	0.20 - 0.50	380	

No asbestos was identified in any of the samples.

9.3 Gas Monitoring

The hazardous ground gas(es) identified to pose a threat to the development is/are methane and carbon dioxide. The table below summarises the maximum values recorded at each borehole during each visit.

3no. boreholes were drilled and fitted with gas and groundwater standpipes. £no. monitoring visits were carried out. During the 3rd visit an additional borehole drilled by others (WS4) was identified on site and monitored for ground gas.

Date	Borehole Ref.	Maximum Carbon Dioxide %v/v	Maximum Methane %v/v
27/05/21	BH3	0.0	0.0
	BH4	0.0	0.0
	BH5	0.0	0.0
03/06/21	BH3	0.0	0.0
	BH4	0.1	0.0
	BH5	0.0	0.0
23/06/21	BH3	0.1	0.0
	BH4	0.1	0.0
	BH5	0.1	0.0
	WS4	2.2	0.0

Atmospheric pressures ranged from 1011 to 1018, allowing for monitoring in variety of pressure conditions. No flow rates were detected. The results of the monitoring showed no methane presence on site. A maximum Carbon dioxide concentration of 2.2 %v/v was detected in WS4 on the final visit.

As no detectable gas flow rate has been recorded, the instrument level of detection of 0.1l/hr has been used to calculate the GSV:

$$\text{GSV} = \text{flow rate (l/h)} \times \text{maximum gas value (\%v/v)}$$

$$\text{GSV} = 0.1\text{l/h} \times 2.2/100 = 0.0022 \text{ l/h}$$

The Carbon Dioxide concentration of 2.2 %v/v was used to calculate a GSV value of 0.0022 l/h. Comparing the results to the NHBC Traffic Lights Gas Risk Assessment, the site classifies as green or Characteristic Situation 1 when compared to the CIRIA C665 guidance. Therefore, gas protection measures are not necessary.

The full results of the monitoring are included within appendix F.

10 CONTAMINATION DISCUSSION

In this investigation samples were tested for a range of commonly occurring contaminants and indicators of contamination including those given by the Contaminated Land Exposure Assessment (CLEA).

The only contaminant identified to exceed the environmental screening level was lead.

No olfactory evidence of contamination (such as vapours) was identified during sampling. No visual evidence of contaminants, such as oils, were noted.

All samples were screened in the laboratory for the presence of asbestos fibres. No asbestos was identified in any of the samples.

The lead exceedances identified pose a risk to on-site and off-site receptors and appropriate remediation is required. However, lead is not a highly mobile contaminant, therefore it is unlikely to travel large distances or have a significant impact on the aquifer within the superficial deposits. Areas where the development is proposed to comprise of buildings and hardstanding do not pose a significant risk to on-site and off-site receptors therefore made ground can remain in these areas. Where areas of communal soft

landscaping and private gardens are proposed a barrier should be placed between any remaining contamination and on-site receptors in the form of 300mm of clean soil to communal soft landscaped and 600mm in the more sensitive private garden areas of the site. Alternatively, contaminated material can be removed down to a depth of natural ground, whichever is less.

Monitoring was undertaken for land gas. Comparing the results to the NHBC Traffic Lights Gas Risk Assessment, the site classifies as green or Characteristic Situation 1 when compared to the CIRIA C665 guidance. Therefore, gas protection measures are not necessary.

If any potentially contaminated spoil is to be removed from site, the Waste Acceptance Criteria (WAC) testing should be agreed with the facility to which the spoil is being transported. It is critical that the WAC results are representative of the material to be disposed of and therefore care must be taken to ensure that different materials are not mixed. Guidance can be obtained from Environment Agency document Waste Sampling and Testing for Disposal to Landfill.

11 REVISED CONCEPTUAL MODEL

The legislative framework for the regulation of contaminated land is embodied in Part IIA of the Environmental Protection Act 1990, implemented in the Contaminated Land (England) Regulations 2000. This legislation allows for the identification and remediation of land where contamination is causing unacceptable risks to human health or the wider environment. The approach adopted by UK contaminated land policy is that of “suitability for use” which implies that the land should be suitable for its current use and made suitable for any proposed future use.

In this contamination assessment the site has been modelled using the Source-Pathway-Receptor approach to produce a site specific conceptual model.

Source - substances or potential contaminants which may cause harm

Pathway - a linkage or route between a source and receptor

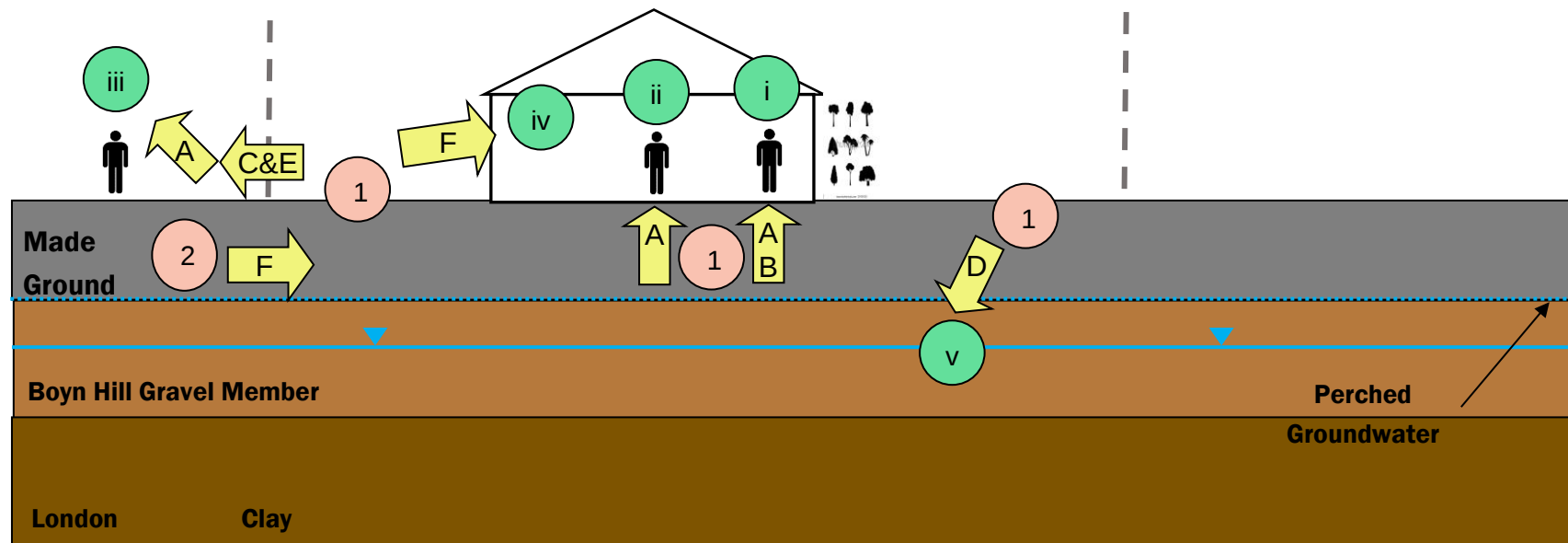
Receptor - humans, plant life, groundwater etc., which could be harmed by a contaminant

Geological records indicate that the site is underlain by an aquifer in the superficial stratum and therefore there is a potential for contaminants to be transported both to and from site in the groundwater.

From the information available at present a conceptual model has been considered.

		POTENTIAL PATHWAYS												
		Inhalation of contaminated vapour	Inhalation of contaminated dust	Direct Soil Ingestion	Direct dermal contact	Inhalation of asbestos	Drinking contaminated water supply	Direct contact of soil with building materials	Surface water run-off	Surface water percolation to	Migration via groundwater	Build-up of ground gas - methane		
		COMMENTS ON DISCOUNTED PATHWAYS												
RECEPTORS	Site Users/ Residents	N	Y	N	Y	N	Y					N	Lead only exceedance identified, therefore vapour pathway no longer considered. No asbestos identified in any of the samples	No significant ground gas volume or flow rate detected
	Construction/ Maintenance Operatives	N	Y	Y	Y	N						N		
	Neighbours	N	Y			N		Y		Y	N			
	Proposed Building						N				N	Ground conditions assessed. design sulphate class for this site is DS-1, with an ACEC class of AC-1		
	Watercourse								N		N		No watercourse of potential significance identified	
	Aquifer									Y				

Schematic Conceptual Model



Sources	Pathways	Receptors
1 Made ground on-site and former site use as a depot (On Site)	A Inhalation, ingestion, dermal contact	i Residents & Site User
2 Infilled land and ponds (Off Site)	B Drinking contaminated water supply	ii Ground Workers
	C Surface water run-off	iii Neighbours
	D Surface water percolation to groundwater	iv Proposed Building
	E Migration via groundwater	v Groundwater (Secondary A Aquifer)
	F Vertical and lateral migration of soil gases	

12 REVISED RISK ASSESSMENT

The level of information provided by the Landmark report and historic Ordnance Survey maps, together with the other information within the report is considered suitable to provide the data for a satisfactory risk assessment for the site. While there will always be uncertainties due to known or unknown gaps in information it is considered that sufficient information is available to reduce those uncertainties to within acceptable limits for the nature of the site under review.

An asbestos survey of existing structures and infrastructure (as defined under Section 5(a) of the Control of Asbestos Regulations 2012) was beyond the brief of this report. The risk assessment has been undertaken on the basis that should asbestos be identified within buildings or infrastructure, these materials will be removed appropriately by licensed contractors and asbestos materials disposed of in accordance with legal requirements prior to demolition or other works in order to avoid contaminating soils at the site.

Only contaminants identified to exceed the environmental screening level have been included in the Risk Assessment.

Sources	Potential pollutant	Receptor	Pathway	Hazard severity	Likelihood of occurrence	Risk / Significance	Comment & control measures
Made ground on-site and former site use as a depot (On Site)	Lead	Site Users	Dermal contact	Mild	Likely	Moderate/Low risk	Remediation of areas of soft landscaping.
			Soil Ingestion	Mild	Low likelihood	Low risk	
			Inhalation of contaminated dust	Mild	Likely	Moderate/Low risk	
			Drinking of water from supply impacted by contaminated soil	Mild	Likely	Moderate/Low risk	A barrier water supply pipe may be required by water supply company. It is recommended that this report is provided to the water supplier with a request for the testing, if any, that they require.
Made ground on-site and former site use as a depot (On Site)	Lead	Ground Workers	Dermal contact	Mild	Likely	Moderate/Low risk	Information to be contained in site Health & Safety Plan and File. Use of appropriate PPE and normal good hygiene measures. Appropriate dust control measures during construction.
			Soil Ingestion	Mild	Low likelihood	Low risk	
			Inhalation of contaminated dust	Mild	Likely	Moderate/Low risk	

Sources	Potential pollutant	Receptor	Pathway	Hazard severity	Likelihood of occurrence	Risk / Significance	Comment & control measures
Made ground on-site and former site use as a depot (On Site)	Lead	Neighbours	Inhalation of contaminated dust (during construction)	Mild	Likely	Moderate/Low risk	Appropriate dust control measures during construction.
			Inhalation of contaminated dust (after construction)	Mild	Likely	Moderate/Low risk	Remediation of areas of soft landscaping.
			Surface water run-off	Mild	Low likelihood	Low risk	No action required.
			Lateral migration of groundwater transporting contaminants	Mild	Low likelihood	Low risk	No action required.

Sources	Potential pollutant	Receptor	Pathway	Hazard severity	Likelihood of occurrence	Risk / Significance	Comment & control measures
Made ground on-site and former site use as a depot (On Site)	Lead	Aquifer	Vertical percolation to groundwater via Foundations	Mild	Low likelihood	Low risk	No action required.
			Vertical percolation to groundwater via soft landscaped and permeable areas	Mild	Low likelihood	Low risk	No action required.
			Percolation to groundwater via SuDS	Mild	Low likelihood	Low risk	No action required.

Any visual or olfactory evidence of contamination noted during works should be investigated by a suitably qualified person and their recommendations implemented.

13 SITE WORKS and UNEXPECTED CONDITIONS

The sample locations were positioned to cover the site. However, there are areas where investigations were not carried out, and although unlikely given the size of the site, it should be considered possible that other areas may potentially be contaminated. Construction operatives should remain vigilant for any unexpected contamination encountered during development (eg discoloured soil or odours or buried waste). Any unexpected conditions should be investigated by a suitably qualified person and their recommendations implemented.

It is recommended that construction operatives use appropriate ppe, normal good hygiene measures, and appropriate dust control measures if necessary. The risks to construction operatives identified, should be addressed under a Construction (Design and Management) (CDM) Plan. The CDM Regulations place legal duties on those involved in construction work. All construction projects require a plan to ensure that health and safety issues are properly considered during a project's development so that the risk of harm to workers is reduced.

14 CONCLUSIONS

14.1 Contamination

In this investigation elevated levels of lead have been recorded within samples taken from boreholes positioned across the site. At these levels there is a potential risk to on-site and off-site receptors and appropriate remediation is required.

Areas where the development is proposed to comprise of buildings and hardstanding do not pose a significant risk to on-site and off-site receptors therefore made ground can remain in these areas. Where areas of communal soft landscaping and private gardens are proposed a barrier should be placed between any remaining contamination and on-site receptors in the form of 300mm of clean soil to communal soft landscaped areas, and 600mm in the more sensitive private garden areas of the site. Alternatively, contaminated material can be removed down to a depth of natural ground, whichever is less.

Gas monitoring was undertaken at 4no. boreholes on site with a total of 3 visits carried out. The maximum Carbon Dioxide concentration of 2.2 %v/v was used to calculate a GSV value of 0.0022 l/h. Comparing the results to the NHBC Traffic Lights Gas Risk Assessment, the site classifies as green or Characteristic Situation 1 when compared to the CIRIA C665 guidance. Therefore, gas protection measures are not necessary.

The sample locations were positioned to provide a general spread across the site. However, there are areas where investigations were not carried out, and due to the presence of contamination identified, it should be considered possible that other areas may potentially be contaminated. Construction operatives should remain vigilant of any unexpected contamination encountered during development (eg discoloured soil or odours or buried waste).

It is also possible the asbestos may be present in other areas of the site and therefore construction operatives should also ensure that appropriate ppe and good hygiene measures are used, and dust control measures during construction where necessary. Any debris from earlier demolition found during site strip is to be inspected for asbestos by a suitably experienced contractor.

It is recommended that this report is referenced in the site Health and Safety Plan and that normal good hygiene practice is observed during the works and subsequent building and grounds maintenance.

If any potentially contaminated spoil is to be removed from site, the Waste Acceptance Criteria (WAC) testing should be agreed with the facility to which the spoil is being transported.

14.2 Geotechnical

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 London Clay bedrock, with superficial Boyn Hill Gravel Member deposits. Made Ground was encountered across the site to a maximum depth of approximately 1.00m with Clayey SAND & GRAVEL underlying the Made Ground.

The Made Ground was encountered to a maximum depth of 1.00m, and foundations should be taken at least 300mm past this to ensure natural ground is encountered, which means a minimum depth of 1.30m.

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 bedrock.

The five boreholes drilled on this site were all found to contain standing water on completion of drilling, at between 2.1m and 3.20m below ground level. In the short term this would indicate that excavations on this site are likely to be affected by water inflows, with the groundwater levels likely to be at a depth of 2.10m. Subsequent groundwater levels during gas monitoring were recorded between 1.95 and 2.45m below ground level.

The material encountered on this site at shallow depth was found to be of a generally granular nature, which would indicate that sides of excavations are unlikely to be self-supporting, certainly in the long term. However, 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.

It is recommended that this report is referenced in the site Health and Safety Plan and that normal good hygiene practice is observed during the works and subsequent building and grounds maintenance.

15 REFERENCES

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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



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SITE LOCATION PLAN



SITE APPLICATION BOUNDARY



EXISTING SURROUNDING BUILT CONTEXT



Drawing / Project Number

PR47.01

Drawing Number Letter

Revision Table & Date

Project Title

Proposed New Build Apartments at Newport Road, Hayes

Client/Desk

Sugler Homes

Drawing Title

Site Location Plan

Drawn

On Architecture

Date

24.04.2018

Scale

1:1250 @ A4

ON
ARCH
ITECT
URE

The Old Brewery Business Centre
75 Stour Street,
Canterbury,
CT1 2NR

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01227 634334

PROPOSED NEW BUILD APARTMENTS AT NEWPORT ROAD, HAYES

Site Location Plan

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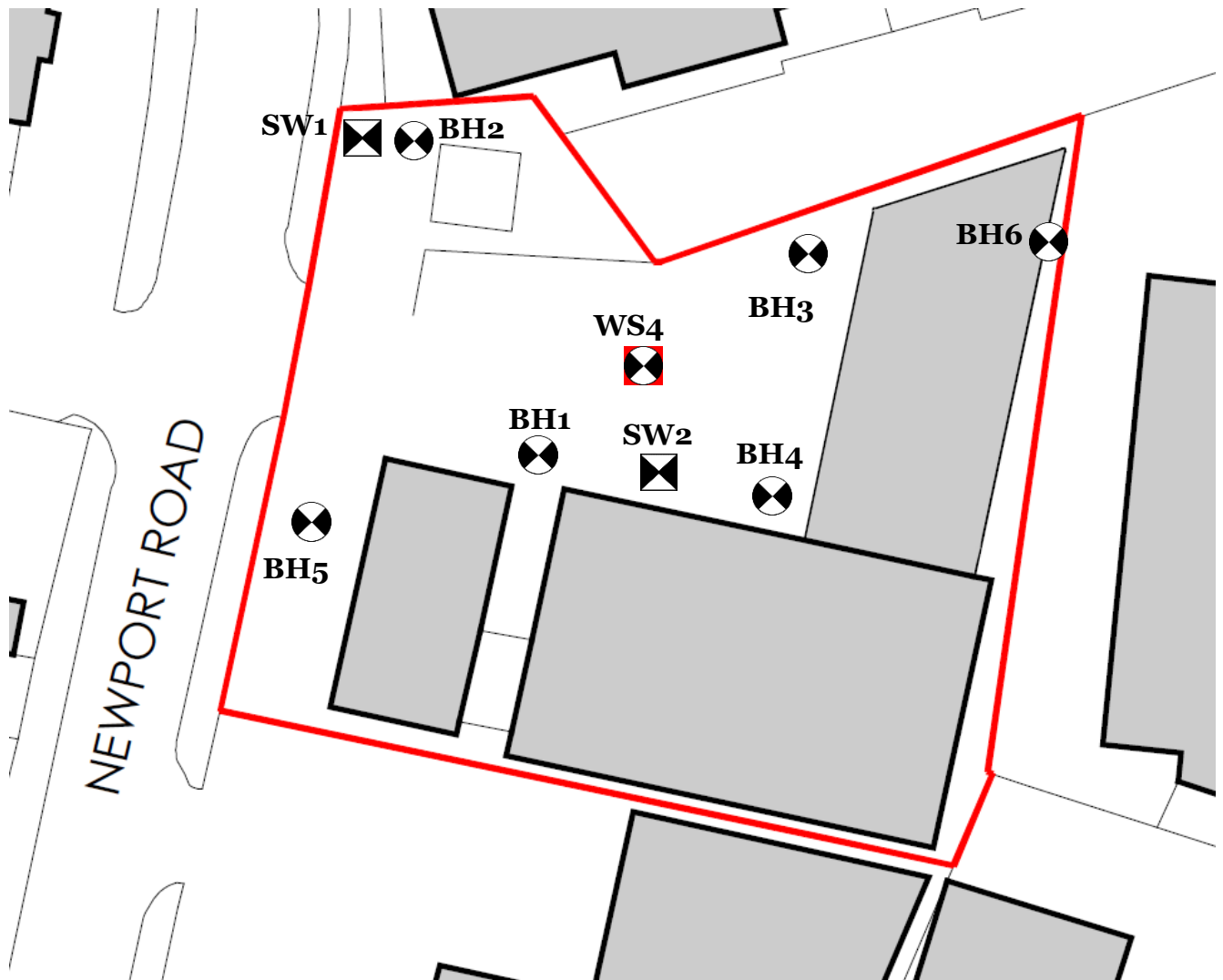
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Do not scale from this drawing.

2077-P2GE-1: Land on the East Side of Newport Road, Hayes
Westway Construction Ltd



Appendix B – Site Works Plan



Sampling locations



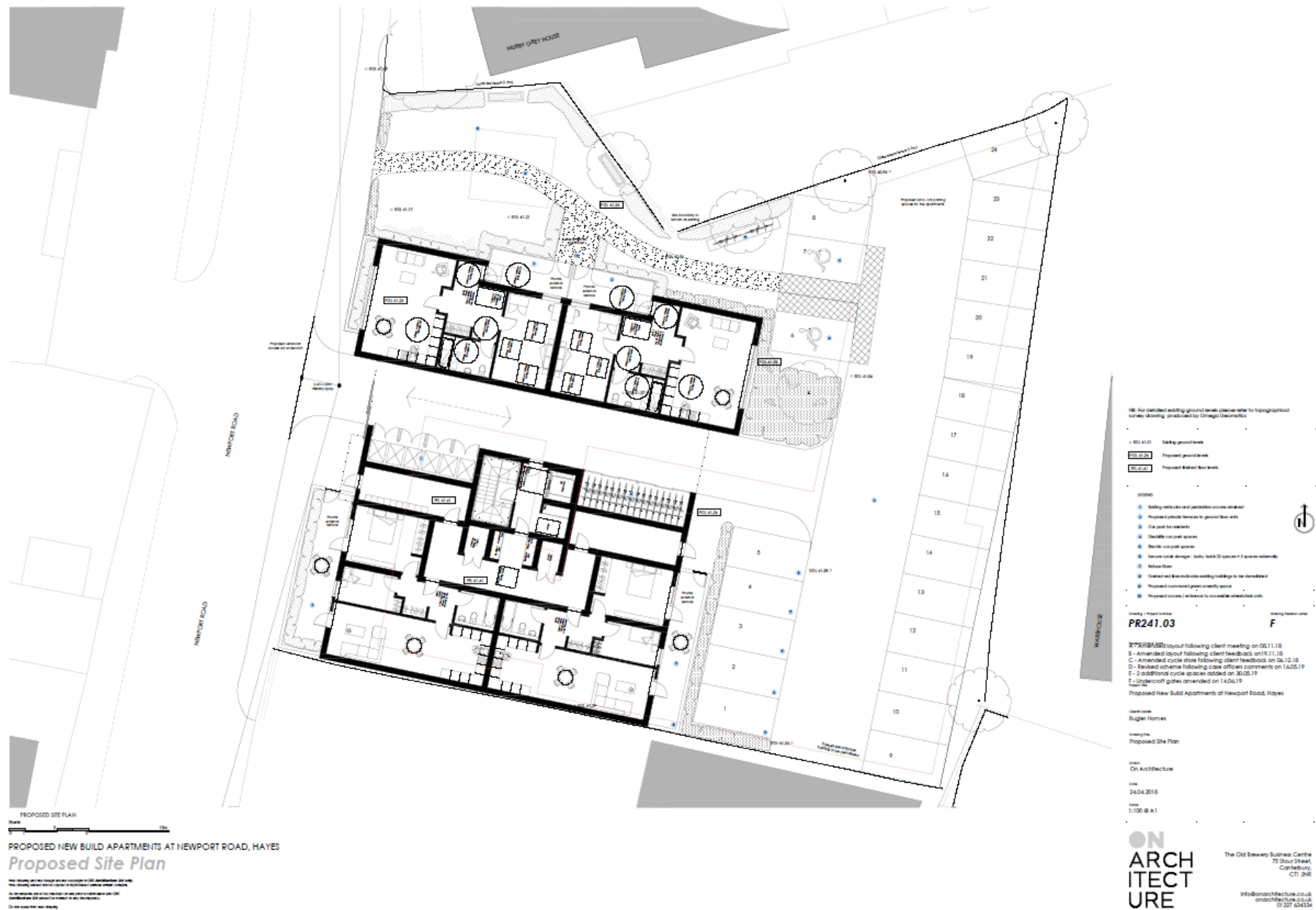
Percolation test locations



BH from unknown previous investigation



Appendix C – Proposed Site Plan



2077-P2GE-1: Land on the East Side of Newport Road, Hayes
Westway Construction Ltd



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: 2077		Project No. 22399		Site Date: 11/05/2021		Hole Type BH		
Location:		Newport Road, Hayes, London UB4 8JX				Scale 1:75		
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					
				0.03		Reinforced CONCRETE	1	
						Brick and Hardcore/Rubble FILL		
	1.00	D		1.00		Mid Brown Clayey SAND & GRAVEL. Gravel is Flint	1	
	1.50	SPT	N = 54					
	2.00	D					2	
	3.00	D					3	
	4.00	D					4	
	4.50	SPT	N = 10	4.50		Mid Brown Silty Sandy CLAY containing occasional Gravel. Gravel is Flint	5	
	5.00	D						
	6.00	D		6.00		Dark Brown/Blue Silty CLAY	6	
		SPT	N = 16					
	7.00	D					7	
	7.50	SPT	N = 31				8	
	8.00	D					9	
	9.00	D					10	
		SPT	N = 21				11	
	10.00	D					12	
10.50	SPT	N = 22				13		
11.00	D					14		
12.00	D					15		
	SPT	N = 23						
13.00	D							
13.50	SPT	N = 26						
14.00	D							
14.55	SPT	N = 27						
15.00	D			15.00		End of Borehole at 15.000m		
Key: D - Disturbed Sample V - Insitu Vane Test MP - Mackintosh Probe Test								
Remarks: Borehole closed at 15.00m. Borehole noted to contain standing water at 3.20m below ground level. No Roots noted.								
								

		Fastrack Site Investigations Ltd Unit 9, Tyndales Farm Southend Road Maldon CM9 6TQ		Borehole Log		Borehole No. BH2 Sheet 1 of 1	
Project Name: 2077			Project No. 22399		Site Date: 11/05/2021		Hole Type BH
Location:		Newport Road, Hayes, London UB4 8JX					Scale 1:30
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				
				0.15		CONCRETE	
						Mid Brown Sandy CLAY containing Brick fragments and Gravel. Gravel is Flint (MADE GROUND)	
	1.00	D	MP = 52/75mm MP = 48/75mm MP = 49/75mm MP = 54/75mm	0.70		Orange/Brown Clayey SAND & GRAVEL. Gravel is Flint	1
	2.00	D	MP = 62/75mm MP = 68/75mm MP = 71/75mm MP = 73/75mm				2
	3.00	D	MP = 81/75mm MP = 86/75mm MP = 85/75mm MP = 94/75mm			Water strike noted at 3.10m	3
	4.00	D	MP = 88/75mm MP = 96/75mm MP = 92/75mm MP = 97/75mm				4
	5.00	D	V (kPa) = 140	4.70		Mid Brown Silty Sandy CLAY containing occasional Gravel. Gravel is Flint	5
				5.00		End of Borehole at 5.000m	6
Key: D - Disturbed Sample V - Insitu Vane Test MP - Mackintosh Probe Test							
Remarks: Borehole closed at 5.00m. Borehole noted to contain standing water at 2.60m below ground level. No Roots noted.							
							

		Fastrack Site Investigations Ltd Unit 9, Tyndales Farm Southend Road Maldon CM9 6TQ		Borehole Log		Borehole No. BH3 Sheet 1 of 1	
Project Name: 2077			Project No. 22399		Site Date: 11/05/2021		Hole Type BH
Location:		Newport Road, Hayes, London UB4 8JX					Scale 1:30
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				
	1.00	D	MP - 68/75mm MP - 66/75mm MP - 69/75mm MP - 74/75mm	0.15		CONCRETE	1
				0.30		Brick and Hardcore/Rubble FILL	
				0.80		Mid Brown Sandy CLAY containing Brick fragments and Gravel. Gravel is Flint (MADE GROUND)	
	2.00	D	MP - 46/75mm MP - 48/75mm MP - 54/75mm MP - 66/75mm	2.00		Orange/Brown Clayey Sandy GRAVEL. Gravel is Flint	2
						Orange Clayey SAND containing Gravel. Gravel is Flint	
	3.00	D	MP - 58/75mm MP - 64/75mm MP - 69/75mm MP - 66/75mm			Water Strike noted at 3.30m	3
	4.00	D	MP - 42/75mm MP - 46/75mm MP - 43/75mm MP - 40/75mm	4.00		Grey Silty Sandy CLAY containing Gravel. Gravel is Flint	4
	5.00	D	V (kPa) - 130 V (kPa) - 140	5.00		End of Borehole at 5.000m	5
Key: D - Disturbed Sample V - Insitu Vane Test MP - Mackintosh Probe Test							
Remarks: Borehole closed at 5.00m. Standpipe installed to 4.00m. Borehole noted to contain standing water at 2.60m below ground level. Standing Water noted at 2.20m below ground level after 2 hours. No Roots noted.							
							

		Fastrack Site Investigations Ltd Unit 9, Tyndales Farm Southend Road Maldon CM9 6TQ		Borehole Log		Borehole No. BH5 Sheet 1 of 1	
Project Name: 2077			Project No. 22399		Site Date: 11/05/2021		Hole Type BH
Location:		Newport Road, Hayes, London UB4 8JX					Scale 1:30
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				
				0.15		CONCRETE	
						Mid-Dark Brown Silty Sandy CLAY containing Brick fragments (MADE GROUND)	
				0.70		Mid Brown Clayey SAND & GRAVEL. Gravel is Flint	
	1.00	D	MP - 50/75mm MP - 56/75mm MP - 58/75mm MP - 57/75mm				1
	2.00	D	MP - 72/75mm MP - 76/75mm MP - 84/75mm MP - 81/75mm				2
	3.00	D	MP - 84/75mm MP - 88/75mm MP - 92/75mm MP - 91/75mm			Water Strike noted at 3.10m	3
	4.00	D	MP - 76/75mm MP - 74/75mm MP - 89/75mm MP - 94/75mm				4
	5.00	D	V (kPa) = 140	4.95 5.00		Mid Brown Silty Sandy CLAY containing Gravel. Gravel is Flint End of Borehole at 5.000m	5
							6
Key: D - Disturbed Sample V - Insitu Vane Test MP - Mackintosh Probe Test							
Remarks: Borehole closed at 5.00m. Standpipe installed to 4.00m. Borehole noted to contain standing water at 2.10m below ground level. Standing Water noted at 2.10m below ground level after 1 hour. No Roots noted.							



Contaminated
Land
Solutions

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4 De Frene Rd
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Web: www.gosolve.co.uk

BOREHOLE/TRIAL PIT LOG

Project	Newport Road, Hayes				Project No.	2077	
Client					Survey date:	11/05/21	
Log ID		BH6		Hole type: BH			
Water Strikes	Samples Type	depth (m)	Level (m OD)	Depth (m)	Legend	Stratum Description and Observations	Depth (m)
				0.20		MADE GROUND Light Brown Stoney, Sandy Topsoil containing brick and concrete	-0.10
							-0.20
	C	0.2 - 0.5				MADE GROUND Dark Brown Sandy Subsoil containing brick and concrete fragments	-0.30
							-0.40
							-0.50
				0.60		Borehole Terminated	-0.60
							-0.70
							-0.80
							-0.90
							-1.00
							-1.10
							-1.20
							-1.30
							-1.40
							-1.50
							-1.60
							-1.70
☒ Water strike							
Remarks: Groundwater not noted during excavations. No visual or olfactory evidence of contamination noted.							
Key: C - Contamination sample W - Water sample P - PID test							



Appendix E – Gas & Groundwater Monitoring Results



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GROUNDWATER & GAS MONITORING RESULTS

Project Number 2077
Project Name Newport Road, Hayes

BH ref	Date	Time	Weather	Borehole Pressure (mb)	Flow Rate (l/hr)	Methane (%)		Methane LEL (%)		Oxygen (%v/v)		Carbon dioxide (%)		Ground water level (m)
						Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady	
BH3	27/05/21	08:10	Sunny and Dry	1013	0.0	0.0	0.0	n/a	n/a	20.8	21.2	0.0	0.0	1.95
	03/06/21	08:20	Sunny and Dry	1011	0.0	0.0	0.0	n/a	n/a	21.1	21.1	0.2	0.0	2.32
	23/06/21	07:45	Sunny and Mild	1017	0.0	0.0	0.0	n/a	n/a	17.9	20.7	2.0	0.1	2.45
BH4	27/05/21	08:00	Sunny and Dry	1013	0.0	0.0	0.0	n/a	n/a	20.9	21.0	0.5	0.0	2.30
	03/06/21	08:10	Sunny and Dry	1011	0.0	0.0	0.0	n/a	n/a	20.1	20.8	0.6	0.1	2.00
	23/06/21	07:30	Sunny and Mild	1018	0.0	0.0	0.0	n/a	n/a	20.1	20.8	0.1	0.1	Dry
BH5	27/05/21	08:20	Sunny and Dry	1013	0.0	0.0	0.0	n/a	n/a	21.1	21.1	0.0	0.0	2.00
	03/06/21	08:30	Sunny and Dry	1011	0.0	0.0	0.0	n/a	n/a	21.1	21.2	0.0	0.0	2.20
	23/06/21	07:50	Sunny and Mild	1017	0.0	0.0	0.0	n/a	n/a	20.5	20.9	0.1	0.1	Dry
WS4	23/06/21	07:40	Sunny and Mild	1018	0.0	0.0	0.0	n/a	n/a	20.9	17.5	0.1	2.2	Dry

Monitoring Equipment: Gas Data GFM436 Multichannel Portable gas analyser, an ATEX and MCERTS accredited hand held gas analyser.

*Gas monitoring should not be for less than 3 minutes. If high concentrations, monitoring should be for up to 10 minutes.

2077-P2GE-1: Land on the East Side of Newport Road, Hayes
Westway Construction Ltd



Appendix F – Contamination Test Results



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

THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number: 21-33710

Issue: 1

Date of Issue: 19/05/2021

Contact: Peter George

Customer Details: GO Contaminated Land Solutions Ltd
4 De Frene Road
Sydenham
London
SE26 4AB

Quotation No: Q14-00029

Order No: 2077

Customer Reference: 2077

Date Received: 12/05/2021

Date Approved: 19/05/2021

Details: Land to East Side of Newport Road, Hayes

Approved by:

Tim Reeve, Quality Officer

Any comments, opinions or interpretations expressed herein are outside the scope of UKAS accreditation (Accreditation Number 2683)

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Sample Summary

Report No.: 21-33710, issue number 1

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
237096	BH1 0.30 - 0.60	11/05/2021	12/05/2021	Silty clayey loam	
237097	BH2 0.20 - 0.50	11/05/2021	12/05/2021	Silty loam	
237098	BH3 0.30 - 0.60	11/05/2021	12/05/2021	Silty loam	
237099	BH4 0.30 - 0.50	11/05/2021	12/05/2021	Sandy silty loam	
237100	BH5 0.25 - 0.55	11/05/2021	12/05/2021	Silty loam	
237101	BH6 0.20 - 0.50	11/05/2021	12/05/2021	Silty loam	

ELAB Reference	237096	237097	237098	237099	237100	237101
Customer Reference						
Sample ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	BH1	BH2	BH3	BH4	BH5	BH6
Sample Depth (m)	0.30 - 0.60	0.20 - 0.50	0.30 - 0.60	0.30 - 0.50	0.25 - 0.55	0.20 - 0.50
Sampling Date	11/05/2021	11/05/2021	11/05/2021	11/05/2021	11/05/2021	11/05/2021
Determinand	Codes	Units	LOD			
Soil sample preparation parameters						
Moisture Content	N	%	0.1	22.8	13.7	12.0
Stones Content	N	%	0.1	41.2	45.1	57.9
Material removed	N	%	0.1	41.2	45.1	57.9
Description of Inert material removed	N		0	Stones	Stones	Stones
Metals						
Arsenic	M	mg/kg	1	9.2	14.8	12.9
Cadmium	M	mg/kg	0.5	< 0.5	0.5	< 0.5
Chromium	M	mg/kg	5	21.3	30.1	24.2
Copper	M	mg/kg	5	20.1	52.4	101
Lead	M	mg/kg	5	83.4	383	175
Mercury	M	mg/kg	0.5	< 0.5	< 0.5	0.8
Nickel	M	mg/kg	5	16.5	21.2	15.2
Selenium	M	mg/kg	1	< 1.0	< 1.0	< 1.0
Zinc	M	mg/kg	5	87.8	186	116
Inorganics						
Free Cyanide	N	mg/kg	1	< 1.0	< 1.0	< 1.0
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	< 0.8	< 0.8
Miscellaneous						
pH	M	pH units	0.1	8.2	7.9	8.9
Soil Organic Matter	U	%	0.1	1.9	3.1	2.4
Phenols						
Total Monohydric Phenols	N	mg/kg	5	< 5	< 5	< 5



Results Summary

Report No.: 21-33710, Issue number 1

ELAB Reference	237096	237097	237098	237099	237100	237101
Customer Reference						
Sample ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	BH1	BH2	BH3	BH4	BH5	BH6
Sample Depth (m)	0.30 - 0.80	0.20 - 0.50	0.30 - 0.80	0.30 - 0.50	0.25 - 0.55	0.20 - 0.50
Sampling Date	11/05/2021	11/05/2021	11/05/2021	11/05/2021	11/05/2021	11/05/2021
Determinand	Codes	Units	LOD			
Polyaromatic hydrocarbons						
Naphthalene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Fluorene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	M	mg/kg	0.1	< 0.1	0.2	0.3
Anthracene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	M	mg/kg	0.1	< 0.1	0.8	0.3
Pyrene	M	mg/kg	0.1	< 0.1	0.5	0.2
Benzo(a)anthracene	M	mg/kg	0.1	< 0.1	0.3	0.1
Chrysene	M	mg/kg	0.1	< 0.1	0.4	0.2
Benzo(b)fluoranthene	M	mg/kg	0.1	< 0.1	0.4	0.1
Benzo(k)fluoranthene	M	mg/kg	0.1	< 0.1	0.3	0.1
Benzo(a)pyrene	M	mg/kg	0.1	< 0.1	0.4	0.2
Indeno(1,2,3-cd)pyrene	M	mg/kg	0.1	< 0.1	0.4	0.2
Dibenzo(a,h)anthracene	M	mg/kg	0.1	< 0.1	0.1	< 0.1
Benzo(g,h,i)perylene	M	mg/kg	0.1	< 0.1	0.3	0.1
Total PAH(15)	M	mg/kg	0.4	< 0.4	4.0	1.7
TPH CWG						
>C5-C8 Aliphatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
>C8-C8 Aliphatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
>C8-C10 Aliphatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0
>C10-C12 Aliphatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0
>C12-C16 Aliphatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0
>C16-C21 Aliphatic	N	mg/kg	1	< 1.0	5.8	< 1.0
>C21-C35 Aliphatic	N	mg/kg	1	1.3	221	< 1.0
>C35-C40 Aliphatic	N	mg/kg	1	< 1.0	124	< 1.0
>C5-C7 Aromatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
>C7-C8 Aromatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
>C8-C10 Aromatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0
>C10-C12 Aromatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0
>C12-C16 Aromatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0
>C16-C21 Aromatic	N	mg/kg	1	< 1.0	5.4	< 1.0
>C21-C35 Aromatic	N	mg/kg	1	< 1.0	320	< 1.0
>C35-C40 Aromatic	N	mg/kg	1	< 1.0	188	< 1.0
Total (>C5-C40) AllAro	N	mg/kg	1	1.3	883	< 1.0



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Results Summary

Report No.: 21-33710, issue number 1

Asbestos Results

Analytical result only applies to the sample as submitted by the client. Any comments, opinions or interpretations (marked #) in this report are outside UKAS accreditation (Accreditation No2683). They are subjective comments only which must be verified by the client.

Elab No	Depth (m)	Clients Reference	Description of Sample Matrix #	Asbestos Identification	Gravimetric Analysis Total (%)	Gravimetric Analysis by ACM Type (%)	Free Fibre Analysis (%)	Total Asbestos (%)
237096	0.30 - 0.60	BH1	Brown soil, stones	No asbestos detected	n/t	n/t	n/t	n/t
237097	0.20 - 0.50	BH2	Brown sandy soil, stones, concrete, brick, clinker, glass	No asbestos detected	n/t	n/t	n/t	n/t
237098	0.30 - 0.60	BH3	Brown sandy soil, stones, concrete, brick, clinker, organics	No asbestos detected	n/t	n/t	n/t	n/t
237099	0.30 - 0.50	BH4	Brown sandy soil, stones, brick, clinker	No asbestos detected	n/t	n/t	n/t	n/t
237100	0.25 - 0.55	BH5	Brown sandy soil, stones, concrete, clinker	No asbestos detected	n/t	n/t	n/t	n/t
237101	0.20 - 0.50	BH6	Brown sandy soil, stones, concrete, brick, clinker, organics	No asbestos detected	n/t	n/t	n/t	n/t



Method Summary

Report No.: 21-33710, issue number 1

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
Free cyanide	N	As submitted sample	14/05/2021	107	Colorimetry
Hexavalent chromium	N	As submitted sample	14/05/2021	110	Colorimetry
pH	M	Air dried sample	19/05/2021	113	Electromeric
Phenols in solids	N	As submitted sample	14/05/2021	121	HPLC
PAH (GC-FID)	M	As submitted sample	14/05/2021	133	GC-FID
Low range Aliphatic hydrocarbons soil	N	As submitted sample	18/05/2021	181	GC-MS
Low range Aromatic hydrocarbons soil	N	As submitted sample	18/05/2021	181	GC-MS
Aliphatic hydrocarbons in soil	N	As submitted sample	14/05/2021	214	GC-FID
Aliphatic/Aromatic hydrocarbons in soil	N	As submitted sample	18/05/2021	214	GC-FID
Aromatic hydrocarbons in soil	N	As submitted sample	14/05/2021	214	GC-FID
Asbestos identification	U	Air dried sample	19/05/2021	280	Microscopy
Aqua regia extractable metals	M	Air dried sample	14/05/2021	300	ICPMS
Soil organic matter	U	Air dried sample	18/05/2021	BS1377:P3	Titrimetry

Tests marked N are not UKAS accredited



Report Information

Report No.: 21-33710, 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)

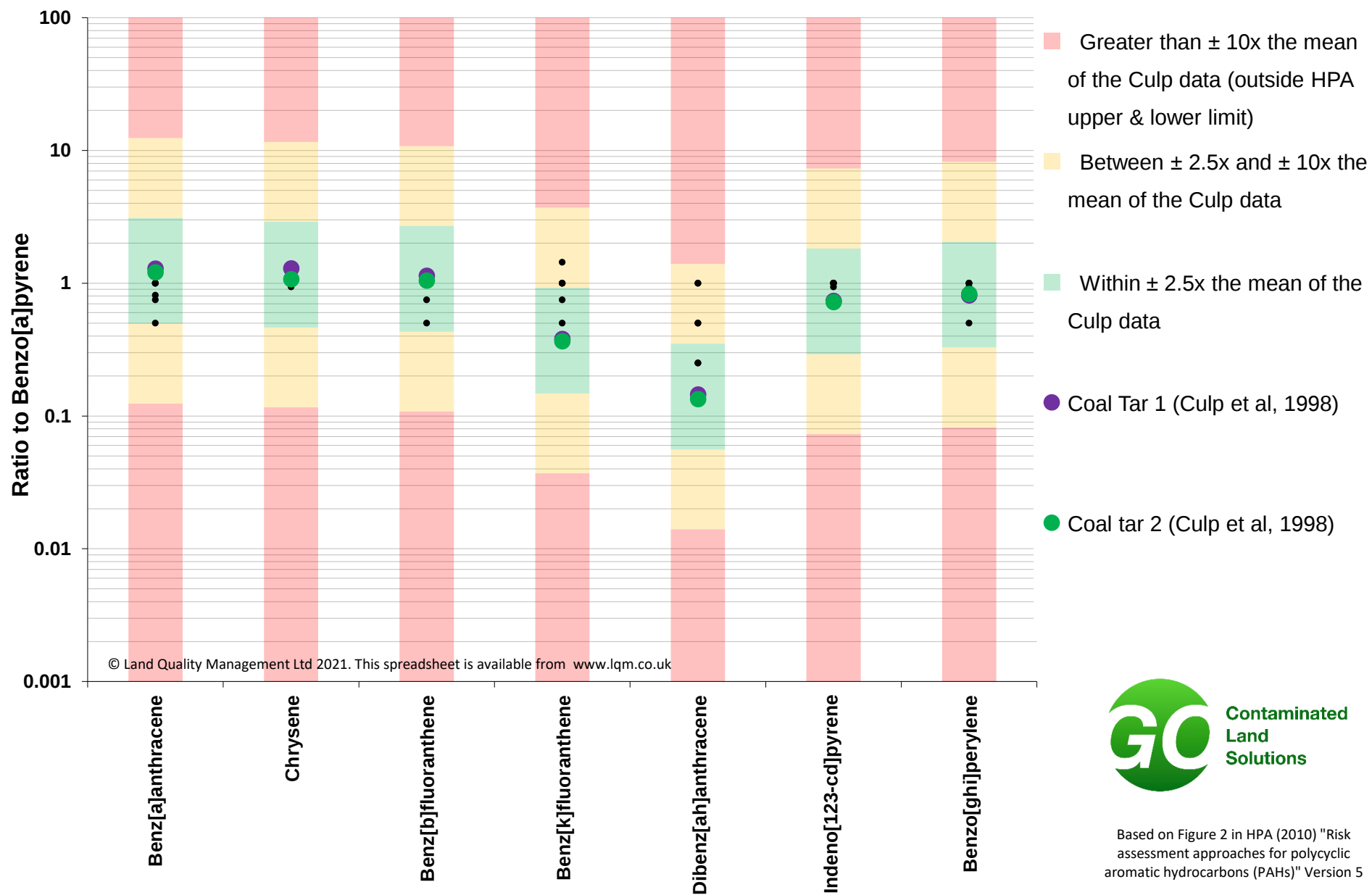
Where a sample has a deviation code, the applicable test result may be invalid.

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



Appendix G – LQM PAH Profiling Tool Results





Appendix H – Geotechnical Test Results

LABORATORY RESULTS

Property Address: Newport Road, Hayes, London, UB4 8JX

SAMPLE DETAILS	ANALYSIS REQUESTED
Investigation date: 11/05/2021	Moisture Content ☒ PSD ☒
Sample details: Bags as received	Liquid Limit ☒ Soil Suction ☐
Samples received: 13/05/2021	Plastic Limit ☒ Shear Strength ☐
Schedule recieved: 13/05/2021	Plasticity Index ☒ Contamination ☐
Samples tested: 13/05/2021 - 19/05/2021	Root ID ☐ Root/Tree DNA ☐
Results reported: 19/05/2021	Other (please state) ☐

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 calendar 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 desiccated 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 Strength

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

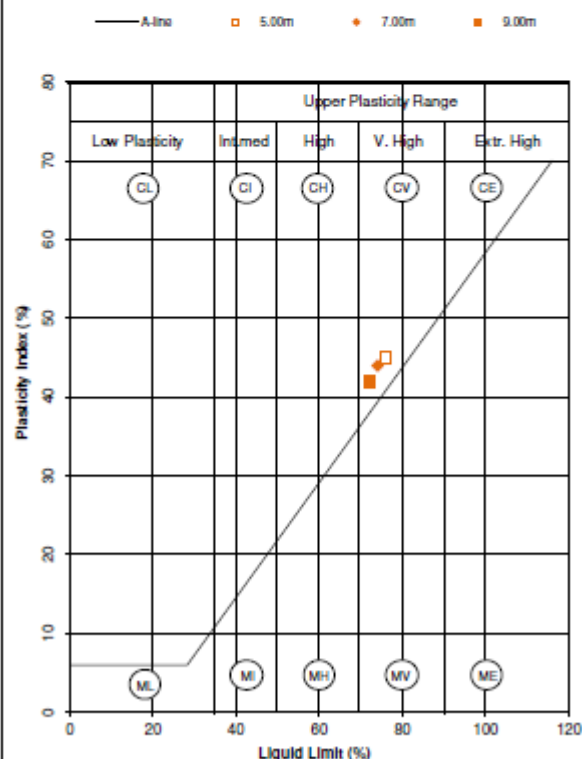
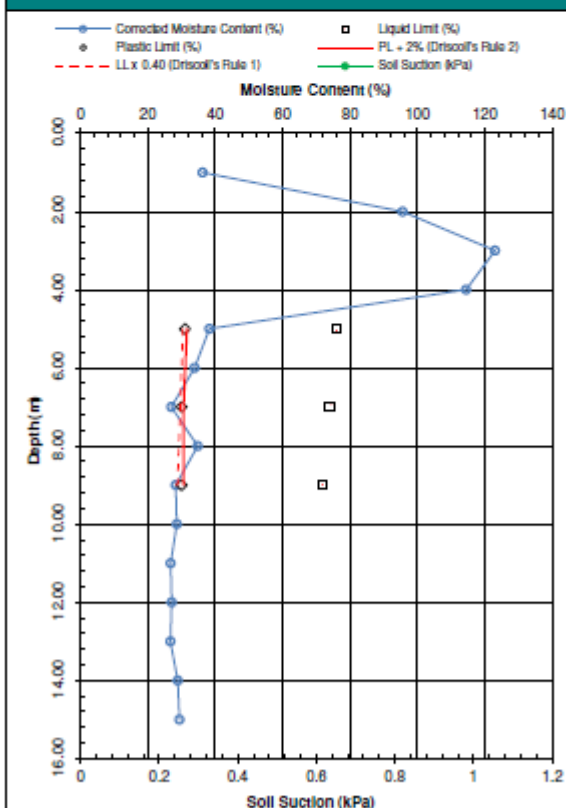
Samples were prepared and tested based on the BRE digest No:IP4/93 (Corrected). 'A method of determining the state of desiccation in clay soils.' (Filter paper method).

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:	Newport Road, Hayes, London, UB4 8JX
--------------------------	--------------------------------------

BOREHOLE 1

[illegible]

Comments:

Issued by: ☒ Jade McLellan (Laboratory Manager)
☐ Isabella Acerbis (Laboratory Supervisor)

☐ Ted Smith (Laboratory Technician)
☐ Benjamin Brocklebank (Laboratory Technician)

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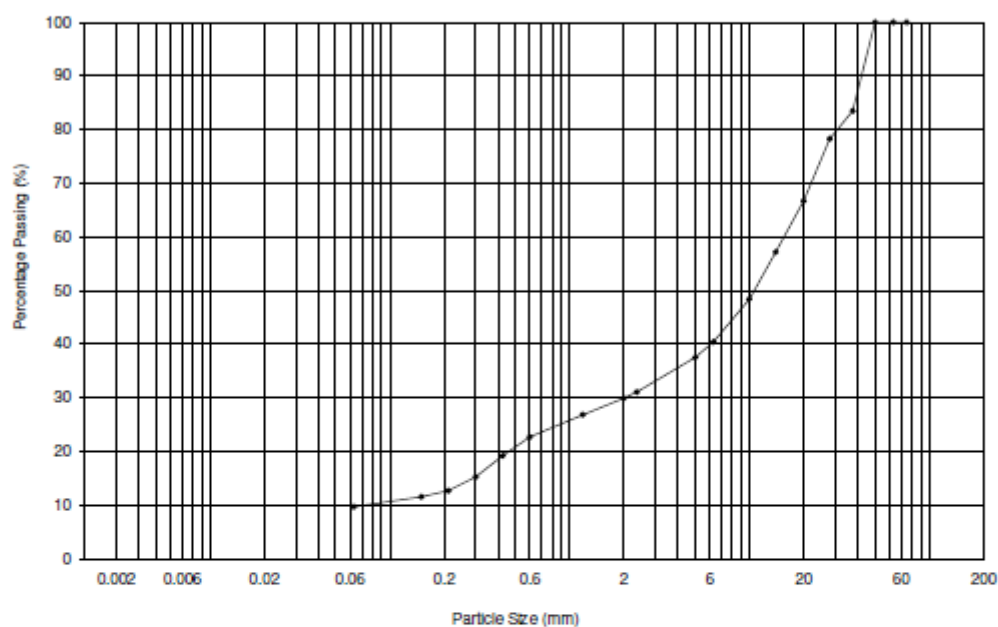
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Appendix No: 3

FGS Ref: 22399

LABORATORY RESULTS**Property Address: Newport Road, Hayes, London, UB4 8JX****PARTICLE SIZE DISTRIBUTION: BOREHOLE 1 at 1.00m**

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

Issued by:

- ☒ Jade Barnett (Laboratory Technician)
- ☐ Other

Signed:

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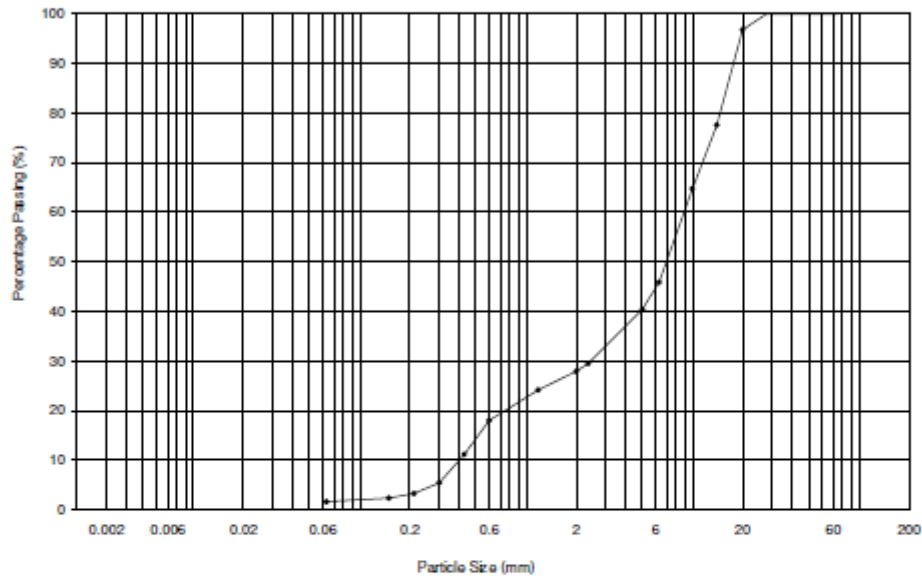
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FGS Ref:

22399

LABORATORY RESULTS**Property Address: Newport Road, Hayes, London, UB4 8JX****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 Barnett (Laboratory Technician)



Other

Signed:

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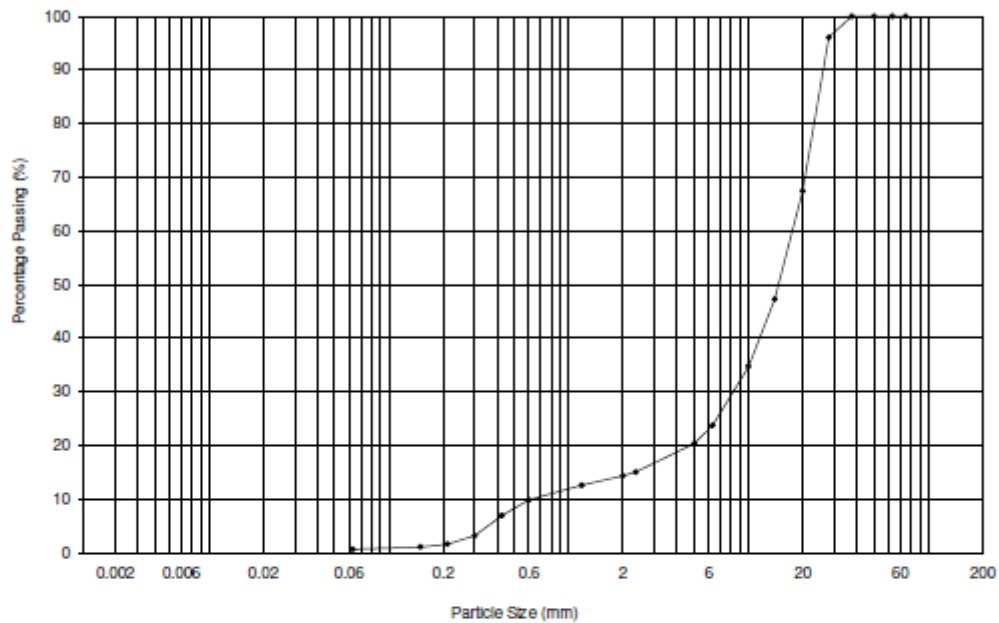
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Appendix No: 3

FGS Ref: 22399

LABORATORY RESULTS**Property Address: Newport Road, Hayes, London, UB4 8JX****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 Barnett (Laboratory Technician)



Other

Signed:

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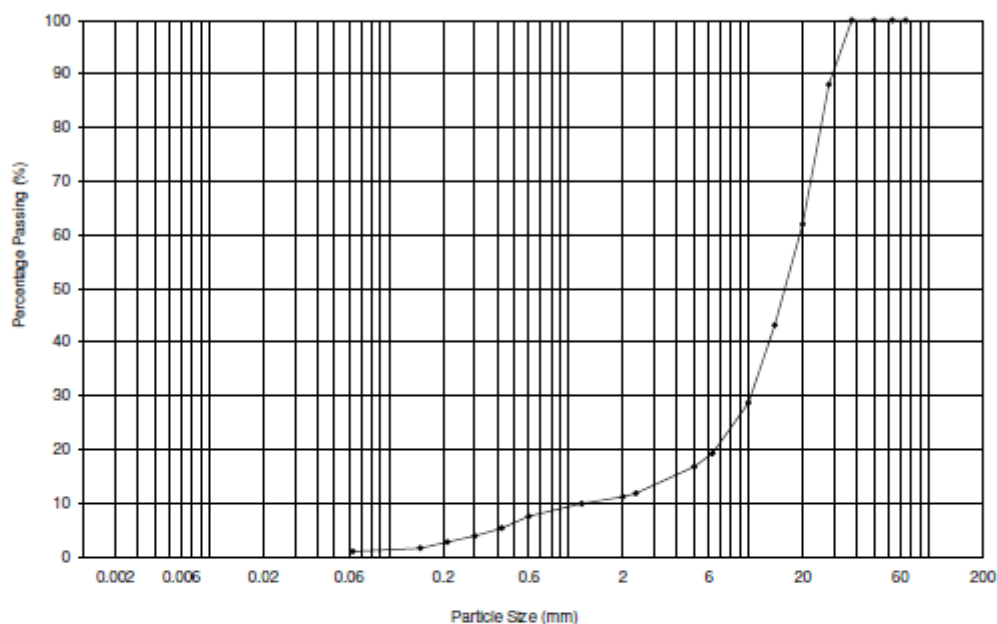
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Appendix No: 3

FGS Ref: 22399

LABORATORY RESULTS**Property Address: Newport Road, Hayes, London, UB4 8JX****PARTICLE SIZE DISTRIBUTION: BOREHOLE 1 at 4.00m**

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

Issued by:



Jade Barnett (Laboratory Technician)



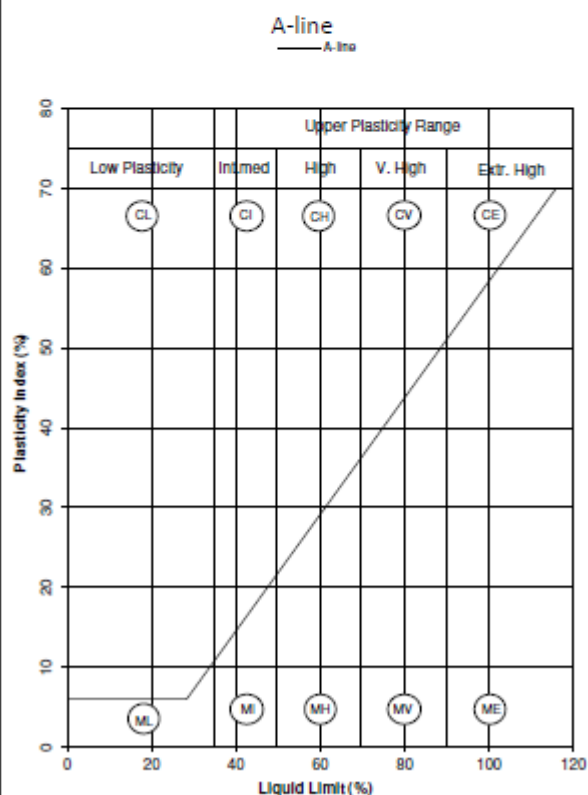
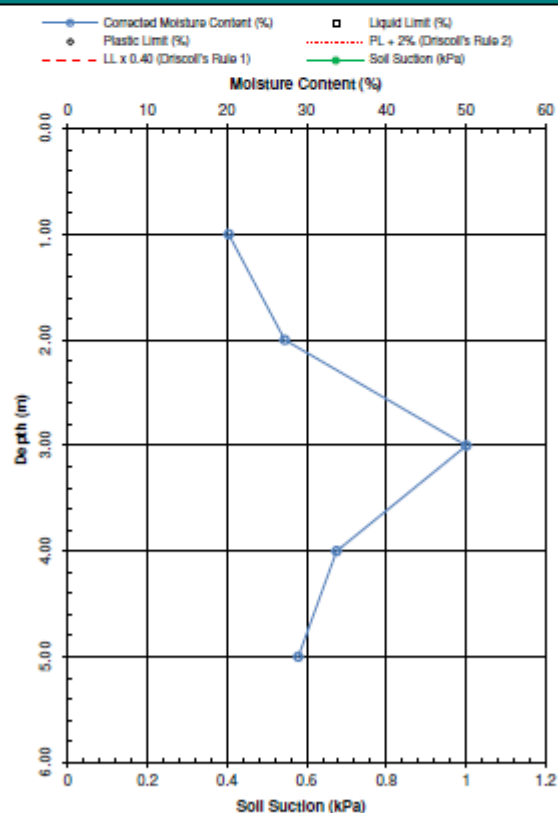
Other

Signed:

LABORATORY RESULTS

Property Address:	Newport Road, Hayes, London, UB4 8JX
-------------------	--------------------------------------

BOREHOLE 2

[illegible]

Comments:

Issued by: ☒ Jade McLellan (Laboratory Manager)
☐ Isabella Acerbis (Laboratory Supervisor)

☐ Ted Smith (Laboratory Technician)
☐ Benjamin Brocklebank (Laboratory Technician)

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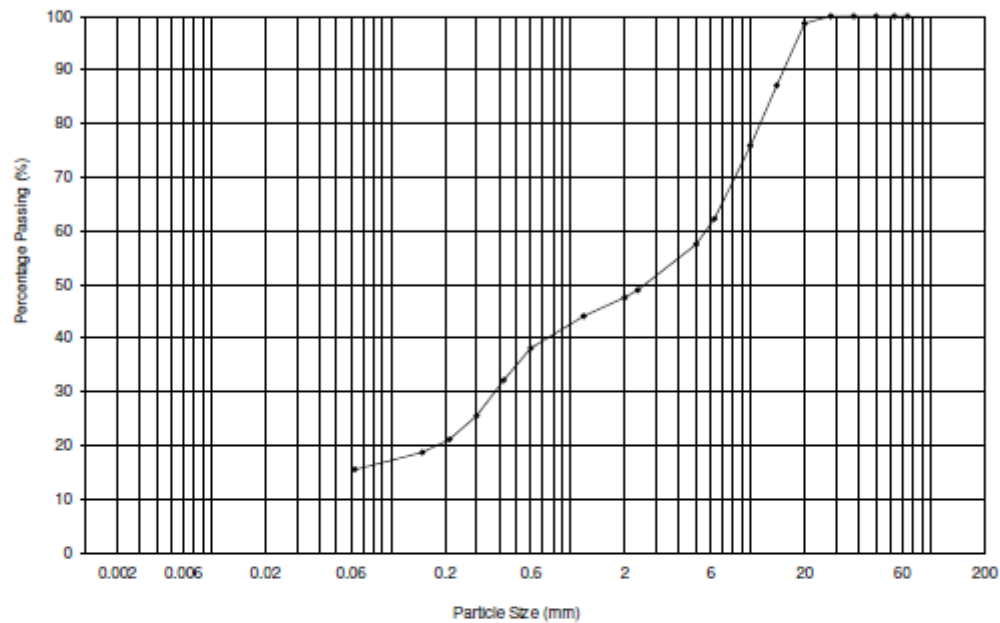
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Appendix No:

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FGS Ref:

22399

LABORATORY RESULTS**Property Address: Newport Road, Hayes, London, UB4 8JX****PARTICLE SIZE DISTRIBUTION: BOREHOLE 2 at 1.00m**

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

Issued by:



Jade Barnett (Laboratory Technician)



Other

Signed:

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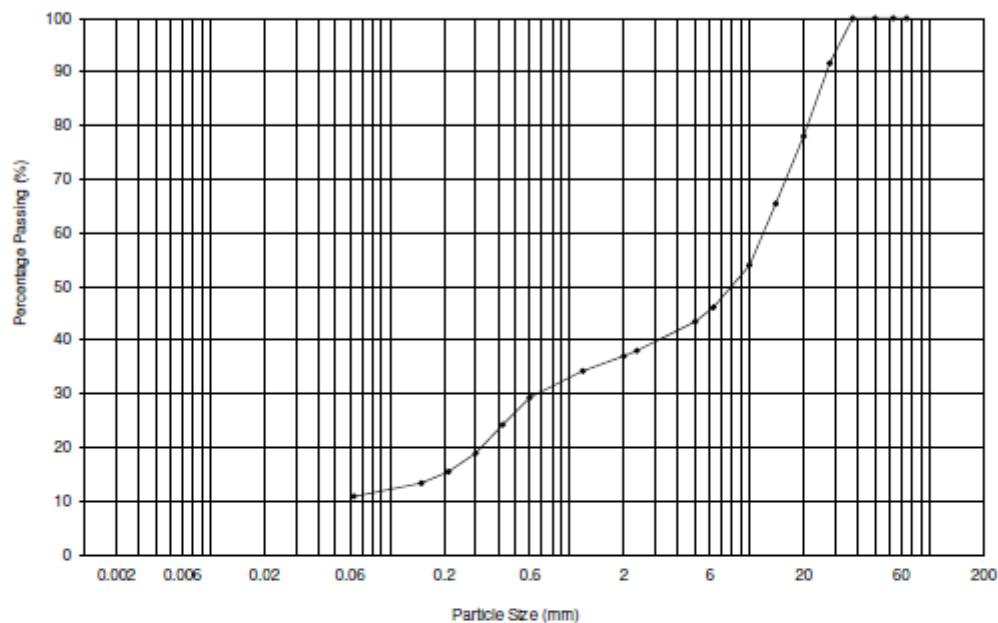
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Appendix No: 3

FGS Ref: 22399

LABORATORY RESULTS**Property Address: Newport Road, Hayes, London, UB4 8JX****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 Barnett (Laboratory Technician)



Other

Signed:

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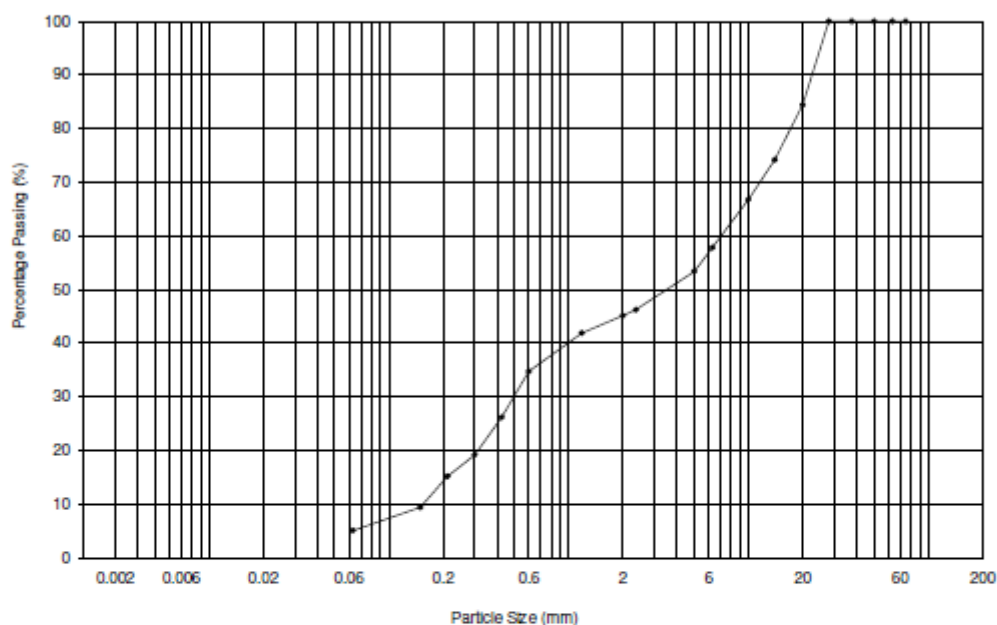
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Appendix No: 3

FGS Ref: 22399

LABORATORY RESULTS**Property Address: Newport Road, Hayes, London, UB4 8JX****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 Barnett (Laboratory Technician)



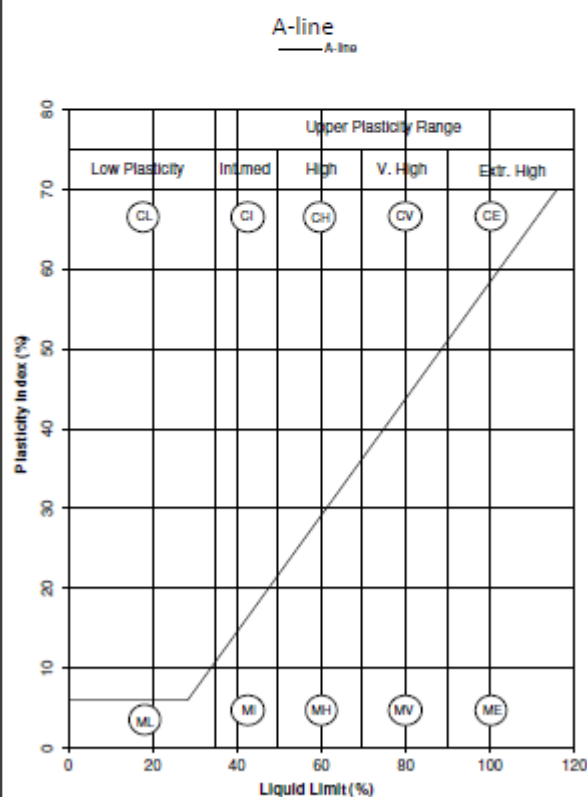
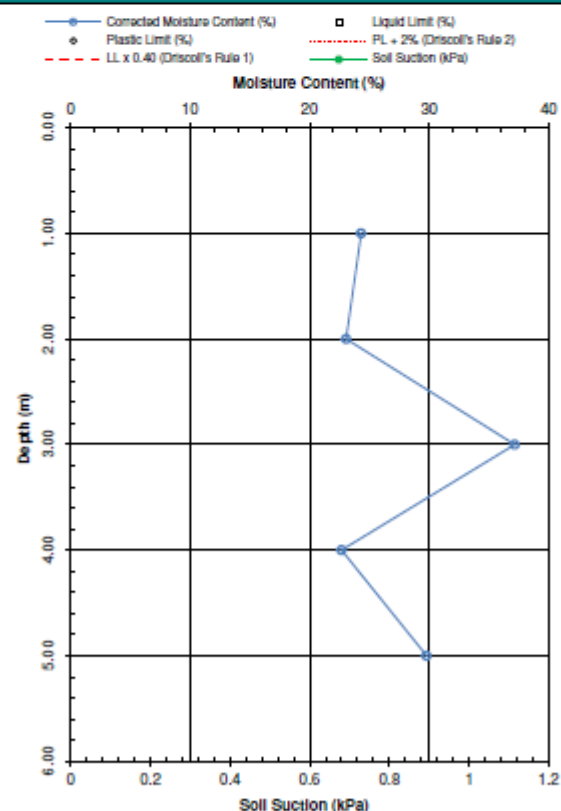
Other

Signed:

LABORATORY RESULTS

Property Address:	Newport Road, Hayes, London, UB4 8JX
-------------------	--------------------------------------

BOREHOLE 3

[illegible]

Comments:

Issued by: ☒ Jade McLellan (Laboratory Manager)
☐ Isabella Acerbis (Laboratory Supervisor)

☐ Ted Smith (Laboratory Technician)
☐ Benjamin Brocklebank (Laboratory Technician)

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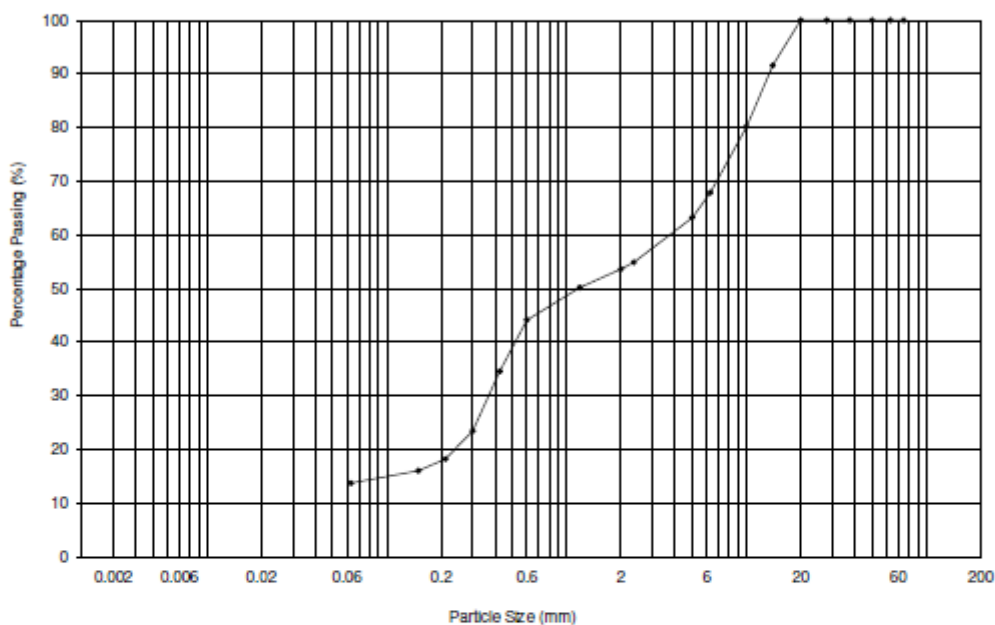
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Appendix No: 3

FGS Ref: 22399

LABORATORY RESULTS**Property Address: Newport Road, Hayes, London, UB4 8JX****PARTICLE SIZE DISTRIBUTION: BOREHOLE 3 at 1.00m**

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

Issued by:



Jade Barnett (Laboratory Technician)



Other

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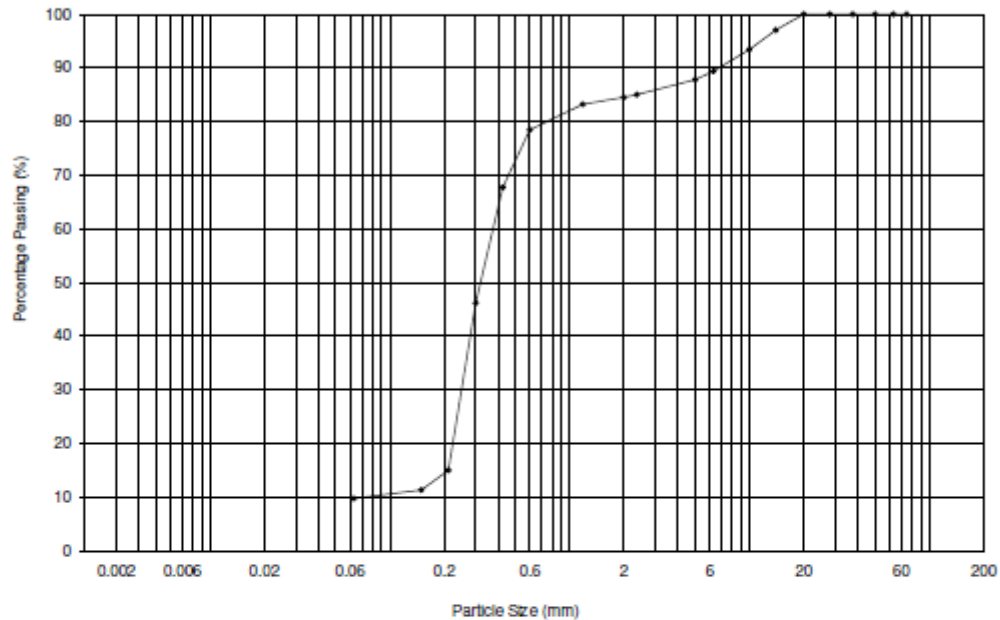
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Appendix No: 3

FGS Ref: 22399

LABORATORY RESULTS**Property Address: Newport Road, Hayes, London, UB4 8JX****PARTICLE SIZE DISTRIBUTION: BOREHOLE 3 at 2.00m**

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

Issued by:



Jade Barnett (Laboratory Technician)



Other

Signed:

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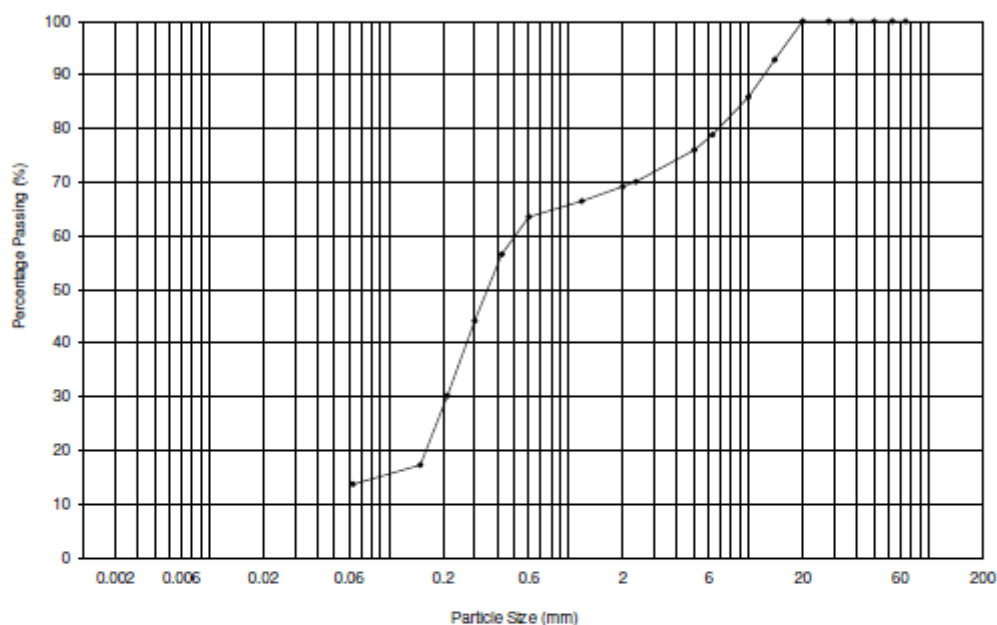
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Appendix No: 3

FGS Ref: 22399

LABORATORY RESULTS**Property Address: Newport Road, Hayes, London, UB4 8JX****PARTICLE SIZE DISTRIBUTION: BOREHOLE 3 at 3.00m**

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

Issued by:



Jade Barnett (Laboratory Technician)



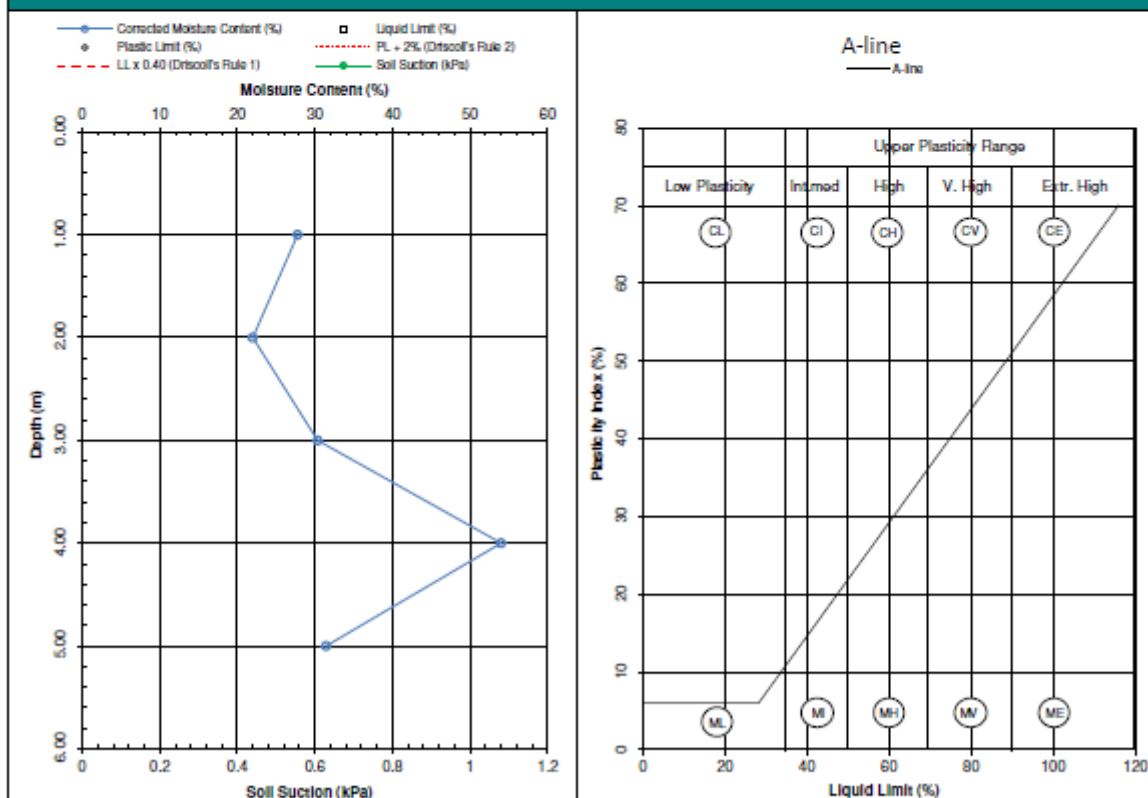
Other

Signed:

LABORATORY RESULTS

Property Address:	Newport Road, Hayes, London, UB4 8JX
-------------------	--------------------------------------

BOREHOLE 4

[illegible]

Comments:

Issued by: ☒ Jade McLellan (Laboratory Manager)
☐ Isabella Acerbis (Laboratory Supervisor)

☐ Ted Smith (Laboratory Technician)
☐ Benjamin Brocklebank (Laboratory Technician)

**FASTRACK**Tyndales Farm, Southend Road, Woodham Mortimer,
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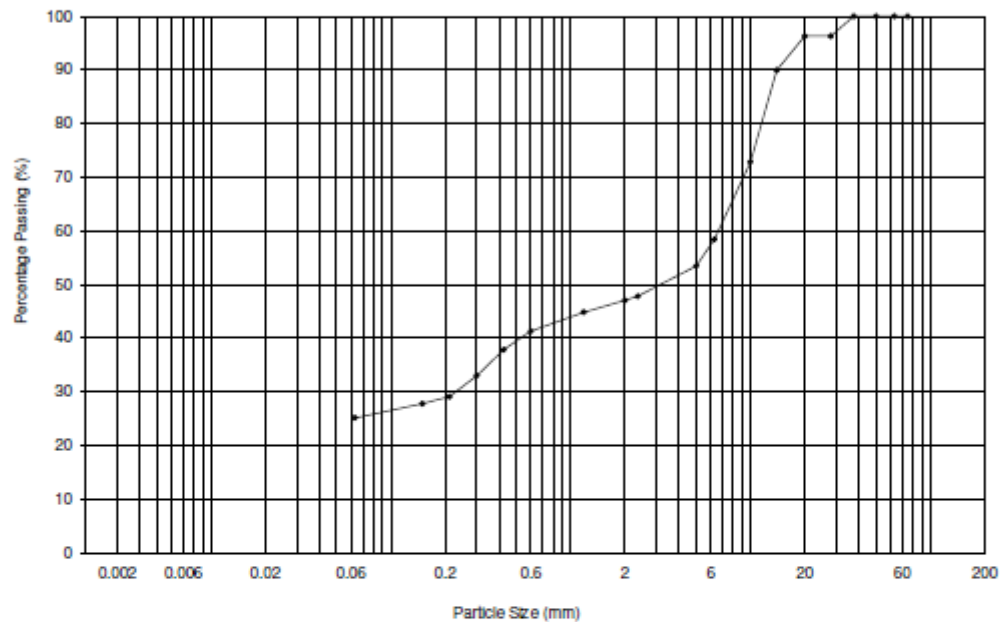
Web: www.fastrack-geotechnical.co.uk

Appendix No:

3

FGS Ref:

22399

LABORATORY RESULTS**Property Address: Newport Road, Hayes, London, UB4 8JX****PARTICLE SIZE DISTRIBUTION: BOREHOLE 4 at 1.00m**

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

Issued by:

- ☒ Jade Barnett (Laboratory Technician)
- ☐ Other

Signed:

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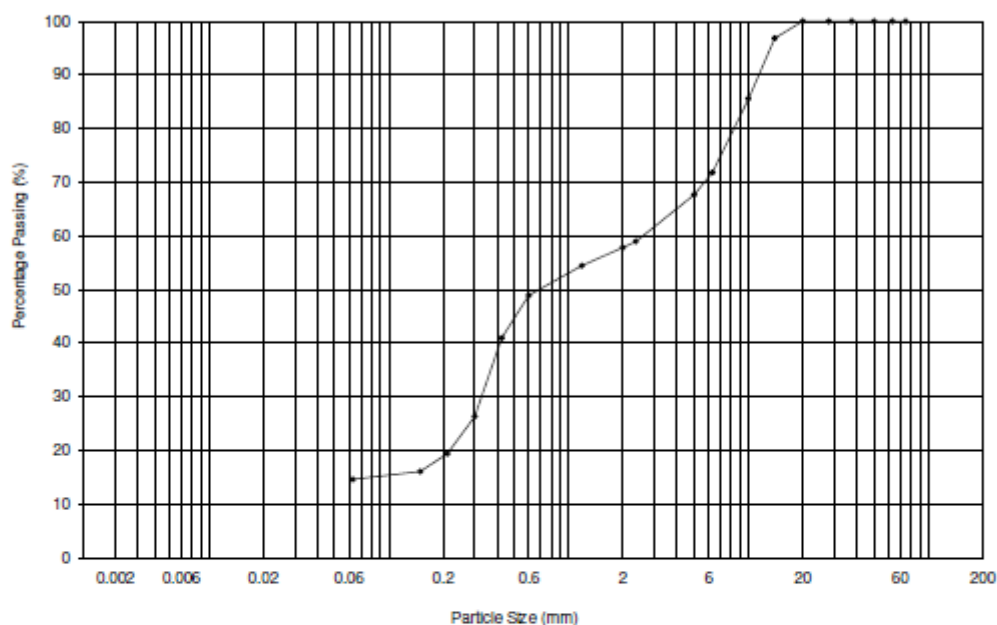
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Appendix No: 3

FGS Ref: 22399

LABORATORY RESULTS**Property Address: Newport Road, Hayes, London, UB4 8JX****PARTICLE SIZE DISTRIBUTION: BOREHOLE 4 at 2.00m**

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

Issued by:



Jade Barnett (Laboratory Technician)



Other

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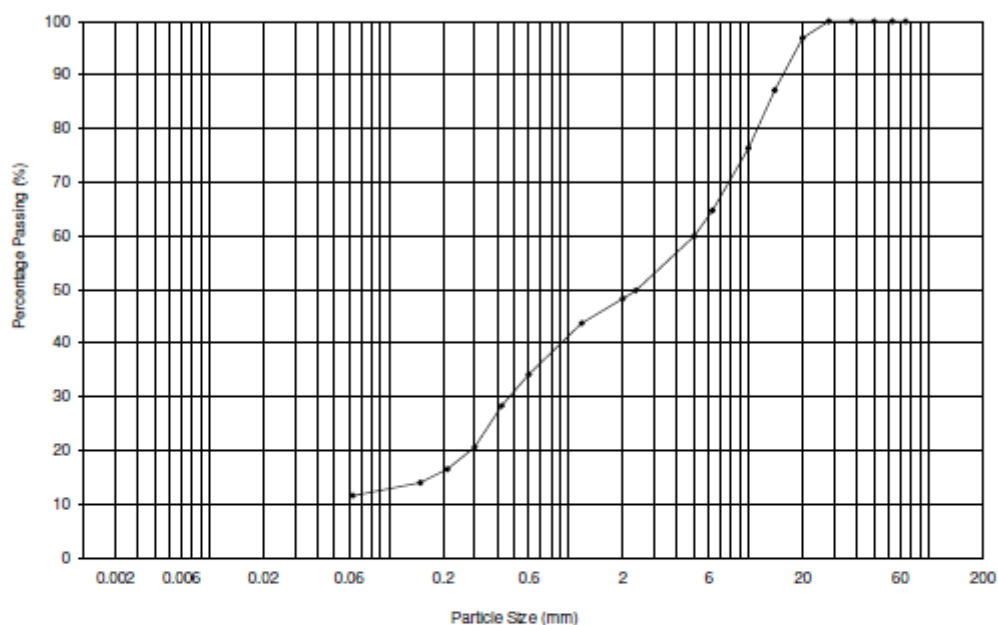
Fax: 0844 3358907

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Web: www.fastrack-geotechnical.co.uk

Appendix No: 3

FGS Ref: 22399

LABORATORY RESULTS**Property Address: Newport Road, Hayes, London, UB4 8JX****PARTICLE SIZE DISTRIBUTION: BOREHOLE 4 at 3.00m**

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

Issued by:

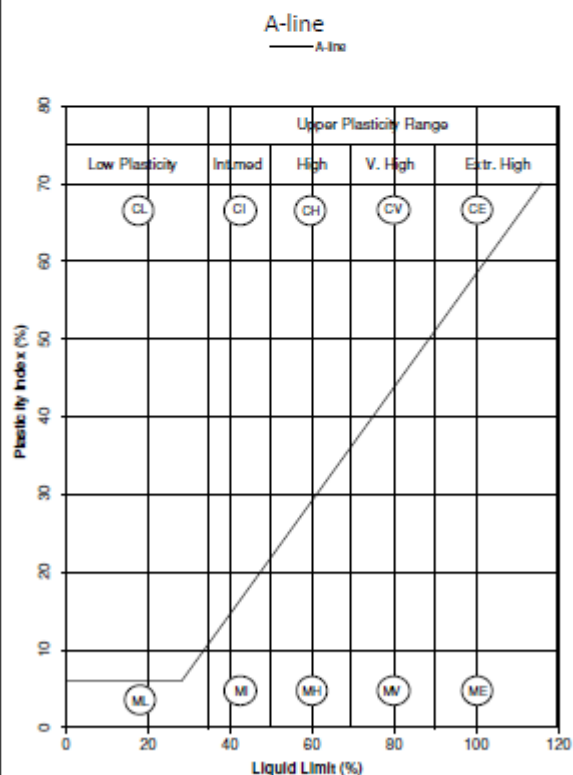
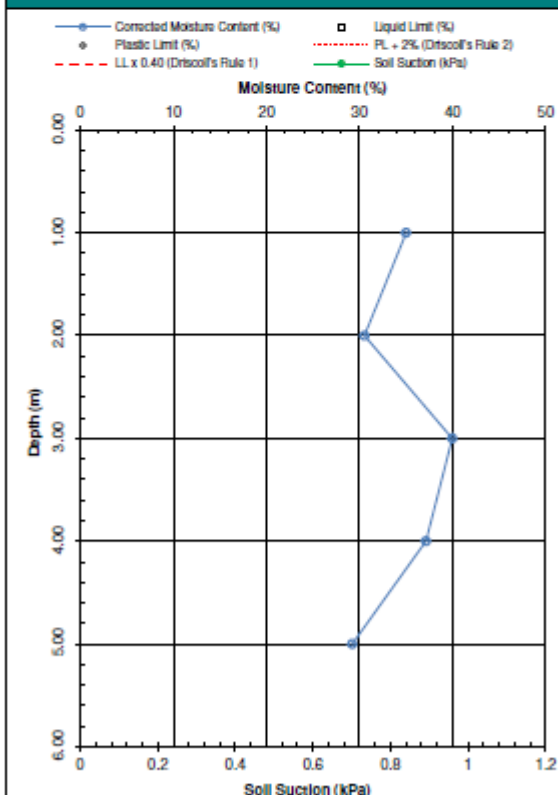
- ☒ Jade Barnett (Laboratory Technician)
- ☐ Other

Signed:

LABORATORY RESULTS

Property Address:	Newport Road, Hayes, London, UB4 8JX
--------------------------	--------------------------------------

BOREHOLE 5

[illegible]

Comments:

Issued by: ☒ Jade McLellan (Laboratory Manager)
☐ Isabella Acerbis (Laboratory Supervisor)

☐ Ted Smith (Laboratory Technician)
☐ Benjamin Broddebanks (Laboratory Technician)

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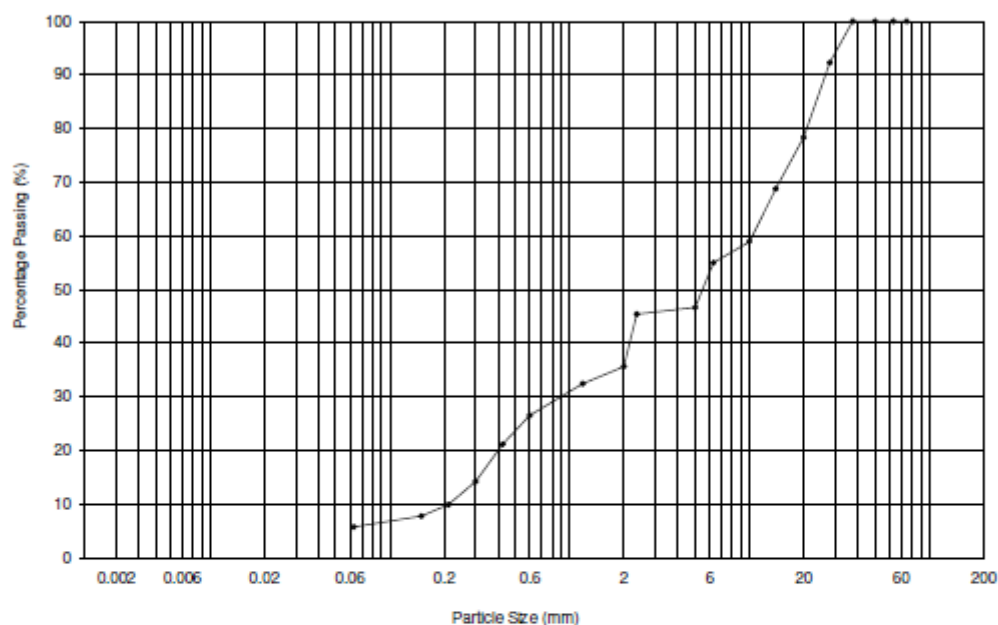
Web: www.fastrack-geotechnical.co.uk

Appendix No:

3

FGS Ref:

22399

LABORATORY RESULTS**Property Address: Newport Road, Hayes, London, UB4 8JX****PARTICLE SIZE DISTRIBUTION: BOREHOLE 5 at 1.00m**

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

Issued by:



Jade Barnett (Laboratory Technician)



Other

Signed:

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Tel: 0844 3358908

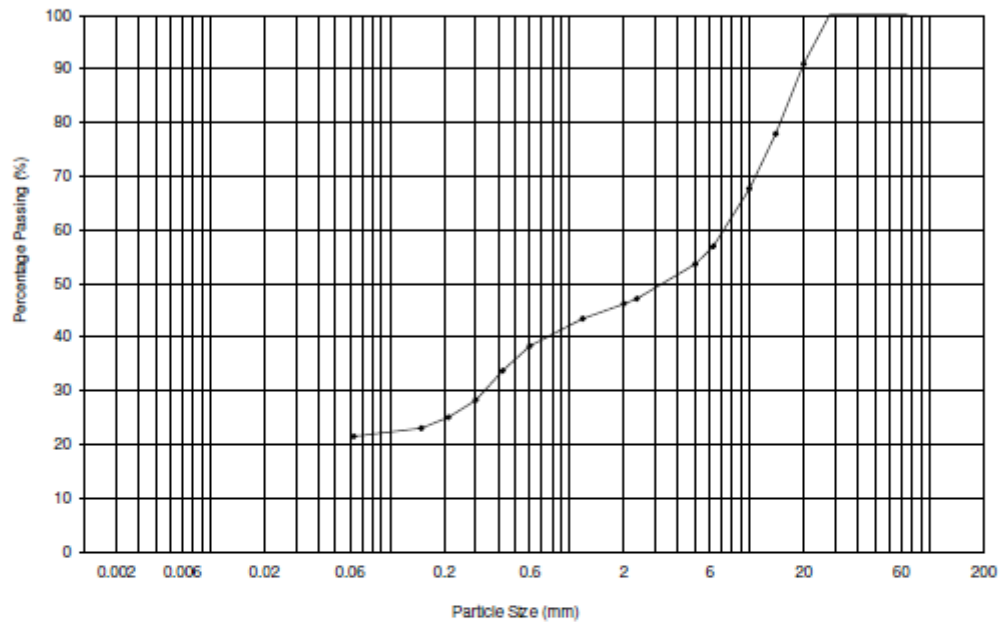
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Web: www.fastrack-geotechnical.co.uk

Appendix No: 3

FGS Ref: 22399

LABORATORY RESULTS**Property Address: Newport Road, Hayes, London, UB4 8JX****PARTICLE SIZE DISTRIBUTION: BOREHOLE 5 at 2.00m**

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

Issued by:



Jade Barnett (Laboratory Technician)



Other

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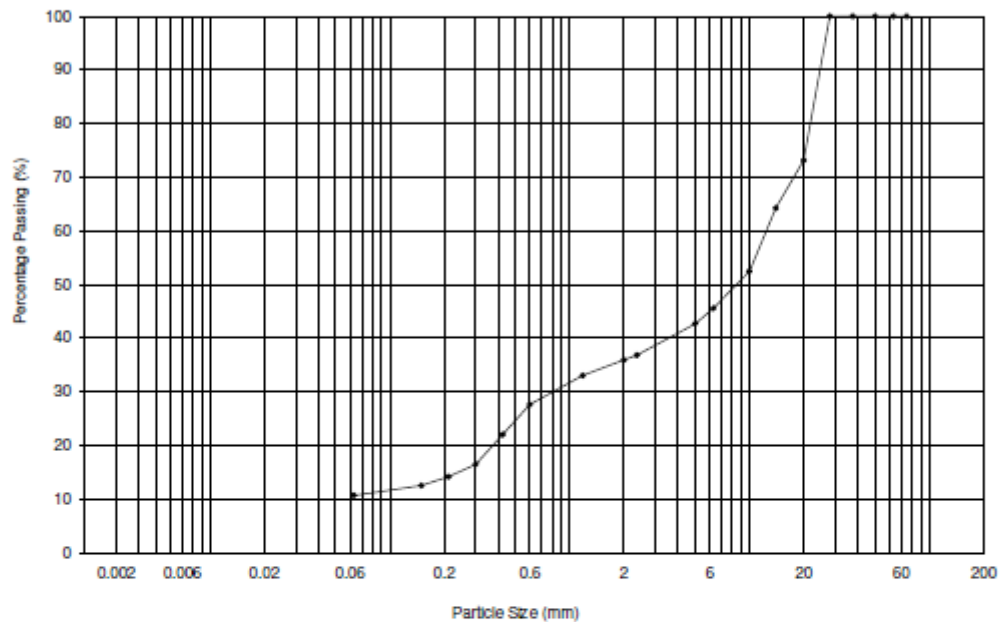
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Appendix No: 3

FGS Ref: 22399

LABORATORY RESULTS**Property Address: Newport Road, Hayes, London, UB4 8JX****PARTICLE SIZE DISTRIBUTION: BOREHOLE 5 at 3.00m**

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

Issued by:



Jade Barnett (Laboratory Technician)

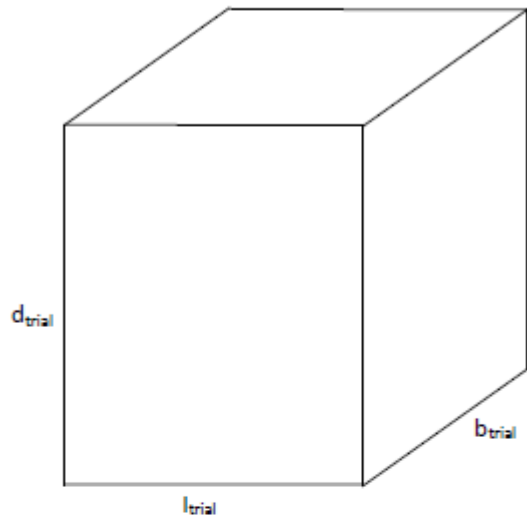


Other

Signed:



Soil Infiltration Rate (BRE Digest 365)



0.00m – CONCRETE

0.10m – Mid Brown Sandy CLAY containing Flint Gravel, Pebbles and Cobbles.

0.80m – Mid Brown Clayey SAND & GRAVEL.
Gravel is Flint

SOAK AWAY TEST NO: 1

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

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

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

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

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

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

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

Test 1 – time to fall from 75% depth to 25% depth = $T_1 = 432$ Seconds

Test 2 – time to fall from 75% depth to 25% depth = $T_2 = 905$ Seconds

Test 3 – time to fall from 75% depth to 25% depth = $T_3 = 909$ Seconds

Longest time to fall from 75% depth to 25% depth = $T_{lg} = \text{Max}(T_1, T_2, T_3) = 909$ Seconds

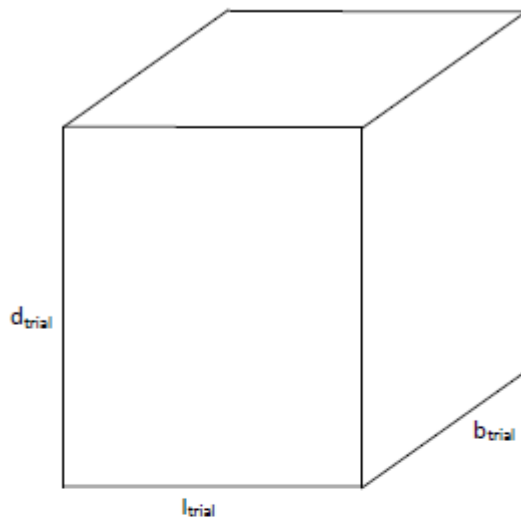
Storage Volume from 75% depth to 25% depth = $V_{p75_25} = (l_{trial} \times b_{trial} \times (d_{75} - d_{25})) \times V_{trial} = 0.045m^3$

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

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

Soil infiltration rate = $F = V_{p75_25} / (A_{p50} \times T_{lg}) = 71.75 \times 10^{-6} m/s$

Soil Infiltration Rate (BRE Digest 365)



0.00m – CONCRETE

0.15m – Mid Brown Sandy CLAY containing Brick fragments and Flint Gravel

0.80m – Mid Brown Clayey SAND & GRAVEL.
Gravel is Flint

SOAK AWAY TEST NO: 2

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 = $T_1 = 482$ Seconds

Test 2 – time to fall from 75% depth to 25% depth = $T_2 = 688$ Seconds

Test 3 – time to fall from 75% depth to 25% depth = $T_3 = 1267$ Seconds

Longest time to fall from 75% depth to 25% depth = $T_{lg} = \text{Max}(T_1, T_2, T_3) = 1267$ 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 = $F = V_{p75_25} / (A_{p50} \times T_{lg}) = 51.47 \times 10^{-6} \text{m/s}$



2683



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THE INDEPENDENT ASSOCIATION
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THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number: 21-33760

Issue: 1

Date of Issue: 21/05/2021

Contact: Martin Rush

Customer Details: Fastrack Site Investigations Ltd
Unit 9 Tyndales Farm
Southend Road
Woodham Mortimer
Essex CM9 6TQ

Quotation No: Q19-01629

Order No: 5000/22399

Customer Reference: 22399

Date Received: 17/05/2021

Date Approved: 21/05/2021

Details: Newport Road, Hayes, London, UB4 8JX

Approved by:

Mike Varley, Technical Manager

Any comments, opinions or interpretations expressed herein are outside the scope of UKAS accreditation (Accreditation Number 2683)

This report may only be reproduced in full



Sample Summary

Report No.: 21-33760, issue number 1

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
237416	BH1 2.00	11/05/2021	17/05/2021	Loamy sand + stones	
237417	BH1 5.00	11/05/2021	17/05/2021	Silty clayey loam	
237418	BH4 3.00	11/05/2021	17/05/2021	Loamy sand	
237419	BH5 1.00	11/05/2021	17/05/2021	Loamy sand	



Results Summary

Report No.: 21-33760, issue number 1

ELAB Reference	237416	237417	237418	237419
Customer Reference				
Sample ID				
Sample Type	SOIL	SOIL	SOIL	SOIL
Sample Location	BH1	BH1	BH4	BH5
Sample Depth (m)	2.00	5.00	3.00	1.00
Sampling Date	11/05/2021	11/05/2021	11/05/2021	11/05/2021

Determinand	Codes	Units	LOD				
Soil sample preparation parameters							
Material removed	N	%	0.1	n/a	28.6	43.0	78.5
Description of Inert material removed	N		0	n/a	Stones	Stones	Stones
Anions							
Water Soluble Sulphate	M	g/l	0.02	^ 0.18	0.09	0.05	0.07
Miscellaneous							
pH	M	pH units	0.1	^ 8.5	7.6	7.7	8.9

Tests marked N are not UKAS accredited.
The Environmental Laboratory Ltd. Reg. No. 3882193

Page 3 of 5

2077-P2GE-1: Land on the East Side of Newport Road, Hayes
Westway Construction Ltd



Method Summary

Report No.: 21-33760, issue number 1

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
pH	M	Air dried sample	21/05/2021	113	Electromeric
Water soluble anions	M	Air dried sample	19/05/2021	172	Ion Chromatography



Report Information

Report No.: 21-33760, 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