constructiveevaluation
Building & Material Test Consultants

Stage 2: Site Investigation

AT

53 Agar Grove,
London Borough of Camden,
London
NW1 9UE

FOR

3PM

Job No. 13.7883
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Contents

Appendices

Trading Terms

Unless specifically stated within the tender/quotation or unless identified within the introduction to this report it is confirmed that this report has been compiled wholly in accord with Constructive Evaluation Limited's terms of engagement.

The following notes should be read in conjunction with the report. Any variation to the general procedures outlined below are indicated in the text.

Foreword

The recommendations made and opinions expressed in the report are based on the conditions revealed by the site works as indicated on the site record sheets, together with an assessment of the data from the insitu and laboratory testing or in respect of the desktop reports. No responsibility can be accepted for conditions that have not been revealed by the research, for example, due to inaccuracies in the data. While the report may offer opinions, these comments are for guidance only and no liability can be accepted for their accuracy.

Routine Sampling

During the site investigation, soil, water and leachate samples have been taken in accordance with recommendations within BS.5930: 1990 *Code of Practice for Site Investigations* (Amendment 2: 2010), & BS.10175: 2011. All samples have been marked accordingly, and stored under suitable conditions to prevent any deterioration of the specimen (e.g. volatilisation of hydrocarbons). All samples have been placed in suitably labelled sealed plastic containers and sampling equipment cleaned between sample locations to prevent possible cross contamination.

During the compilation of desktop studies a number of sources have been contacted in order to provide any relevant information regarding the site in question. The sources contacted provide their own Terms & Conditions with regard to the data provided. As such, each source, e.g. Sitescope, Council Websites, etc. must be considered only in relation to these individual Terms & Conditions. All research has been carried out in accordance with recommendations within BS.10175: 2011.

The method of construction employed to form trial pits is entered on their records. In general, it is not possible to extend machine excavated trial pits to depths significantly below the local water table, especially in predominantly granular soils. Except for manually excavated pits, and unless otherwise stated, the trial pits have not been provided with temporary side support during their construction, hence personnel have not entered them and examined the strata or any construction details so exposed.

Laboratory Testing

Unless stated otherwise within the text, all laboratory tests have been performed in accordance with the requirements detailed in British Standards 1881:1990 or other standards or specifications that may be appropriate.

Regulatory Bodies

After the compilation of desktop study and walkover survey or site investigation works all parties must communicate with regulatory bodies including the Local Authority (both Planning & Environmental Health) and the Environment Agency. It must be accepted that further requirements may develop. It is possible that aspects of desktop study may need to be altered to conform to the requirements of the regulatory bodies.

Definitions

Reference to the word "contamination" in this report does not relate to the statutory definition of contaminated land under 1990 Environmental Protection Act unless otherwise stated. The definition used in this report is: "Land that contains substances that, when present in sufficient quantities or concentrations, are likely to cause harm, directly or indirectly, to man, to the environment, or on occasion to other targets" (NATO CCMS, 1985).

Walkover Survey

It should be noted that a walkover survey is designed as a brief inspection of the site in question, however every reasonable effort has been made to access all areas of the site, areas where this has not proved possible will be referenced in the text. The site reconnaissance is undertaken with permission of the client after the document search is completed with the aim of recording any further aspects of the site not revealed by the desktop study however this does not in itself guarantee that every possible risk has been seen.

Conceptual Model/Risk Assessment/ Sampling Regime

The conceptual model, Risk assessment and sampling regime has been formulated in accordance with BS10175:2011 and CLR 8 based upon the relevant information gained from the desktop and walkover survey. While the model and assessment offer opinions and interpretations of these guidelines, the comments made are for guidance only and no liability can be accepted for their accuracy.

Restrictions

In some instances a site investigation must be separated into two stages, depending on the access to the sub soils at the time of the initial site attendance. It must also be noted that in many instances the access afforded is restricted due to continuing activity on the site. In such instances all reasonable effort were to achieve maximum sampling coverage. This does not imply a guarantee that inaccessible areas are similar.

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1.0 INTRODUCTION

Constructive Evaluation Limited (CE) were instructed by 3PM *'the client'* (Ref: EQ9040, Dated: 31st October 2013) to conduct a Stage 2 Site Investigation works at the site known as 53 Agar Grove within the London Borough of Camden. The works were set out within the scope of works document provided to CE by Webb Yates Engineers (*'the engineer')* referenced J1879-Doc-01/rev X1. This phase of works follows the completion of a Stage 1 Desktop Study completed by CE (Ref: 13.7883, Dated: December 2013), this previous document should be read in conjunction with this report.

The investigation was completed in order to provide environmental and geotechnical information to aid the design of the proposed construction of a new residential block of five storeys and with a basement level, as well as three new mews houses. Based on plans provided it is understood that the basement will not cover the full footprint of the main building but instead will be located centrally to the structure. The basement is shown to be used as a bike storage area.

This investigation incorporated the construction of one cable percussive borehole to a depth of 25.00mbgl; this borehole subsequently underwent groundwater monitoring on two occasions. This was supplemented by the excavation of two trial pits to determine the foundation construction to the boundary walls of the garden. In addition two lightweight window sample and dynamic probes were completed with the site to a maximum depth of 5.00mbgl.

Selected samples have been submitted for determination of geotechnical design properties as well as testing for a basic suite of soil and groundwater contaminants including heavy metals, TPH's, PAH's and asbestos screen.

The following report describes the works undertaken and presents copies of the results obtained, together with recommendations.

2.1 Previous Reports

As noted above a Stage 1: Desktop and Walkover Survey report was compiled by CE in December 2013 and this should be read in conjunction with this report.

This report identified limited sources of potential contamination associated with the various off site works situated approximately 100m from the site. The risks to future residential end user, site workers, services and future developments are considered to be low or negligible.

As such it was recommended that a basic screen of contamination testing was completed during the geotechnical works as a precaution.

2.0 SITE CONDITIONS

The site is located on Agar Grove to the northeast of Camden Town and at the time of the site works consisted of two semi-detached, unoccupied residential. The western house is in a state of disrepair and as such is surrounded by wooden hording.

The property is accessed by vehicle via St Paul's Crescent to the west and by pedestrian means on the southern boundary along Agar Grove.

The garden to the rear is separated by a low brick wall, which has been overgrown with buddleia, brambles and ivy. At least 3 – 4no. trees ranging in height from 5-8m high are located along the western and eastern boundaries of the rear garden.

At the time of the site investigation only the rear garden area of the property was accessible due to the instability of the structure as well as the manifestation of Japanese Knotweed growth local to the front of the property.

The site is surrounded to the north by gardens of the adjacent property with St Paul Crescent to the west and Agar Road to the south.

3.0 PHYSICAL SETTING

3.1 Geology

The relevant 1:50,000 British Geological Survey (BGS) Map 256 (North London) indicates the site to be underlain by the London Clay Formation (bedrock geology).

London Formation – The London Clay Formation typically consists of dark bluish to brownish grey, stiff heavily fissured Clay, containing variable amounts of fine grained sand and silt (particularly at the top and base of the deposit), weathering to orange brown clay near surface.

Geological Hazards – On site, there is considered to be a moderate risk from shrink swell clays, a very low risk of collapsible rocks and a negligible risk from running sands, landslides and compressible ground.

Radon Affected Areas/Protection – The site is not located within a Radon Affected Area, as less than 1% of properties are above the Action Level. No radon protective measures are necessary for any new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment.

4.0 FIELDWORKS

The following intrusive works were carried out on 30th January 2014 supervised by an Engineering Geologist from CE. Subsequent monitoring visits were undertaken on the 7th and 19th February 2014. The SI was undertaken in accordance with the scope of works agreed with our Client and in relation to statutory guidance including BS5930: 1999 Code of Practice for Site Investigations (Amendment 2: 2010) and BS10175: 2011 Investigation of Potentially Contaminated Sites: Code of Practice.

4.1 Exploratory Holes

- Prior to any excavations taking place a Cable Avoidance Tool (CAT) was used to check for the position of any underlying electrical services. In addition, a starter pit was excavated to at least 1.00 meters below ground level (mbgl) to clear the borehole location prior to any drilling commencing.

- One exploratory borehole (BH1) was sunk to a depth of 25.00mbgl by means of a light weight demountable cable percussive rig. Insitu Standard Penetration Testing was completed throughout the drilling programme and representative samples were removed in accordance with current protocol.

- Two trial pits (TP1 and TP2) were hand excavated to a maximum depth of 1.00mbgl for the purposes of exposing the foundations of the boundary garden walls.

- Two window sample holes (WS1 and WS2) were drilled to a maximum depth of 4.43mbgl and one heavy dynamic probe (DP1) drilled to a maximum depth of 6.00mbgl.

- All locations were logged, and any visual or olfactory evidence of contamination observed. Representative soil samples removed in accordance with current protocol for contamination and geotechnical parameters.

- All Trial Pit positions were subsequently backfilled with arisings compacted and reinstated at the surface in accordance with existing ground conditions. The borehole was installed with a 50mm diameter perforated plastic standpipe, finished at the surface with a section of plain pipe and a bentonite seal in order to allow for future monitoring of groundwater level.

- The two subsequent monitoring rounds were completed to determine the groundwater level in the installed standpipe and recover samples for geoenvironmental testing.

The site layout plan indicating the position of the test location is provided in Appendix A, with photographs taken during the investigation in Appendix B.

4.2 Site Limitations

The limitations of the site as discussed in section 2.0 have meant that the full footprint of the proposed area to be developed has not covered by the exploratory holes. The investigation has targeted those available areas within the rear garden area as shown in the sketch plan in appendix A.

5.0 GROUND CONDITIONS

5.1 Soils

The following strata conditions were encountered during the intrusive works:

Made Ground/Topsoil – The surface of the garden is overgrown as formed by a mixture of fauna with scattered debris that includes wood, bricks, scaffold bars and plastic.

Upper Made Ground soils are described to a maximum depth of 0.60mbgl and are generally described as soft very sandy silty Clay with frequent rootlets, occasional roots and abundant brick fragments.

Clay – The initial natural soils are described as soft to firm consistency, light brown silty Clay to a maximum depth of 1.50mbgl and are considered to be representative of the weathered London Clay Formation. There was no notable soil desiccation of these upper cohesive soils and generally appeared to be in a saturated condition.

With depth this material is quickly described as stiff consistency (becoming very stiff consistency at 3.80mbgl) fissured Clay to the maximum drilled depth of 25.00mbgl. This material is considered to be representative of the London Clay Formation.

Please refer to the stratigraphic logs contained within Appendix C for a more detailed description.

5.2 Groundwater

Groundwater seepages were noted in WS1 and BH1 during the drilling process. With BH1 this was sealed off at approximately 2.00mbgl with the drilling casing. A groundwater level was recorded at 1.00mbgl within WS2, which subsequently rose to 0.80mbgl after approximately 30 minutes.

These high groundwaters noted within the upper levels of the London Clay Formation are considered a result of the very high rainfall records from the preceding 4-6 weeks.

5.3 Visual and Olfactory Observations

With exception of anthropogenic materials within the upper ground surface and Made Ground soils no olfactory evidence of contamination was noted during the investigation.

5.4 Existing Foundations

Two trial pits were excavated to determine the foundation construction of the garden boundary walls. TP1 was located at the north east corner of the site whilst TP2 was located along the western boundary wall. Unfortunately due to the proximity of bricks stacked at the north west corner it was not possible to completed TP2 at this location as requested.

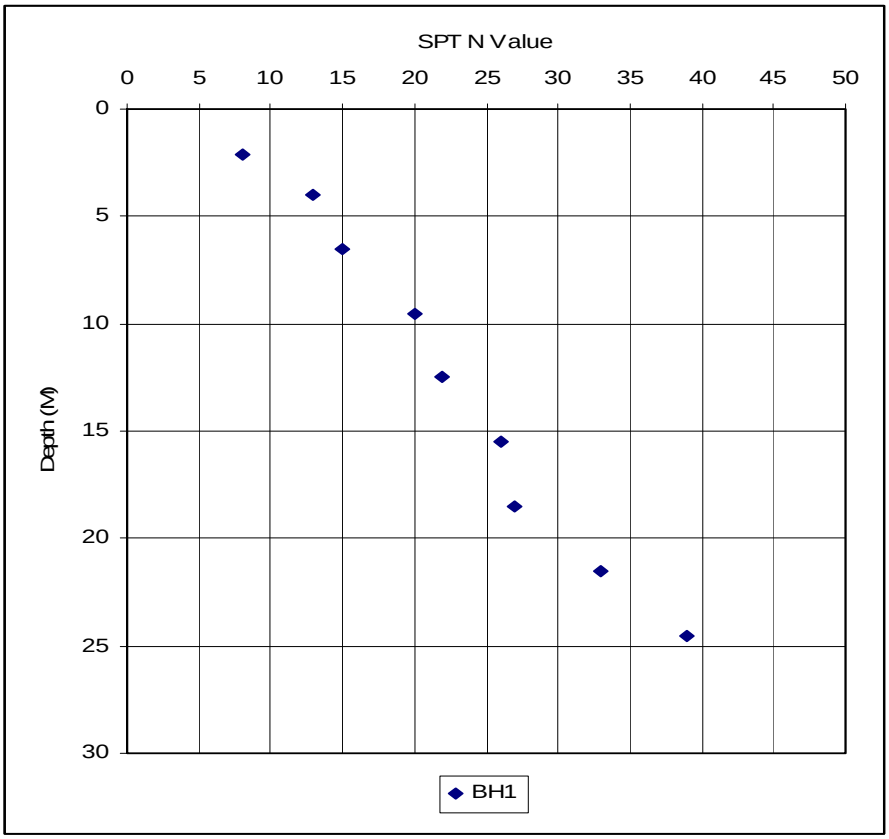
The table below identifies the foundation construction exposed in each pit with detailed sketch drawings shown in appendix C and trial pit images in appendix B.

Pit Reference	Structure Investigated	Foundation Type	Base Depth (mm)	Projection (mm)	Founding Material
TP1	Garden boundary Wall	Brick Corbel	500	150	Firm Clay
TP2	Garden Boundary Wall	Brick Corbel	760	~ 170	Firm Clay

6.0 INSITU TESTING/MONITORING

6.1 Standard Penetration Testing

Standard Penetration testing was completed at regular intervals throughout the drilling of BH1. The graph below shows the relationship between SPT-N value and depth. Full results are detailed on the logs in appendix C.



The testing within the London Clay Formation shows N values of N=8 at 2.10mbgl increasing to N=39 at 24.50mbgl indicative of firm consistency increasing to very stiff/hard consistency clay soils.

6.2 Heavy Dynamic Probing

Results from the single heavy dynamic probe completed at location WS1 are shown in appendix C.

The blows counts per 100mm depth of penetration show a similar pattern to that of the SPT testing shown above and increase with depth. However it was evident that low blow counts between 2 and 3 blows per 100mm were recorded between 1.00m and 2.00mbgl. This was seen to increase to between 4 and 5 blows per 100mm between 2.00m and 3.00mbgl. These values are through soft to firm and then firm to stiff soils respectively.

6.3 Groundwater Monitoring

Two (2no.) rounds of groundwater monitoring (MON1 and MON2) were completed by CE on the 7th and 19th February to record the depth of groundwater and sample from the installations for subsequent pH and sulphate laboratory analysis.

During both monitoring rounds groundwater within WS1 was noted to be very shallow at 0.21mbgl (MON1) and 0.42mbgl (MON2). It was not possible to reduce the level of water despite continuous bailing. It is likely that the soils were completely saturated given heavy recent rain fall which instantly refilled the installations.

Groundwater was found to be deeper within BH1 at 7.26mbgl (MON1) and 7.75mbgl (MON2). After purging of the water it was then recorded to sit at 8.50mbgl (MON1) and 9.00mbgl (MON2) suggesting that recharge is very slow.

7.0 LABORATORY TESTING

7.1 Atterberg Limits and Natural Moisture Content

Three samples from 0.50m to 1.80mbgl of the London Clay Formation were submitted for determination of their Natural Moisture Content and Plasticity Index. A further nine samples ranging in depth from 0.50m to 4.00mbgl were also scheduled for their natural moisture content.

The Natural Moisture Content values were found to range from 29% to 34% and a detailed plot showing these results against sample depth is shown in appendix C.

From the Atterberg Limit testing Liquid limits of the three samples were consistent and ranged from 65% and 67% with subsequent modified Plasticity Index results of 41% to 45%.

On the basis of these results the London Clay Formation may be classed as clay of Very High Plasticity; in accordance with NHBC standards (Chapter 4.3 ‘Building Near Trees’) the material is of high volume change potential.

7.2 Water Soluble Sulphate and pH Analysis

Six samples were subject to analysis for their water soluble sulphate concentration and pH level at depths ranging from 0.50m to 15.00mbgl.

Testing completed returned water soluble sulphate concentrations with the Made Ground Soils (3 samples) of between 0.08mg/kg to 0.92mg/kg, with pH values of 7.7 to 8.0.

Testing completed returned water soluble sulphate concentrations with the natural London Clay deposits (4 samples) of between 0.47mg/kg to 3.12mg/kg, with pH values of 7.8 to 8.3.

Full laboratory test results can be found in Appendix D.

7.3 Triaxial Compressive Strength

Six undisturbed soil samples of the London Clay from BH1 between 1.20m to 20.45mbgl were submitted for determination of their shear strength in single stage triaxial compression (100mm).

Detailed results are shown in appendix E and the shear strengths with moisture contents are summarised in the table below:

Depth (mbgl)	Undrained Shear Strength (kN/m^2)	Sample moisture content (%)
1.20-1.65	37	39
3.00-3.40	23	43
5.00-5.45	77	29
8.00-8.45	83	31
14.00-14.45	142	27
20.00-20.45	135	28

7.4 One Dimensional Consolidation

Two undisturbed samples of the London Clay Formation at depths of 1.20-165m and 3.00-3.40mbgl were submitted for One Dimensional Consolidation testing by Oedometer. Detailed results showing the pressure vs voids ratio curves and determined ranges for their Coefficient of Volume Compressibility (m_v) are shown in appendix E.

In summary the results have shown results ranging between 0.10 and 0.60m^2/MN considered characteristic of high compressibility soils.

7.5 Groundwater

As noted in section 6.3 recovered groundwater samples from the installed exploratory hole BH1 were scheduled for pH and sulphate laboratory analysis.

Results from the two monitoring visits are presented in appendix E and are summarised with pH values of 7.4 and 7.8 and sulphate contents of 2080mg/l and 2340mg/l.

8.0 DISCUSSION OF GROUND CONDITIONS

8.1 General

As discussed in section 1.0 the investigation has been commissioned ahead of the proposed redevelopment of the site to include a new residential block of five storeys and with a basement level, as well as three new mews houses. The five storey block is proposed towards the southern and central areas of the site whilst the new mews located towards the northern perimeter.

Based on plans provided it is understood that the basement will not cover the full footprint of the main building but instead is located centrally within the structure. Thus beyond the 45 degree thrust lines with the site limits to allow its construction with a battered back method. The basement is shown to be used as a bike storage area and will be in the order of 3.50m deep.

As previously discussed due to access limits it was not possible to carry out exploratory holes within the southern portion of the site. Thus our assessments of the ground conditions are based on those areas available and does not assume for those remaining areas on site.

The full design loads for the new buildings were not made known to CE at the time of this report.

From the intrusive exploratory holes completed beneath a surface cover of overgrown fauna with scattered debris the initial soils are comprised of Made Ground, described to a maximum depth of 0.60mbgl as soft very sandy silty Clay with frequent rootlets, occasional roots and abundant brick fragments.

The initial underlying natural soils are described as soft to firm consistency, light brown silty Clay to a depth of 1.50mbgl and are considered to be representative of the weathered London Clay Formation. There was no notable soil desiccation of these upper clays soils as the soil frequently appeared in a saturated condition.

The latter observations are confirmed by the higher soil moisture contents for the soils down to 1.50m ranging between 30% and 35%. Below this depth the soil moistures are found to equal 29% before slowly increasing with depth. It is felt the recent heavy rainfall has resulted in the upper, high plasticity, clays to swell. A plot of the moisture content values against depth is shown in appendix C.

WS2, located near to the north west corner of the site was completed close to an existing tree on site. Whereas WS1 was positioned within the garden at a suitable distance away from existing trees. For such high volume change potential soils a reduction in soil moisture content would be expected nearer the tree in the upper soils than away from them. However no discrepancy was noted since the soils were considered heavily saturated.

However the potential to lose its moisture (shrink) just as quickly as it has gained (swelled) is considered high and the effect of the trees should be considered.

One Dimensional Consolidation testing has indicated that the upper 3.50m soils are of high compressibility with Volume Change Compressibility values (m_v) up to nearly 0.60m^2/MN. These values are more typical of a normally consolidated soils compared to an over-consolidated deposits such as the London Clay Formation. These results may be an effect of their high soil moisture content which may have resulted in high voids ratio at low soil stresses as shown. Although it appears the upper 3.50m soils are swollen, to particularly high values. Subsequently, in its current state, it is felt that soil suction values would be zero when any amount of overburden is removed such as in the construction of a basement, thus any swelling or heave forces would not be effective.

An SPT N value of 8 at 2.10mbgl with undrained shear strengths equal to 37kN/m^2 and 23kN/m^2 at 1.20m and 3.00mbgl respectively suggest the upper soils to 3.50m to 4.00m depth are of low strength. Again these laboratory results are likely to be a result of the high soil moisture contents confirmed from the testing. Once beneath the softer, higher soil moisture content soils strength increases as shown equal to 77kN/m^2 and 83kN/m^2 at 5.00mbgl and 8.00mbgl respectively from the laboratory testing. The increase in SPT blow counts from 13 at 4.00mbgl also described the increase in the shear strength at these depths. However it should be noted that some fissuring was evident within the deeper very stiff to hard clay deposits.

Standing groundwater was encountered during the investigation within WS2 at 0.80mbgl and as seepages in WS1 at similar depths. With BH1 upper seepages were also noted at a similar depth and sealed off with the casing at 2.00mbgl. With no further strikes recorded in BH1 it appears that the upper soils from approximately GL to 2.50m are water bearing as a result of the persistent rainfall prior to the investigation. This perched water has been shown to be present throughout the monitoring phase of the works. The lower levels in BH1 compared to WS1 are likely to be result of the sealing off the more heavy water ingress near the surface in this installation.

It should be noted that these groundwater conditions may not be representative to those at the time of construction, however they do show the extreme levels that can be reached even within a generally unproductive strata such as the London Clay.

Subsequently based on the engineer's observations, insitu and laboratory testing the following moderately conservative soil parameters are considered for the strata encountered and described above:

Approx level (mbgl)	Strata	Unit Weight – moist (kN/m^3)	Undrained Cohesion c_u (kN/m^2)	Angle of Internal Friction φ (°)
G.L. – 0.60	Topsoil/Made Ground	16.0	-	-
0.60- 3.50	Soft to firm silty Clay	16.0-17.0	30	-
3.50-8.00	Stiff consistency silty Clay	19.0-20.0	60	-
8.00-12.50	Very stiff/Hard consistency silty Clay	19.50	60	-
12.50 – 20.0	Hard Consistency silty Clay	20.0	120	-
20.0 – 25.00	Hard Consistency silty Clay	20.0	135	-

8.2 Foundation Design Considerations

Assuming that the main five-storey structure will be constructed with a basement level over only part of the full footprint then shallow foundations may be considered for the remaining proposed structures depending on final loads.

It cannot be recommended that structural foundations be sited on Made Ground or Topsoil deposits as these are frequently present in a weak and variable conditions.

Insitu and laboratory strength testing has shown that the upper clay soils are of particular low strength with shear strength ranging between 23kN/m^2 to 47kN/m^2 to depths of the order of 3.50mbgl. Based on these results, soil bearing capacities for a strip foundations at depths of 1.20mbgl, 2.00mbgl and 2.50mbgl are considered below: -

Depth (mbgl)	Safe Bearing Capacity (kN/m^2)*
1.20	70
2.00	85
2.50	95

* Incl FoS = 3

At such loads it is felt that settlements will remain within tolerable limits.

Although no soil desiccation characteristics have been noted on site, deepening of any shallow foundation design is likely to be required as a result of the high volume change clay soils and existing trees on site. Subsequently foundation designs should be checked against the current NHBC Guidance when building near trees for final foundations depths.

Should any foundations be in excess of 1.50m depth then it is recommended that a void former or compressible material is used around the inside faces sides of any new foundations (load bearing) and/or ground beams in accordance with NHBC Guidance. On the basis that the weathered London Clay cohesive soils are of high volume change potential a thickness of 35mm is recommended for the sides of foundations, and 150mm on the underside of ground beams.

8.3 Deep Foundations

Based on the proposed drawings provided it is suggested that the depth of the basement floor will be in the order of 3.50mbgl.

It is considered likely that the basement slab will be designed as a deep raft and assuming the soil parameters discussed in the previous section a net safe bearing capacity of 130kN/m^2 and net gross safe bearing capacity of 185kN/m^2 can be considered taking into account the volume of soil removed (overburden).

Based on the soils encountered lower to upper value ranges for the Modulus of Subgrade Reaction (k) are suggested in the order of 0.03 to 0.06N/mm^3 at this level. It is unlikely that the inclusion of a suspended basement floor level will be considered in the designs. However suitable slab reinforcement should be considered due to the high volume change soils and subsequent potential differential settlement across the footprint.

As noted in the previous section it is felt that these upper weathered London Clay deposits have undergone swelling in their current conditions. Thus in the removal of soils for the basement construction to 3.50mbgl it is felt that any subsequent heave forces as a result of swelling would not be effective. However this assessment is considered a result of the recent heavy rainfall and heave should be considered due to the removal of overburden (of the order of 55-60kN/m^2) during construction at dryer times when the soils are considered to have much less saturated state. From the results of the consolidation testing the upper clay soils are considered to have a coefficient of volume compressibility (m_v) of the order of 0.50m^2/MN (high compressibility).

Designs have been allowed for basement construction to allow battering back the sides on site. However this assessment does not take into account issues arising from the high water levels noted during the investigation which would cause problems with an unsupported excavation. As such a pile retaining solution may wish to be considered for the construction and contiguous or secant piled retaining wall could be used to provide the deep foundation for the basement whilst reducing issues of groundwater ingress to deep excavation. It is suggested that a CFA piling technique is used due to the proximity of the neighbouring properties as a driven pile may cause unacceptable disturbance and bored piles may suffer from possible groundwater ingress.

In addition the introduction of piling in place of deep spread foundations for the full development may wish to be considered also, particular due to low strength (and subsequent low bearing capacities) noted within the upper soils as well as the proximity of the trees and potential seasonal movement of the clay soil which may occur between the deeper basement and the remaining load bearing structures of the building. If a piled solution is to implemented then a basement design including the full footprint of the building may wish to be considered.

The table below offers suggested safe working loads for a single pile at 20.00m depth into the London Clay deposits. The reported figures include a global factor of safety equal 2.5*. These are only suggested values for the deposits encountered and design calculations based on the soil parameters given and piling method should be sought by a specialist designer.

Pile Length (m)	Pile Diameter (mm)	Safe Working Load (kN)*
20.00	150	195
	250	335
	450	480

Current condition show that swelling has already occurred in the upper clay deposits and further extensive swelling is unlikely there is the potential for the pile as a whole to undergo heave. Subsequently a friction element/sleeve should be considered within all pile design to counter this potential.

Once the full/final development design and layouts including anticipated loads are known it is recommended that a specialist piling contractor is consulted to confirm the most appropriate design and construction method for a piling solution.

8.4 Basement and retaining walls

Based on the soils encountered the following parameters may be used in the design of the permanent basement, retaining walls and any temporary retaining structures:

Approx Level (mAOD)	Strata	Effective Angle of internal Friction (Ø')	Effective Cohesion c' (kPa)	Soil Unit Weight kN/m^3
G.L. – 0.60	Topsoil/Made Ground	20-23	0	16.0
0.60- 3.50	Soft to firm silty Clay	22-23	0	16.0-17.0

As previously discussed based on the shallow perched groundwater encountered during the site work period issues with regards to groundwater should be considered to ensure that appropriate precautions such as tanking are taken into consideration.

Any amounts of groundwater encountered should be removed expediously using appropriate engineering practice. We recommend that specialist advice should be sought prior to excavation method design and that the installed monitoring wells are checked for groundwater levels/fluctuations prior to final designs.

We would recommend that in respect to potential hydrostatic pressure uplift basements are designed to current practices which should be advised by a structural engineer. Although it is felt that this is not considered a factor due to the size of the building to be incorporated above the basement footprint it may be that an appropriate pile design and anchoring of the foundations can be incorporated if required.

It is recommended that there be no manned access to any excavations of greater than 1.2m to comply with current regulations unless temporary support is provided.

8.5 Sulphates and pH

Sulphate concentrations from the soil and water samples tested returned a maximum value of 3.12g/l, with pH values ranging from 7.4 to 8.3. As such a design class of DS-4 AC-4 (outlined in BRE Special Digest 1) should be suitable for the design of any buried concrete foundations required at this site based upon the testing completed.

8.6 Floor Slabs

For areas of the construction that do not have a basement below, it is felt that fully suspended floor slab should be designed due to the high volume change cohesive clays soils beneath. Voids beneath the floor slabs should be in the order of 225mm for a precast concrete construction or 300mm for a suspended timber system as per NHBC Guidance.

9.0 CONTAMINATION TESTING

Four (4no.) samples have been analysed by Messrs QTS Environmental Ltd in their UKAS and MCERTS accredited laboratory testing facility in accordance with laboratory protocol.

The testing completed comprised of a suite of heavy metals, pH, speciated Total Petroleum Hydrocarbons (Aromatic/ Aliphatic Split) and speciated Polycyclic Aromatic Hydrocarbons (PAH – including the more carcinogenic forms naphthalene and benzo(a)pyrene), total cyanide, total phenols, BTEX, MTBE, water soluble sulphates and pH.

Soil results have been compared to the currently available generic assessment criteria using the frameworks identified by the Soil Guideline Values (SGV) and Land Quality Management (LQM) given the proposed end use results have been compared against the ‘residential’ category.

9.1 Soil Contamination Soil Results

All inorganic determinants returned values below the relevant SGV and LQM guidelines within the samples tested.

The results for all organic determinands returned concentrations below the relevant and available SGVs.

Made Ground samples screened for asbestos all returned with negative results.

A copy of the laboratory certificates can be reviewed within Appendix E.

10.0 UPDATED CONCEPTUAL SITE MODEL & RISK ASSESSMENT

The Conceptual Site Model (CSM) has been re-formulated in accordance with the SI results and BS10175:2001 to provide information regarding the possible sources of contamination on site, the pathway in which the contamination can migrate and a vulnerable receptor to the contamination, all of which need to be present for there to be a risk. This is in relation to the proposed and continued end use as 'residential'. Consequently, the previous Source – Pathway – Receptor relationships have been re-evaluated as follows:

Source	***Pathway***	***Receptor***	***Potential Risk***
Hydrocarbons (PAH, TPH, BTEX and MTBE) from various off site works.	Inhalation, ingestion and dermal contact from exposure to contaminated soils.	End users.	**Negligible** risk given the laboratory results the distance to the site and the presence of London Clay underlying the site acting as a barrier to migration.
		Site workers.	**Negligible** risk however, the appropriate PPE should still be used during ground works.
	Impacted Soils.	Services.	**Negligible** risk given the laboratory results the distance to the site and the presence of London Clay underlying the site acting as a barrier to migration.
	Volatilisation of hydrocarbons from the underlying soils to indoor and/or outdoor air.	End user and buildings.	**Negligible** risk however, the appropriate PPE should still be used during ground works.
		Site workers.	**Negligible** risk however, the appropriate PPE should still be used during ground works.
Heavy metals from various off site works.	Inhalation, ingestion and dermal contact from exposure to contaminated soils.	End users.	**Negligible** risk given the laboratory results the distance to the site and the presence of London Clay underlying the site acting as a barrier to migration.
		Site workers.	**Negligible** risk however, the appropriate PPE should still be used during ground works.
	Impacted soils.	Services.	**Negligible** risk given the laboratory results the distance to the site and the presence of London Clay underlying the site acting as a barrier to migration.

Negligible Risk	Defined as the site should be considered suitable for the present or future use and environmental setting. Contaminants unlikely to be present, which might have unacceptable impact on key targets.
Low Risk	Defined as the site should be considered suitable for the present or future use and environmental setting. Contaminants may be present but unlikely to have unacceptable impact on key targets.
Moderate Risk	Defined as the site may not be suitable for the present or future use and environmental setting. Contaminants are probably present and might have unacceptable impact on key targets.
High Risk	Defined as the site is probably or certainly not suitable for the present or future use and environmental setting. Contaminants are probably or certainly present and likely to have unacceptable impact on key targets.

11.0 RECOMMENDATIONS

The following recommendations are based on the plans proposed at the time of writing. CE has been instructed to provide recommendations for the ground conditions at the site based on the results received to date.

11.1 Watching Brief

During the proposed development CE recommends that a watching brief is maintained on site, particularly during the ground works stage. This must be undertaken as part of good working practices and to note any areas of observed contamination.

During any ground works an appraisal of the exposed soils should be made by the on-site manager. If any material is noted to show visual and/or olfactory sign of contamination this material should be stockpiled separately and tested prior to its appropriate removal off site or re-use where necessary. A suitably qualified environmental specialist should be contacted to advise on the further work required.

11.2 Waste Disposal

All materials must be transported in compliance with the Duty of Care Regulations by authorising movements with carrier's individually numbered Duty of Care conveyance notes, complete with the appropriate EWC Codes. All relevant dockets will need to be kept to provide evidence of the removal.

The client or principal contractor has a responsibility to ensure that a Site Waste Management Plan (SWMP) is in place before demolition, excavation and/or construction works commence for projects exceeding costs of £300,000. The plan must record predicted and actual waste streams involved in the site works as well as distinguishing between inert, non-inert and hazardous waste by way of WAC testing.

The plan must also identify how such wastes will be managed with reuse, recycling and/or recovery options being explored before disposal options are considered. For projects exceeding £500,000, the SWMP must be updated at least every six (6no.) months to record actual volumes of waste produced with precise information about disposal arrangements.

11.3 Landscaped Areas

Specifications for topsoil requirements are outlined within BS3882:2007 'Specification for Topsoil and Requirements for Use', which should be used as guidance for the composition and chemical analysis required for the imported material. In addition an asbestos screen is considered appropriate. All certification of the removal, importation and re-use of any materials will have to be kept. It is prudent to contact the Local Authority to determine their specification for imported topsoil analysis.

Furthermore, if material is taken from other areas on the site for landscaped areas must be tested to ensure that it is fit for this purpose.

11.4 Site Workers

We would recommend that all site workers employ the use of Personal Protective Equipment (PPE) and good working practice during the construction phase of this development, particularly where direct contact with soils may occur.

11.5 Flood Risk

This report is not intended to replace a full hydrogeological survey and it is recommended that additional specialist studies be conducted to confirm the flood risks at the site given findings contained within this report.

11.6 Services

CE recommends that new services (in particular potable water supply pipes) should be made out of suitable materials. Certain contaminants (such as hydrocarbons) have been known to degrade polymeric materials such as plastics and rubber.

Furthermore, the local water board should be contacted in relation to the installation of said facilities to ascertain if they have any particular requirements.

11.7 Statutory Authorities

We would recommend that this report be forwarded to the relevant Statutory Consultees including the EA and Local Council's Environmental Health and Planning Department to seek their comments and subsequent approval prior to works commencing on site.

It is recommended that you confirm with the SAs whether as part of any planning conditions if they require a validation and/or closure report providing documentation/audit trail for the importation/removal/reuse of material on site (including topsoil certificates, landfill certificates, waste carrier notes) and any other remedial works completed on site.

The Validation Statement would be produced by a qualified Environmental Consultant to provide a statement that the development and any remedial works have been completed to the required standard and that the site is now suitable for the intended 'residential' use and poses a negligible or no risk to the various potential receptors.

11.8 Validation Report

It is recommended that you confirm with the SAs whether as part of any planning conditions if they require a validation and/or closure report providing documentation/audit trail for the importation/removal/reuse of material on site and any other remedial works completed on site.

11.9 Invasive Species

It was confirmed to CE that the Japanese Knotweed was local to the south of the site only and was undergoing treatment at the time of the site walkover and investigation works. No intrusive site investigations have been undertaken in the vicinity of the Japanese knotweed due to the potential for disturbing the roots and spreading it further. The knotweed should be eradicated before any construction works are undertaken.

APPENDICES

Their contents are listed below:

Appendix A – Exploratory Hole Sketch Plan

Appendix B – Site Investigation Photographs

Appendix C – Borehole, Window Sample, Dynamic Probe Log & Trial Pit Sections

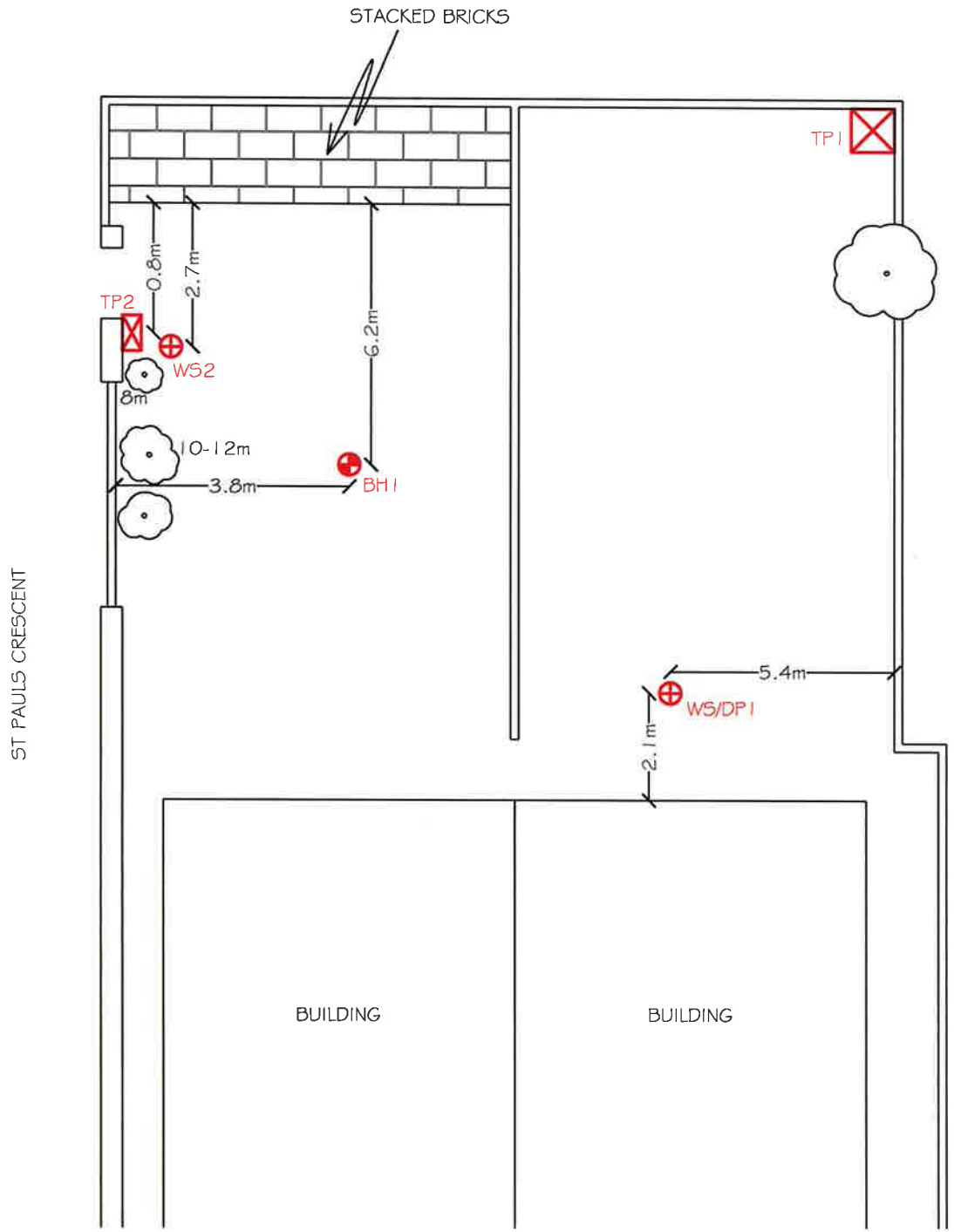
Appendix D –Groundwater Monitoring Results

Appendix E – Laboratory Test Certificates

Appendix F – Limitations

APPENDIX A

Exploratory Hole Sketch Plan



NOTES

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Client.
3PM

Project.
53 AGAR GROVE

Drawing.
TEST LOCATION PLAN

scale
NTS

date FEB 13	drawn D.Y	checked
drawing number 13.7883		revision

APPENDIX B

Site Investigation Photographs

Site Investigation Photographs

A.

B.

C.

D.

A. View of existing property from rear

B. View of existing rear garden area

C. Existing trees on site 10-12m high.

D. Existing trees on site

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Date of Site Works:

Jan 2014

Site Address:

53 Agar Grove

Client:

3PM

Job/ref no.

13.7883

Site Investigation Photographs

E.

F.

G.

H.

E. Bricks located at rear of property

F. BH1 drilling set up

G. TP1 – plan view

H. TP1 plan view showing limited foundation

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Date of Site Works:

Jan 2014

Site Address:

53 Agar Grove

Client:

3PM

Job/ref no.

13.7883

Site Investigation Photographs

I.

J.

K.

L.

I. TP1

J. WS1 GL – 1.0mbgl

K. WS1 spoil material GL – 1.00mbgl

L. WS1 1.00m – 2.00mbgl

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Date of Site Works:

Jan 2014

Site Address:

53 Agar Grove

Client:

3PM

Job/ref no.

13.7883

Site Investigation Photographs

M.

N.

O.

P.

M. WS1 2.00-3.00mbgl

N. WS1 3.00-4.00mbgl

O. TP2 plan view

P. TP2 showing limited foundation

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Date of Site Works:

Jan 2014

Site Address:

53 Agar Grove

Client:

3PM

Job/ref no.

13.7883

Site Investigation Photographs

Q.

R.

Q. WS2 1.0-2.0mbgl

R. WS2 2.0-2.80mbgl

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Date of Site Works:

Jan 2014

Site Address:

53 Agar Grove

Client:

3PM

Job/ref no.

13.7883

APPENDIX C

Borehole, Window Sample, Dynamic Probe Log & Trial Pit Sections

Borehole Logs

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Borehole No **BH1**
Sheet 1 of 3

Project Name	Project No.	Co-ords: -	Hole Type
53 Agar Grove	13.7883		Cable
Location: Camden		Level: -	Scale 1:50
Plant: Dando 2000 CP			
Client: Webb Yates		Dates: 30/01/2014	Logged By
Drilled By: DJ			

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.10			(MADE GROUND) Brick rubble, earth fill (Drillers description)
		0.30-0.40	B					(MADE GROUND) Soft consistency silty slightly gravelly Clay. Gravel is of flint, brick, occasional glass fragments.
		0.50	ES		0.60			Firm orange brown silty CLAY (Driller description)
		1.00	ES		1.20			Firm to stiff consistency light brown silty CLAY with abundant light grey gleying on surfaces. Frequent speckling of fine sand sized Selenite crystals. (LONDON CLAY FORMATION)
		1.20-1.65	U	34				
		1.65-1.85	D					
		2.10	SPT	N=8 (1,1,1,2,2,3)				
		2.10-2.55	D					
		3.00-3.40	U	35	3.40			Stiff consistency light brown silty CLAY with abundant light grey gleying on surfaces. Frequent speckling of fine sand sized Selenite crystals. (LONDON CLAY FORMATION)
		4.00	SPT	N=13 (1,2,3,2,4,4)				
		4.00	D					
		5.00-5.45	U	44	5.00			Stiff consistency light brown fissured silty CLAY with abundant light grey gleying. Frequent speckling of selenite crystals. Fissures are very closely spaced sub horizontal, plannar, undulating. Occasional fine to coarse sand lenses. (London Clay Formation)
		5.45	D					
		6.00	D		6.00			Very stiff consistency brown fissured silty CLAY. Frequent speckling of selenite crystals. Fissures are very closely spaced sub horizontal, plannar, undulating. Occasional fine to coarse sand lenses. (London Clay Formation)
		6.50	SPT	N=15 (2,2,3,3,4,5)				
		6.50-6.95	D					
		7.50	D					
		8.00-8.45	U	50				
		8.45	D					
		9.00	D					
		9.50	SPT	N=20 (3,4,4,5,5,6)				
		9.50-9.95	D					
		Type		Results				Continued next sheet

Remarks: CAT scanned. Hand excavated from GL to 1.20mbgl. Cable percussive boring from 1.20m to 25.00mbgl. Seepages noted near surface at 0.80mbgl. Sealed off at approximately 2.00mbgl. Casing depth 2.20mbgl.

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Borehole No
BH1
Sheet 2 of 3

Project Name	Project No.	Co-ords: -	Hole Type
53 Agar Grove	13.7883		Cable
Location: Camden		Level: -	Scale 1:50
Plant: Dando 2000 CP			
Client: Webb Yates		Dates: 30/01/2014	Logged By
Drilled By: DJ			

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
		10.50	D					Very stiff consistency brown fissured silty CLAY. Frequent speckling of selenite crystals. Fissures are very closely spaced sub horizontal, plannar, undulating. Occasional fine to coarse sand lenses. (London Clay Formation) 10.00m. Dark grey colour.
		11.00-11.45	U	60				
		11.45	D		11.45			Very stiff to hard consistency dark grey fissured silty CLAY. Fissures are very closely to extremely closely spaced sub horizontal, plannar, undulating. Abundant speckling of selenite crystals on surface-fine sand size. (London Clay Formation)
		12.00	D					
		12.50	SPT	N=22 (3,4,5,5,6,6)				
		12.50-12.95	D					
		13.50	D					
		14.00-14.45	U	60				
		14.45	D					14.45m Fissuring not well defined.
		15.00	D					
		15.50	SPT	N=26 (4,4,5,6,7,8)				
		15.50-15.95	D					
		16.50	D					
		17.00-17.45	U	70	17.00			Hard consistency dark grey silty CLAY. (London Clay Formation)
		17.45	D					
		18.00	D					
		18.50	SPT	N=27 (3,4,6,6,6,9)				
		18.50-18.95	D					
		19.50	D					
		Type		Results				

Continued next sheet

Remarks: CAT scanned. Hand excavated from GL to 1.20mbgl. Cable percussive boring from 1.20m to 25.00mbgl. Seepages noted near surface at 0.80mbgl. Sealed off at approximately 2.00mbgl. Casing depth 2.20mbgl.

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Borehole No
BH1
Sheet 3 of 3

Project Name	Project No.	Co-ords: -	Hole Type
53 Agar Grove	13.7883		Cable
Location: Camden		Level: -	Scale
Plant: Dando 2000 CP			1:50
Client: Webb Yates		Dates: 30/01/2014	Logged By
Drilled By: DJ			

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
		20.00-20.45	U	70				Hard consistency dark grey silty CLAY. (London Clay Formation)
		20.45 20.45	D					
		21.00	D					
		21.50	SPT	N=33 (5,5,6,8,9,10)				
		21.50-21.95	D					
		22.50	D					
					23.00			
		23.00-23.45	U	75				Very stiff to hard consistency grey fissured silty CLAY. Fissures are very close to closely spaced, plannar, undulating. (LONDON CLAY FORMATION)
		23.45	D					
		24.00	D					
		24.50	SPT	N=39 (4,7,8,10,10,11)				
		24.50-24.95	D					
					25.00			End of Borehole at 25.00 m
		Type		Results				

21 22 23 24 25 26 27 28 29

Remarks: CAT scanned. Hand excavated from GL to 1.20mbgl. Cable percussive boring from 1.20m to 25.00mbgl. Seepages noted near surface at 0.80mbgl. Sealed off at approximately 2.00mbgl. Casing depth 2.20mbgl.

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Window Sample Logs

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Borehole No
WS1
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Hole Type
53 Agar Grove	13.7883		WS
Location: Camden Plant: Lightweight window sampler		Level: -	Scale 1:50
Client: Webb Yates Drilled By: LB		Dates: 30/01/2014	Logged By DC

Well	Water Strikes	Samples & In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
		0.20	ES		0.20			TOPSOIL
		0.50	D					Soft to firm consistency, light brown silty CLAY. (LONDON CLAY FORMATION)
		0.50	ES					
		1.00	D					0.8m- Seepages noted in pit face
		1.50	IVN 1	48	1.50			Firm to stiff consistency, light brown silty CLAY. (LONDON CLAY FORMATION)
		1.50	D					
		2.00	IVN 2	82	2.00			Stiff consistency. Light brown silty CLAY. (LONDON CLAY FORMATION)
		2.00	D					
		2.50	IVN 3	92				
		2.50	D					
		3.00	IVN 4	143				
		3.00	D					
					3.80			Very stiff consistency, light brown silty CLAY. (LONDON CLAY FORMATION)
					4.43			End of Borehole at 4.43 m
			Type	Results				

Remarks: Buried service clearance pit dug to 1.0mbgl. Lightweight window sampling from 1.00m to 2.80mbgl. No Groundwater encountered.

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Borehole No
WS2
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Hole Type
53 Agar Grove	13.7883		WS
Location: Camden Plant: Lightweight window sampler		Level: -	Scale 1:50
Client: Webb Yates Drilled By: LB		Dates: 30/01/2014	Logged By DC

Well	Water Strikes	Samples & In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
		0.20	ES		0.10			(CONCRETE) Weak Lime mix
								(MADE GROUND) Soft very sandy silty CLAY with frequent rootlet, occasional roots and abundant brick fragments.
		0.60	IVN 1	74	0.60			Firm light greyish brown silty CLAY. (LONDON CLAY FORMATION)
		0.60	D					
	▽	0.60-0.80	ES					
		1.10	IVN 2	89				
		1.10	IVN 3	63	1.20			Firm to stiff consistency, light greyish brown silty CLAY. (LONDON CLAY FORMATION)
		1.20	D					
		1.40	IVN 4	67				
		1.70	IVN 5	116				
		1.80	D		1.80			Stiff consistency, light greyish brown silty CLAY. (LONDON CLAY FORMATION) 2.00-2.50m Claystone noted. Sample wet.
					2.50			Becoming very stiff, light greyish brown silty CLAY. (LONDON CLAY FORMATION)
		2.70	IVN 6	119	2.80			End of Borehole at 2.80 m
			Type	Results				

Remarks: Buried service clearance pit dug to 1.0mbgl. Lightweight window sampling from 1.00m to refusal depth at 2.80mbgl. Groundwater encountered at approximately 1.0mbgl rising to 0.80m.

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Dynamic Probe Logs

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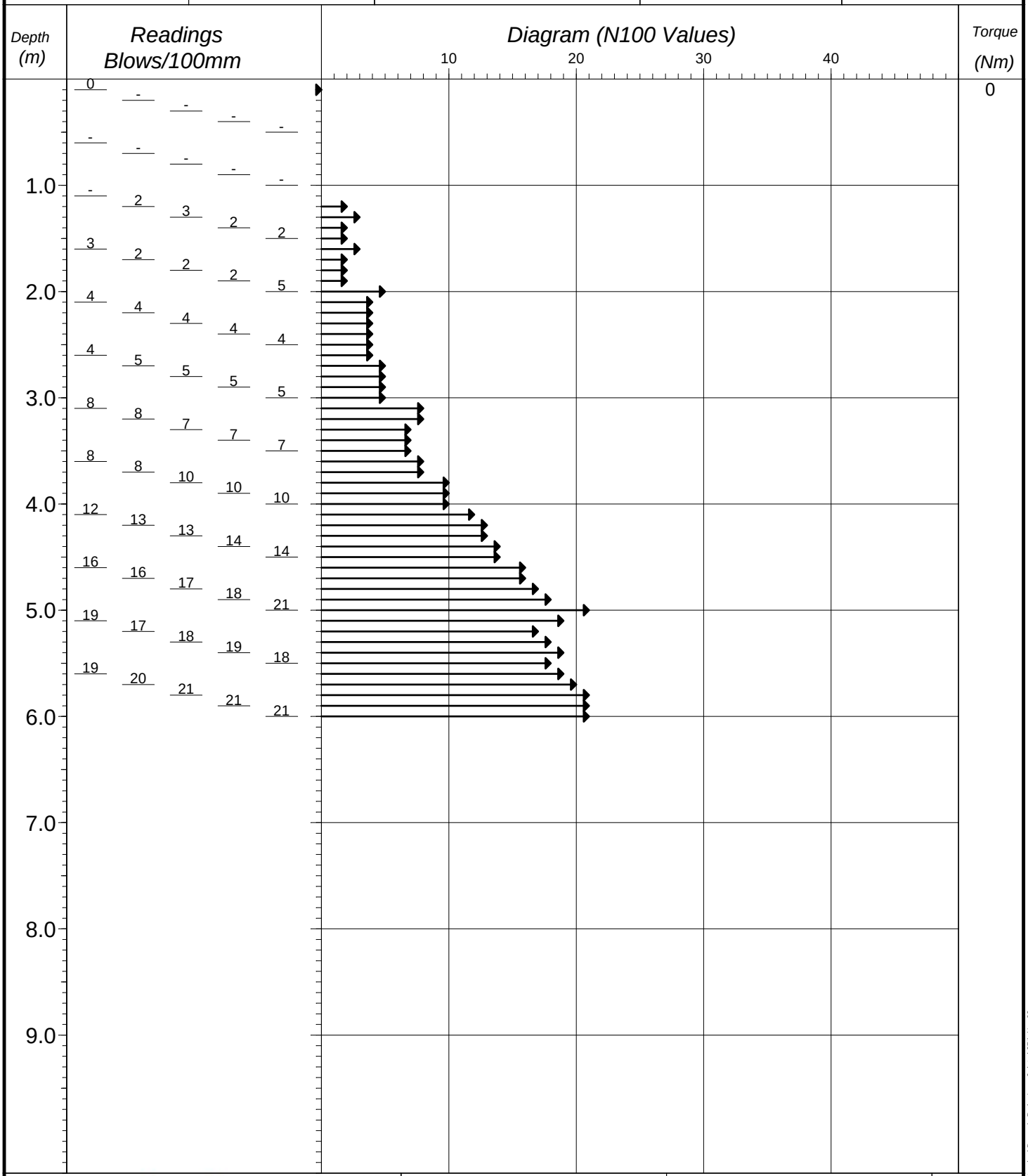
DYNAMIC PROBING

			Probe No **DP1**	
Client **Webb Yates**			Sheet 1 of 1	
Site **53 Agar Grove**			Project No **13.7883**	
E **-**	N **-**	Level **-**	Date **30/01/2014**	Logged by **PQ**



Fall Height	**0**	Cone Base Diameter	**0**
Hammer Wt	**50.00**	Final Depth	**5.90**
Probe Type	**DPH**	Log Scale	1:50

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Trial Pit Sections

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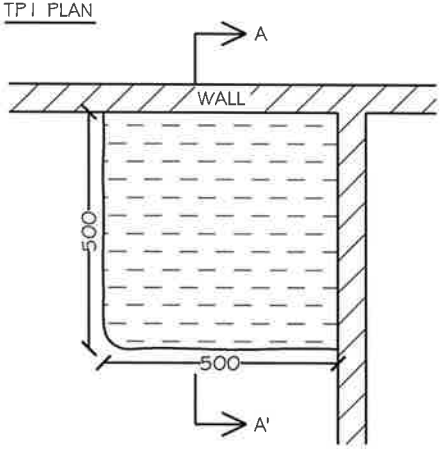
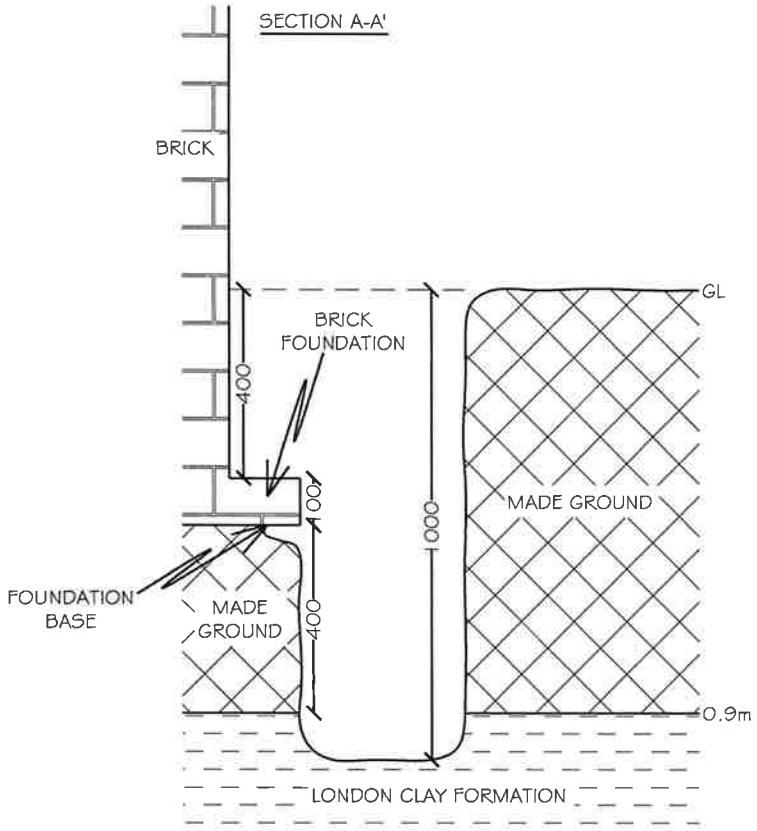
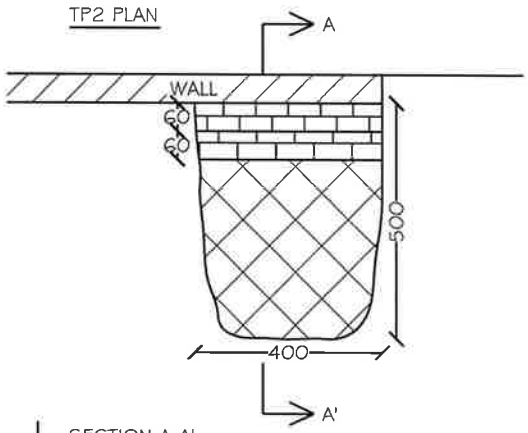
TP1 PLAN



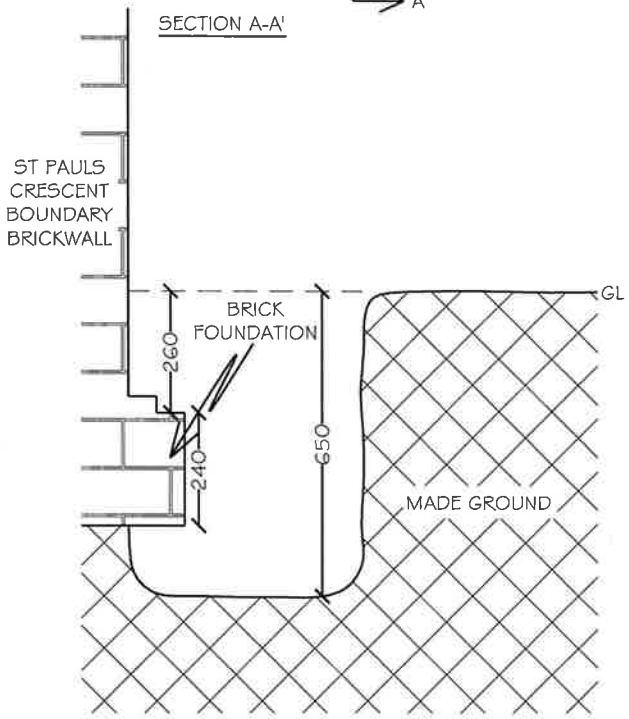
SECTION A-A'



TP2 PLAN



SECTION A-A'



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email-info@theconstructivegroup.com

Client.
3PM

Project.
53 AGAR GROVE

Drawing.
TP SECTIONS

scale
NTS

date FEB 13	drawn D.Y	checked
drawing number 13.7883		revision

APPENDIX D

Monitoring Results

Project No:	13.7883	Project Name:	Agar Grove

Date:	7/02/14	Personnel:	AT
Weather:	Cloudy	Ground Conditions:	Damp
Temp (^{o}C):	8°	Monitoring Round:	1

Groundwater Monitoring

Well No.		BH1	WS1		
Water Level (m)		7.26	0.21		
Depth of Borehole (m)		9.90	4.45		
Volume Purged (l)		15			
Recharge Rate	Level after purging (m)	8.50			
	Final level (m)	8.50			
	Time taken (min)	25			
Sampled (Yes/No)		Y			
Water Appearance		Light Brown			
Hydrocarbon Sheen		No			
Odour		No			
Groundwater Level (mAOD)					
Product Thickness (cm)					
Headspace Reading (ppm)					

Diameter (mm)	35mm	50mm	75mm	100mm
Volume to be purged (L/m)	3	6	14	24

Key:
↓ Decreasing ↑ Increasing - Fluctuating
N/A – Not applicable

Recharge rate:
<0.1m/min = Poor
0.1-0.5m/min = Moderate
>0.5m/min = Good

Project No:	13.7883	Project Name:	Agar Grove

Date:	19/02/14	Personnel:	PQ
Weather:	Bright, Cloudy 7/8	Ground Conditions:	Damp
Temp (^{o}C):	10°	Monitoring Round:	2

Groundwater Monitoring

Well No.		BH1	WS1		
Water Level (m)		7.75	0.42		
Depth of Borehole (m)		9. 87	4.43		
Volume Purged (l)		10			
Recharge Rate	Level after purging (m)	9.00			
	Final level (m)	9.00			
	Time taken (min)	15			
Sampled (Yes/No)		Y			
Water Appearance		Light Brown			
Hydrocarbon Sheen		No			
Odour		No			
Groundwater Level (mAOD)					
Product Thickness (cm)					
Headspace Reading (ppm)					

Diameter (mm)	35mm	50mm	75mm	100mm
Volume to be purged (L/m)	3	6	14	24

Key:
↓ Decreasing ↑ Increasing - Fluctuating
N/A – Not applicable

Recharge rate:
<0.1m/min = Poor
0.1-0.5m/min = Moderate
>0.5m/min = Good

APPENDIX E

Laboratory Certificates

Soils

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TEST RESULT SHEET

Contract : 53 Agar Grove

Job No. : 13.7883

Client : 3PM

Sample No. & Depth:		**WS1 1.0m**
Natural Moisture Content	**W%**	34%

Sample No. & Depth:		**WS1 2.0m**
Natural Moisture Content	**W%**	31%

Sample No. & Depth:		**WS1 2.5m**
Natural Moisture Content	**W%**	32%

Sample No. & Depth:		**WS1 3.0m**
Natural Moisture Content	**W%**	31%

Sample No. & Depth:		**WS1 3.5m**
Natural Moisture Content	**W%**	33%

Sample No. & Depth:		**WS1 4.0m**
Natural Moisture Content	**W%**	30%

Sample No. & Depth:		**WS2 0.6m**
Natural Moisture Content	**W%**	34%

Sample No. & Depth:		**WS2 1.2m**
Natural Moisture Content	**W%**	33%

Sample No. & Depth:		**WS2 2.5m**
Natural Moisture Content	**W%**	32%

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TEST RESULT SHEET

Contract : 53 Agar Grove

Job No. : 13.7883

Client : 3PM

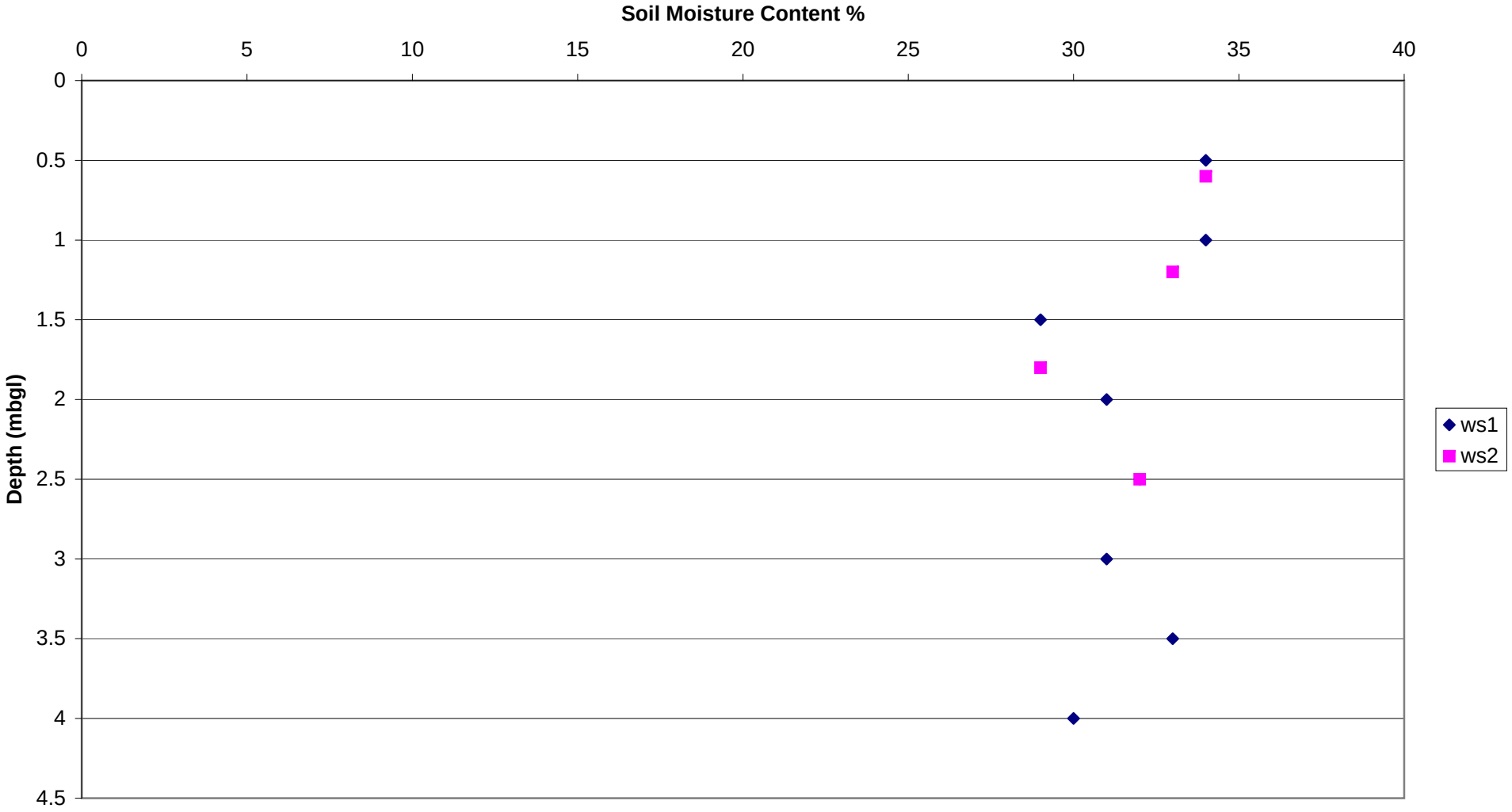
Results Summary		**WS1 0.5m**
Natural Moisture Content	**W%**	31%
Liquid Limit	**W_L%**	67%
Plastic Limit	**W_P%**	21%
Plasticity Index	**I_P%**	46%
Portion Retained on 425µm sieve	**%**	3%
Modified PI	**%**	45%
Soil Classification	**IP_c%**	*CH*
Consistency Index	**I_L%**	*0.78*
Comments:		

Results Summary		**WS1 1.5m**
Natural Moisture Content	**W%**	29%
Liquid Limit	**W_L%**	66%
Plastic Limit	**W_P%**	21%
Plasticity Index	**I_P%**	45%
Portion Retained on 425µm sieve	**%**	11%
Modified PI	**%**	41%
Soil Classification	**IP_c%**	*CH*
Consistency Index	**I_L%**	*0.83*
Comments:		

Results Summary		**WS2 1.8m**
Natural Moisture Content	**W%**	29%
Liquid Limit	**W_L%**	65%
Plastic Limit	**W_P%**	23%
Plasticity Index	**I_P%**	43%
Portion Retained on 425µm sieve	**%**	2%
Modified PI	**%**	42%
Soil Classification	**IP_c%**	*CH*
Consistency Index	**I_L%**	*0.86*
Comments:		

Operator : BW

Plot of Soil Moisture Content % v Depth (m)



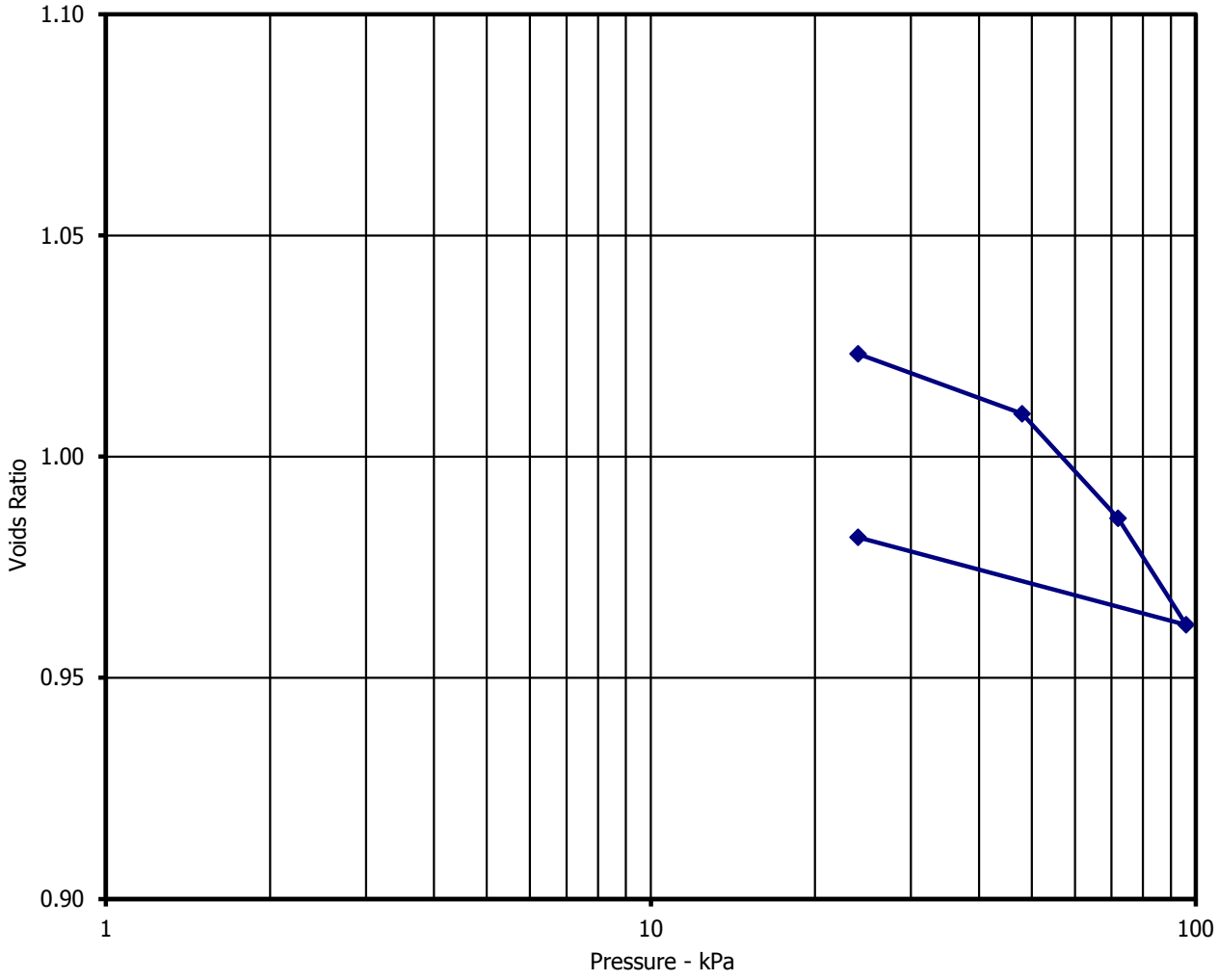
Test Report: ONE DIMENSIONAL CONSOLIDATION

BS1377: Part 5: 1990

Client ref: **13.7883**

Location: **53 Agar Grove, Camden**
Contract Number: **22207-050214**
Hole/Sample Number: **BH1**
Depth (m) : **1.20 - 1.65**
Sample Type: **U**

Initial Conditions		Pressure Range kPa			Mv m2/MN	Cv m2/yr	Method of time fitting used Cv Calculated using t90
Moisture Content (%):	40						
Bulk Density (Mg/m3):	1.82	0	-	24	0.31	24.37	Nominal Laboratory Temperature
Dry Density (Mg/m3):	1.30	24	-	48	0.28	5.47	
Voids Ratio:	1.0383	48	-	72	0.49	5.37	Location of specimen with sample
Degree of saturation:	102.7	72	-	96	0.51	7.82	top
Height (mm):	18.03	96	-	24	0.14	1.19	Remarks:
Diameter (mm)	74.87						
Particle Density (Mg/m3)	2.65						



GSTL
GEO SITE & TESTING SERVICES LTD

B Sharp
Checked by

D P Evans
Approved by

Date approved: 20/02/14

UKAS TESTING 2788

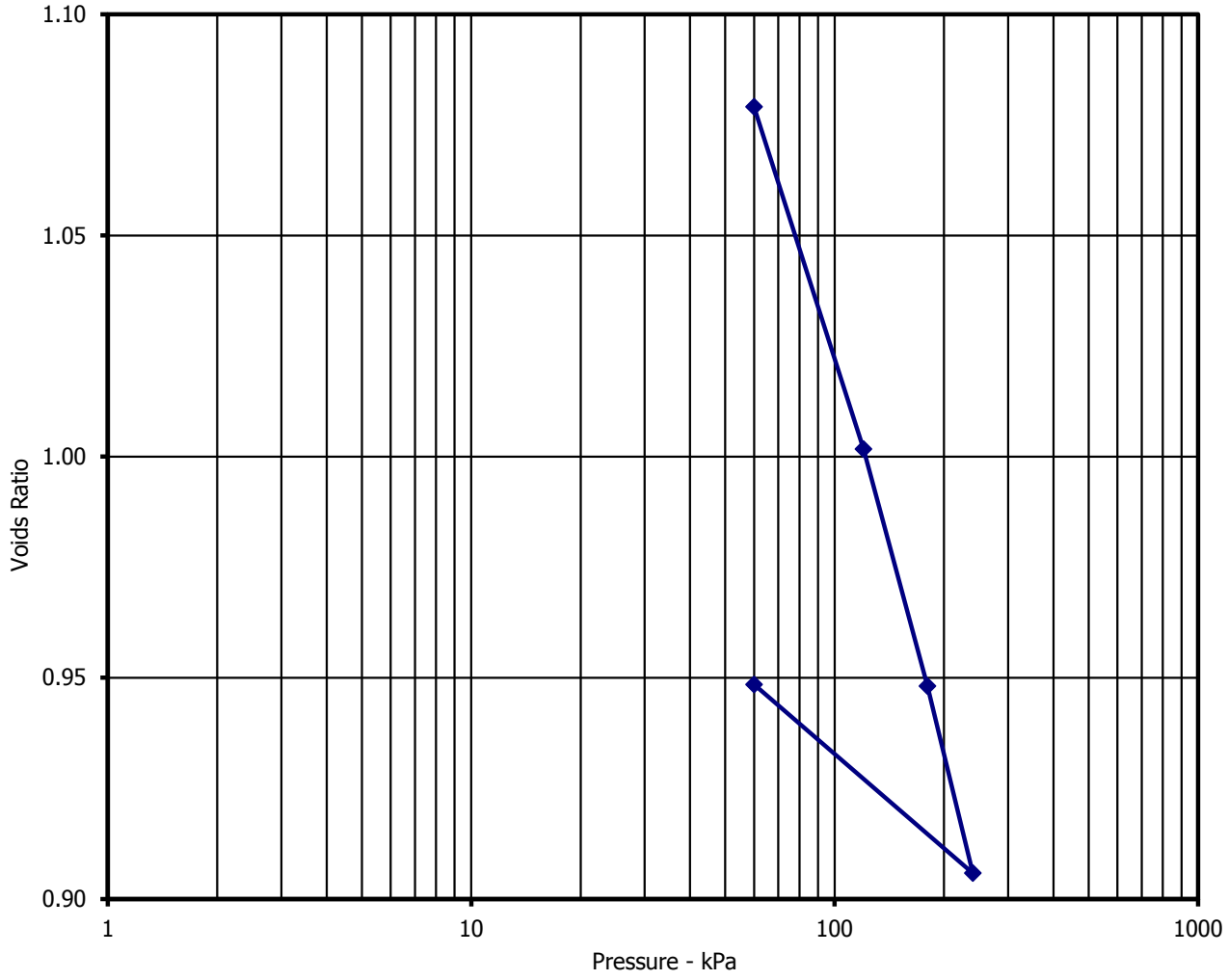
Test Report: ONE DIMENSIONAL CONSOLIDATION

BS1377: Part 5: 1990

Client ref: **13.7883**

Location: **53 Agar Grove, Camden**
Contract Number: **22207-050214**
Hole/Sample Number: **BH1**
Depth (m) : **3.00 - 3.40**
Sample Type: **U**

Initial Conditions		Pressure Range kPa			Mv m2/MN	Cv m2/yr	Method of time fitting used Cv Calculated using t90
Moisture Content (%):	43						
Bulk Density (Mg/m3):	1.76	0	-	60	0.57	2.19	Nominal Laboratory Temperature
Dry Density (Mg/m3):	1.23	60	-	120	0.62	0.74	
Voids Ratio:	1.1532	120	-	180	0.45	0.80	Location of specimen with sample
Degree of saturation:	99.5	180	-	240	0.36	0.85	top
Height (mm):	18.28	240	-	60	0.12	0.45	Remarks:
Diameter (mm)	74.89						
Particle Density (Mg/m3)	2.65						



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B Sharp
Checked by

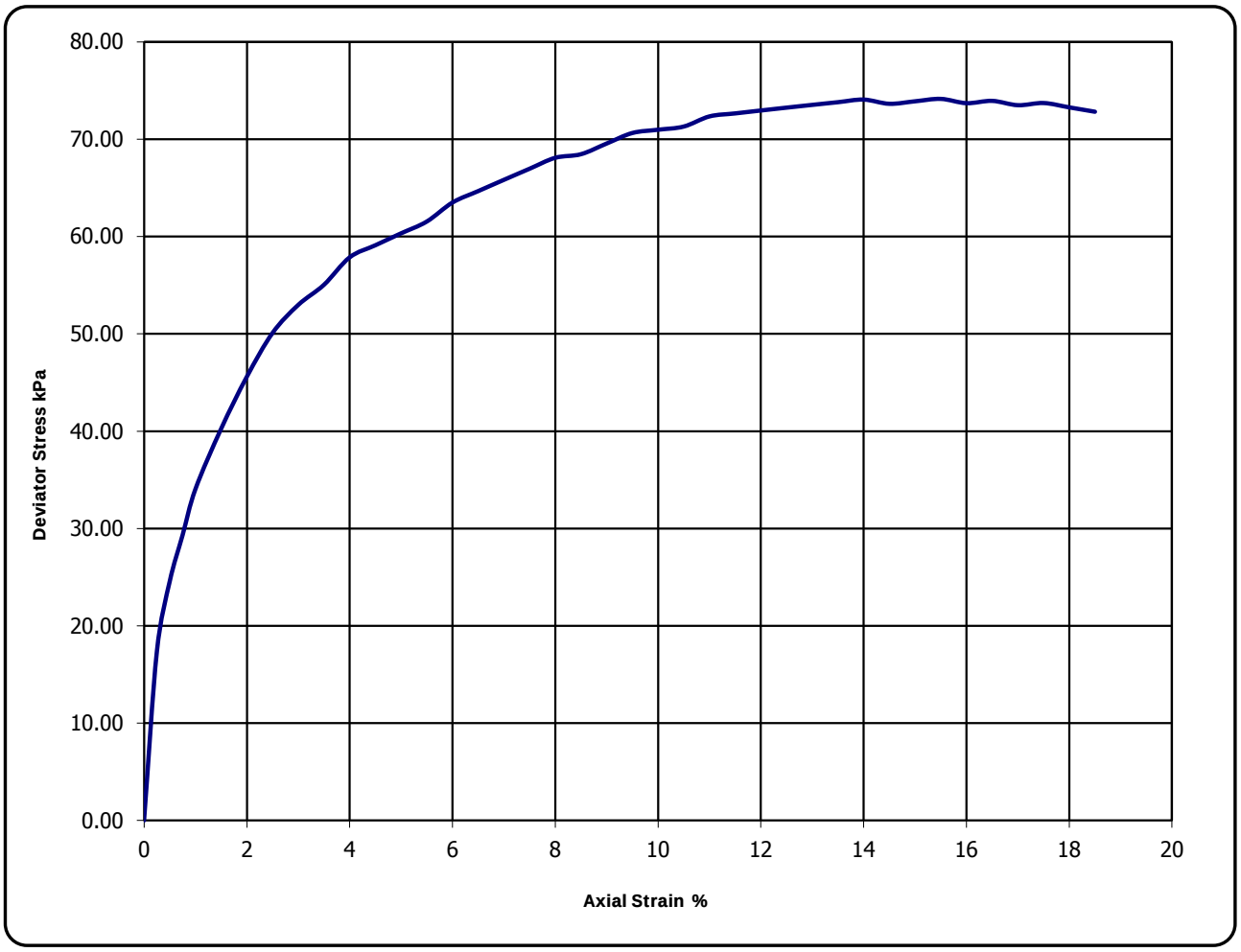
D P Evans
Approved by

Date approved: 20/02/14

UKAS TESTING 2788

Test Report: **Undrained Shear Strength in Triaxial Compression**
BS 1377 : Part7 : Clause 8 : 1990 Single Stage Test
without measurement of Pore Pressure

Client ref:	**13-7883**
Location:	**53 Agar Grove, Camden**
Contract Number:	**22207-050214**
Hole Number	**BH1**
Sample Number:	**N/A**
Depth (m) :	**1.20-1.65**
Sample Type :	**U**



Diameter (mm):	100	Height (mm):	200	Test:	U 100 mm Single Stage.			
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Middle of tube Rate of strain = 2 %/min
A	39.0	1.99	1.43	24	74	37	15.5	Compound	Latex Membrane used 0.2 mm thickness

GEO Site & Testing Services Limited

Checked By

Approved By:

Date Approved: 21.2.14

UKAS TESTING 2788

Test Report: **Undrained Shear Strength in Triaxial Compression**
BS 1377 : Part7 : Clause 8 : 1990 Single Stage Test
without measurement of Pore Pressure

Client ref:	**13-7883**
Location:	**53 Agar Grove, Camden**
Contract Number:	**22207-050214**
Hole Number	**BH1**
Sample Number:	**N/A**
Depth (m) :	**1.20-1.65**
Sample Type :	**U**

Post Test Specimen

Specimen Split

Diameter (mm):		100	Height (mm):		200	Test:	U 100 mm Single Stage.		
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube Rate of strain = 2 %/min
A	39.0	1.99	1.43	24	74	37	15.5	Compound	Latex Membrane used 0.2 mm thickness

GSTL
GEO Site & Testing Services Limited

Checked Checked By

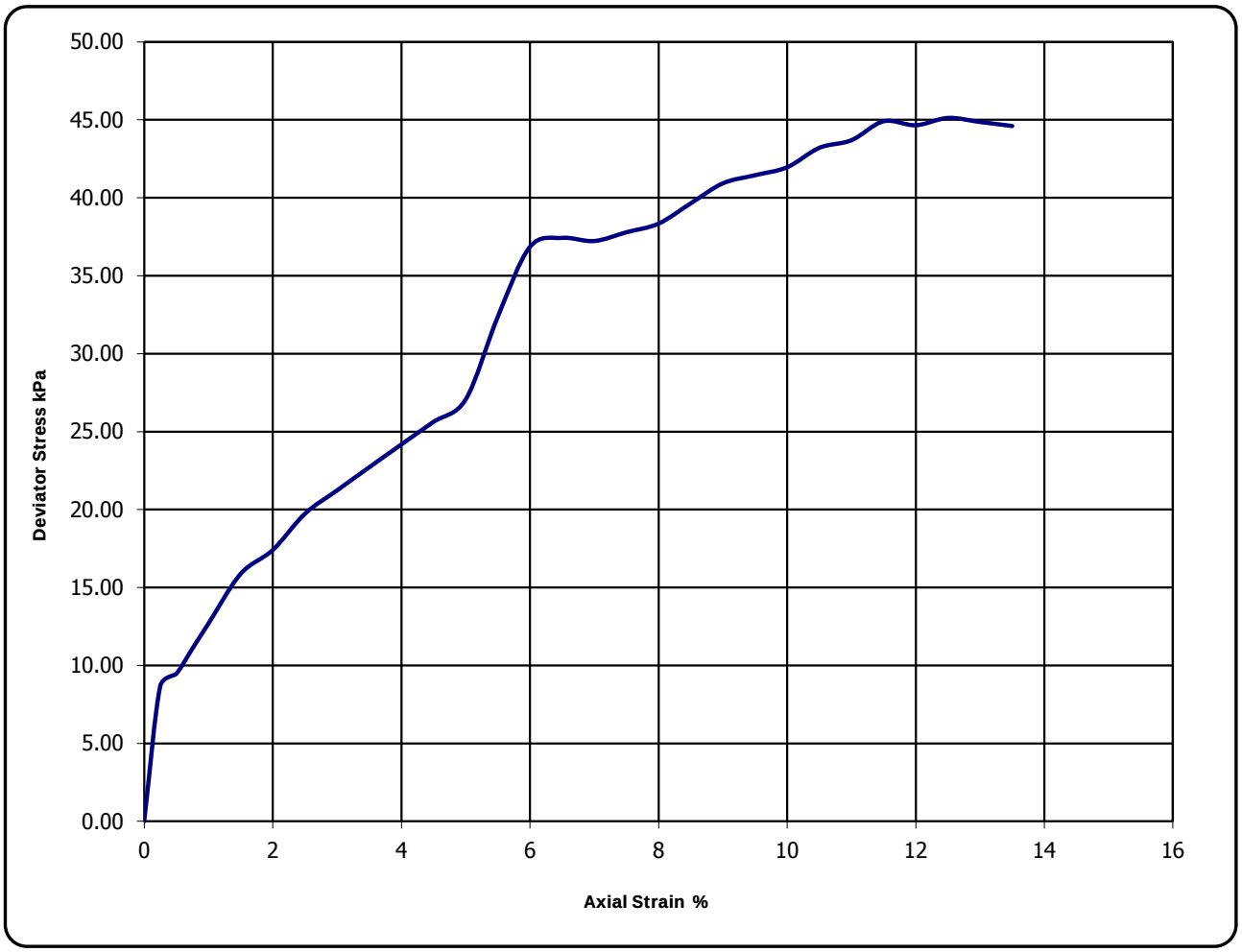
Approved By:

Date Approved: 21.2.14

UKAS TESTING 2788

Test Report: **Undrained Shear Strength in Triaxial Compression**
BS 1377 : Part7 : Clause 8 : 1990 Single Stage Test
without measurement of Pore Pressure

Client ref:	**13-7883**
Location:	**53 Agar Grove, Camden**
Contract Number:	**22207-050214**
Hole Number	**BH1**
Sample Number:	**N/A**
Depth (m) :	**3.00-3.40**
Sample Type :	**U**



Diameter (mm):		99	Height (mm):		200	Test:	U 99 mm Single Stage.		
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Middle of tube Rate of strain = 2 %/min
A	41.6	2.06	1.46	60	45	23	12.5	Compound	Latex Membrane used 0.2 mm thickness

GEO Site & Testing Services Limited

Checked By

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Date Approved: 21.2.14

UKAS TESTING 2788

Test Report: **Undrained Shear Strength in Triaxial Compression**
BS 1377 : Part7 : Clause 8 : 1990 Single Stage Test
without measurement of Pore Pressure

Client ref:	**13-7883**
Location:	**53 Agar Grove, Camden**
Contract Number:	**22207-050214**
Hole Number	**BH1**
Sample Number:	**N/A**
Depth (m) :	**3.00-3.40**
Sample Type :	**U**

Post Test Specimen

Specimen Split

Diameter (mm):		99	Height (mm):		200	Test:	U 99 mm Single Stage.		
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube Rate of strain = 2 %/min
A	41.6	2.06	1.46	60	45	23	12.5	Compound	Latex Membrane used 0.2 mm thickness

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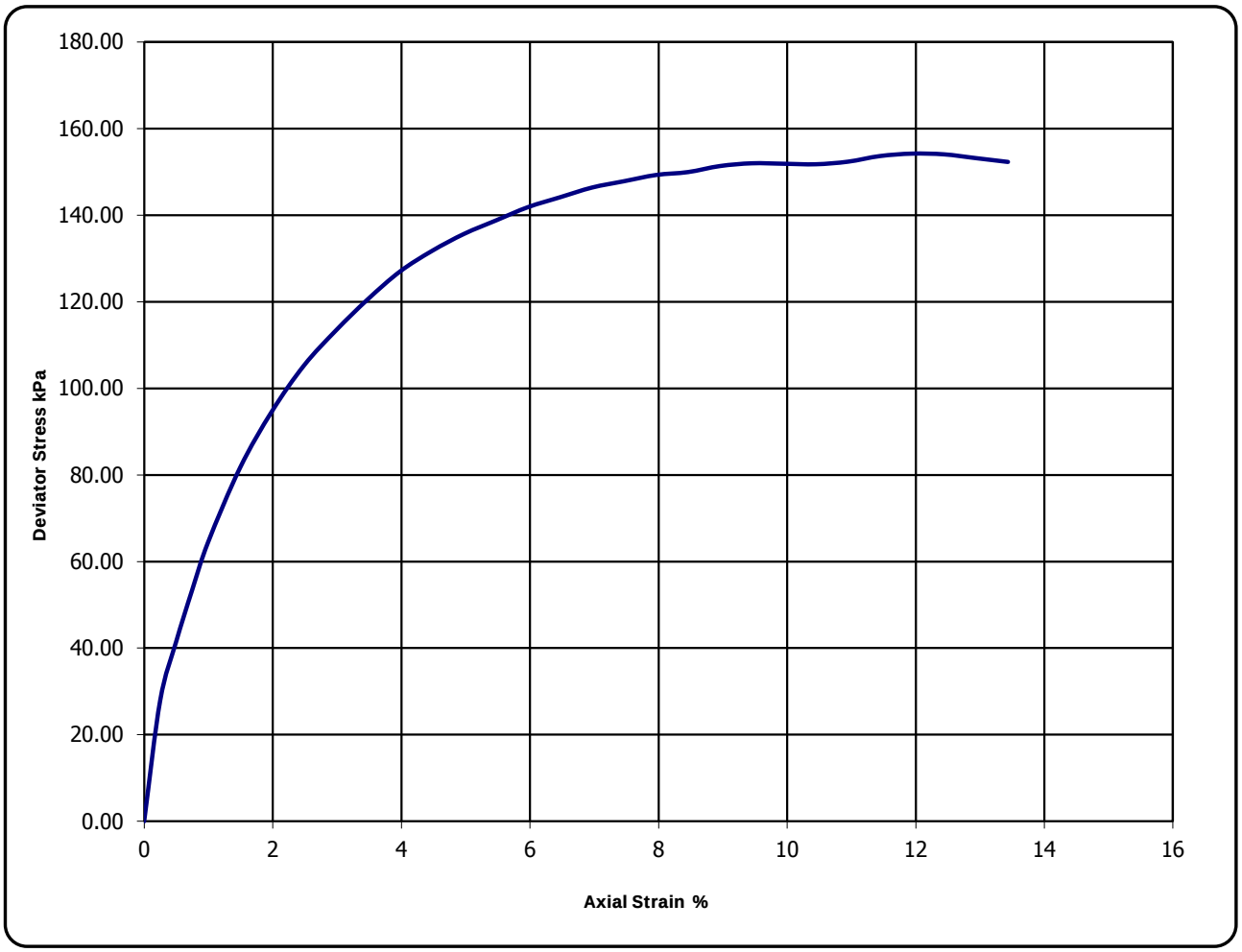
UKAS TESTING 2788

Test Report: **Undrained Shear Strength in Triaxial Compression**
BS 1377 : Part7 : Clause 8 : 1990 Single Stage Test
without measurement of Pore Pressure

Client ref:	**13-7883**
Location:	**53 Agar Grove, Camden**
Contract Number:	**22207-050214**
Hole Number	**BH1**
Sample Number:	**N/A**
Depth (m) :	**5.00-5.45**
Sample Type :	**U**



Diameter (mm):		100	Height (mm):		201	Test:	U 100 mm Single Stage.		
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube Rate of strain = 2 %/min
A	28.8	2.03	1.57	100	154	77	11.9	Compound	Latex Membrane used 0.2 mm thickness

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Approved By:

Date Approved: 21.2.14

UKAS TESTING 2788

Test Report: **Undrained Shear Strength in Triaxial Compression**
BS 1377 : Part7 : Clause 8 : 1990 Single Stage Test
without measurement of Pore Pressure

Client ref:	**13-7883**
Location:	**53 Agar Grove, Camden**
Contract Number:	**22207-050214**
Hole Number	**BH1**
Sample Number:	**N/A**
Depth (m) :	**5.00-5.45**
Sample Type :	**U**

Post Test Specimen

Specimen Split

Diameter (mm):		100	Height (mm):		201	Test:	U 100 mm Single Stage.		
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube Rate of strain = 2 %/min
A	28.8	2.03	1.57	100	154	77	11.9	Compound	Latex Membrane used 0.2 mm thickness

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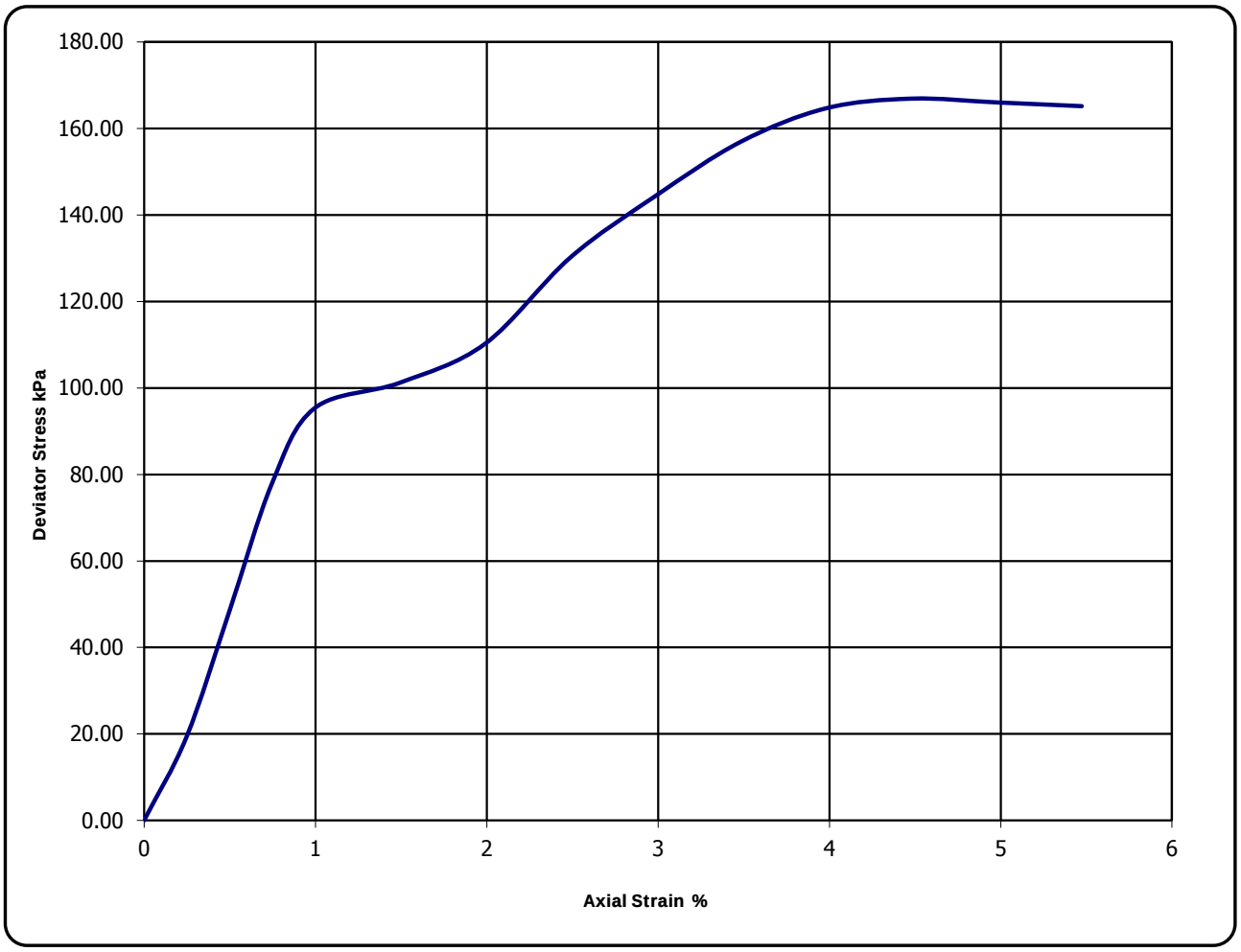
Test Report: **Undrained Shear Strength in Triaxial Compression**
BS 1377 : Part7 : Clause 8 : 1990 Single Stage Test
without measurement of Pore Pressure

Client ref:	**13-7883**
Location:	**53 Agar Grove, Camden**
Contract Number:	**22207-050214**
Hole Number	**BH1**
Sample Number:	**N/A**
Depth (m) :	**8.00-8.45**
Sample Type :	**U**



Diameter (mm):	100	Height (mm):	201	Test:	U 100 mm Single Stage.			
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube Rate of strain = 2 %/min
A	31.3	2.04	1.55	160	167	83	4.5	Compound	Latex Membrane used 0.2 mm thickness

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Test Report: **Undrained Shear Strength in Triaxial Compression**
BS 1377 : Part7 : Clause 8 : 1990 Single Stage Test
without measurement of Pore Pressure

Client ref:	**13-7883**
Location:	**53 Agar Grove, Camden**
Contract Number:	**22207-050214**
Hole Number	**BH1**
Sample Number:	**N/A**
Depth (m) :	**8.00-8.45**
Sample Type :	**U**

Post Test Specimen

Specimen Split

Diameter (mm):		100	Height (mm):		201	Test:	U 100 mm Single Stage.		
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube Rate of strain = 2 %/min
A	31.3	2.04	1.55	160	167	83	4.5	Compound	Latex Membrane used 0.2 mm thickness

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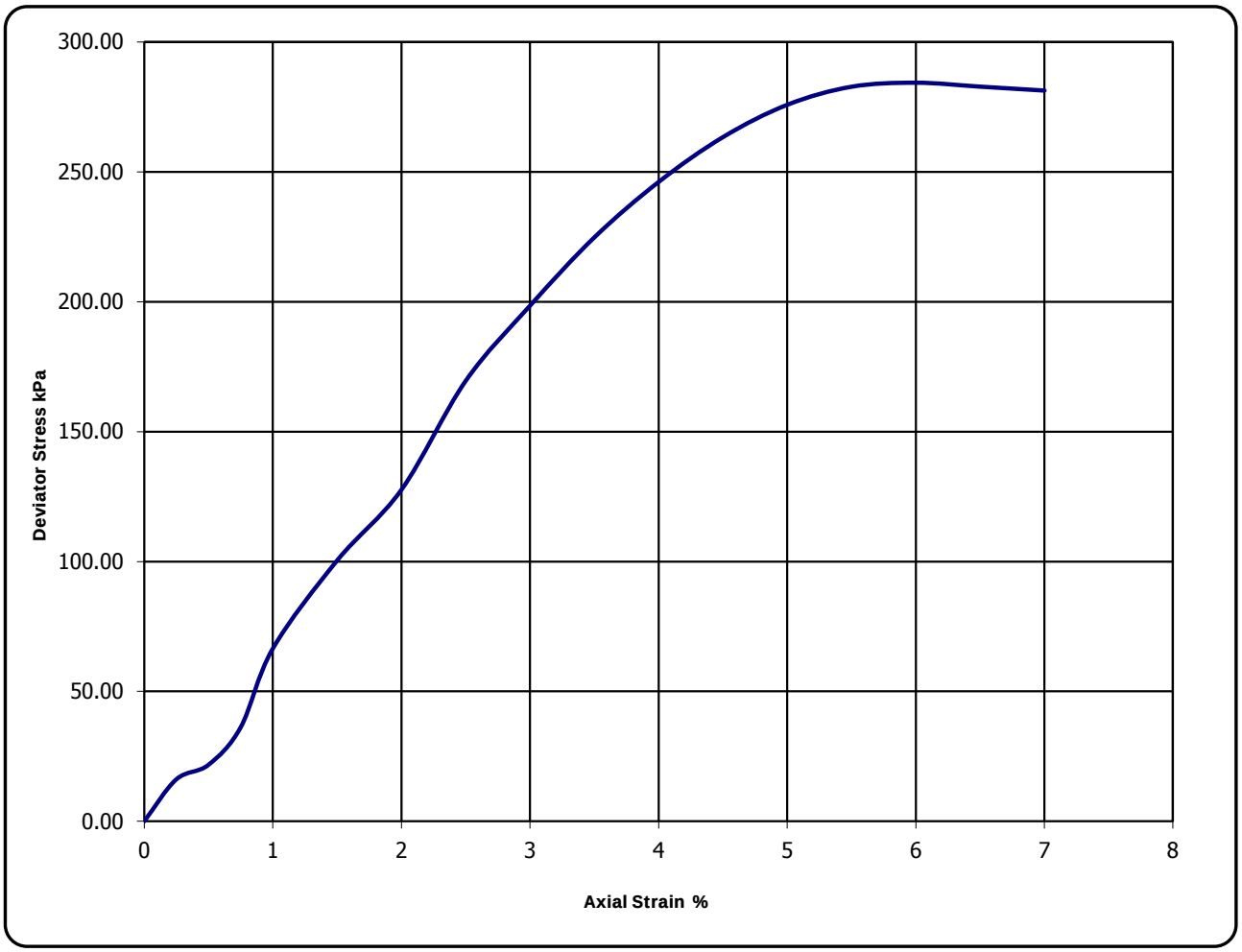
Test Report: **Undrained Shear Strength in Triaxial Compression**
BS 1377 : Part7 : Clause 8 : 1990 Single Stage Test
without measurement of Pore Pressure

Client ref:	**13-7883**
Location:	**53 Agar Grove, Camden**
Contract Number:	**22207-050214**
Hole Number	**BH1**
Sample Number:	**N/A**
Depth (m) :	**14.00-14.45**
Sample Type :	**U**



Diameter (mm):		100	Height (mm):		200	Test:	U 100 mm Single Stage.		
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube Rate of strain = 2 %/min
A	26.5	2.08	1.64	280	284	142	6.0	Compound	Latex Membrane used 0.2 mm thickness

GEO Site & Testing Services Limited

Checked By

Approved By:

Date Approved: 21.2.14

UKAS TESTING 2788

Test Report: **Undrained Shear Strength in Triaxial Compression**
BS 1377 : Part7 : Clause 8 : 1990 Single Stage Test
without measurement of Pore Pressure

Client ref:	**13-7883**
Location:	**53 Agar Grove, Camden**
Contract Number:	**22207-050214**
Hole Number	**BH1**
Sample Number:	**N/A**
Depth (m) :	**14.00-14.45**
Sample Type :	**U**

Post Test Specimen

Specimen Split

Diameter (mm):		100	Height (mm):		200	Test:	U 100 mm Single Stage.		
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube Rate of strain = 2 %/min
A	26.5	2.08	1.64	280	284	142	6.0	Compound	Latex Membrane used 0.2 mm thickness

GSTL
GEO Site & Testing Services Limited

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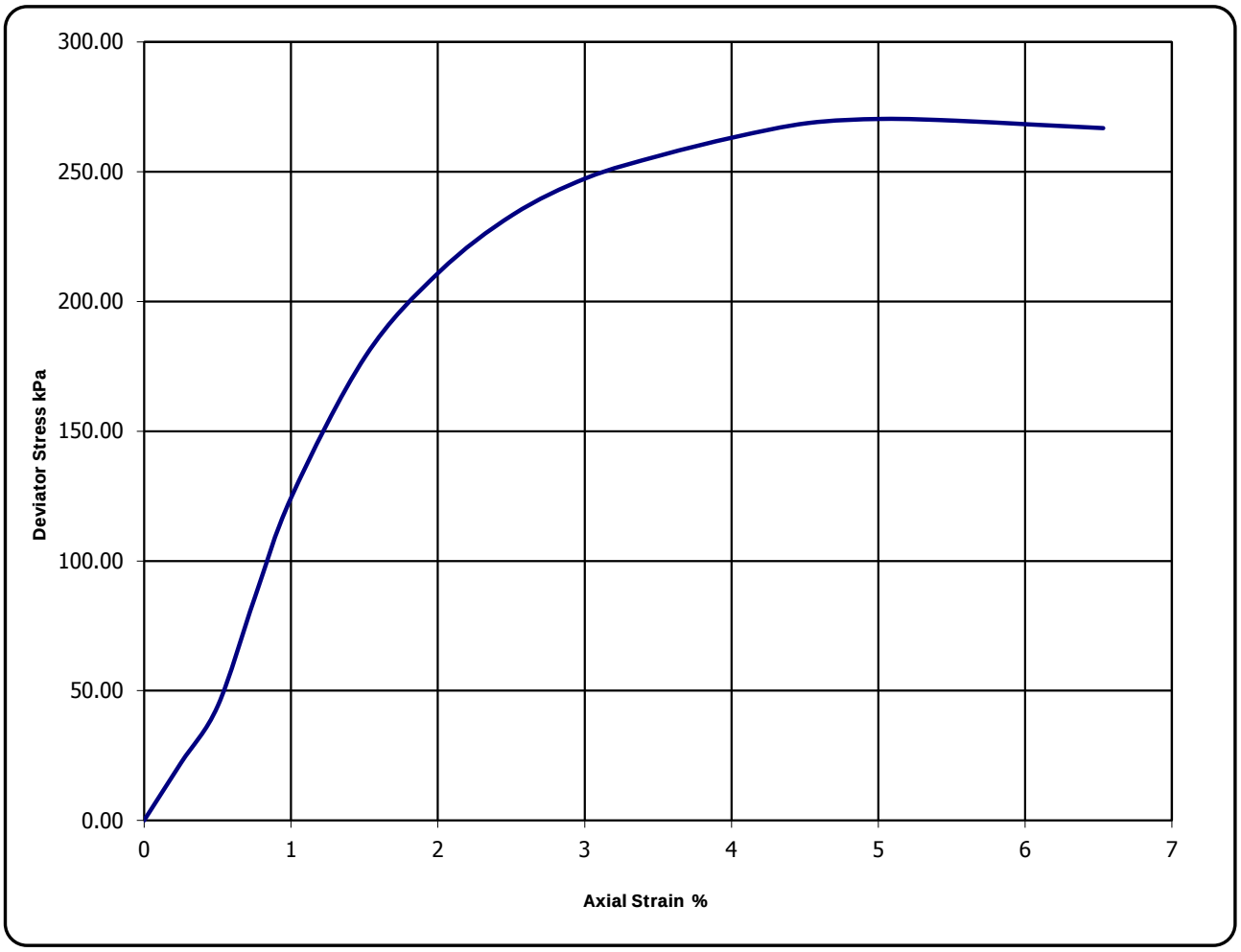
Test Report: **Undrained Shear Strength in Triaxial Compression**
BS 1377 : Part7 : Clause 8 : 1990 Single Stage Test
without measurement of Pore Pressure

Client ref:	**13-7883**
Location:	**53 Agar Grove, Camden**
Contract Number:	**22207-050214**
Hole Number	**BH1**
Sample Number:	**N/A**
Depth (m) :	**20.00-20.45**
Sample Type :	**U**



Diameter (mm):	101	Height (mm):	199	Test:	U 101 mm Single Stage.			
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube Rate of strain = 2 %/min
A	28.3	2.01	1.57	400	270	135	5.0	Compound	Latex Membrane used 0.2 mm thickness

GEO Site & Testing Services Limited

Checked By

Approved By:

Date Approved: 21.2.14

UKAS TESTING 2788

Test Report: **Undrained Shear Strength in Triaxial Compression**
BS 1377 : Part7 : Clause 8 : 1990 Single Stage Test
without measurement of Pore Pressure

Client ref:	**13-7883**
Location:	**53 Agar Grove, Camden**
Contract Number:	**22207-050214**
Hole Number	**BH1**
Sample Number:	**N/A**
Depth (m) :	**20.00-20.45**
Sample Type :	**U**

Post Test Specimen

Specimen Split

Diameter (mm):		101	Height (mm):		199	Test:	U 101 mm Single Stage.		
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube Rate of strain = 2 %/min
A	28.3	2.01	1.57	400	270	135	5.0	Compound	Latex Membrane used 0.2 mm thickness

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GEO Site & Testing Services Limited

Checked Checked By

Approved By:

Date Approved: 21.2.14

UKAS TESTING 2788

Dave Crellin
Constructive Evaluation Ltd
Unit 5 (Top Floor)
Vinnetrow Business Park
Vinnetrow Road
Runcton
Chichester
PO20 1QH

QTS Environmental Ltd
Unit 1
Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Kent
ME17 2JN
t: 01622 850410
russell.jarvis@qtsenvironmental.com

QTS Environmental Report No: 14-19203

Site Reference:	53 Agar Grove, Camden
Project / Job Ref:	13.7883
Order No:	13.7883/DC
Sample Receipt Date:	06/02/2014
Sample Scheduled Date:	06/02/2014
Report Issue Number:	1
Reporting Date:	12/02/2014

Authorised by:

Russell Jarvis
Director
On behalf of QTS Environmental Ltd

Authorised by:

Kevin Old
Director
On behalf of QTS Environmental Ltd

QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410

4480

Soil Analysis Certificate						
QTS Environmental Report No: 14-19203	**Date Sampled**	30/01/14	30/01/14	30/01/14	30/01/14	30/01/14
Constructive Evaluation Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: 53 Agar Grove, Camden	**TP / BH No**	TP1	WS2	BH1	BH1	BH1
Project / Job Ref: 13.7883	**Additional Refs**	MG	MG	NAT	NAT	NAT
Order No: 13.7883/DC	**Depth (m)**	0.50	0.20	1.65 - 1.85	6.00	15.00
Reporting Date: 12/02/2014	**QTSE Sample No**	92798	92799	92800	92801	92802

Determinand	Unit	RL	Accreditation					
Asbestos Screen	N/a	N/a	ISO17025	Not Detected	Not Detected			
pH	pH Units	N/a	MCERTS	8.0	7.8	7.8	7.8	8.3
Total Cyanide	mg/kg	< 2	NONE	< 2	< 2			
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	NONE	0.10	0.08	1.58	3.12	0.84
Organic Matter	%	< 0.1	NONE	3.9	4.5			
Arsenic (As)	mg/kg	< 2	MCERTS	12	9			
Cadmium (Cd)	mg/kg	< 0.5	MCERTS	< 0.5	< 0.5			
Chromium (Cr)	mg/kg	< 2	MCERTS	19	26			
Copper (Cu)	mg/kg	< 4	MCERTS	54	59			
Lead (Pb)	mg/kg	< 3	MCERTS	331	205			
Mercury (Hg)	mg/kg	< 1	NONE	1.2	1.3			
Nickel (Ni)	mg/kg	< 3	MCERTS	14	17			
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3			
Zinc (Zn)	mg/kg	< 3	MCERTS	1720	134			
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2			

Analytical results are expressed on a dry weight basis where samples are dried at less than 30^{O}C
Analysis carried out on the dried sample is corrected for the stone content

The samples have been examined to identify the presence of asbestiform minerals by polarising light microscopy and dispersion staining technique to In-House Procedures QTSE600 Determination of Asbestos in Bulk Materials; Asbestos in Soils/Sediments (fibre screening and identification)

This report refers to samples as received, and QTS Environmental Ltd, takes no responsibility for the accuracy or competence of sampling by others.

The material description shall be regarded as tentative and is not included in our scope of UKAS Accreditation.

Opinions and interpretations expressed herein are outside the scope of UKAS Accreditation.

Asbestos Analyst: Javeed Malik

RL: Reporting Limit

Pinch Test: Where pinch test is positive it is reported "Loose Fibres - PT" with type(s).

Subcontracted analysis $^{(S)}$

QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410

4480

Soil Analysis Certificate							
QTS Environmental Report No: 14-19203	**Date Sampled**	30/01/14	30/01/14			
Constructive Evaluation Ltd	**Time Sampled**	None Supplied	None Supplied			
Site Reference: 53 Agar Grove, Camden	**TP / BH No**	BH1	BH1			
Project / Job Ref: 13.7883	**Additional Refs**	MG	NAT			
Order No: 13.7883/DC	**Depth (m)**	0.50	1.00			
Reporting Date: 12/02/2014	**QTSE Sample No**	92803	92804			

Determinand	Unit	RL	Accreditation					
Asbestos Screen	N/a	N/a	ISO17025	Not Detected				
pH	pH Units	N/a	MCERTS	7.7	7.8			
Total Cyanide	mg/kg	< 2	NONE	< 2	< 2			
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	NONE	0.92	0.47			
Organic Matter	%	< 0.1	NONE	3.1	1.5			
Arsenic (As)	mg/kg	< 2	MCERTS	5	4			
Cadmium (Cd)	mg/kg	< 0.5	MCERTS	< 0.5	< 0.5			
Chromium (Cr)	mg/kg	< 2	MCERTS	25	39			
Copper (Cu)	mg/kg	< 4	MCERTS	28	19			
Lead (Pb)	mg/kg	< 3	MCERTS	113	41			
Mercury (Hg)	mg/kg	< 1	NONE	< 1	< 1			
Nickel (Ni)	mg/kg	< 3	MCERTS	14	33			
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3			
Zinc (Zn)	mg/kg	< 3	MCERTS	65	67			
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2			

Analytical results are expressed on a dry weight basis where samples are dried at less than 30^{O}C
Analysis carried out on the dried sample is corrected for the stone content

The samples have been examined to identify the presence of asbestiform minerals by polarising light microscopy and dispersion staining technique to In-House Procedures QTSE600 Determination of Asbestos in Bulk Materials; Asbestos in Soils/Sediments (fibre screening and identification)

This report refers to samples as received, and QTS Environmental Ltd, takes no responsibility for the accuracy or competence of sampling by others.

The material description shall be regarded as tentative and is not included in our scope of UKAS Accreditation.

Opinions and interpretations expressed herein are outside the scope of UKAS Accreditation.

Asbestos Analyst: Javeed Malik

RL: Reporting Limit

Pinch Test: Where pinch test is positive it is reported "Loose Fibres - PT" with type(s).

Subcontracted analysis $^{(S)}$

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4480

Soil Analysis Certificate - Speciated PAHs							
QTS Environmental Report No: 14-19203	**Date Sampled**	30/01/14	30/01/14	30/01/14	30/01/14		
Constructive Evaluation Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied		
Site Reference: 53 Agar Grove, Camden	**TP / BH No**	TP1	WS2	BH1	BH1		
Project / Job Ref: 13.7883	**Additional Refs**	MG	MG	MG	NAT		
Order No: 13.7883/DC	**Depth (m)**	0.50	0.20	0.50	1.00		
Reporting Date: 12/02/2014	**QTSE Sample No**	92798	92799	92803	92804		

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6	< 1.6	

Analytical results are expressed on a dry weight basis where samples are dried at less than 30^{O}C

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Soil Analysis Certificate - TPH CWG Banded						
QTS Environmental Report No: 14-19203	**Date Sampled**	30/01/14	30/01/14	30/01/14	30/01/14	
Constructive Evaluation Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	
Site Reference: 53 Agar Grove, Camden	**TP / BH No**	TP1	WS2	BH1	BH1	
Project / Job Ref: 13.7883	**Additional Refs**	MG	MG	MG	NAT	
Order No: 13.7883/DC	**Depth (m)**	0.50	0.20	0.50	1.00	
Reporting Date: 12/02/2014	**QTSE Sample No**	92798	92799	92803	92804	

Determinand	Unit	RL	Accreditation					
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	
Aliphatic >C8 - C10	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	
Aliphatic >C10 - C12	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	
Aliphatic >C12 - C16	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	
Aliphatic >C16 - C21	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	
Aliphatic >C21 - C34	mg/kg	< 6	NONE	< 6	< 6	< 6	< 6	
Aliphatic (C5 - C34)	mg/kg	< 12	NONE	< 12	< 12	< 12	< 12	
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	
Aromatic >C8 - C10	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	
Aromatic >C10 - C12	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	
Aromatic >C12 - C16	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	
Aromatic >C16 - C21	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	
Aromatic >C21 - C35	mg/kg	< 6	NONE	< 6	< 6	< 6	< 6	
Aromatic (C5 - C35)	mg/kg	< 12	NONE	< 12	< 12	< 12	< 12	
Total >C5 - C35	mg/kg	< 24	NONE	< 24	< 24	< 24	< 24	

Analytical results are expressed on a dry weight basis where samples are dried at less than 30^{o}C

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Soil Analysis Certificate - BTEX / MTBE						
QTS Environmental Report No: 14-19203	**Date Sampled**	30/01/14	30/01/14	30/01/14	30/01/14	
Constructive Evaluation Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	
Site Reference: 53 Agar Grove, Camden	**TP / BH No**	TP1	WS2	BH1	BH1	
Project / Job Ref: 13.7883	**Additional Refs**	MG	MG	MG	NAT	
Order No: 13.7883/DC	**Depth (m)**	0.50	0.20	0.50	1.00	
Reporting Date: 12/02/2014	**QTSE Sample No**	92798	92799	92803	92804	

Determinand	Unit	RL	Accreditation					
Benzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	
Toluene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	
Ethylbenzene	ug/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	
p & m-xylene	ug/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	
o-xylene	ug/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	
MTBE	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	

Analytical results are expressed on a dry weight basis where samples are dried at less than 30°C

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Soil Analysis Certificate - Sample Descriptions	
QTS Environmental Report No: 14-19203	
Constructive Evaluation Ltd	
Site Reference: 53 Agar Grove, Camden	
Project / Job Ref: 13.7883	
Order No: 13.7883/DC	
Reporting Date: 12/02/2014	

QTSE Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
92798	TP1	MG	0.50	21.5	Brown clayey loam with rubble and stones
92799	WS2	MG	0.20	24.8	Brown clayey loam with brick
92800	BH1	NAT	1.65 - 1.85	20.5	Light brown clay
92801	BH1	NAT	6.00	21	Light brown clay
92802	BH1	NAT	15.00	18.7	Brown clay with crystalline material
92803	BH1	MG	0.50	24.3	Brown loamy clay
92804	BH1	NAT	1.00	24.6	Light brown loamy clay with stones

Insufficient sample I/S
Unsuitable Sample U/S

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Soil Analysis Certificate - Methodology & Miscellaneous Information
QTS Environmental Report No: 14-19203
Constructive Evaluation Ltd
Site Reference: 53 Agar Grove, Camden
Project / Job Ref: 13.7883
Order No: 13.7883/DC
Reporting Date: 12/02/2014

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 – C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	TPH LQM	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6 - C10)	Determination of hydrocarbons C6-C10 by headspace GC-MS	E001

D Dried
AR As Received

Groundwater

constructiveevaluation
Building & Material Test Consultants

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QTS Environmental Report No: 14-19346

Site Reference:	53 Agar Grove, Camden
Project / Job Ref:	13.7883
Order No:	13.7883/DC
Sample Receipt Date:	11/02/2014
Sample Scheduled Date:	11/02/2014
Report Issue Number:	1
Reporting Date:	17/02/2014

Authorised by:

Russell Jarvis
Director
On behalf of QTS Environmental Ltd

Authorised by:

Kevin Old
Director
On behalf of QTS Environmental Ltd

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Water Analysis Certificate						
QTS Environmental Report No: 14-19346	**Date Sampled**	07/02/14				
Constructive Evaluation Ltd	**Time Sampled**	None Supplied				
Site Reference: 53 Agar Grove, Camden	**TP / BH No**	BH1				
Project / Job Ref: 13.7883	**Additional Refs**	None Supplied				
Order No: 13.7883/DC	**Depth (m)**	7.20				
Reporting Date: 17/02/2014	**QTSE Sample No**	93397				

Determinand	Unit	RL	Accreditation					
pH	pH Units	N/a	ISO17025	7.4				
Sulphate as SO_4	mg/l	< 1	ISO17025	2080				

Subcontracted analysis (S)
Insufficient sample I/S
Unsuitable Sample U/S

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Soil Analysis Certificate - Methodology & Miscellaneous Information
QTS Environmental Report No: 14-19346
Constructive Evaluation Ltd
Site Reference: 53 Agar Grove, Camden
Project / Job Ref: 13.7883
Order No: 13.7883/DC
Reporting Date: 17/02/2014

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Water	UF	Alkalinity	Determination of alkalinity by titration against hydrochloric acid using bromocresol green as the end point	E103
Water	UF	BTEX	Determination of BTEX by headspace GC-MS	E101
Water	F	Cations	Determination of cations by filtration followed by ICP-MS	E102
Water	UF	Chemical Oxygen Demand (COD)	Determination using a COD reactor followed by colorimetry	E112
Water	F	Chloride	Determination of chloride by filtration & analysed by ion chromatography	E109
Water	F	Chromium - Hexavalent	Determination of hexavalent chromium by acidification, addition of 1,5 diphenylcarbazide followed by c	E116
Water	UF	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E115
Water	UF	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through liquid:liquid extraction with cyclohexane	E111
Water	F	Diesel Range Organics (C10 - C24)	Determination of liquid:liquid extraction with hexane followed by GI-FID	E104
Water	F	Dissolved Organic Content (DOC)	Determination of DOC by filtration followed by low heat with persulphate addition followed by IR detec	E110
Water	UF	Electrical Conductivity	Determination of electrical conductivity by electrometric measurement	E123
Water	F	EPH (C10 – C40)	Determination of liquid:liquid extraction with hexane followed by GI-FID	E104
Water	F	EPH TEXAS	Determination of liquid:liquid extraction with hexane followed by GI-FID	E104
Water	F	Fluoride	Determination of Fluoride by filtration & analysed by ion chromatography	E109
Water	F	Hardness	Determination of Ca and Mg by ICP-MS followed by calculation	E102
Leachate	F	Leachate Preparation - NRA	Based on National Rivers Authority leaching test 1994	E301
Leachate	F	Leachate Preparation - WAC	Based on BS EN 12457 Pt1, 2, 3	E302
Water	F	Metals	Determination of metals by filtration followed by ICP-MS	E102
Water	F	Mineral Oil (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GI-FID	E104
Water	F	Nitrate	Determination of nitrate by filtration & analysed by ion chromatography	E109
Water	UF	Monohydric Phenol	Determination of phenols by distillation followed by colorimetry	E121
Water	F	PAH - Speciated (EPA 16)	Determination of PAH compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E105
Water	F	PCB - 7 Congeners	Determination of PCB compounds by concentration through SPE cartridge, collection in dichloromethan	E108
Water	UF	Petroleum Ether Extract (PEE)	Gravimetrically determined through liquid:liquid extraction with petroleum ether	E111
Water	UF	pH	Determination of pH by electrometric measurement	E107
Water	F	Phosphate	Determination of phosphate by filtration & analysed by ion chromatography	E109
Water	UF	Redox Potential	Determination of redox potential by electrometric measurement	E113
Water	F	Sulphate (as SO4)	Determination of sulphate by filtration & analysed by ion chromatography	E109
Water	UF	Sulphide	Determination of sulphide by distillation followed by colorimetry	E118
Water	F	SVOC	Determination of semi-volatile organic compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E106
Water	UF	Toluene Extractable Matter (TEM)	Gravimetrically determined through liquid:liquid extraction with toluene	E111
Water	UF	Total Organic Carbon (TOC)	Low heat with persulphate addition followed by IR detection	E110
Water	F	TPH CWG	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID	E104
Water	F	TPH LQM	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID	E104
Water	UF	VOCs	Determination of volatile organic compounds by headspace GC-MS	E101
Water	UF	VPH (C6 - C10)	Determination of hydrocarbons C6-C10 by headspace GC-MS	E101

Key

F Filtered
UF Unfiltered

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QTS Environmental Report No: 14-19697

Site Reference:	53 Agar Grove, Camden
Project / Job Ref:	13.7883
Order No:	13.7883/DC
Sample Receipt Date:	24/02/2014
Sample Scheduled Date:	24/02/2014
Report Issue Number:	1
Reporting Date:	27/02/2014

Authorised by:

Russell Jarvis
Director
On behalf of QTS Environmental Ltd

Authorised by:

Kevin Old
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On behalf of QTS Environmental Ltd

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Water Analysis Certificate						
QTS Environmental Report No: 14-19697	**Date Sampled**	19/02/14				
Constructive Evaluation Ltd	**Time Sampled**	None Supplied				
Site Reference: 53 Agar Grove, Camden	**TP / BH No**	BH1				
Project / Job Ref: 13.7883	**Additional Refs**	MON2				
Order No: 13.7883/DC	**Depth (m)**	9.00				
Reporting Date: 27/02/2014	**QTSE Sample No**	94861				

Determinand	Unit	RL	Accreditation					
pH	pH Units	N/a	ISO17025	7.8				
Sulphate as SO_4	mg/l	< 1	ISO17025	2340				

Subcontracted analysis (S)
Insufficient sample I/S
Unsuitable Sample U/S

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Soil Analysis Certificate - Methodology & Miscellaneous Information
QTS Environmental Report No: 14-19697
Constructive Evaluation Ltd
Site Reference: 53 Agar Grove, Camden
Project / Job Ref: 13.7883
Order No: 13.7883/DC
Reporting Date: 27/02/2014

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Water	UF	Alkalinity	Determination of alkalinity by titration against hydrochloric acid using bromocresol green as the end point	E103
Water	UF	BTEX	Determination of BTEX by headspace GC-MS	E101
Water	F	Cations	Determination of cations by filtration followed by ICP-MS	E102
Water	UF	Chemical Oxygen Demand (COD)	Determination using a COD reactor followed by colorimetry	E112
Water	F	Chloride	Determination of chloride by filtration & analysed by ion chromatography	E109
Water	F	Chromium - Hexavalent	Determination of hexavalent chromium by acidification, addition of 1,5 diphenylcarbazide followed by c	E116
Water	UF	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E115
Water	UF	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through liquid:liquid extraction with cyclohexane	E111
Water	F	Diesel Range Organics (C10 - C24)	Determination of liquid:liquid extraction with hexane followed by GI-FID	E104
Water	F	Dissolved Organic Content (DOC)	Determination of DOC by filtration followed by low heat with persulphate addition followed by IR detec	E110
Water	UF	Electrical Conductivity	Determination of electrical conductivity by electrometric measurement	E123
Water	F	EPH (C10 – C40)	Determination of liquid:liquid extraction with hexane followed by GI-FID	E104
Water	F	EPH TEXAS	Determination of liquid:liquid extraction with hexane followed by GI-FID	E104
Water	F	Fluoride	Determination of Fluoride by filtration & analysed by ion chromatography	E109
Water	F	Hardness	Determination of Ca and Mg by ICP-MS followed by calculation	E102
Leachate	F	Leachate Preparation - NRA	Based on National Rivers Authority leaching test 1994	E301
Leachate	F	Leachate Preparation - WAC	Based on BS EN 12457 Pt1, 2, 3	E302
Water	F	Metals	Determination of metals by filtration followed by ICP-MS	E102
Water	F	Mineral Oil (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GI-FID	E104
Water	F	Nitrate	Determination of nitrate by filtration & analysed by ion chromatography	E109
Water	UF	Monohydric Phenol	Determination of phenols by distillation followed by colorimetry	E121
Water	F	PAH - Speciated (EPA 16)	Determination of PAH compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E105
Water	F	PCB - 7 Congeners	Determination of PCB compounds by concentration through SPE cartridge, collection in dichloromethan	E108
Water	UF	Petroleum Ether Extract (PEE)	Gravimetrically determined through liquid:liquid extraction with petroleum ether	E111
Water	UF	pH	Determination of pH by electrometric measurement	E107
Water	F	Phosphate	Determination of phosphate by filtration & analysed by ion chromatography	E109
Water	UF	Redox Potential	Determination of redox potential by electrometric measurement	E113
Water	F	Sulphate (as SO4)	Determination of sulphate by filtration & analysed by ion chromatography	E109
Water	UF	Sulphide	Determination of sulphide by distillation followed by colorimetry	E118
Water	F	SVOC	Determination of semi-volatile organic compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E106
Water	UF	Toluene Extractable Matter (TEM)	Gravimetrically determined through liquid:liquid extraction with toluene	E111
Water	UF	Total Organic Carbon (TOC)	Low heat with persulphate addition followed by IR detection	E110
Water	F	TPH CWG	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID	E104
Water	F	TPH LQM	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID	E104
Water	UF	VOCs	Determination of volatile organic compounds by headspace GC-MS	E101
Water	UF	VPH (C6 - C10)	Determination of hydrocarbons C6-C10 by headspace GC-MS	E101

Key

F Filtered
UF Unfiltered

APPENDIX F

Limitations

The Environment Agency has recently undertaken revision of the Soil Guideline Values (SGVs) which are partially complete. Where standards are available using the "new" approach, these have been utilised for correlative purposes. Where standards have not yet been revised, guidance following the "old" approach has been utilised. Please note that upon release of the remaining guidelines, the standards contained within this report may be subject to change. In addition, the second edition of the LQM CIEH guidance has now been released and will be utilised in favour of previously published guideline values.

The Client is advised that the conditions observed on site by Constructive Evaluation Limited at the time of the walkover survey are subject to change. Certain indicators of the presence of hazardous substances may have been latent a the time of the most recent site reconnaissance and they may subsequently have become noticeable.

The Client is advised that although every effort is made to identify suspect areas CE cannot be held responsible if buildings on site contain Asbestos. Additionally Engineers sent to site are not specially trained in this aspect of work: if further determination is required the expertise of a BHOS trainer surveyor should be sought.

Comments made relating to soil or groundwater conditions are obtained from the sources described within the text and observations made at the time of the walkover survey unless otherwise stated. Soil or groundwater conditions may vary as a result of seasonal fluctuations or other effects.

The accuracy of the map extracts can not be guaranteed and it should be noted that different conditions may have existed between the subsequent to the various map surveys. Therefore, there can be no certainty that all areas of contamination have been identified during the Phase 1 investigation.

Every effort is undertaken to provide information regarding the potential risks associated with flooding, however CE may not be party to information which the local Authority and Environment Agency may hold in relation to historical or flash flood events.

This assessment is to be regarded preliminary in nature and may be subject to amendment in light of additional information becoming available or statutory consultee review, including the Environment Agency, Local council and NHBC etc. The statutory consultees have not been contacted at this time:

The findings and opinions conveyed in this report are based on information obtained from a variety of sources, including that from previous Site investigations and chemical testing laboratories. Constructive Evaluation Limited has assumed that such information is correct. Constructive Evaluation Limited cannot and does not guarantee the authenticity or reliability of the information it has relied upon and can accept no responsibility for inaccuracies with the data supplied by other parties.

This report is written in the context of an agreed scope of work between Constructive Evaluation Limited and the Client and should not be used in a different context. In light of additional information becoming available, improved practices and changes in legislation amendment or re-interpretation of the assessment or report in whole or part may be necessary after its original submission.

This report is provided for sole use by the Client and is confidential to them. No responsibility whatsoever for the contents of the report will be accepted to anyone other than the Client.

Constructive Evaluation Limited believes that providing information about limitations is essential to help the Client identify and thereby assess and manage risks.

The copyright of written materials supplied shall remain the property of Constructive Evaluation Limited but with a royalty-free perpetual licence, granted to the Client on payment in full of any outstanding monies.

Constructive Evaluation Limited does not provide legal advice and the advice of the Client's legal advisors may also be required.

An ecological, topographical, archaeological, asbestos survey or service search was outside the scope of this report.