End bearing

Stratum	Depth	Undrained cohesion [from strength profile]	Ultimate unit base resistance 'q_b'
London Clay [see Note b}	Below 12m depth	Increases linearly from 140kN/m² at a rate of 6.67kN/m²/m	Increases linearly from 1260kN/m² at a rate of 60kN/m²/m [incorporates Nc = 9]

Notes:
a] Unit base resistance 'q_b' = Nc x c_u [where Nc = 9 and c_u is the equivalent undrained cohesion from the design line]
b] For small diameter mini-piles, the end bearing component is often generally ignored

An overall Factor of Safety of 2.6 should be appropriate when applied to these ultimate parameters, in line with the current guidelines by the London District Surveyors Association [LDSA]. As a guide to the use of the above coefficients, we have calculated the following pile capacity examples:

Pile diameter [mm]	Depth of pile toe- see Note d [m]	Ultimate load [kN]	Working load [kN]
300	12	425	160
	15	650	250
450	12	700	265
	15	1050	400

Notes:
a] Working load is calculated using F_{shaft} and F_{base} = 2.6
b] Concrete stress should be considered in the final design
c] These capacities incorporate an end-bearing contribution
d] The depth of the base of the pile is measured below existing external ground level

Some water was met at shallow level within the surface made ground [BH2] which would need to be sealed. Although seepages within the London Clay were not noted in our boreholes such seepages/inflows are not uncommon, and therefore some modification of the pile parameters or downgrading of the pile capacities may be warranted to mitigate the possible risk of clay softening.

The working load settlement of the piles will vary depending on the pile diameter and loads. This should be checked by analysis for final design by the piling contractor. Tension forces generated by any heave of the London Clay should be checked by the designer.

6.4 Basement slab

The proposed works will comprise new basement excavations to depths of between about 3.5m and 6m which will result in soil unloading of between approximately 70kN/m² and 120kN/m². The new structure will probably not re-apply the same level of stress and the soils beneath the new basement slab will theoretically be in a state of net unloading. The magnitude of the heave pressure/movement will be determined not only by the variation in net unloading by a number of factors such as slab stiffness, the foundation type and the construction programme.

For illustration purposes we have carried out preliminary assessments of heave effects in relation to the design of the basement slab for the main basement excavation. We estimate that total unconstrained heave at the centre of the excavation could be of the order of 40mm. About 50% of this total movement would be expected to occur prior to construction of the slabs, leaving therefore about 20mm of theoretical post construction heave [unrestrained].

If it is assumed that the relationship between heave movement and heave pressure is linear, the maximum heave pressure for a very stiff rigid slab [for the fully constrained condition] could be about 50% of the unload value which would correspond to between 35kN/m² for the main basement area. For a typical slab, which can undergo some deflection, the pressures are likely to be approximately 15kN/m², with maximum movements of about 10mm.

It will be necessary to consider uplift of the slab due to potential hydrostatic pressures and in this respect the guidelines incorporated in BS8102:2009 should be followed. The London Clay will be present at basement level and the development of a full maintained hydrostatic head in this low permeability soil is considered to be unlikely. Notwithstanding this, the slab design should take account of accidental conditions [leaking drains, burst water mains etc] and we would recommend that a water level at say 1m depth below the external ground level should be adopted. It is important to note that the water pressures will not be additional to any soil heave pressures, but will be the minimum uplift pressure for design purposes.

6.5 Foundation concrete

Low to moderately high concentrations [max 1760 mg/kg] of soluble sulphates were measured in selected soil samples with slightly alkaline pH values. Overall, a Design Sulphate Class DS-3 [Table C2 given in BRE Special Digest 1:2005, 3rd Edition, 'Concrete in aggressive ground'] is considered to be applicable for the site. We assess the site to have mobile groundwater conditions [to allow for potential seepages within the London Clay] and our recommendation is that buried concrete should be designed in accordance with ACEC Site Class AC-3.

The London Clay typically contains up to 4% pyrite which can increase sulphate levels in the soil once oxidised when the soil is exposed [for example during shallow foundation construction]. However, from our boreholes it is apparent that the sections of the clay to the proposed basement depth are already in an oxidised state [weathered/brown colouration] thus significant additional oxidation is not anticipated and the Site Class indicated above is considered realistic.

7.0 ENVIRONMENTAL APPRAISAL

This appraisal adopts the current UK practice which uses the Source-Pathway-Receptor methodology to assess contamination risks. For a site to be designated as contaminated a plausible linkage between any identified sources and receptors must be identified, i.e. whether significant pollution linkages [SPLs] are present. In considering the potential for contamination to cause a significant effect, the extent and

nature of the potential source are assessed and pathways/receptors identified; without an SPL there is theoretically no risk to the receptors from contamination. The assessed risks to the various potential receptors are summarised in the tabulated Conceptual Site Model which forms Section 7.5 of this report.

7.1 Environmental setting and context

The Site is underlain by the London Clay which is classified as an **unproductive aquifer.** Environment Agency records indicate the nearest groundwater abstraction point as being 442m distant with the nearest surface water abstraction point over 1 km distant and no surface water features nearby. The site is however within a source protection zone [Outer Catchment].

The site is assessed as being of **Low to Moderate Environmental Sensitivity.**

7.2 Potential contamination sources [on-site and off-site]

The desk study map historical map review has indicated that that prior to the construction of the house in the early 1900's the site formed part either open parkland or agricultural land.

The history of predominantly residential usage [both within the site and its vicinity] indicate a **Low** risk Potential of contaminative sources which could affect the site include the underground railway tunnel and the nearby electricity sub stations.

7.3 Contamination testing

In order to identify whether known or unknown sources within [and outside] the site have caused contamination, we have carried out testing including a general suite of analysis on a number of samples from the boreholes recovered during our investigation. The results were assessed where relevant against the DEFRA Soil Guideline Values [SGV] and the LQM/CIEH Generic Assessment Criteria [GAC] for Human Health Risk Assessment in which LQM/CIEH have derived additional SGVs from the current CLEA Model [2nd Edition, 2009]. There are currently no published SGV's or GAC's for Extractable/Total Petroleum Hydrocarbons and the results were compared with the frequently used EA remedial target of 1,000mg/kg. The SGV for Lead contamination was withdrawn as of 2008 but new Category 4 Screening Levels [C4SLs] have been introduced by DEFRA recently, which can be useful values for comparison with recorded results. C4SLs have also been useful for comparison with several other results.

The contamination testing was carried out specifically for the purpose of providing a general guidance evaluation for the proposed development. Reference should be made to the foreword to the appended contamination test results in order to fully understand the context in which this discussion should be viewed.

For the soil tests we have used, where relevant, the trigger levels for **residential development with home grown produce** to assess the results of the contamination testing. Using these criteria the all of the soil contaminant concentrations were found to be below guidance values or test detection levels, with no exceptions.

Notwithstanding these test results the proposed scheme does not involve any change in usage to that present though there may be some reduction in landscaped areas at the front of the house where the proposed lightwell basement is to be formed.

It should be noted that the investigation provided limited coverage of the site and there may of course be areas of undetected contamination.

The implications of these results are addressed in the site specific Risk Assessment and Conceptual model below.

7.4 Soil Disposal

Our investigation has indicated that there is relatively thin cover of made ground underlain by natural [and assumed uncontaminated] soils. A rigorous hazard assessment of this aspect was not within the scope of our investigation, but our preliminary conclusion is that any made ground will probably classify as either 'inert' or 'non-hazardous' industrial waste', with an 'inert' classification for natural soils. The results WAC test and our other testing detailed in the Appendix will aid in this preliminary classification. We recommend that early consultations are made with the appropriate waste facilities or regulators to confirm the classification for off-site disposal.

7.5 Risk Assessment and Conceptual Model

Taking into account the above discussion, the assessed risks to potential receptors are summarised as follows:

Source/ hazard	Pathway	Receptor	Mitigation measures/explanation	Assessed Risk level
Contaminated soil: on-site and off-site sources	Ingestion/ contact	Site end users and construction workers	↓ Railway tunnel has been identified on-site and there is an electricity substation about 60m from the site. There are no recorded instances of associated contamination with these features recorded in the desk study. ↓ No soil contamination was detected in samples from the boreholes ↓ Risks to construction workers will be controlled by the use of appropriate PPE ↓ A careful watching brief should be kept during construction and if obvious or suspected contamination is encountered this should be dealt with prescriptively	LOW

Source/ hazard	Pathway	Receptor	Mitigation measures/explanation	Assessed Risk level
Contaminated soil: on-site sources	Migration of contaminated ground water and/or surface run-off through contaminated fill into aquifer	Aquifer and surface water	The site is underlain by very low permeability London Clay which classifies as unproductive strata No significant groundwater was present No contamination was measured and no potential contaminative uses identified Whilst the site lies within a Source Protection Zone 2 [outer catchment], the nearest abstraction point is > 400m from the site	LOW
Ground gas: on-site and off-site sources	Migration	Construction workers	No gas monitoring has been undertaken, to date, however, we consider the site to be in a low risk of being affected by ground gas The desk study states that no Radon protection measures are required	LOW

In conclusion, based upon the information reviewed and the results of the investigation, our assessment is that the with appropriate mitigation measures the risks to potential receptors should be LOW. It is self-evident that there may be zones of contamination within the site which were not encountered in our boreholes. A careful watching brief should be kept during construction and if soil contamination is suspected then specialist advice should be sought.

GENERAL INFORMATION, LIMITATIONS AND EXCEPTIONS

Unless otherwise stated, our Report should be construed as being a Ground Investigation Report [GIR] as defined in BS EN1997-2. Our Report is not intended to be and should not be viewed or treated as a Geotechnical Design Report [GDR] as defined in EN1997-2. Any 'design' recommendations which are provided are for guidance only and are intended to allow the designer to assess the results and implications of our investigation/testing and to permit preliminary design of relevant elements of the proposed scheme.

The methods of investigation used have been chosen taking into account the constraints of the site including but not limited to access and space limitations. Where it has not been possible to reasonably use an EC7 compliant investigation technique we have adopted a practical technique to obtain indicative soil parameters and any interpretation is based upon our engineering experience and relevant published information.

The Report is issued on the condition that Soil Consultants Ltd will under no circumstances be liable for any loss arising directly or indirectly from ground conditions between the exploratory points which differ from those identified during our investigation. In addition Soil Consultants Ltd will not be liable for any loss arising directly or indirectly from any opinion given on the possible configuration of strata both between the exploratory points and/or below the maximum depth of the investigation; such opinions, where given, are for guidance only and no liability can be accepted as to their accuracy. The results of any measurements taken may vary spatially or with time and further confirmatory measurements should be made after any significant delay in using this Report.

Comments made relating to ground-water or ground-gas are based upon observations made during our investigation unless otherwise stated. Ground-water and ground-gas conditions may vary with time from those reported due to factors such as seasonal effects, atmospheric effects and and/or tidal conditions. We recommend that if monitoring installations have been included as part of our investigation, continued monitoring should be carried out to maximise the information gained.

Specific geotechnical features/hazards such as [but not limited to] areas of root-related desiccation and dissolution features in chalk/soluble rock can exist in discrete localised areas - there can be no certainty that any or all of such features/hazards have been located, sampled or identified. Where a risk is identified the designer should provide appropriate contingencies to mitigate the risk through additional exploratory work and/or an engineered solution.

Where a specific risk of ground dissolution features has been identified in our Report [anything above a 'low' risk rating], reference should be made to the local building control to establish whether there are any specific local requirements for foundation design and appropriate allowances should be incorporated into the design. If such a risk assessment was not within the scope of our investigation and where it is deemed that the ground sequence may give rise to such a risk [for example near-surface chalk strata] it is recommended that an appropriate assessment should be undertaken prior to design of foundations.

Where spread foundations are used, we recommend that all excavations are inspected and approved by suitably experienced personnel; appropriate inspection records should be kept. This should also apply to any structures which are in direct contact with the soil where the soil could have a detrimental effect on performance or integrity of the structure.

Ground contamination often exists in small discrete areas - there can be no certainty that any or all such areas have been located, sampled or identified.

The findings and opinions conveyed in this Report may be based on information from a variety of sources such as previous desk studies, investigations or chemical analyses. Soil Consultants Limited cannot and does not provide any guarantee as to the authenticity, accuracy or reliability of such information from third parties; such information has not been independently verified unless stated in our Report.

Our Report is written in the context of an agreed scope of work between Soil Consultants Ltd and the Client and should not be used in any different context. In light of additional information becoming available, improved practices and changes in legislation, amendment or re-interpretation of the assessment or the Report in part or in whole may be necessary after its original publication.

Unless otherwise stated our investigation does not include an arboricultural survey, asbestos survey, ecological survey or flood risk assessment and these should be deemed to be outside the scope of our investigation.

[Rev_1_08_03_2013]

APPENDIX A

Fieldwork, in-situ testing and monitoring

- Borehole records
- SPT results
- SPT hammer calibration certificate

Laboratory testing

- Unconsolidated undrained triaxial test results [QUT]
- Index property testing
- Plasticity charts

Ground profiles

- Cohesion versus depth graph

Contamination testing [QTS Environmental]

- General soil suite and soluble sulphate/pH results

Plans & drawings

- Photographs of the site
- Proposed development drawings
- Site Plan
- Location Plan

FOREWORD - GUIDANCE NOTES

GENERAL
The Borehole Records are compiled from the driller's description of the strata encountered, an examination of the samples by our Geotechnical Engineer and the results of in-situ and laboratory tests. Based on this data, the report presents an opinion on the configuration of strata within the site. However, such reasonable assumptions are given for guidance only and no liability can be accepted for changes in conditions not revealed by the boreholes.

BORING METHODS
The Cable Percussion technique of boring is normally employed and allows the ground conditions to be reasonably well established. However, some disturbance of the ground is inevitable, particularly some "softening" of the upper zone of clay immediately beneath a granular soil. The presence of thin layers of different soils within a stratum may not always be detected.

GROUND WATER
The depth at which ground water was struck is entered on the Borehole Records. However, this observation may not indicate the true water level at that period. Due to the speed of boring and the relatively small diameter of the borehole, natural ground water may be present at a depth slightly higher than the water strike. Moreover, ground water levels are subject to variations caused by changes in the local drainage conditions and by seasonal effects. When a moderate inflow of water does take place, boring is suspended for at least 10 minutes to enable a more accurate short term water level to be achieved. An estimate of the rate of inflow is also given. This is a relative term and serves only as a guide to the probable flow of water into an excavation.

Further observations of the water level made during the progress of the borehole are shown including end of shift and overnight readings and the depth at which water was sealed off by the borehole casing, if applicable.

Whilst drilling through granular soils, it is usually necessary to introduce water into the borehole to permit their extraction. When additional water has been used a remark is made on the Borehole Record and the implications are discussed in the text.

SAMPLES
Undisturbed samples of the predominantly cohesive soils are obtained using a 100mm diameter open-drive sampler. In granular soils, disturbed bulk samples are taken and placed in polythene bags. Small jar samples are taken at frequent intervals in all soils for subsequent visual examination. Where ground water is encountered in sufficient quantity, a sample of the ground water is also taken.

IN-SITU STANDARD PENETRATION TESTS
This test is performed in accordance with the procedure given in B.S.1377: 1990. The individual blow count record for each test is given on a separate table. The 'N' value is normally the number of blows to achieve a penetration of 0.3m following a seating distance of 0.15m and is quoted at the mid-depth of the test zone. However, if a change of stratum occurs within the test zone then a revised 'N' value is calculated to assess one layer in particular. In hard strata full penetration may not be obtained. In such cases the suffix '+' indicates that the result has been extrapolated from the limited penetration achieved. Where ground water has affected the measured values, the resultant 'N' value has been placed in brackets since it is unlikely to represent the true in-situ density of the soil.

Site & Location:	**17 Wadham Gardens** **London, NW3 3DN**	Borehole No:	**BH1**
Client:	**Whitehall Park Ltd**	Coords (E/N): 527219.00 - 184060.00	Sheet 1 of 2
Engineer:	**Pringuer James Consulting Engineers**	Ground Level (m): 50.20	Report No: 9722/KOG

Progress & Observations	Samples & Tests Type	Samples & Tests Depth (m)	Field Test Results	Strata Depth (m)	Strata Level (m)	Legend	Strata Description	Backfill / Installation
BH commenced: 13/01/15	D	0.25					TOPSOIL over MADE GROUND: brown/grey silty sandy clay with scattered brick and stone debris and roots	
BH/casing dia: 150mm	D	0.50		0.70	49.50		Firm orange brown mottled grey silty CLAY with rare medium to coarse rounded flint gravel	
Inspection pit to 1.2m	D	1.00						
	D	1.50						
	SPT/S	1.50	N=9 N60=11				...frequent roots to 0.6m, with occasional rootlets noted to 1.6m	
	D	2.00						
	U	2.50						
BH cased 150mm to 3.0m	D	3.00					...slightly more silty towards base	
	D	3.50		3.30	46.90		Stiff fissured brown stained blue grey CLAY containing occasional selenite	
	SPT/S	3.50	N=13 N60=16					
	D	4.00						
	U	4.50						
	D	5.00						
	SPT/S	6.00	N=16 N60=20	6.00	44.20		Stiff fissured brown CLAY	
Standpipe installed to 7.00m depth	D	7.00						
	U	7.50						
	D	8.00						
	D	9.00						
	SPT/S	9.00	N=20 N60=25					
				9.45	40.75		Stiff fissured grey CLAY with occasional fine grey sand partings	
	D	10.00		10.00	40.20		Continued on next sheet	

Key: U = Undisturbed B = Bulk D = Small disturbed W = Water E = glass jar & plastic tub SPT/S = split spoon SPT/C = solid cone HV = Hand Vane [kPa]

PP = Pocket Penetrometer [kg/cm2] PID = Photo Ionisation Detector [ppmv] Borehole type: Cable Percussion

Remarks :- Approximate coordinates interpolated from desk study OS mapping and ground level interpolated from Architects external ground level site datum

Borehole No: **BH1**

[* = full SPT penetration not achieved - see summary sheet]

SoilConsultants

Site & Location:	**17 Wadham Gardens** **London, NW3 3DN**	Borehole No:	**BH1**
Client:	**Whitehall Park Ltd**	Coords (E/N): 527219.00 - 184060.00	Sheet 2 of 2
Engineer:	**Pringuer James Consulting Engineers**	Ground Level (m): 50.20	Report No: 9722/KOG

Progress & Observations	Samples & Tests Type	Samples & Tests Depth (m)	Field Test Results	Strata Depth (m)	Strata Level (m)	Legend	Strata Description	Backfill / Installation
							Stiff fissured grey CLAY with occasional fine grey sand partings	
	U	10.50						
	D	11.00						
	SPT/S	12.00	N=22 N60=28					
	D	13.00						
	U	13.50						
	D	14.00					...becoming very stiff below 14.00m	
	SPT/S	14.50	N=25 N60=32					
BH depth 15.00m, dry				15.00	35.20		End of borehole at 15.00 m	

Key: U = Undisturbed B = Bulk D = Small disturbed W = Water E = glass jar & plastic tub SPT/S = split spoon SPT/C = solid cone HV = Hand Vane [kPa]

PP = Pocket Penetrometer [kg/cm2] PID = Photo Ionisation Detector [ppmv] Borehole type: Cable Percussion

Remarks :- Approximate coordinates interpolated from desk study OS mapping and ground level interpolated from Architects external ground level site datum

Borehole No: **BH1**

[* = full SPT penetration not achieved - see summary sheet]

SoilConsultants

Foreword to: Window Sampler Boreholes

Window Sample Boreholes are constructed by driving in steel sample tubes in which long slots have been cut to enable the soil to be examined, tested or sampled. The tubes are either 1m or 2m in length. The borehole commences using a large diameter tube, 70mm or 80mm, with each succeeding tube reducing usually by 10mm in diameter to assist the extraction of the tube from the ground. Thus, it is theoretically possible to obtain a total continuous sample of the soil for examination or testing.

Window Sample boreholes are a means of rapid and economic sampling where access is not necessarily good or where impact of the investigation must be kept to a minimum.

The method is primarily suited to clay soils and can also achieve reasonable penetration into many granular soils. Soil recovery beneath the water table in granular soils can however be reduced.

The open slot in the sample tube allows hand shear vane and pocket penetrometer tests to be carried out. Samples can also be taken where necessary for laboratory testing, including moisture content, index property tests and contamination analyses.

Hand Shear Vane : The shear strength of cohesive soils are reported in kPa.
Pocket Penetrometer : The unconfined compression strengths values are reported in kg/cm^2.

Rev: August 2009

Soil Consultants

Site & Location:	17 Wadham Gardens London, NW3 3DN		Borehole No: BH2
Client:	Whitehall Park Ltd	Coords (E/N): 527218.00 - 184080.00	Sheet 1 of 2
Engineer:	Pringuer James Consulting Engineers	Ground Level (m): 50.20	Report No: 9722/KOG

Progress & Observations	Samples & Tests Type	Samples & Tests Depth (m)	Field Test Results	Strata Depth (m)	Strata Level (m)	Legend	Strata Description	Backfill / Installation
BH commenced: 13/01/15							PAVING SLAB and sand blinding layer [50mm] over MADE GROUND: brown/grey silty sandy clay with scattered brick and stone debris and roots	
BH diameter 90mm, diameter reducing with increasing epth	D	0.50						
	D	0.80						
Medium ground water inflow at 1.10m				1.10	49.10		Firm orange brown mottled grey silty CLAY with rare medium to coarse rounded flint gravel	
	D HV	1.30 1.30	40					
	D HV	1.60 1.60	45					
	D HV	1.90 1.90	60				..occcasional fine root hairs noted to 2.30m	
	D HV	2.30 2.30	40					
	D HV	2.60 2.60	50				..slightly more silty towards base	
	D HV	2.90 2.90	45					
	D HV	3.30 3.30	35					
				3.50	46.70		Stiff fissured brown stained blue grey CLAY containing occasional selenite	
	D HV	3.60 3.60	90					
	D HV	3.90 3.90	110					
	D HV	4.30 4.30	90					
	D HV	4.60 4.60	85					
	D HV	4.90 4.90	95					
				5.00	45.20		Continued on next sheet	

Key: U = Undisturbed B = Bulk D = Small disturbed W = Water E = glass jar & plastic tub SPT/S = split spoon SPT/C = solid cone HV = Hand Vane [kPa]
PP = Pocket Penetrometer [kg/cm2] PID = Photo Ionisation Detector [ppmv] Borehole type: Window Sampler

Remarks :- Approximate coordinates interpolated from desk study OS mapping and ground level interpolated from Architects external ground level site datum

Borehole No: BH2

[* = full SPT penetration not achieved - see summary sheet]

Soil Consultants

Site & Location:	**17 Wadham Gardens** **London, NW3 3DN**	Borehole No:	**BH2**
Client:	**Whitehall Park Ltd**	Coords (E/N): 527218.00 - 184080.00	Sheet 2 of 2
Engineer:	**Pringuer James Consulting Engineers**	Ground Level (m): 50.20	Report No: 9722/KOG

Progress & Observations	Samples & Tests Type	Samples & Tests Depth (m)	Field Test Results	Strata Depth (m)	Strata Level (m)	Legend	Strata Description	Backfill / Installation
	D	5.30					Stiff fissured brown stained blue grey CLAY containing occasional selenite	
	HV	5.30	100					
	D	5.60						
	HV	5.60	110					
	D	5.90						
	HV	5.90	100	6.00	44.20		Stiff fissured brown CLAY	
	D	6.30						
	HV	6.30	80					
	D	6.60						
	HV	6.60	90					
Standpipe installed to 7.00m depth								
	D	6.90						
BH 7.00m , water level 1.3m	HV	6.90	110	7.00	43.20		End of borehole at 7.00 m	

Key: U = Undisturbed B = Bulk D = Small disturbed W = Water E = glass jar & plastic tub SPT/S = split spoon SPT/C = solid cone HV = Hand Vane [kPa]

PP = Pocket Penetrometer [kg/cm2] PID = Photo Ionisation Detector [ppmv] | Borehole type: Window Sampler

Remarks :- Approximate coordinates interpolated from desk study OS mapping and ground level interpolated from Architects external ground level site datum | Borehole No: **BH2**

[* = full SPT penetration not achieved - see summary sheet]

Soil Consultants

Site & Location	**17 Wadham Gardens** **London, NW3 3DN**	Report No:	**9722/KOG**

STANDARD PENETRATION TEST SUMMARY

BH ID	Depth [m]	Test type	'N' value and blow-counts [Seating blows/Test blows]	N_{60}	N_{60} - ext	Casing depth [m]	Water depth [m]	Remarks
BH1	1.50	S	N = 9 :1 1/ 2 2 2 3	11		0.00	DRY	
BH1	3.50	S	N = 13 :2 2/ 3 3 3 4	16		2.70	DRY	
BH1	6.00	S	N = 16 :2 3/ 3 4 4 5	20		2.70	DRY	
BH1	9.00	S	N = 20 :3 4/ 4 5 5 6	25		2.70	DRY	
BH1	12.00	S	N = 22 :4 4/ 5 5 6 6	28		2.70	DRY	
BH1	14.50	S	N = 25 :5 6/ 5 7 6 7	32		2.70	DRY	

Standard Penetration Test : BS EN ISO 22476:2005 Part 3 Hammer Energy Ratio, Er = 76%

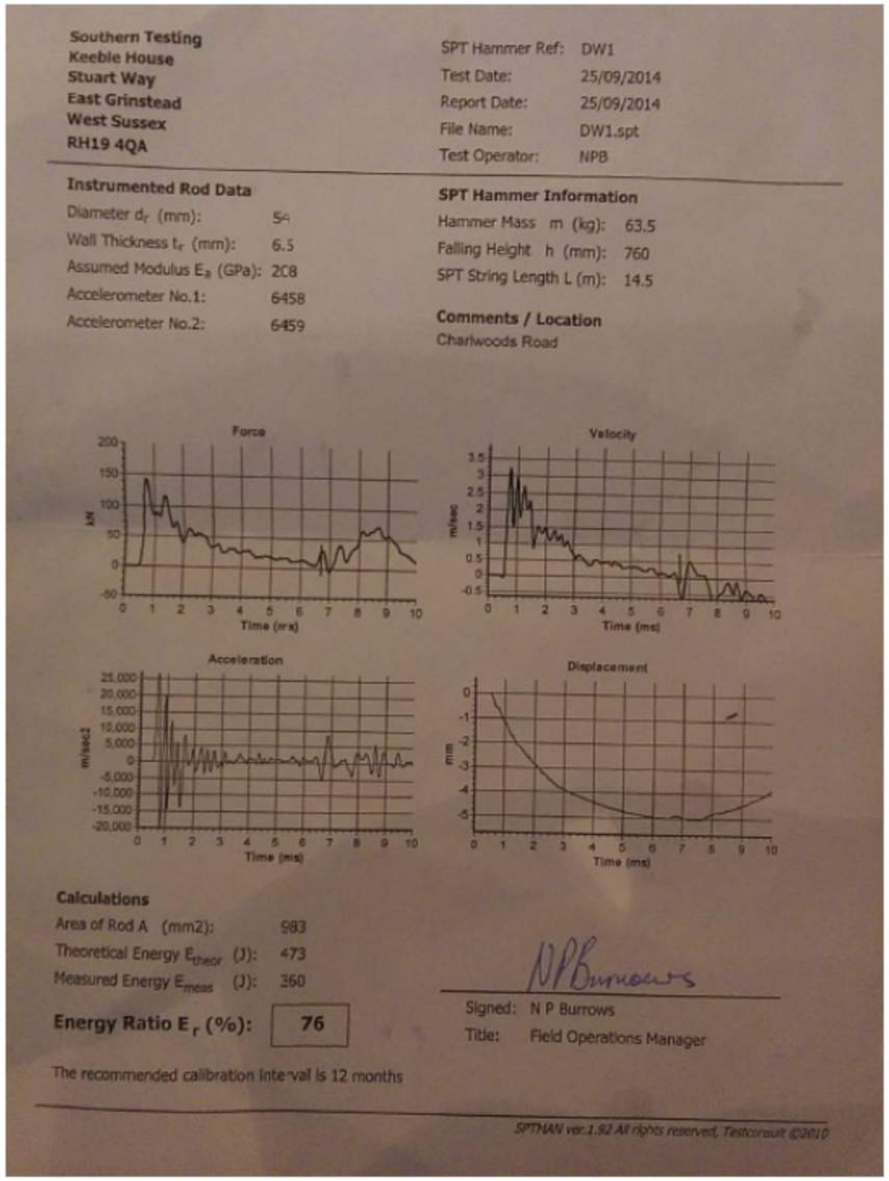
* where full penetration not achieved, the reported N_{60} is based on maximum uncorrected blow-counts of 50

** extrapolated N_{60} value where full penetration not achieved - this is indicative only and should be used with caution [SPT Sheet 1 of 1]

Soil Consultants

Site Location	17 Wadham Gardens, London, NW3 3DN	Report No: 9722/KOG

SPT Hammer Calibration Certificate



Southern Testing
Keeble House
Stuart Way
East Grinstead
West Sussex
RH19 4QA

SPT Hammer Ref: DW1
Test Date: 25/09/2014
Report Date: 25/09/2014
File Name: DW1.spt
Test Operator: NPB

Instrumented Rod Data

Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.5
Assumed Modulus E_a (GPa): 208
Accelerometer No.1: 6458
Accelerometer No.2: 6459

SPT Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
SPT String Length L (m): 14.5

Comments / Location
Charlwoods Road

Force
kN
Time (ms)

Velocity
m/sec
Time (ms)

Acceleration
m/sec2
Time (ms)

Displacement
mm
Time (ms)

Calculations

Area of Rod A (mm2): 983
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 360

Energy Ratio E_r (%): 76

The recommended calibration interval is 12 months

Signed: N P Burrows
Title: Field Operations Manager

SPTHAN ver.1.92 All rights reserved, Testconsult ©2010

Head Office:
Chiltern House, Earl Howe Road, Holmer Green
High Wycombe, Bucks HP15 6QT
t: 01494 712494
e: mail@soilconsultants.co.uk

Cardiff office:
23 Romilly Road
Cardiff CF5 1FH
t: 02920 403575
e: cardiff@soilconsultants.co.uk

Harwich Office:
Haven House, Albemarle Street
Harwich, Essex CO12 3HL
t: 01255 241639
e: harwich@soilconsultants.co.uk

Soil Consultants

Site Location	17 Wadham Gardens London, NW3 3DN	Report No: 9722/KOG

SUMMARY OF UNDRAINED SHEAR STRENGTH TEST RESULTS

BH ID	Depth [m]	Moisture content [%]	Bulk density [Mg/m³]	Dry density [Mg/m³]	Cell pressure [kPa]	$(\sigma_1-\sigma_3)_f$ [kPa]	Failure strain [%]	Failure mode	Undrained cohesion [kPa]	Remarks
BH1	2.50	24	2.00	1.61	90	94	8.00	P	47	
BH1	4.50	32	1.93	1.46	100	176	3.50	I	88	
BH1	7.50	31	1.92	1.47	150	219	5.50	B	110	
BH1	10.50	29	1.95	1.51	210	254	4.00	B	127	
BH1	13.50	29	1.97	1.53	270	201	2.00	B	101	

Testing in accordance with BS EN ISO 17892 UU = unconsolidated, undrained; MUU = multistage, unconsolidated, ur Date: 23 January 15
Unless stated otherwise: Rate of strain = 2mm/min, Standard latex membrame used with thickness = 0.5mm
Failure modes: B = brittle, I = intermediate, P = plastic [Triaxial Sheet 1 of 1]

Soil Consultants

Site & Location: **17 Wadham Gardens, London, NW3 3DN** | Report No: **9722/KOG**

SUMMARY OF CLASSIFICATION TEST RESULTS

BH ID	Depth (m)	Type	w (%)	wL (%)	wP (%)	Pass 425 (%)	IP (%)	Mod IP (%)	IL (%)	LOI (%)	Description
BH1	1.50	D	34								Orange brown mottled grey silty CLAY with rare gravel
BH1	2.00	D	36								Orange brown mottled grey silty CLAY with rare gravel
BH1	2.50	U	24								Orange brown mottled grey silty CLAY with rare gravel
BH1	3.00	D	19								Orange brown mottled grey silty CLAY with rare gravel
BH1	3.50	D	30	79	29	>95	50		0.02		Fissured brown stained blue grey CLAY
BH1	4.00	D	31								Fissured brown stained blue grey CLAY
BH1	4.50	U	32								Fissured brown stained blue grey CLAY
BH1	5.00	D	32								Fissured brown stained blue grey CLAY
BH1	7.50	U	31								Fissured brown CLAY
BH1	9.00	D	30	82	30	>95	52		0.00		Fissured brown CLAY
BH1	10.00	D	30								Fissured grey CLAY
BH1	10.50	U	29								Fissured grey CLAY
BH1	13.50	U	29								Fissured grey CLAY
BH1	14.00	D	29	83	29	>95	54		0.00		Fissured grey CLAY
BH2	1.30	D	26								Orange brown mottled grey silty CLAY with rare gravel
BH2	1.60	D	43	66	26	>95	40		0.43		Orange brown mottled grey silty CLAY with rare gravel
BH2	1.90	D	28								Orange brown mottled grey silty CLAY with rare gravel
BH2	2.30	D	31								Orange brown mottled grey silty CLAY with rare gravel
BH2	2.60	D	25								Orange brown mottled grey silty CLAY with rare gravel

Testing in accordance with BS EN ISO 17892 unless specified otherwise — Date: 23 Jan 15

Modified Plasticity Index calculated in accordance with NHBC Standards Chapter 4.2 (reported if %passing 425mm <95%)

Percent passing 425μm: by estimation, by hand* or by sieving**

(Classification Sheet 1 of 2)

Soil Consultants

Site & Location: **17 Wadham Gardens, London, NW3 3DN** | Report No: **9722/KOG**

SUMMARY OF CLASSIFICATION TEST RESULTS

BH ID	Depth (m)	Type	w (%)	wL (%)	wP (%)	Pass 425 (%)	IP (%)	Mod IP (%)	IL (%)	LOI (%)	Description
BH2	2.90	D	23								Orange brown mottled grey silty CLAY with rare gravel
BH2	3.30	D	24	40	18	>95	22		0.28		Orange brown mottled grey silty CLAY with rare gravel
BH2	3.60	D	28								Fissured brown stained blue grey CLAY
BH2	3.90	D	27	71	24	>95	47		0.07		Fissured brown stained blue grey CLAY
BH2	4.30	D	31								Fissured brown stained blue grey CLAY
BH2	4.60	D	32	78	28	>95	50		0.08		Fissured brown stained blue grey CLAY
BH2	4.90	D	31								Fissured brown stained blue grey CLAY
BH2	5.30	D	32								Fissured brown stained blue grey CLAY
BH2	5.60	D	31	72	26	>95	46		0.11		Fissured brown stained blue grey CLAY
BH2	5.90	D	32								Fissured brown stained blue grey CLAY
BH2	6.30	D	31								Fissured brown CLAY
BH2	6.60	D	32	76	29	>95	47		0.07		Fissured brown CLAY
BH2	6.90	D	32								Fissured brown CLAY

Testing in accordance with BS EN ISO 17892 unless specified otherwise — Date: 23 Jan 15

Modified Plasticity Index calculated in accordance with NHBC Standards Chapter 4.2 (reported if %passing 425mm <95%)

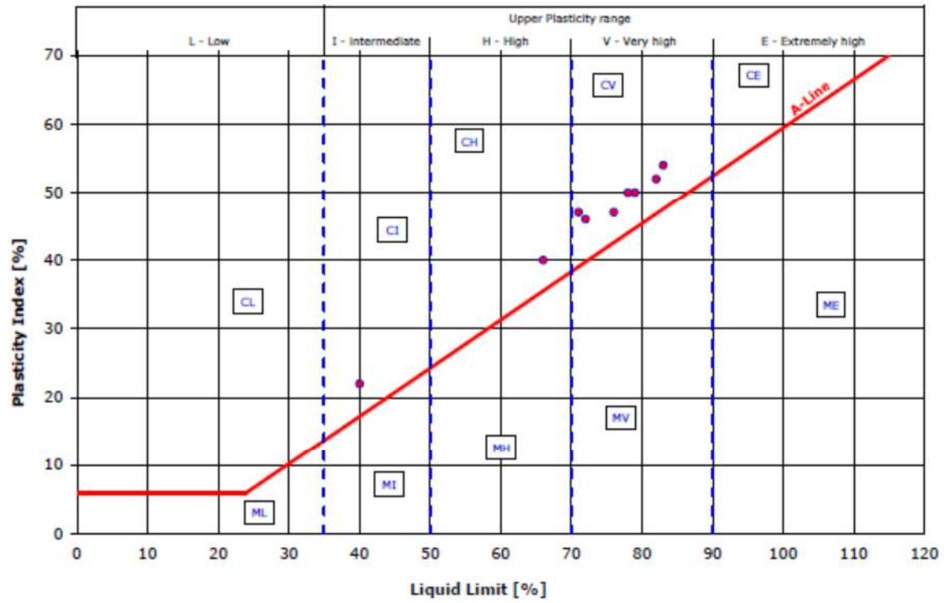
Percent passing 425μm: by estimation, by hand* or by sieving**

(Classification Sheet 2 of 2)

Soil Consultants

Site & Location	17 Wadham Gardens London, NW3 3DN	Report No:	9722/KOG

Plasticity Chart



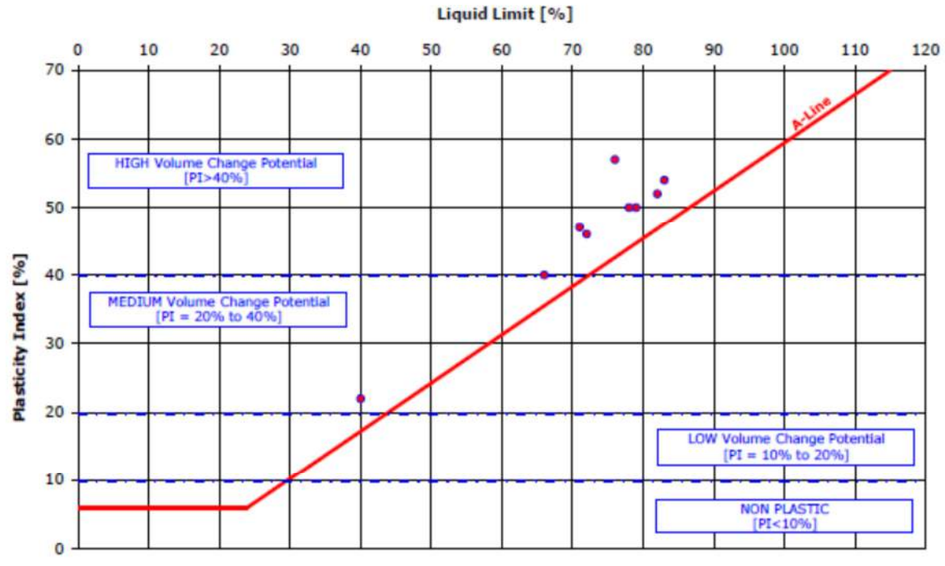
M - SILT [plots below the A-Line}
C - CLAY [plots above the A-Line]

Classification in accordance with BS5930:1999+A2:2010 "Code of practice for site investigations"

SoilConsultants

Site & Location	17 Wadham Gardens London, NW3 3DN	Report No:	9722/KOG

Plasticity Chart



Modified Plasticity Index, I'p:

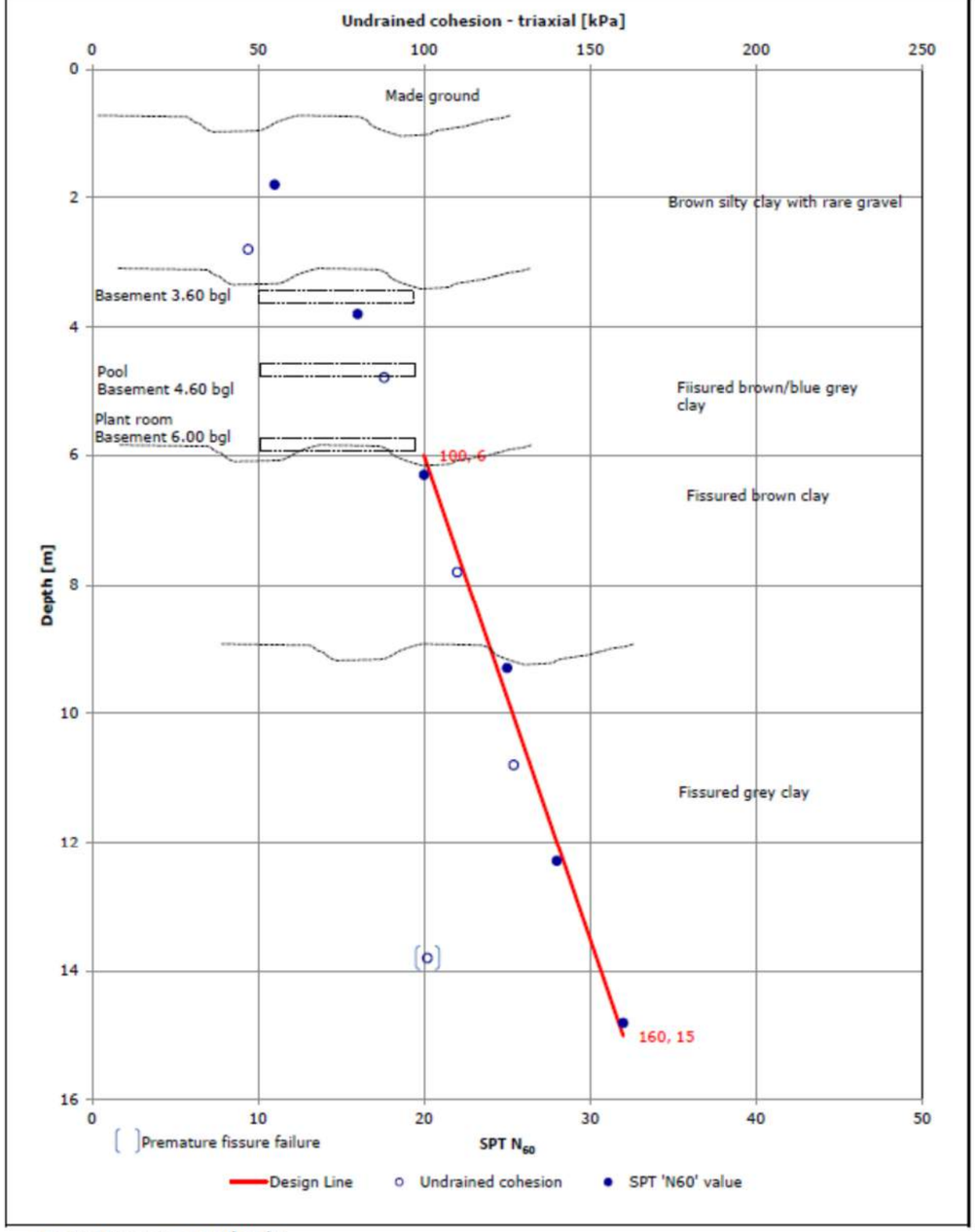
$$I'p = \frac{Ip \times (\%\ passing\ 425mm)}{100\%}$$ [where Ip = Plasticity Index]

Classification in accordance with NHBC Standards, Part 4 'Foundations', Chapter 4.2 'Building near trees'

SoilConsultants

Site & Location	17 Wadham Gardens London, NW3 3DN	Report No:	9722/KOG

Undrained cohesion and SPT [N60] vs depth



Design Line Δcu = 6.67kPa/m

Note: this plot may incorporate extrapolated results, generally where 'N' >50 - these are indicative only and should be used with caution

Soil Consultants

Foreword to: CONTAMINATION TESTING AND ASSESSMENT

The following statements are designed to inform and guide the Client and other potential parties intending to rely upon this report, with the express intent of protecting them from misunderstanding as to the extent and thus the potential associated risks that may result from proceeding without further evaluations or guidance.

1) Unless otherwise stated in this report, the testing of soils and waters is based on a range of commonly occurring potential contaminants for the specific purpose of providing a general guidance evaluation for the proposed form of development. Thus, the range of potential contaminants is neither exhaustive nor specifically targeted to any previous known uses or influences upon the site.

2) The amount and scope of the testing should not be assumed to be exhaustive but has been selected, at this stage, to provide a reasonable, general view of the site ground conditions. In many cases this situation is quite sufficient for the site to be characterised for the purposes of development and related Health and Safety matters for persons involved in or directly affected by the site development works. It must be understood, however, that in certain circumstances aspects or areas of the site may require further investigation and testing in order to fully clarify and characterise contamination issues, both for regulatory compliance and for commercial reasons.

3) The scope of the contamination testing must not automatically be regarded as being sufficient to fully formulate a remediation scheme. For such a scheme it may be necessary to consider further testing to verify the effectiveness of the remedial work after the site has been treated. It must be understood that a remediation scheme which brings a site into a sufficient state for the proposed development ("fit for purpose") under current legislation and published guidance, may result in some contamination being left in-situ. It is possible that forthcoming legislation may result in a site being classified by the Local Authority and assigned a "Degree of Risk" related to previous use or known contamination.

4) The scope of the environmental investigation and contamination testing must not be automatically regarded as sufficient to satisfy the requirements in the wider environmental setting. The risks to adjacent properties and to the water environment are assessed by the regulatory authorities and there may be a requirement to carry out further exploration, testing and, possibly monitoring in the short or long term. It is not possible to sensibly predict the nature and extent of such additional requirements as these are the direct result of submissions to and liaison with the regulatory authorities. It is imperative, therefore, that such submissions and contacts are made as soon as possible, especially if there are perceived to be critical features of the site and proposed scheme, in this context.

5) New testing criteria have been implemented by the Environment Agency to enable a waste disposal classification to be made. The date of implementation of this Waste Acceptance Criteria (WAC) testing was July 2005. It is this testing that will be used by the waste regulatory authorities, including waste disposal sites, to designate soils for disposal in landfill sites. In certain circumstances, to satisfy the waste regulations, there may be the necessity to carry out additional testing to clarify and confirm the nature of any contamination that may be present. If commercial requirements are significant then this process may also necessitate further field operations to clarify the extent of certain features. Thus, the waste classification must be obtained from the waste regulation authorities or a licensed waste disposal site and we strongly recommend that this classification is obtained as soon as possible and certainly prior to establishing any costings or procedures for this or related aspects of the scheme.

Rev: August 2009

Soil Consultants

Keith Gibbs
Soil Consultants Ltd
23 Romilly Road
Cardiff
CF5 1FH

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: 15-28084

Site Reference: 17 Wadham Gardens, London

Project / Job Ref: 9722/KOG

Order No: 9722/KOG

Sample Receipt Date: 22/01/2015

Sample Scheduled Date: 22/01/2015

Report Issue Number: 1

Reporting Date: 28/01/2015

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

Soil Analysis Certificate						
QTS Environmental Report No: 15-28084	**Date Sampled**	13/01/15	13/01/15	13/01/15	13/01/15	13/01/15
Soil Consultants Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: 17 Wadham Gardens, London	**TP / BH No**	BH2	BH2	BH2	BH2	BH2
Project / Job Ref: 9722/KOG	**Additional Refs**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 9722/KOG	**Depth (m)**	0.50	0.80	1.20	2.60	3.90
Reporting Date: 28/01/2015	**QTSE Sample No**	132799	132800	132801	132802	132803

Determinand	Unit	RL	Accreditation					
Asbestos Screen	N/a	N/a	ISO17025	Not Detected	Not Detected	Not Detected		
pH	pH Units	N/a	MCERTS	9.1	7.9	9.0	7.9	7.7
Electrical Conductivity	uS/cm	< 5	NONE	145	75	156		
Total Cyanide	mg/kg	< 2	NONE	< 2	< 2	< 2		
Total Sulphate as SO_4	mg/kg	< 200	NONE	3332	910	1181		
W/S Sulphate as SO4 (2:1)	g/l	< 0.01	MCERTS	0.09	0.13	0.09	0.10	0.14
Total Sulphur	mg/kg	< 200	NONE	1113	336	430		
Organic Matter	%	< 0.1	MCERTS	5.2	2	0.8		
Arsenic (As)	mg/kg	< 2	MCERTS	6	16	6		
W/S Boron	mg/kg	< 1	NONE	< 1	< 1	< 1		
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	0.3	< 0.2		
Chromium (Cr)	mg/kg	< 2	MCERTS	18	51	25		
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2		
Copper (Cu)	mg/kg	< 4	MCERTS	19	37	13		
Lead (Pb)	mg/kg	< 3	MCERTS	139	100	25		
Mercury (Hg)	mg/kg	< 1	NONE	< 1	< 1	< 1		
Nickel (Ni)	mg/kg	< 3	MCERTS	14	54	15		
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3	< 3		
Zinc (Zn)	mg/kg	< 3	MCERTS	40	150	35		
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	< 2		
EPH (C10 - C40)	mg/kg	< 6	MCERTS	< 6	< 6	< 6		

Analytical results are expressed on a dry weight basis where samples are dried at less than 30°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: 15-28084	**Date Sampled**	13/01/15	13/01/15	13/01/15	13/01/15	13/01/15
Soil Consultants Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: 17 Wadham Gardens, London	**TP / BH No**	BH2	BH1	BH1	BH1	BH1
Project / Job Ref: 9722/KOG	**Additional Refs**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 9722/KOG	**Depth (m)**	5.90	0.40	0.90	9.00	14.00
Reporting Date: 28/01/2015	**QTSE Sample No**	132804	132805	132806	132808	132809

Determinand	Unit	RL	Accreditation					
Asbestos Screen	N/a	N/a	ISO17025		Not Detected	Not Detected		
pH	pH Units	N/a	MCERTS	7.5	8.2	7.8	7.5	7.6
Electrical Conductivity	uS/cm	< 5	NONE		158	133		
Total Cyanide	mg/kg	< 2	NONE		< 2	< 2		
Total Sulphate as SO_4	mg/kg	< 200	NONE		2296	759		
W/S Sulphate as SO4 (2:1)	g/l	< 0.01	MCERTS	1.76	1.06	0.25	0.48	0.42
Total Sulphur	mg/kg	< 200	NONE		773	540		
Organic Matter	%	< 0.1	MCERTS		0.9	1.1		
Arsenic (As)	mg/kg	< 2	MCERTS		8	9		
W/S Boron	mg/kg	< 1	NONE		< 1	< 1		
Cadmium (Cd)	mg/kg	< 0.2	MCERTS		< 0.2	< 0.2		
Chromium (Cr)	mg/kg	< 2	MCERTS		29	30		
Chromium (hexavalent)	mg/kg	< 2	NONE		< 2	< 2		
Copper (Cu)	mg/kg	< 4	MCERTS		28	63		
Lead (Pb)	mg/kg	< 3	MCERTS		126	47		
Mercury (Hg)	mg/kg	< 1	NONE		< 1	< 1		
Nickel (Ni)	mg/kg	< 3	MCERTS		23	26		
Selenium (Se)	mg/kg	< 3	NONE		< 3	< 3		
Zinc (Zn)	mg/kg	< 3	MCERTS		58	68		
Total Phenols (monohydric)	mg/kg	< 2	NONE		< 2	< 2		
EPH (C10 - C40)	mg/kg	< 6	MCERTS		< 6	< 6		

Analytical results are expressed on a dry weight basis where samples are dried at less than 30°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: 15-28084	**Date Sampled**	13/01/15				
Soil Consultants Ltd	**Time Sampled**	None Supplied				
Site Reference: 17 Wadham Gardens, London	**TP / BH No**	BH2				
Project / Job Ref: 9722/KOG	**Additional Refs**	None Supplied				
Order No: 9722/KOG	**Depth (m)**	1.30				
Reporting Date: 28/01/2015	**QTSE Sample No**	132810				

Determinand	Unit	RL	Accreditation					
Asbestos Screen	N/a	N/a	ISO17025					
pH	pH Units	N/a	MCERTS	7.7				
Electrical Conductivity	uS/cm	< 5	NONE					
Total Cyanide	mg/kg	< 2	NONE					
Total Sulphate as SO_4	mg/kg	< 200	NONE					
W/S Sulphate as SO4 (2:1)	g/l	< 0.01	MCERTS	0.19				
Total Sulphur	mg/kg	< 200	NONE					
Organic Matter	%	< 0.1	MCERTS					
Arsenic (As)	mg/kg	< 2	MCERTS					
W/S Boron	mg/kg	< 1	NONE					
Cadmium (Cd)	mg/kg	< 0.2	MCERTS					
Chromium (Cr)	mg/kg	< 2	MCERTS					
Chromium (hexavalent)	mg/kg	< 2	NONE					
Copper (Cu)	mg/kg	< 4	MCERTS					
Lead (Pb)	mg/kg	< 3	MCERTS					
Mercury (Hg)	mg/kg	< 1	NONE					
Nickel (Ni)	mg/kg	< 3	MCERTS					
Selenium (Se)	mg/kg	< 3	NONE					
Zinc (Zn)	mg/kg	< 3	MCERTS					
Total Phenols (monohydric)	mg/kg	< 2	NONE					
EPH (C10 - C40)	mg/kg	< 6	MCERTS					

Analytical results are expressed on a dry weight basis where samples are dried at less than 30°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 - Speciated PAHs							
QTS Environmental Report No: 15-28084	Date Sampled	13/01/15	13/01/15	13/01/15	13/01/15	13/01/15
Soil Consultants Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: 17 Wadham Gardens,	TP / BH No	BH2	BH2	BH2	BH1	BH1
Project / Job Ref: 9722/KOG	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 9722/KOG	Depth (m)	0.50	0.80	1.20	0.40	0.90
Reporting Date: 28/01/2015	QTSE Sample No	132799	132800	132801	132805	132806

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	0.13	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	0.14	< 0.1	< 0.1	0.20	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	0.17	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 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	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 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	< 1.6

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

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

4480

Waste Acceptance Criteria Analytical Certificate - BS EN 12457/3												
QTS Environmental Report No: 15-28084		Date Sampled	13/01/15					Landfill Waste Acceptance Criteria Limits		
Soil Consultants Ltd		Time Sampled	None Supplied					Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Site Reference: 17 Wadham Gardens, London		TP / BH No	BH1							
Project / Job Ref: 9722/KOG		Additional Refs	None Supplied							
Order No: 9722/KOG		Depth (m)	1.20							
Reporting Date: 28/01/2015		QTSE Sample No	132807							
Determinand	Unit	MDL								
TOC[M,U]	%	< 0.1	0.5					3%	5%	6%
Loss on Ignition	%	< 0.01	3.70					--	--	10%
BTEX[M,U]	mg/kg	< 0.05	< 0.05					6	--	--
Sum of PCBs	mg/kg	< 0.7	< 0.7					1	--	--
Mineral Oil[M,U]	mg/kg	< 10	< 10					500	--	--
Total PAH[M,U]	mg/kg	< 1.7	< 1.7					100	--	--
pH[M,U]	pH Units	N/a	7.7					--	>6	--
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	1.4					--	To be evaluated	To be evaluated
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**		**Cumulative 10:1 mg/kg**	**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)**			
Arsenic[U]			< 0.01	< 0.01		< 0.2	0.5	2	25	
Barium[U]			0.04	< 0.02		0.2	20	100	300	
Cadmium[U]			< 0.0005	< 0.0005		< 0.02	0.04	1	5	
Chromium[U]			< 0.005	< 0.005		< 0.20	0.5	10	70	
Copper[U]			< 0.01	< 0.01		< 0.5	2	50	100	
Mercury[U]			< 0.005	< 0.005		< 0.01	0.01	0.2	2	
Molybdenum[U]			< 0.001	0.001		< 0.1	0.5	10	30	
Nickel[U]			< 0.007	< 0.007		< 0.2	0.4	10	40	
Lead[U]			< 0.005	< 0.005		< 0.2	0.5	10	50	
Antimony[U]			< 0.005	< 0.005		< 0.06	0.06	0.7	5	
Selenium[U]			< 0.005	< 0.005		< 0.1	0.1	0.5	7	
Zinc[U]			< 0.005	< 0.005		< 0.2	4	50	200	
Chloride[U]			35	6		77	800	15000	25000	
Fluoride[U]			0.7	0.6		6	10	150	500	
Sulphate[U]			47	9		112	1000	20000	50000	
TDS			204	93		989	4000	60000	100000	
Phenol Index			< 0.01	< 0.01		< 0.5	1	-	-	
DOC			20.7	12.4		129	500	800	1000	
Leach Test Information										
Sample Mass (kg)			0.22							
Dry Matter (%)			80.9							
Moisture (%)			23.8							
Stage 1										
Volume Eluate L2 (litres)			0.31							
Filtered Eluate VE1 (litres)			0.09							

Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and QTS Environmental cannot be held responsible for any discrepencies with current legislation
M Denotes MCERTS accredited test
U Denotes ISO17025 accredited test

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

4480

Soil Analysis Certificate - Sample Descriptions

QTS Environmental Report No: 15-28084	
Soil Consultants Ltd	
Site Reference: 17 Wadham Gardens, London	
Project / Job Ref: 9722/KOG	
Order No: 9722/KOG	
Reporting Date: 28/01/2015	

QTSE Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
132799	BH2	None Supplied	0.50	14.3	Light brown clayey gravel with rubble
132800	BH2	None Supplied	0.80	20.4	Light brown clayey gravel
132801	BH2	None Supplied	1.20	17.9	Light brown clayey gravel with rubble
132802	BH2	None Supplied	2.60	17.2	Light brown clay
132803	BH2	None Supplied	3.90	18	Light brown clay
132804	BH2	None Supplied	5.90	20.1	Light brown clay
132805	BH1	None Supplied	0.40	19.3	Light brown clayey gravel with vegetation
132806	BH1	None Supplied	0.90	19.2	Light brown clay
132807	BH1	None Supplied	1.20	19.1	Light brown clay
132808	BH1	None Supplied	9.00	17.7	Light brown clay
132809	BH1	None Supplied	14.00	18.9	Light brown clay
132810	BH2	None Supplied	1.30	17.7	Light brown clay

Moisture content is part of procedure E003 & is not an accredited test
Insufficient Sample U/S
Unsuitable Sample U/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 - Methodology & Miscellaneous Information

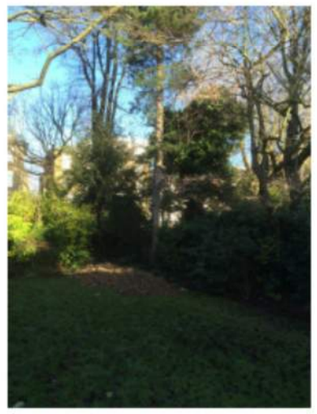
QTS Environmental Report No: 15-28084
Soil Consultants Ltd
Site Reference: 17 Wadham Gardens, London
Project / Job Ref: 9722/KOG
Order No: 9722/KOG
Reporting Date: 28/01/2015

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

Site Location	17 Wadham Gardens, London, NW3 3DN	Report No: 9722/KOG

Photographs of the site [January 2015]



Head Office:
Chiltern House, Earl Howe Road, Holmer Green
High Wycombe, Bucks HP15 6QT
t: 01494 712494
e: mail@soilconsultants.co.uk

Cardiff office:
23 Romilly Road
Cardiff CF5 1FH
t: 02920 403575
e: cardiff@soilconsultants.co.uk

Harwich Office:
Haven House, Albemarle Street
Harwich, Essex CO12 3HL
t: 01255 241639
e: harwich@soilconsultants.co.uk

Soil Consultants