APPENDIX 2
SITE INVESTIGATION REPORTS

Soil Consultants
Ground Investigation
Geotechnical Analysis
Contamination Assessment

SITE INVESTIGATION REPORT

PROPOSED REDEVELOPMENT:
GARAGES TO THE SOUTH OF 27A WEST END LANE, LONDON, NW6 4QL

Client:	**STREETPLOT LTD.** **Unit 1.25 East London Works,** **75 Whitechapel Road,** **London E1 1DU**
Consulting Engineers:	**PRINGUER-JAMES CONSULTING ENGINEERS LTD.** **10 Beulah Road,** **Wimbledon,** **London SW19 3SB**
Report ref:	**10120/MR/CB**
Date:	**24th August 2017 [Rev 0]**

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

Head Office
Chiltern House, Earl Howe Road
Holmer Green, High Wycombe
Buckinghamshire HP15 6QT
t: 01494 712 494
e: mail@soilconsultants.co.uk

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

Registered in England No 1814762 VAT No 491 8249 15

SITE INVESTIGATION REPORT

PROPOSED REDEVELOPMENT:

GARAGES TO THE SOUTH OF 27A WEST END LANE, LONDON, NW6 4QL

DOCUMENT ISSUE STATUS:

Issue	Date	Description	Author	Checked/approved
Rev 0	24/08/2017	First issue	Matthew Rust BSc [Hons] FGS	Charles Bull BSc [Hons] MSc FGS CGeol

TABLE OF CONTENTS

APPENDIX A

Fieldwork, in-situ testing and monitoring

- Foreword
- Borehole record
- Standard Penetration Test results
- SPT hammer calibration certificates
- Trial pit records
- Ground-water and gas monitoring results

Laboratory testing

- Index property testing
- Plasticity charts
- Unconsolidated undrained triaxial test results [QUT]
- Soluble Sulphate/pH results [QTS Environmental]

Contamination testing [QTS Environmental]

- Contamination Foreword
- General soil suite
- WAC test results

Ground profiles

- Plot of SPT 'N' value and undrained cohesion versus depth

Plans & drawings

- Proposed development plan
- Site Plan
- Site Location Map

APPENDIX B

- GroundSure historical maps [Ref SCL-4072312]
- GroundSure EnviroInsight Report [Ref SCL-4072310]
- GroundSure GeoInsight Report [Ref SCL- 4072311]

1.0 INTRODUCTION

Consideration is being given to the construction of a new 3-storey residential building on land currently occupied by a car park and associated garages; no basement is currently proposed. In connection with the proposed works, Soil Consultants Ltd [SCL] were commissioned by the Client, StreetPlot Ltd, to carry out a ground investigation to include the following elements:

- Phase 1 Land Quality Assessment [Desk Study] including Preliminary Risk Assessment
- Phase 2 intrusive investigation
- Provision of advice on foundations and ground floor slabs
- Contamination risk assessment and revised conceptual model

This report includes the findings and conclusions of the Phase 1 research and the Preliminary Risk Assessment. It then describes the investigation undertaken, gives a summary of the ground conditions encountered and discusses various foundation options. An environmental appraisal is then provided, including a site specific contamination risk assessment and revised conceptual model.

2.0 SITE DESCRIPTION

The site is located on the north-western side of West End Lane in the London Borough of Camden with its centre at approximate NGR 525485E 183845N and with overall dimensions of approximately 25m x 25m. The site is currently occupied by a vacant car park on the north-western side of the site, with a row of eight lock-up garages along the south-eastern boundary. The car park is an open area of concrete hardstanding with properties along Mutrix Road to the south-west, Sycamore Court to the north-west and Sycamore Court car park to the north-east. The site has a slight fall from north-east [36.75mOD] to south-west [35.8mOD]. The site boundary is marked on three sides by a brick wall, up to 2.0m high in places, with wooden hoarding marking the north-east boundary of the site.

The site is surrounded by residential buildings with a significant number of trees, some of which have been identified as beech and sycamore along with various shrubs and bushes. The beech tree attained a height of approximately 10m and is located approximately 3m from the western boundary [northern end] along with a sycamore tree being located approximately 5m from the north western corner and attained a height of approximately 15m. An arboricultural survey was not available at the time of compiling this report and a specialist should be consulted regarding the adjacent tree species and heights.

The current site features are shown on the Site Plan which is included in Appendix A.

3.0 PHASE 1 LAND QUALITY ASSESSMENT [DESK STUDY]

This assessment is generally based upon current UK guidance, primarily the combined DEFRA/EA publication CLR 11 [Model Procedures for the Management of Land Contamination, 2004]. The scope of the assessment is as follows:

- A review of historical and current land–use and potential contaminated land risks
- Development of an outline conceptual model, identifying potential sources, pathways and receptors, and a Preliminary Risk Assessment
- Development of a strategy for Phase 2 intrusive investigation

3.1 Review of historical mapping

The following summary of the history of the site and surrounding area has been compiled from a series of historical maps obtained from the Groundsure database; these are included in Appendix B.

Historical development of site and surrounding area		
Map date	**The site**	**Significant development / features in surrounding area**
1865 - 1874	The site is undeveloped and located within agricultural land	The immediate area N and W is undeveloped A tree shown to the south-east Residential properties are located to the south and east Queen's Road, aligned NE-SW, is located immediately SE of site Development along Edgware Road, which is around 175m SW [at closest point] Kilburn Station shown to be 175m S, with railway running ENE-WSW St Paul's Church situated 200m W and St Mary's Church 250m NE Schools and public house shown 220m W Armory and rifle range located 350m W Ponds 80m W and 120m NW

Historical development of site and surrounding area		
Map date	**The site**	**Significant development / features in surrounding area**
1894 - 1951	Two dwellings have been constructed on the site	By 1894 significant residential development has occurred around the site Mutrix Road [west] and Birchington Road [north] have been constructed A priory and two chapels shown 175m to 200m to NE Public Houses located 120m SE, 200m W and 220m SW Queen's Road now known as West End Lane By 1915 Picture Theatre and Sorting Office located around 175m S By 1935 Ladder Works [40m SE], Priory Works [120m S] and Albert Works [100m SW] are all shown, but usage is unknown Edgware Road is now shown as [Kilburn] High Road and Maida Vale
1953 - 1973	No significant changes	Residential properties on south side of West End Lane have been replaced by Holmesdale House, Wharfedale House and Birchington Court, part of Kilburn Vale Estate Ladder Works also replaced as part of redevelopment Albert Works no longer shown Picture Cinema is now the Shannon Club Banba Dance Club shown 120m SE Electricity sub-station present 90m NE
1974 - present	Houses have been replaced by 8no garages	Area to north and west has been redeveloped. Sycamore Court located immediately NW Birchington Road no longer present to north, but still present SW of Mutrix Road Redevelopment bounded by West End Lane to south and east, Quex Road to north and Mutrix Road to west. Access into redevelopment is via Bransdale Close, a new turning off West End Lane, to north-east of site Quex Road Open Space and Adventure playground shown 100m N Kilburn Market shown 200m WSW

3.2 Groundsure database information

The Groundsure report includes information from a database of local activities encompassing a range of subjects related to land use, pollution, and geological/hydrological conditions. A summary of contaminative uses and other environmental issues covered within the site and its immediate surroundings [generally within 250m] is presented below. The full Groundsure report is included as Appendix B and this should be read and understood fully in conjunction with this summary.

Historical Industrial Sites

- Potentially contaminative uses: 18no within 250m; nearest being a smithy 155m W; remainder are railway sidings/station [with duplicates].
- Historical tank database: 3no unspecified tanks within 250m; closest is 22m SW.
- Historical energy features database: 28no within 250m [including duplicates]; closest is 87m NE electricity substation [some duplicates are present in the report].
- Historical garage and motor vehicle repair database: 8no entries within 250m [including duplicates]; closest is garages located 202m N.
- Potentially infilled land: 1no cutting recorded 250m S.

Environmental Permits, Incidents and Registers

- Records of Part A[2] and Part B Activities: 4no within 500m [all dry cleaning, including duplicates]; nearest is 257m S.
- 3no records on the National Incidents Recording System [NIRS] List 2; closest located 202m SW - contaminated water with firefighting run-off.

Landfill and other Waste Sites

- Records of Environment Agency licenced waste sites within 1500m: 1no located 1084m NE – Canfield Place, London NW6, not specified.

Current Land Use

- Potentially contaminative uses: 22no within 250m; the nearest being 108m SE - vehicle repair/testing/servicing.
- Petrol and Fuel Sites: 1no within 500m; obsolete garage located 476m W.
- National Grid High Voltage Underground Electricity Cables; 1no located 171m SW - 400kV A/C underground cable.

Geology

- Artificial/ Made Ground: None recorded.
- Bedrock/Solid Geology: London Clay formation [mixed flow, very low to moderate permeability], no faults recorded within 500m.
- Radon: the property is not in a Radon Affected Area [<1% of properties are above action level] - no protective measures required.
- There are no historical surface ground working features shown by the GroundSure database within 250m of the study site boundary. However, reference to the BGS 6" geological mapping indicates that the site is within an area of pits, 2-3m deep, excavated within the London Clay [original geological mapping dated 1889; last revised 1980].
- Historical Underground Workings: 12no within 1000m of the site; the nearest being 938m E; these are all recorded as tunnels and air shafts.
- Mining, Extraction & Natural Cavities: 7no recorded within 1000m of site boundary; all labelled as air shafts.
- Natural Ground Subsidence: moderate risk for shrink-swell clays; all other categories negligible to very low.
- Borehole Records Map: 15no within 250m of site, of which 1no is located directly on the site [Kilburn Vale Estate BH7].
- Estimated Background Soil Chemistry: no data.

Hydrogeology and Hydrology

- There are no aquifers within superficial deposits.
- Aquifer within bedrock deposits: 'Unproductive' [London Clay].
- Groundwater Abstraction: 4no within 2000m of site including duplicates; nearest being 1320m E, Thames groundwater borehole for spray irrigation.

Flooding

- No Zone 2 or 3 floodplains or flood defences within 250m of site.
- Risk of flooding from rivers and the sea is very low [less than 1 in 1000].
- Groundwater flooding – not applicable.

Designated Environmentally Sensitive Areas

- Local Nature Reserves: 3no within 2000m [including duplicates]; nearest is 1722m SE - St John's Wood Church Grounds.

Railways and Tunnels

- Railway and railway sidings have been identified 162m SE of the site boundary.
- Nearest active railway shown as Watford DC lines, located 176m SE.
- Site is within 5km of High Speed 2 rail project.

3.3 Other Reports

A database search report conducted through the London Borough of Camden formed part of our works however this 'Contaminated Land Enquiry Report' was applied for but had not been issued at the time of compiling this report.

3.4 Walk-over survey

Our site walkover survey was undertaken in conjunction with the fieldwork on 13th July 2017.

The general topography of the site is a slight fall from north-east to south-west. The garages, which form the south-eastern boundary of the site, were disused at the time of our investigation and access to the car park area and six of the eight garages was restricted by the presence of wooden hoardings and a padlocked gate to the secured area. Extensive vegetation, including trees was observed along the north-western and south-western boundaries, with some vegetation located within the boundary of the site along the south-eastern boundary, behind the garages. All other vegetation is located beyond the site boundary.

Along the north-western, south-western and south-eastern boundaries, brick walls of varying heights had been constructed and generally these appeared to be retaining the car park and garages. There is a manhole cover in the western part of the site. The site was found to be in a clean and tidy state with no waste, rubbish, tanks etc present. The surrounding areas were also noted to be in a well-maintained and tidy state. A small electricity substation was indicated 87m to the NW of the site [outlined on the historical maps 1965 to 1991] along Abbot's Place; however, no substation was present within the marked location during the walk-over survey. No significant surface staining around it to indicate significant historical oil spillages etc.

The accessible garages appeared to be in a relatively tidy state although sealed containers were present, which comprised possible concentrated hard limescale remover, tile adhesive & grout and two 5l plastic petrol cans. Faint surface staining was noted, which could be the result of oil and chemical spillages. However, due to the presence of the concrete slab, the potential for migration should be low. As the buildings and garages were constructed before 2000 the potential for asbestos materials being present, particularly in the garage roof sheets, cannot be ruled out.

3.5 Preliminary Risk Assessment and Conceptual Model

The Phase 1 study has indicated that that site has had a fairly consistent history, with the site occupied by two residential properties. By 1974 these properties had been demolished and replaced with 8no garages. The surrounding area has been also been developed for mainly residential usage, with some small works of unknown usage within 40m to 120m.

The walk-over survey did not identify any particular current high risk features [such as fuel tanks, above or below ground], materials [such as chemical containers] or land use within the site or in its immediate vicinity. There was a sub-station present 87m to the NE of the site identified by historical mapping and, whilst no longer present, it would have been a potential risk during its lifecycle. The 6" geology map suggests that the site lies within an area of 2-3m 'pits' and therefore some infilling could be present.

A summary of the main potential contaminants is as follows:

- Asbestos
- Metals and semi-metals
- Migrating ground gases/vapours
- Sub-station PCB's

The history of land usage [both within the site and its vicinity] indicate a **low to moderate** risk potential of contaminative sources which could affect the site.

The Preliminary Risk Assessment [PRA] and Conceptual Model based upon the information reviewed and a walk-over survey is as follows:

Source / hazard	Pathway	Receptor	Potential sources identified	Assessed Risk level
Contaminated soil: on-site sources	Ingestion/ contact	End user and construction workers	• Made ground of unknown source • Potential for ACM from pre-2000 construction • Nearest electricity substation located 87m NE	**Low to moderate**
	Migration of contaminated ground water and/or surface run-off through contaminated fill into aquifer	Aquifer and surface water	Non aquifer present (London Clay)	

Source / hazard	Pathway	Receptor	Potential sources identified	Assessed Risk level
Contaminated soil: off-site sources	Dissolution into shallow groundwater and subsequent lateral migration to the site	End user and construction workers	↓ General unidentified 'works', ladder-works, vehicle repair garage, sub-station and smithy within 200m of the site ↓ Electricity sub-stations	**Low to moderate**
Ground gas: on-site and off-site sources	Migration	End-user and buildings	↓ Possible made ground on site a potential gas source ↓ BGS 6" geological mapping indicates that the site is within an area of pits, 2-3m deep, excavated within the London Clay ↓ No Radon protective measures required	**Low to Moderate**

3.6 Design of intrusive investigation

The PRA has identified potential contaminative sources which could affect various receptors. In designing the Phase 2 intrusive investigation, the various elements in the PRA need to be taken into account. Key elements of the intrusive investigation are as follows:

Type and extent of investigation: identification of the soil sequence in particular the type and thickness of any made ground. A combination of a cable percussive borehole and trial pits should allow determination of the full thickness of the made ground, the nature of the underlying natural soils and groundwater levels. Borehole installations pipe to groundwater/gas monitoring and sampling.

Soil and groundwater sampling: sampling of the made ground and natural soils and ground water if present.

Contamination testing: testing of both made ground and natural soil samples to be carried out. The PRA has identified certain off-site risks and 'unknown' made ground on-site. The contamination testing of soils and groundwater to include petroleum hydrocarbons, metals, phenols and poly-aromatic hydrocarbons to reflect the potential identified risks.

Gas monitoring: precautionary gas monitoring should be carried out for CH_4, CO_2, CO and H_2S. Initially, at least two monitoring visits should be allowed for, with subsequent monitoring if required depending on initial results.

Asbestos: careful visual inspection of soils for suspected Asbestos Containing Materials should be carried out as a matter of course. Screening of all contamination soil samples for asbestos.

4.0 EXPLORATORY WORK AND LABORATORY TESTING

The site investigation was carried out in July 2017. At this time four of the garages were inaccessible. The investigation comprised the following elements.

4.1 Cable percussion borehole

One cable percussion borehole was carried out to a depth of 15m in the centre of the concrete-surfaced car parking area. A 50mm diameter monitoring standpipe was installed to 5.0m depth, with a response zone between 1.0m and 5.0m depth.

Sampling and in-situ testing were carried out at appropriate intervals over the full depth of the borehole. The hammer Energy Ratio [E_r] for the equipment used was 70% and the relevant test certificate is included in Appendix A.

The ground level at the borehole has been extrapolated from the spot levels on the Engineer's drawing.

4.2 Trial pits

Two trial pits [TP1 and TP2] were excavated using hand tools against the existing boundary wall of the property, on the north-western side of the site, in order to establish details of the existing foundations. A further four trial pits [TP3 to TP6] were excavated within garages, using hand tools and also concrete coring equipment, to enable near surface sampling for contamination testing.

4.3 Groundwater and gas monitoring

Water and gas monitoring was carried out on three occasions, following completion of the site works, on 18th July, 27th July and 10th August 2017.

4.4 Geotechnical and chemical laboratory testing

The following geotechnical laboratory testing was completed:

- Index properties tests [Atterberg Limits]
- Unconsolidated, undrained triaxial tests
- Soluble sulphate/sulphur/pH analyses [QTS Environmental Ltd]

4.5 Chemical and contamination testing

Selected soil samples were delivered to a specialist laboratory [QTS Environmental Ltd] and the following testing was carried out:

- General soil suite - 8no samples
- Asbestos screening - 8no samples
- Waste Acceptance Criteria [WAC] - 1no sample

The engineering logs of the exploratory holes and the laboratory testing results are included in the Appendix.

5.0 GROUND CONDITIONS

Published BGS information indicates that the site is underlain by the London Clay with no superficial deposits present. Made ground of varying thickness has been recorded overlying the London Clay in nearby boreholes. The six inch geological mapping for this part of London indicates that the site is within an area of pits, 2-3m deep, excavated within the London Clay [original geological mapping dated 1889; last revised 1980].

This sequence was confirmed by our investigation, which indicated made ground with a maximum thickness of 2.2m encountered in the borehole. The base of the made ground was not encountered in any of the trial pits, which reached depths of between 0.70m and 1.60m. London Clay was encountered to the base of the borehole at 15.0m depth

Detailed descriptions are presented on the exploratory hole records, which are included in Appendix A.

5.1 Made ground

The existing concrete slab varied in thickness between 150mm to 600mm and was noted to be reinforced within the garages. The underlying made ground extended to a maximum depth of 2.20m in the borehole, although the base of this stratum was not found in the trial pits, which extended to a maximum depth of 1.60m. The made ground was heterogenous but generally comprised dark brown to grey silty sandy gravelly clay to clayey sandy gravel with variable amounts of flint, brick, concrete, ash, clinker, slate, chalk and glass. Live and decaying roots were observed to depth of between 0.60m and 1.30m in TP1 to TP4 inclusive with some evidence of partial desiccation in TP1 and TP2. It is likely that this made ground is a result of the historical excavations which are identified on the 6" geological map.

5.2 London Clay

The London Clay was encountered only in the borehole. It comprised brown and orange brown fissured silty clay becoming dark grey at around 10.30mbgl. The clay contained occasional partings of silt, rare manganese staining and occasional selenite crystals above 10.30mbgl. Below this, rare partings of silt were noted along with rare shell fragments. Laboratory triaxial testing and SPTs indicate the London Clay to be of medium becoming high strength with depth - the measured strength profile in included in Appendix A. The plasticity index testing has shown the London Clay to be of Very High plasticity [BS5930] and High Volume Change Potential [NHBC Standards]. No rootlets were observed within the London Clay at the borehole position.

5.3 Ground-water

Ground-water was not encountered in any of the exploratory holes during the investigation. Subsequent monitoring of the standpipes recorded water levels at 2.55m, rising to 0.58m on 10th August. We attribute this to gradual inflow of water from the made ground.

Ground-water levels can of course vary seasonally and with prevailing weather conditions. We recommend that continued monitoring is undertaken prior to design and construction to ascertain water levels in relation to the development/construction works.

5.4 Environmental observations

Potential asbestos containing materials [ACMs] were observed in TP4, together with and clinker throughout the made ground.

6.0 GEOTECHNICAL ASSESSMENT

The proposed works at this site include the following elements:

- demolition of the existing walls and garages
- construction of a new 3-storey residential building

No details of the anticipated column loads were available at the time of compiling this report.

Our investigation has revealed that beneath a significant thickness of made ground [up to 2.20m in the borehole] the London Clay is present to at least 15.0m depth. Spread foundations placed within the London Clay could probably be used for supporting the structural loads, although they will need to be relatively deep and significant support and water control will be required. Piled foundations will present an alternative.

6.1 Spread foundations

Spread foundations must bypass any made ground and be placed within the natural London Clay. On the basis of the borehole, foundation depths of at least 2.20m would be required to bypass any made ground and ensure that the natural soils are exposed, although it must be noted that deeper pockets of fill could be present. It may be also necessary to deepen foundations to take account of existing and future tree growth in accordance with NHBC Standards; this is discussed further below.

The founding stratum will comprise medium becoming high strength clay. As required by EC7, the design engineer must ensure that the correct comparisons are made between Design Actions and Design Resistances after the application of appropriate partial factors and using the final base geometry. For ULS design, both drained and undrained bearing resistances should be determined to calculate the degree of utilisation of the foundation [limit state GEO]. SLS checks should be carried out using appropriate methods in accordance with current practice. For preliminary assessment of the feasibility and sizing of foundations, we envisage that an allowable bearing resistance of 125kN/m^2 would be appropriate for the London Clay at 2.2m and below; this would be applicable to moderate sized strip or pad foundations, say up to 2.5m width.

Within the zones of influence of existing vegetation, precautions will need to be taken with respect to root action. All foundations will need to be designed fully accordance with NHBC Standards [Chapter 4.2, Building near trees'] and deepened as necessary. Based upon our investigation, **medium** and **high** volume change potential classifications should be adopted for the made ground and London Clay respectively to determine the safe foundation depths. For any trees that are not to be removed, mature

tree heights should be assumed when determining the foundation depths. Of particular, but not exclusive, concern should be the Beech and Sycamore trees located around the site and it is possible that the new structure may be affected by these trees.

The foundation excavations will encounter variable made ground which is both cohesive and granular and provision for temporary lateral support will need to be made. On the basis of the borehole monitoring, ground-water inflows should be expected within the excavations. Close trench sheeting, sealed into the London Clay will probably be required to control ground-water inflows. It would be a useful exercise for the groundworks contractor to carry out machine excavated trial pits in advance to determine the likely rate of inflow and the confirm the most appropriate control techniques. As discussed in Section 5.3, continued monitoring of the borehole installation would be advisable.

The excavations will need to be carefully inspected by an experienced foundation engineer to ensure that a competent bearing stratum is exposed. Local deepening should be carried out if obviously desiccated/root-infested clays or soft clay are encountered.

6.2 Piled Foundations

The presence of relatively thick made ground, coupled with shallow ground water may result in some difficulties in forming traditional foundations and therefore piled foundations may be considered as an alternative.

For the ground conditions encountered, either CFA or conventional rotary augered piles could be considered, with the latter type requiring temporary casing sealed into the London Clay. The following table of coefficients may be used for the preliminary determination of the pile resistance.

Shaft adhesion

Stratum	Depth (see note e)	Undrained cohesion (from strength profile)	Ultimate unit shaft adhesion 'q_s'
All soils above London Clay	Above say 2.2m depth	N/A	Ignore
London Clay	2.2m to 15m depth	Increases linearly from 60kN/m^2 at a rate of 7kN/m^2/m	Increases linearly from 30kN/m^2 at a rate of 3.5kN/m^2/m (incorporates α = 0.50)

Notes:

a) Unit shaft adhesion 'q_s' = α x c_u (where α = 0.50 and c_u is the undrained cohesion from the design line)
b) The α value of 0.5 is based upon 102mm diameter triaxial tests and this should not be varied
c) The average shaft adhesion over the pile length should be limited to 110kN/m^2
d) The maximum value for unit shaft adhesion should be limited to 140kN/m^2
e) Depth relates to current ground level at the borehole location – approx +36.15mOD

End bearing

Stratum	Depth (see note c)	Undrained cohesion (from strength profile)	Ultimate unit base resistance 'q_b'
London Clay	Below 10m depth	Increases linearly from 115kN/m^2 at a rate of 7kN/m^2/m	Increases linearly from 1035kN/m^2 at a rate of 60kN/m^2/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) Depth relates to current ground level at the borehole location – approx +36.15mOD

Under EC7 (BS EN 1997-1:2004 and UK National Annex) the limit states GEO and STR must be verified using Design Approach 1, which checks reliability with two different combinations of partial factors. The following partial factors are applicable to bored and CFA piles, to be used in conjunction with a Model Factor of 1.4:

Parameter			Combination 1			Combination 2			
			A1	M1	R1	A2	M1	R4	R4+
Permanent actions (G)	Unfavourable	γ_G	1.35			1.0			
	Favourable	$\gamma_{G,\,fav}$	1.0			1.0			
Variable actions (Q)	Unfavourable	γ_Q	1.5			1.3			
	Favourable	$\gamma_{Q,\,fav}$	0			0			
Material properties (X)		γ_M		1.0			1.0		
Base resistance (R_b)		γ_b			1.0			2.0	1.7
Shaft resistance (R_s)		γ_s			1.0			1.6	1.4
Total resistance (R_t)		γ_t			1.0			2.0	1.7
Tensile resistance ($R_{s,t}$)		$\gamma_{s,t}$			1.0			2.0	1.7

For guidance purposes, indicative pile resistances for CFA/bored piles are as follows, calculated using the above preliminary parameters and partial factors where relevant:

Pile diameter (mm)	Pile toe depth (m bgl)	Compressive Resistance (kN) Combination 1	Combination 2
300	12	190	110
	15	340	205
450	12	330	190
	15	565	335
600	12	500	285
	15	820	480

Notes:

a) Concrete stress should be considered in the final design

b) Pile depth measured from existing ground level at the borehole location – approx 36.15mOD

c) Pile capacities are given as a guide and are not constituted as design recommendations

The design engineer must ensure that the correct comparisons are made between the properly factored Design Actions and Design Resistances. The above pile resistances have incorporated the required partial factors for ULS design but do not incorporate explicit checks on serviceability.

It is noted that groundwater was observed within the standpipe installation within BH1 and that there could be perched groundwater within the made ground. Some modification of the pile parameters or downgrading of the pile capacities may be warranted to mitigate the possible risk of clay softening, although this should be minimal with well-installed CFA piles. If deeper piles are needed required further investigation may be required.

A piling specialist must be consulted at an early stage to confirm the most appropriate pile type and to ultimately provide the final pile design. Due consideration should be given to potential desiccation effects and the designer should use the NHBC guidelines to determine potential depths of desiccation. If pile testing is undertaken it will be possible to apply lower partial factors, resulting in increased pile resistances.

6.3 Ground floor slab

Our investigation encountered a significant thickness of non-engineered made ground and we recommend that fully suspended floor slabs are specified, supported by the main foundations. The slabs should incorporate a suitable void, based on 'High' volume change potential soils to accommodate potential swelling/shrinkage of the underlying clay soils, in accordance with NHBC requirements.

6.4 Foundation concrete

The concentrations of water soluble sulphates [2:1 water/soil extract], measured in selected soil samples varied from 176 mg/l to 3290 mg/l, with near neutral to slightly alkaline pH values [7.6 to 9.3]. The results fall into Site Design Class DS-3 of Table C2 given in BRE Special Digest 1 [2005]. We assess the site as having 'mobile' ground water and this would result in an ACEC Class of AC-3.

Consideration should also be given to the potential oxidation of pyritic soils. Following the procedure recommended in the BRE digest, the amount of oxidisable sulphides is seen to be >0.3% in a number of the samples, suggesting that pyrite is probably present. The characteristic value of Total Potential Sulphate is 3.0%, which equates to Class DS-4 with a resultant classification of ACEC AC-4. If it is deemed unlikely that the foundations will be exposed to disturbed ground which might be vulnerable to oxidation, this more onerous classification may not be required; this must be determined by the designer who should provide the final classification.

7.0 ENVIRONMENTAL APPRAISAL

This appraisal is generally based on the DEFRA/EA publication CLR 11 [Model Procedures for the Management of Contaminated Land, 2004], adopting 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, ie 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 7.6 of this report.

7.1 Environmental setting and context

The site is underlain by the London Clay which has a Bedrock Aquifer Designation of '**Unproductive**'. The site does not lie within a Source Protection Zone. Environment Agency records indicate that there are no borehole or surface abstraction points reported within 500m of the site.

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

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

The Phase 1 Land Quality Assessment has indicated that that site was formerly open fields, before residential construction was undertaken in the 1890s, which was present until the 1970s. Since then, the site has been used for car parking with lock-up garages present along the southern boundary. The surrounding land use has historically been residential and commercial, with works of unknown usage being shown within 100m of the site. No electricity substations have been recorded on site, historically with the nearest located 87m NE although this was not observed during the walkover survey.

The history of residential/commercial usage [both within the site and its vicinity], coupled with the presence of the works of unknown usage, indicates a **Low to Moderate** risk that potential contaminative sources could affect the site.

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 on 8no soil samples that were recovered during the investigation. The testing was for a range of contaminants considered to reflect the potential historical and current site usages.

The results have been assessed where relevant against the DEFRA Soil Guideline Values [SGV] and the LQM/CIEH Suitable 4 Use Level [S4UL] for Human Health Risk Assessment in which LQM/CIEH have derived Generic Assessment Criteria [GACs] from the current CLEA Model [2nd Edition, 2009]. There is no current recommended SGV for Lead contamination and DEFRA Category 4 Screening Levels [C4SLs] have been used to assess the Lead results, together with several other common contaminants. For Extractable/Total Petroleum Hydrocarbons, the results have been compared with the frequently used EA remedial target of 1,000mg/kg. 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.

It is believed that the redevelopment will include 100% of hard cover by the new building and external area. We have therefore used, where relevant, the trigger levels for **residential development with no plant uptake** to assess the results of the contamination testing. Using these criteria the following results are of note:

- **Lead:** elevated concentrations of lead were measured in five samples of made ground, when compared to the C4SL threshold level of 310mg/kg. The desk study has indicated a no data but the typical background concentration of 820mg/kg [BGS urban soil guidance], which was exceeded by three of the samples [BH1@1.4m – 980mg/kg, TP4@0.6m – 1410mg/kg and TP1@1.4m – 5020mg/kg]. There is evidence of demolition rubble and pockets of ash within the made ground which are considered likely to be the source of the lead concentrations measured
- **Petroleum hydrocarbons:** generally low in all samples
- **Polycyclic Aromatic Hydrocarbons:** generally low in all samples
- **Asbestos:** both Chrysotile and Amosite were encountered in the sample from TP1 at 1.4m depth, as microscopic cement fragments and a bundle in the soil sample.

The results indicate localised elevated levels of lead and sulphates. Suspected Asbestos-Containing Materials [ACM] were observed on site in TP4 and ACMs were positively identified in the sample from TP1 at 1.4m depth. We note that buildings [especially those constructed before 2000] are a potential source

of ACM and any made ground, construction or demolition materials on site may also contain ACM. The implications of these results and observations are addressed in the revised site-specific Risk Assessment and Conceptual model below.

It should be noted that whilst our investigation provided relatively good coverage of the site, there may of course be pockets of undetected contamination.

7.4 Ground gas monitoring

Ground gas monitoring within the borehole installation has been undertaken on three occasions [18th and 27th July and 10th August 2017]. Concentrations of carbon dioxide were generally low, with methane very low. Carbon monoxide and hydrogen sulphide not detected but low oxygen levels were recorded on two occasions. One occasion a 9.8l/hr emission rate was recorded.

On the basis of the monitoring carried out to date, a worst-case gas screening value of 0.088l/hr has been calculated, indicates that Characteristic Situation 2 is applicable [as described in CIRIA C665 "Assessing risks posed by hazardous ground gases to buildings", 2007]; appropriate protective measures against ground gas should therefore be incorporated. Further monitoring should be carried out and we would recommend that at least two additional visits are made. The risk level should be revised if required following additional monitoring.

7.5 Disposal of excavated soils

One Waste Acceptance Criteria [WAC] test was undertaken on a sample of made ground and the threshold levels for 'inert' waste landfill were not exceeded. A rigorous hazard assessment of the results was not within the scope of our investigation, but our preliminary conclusion, taking into account the WAC test result and the general contamination testing, is that the made ground will probably classify as 'non-hazardous' industrial waste, with an 'inert' classification for natural soils. The made ground and natural soil should be separated prior to disposal.

Where ACMs are observed within the made ground a more onerous classification is likely and careful sorting/isolation will be required. The elevated levels of lead and sulphates could also affect the waste classification high. We recommend that early consultations are be made with appropriate waste facilities or regulators to confirm the classification for off-site disposal.

7.6 Revised 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	End user and construction workers	▪ Contamination testing indicated elevated lead concentrations [up to 5020 mg/kg] within the made ground, greatly in excess of the BGS normal background concentrations value in urban domains [820 mg/kg] ▪ The new construction will have hardcover over the majority of the site ▪ Where landscaped areas or planting are proposed, a 600mm thick layer of clean, imported topsoil should be placed ▪ Risks to construction workers will be controlled by the use of appropriate PPE - elevated sulphate & lead levels must be addressed in the site H&S plan ▪ The presence of ACM and asbestos fibres should be specifically addressed in the H&S plan ▪ A careful watching brief should be kept during construction and if obvious or suspected contamination is encountered this should be dealt with prescriptively	**LOW** [subject to the mitigation measures and with asbestos risks being adequately addressed in the H&S plan]
Contaminated soil: on-site sources	Migration of contaminated ground water and/or surface run-off through contaminated fill into aquifer	Aquifer and surface water	▪ Contamination testing indicated elevated lead and sulphate levels ▪ However, the site is of low environmental sensitivity, underlain by 'unproductive' strata [London Clay], with no nearby surface water features or abstraction points; the main chalk aquifer is at depth and protected by a thick layer of very low permeability clay ▪ The new construction will have hardcover over the majority of the site	**LOW**

Source / hazard	Pathway	Receptor	Mitigation measures / explanation	Assessed Risk level
Ground gas: on-site and off-site sources	Migration, ingress and accumulation	End-user and buildings	▪ Generally low concentrations of hazardous ground gases were measured, with a significant flow rate during one visit ▪ Based on three monitoring visits, a CIRIA 665 Characteristic Situation 2 has been derived and some gas protection measures will be required ▪ Additional gas monitoring should be undertaken and a minimum of two further visits is recommended ▪ Protection measures against Radon are not required based on the desk study	**LOW** [subject to additional monitoring and incorporation of appropriate gas protection measures]

In conclusion, based upon the information reviewed and the results of the investigation, our assessment is that the risks to potential receptors following appropriate mitigation measures and further gas monitoring is **LOW.** The gas risk should be re-assessed following additional monitoring. The H&S plan should specifically address the localised presence of ACMs and also the elevated concentrations of lead.

It is self-evident that there may be zones of contamination within the site which were not encountered in our exploratory points. A careful watching brief should be kept during construction to ensure that any potentially contaminated soil encountered is disposed of in a safe and controlled manner. Site workers should observe normal hygiene precautions when handling soils and if material suspected of being contaminated is identified during construction, this should be set aside under protective cover and further tests undertaken to verify the nature and levels of contamination present. If contamination is present, a full site re-assessment may be required and a contingency should be in place in this regard.

APPENDIX A

Fieldwork, in-situ testing and monitoring

- Foreword
- Borehole record
- Standard Penetration Test results
- SPT hammer calibration certificates
- Trial pit records
- Ground-water and gas monitoring results

Laboratory testing

- Index property testing
- Plasticity charts
- Unconsolidated undrained triaxial test results [QUT]
- Soluble Sulphate/pH results [QTS Environmental]

Contamination testing [QTS Environmental]

- Contamination Foreword
- General soil suite
- WAC test results

Ground profiles

- Plot of SPT 'N' value and undrained cohesion versus depth

Plans & drawings

- Proposed development plan
- Site Plan

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.

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

Head Office
Chiltern House, Earl Howe Road
Holmer Green, High Wycombe
Buckinghamshire HP15 6QT
t: 01494 712 494
e: mail@soilconsultants.co.uk
w: www.soilconsultants.co.uk

Registered in England No 1814762
VAT No 491 8249 15

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

Site & Location:	**Garages to the south of 27A West End Lane, London NW6 4QJ**	Borehole No:	**BH1**
Client:	**StreetPlot Ltd**	Coordinates: 525485E, 183845N	Sheet 1 of 2
Engineer:	**Pringuer-James Consulting Engineers Ltd**	Ground Level: +36.15mOD	Report No: 10120/MR

Progress & Observations	Samples & Tests Type	Samples & Tests Depth (m)	Field Test Results	Strata Depth (m)	Strata Level (m)	Legend	Strata Descriptions	Backfill / Installation
BH commenced: 13/07/2017							CONCRETE	
	E	0.30		0.30	35.84			
BH diameter: 150mm	B	0.45		0.45	35.70		MADE GROUND: grey brown slightly sandy slightly gravelly silty clay. Gravel is subangular fine to coarse flint and brick with cobbles of breeze block. Occasional pockets of ash.	
	E	0.70						
	B	0.80		0.75	35.40		MADE GROUND: soft to firm brown slightly gravelly silty clay. Gravel is subangular fine to coarse brick, glass and rare clinker. Rare partings of sand.	
	E	1.00						
	U	1.25		1.20	34.94		MADE GROUND: firm locally soft dark grey mottled dark brown slightly gravelly silty clay. Gravel is subangular to rounded fine to coarse flint, brick and clinker.	
	E	1.40						
	D	1.70						
	E	1.80		1.80	34.34		MADE GROUND: dark grey mottled black slightly sandy slightly gravelly clay. Gravel is subangular fine to coarse flint, brick, wood and clinker. Occasional pockets of ash.	
	D	2.00						
	D/S	2.25		2.20	33.94		MADE GROUND: firm to stiff orange brown to brown clay with rare silt. Rare brick fragments.	
	SPT/S	2.25	N=13 N_{60}=15				Stiff fissured brown to orange brown locally mottled blue grey gleying CLAY with rare silt. Rare pockets of selenite crystals. Rare manganese staining.	
	D	3.00						
	E	3.00						
	U	3.25						
	D	4.00					*becoming CLAY to silty CLAY with occasional partings of silt below about 4.10m*	
	D/S	4.25		4.30	31.84			
	SPT/S	4.25	N=17 N_{60}=20				Stiff fissured brown to dark brown silty CLAY with rare partings of silt and sand. Rare to occasional pockets of selenite crystals.	
Standpipe installation to 5.00m	D	5.00						
	U	5.25						
	D	6.00						
	D/S	6.25						
	SPT/S	6.25	N=14 N_{60}=16					
	D	7.00						
Chiselling on Claystone from 7.25m to 7.45m [30 mins]							*claystone from 7.25m to 7.45m*	
	U	7.55						
	D	8.30						
	D/S	8.55						
	SPT/S	8.55	N=22 N_{60}=26					
	D	9.30						
	U	9.55						
				10.00	26.14		Continued on next sheet	

Key: U = Undisturbed B = Bulk D = Small disturbed W = Water ES = glass jar & plastic tub E = glass jar SPT/S = split spoon SPT/C = solid cone PP = Pocket Penetrometer [kg/cm²] HV = Hand Vane [kPa] PID = Photo Ionisation Detector [ppm - Isobutylene Equivalent, PhoCheck Tiger, 10.6eV lamp] * = full SPT penetration not achieved - see summary sheet

Borehole type: Cable Percussion

Remarks: Co-ordinates interpolated from public domain data. Approximate ground levels [mOD] obtained from plan provided by Pringuer-James Consulting Engineers.

Borehole No: **BH1**

Site & Location:	**Garages to the south of 27A West End Lane, London NW6 4QJ**	Borehole No:	**BH1**
Client:	**StreetPlot Ltd**	Coordinates: 525485E, 183845N	Sheet 2 of 2
Engineer:	**Pringuer-James Consulting Engineers Ltd**	Ground Level: +36.15mOD	Report No: 10120/MR

Progress & Observations	Samples & Tests: Type	Samples & Tests: Depth (m)	Field Test Results	Strata: Depth (m)	Strata: Level (m)	Legend	Strata Descriptions	Backfill / Installation
	D	10.30		10.30	25.84		Stiff fissured brown to dark brown silty CLAY with rare partings of silt and sand. Rare to occasional pockets of selenite crystals.	
End of shift: 13/07/2017 BH depth: 11.00m Water depth: Dry Start of shift: 14/07/2017 Water depth: Dry	D/S SPT/S	10.55 10.55	N=24 N60=28				Stiff to very stiff fissured dark grey silty CLAY with rare pockets and partings of silt. Rare shell fragments.	
	D	11.30						
	U	11.55						
	D	12.30						
	D/S SPT/S	12.55 12.55	N=25 N60=29					
	D	13.30						
	U	13.55						
	D	14.30						
BH complete: 14/07/2017 BH depth: 15.00m Water depth: Dry	D/S SPT/S	14.55 14.55	N=27 N60=32					
				15.00	21.14		End of hole at 15.00m	

Key: U = Undisturbed B = Bulk D = Small disturbed W = Water ES = glass jar & plastic tub E = glass jar SPT/S = split spoon SPT/C = solid cone PP = Pocket Penetrometer [kg/cm²] HV = Hand Vane [kPa] PID = Photo Ionisation Detector [ppm - Isobutylene Equivalent, PhoCheck Tiger, 10.6eV lamp] * = full SPT penetration not achieved - see summary sheet

Borehole type: Cable Percussion

Remarks: Co-ordinates interpolated from public domain data. Approximate ground levels [mOD] obtained from plan provided by Pringuer-James Consulting Engineers.

Borehole No: **BH1**

Site & Location	**Garages to the south of 27A West End Lane, London NW6 4QJ**	Report No:	**10120/MR**

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	2.25	S	N = 13 :2 2/ 3 3 3 4	15		1.60	Dry	
	4.25	S	N = 17 :2 2/ 3 4 5 5	20		1.60	Dry	
	6.25	S	N = 14 :2 2/ 2 4 4 4	16		1.60	Dry	
	8.55	S	N = 22 :2 3/ 4 5 6 7	26		1.60	Dry	
	10.55	S	N = 24 :3 3/ 5 5 6 8	28		1.60	Dry	
	12.55	S	N = 25 :3 3/ 5 5 7 8	29		1.60	Dry	
	14.55	S	N = 27 :4 4/ 5 6 8 8	32		1.60	Dry	

Standard Penetration Test : BS EN ISO 22476:2005 Part 3 Hammer Energy Ratio, Er = 70%

* 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

Soil Consultants

Southern Testing
Environmental & Geotechnical

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

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

SPT Hammer Ref:	GEH1
Test Date:	25/02/2017
Report Date:	25/02/2017
File Name:	GEH1.spt
Test Operator:	NPB

Instrumented Rod Data

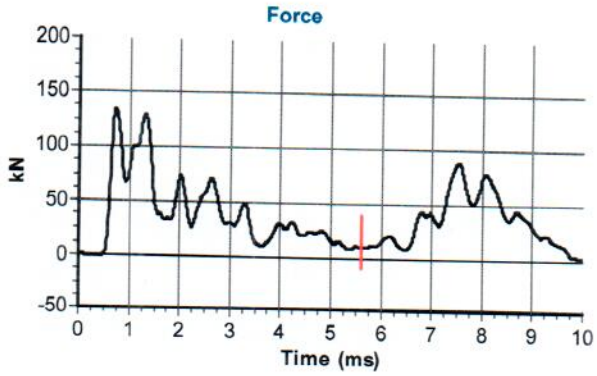
Diameter d_r (mm):	54
Wall Thickness t_r (mm):	6.2
Assumed Modulus E_a (GPa):	208
Accelerometer No.1:	6458
Accelerometer No.2:	9607

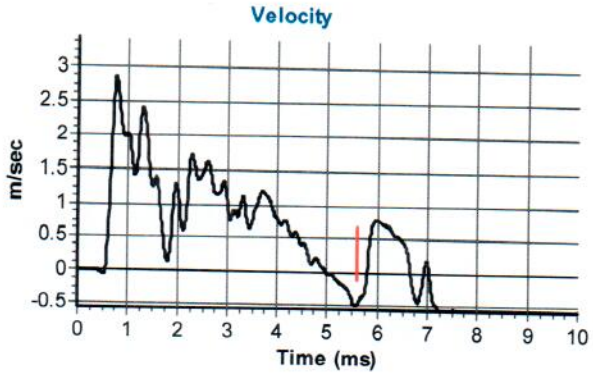
SPT Hammer Information

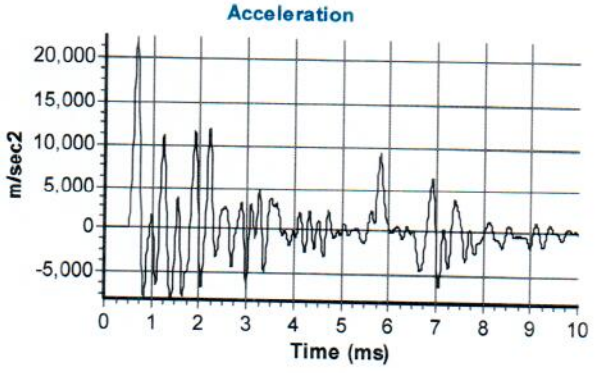
Hammer Mass m (kg):	63.5
Falling Height h (mm):	750
SPT String Length L (m):	14.5

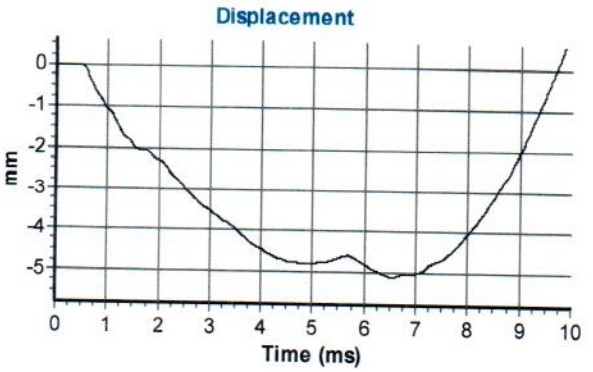
Comments / Location

CHARLWOODS









Calculations

Area of Rod A (mm2):	931
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	332

Energy Ratio E_r (%): **70**

N P Burrows

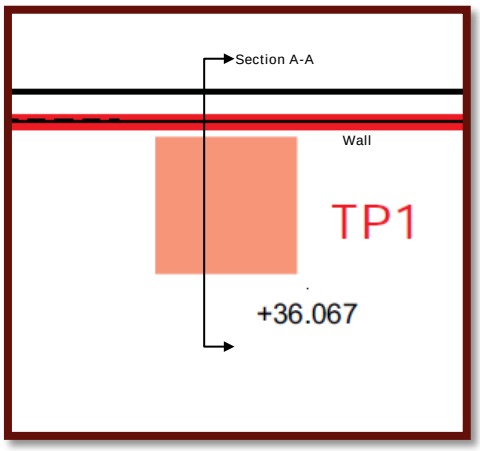
Signed: N P Burrows

Title: Field Operations Manager

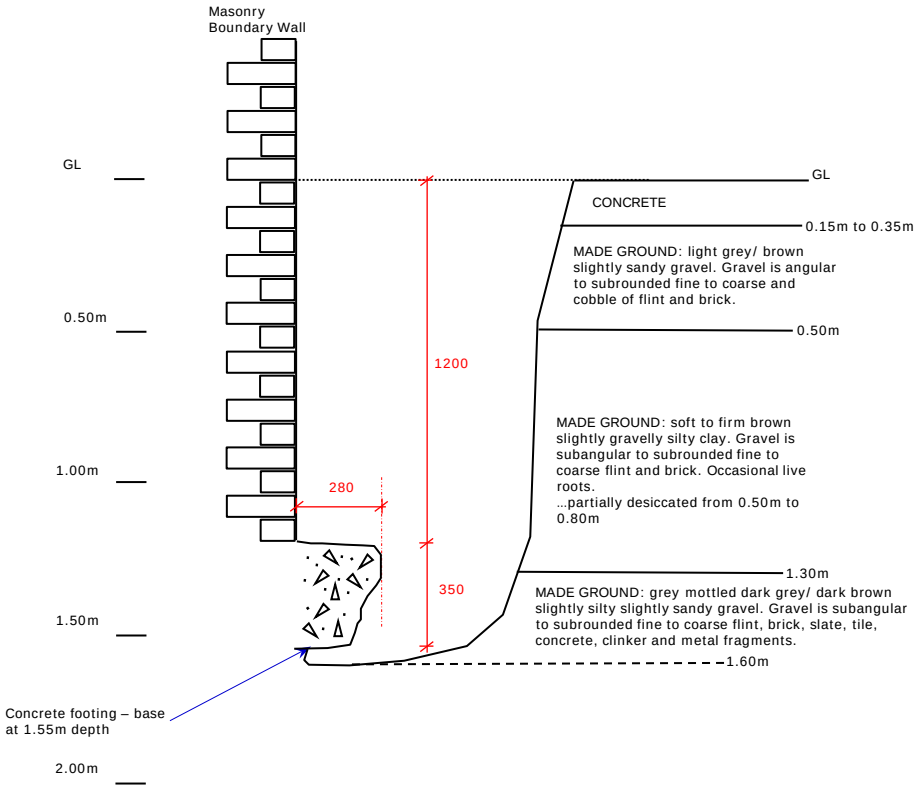
The recommended calibration interval is 12 months

Site & Location	**Garages to the south of 27A West End Lane, London NW6 4QJ**	Trial Pit No: **TP 1** [1 of 2]
Client:	**StreetPlot Ltd**	Report No: **10120/MR**
Engineer:	**Pringuer-James Consulting Engineers Ltd**	

PLAN



SECTION A-A [looking E]



D = small disturbed sample, B = bulk sample, HV = hand shear vane test [kPa], pp = pocket penetrometer [kg/cm²] Scale 1:25@A4 [dimensions in mm]

Date:	13th July 2017 [excavated and logged]	**Groundwater details**	**Samples**	
Equipment:	Hand excavation	• Dry	D	0.60m, 1.00m & 1.40m
Stability:	Stable		E	0.50m & 1.40m
Remarks:			**Logged by**: MR	

Site & Location	Garages to the south of 27A West End Lane, London NW6 4QJ	Trial Pit No: TP 1 [2 of 2]
Client:	StreetPlot Ltd	Report No: 10120/MR
Engineer:	Pringuer-James Consulting Engineers Ltd	

PHOTOGRAPHS

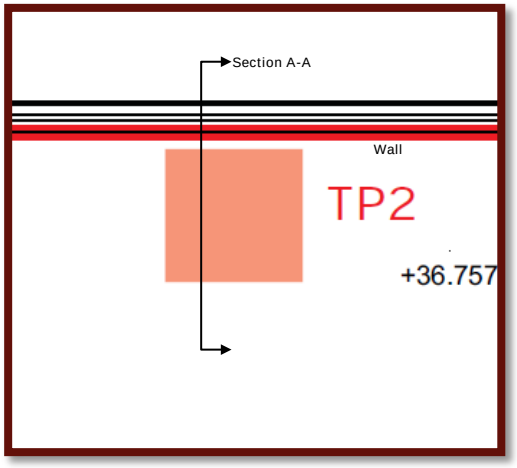
D = small disturbed sample, B = bulk sample, HV = hand shear vane test [kPa], pp = pocket penetrometer [kg/cm^2]

Scale 1:25@A4 [dimensions in mm]

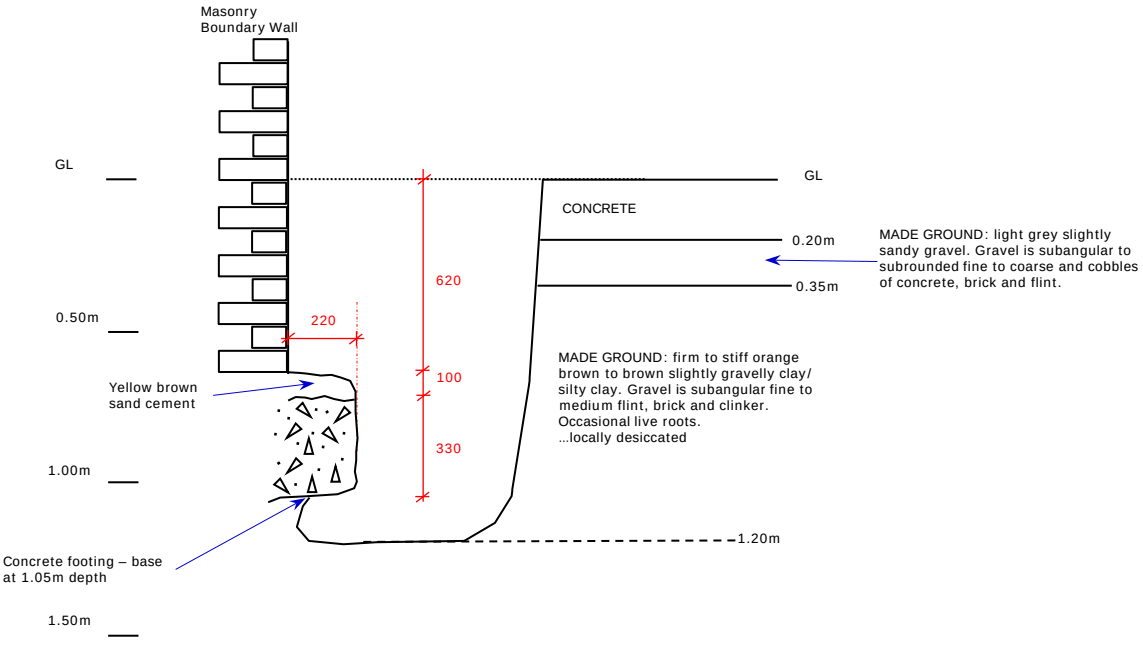
Date:	13th July 2017 [excavated and logged]	Groundwater details	Samples	
Equipment:	Hand excavation	• Dry	D	0.60m, 1.00m & 1.40m
Stability:	Stable		E	0.50m & 1.40m
Remarks:			Logged by: MR	

Site & Location	**Garages to the south of 27A West End Lane, London NW6 4QJ**	Trial Pit No: **TP 2** [1 of 2]
Client:	**StreetPlot Ltd**	Report No: **10120/MR**
Engineer:	**Pringuer-James Consulting Engineers Ltd**	

PLAN



SECTION A-A [looking E]



D = small disturbed sample, B = bulk sample, HV = hand shear vane test [kPa], pp = pocket penetrometer [kg/cm²] Scale 1:25@A4 [dimensions in mm]

Date:	13th July 2017 [excavated and logged]	**Groundwater details**	**Samples**	
Equipment:	Hand excavation	• Dry	D	0.50m, 0.80m & 1.20m
Stability:	Stable		E	0.40m & 0.80m
Remarks:			**Logged by**: MR	

Site & Location	Garages to the south of 27A West End Lane, London NW6 4QJ	Trial Pit No: TP 2 [2 of 2]
Client:	StreetPlot Ltd	Report No: 10120/MR
Engineer:	Pringuer-James Consulting Engineers Ltd	

PHOTOGRAPHS

D = small disturbed sample, B = bulk sample, HV = hand shear vane test [kPa], pp = pocket penetrometer [kg/cm²]

Scale 1:25@A4 [dimensions in mm]

Date:	13th July 2017 [excavated and logged]	Groundwater details	Samples	
Equipment:	Hand excavation	• Dry	D	0.50m, 0.80m & 1.20m
Stability:	Stable		E	0.40m & 0.80m
Remarks:			Logged by: MR	

Soil Consultants

Site & Location	**Garages to the south of 27A West End Lane, London NW6 4QJ**	Trial Pit No	**TP3**
Client	**StreetPlot Ltd**	Report No.	**10120/MR**
Engineer	**Pringuer-James Consulting Engineers Ltd**		

Depth (m)	Strata Description	Samples / Tests		
		Depth (m)	Type	Results
GL to 0.60m	Reinforced CONCRETE			
0.60m to 1.15m	MADE GROUND: firm to stiff dark brown to brown slightly gravelly clay. Gravel is subangular to subrounded fine to coarse flint, brick, concrete and possible clinker. Occasional partings of silt. Occasional live and decaying roots. Rare ash pockets. ...becoming brown below about 0.80m	0.70m 0.80m	E D	
1.15m to 1.25m	MADE GROUND: brown mottled orange brown silty clay with rare brick traces. ...becoming stiff below about 1.20m ...live roots observed to 1.20m	1.20m 1.25m 1.25m	HV E & D HV	130 125

Date of Excavation	14/07/2017	Groundwater	Dry
Equipment	Hand excavated pit	Logged by	MR
Stability	Stable	Checked by	

Remarks
Approximate NGR: 525485E 183830N

Key: D = Disturbed B = Bulk V = Hand Shear Vane Test (kN/m²) P = Pocket Penetrometer (kg/cm^2)

Site & Location	**Garages to the south of 27A West End Lane, London NW6 4QJ**	Trial Pit No	**TP4**
Client	**StreetPlot Ltd**	Report No.	**10120/MR**
Engineer	**Pringuer-James Consulting Engineers Ltd**		

Depth (m)	Strata Description	Samples / Tests		
		Depth (m)	Type	Results
GL to 0.30m	Reinforced CONCRETE			
0.30m to 0.35m	MADE GROUND: reddish brown slightly silty gravel. Gravel is subangular fine to coarse and cobble of brick, concrete, tile, glass and possible ACM.			
0.35m to 0.60m	MADE GROUND: firm to stiff brown slightly gravelly clay/ silty clay. Gravel is subangular fine to coarse flint and brick. Rare decaying and live roots.	0.40m 0.40m	HV D	125
0.60m to 1.15m	MADE GROUND: dark brown/ dark grey slightly gravelly to gravelly silty clay. Gravel is subangular fine to coarse and cobble of flint, brick, concrete, slate, chalk, clinker and possible ACM.	0.60m 0.70m 1.10m	E D E & D	

Date of Excavation	17/07/2017	Groundwater	Dry
Equipment	Hand excavated pit	Logged by	MR
Stability	Stable	Checked by	

Remarks
Approximate NGR: 525490E 183835N
Trial pit terminated at 1.15m due to possible concrete obstruction at the base of the out.

Key: D = Disturbed B = Bulk V = Hand Shear Vane Test (kN/m²) P = Pocket Penetrometer (kg/cm^2)

Site & Location	**Garages to the south of 27A West End Lane, London NW6 4QJ**	Trial Pit No	**TP5**
Client	**StreetPlot Ltd**	Report No.	**10120/MR**
Engineer	**Pringuer-James Consulting Engineers Ltd**		

Depth (m)	Strata Description	Samples / Tests		
		Depth (m)	Type	Results
GL to 0.50m	Reinforced CONCRETE			
0.50m to 0.90m	MADE GROUND: soft to firm orange brown slightly sandy to sandy silty gravelly clay. Gravel is subangular fine to coarse brick, flint and glass.	0.60m 0.60m to 0.80m	E D	
0.90m to 1.30m	MADE GROUND: firm to stiff brown to dark brown mottled dark grey slightly gravelly clay. Gravel is subangular to rounded fine to coarse flint, brick and possible clinker. Occasional partings of silt. Rare pockets of ash. ...live roots observed to about 1.00m	1.00m to 1.20m 1.20m	D E	

Date of Excavation	17/07/2017	Groundwater	Dry
Equipment	Hand excavated pit	Logged by	MR
Stability	Stable	Checked by	

Remarks
Approximate NGR: 525495E 183835N
Trial pit terminated at 1.30m due to digging restrictions.

Key: D = Disturbed B = Bulk V = Hand Shear Vane Test (kN/m²) P = Pocket Penetrometer (kg/cm^2)

.

Site & Location	**Garages to the south of 27A West End Lane, London NW6 4QJ**	Trial Pit No	**TP6**
Client	**StreetPlot Ltd**	Report No.	**10120/MR**
Engineer	**Pringuer-James Consulting Engineers Ltd**		

Depth (m)	Strata Description	Samples / Tests		
		Depth (m)	Type	Results
GL to 0.30m	Reinforced CONCRETE			
0.30m to 0.70m	MADE GROUND: orange brown to brown slightly clayey silty gravelly sand/ very sandy gravel. Gravel is subangular fine to coarse brick, glass and concrete. Rare pockets of ash.	0.40m to 0.70m 0.50m	D E	

Date of Excavation	18/07/2017	Groundwater	Dry
Equipment	Hand excavated pit	Logged by	MR
Stability	Stable	Checked by	

Remarks
Approximate NGR: 525500E 183845N
Trial pit terminated at 0.70m due to boulder sized brick & mortar. Used drill to about 1.20m where obstruction was still present.

Key: D = Disturbed B = Bulk V = Hand Shear Vane Test (kN/m²) P = Pocket Penetrometer (kg/cm^2)

Soil Consultants

Site Location:	**Garages to the south of 27A West End Lane, London NW6 4QJ**	Ref: **10120/MR**

Results of Ground Gas/Groundwater Monitoring

Date:	18 Jul 17	27 Jul 17	10 Aug 17
Time [24hr]:	11:00	16:30	08:00
Barometric pressure:	1008	997	1016
a] Trend [24hrs]:	Falling	Falling	Rising
b] At start [mB]:	1008	997	1016
c] At end [mB]:	1008	997	1016
Recorded by:	MR	LT	LT
Surface ground conditions:	Dry	Dry	Dry
Weather conditions:	Warm, Sunny	Cloudy	Cool
Ambient air temp [^{o}C]:	20	19	13

Monitoring equipment

Instrument: GA2000 Plus MC08/0126/00

Calibration check details: Within monitor tolerance

Next calibration date: October 2017

Notes:

1] Barometric pressure trend and ambient air temperature is recorded from metoffice.gov.uk website on the day of the monitoring visit

2] Calibration check is performed at start of monitoring against ambient air and also periodically with a 5% CH4, 5% CO2 and 6% O2 gas mixture

3] CH4 = methane; CO2 = carbon dioxide; CO = carbon monoxide; O2 = oxygen; H2S = hydrogen sulphide

Results

Date	Time [24hr]	Borehole	GW Depth	Depth to Base	CH4 [%]		CO2 [%]		O2 [%]		Highest [ppm]		Emission Rate	Relative Pressure	PID
			[m]	[m]	Max	Steady	Max	Steady	Min	Steady	CO	H_2S	[l/hr]	[mb]	
18/07/2017	11:00	BH1	Dry	5.00	0	0	0.2	0.2	16.8	16.8	1	0	0.00	0.00	-
27/07/2017	16:30	BH1	2.55	5.00	0	0	0.7	0.7	5.8	5.8	0	0	0.00	0.00	1.0
10/08/2017	08:00	BH1	0.58	5.00	0.1	0.1	0.9	0.9	2.4	2.4	0	0	9.80	-0.26	0.10

SoilConsultants

Site & Location	**Garages to the south of 27A West End Lane, London NW6 4QJ**	Report No:	**10120/MR**

SUMMARY OF CLASSIFICATION TEST RESULTS

BH ID	Depth (m)	Type	w (%)	wL (%)	wP (%)	Pass 425 (%)	IP (%)	Mod IP (%)	IL (%)	LOI (%)	Description
BH1	1.25	U	35	50	25	79.1	25	20	0.40		MADE GROUND: Dark grey mottled black slightly sandy slightly gravelly clay
	3.25	U	29	72	27	>95	45		0.05		Fissured brown / orange brown mottled blue grey CLAY
	5.25	U	31	74	29	>95	45		0.05		Fissured brown to dark brown silty CLAY
	7.55	U	160	78	30	>95	48		2.71		Fissured brown to dark brown silty CLAY
	9.55	U	30	77	31	>95	46		-0.03		Fissured brown to dark brown silty CLAY
	11.55	U	29	82	41	>95	41		-0.30		Fissured dark grey silty CLAY
	13.55	U	27	84	27	>95	57		0.00		Fissured dark grey silty CLAY

Testing in accordance with BS EN ISO 17892 unless specified otherwise

Date: 03 Aug 17

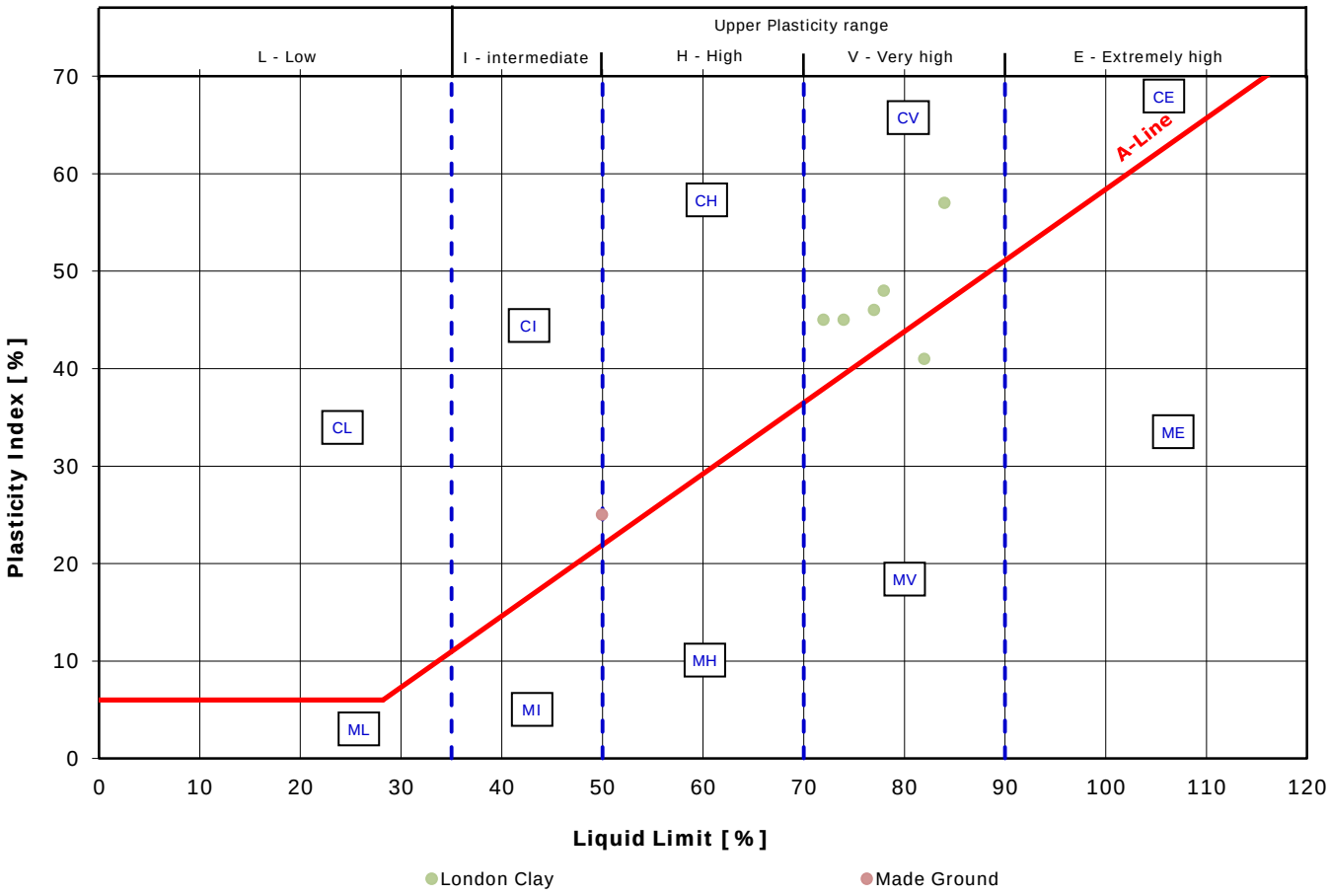
Modified Plasticity Index calculated in accordance with NHBC Standards Chapter 4.2 (reported if %passing 425mm <95%)

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

Soil Consultants

Site & Location	Garages to the south of 27A West End Lane, London NW6 4QJ	Report No:	10120/MR

Plasticity Chart



M - SILT [plots below the A-Line]

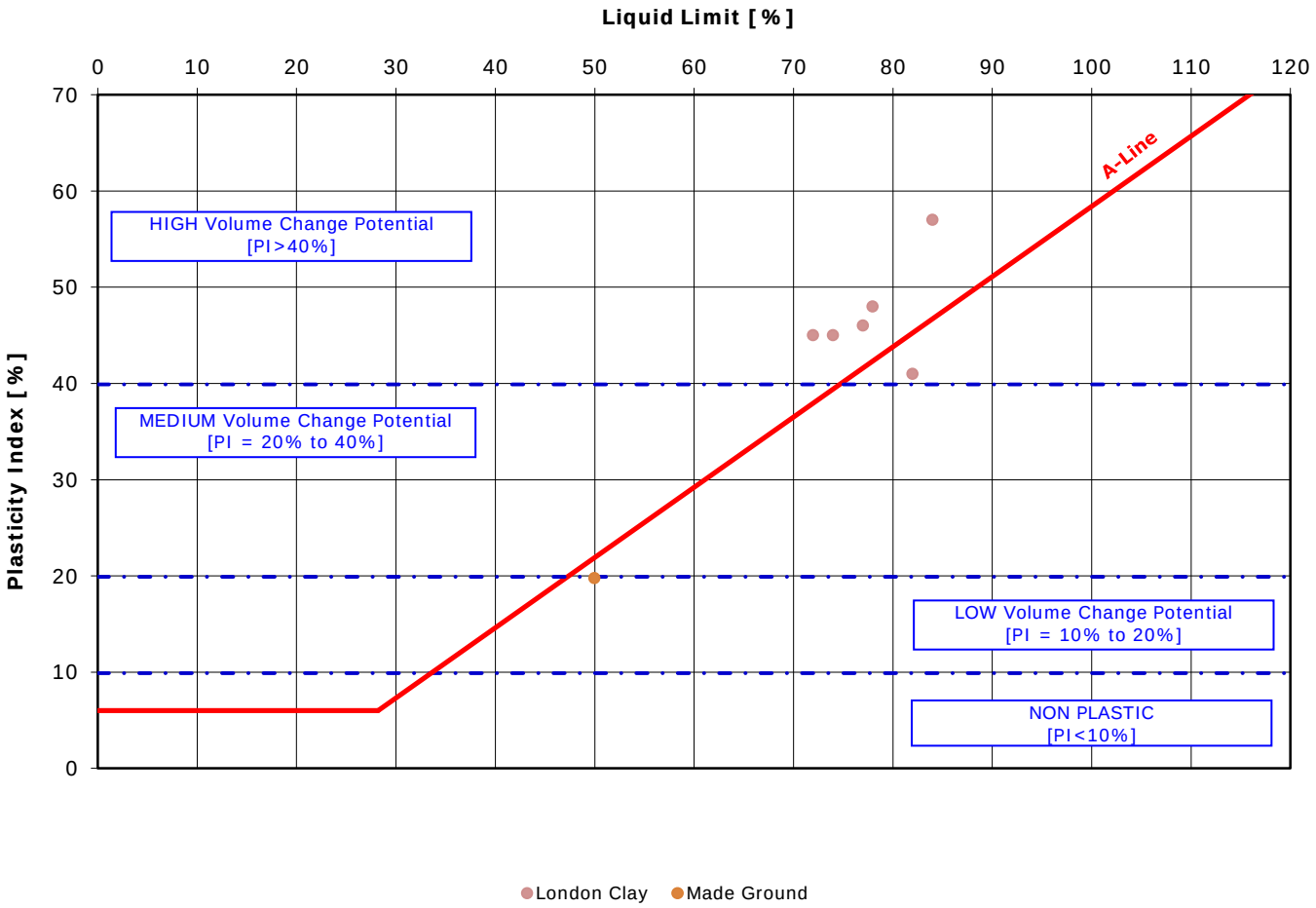
C - CLAY [plots above the A-Line]

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

Soil Consultants

Site & Location	Garages to the south of 27A West End Lane, London NW6 4QJ	Report No:	10120/MR

Plasticity Chart



Modified Plasticity Index, I'p:

$$I'p = \frac{Ip \times (\%\ \text{passing 425mm})}{100\%}$$

[where Ip = Plasticity Index]

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

Soil Consultants

Site / Location	Garages to the south of 27A West End Lane, London NW6 4QJ	Report No:	10120/MR

SUMMARY OF UNDRAINED SHEAR STRENGTH TEST RESULTS

BH ID	Depth [m]	Moisture content [%]	Bulk density [Mg/m^3]	Dry density [Mg/m^3]	Cell pressure [kPa]	$(\sigma_1-\sigma_3)_f$ [kPa]	Failure strain [%]	Failure mode	Undrained cohesion [kPa]	Remarks
BH1	1.25	35	1.81	1.34	60	75	5.00	I	38	
	3.25	29	1.98	1.53	100	169	6.00	B	85	
	5.25	31	1.91	1.46	100	165	7.00	B	83	
	7.55	160	1.96	0.75	160	300	7.00	B	150	
	9.55	30	1.99	1.53	200	282	7.00	B	141	
	11.55	29	1.97	1.53	240	332	7.00	I	166	
	13.55	27	2.05	1.61	280	256	3.00	B	128	

Testing in accordance with BS EN ISO 17892 UU = unconsolidated, undrained; MUU = multistage, unconsolidated, ur Date: 03 August 17

Unless stated otherwise: Rate of strain = 2mm/min, Standard latex membrame used with thickness = 0.5mm

Failure modes: B = brittle, I = intermediate, P = plastic

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.

Matthew Rust
Soil Consultants Ltd
Chiltern House
Earl Howe Road
Holmer Green
High Wycombe
Buckinghamshire
HP15 6QT

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: 17-61645

Site Reference:	27A West End Lane, London, NW6 4QJ
Project / Job Ref:	10120/MR
Order No:	10120/MR
Sample Receipt Date:	17/07/2017
Sample Scheduled Date:	17/07/2017
Report Issue Number:	1
Reporting Date:	24/07/2017

Authorised by:

Kevin Old
Associate Director of Laboratory

Authorised by:

Russell Jarvis
Associate Director of Client Services

QTSE is the trading name of DETS Ltd, company registration number 03705645

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: 17-61645	**Date Sampled**	14/07/17	14/07/17	14/07/17	14/07/17	
Soil Consultants Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	
Site Reference: 27A West End Lane, London, NW6 4QJ	**TP / BH No**	BH1	BH1	TP1	TP2	
Project / Job Ref: 10120/MR	**Additional Refs**	None Supplied	None Supplied	None Supplied	None Supplied	
Order No: 10120/MR	**Depth (m)**	1.00	1.40	1.40	0.40	
Reporting Date: 24/07/2017	**QTSE Sample No**	279874	279875	279876	279877	

Determinand	Unit	RL	Accreditation					
Asbestos Screen [S]	N/a	N/a	**ISO17025**	Not Detected	Not Detected	Detected	Not Detected	
Sample Matrix [S]	Material Type	N/a	NONE			Microscopic cement fragments and bundle in soil		
Asbestos Type [S]	PLM Result	N/a	**ISO17025**			Chrysotile & Amosite		
pH	pH Units	N/a	**MCERTS**	8.6	8.1	8.2	9.1	
Electrical Conductivity	uS/cm	< 5	NONE	288	1070	338	500	
Total Cyanide	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	
Total Sulphate as SO_4	mg/kg	< 200	NONE	1841	5428	3406	2477	
Total Sulphate as SO_4	%	< 0.02	NONE	0.18	0.54	0.34	0.25	
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	**MCERTS**	253	1370	176	772	
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	**MCERTS**	0.25	1.37	0.18	0.77	
Total Sulphur	%	< 0.02	NONE	0.12	0.69	0.13	0.08	
Organic Matter	%	< 0.1	**MCERTS**	1.6	2.3	1.6	0.9	
Arsenic (As)	mg/kg	< 2	**MCERTS**	16	20	20	15	
W/S Boron	mg/kg	< 1	NONE	1.8	2.1	< 1	1.7	
Cadmium (Cd)	mg/kg	< 0.2	**MCERTS**	0.5	0.4	0.7	0.2	
Chromium (Cr)	mg/kg	< 2	**MCERTS**	32	22	28	31	
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	
Copper (Cu)	mg/kg	< 4	**MCERTS**	36	79	56	36	
Lead (Pb)	mg/kg	< 3	**MCERTS**	786	980	5090	706	
Mercury (Hg)	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	
Nickel (Ni)	mg/kg	< 3	**MCERTS**	24	15	15	23	
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3	< 3	< 3	
Zinc (Zn)	mg/kg	< 3	**MCERTS**	233	230	2270	355	
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	
EPH (C10 - C40)	mg/kg	< 6	**MCERTS**	28	52	21	9	

Analytical results are expressed on a dry weight basis where samples are assisted-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

Soil Analysis Certificate - Speciated PAHs						
QTS Environmental Report No: 17-61645	Date Sampled	14/07/17	14/07/17	14/07/17	14/07/17	
Soil Consultants Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	
Site Reference: 27A West End Lane, London, NW6 4QJ	TP / BH No	BH1	BH1	TP1	TP2	
Project / Job Ref: 10120/MR	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	
Order No: 10120/MR	Depth (m)	1.00	1.40	1.40	0.40	
Reporting Date: 24/07/2017	QTSE Sample No	279874	279875	279876	279877	

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	0.80	0.56	0.14	< 0.1	
Anthracene	mg/kg	< 0.1	MCERTS	0.18	0.22	< 0.1	< 0.1	
Fluoranthene	mg/kg	< 0.1	MCERTS	1.70	2.58	0.29	0.14	
Pyrene	mg/kg	< 0.1	MCERTS	1.39	2.14	0.28	0.13	
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	0.67	0.98	0.15	< 0.1	
Chrysene	mg/kg	< 0.1	MCERTS	0.60	0.76	0.14	< 0.1	
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	0.56	0.87	0.18	< 0.1	
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	0.33	0.41	< 0.1	< 0.1	
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	0.57	0.61	< 0.1	< 0.1	
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	0.26	0.34	< 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	0.20	0.30	< 0.1	< 0.1	
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	7.3	9.8	< 1.6	< 1.6	

Analytical results are expressed on a dry weight basis where samples are assisted-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: 17-61645		**Date Sampled**	14/07/17					**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: 27A West End Lane, London, NW6 4QJ		**TP / BH No**	WAC							
Project / Job Ref: 10120/MR		**Additional Refs**	None Supplied							
Order No: 10120/MR		**Depth (m)**	0.50 - 0.70							
Reporting Date: 24/07/2017		**QTSE Sample No**	279878							
Determinand	**Unit**	**MDL**								
TOC[MU]	%	< 0.1	0.3					3%	5%	6%
Loss on Ignition	%	< 0.01	3.20					--	--	10%
BTEX[MU]	mg/kg	< 0.05	< 0.05					6	--	--
Sum of PCBs	mg/kg	< 0.1	< 0.1					1	--	--
Mineral Oil[MU]	mg/kg	< 10	< 10					500	--	--
Total PAH[MU]	mg/kg	< 1.7	< 1.7					100	--	--
pH[MU]	pH Units	N/a	8.6					--	>6	--
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	1.7					--	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]			< 0.02	< 0.02		0.1		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]			0.063	0.019		0.2		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]			0.013	< 0.005		< 0.2		4	50	200
Chloride[U]			13	3		37		800	15000	25000
Fluoride[U]			1.1	0.7		7.5		10	150	500
Sulphate[U]			128	26		315		1000	20000	50000
TDS			243	91		1000		4000	60000	100000
Phenol Index			< 0.01	< 0.01		< 0.5		1	-	-
DOC			11.5	3.7		41.9		500	800	1000
Leach Test Information										
Sample Mass (kg)			0.22							
Dry Matter (%)			78.4							
Moisture (%)			27.6							
Stage 1										
Volume Eluate L2 (litres)			0.30							
Filtered Eluate VE1 (litres)			0.10							

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

Soil Analysis Certificate - Sample Descriptions	
QTS Environmental Report No: 17-61645	
Soil Consultants Ltd	
Site Reference: 27A West End Lane, London, NW6 4QJ	
Project / Job Ref: 10120/MR	
Order No: 10120/MR	
Reporting Date: 24/07/2017	

QTSE Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
279874	BH1	None Supplied	1.00	11.8	Brown sandy clay with stones and concrete
279875	BH1	None Supplied	1.40	14.5	Brown sandy clay with stones and concrete
279876	TP1	None Supplied	1.40	13.2	Brown sandy clay with stones and concrete
279877	TP2	None Supplied	0.40	13.8	Brown sandy clay with stones
279878	WAC	None Supplied	0.50 - 0.70	21.6	Light brown sandy clay with brick

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample I/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: 17-61645
Soil Consultants Ltd
Site Reference: 27A West End Lane, London, NW6 4QJ
Project / Job Ref: 10120/MR
Order No: 10120/MR
Reporting Date: 24/07/2017

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 (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	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 (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10 C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received

Matthew Rust
Soil Consultants Ltd
Chiltern House
Earl Howe Road
Holmer Green
High Wycombe
Buckinghamshire
HP15 6QT

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: 17-62024

Site Reference:	27A West End Lane, London, NW6 4QJ
Project / Job Ref:	10120/MR
Order No:	10120/MR
Sample Receipt Date:	24/07/2017
Sample Scheduled Date:	24/07/2017
Report Issue Number:	1
Reporting Date:	28/07/2017

Authorised by:

Kevin Old
Associate Director of Laboratory

Authorised by:

Russell Jarvis
Associate Director of Client Services

QTSE is the trading name of DETS Ltd, company registration number 03705645

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: 17-62024	**Date Sampled**	19/07/17	19/07/17	19/07/17	19/07/17	19/07/17
Soil Consultants Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: 27A West End Lane, London, NW6 4QJ	**TP / BH No**	TP3	TP4	TP5	TP6	BH1
Project / Job Ref: 10120/MR	**Additional Refs**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 10120/MR	**Depth (m)**	0.70	0.60	0.60 - 0.80	0.50 - 0.70	3.00
Reporting Date: 28/07/2017	**QTSE Sample No**	281379	281380	281381	281382	281383

Determinand	Unit	RL	Accreditation					
Asbestos Screen [S]	N/a	N/a	ISO17025	Not Detected	Not Detected	Not Detected	Not Detected	
pH	pH Units	N/a	MCERTS	8.0	7.9	8.4	9.3	7.7
Electrical Conductivity	uS/cm	< 5	NONE	544	638	717	1040	
Total Cyanide	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	
Total Sulphate as SO_4	mg/kg	< 200	NONE	1602	26720	1744	5843	23750
Total Sulphate as SO_4	%	< 0.02	NONE	0.16	2.67	0.17	0.58	2.38
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	MCERTS	536	1910	1150	1820	3290
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	MCERTS	0.54	1.91	1.15	1.82	3.29
Total Sulphur	%	< 0.02	NONE	0.05	0.86	0.07	0.20	0.74
Organic Matter	%	< 0.1	MCERTS	1.6	2.1	0.8	0.6	
Arsenic (As)	mg/kg	< 2	MCERTS	13	19	15	17	
W/S Boron	mg/kg	< 1	NONE	1.3	1	< 1	< 1	
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	0.6	0.3	0.4	
Chromium (Cr)	mg/kg	< 2	MCERTS	33	30	23	25	
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	
Copper (Cu)	mg/kg	< 4	MCERTS	26	72	34	26	
Lead (Pb)	mg/kg	< 3	MCERTS	128	1410	240	112	
Mercury (Hg)	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	
Nickel (Ni)	mg/kg	< 3	MCERTS	24	25	19	17	
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3	< 3	< 3	
Zinc (Zn)	mg/kg	< 3	MCERTS	107	236	97	87	
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	
EPH (C10 - C40)	mg/kg	< 6	MCERTS	< 6	51	8	< 6	

Analytical results are expressed on a dry weight basis where samples are assisted-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: 17-62024	**Date Sampled**	19/07/17	19/07/17	19/07/17	19/07/17	
Soil Consultants Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	
Site Reference: 27A West End Lane, London, NW6 4QJ	**TP / BH No**	BH1	BH1	BH1	BH1	
Project / Job Ref: 10120/MR	**Additional Refs**	None Supplied	None Supplied	None Supplied	None Supplied	
Order No: 10120/MR	**Depth (m)**	6.00	8.30	11.30	14.30	
Reporting Date: 28/07/2017	**QTSE Sample No**	281384	281385	281386	281387	

Determinand	Unit	RL	Accreditation					
Asbestos Screen [S]	N/a	N/a	ISO17025					
pH	pH Units	N/a	MCERTS	7.6	7.8	8.1	8.3	
Electrical Conductivity	uS/cm	< 5	NONE					
Total Cyanide	mg/kg	< 2	NONE					
Total Sulphate as SO_4	mg/kg	< 200	NONE	35670	3403	2304	1539	
Total Sulphate as SO_4	%	< 0.02	NONE	3.57	0.34	0.23	0.15	
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	MCERTS	2800	2380	1430	807	
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	MCERTS	2.80	2.38	1.43	0.81	
Total Sulphur	%	< 0.02	NONE	1.40	0.12	0.56	0.35	
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 assisted-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

Soil Analysis Certificate - Speciated PAHs						
QTS Environmental Report No: 17-62024	Date Sampled	19/07/17	19/07/17	19/07/17	19/07/17	
Soil Consultants Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	
Site Reference: 27A West End Lane, London, NW6 4QJ	TP / BH No	TP3	TP4	TP5	TP6	
Project / Job Ref: 10120/MR	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	
Order No: 10120/MR	Depth (m)	0.70	0.60	0.60 - 0.80	0.50 - 0.70	
Reporting Date: 28/07/2017	QTSE Sample No	281379	281380	281381	281382	

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	1.37	0.28	0.17	
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	0.32	< 0.1	< 0.1	
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	3.13	0.85	0.29	
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	2.60	0.75	0.25	
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	1.28	0.33	< 0.1	
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	1.39	0.41	0.14	
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	1.49	0.35	< 0.1	
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	0.62	0.19	< 0.1	
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	1.18	0.23	< 0.1	
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	0.71	0.21	< 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	0.58	0.19	< 0.1	
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	14.7	3.8	< 1.6	

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

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

Soil Analysis Certificate - Sample Descriptions	
QTS Environmental Report No: 17-62024	
Soil Consultants Ltd	
Site Reference: 27A West End Lane, London, NW6 4QJ	
Project / Job Ref: 10120/MR	
Order No: 10120/MR	
Reporting Date: 28/07/2017	

QTSE Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
281379	TP3	None Supplied	0.70	17.1	Brown sandy clay
281380	TP4	None Supplied	0.60	16.6	Brown sandy clay with brick
281381	TP5	None Supplied	0.60 - 0.80	14.6	Brown sandy clay with stones
281382	TP6	None Supplied	0.50 - 0.70	17	Brown sandy clay with brick and concrete
281383	BH1	None Supplied	3.00	25.4	Light brown clay
281384	BH1	None Supplied	6.00	15.8	Brown clay
281385	BH1	None Supplied	8.30	15.6	Brown clay
281386	BH1	None Supplied	11.30	15.2	Brown clay
281387	BH1	None Supplied	14.30	14.3	Brown sandy clay

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample I/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

Soil Analysis Certificate - Methodology & Miscellaneous Information

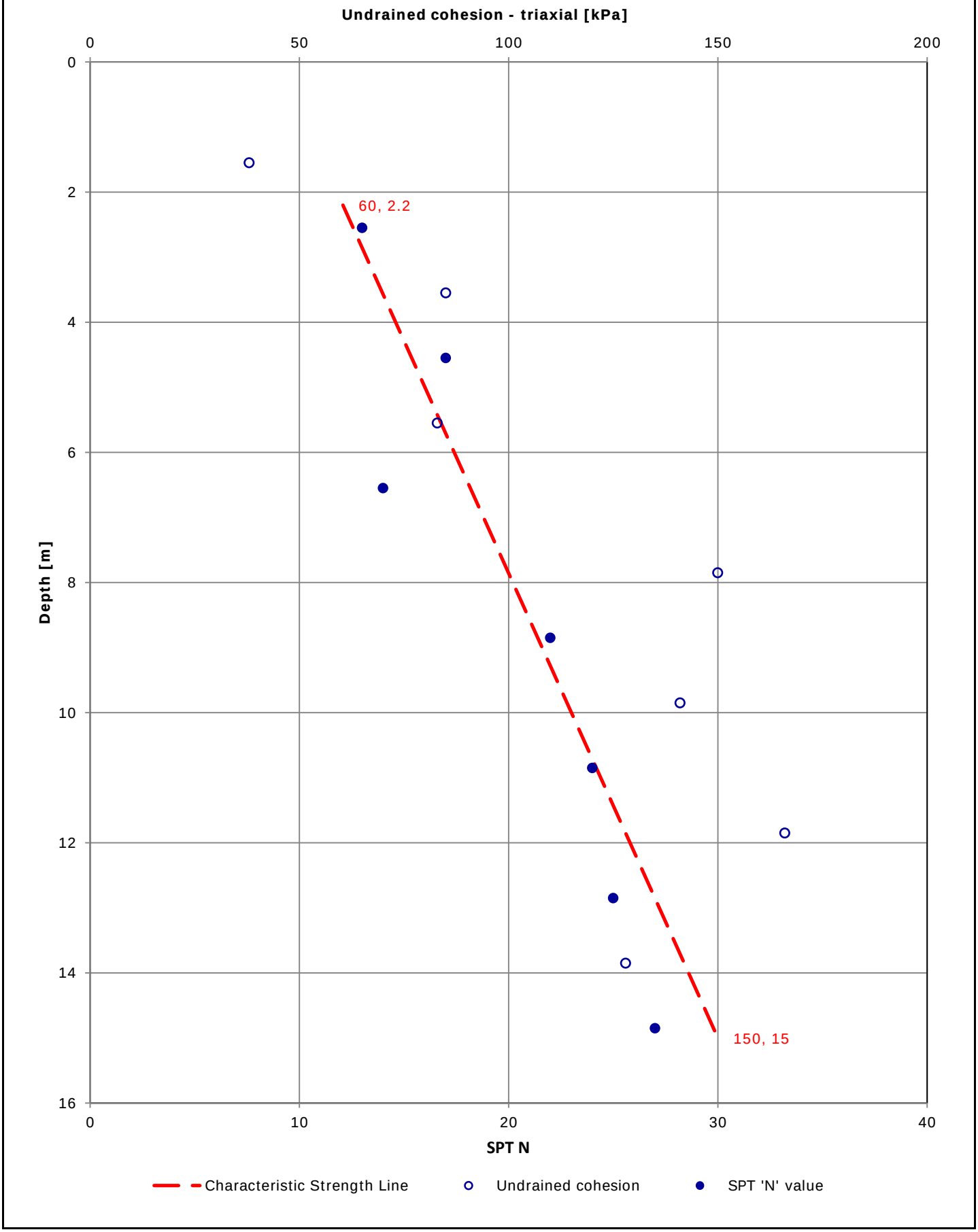
QTS Environmental Report No: 17-62024
Soil Consultants Ltd
Site Reference: 27A West End Lane, London, NW6 4QJ
Project / Job Ref: 10120/MR
Order No: 10120/MR
Reporting Date: 28/07/2017

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 (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	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 (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10 C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received

Site & Location	Garages to the south of 27A West End Lane, London NW6 4QJ	Report No:	10120/MR

Undrained cohesion and SPT [N] vs depth



Δ_{cu} = 7kPa/m

10
MUTRIX ROAD

8
MUTRIX ROAD

Kitchen
(from observation)

6
MUTRIX ROAD

Utility Room
(from observation)

4
MUTRIX ROAD

Kitchen
(from observation)

2
MUTRIX ROAD

Living Area
(from observation)

2
MUTRIX ROAD

+34.588

+34.588

+34.368

+34.368

+33.988

1
202F

202D
BB

PRIVATE (UNUSED) WALKWAY (SYCAMORE COURT)

+35.576

SYCAMORE COURTYARD
LANDSCAPE (ABOVE)

Boundary wall with Sycamore
Court Landscaping

202D
AA

TP1

+36.067

+36.435

TP2

+36.757

+36.145

BH1

Hoarding erected by
Camden Council

EXISTING VACANT
CAR PARK

+36.213

MH Cover

+36.098

+35.990

+35.893

GRID

+36.253

SLOT DRAIN

SLOT DRAIN

SLOT DRAIN

EXISTING ROW OF 8 GARAGES

EXISTING PLANTING

+34.859

+34.789

FALL OF WEST END LANE

+35.038

MH Cover

+35.184

MH Cover

+35.461

FALL OF WEST END LANE

EXISTING SEWER

+35.803

MH Cover

footpath

+35.900

EXISTING SEWER

Telecoms. Junction Box (retained)

+36.255

CC
202E

SYCAMORE
COURT

GF Function Room
(from observation)

+36.972

SYCAMORE COURT
CAR PARK

+36.542

MH Cover

+36.546

DD
202E

WEST END LANE

LEGEND:
? Denotes Dimension Required

Brick Wall

Stepped Brick
Footing

Mass Concrete
footing if Existing

Description of Floor
Structure Required

Description of Soil
Formation required

SCALE
0m 0.5 1 2.5 5

Notes:
1. See typical trial pit section enclosed with specification
2. Making good of surfaces to be done only after consent of SE
3. Minimum area of all trial pits to be 1,00mx1,00m
4. Shoring to be provided as necessary
5. PPI equipment to be worn at all times
6. Contractor to provide method statement for approval before commencement of works

Legend:
TP? - Trial pit location
BH - Borehole lcoation

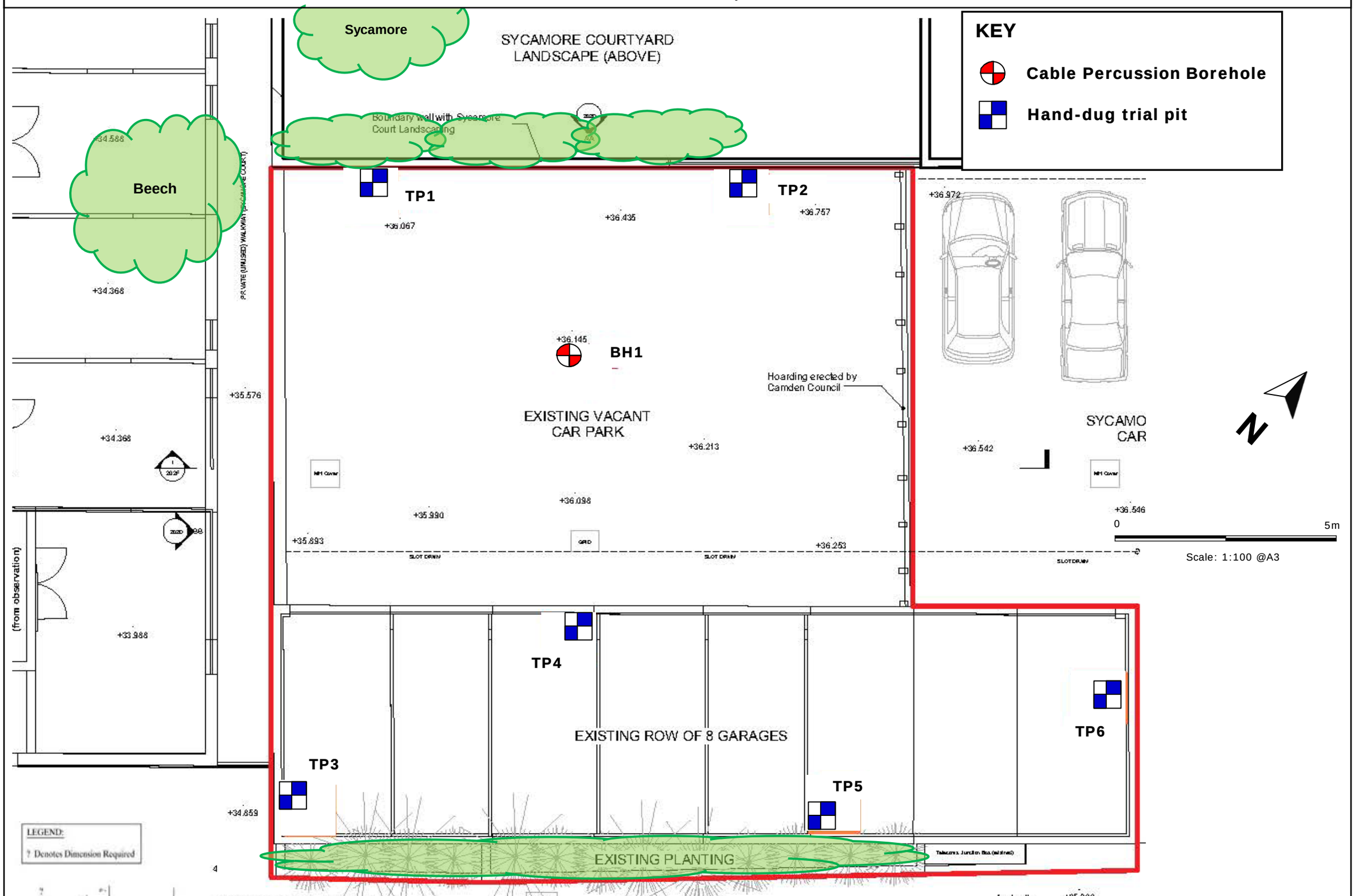
North

Do not scale dimensions.
All dimensions are in millimetres unless noted otherwise.
StreetPlot Ltd. shall be notified in writing of any discrepancies.

Pringuer-James
Consulting Engineers
10 Beulah Road, Wimbledon, London SW19 3SB
Phone - 0208 940 4159 Email - Mail@pjce.com

Site & Location	Garages to the south of 27A West End Lane, London NW6 4QJ	Report No: 10120/MR

Site Location Map

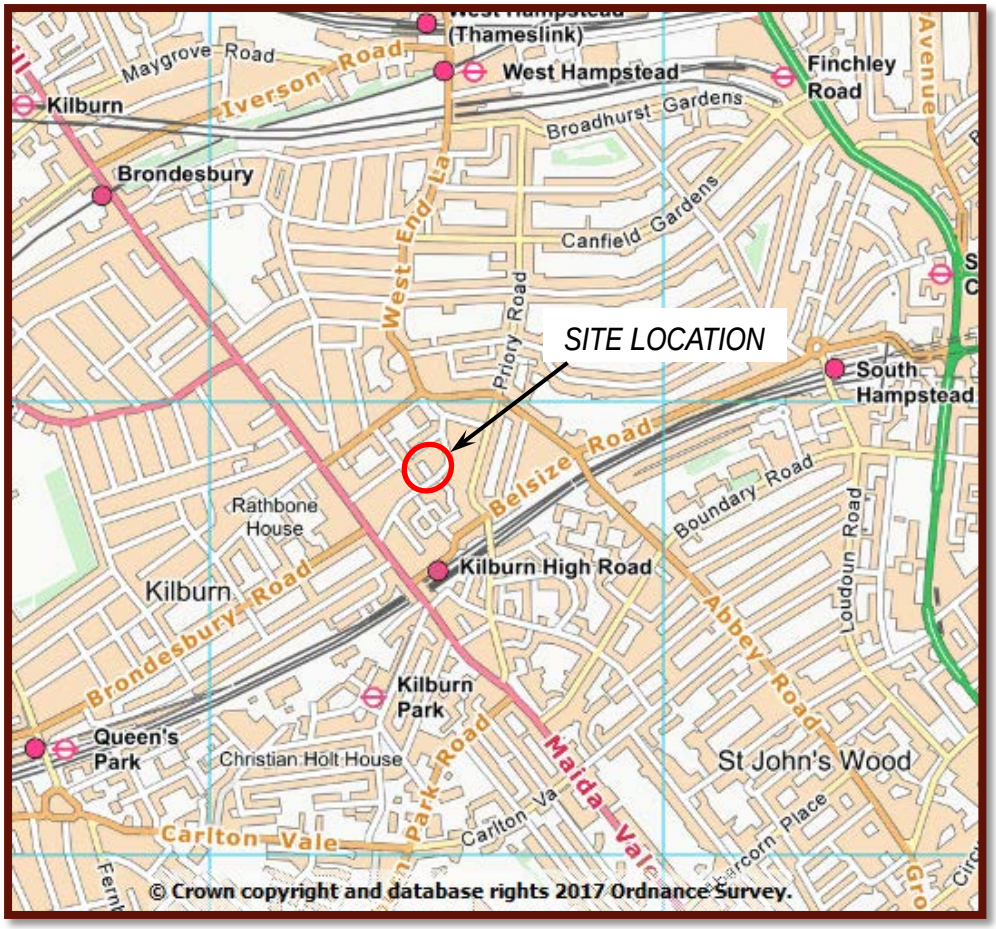


Approx NGR of site 525485E 183845N.

Soil Consultants

Site & Location	Garages to the south of 27A West End Lane, London NW6 4QJ	Report No: 10120/MR

Site Location Map



N

Approx NGR of site 525485E 183845N

Soil Consultants

APPENDIX B

- GroundSure historical maps [Ref SCL-4072312]
- GroundSure EnviroInsight Report [Ref SCL-4072310]
- GroundSure GeoInsight Report [Ref SCL- 4072311]