Land Contamination and Geotechnical Assessment

of

Nos. 1-6 Regent House
Pratt Mews
London
NW1 0AD

for

Hamilton Court Developments

LBH4398 Ver 2.0

March 2016

LBH WEMBLEY

Geotechnical & Environmental

Project No: LBH4398

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Date: 18th March 2016

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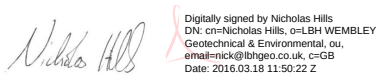

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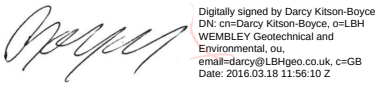

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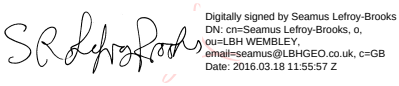

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Foreword-Guidance Notes

GENERAL

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The observations and conclusions described in this report are based solely upon the agreed scope of work. LBH WEMBLEY Geotechnical & Environmental has not performed any observations, investigations, studies or testing not specifically set out in the agreed scope of work and cannot accept any liability for the existence of any condition, the discovery of which would require performance of services beyond the agreed scope of work.

VALIDITY

Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of or reliance upon the report in those circumstances shall be at the client's sole and own risk. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should therefore not be relied upon in the future and any such reliance on the report in the future shall again be at the client's own and sole risk. LBH WEMBLEY Geotechnical & Environmental should in all such altered circumstances be commissioned to review and update this report accordingly.

THIRD PARTY INFORMATION

The report may present an opinion on the disposition, configuration and composition of soils, strata and any contamination within or near the site based upon information received from third parties. However, no liability can be accepted for any inaccuracies or omissions in that information.

DRAWINGS

Any plans or drawings provided in this report are not meant to be an accurate base plan, but are used to present the general relative locations of features on, and surrounding, the site.

1. Introduction

1.1 Background

It is proposed to demolish the existing two storey office building, and construct a new three storey building, with the ground floor being used as offices, with apartments on the two upper floors. A planning application, reference 2013/7739/P, was approved by London Borough of Camden in February 2015 subject to the following condition:

> *"Condition **9***
>
> *At least 28 days before development commences:*
>
> *a) A written programme of ground investigation for the presence of soil and groundwater contamination and landfill gas shall be submitted to and approved by the local planning authority; and*
>
> *b) Following the approval detailed in paragraph (a), an investigation shall be carried out in accordance with the approved programme and the results and a written scheme of remediation measures [if necessary] shall be submitted to and approved by the local planning authority.*
>
> *The remediation measures shall be implemented strictly in accordance with the approved scheme and a written report detailing the remediation shall be submitted to and approved by the local planning authority prior to occupation.*
>
> *Reason: To protect future occupiers of the development from the possible presence of ground contamination arising in connection with the previous industrial/storage use of the site in accordance with policy CS5 of the London Borough of Camden Local Development Framework Core Strategy and policy DP26 of the London Borough of Camden Local Development Framework Development Policies."*

An initial desk-based land contamination assessment by RPS was submitted to the council in June 2013 (ref: HLEL26814 dated 19th June 2013).

A programme of ground investigation was submitted to the local authority contaminated land officer in February 2016.

1.2 Brief

LBH WEMBLEY Geotechnical & Environmental have been appointed to assist the design development of the scheme and to prepare a Land Contamination and Geotechnical Assessment for submission to London Borough of Camden. This report supercedes the previous assessment.

1.3 Report Structure

This report describes the site, its location and topographical setting, and then progresses to a desk study compiled from information obtained from a site inspection, public registers and historical maps. The findings of the recent ground investigation are then reported and discussed.

Following the above an updated land contamination assessment is presented and, finally, consideration is then given to the geotechnical aspects of the development.

2. The Site

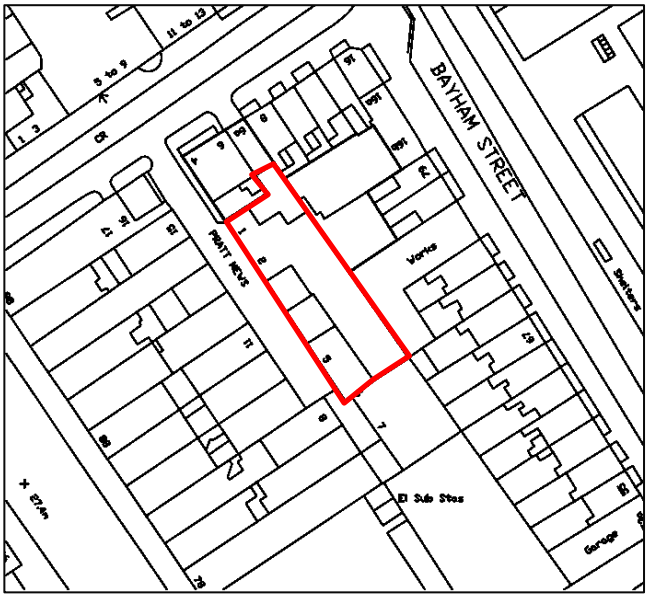
2.1 Site Location

The site is situated on the north eastern side of Pratt Mews, approximately 200m south of Camden Town Station. The site may also be located approximately by postcode NW1 0AD or by National Grid Reference 529075, 183650.

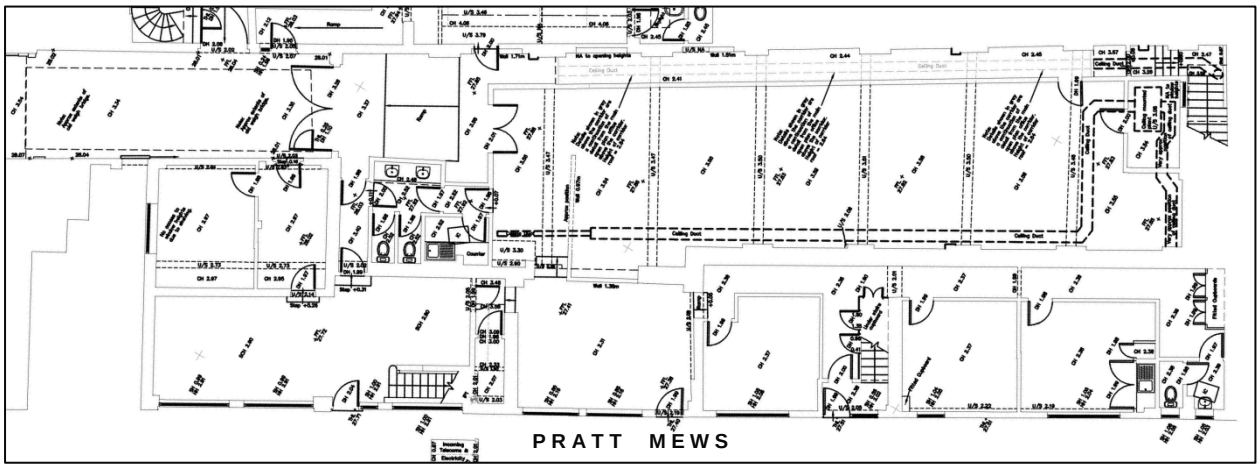
2.2 Site Description

The site comprises Nos. 1-6 Regent House, is roughly rectangular and contains a cluster of now-conjoined two-storey brick buildings that were formerly used as office space and workshops, together with an industrial building to the rear of these.

To the southwest the site fronts onto Pratts Mews and to the northwest is bounded by the yards and rear extensions of mixed use buildings fronting onto Pratt Street. The site is bounded to the northeast by further rear extensions of mixed use buildings fronting onto Bayham Street and to the southeast is bordered by a Jehovah's Witnesses building.



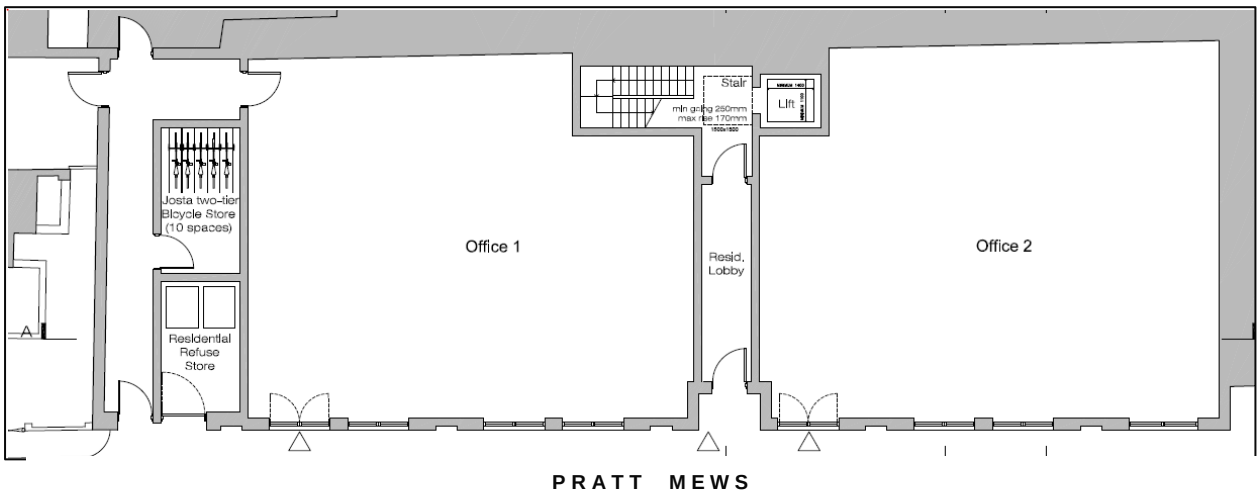
Map extract showing the site location and boundary



Plan extract showing the existing ground floor layout

2.3 Proposed Development

It is proposed to redevelop this site by demolishing the existing two storey buildings and replacing them with a three-storey building. The new building will cover the full site area, with no soft landscaping proposed.

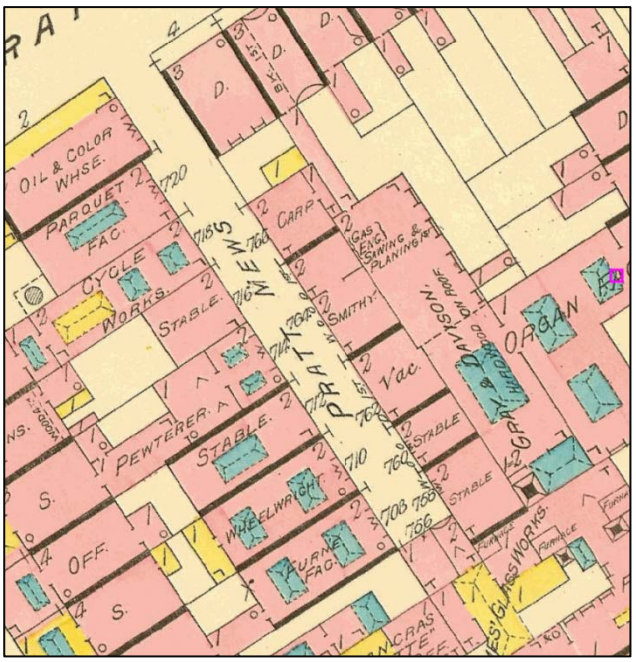


Plan extract showing the proposed ground floor layout

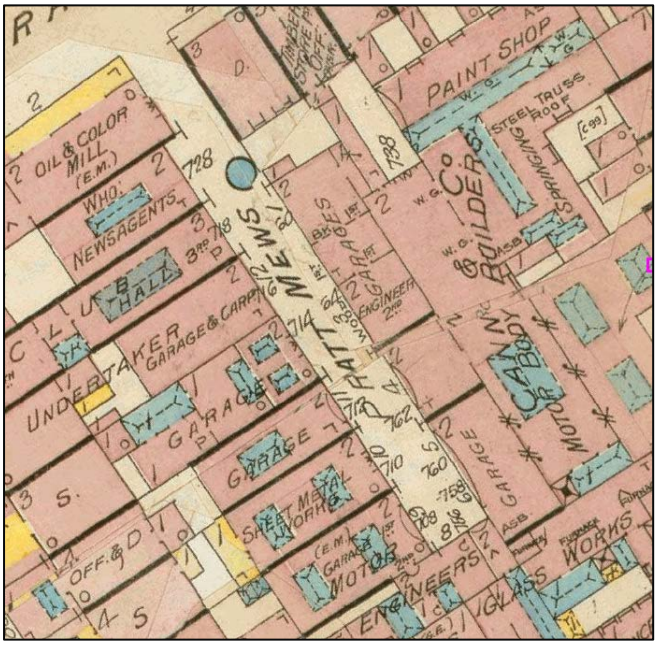
3. Desk Study

3.1 Site History

In the early 19th Century, Pratt Mews and the surrounding roads were laid out, with buildings shown on the site from the late 1830s onwards. By the 1890s the site comprised five buildings directly fronting the Mews (a carpenters, a smithy, a vacant building and two stables) with part of an organ factory running nearly the whole length of the site, with a factory chimney on the southeastern boundary that seems have possibly been originally shared with an adjacent glassworks furnace. At this time the mews was filled with similar small scale industrial buildings including a cycle works, a pewterer, a wheelwright and two small 'factories'.



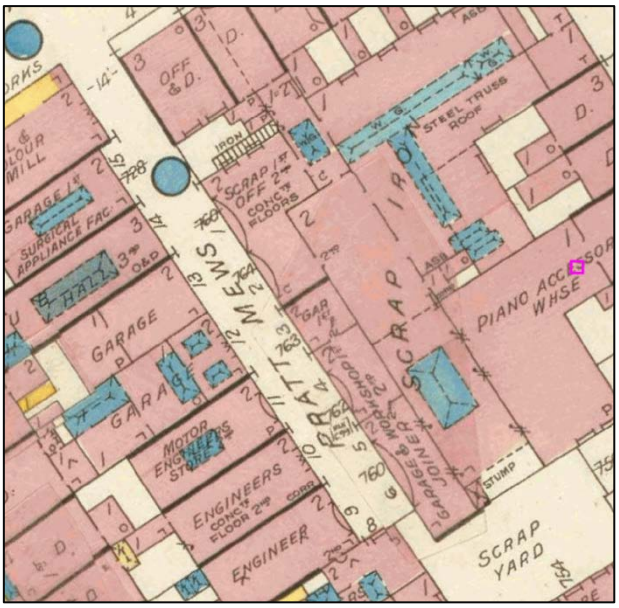
Extract of historic building plan showing Pratt Mews in 1891



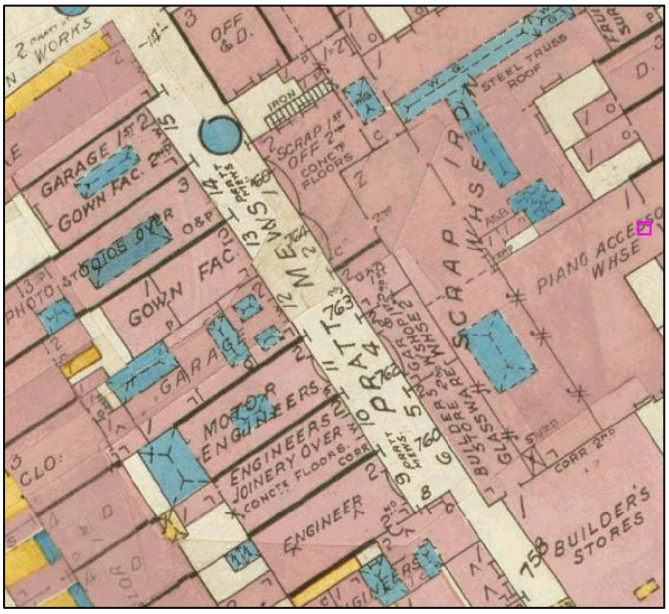
Extract of historic building plan showing Pratt Mews in 1930

By the late 1920s the long section of the organ factory had separated from the Bayham Street section and was in use as a motor body builders. The buildings fronting the mews had combined, with the southern three (formerly vacant and stables) combined into stores for the motor body builders, and the northern two (formerly carpenters and smithy) joined into a smithy & engineers. By 1930 all of the buildings fronting the mews were in use as garages (the southernmost of which had an asbestos roof). The buildings on the opposite side of the mews saw similar changes and by 1930 included a garage, motor engineers and a sheet metal works.

By the 1950s the northern two garages, along with the former motor body builders, were in use as a scrap iron depot, while the remaining garages remained (with a joiner at first floor level). The glassworks was demolished by this time, and the space created was used as a scrap yard. The former chimney was also demolished and only partly remained as a 'stump'.



Extract of historic building plan showing Pratt Mews in 1957



During the 1960s a builder's store was constructed in the former scrap yard. The buildings on the opposite site of the mews remained largely unchanged from the 1930s and included engineers, garages and a gown factory.

Extract of historic building plan showing Pratt Mews in 1966

In 1982 planning permission (Application No. 34311) was granted for the alterations of the existing buildings on the site of the former scrap iron depot to provide offices and warehouse spaces, including new facades to the northern two buildings on the site (Nos. 1 & 2 Pratt Mews). These alterations remain to the present day.

Three of the former garages and workshops on the site (Nos. 4, 5 & 6) were converted to office use (and at one time a secretarial college) along with having new facades added during the 1980s which remain to this day.

No. 3 Pratt Mews appears to have been converted to a similar office use, along with having a new façade to match its neighbours.

At present, the site (now known as Regent's House) is used as office accommodation for an accountancy firm.

3.2 Geological Information

The British Geological Survey (BGS) records indicate that the site is directly underlain by the London Clay.

3.3 Hydrogeological / Hydrological Information

The nearest surface water feature is a now culverted tributary of the River Fleet, the course of which runs approximately 350m to the northeast, crossing Pratt Street at its junction with Royal College Street.

The Environment Agency (EA) classifies the London Clay Formation as Unproductive Strata, defined as *"rock layers or drift deposits with low permeability that has negligible significance for water supply or river base flow"*.

The site is not located within a Groundwater Source Protection Zone and does not appear to be affected by flooding from rivers or reservoirs, although there is a low risk of surface water flooding occurring at the site.

There are no active abstraction permits or discharge consents within 500m of the site.

3.4 Other Environmental Information

Searches have not indicated recorded or historic landfills within 500m of the site.

Five Local Authority Pollution Prevention and Control orders are present within 500m of the site, four of which are dry cleaners, the nearest of which is roughly 200m to the south of the site. Further to these, a petrol station is located 450m to the west.

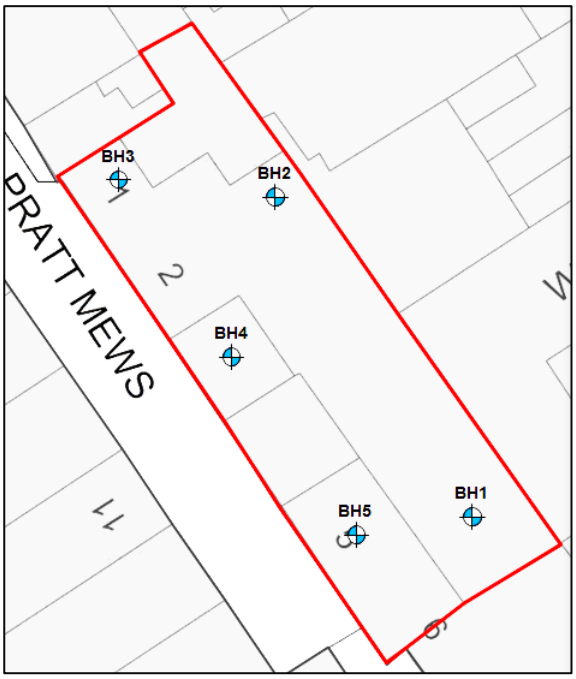
Information provided by the BGS and National Geographic Information Service (NGIS), indicates that the property is located in a lower probability radon area with less than 1% of homes expected to be above the action level. It is further reported that no radon protective measures are necessary in the construction of new dwellings or extensions in this area.

4. Ground Conditions

4.1 Exploratory Work

In early March 2016 an intrusive site investigation, as informally agreed with the Local Authority, was undertaken comprising five boreholes constructed using a modular windowless sampler rig to a maximum depth of 5m, including in-situ Standard Penetration Testing (SPT) within two of the boreholes. Samples were collected from the boreholes for subsequent chemical and geotechnical testing.

The borehole records and test results are included in the Appendices to this report. All OD levels have been interpolated from a survey drawing by Tower Surveys (Ref: R-M3697_203, Rev. A, September 2010).



Plan showing the locations of the five boreholes

4.2 Geology Encountered

The intrusive investigation has confirmed that, beneath a limited thickness of made ground, the London Clay Formation is present.

4.3 Made Ground

Beneath the existing concrete flooring, made ground was found to overlie the natural soils and was encountered to a maximum depth of 1.2m in the boreholes.

The made ground was generally found to comprise dirty brown clayey sandy soil with stones, brick and concrete fragments. It would appear that the ground floor level has been raised in the northwestern end of the site so that beneath the concrete floor slab in BH2, there is a shallow layer of fill resting on a second level of flooring. Abundant broken metal files, such a might have been used in a workshop or smithy, were encountered beneath the upper concrete slab at the BH 2 position.

4.4 London Clay Formation

Directly beneath the made ground, the London Clay Formation was encountered and, while initially soft in the uppermost 0.5m at some positions, the material was generally firm, becoming firm to stiff and stiff, orange-brown and mottled grey silty clay. The London Clay has been shown to extend to some 60m depth in the area.

4.5 Groundwater

No groundwater was encountered during the investigation. It is possible that some high level seepage is present within the made ground, but the underlying London Clay may be considered virtually impermeable.

5. Land Contamination Risk Assessment

5.1 Hazard Identification

The site has had a history of potentially contaminative usage due to use in parts as a smithy, an organ factory, a motor body builders, garages and a scrap metal depot.

5.2 Potential Sources of Contamination

The principal potential sources of contamination at this site include:

- Possible metallic and hydrocarbon contamination resulting from the site's use as a smithy, organ factory, motor body builders and scrap metal depot
- Asbestos containing materials (ACM) relating to previous buildings may have been incorporated into the soil.
- Possible spillage or leakage of fuels and oils associated with the garage usage

No potential gas or groundwater migration issues are considered to affect the site given the virtually impermeable nature of the underlying London Clay that underlies the site at shallow depth.

5.3 Actual Contamination Encountered

No visual or olfactory signs of significant contamination were encountered during the ground investigation, although evidence of demolition materials and metallic fragments was noted within the made ground.

A total of four samples were collected from the made ground across the site for subsequent chemical analysis.

The contamination test results from both investigations have been compared to Category 4 Screening Levels (C4SL) where these are available, otherwise to commonly accepted screening concentrations produced by Land Quality Management Limited (LQM) and the Chartered Institute of Environmental Health (CIEH) (2009, Generic Assessment Criteria for Human Health Risk Assessment (2nd Edition)) and where these are not available then to Environment Agency (EA) Soil Guideline Values (SGVs).

A commercial land use scenario has been considered for the situation of the completed development, and on this basis, in conjunction with the completed site being entirely hard-surfaced, no potentially problematic screening concentrations result.

A Chrysotile asbestos fibres were detected in a sample from BH2 at 0.30m depth, and hence the material used to raise the floor levels in the northeastern section of the building must be regarded as suspected contaminated with Asbestos Containing Materials (ACM).

5.4 Sensitive Receptors

A number of potential sensitive receptors can be identified for the proposed development and these include:

- Construction and demolition workers
- Potential end-users
- Buried services / foundations

5.5 Potential Pathways

A direct pathway to any near-surface contamination would be present for construction workers when the soils are exposed during the foundation groundworks operations.

The site is to be entirely hard-surfaced and no soft landscaping is proposed, hence it is not considered that any pathway exists for end users of the proposed buildings.

Buried services and foundations could be potentially directly affected by the presence of any near-surface contaminated soils.

5.6 Conceptual Model

An initial conceptual model of the envisaged possible contamination has been developed in the form of a source-pathway-receptor pollutant linkage concept. A pollution linkage requires there to be a source of contamination, a sensitive target that can be adversely affected by the contamination and a pathway via which contamination can reach the target.

5.7 Risk Estimation

In order to evaluate the perceived contamination risks at this site the severity of the risk in terms of the magnitude of the potential consequence of the linkage occurring has been compared with the likelihood of the linkage existing. The likelihood and consequence of a problem involving each particular pollutant linkage has been attributed a risk rating as shown in the table below:

RATING	1	2	3	4	5
LIKELIHOOD	Very unlikely	Unlikely	Evens	Probable	Highly probable
CONSEQUENCE	Negligible	Minor minor injury / minimum cost / minor health risk	Mild / Medium chronic health risk / risk of injury / appreciable costs to meet regulatory standards		Severe Death / major injury / explosion / maximum cost

On the basis of this qualitative rating system the various potential pollutant linkages have been attributed a risk ranking on the basis of the value of the product of the likelihood and consequence ratings, where a value of less than five is low, between five and ten is medium and above ten is high. A table estimating the risk associated with the envisaged principal possible pollutant linkages for the site, with regard to the proposed end use, is presented below.

SOURCE	RECEPTOR	PATHWAY	LIKELIHOOD	CONSEQUENCE	RISK RANKING
Possible contamination within near-surface soils resulting from previous usage of site	Construction and demolition workers	Oral ingestion of soil or dust, skin contact or inhalation where soil is exposed during groundworks	3	3	9 (MEDIUM)
	Buried services & foundations	Direct contact	1	2	2
	Controlled Water	Leaching or migration of any mobile contamination	1	2	2 (LOW)
Possible asbestos within near-surface soils	Construction and demolition workers	Inhalation of dust where soil is exposed during groundworks	5	3	15 (HIGH)
	General public	Inhalation of dust where soil is exposed during groundworks	3	3	9 (MEDIUM)

5.8 Risk Evaluation

There is inevitable uncertainty associated with the above assessment. However, it can be stated that those potential pollutant linkages that have been assessed as being of a medium or high risk ranking will normally warrant some degree of further assessment / mitigation / remediation.

5.8.1 Risks to Construction Workers and the General Public

The risks to construction workers may be mitigated through observing strict hygiene and adopting specific working methods. Construction methodology, in the form of risk assessments and method statements for each construction activity, must be prepared to ensure the maintenance of a safe environment and to protect the site workers. to manage the potential human health risks associated with the possible release of contaminants or asbestos fibres from the soil.

It should be stressed that the detected presence of asbestos within the soil does not constitute a risk unless dusty conditions are permitted to develop and a significant amount of fibres become airborne. It must also be noted that asbestos-contaminated soil may adhere to clothing and footwear during wetter conditions and that this must also be dealt with using special precautions for drying. A suitably trained safety advisor must be engaged to provide assistance with the management of the asbestos risk together with specific control measures in accordance with the 2012 Control of Asbestos Regulations.

5.8.2 Unexpected Contamination

Care will need to be taken to identify any unexpected problematic materials that may be revealed during the groundworks phase of the proposed redevelopment. Should any suspicious materials or unexpected contamination be revealed during the course of the redevelopment, then work must be halted and the situation investigated and assessed by a geoenvironmental specialist and notified to the Local Authority environmental health department.

6. **Waste Disposal**

Given the current redevelopment proposals, off-site disposal of all excess soils will be required.

Chemical analysis has indicated that the made ground beneath the site could potentially be classed as Hazardous for waste disposal purposes due to the elevated concentrations of copper, zinc and lead, or due to the possible presence of visible ACM. It is recommended that the advice of a licensed waste carrier be sought in regard to the disposal of this material.

The underlying natural soils may be expected to be Non-Hazardous and, provided that they can be adequately separated from any made ground, it may be possible to dispose of the natural soils to a tip licensed to accept Inert material.

7. Geotechnical Assessment

The proposed development includes the demolition of the existing building and the construction of a new three-storey mixed use building including office use at ground floor level and flats (5 x 2 bedroom and 2 x 3 bedroom) at first and second floor level. No basement spaces are planned.

The results of plasticity index testing have confirmed the London Clay underlying the site to be of high shrinkability.

7.1 Spread Foundations

The new building may be supported by spread foundations placed in suitably stiff natural soils of the London Clay formation, anticipated at a minimum depth of 1.5m below ground level. It is suggested that a provisional net allowable bearing pressure of 150kN/m^2 is adopted for the initial design of new pad or strip foundations at this depth.

7.2 Piled Foundations

Whilst it is anticipated that spread foundations will provide the most practical foundation, the structural loads applied by the building may also be accommodated with a piled foundation solution.

In the absence of specific information from this site, an initial estimate of pile capacity may be obtained on the basis of an empirical strength profile for the London Clay Formation in conjunction with a conservative design approach.

Preliminary graphs of Pile Safe Working Load (SWL) based on Combination 2 ULS GEO are appended for 300mm and 450mm diameter piles. It should be noted that these graphs are based upon an α-value of 0.5, Nc of 9 and conservative geotechnical parameters (for these calculated capacities, a clay strength profile of 50kN/m^2 rising by 7.5kN/m^2 per m depth has been assumed).

The advice of a specialist piling contractor must be sought both in the selection of pile type and to provide a suitable pile design for the proposed scheme.

7.3 Surface Water Drainage

There is no soakage available within the cohesive soils underlying the site and hence surface water will need to be directed off-site.

7.4 Flooring

Outside the zone of influence of trees, a ground-bearing floor slab may be feasible.

7.5 Foundation Concrete

Nearby information suggests the underlying soils to fall within Class DS-1 as defined by BRE Special Digest 1 (2005). The recommendations of that guidance for Class DS-1 sulphate conditions should therefore be followed, assuming an Aggressive Chemical Environment for Concrete (ACEC) site classification of AC-1s for an assumed static groundwater regime. Laboratory testing is currently underway to confirm the situation.

APPENDIX

SITE PLAN SHOWING INVESTIGATION POSITIONS

BOREHOLE LOGS

CONTAMINATION TEST RESULTS

SPT RESULTS

GEOTECHNICAL TEST RESULTS

INITIAL ESTIMATION OF GEO PILE CAPACITIES

PROJECT: 1-6 Regent House, Pratt Mews, London, NW1 0AD
CLIENT: Hamilton Court Developments Limited

LBH4398

SITE PLAN SHOWING EXPLORATORY POSITIONS

KEY:

Existing Building

Site Boundary

Windowless sampler borehole

DO NOT SCALE

PROJECT: Nos. 1-6 Regent House, Pratt Mews, London, NW1 0AD LBH4398

CLIENT: Hamilton Court Developments

BOREHOLE 1

BORING METHOD: Modular Dynamic Window Sampler

Date: 03/03/16

GROUND WATER: No Groundwater Observed

REMARKS: Halted at 3.00m due to lack of ventilation

G.L +27.8 m OD

Samples No	Samples Type	Depth m	Tests	Legend	Depth m	Description
					0.15	MADE GROUND (reinforced concrete over terram)
1	D	0.25				MADE GROUND (dirty brown clayey sand with concrete and brick fragments and scattered gravel)
					0.70	
						Soft brown silty CLAY
2	D	1.00			1.00	
						Firm brown silty CLAY
3	D	1.50			1.50	
						Firm becoming stiff orange-brown silty CLAY
4	D	2.00				
5	D	3.00			3.00	

U=Undisturbed
B= Bulk
D=Disturbed
W=Water

PROJECT: Nos. 1-6 Regent House, Pratt Mews, London, NW1 0AD LBH4398

CLIENT: Hamilton Court Developments

BOREHOLE 2

BORING METHOD: Modular Dynamic Window Sampler

Date: 03/03/16

GROUND WATER: No Groundwater Observed

REMARKS: Refused on secondary layer of reinforced concrete

G.L +28.0 m OD

Samples No	Samples Type	Depth m	Tests	Legend	Depth m	Description
					0.10	MADE GROUND (Reinforced concrete)
					0.20	MADE GROUND (broken metal files and sand sub-base)
1	D	0.30			0.40	MADE GROUND (dirty brown occasionally blueish-green sand with abundant wire fragments, concrete, metal and brick fragments)
						Refused on concrete at 0.4m depth

U=Undisturbed
B= Bulk
D=Disturbed
W=Water

PROJECT: Nos. 1-6 Regent House, Pratt Mews, London, NW1 0AD LBH4398

CLIENT: Hamilton Court Developments

BOREHOLE 3

BORING METHOD: Modular Dynamic Window Sampler

Date: 03/03/16

GROUND WATER: No Groundwater Observed

REMARKS:

G.L +27.7 m OD

Samples No	Samples Type	Depth m	Tests	Legend	Depth m	Description
					0.30	MADE GROUND (reinforced concrete)
					0.80	MADE GROUND (dirty brown clayey sand with concrete and brick fragments and scattered gravel)
1	D	1.00			1.30	Soft becoming firm brown silty CLAY
2	D	2.00				Firm becoming stiff orange-brown silty CLAY
3	D	3.00				...Stiff by 3.0m
4	D	4.00				
5	D	5.00			5.00	

U=Undisturbed
B= Bulk
D=Disturbed
W=Water

PROJECT: Nos. 1-6 Regent House, Pratt Mews, London, NW1 0AD LBH4398

CLIENT: Hamilton Court Developments

BOREHOLE 4

BORING METHOD: Modular Dynamic Window Sampler

Date: 03/03/16

GROUND WATER: No Groundwater Observed

REMARKS:

G.L +27.4 m OD

Samples No	Samples Type	Depth m	Tests	Legend	Depth m	Description
					0.15	MADE GROUND (reinforced concrete)
1	D	0.40			0.50	MADE GROUND (dirty brown sandy clay with burnt wood fragments, brick, concrete and metal fragemts)
					2.00	Firm becoming stiff orange-brown silty CLAY

U=Undisturbed
B= Bulk
D=Disturbed
W=Water

PROJECT: Nos. 1-6 Regent House, Pratt Mews, London, NW1 0AD LBH4398

CLIENT: Hamilton Court Developments

BOREHOLE 5

BORING METHOD: Modular Dynamic Window Sampler

Date: 03/03/16

GROUND WATER: No Groundwater Observed

REMARKS:

G.L +27.4 m OD

Samples No	Samples Type	Depth m	Tests	Legend	Depth m	Description
					0.20	MADE GROUND (reinforced concrete)
1	D	0.30				MADE GROUND (dirty brown clay with burnt wood fragments, brick, concrete and metal fragemts)
						…becoming more brown
					1.20	
						Firm becoming stiff orange-brown silty CLAY
					2.00	

U=Undisturbed
B= Bulk
D=Disturbed
W=Water

Derwentside Environmental Testing Services

Certificate of Analysis

Certificate Number 16-60301

11-Mar-16

Client LBH Wembley
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Buckingham Industrial Park
Buckingham
MK18 1TF

Our Reference 16-60301

Client Reference LBH4398

Order No LBH4398

Contract Title 1-6 Regent House, Pratt Mews, London

Description 5 Soil samples, 2 Leachate samples.

Date Received 07-Mar-16

Date Started 07-Mar-16

Date Completed 11-Mar-16

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the scope of UKAS accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. Observations and interpretations are outside the scope of ISO 17025. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Rob Brown
Business Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 16-60301
Client Ref LBH4398
Contract Title 1-6 Regent House, Pratt Mews, London

			Lab No	954020	954021	954022	954023
			Sample ID	BH1	BH2	BH4	BH5
			Depth	0.25	0.30	0.40	0.30
			Other ID				
			Sample Type	SOIL	SOIL	SOIL	SOIL
			Sampling Date	03/03/16	03/03/16	03/03/16	03/03/16
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Preparation							
Moisture Content	DETSC 1004*	0.1	%	22	10	25	22
Metals							
Arsenic	DETSC 2301#	0.2	mg/kg	17	11	14	13
Boron, Water Soluble	DETSC 2123#	0.2	mg/kg	3.0	1.9	1.4	1.3
Cadmium	DETSC 2301#	0.1	mg/kg	0.8	4.4	0.6	0.5
Chromium	DETSC 2301#	0.15	mg/kg	24	19	32	14
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	42	1300	54	87
Lead	DETSC 2301#	0.3	mg/kg	230	480	180	1100
Mercury	DETSC 2325#	0.05	mg/kg	0.34	0.63	0.61	0.56
Nickel	DETSC 2301#	1	mg/kg	22	51	31	14
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	0.7	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	270	14000	160	350
Inorganics							
pH	DETSC 2008#			9.1	11.5	9.8	9.3
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	0.6	< 0.1	0.6
Cyanide, Free	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Thiocyanate	DETSC 2130#	0.6	mg/kg	< 0.6	< 0.6	< 0.6	< 0.6
Total Organic Carbon	DETSC 2002	0.1	%	0.4	0.7	0.7	2.0
Organic matter	DETSC 2002#	0.1	%	0.7	1.3	1.3	3.4
Sulphide	DETSC 2024#	10	mg/kg	20	28	20	24
Sulphur (free)	DETSC 3049#	0.75	mg/kg	< 0.75	< 0.75	< 0.75	< 0.75
Sulphate as SO4, Total	DETSC 2321#	0.01	%	1.2	0.61	0.10	0.23

Key: * -not accredited. # -MCERTS (accreditation only implied if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 16-60301
Client Ref LBH4398
Contract Title 1-6 Regent House, Pratt Mews, London

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			Other ID				
			Sample Type	SOIL	SOIL	SOIL	SOIL
			Sampling Date	03/03/16	03/03/16	03/03/16	03/03/16
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Petroleum Hydrocarbons							
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	3.2	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	4.0	< 1.4	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
MTBE	DETSC 3321	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01

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Summary of Chemical Analysis
Soil Samples

Our Ref 16-60301
Client Ref LBH4398
Contract Title 1-6 Regent House, Pratt Mews, London

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			Sample ID	BH1	BH2	BH4	BH5
			Depth	0.25	0.30	0.40	0.30
			Other ID				
			Sample Type	SOIL	SOIL	SOIL	SOIL
			Sampling Date	03/03/16	03/03/16	03/03/16	03/03/16
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
PAHs							
Naphthalene	DETSC 3301	0.1	mg/kg	1.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	2.1	< 0.1	< 0.1	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	1.6	< 0.1	< 0.1	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	28	< 0.1	< 0.1	< 0.1
Anthracene	DETSC 3301	0.1	mg/kg	0.9	< 0.1	< 0.1	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	31	< 0.1	< 0.1	< 0.1
Pyrene	DETSC 3301	0.1	mg/kg	25	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	8.9	< 0.1	< 0.1	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	11	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	7.5	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	4.6	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	8.2	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	6.1	< 0.1	< 0.1	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	0.9	< 0.1	< 0.1	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	5.1	< 0.1	< 0.1	< 0.1
PAH Total	DETSC 3301	1.6	mg/kg	140	< 1.6	< 1.6	< 1.6
Phenols							
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3

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Summary of Asbestos Analysis
Soil Samples

Our Ref 16-60301
Client Ref LBH4398
Contract Title 1-6 Regent House, Pratt Mews, London

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
954020	BH1 0.25	SOIL	NAD	none	Colin Patrick
954021	BH2 0.30	SOIL	Chrysotile	small bundle of Chrysotile fibres	Colin Patrick
954022	BH4 0.40	SOIL	NAD	none	Colin Patrick
954023	BH5 0.30	SOIL	NAD	none	Colin Patrick

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * -not included in laboratory scope of accreditation.

WASTE ACCEPTANCE CRITERIA TESTING
ANALYTICAL REPORT

Our Ref 16-60301
Client Ref LBH4398
Contract Title 1-6 Regent House, Pratt Mews, London
Sample Id BH1 1.50

Sample Numbers 954024 954025 954026
Date Analysed 11/03/2016

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values: Inert Waste	SNRHW	Hazardous Waste
DETSC 2084* Total Organic Carbon	%	0.3	3	5	6
DETSC 2003# Loss On Ignition	%	6.1	n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311# TPH (C10 - C40)	mg/kg	< 10	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	< 1.6	100	n/a	n/a
DETSC 2008# pH	pH Units	8.2	n/a	>6	n/a
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	1.5	n/a	TBE	TBE
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1	n/a	TBE	TBE

Test Results On Leachate

Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached mg/kg		WAC Limit Values (Limit values for LS10 Leachate): Inert Waste	SNRHW	Hazardous Waste
	2:1	8:1	LS2	LS10			
DETSC 2306 Arsenic as As	< 0.16	< 0.16	< 0.002	< 0.01	0.5	2	25
DETSC 2306 Barium as Ba	35	21	0.07	0.23	20	100	300
DETSC 2306 Cadmium as Cd	< 0.03	< 0.03	< 0.004	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	0.76	< 0.25	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	0.8	0.8	< 0.004	< 0.02	2	50	100
DETSC 2306 Mercury as Hg	0.01	< 0.01	< 0.0004	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	< 1.1	< 1.1	< 0.02	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	1	1	< 0.02	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	0.09	0.11	< 0.01	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	< 0.17	< 0.17	< 0.01	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	< 0.25	< 0.25	< 0.006	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	1.9	< 1.3	0.004	< 0.01	4	50	200
DETSC 2055 Chloride as Cl	8000	3300	< 20	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	< 100	< 100	< 0.02	< 0.1	10	150	500
DETSC 2055 Sulphate as SO4	17000	13000	34	135.7	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	7600	8300	15.2	82	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
* Dissolved Organic Carbon	4900	5700	< 10	55.9	500	800	1000

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive Hazardous Waste

Additional Information

DETSC 2008 pH	8	8.2
DETSC 2009 Conductivity uS/cm	10.9	11.8
* Temperature*	8.2	8.4

Mass of Sample Kg	0.140
Mass of dry Sample Kg	0.111

Stage 1

Volume of Leachant L2	0.192
Volume of Eluate VE1	0.158

Stage 2

Volume of Leachant L8	0.885
Volume of Eluate VE2	0.83

Disclaimer: The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.

Information in Support of the Analytical Results

Our Ref 16-60301
Client Ref LBH4398
Contract 1-6 Regent House, Pratt Mews, London

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
954020	BH1 0.25 SOIL	03/03/16	GJ 250ml, PT 1L		
954021	BH2 0.30 SOIL	03/03/16	GJ 250ml, PT 1L		
954022	BH4 0.40 SOIL	03/03/16	GJ 250ml, PT 1L		
954023	BH5 0.30 SOIL	03/03/16	PT 1L		Aliphatics/Aromatics, BTEX, Naphthalene, PAH FID
954024	BH1 1.50 SOIL	03/03/16	PT 1L		BTEX, PAH FID, PCB, EPH/TPH
954025	BH1 1.50 LEACHATE	03/03/16	PT 1L		
954026	BH1 1.50 LEACHATE	03/03/16	PT 1L		

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time and/or inappropriate containers are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

PROJECT: Nos. 1-6 Regent House, Pratt Mews, London, NW1 0AD LBH4398

CLIENT: Hamilton Court Developments

SPT RESULTS

Borehole No	Depth at Start of Test (m)	Spoon or Sone	Blow for each successive 75mm penetration						Water Level (m)	Is Hole Blowing?	N Value
1	1.20	S	SW	1		1	1	1	DRY	-	3
	2.00	S	2	2	2	3	2	2	DRY	-	9
	3.00	S	3	3	3	3	4	4	DRY	-	14
3	1.20	S	1	1	1		1	2	DRY	-	4
	2.00	S	2	2	2	2	2	2	DRY	-	8
	3.00	S	2	3	3	4	3	4	DRY	-	14
	4.00	S	3	3	2	4	5	5	DRY	-	16
	5.00	S	4	5	5	4	6	5	DRY	-	20

GroundTech Laboratories

Geotechnical Testing Facility

Slapton Hill Barn, Blakesley Road, Slapton, Towcester, Northants. NN12 8QD

Telephone:- 01327 860947/860060 Fax:- 01327 860430 Email: groundtech@listersgeotechnics.co.uk

PROJECT INFORMATION		SAMPLE INFORMATION		
Site Location:-	1-6 Regents House, Pratts Mews, London, NW1 0AD	**Laboratory Tests Undertaken:-**		
		TEST TYPE	**TEST METHOD**	**TESTED**
		Natural Moisture Contents (MC%)	(BS 1377:Part 2:1990 Clause 3.2)	✓
		Liquid Limits (%)	(BS 1377:Part 2:1990 Clause 4.3)	✓
		Plastic Limits (%)	(BS 1377:Part 2:1990 Clause 5.3)	✓
		Plasticity Index (%)	(BS 1377:Part 2:1990 Clause 5.4)	✓
		Linear Shrinkage (%)	(BS 1377:Part 2:1990 Clause 6.5)	
		PSD - Wet Sieving	(BS 1377:Part 2:1990 Clause 9.2)	
Client Reference:-	-	Engineering Sample Descriptions	(BS 5930 : Section 6)	
		Passing 425/63 (μm)	-	✓
		Hydrometer	(BS 1377:Part 2:1990 Clause 9.5)	
Date Samples Received:-	5th March 2016	Loss on Ignition (%)	-	
Date Testing Completed:-	10th March 2016	Soil Suctions (kPa)	BRE Digest IP 4/93, 1993	
		Bulk Density (Mg/m^3)	(BS 1377:Part 2:1990 Clause 7.2)	
		Strength Tests	(BS 1377:Part 7:1990 Clause 8 & 9)	
		Soluble Sulphate Content (SO^4g/l)	(BS 1377:Part 3:1990 Clause 5.3)	✓
		pH value	(BS 1377:Part 3:1990 Clause 9.4)	✓
		California Bearing Ratios (CBR)	(BS 1377:Part 4:1990 Clause 7)	
		Compaction Tests	(BS 1377:Part 4:1990 Clauses 3.0-3.6)	

The results relate only to the samples tested

Laboratory testing in accord with BS EN ISO/IEC 17025-2000 and Quality Management in accord with ISO 9001

Signed on behalf of GroundTech Laboratories:-_____ **Technical Signatory**

Quality Assured to ISO 9001

GEOTECHNICAL LABORATORY TEST RESULTS

Project Ref: 16.03.004

GroundTech Laboratories

Geotechnical Testing Facility

Slapton Hill Barn, Blakesley Road, Slapton, Towcester, Northants. NN12 8QD
Telephone: 01327 860947/860060 Fax: 01327 860430 Email: groundtech@listersgeotechnics.co.uk

Quality Assured to ISO 9001

SAMPLES				CLASSIFICATION TESTS							CLASSIFICATION TESTS							STRENGTH TESTS					CHEMICAL TESTS	
Test Location	Sample Type	Sample Depth -m	Test Type	MC %	LL %	PL %	PI %	Passing 425 µm %	Modified PI %	Class	Passing 63 µm %	MC/ LL	PL+ 2%	Liquidity Index	Loss on Ignition %	Soil Suction kPa	Bulk Density Mg/m3	Test Type	Cell Pressure kN/m2	Deviator Stress kN/m2	Apparent Cohesion kN/m2	ϕ	pH Value	Soluble Sulphate Content SO4 g/l
BH 1	D	2.00	PI/63	31	65	26	39	100	39	CH	99	0.48	28	0.13									7.0	0.12
	D	3.00	PI/63	33	74	27	47	100	47	CV	99	0.45	29	0.13									7.0	0.13
BH 3	D	1.00	PI/63	37	67	26	41	100	41	CH	98	0.55	28	0.27									7.1	0.13
	D	4.00	PI/63	35	69	28	41	93	38	CH	86	0.51	30	0.17									7.1	0.13

Symbols:

U	Undisturbed Sample	R	Remoulded	PI	Plasticity Index	T	Triaxial Undrained	L	100mm specimen
D	Disturbed Sample	63	Passing 63µm	F	Filter Paper Suction Tests	M	Multistage Triaxial	S	38mm specimen
B	Bulk Sample	H	Hydrometer	CC	Continuous Core	HP	Hand Penetrometer		
W	Water Sample	PSD	Wet Sieving			V	Vane Test		

LABORATORY TEST RESULTS

Project Reference
16.03.004

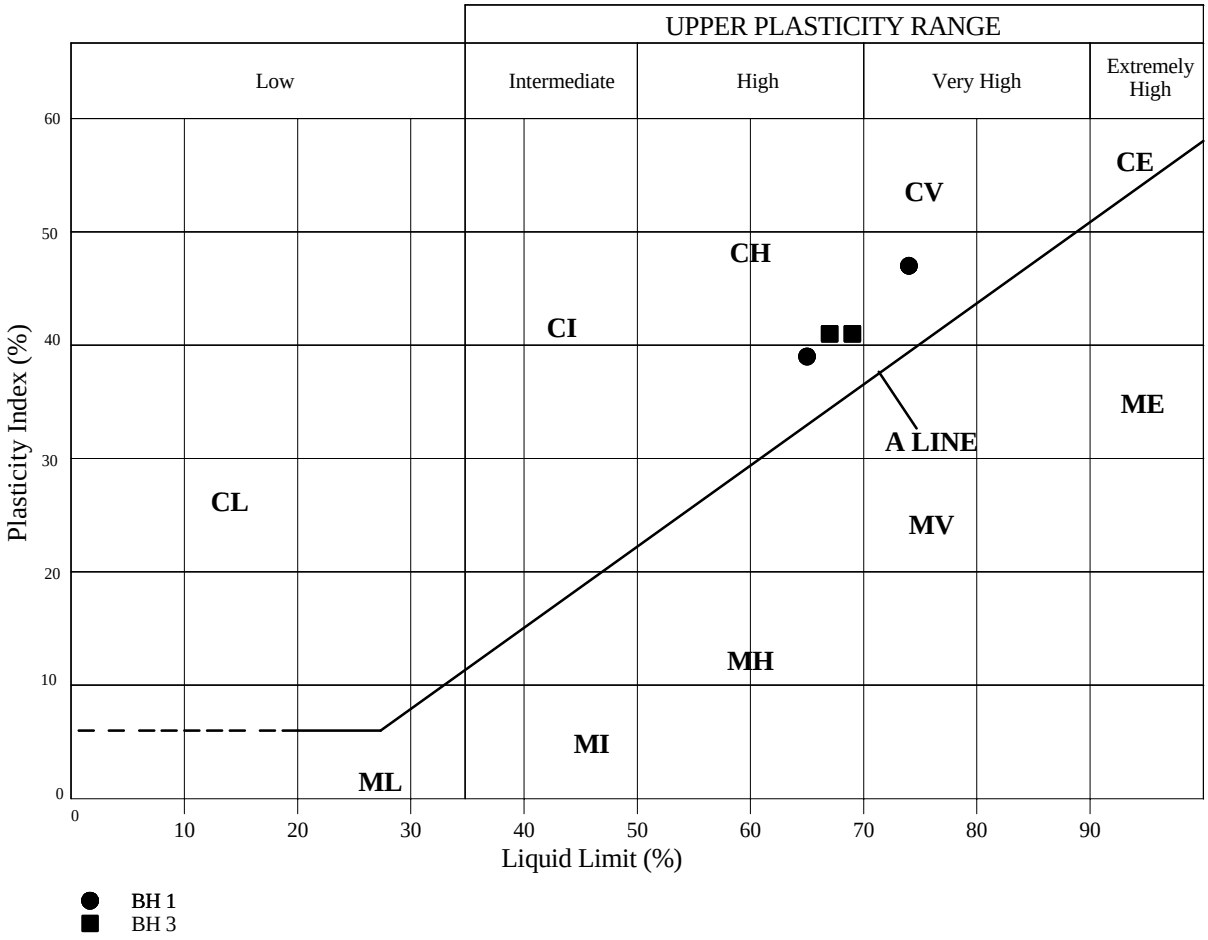
GroundTech Laboratories

Geotechnical Testing Facility

Slapton Hill Barn, Blakesley Road, Slapton, Towcester, Northants. NN12 8QD
Telephone:- 01327 860947/860060 Fax:- 01327 860430

Quality Assured to ISO9001

Site: 1-6 Regents House, Pratts Mews, London, NW1 0AD

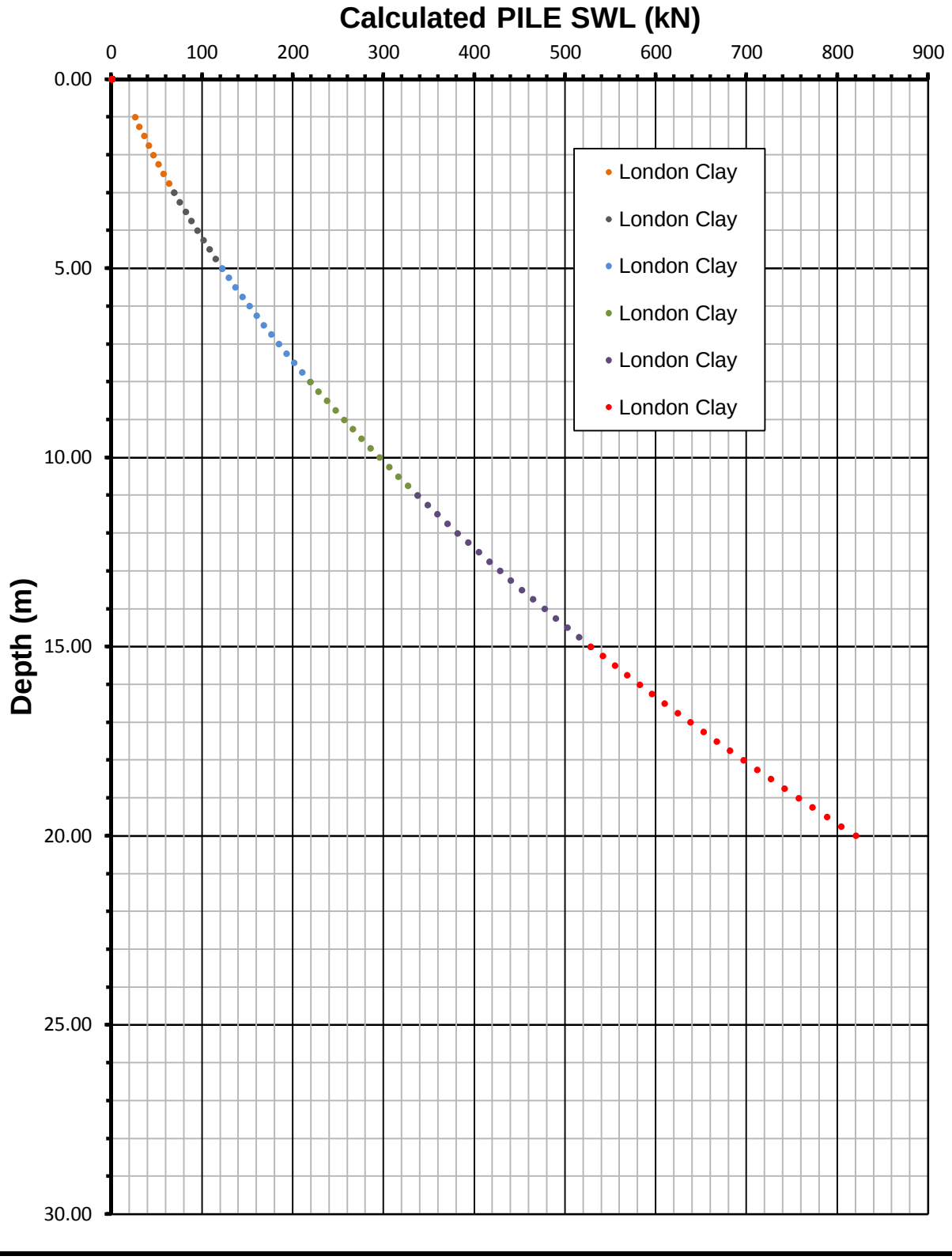


PLASTICITY CHART

Lab. Ref. 16.03.004

PROJECT:	Nos. 1-6 Regent House, Pratt Mews	LBH4398	**450 mm dia. PILE CAPACITY**
CLIENT:	Hamilton Court Developments	08/03/2016	

Combination 2 ULS analysis (GEO loading)



PROJECT:	Nos. 1-6 Regent House, Pratt Mews	LBH4398	**300 mm dia. PILE CAPACITY**
CLIENT:	Hamilton Court Developments	08/03/2016	

Combination 2 ULS analysis (GEO loading)