Panther House and 156-164 Grays Inn Road

Panther House Developments Limited

Contaminated Land Assessment

August 2019

REMEDIATION METHOD STATEMENT

Panther House, 38 Mount Pleasant and
156-164 Gray's Inn Road
London
WC1X 0AN

Client: Panther House Development Limited

16 August 2019

J19225

GEA

Document Control

Project title	*Panther House, 38 Mount Pleasant, and 156-164 Gray's Inn Road, London WC1X 0AN*	**Project No**	J19225
Report title	Remediation Method Statement		
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Report checked and approved for issue by			
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Issue No	Status	Amendment Details	Date	Approved for Issue
1	FINAL		16 August 2019	

This report has been issued by the GEA office indicated below. Any enquiries regarding the report should be directed to the office indicated or to Steve Branch in our Herts office.

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Contents

1.0 INTRODUCTION

Geotechnical and Environmental Associates (GEA) has been commissioned by Eckersley O'Callaghan, on behalf of Panther House Development Limited, to provide a remediation method statement for the redevelopment of this site at Panther House, 38 Mount Pleasant and 156-164 Gray's Inn Road, London WC1X 0AN.

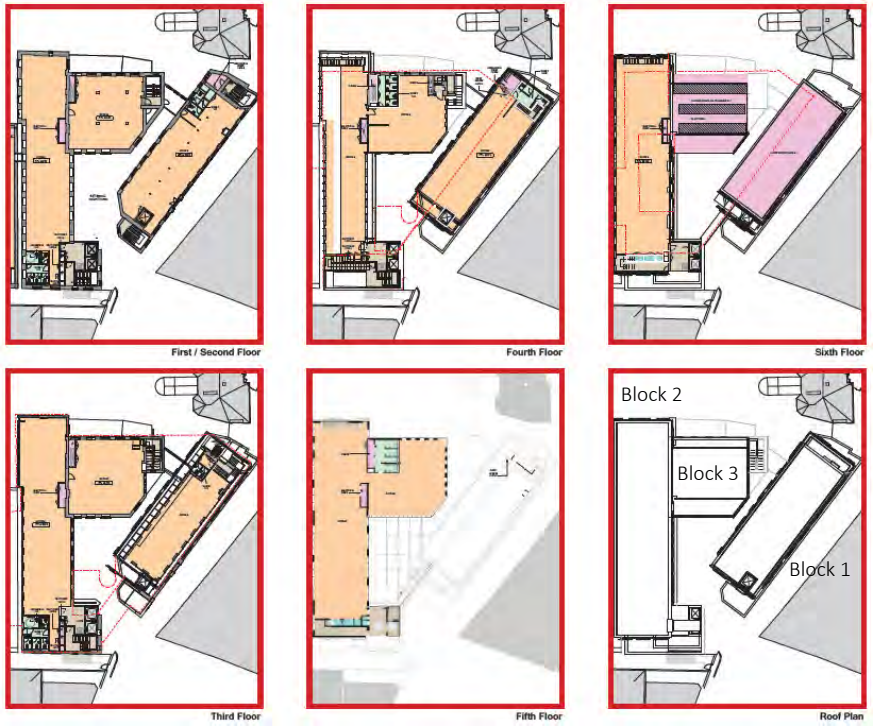
Consideration is being given to redevelopment of Panther House which will comprise, in summary, the following:

- refurbished office space on the third floor in Panther House Blocks 2 and 3 but the existing roof removed and a floor for new office space in Block 1;
- new office space on the fourth floor in Blocks 2 and 3, where the existing roof is removed and a final level of new office space in Block 1;
- new office space on the fifth floor in Blocks 2 and 3 only;
- new office space on the sixth floor in Block 2 only with a new external plant enclosure at the top of the northern Panther House Block 3; and
- no areas of soft landscaping are proposed and the site will continue to be used for commercial purposes only.

The proposed site layout plans for each floor are provided opposite.

Additionally, 156-164 Gray's Inn Road is to be demolished and reconstructed with a seven-storey mixed retail, residential and commercial building.

A Basement Impact Assessment (BIA) has previously been carried out by GEA (report ref J15249 Rep Iss 5, dated May 2018) and included an interpretation of the ground conditions based on a ground investigation report that had previously been carried out by Site Analytical Services (SAS, report ref 15/23911 dated August 2015) and both are referred to in this report where relevant. In addition to the site investigation from SAS, a series of trial pits was completed by GB Geotechnics Ltd (GBG) in June 2016, (ref 4141), also referenced in this report where relevant.



1.1 Limitations

The conclusions and recommendations made in this report are limited to those that can be made on the basis of the investigations carried out. The results of the work should be viewed in the context of the range of data sources consulted, the number of locations where the ground was sampled, and the number of soil, gas or groundwater samples tested; no liability can be accepted for information in other data sources or conditions not revealed by the sampling or testing. Any comments made on the basis of information obtained from the client or other

third parties are given in good faith on the assumption that the information is accurate; no independent validation of such information has been made by GEA.

2.0 THE SITE

The site is located in the London Borough of Camden, 450 m to the northwest of Chancery Lane London Underground station. It is irregular in shape and measures approximately 40 m north-south by 65 m east-west and fronts onto Gray's Inn Road to the west and is bounded to the east by Mount Pleasant and by commercial buildings to the north and south. The site may be additionally located by National Grid Reference 531000, 182070.

The site is understood to be sensibly level and currently occupied by various buildings, ranging from single storeys to six-storeys, understood to be of commercial use. In the east of the site is 38 Mount Pleasant, which includes a single storey basement, which extends to a level of about 15.54 m OD. In the west of the site is 156–164 Gray's Inn Road.

Beneath the existing tramshed of Brain Yard, located in the central part of the site, a partial basement is present, which extends to a level of about 17.70 m OD. The remainder of the site is covered by hardstanding. The site is devoid of vegetation and will remain so as part of the proposed development.

2.1 Site History

At the time of the earliest map studied, dated 1877, the site was occupied by a workhouse. On the 1916 map, a canal works is shown immediately to the south of the site. At some time between 1896 and 1916, the layout of the building along the western frontage appears to have changed and similarly between 1916 and 1953. It is understood that the western part of the site was damaged by World War II bombing. On the 1942 Goad Insurance plan, the site is shown to have been occupied by a motor-generator sub-station, opticians, printers, gown factory and aluminium foil factory. On the 1951 plan, a cinema screen was on site along with a warehouse.

By 1952, an electricity substation is shown in the central part of the site and an optical works in the west. On the 1960 Goad Insurance plan, the cinema screen is shown to have been replaced by a camera repairers and a woodworkers was present on site. By the time of the 1965 map, the optical works is just shown as a works. The eastern side of the site is labelled as a works on the historical maps, until at least 1995.

3.0 GROUND MODEL

The previous desk study research has indicated that the site has had a potentially contaminative history, having been occupied by a workhouse, works, printers, factories, woodworkers and warehouse.

A ground investigation was carried out by SAS in August 2015 which comprised a single rotary percussive borehole, advanced to a depth of 25.00 m, and a single continuous flight auger (cfa) borehole to a depth of 15.00 m. On the basis of the fieldwork, the ground conditions at this site can be characterised as follows:

- beneath a moderate to significant thickness of made ground, River Terrace Deposits are underlain by the London Clay, over the Lambeth Group to the maximum depth investigated of 25.00 m (-4.80 m OD);
- the made ground comprises various amounts of brick, concrete, ceramic pipe and ash and extends to depths of between 0.90 m (14.59 m OD) and 3.10 m (17.10 m OD). It is understood that no visual or olfactory evidence of contamination was observed during the fieldwork;
- the River Terrace Deposits comprise medium dense to very dense brown sandy gravel and extend to depths of 1.80 m (13.69 m OD) and 5.50 m (14.70 m OD);
- the London Clay is reported to initially comprise stiff mottled brown silty sandy clay with occasional gypsum crystals, extending to depths of 2.00 m

(13.49 m OD) and 5.80 m (14.40 m OD). Below this depth stiff or very stiff dark grey silty sandy fissured clay was proved to the full 15.00 m (0.49 m OD) depth of Borehole No 1 and the base of the stratum was proved at a depth of 17.50 m (2.70 m OD) in Borehole No 2;

- three samples of made ground were tested for the presence of contamination as a precautionary measure and no contaminants were elevated. Samples were also screened for the presence of asbestos, but none was detected;
- a seepage was encountered at a depth of 0.90 m (14.49 m OD) at the base of the made ground in Borehole No 1. A water strike was encountered at a depth of 5.50 m (14.70 m OD) in Borehole No 2 at the base of the River Terrace Deposits. A seepage was encountered at a depth of 14.00 m (6.20 m OD) from within the London Clay;
- groundwater has been monitored in standpipes approximately two weeks after the investigation at a depth of 1.77 m (13.72 m OD) in Borehole No 1 and 4.00 m (15.30 m OD) in Borehole No 2 and was subsequently monitored by GEA in February 2016 at a depth of 1.20 m (14.29 m OD) in Borehole No 1, but Borehole No 2 was blocked; and
- trial pits excavated by GBG within the existing buildings were generally found to be free of water however, groundwater was encountered at two locations within the existing basement beneath Panther House, at depths of 0.9 m (14.63 m OD) and 1.34 m (14.18 m OD), and at a depth of 2.30 m (15.39 m OD) within a trial excavation completed from the existing basement beneath Brain Yard.

3.1 Contamination Testing

Whilst no visual and olfactory evidence of contamination was reported to be present in the made ground, three samples were analysed for a range of contaminants as a precautionary measure. The results have been compared to the screening values for a commercial end-use as no areas of soft landscaping are proposed. The table below sets out the values measured within the three samples of made ground tested.

Determinant	BH1: 0.50 m	BH2: 0.50 m	BH1: 0.25 m
pH	10.9	7.9	10
Arsenic	6.5	12	5
Cadmium	<0.2	0.2	<0.2
Chromium	14	21	11
Lead	190	210	52
Mercury	<0.3	<0.3	<1
Copper	43	89	17
Nickel	16	23	8
Zinc	53	99	20
Total Cyanide	<1	<1	<2
Total Phenols	<1.0	<1.0	<2
Total PAH	15.90	<1.60	3.8
Sulphide	17	<1.0	<5
Benzo(a)pyrene	1.5	<0.1	0.34
Naphthalene	<0.05	<0.05	<0.1
TPH (aliphatic c5 to c35)	22	<10	100
TPH (aromatic c5 to c35)	51	<10	184
Total Organic Carbon %	0.4	3.1	2.1

The chemical analyses indicated that no contaminants tested are in excess of their respective Generic Risk-Based Screening Values for a commercial end-use with only slightly elevated concentrations of TPH. Additionally, no asbestos was identified.

4.0 CONCEPTUAL MODEL

The table below sets out the risk pathways that could potentially be present following the redevelopment of the site. This Conceptual Model is based upon the findings of the ground model developed in the light of the investigation findings and highlights areas where remedial work should be considered.

SOURCE	RECEPTOR	PATHWAY	COMMENT
Minor contamination from previous use or in made ground	End users	Direct contact, accidental ingestion or inhalation of soil or soil-derived dust	Any contamination present will be located beneath hardstanding as no areas of soft landscaping are proposed across the entire site areas. End-users will not therefore come into contact with potentially contaminated soils given that hardstanding will cover the site.
	Groundwater	Percolation and leaching of surface run-off in areas of soft landscaping	The secondary 'A' aquifer beneath the site at depth could allow the migration of contaminated groundwater through the shallow soils to surrounding sites, although percolation to the chalk aquifer beneath the site is effectively prevented by the London Clay.
	Adjacent sites	Mobilisation of contaminants to underlying aquifer via leaching	
	Groundworkers and future site workers	Ingestion of contaminated soil or dust, through skin contact or inhalation, although in acute dose the risk posed by the concentrations present is considered to be small	Skin contact with the soil should be minimised through the use of normal high standards of hygiene and provision of appropriate PPE.
	Buried services	Direct contact with soil	Contamination will be isolated from buried services through the use of oversized, clean backfilled trenches or through the use of barrier pipe.

5.0 RISK ASSESSMENT

Contamination testing of samples of made ground did not record any concentrations of contaminants in excess of their respective Generic Risk-Based Screening Values for a commercial end-use with only slightly elevated concentrations of TPH. Additionally, no asbestos was identified.

The exact source of the TPH contamination is unknown but it is likely to have originated from localised leakage of oil from vehicles parked in the area from where the sample was retrieved.

6.0 REMEDIAL OBJECTIVES

Based on the above risk assessment the following remedial objectives have been established for this development;

- to break the potential chronic human exposure pathways to the contaminated soil in areas that are not to be covered by hard structures and pavements; and
- to protect ground workers who will be exposed to the soil.

Good construction practice and health and safety procedures will be adhered to at all times. In particular, the specific requirements of Health and Safety Executive (HSE) guidance[1] and the COSHH[2] guidance must be followed in addition to the current Building Regulations. Guidelines prepared by CIRIA[3] should also be taken into account.

[1] HSE 1992 HS(G)66 – *Protection of workers and the public during the development of contaminated land* HMSO

[2] HSE 1998 – *Code of practice for the Control of Substances Hazardous to Health and Control of Carcinogenic Substances 2nd Edition*

[3] CIRIA Report 132 – *A Guide for Safe Working on Contaminated Sites*

The HSE document sets out the approach to be adopted and the aspects that must be considered under the COSHH Regulations, including an assessment of the risks to health of both employees and the general public and identification of the means by which any risks may be controlled.

7.0 REMEDIAL RECOMMENDATIONS

The site investigation and risk assessment have identified potential risks to commercial end users such that remedial measures are unlikely to be required due to the relatively low sensitivity of the receptors, the low concentrations of contaminants identified across the site and the fact the site is to be completely covered with hardstanding. However, given the potentially contaminative history of the site, it would be prudent to inform site workers of the potential for contamination and maintain a watching brief as detailed below.

7.1 Site Workers

Site workers will be made aware of the potential for contamination in the soils and a programme of working will be identified to protect workers handling any soil. The method of site working will be in accordance with guidelines set out by HSE and CIRIA. Washing facilities will be provided and site workers will be encouraged to wash prior to eating and to use appropriate PPE when on-site to minimise skin contact with the soil.

A watching brief should be maintained and if any suspicious soils or suspected asbestos-containing materials are encountered, provision should be made for the inspection of the suspect soils by the geoenvironmental engineer, with a view to determining the requirement for additional remedial works.

7.1.1 Discovery Strategy and Watching Brief

A Discovery Strategy will be available on-site in order to define the process to be undertaken on-site in the event that previously unidentified pockets of contamination or suspicious material are discovered during the redevelopment of the site. It is intended to be understood and followed by all on-site workers

and for all new site workers to be made aware of the procedure during a site briefing, and sets out the actions that must be taken if suspicious soils are encountered.

It is the responsibility of the site manager to ensure watching briefs are kept, which should include a record of any observations of contamination noted by a member of staff on site and photographic evidence. A photographic record of key stages of development is also required.

The Discovery Strategy should be displayed in the site office, along with the contact names and numbers of the geoenvironmental engineer, so that contact can easily be made if any suspicious substances are encountered. Provision should be made for the inspection of any suspect soils by the geoenvironmental engineer with a view to determining the requirement for additional remedial works. In the event of identifying significant contamination that was not previously identified the remediation strategy will be reviewed and details submitted to the Local Authority for approval.

At the end of the construction phase, an account of any suspected materials will be provided along with details of how the remediation strategy was altered. If no suspicious material is identified then a nominated member of the site personnel will provide a written statement to the effect to be included within the remediation verification report.

7.1.2 Site Briefing

Site workers should be made aware of the possible presence of contamination and a programme of working should be identified to protect workers handling any soil or groundwater and the method of site working should be in accordance with HSE guidelines and the requirements of the Local Authority. Such requirements are likely to include that all site workers are protected from skin contact with any soil, and eating, drinking and smoking on site should be strictly confined to clean areas. Guidelines prepared by CIRIA should also be taken into account.

7.2 Waste Classification

Waste classification is detailed in the final ground investigation report, although a summary is provided here. Additional testing may be required to confirm the waste classification. Any made ground found to be impacted with hydrocarbons is likely to be classified as hazardous waste and should be kept separate from non-contaminated soil so that all spoil can be disposed of correctly.

If fragments of asbestos-containing material (ACM) are present, the waste is Mixed Waste and is Hazardous unless separated.

The results from the ground investigation should be used to help define the sampling plan for such further testing, which could include WAC leaching tests where the totals analysis indicates the soil to be a hazardous waste or inert waste from a contaminated site. It should, however, be noted that the Environment Agency guidance WM3 states that landfill WAC analysis, specifically leaching test results, must not be used for waste classification purposes. WAC (Waste Acceptance Criteria) testing is only applicable to landfill acceptance and does not give an indication as to whether a waste may be hazardous or non-hazardous.

8.0 VALIDATION OF REMEDIAL MEASURES

As no remedial measures are proposed, there is no requirement for validation or a completion report. However, waste transfer tickets for all soil removed from site should be retained.

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Analytical Report Number : 15-77017

Project / Site name:	Panther House, 156-164 Gray's Inn Road, London WCIX 8ED	**Samples received on:**	12/08/2015
Your job number:	15-23911	**Samples instructed on:**	12/08/2015
Your order number:	21916	**Analysis completed by:**	19/08/2015
Report Issue Number:	1	**Report issued on:**	19/08/2015
Samples Analysed:	2 soil samples		

Signed:

Rexona Rahman
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Signed:

Emma Winter
Assistant Reporting Manager
For & on behalf of i2 Analytical Ltd.

Other office located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Analytical Report Number: 15-77017

Project / Site name: Panther House, 156-164 Gray's Inn Road, London WCIX 8ED
Your Order No: 21916

Lab Sample Number				475162	475163			
Sample Reference				BH1	BH2			
Sample Number				D2	D2			
Depth (m)				0.50	0.50			
Date Sampled				12/08/2015	12/08/2015			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Moisture Content	%	N/A	NONE	1.2	9.8			
Total mass of sample received	kg	0.001	NONE	0.62	0.74			
Whole Sample Crushed		N/A	NONE	Crushed	Crushed			
Asbestos in Soil Screen	Type	N/A	ISO 17025	Not-detected	Not-detected			
General Inorganics								
pH	pH Units	N/A	MCERTS	10.9	7.9			
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1			
Complex Cyanide	mg/kg	1	NONE	< 1	< 1			
Free Cyanide	mg/kg	1	NONE	< 1	< 1			
Total Sulphate as SO_4	mg/kg	50	MCERTS	3200	1100			
Water Soluble Sulphate (Soil Equivalent)	g/l	0.0025	MCERTS	0.072	0.41			
Water Soluble Sulphate (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.036	0.21			
Sulphide	mg/kg	1	MCERTS	17	< 1.0			
Total Organic Carbon (TOC)	%	0.1	MCERTS	0.4	3.1			
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0			
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Acenaphthylene	mg/kg	0.1	MCERTS	< 0.10	< 0.10			
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10			
Fluorene	mg/kg	0.1	MCERTS	< 0.10	< 0.10			
Phenanthrene	mg/kg	0.1	MCERTS	1.3	< 0.10			
Anthracene	mg/kg	0.1	MCERTS	0.51	< 0.10			
Fluoranthene	mg/kg	0.1	MCERTS	2.9	< 0.10			
Pyrene	mg/kg	0.1	MCERTS	2.7	< 0.10			
Benzo(a)anthracene	mg/kg	0.1	MCERTS	1.6	< 0.10			
Chrysene	mg/kg	0.05	MCERTS	1.7	< 0.05			
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	1.4	< 0.10			
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	0.75	< 0.10			
Benzo(a)pyrene	mg/kg	0.1	MCERTS	1.5	< 0.10			
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	0.62	< 0.10			
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	0.11	< 0.10			
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.81	< 0.05			
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	15.9	< 1.60			
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	6.5	12			
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.8	1.5			
Boron (total)	mg/kg	1	MCERTS	11	15			
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.2			
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0			
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	14	21			
Copper (aqua regia extractable)	mg/kg	1	MCERTS	43	89			
Lead (aqua regia extractable)	mg/kg	1	MCERTS	190	210			
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3			
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	16	23			
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0			
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	30	58			
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	53	99			

Analytical Report Number: 15-77017

Project / Site name: Panther House, 156-164 Gray's Inn Road, London WCIX 8ED
Your Order No: 21916

Lab Sample Number				475162	475163			
Sample Reference				BH1	BH2			
Sample Number				D2	D2			
Depth (m)				0.50	0.50			
Date Sampled				12/08/2015	12/08/2015			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics								
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0			
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0			
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0			
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.1	MCERTS	< 0.1	< 0.1			
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.1	MCERTS	< 0.1	< 0.1			
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.1	MCERTS	< 0.1	< 0.1			
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	1.0	< 1.0			
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	6.7	< 2.0			
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	14	< 8.0			
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0			
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	22	< 10			
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.1	MCERTS	< 0.1	< 0.1			
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.1	MCERTS	< 0.1	< 0.1			
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.1	MCERTS	< 0.1	< 0.1			
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0			
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	3.1	< 2.0			
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	13	< 10			
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	35	< 10			
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	51	< 10			

Analytical Report Number : 15-77017

Project / Site name: Panther House, 156-164 Gray's Inn Road, London WCIX 8ED

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and topsoil/loam soil types. Data for unaccredited types of solid should be interpreted with care.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
475162	BH1	D2	0.50	Light brown loam and sand with gravel.
475163	BH2	D2	0.50	Brown clay and sand.

Analytical Report Number : 15-77017

Project / Site name: Panther House, 156-164 Gray's Inn Road, London WCIX 8ED

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos Identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
BTEX and MTBE in soil	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073S-PL	W	MCERTS
Complex cyanide in soil	Determination of complex cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	NONE
Crush Whole Sample	Either: Client specific preparation instructions - sample(s) crushed whole prior to analysis; OR Sample unsuitable for standard preparation and therefore crushed whole prior to analysis.	In house method, applicable to dry samples only.	L019-UK	D	NONE
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	NONE
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS

Analytical Report Number : 15-77017

Project / Site name: Panther House, 156-164 Gray's Inn Road, London WCIX 8ED

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Total organic carbon in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L023-PL	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L038-PL	D	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	L076-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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QTS Environmental Report No: 15-34501

Site Reference:	Panther House, 156-164 Gray's Inn Road, London, WC1X 8ED
Project / Job Ref:	15/23911
Order No:	21917
Sample Receipt Date:	13/08/2015
Sample Scheduled Date:	13/08/2015
Report Issue Number:	1
Reporting Date:	19/08/2015

Authorised by:

Russell Jarvis
Director
On behalf of QTS Environmental Ltd

Authorised by:

Kevin Old
Director
On behalf of QTS Environmental Ltd

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Soil Analysis Certificate						
QTS Environmental Report No: 15-34501	Date Sampled	None Supplied				
Site Analytical Services Ltd	Time Sampled	None Supplied				
Site Reference: Panther House, 156-164 Gray's Inn Road, London, WC1X 8ED	TP / BH No	BH1				
Project / Job Ref: 15/23911	Additional Refs	D1				
Order No: 21917	Depth (m)	0.25				
Reporting Date: 19/08/2015	QTSE Sample No	162262				

Determinand	Unit	RL	Accreditation					
Asbestos Screen	N/a	N/a	ISO17025	Not Detected				
pH	pH Units	N/a	MCERTS	10.0				
Total Cyanide	mg/kg	< 2	NONE	< 2				
Complex Cyanide	mg/kg	< 2	NONE	< 2				
Free Cyanide	mg/kg	< 2	NONE	< 2				
Total Sulphate as SO_4	mg/kg	< 200	NONE	2491				
Total Sulphate as SO_4	%	< 0.02	NONE	0.25				
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	MCERTS	264				
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	MCERTS	0.26				
Sulphide	mg/kg	< 5	NONE	< 5				
Organic Matter	%	< 0.1	MCERTS	2.1				
Total Organic Carbon (TOC)	%	< 0.1	MCERTS	1.2				
Arsenic (As)	mg/kg	< 2	MCERTS	5				
W/S Boron	mg/kg	< 1	NONE	< 1				
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2				
Chromium (Cr)	mg/kg	< 2	MCERTS	11				
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2				
Copper (Cu)	mg/kg	< 4	MCERTS	17				
Lead (Pb)	mg/kg	< 3	MCERTS	52				
Mercury (Hg)	mg/kg	< 1	NONE	< 1				
Nickel (Ni)	mg/kg	< 3	MCERTS	8				
Selenium (Se)	mg/kg	< 3	NONE	< 3				
Zinc (Zn)	mg/kg	< 3	MCERTS	20				
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2				

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

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

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

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

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

Asbestos Analyst: Graham Revell

RL: Reporting Limit

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

Subcontracted analysis [S]

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Soil Analysis Certificate - Speciated PAHs		
QTS Environmental Report No: 15-34501	Date Sampled	None Supplied
Site Analytical Services Ltd	Time Sampled	None Supplied
Site Reference: Panther House, 156-164 Gray's Inn Road, London, WC1X 8ED	TP / BH No	BH1
Project / Job Ref: 15/23911	Additional Refs	D1
Order No: 21917	Depth (m)	0.25
Reporting Date: 19/08/2015	QTSE Sample No	162262

Determinand	Unit	RL	Accreditation	
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	0.38
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	0.72
Pyrene	mg/kg	< 0.1	MCERTS	0.62
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	0.35
Chrysene	mg/kg	< 0.1	MCERTS	0.38
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	0.43
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	0.18
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	0.34
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	0.24
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1
Benzo(ghl)perylene	mg/kg	< 0.1	MCERTS	0.19
Coronene	mg/kg	< 0.1	NONE	< 0.1
Total Oily Waste PAHs	mg/kg	< 1	MCERTS	1.9
Total Dutch 10 PAHs	mg/kg	< 1	MCERTS	2.8
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	3.8
Total WAC-17 PAHs	mg/kg	< 1.7	NONE	3.8

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

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Soil Analysis Certificate - TPH CWG Banded						
QTS Environmental Report No: 15-34501	Date Sampled	None Supplied				
Site Analytical Services Ltd	Time Sampled	None Supplied				
Site Reference: Panther House, 156-164 Gray's Inn Road, London, WC1X 8ED	TP / BH No	BH1				
Project / Job Ref: 15/23911	Additional Refs	D1				
Order No: 21917	Depth (m)	0.25				
Reporting Date: 19/08/2015	QTSE Sample No	162262				

Determinand	Unit	RL	Accreditation					
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01				
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05				
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	< 2				
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	< 2				
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	< 3				
Aliphatic >C16 - C21	mg/kg	< 3	MCERTS	10				
Aliphatic >C21 - C34	mg/kg	< 10	MCERTS	90				
Aliphatic (C5 - C34)	mg/kg	< 21	NONE	100				
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01				
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05				
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	< 2				
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	< 2				
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	< 2				
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	17				
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	167				
Aromatic (C5 - C35)	mg/kg	< 21	NONE	184				
Total >C5 - C35	mg/kg	< 42	NONE	284				

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

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Soil Analysis Certificate - BTEX / MTBE						
QTS Environmental Report No: 15-34501	Date Sampled	None Supplied				
Site Analytical Services Ltd	Time Sampled	None Supplied				
Site Reference: Panther House, 156-164 Gray's Inn Road, London, WC1X 8ED	TP / BH No	BH1				
Project / Job Ref: 15/23911	Additional Refs	D1				
Order No: 21917	Depth (m)	0.25				
Reporting Date: 19/08/2015	QTSE Sample No	162262				

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

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

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Waste Acceptance Criteria Analytical Certificate - BS EN 12457/3

QTS Environmental Report No: 15-34501	Date Sampled	None Supplied	
Site Analytical Services Ltd	Time Sampled	None Supplied	
Site Reference: Panther House, 156-164 Gray's Inn Road, London, WC1X 8ED	TP / BH No	BH1	
Project / Job Ref: 15/23911	Additional Refs	D1	
Order No: 21917	Depth (m)	0.25	
Reporting Date: 19/08/2015	QTSE Sample No	162262	

Determinand	Unit	MDL		Landfill Waste Acceptance Criteria Limits: Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
TOC[MU]	%	< 0.1	1.2	3%	5%	6%
Loss on Ignition	%	< 0.01	2.90	--	--	10%
BTEX[MU]	mg/kg	< 0.05	< 0.05	6	--	--
Sum of PCBs	mg/kg	< 0.7	< 0.7	1	--	--
Mineral Oil[MU]	mg/kg	< 10	100	500	--	--
Total PAH[MU]	mg/kg	< 1.7	3.8	100	--	--
pH[MU]	pH Units	N/a	10.0	--	>6	--
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	1.8	--	To be evaluated	To be evaluated

Eluate Analysis	2:1 mg/l	8:1 mg/l		Cumulative 10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)		
Arsenic[U]	< 0.01	< 0.01		< 0.2	0.5	2	25
Barium[U]	0.04	0.03		0.3	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]	0.02	< 0.01		< 0.5	2	50	100
Mercury[U]	< 0.005	< 0.005		< 0.01	0.01	0.2	2
Molybdenum[U]	0.014	0.006		< 0.1	0.5	10	30
Nickel[U]	< 0.007	< 0.007		< 0.2	0.4	10	40
Lead[U]	< 0.005	< 0.005		< 0.2	0.5	10	50
Antimony[U]	< 0.005	< 0.005		< 0.06	0.06	0.7	5
Selenium[U]	0.005	< 0.005		< 0.1	0.1	0.5	7
Zinc[U]	0.006	< 0.005		< 0.2	4	50	200
Chloride[U]	23	6		79	800	15000	25000
Fluoride[U]	< 0.5	< 0.5		< 1	10	150	500
Sulphate[U]	162	70		799	1000	20000	50000
TDS	309	177		1908	4000	60000	100000
Phenol Index	< 0.01	< 0.01		< 0.5	1	-	-
DOC	9	6.4		66.8	500	800	1000
Leach Test Information							
Sample Mass (kg)	0.19						
Dry Matter (%)	92.7						
Moisture (%)	7.8						
Stage 1							
Volume Eluate L2 (litres)	0.34						
Filtered Eluate VE1 (litres)	0.18						

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

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Soil Analysis Certificate - Sample Descriptions
QTS Environmental Report No: 15-34501
Site Analytical Services Ltd
Site Reference: Panther House, 156-164 Gray's Inn Road, London, WC1X 8ED
Project / Job Ref: 15/23911
Order No: 21917
Reporting Date: 19/08/2015

QTSE Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
^ 162262	BH1	D1	0.25	7.2	Brown sandy gravel

Moisture content is part of procedure E003 & is not an accredited test
Insufficient Sample I/S
Unsuitable Sample U/S
^ no sampling date provided; unable to confirm if samples are within acceptable holding times

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Soil Analysis Certificate - Methodology & Miscellaneous Information
QTS Environmental Report No: 15-34501
Site Analytical Services Ltd
Site Reference: Panther House, 156-164 Gray's Inn Road, London, WC1X 8ED
Project / Job Ref: 15/23911
Order No: 21917
Reporting Date: 19/08/2015

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 – C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (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

7.3 Piled Foundations

For the ground conditions at this site some form of bored pile is likely to be the most appropriate. A conventional rotary augered pile may be appropriate but consideration will need to be given to the possible instability and water ingress in the made ground and within any silty or sandy zones within the London Clay. The use of bored piles installed using continuous flight auger (cfa) techniques may therefore be the most appropriate.

The following table of ultimate coefficients may be used for the preliminary design of bored piles from ground floor level, based on the measured SPT and cohesion / depth graph in the appendix.

Ultimate Skin Friction		**kN/m²**
Made Ground / London Clay	GL to 17 m	Ignore (Basement excavation)
London Clay ($\alpha = 0.5$)	17 m to 40 m	Increasing linearly from 55 to 105
Ultimate End Bearing		**kN/m²**
London Clay	30 m to 40 m	Increasing linearly from 1440 to 1890

In the absence of pile tests, guidance from the London District Surveyors Association (LDSA)[8] suggests that a factor of safety of 2.6 should be applied to the above coefficients in the computation of safe theoretical working loads. On this basis the following safe working loads have been estimated for pile diameters ranging from 450 mm to 900 mm and bearing at depths of between 10 m and 28 m below the proposed basement level.

Pile Diameter mm	Pile length m (Toe level m OD)	Safe Working Load kN)
450	20 (-23.75)	900
	25 (-28.75)	1200
600	15 (-18.75)	900
	20 (-23.75)	1200
900	10 (-13.75)	900
	13 (-16.75)	1200
	19 (-22.75)	1800

The above examples are not intended to constitute any form of recommendation with regard to pile size or type, but merely serve to illustrate the use of the above coefficients. Specialist

[8] LDSA (2009) *Foundations No 1 – Guidance notes for the design of straight shafted bored piles in London Clay.* LDSA Publications

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Generic Risk-Based Soil Screening Values

Site	Panther House, 38 Mount Pleasant, London WC1X 0AN
Client	Panther House Development Limited
Engineer	Eckerlsey O'Callaghan

Job Number J19225

Sheet 1 / 2

Proposed End Use Commercial

Soil pH 7

Soil Organic Matter content % 1.0

Contaminant	Screening Value mg/kg	Data Source
Metals		
Arsenic	640	C4SL
Cadmium	410	C4SL
Chromium (III)	30400	LQM/CIEH
Chromium (VI)	49	C4SL
Copper	71,700	LQM/CIEH
Lead	2330	C4SL
Elemental Mercury	170	SGV
Inorganic Mercury	3600	SGV
Nickel	1350	LQM/CIEH
Selenium	13000	SGV
Zinc	665,000	LQM/CIEH
Hydrocarbons		
Benzene	27	C4SL
Toluene	870	SGV
Ethyl Benzene	48000	SGV
Xylene	475	SGV
Aliphatic C5-C6	3400	LQM/CIEH
Aliphatic C6-C8	8300	LQM/CIEH
Aliphatic C8-C10	2100	LQM/CIEH
Aliphatic C10-C12	10000	LQM/CIEH
Aliphatic C12-C16	61000	LQM/CIEH
Aliphatic C16-C35	1,600,000	LQM/CIEH
Aromatic C6-C7	See Benzene	LQM/CIEH
Aromatic C7-C8	See Toluene	LQM/CIEH
Aromatic C8-C10	3700	LQM/CIEH
Aromatic C10-C12	17000	LQM/CIEH
Aromatic C12-C16	36000	LQM/CIEH
Aromatic C16-C21	28000	LQM/CIEH
Aromatic C21-C35	28000	LQM/CIEH
PRO (C_5 –C_{10})	18397	Calc
DRO (C_{12} –C_{28})	1,725,000	Calc
Lube Oil (C_{28} –C_{44})	1,628,000	Calc
TPH	**1000**	Trigger for speciated testing

Contaminant	Screening Value mg/kg	Data Source
Anions		
Soluble Sulphate	500 mg/l	Structures
Sulphide	50	Structures
Chloride	400	Structures
Others		
Organic Carbon (%)	10	Methanogenic potential
Total Cyanide	12000	WRAS
Total Mono Phenols	3200	SGV
PAH		
Naphthalene	200.00	C4SL exp & LQM/CIEH
Acenaphthylene	84,000	LQM/CIEH
Acenaphthene	85,000	LQM/CIEH
Fluorene	64,000	LQM/CIEH
Phenanthrene	22,000	LQM/CIEH
Anthracene	530,000	LQM/CIEH
Fluoranthene	23,000	LQM/CIEH
Pyrene	54,000	LQM/CIEH
Benzo(a) Anthracene	90.0	C4SL exp & LQM/CIEH
Chrysene	140	C4SL exp & LQM/CIEH
Benzo(b) Fluoranthene	100.0	C4SL exp & LQM/CIEH
Benzo(k) Fluoranthene	140.0	C4SL exp & LQM/CIEH
Benzo(a) pyrene	42.00	C4SL
Indeno(1 2 3 cd) Pyrene	60.0	C4SL exp & LQM/CIEH
Dibenzo(a h) Anthracene	13.00	C4SL exp & LQM/CIEH
Benzo (g h i) Perylene	650	C4SL exp & LQM/CIEH
Screening value for PAH	**600.0**	B(a)P / 0.15
Chlorinated Solvents		
1,1,1 trichloroethane (TCA)	552	LQM/CIEH
tetrachloroethane (PCA)	150	LQM/CIEH
tetrachloroethene (PCE)	63.1	LQM/CIEH
trichloroethene (TCE)	6.42	LQM/CIEH
1,2-dichloroethane (DCA)	0.71	LQM/CIEH
vinyl chloride (Chloroethene)	0.0587	LQM/CIEH
tetrachloromethane (Carbon tetra	3	LQM/CIEH
trichloromethane (Chloroform)	79.4	LQM/CIEH

Notes

Concentrations measured below the above values may be considered to represent 'uncontaminated conditions' which pose 'LOW' risk to human health. Concentrations measured in excess of these values indicate a potential risk which require further, site specific risk assessment.

SGV - Soil Guideline Value, derived from the CLEA model and published by Environment Agency 2009

LQM/CIEH - Generic Assessment Criteria for Human Health Risk Assessment 2nd edition (2009)derived using CLEA 1.04 model 2009

C4SL - Defra Category 4 Screening value based on Low Level of Toxicological Risk

C4SL exp & LQM/CIEH calculated using C4SL revisions to exposure assessment but LQM/CIEH health criteria values

Calc - sum of nearest available carbon range specified including BTEX for PRO fraction

B(a)P / 0.15 - GEA experience indicates that Benzo(a) pyrene (one of the most common and most carcinogenic of the PAHs) rarely exceeds 15% of the total PAH concentration, hence this Total PAH threshold is regarded as being conservative

— = POSITION AGREED ON SITE 15/7/15.

EOC MARK UP
15/7/15 JH.

EOC MARK UPS SHOWING PROPOSED INVESTIGATIONS

15078 JH

ALLOW FOR TP4 IN BASEMENT OF BRAIN YD. LOCATION TO BE CONFIRMED. ALLOW 1m x 1m x 1m dp

TP5

Existing Tramshed

ALLOW FOR 3No" ORICE INVESTIGATIONS IN TRAM SHED BASEMENT.

TP4

TP8

Panther House

TP2

Sky Light Above

Hatch Above

UP

Tank Room

Boiler Room

Lift

ALLOW FOR BH1 TO BE 20m DEEP. NOTE APPROX. 3m HEADROOM AVAILABLE

B.H.1

TP3

WC

C1

B1

W1

D1

T.P.1

C2

Mount Pleasant

Lavstall Stre

TP1 LOCATED IN ROOM S6C NEXT TO MASONRY PIER OF EXTERNAL WALL

PLANNING

NOTE: IT IS POSSIBLE THAT EXIST. BUILDING IS FOUNDED ON A RAFT THIS IS TO BE INVESTIGATED (e.g. by DRILLING) PRIOR TO CONSTRUCTING TRIAL PITS 1 - 3.

NOTE: ALL INVESTIGATION LOCATIONS TO BE AGREED ON SITE PRIOR TO COMMENCEMENT OF WORKS.

CUT DOWN RIG REQ'D FOR BH 1

Octagon Assets Ltd.

156 - 164 Gray's Inn Road

Existing Basement Floor Plan

07155 AP(0)09 MT 27/04/2009 1:100 @ A1

FRANCIS

Holsworthy Square

ALL STEELWORK ENCASED IN CONCRETE (ON ALL FLOORS)

N

61 to 72

1 to 15

LOCATION OF TRIAL PITS TBC

TP5 moved to basement of Brain Yd.

TP5 TO EXPOSE FOUNDATION OF BOUNDARY WALL & TRAM SHED ALLOW 2m x 2m x 2m DEEP.

TP4 moved down as shown.

TP4

TP4

Zone A 27.3 sq m 294 sq ft

Zone B 38.3 sq m 412 sq ft

Toilet

Zone C 3.6 sq m 39 sq ft

Zone A 32.9 sq m 354 sq ft

Zone B 31.3 sq m 337 sq ft

Toilets

Zone A 32.7 sq m 352 sq ft

Zone B 27.0 sq m 291 sq ft

Zone C 3.5 sq m 38 sq ft

GRAYS INN ROAD

ALLOW FOR 1m x 1m x 1m dp.

TP6

LOCATION OF BOREHOLE TBC

BH2 MOVE ALLOW FOR 25m DEEP

BH2 TO BE BH2

BH 2 POSITION TO AVOID EXIST SERVICES.

ALLOW FOR 1 No DRILL INVESTIGATION IN TRAMSHED. LOCATION TBC.

Lift

Common Reception

Core

C6

C5

Core

ALL STEELWORK ENCASED IN CONCRETE (ON ALL FLOORS)

MOUNT PLEASANT

C9

C7

B2

B02

Core

STEELWORK ENCASED IN FIRE PROTECTION (BEAMS) COLUMNS ARE BEHIND DRY LINING (ON ALL FLOORS).

EXISTING Ground Floor

Panther House / Grays Inn Road

I
07-002

EXISTING SITE PLAN
1 : 250

Scale 1:250
0 5 10 15 20 25M

Important note

All dimensions in millimetres. Where dimensions are not given, drawings must not be scaled and the matter referred back to Veretec Limited.
All dimensions and conditions are to be checked on site by the contractor prior to preparing drawings or commencing any work.
The contractor is responsible for checking that there is no conflict between site dimensions and drawn dimensions.
In the event of any detail or dimensional conflict between Veretec Limited drawings, the matter must be referred back to Veretec Limited for clarification.

Rev	Date	Issued for	By	Authorised
A	12-08-2019	FOR PLANNING	AA/SM	RM

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veretec
ESTUDIO CANO LASSO
ARQUITECTOS

Client
PANTHER HOUSE DEVELOPMENTS LTD

Project
PANTHER HOUSE

Date 12/08/19 | Drawn AA | Checked RM | Authorised JA

Title
SITE PLAN - EXISTING

Scale
1 : 250@A1

Issue Status
FOR PLANNING

Drawing Number 21835-07-002 | Rev A

Client Drawing Number

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