HERTS & ESSEX SITE INVESTIGATIONS

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GEOTECHNICAL ASSESSMENTS – ENVIRONMENTAL ASSESSMENT - DESKTOP STUDY – CONTAMINATED LAND

Report For :

London Building Company

Phase II ENVIRONMENTAL REPORT

Site location :

Bird In The Hand PH
West End Lane
London
NW6 4NX

February 2022
Report No. 17185

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DOCUMENT INFORMATION AND CONTROL SHEET

Client

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Qualifications

C.S.Gray

- ONC - Civil Engineering
- HNC – Civil Engineering
- P.G. Certificate – Geotechnical Engineering, (Inc. Environmental Engineering)
- P.G. Diploma – Geotechnical Engineering, (Inc. Environmental Engineering),
- Master of Science, (Geotechnical Engineering), (Inc. Environmental Engineering)
- SNIFFER modelling course
- CONSIM Groundwater Assessment Course.
- (30 Years in Geotechnical and Environmental Engineering)
- Asbestos Awareness Course;
- Non-Licensed Work with Asbestos Including NNLW.
- Site Supervisors Safety Training Scheme, (SSSTS).
- First Aid Course in Construction – 3 Day Course – 3 years
- CSCS Labourer Card

Document Status and Approval Schedule

Issue No	Status	Date	***Prepared by :*** Rebecca Chamberlain Signature / Date	***Technical review by :*** Chris Gray Martyn Smith Signature / Date	***Checked By :*** Chris Gray Martyn Smith Signature / Date
1	Final	February 2022			

REPORT ISSUE RECORD

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Issue No	Recipient	Type	No. of copies	Date
1	HESI, (File Copy)	Electronic Copy	1	February 2022
2	The London Building Company	Electronic Copy	1	February 2022
3				
4				
5				
6				
7				
8				

EXECUTIVE SUMMARY
Phase II - Environmental Report

Client	London Building Company		
Site Location	The site at the Bird In The Hand Public House, West End Lane, London NW6 4NX		
Existing Development	Public house and small parking area to the rear		
Proposed Development	No proposed plans are available.		
Site Settings and Previous Uses	The site is recorded as open land from the earliest map record until 1870 when residential land is identified in place. This remains as residential until 1951 when the public house is noted on site. This remains in place until present day. Surrounding the site, open land is in place from 1850 until the 1870's when residential land was developed around the general area. Railway land is in place from 1870 some 120 metres to the south of the site. Works are present from 1935 to 1951 some 30 metres to the east and west and 80 metres to the south of the site. Residential flats are shown in place from 1951 to present day surrounding the site and garages are present to the south from 1991 to present day.		
Nearest Surface Water Feature	The nearest surface water feature is recorded as 794 metres to the south of the site which has no appreciable water feature in place.		
Geological and Hydrological Profile	***Geology***		
	Made Ground	Shallow Made Ground Anticipated	Not Classified
	London Clay	Clay	Unproductive Stratum
Groundwater Abstractions	The nearest abstraction well is located 1376 metres to the east of the site which is recorded as for Municipal Grounds : Spray and Irrigation.		
Source Protection Zone	The site does not lie within a Source Protection Zone.		
Potential Sources of Contamination	***On Site*** • Parking Areas. • Public House.	***Off Site*** • Garages, Off Site, 5m, S. • Railway Land, Off Site, 120m, S. • Works, Off Site, 30m, E & W, 80m, S.	
Previous Investigations	No reports relating to contaminated land are known to us at the time of writing this report relating to the site.		

HUMAN HEALTH RISK	Contamination has been reviewed as in place from PAH's, Arsenic and Lead. The contamination is recorded as widespread across the site and as such, remediation works will be required where pathways to receptors are in place.
WORKFORCE	The above human health risk is in place within the site area, will promote a low risk on a short term bases to any workforce within the areas. Appropriate PPE / RPE should be worn and the soil contamination risk should be noted within any site inductions.
GROUNDWATER RISKS	Groundwater risks have been considered as low.
VAPOUR RISKS	Chemical testing of the soils show that low risks are in place. Vapour risk is not in place.
GAS RISKS	No ground gas risk is in place.
CONSTRUCTION MATERIALS	Construction materials have been considered and risk has been identified directly to any water main pipework developed at the site. • New water main pipework should be laid in a Protective barrier pipework system. • Any water main pipework should be laid in clean corridors in order to prevent future risk to workforce used in the maintenance and repair of any water main system. Concrete has been identified as a risk and as such, any cement used within the development of the site should be a DS1-AC1s classification sulphate resisting cement.
FURTHER WORKS	Prepare a remediation strategy report based on the findings of all necessary environmental testing. The exact details of remediation required for the site should be assessed and reported in a Remediation Strategy Report in order to comply with current best practice, (BS 10175 & CLR 11). Submit reports to Local Authority and Environment Agency for review and confirm the risks identified in this report along with the further works proposed are suitable and acceptable.

INVESTIGATION WORKS AND RISK ASSESSMENT REPORTING

1 Introduction

We have been asked by The London Building Company to undertake an investigation of the above site in order to assess the potential environmental impact of the historical use of the site on the proposed development. The development of this report has been completed utilising information and assessments completed by HESI developed from a desk top study completed in January 2022 by Herts & Essex Site Investigations.

2 Report Objectives

The objectives of this report are to assess and define the extent of contamination within the site as a result of the investigation works undertaken to date.

2.1 Limitations

The opinions expressed within this document and the comments and recommendations given, are based on the information gained, to date within a desktop study previously undertaken on the site. The interpretation of the data has been made by Herts & Essex Site Investigations.

Within any site investigation, materials sampled represent only a small proportion of the materials present on site. It is therefore possible that other conditions prevailing at the site which have not been revealed within the scope of this report, have not been taken into account. Where suspect materials are encountered during any further or future works within the site, additional specialist advice should be sought to assess whether any new information will materially affect the recommendations given within any physical ground investigation.

2.2 Planning Condition

This report has been prepared with the pre-commencement condition at Camden Council in mind.

Application Number : None – No current applications are in place.

3 Site Location and National Grid Reference

The site is located within a commercial and residential area of Camden, the details of which are summarised in Table 1 with the location plan of the site shown in Appendix 2, Sheet 1.

Table 1 Site Detail

Site Address :	Bird in Hand West End Lane London NW6 4NX
Site assessed under	Site Owners Request - Aid as part of planning
Current use of land :	Public house and car park
Previous use of site, (if known)	As above
Grid Reference	NGR 525450, 183770
Site Area	0.05 Hectares
Local Authority	Camden Council
Gradient of the site	The site and the surrounding area forms a level area of land.
Proximity of Controlled Waters, (if known)	The nearest surface water feature is recorded as 794 metres to the south of the site which is recorded as no specific feature.

4 Review of Previous Reports or Documents Relating to the Site

4.1 Site Details

- The existing site is recorded as a public house and small parking area to the rear.
- No proposed plans are available.
- The site is recorded as open land from the earliest map record until 1870 when residential land is identified in place. This remains as residential until 1951 when the public house is noted on site. This remains in place until present day.
- Surrounding the site, open land is in place from 1850 until the 1870's when residential land was developed around the general area. Railway land is in place from 1870 some 120 metres to the south of the site. Works are present from 1935 to 1951 some 30 metres to the east and west and 80 metres to the south of the site. Residential flats are shown in place from 1951 to present day surrounding the site and garages are present to the south from 1991 to present day.
- The nearest surface water feature is recorded as 794 metres to the south of the site which has no appreciable water feature in place.
- The geology is recorded as a nominal depth of made ground which in turn overlies London Clay.
- The nearest abstraction well is located 1376 metres to the east of the site which is recorded as for Municipal Grounds : Spray and Irrigation.
- The site does not lie within a Source Protection Zone.

4.2 Risks derived from DTS

As a result of the works undertaken, the following have been confirmed as the following:

Source Risk

On Site

- Parking Areas.
  Public House.

Off Site

- Garages, Off Site, 5m, S.
- Railway Land, Off Site, 120m, S.
- Works, Off Site, 30m, E & W, 80m, S.

Pathways

Potential pathways in place within the site area recorded as: -

- Dermal Contact.
- Inhalation of dust and fibres.
- Ingestion of home grown produce.
- Ingestion of dust and fibres.
- Ingestion of contaminated water through water main pipework.
- Inhalation of vapours from soils.
- Inhalation Asbestos dust and fibres (from Asbestos within the building).
- Inhalation Asbestos dust and fibres (from asbestos within the soil).
- Inhalation of vapours from Groundwater.

Receptors

Potential receptors in place within the site area recorded as : -

- Human Health, (Site Development Personnel).
- Human Health, (Residents or staff).
- Adjoining Land Owners, (unlikely).
- Flora, (Plant Growth).
- Buildings, Construction Materials, Services.
- Groundwater.

Sources

Table 2 Pollutant Risk

Risk Assessment	***Land Use***	***Pollutant***	
Risk Assessment A	***Historic Maps*** ***Public House, Parking*** On Site / Adjacent to the site	***Soil, Groundwater & Vapour Risk*** Moisture Content, pH, Electrical Conductivity, Cyanide, (Free), Cyanide, (Total), Organic Matter, Boron, Sulfate, (2:1 water soluble), Chromium, (Hexavalent), Sulfate, (Total), Arsenic, Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Zinc, Speciated PAH's, (EPA Priority 16), Phenols, Asbestos, Total Petroleum Hydrocarbons (aliphatic/ aromatic 8-Band), Naphthalene. ***Soil Sampling Groundwater & Vapour Assessment***	
Risk Assessment B	***Historical Features & Walk Over Survey*** ***Railway Land and Works*** On Site	***Vapour Risk*** Total Petroleum Hydrocarbons (aliphatic/ aromatic 8-Band), Naphthalene, PCB's. ***Vapour Assessment***	
Spatial Sampling, (General Assessment)		Moisture Content, pH, Electrical Conductivity, Cyanide, (Free), Cyanide, (Total), Organic Matter, Boron, Sulfate, (2:1 water soluble), Chromium, (Hexavalent), Sulfate, (Total), Arsenic, Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Zinc, Speciated PAH's, (EPA Priority 16), Phenols.	25 meter Centres In accordance with BS10175: 2011+A2:2017.
		Asbestos	5-10 meter Centres In accordance with BS10175: 2011+A2:2017.

5 Details of Preparatory Work

Preparatory works had originally been agreed with the client to gain access and undertake excavations within the site. This incorporates free access across the site area. Limited access to within the building for the drilling rigs is in place therefore no investigations could be completed within these areas.

6 Details of Investigation Objectives.

Within the scope of this report, the objectives will form the following :-

- To anticipate regulatory action and provide sufficient data to overcome and answer any outstanding queries they may raise.
- Provide the relevant authorities sufficient information to satisfy any regulatory requirements set for the site;
- To ensure that the development, on completion, will be fit for the proposed use with all risk assessed and removed.
- It is proposed within this investigation to assess the suitability of the site for a new development which will incorporate residential structure and associated landscaping.
- In order to assess this suitability for development, it is proposed to use a source-pathway-receptor analogy, which, if broken, presents a reduced risk to the development.
- It is proposed to assess, where possible, sources of contamination within the site as a result of historical or ongoing use and whether these uses have pathways to receptors within the proposed development.

7 Summery of Work Undertaken

The scope of the works involved excavation of boreholes to gain a better and more visual understanding of the site conditions. This was undertaken at locations around the site and broadly confirmed the findings of the visual inspection of the site.

Samples were taken in containers dependent upon the proposed sampling regime required and placed in cool boxes where they were transported directly to the analytical chemist for assessment. These works included the following :-

7.1 Investigation Works Completed

The investigation works completed are as detailed below :-

1. The focus of the investigation was to confirm risks from the site which are detailed as follows :-
   a. Assessment of soils across the site area.
   b. Assessment of parking area.
2. Spatial sampling around the remainder of the site to provide a general assessment.

Initial Investigation

- 2No Shell & Auger borehole sunk immediately outside the footprint of the proposed structure in order to assess soils, complete insitu testing, recover samples and record the soil profile. The depth of these boreholes were identified as 1.20 metres and 25.00 metres deep. The date of these works was recorded as 8th to 9th February 2022.
- 2No Dynamic Competitor Rig Boreholes sunk to a depth of between 1.56 metres and 10.00 metres – Date Of Works – 9th February 2022.
- Installation of a standpipe in BH2 to a depth of 5.00 metres
- Laboratory Testing – February 2022.
- Chemical Analysis – February 2022

7.2 Historic Investigation

- Prior to our involvement in the development of the site, no historic investigations are known to us.

8 Location Plans for Exploratory Excavations

The plans which detail the location of the site, existing site use, proposed site use and identification of features on the site that may promote a risk are shown in Appendix Two. The plans also confirm the location of the excavations made on the site.

The areas of risk will be dictated by the risk classification given in this report and confirm where risk is in place relevant to the proposed end land use classification.

9 Description of Site Works and on/off Site Observations

To provide an easy understanding of the proposed development, we can confirm that the site will assess as a single section of land with the same proposed land use.

The Site.

The site has been reviewed and we can confirm that the geology within the site is as follows :-

Table 3 Geological Profile

Stratum	*Description*	*Depth, Range*	*Thickness, Range*
Made Ground	Loose to compact clay FILL with flint gravel and brick fragments	1.20-1.56m	1.20-1.56m
	Crushed tarmac (0.10m) over brown clayey sandy brick FILL	0.80m	0.80m
LONDON CLAY	Firm to stiff brown mottled grey slightly silty CLAY	25m+	8.80m+ to 24.20m+
Ground Water : No groundwater has been identified based on the short term observations to date.			

10 Contamination Assessment

10.1 Contamination

To assess the site, the site will be considered based on the historic land use of the site which will depict the extent of testing undertaken to consider risk within the area and additionally, the site will consider the proposed land use for assessment of whether target values have been exceeded for that particular land use.

10.2 Human Health Risk

As part of a generic assessment of the subsoil conditions, a comparison has initially been made using Generic Quantitative Assessment Criteria, (GQRA), values for contaminants derived the Environment Agency in Soil Guideline Values released in August 2015, LQM / CIEH - S4UL's for Human Health Risk Assessment and also Category 4 Screening Values, (DEFRA), to evaluate whether the levels of contamination measured at the site exceed the human health risk levels which have been derived for the site. For the proposed land use of this site, we can confirm that Generic Quantitative Assessment Criteria have been identified for the site. This is the order in which the Health Criteria Values will be used.

We are aware that the CIEH have published a 'Position Statement' which confirms that they do not wish to be associated with Category 4 screening values under the planning regime and as such would revert back to their own values, although, we are also aware that Local Authorities recommend the use of these value, although this is dependent upon the council EHO. As detailed above, the order of progression will be EA - SGV's, LQM / CIEH Data and then C4SL data.

It is possible that where exceedance of these values are recorded, a more Detailed, Qualitative Risk Assessment, (DQRA), could be completed using site specific scenarios and toxicological properties of the subsoil and site conditions to derive Site Specific Assessment Criteria, (SSAC), for the site. The assessment of testing has been completed as follows and reports the initial risks considered in place compared to GQRA

For ease of assessment, we can confirm that the site will be considered based on single zone of development as detailed below :-

- ***Zone 1 The Site Residential Land Use Standards with home grown produce.***

By comparison of the data recovered from the sample analysis against the human health risk assessments, it can be seen that exceedance of the relevant generic guidance values have been identified which are detailed as follows.

Table 4 *Sampling and Testing Schedule*

SITE DETAILS			SAMPLE ID						TESTING SUITE					Asbestos		METALS		PAH's				
EXISTING SITE USE	PROPOSED SITE USE	CHEMICAL TESTING DATE	SAMPLE TYPE	DEPTH OF STRATUM, (M)	SAMPLE ID	SAMPLE DEPTH, (M)			HESI SUITE 1	TPH' S, (TPHCWG)	PAH' S, (SPECIATED)	PCB' S	ASBESTOS	TYPE OF ASBESTOS IDENTIFIED	ASBESTOS QUANTIFICATION	LEAD, (mg/kg^{-1})	ARSENIC, (mg/kg^{-1})	BENZO(A)ANTHRACENE , (mg/kg^{-1})	CHRYSENE , (mg/kg^{-1})	BENZO(B)FLUORANTHENE(mg/kg^{-1})	BENZO(A)PYRENE , (mg/kg^{-1})	DIBENZ(A,H)ANTHRACENE , (mg/kg^{-1})
PUBLIC HOUSE	UNKNOWN – RESIDENTIAL?	14/2/2022	FILL	1.20m+	BH1	1.00	-	1.05	✓	✓	✓		✓	NONE								
				0.80m	BH2	0.50	-	0.55	✓	✓	✓		✓			292		6.30		7.35	5.98	0.75
				1.20m	BH2	1.00	-	1.05	✓	✓	✓		✓									
			NATURAL	25m+	BH2	3.15	-	3.20	✓	✓	✓		✓									
			FILL	1.56m	WS1	0.60	-	0.65	✓	✓	✓		✓			450						
				1.20m	WS2	0.70	-	0.75	✓	✓	✓	✓	✓			1000	61	45.6	37.80	50.60	44.60	3.67
* Indicates the value which forms the lowest trigger level. Some PAH's are additionally tested within the VOC List. The highest values have been taken. For the purposes of assessment, Soil Organic Matter values of 2.5% has been used. All measurements are given in mg/kg^{-1}									EXPOSURE LEVEL (Organic Matter 1%)							200	37	11	22	3.3	2.7	0.28

10.3 Source

Based on the information gained, we can confirm that some areas of the site have recorded contamination in place above a human health risk level which can be confirmed as follows: -

- From a review of the sample dataset, it can be seen that some metals are in place across the site in the form of Lead and Arsenic. The concentrations are recorded as above a residential land use standard. The contamination is recorded in BH2 and WS1 and WS2.
- Contamination was also identified from PAH's in BH2 within the upper geology and in WS2 at depth.
- No asbestos has been identified within the site.

The density of sampling has been appropriate to consider Asbestos risks across the entire proposed development area, which required a 10 meter sampling grid pattern, Also, for general risk pollutants, the identified risks have been appropriately classified in accordance with BS10175:2011+A2:2017.

10.4 Human Health Source Conclusions

Risk based on assessments for a proposed residential land use, risk is in place as follows:-

Table 6 Soil Contamination Risks

Risk Factor	*Risks in place*	*Remediation*
Targeted Risks	Whilst the risks are isolated to specific areas, given the size of the site, risk is likely to be widespread.	
Spatial Risks	***LEAD, ARSENIC & PAHS***	Remediation action required. Assume as Widespread OR Additional sampling to complete the data set and to confirm risk.

10.5 Workforce

- All Site Staff and visitors to the site should be made aware of the contamination risk within the site area (PAH's, Lead and Arsenic).
- Appropriate PPE and RPE should always be worn.
- Washing facilities should be made available for washing hands prior to consumption of any food or water within the site area.

10.6 Ground and Surface Water Source

The nearest surface water feature is recorded as 794 metres to the south of the site which has no appreciable water feature in place.

No discharge consents are recorded surrounding the site.

No pollution incidents to controlled waters are present surrounding the site.

The published Environment Agency Groundwater Vulnerability Map of the area, (Sheet 40 Thames Estuary), indicates the site to be located within an area classified as an Unproductive Stratum which is formed by London Clay.

The nearest abstraction well is located 1376 metres to the east of the site which is recorded as for Municipal Grounds : Spray and Irrigation.

The site does not lie within a Source Protection Zone.

Based on London Clay underlying the site, risk to groundwater is removed. No groundwater system is in place to impact on.

10.8 Land Gas Assessments

No sources of land gases are in place for the site area, should significant made ground or organic matter be encountered within the site area reassessment may be required, although for the information collect to date the risk of this is low.

10.9 Vapour Risks

Considering the potential for vapour risk to be in place from various source as noted below, the following risk are in place.

Table 7 Vapour Risk Assessment - Response Zone

Feature	*Targeted Response Zone*	*Location to Target*	*Vapour risk*
Parking Areas	Made Ground	Site wide	TPH's, Naphthalene, BTEX. MTBE.
Vehicle Garages		Site wide	
Works, (Off Site).		North	
Railway Land, (Off Site).		South	

Chemical testing has been completed and no significantly elevated level of these vaporous contamination have been recorded in place also when logging and sub-sampling a visual and olfactoral assessment of the soils have been completed, and no contamination that promotes a vapour risk has been encountered within the assessment completed to date.

10.10 Building Risks

Based on the information shown, we can confirm that the risk from explosive land gases is low based on the information identified. The justification for low ground gas risk has been identified and reviewed in Section 10.6.

Considering the risk from Sulphates to concrete we can confirm that the chemical testing completed confirms the sulphate levels in the ground which can identify risk to concrete and whether special sulphate resisting cement may be required.

Based on the information gained, concrete has been identified as a risk and as such, any cement used within the development of the site should be a DS1-AC1s classification sulphate resisting cement.

10.11 Water Main Pipework

Construction materials have been considered and no risk has been identified directly to any water main pipework developed at the site.

An assessment of risk in relation to water main pipework has been considered within the scope of the works and considering the pollution measured at the site. Based on a comparison of the WRAS Data and UKWIR, (Guidance for the selection of water supply pipework on brownfield sites), it can be seen that elevated levels of contamination have been identified and risk IS IN PLACE to water main pipework. This would suggest that any new water main pipework SHOULD BE INSTALLED USING BARRIER PIPEWORK.

Considering the risk to the workforce used in the construction and possible future maintenance of water main pipework, no risk is in place. To confirm :-

- Water main pipework should be laid in a BARRIER PIPEWORK system;
- Any water main pipework should be laid in clean corridors in order to prevent future risk to workforce used in the maintenance and repair of any water main system

11 Risk Assessment Based on Source Risk

Considering the presence of contamination which has been identified above, we confirm the following outlines the assessment of the site completed and way forward for the site.

Table 8 Risk Assessment A

Source	*Receptors*	*Pathway*	*Mitigation / Discussion*
PAH's Lead Arsenic	Site Users, (current and future); Construction Workers; Adjacent Site Users, Fauna.	Direct contact	Widespread risk in place
		Ingestion dust and soil	
		Ingestion of soils attached to vegetation	
		Inhalation of asbestos fibers	Not Applicable
		Inhalation of vapours, (gas and organic)	No vapour risk from contamination identified
		Explosive risk from Land Gas	Not Applicable
		Ingestion of contaminated water through water main pipework	Protective pipework to be installed in clean corridors
		Inhalation of vapours through contaminated ground waters	No vapour risks in place.
		Direct contact with contaminated ground waters	Groundwater risk has been identified as low based on the information gained.
	Surface Water.	Lateral migration of shallow groundwater to a target receptor.	
	Ground Water. Abstraction Well.	Migration through fissures / cracks which may migrate to a groundwater receptor.	
	Plants. Vegetation.	Plant uptake. Direct contact.	Plant Risks are considered Low based on assessments with ICRCL old exposure levels. No specific plant risk assessment criteria is in place to date.
	Buildings. Construction Materials.	Direct contact with contaminated soils;	PAH's pose a low risk to the built environment.
		Direct contact with contaminated groundwater	Groundwater risk has been identified as low based on the information gained.

11 Implications of the End Use of the Site

Within the assessment of the site completed within this report, we can confirm that existing source – pathway – receptor risk assessments are now in place based on actual site data. Based on the change in use of the site through this proposed development, it is possible that pathways to receptors will be either be removed or enhanced such that risk may be in place / removed.

The end use risks based on pathways are discussed below and relate to the site as a whole:-

Hard Landscaping - will effectively cap off any contamination and remove risk, although, the placement of hard surfaces across the site should be confirmed as part of the planning application and not form a system of remediation that homeowners could remove as part of the ongoing habitation.

Soft Landscaping - will form an area where risk is in place and as such, remedial measures are likely to be required. Based on our findings to date, the risks may be isolated, although, additional sampling will be required in order to complete this.

Under Buildings - will effectively cap off any contamination and remove risk.

Services - By examination of the UKWIR, (Guidance for the selection of water supply pipes to be used in brownfield sites) we can confirm the risks associated with human health from water main feeds have been considered in place, as such, preventative measures ***will*** be required for the site.

- ***Any water main pipework should be laid using Protecta-Line pipework in clean corridors in order to prevent future risk to workforce used in the maintenance and repair of any water main system.***

12 Outline Remediation Measures

Considering the above, we would suggest that the following outline remediation measures could be employed in order to develop the site based on the existing data. This will be based on the assumption that there is widespread risk within the site area.

12.1 Cover Systems - NHBC

The remedial measures are likely to include one of the following cover systems for the site :-

Engineered cover systems – designed to provide the complete separation of the receptor from the hazard and to perform a number of functions including limiting upward migration of contaminants due to capillary rise and controlling the downward infiltration of water.

Simple cover systems – to provide a reduction of the hazard to human health and to provide a suitable medium for plant growth.

Consultation within NHBC guidance documents, (Cover Systems for Land Regeneration), confirm that maximum depths of cover will be required for residential sites and overcome the inherent issues with earthworm activity, burrowing animals, effects of trees and plants, digging during garden activities and intermixing of leaf fall. Justification of this is included within the NHBC guidance document.

It is also recorded that as part of the review, a questionnaire was sent out to various Developers, Consultants and Regulators who all confirmed variable degrees of cover system based on the level of contamination which ranged from 0.30 meters to 3.00 meters, although, the report by NHBC removes these as conservative and the suggestion of a 0.60 meter cover system adopted by the report as a maximum depth of cover required to be sufficient.

It should be noted that these cover systems do not overcome the risks from soil gases, hydrocarbons, highly elevated Mercury or Arsenic, the groundwater or any controlled waters, significant contamination, deep excavations, services, slopes or areas where rabbit or badger populations are significant.

Table 9 Outline Remediation Measures for end use of the site

Land Use	*Mitigation Measure*	*Any Additional Works*	*Depth to remove risk*	*Confirmation required.*
Communal Areas & Shrub Planting Areas	Excavate and remove soils which are assessed to form a risk and placement of clean inert soils to a minimum depth of 0.60 meters. (See Cover Systems above for justification).	None	Excavate a maximum of 0.60 meters of the contaminated layer, (defined within this report as the Made Ground), and confirm the geology at depth. If the contaminated layer is still in place, recover validation samples from the base of the excavation to confirm the contamination status of the soils for future assessment and record. Lay Geo-textile over this contaminated layer to warn future excavators that risk is present below. If clean soils are encountered, recover validation samples from the base to confirm that risk has been removed for validation purposes. This can be at any depth provided that clean soils are identified and recorded.	Validation Works will be required. Validation of the base of excavation and validation of any soils brought onto the site.
Hard Landscaping	Hard landscaping will remove any risks through pathway removal. Must be a permanent feature, (not patio's). Patio's should assume a soft landscape finish.	Confirmation will be required from the Local or relevant Authority that hard landscaping areas will require specific permission to remove any and / or all hard surfaces which may expose contamination to human receptors		
Under Buildings	NO ACTION			
Water Main	Any new water main installations can be installed using Protecta-Line pipework. Any new water main pipework should be laid in clean corridors. Full removal of Asbestos should be completed as identified above	None	None	To Be Confirmed with the relevant statutory authority
Controlled Waters – Surface Water & Ground Water	Groundwater risks removed based on the current site condition. Consider possible future development and pathway creation for contamination to impact on the underlying Secondary Aquifer.			

13 Waste Disposal

The Landfill Directive sets rigorous standards to reduce both our reliance on landfill and the environmental impact of wastes disposed of by landfill. Tighter operational and infrastructure standards limit the types and nature of waste that we can send to landfill and place greater restrictions on the location of landfill sites

The key points are:

• Certain kinds of waste cannot be landfilled.

• Landfills are classified according to whether they can accept hazardous, non-hazardous or inert wastes.

• Wastes can only be accepted at a landfill if they meet the waste acceptance criteria (WAC) for that class of landfill.

• Most wastes must be treated before you can send them to landfill.

• There are formal processes for identifying and checking wastes you must follow before wastes can be accepted at a landfill site.

The Council Decision lays down waste acceptance procedures (WAP). From this foundation landfill operators should build their own site-specific WAP. The Council Decision WAP must be used to determine whether a waste is suitable to go to landfill, and if so, to which class of landfill. The WAP consist of three steps to identify and periodically check the main characteristics of the waste (see Section 9):

- ***Level 1***: basic characterisation. Before you can send a load of waste to landfill, you need to know its composition and properties so you can determine whether it is suitable for acceptance and at which class of site (see the Council Decision Annex, paragraph 1.1),
- ***Level 2***: compliance testing. If you produce waste that is 'regularly arising', e.g. from an industrial process, you must periodically check the waste to ensure that those properties have not changed (see the Council Decision Annex, paragraph 1.2),
- ***Level 3***: on-site verification. The operator must check each delivery at the landfill to verify that it is the expected waste and that it has not been contaminated in storage or transport (see the Council Decision Annex, paragraph 1.3).

Before a waste producer can take waste to a landfill site for disposal, they need to check the landfill site has the appropriate permit and must have completed the following:

- Duty of care transfer note/Hazardous Waste consignment note
- Pre-treatment declaration form
- Basic characterisation of the waste, to include:
    - Description of the waste
    - Waste code (using List of Wastes)
    - Composition of the waste (by testing, if necessary)
    - WAC testing (if required)

13.1 WAC Testing

No WAC tests have been completed on samples from the site area

14 Source Risk Conclusions

HUMAN HEALTH RISK

- Contamination has been reviewed as in place from PAH's and Metals. The site is relatively small in size and as such, an assumption that widespread risk is in place.

- ***It is likely that the contamination will form widespread risk from Lead, Arsenic and PAH's and additional testing would likely confirm this. As such, an assumption that widespread risk is in place should be made.***

WORKFORCE

- ***All Site Staff and visitors to the site should be made aware of the contamination risk within the site area (PAH's, Lead and Arsenic).***
    - ***Appropriate PPE and RPE should always be worn.***
    - ***Washing facilities should be made available for washing hands prior to consumption of any food or water within the site area.***

BUILDING MATERIALS

- ***Water main pipework should be laid in a BARRIER PIPEWORK system.***
    - ***Any water main pipework should be laid in clean corridors in order to prevent future risk to workforce used in the maintenance and repair of any water main system.***

- ***Concrete has been identified as a risk and as such, any cement used within the development of the site should be a DS1-AC1s classification sulphate resisting cement.***

GROUNDWATER

- ***No risk is in place to groundwater.***

GROUND GAS

- ***No ground gas risk is in place.***

VAPOUR RISK

- ***No risk is in place from vapours.***

FURTHER WORKS

- ***Prepare a remediation strategy report based on the findings of all necessary environmental testing;***

- ***The exact details of remediation required for the site should be assessed and reported in a Remediation Strategy Report in order to comply with current best practice, (BS 10175 & CLR 11).***

- ***Submit reports to Local Authority and Environment Agency for review and confirm the risks identified in this report along with the further works proposed are suitable and acceptable.***

HERTS & ESSEX SITE INVESTIGATIONS
The Old Post Office, Wellpond Green
Standon, Ware, Herts. SG11 1NJ
Telephone: 01920 822233
e-mail info@hesi.co.uk

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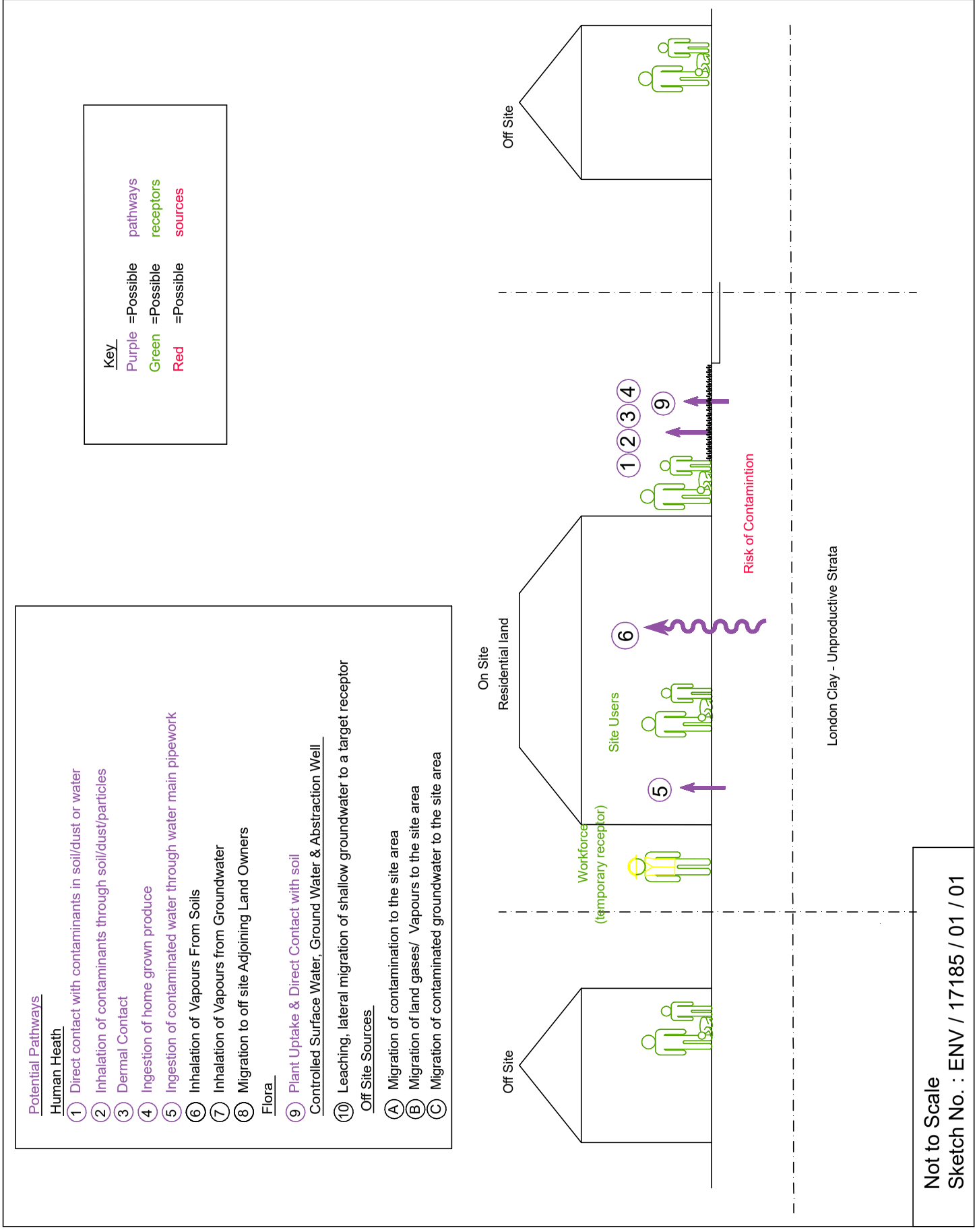
????

Site Conceptual Model - Proposed SIte Plan



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Appendix No	1
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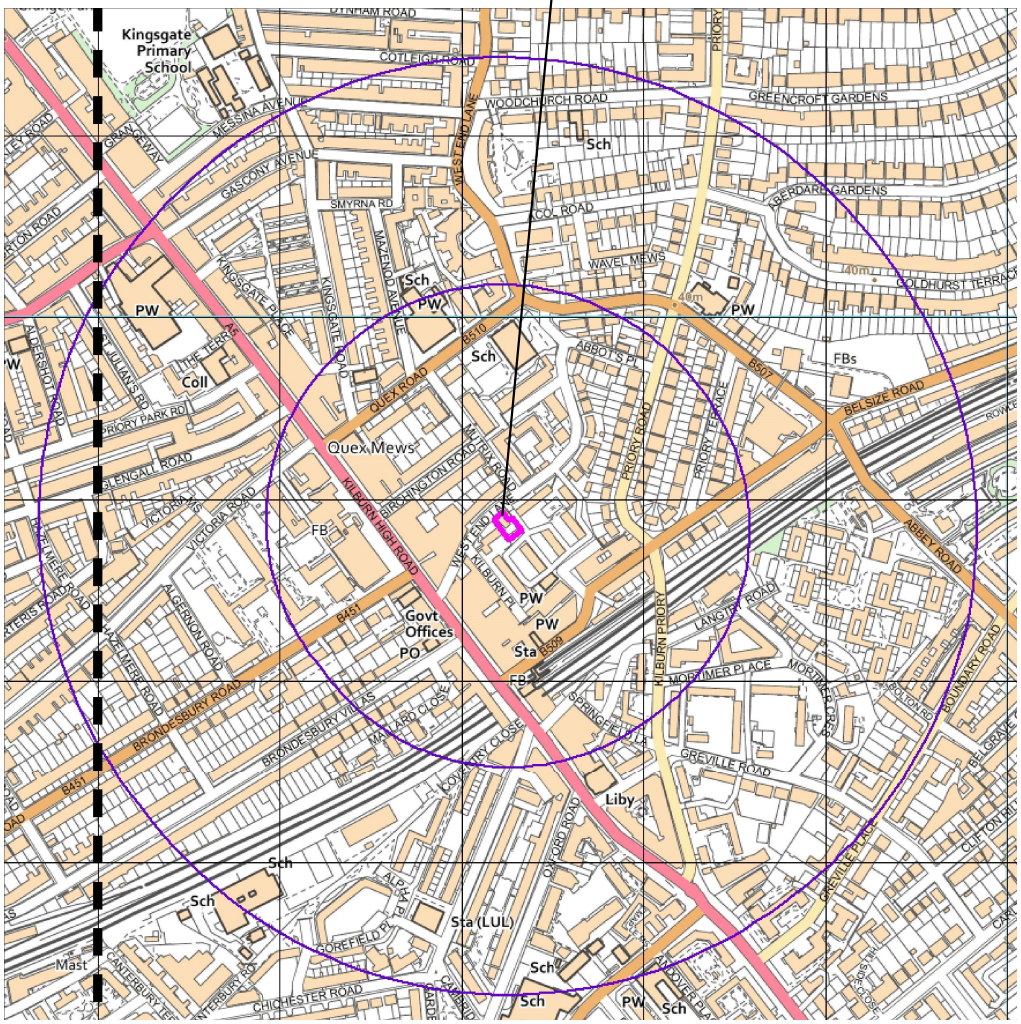
Bird in the Hand, West End Lane, London NW6 4NX

Location Plan

N

The Site



Not to Scale

Sketch No. : ENV / 17185/ 01 / 01

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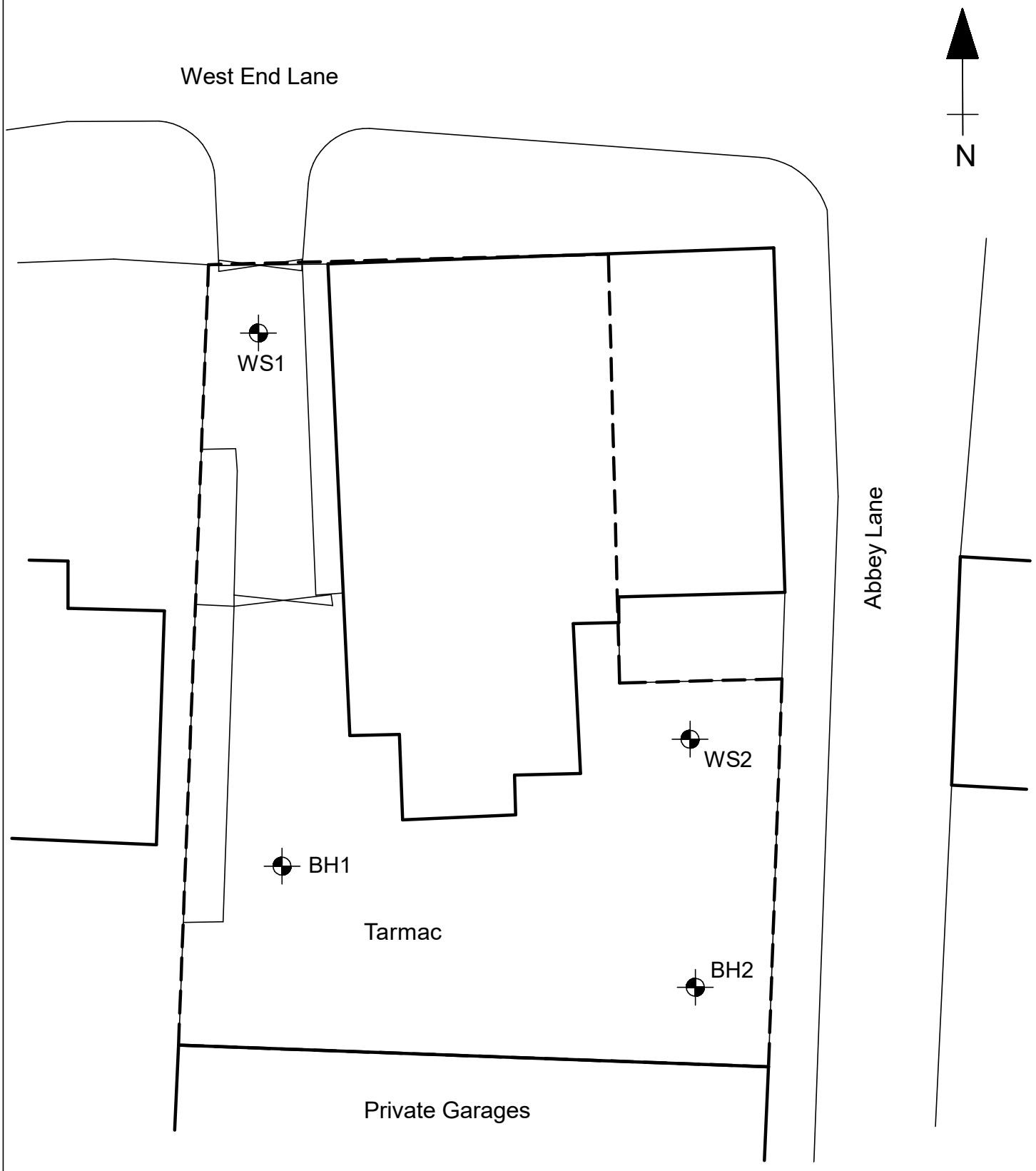
Bird in the Hand, West End Lane, London NW6 4NX

Existing Site Plan



Not to Scale

Sketch No. : ENV / 17185 / 01 / 02

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Appendix No 2
Sheet No 1
Job No 17185
Date Feb 2022

Bird in the Hand, West End Lane, London NW6 4NX

Borehole One

Description Of Stratum	Legend	Depth	Thickness (m)	Water Level	Samples No	Samples Type	Samples Depth (m)	S.P.T N-Value or Vane Strength	VOC's (ppm)	Installations	Casing Depth, (m)
Crushed tarmac		0.40	0.40								
Loose to compact clay FILL with flint gravel and brick fragments		1.20	0.80								
Closed at 1.20m Obstruction - No progress											

1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10

Remarks

Scale 1 : 50

Key : U - Undisturbed Sample (100mm **diameter**) B - Bulk Sample ▼ - Water Struck D - Disturbed Sample ▽ - Water Standing W - Water Sample T - Chemical Tub N - SPT N-Value V - Vane Test, (kN.m²)

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Appendix No 2
Sheet No 2
Job No 17185
Date Feb 2022

Bird in the Hand, West End Lane, London NW6 4NX

Borehole Two

Description Of Stratum	Legend	Depth	Thickness (m)	Water Level	Samples No	Samples Type	Samples Depth (m)	S.P.T N-Value or Vane Strength	VOC's (ppm)	Installations	Casing Depth, (m)
Crushed tarmac (0.10m) over brown clayey sandy brick FILL		0.80	0.80		1	B	0.50	N=12		Bentonite Seal	
Firm grey brown moderately silty CLAY with flint gravel		1.20	0.40								
Soft to firm brown mottled grey CLAY with flint gravel		1.70	0.50								1.40
Soft to firm brown mottled grey CLAY		2.25	0.55		1	U	1.80			Solid Pipework	
Firm grey slightly silty CLAY		2.50	0.25								
Firm to stiff brown mottled grey slightly silty CLAY Weak claystone from 3.15 to 3.20m			8.10		2 3 4 5 6 7	U U U U U U	2.70 4.00 5.00 6.50 8.00 9.50			50 mmø Slotted Pipework Pea Shingle	

Remarks

Scale 1 : 50

Key : U - Undisturbed Sample (100mm **diameter**) B - Bulk Sample - Water Struck D - Disturbed Sample - Water Standing W - Water Sample T - Chemical Tub N - SPT N-Value V - Vane Test, (kN.m²)

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Appendix No 2
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Job No 17185
Date Feb 2022

Bird in the Hand, West End Lane, London NW6 4NX

Borehole Two .... continued

Description Of Stratum	Legend	Depth	Thickness (m)	Water Level	Samples No	Samples Type	Samples Depth (m)	S.P.T N-Value or Vane Strength	VOC's (ppm)	Installations	Casing Depth, (m)
As above		1.20	8.10								
Stiff grey slightly silty CLAY					8	U	11.00				
					9	U	12.50				
					10	U	14.50				
			14.40								
					11	U	15.50				
					12	U	17.00				
					13	U	18.50				

Remarks

Scale 1 : 50

Key : U - Undisturbed Sample (100mm **diameter**) B - Bulk Sample - Water Struck D - Disturbed Sample - Water Standing W - Water Sample T - Chemical Tub N - SPT N-Value V - Vane Test, (kN.m²)

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Appendix No 2
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Job No 17185
Date Feb 2022

Bird in the Hand, West End Lane, London NW6 4NX

Borehole Two ....continued

Description Of Stratum	Legend	Depth	Thickness (m)	Water Level	Samples No	Samples Type	Samples Depth (m)	S.P.T N-Value or Vane Strength	VOC's (ppm)	Installations	Casing Depth, (m)
As above			14.40		14	U	20.00				
					15	U	21.50				
					16	U	23.00				
					17	U	24.50				
		25.00									
Borehole closed at 25.00 m											

Remarks

Scale 1 : 50

Key : U - Undisturbed Sample (100mm **diameter**) B - Bulk Sample - Water Struck D - Disturbed Sample - Water Standing W - Water Sample T - Chemical Tub N - SPT N-Value V - Vane Test, (kN.m²)

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Appendix No 2
Sheet No 5
Job No 17185
Date Feb 2022

Bird in the Hand, West End Lane, London NW6 4NX

Window Sampler One

Description Of Stratum	Legend	Depth	Thickness (m)	Water Level	Samples No	Samples Type	Samples Depth (m)	S.P.T N-Value or Vane Strength	VOC's (ppm)	Installations	Casing Depth, (m)
Crushed tarmac		0.40	0.40								
Loose to compact silty clay FILL with flint gravel and brick fragments		1.56	1.16								
Closed at 1.56m Obstruction - No progress											

1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10

Remarks

Scale 1 : 50

Key : U - Undisturbed Sample (100mm **diameter**) B - Bulk Sample ▼ - Water Struck D - Disturbed Sample ▽ - Water Standing W - Water Sample T - Chemical Tub N - SPT N-Value V - Vane Test, (kN.m²)

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Appendix No 2
Sheet No 6
Job No 17185
Date Feb 2022

Bird in the Hand, West End Lane, London NW6 4NX

Window Sampler Two

Description Of Stratum	Legend	Depth	Thickness (m)	Water Level	Samples No	Samples Type	Samples Depth (m)	S.P.T N-Value or Vane Strength	VOC's (ppm)	Installations	Casing Depth, (m)
Crushed tarmac		0.60	0.60		1	U	GL - 1.00				
Loose to compact clayey FILL with flint gravel and much brick butts and fragments		1.20	0.60		2	U	1.00-2.00				1.00
Firm to stiff brown mottled grey slightly silty CLAY			8.80		3	U	2.00-3.00				
					4	U	3.00-4.00				
					5	U	4.00-5.00				
					6	U	5.00-6.00				
					7	U	6.00-7.00				
					8	U	7.00-8.00				
					9	U	8.00-9.00				
					10	U	9.00-10.00				
Closed at 10.00m		10.00									

Remarks

Scale 1 : 50

Key : U - Undisturbed Sample (100mm **diameter**) B - Bulk Sample - Water Struck D - Disturbed Sample - Water Standing W - Water Sample T - Chemical Tub N - SPT N-Value V - Vane Test, (kN.m²)

DETS

DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane, Lenham Heath
Maidstone
Kent ME17 2JN

Tel: 01622 850410

russell.jarvis@suez.com

Client: Herts and Essex Site Investigation
Address: The Old Post Office
Wellpond Green
Standon SG11 1NJ
Tel: 01920822233

Date Samples Dispatched:
Sampler: Chris Gray
Quotation No:
(if no contract rates apply)

Sheet 1
of 1

Project / Site Name: **Bird in Hand, West End Lane, London NW6 4NX**
Project / Job No: **17185**
Contact Name: Chris Gray / Rebecca Chamberlain
E-mail: csgray@hesi.co.uk / rchamberlain@hesi.co.uk

	Lab Use	Date Sampled	Client Sample ID	Depth (m)	Additional references	No. of Containers	Sample Type	Suite Name / Analysis Required: HESISuite 1	TPH CWG	Asbestos + Quant	PCBs											
1		14/2/22	BH1	1.00	D2	PT/AJ250	S	X	X	X												
2		14/2/22	BH2	0.50	D1	PT/AJ250	S	X	X	X												
3		14/2/22	BH2	1.00	B1	PT/AJ250	S	X	X	X												
4		14/2/22	BH2	3.15	D4	PT/AJ250	S	X	X	X												
5		14/2/22	WS1	0.60	U	PT/AJ250	S	X	X	X												
6		14/2/22	WS2	0.70	U	PT/AJ250	S	X	X	X	X											
7																						
8																						
9																						
10																						
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25																						
26																						
27																						
28																						
29																						
30																						
								6	6	6	1	0	0	0	0	0	0	0	0	0	0	0

Turnaround (please indicate)

5 day (standard)	X
4 day	
3 day	
Other	
Specific Date	

HESI USE

Additional instructions should be entered here

Purchase Order No: Same as Job No

KO Version 4.0 03/02/2017

Chris Gray
Herts and Essex Site Investigations
The Old Post Office
Wellpond Green
Standon
Ware
Herts
SH11 1DJ

Derwentside Environmental Testing Services Ltd
Unit 1
Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Kent
ME17 2JN
t: 01622 850410

DETS Report No: 22-01543

Site Reference:	Bird in Hand, West End Lane, London, NW6 4NX
Project / Job Ref:	17185
Order No:	17185
Sample Receipt Date:	17/02/2022
Sample Scheduled Date:	17/02/2022
Report Issue Number:	1
Reporting Date:	24/02/2022

Authorised by:

Dave Ashworth
Technical Manager

Dates of laboratory activities for each tested analyte are available upon request.

Opinions and interpretations are outside the laboratory's scope of ISO 17025 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. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

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

Soil Analysis Certificate						
DETS Report No: 22-01543	**Date Sampled**	14/02/22	14/02/22	14/02/22	14/02/22	14/02/22
Herts and Essex Site Investigations	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Bird in Hand, West End Lane, London, NW6 4NX	**TP / BH No**	BH1	BH2	BH2	BH2	WS1
Project / Job Ref: 17185	**Additional Refs**	D2	D1	B1	D4	U
Order No: 17185	**Depth (m)**	1.00	0.50	1.00	3.15	0.60
Reporting Date: 24/02/2022	**DETS Sample No**	586753	586754	586755	586756	586757

Determinand	Unit	RL	Accreditation					
							(n)	
Asbestos Screen (S)	N/a	N/a	ISO17025	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
pH	pH Units	N/a	MCERTS	7.5	8.1	7.4	8.0	8.1
Electrical Conductivity	uS/cm	< 5	NONE	165	197	166	483	164
Total Cyanide	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Free Cyanide	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Total Sulphate as SO_4	mg/kg	< 200	MCERTS	525	521	287	1905	667
Total Sulphate as SO_4	%	< 0.02	MCERTS	0.05	0.05	0.03	0.19	0.07
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	MCERTS	28	22	16	189	10
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	MCERTS	0.03	0.02	0.02	0.19	0.01
Organic Matter (SOM)	%	< 0.1	MCERTS	2.5	1.4	1.6	0.7	1.2
Arsenic (As)	mg/kg	< 2	MCERTS	11	10	11	6	10
W/S Boron	mg/kg	< 1	NONE	1.6	< 1	1.2	< 1	< 1
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	0.2	< 0.2	< 0.2	< 0.2
Chromium (Cr)	mg/kg	< 2	MCERTS	25	9	26	13	14
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	46	39	24	15	48
Lead (Pb)	mg/kg	< 3	MCERTS	147	292	77	29	450
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	20	9	17	16	13
Zinc (Zn)	mg/kg	< 3	MCERTS	64	104	56	30	56
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion

Subcontracted analysis (S)

(n) Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation

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Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410

Soil Analysis Certificate						
DETS Report No: 22-01543	**Date Sampled**	14/02/22				
Herts and Essex Site Investigations	**Time Sampled**	None Supplied				
Site Reference: Bird in Hand, West End Lane, London, NW6 4NX	**TP / BH No**	WS2				
Project / Job Ref: 17185	**Additional Refs**	U				
Order No: 17185	**Depth (m)**	0.70				
Reporting Date: 24/02/2022	**DETS Sample No**	586758				

Determinand	Unit	RL	Accreditation					
Asbestos Screen (S)	N/a	N/a	ISO17025	Not Detected				
pH	pH Units	N/a	MCERTS	7.9				
Electrical Conductivity	uS/cm	< 5	NONE	230				
Total Cyanide	mg/kg	< 2	NONE	< 2				
Free Cyanide	mg/kg	< 2	NONE	< 2				
Total Sulphate as SO_4	mg/kg	< 200	MCERTS	1691				
Total Sulphate as SO_4	%	< 0.02	MCERTS	0.17				
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	MCERTS	26				
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	MCERTS	0.03				
Organic Matter (SOM)	%	< 0.1	MCERTS	2.5				
Arsenic (As)	mg/kg	< 2	MCERTS	61				
W/S Boron	mg/kg	< 1	NONE	< 1				
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	0.9				
Chromium (Cr)	mg/kg	< 2	MCERTS	20				
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2				
Copper (Cu)	mg/kg	< 4	MCERTS	667				
Lead (Pb)	mg/kg	< 3	MCERTS	1000				
Mercury (Hg)	mg/kg	< 1	MCERTS	3.5				
Nickel (Ni)	mg/kg	< 3	MCERTS	53				
Zinc (Zn)	mg/kg	< 3	MCERTS	407				
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2				

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)

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

Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 22-01543	**Date Sampled**	14/02/22	14/02/22	14/02/22	14/02/22	14/02/22
Herts and Essex Site Investigations	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Bird in Hand, West End Lane, London, NW6 4NX	**TP / BH No**	BH1	BH2	BH2	BH2	WS1
Project / Job Ref: 17185	**Additional Refs**	D2	D1	B1	D4	U
Order No: 17185	**Depth (m)**	1.00	0.50	1.00	3.15	0.60
Reporting Date: 24/02/2022	**DETS Sample No**	586753	586754	586755	586756	586757

Determinand	Unit	RL	Accreditation				(n)	
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	0.20	< 0.1	< 0.1	0.70
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	0.14	< 0.1	< 0.1	0.72
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	0.38	< 0.1	< 0.1	0.72
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	0.58	< 0.1	< 0.1	0.95
Phenanthrene	mg/kg	< 0.1	MCERTS	0.18	8.29	< 0.1	< 0.1	28.10
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	1.57	< 0.1	< 0.1	8.56
Fluoranthene	mg/kg	< 0.1	MCERTS	0.32	14.90	< 0.1	< 0.1	90.70
Pyrene	mg/kg	< 0.1	MCERTS	0.27	12.80	< 0.1	< 0.1	84.10
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	0.19	6.30	< 0.1	< 0.1	45.60
Chrysene	mg/kg	< 0.1	MCERTS	0.17	5.77	< 0.1	< 0.1	37.80
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	0.24	7.35	< 0.1	< 0.1	50.60
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	2.34	< 0.1	< 0.1	13.20
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	0.20	5.98	< 0.1	< 0.1	44.60
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	0.14	3.38	< 0.1	< 0.1	20.10
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	0.75	< 0.1	< 0.1	3.67
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	0.14	3.10	< 0.1	< 0.1	16.20
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	1.8	73.8	< 1.6	< 1.6	446

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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 22-01543	**Date Sampled**	14/02/22				
Herts and Essex Site Investigations	**Time Sampled**	None Supplied				
Site Reference: Bird in Hand, West End Lane, London, NW6 4NX	**TP / BH No**	WS2				
Project / Job Ref: 17185	**Additional Refs**	U				
Order No: 17185	**Depth (m)**	0.70				
Reporting Date: 24/02/2022	**DETS Sample No**	586758				

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	0.24				
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1				
Fluoranthene	mg/kg	< 0.1	MCERTS	0.13				
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1				
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	0.15				
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1				
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	0.20				
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1				
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	0.14				
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1				
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1				
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1				
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6				

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Soil Analysis Certificate - TPH CWG Banded						
DETS Report No: 22-01543	**Date Sampled**	14/02/22	14/02/22	14/02/22	14/02/22	14/02/22
Herts and Essex Site Investigations	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Bird in Hand, West End Lane, London, NW6 4NX	**TP / BH No**	BH1	BH2	BH2	BH2	WS1
Project / Job Ref: 17185	**Additional Refs**	D2	D1	B1	D4	U
Order No: 17185	**Depth (m)**	1.00	0.50	1.00	3.15	0.60
Reporting Date: 24/02/2022	**DETS Sample No**	586753	586754	586755	586756	586757

Determinand	Unit	RL	Accreditation				(n)	
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aliphatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aliphatic >C21 - C34	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10
Aliphatic (C5 - C34)	mg/kg	< 21	NONE	< 21	< 21	< 21	< 21	< 21
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	< 2	5	< 2	< 2	16
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	59	< 3	< 3	367
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	< 10	76	< 10	< 10	503
Aromatic (C5 - C35)	mg/kg	< 21	NONE	< 21	141	< 21	< 21	886
Total >C5 - C35	mg/kg	< 42	NONE	< 42	141	< 42	< 42	886

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Soil Analysis Certificate - TPH CWG Banded						
DETS Report No: 22-01543	**Date Sampled**	14/02/22				
Herts and Essex Site Investigations	**Time Sampled**	None Supplied				
Site Reference: Bird in Hand, West End Lane, London, NW6 4NX	**TP / BH No**	WS2				
Project / Job Ref: 17185	**Additional Refs**	U				
Order No: 17185	**Depth (m)**	0.70				
Reporting Date: 24/02/2022	**DETS Sample No**	586758				

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	< 3				
Aliphatic >C21 - C34	mg/kg	< 10	MCERTS	< 10				
Aliphatic (C5 - C34)	mg/kg	< 21	NONE	< 21				
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	< 3				
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	< 10				
Aromatic (C5 - C35)	mg/kg	< 21	NONE	< 21				
Total >C5 - C35	mg/kg	< 42	NONE	< 42				

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Soil Analysis Certificate - BTEX / MTBE							
DETS Report No: 22-01543	**Date Sampled**	14/02/22	14/02/22	14/02/22	14/02/22	14/02/22
Herts and Essex Site Investigations	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Bird in Hand, West End Lane, London, NW6 4NX	**TP / BH No**	BH1	BH2	BH2	BH2	WS1
Project / Job Ref: 17185	**Additional Refs**	D2	D1	B1	D4	U
Order No: 17185	**Depth (m)**	1.00	0.50	1.00	3.15	0.60
Reporting Date: 24/02/2022	**DETS Sample No**	586753	586754	586755	586756	586757

Determinand	Unit	RL	Accreditation				(n)	
Benzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	4
Toluene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
p & m-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
o-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
MTBE	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5

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Soil Analysis Certificate - BTEX / MTBE							
DETS Report No: 22-01543	**Date Sampled**	14/02/22					
Herts and Essex Site Investigations	**Time Sampled**	None Supplied					
Site Reference: Bird in Hand, West End Lane, London, NW6 4NX	**TP / BH No**	WS2					
Project / Job Ref: 17185	**Additional Refs**	U					
Order No: 17185	**Depth (m)**	0.70					
Reporting Date: 24/02/2022	**DETS Sample No**	586758					

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				

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Soil Analysis Certificate - PCB (7 Congeners)						
DETS Report No: 22-01543	**Date Sampled**	14/02/22				
Herts and Essex Site Investigations	**Time Sampled**	None Supplied				
Site Reference: Bird in Hand, West End Lane, London, NW6 4NX	**TP / BH No**	WS2				
Project / Job Ref: 17185	**Additional Refs**	U				
Order No: 17185	**Depth (m)**	0.70				
Reporting Date: 24/02/2022	**DETS Sample No**	586758				

Determinand	**Unit**	**RL**	**Accreditation**				
PCB Congener 28	mg/kg	< 0.008	NONE	< 0.008			
PCB Congener 52	mg/kg	< 0.008	NONE	< 0.008			
PCB Congener 101	mg/kg	< 0.008	NONE	< 0.008			
PCB Congener 118	mg/kg	< 0.008	NONE	< 0.008			
PCB Congener 138	mg/kg	< 0.008	NONE	< 0.008			
PCB Congener 153	mg/kg	< 0.008	NONE	< 0.008			
PCB Congener 180	mg/kg	< 0.008	NONE	< 0.008			
Total PCB (7 Congeners)	mg/kg	< 0.1	NONE	< 0.1			

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Soil Analysis Certificate - Sample Descriptions
DETS Report No: 22-01543
Herts and Essex Site Investigations
Site Reference: Bird in Hand, West End Lane, London, NW6 4NX
Project / Job Ref: 17185
Order No: 17185
Reporting Date: 24/02/2022

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
586753	BH1	D2	1.00	21.4	Brown sandy clay with stones and brick
586754	BH2	D1	0.50	14.2	Brown sandy clay with stones
586755	BH2	B1	1.00	19.8	Brown sandy clay
586756	BH2	D4	3.15	2.8	Brown gravel with stones
586757	WS1	U	0.60	14.7	Brown sandy clay
586758	WS2	U	0.70	20.6	Brown sandy clay with stones

Moisture content is part of procedure E003 & is not an accredited test
Insufficient Sample I/S
Unsuitable Sample U/S

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Soil Analysis Certificate - Methodology & Miscellaneous Information
DETS Report No: 22-01543
Herts and Essex Site Investigations
Site Reference: Bird in Hand, West End Lane, London, NW6 4NX
Project / Job Ref: 17185
Order No: 17185
Reporting Date: 24/02/2022

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	Fraction Organic Carbon (FOC)	Determination of TOC by combustion analyser.	E027
Soil	D	Organic Matter (SOM)	Determination of TOC by combustion analyser.	E027
Soil	D	TOC (Total Organic Carbon)	Determination of TOC by combustion analyser.	E027
Soil	AR	Exchangeable Ammonium	Determination of ammonium by discrete analyser.	E029
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