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Geotechnical Assessments | Environmental Assessments | Desktop Studies | Contamination Analysis

ENVIRONMENTAL REPORT

Site Address:	Monks Green Farm Mangrove Lane Brickendon Hertford, Herts SG13 8QL
Report Date:	November 2023
Project No.:	18625
Prepared for:	Monks Green Farm Ltd
Planning Application	East Herts Council - 3/20/1648/FUL

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APPENDIXES

TABLES AND FIGURES

LIST OF ABBREVIATIONS

BGS	British Geological Society
CIRIA	Construction Industry Research and Information Association
EA	Environment Agency
GL	Ground Level
GW	Groundwater
HESI	Herts & Essex Site Investigations
LAPPC	Local Authority Pollution Prevention and Control
NOS	Not Otherwise Specified (waste material)
NHBC	National House-Building Council
OS	Ordnance Survey
PAH	Poly Aromatic Hydrocarbons
SPZ	Source Protection Zone
TPH	Total Petroleum Hydrocarbons
UFST	Underground Fuel Storage Tanks

GENERAL NOTES

This report has been prepared based on the findings of investigations into the site conditions using current available data which has been recovered from Envirocheck to provide environmental data in relation to the site and surrounding area. Where possible, local sources have been researched to gain a better understanding of the site conditions. As part of this review, research has been undertaken with the Local Authority and the Environment Agency as to the site condition.

We can confirm that this report has been prepared based on the information gained and that this information is not exhaustive, and that subsequent research may reveal additional facts that may influence the reporting. Where possible, this information has been researched.

All geological information has been researched using the British Geological Society website, (the geology viewer). The disclaimer associated with this portal confirms 'The British Geological Society accept no responsibility for omissions or misinterpretations of the data from their Data Bank as this may be old or obtained from Non-BGS sources and may not represent current interpretation.

The accuracy of map extracts cannot be guaranteed, and it should be recognized that different conditions on site may have existed between subsequent to the various map surveys.

We can confirm that within the assessment of the site, various websites have been visited and as such, we cannot confirm the validity of these sites and as such, this information is accepted de facto and without prejudice. Anyone relying on these sources does so at their own risk, however, Herts & Essex Site Investigations does undertake all reasonable care to ensure this data is relevant and correct.

It should be confirmed that the extent of review of this report has undertaken a broad review of on site features which would promote a contamination ground risk, however, this does not include ecological features and in particular Japanese Knotweed which should be reviewed under separate cover.

A review of the site will be made to confirm the extent of obvious Asbestos product or sheet materials either on the surface of the site soils or evident above ground, however, does not constitute a full Asbestos Survey by any means. This should be sought under separate cover.

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 Signature / Date*
1	Final	December 2023		

SUMMARY

Client	Monks Green Farm Ltd
Site Location	Monks Green Farm Mangrove Lane Brickendon Hertford Herts SG13 8QL
Existing Development	Storage barn
Proposed Development	Conversion of an agricultural building to two separate C3 residential units, containing 4 x 1 bed units and 1 x 5 bed unit with associated extra parking and communal gardens
Site Settings and Previous Uses	The site area is recorded as open land until about 1993 when a poultry barn is recorded within the site area, this remains in place to date, although is currently in use as storage barn. To the east and south of the site area there is grass land in place which is mounded slightly within the southeast. Surrounding the site to the east and south there is woodland in place, which remains in place to date. To the north and west of the site area the open land was developed to form poultry houses to the east, from 1974, and a residential dwelling to the north from 1978.

Geological and Hydrological Profile

Geology		Aquifer Classification
Made Ground	Shallow Made Ground Anticipated	Not Classified
Sand & Gravel	Sand & Gravel	Secondary A Aquifer
London Clay	Clay	Unproductive Stratum

Nearest Surface Water Feature	The nearest surface water feature is recoded as a pond 60 meters to the north west of the site area.
Groundwater Abstractions	The nearest abstraction well is located 1210 meters to the southeast of the site which is recorded for Holiday Sites; Camp Sites and Tourist Attractions: Drinking; Cooking; Sanitary; Washing; (Small Garden)
Source Protection Zone	The site lies within a Zone 3 Source Protection zone.
Potential Sources of Contamination	***Features On Site*** • Storage Barn • Yard / parking area • Mounded soil • Poultry Houses ***Features Off Site*** • Light industrial / storage units
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	***No elevated levels of contamination are recorded within the site area.***
Workforce	The lack of human health risk is in place within the site area, will promote a low risk to any workforce within the areas. ***Appropriate PPE / RPE should be worn.***
Groundwater Risks	No sources of risk are recorded in place within the site area - ***risks to groundwater is not in place***
Vapour Risks	Chemical testing of the soils show that no risks are in place. ***Vapour risk is not in place.***
Gas Risks	Based on a pragmatic approach to land gases, we can confirm that the ***classification for ground gas regime is low and classified as CS1.***
Construction Materials	Construction materials have been considered and no risk has been identified directly to any water main pipework developed at the site. • ***Water main pipework can be laid in a conventional 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.***
Further Works	***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.*** ***Maintain a watching brief as follows:-*** It should be noted that this investigation is undertaken in order to identify the extent of contamination as a result of historic and ongoing use. Should any areas of the site be encountered within the development that appear potentially contaminated through visual or olfactory assessment outside that discussed within this report, consultation with ourselves should be undertaken in order to identify the risk associated with the material.

ENVIRONMENTAL ASSESSMENT - PHASE 2

1 Context and Objectives of this report

1.1 Introduction

We have been asked by Monks Green Farm Ltd 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 November 2023.

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.

The assessment of the site in this report have been prepared in accordance with key guidance documents as follows: -

- National Planning Policy Framework.
- British Standards 10175:2011+A2:2017
- Land contamination risk management (LCRM)
- Contaminated Land Report, (CLR11) 11, 'Model Procedures for the Management of Contaminated Land', (2004).
- DEFRA: Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance, (April 2012)
- Environment Agency, (2010) GPLC1 Guidance Principles for Land Contamination.

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 considered. 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

An application is in place with East Herts District Council as follows:-

Application No: 3/20/1648/FUL

Proposal: Conversion of an agricultural building to two separate C3 residential units, containing 4 x 1 bed units and 1 x 5 bed unit with associated extra parking and communal gardens.

Decision Grant Planning Permission subject to Conditions.

Condition 3

The scheme shall include all of the following measures unless the Local Planning Authority dispenses with any such requirement specifically and in writing 1. A Phase I site investigation report carried out by a competent person to include a desk study, site walkover, the production of a site conceptual model and a human health and environmental risk assessment, undertaken in accordance with BS 10175: 2011 Investigation of Potentially Contaminated Sites - Code of Practice.

2. A Phase II intrusive investigation report detailing all investigative works and sampling on site, together with the results of the analysis, undertaken in accordance with BS 10175:2011 Investigation of Potentially Contaminated Sites - Code of Practice. The report shall include a detailed quantitative human health and environmental risk assessment.

3. A remediation scheme detailing how the remediation will be undertaken, what methods will be used and what is to be achieved. A clear end point of the remediation shall be stated, and how this will be validated. Any ongoing monitoring shall also be determined.

4. If during the works contamination is encountered which has not previously been identified, then the additional contamination shall be fully assessed in an appropriate remediation scheme which shall be submitted to and approved in writing by the local planning authority.

5. A validation report detailing the proposed remediation works and quality assurance certificates to show that the works have been carried out in full accordance with the approved methodology shall be submitted prior to [first occupation of the development/the development being brought into use]. Details of any post-remedial sampling and analysis to demonstrate that the site has achieved the required clean-up criteria shall be included, together with the necessary documentation detailing what waste materials have been removed from the site.

Reason

To minimise and prevent pollution of the land and the water environment and in accordance with national planning policy guidance set out in section 11 of the National Planning Policy Framework, and in order to protect human health and the environment in accordance with Policy EQ1 of the adopted East Herts District Plan 2018

3 Site Location and National Grid Reference

The site is located within a rural area of Hertford in Hertfordshire, 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:	Monks Green Farm, Mangrove Lane, Brickendon, Hertford. Herts. SG13 8QL
Site assessed under	Site Owners Request - Aid as part of planning and warranties
Current use of land:	Storage Barn
Previous use of site, (if known)	Former agricultural barn – poultry
Grid Reference	NGR 533490, 208460
Site Area	0.34 Hectares
Local Authority	East Herst District Council
Gradient of the site	The site forms a level area of land with a slightly mounded area within the south east of the site area.
Proximity of Controlled Waters, (if known)	The nearest surface water feature is recorded as 60 meters to the northwest of the site area where there is a pond within the garden of a residential dwelling.

4 Review of Previous Reports or Documents Relating to the Site

4.1 Site Details

- The site is recorded as an existing storage unit.
- The proposals are to Conversion of an agricultural building to two separate C3 residential units, containing 4 x 1 bed units and 1 x 5 bed unit with associated extra parking and communal gardens.
- The site area is recorded as open land until about 1993 when a poultry barn is recorded within the site area, this remains in place to date, although is currently in use as storage barn. To the east and south of the site area there is grass land in place which is mounded slightly within the southeast.
- Surrounding the site to the east and south there is woodland in place, which remains in place to date. To the north and west of the site area the open land was developed to form poultry houses to the east, from 1974, and a residential dwelling to the north from 1978. The nearest surface water feature is recorded as 91 meters to the southeast of the site which is recorded as a pond.
- The nearest surface water feature is recoded as a pond 60 meters to the north-west of the site area.
- The nearest abstraction well is located 1210 meters to the southeast of the site which is recorded for Holiday Sites; Camp Sites and Tourist Attractions: Drinking; Cooking; Sanitary; Washing; (Small Garden)
- The site lies within a Zone 3 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

Features On Site

- Storage Barn
- Yard / parking area
- Mounded soil
- Poultry Houses

Features Off Site

- Light industrial / storage units
-

Table 2 *Pollutant Risk*

Risk Assessment	*Land Use*	*Pollutant*	
Risk Assessment A	***Storage Barn Yard / parking area Mounded soil Light industrial / storage units Poultry Houses***	***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), CO_2, CH_4. ***Soil Sampling Groundwater & 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.

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 of vapours from Groundwater.
- Inhalation Asbestos dust and fibres (from Asbestos within the building);
- Inhalation Asbestos dust and fibres (from asbestos within the soil).

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)
- Groundwater
- Surface water features

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, the proposed investigation was not inhibited in any way and had free access across the site.

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 focus of the investigation was to confirm risks from the site which are detailed as follows: -

- Assessment of possible Asbestos in soils across the site area.
- Targeted sampling to access risk from the storage barn and former use of the area.
- Spatial sampling around the remainder of the site to provide a general assessment.

Initial Investigation – November 2022

- 5 No Competitor Rig Windowless Sampler borehole sunk to a maximum depth of 3.00 meters - Date of Works – November 2023.
- Chemical Sampling and Testing recovered from samples and sent to analytical chemist, (report date 24/11/23).

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

In order 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 residential land use with potential for home grown produce.

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 (m)	Thickness, Range (m)
MADE GROUND	Brick and gravel FILL	0.40m	0.30m
	Loose to compact brown silty clayey topsoil FILL	0.30m	0.30m
	Firm brown clay FILL rare fine brick and flint gravel	0.70 – 1.25m	0.60 - 0.95m
SUPERFICIAL DEPOSITS / LOWESTOFT FORMATION	Soft grey moderately silty CLAY	0.60m	0.20m
	Soft to firm brown mottled dark grey organic CLAY	0.60+ - 0.90m	0.20m
	Medium dense grey slightly claybound GRAVEL	1.80 – 2.70+m	0.60 – 2.10m
	Firm to stiff brown sandy CLAY with occasional flint gravel	2.00m	1.10m
	Firm to stiff mottled brown and grey CLAY	3.00+m	0.30 + – 1.00+m
Ground Water	Window sampler two recorded a slight seepage at 2.00 metres. To date, no long-term monitoring had been completed.		

10 Contamination Assessment

10.1 Contamination

In order 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 LCRM, (Land Contamination Risk Management), for Human Health Risk Assessment. 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 excedance 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 a single zone of development with the following land use: -

Zone 1 ***The Site*** ***Residential Land Use with Homegrown Produce***

A comparison of the data recovered from the sample analysis against the human health risk assessments for Residential Land Use with Homegrown Produce has been completed, the standards used are shown in the table below and where exceedance of the relevant generic guidance values have been identified, if any, these are detailed within Table 6. A complete copy of all the chemical data is recorded within the appendix of this report.

Table 4 *Generic Guidance Values Criteria - Residential Land Use with Home Grown Produce*

Pollutant	Allowable Level (mg/kg^{-1})	Source
Asbestos	Absent /Present	
Inorganic Arsenic	37	S4UL
Beryllium	1.7	S4UL
Cadmium	11	S4UL
Chromium, (III)	910	S4UL
Chromium, (VI)	6	S4UL
Copper	2400	S4UL
Lead	200	At Risk Soils
Mercury, (Elemental)	1.2	S4UL
Mercury, (Inorganic)	40	S4UL
Mercury, (Methyl)	11	S4UL
Nickel	180	S4UL
Selenium	250	S4UL
Vanadium	410	S4UL
Zinc	3700	S4UL
Boron	290	S4UL
TPH, (Total)	>20 required Speciated assessment	

Pollutant	Allowable Level (mg/kg-1)			Source
	1% SOM	2.5% SOM	6% SOM	
Naphthalene	2.3	5.6	13	S4UL
Acenapthylene	170	420	920	
Acenapthene	210	510	1100	
Flourene	170	400	860	
Phenanthrene	95	220	440	
Anthracene	2400	5400	11000	
Flouranthene	280	560	890	
Pyrene	620	1200	2000	
Benzo(a)anthracene	7.2	11	13	
Chrysene	15	22	27	
Benzo(b)flouranthene	2.6	3.3	3.7	
Benzo(k)flouranthene	77	93	100	
Benzo(a)pyrene	2.2	2.7	3	
Indeno(1,2,3-cd)pyrene	27	36	41	
Dibenzo(ah)anthracene	0.24	0.28	0.3	
Benzo(g,h,i)perylene	320	340	350	
Phenols	280	550	1100	LQM/CIEH (S4UL)

Table 5 TPHs - Generic Guidance Values Criteria - Residential Land Use with Home Grown Produce

Pollutant	1% Soil Organic Matter	2.5% Soil Organic Matter	6% Soil Organic Matter	Source
Total Petroleum Hydrocarbons				
Aliphatic Fractions				
EC > 5-6	42	78	160	*S4UL*
EC > 6-8	100	230	530	
EC > 8-10	27	65	150	
EC > 10-12	130	330	760	
EC > 12-16	1100	2400	4300	
EC > 16-35	65000	92000	110000	
EC > 35-44	65000	92000	110000	
Aromatic Fractions				
EC > 5-7	70	140	300	*S4UL*
EC > 7-8	130	290	660	
EC > 8-10	34	83	190	
EC > 10-12	74	180	380	
EC > 12-16	140	330	660	
EC > 16-21	260	540	930	
EC > 21-35	1100	1500	1700	
EC > 33–44	110	1500	1700	
Aliphatic & Aromatic				
EC > 44-70	1600	1800	1900	*S4UL*

Table 6 *Sampling and Testing Schedule*

Site Details					Sample ID					Testing Suite							
Existing Site Use	Proposed Site Use	Chemical Testing Date	stratum sampled	Depth Of Stratum (m b.g.l)	Sample Location	Sample Depth (m)			Justification	HESI Suite 1	PAH's (Speciated)	TPH's (TPHCWG)	Asbestos	DDTs	Type Of Asbestos Identified	Elevated levels of contamination
Storage Barn	Residential dwelling	24/11/23	FILL	0.40	WS1	0.20	- 0.35		Spatial coverage	✓	✓	✓	✓	✓	NONE	
			FILL	0.90	WS2	0.20	- 1.05		Spatial coverage	✓	✓	✓	✓		NONE	
					WS2	0.80	- 0.35		Spatial coverage				✓		NONE	
			FILL	0.70	WS3	0.60	- 0.65		Spatial coverage	✓	✓	✓	✓		NONE	
			CLAY	0.90	WS3	0.80	- 0.85		Spatial coverage				✓		NONE	No elevated levels of contamination
			FILL	0.40	WS4	0.20	- 0.25		Spatial coverage	✓	✓	✓	✓		NONE	
			FILL	0.30	WS5	0.20	- 0.25		Spatial coverage	✓	✓	✓	✓		NONE	
			FILL	1.25	WS5	0.50	- 0.55		Spatial coverage	✓	✓	✓	✓		NONE	
			CLAY	1.50+	WS5	1.25	- 1.30		Spatial coverage				✓		NONE	

* Indicates the value which forms the lowest trigger level.

Where PAH's are additionally tested within the VOC List. the highest values have been taken.

For the purposes of assessment where not stated otherwise Soil Organic Matter values of 2.5% has been used. All measurements are given in mg/kg - Sample not tested for the contaminant

EXPOSURE LEVELS Absent/ Presents

10.3 Sources of Risk within Soils

Based on the information gained, we can confirm the following :-

- ***No elevated levels of contamination have been encountered within the site area.***

We can confirm that the testing completed was undertaken in line with the proposed targeted risk assessment as proposed within the Desk Top Study.

10.3 Land Gas Risks

Considering the potential for Land Gas risks due to mound of soil within the south of the site, Land Gas risk assessments must be considered. These will include the potential for contamination migration from on and off-site sources which may be present in concentrations where risk is recorded.

Land gas monitoring should be specifically targeting the following land uses

Table 7 Land Gas Risk Assessment - Response Zone

Feature	*Targeted Response Zone*	*Location to Target*	*Vapour or Gas risk*
Mound	Made Ground	Site Wide	Land Gases - CO_2, CH_4.

A visual appraisal has been made for any decomposable materials and fuels or organic compounds which may promote a risk, whilst sub-sampling soils at the site for chemical analysis. Based on this review, no visual risks were identified in place.

Testing confirms that there are no significantly high levels of organic matter within the soils. Which confirms a that low risks are in place.

We have considered a number of factors in the assessment and decision making in relation to ground gases which are detailed below which has broadly been derived from RB17, (A Pragmatic Approach to Ground Gas Risk Assessment – November 2012): -

- Conceptual Site Model.
- Soil Type, (made ground, clay, gravel, organic, peat, chalk) in relation to permeability.
- CO_2 and CH_4 concentration.
- O_2 concentration in conjunction with CO_2 and CH_4, (i.e. any other vapours present – hydrocarbons etc which reduce O_2 levels and see no CO_2 gases or methane, therefore what's utlising the O_2).
- Source of ground gas.
- Distance from site.
- Atmospheric Pressure.
- Total Organic Carbon, (where available).
- Groundwater presence / absence.
- Response Zones.
- Variable Stratum.

- Proposed construction.

Based on the above, the following criteria should be considered: -

- An excavation was made within the mound area, the soils encountered were recorded as a sandy clay FILL with brick and concrete fragments, which is unlikely to promote land gases.
- No elevated levels of organic matter are recorded in place.
- The soils below the mound and around the site are clay soil which will reduce any migration potential.
- Any land gases or vapours if in place would dissipate into the air and therefore not impact on the proposed building which will be constructed in the location of the existing building.

Based on this information, we can confirm that the classification for ground gas regime is low and classified as CS1.

10.4 Vapour Risks

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. Chemical testing confirms that no vaporous risks are in place within the site area.

10.5 Human Health Source Conclusions

Risk based on assessments of the site confirm that risk is in place as follows :-

Zone 1 - The Site

Risk Factor	*Is Risks in place*	*Remediation*
Targeted Risks	None	
Spatial Risks	None	
Land Gas Risks	None	
Vapour Risk	None	

10.6 Ground and Surface Water Source

The nearest surface water feature is recorded as 60 meters to the northwest of the site which is recorded as a pond within the garden of a residential dwelling.

The nearest abstraction well is located 1210 meters to the southeast of the site which is recorded for Holiday Sites; Camp Sites and Tourist Attractions: Drinking; Cooking; Sanitary; Washing; (Small Garden)

The site is recorded within a Zone 3 Source Protection Zone.

By examination of the Environment Agency Website, the underlying bedrock is recorded as a Secondary Aquifer.

The nearest abstraction well is located 1210 meters to the southeast of the site which is recorded for Holiday Sites; Camp Sites and Tourist Attractions: Drinking; Cooking; Sanitary; Washing; (Small Garden)

The site is recorded within a Zone 3 Source Protection Zone.

In addition to the above no soils risk are recorded in place within the site area therefore no risk to the ground water is in place.

10.7 Water Main Pipework

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 no elevated levels of contamination have been identified and risk is directly in place to water main pipework. This would suggest that any new water main pipework should be installed using conventional pipework.

Considering the risk to the workforce used in the construction and possible future maintenance of water main pipework, risk is in place based on the standard human health risk, as detailed in Section 10.5. As such, we would suggest that if the site has not undergone full remediation, all water main pipework should be laid in clean corridors to prevent future harm to the workforce used in maintenance of the system. To confirm: -

New water main pipework can be laid in a conventional 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.

10.8 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 has been completed.

Based on the information gained, we can confirm that a classification of DS1-AC1s should be adopted for the site. This would suggest that a conventional cement mix can be used for the development, although testing of the deeper soils should be completed.

11 Source Risk Conclusions

HUMAN HEALTH RISK

No elevated levels of contamination are recorded within the site area.

WORKFORCE

The lack of human health risk is in place within the site area, will promote a low risk to any workforce within the areas. ***Appropriate PPE / RPE should be worn.***

GROUNDWATER RISKS

No sources of risk are recorded in place within the site area - ***risks to groundwater is not in place.***

VAPOUR RISKS

Chemical testing of the soils show that no risks are in place. ***Vapour risk is not in place.***

GAS RISKS

Based on a pragmatic approach to land gases, we can confirm that the ***classification for ground gas regime is low and classified as CS1.***

CONSTRUCTION MATERIALS

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

- ***Water main pipework can be laid in a conventional 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.***

FURTHER WORKS

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.

Maintain a watching brief as follows:-

It should be noted that this investigation is undertaken in order to identify the extent of contamination as a result of historic and ongoing use. Should any areas of the site be encountered within the development that appear potentially contaminated through visual or olfactory assessment outside that discussed within this report, consultation with ourselves should be undertaken in order to identify the risk associated with the material.

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Herts & Essex Site Investigations

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Appendix No	A
Sheet No	1
Job No	18625
Date	Nov 2023

Monks Green Farm Mangrove Lane Brickendon Hertford, Herts SG13 8QL

Site Conceptual Model - Proposed Site Plan

Potential Pathways

Human Heath

1. Direct contact with contaminants in soil/dust or water
2. Inhalation of contaminants through soil/dust/particles
3. Dermal Contact
4. Ingestion of home grown produce
5. Ingestion of contaminated water through water main pipework
6. Inhalation of Land Gases / Vapours From Soils
7. Inhalation of Vapours from Groundwater
8. Migration to off site Adjoining Land Owners

Flora

9. Plant uptake & direct contact with soil

Controlled Surface Water, Ground Water & Abstraction Well

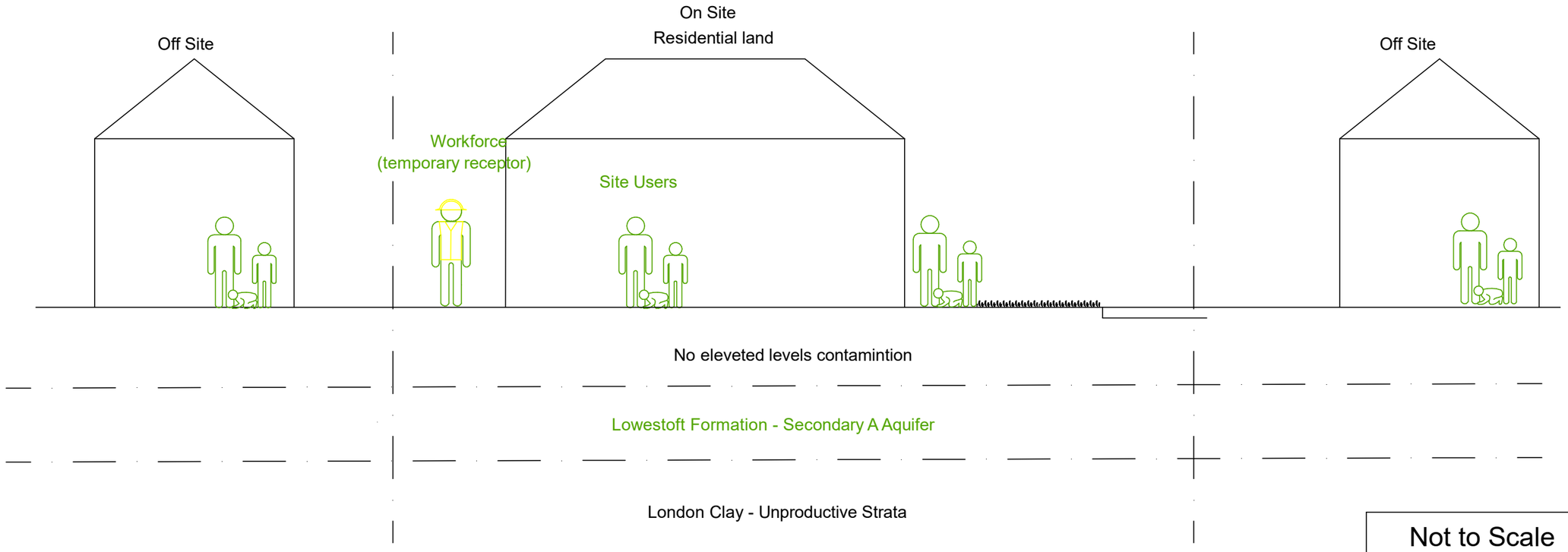
10. Leaching, lateral migration of shallow groundwater to a target receptor

Off Site Sources

A. Migration of contamination to the site area
B. Migration of land gases/ vapours to the site area
C. Migration of contaminated groundwater to the site area

Key

Purple =Possible pathways
Green =Possible receptors
Red =Possible sources



Not to Scale
Sketch No. : ENV / 18625 / A / 01

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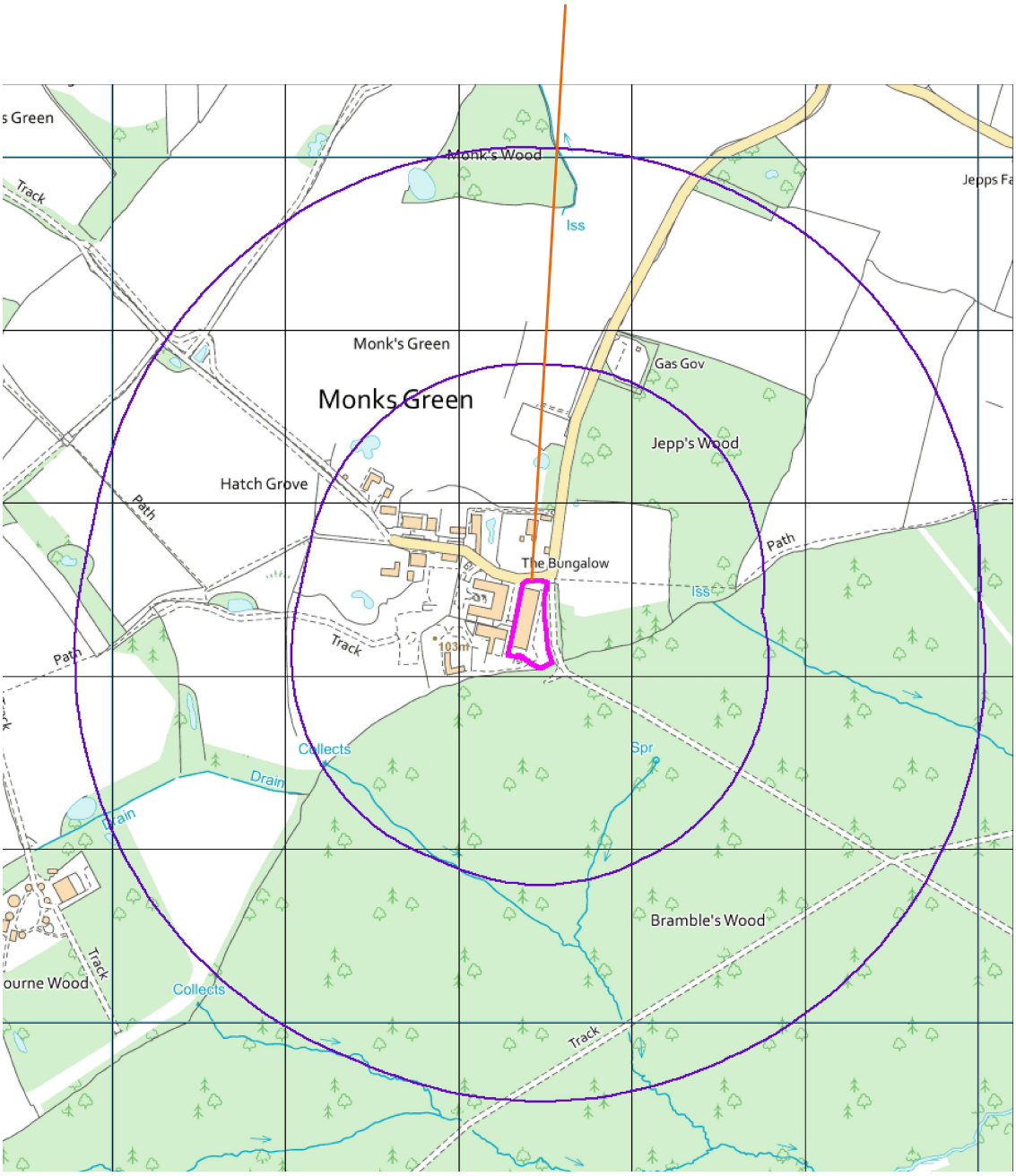
Date	Nov 2023

Monks Green Farm Mangrove Lane Brickendon Hertford, Herts SG13 8QL

Location Plan

N

Site Plan



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Sketch No. : ENV / 18564 / 01 / 01

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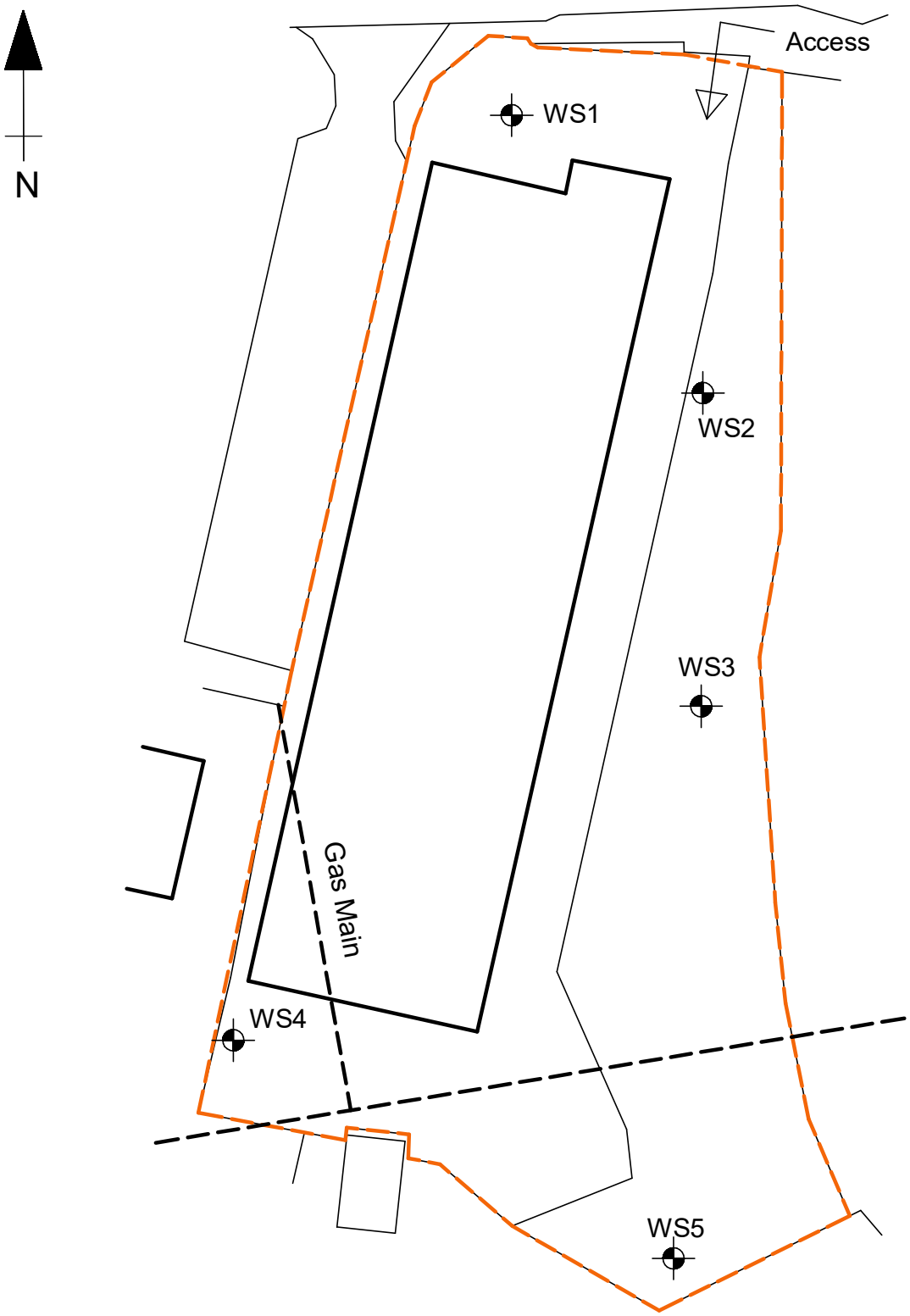
Monks Green Farm Mangrove Lane Brickendon Hertford, Herts SG13 8QL

Existing Site Plan



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Appendix No	1
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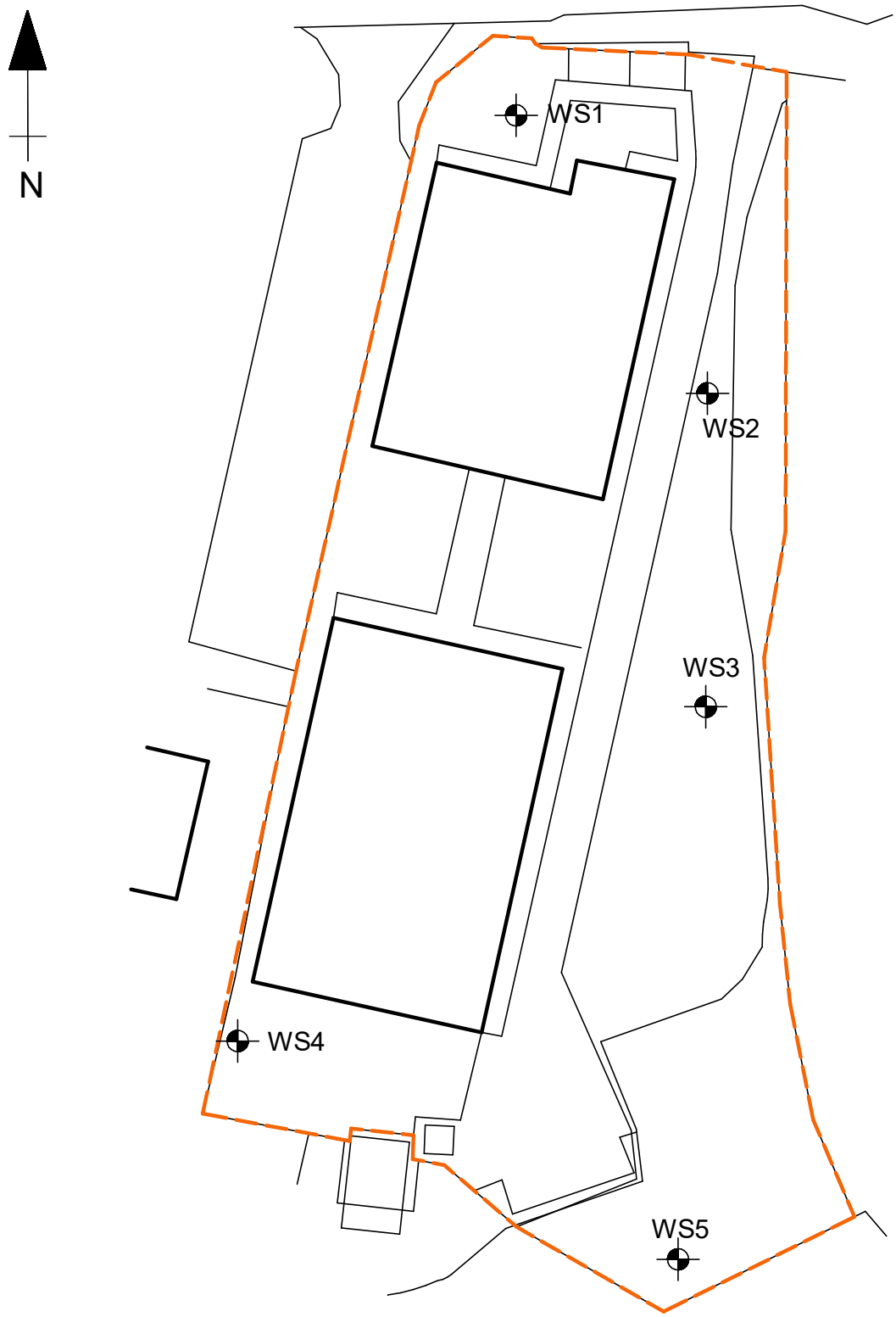
Date	Nov 2023

Monks Green Farm Mangrove Lane Brickendon Hertford, Herts SG13 8QL

Proposed Site Plan



Not to Scale

Sketch No. : ENV / 18564 / 01 / 03

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Appendix No 2
Sheet No 1
Job No 18625
Date Nov 2023

Monks Green Farm Mangrove Lane Brickendon Hertford, Herts SG13 8QL

Window Sample 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)
Concrete		0.10	0.10	DRY	1	U	GL - 1.00				
Brick and gravel FILL		0.40	0.30								
Soft grey moderately silty CLAY		0.60	0.20								
Medium dense grey slightly claybound GRAVEL		2.70	2.10		2	U	1.00-2.00	N=32			1.00
					3	U	2.00 - 3.00	N=46			
Firm to stiff mottled brown and grey CLAY		3.00	0.30				3.00	N=20			
Borehole Complete at 3.00m											

Remarks

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 18625
Date Nov 2023

Monks Green Farm Mangrove Lane Brickendon Hertford, Herts SG13 8QL

Window Sample 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)
Loose brown topsoil FILL		0.10	0.10		1	U	GL - 1.00				
Firm brown clay FILL rare fine brick and flint gravel		0.90	0.80								
1.0 Firm brown mottled grey CLAY		1.20	0.30		2	U	1.00-2.00				1.00
Medium dense brown slightly claybound GRAVEL		1.80	0.60	Slight Seepage							
2.0 Firm to stiff orange brown mottled grey slightly claybound SAND & GRAVEL			1.20	2.00	3	U	2.00 - 3.00	N=30			
3.0 Borehole Complete at 3.00m		3.00					3.00	N=24			

Remarks

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 3
Job No 18625
Date Nov 2023

Monks Green Farm Mangrove Lane Brickendon Hertford, Herts SG13 8QL

Window Sample Three

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)
Loose brown topsoil FILL		0.10	0.10	DRY	1	U	GL - 1.00				
Firm brown clay FILL rare fine brick and flint gravel		0.70	0.60								
Soft to firm brown mottled dark grey organic CLAY		0.90	0.20								
1.0 Firm to stiff brown sandy CLAY with occasional flint gravel		2.00	1.10		2	U	1.00-2.00	N=7			1.00
2.0 Firm brown mottled grey slighlty silty CLAY		3.00	1.00		3	U	2.00 - 3.00	N=12			
3.0 Borehole Complete at 3.00m		3.00					3.00	N=17			

Remarks

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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Sheet No 4
Job No 18625
Date Nov 2023

Monks Green Farm Mangrove Lane Brickendon Hertford, Herts SG13 8QL

Window Sample Four

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)
Concrete		0.10	0.10	DRY							
Compact crushed brick and concrete clayey FILL		0.40	0.30		1	T	0.20				
Soft to firm brown mottled dark grey slightly organic slightly silty CLAY		0.60	0.20		1	T	0.60				
Borehole Complete at 0.60m							3.00	N=17			

1.0
2.0
3.0

Remarks

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 18625
Date Nov 2023

Monks Green Farm Mangrove Lane Brickendon Hertford, Herts SG13 8QL

Window Sample Five

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)
Loose to compact brown silty clayey topsoil FILL		0.30	0.30	DRY	1	T	0.20				
Compact brown sandy clayey FILL with brick and concrete fragments		1.25	0.95		2	T	0.60				
Firm brown sandy CLAY with occasional flint gravel		1.50	0.25		3	T	1.25				
Borehole Complete at 1.50m							3.00	N=17			

1.0
2.0
3.0

Remarks

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)

Sampling Chain of Custody (CoC)

eurofins | Chemtest

Please note that any testing scheduled where a matrix option is not selected may be subject to Non-Conformance.
Failure to complete all sections of this form may delay analysis.

Required Information

Company Name:	Herts and Essex Site Investigations
Company Address:	
	Unit J8, Peek Business Park, Woodside, Bishop's Stortford CM23 5RG
Site Location:	Monks Green Farm Mangrove Lane Brickendon Hertford, Herts SG13 8QL
Project Reference:	18625
PO Number:	As above
Quote Number:	
Project Contact Name(s)	Chris Gray
Project Contact Email(s)	csgray@hesi.co.uk bmccullock@hesi.co.uk
	rchamberlain@hesi.co.uk dhudd@hesi.co.uk
Main Contact:	Chris Gray
Secondary Contact:	Rebecca Chamberlain

Lab Contact Information

Delivery Information:	Eurofins Chemtest Ltd
	12 Depot Road
	Newmarket. CB8 0AL
Contact Information:	Phone: 01638 606070
	Email: cs.team@chemtest.com
	Web: www.chemtest.com

Water Matrix Codes

Ground Water (**GW**)	Treated Sewage (**TS**)	Soils (**S**)
Surface Water (**SW**)	Trade Effluent (**TE**)	Gas (**G**)
Drinking Water (**DW**)	Saline Water (**SA**)	Product (**P**)
Land Leachate (**LE**)	Process Water (**PR**)	Sludge (**SL**)
Prepared Leachate (**PL**)	Recreational Water (**RE**)	Unspecified Solid (**UNS**)
Untreated Sewage (**US**)	Unspecified Liquid (**UNL**)	

Other Codes

Type of Analysis

Suite / Determinand

HESI Suite 1 | TPHs (CWG) | Asbestos (+ quant if found) | DDTS

Sample Information

PLEASE DETAIL BELOW ANY POTENTIAL HAZARDS THAT MAY BE ASSOCIATED WITH THESE SAMPLES
example; Anthrax, Radioactive, Explosives

ANALYSIS REQUIRED (please tick appropriately)

Sample Date	Sample Time	Location	AGS Type	Sample Ref	Sample ID	Top Depth	Bottom Depth	MATRIX CODE	Container Type (see key below)	HESI Suite 1	TPHs (CWG)	Asbestos (+ quant if found)	DDTS
SAMP_DATE	SAMP_TIME	LOCA_ID	SAMP_TYPE	SAMP_REF	SAMP_ID	SAMP_TOP	SAMP_BASE						
17/11/2023		WS1				0.20		S	PT / AJ250	X	X	X	X
17/11/2023		WS2				0.20		S	PT / AJ250	X	X	X	
17/11/2023		WS2				0.80		S	PT			X	
17/11/2023		WS3				0.60		S	PT / AJ250	X	X	X	
17/11/2023		WS3				0.80		S	PT			X	
17/11/2023		WS4				0.20		S	PT / AJ250	X	X	X	
17/11/2023		WS5				0.20		S	PT / AJ250	X	X	X	
17/11/2023		WS5				0.50		S	PT / AJ250	X	X	X	
17/11/2023		WS5				1.25		S	PT			X	

Client's signature:

Date of Collection

Container Key:

PB - 1L Plastic Bottle	V - 40ml Vial
AB - 1L Winchester	PT - Plastic Tub
AJ - 60/250 Amber Jar	TT - Tenax Tube

Lab Use Only

Consignment Condition:	Received by:
Arriving Temperature:	Date and time:

Turnaround Time Agreed:

3	5	7	10
WAC 5	WAC 7	Other:	

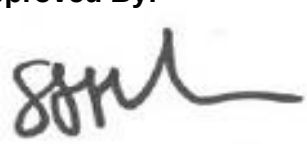
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	23-38412-1
Initial Date of Issue:	24-Nov-2023
Re-Issue Details:	
Client	Herts & Essex Site Investigations
Client Address:	Unit J8 Peek Business Park Woodside Bishops Stortford Hertfordshire CM23 5RG
Contact(s):	Ben McCullock Chris Gray Dafydd Hudd Rebecca Chamberlain
Project	18625 Monks Green Farm Mangrove Lane Brickendon Hertford

Quotation No.:		**Date Received:**	17-Nov-2023
Order No.:	18625	**Date Instructed:**	17-Nov-2023
No. of Samples:	9		
Turnaround (Wkdays):	5	**Results Due:**	23-Nov-2023
Date Approved:	24-Nov-2023		

Approved By:



Details: Stuart Henderson, Technical Manager

Results - Soil

Project: 18625 Monks Green Farm Mangrove Lane Brickendon Hertford

Client: Herts & Essex Site Investigations			Chemtest Job No.:		23-38412	23-38412	23-38412	23-38412	23-38412	23-38412	23-38412	23-38412	23-38412
Quotation No.:			Chemtest Sample ID.:		1733161	1733162	1733163	1733164	1733165	1733166	1733167	1733168	1733169
			Sample Location:		WS1	WS2	WS2	WS3	WS3	WS4	WS5	WS5	WS5
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.20	0.20	0.80	0.60	0.80	0.20	0.20	0.50	1.25
			Date Sampled:		17-Nov-2023	17-Nov-2023	17-Nov-2023	17-Nov-2023	17-Nov-2023	17-Nov-2023	17-Nov-2023	17-Nov-2023	17-Nov-2023
			Asbestos Lab:		NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
ACM Type	U	2192		N/A	-	-	-	-	-	-	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	11	12		13		17	13	16	
Stones and Removed Materials	N	2030	%	0.020	< 0.020	< 0.020		< 0.020		< 0.020	< 0.020	< 0.020	
Soil Colour	N	2040		N/A	Brown	Brown		Brown		Brown	Brown	Brown	
Other Material	N	2040		N/A	Stones	Stones		Stones		Stones	Stones and Roots	Stones	
Soil Texture	N	2040		N/A	Loam	Clay		Clay		Clay	Loam	Clay	
pH at 20C	M	2010		4.0	11.5	9.1		8.9		9.0	8.5	8.5	
Electrical Conductivity (2:1)	N	2020	µS/cm	1.0	830	160		150		170	170	170	
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	0.70	0.91		0.53		1.3	1.3	1.1	
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	0.18	0.099		< 0.010		0.072	< 0.010	< 0.010	
Cyanide (Free)	M	2300	mg/kg	0.50	< 0.50	< 0.50		< 0.50		< 0.50	< 0.50	< 0.50	
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50	< 0.50		< 0.50		< 0.50	< 0.50	< 0.50	
Sulphate (Total)	U	2430	%	0.010	0.30	0.17		0.016		0.19	0.099	0.41	
Arsenic	M	2455	mg/kg	0.5	8.2	7.3		11		8.0	9.0	7.3	
Cadmium	M	2455	mg/kg	0.10	0.26	0.53		0.20		0.18	0.24	0.12	
Copper	M	2455	mg/kg	0.50	20	19		14		22	23	24	
Mercury	M	2455	mg/kg	0.05	0.07	< 0.05		< 0.05		< 0.05	0.05	< 0.05	
Nickel	M	2455	mg/kg	0.50	12	9.8		18		12	9.8	19	
Lead	M	2455	mg/kg	0.50	91	25		29		34	44	19	
Zinc	M	2455	mg/kg	0.50	85	60		57		110	90	59	
Chromium (Trivalent)	N	2490	mg/kg	1.0	18	14		22		19	16	37	
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50		< 0.50		< 0.50	< 0.50	< 0.50	
Aliphatic VPH >C5-C6	U	2780	mg/kg	0.05	< 0.05	< 0.05		< 0.05		< 0.05	< 0.05	< 0.05	
Aliphatic VPH >C6-C7	U	2780	mg/kg	0.05	< 0.05	< 0.05		< 0.05		< 0.05	< 0.05	< 0.05	
Aliphatic VPH >C7-C8	U	2780	mg/kg	0.05	< 0.05	< 0.05		< 0.05		< 0.05	< 0.05	< 0.05	
Aliphatic VPH >C6-C8 (Sum)	N	2780	mg/kg	0.10	< 0.10	< 0.10		< 0.10		< 0.10	< 0.10	< 0.10	
Aliphatic VPH >C8-C10	U	2780	mg/kg	0.05	< 0.05	< 0.05		< 0.05		< 0.05	< 0.05	< 0.05	
Total Aliphatic VPH >C5-C10	U	2780	mg/kg	0.25	< 0.25	< 0.25		< 0.25		< 0.25	< 0.25	< 0.25	
Aliphatic EPH >C10-C12	M	2690	mg/kg	2.00	< 2.0	< 2.0		< 2.0		< 2.0	2.2	< 2.0	
Aliphatic EPH >C12-C16	M	2690	mg/kg	1.00	< 1.0	< 1.0		< 1.0		< 1.0	2.9	< 1.0	
Aliphatic EPH >C16-C21	M	2690	mg/kg	2.00	< 2.0	< 2.0		< 2.0		< 2.0	2.6	< 2.0	
Aliphatic EPH >C21-C35	M	2690	mg/kg	3.00	< 3.0	13		< 3.0		3.1	< 3.0	< 3.0	
Aliphatic EPH >C35-C40	N	2690	mg/kg	10.00	< 10	< 10		< 10		< 10	< 10	< 10	
Total Aliphatic EPH >C10-C35	M	2690	mg/kg	5.00	< 5.0	13		< 5.0		< 5.0	11	< 5.0	

Results - Soil

Project: 18625 Monks Green Farm Mangrove Lane Brickendon Hertford

Client: Herts & Essex Site Investigations			Chemtest Job No.:		23-38412	23-38412	23-38412	23-38412	23-38412	23-38412	23-38412	23-38412	23-38412
Quotation No.:			Chemtest Sample ID.:		1733161	1733162	1733163	1733164	1733165	1733166	1733167	1733168	1733169
			Sample Location:		WS1	WS2	WS2	WS3	WS3	WS4	WS5	WS5	WS5
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.20	0.20	0.80	0.60	0.80	0.20	0.20	0.50	1.25
			Date Sampled:		17-Nov-2023	17-Nov-2023	17-Nov-2023	17-Nov-2023	17-Nov-2023	17-Nov-2023	17-Nov-2023	17-Nov-2023	17-Nov-2023
			Asbestos Lab:		NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Total Aliphatic EPH >C10-C40	N	2690	mg/kg	10.00	< 10	13		< 10		< 10	11	< 10	
Aromatic VPH >C5-C7	U	2780	mg/kg	0.05	< 0.05	< 0.05		< 0.05		< 0.05	< 0.05	< 0.05	
Aromatic VPH >C7-C8	U	2780	mg/kg	0.05	< 0.05	< 0.05		< 0.05		< 0.05	< 0.05	< 0.05	
Aromatic VPH >C8-C10	U	2780	mg/kg	0.05	< 0.05	< 0.05		< 0.05		< 0.05	< 0.05	< 0.05	
Total Aromatic VPH >C5-C10	U	2780	mg/kg	0.25	< 0.25	< 0.25		< 0.25		< 0.25	< 0.25	< 0.25	
Aromatic EPH >C10-C12	U	2690	mg/kg	1.00	< 1.0	< 1.0		< 1.0		< 1.0	< 1.0	< 1.0	
Aromatic EPH >C12-C16	U	2690	mg/kg	1.00	< 1.0	< 1.0		< 1.0		< 1.0	< 1.0	< 1.0	
Aromatic EPH >C16-C21	U	2690	mg/kg	2.00	4.2	< 2.0		< 2.0		< 2.0	2.5	< 2.0	
Aromatic EPH >C21-C35	U	2690	mg/kg	2.00	3.0	4.8		< 2.0		8.9	24	< 2.0	
Aromatic EPH >C35-C40	N	2690	mg/kg	1.00	< 1.0	< 1.0		< 1.0		< 1.0	25	< 1.0	
Total Aromatic EPH >C10-C35	U	2690	mg/kg	5.00	7.2	6.1		< 5.0		11	27	< 5.0	
Total Aromatic EPH >C10-C40	N	2690	mg/kg	10.00	< 10	< 10		< 10		11	52	< 10	
Total VPH >C5-C10	U	2780	mg/kg	0.50	< 0.50	< 0.50		< 0.50		< 0.50	< 0.50	< 0.50	
Total EPH >C10-C35	U	2690	mg/kg	10.00	< 10	19		< 10		14	37	< 10	
Total EPH >C10-C40	N	2690	mg/kg	10.00	< 10	19		< 10		14	62	< 10	
Organic Matter	M	2625	%	0.40	1.7	2.0		1.3		2.6	4.8	0.71	
Naphthalene	M	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10		< 0.10	< 0.10	< 0.10	
Acenaphthylene	M	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10		< 0.10	< 0.10	< 0.10	
Acenaphthene	M	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10		< 0.10	< 0.10	< 0.10	
Fluorene	M	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10		< 0.10	< 0.10	< 0.10	
Phenanthrene	M	2700	mg/kg	0.10	0.94	0.25		0.36		< 0.10	0.74	< 0.10	
Anthracene	M	2700	mg/kg	0.10	0.34	0.13		0.12		< 0.10	0.28	< 0.10	
Fluoranthene	M	2700	mg/kg	0.10	1.6	0.84		0.45		< 0.10	1.8	0.42	
Pyrene	M	2700	mg/kg	0.10	1.7	0.85		0.48		< 0.10	1.9	0.39	
Benzo[a]anthracene	M	2700	mg/kg	0.10	0.62	0.60		< 0.10		< 0.10	1.2	< 0.10	
Chrysene	M	2700	mg/kg	0.10	0.38	0.35		< 0.10		< 0.10	1.5	< 0.10	
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	1.3	0.88		< 0.10		< 0.10	1.8	< 0.10	
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	0.39	0.30		< 0.10		< 0.10	0.82	< 0.10	
Benzo[a]pyrene	M	2700	mg/kg	0.10	0.81	0.49		< 0.10		< 0.10	1.2	< 0.10	
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10		< 0.10	< 0.10	< 0.10	
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10		< 0.10	< 0.10	< 0.10	
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10		< 0.10	< 0.10	< 0.10	
Total Of 16 PAH's	M	2700	mg/kg	2.0	8.1	4.7		< 2.0		< 2.0	11	< 2.0	
Alpha-HCH	N	2840	mg/kg	0.20	< 0.20								
Gamma-HCH (Lindane)	N	2840	mg/kg	0.20	< 0.20								
Beta-HCH	N	2840	mg/kg	0.20	< 0.20								
Delta-HCH	N	2840	mg/kg	0.20	< 0.20								

Results - Soil

Project: 18625 Monks Green Farm Mangrove Lane Brickendon Hertford

Client: Herts & Essex Site Investigations			**Chemtest Job No.:**		23-38412	23-38412	23-38412	23-38412	23-38412	23-38412	23-38412	23-38412	23-38412
Quotation No.:			**Chemtest Sample ID.:**		1733161	1733162	1733163	1733164	1733165	1733166	1733167	1733168	1733169
			Sample Location:		WS1	WS2	WS2	WS3	WS3	WS4	WS5	WS5	WS5
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.20	0.20	0.80	0.60	0.80	0.20	0.20	0.50	1.25
			Date Sampled:		17-Nov-2023	17-Nov-2023	17-Nov-2023	17-Nov-2023	17-Nov-2023	17-Nov-2023	17-Nov-2023	17-Nov-2023	17-Nov-2023
			Asbestos Lab:		NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Heptachlor	N	2840	mg/kg	0.20	< 0.20								
Aldrin	N	2840	mg/kg	0.20	< 0.20								
Heptachlor Epoxide	N	2840	mg/kg	0.20	< 0.20								
Gamma-Chlordane	N	2840	mg/kg	0.20	< 0.20								
Alpha-Chlordane	N	2840	mg/kg	0.20	< 0.20								
Endosulfan I	N	2840	mg/kg	0.20	< 0.20								
4,4-DDE	N	2840	mg/kg	0.20	< 0.20								
Dieldrin	N	2840	mg/kg	0.20	< 0.20								
Endrin	N	2840	mg/kg	0.20	< 0.20								
4,4-DDD	N	2840	mg/kg	0.20	< 0.20								
Endosulfan II	N	2840	mg/kg	0.20	< 0.20								
Endrin Aldehyde	N	2840	mg/kg	0.20	< 0.20								
4,4-DDT	N	2840	mg/kg	0.20	< 0.20								
Endosulfan Sulphate	N	2840	mg/kg	0.20	< 0.20								
Methoxychlor	N	2840	mg/kg	0.20	< 0.20								
Endrin Ketone	N	2840	mg/kg	0.20	< 0.20								
Total Phenols	M	2920	mg/kg	0.10	< 0.10	< 0.10		< 0.10		< 0.10	< 0.10	< 0.10	

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH at 20°C	pH Meter
2020	Electrical Conductivity	Electrical conductivity (EC) of aqueous extract or calcium sulphate solution for topsoil	Measurement of the electrical resistance of a 2:1 water/soil extract.
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2690	EPH A/A Split	Aliphatics: >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35– C40 Aromatics: >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C40	Acetone/Heptane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2780	VPH A/A Split	Aliphatics: >C5–C6, >C6–C7,>C7–C8,>C8-C10 Aromatics: >C5–C7,>C7-C8,>C8–C10	Water extraction / Headspace GCxGC FID detection
2840	Organochlorine (O-Cl) Pesticides in Soils by GC-MS	Organochlorine pesticide representative suite including DDT and its metabolites, 'drins' and HCH etc, plus client specific determinands	Dichloromethane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com