

# ENVIRONMENTAL REPORT

Site Address:	Coles Green Farm Throcking Road Cottered Buntingford Hertfordshire SG9 9RB
Report Date:	July 2023
Project No.:	18369
Prepared for:	Intouch Planning Ltd
Planning Application	East Herts Council 3/22/1887/ARPN



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## 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 'Copyright' within this report including plans and all other prepared documents prepared by Herts & Essex Site Investigations, (HESI), is owned by HESI and no such report, plan or document may be reproduced, published or adapted without their written consent. Complete copies of this report may, however, be made and distributed by the client as an expedient in dealing with matters relating to this commission.

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

<i>Issue No</i>	<i>Status</i>	<i>Date</i>	<i>Prepared by: Rebecca Chamberlain Signature / Date</i>	<i>Technical review by: Chris Gray Signature / Date</i>
1	Final	August 2023		



**SUMMARY**

Client	Intouch Planning Ltd																
Site Location	Coles Green Farm, Throcking Road, Cottered, Buntingford, Hertfordshire. SG9 9RB																
Existing Development	Farm barn																
Proposed Development	Residential dwelling and associated landscaping																
Site Settings and Previous Uses	The site area is recorded as open land until about 1975 when barns are recorded within the site area, which remain in place to date.																
	Surrounding the site to the east and south east a farm yard is recorded in place from 1975 and again remains in place to date.  No other significant features are recorded surrounding the site, some distance from the site ponds were recorded in place and were possibly infilled, although due to the time that has passed the distance from the site and the areas remaining open land risk to the site are reduced.																
Geological and Hydrological Profile	<table border="1"> <thead> <tr> <th colspan="2">Geology</th> <th colspan="2">Aquifer Classification</th> </tr> </thead> <tbody> <tr> <td>Made Ground</td> <td>Shallow Made Ground Anticipated</td> <td colspan="2">Not Classified</td> </tr> <tr> <td>Lowestoft Formation</td> <td>Chalky till, together with outwash sands and gravels, silts and clays</td> <td>Secondary Undifferentiated</td> <td>Aquifer</td> </tr> <tr> <td>New Pit Chalk</td> <td>Chalk</td> <td colspan="2">Principle Aquifer</td> </tr> </tbody> </table>	Geology		Aquifer Classification		Made Ground	Shallow Made Ground Anticipated	Not Classified		Lowestoft Formation	Chalky till, together with outwash sands and gravels, silts and clays	Secondary Undifferentiated	Aquifer	New Pit Chalk	Chalk	Principle Aquifer	
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Lowestoft Formation	Chalky till, together with outwash sands and gravels, silts and clays	Secondary Undifferentiated	Aquifer														
New Pit Chalk	Chalk	Principle Aquifer															
Nearest Surface Water Feature	The nearest surface water feature is recorded as 9 meters to the south of the site which is recorded as a ditch which extends away from the site.																
Groundwater Abstractions	The nearest abstraction well is located 1453 meters to the north of the site which is recorded as a Private Water Undertaking: General Farming and Domestic.																
Source Protection Zone	The site lies within a Zone 3 Source Protection Zone																
Potential Sources of Contamination	<table border="0"> <tr> <td style="vertical-align: top;"> <p><b>Features On Site</b></p> <ul style="list-style-type: none"> <li>• Farmyard</li> <li>• Barns</li> <li>• Private workshop</li> <li>• Possible asbestos sheeting</li> </ul> </td> <td style="vertical-align: top; padding-left: 20px;"> <p><b>Features Off Site</b></p> <ul style="list-style-type: none"> <li>• None</li> </ul> </td> </tr> </table>	<p><b>Features On Site</b></p> <ul style="list-style-type: none"> <li>• Farmyard</li> <li>• Barns</li> <li>• Private workshop</li> <li>• Possible asbestos sheeting</li> </ul>	<p><b>Features Off Site</b></p> <ul style="list-style-type: none"> <li>• None</li> </ul>														
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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	<p>Risks have been recorded within the soil at the site as follows</p> <ul style="list-style-type: none"> <li>o Upper hardcore / gravel FILL - Asbestos contamination - Chrysotile –BH1, BH2, BH3.</li> <li>o Lower clay FILL - Asbestos contamination - Chrysotile –BH1 @ 0.30m.</li> <li>o Upper and lower FILL –PAHs - in the location of BH2, BH3 and BH4.</li> </ul> <p>Based on the location of the risks and the small size of the site <b>widespread</b> risk from <b>Asbestos and PAHs</b> has been classed as in place within the <b>FILL</b>.</p>
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. <b>Appropriate PPE / RPE should be worn and the soil contamination risk should be noted within any site inductions. This is particularly relevant to the Asbestos risks.</b>
Groundwater Risks	Due to the presence of a significant depth of clay across the site, <b>risks to groundwater are generally considered low.</b>
Vapour Risks	Chemical testing of the soils show that low risks are in place. Vapour risk is not in place.
Gas Risks	Land Gases risks are recorded as low within the site area.
Construction Materials	<p>Water main pipework has been considered and risk has been identified directly to any water main pipework developed at the site.</p> <p>Water main pipework can be laid in a protective pipework system.</p> <p>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.</p>
Further Works	<p>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.</p> <p>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 &amp; CLR 11).</p>

## ENVIRONMENTAL ASSESSMENT - PHASE 2

### **1 Context and Objectives of this report**

#### **1.1 Introduction**

We have been asked by Intouch Planning 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 July 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 Council as follows:-

3/22/1887/ARPN

Change of use of agricultural barn to two one-bedroom dwellings with alterations to fenestration and openings.  
Demolition of workshop and store.

Prior Approval is Required and Granted Subject to Conditions

The following condition is in place.



3 The development hereby permitted shall not begin until a scheme to deal with contamination of land/ground gas/controlled waters has been submitted to and approved in writing by the local planning authority. The scheme shall include all of the following measures, unless the local planning authority dispenses with any such requirement specifically 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 Cottered to the west of Buntingford 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**

<i>Site Address:</i>	Coles Green Farm, Throcking Road, Cottered, Buntingford, Hertfordshire. SG9 9RB
<i>Site assessed under</i>	Site Owners Request - Aid as part of planning and warranties
<i>Current use of land:</i>	Farm
<i>Previous use of site, (if known)</i>	As above
<i>Grid Reference</i>	NGR 532720, 229940
<i>Site Area</i>	0.04 Hectares
<i>Local Authority</i>	East Herts Council
<i>Gradient of the site</i>	The site and the surrounding area form a level area of land
<i>Proximity of Controlled Waters, (if known)</i>	The nearest surface water feature is recorded as 9 meters to the south of the site area, where a ditch is recorded in place extending away from the site.

#### 4 Review of Previous Reports or Documents Relating to the Site

##### 4.1 Site Details

- The site is recorded as an existing farm barn.
- The proposals are to convert the building to form a residential dwelling and associated landscaping.
- The site area is recorded as open land until about 1975 when barns are recorded within the site area, which remain in place to date.
- Surrounding the site to the east and south east a farm yard is recorded in place from 1975 and again remains in place to date.
- The nearest surface water feature is recorded as 9 meters to the south of the site which is recorded as a ditch which extends away from the site.
- The nearest abstraction well is located 1453 meters to the north of the site which is recorded as a Private Water Undertaking: General Farming and Domestic.
- 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

- Farmyard
- Barns
- Private workshop
- Possible asbestos sheeting

###### Features Off Site

- None

**Table 2**      **Pollutant Risk**

<i>Risk Assessment</i>	<i>Land Use</i>	<i>Pollutant</i>
<b>A</b>	<b>Farmyard</b>	<b>Soil, Groundwater &amp; Vapour Risk</b>
	<b>Barns</b>	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)
	<b>Private workshop</b>	
	<b>Possible asbestos sheeting</b>	<b>Soil Sampling Groundwater &amp; Vapour Assessment</b>
<b>B</b>	<b>Infilled Pond –SE 50m</b>	
	<b>Unknown Filled Ground</b> - NE 26m - SE 44m	Distance and small scale of the feature and the area remaining open land will reduce the risks of migration to the site area.
<b>Spatial Sampling, (General Assessment)</b>	<b>(General)</b>	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
		25-meter Centres In accordance with BS10175: 2011+A2:2017.
		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 Summary 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 workshop area.
- Spatial sampling around the remainder of the site to provide a general assessment.

**Initial Investigation – August 2023**

- 4 No Hand excavated borehole sunk to a maximum depth of between 0.8 -1.00 meters - Date of Works –August 2023.
- Chemical Sampling and Testing recovered from samples and sent to analytical chemist, (report date 17/8/23).

**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**

<i>Stratum</i>	<i>Description</i>	<i>Depth, Range (m)</i>	<i>Thickness, Range (m)</i>
<b>MADE GROUND</b>	Compact dark brown slightly topsoil FILL with rare flint gravel and brick fragments	0.10 –0.20	0.10 –0.20
	Compact dark brown slightly clayey gravel FILL with brick fragments and much ash and clinker	0.30	0.18 - 0.23
	Stiff orange brown slightly silty reworked clay FILL with occasional ash and clinker	0.50	0.20
	Stiff greenish grey brown slightly silty clay FILL with rare black organic seams and fine gravel	0.35 –0.70	0.25 –0.50
<b>LOWESTOFT FORMATION</b>	Stiff orange brown slightly silty CLAY with occasional to much chalk	0.80+ - 1.00+	0.30+ - 0.65+
<b>Ground Water</b>	No ground water was in place at the time of the site works. 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 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 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 (mg/kg <sup>-1</sup> )	Level	Source	Pollutant	Allowable Level (mg/kg-1)			Source
					1% SOM	2.5% SOM	6% SOM	
<b>Asbestos</b>	Absent /Present							
<b>Inorganic Arsenic</b>	37		S4UL	<b>Naphthalene</b>	2.3	5.6	13	
<b>Beryllium</b>	1.7		S4UL	<b>Acenaphthylene</b>	170	420	920	
<b>Cadmium</b>	11		S4UL	<b>Acenaphthene</b>	210	510	1100	
<b>Chromium, (III)</b>	910		S4UL	<b>Flourene</b>	170	400	860	
<b>Chromium, (VI)</b>	6		S4UL	<b>Phenanthrene</b>	95	220	440	
<b>Copper</b>	2400		S4UL	<b>Anthracene</b>	2400	5400	11000	
<b>Lead</b>	200		At Risk Soils	<b>Flouranthene</b>	280	560	890	
<b>Mercury, (Elemental)</b>	1.2		S4UL	<b>Pyrene</b>	620	1200	2000	
<b>Mercury, (Inorganic)</b>	40		S4UL	<b>Benzo(a)anthracene</b>	7.2	11	13	S4UL
<b>Mercury, (Methyl)</b>	11		S4UL	<b>Chrysene</b>	15	22	27	
<b>Nickel</b>	180		S4UL	<b>Benzo(b)flouranthene</b>	2.6	3.3	3.7	
<b>Selenium</b>	250		S4UL	<b>Benzo(k)flouranthene</b>	77	93	100	
<b>Vanadium</b>	410		S4UL	<b>Benzo(a)pyrene</b>	2.2	2.7	3	
<b>Zinc</b>	3700		S4UL	<b>Indeno(1,2,3-cd)pyrene</b>	27	36	41	
<b>Boron</b>	290		S4UL	<b>Dibenzo(ah)anthracene</b>	0.24	0.28	0.3	
<b>TPH, (Total)</b>	>20 required Speciated assessment			<b>Benzo(g,h,i)perylene</b>	320	340	350	
				<b>Phenols</b>	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
<b>Total Petroleum Hydrocarbons</b>				
<b>Aliphatic Fractions</b>				
EC > 5-6	42	78	160	
EC > 6-8	100	230	530	
EC > 8-10	27	65	150	
EC > 10-12	130	330	760	S4UL
EC > 12-16	1100	2400	4300	
EC > 16-35	65000	92000	110000	
EC > 35-44	65000	92000	110000	
<b>Aromatic Fractions</b>				
EC > 5-7	70	140	300	
EC > 7-8	130	290	660	
EC > 8-10	34	83	190	
EC > 10-12	74	180	380	S4UL
EC > 12-16	140	330	660	
EC > 16-21	260	540	930	
EC > 21-35	1100	1500	1700	
EC > 35-44	1100	1500	1700	
<b>Aliphatic &amp; Aromatic</b>				
EC > 44-70	1600	1800	1900	S4UL

Table 6 Sampling and Testing Schedule

Site Details			Sample ID		Testing Suite		Elevated levels of contamination																															
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	Pesticides	Type Of Asbestos Identified	Asbestos by Gravimetry %	Organic Matter %	TPH Total (mg/kg)	Benzo(a)anthracene (mg/kg)	Chrysene (mg/kg)	Benzo(b)fluoranthene (mg/kg)	Benzo(a)pyrene (mg/kg)	Dibenz(a,h)anthracene (mg/kg)																	
Barn Residential dwelling	3/8/23		FILL	0.10	BH1	0.05 - 0.10	Spatial coverage							Fibres/Clumps Chrysotile	0.047	-	-	-	-	-	-	-																
			FILL	0.35	BH1	0.30 - 0.35	Farm land								Fibres/Clumps Chrysotile	0.001	2.1	27	0.66	0.67	0.72	0.62	<0.10															
			FILL	0.20	BH2	0.15 - 0.20	Spatial coverage								Fibres/Clumps Chrysotile	0.013	-	-	-	-	-	-	-	-														
			FILL	0.70	BH2	0.35 - 0.40	Farm Yard								NONE		2.0	160	0.44	0.57	0.63	1.1	0.38															
			FILL	0.30	BH3	0.15 - 0.20	Spatial coverage								Fibres/Clumps Chrysotile	0.015	-	-	-	-	-	-	-	-														
			FILL	0.50	BH3	0.35 - 0.40	Workshop & Farm Yard								NONE		2.1	31	20	21	26	23	3.7															
			FILL	0.30	BH4	0.25 - 0.30	Workshop & Farm Yard								NONE		4.5	1100	31	30	46	38	5.9															
			CLAY	0.80+	BH4	0.35 - 0.40	Spatial coverage								NONE		-	-	-	-	-	-	-	-														
<p>* 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</p>															EXPOSURE LEVELS		Absent/Presents		0.001%		1%		2.5%		6%		50 – water main and possible vapour risk		7.2		15		2.6		2.2		0.24	

### 10.3 Sources of Risk within Soils

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

- Upper hardcore / gravel FILL - **Asbestos** contamination - **Chrysotile –BH1, BH2, BH3.**
- Lower clay FILL - **Asbestos** contamination - Chrysotile –**BH1 @ 0.30m.**
- Upper and lower FILL – **PAHs** - in the location of **BH2, BH3 and BH4.**

### 10.4 Human Health Source Conclusions

Due to the small size of the site and the mixture of contamination is in place from asbestos in some locations and PAHs within some of these locations as well as additional locations, we would suggest that the risk is classed as widespread across the site. Additional testing to isolate risks and segregation of the areas while completing muck away are likely to be uneconomical. Therefore risk based on the assessments of the site confirms the follows: -

**Table 7 Soil Contamination Risks**

<i>Risk Factor</i>	<i>Risks in place</i>	<i>Remediation</i>
<b>Targeted Risks</b>	None	None
<b>Spatial Risks</b>	<b>Asbestos &amp; PAH's</b>	Remediation action required. Assumed as Widespread

### 10.5 Ground and Surface Water Source

The nearest surface water feature is recorded as 9 meters to the south of the site which is recorded as a ditch which extends away from the site.

The nearest discharge consent is recorded 157 meters to the south east of the site, for Sewage Discharges - Final/Treated Effluent - Not Water Company.

No pollution incident to controlled waters are recorded surrounding of the site area.

The published Environment Agency Groundwater Vulnerability Map of the area indicates the site to be located within an area classified as a Secondary Aquifer Undifferentiated. The underlying geology is recorded as a Principal Aquifer within the Chalk.

The nearest abstraction well is located 1453 meters to the north of the site which is recorded as a Private Water Undertaking: General Farming and Domestic.

The site lies within a Zone 3 Source Protection Zone.

Within the site area no groundwater was encountered and a clay soils was recorded in place below the fill across the site area.

Risk from *Asbestos and PAH's promote low risk to groundwater.*

Considering the above, we can confirm that the likely current and historical impact of pollution on a groundwater system underlying the site will be minimal due to the presents of clay and the absence of a groundwater system or controlled surface water features.

### 10.6 Land Gas Assessments

To the north east of the site 26 meters and south east 44 meters, some infilled land is recorded in place, this is likely to form small ponds as seen within the historical mapping. Due to the small scale of these features and the areas remaining open land the likelihood of risk migrating to the site area are low.

Clay soils have been recorded access to the site area as such the migration potential to the site form the above sources are additional reduced.

No significant depths of made ground are recorded within the site, and although there was some slightly organic seams with the clay the levels of organic matter within the site was recorded as below 4.5%. A visual appraisal has been made for any decomposable materials and fuels or organic matter 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.

### 10.7 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 8 Vapour Risk Assessment - Response Zone**

<i>Feature</i>	<i>Targeted Response Zone</i>	<i>Location to Target</i>	<i>Vapour or Gas risk</i>
<i>Farmyard</i>	Made Ground	Site wide	TPH's
<i>Barns</i>	Made Ground	Site wide	TPH's
<i>Private workshop</i>	Made Ground	Site wide site	TPH's, VOC's

Chemical testing has been completed and no 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.

### 10.8 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 marginal levels of contamination, (In the form of fuels), 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 Protecta-Line 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: -

Water main pipework should be laid in a Protecta-Line 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.

### **10.9 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.

### **10.10 General Source Risk Conclusions**

- Risks have been recorded within the soil at the site as follows
  - o Upper hardcore / gravel FILL - Asbestos contamination - Chrysotile –BH1, BH2, BH3.
  - o Lower clay FILL - Asbestos contamination - Chrysotile –BH1 @ 0.30m.
  - o Upper and lower FILL –PAHs - in the location of BH2, BH3 and BH4.
- Based on the location of the risks and the small size of the site *widespread* risk from *Asbestos and PAHs* has been classed as in place within the *FILL*.
- Groundwater risk is identified as low.
- Land Gas risk area recorded as low.
- No vapour risk area recorded in place.



## 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 9 Risk Assessment A**

Source	Receptors	Pathway	Mitigation / Discussion
<b>TPH's</b>	Site Users, (current and future); Construction Workers; Adjacent Site Users, Fauna.	Direct contact	Levels are NOT above a human health risk
		Ingestion dust and soil	
		Ingestion of soils attached to vegetation	
	Surface Water. Ground Water. Abstraction Well. Plants. Vegetation. Buildings. Construction Materials. Watermain pipework	Inhalation of vapours, (gas and organic)	Levels are NOT above a human health risk
		Ingestion of contaminated water through water main pipework	Remediation required OR Mitigation measure to be installed
		Inhalation of vapours through contaminated ground waters	No groundwater encountered, Clay in place within the site
		Direct contact with contaminated ground waters	Groundwater risk has been identified as low based on the information gained.
		Lateral migration of shallow groundwater to a target receptor.	
		Migration through fissures / cracks which may migrate to a groundwater receptor.	Plant Risks are considered low based on assessments with BS3882:2015.
		Plant uptake. Direct contact.	
Direct contact with contaminated soils;	Remediation required OR Mitigation measure to be installed		
Direct contact with contaminated groundwater	Groundwater risk has been identified as low based on the information gained.		

**Table 10** *Risk Assessment B*

<i>Source</i>	<i>Receptors</i>	<i>Pathway</i>	<i>Mitigation / Discussion</i>	
<b>PAH's</b>	Site Users, (current and future); Construction Workers; Adjacent Site Users, Fauna.	Direct contact	Widespread risk –remediation required	
		Ingestion dust and soil		
		Ingestion of soils attached to vegetation		
		Inhalation of vapours, (gas and organic)		No vapour risk from PAH contamination identified
		Ingestion of contaminated water through water main pipework		No risk in place from PAH contamination identified
		Inhalation of vapours through contaminated ground waters		No vapour risk from PAH.
	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 BS3882:2015.
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.	

*Table 11 Risk Assessment C*

<i>Source</i>	<i>Receptors</i>	<i>Pathway</i>	<i>Mitigation / Discussion</i>
<b><i>Asbestos</i></b>	Site Users, (current and future) Construction Workers; Adjacent Site Users, Fauna.	Inhalation of asbestos fibers	Remediation required

## 12 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.

- o *Where Asbestos is in place, full remediation and validation will be required.*
- o *Maintain a watching brief. Additional sampling has identified no additional risk and as such, the risk from Asbestos will be low.*

**Soft Landscaping** - will form an area where risk is in place and as such, remedial measures are likely to be required.

- o *Where Asbestos is in place, full remediation and validation will be required*

**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 *are likely to* be required for the site. We would suggest that consultation with the relevant statutory authority will be required which may lead to all existing water mains being retained and any new water main installations being in '*Protect-Aline*' pipework.

## 13 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 isolated risk within the site area. although further testing is needed to confirm this.

### 13.1 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 12 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	<p><b>Widespread Risk from PAH's</b></p> <p>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).</p>	Remediation Required	<p>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.</p> <p>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.</p> <p>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.</p>	Validation Works will be required. Validation of the base of excavation and validation of any soils brought onto the site.
	<p><b>ASBESTOS- Widespread Risk</b></p> <p>Remediate asbestos risk or fully excavate the removal of Asbestos materials fragments or fibres and complete full validation sampling to confirm risk is removed.</p> <p>Remediation works should be designed through a REMEDIATION STRATEGY REPORT.</p>	<p><b>ASBESTOS</b></p> <p>Maintain a watching brief through any construction works and ensure all workforce used in the development of the site adhere to strict health and safety regimes in respect to PPE and RPE</p>	<p>1.00m excavation or full removal and replacement of clean inert soils tested to confirm the infilled soils fall below the human health residential land use standards.</p> <p>OR</p> <p>Install Cobblestone layer within the base of the capping layer if fill is in place at the base.</p>	Complete Validation testing to the sides (if pre validation is not completed) and base of the remediation cell.
Hard Landscaping	<p>Hard landscaping will remove any risks through pathway removal. Must be a permanent feature, (not patio's).</p> <p>Patio's should assume a soft landscape finish.</p>	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		
	<p><b>ASBESTOS</b></p> <p>Fully excavate the removal of Asbestos materials fragments or fibres and complete full validation sampling to confirm risk is removed.</p> <p>Remediation works should be designed through a REMEDIATION STRATEGY REPORT.</p>	<p><b>ASBESTOS</b></p> <p>Maintain a watching brief through any construction works and ensure all workforce used in the development of the site adhere to strict health and safety regimes in respect to PPE and RPE</p>	FULLY remove all soils impacted on by Asbestos contamination.	Complete Validation testing to the sides (if pre validation is not completed) and base of the remediation cell.
Under Buildings	The building will remove any risks through pathway removal.	<p><b>ASBESTOS</b></p> <p>Maintain a watching brief through any construction works and ensure all workforce used in the development of the site adhere to strict health and safety regimes in respect to PPE and RPE</p>		
Water Main	<p>Any new water main installations can be installed using Protecta-Line pipework.</p> <p>Any new water main pipework should be laid in clean corridors. Full removal of Asbestos should be completed as identified above</p>	None	None	To Be Confirmed with the relevant statutory authority
Controlled Waters – Surface Water & Ground Water	<p>Groundwater risks removed based on the current site condition.</p> <p>Consider possible future development and pathway creation for contamination to impact on the underlying Secondary Aquifer.</p>			



## 14 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:
  - o Description of the waste
  - o Waste code (using List of Wastes)
  - o Composition of the waste (by testing, if necessary)
  - o WAC testing (if required)

## 14.1 WAC Testing

No WAC Testing has been completed at the site. For full classification of the materials for muck away purposes. In line with best practice, we can confirm that the classification and correct disposal of waste should be adhered to in line with Waste Framework Directive. This will include the classification of the waste, appropriate paperwork to be recorded for disposal routes, confirmation of waste classification upon excavation of the waste and validation of its removal.

## 15 Source Risk Conclusions

### HUMAN HEALTH RISK

The site has identified made ground and potentially contaminated ground. These risks form the following layers and associated contamination: -

- Risks have been recorded within the soil at the site as follows :-
  - o Upper hardcore / gravel FILL - Asbestos contamination - Chrysotile –BH1, BH2, BH3.
  - o Lower clay FILL - Asbestos contamination - Chrysotile –BH1 @ 0.30m.
  - o Upper and lower FILL –PAHs - in the location of BH2, BH3 and BH4.
- Based on the location of the risks and the small size of the site **widespread** risk from **Asbestos and PAHs** has been classed as in place within the **FILL**.

Based on the above, **remedial measures will likely be required areas 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. This is particularly relevant to the Asbestos risks.**

### GROUNDWATER RISKS

Due to the presence of a significant depth of clay across the site, **risks to groundwater are generally considered low.**

### VAPOUR RISKS

Chemical testing of the soils show that low risks are in place. Vapour risk is not in place.

### GAS RISKS

Land Gases risks are recorded as low within the site area.

### CONSTRUCTION MATERIALS

Water main pipework has been considered and risk has been identified directly to any water main pipework developed at the site.

Water main pipework can be laid in a protective 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.

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).

# APPENDIX A

# CONCEPTUAL MODEL

Barn at Coles Green Farm Throcking Road Cottered Buntingford Herts SG9 9RB

Site Conceptual Model - Proposed Site Plan

Potential Pathways

Human Health

- 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

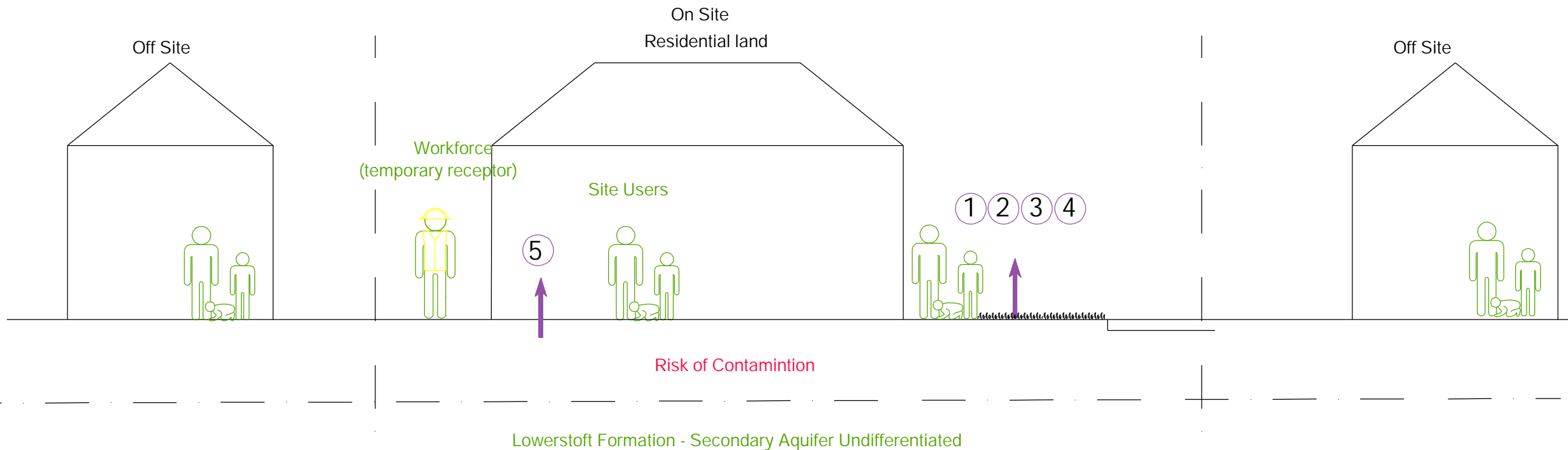
- ⑨ Plant uptake & direct contact with soil
- ⑩ Leaching, lateral migration of shallow groundwater to a target receptor

Controlled Surface Water, Ground Water & Abstraction Well

- 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 / 18369 / 01 / 01

# APPENDIX ONE

# SITE PLANS

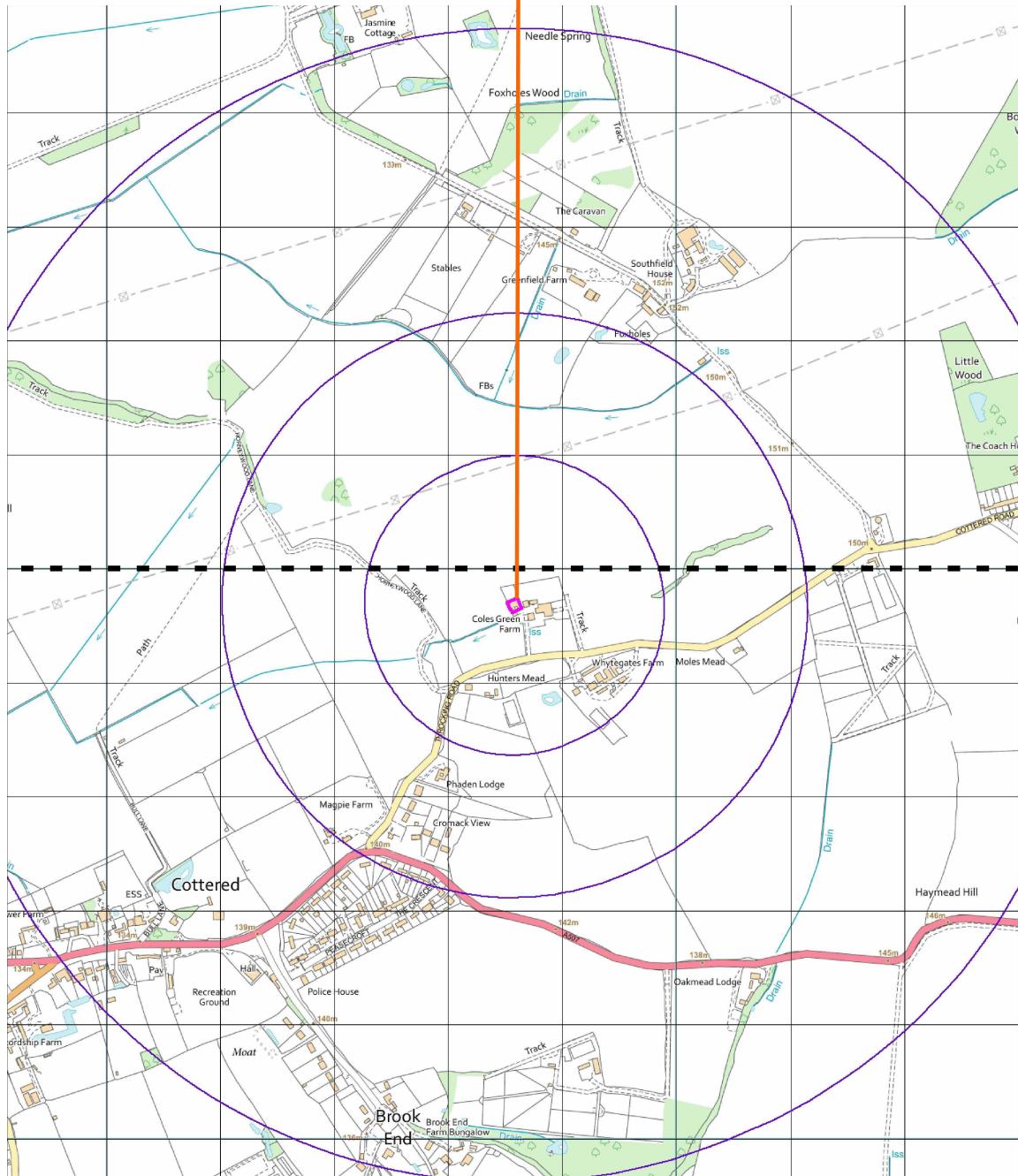


# Barn at Coles Green Farm Throcking Road Cottedred Buntingford Herts SG9 9RB

## Location Plan



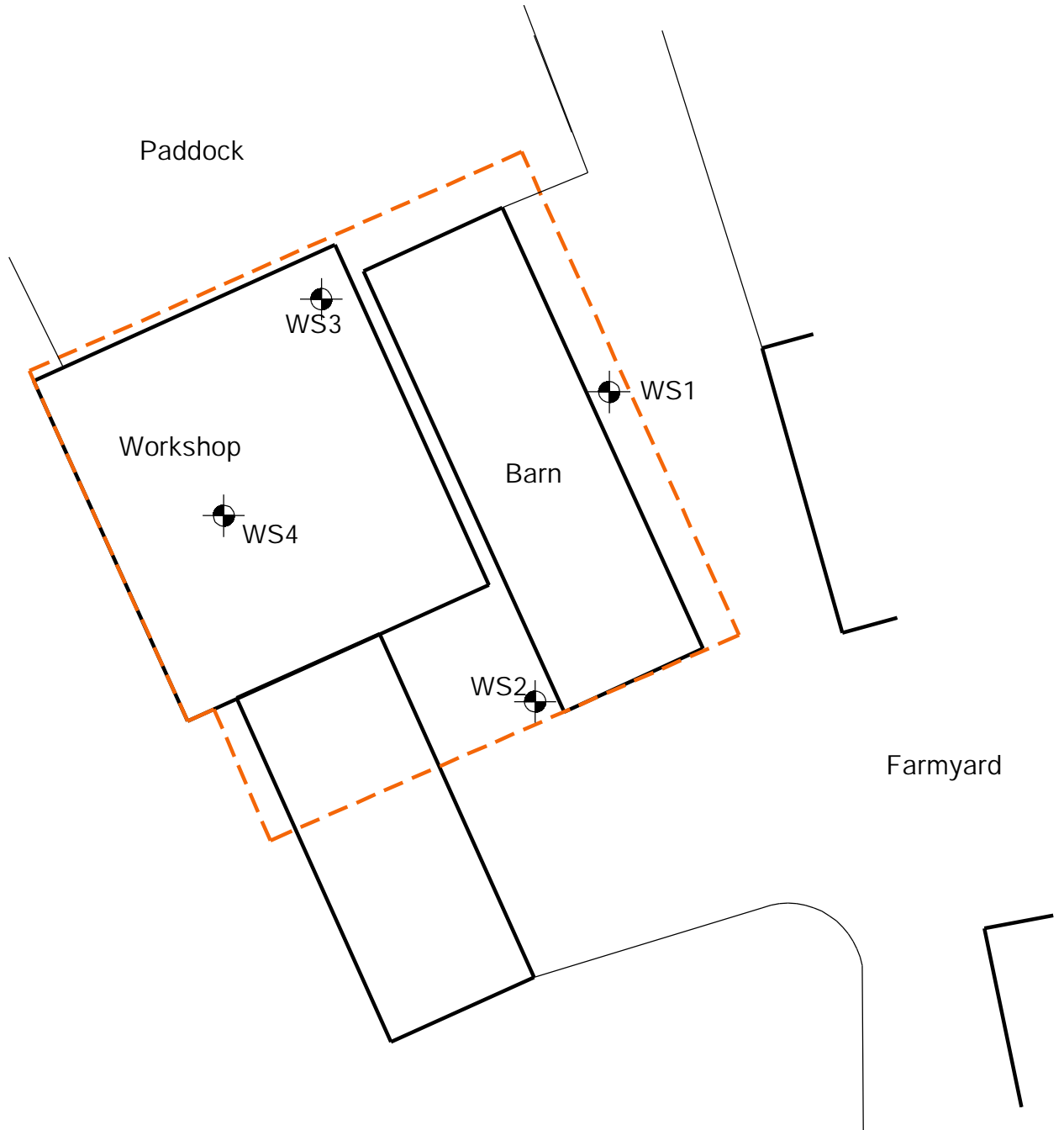
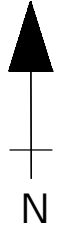
### Site Plan



Not to Scale  
Sketch No. : ENV / 18369 / 01 / 01

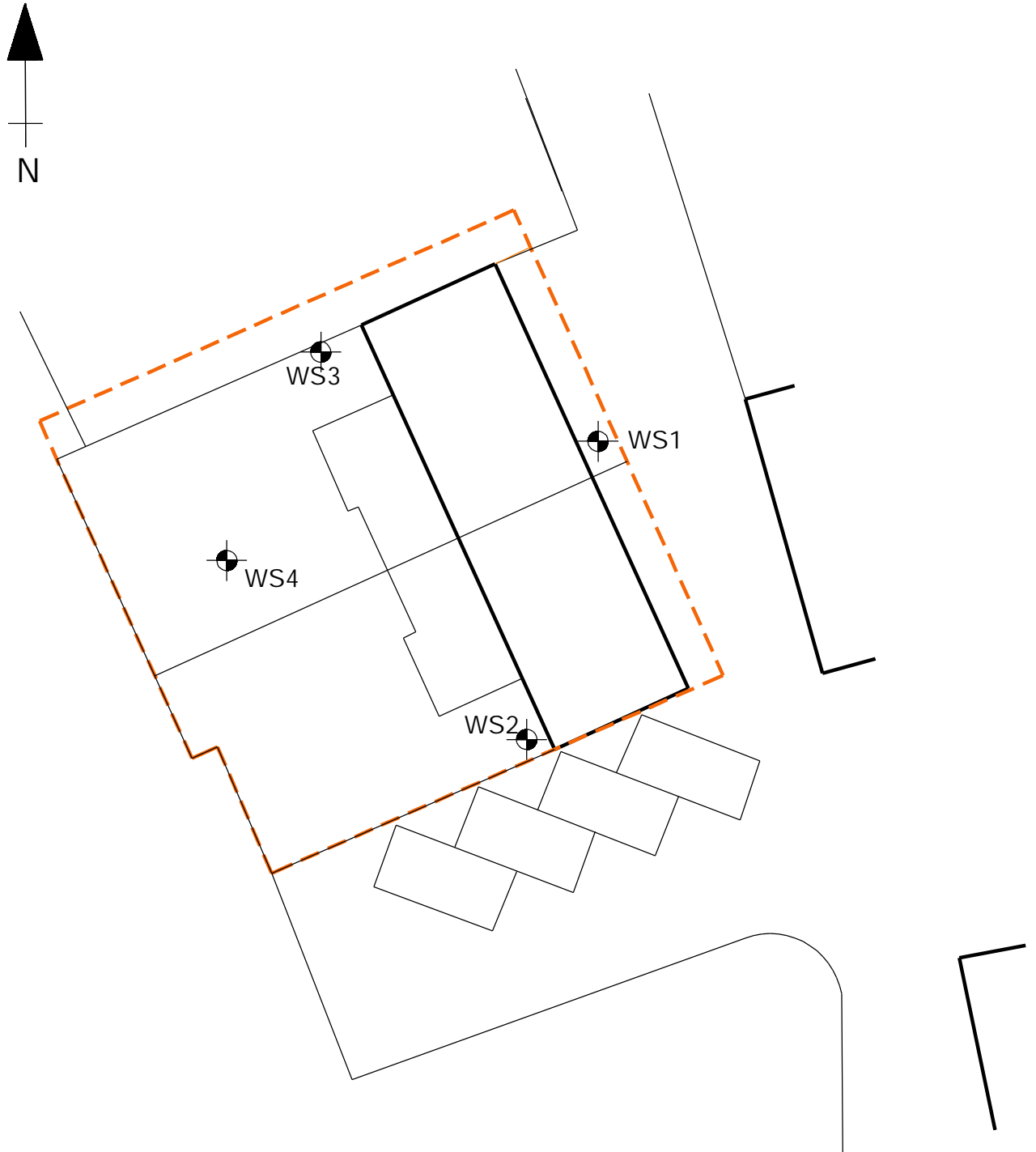
Barn at Coles Green Farm Throcking Road Cottedred Buntingford Herts SG9 9RB

Existing Site Plan



Barn at Coles Green Farm Throcking Road Cottedred Buntingford Herts SG9 9RB

Proposed Site Plan



# APPENDIX TWO

## LOGS


Barn at Coles Green Farm Throcking Road Cottesford Buntingford Herts SG9 9RB


Borehole One

Description Of Stratum	SPT		Samples		Depth (m)	Vane Strength			
	No	Value	No	Type					
Compact dark brown slightly topsoil FILL with rare flint gravel and brick fragments	0.10	0.10	1	T	0.05				
Stiff greenish grey brown slightly silty clay FILL with rare black organic seams and fine gravel	0.3	0.3	2	T	0.30				
Stiff orange brown slightly silty CLAY with occasional to much chalk		0.65							
	1.00								
Borehole Complete at 1.00m									

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.m<sup>2</sup>)


Barn at Coles Green Farm Throcking Road Cottred Buntingford Herts SG9 9RB


Borehole Two

Description Of Stratum	Samples		No	Depth (m)	Vane Strength
Compact dark brown slightly clayey gravel FILL with brick fragments and rare clinker	0.20	0.20	1	T 0.15	
Stiff greenish grey brown slightly silty CLAY with rare black organic seams and fine gravel	0.50	0.50	2	T 0.35	
Stiff orange brown slightly silty CLAY with occasional to much chalk	0.70	0.30			
Borehole Complete at 1.00m	1.00				

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.m<sup>2</sup>)

Barn at Coles Green Farm Throcking Road Cottesford Buntingford Herts SG9 9RB

Borehole Three

Description Of Stratum	[REDACTED]		[REDACTED]		[REDACTED]		[REDACTED]		[REDACTED]	
	No	Depth (m)	No	Depth (m)	No	Depth (m)	No	Depth (m)	No	Depth (m)
Concrete		0.07		0.07						
Compact dark brown slightly clayey gravel FILL with brick fragments and much ash and clinker		0.31		0.31	1	T 0.15				
Stiff orange brown slightly silty reworked clay FILL with occasional ash and clinker		0.50		0.20	2	T 0.35				
Stiff orange brown slightly silty CLAY with occasional to much chalk		0.80		0.30						
Borehole Complete at 0.80m										

Remarks





# APPENDIX THREE

## CHEMICAL TESTING





# Final Report

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**Report No.:** 23-26273-1

**Initial Date of Issue:** 17-Aug-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 McCulloch  
Chris Gray  
Dafydd Hudd  
Rebecca Chamberlain

**Project** 18369 Coles Green Farm Throcking  
Road Cottered Buntingford

**Quotation No.:** **Date Received:** 04-Aug-2023

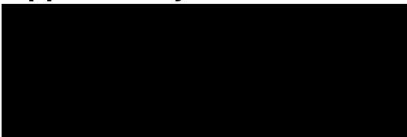
**Order No.:** 18369 **Date Instructed:** 04-Aug-2023

**No. of Samples:** 8

**Turnaround (Wkdays):** 5 **Results Due:** 10-Aug-2023

**Date Approved:** 17-Aug-2023

**Approved By:**



**Details:** Stuart Henderson, Technical  
Manager

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# Results - Soil

**Project: 18369 Coles Green Farm Throcking Road Cottedred  
Buntingford**

Client: Herts & Essex Site Investigations	Chemtest Job No.:		23-26273	23-26273	23-26273	23-26273	23-26273	23-26273	23-26273	23-26273	23-26273
Quotation No.:	Chemtest Sample ID.:		1683708	1683709	1683710	1683711	1683712	1683713	1683714	1683715	
	Sample Location:		BH1	BH1	BH2	BH2	BH3	BH3	BH4	BH4	
	Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	
	Top Depth (m):		0.05	0.30	0.15	0.35	0.15	0.35	0.25	0.35	
	Date Sampled:		03-Aug-2023	03-Aug-2023	03-Aug-2023	03-Aug-2023	03-Aug-2023	03-Aug-2023	03-Aug-2023	03-Aug-2023	
	Asbestos Lab:		COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	
Determinand	Accred.	SOP	Units	LOD							
ACM Type	U	2192		N/A	Fibres/Clumps	Fibres/Clumps	Fibres/Clumps	-	Fibres/Clumps	-	-
Asbestos Identification	U	2192		N/A	Chrysotile	Chrysotile	Chrysotile	No Asbestos Detected	Chrysotile	No Asbestos Detected	No Asbestos Detected
Asbestos by Gravimetry	U	2192	%	0.001	0.047	0.001	0.013		0.015		
Total Asbestos	U	2192	%	0.001	0.047	0.001	0.013		0.015		
Moisture	N	2030	%	0.020		17		13		13	6.5
Stones and Removed Materials	N	2030	%	0.020		< 0.020		< 0.020		< 0.020	< 0.020
Soil Colour	N	2040		N/A	Brown	Brown	Brown	Brown	Brown	Brown	Brown
Other Material	N	2040		N/A	Stones and Roots	Stones	Stones	Stones	Stones	Stones	Stones
Soil Texture	N	2040		N/A	Sand	Sand	Sand	Clay	Sand	Sand	Sand
pH	M	2010		4.0		8.4		8.2		8.4	9.7
Electrical Conductivity (2:1)	N	2020	µS/cm	1.0		190		380		500	800
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40		5.1		2.8		2.3	0.83
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010		0.012		0.057		0.13	0.63
Cyanide (Free)	M	2300	mg/kg	0.50		< 0.50		< 0.50		< 0.50	< 0.50
Cyanide (Total)	M	2300	mg/kg	0.50		< 0.50		< 0.50		< 0.50	1.0
Sulphate (Total)	U	2430	%	0.010		0.27		0.17		0.26	0.26
Arsenic	M	2455	mg/kg	0.5		10		12		11	12
Cadmium	M	2455	mg/kg	0.10		0.11		0.13		0.10	0.10
Copper	M	2455	mg/kg	0.50		16		21		15	25
Mercury	M	2455	mg/kg	0.05		< 0.05		< 0.05		< 0.05	0.07
Nickel	M	2455	mg/kg	0.50		29		32		28	16
Lead	M	2455	mg/kg	0.50		19		130		22	33
Zinc	M	2455	mg/kg	0.50		90		100		88	180
Chromium (Trivalent)	N	2490	mg/kg	1.0		32		34		34	21
Chromium (Hexavalent)	N	2490	mg/kg	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
Aliphatic VPH >C6-C7	U	2780	mg/kg	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
Aliphatic VPH >C6-C8 (Sum)	N	2780	mg/kg	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
Total Aliphatic VPH >C5-C10	U	2780	mg/kg	0.25		< 0.25		< 0.25		< 0.25	< 0.25
Aliphatic EPH >C10-C12	M	2690	mg/kg	2.00		3.6		3.6		4.2	4.3
Aliphatic EPH >C12-C16	M	2690	mg/kg	1.00		1.8		< 1.0		1.3	6.1
Aliphatic EPH >C16-C21	M	2690	mg/kg	2.00		< 2.0		< 2.0		< 2.0	8.4
Aliphatic EPH >C21-C35	M	2690	mg/kg	3.00		3.8		26		7.3	14

# Results - Soil

**Project: 18369 Coles Green Farm Throcking Road Cottered  
Buntingford**

Client: Herts & Essex Site Investigations		Chemtest Job No.:		23-26273	23-26273	23-26273	23-26273	23-26273	23-26273	23-26273	23-26273
Quotation No.:		Chemtest Sample ID.:		1683708	1683709	1683710	1683711	1683712	1683713	1683714	1683715
		Sample Location:		BH1	BH1	BH2	BH2	BH3	BH3	BH4	BH4
		Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):		0.05	0.30	0.15	0.35	0.15	0.35	0.25	0.35
		Date Sampled:		03-Aug-2023	03-Aug-2023	03-Aug-2023	03-Aug-2023	03-Aug-2023	03-Aug-2023	03-Aug-2023	03-Aug-2023
		Asbestos Lab:		COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD							
Aliphatic EPH >C35-C40	N	2690	mg/kg	10.00		< 10		< 10		< 10	< 10
Total Aliphatic EPH >C10-C35	M	2690	mg/kg	5.00		9.1		30		13	33
Total Aliphatic EPH >C10-C40	N	2690	mg/kg	10.00		< 10		30		13	33
Aromatic VPH >C5-C7	U	2780	mg/kg	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
Aromatic VPH >C8-C10	U	2780	mg/kg	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
Aromatic EPH >C10-C12	U	2690	mg/kg	1.00		< 1.0		< 1.0		< 1.0	1.2
Aromatic EPH >C12-C16	U	2690	mg/kg	1.00		< 1.0		< 1.0		< 1.0	29
Aromatic EPH >C16-C21	U	2690	mg/kg	2.00		12		19		11	280
Aromatic EPH >C21-C35	U	2690	mg/kg	2.00		5.2		100		7.2	690
Aromatic EPH >C35-C40	N	2690	mg/kg	1.00		< 1.0		6.7		< 1.0	93
Total Aromatic EPH >C10-C35	U	2690	mg/kg	5.00		17		120		18	1000
Total Aromatic EPH >C10-C40	N	2690	mg/kg	10.00		17		130		18	1100
Total VPH >C5-C10	U	2780	mg/kg	0.50		< 0.50		< 0.50		< 0.50	< 0.50
Total EPH >C10-C35	U	2690	mg/kg	10.00		27		150		31	1000
Total EPH >C10-C40	N	2690	mg/kg	10.00		27		160		31	1100
Organic Matter	M	2625	%	0.40		2.1		2.0		2.1	4.5
Naphthalene	M	2700	mg/kg	0.10		1.5		0.34		1.5	0.84
Acenaphthylene	M	2700	mg/kg	0.10		2.3		0.57		3.1	4.7
Acenaphthene	M	2700	mg/kg	0.10		3.1		0.87		3.2	5.3
Fluorene	M	2700	mg/kg	0.10		0.67		0.38		5.1	5.7
Phenanthrene	M	2700	mg/kg	0.10		0.87		1.1		29	41
Anthracene	M	2700	mg/kg	0.10		0.39		0.23		9.5	16
Fluoranthene	M	2700	mg/kg	0.10		1.0		0.79		43	69
Pyrene	M	2700	mg/kg	0.10		1.3		0.80		41	68
Benzo[a]anthracene	M	2700	mg/kg	0.10		0.66		0.44		20	31
Chrysene	M	2700	mg/kg	0.10		0.67		0.57		21	30
Benzo[b]fluoranthene	M	2700	mg/kg	0.10		0.72		0.63		26	46
Benzo[k]fluoranthene	M	2700	mg/kg	0.10		0.42		0.61		17	18
Benzo[a]pyrene	M	2700	mg/kg	0.10		0.62		1.1		23	38
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10		< 0.10		0.29		14	28
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10		< 0.10		0.38		3.7	5.9
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10		< 0.10		0.62		13	25
Total Of 16 PAH's	M	2700	mg/kg	2.0		14		9.7		270	430
Alpha-HCH	N	2840	mg/kg	0.20				< 0.20			
Gamma-HCH (Lindane)	N	2840	mg/kg	0.20				< 0.20			

## Results - Soil

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Buntingford**

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		Sample Location:		BH1	BH1	BH2	BH2	BH3	BH3	BH4	BH4
		Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):		0.05	0.30	0.15	0.35	0.15	0.35	0.25	0.35
		Date Sampled:		03-Aug-2023	03-Aug-2023	03-Aug-2023	03-Aug-2023	03-Aug-2023	03-Aug-2023	03-Aug-2023	03-Aug-2023
		Asbestos Lab:		COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD							
Beta-HCH	N	2840	mg/kg	0.20			< 0.20				
Delta-HCH	N	2840	mg/kg	0.20			< 0.20				
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	0.17	

## Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	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	Alkaline 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 'Aquamem 600' Discrete Analyser using 1,5-diphenylcarbazine.
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-CI) 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**

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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**

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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**

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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](mailto:customerservices@chemtest.com)