

ERGO

ENVIRONMENTAL LTD

PHASE II GEO-ENVIRONMENTAL SITE ASSESSMENT

**Moor House Farm,
Shincliffe
DH1 2TQ**

Prepared for:

Mr & Mrs Seymour

**Report Ref: 21-871-r2
Date Issued: August 2022**



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EXECUTIVE SUMMARY

Site Address	Land at Moor House Farm, Shincliffe, DH1 2TQ.	
Grid Reference	E429467, N539246.	
Site Area	c. 0.07 Ha.	
Current Site Use	<p>The subject site is a rectangular shaped parcel of land situated immediately to the east of Moor House Farm. The site currently comprises an existing metal and wood clad portal frame agricultural barn with associated hardstanding and peripheral soft-standing.</p> <p>The barn located centrally within the plot is currently used as a storage facility for agricultural vehicles and livestock. A suspected fuel tank was noted in the north of the site. Access to the site is possible via a track on the northern site boundary.</p>	
Proposed Development	ERGO understands that the client intends to convert the agricultural barn for residential end use, with associated car parking, private garden and sewage treatment plant.	
Environmental Setting	<i>Drift Geology</i>	Glacial Till - BGS borehole logs indicate Clay and Sand.
	<i>Bedrock Geology</i>	Pennine Middle Coal Measures - Sandstone, Mudstone, Siltstone.
	<i>Hydrogeology</i>	Undifferentiated aquifer strata overlying a Secondary A Aquifer (Bedrock Geology).
	<i>Hydrology</i>	The nearest surface water feature is an unnamed stream c.178m north of site.
	<i>Flood Risk</i>	The site is located within a Flood Risk Zone 1.
	<i>Subsidence Hazard</i>	No significant hazards were identified in the data searches.
Site History	Available historical mapping suggests that the site remained undeveloped until c. 2006 when the existing barn was constructed.	
Utility Locations	ERGO understand that private water supply is present beneath the building. Further utility infrastructure cannot be ruled out at this time.	
Landfill Sites & Ground Gases	There are no recorded landfills within 250m of the site.	
Radon	Unaffected – no special precautions required.	
Coal Mining	The site is considered to be at Low Risk from shallow coal mining.	
ERGO Intrusive Ground Investigation		
Site Investigation Works	ERGO has completed an intrusive Ground Investigation comprising window sample boreholes and hand excavated trial pits.	
Ground Conditions	<p>Made Ground</p> <p>Limited Made Ground deposits were encountered within the majority of exploratory hole locations to general depths of between 0.15-0.30mbgl, generally comprising brown sandy topsoil with gravels of brick, concrete, sandstone, and mudstone. A yellow gravelly sand was recorded within WS104 and WS105.</p>	

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<p>Ground Conditions (Continued)</p>	<p>The deepest Made Ground was encountered within WS101, in the footprint of the existing structure, to a depth of 1.40mbgl and generally comprised surficial concrete overlying gravelly sand with gravels of sandstone and limestone to 0.50mbgl.in turn overlying a firm reworked clay with gravels sandstone, limestone, coal and rare brick fragments to 1.40mbgl.</p> <p>Drift Natural drift deposits were encountered within all exploratory locations comprising predominantly firm to stiff occasionally very stiff greyish brown slightly sandy gravelly CLAYs to maximum proven depths of 5.45mbgl.</p> <p>Solid Solid bedrock geology was not encountered during this investigation.</p> <p>Groundwater Groundwater was encountered within WS101 at 3.25mbgl and WS105 at 2.50mbgl.</p>
<p>Human Health</p>	<p>A Tier I Human Health Risk Assessment has been undertaken using the chemical analysis results of the soils and comparing to the relevant Tier I criteria.</p> <p>This assessment identified no elevated concentrations of contaminants, furthermore asbestos was not identified within the samples tested.</p> <p>Chemical analysis of the natural clay drift deposits and topsoil have identified these soils to be acceptable for use as topsoil and subsoil within proposed areas of landscaping, however further chemical validation samples may be required to confirm this.</p>
<p>Controlled Waters</p>	<p>The ICSM identified the underlying Secondary A Aquifer as a potential receptor. Following completion of the intrusive investigation which identified limited thicknesses of Made Ground overlying cohesive clay deposits and an absence of visual/olfactory evidence of contamination. Furthermore, concentrations of TPH, BTEX and VOC contaminants within soils adjacent to the AST were negligible and ERGO consider no potential risk to receptors from this feature.</p> <p>ERGO consider there to be negligible risk to Controlled Water receptors and no further assessment is considered to be required.</p>
<p>Ground Gas</p>	<p>No significant sources of hazardous ground gas generation were identified during the Phase I and Phase II investigations and therefore no further action was deemed necessary.</p>

Geotechnical Assessment

<p>Underground Obstructions & Anomalies</p>	<p>Significant cobble/boulder obstructions have been encountered and concrete foundations are present associated with the existing structure.</p>
<p>Foundation Options</p>	<p>Based on the assessment of the relative undrained shear strength, relative in-situ densities and corresponding safe net Allowable Bearing Potential, the suitable target founding stratum has been identified as the underlying firm to very stiff Glacial clays at depths of c.0.90mbgl. given the volume change potential of the underlying clays which should provide an allowable bearing capacity in the order of 100kN/m² for foundations up to 1.00m wide.</p> <p>Foundation depths should take account of the presence of existing and proposed trees with foundations deepened locally, to mitigate the potential for volumetric instability attributed to fluctuations in moisture content, in accordance with the requirements of NHBC standards.</p>



EXECUTIVE SUMMARY


	Subject to appropriate structural assessment it may be possible to utilise the existing foundations however this would need to be confirmed by a Structural Engineer.
Building Slabs Floor	Ground bearing floor slabs are unlikely to be viable given the anticipate depths or reworked Made Ground >600mm and the presence of cohesive soils.
Heave Precautions	The underlying clay is of medium volume change potential, appropriate Heave Precautions will be required to be incorporated in to proposed designs.
Soakaway Drainage	The presence of likely low permeability cohesive clays underlying the site will likely preclude the use of soakaway drainage at the site. If soakaway drainage is to be considered, full BRE365 Testing must be completed to inform the detailed design.
Sulphate Assessment	Concrete classification will be DS1 AC1.
CBR Design %	Granular soils can be re-engineered to ensure 5% within the sub-grade during favourable climatic conditions. Natural clay soils will provide a CBR in the order of 3-5% during drier climatic periods, however If water is allowed to shed onto the formation, the CBR will reduce to <2% which will require specialist engineering of the sub-grade.
Recommendations	Based on the findings of the intrusive site investigation, the following additional works are recommended to be completed in due course:  Approval of this report with Regulators.

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Appendix I Limitations

Appendix II Glossary

Appendix III Drawings

Drawing No 21-871-001 – Site Location Plan

Drawing No 21-871-002 – Proposed Development Layout

Drawing No 21-871-003 – Exploratory Hole Location Plan

Appendix IV ERGO Exploratory Hole Logs

Appendix V Chemical Testing Results

Appendix VI Origin of Tier I Generic Assessment Criteria

Appendix VII Geotechnical Testing Results










1. INTRODUCTION

1.1 Background

ERGO has been commissioned by Mr and Mrs Seymour to undertake a detailed Phase II Geo-Environmental Site Investigation for a parcel of land at Moor House Farm, Shincliffe.

This report is required to determine potential contaminated land liabilities, remediation requirements and geotechnical engineering works that will be required as part of the proposed development for the proposed low rise residential development.

The scope of work consisted of following elements.

-  *Review of previous Desk Study;*
-  *Design of suitable intrusive Ground Investigation;*
-  *Window sample probeholes;*
-  *Hand Excavated Trial Pits to assess existing foundations;*
-  *In-situ Geotechnical Testing;*
-  *Chemical & Geotechnical Laboratory analysis;*
-  *Contamination Risk Assessment & Conceptual Site Model;*
-  *Geotechnical Assessment & Interpretation; and,*
-  *Factual and interpretive reporting.*

1.2 Proposed Development

The client intends to convert the existing barn for residential end use, with associated car parking, private garden area and sewage treatment plant. Drawing 21-871-002 (Appendix III) identifies the proposed development layout.





A snapshot of the proposed development layout is indicated in Figure 1.1:



Figure 1.1 Snapshot of Proposed Development

1.3 Objectives

The objectives of the Geo-Environmental Investigation are to:

-  Undertake a preliminary stage of sampling and analysis to provide an overview of environmental issues identified;
-  Assess the implications of any potential environmental risks, liabilities and development constraints associated with the site in relation to the future use of the site and in relation to off-site receptors;
-  Assess the geotechnical information and provide preliminary recommendations in relation to foundations, pavement construction and floor slabs; and,
-  Provide recommendations regarding future works required.

1.4 Previous Reports

The following phases of Geo-Environmental investigations have previously been carried out at the site:

ERGO: *ERGO Phase I Geo-Environmental Site Investigation, ref: 21-871-r01 dated: March 2021*

The pertinent points of this assessment are summarised in Section 2.0.

1.5 Limitations

The limitations of this report are presented in Appendix I.

1.6 Confidentiality

ERGO has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from ERGO; a charge may be levied against such approval.

2. SUMMARY OF PREVIOUS REPORTS

The pertinent points of the previous reports are summarised below.

2.1 ERGO Phase I Geoenvironmental Investigation

2.1.1 Site Setting

The site is a rectangular shaped parcel of land east of Moor House Farm. The site comprises an existing agricultural barn with associated hardstanding and peripheral landscaping. An AST suspected to contain fuel was noted on the exterior of the structure.

2.1.2 Site History

Historical mapping suggests that the site remained largely undeveloped agricultural land until c. 2006 when the present barn was constructed onsite.

2.1.3 Geology, Hydrogeology & Hydrology

BGS borehole logs within the vicinity of the site record the site to be underlain by Glacial Till overlying the Pennine Middle Coal Measures.

Drift deposits are noted to comprise an Undifferentiated aquifer overlying a Secondary A aquifer (Bedrock).

The nearest watercourse is an unnamed stream c. 178m north of site.

2.1.4 Coal Mining

The site is considered as low risk of coal mining related issues. The Maudlin Coal seam is recorded to outcrop to the south of the site and is inferred to dip away from the site.

2.1.5 Risk Assessment

Human Health

The presence of significant Made Ground thicknesses is considered unlikely, however given the development onsite, the presence of an AST, and the storage of vehicles onsite the presence of contamination cannot be ruled out. Based on the available information the risk to the proposed development from heavy metal PAH, and TPH impact is considered to be low, however, this should be confirmed via intrusive investigation.

Controlled Waters

The presence of a suspected fuel tank within the northern area of the site is considered a potentially significant source of mobile contamination which may migrate towards the underlying Secondary aquifer. The sensitivity of the underlying aquifer is reduced given the expected low permeability drift deposits and the absence of any groundwater abstractions within the vicinity of the site.

The risk to controlled waters is considered low however this should be confirmed during any subsequent intrusive investigation.

Ground Gas

The potential presence of Made Ground and hydrocarbon deposits associated with the AST represent potentially significant sources of hazardous ground gas generation. Based on the available information there is considered to be a low risk, however this should be confirmed during any intrusive investigation works.

3. GROUND INVESTIGATION

3.1 General

A Ground Investigation has been designed based on the findings of the desk study with exploratory holes advanced to target specific potential contaminant sources summarised in Section 2.0. The investigation has also been used to collect geotechnical information to assist in the design and construction of the proposed development.

Exploratory fieldwork was completed between on the 15th July 2022, the works are summarised in Table 3.1 below.

Table 3.1 Summary of Fieldwork

POTENTIAL SOURCE/RATIONALE	LOCATION HOLE	TYPE	MAXIMUM DEPTH (mbgl)
General Ground Conditions including the presence / nature of obstructions.	WS101	Window Sample Probehole	5.45
	WS102		3.45
	WS103		3.45
	WS104		3.00
Investigating potential contamination from AST.	WS105		2.60
Investigation of foundations of existing structure.	HDP01	Hand Excavated Trial Pit	0.40

Window sample probeholes were advanced to undertake in-situ detailed geotechnical testing, obtain environmental samples and install groundwater and ground gas monitoring wells.

A hand excavated trial pit was advanced to investigate the existing foundations and to obtain environmental samples.

The presence of the onsite structure and equipment somewhat restricted access for investigation. The sampling locations are illustrated in Drawing 21-871-003 (Appendix III). The ground conditions encountered are indicated on the logs which are provided in Appendix IV.

3.2 In-Situ Standard Penetration Testing (SPT)



In-situ geotechnical testing was conducted using the Standard Penetration Test (SPT) and where the ground is granular, a 60° cone (SPT(C)) was used instead of the sampling tube. The results are shown in the probehole logs in Appendix IV and presented in Table 4.5 and discussed in Section 4.0.

3.3 Laboratory Analysis

Selected soil samples were submitted for a range of chemical analysis comprising, metals, pH, total sulphate, water soluble sulphate (2:1 extract), total organic content, total and speciated poly-aromatic hydrocarbons (PAHs), SVOCs, VOCs, asbestos and total and speciated petroleum hydrocarbon (TPH).

I2 Analytical undertook the analytical work and the testing results are included in Appendix V and discussed in Section 5.0.

Selected samples were submitted to I2 Analytical where the following geotechnical tests were undertaken:

-  Atterberg Limits Determinations;
-  Moisture Content;

Laboratory analysis sheets are included in Appendix VII and are summarised in Section 4.0.

4. GROUND AND GROUNDWATER CONDITIONS

4.1 Ground and Groundwater Conditions

4.1.1 Summary of Ground Conditions

The Ground Investigation generally confirms the published geology and identifies the strata set out in Table 4.1 below:

Table 4.1 Summary of Strata

STRATA	GENERAL DESCRIPTION	TYPICAL DEPTH (mbgl):				LOCATION
		TOP:		BASE:		
		MIN:	MAX:	MIN:	MAX:	
MADE GROUND	MADE GROUND: Concrete.	0.00	-	0.13	-	WS101
MADE GROUND	MADE GROUND: Brown sandy topsoil.	0.00	-	0.10	0.15	WS102-WS105, HDP101
MADE GROUND	MADE GROUND: Yellow gravelly sand.	0.10	-	0.25	0.30	WS104, WS105
MADE GROUND	MADE GROUND: Light brown gravelly clayey sand.	0.13	-	0.50	-	WS101
MADE GROUND	MADE GROUND: Firm greyish brown sandy gravelly clay.	0.50	-	1.40	-	WS101
CLAY	Firm to stiff brown mottled grey sandy gravelly CLAY.	0.15	1.40	0.40	2.50	WS101-WS105, HDP101
CLAY	Soft brown sandy gravelly CLAY.	0.90	-	1.95	-	WS104
CLAY	Stiff-very stiff greyish brown sandy gravelly CLAY.	0.90	2.20	2.80	5.45	WS101-WS104
SAND	Brown gravelly SAND.	2.50	-	2.60	-	WS105

4.1.2 Made Ground

Limited Made Ground deposits were encountered within all exploratory hole locations to general depths of 0.15-0.30mbgl. with WS101, within the footprint of the existing structure, recording Made Ground to localised depths of 1.40mbgl.

Within the footprint of the building, Made Ground generally comprised surficial concrete overlying gravelly sand with gravels of sandstone and limestone to 0.50mbgl. in turn overlying a firm reworked clay with gravels sandstone, limestone, coal and rare brick fragments to 1.40mbgl.

Within the remaining exploratory holes outside of the building, Made Ground was encountered at depths of between 0.15-0.30mbgl., generally comprising brown sandy topsoil with gravels of brick, concrete, sandstone, and mudstone. A yellow gravelly sand was recorded within WS104 and WS105.

4.1.3 Drift Deposits

Drift deposits were encountered within all exploratory locations comprising predominantly firm to stiff occasionally very stiff greyish brown slightly sandy gravelly CLAYs to maximum proven depths of 5.45mbgl. Localised soft clays were noted in WS104 between 0.90-1.95mbgl.

A brown gravelly very dense SAND was encountered within WS105 between 2.50-2.60mbgl and is considered likely to represent a potential cobble or boulder inclusion.

4.1.4 Solid Geology

Solid bedrock geology was not encountered during this investigation.

4.1.5 Soil Consistency

Undrained shear strength values were measured using field hand shear vane tests. Results of the tests are presented in Table 4.2 below which indicate the clay soils to vary between soft and very stiff. Strength test data is generally consistent with the field descriptions of the soils given above.

Table 4.2 Summary of Hand Shear Vane Tests

DEPTH (m)	SHEAR STRENGTH (kPa)
0.00-1.00	49-72
1.00-2.00	39-130
2.00-3.00	100-130
3.00-4.00	42
4.00-5.00	76

Results of the Standard Penetration Tests, including undrained shear strengths derived from SPTs are included on Table 4.5 (overleaf).

4.1.6 pH and Sulphate

Chemical analyses for pH and soluble sulphate content contained in Appendix VII (summarised below in Table 4.3), shows that the soils at the site meet Class DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1 in accordance with BRE Special Digest 1 (2005).

Table 4.3 Summary of pH and Sulphate Data

LOCATION	DEPTH (m)	SO ₄ IN 2:1 WATER / SOIL (mg/l)	pH VALUE	CLASSIFICATION
WS101	2.00	34	8.5	DS-1, AC-1
WS102	0.70	56	7.9	DS-1, AC-1
WS104	1.00	33	8.4	DS-1, AC-1
WS105	0.50	42	8.0	DS-1, AC-1
WS105	2.00	35	8.4	DS-1, AC-1

4.1.7 Buried Obstructions and Anomalies

During the site investigation 4no. window samples probeholes were terminated prematurely due to SPT refusals between 2.60-3.45mbgl. This may be due to large cobbles or boulders underlying the site or potential shallow bedrock.

A localised area of soft clay was encountered within WS104 between 0.90-1.95mbgl.

The current foundations for the building are noted to extend from ground level to 0.20mbgl and consist of concrete.

4.2 Groundwater Conditions

Groundwater was encountered as strikes and seepages. The depth of the seepages are shown on the exploratory hole records and summarised in Table 4.4.

Table 4.4 **Summary Groundwater Strikes**

LOCATION	DEPTH TO STRIKE (m)	NOTES
WS101	3.25	Water strike
WS101	0.13-0.50	Water perched in MG
WS105	2.50	Seepage in granular strata

Table 4.5 Standard/Cone Penetration Test Results

BOREHOLES	DEPTH (mbgl)	MATERIAL FIELD DESCRIPTION	CPT/SPT "N" VALUE	CORRECTED "N" VALUE (N ₁) ₆₀	TERZAGHI & PECK RELATIVE DENSITY (SANDS)	EUROCODE SOIL STRENGTH	CONSISTENCY (BS5930)	TERZAGHI & PECK APPROXIMATE UNDRAINED SHEAR STRENGTH (kN/m ²)
WS101	1.20	MG: Firm clay	6	5.89	N/A	Low strength	Firm	29.44
WS101	2.00	Stiff CLAY	50	45.68	N/A	Very high strength	Very Stiff	228.38
WS101	3.00	Very stiff CLAY	20	17.39	N/A	High strength	Very Stiff	86.97
WS101	4.00	Very stiff CLAY	17	14.36	N/A	Medium strength	Stiff	71.81
WS101	5.00	Very stiff CLAY	14	11.61	N/A	Medium strength	Stiff	58.07
WS102	1.20	Stiff CLAY	10	9.81	N/A	Medium strength	Stiff	49.06
WS102	2.00	Stiff CLAY	27	24.67	N/A	High strength	Very Stiff	123.33
WS102	3.45	Stiff CLAY	50	43.48	N/A	Very high strength	Very Stiff	217.41
WS103	1.20	Stiff CLAY	8	7.85	N/A	Low strength	Firm	39.25
WS103	2.00	Stiff CLAY	24	21.92	N/A	High strength	Very Stiff	109.62
WS103	3.00	Stiff CLAY	50	43.48	N/A	Very high strength	Very Stiff	217.41
WS104	1.20	Firm CLAY	9	8.83	N/A	Medium strength	Stiff	44.16
WS104	2.00	Stiff CLAY	12	10.96	N/A	Medium strength	Stiff	54.81
WS104	3.00	Stiff CLAY	50	43.82	N/A	Very high strength	Very Stiff	219.10
WS105	1.20	Stiff CLAY	10	9.81	N/A	Medium strength	Stiff	49.06
WS105	2.00	Stiff CLAY	25	22.84	N/A	High strength	Very Stiff	114.19
WS105	2.60	Very dense brown SAND	50	44.2	Dense	N/A	N/A	N/A

4.3 Soil Plasticity

The Liquid and Plastic Limits of samples of natural in-situ clay are determined using the cone penetrometer method and the rolling thread test. These tests enable determination of an average Plasticity Index (PI) for each “type” of clay, although judgement is applied where variable results are reported.

PI can be related to shrinkability (low, medium or high) and then to minimum founding depth. ERGO typically only consider a soil to be shrinkable if the proportion finer than 63µm is >35%.

PI results are compared against guidance given in the NHBC Standards, Chapter 4.2 (revised January 2014), which advocates the use of modified Plasticity Index (I’p), defined as:

$$I'p = Ip * (\% < 425\mu m / 100)$$

ie if PI is 30%, but the soil contains 80% < 425µm, then: I’p = 30 * 80/100 = 24%.

It should be noted that in accordance with the requirements of BS 1377, the % passing the 425µm sieve is routinely reported by testing labs.

ERGO apply engineering judgement where PI results are spread over a range of classifications. Consideration is given to the average values for each particular soil type (ie differentiate between residual soil and alluvium), the number of results in each class and the actual values.

The Atterberg Limits determinations, summarised in Table 4.6 below, show the clay to be of medium plasticity clay.

Table 4.6 Summary of Plasticity Index Test Results

LOCATION	DEPTH (m)	NATURAL MOISTURE CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	PASSING 425µm SIEVE (%)	MODIFIED PLASTICITY INDEX	NHBC VOLUME CHANGE POTENTIAL
WS101	2.00	19	23	46	23	96	22	Medium
WS102	0.70	22	22	44	22	98	21	Medium
WS103	1.50	17	21	39	18	98	17	Low
WS105	0.50	18	21	41	20	96	19	Low

The results of the Atterberg Limits testing confirmed that the soils would be deemed to be predominantly low to medium (medium should be utilised as a minimum for design purposes) Volume Change Potential in accordance with the classification system utilised by the LABC / NHBC industry guidance.

5. TIER I QUALITATIVE CONTAMINATED LAND RISK ASSESSMENT

ERGO has undertaken a Tier 1 qualitative risk assessment to determine if any potential contaminants within the underlying soils and groundwater pose an unacceptable level of risk to the identified receptors.

5.1 Human Health Risk Assessment

At a Tier 1 stage the long term (chronic) human health toxicity of the soil has been assessed by comparing the onsite concentrations of organic and inorganic compounds with reference values published in LQM / CIEH S4UL (S4UL3747).

The results of this comparison have been summarised within Table 5.1.

Table 5.1 Summary of Toxicity Assessment for a Residential End Use

DETERMINANT	UNIT	GAC	N	MC	LOC. OF EX	PATHWAY	ASSESSMENT
Arsenic	mg/kg	37	8	7.4	N/A	1	No Further Action
Cadmium	mg/kg	11	8	0.4	N/A	1	No Further Action
Chromium (VI)	mg/kg	6.1	8	<1.2	N/A	1	No Further Action
Lead	mg/kg	200	8	42	N/A	1	No Further Action
Mercury	mg/kg	40	8	<0.3	N/A	2	No Further Action
Nickel	mg/kg	180	8	64	N/A	1	No Further Action
Selenium	mg/kg	250	8	<1.0	N/A	1	No Further Action
Copper	mg/kg	2400	8	26	N/A	1	No Further Action
Zinc	mg/kg	3700	8	110	N/A	1	No Further Action
Asbestos	Fibres	NFD	6	N/A	N/A	2	No Further Action
Naphthalene	mg/kg	2.3	7	<0.05	N/A	2	No Further Action
Acenaphthylene	mg/kg	170	7	<0.05	N/A	3	No Further Action
Acenaphthene	mg/kg	210	7	<0.05	N/A	1	No Further Action
Fluorene	mg/kg	170	7	<0.05	N/A	1	No Further Action
Phenanthrene	mg/kg	95	7	1	N/A	3	No Further Action
Anthracene	mg/kg	2400	7	0.39	N/A	3	No Further Action
Fluoranthene	mg/kg	280	7	2.4	N/A	3	No Further Action
Pyrene	mg/kg	620	7	1.9	N/A	3	No Further Action
Benzo(a)Anthracene	mg/kg	7.2	7	1.7	N/A	3	No Further Action
Chrysene	mg/kg	15	7	1.4	N/A	3	No Further Action
Benzo(b)Fluoranthene	mg/kg	2.6	7	1.5	N/A	3	No Further Action
Benzo(k)Fluoranthene	mg/kg	77	7	0.51	N/A	3	No Further Action
Benzo(a)Pyrene	mg/kg	2.2	7	1.1	N/A	3	No Further Action
Indeno(123-cd)Pyrene	mg/kg	27	7	0.49	N/A	3	No Further Action
Dibenzo(a,h)Anthracene	mg/kg	0.24	7	0.21	N/A	3	No Further Action
Benzo(ghi)Perylene	mg/kg	320	7	0.5	N/A	3	No Further Action
TPH C5-C6 (aliphatic)	mg/kg	42	6	<0.001	N/A	2	No Further Action
TPH C6-C8 (aliphatic)	mg/kg	100	6	<0.001	N/A	2	No Further Action
TPH C8-C10 (aliphatic)	mg/kg	27	6	<0.001	N/A	2	No Further Action
TPH C10-C12 (aromatic)	mg/kg	74	6	<1.0	N/A	2	No Further Action
TPH C12-C16 (aromatic)	mg/kg	140	6	<2.0	N/A	2	No Further Action
TPH C16-C21 (aromatic)	mg/kg	260	6	12	N/A	1	No Further Action
TPH C21-C35 (aromatic)	mg/kg	1100	6	27	N/A	1	No Further Action

Notes

Main Exposure Pathways: 1 = Soil Ingestion, 2 = Vapour Inhalation (indoor), 3 = Dermal Contact & Ingestion, 4 = Dust Inhalation.
Abbreviations: GAC = General Assessment Criteria, n = number of samples, MC = Maximum Concentration; Loc of Ex = Location of Exceedance; NFD = No Fibres Detected

The Tier 1 GAC for the hydrocarbon fraction is derived from the CIEH assessment for petroleum hydrocarbons Criteria Working Group (CWG) for both aliphatic and aromatic compounds. ERGO has utilised the Tier 1 values for aliphatic compounds for the volatile and semi volatile fractions (C₅-C₁₂) and the Tier 1 values for aromatic compound for the non-volatile fractions (C₁₂-C₃₅). The comparison of a total (aliphatic/aromatic) compounds to an individual fraction is considered to be a conservative approach and satisfactory for the protection of human health.

Referring to Table 5.1, the result of this direct comparison indicates that the data does not exceed the screening criteria for a residential end use for any contaminants.

Asbestos was not identified within any of the samples.

Soils were analysed onsite for VOCs using a photo-ionisation detector, no significant concentrations of VOCs were identified. No significant concentrations were identified within laboratory testing.

Risk Assessment and Mitigation

It is considered that no significant potential unacceptable level of risk will be posed to future residential end users and construction workers based on the identified chemical concentrations within the samples tested.

Preliminary chemical analysis has indicated reworked topsoil and underlying natural cohesive deposits are suitable for re-use within the landscaping areas within the development. However, topsoil deposits recorded minimal amounts of brick and other anthropogenic materials, it is considered with careful management that the proposed development may be constructed with only 150mm topsoil (site won dependent on confirmatory validation analysis) directly overlying natural drift deposits within landscaped areas.

Therefore the proposed development may be constructed with only 150mm topsoil (site won dependent on confirmatory validation analysis) directly overlying natural drift deposits.

5.2 Controlled Waters Risk Assessment

The site sensitivity with respect to controlled waters is summarised within Table 5.2.

Table 5.2 Controlled Waters Sensitivity Profile

RISK PROFILE	DISCUSSION	SENSITIVITY RATING
Groundwater Source Protection Zone or Drinking Water Safeguard Zone	The site is not located within a Groundwater Source Protection Zone or Drinking Water Safeguard Zone.	LOW
Distance to the closest groundwater abstraction point.	There are no recorded groundwater abstraction points within 1km of the site.	LOW
Aquifer Classification in Superficial Drift Deposits.	Secondary Undifferentiated	LOW
Aquifer classification in Bedrock.	The underlying solid deposits are classified as a Secondary A Aquifer.	LOW/MODERATE
Viability for Anthropogenic soil in direct contact with aquifer (drift or bedrock).	No borehole records are available in the vicinity of the site. However, the site is recorded to be underlain by Glacial Till and therefore likely low permeability clays.	LOW/MODERATE
Is the site located within 50m of a surface watercourse?	None recorded within 50m.	LOW
Summary		
The ICSM developed within the context of the site setting identified the potential vertical migration of potentially mobile phase soluble contaminants towards the underlying Secondary A aquifer as the only viable pollutant linkage. However the overall sensitivity of this receptor is reduced given the absence of any groundwater abstraction and thus the potential for the creation of a complete pollutant linkage.		

To further refine the ICSM, ERGO has undertaken an initial qualitative assessment of the soil data analysis to assess the potential for a source of separate phase or dissolved phase contamination originating from either a defined onsite source or from impacted soils. This assessment is summarised in Table 5.3.

Table 5.3 Qualitative Risk to Controlled Waters from Soil Analytical Results

BTEX - > 1mg/kg	Concentrations of BTEX were below the laboratory LOD
Total VOC -> 1mg/kg	Concentrations of VOCs were below the laboratory LOD
Total SVOC -> 1 mg/kg	PAH analysis recorded concentrations either below or only slightly elevated above the laboratory LOD.
C5-C10 -> 5mg/kg	All concentrations are below 5mg/kg.
C10-C12 -> 10mg/kg	All concentrations are below 10mg/kg.
C12-C16 -> 50mg/kg	All concentrations are below 50mg/kg.
Phenols -> 2mg/kg	All concentrations are below the laboratory LOD.
Naphthalene - > 2mg/kg	The most soluble SVOC (Naphthalene) has been not identified at concentrations greater than 2mg/kg.
Total PAH - > 10mg/kg	Low solubility PAH compounds at concentrations in excess of 10mg/kg were recorded within WS104 (0.05mbgl.).
PCB - > 1mg/kg	No potential sources of PCB have been identified.
Heavy metals - > 500mg/kg	Concentrations of heavy metals are all below 500mg/kg.



In due consideration of the ICSM which has identified a potential pollutant linkage associated with potential vertical migration towards the underlying Secondary A Aquifer and following completion of the intrusive investigation which identified limited thicknesses of Made Ground overlying cohesive clay deposits, and an absence of visual/olfactory evidence of contamination, ERGO consider there to be negligible risk to Controlled Water receptors and no further assessment is considered to be required.

Concentrations of TPH, BTEX and VOC contaminants associated with soils in the vicinity of the AST were negligible, therefore the risks posed by this feature are considered to be negligible.

5.3 Ground Gas

The potential impact on the development from ground gases has been assessed with reference to standards and guidelines published in CIRIA Report 665 (*Assessing risks posed by hazardous ground gases to buildings*, 2007).

The Phase I report identified the following potential sources of ground gas:

-  Made Ground Deposits; and,
-  Onsite AST.

The intrusive investigation has identified negligible thicknesses of inert Made Ground are present at the site, with no visual/olfactory evidence of contamination associated with the AST. As such, no significant sources of ground gas generation has been identified and ERGO consider there to be no requirement for further investigation in this respect.

5.4 Revised Conceptual Site Model

Following the completion of the intrusive site investigation, chemical analysis and risk assessment the conceptual model shown in Table 5.4 (overleaf) has been prepared for the site.

Table 5.4 Conceptual Model

PATHWAY	RECEPTOR	CONTAMINANT (SOURCE)	PROBABILITY	RISK	ASSESSMENT AND RECOMMENDATIONS
Dermal contact. Inhalation of soil, fibres and dust.	Future site users and offsite receptors.	ACM within onsite Made Ground	Unlikely	Low	No evidence of asbestos was encountered onsite or within samples sent for laboratory analysis. Based on the findings of the assessment completed the risk from potential asbestos is considered low. Recommendation: Construction workers should be trained in asbestos identification. ERGO should be contacted should unforeseen contamination be identified.
Ingestion of soils, dust and direct contact with contaminated soils	Future site users and offsite receptors.	Heavy Metals, PAH, TPH and BTEX compounds within shallow Made Ground deposits.	Unlikely	Low	No evidence of significant contamination was identified within the samples analysed with respect to the proposed site end use. Furthermore, the proposed development comprising predominantly hard standing impermeable surfaces reducing the likelihood of complete source-receptor pathways. Recommendation: ERGO should be contacted should unforeseen contamination be identified.
Inhalation of gas or volatiles. Migration through permeable strata and preferential pathways. Explosion in confined spaces.	Future site users. Buildings. Offsite land users.	Methane, carbon dioxide or volatile contaminants within onsite and adjacent Made Ground	Unlikely	Low	Following completion of the intrusive phase of investigation it is considered that negligible thicknesses of Made Ground are present at the site with no visual/olfactory evidence of contamination associated with the AST. As such, no significant risk was identified. Recommendation: No further assessment required.
Vertical Migration.	Groundwater (Secondary A Aquifer).	Mobile contaminants within onsite Made Ground	Unlikely	Very Low	The ICSM identified the underlying Secondary A Aquifer as a potential receptor. Following completion of the intrusive investigation which identified limited thicknesses of Made Ground overlying cohesive clay deposits and an absence of visual/olfactory evidence of contamination, ERGO consider there to be negligible risk to

PATHWAY	RECEPTOR	CONTAMINANT (SOURCE)	PROBABILITY	RISK	ASSESSMENT AND RECOMMENDATIONS
					Controlled Water receptors and no further assessment is considered necessary. Furthermore, concentrations of TPH, BTEX and VOC contaminants associated with the AST were negligible and ERGO consider no potential risk to receptors from this feature. Recommendation: No further action.
Sulphate attack on concrete.	Building structure.	Onsite Made Ground	Unlikely	Low	Concrete of classification DS-1 AC-1 has been determined to be appropriate for the site. Recommendation: Use concrete of appropriate classification.



6. GEOTECHNICAL ASSESSMENT

6.1 Proposed Development

ERGO understands that the client intends to convert the agricultural barn for residential end use, with associated car parking, private garden and sewage treatment plant. Drawing 21-871-002 (Appendix III) identifies the proposed development layout.

6.2 Summary of Ground Conditions

Made Ground

Limited Made Ground deposits were encountered within the majority of exploratory hole locations to general depths of between 0.15-0.30mbgl, generally comprising brown sandy topsoil with gravels of brick, concrete, sandstone, and mudstone. A yellow gravelly sand was recorded within WS104 and WS105.

Within the remaining exploratory holes outside of the building footprint, Made Ground was encountered at depths of between 0.15-0.30mbgl., comprising brown sandy topsoil with gravels of brick, concrete, sandstone, and mudstone. A yellow gravelly sand was recorded within WS104 and WS105.

The deepest Made Ground was encountered within WS101, in the footprint of the existing structure, to a depth of 1.40mbgl and generally comprised surficial concrete overlying gravelly sand with gravels of sandstone and limestone to 0.50mbgl.in turn overlying a firm reworked clay with gravels sandstone, limestone, coal and rare brick fragments to 1.40mbgl.

Drift

Natural drift deposits were encountered within all exploratory locations comprising predominantly firm to stiff occasionally very stiff greyish brown slightly sandy gravelly CLAYs to maximum proven depths of 5.45mbgl.

A very dense brown gravelly SAND was encountered within WS105 between 2.50-2.60mbgl and is considered likely to represent a potential cobble or boulder inclusion.

Solid

The solid bedrock geology was not encountered during this investigation.

Groundwater

Groundwater was encountered within WS101 at 3.25mbgl and WS105 at 2.50mbgl.

6.3 Site Preparation

The site should be cleared and any vegetation below areas of proposed development stripped in accordance with Series 200 of the Specification for Highway Works. This should include:

- Roots present below the footprint of proposed structures and infrastructure should be grubbed out and the resulting void infilled with suitable compacted engineered fill;
- Demolition of all existing buildings and removal of all concrete hardstanding (as required);
- Redundant services should be sealed off and grubbed out and replaced with suitable compacted engineered fill; and,
- Existing foundations have been encountered onsite. These should be excavated from below the proposed development footprint with the resulting void backfilled (as required).

6.4 Existing Foundations

Evidence of concrete foundations were encountered at a depth of 0.00-0.20mbgl within HDP101, founding within the firm sandy slightly gravelly CLAY.

6.5 Foundation Conditions & Assessment of Potential Bearing Capacities

In due consideration of the identified ground conditions, in-situ and laboratory geotechnical testing, ERGO has undertaken an assessment of the net safe Allowable Bearing Pressure (ABP) within the underlying natural stratum to assist in the detailed design of foundations and infrastructure and determine the target founding stratum.

Based on the assessment of the relative undrained shear strength, relative in-situ densities and corresponding safe net Allowable Bearing Potential, the suitable target founding stratum has been identified as the underlying firm to very stiff Glacial clays at depths of c.0.90mbgl. given the volume change potential of the underlying clays which should provide an allowable bearing capacity in the order of 100kN/m² for foundations up to 1.00m wide.

Prior to the detailed design of suitable foundations, a programme of enabling works will be required to remove the buried obstructions (as required) and provide a suitable development platform.

Foundation depths should take account of the presence of existing and proposed trees with foundations deepened locally, to mitigate the potential for volumetric instability attributed to fluctuations in moisture content, in accordance with the requirements of NHBC standards.

Subject to appropriate structural assessment it may be possible to utilise the existing foundations however, this would need to be confirmed by a Structural Engineer.

Should unforeseen ground conditions be encountered ERGO should be contacted for further advice.

6.6 Ground Floor Slabs

Current building control regulations require that where infilled ground is present to depths in excess of 600mm or where the sub-stratum is variable in terms of the structure and settlement potential or where clay soils are present within the influence of existing or proposed trees, a suspended floor slab is required.

Where a cast in-situ suspended slab is utilised with no sub-floor void, appropriate compressible material (heave precautions) will be required in the construction of the sub-structure.

6.7 Heave Precautions

The site has been proven to be underlain by clay soils which are susceptible to volumetric instability due to fluctuations in moisture content, particularly within influencing distance of trees as per the NHBC / LABC conjectured zones of influence.

As the clay is deemed to be Medium Volume Change Potential, appropriate Heave Precautions will be required to be incorporated in to proposed designs. A summary of heave precautions is present in Table 6.1 (overleaf).

Table 6.1 Summary of Heave Precautions

		MINIMUM VOID DIMENSION FOR FOUNDATIONS, GROUND BEAMS AND SUSPENDED IN-SITU CONCRETE GROUND FLOORS		MINIMUM VOID DIMENSIONS UNDER PRE-CAST CONCRETE AND SUSPENDED TIMBER FLOORS
Volume Change Potential	Required Foundation Depth (m)	Thickness of Void Against Side of Foundation or Ground Beam (mm)	Thickness of Void* on Underside of Edge Beam and Floor Slab (mm)	Void Dimension (mm)
High (>40)	>2.50	Engineer Design		Engineer Design
	2.00-2.50	35	150	300
	1.50-2.00	25	75	
Medium (20-40)	>2.50	Engineer Design		Engineer Design
	2.00-2.50	25	100	250
	1.50-2.00	25	50	
Low (<20)	2.00-2.50	-	50	200
	>2.00	No Special Precautions		

*The thickness of compressible material required should be established from the manufacturer's recommendations, but generally will be approximately twice the void dimension shown.

If a ground beam is to be constructed within the zone of tree influence, heave precautions are required to the underside of this and edge beams.

If the ground floor slab is to be constructed with a beam and block floor, a minimum sub-floor void of 200mm is required within any structures located in the zone of conjectured tree influence.

If the ground floor slab is constructed with a cast in-situ suspended floor slab heave precautions that can tolerate 50mm of clay swelling are required within any part of the floor slab to be located within the zone of influence of a tree.

6.8 Hardstanding Construction

A programme of remediation and enabling works will be required to remediate the proposed road sub-grade in accordance with the requirements of the highways design manual (series 600) for a Method Compaction.

Granular soils can be re-engineered to ensure 5% within the sub-grade during favourable climatic conditions.

Natural clay soils will provide a CBR in the order of 3-5% during drier climatic periods, however If water is allowed to shed onto the formation, the CBR will reduce to <2% which will require specialist engineering of the sub-grade..

6.9 Drainage

The presence of likely low permeability cohesive clays underlying the site will likely preclude the use of soakaway drainage at the site.

If soakaway drainage is to be considered, full BRE365 Testing must be completed to inform the detailed design.

6.10 Concrete Durability

Based upon the results of the chemical analyses summarised in it is considered that subsurface concrete can be designed in accordance with Design Sulphate Class DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1 in accordance with the recommendations provided in BRE Special Digest 1 (2005).

6.11 Excavations

Based on available information, site observations indicate that excavations should be feasible in the near surface with normal plant, however existing foundations and buried suspected boulder and cobbles features are known to be present within the near surface and existing former floor slabs remain. It is anticipated that any obstructions will be grubbed out during the reduced level dig for the sub-structure works.

Due to the potential for trench collapse, it is considered that all excavations will require to be supported or battered back in accordance with guidance contained in CIRIA R97.

Groundwater was encountered locally at depths of 0.13-3.25mbgl within the advanced exploratory probehole during the works undertaken. However, the rapid rate of advancement of the exploratory holes may mask minor seepages and it should be borne in mind that water levels fluctuate with a number of influences including season, rainfall, dewatering and pumping activities. Therefore, water levels higher than those found during this investigation may be encountered.

Table 5.2 discusses the civil engineering risk matrix for the site.

Table 5.2 Civil Engineering Excavation Risk Matrix

Risk Item	Present	Comment
Running Sands	No	Running sands were not encountered within advanced exploratory probeholes at the site.
Minor Water ingress	Yes	Minor water ingress will require localised dewatering / sump pumping during the construction of site drainage infrastructure. Ingress of water into foundation excavation will potentially flood foundation excavations.
Shallow Bedrock	No	Shallow bedrock was not identified within the advanced exploratory probeholes, though localised suspected cobble/boulder features were noted at depths of c.2.50-3.45mbgl.

6.12 Construction Activity and Inspection

The following activities and inspections should be incorporated in to the site works:

- Due to the potential variability of the soils at the site it is recommended that sufficient allowance is made for the inspection of formation and sub formations to foundations and pavement construction;
- Excavations where access is required should be subject to a risk assessment from a competent person and where appropriate mitigation measures such as benching back the sides or use of support systems in accordance with CIRIA R97 utilised;
- It is considered that de-watering may be required, especially following periods of heavy rainfall. Removal of surface water and water within trenches should be possible with conventional sump pumping. Discharge of any water should be agreed with the relevant regulatory body and be undertaken under a trade effluent discharge, where required. Measures to remove silt and suspended solids may be required and consideration should be given to provision of space for settling tanks or an attenuation pond;
- Where access to confined spaces is required appropriate mitigation measures should be addressed within the Construction Stage Health and Safety Plan. Particular account should be taken of the gas results; and,
- The presence of potential contamination and mitigation measures should be addressed as part of the Construction Stage Health and Safety Plan and should include measures to design out the risks, reduce their impact and finally the use of Personnel Protective Equipment (PPE).

7. FURTHER WORKS

Based on the findings of the intrusive site investigation, the following additional works are recommended to be completed in due course:

- 🌍 Approval of this report with Regulators.

8. CONCLUSIONS

Contaminated Land

Human Health

A Tier I Human Health Risk Assessment has been undertaken using the chemical analysis results of the soils and comparing to the relevant Tier I criteria.

This assessment identified no elevated concentrations of contaminants, furthermore asbestos was not identified within the samples tested.

Chemical analysis of the natural clay drift deposits and topsoil have identified these soils to be acceptable for use as topsoil and subsoil within proposed areas of landscaping, however further chemical validation samples may be required to confirm this.

Controlled Waters

Low risk, no further action required.

Ground Gas

Low risk, no further action required.

Geotechnical Issues

Significant cobble/boulder obstructions have been encountered and concrete foundations are present associated with the existing structure.

Based on the assessment of the relative undrained shear strength, relative in-situ densities and corresponding safe net Allowable Bearing Potential, the suitable target founding stratum has been identified as the underlying firm to very stiff Glacial clays at depths of c.0.90mbgl. given the volume change potential of the underlying clays which should provide an allowable bearing capacity in the order of 100kN/m² for foundations up to 1.00m wide.

Foundation depths should take account of the presence of existing and proposed trees with foundations deepened locally, to mitigate the potential for volumetric instability attributed to fluctuations in moisture content, in accordance with the requirements of NHBC standards.

END OF REPORT

**APPENDIX I
LIMITATIONS**



1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between ERGO and the Client as indicated in Section 1.2.
2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information it has been assumed it is correct. No attempt has been made to verify the information.
3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination which are enforced by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals.
4. During the site walkover reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not been made known or accessible.
5. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.
6. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.
7. Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials this is for indicative purposes only and do not constitute or replace full and proper surveys.
8. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.
9. ERGO cannot be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The copyright in this report and other plans and documents prepared by ERGO is owned by them and no such plans or documents may be reproduced, published or adapted without written consent. Complete copies of this may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by ERGO in this connection without their explicit written agreement there to by ERGO.
10. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.



**APPENDIX II
GLOSSARY**

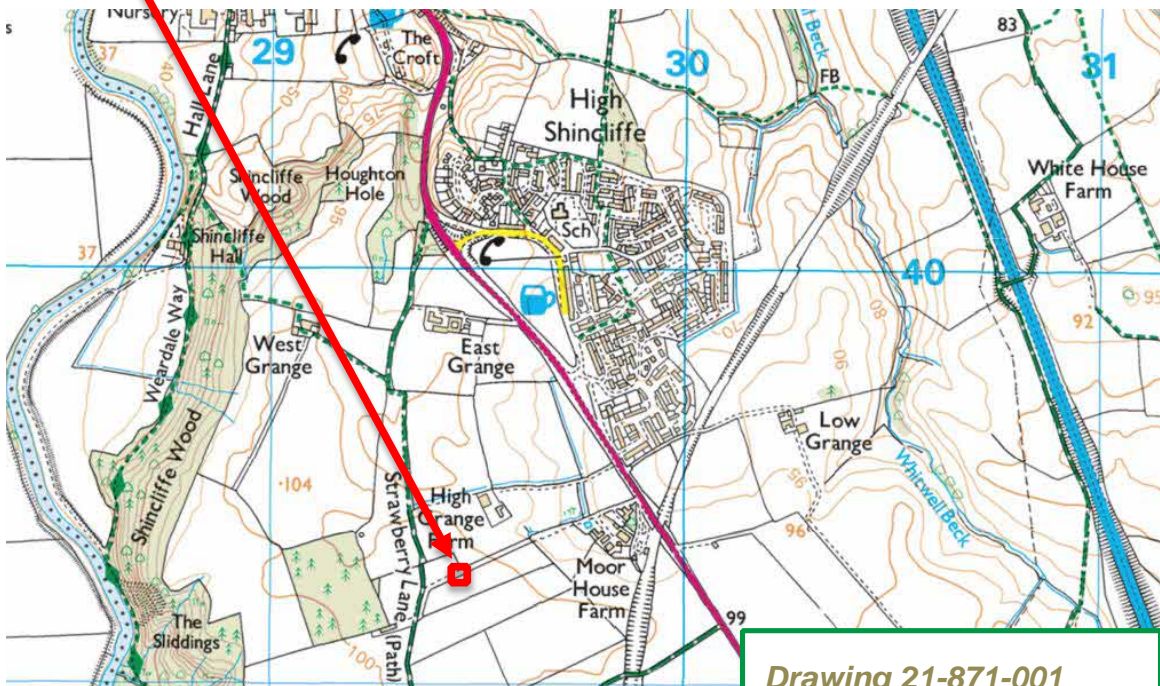


TERMS

AST	Above Ground Storage Tank	SGV	Soil Guideline Value
BGS	British Geological Survey	SPH	Separate Phase Hydrocarbon
BSI	British Standards Institute	TPH CWG	Total Petroleum Hydrocarbon (Criteria Working Group)
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes	SPT	Standard Penetration Test
CIEH	Chartered Institute of Environmental Health	SVOC	Semi Volatile Organic Compound
CIRIA	Construction Industry Research Association	UST	Underground Storage Tank
CLEA	Contaminated Land Exposure Assessment	VCCs	Vibro Concrete Columns
CSM	Conceptual Site Model	VOC	Volatile Organic Compound
DNAPL	Dense Non-Aqueous Phase Liquid (chlorinated solvents, PCB)	WTE	Water Table Elevation
DWS	Drinking Water Standard	m	Metres
EA	Environment Agency	km	Kilometres
EQS	Environmental Quality Standard	%	Percent
GAC	General Assessment Criteria	%v/v	Percent volume in air
GL	Ground Level	mb	Milli Bars (atmospheric pressure)
GSV	Gas Screening Value	l/hr	Litres per hour
HCV	Health Criteria Value	µg/l	Micrograms per Litre (parts per billion)
ICSM	Initial Conceptual Site Model	ppb	Parts Per Billion
LNAPL	Light Non-Aqueous Phase Liquid (petrol, diesel, kerosene)	mg/kg	Milligrams per kilogram (parts per million)
ND	Not Detected	ppm	Parts Per Million
LMRL	Lower Method Reporting Limit	mg/m³	Milligram per metre cubed
NR	Not Recorded	m bgl	Metres Below Ground Level
PAH	Polycyclic Aromatic Hydrocarbon	m bcl	Metre Below Cover Level
PCB	Poly-Chlorinated Biphenyl	mAOD	Metres Above Ordnance Datum (sea level)
PID	Photo Ionisation Detector	kN/m²	Kilo Newtons per metre squared
QA	Quality Assurance	µm	Micro metre
SGV	Soil Guideline Value		

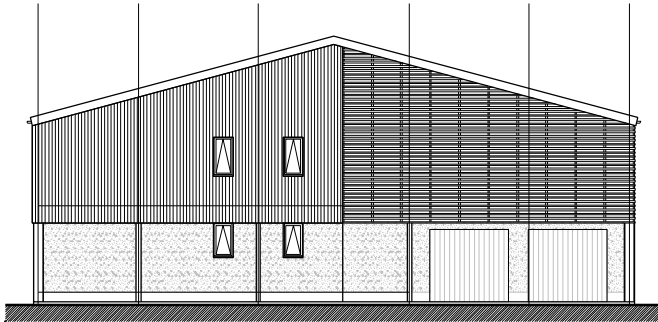
**APPENDIX III
DRAWINGS**



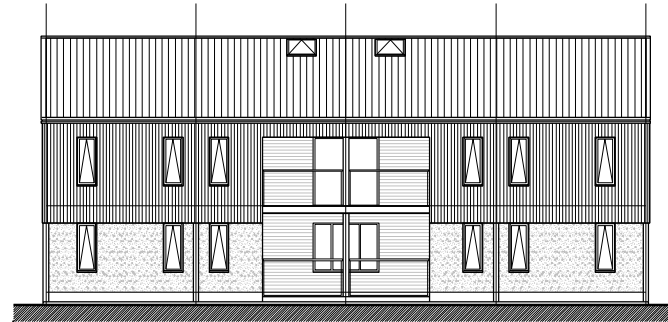


*Drawing 21-871-001
Site Location Plan*

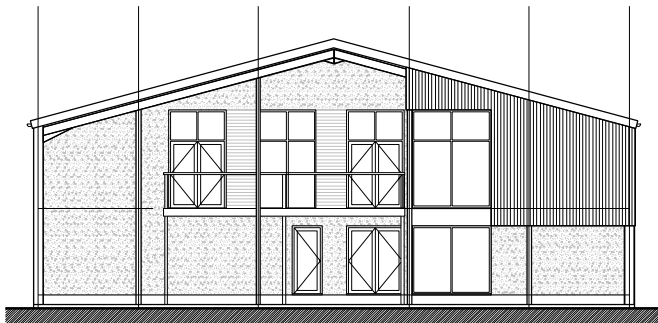




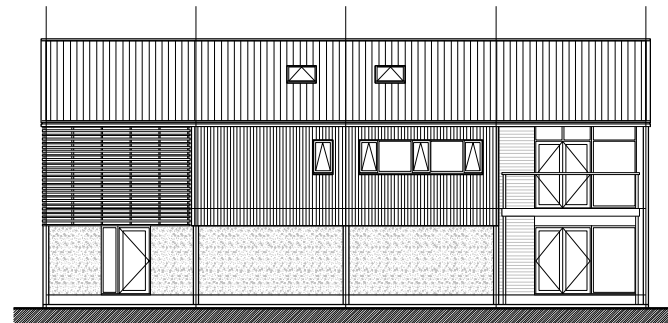
Front (NW) Elevation



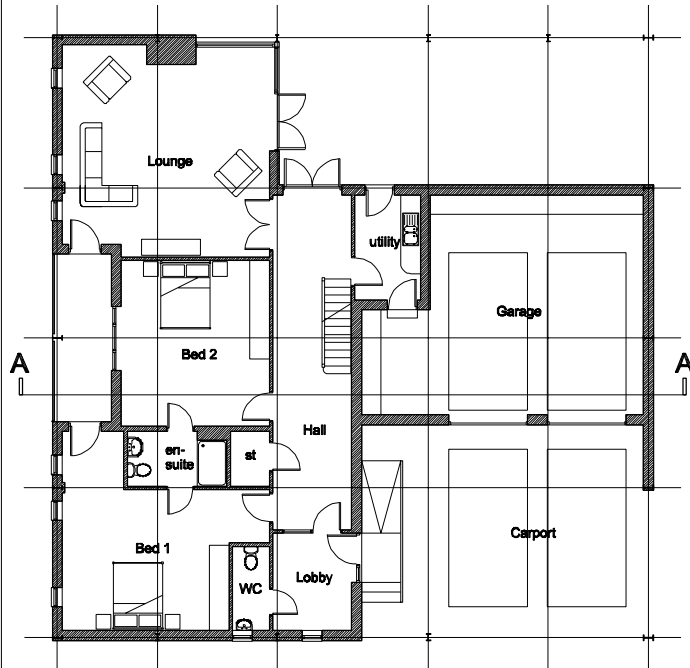
Side (NE) Elevation



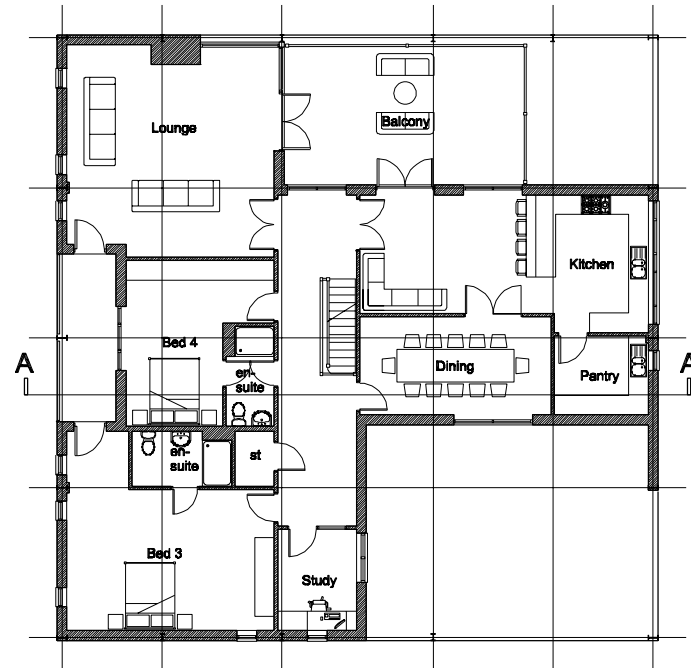
Rear (SE) Elevation



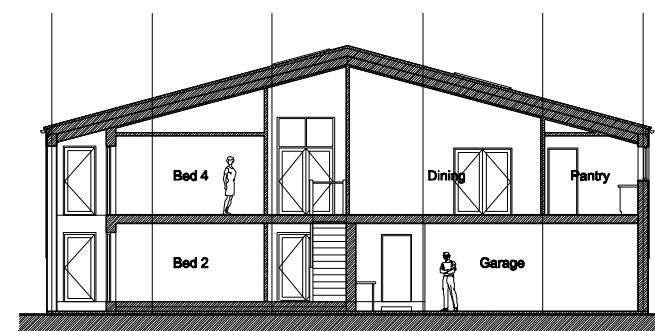
Side (SW) Elevation



Ground Floor Plan



First Floor Plan



Section A-A

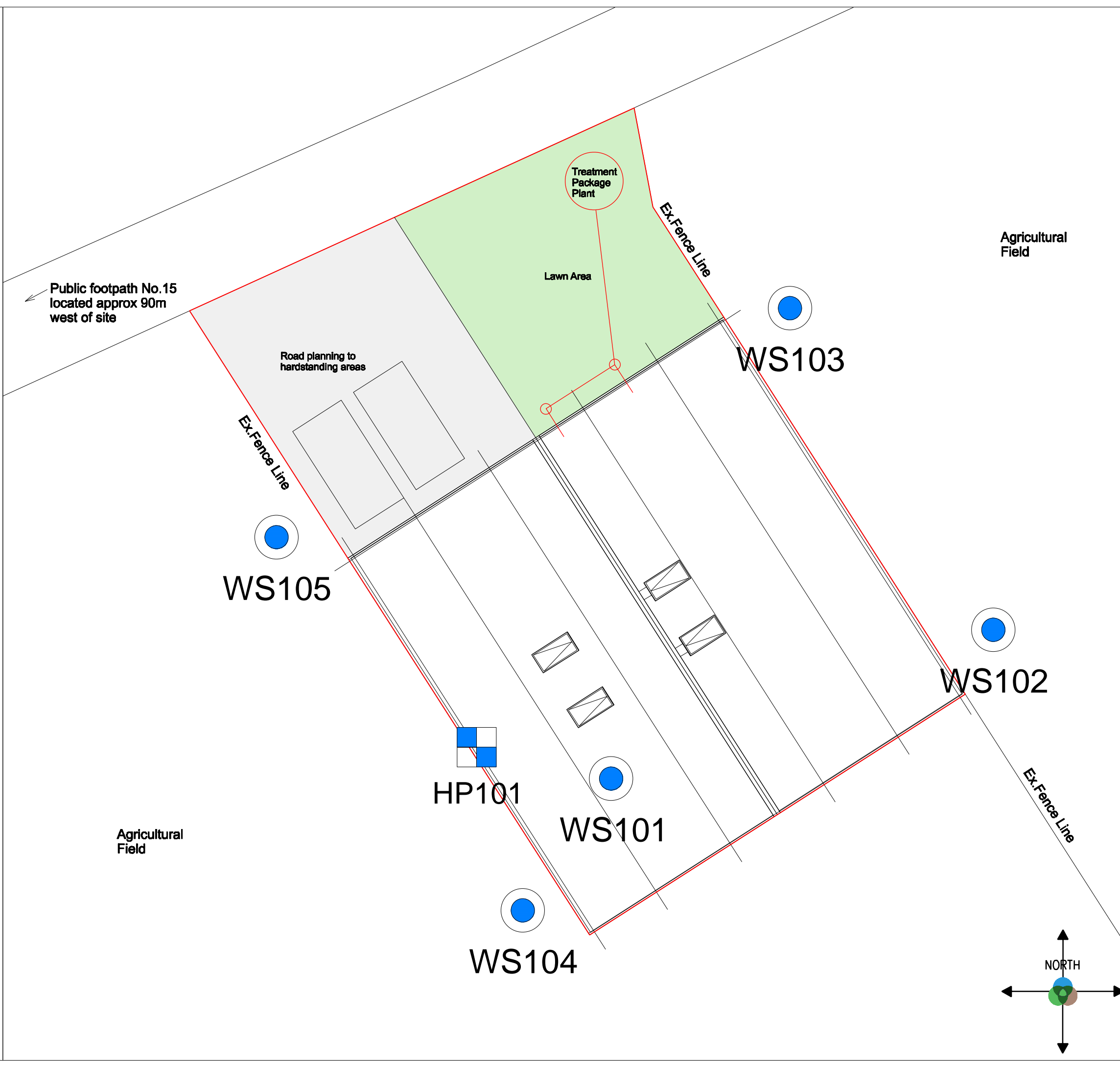
Key:

Notes:

P1	-	08.03.2021	DRAFT	MS	JN
Phase	Revision	Date	Issue	Drawn	Authorised
Client: Garry Hodgson			Job No: 21-871	Date: 08.03.2021	
			Drawing No: 002	Scale: NTS	
Job Title: Moor House Farm, Shincliffe			Drawing Title: Proposed Development Plan		

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Key:

Location Symbols

- WS101 Approximate Window Sample Probehole Location
- HP101 Approximate Hand Excavated Pit Location

Public footpath No.15 located approx 90m west of site

Agricultural Field

Ex.Fence Line

Treatment Package Plant

Lawn Area

WS103

WS105

WS102

WS101

HP101

WS104

Ex.Fence Line

Agricultural Field

NORTH

Notes:

P1	-	18.07.2022	DRAFT	AB	JN
Phase	Revision	Date	Issue	Drawn	Authorised
Client: Mr & Mrs Seymour			Job No: 20-871	Date: 18.07.2022	
			Drawing No: 003	Scale: NTS	
Job Title: Moor House Farm, Shincliffe			Drawing Title: Exploratory Hole Location Plan		



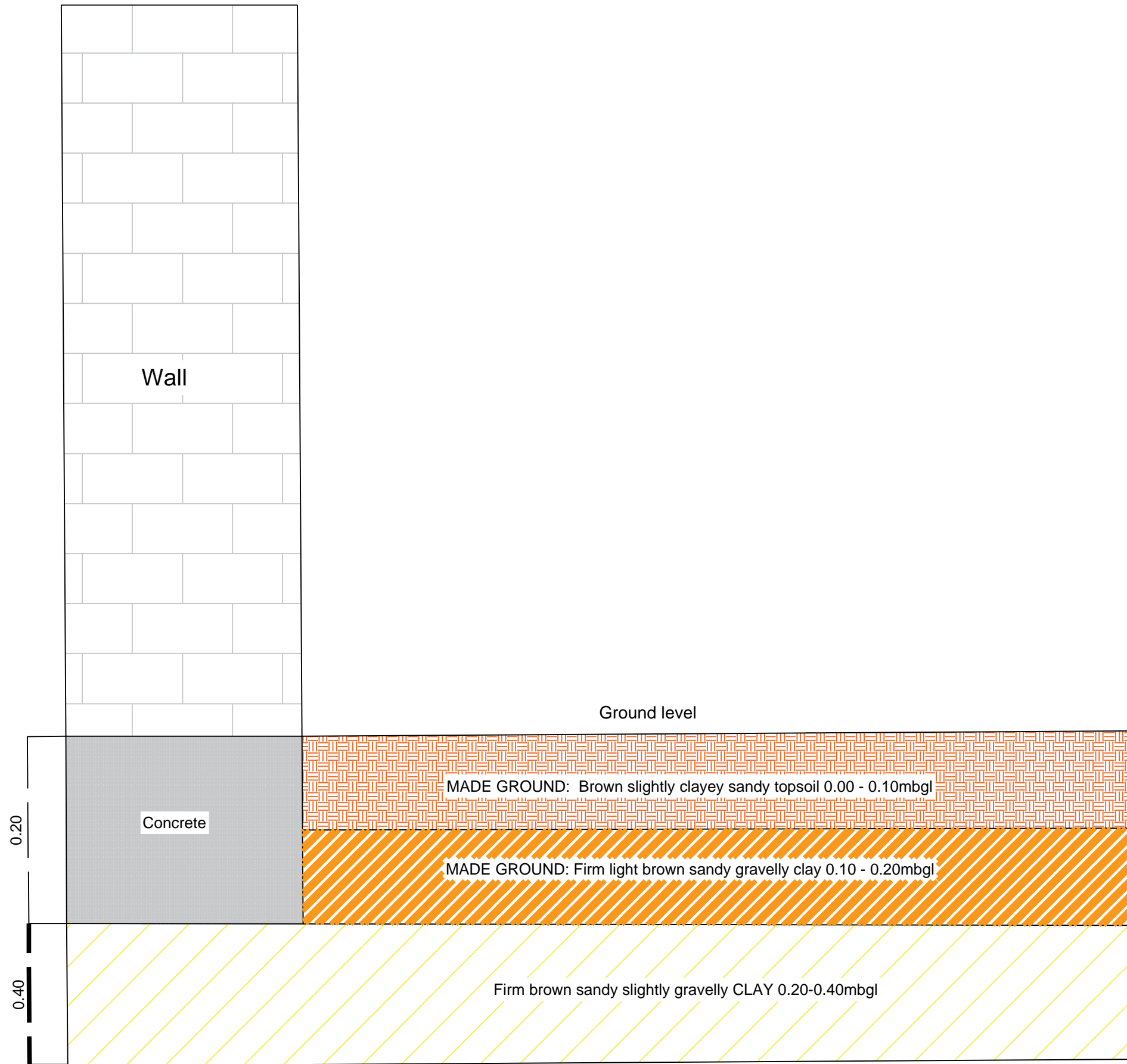
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APPENDIX IV
ERGO EXPLORATORY HOLE LOGS

Well

Foundations Pit- HDP101



Notes:

P1	-	26.08.2022	DRAFT	AB	JN
Phase	Revision	Date	Issue	Drawn	Authorised
Client: Mr & Mrs Seymour			Job No: 21-871	Date: 26.08.2022	
			Drawing No: HDP101	Scale: NTS	
Job Title: Moor House Farm			Drawing Title: Cross Section of HDP101		



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Well

Well

Well

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Well

APPENDIX V
CHEMICAL TESTING RESULTS

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Ergo Environmental Ltd
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Hoults Yard
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Newcastle upon Tyne
NE6 2HL

i2 Analytical Ltd.
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e: Ergo Group

Analytical Report Number : 22-72343

Project / Site name:	Moor House Farm	Samples received on:	19/07/2022
Your job number:	21-871	Samples instructed on/ Analysis started on:	19/07/2022
Your order number:	1521-PC-21-871	Analysis completed by:	27/07/2022
Report Issue Number:	1	Report issued on:	27/07/2022
Samples Analysed:	8 soil samples		

Signed: 

Izabela Wójcik
Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

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

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

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

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 22-72343
 Project / Site name: Moor House Farm
 Your Order No: 1521-PC-21-871

Lab Sample Number	2356094		2356095		2356096		2356097		2356098	
Sample Reference	WS101		WS101		WS102		WS102		WS104	
Sample Number	None Supplied		None Supplied		None Supplied		None Supplied		None Supplied	
Depth (m)	0.20		0.70		0.10		0.50		0.05	
Date Sampled	15/07/2022		15/07/2022		15/07/2022		15/07/2022		15/07/2022	
Time Taken	None Supplied		None Supplied		None Supplied		None Supplied		None Supplied	
Analytical Parameter (Soil Analysis)										
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	14	15	23	13	22		
Total mass of sample received	kg	0.001	NONE	0.8	0.8	0.8	0.8	0.8		0.8

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	-	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	SSZ	SSZ	SSZ	N/A	SSZ

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.8	7.7	8	7.7	7.5
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	62	61	310	45	76
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.031	0.03	0.15	0.023	0.038
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	30.9	30.4	155	22.7	37.9
Organic Matter	%	0.1	MCERTS	-	-	15	-	-
Organic Matter (automated)	%	0.1	MCERTS	0.9	2.7	-	1.5	10
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.5	-	-	0.8	-

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	1
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.39
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	2.4
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	1.9
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	1.7
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	1.4
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	1.5
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.51
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	1.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.49
Dibenzo(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.21
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.5

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	< 0.80	< 0.80	13
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	3.3	7.4	4.8	7.2	5.7
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	12	21	7.7	22	9.5
Copper (aqua regia extractable)	mg/kg	1	MCERTS	7.4	21	11	20	14
Lead (aqua regia extractable)	mg/kg	1	MCERTS	18	42	25	28	32
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	8.4	18	5	22	5
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	49	60	45	77	51

Analytical Report Number: 22-72343
 Project / Site name: Moor House Farm
 Your Order No: 1521-PC-21-871

Lab Sample Number	2356094	2356095	2356096	2356097	2356098
Sample Reference	WS101	WS101	WS102	WS102	WS104
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	0.20	0.70	0.10	0.50	0.05
Date Sampled	15/07/2022	15/07/2022	15/07/2022	15/07/2022	15/07/2022
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)					

Monoaromatics & Oxygenates

Compound	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic > EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic > EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic > EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic > EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic > EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic > EC16 - EC21	mg/kg	8	MCERTS	13	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic > EC21 - EC35	mg/kg	8	MCERTS	160	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	27	< 8.4	< 8.4	< 8.4	< 8.4
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	170	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	200	< 10	< 10	< 10	< 10

TPH-CWG - Aromatic > EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic > EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic > EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic > EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic > EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic > EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	12
TPH-CWG - Aromatic > EC21 - EC35	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	27
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4	< 8.4	< 8.4	< 8.4
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	39
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	< 10	< 10	< 10	< 10	39

VOCs

Compound	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Chloromethane	µg/kg	1	NONE	-	-	-	-	< 1.0
Chloroethane	µg/kg	1	NONE	-	-	-	-	< 1.0
Bromomethane	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Vinyl Chloride	µg/kg	1	NONE	-	-	-	-	< 1.0
Trichlorofluoromethane	µg/kg	1	NONE	-	-	-	-	< 1.0
1,1-Dichloroethene	µg/kg	1	NONE	-	-	-	-	< 1.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,1-Dichloroethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
2,2-Dichloropropane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Trichloromethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,2-Dichloroethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,1-Dichloropropene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	-	-	-	< 1.0
Benzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Tetrachloromethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,2-Dichloropropane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Trichloroethene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Dibromomethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0

Analytical Report Number: 22-72343
 Project / Site name: Moor House Farm
 Your Order No: 1521-PC-21-871

Lab Sample Number				2356094	2356095	2356096	2356097	2356098
Sample Reference				WS101	WS101	WS102	WS102	WS104
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.70	0.10	0.50	0.05
Date Sampled				15/07/2022	15/07/2022	15/07/2022	15/07/2022	15/07/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)								
Bromodichloromethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Toluene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Dibromochloromethane	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Tetrachloroethene	µg/kg	1	NONE	-	-	-	-	< 1.0
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Chlorobenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
p & m-Xylene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Styrene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Tribromomethane	µg/kg	1	NONE	-	-	-	-	< 1.0
o-Xylene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Isopropylbenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Bromobenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
n-Propylbenzene	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
2-Chlorotoluene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
4-Chlorotoluene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
tert-Butylbenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
sec-Butylbenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Butylbenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Hexachlorobutadiene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	-	-	-	< 1.0

SVOCs

Aniline	mg/kg	0.1	NONE	-	-	-	-	< 0.1
Phenol	mg/kg	0.2	ISO 17025	-	-	-	-	< 0.2
2-Chlorophenol	mg/kg	0.1	MCERTS	-	-	-	-	< 0.1
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	-	-	-	< 0.2
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	-	-	< 0.2
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.1
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	-	-	< 0.2
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	-	-	-	< 0.1
2-Methylphenol	mg/kg	0.3	MCERTS	-	-	-	-	< 0.3
Hexachloroethane	mg/kg	0.05	MCERTS	-	-	-	-	< 0.05
Nitrobenzene	mg/kg	0.3	MCERTS	-	-	-	-	< 0.3
4-Methylphenol	mg/kg	0.2	NONE	-	-	-	-	< 0.2
Isophorone	mg/kg	0.2	MCERTS	-	-	-	-	< 0.2
2-Nitrophenol	mg/kg	0.3	MCERTS	-	-	-	-	< 0.3
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	-	-	-	< 0.3
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	-	-	-	< 0.3

Analytical Report Number: 22-72343
 Project / Site name: Moor House Farm
 Your Order No: 1521-PC-21-871

Lab Sample Number				2356094	2356095	2356096	2356097	2356098
Sample Reference				WS101	WS101	WS102	WS102	WS104
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.70	0.10	0.50	0.05
Date Sampled				15/07/2022	15/07/2022	15/07/2022	15/07/2022	15/07/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)								
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	-	-	-	< 0.3
Naphthalene	mg/kg	0.05	MCERTS	-	-	-	-	< 0.05
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	-	-	-	< 0.3
4-Chloroaniline	mg/kg	0.1	NONE	-	-	-	-	< 0.1
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.1
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	-	-	-	< 0.1
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	-	-	-	< 0.1
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	-	-	-	< 0.2
2-Methylnaphthalene	mg/kg	0.1	NONE	-	-	-	-	< 0.1
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.1
Dimethylphthalate	mg/kg	0.1	MCERTS	-	-	-	-	< 0.1
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.1
Acenaphthylene	mg/kg	0.05	MCERTS	-	-	-	-	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	-	-	-	-	< 0.05
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	-	-	-	< 0.2
Dibenzofuran	mg/kg	0.2	MCERTS	-	-	-	-	< 0.2
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	-	-	-	< 0.3
Diethyl phthalate	mg/kg	0.2	MCERTS	-	-	-	-	< 0.2
4-Nitroaniline	mg/kg	0.2	MCERTS	-	-	-	-	< 0.2
Fluorene	mg/kg	0.05	MCERTS	-	-	-	-	< 0.05
Azobenzene	mg/kg	0.3	MCERTS	-	-	-	-	< 0.3
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	-	-	-	< 0.2
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	-	-	-	< 0.3
Phenanthrene	mg/kg	0.05	MCERTS	-	-	-	-	1
Anthracene	mg/kg	0.05	MCERTS	-	-	-	-	0.39
Carbazole	mg/kg	0.3	MCERTS	-	-	-	-	< 0.3
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	-	-	-	< 0.2
Anthraquinone	mg/kg	0.3	MCERTS	-	-	-	-	< 0.3
Fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-	2.4
Pyrene	mg/kg	0.05	MCERTS	-	-	-	-	1.9
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	-	-	-	< 0.3
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-	-	-	1.7
Chrysene	mg/kg	0.05	MCERTS	-	-	-	-	1.4
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-	1.5
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-	0.51
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-	-	-	1.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-	-	-	0.49
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-	-	-	0.21
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	-	-	0.5

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 22-72343
 Project / Site name: Moor House Farm
 Your Order No: 1521-PC-21-871

Lab Sample Number	2356099			2356100	2356101
Sample Reference	WS104			WS105	WS103
Sample Number	None Supplied			None Supplied	None Supplied
Depth (m)	0.20			1.00	0.10
Date Sampled	15/07/2022			15/07/2022	15/07/2022
Time Taken	None Supplied			None Supplied	None Supplied
Analytical Parameter (Soil Analysis)					
Stone Content	%	0.1	NONE	49	< 0.1
Moisture Content	%	0.01	NONE	9.7	12
Total mass of sample received	kg	0.001	NONE	0.8	0.8

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	SSZ	N/A	SSZ

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.9	7.7	7.5
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	33	110	77
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.017	0.055	0.039
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	16.5	55.3	38.5
Organic Matter	%	0.1	MCERTS	-	-	-
Organic Matter (automated)	%	0.1	MCERTS	0.1	2.1	-
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	-	-	-

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	-
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	2	7	6.5
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.4	< 0.2
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	3.6	25	13
Copper (aqua regia extractable)	mg/kg	1	MCERTS	7.2	26	16
Lead (aqua regia extractable)	mg/kg	1	MCERTS	17	33	37
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	2.9	64	7.9
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	44	110	53

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Lab Sample Number	2356099			2356100			2356101		
Sample Reference	WS104			WS105			WS103		
Sample Number	None Supplied			None Supplied			None Supplied		
Depth (m)	0.20			1.00			0.10		
Date Sampled	15/07/2022			15/07/2022			15/07/2022		
Time Taken	None Supplied			None Supplied			None Supplied		
Analytical Parameter (Soil Analysis)									
Monoaromatics & Oxygenates									
Benzene	µg/kg	1	MCERTS	< 1.0	-	-	-	-	-
Toluene	µg/kg	1	MCERTS	< 1.0	-	-	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	-	-	-
p & m-xylene	µg/kg	1	MCERTS	< 1.0	-	-	-	-	-
o-xylene	µg/kg	1	MCERTS	< 1.0	-	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-	-	-	-	-

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6 _{HS_1D_AL}	mg/kg	0.001	MCERTS	< 0.001	-	-	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8 _{HS_1D_AL}	mg/kg	0.001	MCERTS	< 0.001	-	-	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10 _{HS_1D_AL}	mg/kg	0.001	MCERTS	< 0.001	-	-	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12 _{EH_CU_1D_AL}	mg/kg	1	MCERTS	< 1.0	-	-	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16 _{EH_CU_1D_AL}	mg/kg	2	MCERTS	< 2.0	-	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21 _{EH_CU_1D_AL}	mg/kg	8	MCERTS	< 8.0	-	-	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35 _{EH_CU_1D_AL}	mg/kg	8	MCERTS	< 8.0	-	-	-	-	-
TPH-CWG - Aliphatic > EC35 - EC44 _{EH_CU_1D_AL}	mg/kg	8.4	NONE	< 8.4	-	-	-	-	-
TPH-CWG - Aliphatic (EC5 - EC35) _{EH_CU+HS_1D_AL}	mg/kg	10	MCERTS	< 10	-	-	-	-	-
TPH-CWG - Aliphatic (EC5 - EC44) _{EH_CU+HS_1D_AL}	mg/kg	10	NONE	< 10	-	-	-	-	-

TPH-CWG - Aromatic >EC5 - EC7 _{HS_1D_AR}	mg/kg	0.001	MCERTS	< 0.001	-	-	-	-	-
TPH-CWG - Aromatic >EC7 - EC8 _{HS_1D_AR}	mg/kg	0.001	MCERTS	< 0.001	-	-	-	-	-
TPH-CWG - Aromatic >EC8 - EC10 _{HS_1D_AR}	mg/kg	0.001	MCERTS	< 0.001	-	-	-	-	-
TPH-CWG - Aromatic >EC10 - EC12 _{EH_CU_1D_AR}	mg/kg	1	MCERTS	< 1.0	-	-	-	-	-
TPH-CWG - Aromatic >EC12 - EC16 _{EH_CU_1D_AR}	mg/kg	2	MCERTS	< 2.0	-	-	-	-	-
TPH-CWG - Aromatic >EC16 - EC21 _{EH_CU_1D_AR}	mg/kg	10	MCERTS	< 10	-	-	-	-	-
TPH-CWG - Aromatic >EC21 - EC35 _{EH_CU_1D_AR}	mg/kg	10	MCERTS	< 10	-	-	-	-	-
TPH-CWG - Aromatic > EC35 - EC44 _{EH_CU_1D_AR}	mg/kg	8.4	NONE	< 8.4	-	-	-	-	-
TPH-CWG - Aromatic (EC5 - EC35) _{EH_CU+HS_1D_AR}	mg/kg	10	MCERTS	< 10	-	-	-	-	-
TPH-CWG - Aromatic (EC5 - EC44) _{EH_CU+HS_1D_AR}	mg/kg	10	NONE	< 10	-	-	-	-	-

VOCs

Chloromethane	µg/kg	1	ISO 17025	< 1.0	-	-	-	-	-
Chloroethane	µg/kg	1	NONE	< 1.0	-	-	-	-	-
Bromomethane	µg/kg	1	ISO 17025	< 1.0	-	-	-	-	-
Vinyl Chloride	µg/kg	1	NONE	< 1.0	-	-	-	-	-
Trichlorofluoromethane	µg/kg	1	NONE	< 1.0	-	-	-	-	-
1,1-Dichloroethene	µg/kg	1	NONE	< 1.0	-	-	-	-	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	< 1.0	-	-	-	-	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	< 1.0	-	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-	-	-	-	-
1,1-Dichloroethane	µg/kg	1	MCERTS	< 1.0	-	-	-	-	-
2,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	-	-	-	-	-
Trichloromethane	µg/kg	1	MCERTS	< 1.0	-	-	-	-	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	< 1.0	-	-	-	-	-
1,2-Dichloroethane	µg/kg	1	MCERTS	< 1.0	-	-	-	-	-
1,1-Dichloropropene	µg/kg	1	MCERTS	< 1.0	-	-	-	-	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	< 1.0	-	-	-	-	-
Benzene	µg/kg	1	MCERTS	< 1.0	-	-	-	-	-
Tetrachloromethane	µg/kg	1	MCERTS	< 1.0	-	-	-	-	-
1,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	-	-	-	-	-
Trichloroethene	µg/kg	1	MCERTS	< 1.0	-	-	-	-	-
Dibromomethane	µg/kg	1	MCERTS	< 1.0	-	-	-	-	-

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 Project / Site name: Moor House Farm
 Your Order No: 1521-PC-21-871

Lab Sample Number				2356099	2356100	2356101
Sample Reference				WS104	WS105	WS103
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.20	1.00	0.10
Date Sampled				15/07/2022	15/07/2022	15/07/2022
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)						
Bromodichloromethane	µg/kg	1	MCERTS	< 1.0	-	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	-	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	-	-
Toluene	µg/kg	1	MCERTS	< 1.0	-	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	< 1.0	-	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	< 1.0	-	-
Dibromochloromethane	µg/kg	1	ISO 17025	< 1.0	-	-
Tetrachloroethene	µg/kg	1	NONE	< 1.0	-	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	< 1.0	-	-
Chlorobenzene	µg/kg	1	MCERTS	< 1.0	-	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	-	-
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-	-
p & m-Xylene	µg/kg	1	MCERTS	< 1.0	-	-
Styrene	µg/kg	1	MCERTS	< 1.0	-	-
Tribromomethane	µg/kg	1	NONE	< 1.0	-	-
o-Xylene	µg/kg	1	MCERTS	< 1.0	-	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	-	-
Isopropylbenzene	µg/kg	1	MCERTS	< 1.0	-	-
Bromobenzene	µg/kg	1	MCERTS	< 1.0	-	-
n-Propylbenzene	µg/kg	1	ISO 17025	< 1.0	-	-
2-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	-	-
4-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	-	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	-	-
tert-Butylbenzene	µg/kg	1	MCERTS	< 1.0	-	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	-	-
sec-Butylbenzene	µg/kg	1	MCERTS	< 1.0	-	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	< 1.0	-	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	< 1.0	-	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	-	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	-	-
Butylbenzene	µg/kg	1	MCERTS	< 1.0	-	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	< 1.0	-	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	< 1.0	-	-
Hexachlorobutadiene	µg/kg	1	MCERTS	< 1.0	-	-
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	< 1.0	-	-

SVOCs

Aniline	mg/kg	0.1	NONE	< 0.1	-	-
Phenol	mg/kg	0.2	ISO 17025	< 0.2	-	-
2-Chlorophenol	mg/kg	0.1	MCERTS	< 0.1	-	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	< 0.2	-	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	-	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	< 0.1	-	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	-	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	< 0.1	-	-
2-Methylphenol	mg/kg	0.3	MCERTS	< 0.3	-	-
Hexachloroethane	mg/kg	0.05	MCERTS	< 0.05	-	-
Nitrobenzene	mg/kg	0.3	MCERTS	< 0.3	-	-
4-Methylphenol	mg/kg	0.2	NONE	< 0.2	-	-
Isophorone	mg/kg	0.2	MCERTS	< 0.2	-	-
2-Nitrophenol	mg/kg	0.3	MCERTS	< 0.3	-	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	< 0.3	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	< 0.3	-	-

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Lab Sample Number				2356099	2356100	2356101
Sample Reference				WS104	WS105	WS103
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.20	1.00	0.10
Date Sampled				15/07/2022	15/07/2022	15/07/2022
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)						
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	< 0.3	-	-
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	< 0.3	-	-
4-Chloroaniline	mg/kg	0.1	NONE	< 0.1	-	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	< 0.1	-	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	< 0.1	-	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	< 0.1	-	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	< 0.2	-	-
2-Methylnaphthalene	mg/kg	0.1	NONE	< 0.1	-	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	< 0.1	-	-
Dimethylphthalate	mg/kg	0.1	MCERTS	< 0.1	-	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	< 0.1	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	-	-
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	-	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	< 0.2	-	-
Dibenzofuran	mg/kg	0.2	MCERTS	< 0.2	-	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	< 0.3	-	-
Diethyl phthalate	mg/kg	0.2	MCERTS	< 0.2	-	-
4-Nitroaniline	mg/kg	0.2	MCERTS	< 0.2	-	-
Fluorene	mg/kg	0.05	MCERTS	< 0.05	-	-
Azobenzene	mg/kg	0.3	MCERTS	< 0.3	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	< 0.2	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	< 0.3	-	-
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	-	-
Anthracene	mg/kg	0.05	MCERTS	< 0.05	-	-
Carbazole	mg/kg	0.3	MCERTS	< 0.3	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	< 0.2	-	-
Anthraquinone	mg/kg	0.3	MCERTS	< 0.3	-	-
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	-
Pyrene	mg/kg	0.05	MCERTS	< 0.05	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	< 0.3	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	-
Chrysene	mg/kg	0.05	MCERTS	< 0.05	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	-	-

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 22-72343
Project / Site name: Moor House Farm

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

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2356094	WS101	None Supplied	0.2	Brown clay and sand with gravel.
2356095	WS101	None Supplied	0.7	Brown clay and sand with gravel and vegetation.
2356096	WS102	None Supplied	0.1	Brown clay and sand with gravel and vegetation.
2356097	WS102	None Supplied	0.5	Brown clay and sand with gravel and vegetation.
2356098	WS104	None Supplied	0.05	Brown clay and loam with gravel and vegetation.
2356099	WS104	None Supplied	0.2	Brown sand with gravel and stones.
2356100	WS105	None Supplied	1	Brown clay and sand with gravel.
2356101	WS103	None Supplied	0.1	Brown loam and clay with gravel and vegetation.

Analytical Report Number : 22-72343
 Project / Site name: Moor House Farm

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos identification with the use of polarised light microscopy in conjunction with dispersion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Organic matter in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L023-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds in soil by extraction in dichloromethane and hexane followed by GC-MS.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	NONE
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	NONE
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS

Analytical Report Number : 22-72343
 Project / Site name: Moor House Farm

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
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For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 300C.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
-	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total



James Nairn
Ergo Environmental Ltd
Maling Exchange
Hoults Yard
Walker Rd
Newcastle upon Tyne
NE6 2HL

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

e: Ergo Group

Analytical Report Number : 22-72709

Project / Site name:	Moor House Farm, Shincliffe	Samples received on:	19/07/2022
Your job number:	21-871	Samples instructed on/ Analysis started on:	21/07/2022
Your order number:	1522-PC-21-871	Analysis completed by:	01/08/2022
Report Issue Number:	1	Report issued on:	01/08/2022
Samples Analysed:	5 soil samples		

Signed: 

Joanna Wawrzeczko
Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

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

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

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

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 22-72709
 Project / Site name: Moor House Farm, Shincliffe
 Your Order No: 1522-PC-21-871

Lab Sample Number				2358158	2358159	2358160	2358161	2358162
Sample Reference				WS101	WS102	WS104	WS105	WS105
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.00	0.70	1.00	0.50	2.00
Date Sampled				Deviating	Deviating	Deviating	Deviating	Deviating
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)								
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	13	15	13	9.6	13
Total mass of sample received	kg	0.001	NONE	0.4	0.4	0.4	0.4	0.4

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.5	7.9	8.4	8	8.4
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	69	110	66	84	69
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.034	0.056	0.033	0.042	0.035
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	34.3	56.2	33.1	41.9	34.5

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 22-72709

Project / Site name: Moor House Farm, Shincliffe

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

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2358158	WS101	None Supplied	2	Brown clay and loam with gravel.
2358159	WS102	None Supplied	0.7	Brown clay and loam with gravel.
2358160	WS104	None Supplied	1	Brown clay and sand with gravel.
2358161	WS105	None Supplied	0.5	Brown clay and sand with gravel.
2358162	WS105	None Supplied	2	Brown clay with gravel.

Analytical Report Number : 22-72709
 Project / Site name: Moor House Farm, Shincliffe

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Sample Deviation Report



Analytical Report Number : 22-72709

Project / Site name: Moor House Farm, Shincliffe

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis. Please note that the associated result(s) may be unreliable and should be interpreted with care.

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
WS101	None Supplied	S	2358158	a	None Supplied	None Supplied	None Supplied
WS102	None Supplied	S	2358159	a	None Supplied	None Supplied	None Supplied
WS104	None Supplied	S	2358160	a	None Supplied	None Supplied	None Supplied
WS105	None Supplied	S	2358161	a	None Supplied	None Supplied	None Supplied
WS105	None Supplied	S	2358162	a	None Supplied	None Supplied	None Supplied

**APPENDIX VI
ORIGIN OF TIER I GENERIC
ASSESSMENT CRITERIA**

CONSTITUENT	ORIGIN OF RISK ASSESSMENT VALUE
Arsenic	PC4SL - DEFRA
Cadmium	P4CSL - DEFRA
Chromium	P4CSL - DEFRA
Lead	P4CSL - DEFRA
Mercury	2014 LQM/CIEH S4ULs – Inorganic mercury
Nickel	2014 LQM/CIEH S4ULs
Selenium	2014 LQM/CIEH S4ULs
Copper	2014 LQM/CIEH S4ULs
Zinc	2014 LQM/CIEH S4ULs
Cyanide - Total	2014 LQM/CIEH S4ULs
Phenols - Total.	2014 LQM/CIEH S4ULs
Naphthalene	General Assessment Criteria (GAC) developed by CIEH / LQM Suitable 4 Use Levels with supporting data from SR3, SR7 and existing Tox report where applicable. 1% SOM
Acenaphthylene	
Acenaphthene	
Fluorene	
Phenanthrene	
Anthracene	
Fluoranthene	
Pyrene	
Benzo(a)Anthracene(
Chrysene	
Benzo(b/k)Fluoranthene (iii)	
Benzo(a)Pyrene	
Indeno(123-cd)Pyrene	
Dibenzo(a,h)Anthracene	
Benzo(ghi)Perylene	
TPH C5-C6 (aliphatic)	
TPH C6-C8 (aliphatic)	
TPH C8-C10 (aliphatic)	
TPH C10-C12 (aliphatic)	
TPH C12-C16 (aromatic)	
TPH C16-C21 (aromatic)	
TPH C21-C35 (aromatic)	

**APPENDIX VII
GEOTECHNICAL TESTING
RESULTS**

4041

Client: Ergo Environmental Ltd
 Client Address: Maling Exchange, Hoult's Yard,
 Walker Rd, Newcastle upon Tyne,
 NE6 2HL
 Contact: James Nairn
 Site Address: Moor House Farm, Shincliffe

Client Reference: 21-871
 Job Number: 22-72704
 Date Sampled: Not Given
 Date Received: 19/07/2022
 Date Tested: 01/08/2022
 Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

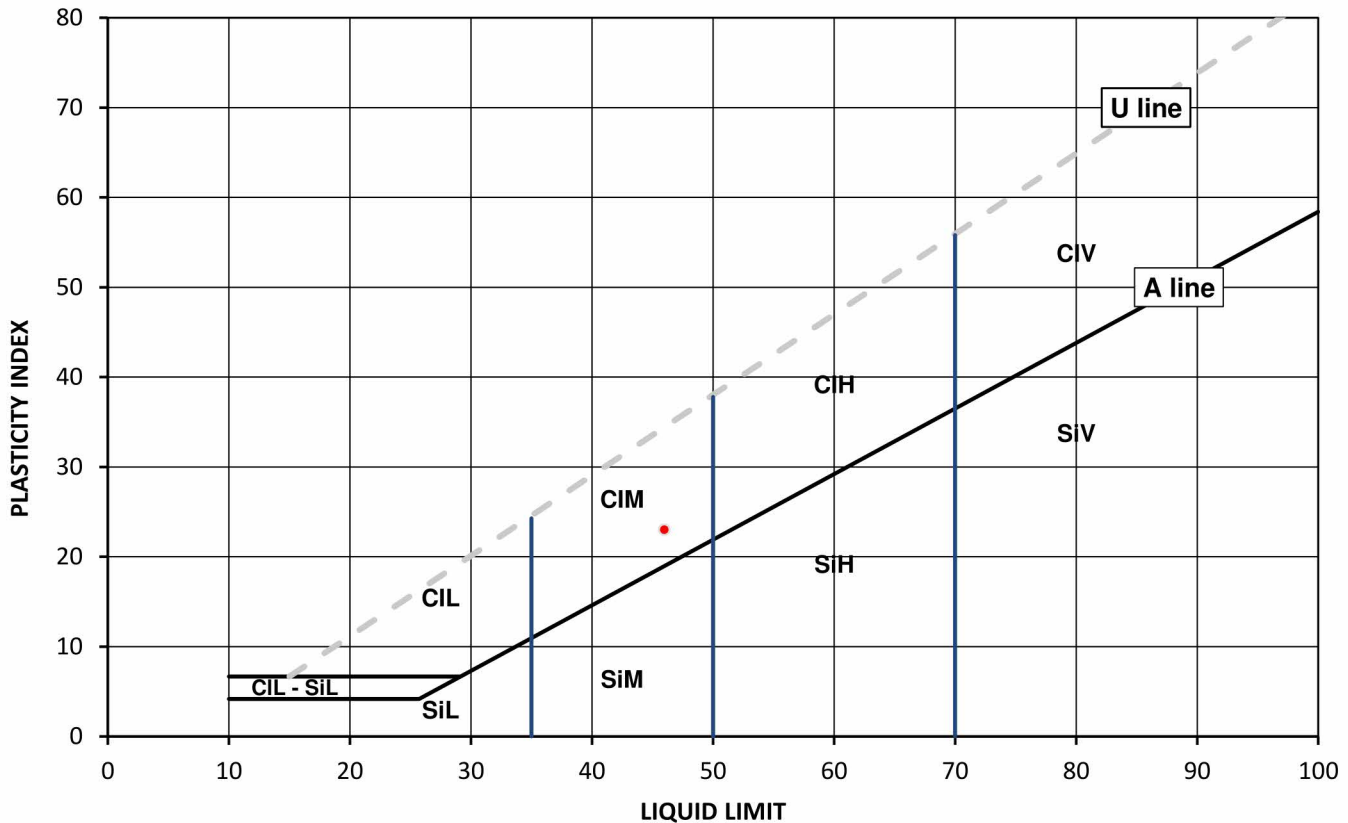
Test Results:

Laboratory Reference: 2358126
 Hole No.: WS101
 Sample Reference: Not Given
 Sample Description: Brown slightly gravelly slightly sandy CLAY

Depth Top [m]: 2.00
 Depth Base [m]: Not Given
 Sample Type: D

Sample Preparation: Tested after >425um removed by hand

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
19	46	23	23	96



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

Cl	Clay	Plasticity	L	Low	Liquid Limit	below 35
Si	Silt		M	Medium		35 to 50
			H	High		50 to 70
			V	Very high		exceeding 70
			O	Organic		append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



Monika Siewior
 Reporting Specialist
 for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS
Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: Ergo Environmental Ltd
Client Address: Maling Exchange, Hoult's Yard,
Walker Rd, Newcastle upon Tyne,
NE6 2HL
Contact: James Nairn
Site Address: Moor House Farm, Shincliffe

Client Reference: 21-871
Job Number: 22-72704
Date Sampled: Not Given
Date Received: 19/07/2022
Date Tested: 01/08/2022
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

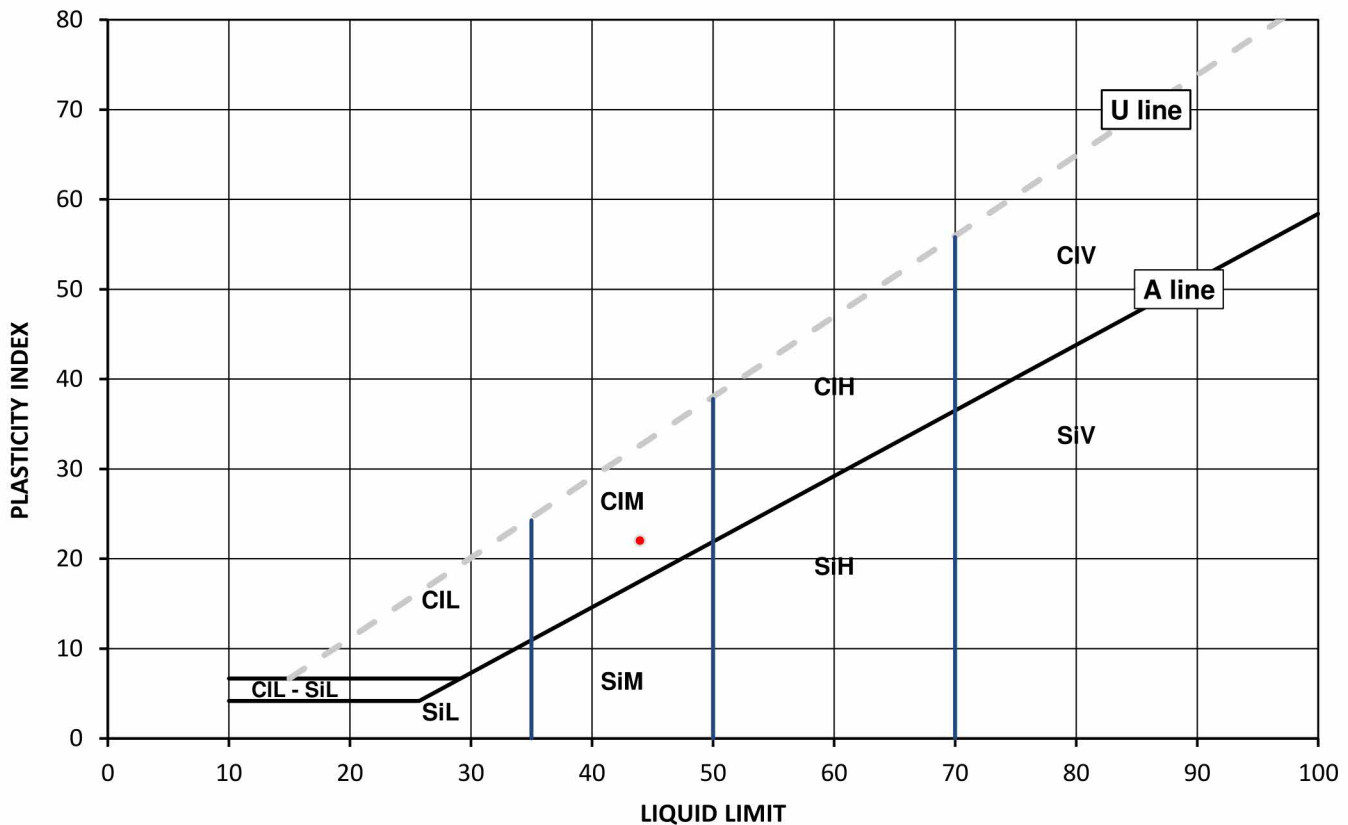
Test Results:

Laboratory Reference: 2358127
Hole No.: WS102
Sample Reference: Not Given
Sample Description: Dark brown slightly gravelly sandy CLAY

Depth Top [m]: 0.70
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested after >425um removed by hand

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
22	44	22	22	98



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

Cl	Clay	Plasticity	L	Low	Liquid Limit	below 35
Si	Silt		M	Medium		35 to 50
			H	High		50 to 70
			V	Very high		exceeding 70
			O	Organic		append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS
Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: Ergo Environmental Ltd
Client Address: Maling Exchange, Hoult's Yard,
Walker Rd, Newcastle upon Tyne,
NE6 2HL
Contact: James Nairn
Site Address: Moor House Farm, Shincliffe

Client Reference: 21-871
Job Number: 22-72704
Date Sampled: Not Given
Date Received: 19/07/2022
Date Tested: 01/08/2022
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

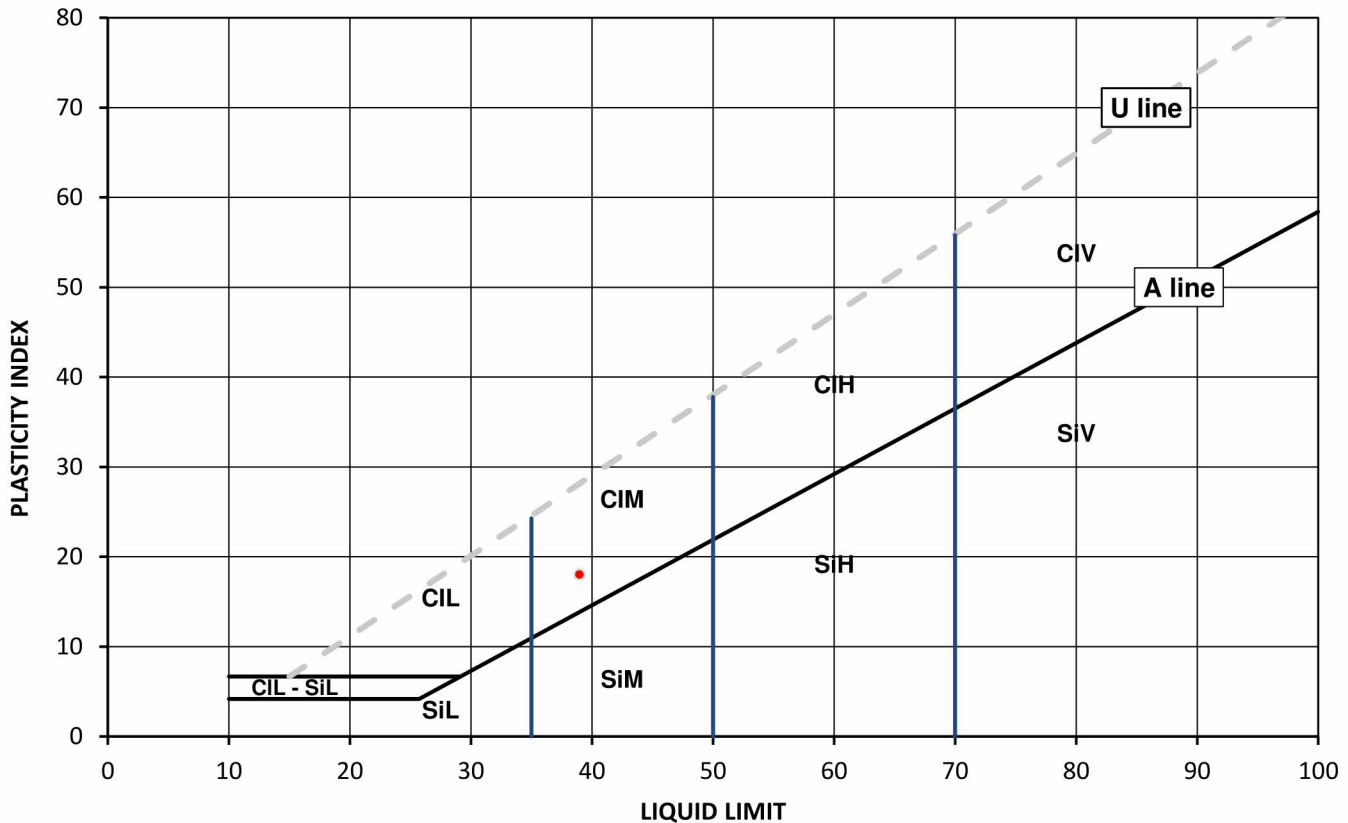
Test Results:

Laboratory Reference: 2358128
Hole No.: WS103
Sample Reference: Not Given
Sample Description: Dark brown slightly gravelly sandy CLAY

Depth Top [m]: 1.50
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested after >425um removed by hand

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
17	39	21	18	98



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

Cl	Clay	Plasticity	L	Low	Liquid Limit	below 35
Si	Silt		M	Medium		35 to 50
			H	High		50 to 70
			V	Very high		exceeding 70
			O	Organic		append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



Monika Siewior
Reporting Specialist
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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS
Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: Ergo Environmental Ltd
Client Address: Maling Exchange, Hoult's Yard,
Walker Rd, Newcastle upon Tyne,
NE6 2HL
Contact: James Nairn
Site Address: Moor House Farm, Shincliffe

Client Reference: 21-871
Job Number: 22-72704
Date Sampled: Not Given
Date Received: 19/07/2022
Date Tested: 01/08/2022
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

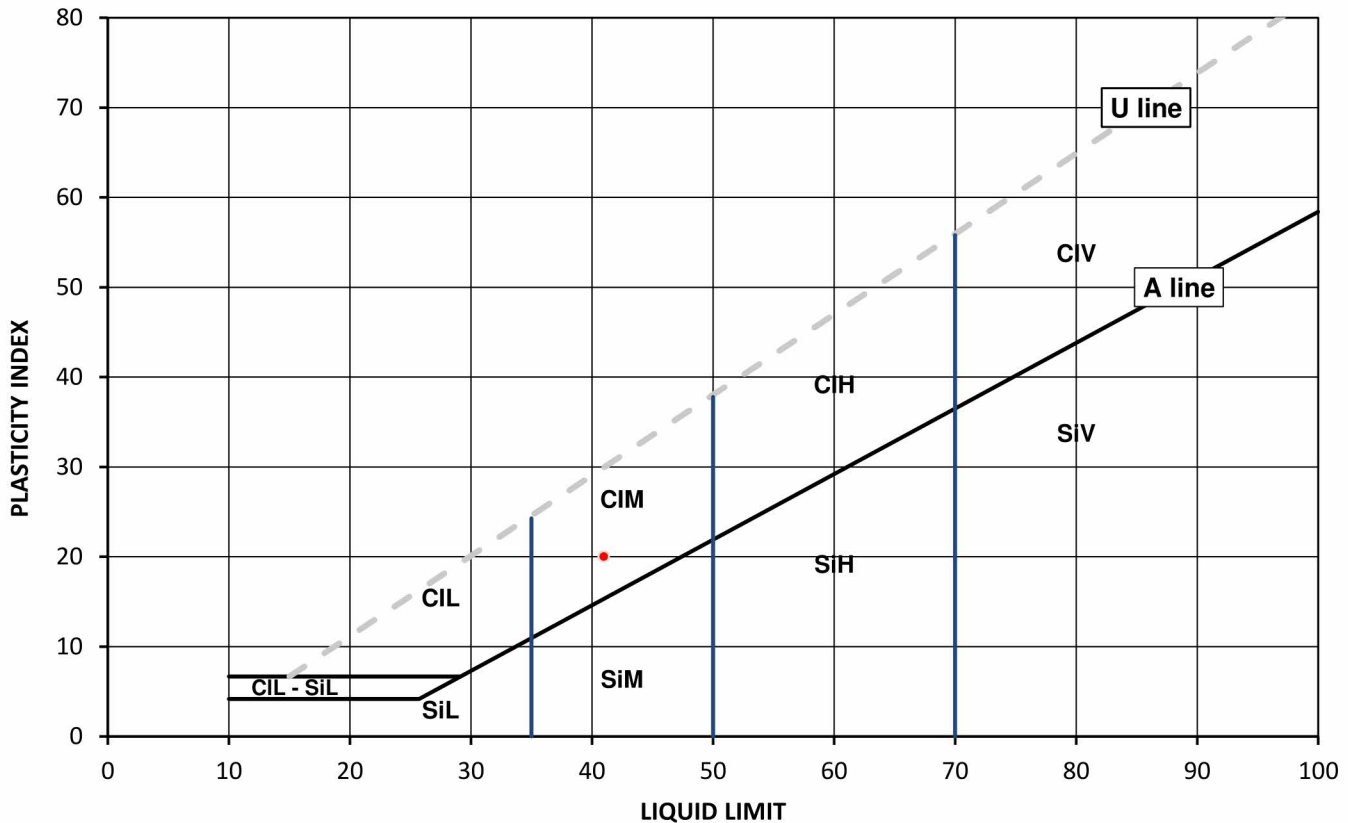
Test Results:

Laboratory Reference: 2358129
Hole No.: WS105
Sample Reference: Not Given
Sample Description: Brown slightly gravelly sandy CLAY

Depth Top [m]: 0.50
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested after >425um removed by hand

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
18	41	21	20	96



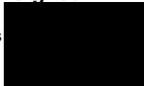
Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L Low	50 to 70
	M Medium	exceeding 70
	H High	append to classification for organic material (eg CIHO)
	V Very high	
	O Organic	

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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Client: Ergo Environmental Ltd
Client Address: Maling Exchange, Hoult's Yard, Walker Rd, Newcastle upon Tyne, NE6 2HL

Contact: James Nairn
Site Address: Moor House Farm, Shincliffe

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

SUMMARY REPORT

SUMMARY OF CLASSIFICATION TEST RESULTS

Tested in Accordance with:

Water Content by BS 1377-2:1990: Clause 3.2; Atterberg by BS 1377-2: 1990: Clause 4.3 (4 Point Test), Clause 4.4 (1 Point Test) and 5; PD by BS 1377-2: 1990: Clause 8.2

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

Client Reference: 21-871
Job Number: 22-72704
Date Sampled: Not Given
Date Received: 19/07/2022
Date Tested: 01/08/2022
Sampled By: Not Given

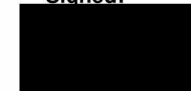
Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Water Content BS 1377-2 [W] %	Water Content BS EN ISO 17892-1 [W] %	Atterberg				Density			Total Porosity# %	
		Reference	Depth Top m	Depth Base m	Type					% Passing 425um	WL %	Wp %	Ip %	bulk Mg/m3	dry Mg/m3	PD Mg/m3		
2358126	WS101	Not Given	2.00	Not Given	D	Brown slightly gravelly slightly sandy CLAY	Atterberg 1 Point	19		96	46	23	23					
2358127	WS102	Not Given	0.70	Not Given	D	Dark brown slightly gravelly sandy CLAY	Atterberg 1 Point	22		98	44	22	22					
2358128	WS103	Not Given	1.50	Not Given	D	Dark brown slightly gravelly sandy CLAY	Atterberg 1 Point	17		98	39	21	18					
2358129	WS105	Not Given	0.50	Not Given	D	Brown slightly gravelly sandy CLAY	Atterberg 1 Point	18		96	41	21	20					

Note: # Non accredited; NP - Non plastic

Comments:

Signed:



Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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Client Address: Maling Exchange, Hoult's Yard,
Walker Rd, Newcastle upon Tyne,
NE6 2HL

Contact: James Nairn
Site Address: Moor House Farm, Shincliffe

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

SUMMARY REPORT

DETERMINATION OF WATER CONTENT

Tested in Accordance with: BS 1377-2: 1990: Clause 3.2

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

Client Reference: 21-871
Job Number: 22-72704
Date Sampled: Not Given
Date Received: 19/07/2022
Date Tested: 01/08/2022
Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	WC %	Sample preparation / Oven temperature at the time of testing			
		Reference	Depth Top m	Depth Base m	Type							
2358126	WS101	Not Given	2.00	Not Given	D	Brown slightly gravelly slightly sandy CLAY		19	Sample was quartered, oven dried at 108.7 °C			
2358127	WS102	Not Given	0.70	Not Given	D	Dark brown slightly gravelly sandy CLAY		22	Sample was quartered, oven dried at 108.7 °C			
2358128	WS103	Not Given	1.50	Not Given	D	Dark brown slightly gravelly sandy CLAY		17	Sample was quartered, oven dried at 108.7 °C			
2358129	WS105	Not Given	0.50	Not Given	D	Brown slightly gravelly sandy CLAY		18	Sample was quartered, oven dried at 108.7 °C			

Comments:

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Signed:



Monika Siewior
Reporting Specialist
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