GEOSPHERE ENVIRONMENTAL

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SITE:	Rishangles Hall, Eye Road, Rishangles, IP23 7LA
DATE:	03/01/2024

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Limit of Reliance:

This report is based on the site findings at the time of the associated walkover/site investigation works and information provided by the client at the time of writing. Should site conditions alter or development proposals alter, a reassessment of the enclosed findings should be undertaken. Refer to Appendix 1 for full details of report limitations.

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VERSION RECORD

Version	Date	Document Revision Details	Prepared By:	Admin
V1	03/07/23	Original Document	PC	CD
V2	03/01/24	Updates following further investigation	PC	HP

Executive Summary

Project Description		Geosphere Environmental Ltd was commissioned by Mrs. Jane Smith to undertake a Phase 2 Site Investigation at Rishangles Hall, Eye Road, Rishangles, IP23 7LA. It was understood that an existing modern barn is to be demolished and the adjacent historic barn is to be extended and converted into a single residential dwelling with associated car parking and garden areas. At the time of the investigation this area comprised hardstanding yard in the north with two barn structures in the centre and undeveloped land to the south. A rough track was present to the east of the barns forming access to the south.
Site Location / Description		The site was located at Rishangles Hall, Eye Road, Rishangles, IP23 7LA and may be located by National Grid Reference (NGR) TM 16445 67573.
Site Works		Site works were carried out on 11 to 12 May 2023 and 28 November 2023 and comprised the following: • The formation of 15 windowless sampler boreholes; • The installation of two ground gas / groundwater monitoring wells; • The formation of a six hand dug pits. Undertaking environmental and geotechnical soil sampling and soil logging.
Gas Monitoring		Ground gas monitoring was carried out in accordance with current guidance. Six consecutive monitoring visits were undertaken over a period of 16 May 2023 to 19 June 2023 including falling barometric pressure conditions. Carbon dioxide concentrations in exceedance of 5.0% were consistently recorded and therefore Characteristic Situation CS2 is considered appropriate.
Laboratory Results		Within a sample taken from WS09 at a depth of 0.30m bgl aromatic TPH in the C21-C35 band was recorded at a level of 1627mg/kg compared to the screening value of 1100mg/kg based upon a soil organic matter (SOM) of 1%. Subsequent testing in the surrounding areas did not record elevated concentrations, indicating a localised hotspot.

		A marginal exceedance of lead (203mg/kg compared to a screening value of 200mg/kg) was recorded within a single location, WS13 at 0.4m. Cement bound PACM was noted near surface within HP01 within a rough track between the two existing barns, a sample of which was dispatched to the environmental laboratory for testing which confirmed the presence of chrysotile asbestos fibres within the cement bound matrix. Four soil samples taken from along the track (HP02-HP05) tested positive for asbestos fibres, however quantification testing confirmed that this was at very low concentrations with two samples at the limit of reporting, 0.001%, and two below this level. A single sample from WS10 at 0.4mbgl, below the concrete floor slab within the barn, tested positive for the presence of asbestos fibres, however this was at a level below the limit of reporting (<0.001%).
Advanced Conceptual Model		Low to moderate risk identified, localised around WS09, to proposed garden areas and controlled waters from TPH contamination. Low risk from cement bound asbestos and low concentrations of loose fibres within the soils along the track.
Recommendations and Further Works		A Remediation Method Statement (RMS) should be prepared detailing the remedial measures and validation required to address the TPH and asbestos contamination identified at the site.
This Executive Summary only provides a summary of the site data and its assessment. It does not provide a definitive engineering analysis and is for guidance only. It is recommended that the reader reviews the report in its entirety and any material referenced therein.		

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TABLES

1. INTRODUCTION

Geosphere Environmental Ltd was commissioned by Peter Wells Architects Ltd on behalf on the Client, Mrs. Jane Smith to undertake a Phase 2 Ground Investigation for a proposed residential conversion at Rishangles Hall, Eye Road, Rishangles, IP23 7LA.

It was understood that an existing modern barn is to be demolished and the adjacent historic barn is to be extended and converted into a single residential dwelling with associated car parking and garden areas.

A Proposed Development Plan, Peter Wells Architects drawing ref. PW941_P102-RevD, is provided within Appendix 3.

The primary objectives of this ground investigation were to:

- Assess the ground conditions at the site;
- Assess the potential risk to human health and the environment based on the findings of the investigation.

These were achieved by:

- Undertaking an intrusive investigation of the site, based upon the findings of previous site data, the proposed development layout and the scope agreed with the client;
- Logging and sampling the soils on the site and noting any visual or olfactory evidence of contamination;
- Undertaking laboratory chemical analysis of selected soil samples to assess soil quality at the site;
- Installing monitoring wells for ground gas and groundwater level monitoring;
- Creating a Conceptual Site Model and defining suitable remedial / mitigating and verification actions.

1.1 Previous Reports

A Phase I Contaminated Land Assessment (hereafter referred to as 'the Phase I Report', report reference IE19/100, prepared by JPC Environmental Services was provided by the Client to assist in the preparation of this investigation. This report encompassed the subject site and the surrounding areas. The report highlighted the following as potential hazards relevant to the site:

- Potential Made Ground and potential asbestos containing materials (PACM) associated with historic demolition and redevelopment;
- Oil tanks and barrels;
- Potential migration of hazardous ground gases associated with infilled land offsite.

2. SITE SETTINGS

2.1 Site Description

The subject site was situated in Rishangles and may be located by National Grid Reference (NGR) TM 16445 67573.

The subject site was a rectangular portion of land covering an approximate area of 0.2ha. A full walkover was undertaken in conjunction with the Phase I Report. At the time of the investigation this area comprised hardstanding yard in the north with two barn structures in the centre and undeveloped land to the south. A rough track was present to the east of the barns forming access to the south. Scattered trees were present in the south.

A residential property bordered the site to the west while to the north and east further agricultural development continued. The southern boundary was formed by a drainage ditch, beyond which was undeveloped land.

A Site Location Plan is included within Appendix 3 as drawing reference 7213,GI/001/Rev0.

3. SITE WORKS

3.1 Methodology

This site investigation was carried out in accordance with the practices set out in BS 10175: 2011+A1:2013, (ref. **R.8**) and BS 5930: 2015 (ref. **R.9**). The location of exploratory holes has been planned, where possible, to give the best possible coverage of the proposed residential development within access restrictions and budgetary constraints while targeting any locations highlighted in the desk study and / or site walkover.

3.2 Scope

Site works were carried out on 11 and 12 May 2023 and comprised the following:

- The formation of 9 windowless sampler boreholes;
- The installation of 2 ground gas / groundwater monitoring wells;
- The formation of a single hand dug pit.

Further investigation was undertaken on 28 November 2023 and comprised the following:

- The formation of 6 windowless sampler boreholes;
- The formation of 5 hand dug pits.

3.3 Ground Conditions Encountered

The sequence of the strata encountered during the investigation generally confirmed the anticipated geology as interpreted from the British Geological Survey (BGS) digital mapping, at a scale of 1:50,000.

The sequence and indicative thickness of the strata encountered are provided below:

Table 1 – Ground Conditions

Strata	Depth Encountered (mbgl)		Strata Thickness (m)	Composition
	From	To		
Concrete	0.0	0.10 to 0.13	0.10 to 0.13	WS08 and WS09 only.
Made Ground	0.0	0.20 to 0.40	Unproven to 0.40	HP01: A dark brown silty gravelly sand. Gravel is fine to coarse flint, brick and cement bound ACM. WS09: A greyish brown clayey gravelly sand with organic staining.

Table 1 – Ground Conditions				
Strata	**Depth Encountered (mbgl)**		**Strata Thickness (m)**	**Composition**
	From	**To**		
Topsoil	0.0	0.45 to 0.60	0.45 to 0.60	WS01 to WS07.
Cohesive deposits	0.13 to 0.40	0.40 to 1.20		Generally, an orange, brown sandy clay. Locally with flint gravel.
Lowestoft Formation – diamicton	0.4 to 1.2	2.0	Unproven	All exploratory holes: Generally, an orangish brown gravelly clay with chalk and flint, locally mottled grey.

3.4 Visual and Olfactory Evidence of Contamination

No visual or olfactory evidence of contamination within the recovered soils was noted during the investigation.

4. LABORATORY TESTING

4.1 Methodology

Representative environmental samples were taken at the depths shown on the exploratory hole records and despatched to the laboratory. The exploratory hole logs are included in Appendix 5.

Samples were collected for environmental purposes in amber glass jars and plastic tubs and kept in a cool box with cooling aid.

Samples were selected to give general coverage across the site including proposed garden areas.

4.2 Environmental Testing Suite

4.2.1 Quality Control

The environmental laboratory used (DETS) is an accredited laboratory by the United Kingdom Accreditation Service (UKAS), and at least 50% of individual parameters are from methods pending accreditation to the Environment Agency Monitoring Certification Scheme (MCERTS) for the range of analyses undertaken as part of this investigation. The MCERTS performance standard for the chemical testing of soil is an application of ISO 17025: 2005, specifically for the chemical testing of soil.

4.2.2 Environmental Testing Suite – Soils

The suite of chemical analyses was based upon the findings of the site observations and the conceptual model. The full suite of chemical analyses were carried out on nine samples of soil. The nature of the analyses is detailed below:

- Metals screen - arsenic, cadmium, chromium, lead, mercury, selenium, boron (water soluble), beryllium, copper, nickel, vanadium and zinc;
- Organic screen - total petroleum hydrocarbons (TPH) – with specific carbon banding; benzene, toluene, ethylbenzene and xylenes (BTEX); polyaromatic hydrocarbons (PAH) – USEPA 16 suite; monohydric phenols;
- Inorganics screen - cyanide (total), sulphate (water soluble);
- Others - pH, organic matter, asbestos;

Asbestos identification was also undertaken on a cement bound fragment of PACM.

A copy of the laboratory test results is included in Appendix 7.

5. MONITORING

5.1 Ground Gas

Ground gas monitoring was undertaken by a suitably qualified environmental consultant, using a GFM436 landfill gas analyser and a MultiRaeLite Photo-ionisation detector (PID). The main determinants recorded were methane (CH_4), carbon dioxide (CO_2), oxygen (O_2), VOCs as well as flow.

Ground gas monitoring was carried out in accordance with current guidance (ref. **R.23**). Six consecutive monitoring visits were undertaken over a period of 16 May 2023 to 19 June 2023 including falling barometric pressure conditions.

The results of ground gas monitoring are included in Appendix 6 and a summary is presented in the table below.

Table 2 – Ground Gas Monitoring Results Summary

Location	Typical Concentration					Flow Rate	VOC	Atmospheric Pressure
	Methane (CH_4)	Carbon Dioxide (CO_2) [% v/v]		Oxygen (O_2) [% v/v]				
	[% v/v]	(Max.)	(Min.)	(Max.)	(Min.)	(l/hr)	(ppm)	(mb)
WS06	<0.1	7.3	0.5	21.7	18.5	0	4	1003 - 1022
WS09	<0.1	0.4	<0.1	21.5	19.9	0	3	1003 - 1023

5.2 Groundwater

Groundwater was not encountered within any of the exploratory holes during the site investigation.

During subsequent monitoring visits the measured groundwater levels were recorded using a dipmeter and the results of monitoring are presented in the table below:

Table 3 – Groundwater Monitoring Results

Monitoring Well	Depth of Monitoring Well (mbgl)	Groundwater Encountered at (mbgl)					
		Visit 1	Visit 2	Visit 3	Visit 4	Visit 5	Visit 6
		16/05/23	23/05/23	30/05/23	06/06/23	13/06/23	19/06/23
WS06	1.52	0.46	0.83	0.94	1.05	1.15	0.99
WS09	1.46	0.18	0.24	0.11	0.03	0.27	0.19

Notes:
Dry - no groundwater encountered.
n/m – not measured.
0 - well filled with water.

Although high water levels within WS09 were recorded, the results are not considered representative of groundwater levels in this area, as significant water ingress from the surface was noted during installation of this well, during a period of heavy precipitation. Due to the cohesive nature of the soils this was then unable to escape.

6. RISK ASSESSMENT

6.1 Risk to Human Health

6.1.1 Methodology

The current guidance requires that a conceptual model be formulated, based upon the findings of the research. The conceptual model is limited at this stage to the identification and assessment of potential 'hazards', identified or suspected from the results of the research; the potential 'receptors' that may be affected and the anticipated 'pathways' to those receptors. The findings are summarised in the following subsections.

The guidance proposes a four-stage approach for the assessment of contamination and the associated risks. The four stages are listed below:

- Hazard Identification;
- Hazard Assessment;
- Risk Estimation;
- Risk Evaluation.

6.1.2 Soil Quality Screening Values

A total of six representative soil samples were selected for testing and subjected to a suite of testing as detailed in section 4.2.2. The results of the soil analyses have been compared to soil quality screening values for the proposed end use of residential with plant uptake, where deemed applicable, such as:

- The LQM/CIEH S4ULs for Human Health Risk Assessment, (ref. **R.21**);
- Defra/CL:AIRE Final C4SLs, (ref. **R.20**).

Where the concentrations reported by the laboratory analysis (and thus determined onsite) are at or below the respective screening concentrations, they are considered not to pose a risk and are removed from further consideration, unless otherwise stated in the following sections.

6.2 Elevated Soil Concentrations

A single exceedance was recorded within the results of the initial round of testing. Within a sample taken from WS09 at a depth of 0.30m bgl, aromatic TPH in the C21-C35 band was recorded at a level of 1627mg/kg, compared to the screening value of 1100mg/kg based upon a soil organic matter (SOM) of 1%.

Further investigation and testing was then undertaken in the areas surrounding WS09, including proposed garden areas. The full suite of testing, as detailed within Section 4.2.2, was undertaken on 3 samples with TPH testing undertaken on 4 additional samples from around WS09. No elevated TPH was recorded within any of the samples selected for subsequent testing. However, a single marginal exceedance of Lead (203mg/kg compared to the screening value of 200mg/kg) was recorded within WS13.

6.2.1 Asbestos

No visual evidence of PACM was noted within soils recovered from the windowless sampler boreholes. Nine representative samples selected for testing were also subjected to asbestos screening, with a positive result returned for a single sample from WS10 at 0.4m bgl situated below the concrete floor slab within the barn. Subsequent quantification testing confirmed that asbestos fibres were present at a level below the limit of reporting (<0.001% or <0.1mg/kg).

Cement bound PACM was noted near surface within HP01 within a rough track between the two existing barns, a sample was collected and dispatched to the environmental laboratory for testing which confirmed the presence of chrysotile asbestos fibres within the cement bound matrix. Four samples of the shallow Made Ground from along the length of the track were subsequently screened for asbestos fibres, with positive results returned for each sample. Asbestos quantification was undertaken on all four of these samples, which confirmed very low concentrations of loose fibres within the soil matrix; two samples recorded concentrations of 0.001% and two were below the limit of reporting (<0.001%).

Based upon observations and anecdotal evidence onsite it is likely that this is a result of historic mixed 'hardcore' being laid down to form the track.

This track is outside the fence line of the proposed residential property and therefore will not be directly disturbed as part of the proposed works. However, vehicle movements along this track introduce the risk of disturbance of cement bound ACM, potentially breaking up fragments and releasing asbestos fibres into the air or soil. Although this risk is relatively low, it cannot be ruled out and should be addressed as part of the Remediation Method Statement (RMS) for the site.

6.3 Ground Gas

The results of the soil gas monitoring have been compared with current guidance (ref. **R.23**).

The results show no methane generation within soils, but limited generation of carbon dioxide. No significant gas flow was detected within the wells across the site.

A Gas Screening Value (GSV) has been equated for each of the monitoring points taking the highest recorded flow, Carbon Dioxide and Methane across the monitoring visits. On the basis of the recorded methane concentration a gas screening value of <0.01l_{CH4}/hr has been calculated. Similarly, on the basis of the recorded carbon dioxide concentrations, a gas screening value of <0.01 l_{CO2}/hr has been calculated.

Based upon these results, the site would be placed in Characteristic Situation CS1 however, in accordance with BS8485, where carbon dioxide concentrations in exceedance of 5.0% are recorded an increase to CS2 must be considered. In this instance, due to the significant and consistent exceedance of this threshold a Characteristic Situation CS2 is considered appropriate.

6.4 Risk to Controlled Waters

The risks to Controlled Waters from TPH contamination have been assessed with the available soil quality data only, as groundwater analysis was outside the scope of this investigation.

Although elevated concentrations were recorded in a single location, considering the relatively low levels, and the presence of cohesive soils the risk to controlled waters is low from the encountered contamination. Furthermore, additional investigation undertaken in the surrounding areas confirmed that this contamination was likely to be localised to the areas immediately surrounding WS09.

6.5 Risk to Construction Workers

The concentrations do not pose a significant hazard to construction workers assuming that standard health and safety and good hygiene practices are applied during any groundworks.

6.6 Risk to Plants

A review of the commonly occurring phytotoxic chemicals, copper, nickel and zinc, has been undertaken based upon the now superseded ICRCL guidance. Although the ICRCL trigger threshold levels have been withdrawn; British Standard BS8601 provides a series of soil concentrations indicating suitable qualities for multipurpose subsoils, including concentrations of <300mg/kg for Zinc, <200mg/kg for Copper and <110mg/kg for Nickel as indicative parameters.

Concentrations of metals were recorded at concentrations below the thresholds considered to have phytotoxic effects. As a result of which, the risk to plants is assessed to be low. This is notwithstanding the quality of the soil utilised within areas of planting; soil quality in terms of nutrients and suitability for the applied planting is outside of the scope of this assessment and specialist advice may need to be sought along with utilising suitable quality landscaping materials.

6.7 Risk to Services - Pipes

An initial comparison of the laboratory results has been made against the Contaminated Land Assessment Guidance, published by Water UK (Ref. **R.13)** also often termed the "UKWIR Guidance". Note, the full range of thresholds given in this guidance have not specifically been tested for within the scope of this investigation; further soil sampling and analysis may be required by the water providing company or designers.

The Made Ground soil analysis undertaken indicates concentrations of some TPH congeners that may have the potential to affect (permeate) standard PE pipes. Two initial options exist for consultation and agreement with the local water supply company prior to further design of the scheme and before laying any services: (1) Removal of all Made Ground or contaminated soil in the vicinity of the proposed routes of potable water pipes, appropriate recording of this and backfilling with clean soil / granular materials; this may also require pipe "wrapping" with geotextile. (2) Use of a "barrier" pipe and fittings throughout the development. As detailed within section 6.4. the removal of contaminated soil in this area is recommended to address potential risks to controlled waters which, depending on the extent of contamination and proposed service routes, may address this risk.

It is advised that the UK Water Industry Research Guidance (ref. **R.13**) is adopted and consultation with the local water company is sought prior to laying any services. In addition, as part of any Discovery Strategy for soil disturbance works, if suspected poor quality or contaminated soils are encountered where potable water pipes are to be laid, further assessment is likely.

6.8 Advanced Conceptual Site Model

Following the findings of the site investigation the Preliminary Conceptual Site Model for the site has been reviewed and the conclusions are presented in the Table 4 overleaf.

Table 4 – Advanced Conceptual Site Model

Sources	PATHWAYS:					RECEPTORS:						Risk Rating	Comments
	Root Uptake	Direct Contact	Ingestion	Respiration	Gas Accumulation	Plants	End Users	Structures (Concrete)	Services/Utilities	Construction Workers	Controlled Waters (GW)		
Made Ground – Asbestos in track – cement and very low levels of fibres.	N	N	N	U	N	N	Mo	N	N	N	N	LR	Asbestos present along track in the form of cement bound fragments and loose fibres in very low concentrations. Low overall risk to be addressed via RMS.
Site activities (inc. oil tanks).	U	L	L	U	U	Mi	Mo	Mi	Mo	Mi	Mo	LR-MR	Localised low to moderate risk identified around WS09 to proposed garden areas and controlled waters.
Infilled land (offsite).	N	N	N	N	U	N	Mi	N	N	N	N	LR	Low risk identified. CS2 characterisation recommended.

Legend: -
See Comparison of Consequence Against Probability within Appendix 4 for Key to Legend.

Probability:	
Negligible (N)	
Unlikely (U)	
Likely (L)	
Highly Likely (HL)	

Consequence (Severity):	
Negligible (N)	
Mild (Mi)	
Moderate (Mo)	
Severe (S)	

Risk Rating:	
Very High Risk	**VH**
High Risk	**HR**
Medium Risk	**MR**
Low Risk	**LR**
Negligible Risk	**NR**

7. CONCLUSIONS AND RECOMMENDATIONS

Geosphere Environmental Ltd was commissioned by Peter Wells Architects Ltd on behalf on the Client, Mrs. Jane Smith to undertake a Phase 2 Ground Investigation for a proposed residential conversion at Rishangles Hall, Eye Road, Rishangles, IP23 7LA.

Based upon the findings of the desk study and walkover, a number of potential contaminant sources and pathways to sensitive receptors had been identified. These sources that warranted further investigation were potential Made Ground and potential asbestos containing materials (PACM) associated with historic demolition and redevelopment, oil tanks and barrels, and potential migration of hazardous ground gases associated with infilled land offsite.

Subsequent intrusive investigation determined that a single exceedance was recorded within the results of testing. Within a sample taken from WS09 at a depth of 0.30m bgl aromatic TPH in the C21-C35 band was recorded at a level of 1627mg/kg compared to the screening value of 1100mg/kg based upon a soil organic matter (SOM) of 1%. This is unsuitable for proposed garden areas and has the potential to impact groundwater and standard PE pipes. Further investigation of the surrounding areas confirmed that this contamination is likely to be localised to the areas immediately surrounding WS09. It is recommended that a Remediation Method Statement (RMS) is prepared for the site detailing how this risk should be addressed as part of the development process.

A marginal exceedance of lead was recorded within a single location – WS13. However, the risk from this concentration is low and this area is situated below an area of proposed hardstanding car parking, forming a pathway break to end users. No specific remedial measures are recommended, however appropriate PPE should be utilised during any work involving direct contact with soils in this area.

Cement bound PACM was noted near surface within HP01 within a rough track between the two existing barns. Laboratory testing confirmed the presence of chrysotile asbestos fibres within the cement bound matrix and further sampling along the track confirmed fibres at very low concentrations within the shallow soils. This track is outside the fence-line of the proposed residential property and therefore will not be directly disturbed as part of the proposed works. However, as this area of the site falls within the red line boundary it is considered part of the development and the risk of disturbance to asbestos will need to be addressed as part of the RMS.

Ground gas monitoring was carried out in accordance with current guidance. Carbon dioxide concentrations in exceedance of 5.0% were consistently recorded and therefore Characteristic Situation CS2 is considered appropriate.

It is recommended that this report be submitted to the Local Authority as part of the site's planning submission.

Although outside the scope of this investigation, as demolition of the buildings is proposed it would be necessary to undertake a Refurbishment and Demolition (asbestos survey) of the buildings, in accordance with MDHS guidance (ref. **R.8**).

APPENDICES

Appendix 1 – Report Limitations and Conditions

General Limitations and Exceptions

This report was prepared solely for our Client for the stated purposes only and is not intended to be relied on by any other party or for any other use. No extended duty of care to any third party is implied or offered.

Geosphere Environmental Ltd does not purport to provide specialist legal advice.

The Executive Summary, Conclusions and Recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon until considered in the context of the whole report.

Interpretations and recommendations contained in the report represent our professional opinions, which were arrived at in accordance with currently accepted industry practices at the time of reporting and based upon current legislation in force at that time.

Environmental and Geotechnical Reporting (including Phase 1, Phase 2 and Site Walkovers) Limitations and Exceptions

The comments given in this report and the options expressed herein are based on the readily available information collated for the report and an assessment based upon the current guidance which for Phase 1 / Phase 2 report is guidance BS 10175: 2011+A1:2013 and BS 5930: 2015.

The report has been prepared in relation to the proposed end-use and should another end-use be intended, reassessment may be required.

No warranty is given as to the possibility of future changes in the condition of the site.

The opinions expressed cannot be absolute due to the limitation of time and resources imposed by the agreed brief.

With regards to any aspect of land contamination referred to, this is limited to those aspects specifically stated and necessarily qualified. No liability shall be accepted for other aspects which may be the result of gradual or sudden pollution incidents, past or present land uses and the potential for associated contamination migration.

Any Desk Study Report / data has been produced largely from the information purchased from The Landmark Information Group. The information is not necessarily exhaustive and further information

relevant to the site may be available from other sources. The information purchased has been assumed to be correct and free from errors; However, there is the possibility that some data may be missing from the report including (but not limited to) unrecorded land uses both onsite and offsite or unrecorded pollution events. No attempt has been made to verify the information.

The accuracy of any map extracts cannot be guaranteed. It is possible that different conditions existed onsite, between and subsequent to the various map surveys provided.

Any site walkover undertaken is a snapshot of the site recording the visually evident conditions at the time of the walkover in the areas readily accessible. It is possible that after the walkover, the site was altered (for example by fly-tipping or groundworks) or before the walkover, the site conditions changed removing evidence of potentially contaminative features (such as oil tanks removed).

Any intrusive works only cover a tiny proportion of the site. Where exploratory holes are positioned by GEL, they are located to give as good a coverage of the site as possible and to target features / proposed land use where applicable while allowing for areas that cannot be accesses, Client requested locations and other site / time / budget constraints. While assumptions may have been drawn between exploratory holes on the ground conditions and / or extent or otherwise of any contamination, this is for guidance only and no liability can be accepted on its accuracy.

Foundation design is outside of the remit of Geosphere Environmental unless specifically stated and it is recommended that the services of foundation design specialists are sought as required. Any foundation appraisal contained with the report is limited to foundation optioneering.

Any Conceptual Site Model is based on the information available at the time of conducting this assessment and is an interpretive assessment of the conditions at the site. Redevelopment and / or further investigation of the site may reveal additional information and therefore alter the Conceptual Site Model and the report conclusions.

Any infiltration testing results are considered to be representative of the ground conditions at the locations tested and at the time of testing. As well as lateral variation in ground conditions, seasonal changes in ground water level may affect the results.

Any post-fieldwork monitoring (including ground gas / groundwater) is a snapshot of the conditions at the time of monitoring.

Appendix 2 – References

R.1. Land Contamination Risk Management (LCRM), 2020.

R.2. Health Protection Agency and British Geological Survey, Report HPA-RPD-033 'Indicative Atlas of Radon in England and Wells', 2007.

R.3. BRE Report 211, 'Radon, Guidance on the Protective Measures for New Buildings, 2015.

R.4. BRE Digest 465, 'Cover Systems for Land Regeneration – Thickness Cover Systems for Contaminated Land', 2004.

R.5. Nitrates Directive (91/676/EEC) 1991.

R.6. The Environmental Protection Act, Part IIA, Section 78, 1990.

R.7. Environment Act 1995, Section 57, DoE 1995.

R.8. British Standards Institute: BS 10175 'Investigation of Potentially Contaminated Sites', Code of Practice, BSI 2011+A2:2017.

R.9. British Standards Institute: BS 5930 'Code of Practice for Ground Investigations', 2015.

R.10. Asbestos: The Survey Guide, HSG 264, 2nd Edition, 2012.

R.11. CL:AIRE 'Guidance on Comparing Soil Contamination Data with a Critical Concentration', The Chartered Institute of Environmental Health, May 2008.

R.12. EIC/AGS/CL:AIRE. Soil Generic Assessment Criteria for Human Health Risk Assessment. Contaminated Land: Applications in Real Environments, London, UK, January 2010.

R.13. Contaminated Land Assessment Guidance Protocols, Published by agreement between Water UK and the Home Builders Federation, Published by Water UK, January 2014.

R.14. UKWIR 'Guidance for the Selection of Water Supply Pipes to be Used in Brownfield Sites, August 2010.

R.15. CIRIA Reports 149 to 152, 'Methane and Associated Hazards to Construction', 1995.

R.16. CIRIA Report C665, 'Assessing Risks Posed by Hazardous Ground Gases to Buildings', 2007.

R.17. Environment Agency. Performance Standard for Laboratories Undertaking Chemical Testing on Soil, Version 4, March 2012.

R.18. National Radiological Protection Board, Report NRPB-R290, 1996, 'Radon Atlas of England'.

R.19. National House-Building Council, Standards, Chapter 4.2, 2018 'Building Near Trees'.

R.20. SP1010 – Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination, Final Project Report (Revision 2), Contaminated Land: Applications in Real Environments (CL:AIRE) September 2014. Appendix H – Lead.

R.21. Land Quality Press, The LQM/CIEH S4ULs for Human Health Risk Assessment, 2015.

R.22. The Environment Agency, Technical Guidance WM3, 'Waste Classification: Guidance on the Classification and Assessment of Waste' 1st Edition, May 2015 (V1.1 – May 2018).

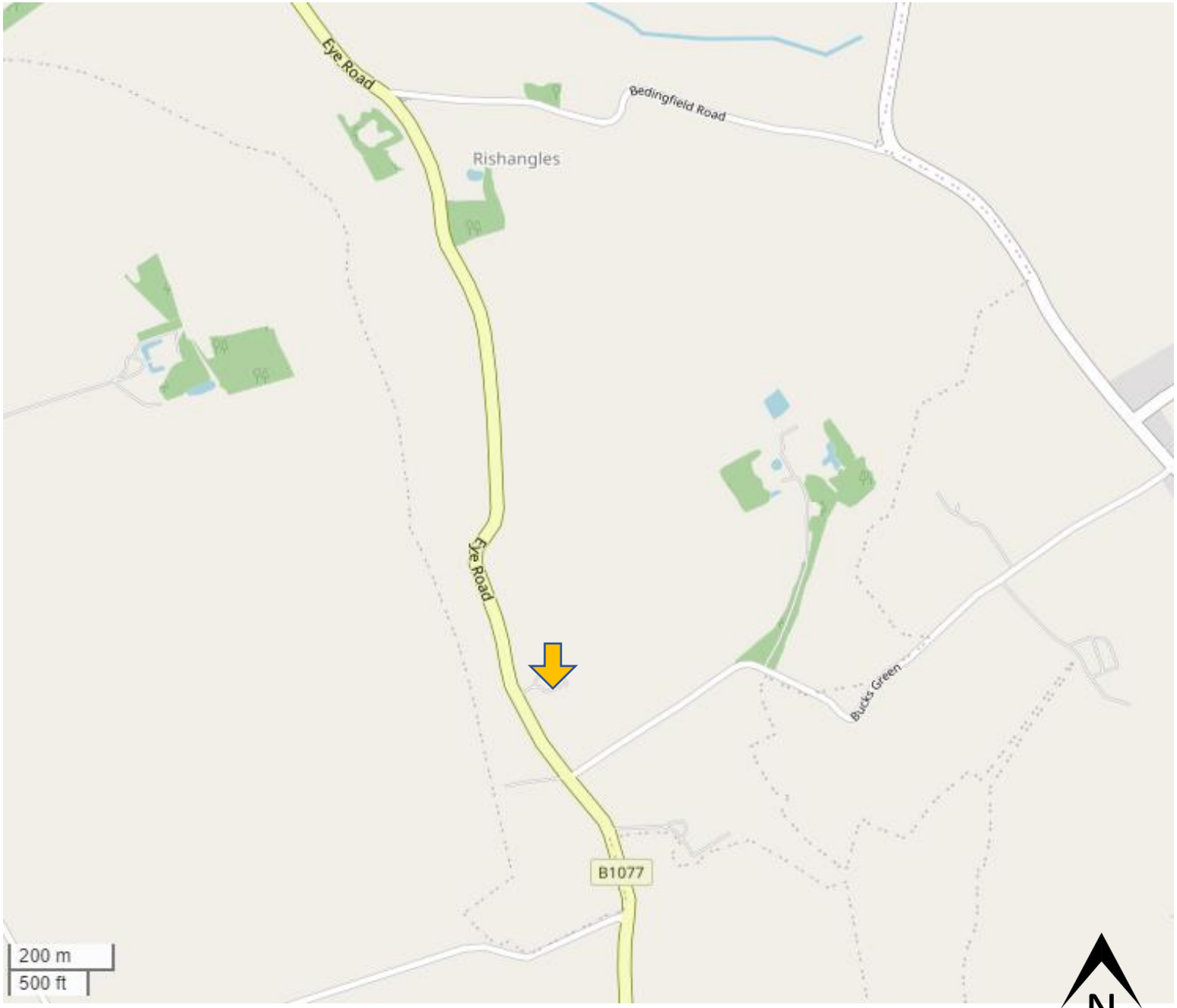
R.23. British Standards Institute, BS 8485, 'Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings', 2015.

Appendix 3 – Drawings

Site Location Plan – Drawing ref. 7213,GI/001/Rev0

Exploratory Hole Location Plan – Drawing ref. 7213,GI/002/Rev1

Proposed Development Plan – Peter Wells Architects Drawing ref. PW941_P102 RevD



GEOSPHERE ENVIRONMENTAL

LEGEND

Site Location

SOURCE

© OpenStreetMap contributors

PROJECT

Rishangles Hall, Eye Road, Rishangles, IP23 7LA

TITLE

Site Location Plan

DRAWING NUMBER

7213,GI/001/Rev0

SCALE	DATE
As marked	06/06/2023
DRAWN BY	**CHECKED BY**
PC	TP

GEOSPHERE ENVIRONMENTAL

LEGEND

- Site boundary
- Window Sample
- Hand Pit

SOURCE

Client supplied background image

PROJECT

Rishangles Hall, Eye Road, Rishangles, IP23 7LA

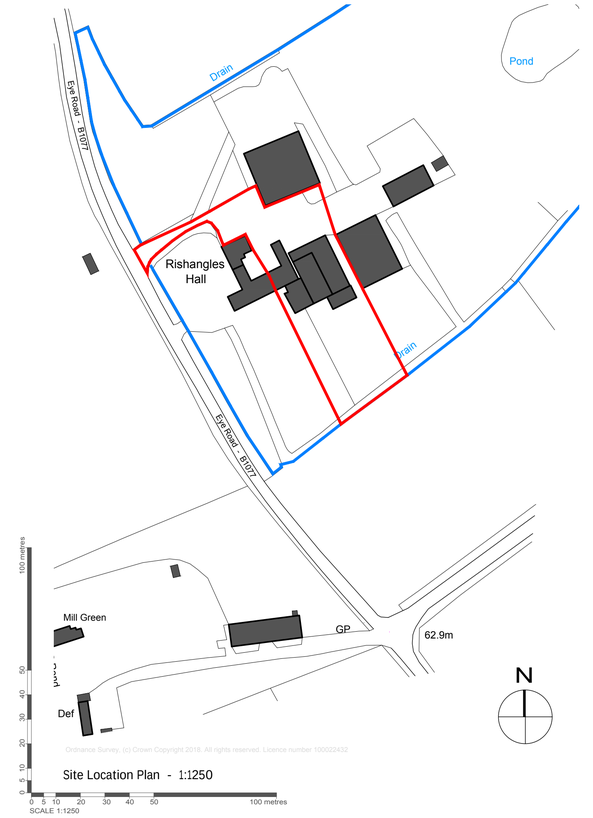
TITLE

Exploratory Hole Location Plan

DRAWING NUMBER

7213,GI/002/Rev1

SCALE	DATE
As marked	08/12/2023
DRAWN BY	**CHECKED BY**
PC	TP



Key:

1. Grey Barn
2. Red barn
3. Black Barn
4. Green Barn
5. Log store
6. Demolition material, soil heaps and made ground
7. Bonfire
8. Potentially Infilled land
9. 3 No. Fuel Tanks

Proposed Site Plan - 1:250

Date	Revision	Description	Drawn	Checked
21.01.20	D	Amended to clients comments	AB	PW
03.05.19	C	Amended following client meeting	AB	PW
24.04.19	B	Scheme amended following planners comments	AB	PW
05.10.18	A	Amended following client meeting	AB	PW

peterwellsarchitects

office farm, letheringham, woodbridge, suffolk, IP13 7RA - 01728 745356 - info@peterwellsarchitects.co.uk

Project :	Rishingles Hall - Barn Conversion						
Client :	Ms Jane Smith						
Dwg. Title :	Site Location Plan and Proposed Site Plan			Dwg. Status :	PLANNING	Drawn by :	AB
Date :	Aug 2018	Scale :	1:250/1250 @ A1	Dwg. No. :	PW941_P102	Revision :	D

Appendix 4 – Comparison of Consequences Against Probability

		Consequence (Severity of Linkage)			
		Severe (S)	Moderate (Mo)	Mild (Mi)	Negligible (N)
Probability (Likelihood of linkage from)	Highly Likely (HL)	Very High Risk (VH)	High Risk (HR)	Moderate Risk (MR)	Moderate/Low Risk (MR-LR)
	Likely (L)	High Risk (HR)	Moderate Risk (MR)	Moderate/Low Risk (MR-LR)	Low Risk (LR)
	Unlikely (U)	Moderate Risk (MR)	Moderate/Low Risk (MR-LR)	Low Risk (LR)	Negligible Risk (NR)
	Negligible (N)	Moderate/Low Risk (MR-LR)	Low Risk (LR)	Negligible Risk (NR)	Negligible Risk (NR)

This table is to provide reference information in conjunction with the GEL Conceptual Model attached within the Hazard Risk Assessment section of this report, Table 4 – Conceptual Model.

Very High Risk (VH)

- There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR there is evidence that severe harm to a designated receptor is happening currently.
- Urgent investigation and remediation are likely to be required and advised.

High Risk (HR)

- Harm is likely to arise to a designated receptor from an identified hazard.
- Urgent investigation is required, and remedial works are likely necessary in both the short to long term.

Moderate Risk (MR)

- It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild.
- Investigation is required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer term.

Low Risk (LR)

- It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild. Limited investigation recommended.

Negligible Risk (NR)

- There is a minimal possibility that harm could arise to a receptor. In the event of such harm being realised it is high likely to not be severe. Investigation not deemed necessary.

Appendix 5 – Exploratory Hole Logs

Windowless Sample Hole Logs
(WS01 to WS15)

Hand Pit Logs
(HP01 and HP06)

CLIENT: Mrs Jane Smith	**PROJECT: Rishangles Hall, Rishangles**	**GROUND LEVEL m**	**HOLE No. WS01**
LOGGED BY: PC FIELDWORK BY: GEL TEMPLATE REF: GEL AGS BH BETA CHECKED BY: TP DATE: 03/07/2023	EXCAVATION METHOD: Windowless sampler Uncased to 2.0 m	Coordinates/Grid Reference: DATES 11/05/2023 - 11/05/2023	SHEET 1 OF 1 PROJECT NO. 7213,GI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				Brown slightly sandy slightly gravelly ORGANIC CLAY with fine and medium roots. Gravel is fine and medium subangular flint [TOPSOIL]			0.00		0												
									0.30	ES	1									
				Orangish brown sandy CLAY with fine roots			0.45													
				Orangish brown mottled grey gravelly CLAY. Gravel is fine to coarse subangular and subrounded chalk			0.80		1											
							2.00		2											

*WATER ▼ Standing water level; ▽ Water strikes

PIEZOMETER: Upper seal; Response zone; Lower seal

SAMPLE AND TEST KEY

D Small disturbed sample; B Bulk disturbed sample; U Undisturbed sample; P Piston sample; J Disturbed jar sample; ES Environmental soil sample; W Water Sample

S Standard penetration test; C Cone penetration test; K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count

SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating

<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

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IP10 0BJ
Telephone: 01603 298076

HOLE No. WS01 | SHEET 1 OF 1 | PROJECT No. 7213,GI

GEL AGS BH BETA 7213.GI RISHANGLES HALL.GPJ GINT STD AGS 3 1.GDT 3/1/24

CLIENT: Mrs Jane Smith	**PROJECT: Rishangles Hall, Rishangles**	**GROUND LEVEL m**	**HOLE No. WS02**
LOGGED BY: PC FIELDWORK BY: GEL TEMPLATE REF: GEL AGS BH BETA CHECKED BY: TP DATE: 03/07/2023	EXCAVATION METHOD: Windowless sampler Uncased to 2.0 m	Coordinates/Grid Reference: DATES 11/05/2023 - 11/05/2023	SHEET 1 OF 1 PROJECT NO. 7213,GI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				Brown slightly sandy slightly gravelly ORGANIC CLAY with fine and medium roots. Gravel is fine and medium subangular flint with occasional brick fragmens [TOPSOIL]			0.00		0												
									0.40	ES	1									
				Orangish brown slightly gravelly sandy CLAY. Gravel is fine to coarse subangular flint			0.50													
				Orangish brown slightly sandy gravelly CLAY with occasional sandy pockets. Gravel is fine and medium subangular chalk			1.00		1											
				1.60 Becoming less sandy. Gravel is chalk and flint																
							2.00		2											

*WATER ▼ Standing water level ▽ Water strikes PIEZOMETER Upper seal Response zone Lower seal

SAMPLE AND TEST KEY

D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

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IP10 0BJ
Telephone: 01603 298076

HOLE No. WS02 | SHEET 1 OF 1 | PROJECT No. 7213,GI

GEL AGS BH BETA 7213.GI RISHANGLES HALL.GPJ GINT STD AGS 3 1.GDT 3/1/24

CLIENT: Mrs Jane Smith	**PROJECT: Rishangles Hall, Rishangles**	**GROUND LEVEL m**	**HOLE No. WS03**
LOGGED BY: PC FIELDWORK BY: GEL TEMPLATE REF: GEL AGS BH BETA CHECKED BY: TP DATE: 03/07/2023	EXCAVATION METHOD: Windowless sampler Uncased to 2.0 m	Coordinates/Grid Reference: DATES 11/05/2023 - 11/05/2023	SHEET 1 OF 1 PROJECT NO. 7213,GI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				Dark brown sandy ORGANIC CLAY with fine roots [TOPSOIL]			0.00		0											
				Orangish brown sandy CLAY			0.45		1											
				Orange mottled grey gravelly CLAY. Gravel is fine and medium subangular and subrounded chalk			1.20													
							2.00		2											

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal / Response zone / Lower seal

SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

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HOLE No. WS03 | SHEET 1 OF 1 | PROJECT No. 7213,GI

GEL AGS BH BETA 7213.GI RISHANGLES HALL.GPJ GINT STD AGS 3 1.GDT 3/1/24

CLIENT: Mrs Jane Smith	**PROJECT: Rishangles Hall, Rishangles**	**GROUND LEVEL m**	**HOLE No. WS04**
LOGGED BY: PC FIELDWORK BY: GEL TEMPLATE REF: GEL AGS BH BETA CHECKED BY: TP DATE: 03/07/2023	EXCAVATION METHOD: Windowless sampler Uncased to 2.0 m	Coordinates/Grid Reference: DATES 11/05/2023 - 11/05/2023	SHEET 1 OF 1 PROJECT NO. 7213,GI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				Dark brown with occasional dark orangish brown mottling sandy ORGANIC CLAY with fine roots [TOPSOIL]			0.00		0											
				Orangish brown sandy CLAY			0.60		0.50	ES	1									
				Orangish brown slightly gravelly sandy CLAY. Gravel is fine and medium subangular and subrounded chalk 1.00 Becoming grey mottled			0.90		1											
				1.80 - 1.90 Pocket of fine and medium sand																
							2.00		2											

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal, Response zone, Lower seal

SAMPLE AND TEST KEY

D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

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HOLE No. WS04 | SHEET 1 OF 1 | PROJECT No. 7213,GI

GEL AGS BH BETA 7213.GI RISHANGLES HALL.GPJ GINT STD AGS 3 1.GDT 3/1/24

CLIENT: Mrs Jane Smith	**PROJECT: Rishangles Hall, Rishangles**	**GROUND LEVEL m**	**HOLE No. WS05**
LOGGED BY: PC FIELDWORK BY: GEL TEMPLATE REF: GEL AGS BH BETA CHECKED BY: TP DATE: 03/07/2023	EXCAVATION METHOD: Windowless sampler Uncased to 2.0 m	Coordinates/Grid Reference: DATES 11/05/2023 - 11/05/2023	SHEET 1 OF 1 PROJECT NO. 7213,GI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				Dark brown slightly gravelly sandy ORGANIC CLAY. Gravel is fine to coarse subangular flint [TOPSOIL]			0.00		0												
				Orangish brown sandy CLAY			0.60														
				Orangish brown mottled grey gravelly CLAY. Gravel is fine and medium subangular and subrounded chalk			0.80		1												
							2.00		2												

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal / Response zone / Lower seal

SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

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HOLE No. WS05 | SHEET 1 OF 1 | PROJECT No. 7213,GI

GEL AGS BH BETA 7213.GI RISHANGLES HALL.GPJ GINT STD AGS 3 1.GDT 3/1/24

CLIENT: Mrs Jane Smith	**PROJECT: Rishangles Hall, Rishangles**	**GROUND LEVEL m**	**HOLE No. WS06**
LOGGED BY: PC FIELDWORK BY: GEL TEMPLATE REF: GEL AGS BH BETA CHECKED BY: TP DATE: 03/07/2023	EXCAVATION METHOD: Windowless sampler Uncased to 2.0 m	Coordinates/Grid Reference: DATES 11/05/2023 - 11/05/2023	SHEET 1 OF 1 PROJECT NO. 7213,GI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				Dark brown sandy slightly gravelly ORGANIC CLAY with fine and medium roots. Gravel is fine to coarse subangular flint [TOPSOIL]			0.00		0												
									0.40	ES	1									
				Orangish brown slightly gravelly sandy CLAY with medium roots. Gravel is fine to coarse subangular flint			0.50														
				Orangish brown mottled grey gravelly CLAY. Gravel is fine and medium subangular chalk			0.80		1												
+ 20 mins	2.00	1.30					2.00		2											Inflow of water at 2m

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal / Response zone / Lower seal

SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

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Telephone: 01603 298076

HOLE No. WS06 | SHEET 1 OF 1 | PROJECT No. 7213,GI

GEL AGS BH BETA 7213.GI RISHANGLES HALL.GPJ GINT STD AGS 3 1.GDT 3/1/24

CLIENT: Mrs Jane Smith	PROJECT: Rishangles Hall, Rishangles	GROUND LEVEL m	HOLE No. WS07
LOGGED BY: PC FIELDWORK BY: GEL TEMPLATE REF: GEL AGS BH BETA CHECKED BY: TP DATE: 03/07/2023	EXCAVATION METHOD: Windowless sampler Uncased to 2.0 m	Coordinates/Grid Reference: DATES 11/05/2023 - 11/05/2023	SHEET 1 OF 1 PROJECT NO. 7213,GI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				Dark brown slightly gravelly sandy ORGANIC CLAY. Gravel is fine and medium subangular and subrounded flint and brick [TOPSOIL]			0.00		0											
				Brown becoming orangish brown sandy CLAY			0.50													
				1.00 Becoming gravelly. Gravel is fine to coarse angular to subrounded flint					1											
				1.60 With gravel of fine and medium chalk																
							2.00		2											

*WATER ▼ Standing water level; ▽ Water strikes

PIEZOMETER: Upper seal; Response zone; Lower seal

SAMPLE AND TEST KEY

D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count

SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating

<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

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HOLE No. WS07 | SHEET 1 OF 1 | PROJECT No. 7213,GI

GEL AGS BH BETA 7213.GI RISHANGLES HALL.GPJ GINT STD AGS 3 1.GDT 3/1/24

CLIENT: Mrs Jane Smith	**PROJECT: Rishangles Hall, Rishangles**	**GROUND LEVEL m**	**HOLE No. WS08**
LOGGED BY: PC FIELDWORK BY: GEL TEMPLATE REF: GEL AGS BH BETA CHECKED BY: TP DATE: 03/07/2023	EXCAVATION METHOD: Windowless sampler Uncased to 2.0 m	Coordinates/Grid Reference: DATES 12/05/2023 - 12/05/2023	SHEET 1 OF 1 PROJECT NO. 7213,GI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				CONCRETE			0.00		0											
				Brown gravelly slightly sandy CLAY. Gravel is fine to coarse subangular and subrounded flint			0.13													
				0.40 - 0.55 With black staining and organic odour					0.50	ES	1									
				Orangish brown mottled grey gravelly CLAY. Gravel is fine to coarse subangular and subrounded chalk			0.60													
				1.10 With coarse flint gravel					1											
							2.00		2											

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal, Response zone, Lower seal

SAMPLE AND TEST KEY

D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

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HOLE No. WS08 | SHEET 1 OF 1 | PROJECT No. 7213,GI

GEL AGS BH BETA 7213.GI RISHANGLES HALL.GPJ GINT STD AGS 3 1.GDT 3/1/24

CLIENT: Mrs Jane Smith

PROJECT: Rishangles Hall, Rishangles

GROUND LEVEL m

HOLE No. WS09

LOGGED BY: PC
FIELDWORK BY: GEL
TEMPLATE REF: GEL AGS BH BETA

CHECKED BY: TP
DATE: 03/07/2023

EXCAVATION METHOD: Windowless sampler
Uncased to 2.0 m

Coordinates/Grid Reference:

DATES 12/05/2023 - 12/05/2023

SHEET 1 OF 1

PROJECT NO. 7213,GI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				CONCRETE			0.00		0											Heavy precipitation and surface water pooling - borehole filling from surface
				MADE GROUND (Greyish brown locally stained black (organic) clayey gravelly SAND. Gravel is angular to subrounded fine to coarse flint and chalk)			0.10													
									0.30	ES	1									
				Grey mottled orangish brown gravelly CLAY. Gravel is fine to coarse subangular and subrounded chalk			0.40													
									1											
							2.00		2											

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal, Response zone, Lower seal

SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

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IP10 0BJ
Telephone: 01603 298076

HOLE No. WS09 | SHEET 1 OF 1 | PROJECT No. 7213,GI

GEL AGS BH BETA 7213.GI RISHANGLES HALL.GPJ GINT STD AGS 3 1.GDT 3/1/24

CLIENT: Mrs Jane Smith	PROJECT: Rishangles Hall, Rishangles	GROUND LEVEL m	HOLE No. WS10
LOGGED BY: PC FIELDWORK BY: GEL TEMPLATE REF: GEL AGS BH BETA CHECKED BY: TP DATE: 03/01/2024	EXCAVATION METHOD: Windowless sampler Uncased to 2.0 m	Coordinates/Grid Reference: DATES 28/11/2023 - 28/11/2023	SHEET 1 OF 1 PROJECT NO. 7213,GI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				MADE GROUND (Concrete with plastic membrane at base).			0.00		0											
				MADE GROUND (Dark greyish brown /dark brown gravelly clay. Gravel is fine to coarse sub-angular and sub-rounded concrete, chert and chalk).			0.15													
				0.50 Concrete gravel no longer present					0.40	ES	1									
									0.80	ES	2									
									1											
				Firm to stiff light brown gravelly CLAY. Gravel is fine to coarse sub-angular chalk.			1.20													
				END OF EXPLORATORY HOLE			2.00		2											

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal / Response zone / Lower seal

SAMPLE AND TEST KEY
- D Small disturbed sample
- B Bulk disturbed sample
- U Undisturbed sample
- P Piston sample
- J Disturbed jar sample
- ES Environmental soil sample
- S Standard penetration test
- C Cone penetration test
- K Permeability test
- W Water Sample

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count

SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating

<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
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IP10 0BJ
Telephone: 01603 298076

HOLE No. WS10 | SHEET 1 OF 1 | PROJECT No. 7213,GI

GEL AGS BH BETA 7213.GI RISHANGLES HALL.GPJ GINT STD AGS 3 1.GDT 3/1/24

CLIENT: Mrs Jane Smith	**PROJECT: Rishangles Hall, Rishangles**	**GROUND LEVEL m**	**HOLE No. WS11**
LOGGED BY: PC FIELDWORK BY: GEL TEMPLATE REF: GEL AGS BH BETA CHECKED BY: TP DATE: 03/01/2024	EXCAVATION METHOD: Windowless sampler Uncased to 2.0 m	Coordinates/Grid Reference: DATES 28/11/2023 - 28/11/2023	SHEET 1 OF 1 PROJECT NO. 7213,GI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				MADE GROUND (Concrete).			0.00		0											
				MADE GROUND (Brown sandy gravel. Gravel is fine to coarse angular to sub-rounded flint).			0.12		0.30	ES	1									
				MADE GROUND (Soft greenish brown to grey gravelly clay. Gravel is fine to coarse sub-angular and sub-rounded chert and chalk).			0.45		0.80	ES	2									
				Firm to stiff grey gravelly CLAY. Gravel is fine to coarse chalk.			1.50		1											
				END OF EXPLORATORY HOLE			2.00		2											

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal / Response zone / Lower seal

SAMPLE AND TEST KEY

D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count

SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating

<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Unit 11 Brightwell Barns
IP10 0BJ
Telephone: 01603 298076

HOLE No. WS11 | SHEET 1 OF 1 | PROJECT No. 7213,GI

GEL AGS BH BETA 7213.GI RISHANGLES HALL.GPJ GINT STD AGS 3 1.GDT 3/1/24

CLIENT: Mrs Jane Smith	**PROJECT: Rishangles Hall, Rishangles**	**GROUND LEVEL m**	**HOLE No. WS12**
LOGGED BY: PC FIELDWORK BY: GEL TEMPLATE REF: GEL AGS BH BETA CHECKED BY: TP DATE: 03/01/2024	EXCAVATION METHOD: Windowless sampler Uncased to 1.0 m	Coordinates/Grid Reference: DATES 28/11/2023 - 28/11/2023	SHEET 1 OF 1 PROJECT NO. 7213,GI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				MADE GROUND (Concrete).			0.00		0											
				MADE GROUND (Brown sandy gravel. Gravel is fine to coarse sub-angular flint).			0.10													
									0.20	ES	1									
				Firm to stiff greyish brown gravelly CLAY. Gravel is fine to coarse sub-angular and sub-rounded chalk.			0.30													
				END OF EXPLORATORY HOLE			1.00		1											
									2											

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal / Response zone / Lower seal

SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Unit 11 Brightwell Barns
IP10 0BJ
Telephone: 01603 298076

HOLE No. WS12 | SHEET 1 OF 1 | PROJECT No. 7213,GI

GEL AGS BH BETA 7213.GI RISHANGLES HALL.GPJ GINT STD AGS 3 1.GDT 3/1/24

CLIENT: Mrs Jane Smith	**PROJECT: Rishangles Hall, Rishangles**	**GROUND LEVEL m**	**HOLE No. WS13**
LOGGED BY: PC FIELDWORK BY: GEL TEMPLATE REF: GEL AGS BH BETA CHECKED BY: TP DATE: 03/01/2024	EXCAVATION METHOD: Windowless sampler Uncased to 2.0 m	Coordinates/Grid Reference: DATES 28/11/2023 - 28/11/2023	SHEET 1 OF 1 PROJECT NO. 7213,GI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				MADE GROUND (Concrete).			0.00		0											
				MADE GROUND (Light greyish brown to dark grey gravelly SAND. Gravel is fine to coarse sub-angular and sub-rounded chert and concrete).			0.16													
									0.50	ES	1									
				Firm to soft dark grey to grey slightly gravelly CLAY. Gravel is fine to coarse sub-angular and sub-rounded chert and chalk.			0.60													
									1											
				Firm to stiff greyish brown gravelly CLAY. Gravel is fine and medium chalk.			1.40													
				END OF EXPLORATORY HOLE			2.00		2											

*WATER ▼ Standing water level; ▽ Water strikes

PIEZOMETER: Upper seal; Response zone; Lower seal

SAMPLE AND TEST KEY

D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count

SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating

<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Unit 11 Brightwell Barns
IP10 0BJ
Telephone: 01603 298076

HOLE No. WS13 | SHEET 1 OF 1 | PROJECT No. 7213,GI

GEL AGS BH BETA 7213.GI RISHANGLES HALL.GPJ GINT STD AGS 3 1.GDT 3/1/24

CLIENT: Mrs Jane Smith	**PROJECT: Rishangles Hall, Rishangles**	**GROUND LEVEL m**	**HOLE No. WS14**
LOGGED BY: PC FIELDWORK BY: GEL TEMPLATE REF: GEL AGS BH BETA CHECKED BY: TP DATE: 03/01/2024	EXCAVATION METHOD: Windowless sampler Uncased to 1.0 m	Coordinates/Grid Reference: DATES 28/11/2023 - 28/11/2023	SHEET 1 OF 1 PROJECT NO. 7213,GI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				MADE GROUND (Concrete).			0.00		0											
				MADE GROUND (Dark grey/greyish brown gravelly clay. Gravel is fine to coarse chert).			0.20		0.40	ES	1									
				Grey gravelly CLAY. Gravel is fine and medium chalk.			0.90		1											
				END OF EXPLORATORY HOLE - REFUSAL - POSSIBLE COBBLE			1.00		2											

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal, Response zone, Lower seal

SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Unit 11 Brightwell Barns
IP10 0BJ
Telephone: 01603 298076

HOLE No. WS14 | SHEET 1 OF 1 | PROJECT No. 7213,GI

GEL AGS BH BETA 7213.GI RISHANGLES HALL.GPJ GINT STD AGS 3 1.GDT 3/1/24

CLIENT: Mrs Jane Smith	**PROJECT: Rishangles Hall, Rishangles**	**GROUND LEVEL m**	**HOLE No. WS15**
LOGGED BY: PC FIELDWORK BY: GEL TEMPLATE REF: GEL AGS BH BETA CHECKED BY: TP DATE: 03/01/2024	EXCAVATION METHOD: Windowless sampler Uncased to 2.0 m	Coordinates/Grid Reference: DATES 28/11/2023 - 28/11/2023	SHEET 1 OF 1 PROJECT NO. 7213,GI

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				MADE GROUND (Concrete).			0.00		0											
				MADE GROUND (Brown sandy gravel. Gravel is fine to coarse angular to sub-rounded flint).			0.13		0.30	ES	1									
				Firm to stiff greyish brown gravelly CLAY. Gravel is fine and medium chalk.			0.50		0.70	ES	2									
				Orangish brown fine and medium SAND.			0.85		1											
				Firm dark grey gravelly CLAY. Gravel is fine and medium chalk.			1.20													
				END OF EXPLORATORY HOLE			2.00		2											

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal / Response zone / Lower seal

SAMPLE AND TEST KEY
- D Small disturbed sample
- B Bulk disturbed sample
- U Undisturbed sample
- P Piston sample
- J Disturbed jar sample
- ES Environmental soil sample
- W Water Sample
- S Standard penetration test
- C Cone penetration test
- K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count

SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating

<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental Ltd
Unit 11 Brightwell Barns
IP10 0BJ
Telephone: 01603 298076

HOLE No. WS15 | SHEET 1 OF 1 | PROJECT No. 7213,GI

GEL AGS BH BETA 7213.GI RISHANGLES HALL.GPJ GINT STD AGS 3 1.GDT 3/1/24

Geosphere Environmental Ltd
Unit 11 Brightwell Barns
IP10 0BJ
Telephone: 01603 298076

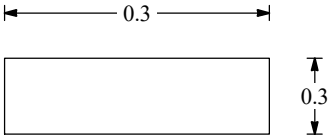
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Rishangles Hall, Rishangles	Mrs Jane Smith	**HP01**

Job No	Date	Ground Level (m)	Coordinates/Grid Reference ()
7213,GI	11-05-23 11-05-23		

Fieldwork By	Logged By	Sheet
GEL	PC	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.20	MADE GROUND (Dark brown silty gravelly SAND. Gravel is fine to coarse subangular flint, concrete and PACM)		0.10	ES1ES	
0.20	Terminated due to PACM				



Shoring/Support:
Stability:

All dimensions in metres Scale 1:5	Method Hand Pit	Plant Used HAND DUG	Checked By TP

Geosphere Environmental Ltd
Unit 11 Brightwell Barns
IP10 0BJ
Telephone: 01603 298076

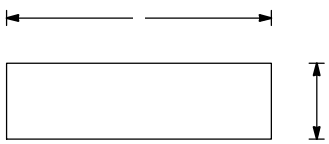
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Rishangles Hall, Rishangles	Mrs Jane Smith	**HP06**

Job No	Date	Ground Level (m)	Coordinates/Grid Reference ()
7213,GI	28-11-23 28-11-23		

Fieldwork By	Logged By	Sheet
GEL	PC	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.20	MADE GROUND (Concrete).				
0.20-0.40	MADE GROUND (Brown sandy gravel. Gravel is fine to coarse sub-angular flint, chert and occasional red brick).		0.30	1ES	
0.40	END OF EXPLORATORY HOLE - NFP PERCHED WATER INGRESS				



Shoring/Support:
Stability:

All dimensions in metres Scale 1:5	Method Hand Pit	Plant Used HAND DUG	Checked By TP

Appendix 6 – Gas and Groundwater Monitoring Data

GROUND GAS AND GROUNDWATER MONITORING DATA

GEOSPHERE ENVIRONMENTAL

Project Number: 7213,GI

Project Name: Rishangles Hall, Eye Road, Rishangles, IP23 7LA

Date: 03/07/2023

Exploratory Hole Location WS06 **Date of Installation** 11/05/2023

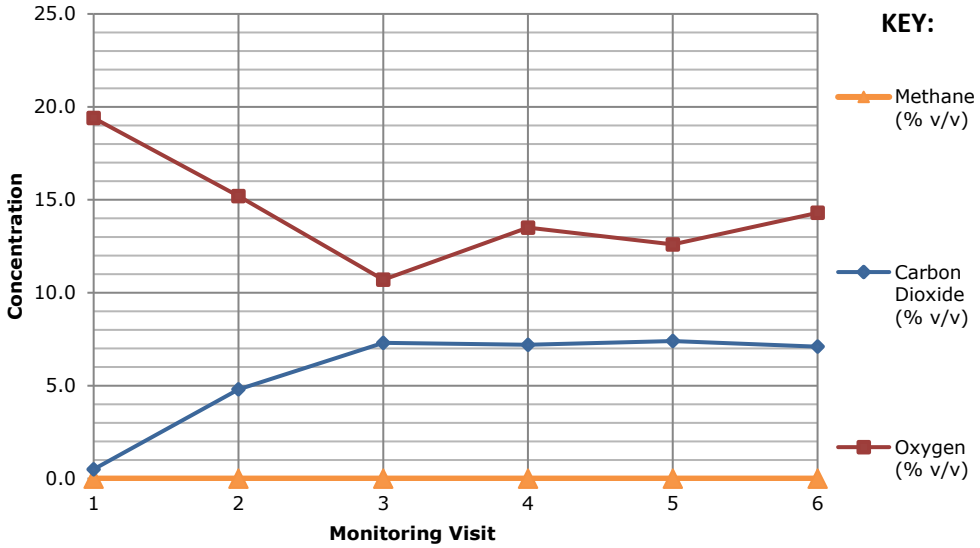
Return Visit #	Monitoring Date	Atmospheric Pressure (mb)	Methane Content (% v/v)	Methane Content (% LEL)	Carbon Dioxide (% v/v)	Oxygen (% v/v)	Flow Rate (l/hr)	H2S (ppm)	CO (ppm)	VOC (ppm)	Water Level (mbgl)	Base of Well (mbgl)	Weather Conditions	Comments / Pressure Rise or Fall
1st visit	16/05/2023	1016	<0.1	<2	0.5	19.4	0.0	0	0	1	0.46	1.49	Warm, sunny, dry, breezy	
2nd visit	23/05/2023	1019	<0.1	<2	4.8	15.2	0.0	0	0	0	0.83	1.52	Warm, cloudy, dry, windy	
3rd visit	30/05/2023	1022	<0.1	<2	7.3	10.7	0.0	0	0	0	0.94	1.48	Cool, cloudy, dry, windy	
4th visit	06/06/2023	1017	<0.1	<2	7.2	13.5	0.0	0	0	0	1.05	1.49	Cool, overcast, damp, breezy	Falling pressure
5th visit	13/06/2023	1008	<0.1	<2	7.4	12.6	0.0	0	0	1	1.15	1.41	Hot, sunny, dry, breezy	
6th visit	19/06/2023	1003	<0.1	<2	7.1	14.3	0.0	0	0	4	0.99	1.47	Hot, sunny, damp, breezy	

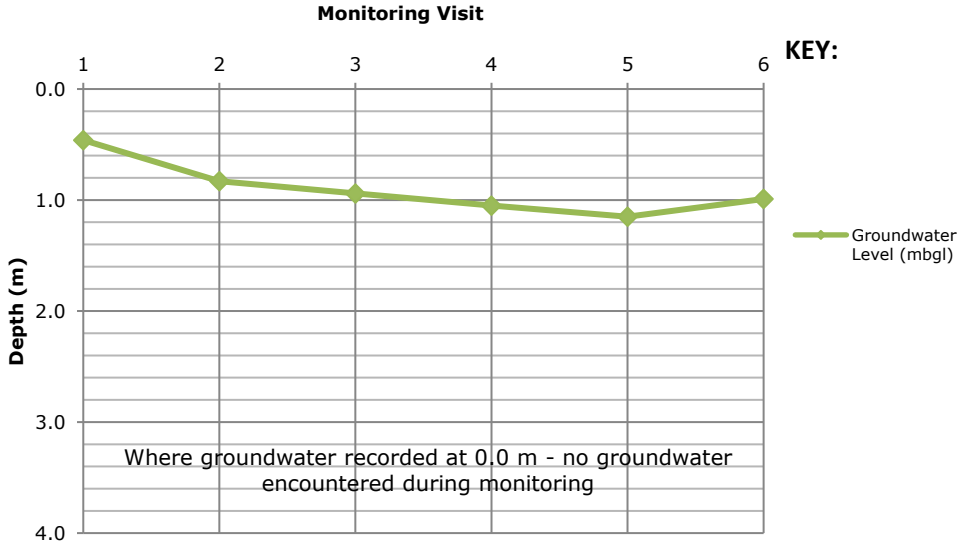
Instruments Used: GFM436 gas analyser / PID MultiRAE lite

REMARKS:

NOTE: **n/a** Not applicable

nm Not measured





GROUND GAS AND GROUNDWATER MONITORING DATA

Project Number: 7213,GI

Project Name: Rishangles Hall, Eye Road, Rishangles, IP23 7LA

Date: 03/07/2023

Exploratory Hole Location WS09 **Date of Installation** 12/05/2023

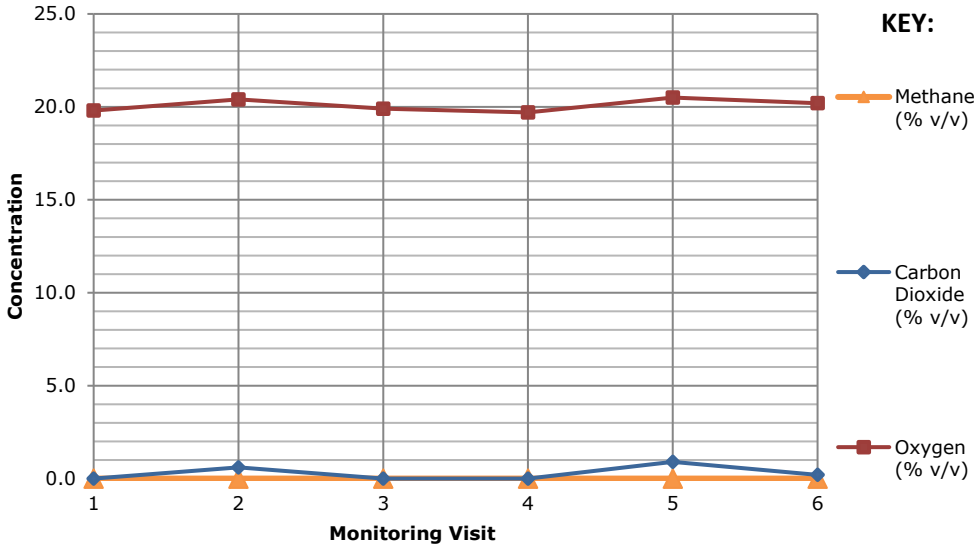
Return Visit #	Monitoring Date	Atmospheric Pressure (mb)	Methane Content (% v/v)	Methane Content (% LEL)	Carbon Dioxide (% v/v)	Oxygen (% v/v)	Flow Rate (l/hr)	H2S (ppm)	CO (ppm)	VOC (ppm)	Water Level (mbgl)	Base of Well (mbgl)	Weather Conditions	Comments / Pressure Rise or Fall
1st visit	16/05/2023	1017	<0.1	<2	0.0	19.8	0.0	0	0	1	0.18	1.41	Warm, sunny, dry, breezy	
2nd visit	23/05/2023	1020	<0.1	<2	0.6	20.4	0.0	0	0	0	0.24	1.42	Warm, cloudy, dry, windy	
3rd visit	30/05/2023	1023	<0.1	<2	0.0	19.9	0.0	0	0	0	0.11	1.46	Cool, cloudy, dry, windy	
4th visit	06/06/2023	1017	<0.1	<2	0.0	19.7	0.0	0	0	1	0.03	1.41	Cool, overcast, damp, breezy	Falling pressure
5th visit	13/06/2023	1008	<0.1	<2	0.9	20.5	0.0	0	0	0	0.27	1.34	Hot, sunny, dry, breezy	
6th visit	19/06/2023	1003	<0.1	<2	0.2	20.2	0.0	0	0	3	0.19	1.39	Hot, sunny, damp, breezy	

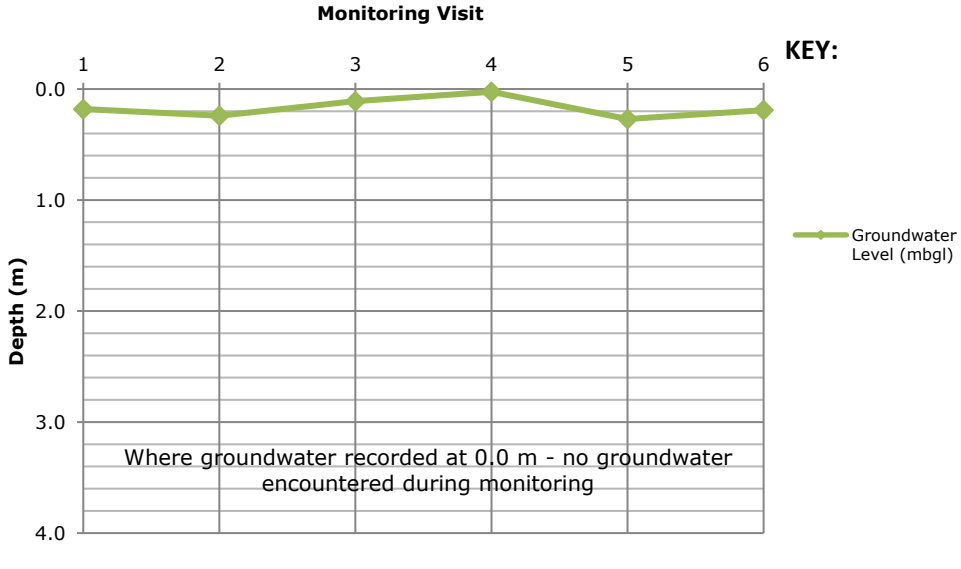
Instruments Used: GFM436 gas analyser / PID MultiRAE lite

REMARKS:

NOTE: **n/a** Not applicable

nm Not measured





Appendix 7 – Environmental Laboratory Test Result

Peter Coyne
Geosphere Environmental Ltd
Brightwell Barns
Ipswich Road
Brightwell
Suffolk
IP10 0BJ

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

DETS Report No: 23-06248

Site Reference:	Rishangles Hall
Project / Job Ref:	7213, GI
Order No:	None Supplied
Sample Receipt Date:	15/05/2023
Sample Scheduled Date:	15/05/2023
Report Issue Number:	1
Reporting Date:	23/05/2023

Authorised by:

Kevin Old
Operations Director

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

Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

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

Soil Analysis Certificate						
DETS Report No: 23-06248	**Date Sampled**	11/05/23	11/05/23	11/05/23	11/05/23	11/05/23
Geosphere Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Rishangles Hall	**TP / BH No**	HP01	WS01	WS02	WS04	WS06
Project / Job Ref: 7213, GI	**Additional Refs**	ES1	ES1	ES1	ES1	ES1
Order No: None Supplied	**Depth (m)**	0.10	0.30	0.40	0.50	0.40
Reporting Date: 23/05/2023	**DETS Sample No**	651569	651570	651571	651572	651573

Determinand	**Unit**	**RL**	**Accreditation**					
Asbestos Screen (S)	N/a	N/a	**ISO17025**		Not Detected	Not Detected	Not Detected	Not Detected
pH	pH Units	N/a	**MCERTS**		7.7	7.7	7.6	7.7
Total Cyanide	mg/kg	< 1	NONE		< 1	< 1	< 1	< 1
Complex Cyanide	mg/kg	< 1	NONE		< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	< 1	NONE		< 1	< 1	< 1	< 1
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	**MCERTS**		< 10	< 10	< 10	< 10
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	**MCERTS**		< 0.01	< 0.01	< 0.01	< 0.01
Organic Matter (SOM)	%	< 0.1	**MCERTS**		3	3.4	3.6	3.4
Arsenic (As)	mg/kg	< 2	**MCERTS**		6	8	9	8
Barium (Ba)	mg/kg	< 2.5	**MCERTS**		20	31	32	34
Beryllium (Be)	mg/kg	< 0.5	**MCERTS**		< 0.5	0.5	0.5	0.5
W/S Boron	mg/kg	< 1	NONE		< 1	< 1	1	1.1
Cadmium (Cd)	mg/kg	< 0.2	**MCERTS**		< 0.2	0.2	0.3	0.2
Chromium (Cr)	mg/kg	< 2	**MCERTS**		7	10	11	12
Chromium (hexavalent)	mg/kg	< 2	NONE		< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	**MCERTS**		9	13	13	16
Lead (Pb)	mg/kg	< 3	**MCERTS**		12	28	21	24
Mercury (Hg)	mg/kg	< 1	**MCERTS**		< 1	< 1	< 1	< 1
Molybdenum (Mo)	mg/kg	< 1	**MCERTS**		< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	**MCERTS**		8	11	12	12
Selenium (Se)	mg/kg	< 2	**MCERTS**		< 2	< 2	< 2	< 2
Vanadium (V)	mg/kg	< 1	**MCERTS**		15	21	22	22
Zinc (Zn)	mg/kg	< 3	**MCERTS**		35	71	103	75

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

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

Soil Analysis Certificate						
DETS Report No: 23-06248	**Date Sampled**	11/05/23	11/05/23			
Geosphere Environmental Ltd	**Time Sampled**	None Supplied	None Supplied			
Site Reference: Rishangles Hall	**TP / BH No**	WS08	WS09			
Project / Job Ref: 7213, GI	**Additional Refs**	ES1	ES1			
Order No: None Supplied	**Depth (m)**	0.50	0.30			
Reporting Date: 23/05/2023	**DETS Sample No**	651574	651575			

Determinand	**Unit**	**RL**	**Accreditation**					
Asbestos Screen (S)	N/a	N/a	**ISO17025**	Not Detected	Not Detected			
pH	pH Units	N/a	**MCERTS**	8.9	10.1			
Total Cyanide	mg/kg	< 1	NONE	< 1	< 1			
Complex Cyanide	mg/kg	< 1	NONE	< 1	< 1			
Free Cyanide	mg/kg	< 1	NONE	< 1	< 1			
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	**MCERTS**	171	58			
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	**MCERTS**	0.17	0.06			
Organic Matter (SOM)	%	< 0.1	**MCERTS**	3.2	1.2			
Arsenic (As)	mg/kg	< 2	**MCERTS**	12	8			
Barium (Ba)	mg/kg	< 2.5	**MCERTS**	45	23			
Beryllium (Be)	mg/kg	< 0.5	**MCERTS**	0.6	< 0.5			
W/S Boron	mg/kg	< 1	NONE	< 1	< 1			
Cadmium (Cd)	mg/kg	< 0.2	**MCERTS**	< 0.2	< 0.2			
Chromium (Cr)	mg/kg	< 2	**MCERTS**	10	9			
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2			
Copper (Cu)	mg/kg	< 4	**MCERTS**	15	14			
Lead (Pb)	mg/kg	< 3	**MCERTS**	10	10			
Mercury (Hg)	mg/kg	< 1	**MCERTS**	< 1	< 1			
Molybdenum (Mo)	mg/kg	< 1	**MCERTS**	2.8	1.8			
Nickel (Ni)	mg/kg	< 3	**MCERTS**	18	13			
Selenium (Se)	mg/kg	< 2	**MCERTS**	< 2	< 2			
Vanadium (V)	mg/kg	< 1	**MCERTS**	21	18			
Zinc (Zn)	mg/kg	< 3	**MCERTS**	37	49			

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

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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 23-06248	**Date Sampled**	11/05/23	11/05/23	11/05/23	11/05/23	11/05/23
Geosphere Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Rishangles Hall	**TP / BH No**	WS01	WS02	WS04	WS06	WS08
Project / Job Ref: 7213, GI	**Additional Refs**	ES1	ES1	ES1	ES1	ES1
Order No: None Supplied	**Depth (m)**	0.30	0.40	0.50	0.40	0.50
Reporting Date: 23/05/2023	**DETS Sample No**	651570	651571	651572	651573	651574

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	0.15	< 0.1	< 0.1	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6

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Soil Analysis Certificate - Speciated PAHs							
DETS Report No: 23-06248	**Date Sampled**	11/05/23					
Geosphere Environmental Ltd	**Time Sampled**	None Supplied					
Site Reference: Rishangles Hall	**TP / BH No**	WS09					
Project / Job Ref: 7213, GI	**Additional Refs**	ES1					
Order No: None Supplied	**Depth (m)**	0.30					
Reporting Date: 23/05/2023	**DETS Sample No**	651575					

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1				
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1				
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1				
Fluorene	mg/kg	< 0.1	MCERTS	0.27				
Phenanthrene	mg/kg	< 0.1	MCERTS	0.55				
Anthracene	mg/kg	< 0.1	MCERTS	0.24				
Fluoranthene	mg/kg	< 0.1	MCERTS	3.04				
Pyrene	mg/kg	< 0.1	MCERTS	2.50				
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	1.18				
Chrysene	mg/kg	< 0.1	MCERTS	1.19				
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	0.99				
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	0.48				
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	1				
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	0.48				
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1				
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	0.42				
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	12.3				

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Soil Analysis Certificate - TPH CWG Banded						
DETS Report No: 23-06248	**Date Sampled**	11/05/23	11/05/23	11/05/23	11/05/23	11/05/23
Geosphere Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Rishangles Hall	**TP / BH No**	HP01	WS01	WS02	WS04	WS06
Project / Job Ref: 7213, GI	**Additional Refs**	ES1	ES1	ES1	ES1	ES1
Order No: None Supplied	**Depth (m)**	0.10	0.30	0.40	0.50	0.40
Reporting Date: 23/05/2023	**DETS Sample No**	651569	651570	651571	651572	651573

Determinand	Unit	RL	Accreditation					
Aliphatic >C5 - C6 : HS_1D_MS_AL	mg/kg	< 0.01	NONE		< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic >C6 - C8 : HS_1D_MS_AL	mg/kg	< 0.05	NONE		< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic >C8 - C10 : EH_CU_1D_AL	mg/kg	< 2	MCERTS		< 2	< 2	< 2	< 2
Aliphatic >C10 - C12 : EH_CU_1D_AL	mg/kg	< 2	MCERTS		< 2	< 2	< 2	< 2
Aliphatic >C12 - C16 : EH_CU_1D_AL	mg/kg	< 3	MCERTS		< 3	< 3	< 3	< 3
Aliphatic >C16 - C21 : EH_CU_1D_AL	mg/kg	< 3	MCERTS		< 3	< 3	< 3	< 3
Aliphatic >C21 - C34 : EH_CU_1D_AL	mg/kg	< 10	MCERTS		< 10	< 10	< 10	< 10
Aliphatic (C5 - C34) : HS_1D_MS+EH_CU_1D_AL	mg/kg	< 21	NONE		< 21	< 21	< 21	< 21
Aromatic >C5 - C7 : HS_1D_MS_AR	mg/kg	< 0.01	NONE		< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >C7 - C8 : HS_1D_MS_AR	mg/kg	< 0.05	NONE		< 0.05	< 0.05	< 0.05	< 0.05
Aromatic >C8 - C10 : EH_CU_1D_AR	mg/kg	< 2	MCERTS		< 2	< 2	< 2	< 2
Aromatic >C10 - C12 : EH_CU_1D_AR	mg/kg	< 2	MCERTS		< 2	< 2	< 2	< 2
Aromatic >C12 - C16 : EH_CU_1D_AR	mg/kg	< 2	MCERTS		< 2	< 2	< 2	< 2
Aromatic >C16 - C21 : EH_CU_1D_AR	mg/kg	< 3	MCERTS		< 3	< 3	< 3	< 3
Aromatic >C21 - C35 : EH_CU_1D_AR	mg/kg	< 10	MCERTS		< 10	< 10	< 10	< 10
Aromatic (C5 - C35) : HS_1D_MS+EH_CU_1D_AR	mg/kg	< 21	NONE		< 21	< 21	< 21	< 21
Total >C5 - C35 : HS_1D_MS+EH_CU_1D_Total	mg/kg	< 42	NONE		< 42	< 42	< 42	< 42

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Soil Analysis Certificate - TPH CWG Banded						
DETS Report No: 23-06248	**Date Sampled**	11/05/23	11/05/23			
Geosphere Environmental Ltd	**Time Sampled**	None Supplied	None Supplied			
Site Reference: Rishangles Hall	**TP / BH No**	WS08	WS09			
Project / Job Ref: 7213, GI	**Additional Refs**	ES1	ES1			
Order No: None Supplied	**Depth (m)**	0.50	0.30			
Reporting Date: 23/05/2023	**DETS Sample No**	651574	651575			

Determinand	Unit	RL	Accreditation					
Aliphatic >C5 - C6 : HS_1D_MS_AL	mg/kg	< 0.01	NONE	< 0.01	< 0.01			
Aliphatic >C6 - C8 : HS_1D_MS_AL	mg/kg	< 0.05	NONE	< 0.05	< 0.05			
Aliphatic >C8 - C10 : EH_CU_1D_AL	mg/kg	< 2	MCERTS	< 2	< 2			
Aliphatic >C10 - C12 : EH_CU_1D_AL	mg/kg	< 2	MCERTS	< 2	< 2			
Aliphatic >C12 - C16 : EH_CU_1D_AL	mg/kg	< 3	MCERTS	< 3	< 3			
Aliphatic >C16 - C21 : EH_CU_1D_AL	mg/kg	< 3	MCERTS	< 3	< 3			
Aliphatic >C21 - C34 : EH_CU_1D_AL	mg/kg	< 10	MCERTS	< 10	< 10			
Aliphatic (C5 - C34) : HS_1D_MS+EH_CU_1D_AL	mg/kg	< 21	NONE	< 21	< 21			
Aromatic >C5 - C7 : HS_1D_MS_AR	mg/kg	< 0.01	NONE	< 0.01	< 0.01			
Aromatic >C7 - C8 : HS_1D_MS_AR	mg/kg	< 0.05	NONE	< 0.05	< 0.05			
Aromatic >C8 - C10 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	< 2	< 2			
Aromatic >C10 - C12 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	< 2	< 2			
Aromatic >C12 - C16 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	< 2	4			
Aromatic >C16 - C21 : EH_CU_1D_AR	mg/kg	< 3	MCERTS	< 3	26			
Aromatic >C21 - C35 : EH_CU_1D_AR	mg/kg	< 10	MCERTS	< 10	1627			
Aromatic (C5 - C35) : HS_1D_MS+EH_CU_1D_AR	mg/kg	< 21	NONE	< 21	1656			
Total >C5 - C35 : HS_1D_MS+EH_CU_1D_Total	mg/kg	< 42	NONE	< 42	1656			

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Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 23-06248	**Date Sampled**	11/05/23	11/05/23	11/05/23	11/05/23	11/05/23
Geosphere Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Rishangles Hall	**TP / BH No**	WS01	WS02	WS04	WS06	WS08
Project / Job Ref: 7213, GI	**Additional Refs**	ES1	ES1	ES1	ES1	ES1
Order No: None Supplied	**Depth (m)**	0.30	0.40	0.50	0.40	0.50
Reporting Date: 23/05/2023	**DETS Sample No**	651570	651571	651572	651573	651574

Determinand	**Unit**	**RL**	**Accreditation**					
Benzene : HS_1D_MS	ug/kg	< 2	**MCERTS**	< 2	< 2	< 2	< 2	< 2
Toluene : HS_1D_MS	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	7	< 5
Ethylbenzene : HS_1D_MS	ug/kg	< 2	**MCERTS**	< 2	< 2	5	3	< 2
p & m-xylene : HS_1D_MS	ug/kg	< 2	**MCERTS**	4	9	8	15	4
o-xylene : HS_1D_MS	ug/kg	< 2	**MCERTS**	3	4	3	7	< 2
MTBE : HS_1D_MS	ug/kg	< 5	**MCERTS**	< 5	< 5	< 5	< 5	< 5

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Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 23-06248	**Date Sampled**	11/05/23				
Geosphere Environmental Ltd	**Time Sampled**	None Supplied				
Site Reference: Rishangles Hall	**TP / BH No**	WS09				
Project / Job Ref: 7213, GI	**Additional Refs**	ES1				
Order No: None Supplied	**Depth (m)**	0.30				
Reporting Date: 23/05/2023	**DETS Sample No**	651575				

Determinand	Unit	RL	Accreditation					
Benzene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2				
Toluene : HS_1D_MS	ug/kg	< 5	MCERTS	< 5				
Ethylbenzene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2				
p & m-xylene : HS_1D_MS	ug/kg	< 2	MCERTS	3				
o-xylene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2				
MTBE : HS_1D_MS	ug/kg	< 5	MCERTS	< 5				

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Bulk Analysis Certificate						
DETS Report No: 23-06248	**Date Sampled**	11/05/23				
Geosphere Environmental Ltd	**Time Sampled**	None Supplied				
Site Reference: Rishangles Hall	**TP / BH No**	HP01				
Project / Job Ref: 7213, GI	**Additional Refs**	ES1				
Order No: None Supplied	**Depth (m)**	0.10				
Reporting Date: 23/05/2023	**DETS Sample No**	651569				

Determinand	**Unit**	**RL**	**Accreditation**					
Asbestos Type (S)	PLM Result	N/a	**ISO17025**	Chrysotile				
Sample Matrix (S)	Material Type	N/a	NONE	Cement				

The samples have been examined to identify the presence of asbestiform minerals by polarising light microscopy and dispersion staining technique to In-House Procedures QTSE600 Determination of Asbestos in Bulk Materials; Asbestos in Soils/Sediments (fibre screening and identification) that is in accordance with the Health and Safety Executive HSG 248 Appendix 2.

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

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

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

RL: Reporting Limit

Subcontracted analysis (S)

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Soil Analysis Certificate - Sample Descriptions	
DETS Report No: 23-06248	
Geosphere Environmental Ltd	
Site Reference: Rishangles Hall	
Project / Job Ref: 7213, GI	
Order No: None Supplied	
Reporting Date: 23/05/2023	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
651570	WS01	ES1	0.30	18	Brown sandy clay with stones
651571	WS02	ES1	0.40	18.9	Brown sandy clay with vegetation
651572	WS04	ES1	0.50	18.9	Brown sandy clay with vegetation
651573	WS06	ES1	0.40	19.6	Brown sandy clay
651574	WS08	ES1	0.50	24.6	Brown clay
651575	WS09	ES1	0.30	16.1	Brown sandy clay with stones

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

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Soil Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 23-06248
Geosphere Environmental Ltd
Site Reference: Rishangles Hall
Project / Job Ref: 7213, GI
Order No: None Supplied
Reporting Date: 23/05/2023

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 – C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	Fraction Organic Carbon (FOC)	Determination of TOC by combustion analyser.	E027
Soil	D	Organic Matter (SOM)	Determination of TOC by combustion analyser.	E027
Soil	D	TOC (Total Organic Carbon)	Determination of TOC by combustion analyser.	E027
Soil	AR	Exchangeable Ammonium	Determination of ammonium by discrete analyser.	E029
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received

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List of HWOL Acronyms and Operators
DETS Report No: 23-06248
Geosphere Environmental Ltd
Site Reference: Rishangles Hall
Project / Job Ref: 7213, GI
Order No: None Supplied
Reporting Date: 23/05/2023

Acronym	Description
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

Det - Acronym
Benzene - HS_1D_MS
Ethylbenzene - HS_1D_MS
MTBE - HS_1D_MS
TPH CWG - Aliphatic >C10 - C12 - EH_CU_1D_AL
TPH CWG - Aliphatic >C12 - C16 - EH_CU_1D_AL
TPH CWG - Aliphatic >C16 - C21 - EH_CU_1D_AL
TPH CWG - Aliphatic >C21 - C34 - EH_CU_1D_AL
TPH CWG - Aliphatic >C5 - C6 - HS_1D_MS_AL
TPH CWG - Aliphatic >C6 - C8 - HS_1D_MS_AL
TPH CWG - Aliphatic >C8 - C10 - EH_CU_1D_AL
TPH CWG - Aliphatic C5 - C34 - HS_1D_MS+EH_CU_1D_AL
TPH CWG - Aromatic >C10 - C12 - EH_CU_1D_AR
TPH CWG - Aromatic >C12 - C16 - EH_CU_1D_AR
TPH CWG - Aromatic >C16 - C21 - EH_CU_1D_AR
TPH CWG - Aromatic >C21 - C35 - EH_CU_1D_AR
TPH CWG - Aromatic >C5 - C35 - HS_1D_MS+EH_CU_1D_AR
TPH CWG - Aromatic >C5 - C7 - HS_1D_MS_AR
TPH CWG - Aromatic >C7 - C8 - HS_1D_MS_AR
TPH CWG - Aromatic >C8 - C10 - EH_CU_1D_AR
TPH CWG - Total >C5 - C35 - HS_1D_MS+EH_CU_1D_Total
Toluene - HS_1D_MS
m & p-xylene - HS_1D_MS
o-Xylene - HS_1D_MS

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DETS Report No: 23-14801

Site Reference:	Rishangles Hall
Project / Job Ref:	8062
Order No:	None Supplied
Sample Receipt Date:	04/12/2023
Sample Scheduled Date:	04/12/2023
Report Issue Number:	1
Reporting Date:	08/12/2023

Authorised by:

Kevin Old
Operations Director

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

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Soil Analysis Certificate						
DETS Report No: 23-14801	**Date Sampled**	28/11/23	28/11/23	28/11/23	28/11/23	28/11/23
Geosphere Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Rishangles Hall	**TP / BH No**	WS10	WS10	WS11	WS13	WS14
Project / Job Ref: 8062	**Additional Refs**	ES1	ES2	ES1	ES1	ES1
Order No: None Supplied	**Depth (m)**	0.40	0.80	0.30	0.50	0.40
Reporting Date: 08/12/2023	**DETS Sample No**	688458	688459	688460	688461	688462

Determinand	**Unit**	**RL**	**Accreditation**	(n)				
Asbestos Screen [S]	N/a	N/a	**ISO17025**	Detected			Not Detected	
Sample Matrix [S]	Material Type	N/a	NONE	Chrysotile present as fibre bundles				
Asbestos Type [S]	PLM Result	N/a	**ISO17025**	Chrysotile				
pH	pH Units	N/a	**MCERTS**	7.8			8.3	
Total Cyanide	mg/kg	< 1	NONE	< 1			< 1	
Complex Cyanide	mg/kg	< 1	NONE	< 1			< 1	
Free Cyanide	mg/kg	< 1	NONE	< 1			< 1	
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	**MCERTS**	145			156	
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	**MCERTS**	0.14			0.16	
Organic Matter (SOM)	%	< 0.1	**MCERTS**	3.7			2.8	
Arsenic (As)	mg/kg	< 2	**MCERTS**	10			10	
Barium (Ba)	mg/kg	< 2.5	**MCERTS**	44			56	
Beryllium (Be)	mg/kg	< 0.5	**MCERTS**	< 0.5			< 0.5	
W/S Boron	mg/kg	< 1	NONE	1.2			< 1	
Cadmium (Cd)	mg/kg	< 0.2	**MCERTS**	0.2			0.3	
Chromium (Cr)	mg/kg	< 2	**MCERTS**	11			12	
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2			< 2	
Copper (Cu)	mg/kg	< 4	**MCERTS**	28			52	
Lead (Pb)	mg/kg	< 3	**MCERTS**	33			203	
Mercury (Hg)	mg/kg	< 1	**MCERTS**	< 1			< 1	
Molybdenum (Mo)	mg/kg	< 1	**MCERTS**	< 1			< 1	
Nickel (Ni)	mg/kg	< 3	**MCERTS**	15			14	
Selenium (Se)	mg/kg	< 2	**MCERTS**	< 2			< 2	
Vanadium (V)	mg/kg	< 1	**MCERTS**	19			20	
Zinc (Zn)	mg/kg	< 3	**MCERTS**	92			190	

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)
(n) Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation

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Soil Analysis Certificate						
DETS Report No: 23-14801	**Date Sampled**	28/11/23	28/11/23	28/11/23	28/11/23	28/11/23
Geosphere Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Rishangles Hall	**TP / BH No**	WS15	HP02	HP03	HP04	HP05
Project / Job Ref: 8062	**Additional Refs**	ES1	ES1	ES1	ES1	ES1
Order No: None Supplied	**Depth (m)**	0.30	0.10	0.10	0.10	0.10
Reporting Date: 08/12/2023	**DETS Sample No**	688463	688464	688465	688466	688467

Determinand	**Unit**	**RL**	**Accreditation**					
Asbestos Screen (S)	N/a	N/a	**ISO17025**	Not Detected	Detected	Detected	Detected	Detected
Sample Matrix (S)	Material Type	N/a	NONE		Chrysotile present as fibre bundles	Chrysotile present as fibre bundles	Chrysotile present as fibre bundles	Chrysotile present as fibre bundles
Asbestos Type (S)	PLM Result	N/a	**ISO17025**		Chrysotile	Chrysotile	Chrysotile	Chrysotile
pH	pH Units	N/a	**MCERTS**	10.1				
Total Cyanide	mg/kg	< 1	NONE	< 1				
Complex Cyanide	mg/kg	< 1	NONE	< 1				
Free Cyanide	mg/kg	< 1	NONE	< 1				
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	**MCERTS**	129				
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	**MCERTS**	0.13				
Organic Matter (SOM)	%	< 0.1	**MCERTS**	1.1				
Arsenic (As)	mg/kg	< 2	**MCERTS**	8				
Barium (Ba)	mg/kg	< 2.5	**MCERTS**	36				
Beryllium (Be)	mg/kg	< 0.5	**MCERTS**	< 0.5				
W/S Boron	mg/kg	< 1	NONE	< 1				
Cadmium (Cd)	mg/kg	< 0.2	**MCERTS**	< 0.2				
Chromium (Cr)	mg/kg	< 2	**MCERTS**	11				
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2				
Copper (Cu)	mg/kg	< 4	**MCERTS**	103				
Lead (Pb)	mg/kg	< 3	**MCERTS**	21				
Mercury (Hg)	mg/kg	< 1	**MCERTS**	< 1				
Molybdenum (Mo)	mg/kg	< 1	**MCERTS**	< 1				
Nickel (Ni)	mg/kg	< 3	**MCERTS**	19				
Selenium (Se)	mg/kg	< 2	**MCERTS**	< 2				
Vanadium (V)	mg/kg	< 1	**MCERTS**	16				
Zinc (Zn)	mg/kg	< 3	**MCERTS**	43				

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Subcontracted analysis (S)

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Soil Analysis Certificate						
DETS Report No: 23-14801	**Date Sampled**	28/11/23				
Geosphere Environmental Ltd	**Time Sampled**	None Supplied				
Site Reference: Rishangles Hall	**TP / BH No**	HP06				
Project / Job Ref: 8062	**Additional Refs**	ES1				
Order No: None Supplied	**Depth (m)**	0.30				
Reporting Date: 08/12/2023	**DETS Sample No**	688468				

Determinand	**Unit**	**RL**	**Accreditation**	(n)				
Asbestos Screen (S)	N/a	N/a	**ISO17025**					
Sample Matrix (S)	Material Type	N/a	NONE					
Asbestos Type (S)	PLM Result	N/a	**ISO17025**					
pH	pH Units	N/a	**MCERTS**					
Total Cyanide	mg/kg	< 1	NONE					
Complex Cyanide	mg/kg	< 1	NONE					
Free Cyanide	mg/kg	< 1	NONE					
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	**MCERTS**					
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	**MCERTS**					
Organic Matter (SOM)	%	< 0.1	**MCERTS**					
Arsenic (As)	mg/kg	< 2	**MCERTS**					
Barium (Ba)	mg/kg	< 2.5	**MCERTS**					
Beryllium (Be)	mg/kg	< 0.5	**MCERTS**					
W/S Boron	mg/kg	< 1	NONE					
Cadmium (Cd)	mg/kg	< 0.2	**MCERTS**					
Chromium (Cr)	mg/kg	< 2	**MCERTS**					
Chromium (hexavalent)	mg/kg	< 2	NONE					
Copper (Cu)	mg/kg	< 4	**MCERTS**					
Lead (Pb)	mg/kg	< 3	**MCERTS**					
Mercury (Hg)	mg/kg	< 1	**MCERTS**					
Molybdenum (Mo)	mg/kg	< 1	**MCERTS**					
Nickel (Ni)	mg/kg	< 3	**MCERTS**					
Selenium (Se)	mg/kg	< 2	**MCERTS**					
Vanadium (V)	mg/kg	< 1	**MCERTS**					
Zinc (Zn)	mg/kg	< 3	**MCERTS**					

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

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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 23-14801	**Date Sampled**	28/11/23	28/11/23	28/11/23		
Geosphere Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied		
Site Reference: Rishangles Hall	**TP / BH No**	WS10	WS13	WS15		
Project / Job Ref: 8062	**Additional Refs**	ES1	ES1	ES1		
Order No: None Supplied	**Depth (m)**	0.40	0.50	0.30		
Reporting Date: 08/12/2023	**DETS Sample No**	688458	688461	688463		

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Fluorene	mg/kg	< 0.1	MCERTS	0.18	< 0.1	< 0.1		
Phenanthrene	mg/kg	< 0.1	MCERTS	1.09	0.27	< 0.1		
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Fluoranthene	mg/kg	< 0.1	MCERTS	0.91	0.62	0.28		
Pyrene	mg/kg	< 0.1	MCERTS	0.70	0.52	0.26		
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	0.29	0.28	0.16		
Chrysene	mg/kg	< 0.1	MCERTS	0.33	0.29	0.18		
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	0.29	0.30	0.24		
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	0.24	0.22	0.21		
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	0.13	0.13	0.16		
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	0.12	0.13		
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	4.2	2.7	1.6		

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Soil Analysis Certificate - TPH CWG Banded						
DETS Report No: 23-14801	**Date Sampled**	28/11/23	28/11/23	28/11/23	28/11/23	28/11/23
Geosphere Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Rishangles Hall	**TP / BH No**	WS10	WS10	WS11	WS13	WS14
Project / Job Ref: 8062	**Additional Refs**	ES1	ES2	ES1	ES1	ES1
Order No: None Supplied	**Depth (m)**	0.40	0.80	0.30	0.50	0.40
Reporting Date: 08/12/2023	**DETS Sample No**	688458	688459	688460	688461	688462

Determinand	Unit	RL	Accreditation	(n)				
Aliphatic >C5 - C6 : HS_1D_MS_AL	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic >C6 - C8 : HS_1D_MS_AL	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic >C8 - C10 : EH_CU_1D_AL	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C10 - C12 : EH_CU_1D_AL	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C12 - C16 : EH_CU_1D_AL	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aliphatic >C16 - C21 : EH_CU_1D_AL	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aliphatic >C21 - C34 : EH_CU_1D_AL	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10
Aliphatic (C5 - C34) : HS_1D_MS+EH_CU_1D_AL	mg/kg	< 21	NONE	< 21	< 21	< 21	< 21	< 21
Aromatic >C5 - C7 : HS_1D_MS_AR	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >C7 - C8 : HS_1D_MS_AR	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic >C8 - C10 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C10 - C12 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	< 2	3	< 2	< 2	< 2
Aromatic >C12 - C16 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	3	< 2	< 2	< 2	< 2
Aromatic >C16 - C21 : EH_CU_1D_AR	mg/kg	< 3	MCERTS	5	< 3	< 3	< 3	< 3
Aromatic >C21 - C35 : EH_CU_1D_AR	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10
Aromatic (C5 - C35) : HS_1D_MS+EH_CU_1D_AR	mg/kg	< 21	NONE	< 21	< 21	< 21	< 21	< 21
Total >C5 - C35 : HS_1D_MS+EH_CU_1D_Total	mg/kg	< 42	NONE	< 42	< 42	< 42	< 42	< 42

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Soil Analysis Certificate - TPH CWG Banded						
DETS Report No: 23-14801	**Date Sampled**	28/11/23	28/11/23			
Geosphere Environmental Ltd	**Time Sampled**	None Supplied	None Supplied			
Site Reference: Rishangles Hall	**TP / BH No**	WS15	HP06			
Project / Job Ref: 8062	**Additional Refs**	ES1	ES1			
Order No: None Supplied	**Depth (m)**	0.30	0.30			
Reporting Date: 08/12/2023	**DETS Sample No**	688463	688468			

Determinand	Unit	RL	Accreditation	(n)				
Aliphatic >C5 - C6 : HS_1D_MS_AL	mg/kg	< 0.01	NONE	< 0.01	< 0.01			
Aliphatic >C6 - C8 : HS_1D_MS_AL	mg/kg	< 0.05	NONE	< 0.05	< 0.05			
Aliphatic >C8 - C10 : EH_CU_1D_AL	mg/kg	< 2	MCERTS	< 2	< 2			
Aliphatic >C10 - C12 : EH_CU_1D_AL	mg/kg	< 2	MCERTS	< 2	< 2			
Aliphatic >C12 - C16 : EH_CU_1D_AL	mg/kg	< 3	MCERTS	< 3	< 3			
Aliphatic >C16 - C21 : EH_CU_1D_AL	mg/kg	< 3	MCERTS	< 3	< 3			
Aliphatic >C21 - C34 : EH_CU_1D_AL	mg/kg	< 10	MCERTS	< 10	< 10			
Aliphatic (C5 - C34) : HS_1D_MS+EH_CU_1D_AL	mg/kg	< 21	NONE	< 21	< 21			
Aromatic >C5 - C7 : HS_1D_MS_AR	mg/kg	< 0.01	NONE	< 0.01	< 0.01			
Aromatic >C7 - C8 : HS_1D_MS_AR	mg/kg	< 0.05	NONE	< 0.05	< 0.05			
Aromatic >C8 - C10 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	< 2	< 2			
Aromatic >C10 - C12 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	< 2	< 2			
Aromatic >C12 - C16 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	< 2	2			
Aromatic >C16 - C21 : EH_CU_1D_AR	mg/kg	< 3	MCERTS	< 3	5			
Aromatic >C21 - C35 : EH_CU_1D_AR	mg/kg	< 10	MCERTS	< 10	11			
Aromatic (C5 - C35) : HS_1D_MS+EH_CU_1D_AR	mg/kg	< 21	NONE	< 21	< 21			
Total >C5 - C35 : HS_1D_MS+EH_CU_1D_Total	mg/kg	< 42	NONE	< 42	< 42			

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Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 23-14801	**Date Sampled**	28/11/23	28/11/23	28/11/23	28/11/23	28/11/23
Geosphere Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Rishangles Hall	**TP / BH No**	WS10	WS10	WS11	WS13	WS14
Project / Job Ref: 8062	**Additional Refs**	ES1	ES2	ES1	ES1	ES1
Order No: None Supplied	**Depth (m)**	0.40	0.80	0.30	0.50	0.40
Reporting Date: 08/12/2023	**DETS Sample No**	688458	688459	688460	688461	688462

Determinand	Unit	RL	Accreditation	(n)				
Benzene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Toluene : HS_1D_MS	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Ethylbenzene : HS_1D_MS	ug/kg	< 2	MCERTS	3	< 2	< 2	< 2	< 2
p & m-xylene : HS_1D_MS	ug/kg	< 2	MCERTS	4	< 2	< 2	< 2	< 2
o-xylene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
MTBE : HS_1D_MS	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5

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Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 23-14801	**Date Sampled**	28/11/23	28/11/23			
Geosphere Environmental Ltd	**Time Sampled**	None Supplied	None Supplied			
Site Reference: Rishangles Hall	**TP / BH No**	WS15	HP06			
Project / Job Ref: 8062	**Additional Refs**	ES1	ES1			
Order No: None Supplied	**Depth (m)**	0.30	0.30			
Reporting Date: 08/12/2023	**DETS Sample No**	688463	688468			

Determinand	Unit	RL	Accreditation	(n)				
Benzene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2	< 2			
Toluene : HS_1D_MS	ug/kg	< 5	MCERTS	< 5	< 5			
Ethylbenzene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2	< 2			
p & m-xylene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2	< 2			
o-xylene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2	< 2			
MTBE : HS_1D_MS	ug/kg	< 5	MCERTS	< 5	< 5			

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Soil Analysis Certificate - Sample Descriptions
DETS Report No: 23-14801
Geosphere Environmental Ltd
Site Reference: Rishangles Hall
Project / Job Ref: 8062
Order No: None Supplied
Reporting Date: 08/12/2023

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
688458	WS10	ES1	0.40	15.8	Brown sandy clay with stones
688459	WS10	ES2	0.80	16.8	Grey clay with stones
688460	WS11	ES1	0.30	4.2	Brown gravelly sand with stones
688461	WS13	ES1	0.50	17.4	Brown gravelly sand with stones
688462	WS14	ES1	0.40	11.1	Brown sandy clay
688463	WS15	ES1	0.30	8	Brown gravelly sand with stones
688468	HP06	ES1	0.30	13.2	Brown sandy gravel with stones

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

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Soil Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 23-14801
Geosphere Environmental Ltd
Site Reference: Rishangles Hall
Project / Job Ref: 8062
Order No: None Supplied
Reporting Date: 08/12/2023

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 – C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	Fraction Organic Carbon (FOC)	Determination of TOC by combustion analyser.	E027
Soil	D	Organic Matter (SOM)	Determination of TOC by combustion analyser.	E027
Soil	D	TOC (Total Organic Carbon)	Determination of TOC by combustion analyser.	E027
Soil	AR	Exchangeable Ammonium	Determination of ammonium by discrete analyser.	E029
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received

DETS Ltd
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List of HWOL Acronyms and Operators
DETS Report No: 23-14801
Geosphere Environmental Ltd
Site Reference: Rishangles Hall
Project / Job Ref: 8062
Order No: None Supplied
Reporting Date: 08/12/2023

Acronym	**Description**
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

Det - Acronym
Benzene - HS_1D_MS
Ethylbenzene - HS_1D_MS
MTBE - HS_1D_MS
TPH CWG - Aliphatic >C10 - C12 - EH_CU_1D_AL
TPH CWG - Aliphatic >C12 - C16 - EH_CU_1D_AL
TPH CWG - Aliphatic >C16 - C21 - EH_CU_1D_AL
TPH CWG - Aliphatic >C21 - C34 - EH_CU_1D_AL
TPH CWG - Aliphatic >C5 - C6 - HS_1D_MS_AL
TPH CWG - Aliphatic >C6 - C8 - HS_1D_MS_AL
TPH CWG - Aliphatic >C8 - C10 - EH_CU_1D_AL
TPH CWG - Aliphatic C5 - C34 - HS_1D_MS+EH_CU_1D_AL
TPH CWG - Aromatic >C10 - C12 - EH_CU_1D_AR
TPH CWG - Aromatic >C12 - C16 - EH_CU_1D_AR
TPH CWG - Aromatic >C16 - C21 - EH_CU_1D_AR
TPH CWG - Aromatic >C21 - C35 - EH_CU_1D_AR
TPH CWG - Aromatic >C5 - C35 - HS_1D_MS+EH_CU_1D_AR
TPH CWG - Aromatic >C5 - C7 - HS_1D_MS_AR
TPH CWG - Aromatic >C7 - C8 - HS_1D_MS_AR
TPH CWG - Aromatic >C8 - C10 - EH_CU_1D_AR
TPH CWG - Total >C5 - C35 - HS_1D_MS+EH_CU_1D_Total
Toluene - HS_1D_MS
m & p-xylene - HS_1D_MS
o-Xylene - HS_1D_MS

Peter Coyne
Geosphere Environmental Ltd
Brightwell Barns
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IP10 0BJ

Derwentside Environmental Testing Services Ltd
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Lenham Heath
Kent
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t: 01622 850410

DETS Report No: 23-15162

Site Reference:	Rishangles Hall
Project / Job Ref:	8062
Order No:	None Supplied
Sample Receipt Date:	12/12/2023
Sample Scheduled Date:	12/12/2023
Report Issue Number:	1
Reporting Date:	18/12/2023

Authorised by:

Kevin Old
Operations Director

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

Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

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UKAS TESTING
4480

Soil Analysis Certificate						
DETS Report No: 23-15162	**Date Sampled**	28/11/23	28/11/23	28/11/23	28/11/23	28/11/23
Geosphere Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Rishangles Hall	**TP / BH No**	WS10	HP02	HP03	HP04	HP05
Project / Job Ref: 8062	**Additional Refs**	ES1	ES1	ES1	ES1	ES1
Order No: None Supplied	**Depth (m)**	0.40	0.10	0.10	0.10	0.10
Reporting Date: 18/12/2023	**DETS Sample No**	690058	690059	690060	690061	690062

Determinand	Unit	RL	Accreditation					
Asbestos Quantification (S)	%	< 0.001	ISO17025	< 0.001	0.001	0.001	< 0.001	< 0.001

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

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Soil Analysis Certificate - Methodology & Miscellaneous Information
DETS Report No: 23-15162
Geosphere Environmental Ltd
Site Reference: Rishangles Hall
Project / Job Ref: 8062
Order No: None Supplied
Reporting Date: 18/12/2023

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 – C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	Fraction Organic Carbon (FOC)	Determination of TOC by combustion analyser.	E027
Soil	D	Organic Matter (SOM)	Determination of TOC by combustion analyser.	E027
Soil	D	TOC (Total Organic Carbon)	Determination of TOC by combustion analyser.	E027
Soil	AR	Exchangeable Ammonium	Determination of ammonium by discrete analyser.	E029
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

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Tel : 01622 850410

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List of HWOL Acronyms and Operators
DETS Report No: 23-15162
Geosphere Environmental Ltd
Site Reference: Rishangles Hall
Project / Job Ref: 8062
Order No: None Supplied
Reporting Date: 18/12/2023

Acronym	Description
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

Det - Acronym

GEOSPHERE ENVIRONMENTAL

Ec Ecology.

Fr Flood Risk.

Ge Geotechnical.

En Environmental.

Kw Knotweed.

GEOSPHERE ENVIRONMENTAL LTD

Brightwell Barns, Ipswich Road, Brightwell, Suffolk, IP10 0BJ

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