

Phase 1 & 2 Desk Study & Ground Investigation

Land Adjacent Seagry House, Upper Seagry



Imagery © 2024 Google Earth.

Contract No./Report Type: 24-025/P1&P2
Produced for Thala Family Investments Ltd

AG Geo-Consultants Ltd

Report Title
Phase 1 & 2 Desk Study & Ground Investigation

Project	Project No./Report Type
Land Adjacent Seagry House, Upper Seagry	24-025/P1&P2

Client Name
Thala Family Investments Ltd

Issue Date/Version	Status	Comments, Description of Amendments
10 th May 2024	Final	-

Report Prepared by:			
André Gilleard	Director SiLC QP CSci CEnv BEng(Hons) andre@ag-geoconsultants.co.uk Tel: 07395 100 727	 DoW CoP Sustainable Reuse of Soils  ACEAIRE Initiative	

Specialist in Land Condition (SiLC) No. A1201 Qualified Person (QP), No.086 (CL:AIRE Definition of Waste, Industry Code of Practice, DoWCoP)

This report is provided for the benefit of the Client. We do not accept responsibility in the event that the report contents are used in whole or in part by a third party and we exercise no duty of care to any such third party. © AG Geo-Consultants Ltd

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

Contents

Executive Summary	3
1 Introduction	1
1.1 Introduction and Brief	1
1.2 Proposed Development.....	1
1.3 Scope of Works.....	1
1.4 Limitations.....	2
2 Phase 1 Desk Study (Inc Preliminary Risk Assessment)	3
2.1 Introduction.....	3
2.2 Desk Study.....	3
2.3 Preliminary Conceptual Model & Risk Assessment.....	5
2.3.1 General	5
2.3.2 Preliminary Conceptual Model & Risks	6
3 Phase 2 Site Investigation	8
3.1 General	8
3.2 Trial Pitting	8
3.3 In-Situ Testing.....	8
3.4 Sample Collection and Laboratory Analysis	9
4 Ground Conditions.....	10
4.1 General	10
4.2 Geotechnical Parameters	10
4.3 Groundwater	11
4.4 Contamination Indications	11
4.5 Underground Services Encountered	11
5 Geotechnical Assessment.....	12
5.1 Introduction.....	12
5.2 Excavations.....	12
5.3 Earthworks	12
5.4 Foundation Assessment	12
5.5 Floor Slabs	15
5.6 Roads and Pavements	16
5.6.1 California Bearing Ratio	16
5.6.2 Frost Susceptibility	16
5.6.3 General Information	16
5.7 Drainage	16
5.8 Chemical Attack on Buried Materials.....	17
6 Assessment of Contamination & Environmental Risks.....	18
6.1 Tier 1 Generic Quantitative Risk Assessment - Soil Risks to Humans	18
6.1.1 Metals.....	18
6.1.2 Organics – General	19
6.1.3 Organics – TPH.....	19
6.1.4 Organics – Polyaromatic Hydrocarbons (PAHs).....	20
6.1.5 Other.....	20
6.2 Tier 2 Detailed Quantitative Risk Assessment - Soil Risks to Humans	20
6.3 Soil Risks to Plants (Phytotoxicity).....	20
6.4 Soil Risks to Water Supply Pipes.....	21
6.5 Tier 1 Generic Quantitative Risk Assessment – Risks to Water Resources	22
6.6 Ground/Landfill Gas Risks to Humans	22

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

6.7	Radon Risk to Humans.....	22
6.8	Chemical Vapour Risks to Humans.....	22
6.9	Final Conceptual Model and Risk Assessment	22
6.10	Strategy for Risk Reduction & Remediation	26
6.10.1	Introduction.....	26
6.10.2	Pre-Commencement “Remediation” Requiring Validation.....	26
6.10.3	Post-Commencement Risk Reduction Measures Requiring Validation.....	27
6.10.4	Post-Commencement Risk Reduction Measures Not Requiring Validation.....	28
6.10.5	Summary of Risk Reduction and Remediation Measures and Validation	28
6.10.6	Validation Report.....	30
7	Other Aspects.....	31
7.1	“Site H&S File”	31
7.2	Soil/Materials Reuse & Disposal.....	31
7.2.1	General	31
7.2.2	Reuse on Site	32
7.2.3	Transfer for Reuse on Another Site	32
7.2.4	Soil Treatment Facilities	32
7.2.5	Disposal to Licensed Waste Sites.....	32
7.2.6	Asbestos Content to Soils	34

Appendices

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

Executive Summary

Client	Thala Family Investments Ltd																																								
Site and Location	Land Adjacent Seagry House, Upper Seagry Approximate postcode = SN15 5JZ																																								
Proposed Development	Demolition of existing barn and replacement with a line of commercial units. Some landscaping is to be expected.																																								
Client Brief	The client's brief was to undertake soakaway testing, but then we advised, and the client accepted, assessments for contamination and geotechnics at the same time.																																								
History of Site & Surroundings	On Site In the past, fields, woods and footpaths. Currently an old derelict (former chicken) barn (appeared 1960-1983 and no chickens for past 30yrs) with asbestos cement roofing. Two garages lie W of the main barn and there is an above ground fuel tank E of the barn. E of the barn, extending to the road, has always been a field. In the Surroundings In the past, fields, woods and possible stables. <i>Wells</i> and <i>pumps</i> once existed just E and S of the site. Currently largely unchanged, except immediately E of the barn area, the stables(?) were redeveloped and include a line of private modern garages.																																								
Ground Conditions	BGS Mapping Suggests: • Fault Lines: None lie significantly close enough to the site. • Made ground (MG): None >1m thickness shown. • Drift Deposits: None. • Solid Geology: Kellaways Sand Member (Sandstone). Just beyond the W site edge lies Kellaways Clay Member (Mudstone, 15-18m thick)). The sandstone overlies the clay and dip could be to the SE and so the sand should be thickest in the E of the site. • The nearest BGS boreholes (on the same geology) suggests: - The Kellaways Sandstone to comprise clays, sands and silts. Our Investigation Found: <table border="1"> <thead> <tr> <th rowspan="2">Strata</th><th colspan="2">Depth (mBGL)</th><th rowspan="2">Typical Thickness (m)</th><th rowspan="2">Description & Comments</th></tr> <tr> <th>Top</th><th>Bottom</th></tr> </thead> <tbody> <tr> <td>MG Topsoil</td><td>0</td><td>0.2, 0.35</td><td></td><td>TP2 and TP6 only</td></tr> <tr> <td>Topsoil</td><td>0</td><td>0.25</td><td></td><td>TP4 and TP5 only</td></tr> <tr> <td>MG: clay</td><td>0 to 0.35</td><td>0.6 to 0.9</td><td></td><td>Very soft and soft, and contains fragments of concrete and brick, with rare metal and pipe.</td></tr> <tr> <td>Soft SILT</td><td>0.25 to 0.8</td><td>1.45 to 2.35</td><td></td><td>Grey and very sandy. TP1, TP2, TP4, TP5, TP6</td></tr> <tr> <td>Firm SILT</td><td>0.6, 0.9, 1.7</td><td>2.3, 2.45</td><td></td><td>Orangish Brown and very sandy. TP3, TP6 and TP7 only</td></tr> <tr> <td>Stiff CLAY</td><td>1.45 to 2.45</td><td>>2.45, >2.8, >3.2, >3.2, >3.35, >3.5</td><td></td><td>Grey and slightly or very, sandy and silty</td></tr> </tbody> </table>				Strata	Depth (mBGL)		Typical Thickness (m)	Description & Comments	Top	Bottom	MG Topsoil	0	0.2, 0.35		TP2 and TP6 only	Topsoil	0	0.25		TP4 and TP5 only	MG: clay	0 to 0.35	0.6 to 0.9		Very soft and soft, and contains fragments of concrete and brick, with rare metal and pipe.	Soft SILT	0.25 to 0.8	1.45 to 2.35		Grey and very sandy. TP1, TP2, TP4, TP5, TP6	Firm SILT	0.6, 0.9, 1.7	2.3, 2.45		Orangish Brown and very sandy. TP3, TP6 and TP7 only	Stiff CLAY	1.45 to 2.45	>2.45, >2.8, >3.2, >3.2, >3.35, >3.5		Grey and slightly or very, sandy and silty
Strata	Depth (mBGL)		Typical Thickness (m)	Description & Comments																																					
	Top	Bottom																																							
MG Topsoil	0	0.2, 0.35		TP2 and TP6 only																																					
Topsoil	0	0.25		TP4 and TP5 only																																					
MG: clay	0 to 0.35	0.6 to 0.9		Very soft and soft, and contains fragments of concrete and brick, with rare metal and pipe.																																					
Soft SILT	0.25 to 0.8	1.45 to 2.35		Grey and very sandy. TP1, TP2, TP4, TP5, TP6																																					
Firm SILT	0.6, 0.9, 1.7	2.3, 2.45		Orangish Brown and very sandy. TP3, TP6 and TP7 only																																					
Stiff CLAY	1.45 to 2.45	>2.45, >2.8, >3.2, >3.2, >3.35, >3.5		Grey and slightly or very, sandy and silty																																					
Hydrogeology & Hydrology	• Watercourses, Aquifers, Source Protection Zones (SPZ), Abstractions: Not checked as unlikely to be significant. • Groundwater (GW): Pits were up ~3.6m deep & no groundwater was found in any.																																								
Geotechnical Considerations	• The site lies in an area (potentially conservatively) deemed low risk, for UXO presence. Excavations • Should be possible with conventional earthmoving plant. • Should remain stable in the short term. • Groundwater could occur as seepages, but should be controllable by sump pumping. Foundations & Ground Floor Slabs • Sands (weathered Kellaways Sandstone (KS)) <u>had been expected</u> across the entire site. The closest thing to the KS was silty SAND found in TP3 and TP7 (All other pits found soft clays to 1.45m to 2.35m depth). These two pits appear to be outwith of a possible channel across the site, infilled with soft clays. This channel could run from the ditch on the opposite side of the road to TP5, through the site, to the ponds area, and could be steep sided. • The Clays/silts are of medium volume change potential.																																								

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

	- The made ground is unsuitable to bear within. We recommend footings be founded into either the firm or stiff, natural clays, of the following strengths and providing the following bearing capacities:<table><tr><th>Foundation Type</th><th>Onto Firm Clays (Cu=50kPa #) at >=0.9mbegl @</th><th>Onto Stiff Clays (Cu=80kPa #) at >=2.2mbegl @</th></tr><tr><td>0.45m wide strips</td><td>Qa>=115kPa @</td><td>Qa>=200kPa @</td></tr><tr><td>0.6m wide strips</td><td>Qa>=110kPa @</td><td>Qa>=200kPa @</td></tr><tr><td>1m square pads</td><td>Qa>=130kPa @</td><td>QA>=225kPa @</td></tr></table> #: Required strengths. @: capacity increases with depth. - Probable founding depths (or minimum 0.9mbegl) are shown on the plan in Appendix B, i.e. 0.9m at the new building's southern end, increasing to ~2.5m at the northern end. - Vibro-improvement might be a foundation option, but the ground is expected to be too soft for such. - Mini/pin piles could be another option. - Suspended ground floor slabs are recommended. Road Pavements - No CBR testing has been undertaken, but the equilibrium CBR value is suggested as CBR=3% to 4%. - Incorporation of a geogrid should be beneficial. - The soils should not be frost susceptible. Drainage - Conventional soakaway drainage is unlikely to be feasible. With test head of water of up to ~3m depth, no waters drained. Ground Aggressivity to Buried Concrete - Design Sulphate Class DS-1 and ACEC classes AC-1s and AC-1 above and below groundwater (>3.6m depth) respectively.	Foundation Type	Onto Firm Clays (Cu=50kPa #) at >=0.9mbegl @	Onto Stiff Clays (Cu=80kPa #) at >=2.2mbegl @	0.45m wide strips	Qa>=115kPa @	Qa>=200kPa @	0.6m wide strips	Qa>=110kPa @	Qa>=200kPa @	1m square pads	Qa>=130kPa @	QA>=225kPa @
Foundation Type	Onto Firm Clays (Cu=50kPa #) at >=0.9mbegl @	Onto Stiff Clays (Cu=80kPa #) at >=2.2mbegl @											
0.45m wide strips	Qa>=115kPa @	Qa>=200kPa @											
0.6m wide strips	Qa>=110kPa @	Qa>=200kPa @											
1m square pads	Qa>=130kPa @	QA>=225kPa @											
Contamination Considerations	- Potential risks were considered to be: - Probable made ground, with possible asbestos cement fragments. Note that everything on the chicken shed is asbestos and we spotted piles of asbestos sheets and ducting on site. Red diesel tank. - Other farm petroleum hydrocarbons. - Farm tipping. Chicken feed (heavy metals). - There were not considered to be any significant risks from: Chicken shed manure (ammonia, acidity); and the modern private garages just off site. - Anthropogenic components of the made ground comprise: fragments of concrete, brick, and rare metal and pipe. - There were no visual or olfactory indications of contamination. Exploratory holes near the fuel tanks and on-site garages found no contamination. - No significant risks to plants, nor groundwater have been found on site. - For risk to humans: - None of the test results exceeded the GAC for a commercial end use, meaning there is no risk. - PAHs in TP2 at 0.3m depth exceeded the GAC for a residential-with-plant-uptake end-use, showing that there could be risks to groundworkers (and in the absence of further assessment, then PAHs currently could pose risk to a <i>residential-with-plant-uptake</i> end-use if the end-use changed). - No asbestos was found in the soils tested, but such should be expected to exist. - PE and PVC water supply pipes should be acceptable. Ground Gases, Radon and Chemical Vapours - No potential sources of ground gas have been found under the site and none (including from historic or recent landfills) have been found close enough to the site to pose potential significant risk. - No risks have been found that require protection against Radon and chemical vapours.												

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation Land Adjacent Seagry House, Upper Seagry

Strategy for Remediation & Risk Reduction	The investigation has revealed the development site to only exhibit a risk from soil contamination, with such contamination being the same type and degree as found on most urban brownfield sites. Such risks are easily remedied and therefore this report concludes that the principle of commercial development is a suitable use for the site in terms of contamination. • No remediation is required. • No long-term monitoring and maintenance of remediation is required. • To remove the human health risks: ○ Site, landscape and maintenance workers should wear gloves, boots and overalls and wash their hands before eating, drinking and smoking. Excessive dust generation should be avoided. ○ Excavations or below ground voids should be checked for the presence of harmful vapours prior to personnel entry. • No other risk reduction measures are required (e.g. gas protection, special water supply pipe materials, etc). • A watching brief should be kept during siteworks for asbestos containing materials (ACM) in the soils and any other unforeseen/unsuspected contamination. If such is found, then work should stop and a competent person should be contacted for advice and assessment. Also watch for potential UXO. • A suitably insured consultant is expected to advise that any asbestos cement fragments spotted during groundworks, should be litter picked and removed off site. • Any recycled aggregates that are planned to be imported to site, should be assessed for contamination (especially asbestos) prior to import and relevant records retained for validation purposes. • Topsoil and subsoil should be assessed for contamination prior to import.
Reuse of Soils on or Off site	To avoid Landfill Tax reuse as much soil on site as possible (ensure legitimate reuse and only in the quantity required. Follow waste protocols). By following waste protocols, surplus natural soils can be exported to other development or construction sites. Contaminated Made ground can only be exported to soil treatment facilities, or other permitted/exempt sites. Clean made ground could go to other construction sites.

This is only a summary and should not be read in isolation from the main text.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

1 Introduction

1.1 Introduction and Brief

AG Geo-Consultants Ltd (AGGC) were commissioned by *DE Planning Ltd* on behalf of *Thala Family Investments Ltd* (the Client) to produce a Phase I & II Desk Study and Ground Investigation report for a site known as Land Adjacent Seagry House, Upper Seagry, SN15 5JZ (the “Site”).

The client’s brief was to undertake soakaway testing, but then we advised, and the client accepted, the extended scope below.

1.2 Proposed Development

The proposed development (there is no plan/drawing yet) comprises demolition of existing barn and replacement with a line of commercial units. Some landscaping is to be expected.

1.3 Scope of Works

The client accepted AGGC’s proposed detailed scope of work for a Phase 1 Desk Study, followed by a Phase 2 investigation (based on the findings of the desk study). The scope was designed to primarily undertake soakaway testing, but also identify foundation requirements and if any significant contamination could exist across the site, with recommendations on remediation measures considered necessary, should any material contamination risks be identified.

The objectives of the work were to determine the sub-surface conditions in respect of:

Contamination/Environmental Aspects:

- Contamination assessment to consider potential significant pollutant linkages arising from historic and current land uses, on and off site.

Geotechnical Aspects:

- Likely foundations for proposed structures.
- Likely ground floor slab types.
- Likely soakaway potential.
- Design guidance for access roads and car park construction.

This report should be submitted to the LPA to satisfy the relevant planning conditions, but also to seek their “**no objection**” to the potential employment of the **CL:AIRE Definition of Waste Code of Practice** (DoWCoP) at the site (i.e. in case there will be surplus natural soils and transfer of such soils to other development sites for reuse, is a consideration) (see Section 7.3).

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

1.4 Limitations

Until all invoices associated with the production of this report have been paid in full, then it remains the property of AGGC and not the client, and AGGC do not grant legal reliance upon it to satisfy (or remove) planning permission conditions, or to be used for engineering design, etc.

This report is provided for the benefit only of the party to whom it is addressed and their advisors. No other developer or party may use it without our express written permission (i.e. reassignment). We do not accept responsibility to any other third party for the whole or any part of the contents and we exercise no duty of care in relation to this report to any third party.

Where intrusive investigations have been completed, information, comments and opinions given in this report are based on the ground conditions encountered during the site work and on the results of laboratory and field tests performed during the investigation. However, subsoils are inherently variable and hidden from view such that no investigation can be exhaustive to the extent that all soil conditions are revealed. Conditions may therefore be present beneath the site that were not apparent in the data reviewed as part of this assessment. In particular, it should be noted that groundwater levels vary due to seasonal and other effects, and may at times differ to those measured during the investigation.

This assessment has been based to some extent on data acquired from Third Parties. This data has been accepted as correct and has not been subjected to any additional validation.

Unless specifically noted to the contrary, it should be assumed that this report has not been submitted to any other regulatory authorities for approval. Redevelopment sites in particular may have planning conditions attached in respect of contaminated land assessment. Where we are made aware of such conditions in advance of scoping the works, we can tailor the report to the regulatory authority requirements. Where we are not made aware of any such requirements there can be no certainty that our investigation will meet any or all of the regulatory authority requirements.

2 Phase 1 Desk Study (Inc Preliminary Risk Assessment)

2.1 Introduction

The following research has been undertaken in order to aid accurate design of the subsequent **Phase 2 ground investigation** (which is always recommended).

2.2 Desk Study

Table 2.1: Desk Study

Planning conditions	There are no planning conditions for this site yet, but we expect there to be contaminated land conditions. Also, the NPPF reminds developers (CI 184) that they are responsible for providing developments that are free of significant risks (both contamination and geotechnical). Furthermore, there are ground assessment requirements within Building Regulations . Potential risks to groundworkers should also be considered.
Current Use of Site and Surroundings	On Site Old derelict (former chicken) barn with asbestos cement roofing . Two garages lie W of the main barn and there is an above ground fuel tank E of the barn. E of the barn, extending to the road, is a field. In the Surroundings Woods and farmland, with village to the SE. There is a line of private modern garages immediately E of our barn area.
Other	The client reported that the ground in this area can be very soft (he got a telehandler stuck). Also, when asked when the barn might last have had chickens in, he said <i>guess..... over 30 years since there were chickens there</i> . The above-ground tank on site was for <i>diesel</i> . DE Planning advised that a surface water sewer crosses at 2m depth, from E to W near our two garages.
Anticipated Ground Conditions	BGS Mapping Suggests: • Fault Lines: None lie significantly close enough to the site. • Made ground (MG): None >1m thickness shown. • Drift Deposits: None. • Solid Geology: Kellaways Sand Member (Sandstone). Just beyond the W site edge lies Kellaways Clay Member (Mudstone, 15-18m thick). The sandstone overlies the clay and dip could be to the SE and so the sand should be thickest in the E of the site. • The nearest BGS boreholes (on the same geology) suggests: - The Kellaways Sandstone to comprise clays, sands and silts. Other From our significant experience, we'd expect ~0.5m of man-made ground.
Hydrology and Hydrogeology	Watercourses, Aquifers, Source Protection Zones (SPZ), Abstractions: Not checked as unlikely to be significant. Groundwater (GW): perched water expected upon the Kellaways Clays at a few metres depth.
Historical Land Uses (see Appendix G)	On Site Fields, woods and footpaths. The barn appeared between 1960 and 1983. E of the barn, extending to the road, has always been a field.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

	<u>In the Surroundings</u> Fields, woods, Upper Seagry village and possible stables (E of the site) where a <i>pump</i> and <i>well</i> are shown. <i>Wells</i> also exist S of the site. Segary House exists just NNW of the site from before 1888. By 1983 there are 2no. ponds just W of the site. By 1998 the stables(?) E of the site had been redeveloped and the private garages have appeared.
Aerial Photographs	Show nothing extra or significant.
Environmental Datasheets (see Appendix F)	Flood risk data is contained herein, but a drainage engineer should be consulted to assess and comment upon sources of flood risk. No Radon protection is required for new buildings (<1% homes exceed action level). # There are no other potentially significant aspects. #: The probability result is only valid for properties above ground. All basement and cellar areas are considered to be at additional risk from high radon levels
Landfills?	No licensed ones shown on or significantly near to the site. No other potential unlicensed landfilling is evident.
Potential UXO Risk?	Unlikely. From a basic map search, the Site is assessed as low # risk of Unexploded Ordnance (UXO) being present. Bomb Map: n/a #: Low: Areas indicated as having 15 bombs per 1000acre or less
Potential Ground Risks	The following <i>Contaminated Land Type</i> risks could exist, which we recommend further assessment of: • Probable made ground, with possible asbestos cement fragments. • Red diesel tank. • Other farm petroleum hydrocarbons. • Farm tipping. • Chicken feed (heavy metals). There were not considered to be any significant risks from: Chicken shed manure (ammonia, acidity); and the modern private garages just off site. There is no significant recorded Radon risk. There could also be <i>Geotechnical Risks</i> (e.g. to foundations, etc) which one should consider assessment of: • Shrink/swell risks especially from removal or retention of trees (a tree survey is recommended and especially before any are removed), • Possible soft ground, • Possible sulphate attack on buried concrete.

2.3 Preliminary Conceptual Model & Risk Assessment

2.3.1 General

The assessment of contamination risks and other environmental risks uses the **Source-Pathway-Receptor** principle.

The site characterisation attempts to identify potential previous and existing **sources** of contamination (or environmental risk) on-site, as well as off-site ones sufficiently close to the site to potentially affect it. The conceptual model links the identified sources likely to cause harm, via **pathways** to identified critical **receptors**.

In the event of a change of land use to a more sensitive use, the town planning regime will require assessment of the new site development layout within the context of the sources of risk and introducing new exposure pathways. The assessment is also used to determine if the site, once developed, would be classed as “contaminated land” under the definition provided by the Part 2A of the Environment Act 1990 as defined in the Environment Protection Act 1995.

The conceptual model is therefore based on a number of identified source-pathway-receptor scenarios. For land to pose a risk (or be classified as “contaminated” under Part 2a) a significant pollutant linkage between source and receptor needs to be identified, which will include each component of the conceptual model.

Risk assessment is always based upon the current state of the site, in case the client does nothing with surfacing, potential hotspots, etc, during their (re)development. The risk assessment does not discuss the post-development risks at the site, because there are required to be no significant ones (Ref NPPF).

The absence or removal of a source, or interception of a pathway, will ‘break’ the pollutant linkage and remove the risk.

The conceptual model is characterised by identification of plausible pathways between the following:

- **On-site** sources, which may impact **on-site** receptors.
- **On-site** sources, which may impact **off-site** receptors.
- **Off-site** sources, which may impact **on-site** receptors.

The hazard, consequence and degree of risk all remain as ‘potential’ until assessed by intrusive investigation.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

2.3.2 Preliminary Conceptual Model & Risks

Table 2.2: Potential Risks

Feature	Potential Risks and Contaminants of Concern [#] (CoC)
On-Site: Localised	
Made ground (only expected around the barn)	Heavy Metals, hydrocarbons (TPH, PAHs), asbestos.
Asbestos containing materials (ACM): - As asbestos cement debris/fragments in soils around the barn, clad with asbestos.	Asbestos fragments and loose fibres in the soils. Such materials were just another building material when these buildings were built.
Potential for automotive hydrocarbons impacting soil around the barn area.	Oils, Petrol, Diesel (TPH, PAHs). Chemical vapours.
Above- ground diesel tank.	
On-Site: Site-wide	
Unexploded Ordnance.	Explosion. There is always a risk of UXO being present on any site, but for this site the potential presence, and risk to construction workers forming excavations, is considered very low .
Off-Site	
None.	-

[#]: From industry profiles, etc.

There are not considered to be any significant risks from:

- **Chicken shed manure** (ammonia, acidity) due it now being >~30yrs old (if it indeed was dumped on site); and
- the **private garages** just off site, due to them being fairly modern.
- **Ground or landfill, gases**, since there are no landfills, or significant infilled ground, near the site and no organic-rich soils [#] are expected on site ([#]: including made ground).
- **Radon Gas**.

A **preliminary** conceptual model is indicated in the following table (the model is finalised following intrusive site investigation, see Section 6).

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

Table 2.3: On-Site to the On-Site Source – Pathway – Receptor Model

Source		Pathway	Receptor	Potential Linkage?
General	Hazard			
Total soils concentrations (e.g. heavy metals and hydrocarbons): General impact (made ground) from former site usage.	Contamination of groundwater.	Migration of leachate through unsaturated zone; Then Migration through saturated zone/groundwater.	Groundwater and/or surface waters, and/or eco-system	Yes, but only if relatively permeable soils.
	Impact on Human health.	Ingestion of and dermal contact with soil & household dust; Inhalation of dust (indoor household and outdoor fugitive).	Construction workers.	Yes
		Growing then eating food crops.	Site end-users.	Yes
	Vegetation poisoning.	Plant root uptake.	Plants.	Yes, but unlikely from experience.
Hydrocarbon vapours at hotspots. Ground Gases from degradation of petroleum hydrocarbons at hotspots.	Explosion (accumulation of methane and volatiles).	Preferential flow paths into buildings through unsaturated zone. Inhalation of indoor vapours/gases and possible explosion.	Site end-users.	Yes, but significant hotspots are not expected
	Asphyxiation (resulting from elevated levels of carbon dioxide, methane etc).	Preferential flow paths into buildings via piled foundations vibro columns, etc . Inhalation of indoor vapours/gases and possible explosion.		No. Such foundations are unlikely
		Inhalation of outdoor vapours/gases.	Groundworkers	Negligible risk
Ground Gases from: - natural soils with organic content (e.g. peat, alluvium) - made ground with organic content. Landfill Gases from landfilled material within say 500m of the site.	Explosion (accumulation of methane). Asphyxiation (resulting from elevated levels of carbon dioxide, methane etc).	Preferential flow paths into buildings through unsaturated zone. Inhalation of indoor vapours/gases and possible explosion.	Site end-users.	No
		Preferential flow paths into buildings via piled foundations vibro columns, etc . Inhalation of indoor vapours/gases and possible explosion.		No
		Inhalation of outdoor gases.	Groundworkers	Negligible risk
Liquid contaminants Hotspot: - Diesel at tank location - Oils at garages Hydrocarbons and/or solvents impact to soils	Contamination of groundwater.	Migration through unsaturated zone to groundwater .	Groundwater and/or ecosystem.	Yes, but only if relatively permeable soils.
		Via piled foundations.		No. Such foundations unlikely
	Impact on Human health.	Permeation into PE Water supply pipes.	Human drinking water.	Yes
		Ingestion of and dermal contact with soil.	Site end-users Groundworkers	Yes but unlikely Yes
Radon Gas from natural soils/rocks (radionuclides).	Damage to lung tissue and/or Carcinogenic effects.	Preferential flow paths into buildings (e.g. drains, service runs, wall cavities, piles etc.); Inhalation of indoor gases.	Site end-users.	No
UXO.	Explosion.	Hit during excavations.	Construction workers & Drillers.	Yes, but unlikely

Linkages: likely to exist, might exist, unlikely to exist

There are not considered to be any significant **on-site to off-site** pathways or risks.

There are not considered to be any significant **off-site to on-site** pathways or risks.

3 Phase 2 Site Investigation

3.1 General

An intrusive site investigation was carried out on 22nd April 2024, and employed trial pits. In-situ soakaway testing was also undertaken.

The holes are summarised as follows, with any targeted and non-targeted holes/sampling shown:

Table 3.1: Exploratory Hole Details

Exploratory Hole ID	Technique	Hole Depth (mBGL)		Targeted?	Comments & Reasons for Holes
		Target	Actual		
TP1	Mechanical Excavator	4m	2.80	Yes, for MG and asbestos in soils	Soak Test and to inform founding depth for 1-storey building. Target MG.
TP2		2m	3.35		To inform founding depth for 1-storey building. Target MG
TP3			3.20		
TP4		4.0	2.45	No	Soak test and for access road design
TP5		4.0	3.20	No	Soak test and for access road design
TP6		2m	3.50	The two garages	To inform founding depth for 1-storey building. Target garages.
TP7	Hand dug	1.0	1.00	Diesel tanks (one of top of other)	Target tanks

A plan showing the exploratory hole and test locations is presented as Appendix A. Such also shows the locations of the potential sources of contamination/risk.

Final hole locations are measured or estimated and were not surveyed.

3.2 Trial Pitting

6no. trial pits were excavated using a JCB 3CX excavator. 1no. trial pits was excavated by hand digging. The trial pits were logged by an onsite engineer and samples were taken from the resulting spoil for geotechnical and chemical laboratory analysis.

On completion the pits were backfilled with excavated spoil and compacted.

Detailed log sheets of the trial pits are included in Appendix B.

3.3 In-Situ Testing

Where possible, hand shear vane (HV) tests were undertaken on recovered soil samples that were as undisturbed as possible.

Soakaway tests were undertaken in the following pits in general accordance with recommended practice given in BRE Digest 365. The results are contained in Appendix C.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

Table 3.2: Soakaway Tests

Pit Reference	Comments
TP1	3no. fillings of the pits were not undertaken due to slow infiltration rates
TP4	
TP5	

3.4 Sample Collection and Laboratory Analysis

Samples obtained during the investigation were subjected to a range of geotechnical and chemical testing at appropriate UKAS accredited laboratories.

Samples were submitted for **geotechnical laboratory testing** to characterise the engineering properties of the soil. The following testing was scheduled:

- Moisture Content.
- Classification tests (Atterberg Limits).

Geotechnical laboratory test data is presented in Appendix D.

Soil samples were sent for **chemical laboratory analysis** to be analysed for:

Table 3.3: Soil Sample Chemical Tests

Testing:	Number of Samples Tested	
	Made Ground	Natural Soils
AGGC Full suite comprising: arsenic, cadmium, copper, total chromium, chromium VI, lead, mercury, nickel, selenium, zinc, Speciated Polyaromatic Hydrocarbons (PAH), speciated Total Petroleum Hydrocarbons (TPH-CWG), soil organic matter content (SOM), pH and soluble sulphate.	5	0
AGGC Screen suite comprising: arsenic, cadmium, copper, chromium, lead, mercury, nickel, selenium, zinc, speciated Polyaromatic Hydrocarbons (PAH), banded Total Petroleum Hydrocarbons (TPH), soil organic matter content (SOM), pH and soluble sulphate.	0	1
Asbestos Screen & ID.	5	0
pH, soluble sulphate (for buried concrete design).	0	5

Generally, no natural soils were tested for **contamination**, as given the site usage and natural clays, etc, they were considered unlikely to be contaminated (also no visual or olfactory indications of contamination were found in our holes). One shallow sample was tested to show absence of any contamination.

All soil samples were collected using either clean stainless steel utensils or clean disposable gloves and placed directly into clean containers provided by the laboratory.

The chemical laboratory test results are presented in Appendix E.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

4 Ground Conditions

4.1 General

The following table provides a summary of the strata encountered in the exploratory holes and the depth to the base of each stratum. MG = man-made ground.

Table 4.1: Typical Strata

Strata	Depth (mBGL) Encountered		Typical Thickness (m)	Description & Comments
	Top	Bottom		
MG Topsoil	0	0.2, 0.35		TP2 and TP6 only
Topsoil	0	0.25		TP4 and TP5 only
MG: clay	0 to 0.35	0.6 to 0.9		Very soft and soft, and contains fragments of concrete and brick, with rare metal and pipe.
Soft silty CLAY #	0.25 to 0.8	1.45 to 2.35		Grey and very sandy. TP1, TP2, TP4, TP5, TP6
Firm silty CLAY #	0.6, 0.9, 1.7	2.3, 2.45		Orangish Brown and very sandy. TP3, TP6 and TP7 only
Stiff CLAY	1.45 to 2.45	>2.45, >2.8, >3.2, >3.2, >3.35, >3.5		Grey and slightly or very, sandy and silty

#: on site logging felt this was a silt, as shown on the logs, but lab testing confirmed the strata to be **silty CLAYS**.

Anthropogenic components of the made ground comprised concrete, brick, and rare metal and pipe.

Groundwater observations are detailed in Section 4.3.

4.2 Geotechnical Parameters

Under the entire site area there are just cohesive silts and clays (solid geology), to >3.5m depth.

Plasticity indices (Appendix D)(Liquid limits= 40% to 54%) indicate the silty clays to be of intermediate and high plasticity. The plasticity indices (PI) range from 23% to 35%.

Results are summarised as follows:

Table 4.2: Modified Plasticity Indices Summary (arranged in depth order)

Sample/Hole Reference	Depth (mbegl)	Plasticity index %	% Passing 0.425mm	Remarks (C=clay)	Modified Plasticity Index %	Shrinkability
TP3	1.00	28	100	CI Intermediate Plasticity	28	M
TP1	1.50	31	100	CH High Plasticity	31	M
TP6	1.50	30	100	CI Intermediate Plasticity	30	M
TP2	1.80	35	100	CH High Plasticity	35	M
TP1	2.50	23	100	CI Intermediate Plasticity	23	M
TP2	2.50	31	100	CH High Plasticity	31	M
TP3	2.50	24	100	CI Intermediate Plasticity	24	M
TP6	2.70	32	100	CI/CH Intermediate/ High Plasticity	32	M

L=Low M=Medium H=High

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation Land Adjacent Seagry House, Upper Seagry

The modified plasticity indices (MPI) indicate the clays to possess **medium** volume change potentials with changes in moisture content, according to the criteria of NHBC Standards, Chapter 4.2 (2023) Building Near Trees. Based on these results, it is recommended that a **medium volume change potential** be assumed for design purposes, with corresponding minimum founding depths of 0.9m (in areas away from existing and proposed trees).

and vane tests gave the following results, with engineer's site interpretation for comparison.

Table 4.3: Hand Vanes Results (Shear strength, kPa)

Test depth (mbegl)	TP1	TP2	TP6		
0.5	-	-	-		
1.0	20, "Soft"	-	20, "Soft"		
1.5	-	-	-		
2.0	42, "Soft"	-	38, "Firm"		
2.5	-	-	-		
3.0	-	38, "Stiff"	-		

4.3 Groundwater

Pits were up to be up to ~3.6m deep and no groundwater was found in any of them.

4.4 Contamination Indications

Everything on the chicken shed is asbestos. There were no visual or olfactory indications of contamination noted in the soils during the site works.

We especially did not observe any asbestos containing-materials (ACM) in the soils around the existing building (but such could still exist). We spotted piles of asbestos sheets and ducting.

4.5 Underground Services Encountered

None were found in the exploratory holes.

5 Geotechnical Assessment

5.1 Introduction

The current development proposals are discussed in Section 1.2.

Likely wall loadings are currently unknown, but we could assume loads could be no more than a single-storey house of standard construction, for which wall loadings could be as follows.

Table 5.1: Potential Building Loads

House Size	Potential Maximum Line Load (kN per m run of wall)	Corresponding Max' Bearing Pressure (kPa) for Footing Widths of:		
		0.45m	0.6m	1.0m
1-storey semi-detached	40	90	67	40

5.2 Excavations

Excavations should be suitable with conventional earthmoving plant.

It is unlikely that shallow excavations will encounter significant groundwater. Groundwater could occur as seepages and should this happen then it should be possible to keep excavations dry by pumping from a conveniently located sump to a nearby sewer. If this is required, a temporary discharge licence will be required from the water authority.

All of our trial pits remained stable and open during the short time of their formation. Temporary excavations are therefore expected to stand unsupported in the short term, either vertically, or with steep cut gradients. Excavations below approximately 1m depth will require sheeting and shoring for personnel to enter safely. The stability of all excavations could deteriorate on wetting either from groundwater or surface water. Excavations could therefore be protected from rain and surface water runoff.

Any areas of particularly poor quality underlying soils (i.e. wet, soft, loose materials) should be removed from beneath all proposed foundation and hardstanding areas, and the deficit made good with suitable compacted granular fill (placed to an engineering specification).

Carbon & Sustainability

Attempt to retain & reuse surplus soils on site, provided there is legitimate reason for reuse.

5.3 Earthworks

No significant earthworks are envisaged.

5.4 Foundation Assessment

General

Made Ground was present across the site (albeit of only **0.6m to 0.9m proven thickness** at the locations investigated) and should not be relied upon to form a suitable bearing stratum for buildings, due to the high potential for varying strengths/densities and compositions, that such soils usually have.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

Based on the *Modified Plasticity Indices* range showing **medium volume change potentials** with changes in moisture content, then we recommend a **minimum founding depth of 0.9m** away from existing or former tree locations.

Sands (weathered Kellaways Sandstone) had been expected across the site, but no significant sands were found.

The drawing in Appendix B shows the distribution of soft silt across the site. It is possible that there is a **(steep sided) channel of softer material, running from the ditch on the opposite side of the road to TP5, through the site, to the ponds area.**

In TP3 and TP7 there was no soft found, just made ground, and these two holes showed the closest thing to the Kellaways Sand, being silty SAND.

The various options for foundations are discussed as follows, starting with an assessment of shallow foundations, then assessing other options of increasing complexity and cost.

Taking account of the strata revealed by this investigation we recommend that shallow/strip/pad/trench fill foundations are adopted for the proposed development.

The following foundation guidance should be reviewed if the ground conditions vary significantly from those highlighted in Section 4.

All foundation formations should be inspected and approved by a suitably qualified geotechnical engineer. Any 'soft' spots where exposed should be excavated and replaced with suitably compacted engineering fill.

Carbon & Sustainability

For sustainability, one should consider the following:

- Propose the use of cement-types with less impact than the classical Portland Cement. (use CEMII or CEMIII to replace CEMI).
- Earth Friendly Concrete (EFC): Replacement of Cement by the use of GGBS (Ground Granulated Blast Furnace Slag)(and fly ash geopolymers).
- Propose alternative materials. E.g. alkali activated materials (AAM's) and micro-macro synthetic fibre to replace steel reinforcement.
- Design cement-free ground improvement solutions and specify low Ordinary Portland Cement (OPC) mixes. For example, by cement replacement with Ground Granular Blast Furnace Slag (GGBS) / Pulverised Fly Ash (PFA) (e.g. CEMIII B) where locally available.
- Consider other, non/less- cement based techniques of ground improvement (e.g. stone columns or well-designed soil-mixing), or driven **timber piles** #.

#: One of the main drawbacks to using timber is that it is biodegradable. Decay occurs fastest when the timber is exposed to the air, which allows fungal decay and rot to occur. As such, a typical life span for timber placed in an **unsaturated environment is c. 25 years**. Timber placed **below groundwater level**, in a saturated, anoxic environment, will decay at a much slower rate and can have a design life of **up to 100 years** depending on the timber species used.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

Shallow Strips, Pads and Trench Fill Foundations

We recommend that shallow **strip or pad foundations** be seated into the **stiff clays** of the *Kellaways Clay Member*, which lie at 2.2m to 2.45m depth in the current barn area.

One could also found in the overlying **firm clays** (TP3, TP6 & TP7, which could mean the southern half of the existing barn/new commercial unit) that lie at 0.6mBGL to 1.7mBGL.

Carbon & Sustainability

Foundation depths and widths should be assessed to find the minimum volume of soil arisings that could occur, and so minimise the amount of concrete used in foundations (if surplus soils need to go off site, such will also minimise the carbon footprint of exporting).

Founding depths for new foundations should be the greater of the following depths:

1. 0.9m below **finished** ground levels (mbfgl) (due to shrinkage potential) with no tree effects.
2. Deepened to comply with NHBC requirements if within the influence zones of trees.

The deeper founding depths will turn the strip footings into **deep trench fill** and so depending upon a number of factors (e.g. increased cost of mass concrete, landfill cost of increased soil volumes, etc), then it is possible that vibro-improvement, or mini piles, could be more cost-effective.

At the minimum foundation depth of 0.9mbfgl, or at least 0.1m into the founding level clays, the allowable bearing capacities are (adopting a factor of safety of 3 on the ultimate calculated value):

Table 5.2 Allowable Bearing Capacities (Qa)

Foundation Type	Onto Firm Clays (Cu=50kPa #) at >=0.9mbfgl @	Onto Stiff Clays (Cu=80kPa #) at >=2.2mbfgl @
0.45m wide strips	Qa>=115kPa @	Qa>=200kPa @
0.6m wide strips	Qa>=110kPa @	Qa>=200kPa @
1m square pads	Qa>=130kPa @	QA>=225kPa @

#: Required strengths.

@: capacity increases with depth.

Probable founding depths (or minimum 0.9mbfgl) are shown on the plan in Appendix B, i.e. 0.9m at the new building's southern end, increasing to ~2.5m at the northern end.

The above satisfies the aforementioned estimated maximum loads from semi-detached 1- storey houses (Table 6.1).

At the intensities of loading given above, total settlements should not exceed 25mm, with differential settlements between adjacent pad footings of approximately half this value. In the event that shallow foundations are employed for the development, the detailed design should include a serviceability check for settlement between differentially loaded foundation elements when foundation loads are determined.

Note that if detailed design causes individual foundations to be closer to one another than about 5x their width/breadth, then their pressure bulbs could interact and the above advice will need to be rechecked.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

The above values are based on a fresh cut formation for foundation level. If the formation is left exposed to the weather for a period of time, then further excavation may be required until the strengths/densities discussed above for the bearing stratum are obtained.

To avoid the risk of differential settlements then individual foundations should found upon the same strata type (for example, entirely onto firm clays, or entirely onto stiff clays).

Where two or more strata types are revealed at planned founding level, then footings shall be deepened to found onto whichever of those strata types underlies the other.

Foundations may need to be deepened **if underlain by cohesive soils** lying within ~3m of finished ground level and if they lie in the within the influencing distance of either existing trees that are to be retained, **ones that have been (or are to be) removed**, or new ones that are to be planted. Such could mean the use of deep trench fill foundations or other foundation options below. **The client should check for any significant trees that may have been removed in the last few years, as those locations could continue to heave as the soils recover.**

Vibro-Improvement

Such uses either **Vibro-Stone Columns (VSC)** or **Vibro-Concrete Columns (VCC)**, depending on the local availability of stone and upon the ground conditions being treated.

For VSC/VCC, the specialist piling contractor Keller usually requires at least 30kPa soil strength (if NHBC are involved, then they require developers to only use VCC/VSC in soils of > 40kPa strength). We have found soils strengths as low as 20kPa, and so VCC and VSC might not be feasible.

After the Vibro treatment it is usually possible to adopt bearing pressures of 100kN/m² to 125kN/m² to the foundations. Greater may be possible following discussions with a specialist contractor.

Vibro would not overcome any ground movements associated with swelling and shrinkage and so foundations would have to be founded at depths in line with NHBC requirements.

Traditional Piles

A further economical solution could be **pin piles** (small diameter, installed with 360° excavator).

A Foundation Works Risk Assessment may also be required for piling works, as may the design for a piling mat.

A copy of this report should be provided to suitable piling contractors and they should be asked to demonstrate the suitability of their equipment in these ground conditions. Furthermore, it is recommended that pile integrity and load testing be carried out as part of the quality assurance process.

5.5 Floor Slabs

Suspended floor slabs (designed in accordance with NHBC guidelines) are recommended at the site because made ground exceeds 0.6m thickness and the shallow soils are likely to be susceptible to volume change with changes in moisture content.

Any requirements for membranes to be placed within ground floor slabs to protect against ground/landfill gas, chemical vapours, or Radon, are discussed in later sections of this report.

5.6 Roads and Pavements

5.6.1 California Bearing Ratio

No CBR testing has been undertaken. Such should be carried out prior to construction, or when formation level has been reached.

Based on the general characteristics of the natural soils, the equilibrium CBR value for pavements, parking and hardstanding areas is suggested to be taken as CBR=3% to 4%.

5.6.2 Frost Susceptibility

The clays are of low permeability with a high clay fraction and are unlikely to suffer from heave under the action of frost.

5.6.3 General Information

Carbon & Sustainability

For **CBR values <~8%**, the incorporation of a geogrid at the base of the capping would reduce the required thickness of capping and therefore reduce the volume of imported engineering fill.

Due to silts/clays at the formation, such will degrade on exposure to wet weather and therefore it should be covered with 150mm of compact granular fill, as soon as possible following exposure.

5.7 Drainage

Surface Water

There are simple ways to approach a drainage design differently and provide multiple benefits, without increasing cost or build complexity to the scheme, e.g. **large rainwater harvesting tanks**, rain gardens, tree pits, swales, etc.

The long-term maintenance and ownership responsibility has advanced with the release of the *Design & Construction Guidance (Sewers for Adoption, 8th Edition, April 2020)* and the increasing use of new appointments and variations (NAVs), with the scope to adopt and maintain infrastructure not usually accepted by the water authorities.

Soakaway infiltration was undertaken in 3no. trial pits. The results are contained in Appendix C and are summarised as follows:

Table 5.3: Soakaway Results

Trial Pit	Test Depth range (mbegl)	Corresponding Stratum	Soil Infiltration Rate (m/s)
TP1	0.32-2.8 (2.48m head)	Silty CLAYS	No infiltration
TP4	0.3-2.45 (2.15m head)		No infiltration
TP5	0.28-3.2 (2.92m head)		No infiltration

The results suggest that conventional soakaway drainage is unlikely to be feasible.

Foul Water

Normally foul water would be discharged to nearby sewers.

If discharge to nearby **surface water courses**, or to the **ground**, is a consideration, then AGGC can assist with the assessment for such. We would recommend trying to avoid drainage fields. Previously we have obtained EA agreement to discharge to surface water type soakaways.

5.8 Chemical Attack on Buried Materials

Concrete

Carbon & Sustainability

See Section 5.4, General.

Samples were tested for sulphate suites as outlined in *BRE Special Digest 1, Concrete in Aggressive Ground: 2005* (SD1).

The site can be classed as Greenfield (not Brownfield¹) and with groundwater lying at >3.6m depth, water conditions are taken to be static above that depth and mobile below.

The water-soluble sulphate results for both the made ground and natural soils were all <92mg/l. The 'Characteristic Value' is therefore conservatively 100mg/l and this falls into Design Sulphate Class DS-1 in Table C1 of BRE Special Digest 1 (SD1).

The geology (Kellaways Clays) at the site may be potentially pyritic. **However**, such soils lie at >2.2-2.45m depth in the barn area and so buried concrete is unlikely to be exposed to disturbed ground in which pyrite may oxidize to sulphate and so the concrete classification need not be based on the pyrite test results.

Soil pH values varying from 5.8 to 8.0 were recorded and from these results a 'Characteristic Value' of 5.8 is derived.

From consideration of the sulphate, sulphur, pH and groundwater conditions it is concluded that the DS and Aggressive Chemical Environment for Concrete (ACEC) classes are:

- AC-1s if there is no risk of concrete being in contact with groundwater,
- and AC-1 where concrete could be contact with groundwater (e.g. >3.6 m depth).

The designer should utilise these classifications in order to produce the concrete specification.

Other Materials

The parties responsible for selecting all other materials that will be placed in the ground as part of this development, shall ensure that they are resistant to the chemical concentrations identified in the appendix of this report (e.g. pipe joint seals).

¹ The definition of "Brownfield" adopted by SD1 is one that has been *subject to industrial development, storage of chemicals, or deposition of waste, and which may contain aggressive chemicals in residual surface materials or in ground penetrated by leachates.*

6 Assessment of Contamination & Environmental Risks

6.1 Tier 1 Generic Quantitative Risk Assessment - Soil Risks to Humans

The proposed redevelopment of the Site is non-residential, therefore, to identify chemicals of potential concern, the analytical data has initially been compared against the relevant available guidelines for **commercial** end-use. **Residential with plant uptake** guidelines are given for information (e.g for risks to groundworkers).

The maximum results, have been used for subsequent comparison with the following 4no. sets of GAC:

1. Firstly against **Category 4 (Cat 4) Screening Levels**, SP1010, 24th September 2014, by CL:AIRE.
2. Then:
 - a. CL:AIRE/EIC/AGS **Soil Generic Assessment Criteria** (GAC) for Human Health Risk assessment, January 2010.
 - b. The LQM/CIEH **S4ULs** for Human Health Risk Assessment. Ref: S4UL3269, released January 2015 (with update in August 2015), Land Quality Press, Nottingham.
 - c. **EA Science Reports** SC050021, SR2 & SR3.

6.1.1 Metals

The CLEA model has separate Soil Guideline Values (SGVs) for different forms of mercury. However, the SGV report states that for general surface contamination, and to simplify the assessment, the chemical analysis results for total mercury content can just normally be compared with the SGVs for inorganic mercury (e.g. 40mg/kg for private gardens)(this is because the equilibrium concentrations of elemental and methyl mercury compounds are likely to be very low).

The following table summarises the results (**Bold** and/or **highlight** shows exceedances):

Table 6.1: Values for Metals in Soils

Compound	No. of samples	Maximum values (mg/kg)	SGV or GAC (1% SOM) mg//kg (Residential <u>with</u> plant uptake)	SGV or GAC (1% SOM) (Commercial) mg/kg
Arsenic	6	9.8	37	640
Cadmium	6	0.4	11	190
Chromium	6	7.9	910 #	8,600 #
Chromium VI	6	<0.8	6	33
Copper	6	11	2,400	68,000
Mercury (Inorganic)	6	0.2	40	1,100
Nickel	6	23.2	180	980
Lead	6	35.7	200	2,300
Selenium	6	<1	250	12,000
Zinc	6	161	3,700	730,000

#Chromium III

None of the results exceeded the GAC values for *residential with plant uptake*, nor *commercial*, end-uses.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

6.1.2 Organics – General

Soil Organic Matter (SOM) tests were undertaken on 6no. samples. The results ranged from 0.1% to 11% and so a conservative figure of 1% SOM has been adopted when selecting the Generic Assessment Criteria (GAC) screening values for organics in the following sections.

6.1.3 Organics – TPH

The following table summarises the results (**Bold** and/or **highlight** shows exceedances):

Table 6.2: Values for Speciated Hydrocarbons in Soils

Compound	No. of samples	Maximum values (mg/kg)	SGV or GAC (1% SOM) mg/kg (Residential <u>with</u> plant uptake)	SGV or GAC (1% SOM) (Commercial) mg/kg
Aliphatic				
EC 5-6	6	<0.01	42	3,200
EC> 6-8	6	<0.01	100	7,800
EC> 8-10	6	<1	27	2,000
EC> 10-12	6	<1	130	9,700
EC> 12-16	6	<1	1,100	59,000
EC> 16-35	6	19.8	65,000	None #
EC> 35-44	6	4.1	65,000	None #
Aromatic				
EC 5-7(benzene)	6	<0.01	70	26,000
EC> 7-8 (toluene)	6	<0.01	130	56,000
EC>8-10	6	<1	34	3,500
EC>10-12	6	<1	74	16,000
EC>12-16	6	<1	140	36,000
EC>16-21	6	1.5	260	28,000
EC>21-35	6	38.3	1,100	28,000
EC>35-44	6	13.2	1,100	28,000

#: Commercial: S4ULs of 1.6kg/kg are given and so these GAC are taken as N/A.

None of the results exceeded the GAC values for *residential with plant uptake* nor *commercial* end-uses.

All BTEX (petrol)(Benzene, Toluene, Ethylbenzene, Xylene) were below the limits of detection.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

6.1.4 Organics – Polyaromatic Hydrocarbons (PAHs)

The following table summarises the results (**Bold** and/or **highlight** shows exceedances):

Table 6.3: Values for Speciated PAH in Soils

Compound	No. of samples	Maximum values (mg/kg)	SGV or GAC (1% SOM) mg/kg (Residential <u>with</u> plant uptake)	SGV or GAC (1% SOM) (Commercial) mg/kg
Naphthalene	6	0.06	2.3	190
Acenaphthylene	6	0.04	170	83,000
Acenaphthene	6	0.04	210	84,000
Fluorene	6	0.04	170	6,3000
Phenanthrene	6	0.52	95	22,000
Anthracene	6	0.34	2,400	520,000
Fluoranthene	6	4.85	280	23,000
Pyrene	6	4.54	620	54,000
Benzo(a)anthracene	6	3.83	7.2	170
Chrysene	6	4.35	15	350
Benzo(b)fluorathene	6	5.18	2.6	44
Benzo(k)fluorathene	6	4.99	77	1,200
Benzo(a)pyrene	6	6.18	2.2	35
Indeno(123-ed)pyrene	6	3.99	27	500
Dibenzo(ah)anthracene	6	1.20	0.24	3.5
Benzo(ghi)perylene	6	4.69	320	3,900

3no. PAHs (all from TP2 at 0.3m depth) exceeded the GAC values for *residential with plant uptake*, but not *commercial*, end-uses.

6.1.5 Other

Asbestos was screened for in 5no. made ground samples (0.3-0.7m depth) and none was found.

6.2 Tier 2 Detailed Quantitative Risk Assessment - Soil Risks to Humans

The purpose of *detailed quantitative risk assessment* (DQRA) is to establish and use more detailed site-specific information and criteria to decide whether the elevated results do indeed pose unacceptable risks. Whether such further assessment is worthwhile can depend on a number of factors.

If the site were ever considered for residential end-use, then further assessment of BaP as a “surrogate marker” could show the PAH risks to be less, or even absent.

6.3 Soil Risks to Plants (Phytotoxicity)

It is not possible to produce a definitive list of phytotoxic substances on account of numerous variables. However, a number of metals are repeatedly cited as commonly occurring priority pollutants. As a result, the following list is adopted as indicators of the potential for phytotoxicity: As, B, Cr, Cu, Ni and Zn.

For the guideline values, the most authoritative source is the British Standard for topsoil (**BS3882**), but this only lists three elements. CLR 11 states that the **ICRCL Guidance Note 70/90** can be used for initial screening criteria. This approach has been adopted where BS3882 is lacking, but where an ICRCL 70/90 criterion is lacking, the next lowest criterion, has been adopted.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

Table 6.4: GAC for Phytotoxic Risks

Compound	Generic Assessment Criteria (GAC)(mg/kg)				GAC Source
	pH 5.0 - <5.5	pH 5.5 - <6.0	pH 6.0 - <7.0	pH >7.0	
Boron	3				1987: ICRL 59/83 (also New Zealand)
Chromium VI	25				1990: ICRL 70/90
Chromium III	400				1998: MAFF Agricultural Practice for sewage sludge
Arsenic	250 ("applicable to plants")				
Copper (Cu)	80	100	135	200	2015: BS3882
Nickel (Ni)	50	60	75	110	& 1996: DoE #
Zinc (Zn)	200	200	200	300	

#: Department of the Environment Publication, Code of Practice for Agricultural Use of Sewage Sludge, 1996

The pH results varied from 5.8 to 8.0 and so concentrations determined of Cu, Ni, Zn did not exceed the stated guidelines. Additionally, there were not any significant results for other heavy metals (which can also be potentially phytotoxic).

6.4 Soil Risks to Water Supply Pipes

The future routes of water supply pipes had not been provided at the time of this report, hence the investigation and sampling strategy may not be fully compliant with UK Water Industry Research (UKWIR) recommendations.

To assess possible risks to proposed water supply pipes, the laboratory test results have been subject to initial assessment against the GAC presented in UKWIR. Full testing has not been undertaken to determine the suitability of metallic pipe materials.

It is assumed that water pipes will be placed no deeper than 1m below existing ground level and results that relate to strata below 1m are not considered in the following table. Assessment of the results versus the GAC is summarised as follows:

Table 6.5: GAC for Water Supply Pipes

Parameter	GAC (mg/kg)		Results exceeding the GAC (mg/kg)	
	PE pipes	PVC pipes	PE pipes	PVC pipes
BTEX (<C11)	0.1	0.03	None	None
Mineral Oil C11-C20	10	Suitable	None	None
Mineral Oil C21-C40	500	Suitable	None	None

Other parameters within UKWIR have not been assessed since they are not potential contaminants of concern for this site.

Visual or olfactory indications of chemicals, or petroleum hydrocarbons (e.g. oil, petrol, diesel) were not noted on site.

Given the above, then we consider that the local water supply company should accept the use of PVC and PE water supply pipe materials on site.

It is recommended that this assessment be given to the relevant water supply company at an early stage (ideally prior to an application for planning permission being made) to confirm its requirements, which may not necessarily be the same as those recommended by UKWIR.

6.5 Tier 1 Generic Quantitative Risk Assessment – Risks to Water Resources

No significant contamination has been found that could migrate or leach to groundwater. Given this, then it is unlikely that any significant risk will be posed to groundwater under the site.

6.6 Ground/Landfill Gas Risks to Humans

No potential sources of ground gas have been found under the site (i.e. soils with significant organic content that could degrade) and none (including from historic or recent landfills) have been found close enough to the site to pose potential significant risk.

The site is therefore unlikely to be at significant risk from gases (Radon is discussed below).

6.7 Radon Risk to Humans

The chance of a property having a radon level that is at least as high as the **Action Level**, is called the **Radon Potential**.

For this area the environmental data sheets show the Radon Potential to be **0-1% (low risk)**(i.e. up to 1% of properties in this area could exceed the action level),for which **no radon protection** is required for new buildings or extensions on site.

Even though the Radon potential shows “no” Radon protection to be required, many developers are nonetheless adopting “Basic” protection and we would recommend such be considered here. The reason is that protection is obligatory only where >3% of properties exceed the Radon Action Level, but that still leaves 3% potentially at risk from Radon.

6.8 Chemical Vapour Risks to Humans

No olfactory indications that could suggest a vapour risk, have been found.

6.9 Final Conceptual Model and Risk Assessment

The preliminary conceptual model and risk assessment has been updated in light of the findings of the Phase 2 work as shown in the following table.

The method used for risk evaluation is qualitative based on interpretation of the available geoenvironmental and geotechnical data in order to provide an overall impression of the potential risks present at the site. This is described in terms of two variables as follows:

- **“Probability”** – being the likelihood that a hazard is present on site or in the surroundings.
- **“Consequence”** – being the potential outcome of the hazard.

The combination of these is used to define the risk. Clearly if a hazard is not present there can be no consequence. Similarly hazards that are potentially present will have different degrees of potential consequence. The combination of the presence of a hazard, and the potential severity of outcome of such a hazard within any event, can be used to manage the approach to management of the risk.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

The **probability** (likelihood) of an event can be classified on a four point system using the following terms and definitions based on CIRIA C552:

- **Highly likely:** The event appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution;
- **Likely:** It is probable that an event will occur, or circumstances are such that the event is not inevitable, but possible in the short term and likely over the long term;
- **Low likelihood:** Circumstances are possible under which an event could occur, but it is not certain even in the long term that an event would occur and it is less likely in the short term;
- **Unlikely:** Circumstances are such that it is improbably the event would occur even in the long term.

An extra class is added to those of C552, that of “**negligible likelihood**”, which is an amount or effect that is negligible, i.e. is so small that it is not worth considering or worrying about.

The **consequence** (severity) can be classified using a similar system also based on CIRIA C552. The terms and definitions relating to consequence are:

- **Severe:** Short term (acute) risk to human health likely to result in ‘significant harm’¹. Short-term risk of pollution of sensitive water resources. Catastrophic damage to buildings or property. Short term risk to an ecosystem or organism forming part of that ecosystem¹;
- **Medium:** Chronic damage to human health (‘significant harm’¹), pollution of sensitive water resources, significant change in an ecosystem or organism forming part of that ecosystem¹;
- **Mild:** Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services (‘significant harm’¹). Damage to sensitive buildings, structures or the environment; and
- **Minor:** Harm, not necessarily significant, but that could result in financial loss or expenditure to resolve. Non-permanent human health effects easily prevented by use of personal protective clothing. Easily repairable damage to buildings, structures and services.

(¹ Defined in Defra Circular on “Contaminated Land”, EPA 1990 Part 2a”, 01/2006, September 2006.)

Once the probability of an event occurring and its consequence have been classified, a risk category can be assigned as in the following table.

Table 6.6: Risk Classification System (CIRA 552)

		Consequence			
		Severe	Medium	Mild	Minor
Probability	Highly likely	Very high	High	Moderate	Moderate/Low
	Likely	High	Moderate	Moderate/Low	Low
	Low likelihood	Moderate	Moderate/Low	Low	Very Low
	Unlikely	Moderate/Low	Low	Very Low	Very Low

Risk Level	Action
Low to Very Low	None
Moderate to Moderate/Low	Undertake appropriate mitigation measures to reduce the risk level by appropriate on-site practice at little additional cost.
High to Very High	Designers should take such risks into account and avoid or reduce risk level to acceptable levels. Additional resources required.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

The following duplicates the **preliminary potential risks** from Table 2.2 and discusses whether they have now been proven to be risks.

Table 6.7: Proven Risks

Feature	Now proven to be a risk?
On-Site	
Unknown made ground.	Yes, primarily to groundworkers since most pathways will be cut to end-users.
Asbestos containing materials (ACM) in the near-surface soils across the entire site.	No, but we expect such to exist
Potential for automotive hydrocarbons and red diesel, in the soils around the garages and diesel tanks.	No, but such could exist as hotspots.
Unexploded Ordnance.	A risk could always exist
Radon from natural soils/rocks (radionuclides)	No
Off-Site	
None.	No change
Exists or likely to exist, might exist; unlikely to exist	

The table that follows provides a summary of the data reference points, together with an indication of the hazards, probabilities, consequences and degrees of risk.

Ground and landfill gases are not considered risks.

This assessment indicates the site and environs are considered as **Very Low to Moderate/Low** risk with respect to contamination. **Indicators above low risk** comprise:

- **Made ground** risks to groundworks.
- No **hydrocarbon hotspots** have been found, but such could still exist and pose risks to end-users and groundworkers.
- **UXO** could always be present and pose significant risks.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

Table 6.8: On-Site to On-Site Source – Pathway Receptor Model

Source		Pathway	Receptor	Probability	Consequence	Potential Risk?
General	Hazard					
Total soils concentrations (e.g. heavy metals and hydrocarbons): General impact (made ground) from former site usage	Contamination of groundwater	Migration of leachate through unsaturated zone; Then Migration through saturated zone/groundwater.	Groundwater and/or surface waters, and/or eco-system	Unlikely	Mild	Very Low
	Human health	Ingestion of and dermal contact with soil & household dust; Inhalation of dust (indoor household & outdoor fugitive).	Construction workers	Likely	Medium	Moderate
		Growing then eating food crops.	Site end-users	Unlikely	Medium	Low
		Plant root uptake	Plants	n/a	Medium	n/a
	Vegetation poisoning.	Plant root uptake	Plants	Unlikely	Mild	Very Low
Hydrocarbon vapours at hotspots. Ground Gases from degradation of petroleum hydrocarbons at hotspots.	Explosion (accumulation of methane and volatiles)	Preferential flow paths into buildings through unsaturated zone Inhalation of indoor vapours/gases and possible explosion.	Site end-users	Unlikely	Medium (Inhalation of indoor vapours/gases)	Low
		Severe (possible explosion)				Moderate/Low
	Asphyxiation (resulting from elevated levels of carbon dioxide, methane etc).	Preferential flow paths into buildings via piled foundations vibro columns , etc Inhalation of indoor vapours/gases and possible explosion.		Low Likelihood	Medium	Low/moderate (but depends on foundation type)
		Inhalation of outdoor vapours/gases.			Medium	Low
			Groundworkers	Low likelihood	Medium	Low/moderate
Liquid contaminants Hotspot: - Diesel at tank location - Oils at garages Hydrocarbons and/or solvents impact to soils	Contamination of groundwater	Migration through unsaturated zone to groundwater	Groundwater and/or ecosystem	Unlikely	Mild	Very Low
		Via piled foundations		Low Likelihood	Mild	Low
	Impact on Human health	Permeation into PE Water supply pipes	Human drinking water	Low Likelihood	Mild	Low
		Ingestion of and dermal contact with soil	Site end-users	Low Likelihood	Medium	Low/moderate
			Groundworkers	Low Likelihood	Medium	Low/Moderate
UXO	Explosion	Hit during excavations, piling or borehole drilling	Construction workers & drillers	Unlikely	Severe	Low/moderate

There are not considered to be any significant **on-site to off-site** pathways or risks.
There are not considered to be any significant **off-site to on-site** pathways or risks.

6.10 Strategy for Risk Reduction & Remediation

6.10.1 Introduction

There are two ways to reduce contamination/environmental type risks:

- “**remediation**” of soil and/or groundwater.
- Other **risk reduction measures** (that can only be completed post-commencement, such as clean cover in final garden areas, gas protection, or special water supply pipe materials).

Carbon & Sustainability

Final site levels should be designed to accommodate as much surplus soils/materials[#] from construction, as is legitimately possible (without been seen to be trying to lose such on site, in which case they would class as “waste”).

Conduct a cut/fill assessment to establish any surpluses or deficits of soil/materials[#].

Any deficit can be resolved by obtaining surplus soils from other development sites by using a **U1 Waste Exemption** or the **Definition of Waste Code of Practice (DoWCoP)**.

It may be possible for any surplus soils/materials[#] posing hazards, to be reused in areas where they will not pose hazard.

[#]: e.g. brick, tiles, concrete and tarmac, crushed for reuse as fill, provided that tarmac/asphalt does not contain hazardous concentrations of **coal-tar**.

No unacceptable risks have been found that require **pre-commencement** soil or groundwater remediation.

No long-term monitoring and maintenance of remediation is required.

Timescales for the construction and implementation of risk-reduction measures, are unknown.

6.10.2 Pre-Commencement “Remediation” Requiring Validation

The following measures require implementation before the “development” can proceed.

Above-Ground Tanks

Remove such tanks and their contents, from site.

Impacted Soils

None has been found but any impacted soils around and below the above features, shall be removed until soils show no visual or olfactory indications of petroleum hydrocarbons.

A contaminated land consultant should attend site immediately that the above features are removed. They will direct the **removal of any significantly contaminated soils** around and below them (i.e. grey/black stained, or exhibiting (strong) hydrocarbon odours) and will take samples to prove (validation) that remaining soils are not significantly contaminated and no longer pose significant risks.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

General

Provided undertaken correctly, and that currently clean soils on site are prevented from becoming contaminated, then it may be possible to retain hydrocarbon-impacted soils on site and treat them (e.g. windrow) and then safely reuse the resulting clean soils on site (e.g. to backfill voids).

Given the existence of made ground on the site and the site's past usage, vigilance should be maintained during site clearance, in case any further areas of suspected contamination are encountered. If areas are found, then work will stop in that area, a suitably qualified and experienced geo-environmental engineer will be contacted to assess the situation and potentially undertake appropriate sampling, testing and further risk assessment. The Engineer may also contact the Local Authority (LA) Environmental Health Officer (EHO) to discuss the situation and agree a way forward.

If any amendments to this Remediation Method Statement are required as a result of unforeseen contamination, then these will be agreed in writing with the Contaminated Land Officer before being carried out on site.

6.10.3 Post-Commencement Risk Reduction Measures Requiring Validation

General:

The following measures are undertaken as part of the development/construction and are "post-commencement".

Measures to overcome unacceptable risks identified in the previous sections are as follows.

All validation shall be undertaken by a suitably qualified and experienced geo-environmental engineer.

Risks from Imported Materials and Recycled Aggregates

For **sustainability**, recycled aggregates should be considered. Any recycled aggregates that are planned to be imported to site, and **any derived from on-site**, shall be assessed for asbestos content (and any other contaminants that might be present at the source site), prior to import.

All imported fill, topsoil and sub-soil shall be tested for a general suite of contaminants (e.g. "AGGC's Full Suite" herein, plus asbestos if derived from brownfield or recycling. Target concentrations shall be as per the targets given in Tables 6.1-6.3 for **commercial** end-use. For topsoil and subsoil, chemical test results shall be obtained from the supplier prior to import. **Once imported the topsoil/subsoil shall be sampled and tested in order to prove that the import is not significantly different (worse) than as promised.**

Topsoil and subsoil can contain naturally occurring contamination such as arsenic and lead. The results shall be assessed for any exceedances of guidelines.

Prior to import, test results should be obtained and checked. Once imported, and prior to placement, the material shall be tested at a rate of 1no. sample per 100m³ (with a minimum of 2 samples per soil source). This is to ensure that the soils are as promised by the supplier.

It may make commercial sense to import soils that are surplus on other development (donor) sites. Surplus soils become waste as soon as they leave donor sites, unless they are being

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

transferred to another “development” or “construction” (receiver) site for reuse. Such transfer means that such soils do not class as waste, provided that an assessment (Definition of Waste: Industry Code of Practice (DoWCoP), or waste exemption) is completed (see Section 7). There must be a pre-determined use at the receiving site and the soils must be proven, via the assessment, not to pose any unacceptable risks at the receiving site (and not to class as “waste”).

Unforeseen Contamination

A site investigation samples a very small portion of the overall site soils. Given the existence of made ground on the site, vigilance should be maintained during site clearance and construction, in case any areas of suspected **unforeseen contamination** are encountered. If areas are found then a suitably qualified person (e.g. AGGC) should undertake appropriate sampling, testing and further risk assessment.

6.10.4 Post-Commencement Risk Reduction Measures Not Requiring Validation

Asbestos cement fragments have not yet been found on site, but are to be expected. **Risks from asbestos can be reduced by removing such fragments from site.** Although we have past experience of offering advice to reduce asbestos-in-soils risks, we are now not insured to do so and so **you should seek advice from a suitably qualified and insured consultant.** We expect however that they might advise the following:

- Before any heavy plant tracks the site (i.e. before site clearance), fragments lying at ground level should be litter picked and disposed of off-site.
- Litter picking should be repeated once the site is cleared and again for any fragments spotted during all excavations and groundworks.

Site, landscape and maintenance workers should wear gloves, boots and overalls and wash their hands before eating, drinking and smoking. Excessive dust generation should be avoided.

Excavations or below ground voids should be checked for the presence of harmful gases and vapours prior to personnel entry.

A watch should be kept for potential UXO.

6.10.5 Summary of Risk Reduction and Remediation Measures and Validation

The measures required, the data that will be gathered to prove correct implementation and parties to validate them are as follows:

Of the aforementioned measures, there is no “remediation” that can feasibly be undertaken pre-commencement, all is post-commencement, as follows:

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

Table 6.9: Pre-Commencement Validation

Measure:	Data to be gathered:	Party to validate:
Remove Fuel tank.	Supply sheets showing removal of tanks and any contents and fuel/vent lines.	Tank contractor to supply to Contaminated Land Engineer (e.g. AGGC).
Remove any grossly h/c impacted soils from around and below tank.	Direct the removal of any grossly contaminated soils. Take and test soil samples to prove none such remains. Take at least one sample from each side of the resulting void and at least one from the base (more if the excavation size warrants).	Contaminated Land Engineer (e.g. AGGC).

Table 6.10: Post-Commencement Validation

Measure:	Data to be gathered:	Party to validate:
Test any imported topsoil and subsoil and any recycled aggregates.	- Information on the history of the donor site(s). - Estimate on the volume of soil/aggregate imported. Contamination concentration required for imported soils/aggregates <u>prior to import</u>. Confirmatory sampling and testing of: 3no. samples per soil type <u>after delivery to site</u>. - recycled aggregates, 1no. sample per 100m³ <u>after delivery to site</u>.	Client/Supplier to provide history, volume and test results to Contaminated Land Engineer (e.g. AGGC) for assessment prior to import.
Assess any unforeseen/new contamination found	Not possible to determine scope at present.	Contaminated Land Engineer (e.g. AGGC).

Once all of the above risk reduction measures have been completed, and then a Validation Report will be prepared to confirm that such measures have been undertaken in accordance with the requirements herein.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

6.10.6 Validation Report

If planning conditions require such, then in order to achieve sign-off by the Regulators, a final Validation Report will be established for their review and agreement, following substantial completion of the development (but prior to first occupation). Validation might still be prudent in order to satisfy lenders or site purchasers. The report's aim is to validate the measures in Section 6.10.2 and 6.10.3 as having been completed, and completed correctly.

Validation shall be undertaken by a suitably qualified and experienced geo-environmental engineer. Any Validation Report shall include the following information as a minimum:

- Validation of the aforementioned measures (where required).
- Copies of all chemical testing results of soils and for all materials tested.
- Figures and drawings (or discussion) detailing the locations of all samples retrieved for chemical testing.
- Copies of any correspondence with the Regulators.

The client shall separately maintain copies of all Duty of Care Consignment Notes for off-site treatment, re-use and/or disposal of materials. Information regarding such materials and their volumes will be required to validate any DoWCoP *Materials Management Plan* (MMP). This information is usually provided within a final Verification report and such can be one in-the-same as the Validation report for contamination risks.

A copy of the final Validation Report (following sign-off by the Regulators if applicable) shall be incorporated within the Site File in accordance with the CDM Regulations (2015).

7 Other Aspects

7.1 “Site H&S File”

The remediation and risk-reduction measures discussed earlier are designed to protect **end-users** of the site. Others at risk compromise **post-construction groundworkers** and **utilities workers**, etc, for which it is not usually economically viable to remove all risks.

Accordingly, and as with most sites, some sources of risk will, or could, remain as follows. **Such should be added to, and discussed in, the “Site H&S File” (or similar document):**

- Made ground remaining in place that contains elevated contaminants (including, potentially, small amounts of asbestos cement fragments and likely corresponding loose asbestos fibres).

7.2 Soil/Materials Reuse & Disposal

7.2.1 General

Carbon & Sustainability

Final site levels should be designed to accommodate as much surplus soils/materials[#] from construction, as is legitimately possible (without been seen to be trying to lose such on site, in which case they would class as “waste”).

Conduct a cut/fill assessment to establish any surpluses or deficits of soil/materials[#].

Any deficit can be resolved by obtaining surplus soils from other development sites by using a **U1 Waste Exemption** or the **Definition of Waste Code of Practice (DoWCoP)**.

It may be possible for any surplus soils/materials[#] posing hazards, to be reused in areas where they will not pose hazard.

[#]: e.g. brick, tiles, concrete and tarmac, crushed for reuse as fill, provided that tarmac/asphalt does not contain hazardous concentrations of **coal-tar**.

In order to prevent excessive costs and reduce the environmental impact of the development (**sustainability**), it is recommended that removal of wastes from the site, including waste soils, is kept to a minimum by:

- firstly trying to balance cut/fill earthworks operations to retain soils on site,
- or removing from site for reuse at other construction/development sites, that require soil:
 - by employing *U1 Waste Exemptions (use of waste in construction)*,
 - and/or *Definition of Waste: Industry Code of Practice (DoWCoP)* assessment,
 - and/or exporting to a soil treatment hub,
- with the last resort being disposal to a licensed waste disposal site (subject to Landfill Tax).

To avoid the risk that any surplus soils remain classed as waste, then a *Materials Management Plan (MMP)* is required before employing the DoWCoP and is strongly recommended for all other situations (e.g. in case it is later decided to employ the DoWCoP).

A MMP must be drafted to show the intent for surplus soils, before they are excavated otherwise the client may have to landfill natural soils that had been planned for reuse off-site, or made ground soils that had been planned for reuse on site.

AGGC’s DoWCoP *Qualified Person* can assist with these assessments.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

If removing to a licensed disposal site, then **Waste Acceptance Criteria** (WAC) test results and other chemical test results should be given to the waste disposal site for classification, along with the exploratory hole logs (which show sample locations and depths) to show which soils are natural and which are man-made. **Note that WAC alone cannot classify waste soils.**

The lab results to enable *Initial Waste Characterisation*, are contained in Appendix E.

If this report is presented to the Local Authority Environmental Health/Contaminated Land Officer, then we hereby notify the local authority of our potential intent to employ the CL:AIRE DoWCoP in order to import and export/transfer surplus soils from/to other development sites. By accepting this report, the LA provide “no objection” to this potential proposal.

7.2.2 Reuse on Site

There is unlikely to be any scope for legitimate reuse on site.

7.2.3 Transfer for Reuse on Another Site

Surplus soils become waste as soon as they leave site, unless they are being transferred to another “development” or “construction” site for reuse. Such transfer means that such soils do not class as waste, provided that a waste assessment is completed (e.g. by a DoWCoP Qualified Person) to prove compliance with the 4no. (DoWCoP type) factors.

Soil types can be transferred as follows:

- **Utilising DoWCoP:** Currently only natural soils can be transferred via a DoWCoP.
- **Utilising U1 Waste Exemption:** Limited quantities of both natural soils and made ground can be transferred via a U1, provided that they pose no risks to humans, nor the environment.

Certain other materials may also be reused on other “Construction” sites by employing a *U1 Waste Exemption*.

7.2.4 Soil Treatment Facilities

Made ground and a wide range of hazardous wastes (including Waste Acceptance Criteria (WAC) failing materials), can avoid landfill disposal by being treated at a number of *Soil Treatment Facilities* around the UK. Such disposal is exempt from Landfill Tax.

7.2.5 Disposal to Licensed Waste Sites

To evaluate the various on-site soils for potential off-site disposal, soils are classified in accordance with the Hazardous Waste Directive (HWD) that enables the provision of a European Waste Catalogue (EWC) Code for use during offsite disposal and a Hazardous or Non-Hazardous Classification.

- **Non-Hazardous** material is suitable for disposal in a Non-Hazardous landfill;
- however, disposal to an **Inert** Landfill requires further Waste Acceptance Criteria (WAC) testing in accordance with BS EN 12457–3.
- Material classed as **Hazardous** also requires WAC testing to assign a suitable hazardous classification.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

The Landfill Regulations require that all Hazardous and Non-Hazardous solid waste must be treated prior to offsite disposal to landfill. You can define 'treatment' by using the following 'three-point test'. All three criteria must be satisfied for all of the waste to qualify as being treated:

1. It must be a physical, thermal, chemical or biological process including sorting.
2. It must change the characteristics of the waste.
3. It must do so in order to:
 - a. Reduce its volume; or
 - b. Reduce its hazardous nature; or
 - c. Facilitate its handling; or
 - d. Enhance recovery.

It should be noted that a site investigation is unable to identify all below ground conditions at a site and therefore, if during construction works soils that require offsite disposal are identified as being different to what has been preliminarily tested in this report, additional testing will be required by a suitably qualified environmental consultant prior to disposal or recovery at a licensed offsite facility.

It is also recommended that prior to offsite disposal or recovery of any waste soils; the receiving licensed treatment/landfill facility should be sent copies of all relevant chemical analysis, plus exploratory hole logs showing the engineering descriptions of the soils to which the sample depths relate.

All producers of waste have a **duty of care** to ensure that any waste they produce is handled safely and within the law. They must **check** that anyone they pass waste on to is **authorised** to take it. This includes the authorised site earmarked to handle the waste and any haulier (licensed waste carrier) used to transport the waste between the sites.

All waste holders must act to keep waste safe against:

1. Corrosion or wear of waste containers;
2. Accidental spilling or leaking or inadvertent leaching from waste unprotected from rainfall;
3. Accident or weather breaking open contained waste and allowing it to escape;
4. Waste blowing away or falling while stored or transported;
5. Scavenging of waste by vandals, thieves, children, trespassers or animals.

Holders should protect waste against the above risks while it is in their possession and they should also protect it for its future handling requirements. Waste should reach not only its next holder but a licensed facility or other appropriate destination without escape. It is recommended that the container used to transport the waste is suitable not only to prevent solid and liquid residues escaping, but also any potentially dangerous vapours or odours associated with the waste.

Segregation of different categories of waste where they are produced may be necessary to prevent the mixing of incompatible wastes. Segregation may assist the disposal of waste to specialist outlets. Where segregation is practiced on sites, the waste holder should ensure that his employees and anyone else handling waste there are aware of the locations and uses of each segregated waste container.

AG Geo-Consultants Ltd

Phase 1 & 2 Desk Study & Ground Investigation
Land Adjacent Seagry House, Upper Seagry

Waste handed over to another person should be in some sort of container, which might include a skip. The only reasonable exception would be loose material loaded into a vehicle and then covered sufficiently to prevent escape before being moved. Waste containers should suit the material put in them.

A waste transfer note (WTN) is a document that must accompany any transfer of waste between different holders. The purpose of a WTN is to allow other people who handle your waste to know what they are dealing with so that they can manage it safely and properly. A WTN must be created for each load of waste that leaves the site and must contain enough information about the waste to enable anyone coming into contact with it to handle it safely, and either dispose of it or allow it to be recovered within the law. If insufficient information is given on the WTN the responsible party may liable to be prosecuted.

Records of all waste transferred or received must keep for at least two years.

7.2.6 Asbestos Content to Soils

Since **asbestos cement fragments** contain greater than 0.1 % asbestos by weight, then any waste consignment of soil that contains any obvious asbestos cement fragments will automatically class as hazardous waste (hence the recommendation to litter pick any fragments observed).

If **Loose asbestos fibres** concentrations are all below 0.1% by weight, then any man-made ground will be classed as non-hazardous waste (provided that it contains no obvious asbestos cement fragments).

Any litter picked asbestos cement fragments disposed of separately from the man-made ground would be classed individually as Hazardous Waste.

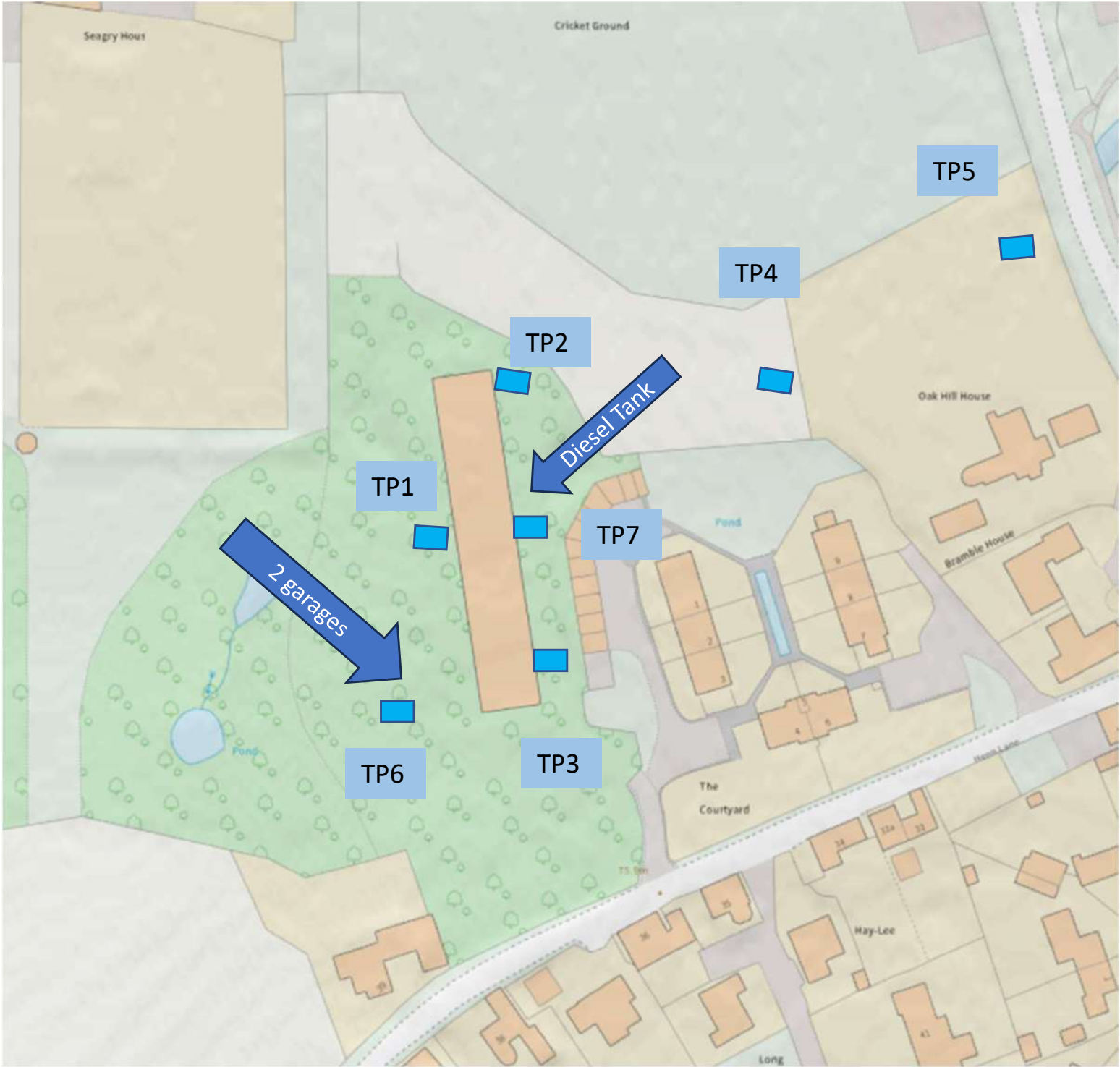
The man-made ground that contains asbestos/ACM would be classed as a mixed waste (hazardous or non-hazardous, as discussed above) and the waste code would be 17-06-05.

Appendices

- A. Exploratory Hole Locations
- B. Exploratory Hole Logs
- C. In-situ Test Results: Soakaways
- D. Geotechnical Laboratory Results
- E. Chemical Laboratory Results
- F. Environmental Datasheets
- G. Historic Mapping

Appendix A

Exploratory Hole
Location Plan

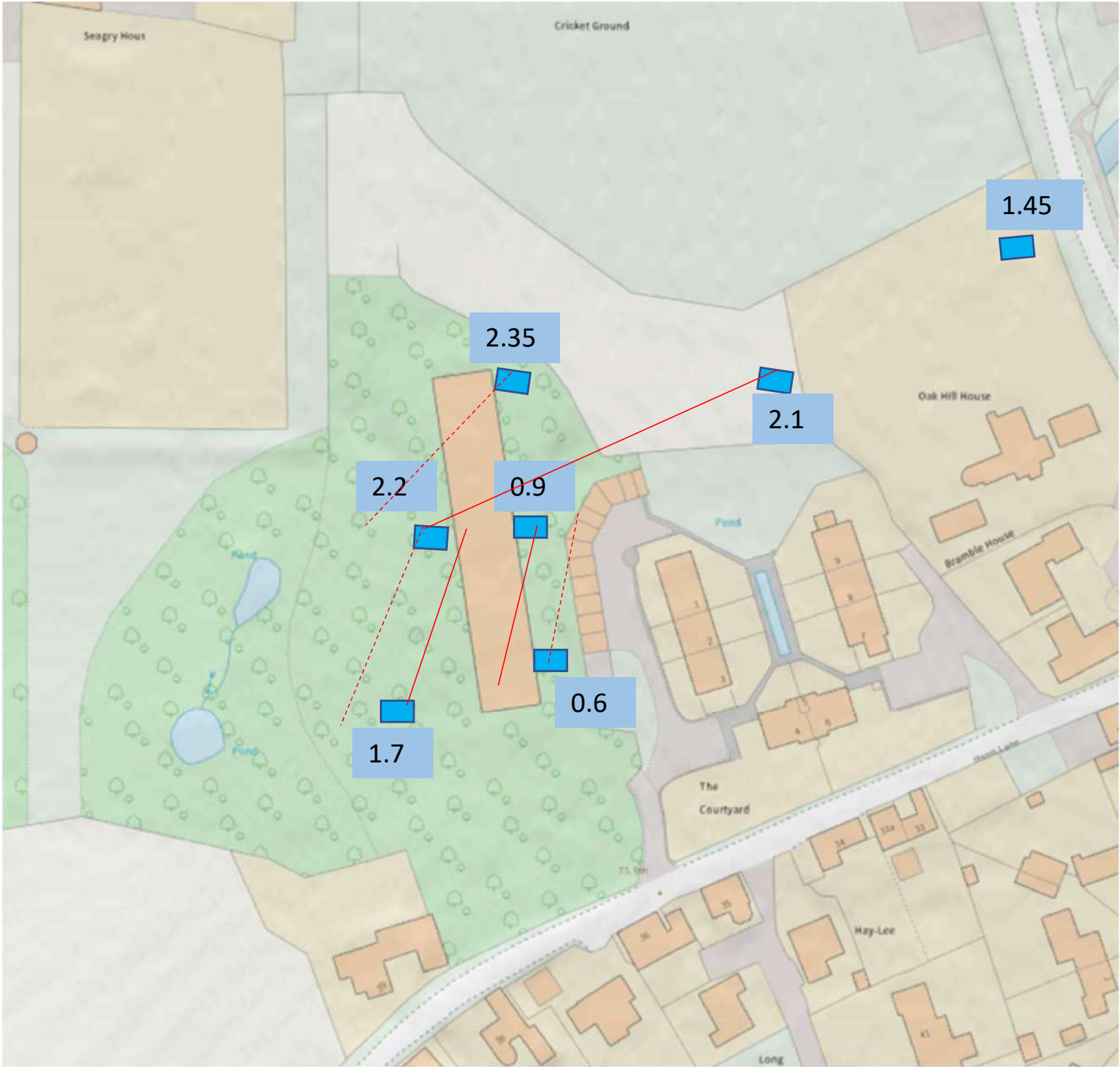


Version	Date
0	19/03/24
1	18/04/24
2	22/04/24
3	23/04/24
4	09/05/24

AG Geo-Consultants Ltd

Appendix B

Depth to base of
soft (mbegl)



Version	Date
0	11/05/24

Key to Exploratory Hole Symbols and Abbreviations

SAMPLE TYPES

B	Bulk disturbed sample	ES	Environmental soil sample	U	Undisturbed sample
C	Core sample	EW	Environmental water sample	UT	Undisturbed thin wall sample
CBR-D	Disturbed sample from CBR test area	G	Gas sample	W	Water sample
CBR-U	Undisturbed sample from CBR test area	L	Liner sample		
D	Small disturbed sample	SPT	SPT split spoon sample		

IN-SITU TESTING

SPTs	Standard Penetration Test (using a split spoon sampler)
SPTc	Standard Penetration Test (using a solid 60 degree cone)
N	Recorded SPT 'N' Value *
-/-	Blows/Penetration (mm) after seating blows totalling 150 mm
MX	Mexi Probe Test (records CBR as %)
HV	Hand Shear Vane Test (undrained shear strength quoted in kPa)
HP	Hand Penetrometer Test (kg/m ³)
()	Denotes residual test value
PID	Photo Ionisation Detector (ppm) *
Kf/Kr	Permeability Test (f = falling head, r = rising head quoted in ms ⁻¹)
HPD	High Pressure Dilatometer Test (pressure meter)
PKR	Packer / Lugeon Permeability Test
CBR	California Bearing Ratio Test

ROTARY CORE DETAILS

TCR	Total Core Recovery, %
SCR	Solid Core Recovery, %
RQD	Rock Quality Designation (% of intact core >100 mm)
FI	Fracture Spacing (average fracture spacing; in mm, over indicated length of core) **
NI	Non-Intact Core
AZCL	Assumed Zone of Core Loss

GROUNDWATER



Groundwater strike



Standing water level after 20 minutes; 1st, 2nd etc (number denotes level order)

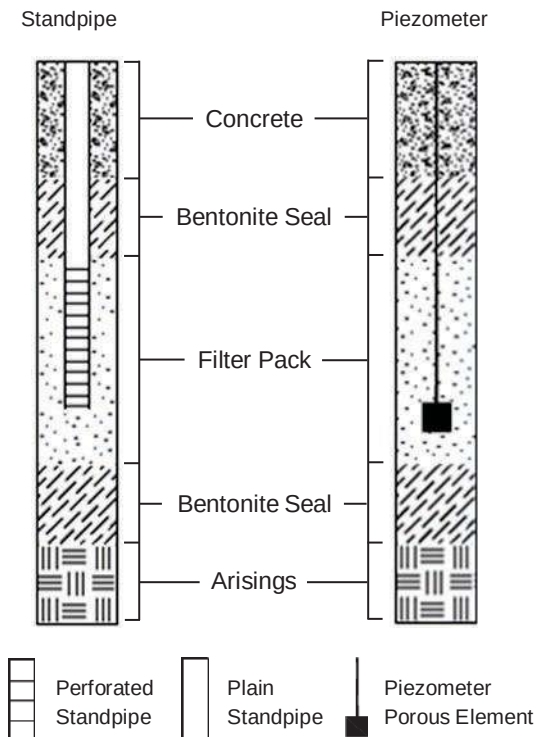
STRATA LEGENDS - Note: Composite strata types are shown by combining symbols

	Made Ground		Silt		Peat		Limestone
	Concrete		Sand		Void		Chalk
	Bituminous Bound Materials		Gravel		Mudstone		Coal
	Topsoil		Cobbles		Siltstone		Metamorphic Rock
	Clay		Boulders		Sandstone		Fine Grained Igneous Rock

* Where a single value is quoted this is the uncorrected 'N' value for a full 300 mm test drive following a seating drive of 150mm. Where the full test drive penetration is not achieved the number of blows is quoted for the penetration below the test total of 300mm, e.g.: 50/75.

** The minimum, average and maximum are shown e.g. 5/45/125.

INSTALLATION & BACKFILL DETAILS



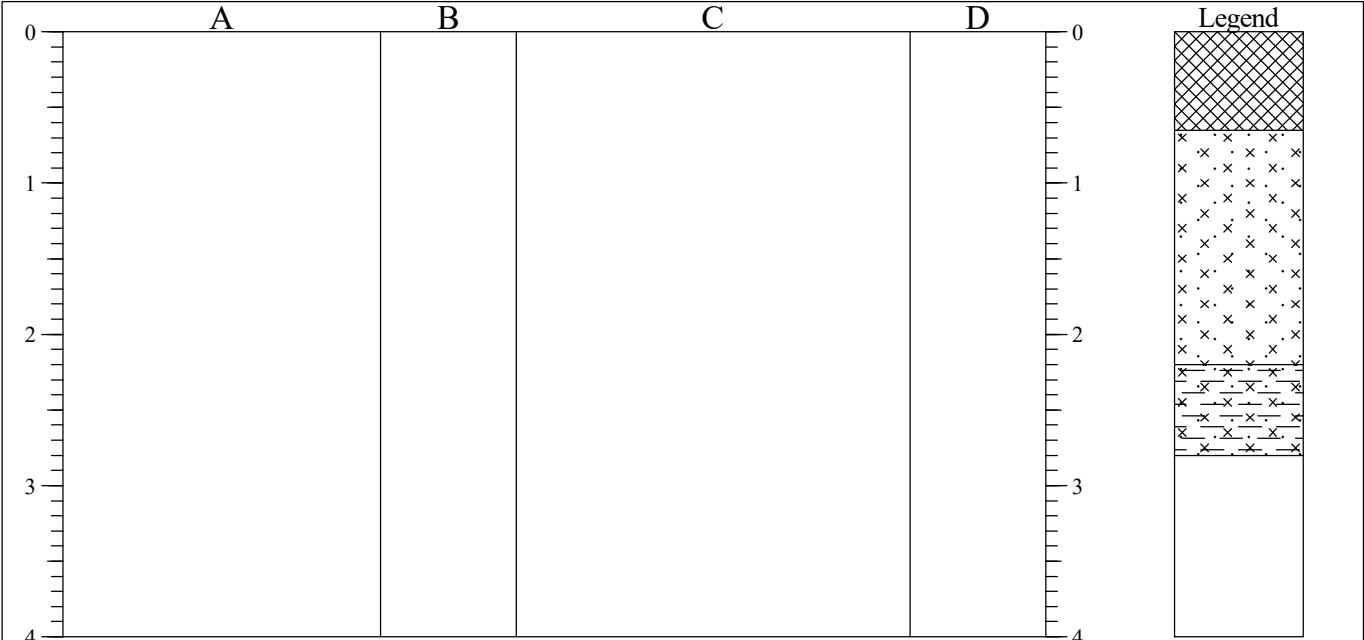
STRATUM BOUNDARIES

Unit boundary



TRIAL PIT LOG

Project Upper Seagry				TRIAL PIT No TP1
Job No F0401	Start Date 22-04-24 End Date 22-04-24	Ground Level (m)	Co-Ordinates ()	
Contractor				Sheet 1 of 1



STRATA				SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests	
0,00-0,65		MADE GROUND: Very soft dark brown sandy gravelly CLAY. Gravel is angular fine to coarse concrete and brick.				
0,65-2,20		Soft grey and orangish brown very sandy SILT.	0,50-0,55	ES		
			1,00	D		
			1,00	HV	20(8)	
2,20-2,80		Stiff grey slightly sandy silty CLAY.	1,50-2,00	B		
			2,00	HV	42(14)	
			2,50	D		

Shoring/Support: None
Stability: Stable

All dimensions in metres
Scale 1:50

GENERAL REMARKS

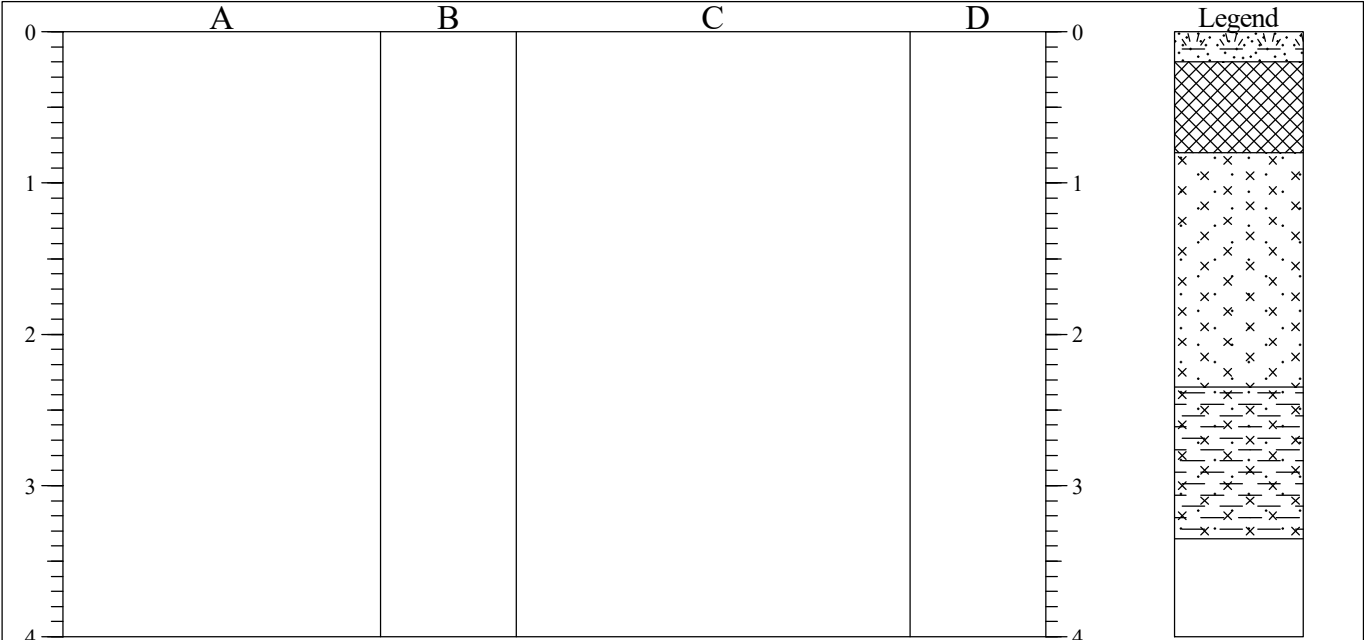
Soakaway test undertaken following pitting. Groundwater not encountered.

All dimensions in metres Scale 1:50	Client AG Geo	Plant JCB 3CX	Logged By IP
--	------------------	------------------	-----------------



TRIAL PIT LOG

Project Upper Seagry				TRIAL PIT No TP2
Job No F0401	Start Date 22-04-24 End Date 22-04-24	Ground Level (m)	Co-Ordinates ()	
Contractor				Sheet 1 of 1



STRATA				SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests	
0,00-0,20		Soft dark brown sandy CLAY with frequent roots and rootlets (TOPSOIL)				
0,20-0,80		MADE GROUND: Soft brown sandy very gravelly CLAY. Gravel is angular fine to coarse concrete, brick, metal and pipe.	0,30-0,40	ES		
0,80-2,35		Soft grey and orangish brown very sandy SILT.	1,00	D		
			1,80	D		
2,35-3,35		Stiff grey very sandy silty CLAY.	2,20-2,70	B		
			2,50	D		
			3,00	HV	38(18)	

Shoring/Support: None Stability: Stable				GENERAL REMARKS	
				Groundwater not encountered.	

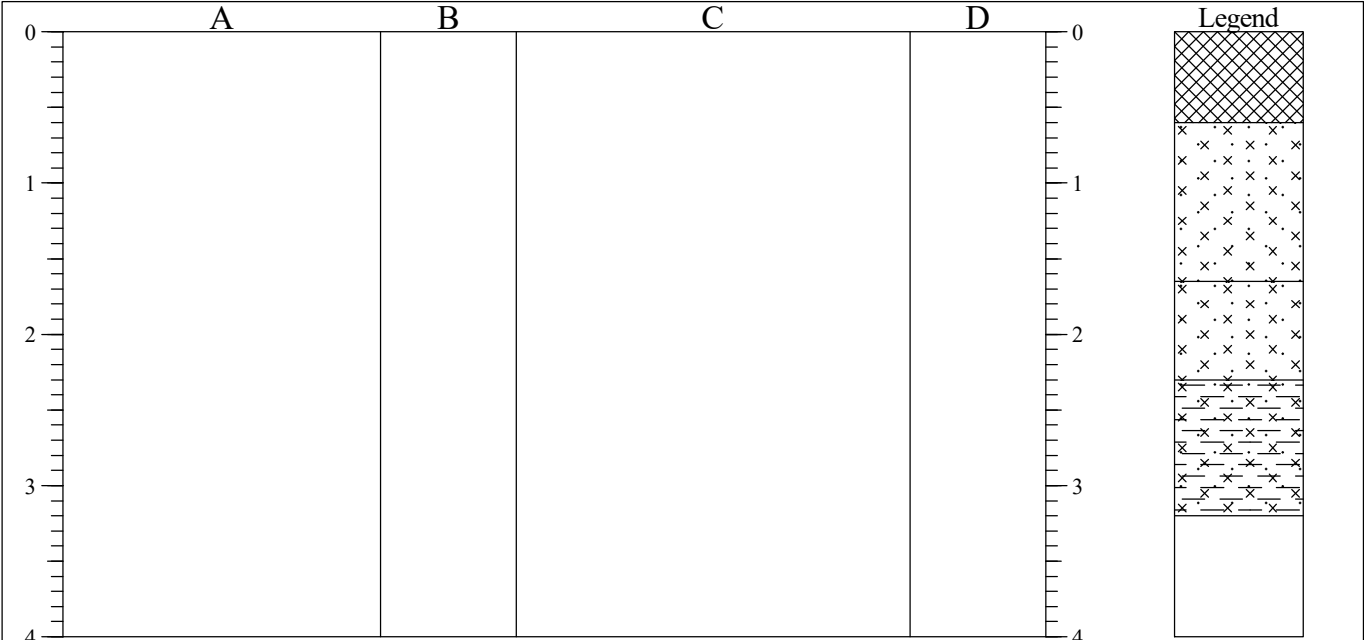
All dimensions in metres Scale 1:50	Client AG Geo	Plant JCB 3CX	Logged By IP
--	---------------	---------------	--------------

Report ID: AGS4 UK TP || Project: F0401 - UPPER SEAGRY.GPJ || Library: GINT STD AGS 4_0.GLB || Date: 22 April 2024



TRIAL PIT LOG

Project Upper Seagry				TRIAL PIT No TP3
Job No F0401	Start Date 22-04-24 End Date 22-04-24	Ground Level (m)	Co-Ordinates ()	
Contractor				Sheet 1 of 1



STRATA				SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests	
0,00-0,60		MADE GROUND: Soft brown sandy gravelly CLAY. Gravel is angular fine to coarse concrete and brick.	0,40-0,50	ES		
0,60-1,65		Firm dark orangish brown very sandy SILT locally tending to very silty SAND.	1,00-1,20	B		
1,65-2,30		Firm orangish brown very sandy SILT.	2,00	D		
2,30-3,20		Stiff grey slightly sandy silty CLAY.	2,50	D		

Shoring/Support: None
Stability: Stable

All dimensions in metres
Scale 1:50

GENERAL REMARKS

Groundwater not encountered.

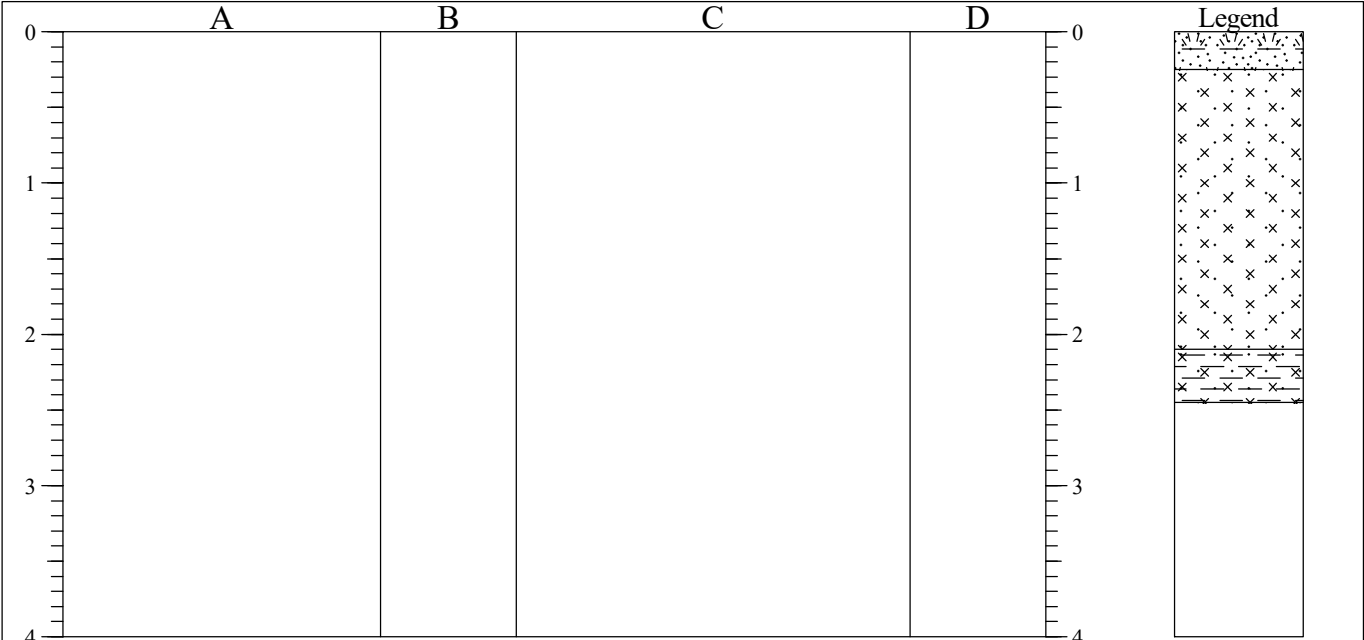
All dimensions in metres Scale 1:50	Client AG Geo	Plant JCB 3CX	Logged By IP
--	------------------	------------------	-----------------

Report ID: AGS4 UK TP || Project: F0401 - UPPER SEAGRY.GPJ || Library: GINT STD AGS 4_0.GLB || Date: 22 April 2024



TRIAL PIT LOG

Project Upper Seagry				TRIAL PIT No TP4
Job No F0401	Start Date 22-04-24 End Date 22-04-24	Ground Level (m)	Co-Ordinates ()	
Contractor				Sheet 1 of 1



STRATA				SAMPLES & TESTS		
Depth	No	DESCRIPTION		Depth	No	Remarks/Tests
0,00-0,25		Soft dark brown sandy CLAY with frequent roots and rootlets (TOPSOIL)				
0,25-2,10		Soft grey and orangish brown very sandy SILT.		0,50	ES	
				1,00-1,50	B	
2,10-2,45		Stiff grey very sandy silty CLAY.		2,00	D	

Shoring/Support: None
Stability: Stable

Diagram labels: A, B, C, D

GENERAL REMARKS

Soakaway test undertaken following pitting. Groundwater not encountered.

All dimensions in metres Scale 1:50	Client AG Geo	Plant JCB 3CX	Logged By IP
--	------------------	------------------	-----------------

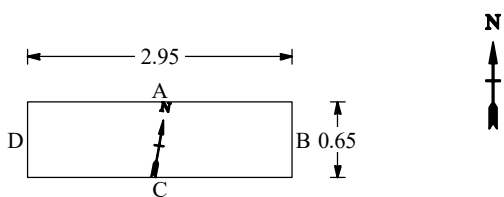


TRIAL PIT LOG

Project Upper Seagry				TRIAL PIT No TP5
Job No F0401	Start Date 22-04-24 End Date 22-04-24	Ground Level (m)	Co-Ordinates ()	
Contractor				Sheet 1 of 1

A		B		C		D		Legend
0							0	
1							1	
2							2	
3							3	
4							4	

STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0,00-0,25		Soft dark brown sandy CLAY with frequent roots and rootlets (TOPSOIL)	1,20 1,60 2,00-2,50	D D B	
0,25-1,45		Soft grey and orangish brown very sandy SILT.			
1,45-3,20		Stiff grey very sandy silty CLAY.			

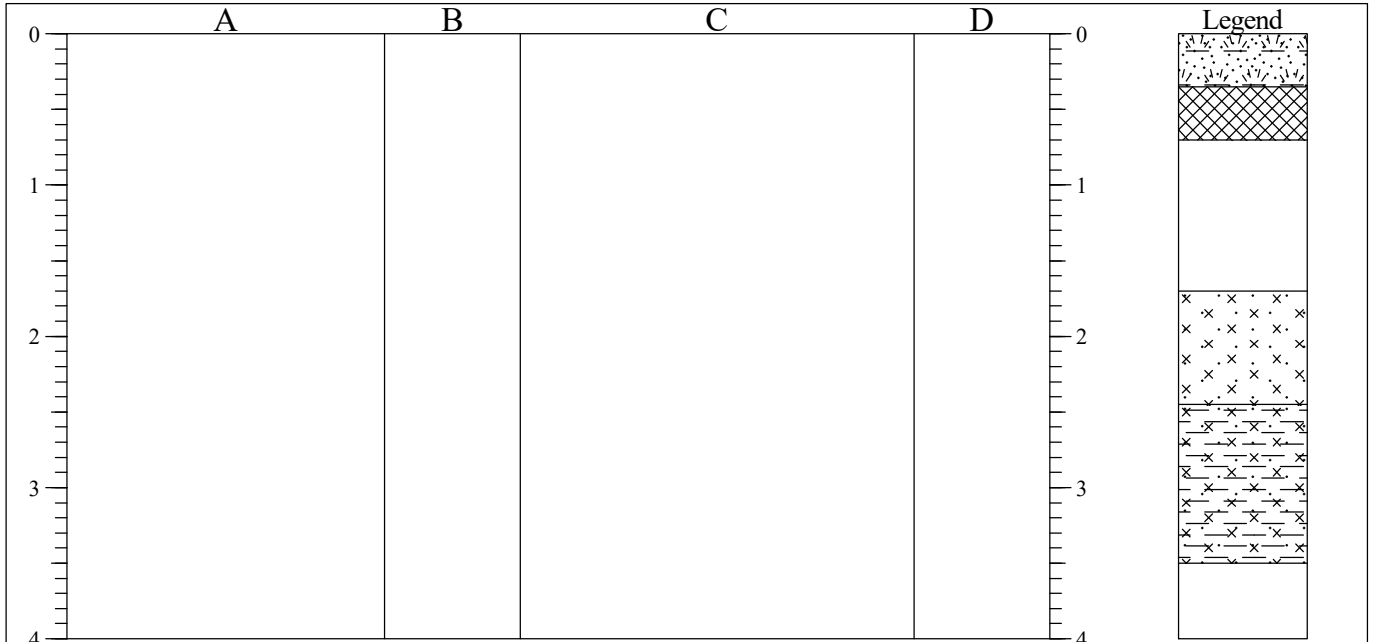
Shoring/Support: None Stability: Stable		GENERAL REMARKS
		Soakaway test undertaken following pitting. Groundwater not encountered.

All dimensions in metres Scale 1:50	Client AG Geo	Plant JCB 3CX	Logged By IP
--	---------------	---------------	--------------



TRIAL PIT LOG

Project Upper Seagry				TRIAL PIT No TP6
Job No F0401	Start Date 22-04-24 End Date 22-04-24	Ground Level (m)	Co-Ordinates ()	
Contractor				Sheet 1 of 1



STRATA				SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests	
0,00-0,35		Soft dark brown sandy CLAY with frequent roots and rootlets (TOPSOIL)				
0,35-0,70		MADE GROUND: Soft brown sandy gravelly CLAY. Gravel is angular fine to coarse concrete and brick.	0,30-0,35	ES		
0,70-1,70		Soft grey and orangish brown very sandy SILT.	0,70	D		
			1,00	HV	20(8)	
			1,50-2,00	B		
1,70-2,45		Firm orangish brown very sandy SILT.	2,00	D		
			2,00	HV	38(16)	
2,45-3,50		Stiff grey slightly sandy silty CLAY.	2,70	D		

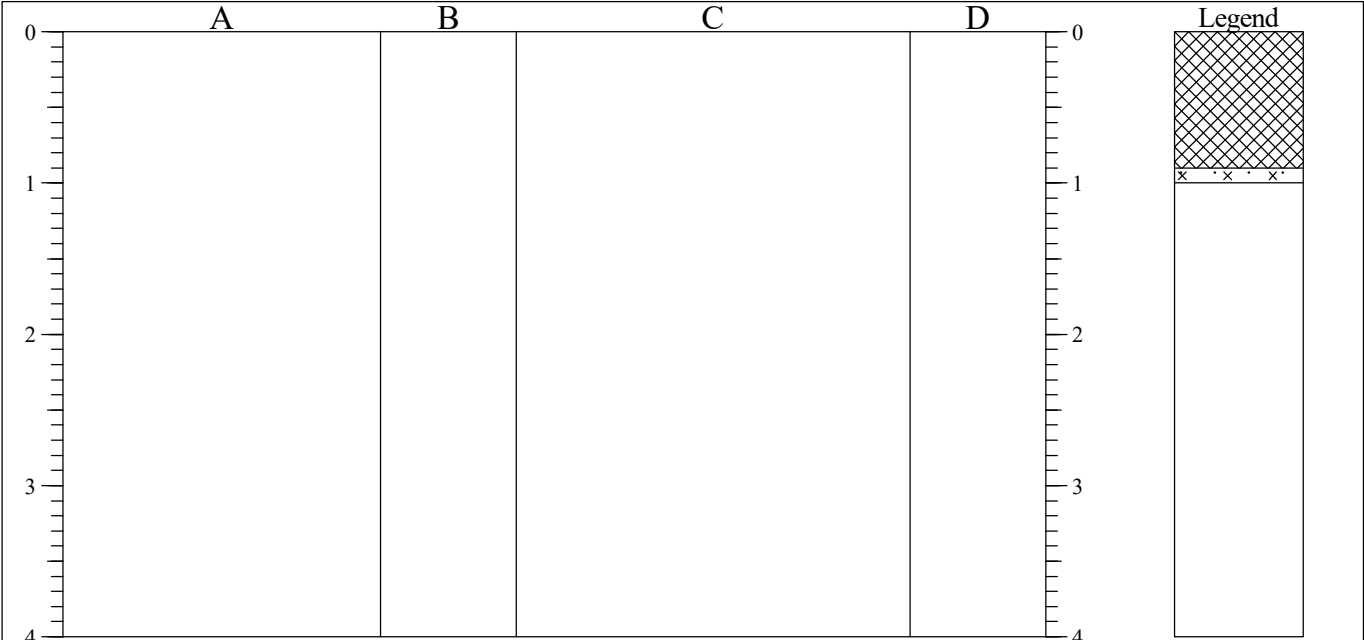
Shoring/Support: None Stability: Stable		GENERAL REMARKS

All dimensions in metres Scale 1:50	Client AG Geo	Plant JCB 3CX	Logged By IP
--	---------------	---------------	--------------



TRIAL PIT LOG

Project Upper Seagry				TRIAL PIT No TP7	
Job No F0401	Start Date 22-04-24 End Date 22-04-24	Ground Level (m)	Co-Ordinates ()		
Contractor				Sheet 1 of 1	



STRATA				SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests	
0,00-0,90		MADE GROUND: Soft brown sandy gravelly CLAY. Gravel is angular fine to coarse concrete and brick.				
0,90-1,00		Firm dark orangish brown very sandy SILT locally tending to very silty SAND.	0,70-0,80	ES		

Shoring/Support: None Stability:			GENERAL REMARKS
			Hand pit excavated in area of historical fuel tank. Groundwater not encountered.

All dimensions in metres Scale 1:50	Client AG Geo	Plant Hand Tools	Logged By IP
--	------------------	---------------------	-----------------

Report ID: AGS4 UK TP || Project: F0401 - UPPER SEAGRY.GPJ || Library: GINT STD AGS 4_0.GLB || Date: 22 April 2024

AG Geo-Consultants Ltd

Appendix C

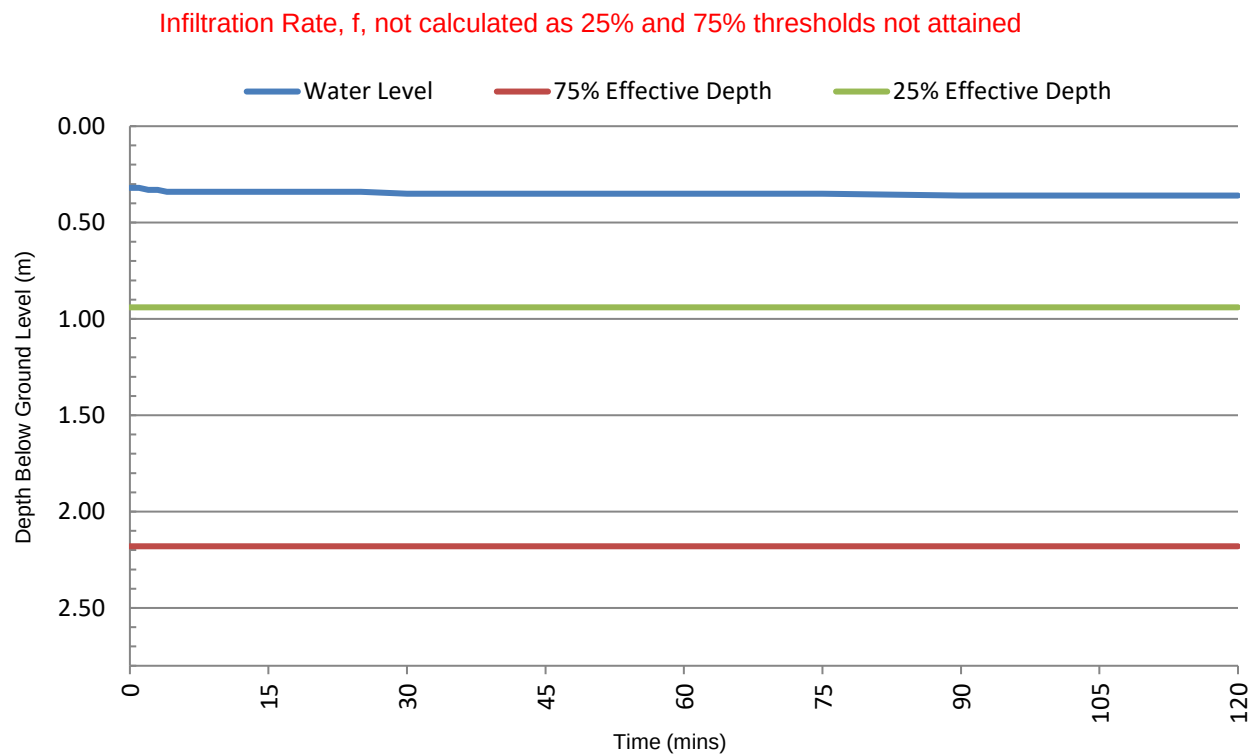
SOAKAWAY INFILTRATION TEST

Project Upper Seagry				Trial Pit No TP1
Job No. F0401	Date 22/4/24	Easting	Northing	
Client: AG Geoconsultants Ltd				Sheet 1 of 1

Dimension Prior To Test		Dimension After Test	
Length	2.40	Length	2.40
Width	0.65	Width	0.65
Depth	2.80	Depth	2.80

Time Lapsed (minutes)	Depth to Water (m bgl)	Time Lapsed (minutes)	Depth to Water (m bgl)
0	0.32	75	0.35
1	0.32	90	0.35
2	0.33	120	0.35
3	0.33		
4	0.34		
5	0.34		
10	0.34		
15	0.34		
20	0.34		
25	0.34		
30	0.35		
45	0.35		
60	0.35		

Infiltration Graph



All dimensions in metres	Remarks Infiltration Rate, f , not calculated as 25% and 75% thresholds not attained	Logged by IP
--------------------------	---	-----------------

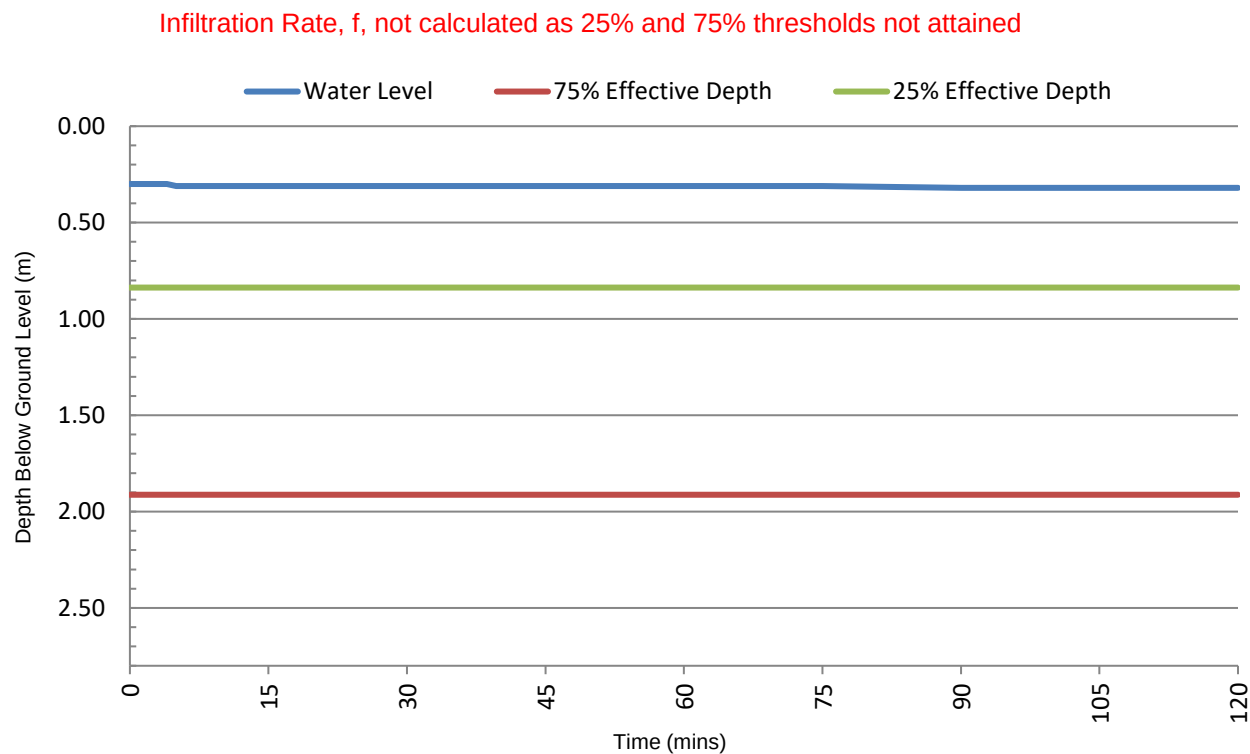
SOAKAWAY INFILTRATION TEST

Project Upper Seagry				Trial Pit No TP4
Job No. F0401	Date 22/4/24	Easting	Northing	
Client: AG Geoconsultants Ltd				Sheet 1 of 1

Dimension Prior To Test		Dimension After Test	
Length	2.45	Length	2.45
Width	0.65	Width	0.65
Depth	2.45	Depth	2.45

Time Lapsed (minutes)	Depth to Water (m bgl)	Time Lapsed (minutes)	Depth to Water (m bgl)
0	0.30	75	0.31
1	0.30	90	0.32
2	0.30	120	0.32
3	0.30		
4	0.30		
5	0.31		
10	0.31		
15	0.31		
20	0.31		
25	0.31		
30	0.31		
45	0.31		
60	0.31		

Infiltration Graph



All dimensions in metres	Remarks Infiltration Rate, f , not calculated as 25% and 75% thresholds not attained	Logged by IP
--------------------------	---	-----------------

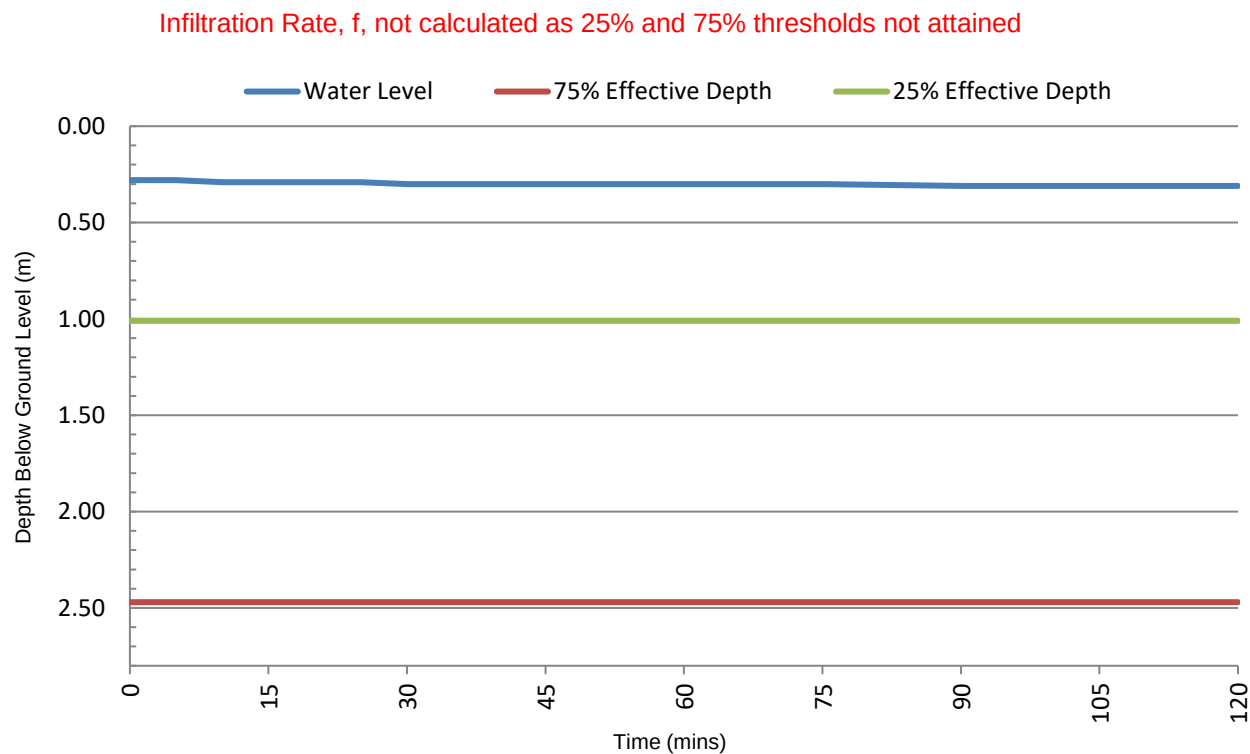
SOAKAWAY INFILTRATION TEST

Project Upper Seagry				Trial Pit No TP5
Job No. F0401	Date 22/4/24	Easting	Northing	
Client: AG Geoconsultants Ltd				Sheet 1 of 1

Dimension Prior To Test		Dimension After Test	
Length	2.75	Length	2.75
Width	0.65	Width	0.65
Depth	3.20	Depth	3.20

Time Lapsed (minutes)	Depth to Water (m bgl)	Time Lapsed (minutes)	Depth to Water (m bgl)
0	0.28	75	0.30
1	0.28	90	0.31
2	0.28	120	0.31
3	0.28		
4	0.28		
5	0.28		
10	0.29		
15	0.29		
20	0.29		
25	0.29		
30	0.30		
45	0.30		
60	0.30		

Infiltration Graph



All dimensions in metres	Remarks Infiltration Rate, f , not calculated as 25% and 75% thresholds not attained	Logged by IP
--------------------------	---	-----------------

AG Geo-Consultants Ltd

Appendix D



Laboratory Report



Contract Number: 72423

Client Ref: **24-025**

Client PO: **24-025**

Date Received: **29-04-2024**

Date Completed: **10-05-2024**

Report Date: **10-05-2024**

Client: **AG Geo-Consultants Ltd**

This report has been checked and approved by:

Contract Title: **Land Adj, Upper Seagry Ho**
For the attention of: **Andre Gilleard**

Brendan Evans
Office Administrator

Description	Qty
Moisture Content BS 1377:1990 - Part 2 : 3.2 - * UKAS	8
1 Point Liquid & Plastic Limit BS 1377:1990 - Part 2 : 4.4 & 5.3 - * UKAS	8
Disposal of samples for job	1

Notes: Observations and Interpretations are outside the UKAS Accreditation

* - denotes test included in laboratory scope of accreditation

- denotes test carried out by approved contractor

@ - denotes non accredited tests

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 test report/certificate shall not be reproduced except in full, without the approval of GEO Site & Testing Services Ltd. Any opinions or interpretations stated - within this report/certificate are excluded from the laboratories UKAS accreditation.

Approved Signatories:

Brendan Evans (Office Administrator) - Darren Bourne (Quality Senior Technician) - Paul Evans (Director)

Richard John (Quality/Technical Manager) - Shaun Jones (Laboratory manager) - Shaun Thomas (Site Manager)

Wayne Honey (HR & HSE Manager)

**NATURAL MOISTURE, LIQUID LIMIT, PLASTIC LIMIT AND
PLASTICITY INDEX
(BS 1377:1990 - Part 2 : 4.4 & 5.3)**

Contract Number	72423	
Project Name	Land Adj, Upper Seagry Ho	
Date Tested	08/04/2024	
	DESCRIPTIONS	

[illegible]

Operator
Clayton Jenkins

Symbols: NP : Non Plastic # : Liquid Limit and Plastic Limit Wet Sieved

2788

AG Geo-Consultants Ltd

Appendix E



2683



THE ENVIRONMENT AGENCY'S
MONITORING CERTIFICATION SCHEME

Unit A2
Windmill Road
Ponswood Industrial Estate
St Leonards on Sea
East Sussex
TN38 9BY
Telephone: (01424) 718618

cs@elab-uk.co.uk
info@elab-uk.co.uk

Certificate of Analysis

THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number: 24-53468

Issue: 1

Date of Issue: 01/05/2024

Contact: Andre Gilleard

Customer Details: AG Geo-Consultants Ltd
58 Church Road
Horfield
Bristol
BS7 8SE

Quotation No: Q24-04200

Order No: Not Supplied

Customer Reference: 24-025

Date Received: 24/04/2024

Date Approved: 01/05/2024

Details: Land adj Upper Seagry Ho

Approved by:

Tim Reeve, Technical Coordinator



Sample Summary

Report No.: 24-53468, issue number 1

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
359095	TP1 0.50	22/04/2024	24/04/2024	Loamy sand	
359096	TP1 1.00	22/04/2024	24/04/2024	Loamy sand	
359097	TP2 0.30	22/04/2024	24/04/2024	Sandy silty loam	
359098	TP2 1.00	22/04/2024	24/04/2024	Loamy sand	
359099	TP3 0.40	22/04/2024	24/04/2024	Sandy silty loam	
359100	TP3 2.00	22/04/2024	24/04/2024	Loamy sand	
359101	TP4 0.50	22/04/2024	24/04/2024	Sand	
359102	TP4 2.00	22/04/2024	24/04/2024	Loamy sand	
359103	TP5 1.60	22/04/2024	24/04/2024	Sand	
359104	TP6 0.30	22/04/2024	24/04/2024	Sandy loam	
359105	TP6 0.70	22/04/2024	24/04/2024	Sandy Silty clayey loam	
359106	TP7 2.00	22/04/2024	24/04/2024	Sandy loam	
359107	TP7 0.70	22/04/2024	24/04/2024	Loamy sand	



Results Summary

Report No.: 24-53468, issue number 1

ELAB Reference	359095	359096	359097	359098	359099	359100	359101
Customer Reference							
Sample ID							
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	TP1	TP1	TP2	TP2	TP3	TP3	TP4
Sample Depth (m)	0.50	1.00	0.30	1.00	0.40	2.00	0.50
Sampling Date	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024

Determinand	Codes	Units	LOD							
Soil sample preparation parameters										
Moisture Content	N	%	0.1	13.8	15.1	16.1	15.8	16.9	13.4	15.0
Material removed	N	%	0.1	< 0.1	< 0.1	9.2	< 0.1	< 0.1	8.0	< 0.1
Description of Inert material removed	N		0	None	None	Stones	None	None	Stones	None
Metals										
Arsenic	M	mg/kg	0.5	9.8	n/t	4.5	n/t	6.8	n/t	3.5
Cadmium	M	mg/kg	0.2	< 0.2	n/t	0.4	n/t	< 0.2	n/t	< 0.2
Chromium	M	mg/kg	1	7.6	n/t	5.9	n/t	6.6	n/t	3.7
Copper	M	mg/kg	4	< 4.0	n/t	11.0	n/t	7.7	n/t	< 4.0
Lead	M	mg/kg	1	8.4	n/t	22.2	n/t	35.7	n/t	6.3
Mercury	M	mg/kg	0.1	< 0.1	n/t	< 0.1	n/t	0.2	n/t	< 0.1
Nickel	M	mg/kg	1	3.4	n/t	4.4	n/t	5.0	n/t	23.2
Selenium	M	mg/kg	1	< 1.0	n/t	< 1.0	n/t	< 1.0	n/t	< 1.0
Zinc	M	mg/kg	4.5	12.7	n/t	161	n/t	50.3	n/t	43.5
Anions										
Water Soluble Sulphate	M	mg/l	20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Inorganics										
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	n/t	< 0.8	n/t	< 0.8	n/t	n/t



Results Summary

Report No.: 24-53468, issue number 1

				ELAB Reference	359095	359096	359097	359098	359099	359100	359101
				Customer Reference							
				Sample ID							
				Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Sample Location	TP1	TP1	TP2	TP2	TP3	TP3	TP4
				Sample Depth (m)	0.50	1.00	0.30	1.00	0.40	2.00	0.50
				Sampling Date	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024
Determinand	Codes	Units	LOD								
Miscellaneous											
pH	M	pH units	0.1		8.0	7.9	7.6	7.8	7.9	6.9	7.8
Soil Organic Matter	U	%	0.1		0.2	n/t	11	n/t	3.2	n/t	0.1
Polyaromatic hydrocarbons											
Naphthalene GCMS	N	mg/kg	0.01		0.01	n/t	0.06	n/t	0.02	n/t	< 0.01
Acenaphthylene GCMS	N	mg/kg	0.01		< 0.01	n/t	0.04	n/t	< 0.01	n/t	< 0.01
Acenaphthene GCMS	N	mg/kg	0.01		< 0.01	n/t	0.04	n/t	< 0.01	n/t	< 0.01
Fluorene GCMS	N	mg/kg	0.01		< 0.01	n/t	0.04	n/t	< 0.01	n/t	< 0.01
Phenanthrene GCMS	N	mg/kg	0.01		< 0.01	n/t	0.52	n/t	0.07	n/t	< 0.01
Anthracene GCMS	N	mg/kg	0.01		< 0.01	n/t	0.34	n/t	0.03	n/t	< 0.01
Fluoranthene GCMS	N	mg/kg	0.01		< 0.01	n/t	4.85	n/t	0.31	n/t	< 0.01
Pyrene GCMS	N	mg/kg	0.01		< 0.01	n/t	4.54	n/t	0.29	n/t	< 0.01
Benzo(a)anthracene GCMS	N	mg/kg	0.01		< 0.01	n/t	3.83	n/t	0.20	n/t	< 0.01
Chrysene GCMS	N	mg/kg	0.01		< 0.01	n/t	4.35	n/t	0.26	n/t	< 0.01
Benzo(b)fluoranthene GCMS	N	mg/kg	0.01		< 0.01	n/t	5.18	n/t	0.35	n/t	< 0.01
Benzo(k)fluoranthene GCMS	N	mg/kg	0.01		< 0.01	n/t	4.99	n/t	0.32	n/t	< 0.01
Benzo(a)pyrene GCMS	N	mg/kg	0.01		< 0.01	n/t	6.18	n/t	0.37	n/t	< 0.01
Indeno(1,2,3-cd)pyrene GCMS	N	mg/kg	0.01		< 0.01	n/t	3.99	n/t	0.29	n/t	< 0.01
Dibenzo(a,h)anthracene GCMS	N	mg/kg	0.01		< 0.01	n/t	1.20	n/t	0.07	n/t	< 0.01
Benzo(g,h,i)perylene GCMS	N	mg/kg	0.01		< 0.01	n/t	4.69	n/t	0.38	n/t	< 0.01
Total PAH(16) GCMS	N	mg/kg	0.04		0.04	n/t	44.8	n/t	2.98	n/t	< 0.04



Results Summary

Report No.: 24-53468, issue number 1

				ELAB Reference	359095	359096	359097	359098	359099	359100	359101
				Customer Reference							
				Sample ID							
				Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Sample Location	TP1	TP1	TP2	TP2	TP3	TP3	TP4
				Sample Depth (m)	0.50	1.00	0.30	1.00	0.40	2.00	0.50
				Sampling Date	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024
Determinand	Codes	Units	LOD								
BTEX											
Benzene	M	ug/kg	10	< 10.0	n/t	< 10.0	n/t	< 10.0	n/t	n/t	n/t
Toluene	M	ug/kg	10	< 10.0	n/t	< 10.0	n/t	< 10.0	n/t	n/t	n/t
Ethylbenzene	M	ug/kg	10	< 10.0	n/t	< 10.0	n/t	< 10.0	n/t	n/t	n/t
Xylenes	M	ug/kg	10	< 10.0	n/t	< 10.0	n/t	< 10.0	n/t	n/t	n/t
MTBE	N	ug/kg	10	< 10.0	n/t	< 10.0	n/t	< 10.0	n/t	n/t	n/t
TPH CWG											
>C5-C6 Aliphatic (HS_1D_MS_AL)	N	mg/kg	0.01	< 0.01	n/t	< 0.01	n/t	< 0.01	n/t	n/t	n/t
>C6-C8 Aliphatic (HS_1D_MS_AL)	N	mg/kg	0.01	< 0.01	n/t	< 0.01	n/t	< 0.01	n/t	n/t	n/t
>C8-C10 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1	< 1.0	n/t	< 1.0	n/t	< 1.0	n/t	n/t	n/t
>C10-C12 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1	< 1.0	n/t	< 1.0	n/t	< 1.0	n/t	n/t	n/t
>C12-C16 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1	< 1.0	n/t	< 1.0	n/t	< 1.0	n/t	n/t	n/t
>C16-C21 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1	< 1.0	n/t	< 1.0	n/t	1.0	n/t	n/t	n/t
>C21-C35 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1	< 1.0	n/t	7.9	n/t	18.8	n/t	n/t	n/t
>C35-C40 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1	< 1.0	n/t	3.0	n/t	4.1	n/t	n/t	n/t
Total (>C5-C40) Aliphatic (HS_1D_MS+EH_CU_1D_AL)	N	mg/kg	1	< 1.0	n/t	10.9	n/t	22.9	n/t	n/t	n/t
>C5-C7 Aromatic (HS_1D_MS_AR)	N	mg/kg	0.01	< 0.01	n/t	< 0.01	n/t	< 0.01	n/t	n/t	n/t
>C7-C8 Aromatic (HS_1D_MS_AR)	N	mg/kg	0.01	< 0.01	n/t	< 0.01	n/t	< 0.01	n/t	n/t	n/t
>C8-C10 Aromatic (EH_CU_1D_AR)	N	mg/kg	1	< 1.0	n/t	< 1.0	n/t	< 1.0	n/t	n/t	n/t
>C10-C12 Aromatic (EH_CU_1D_AR)	N	mg/kg	1	< 1.0	n/t	< 1.0	n/t	< 1.0	n/t	n/t	n/t
>C12-C16 Aromatic (EH_CU_1D_AR)	N	mg/kg	1	< 1.0	n/t	< 1.0	n/t	< 1.0	n/t	n/t	n/t
>C16-C21 Aromatic (EH_CU_1D_AR)	N	mg/kg	1	< 1.0	n/t	1.4	n/t	1.5	n/t	n/t	n/t
>C21-C35 Aromatic (EH_CU_1D_AR)	N	mg/kg	1	< 1.0	n/t	29.0	n/t	38.3	n/t	n/t	n/t
>C35-C40 Aromatic (EH_CU_1D_AR)	N	mg/kg	1	< 1.0	n/t	7.4	n/t	13.2	n/t	n/t	n/t
Total (>C5-C40) Aromatic (HS_1D_MS+EH_CU_1D_AR)	N	mg/kg	1	< 1.0	n/t	37.7	n/t	53.0	n/t	n/t	n/t
Total (>C5-C40) Ali/Aro (HS_1D_MS+EH_CU_1D_Total)	N	mg/kg	1	< 1.0	n/t	48.6	n/t	75.9	n/t	n/t	n/t

Tests marked N are not UKAS accredited.
The Environmental Laboratory Ltd. Reg. No. 3882193



Results Summary

Report No.: 24-53468, issue number 1

ELAB Reference				359095	359096	359097	359098	359099	359100	359101
Customer Reference										
Sample ID										
Sample Type				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location				TP1	TP1	TP2	TP2	TP3	TP3	TP4
Sample Depth (m)				0.50	1.00	0.30	1.00	0.40	2.00	0.50
Sampling Date				22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024
Determinand	Codes	Units	LOD							
Total Petroleum Hydrocarbons										
Total TPH (>C8-C40) (EH_1D_Total)	N	mg/kg	5	n/t	n/t	n/t	n/t	n/t	n/t	< 5



Results Summary

Report No.: 24-53468, issue number 1

ELAB Reference	359102	359103	359104	359105	359106	359107
Customer Reference						
Sample ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	TP4	TP5	TP6	TP6	TP7	TP7
Sample Depth (m)	2.00	1.60	0.30	0.70	2.00	0.70
Sampling Date	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024

Determinand	Codes	Units	LOD						
Soil sample preparation parameters									
Moisture Content	N	%	0.1	13.5	12.3	< 0.1	14.8	14.3	14.1
Material removed	N	%	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Description of Inert material removed	N		0	None	None	None	None	None	None
Metals									
Arsenic	M	mg/kg	0.5	n/t	n/t	3.6	n/t	n/t	6.6
Cadmium	M	mg/kg	0.2	n/t	n/t	< 0.2	n/t	n/t	< 0.2
Chromium	M	mg/kg	1	n/t	n/t	3.5	n/t	n/t	7.9
Copper	M	mg/kg	4	n/t	n/t	< 4.0	n/t	n/t	5.8
Lead	M	mg/kg	1	n/t	n/t	25.2	n/t	n/t	6.5
Mercury	M	mg/kg	0.1	n/t	n/t	< 0.1	n/t	n/t	< 0.1
Nickel	M	mg/kg	1	n/t	n/t	2.1	n/t	n/t	6.4
Selenium	M	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t	< 1.0
Zinc	M	mg/kg	4.5	n/t	n/t	23.5	n/t	n/t	21.4
Anions									
Water Soluble Sulphate	M	mg/l	20	27	73	< 20	^ < 20	92	< 20
Inorganics									
Hexavalent Chromium	N	mg/kg	0.8	n/t	n/t	< 0.8	n/t	n/t	< 0.8



Results Summary

Report No.: 24-53468, issue number 1

ELAB Reference	359102	359103	359104	359105	359106	359107
Customer Reference						
Sample ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	TP4	TP5	TP6	TP6	TP7	TP7
Sample Depth (m)	2.00	1.60	0.30	0.70	2.00	0.70
Sampling Date	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024

Determinand	Codes	Units	LOD						
Miscellaneous									
pH	M	pH units	0.1	7.2	7.3	7.9	^ 7.7	5.8	7.1
Soil Organic Matter	U	%	0.1	n/t	n/t	2.0	n/t	n/t	0.3
Polyaromatic hydrocarbons									
Naphthalene GCMS	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
Acenaphthylene GCMS	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
Acenaphthene GCMS	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
Fluorene GCMS	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
Phenanthrene GCMS	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
Anthracene GCMS	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
Fluoranthene GCMS	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
Pyrene GCMS	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
Benzo(a)anthracene GCMS	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
Chrysene GCMS	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
Benzo(b)fluoranthene GCMS	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
Benzo(k)fluoranthene GCMS	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
Benzo(a)pyrene GCMS	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
Indeno(1,2,3-cd)pyrene GCMS	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
Dibenzo(a,h)anthracene GCMS	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
Benzo(g,h,i)perylene GCMS	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
Total PAH(16) GCMS	N	mg/kg	0.04	n/t	n/t	< 0.04	n/t	n/t	< 0.04



Results Summary

Report No.: 24-53468, issue number 1

ELAB Reference	359102	359103	359104	359105	359106	359107
Customer Reference						
Sample ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	TP4	TP5	TP6	TP6	TP7	TP7
Sample Depth (m)	2.00	1.60	0.30	0.70	2.00	0.70
Sampling Date	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024

Determinand	Codes	Units	LOD						
BTEX									
Benzene	M	ug/kg	10	n/t	n/t	< 10.0	n/t	n/t	< 10.0
Toluene	M	ug/kg	10	n/t	n/t	< 10.0	n/t	n/t	< 10.0
Ethylbenzene	M	ug/kg	10	n/t	n/t	< 10.0	n/t	n/t	< 10.0
Xylenes	M	ug/kg	10	n/t	n/t	< 10.0	n/t	n/t	< 10.0
MTBE	N	ug/kg	10	n/t	n/t	< 10.0	n/t	n/t	< 10.0
TPH CWG									
>C5-C6 Aliphatic (HS_1D_MS_AL)	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
>C6-C8 Aliphatic (HS_1D_MS_AL)	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
>C8-C10 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t	< 1.0
>C10-C12 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t	< 1.0
>C12-C16 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t	< 1.0
>C16-C21 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t	< 1.0
>C21-C35 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t	6.2
>C35-C40 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t	< 1.0
Total (>C5-C40) Aliphatic (HS_1D_MS+EH_CU_1D_AL)	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t	6.2
>C5-C7 Aromatic (HS_1D_MS_AR)	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
>C7-C8 Aromatic (HS_1D_MS_AR)	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t	< 0.01
>C8-C10 Aromatic (EH_CU_1D_AR)	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t	< 1.0
>C10-C12 Aromatic (EH_CU_1D_AR)	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t	< 1.0
>C12-C16 Aromatic (EH_CU_1D_AR)	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t	< 1.0
>C16-C21 Aromatic (EH_CU_1D_AR)	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t	< 1.0
>C21-C35 Aromatic (EH_CU_1D_AR)	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t	1.1
>C35-C40 Aromatic (EH_CU_1D_AR)	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t	< 1.0
Total (>C5-C40) Aromatic (HS_1D_MS+EH_CU_1D_AR)	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t	1.1
Total (>C5-C40) Ali/Aro (HS_1D_MS+EH_CU_1D_Total)	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t	7.2

Tests marked N are not UKAS accredited.
The Environmental Laboratory Ltd. Reg. No. 3882193



Results Summary

Report No.: 24-53468, issue number 1

ELAB Reference	359102	359103	359104	359105	359106	359107
Customer Reference						
Sample ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	TP4	TP5	TP6	TP6	TP7	TP7
Sample Depth (m)	2.00	1.60	0.30	0.70	2.00	0.70
Sampling Date	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024	22/04/2024

Determinand	Codes	Units	LOD						
Total Petroleum Hydrocarbons									
Total TPH (>C8-C40) (EH_1D_Total)	N	mg/kg	5	n/t	n/t	n/t	n/t	n/t	n/t



Unit A2, Windmill Road, Ponswood Industrial Estate, St Leonards on Sea, East Sussex, TN38 9BY

Tel: +44 (0)1424 718618, Email: info@elab-uk.co.uk, Web: www.elab-uk.co.uk

Results Summary

Report No.: 24-53468, issue number 1

Asbestos Results

Analytical result only applies to the sample as submitted by the client. Any comments, opinions or interpretations (marked #) in this report are outside UKAS accreditation (Accreditation No2683). They are subjective comments only which must be verified by the client.

In accordance with procedures, a 1kg soil sample should be analysed. For amounts less than this caution should be used when analysing the data as sample size is smaller than the recommended amount, therefore samples could be deemed as not being representative of the materials present on site.

Elab No	Depth (m)	Clients Reference	Description of Sample Matrix #	Asbestos Identification	Gravimetric Analysis Total (%)	Gravimetric Analysis by ACM Type (%)	Free Fibre Analysis (%)	Total Asbestos (%)	F/mm2 (l)
359095	0.50	TP1	Brown Sandy Soil,Stones	No asbestos	n/t	n/t	n/t	n/t	n/t
359097	0.30	TP2	Brown Sandy Soil,Stones	No asbestos	n/t	n/t	n/t	n/t	n/t
359099	0.40	TP3	Brown Sandy Soil,Stones, Clinker, Concrete	No asbestos detected	n/t	n/t	n/t	n/t	n/t
359104	0.30	TP6	Brown Sandy Soil,Stones	No asbestos	n/t	n/t	n/t	n/t	n/t
359107	0.70	TP7	Brown Sandy Soil,Stones	No asbestos	n/t	n/t	n/t	n/t	n/t



Method Summary

Report No.: 24-53468, issue number 1

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
PAH (GC-MS)	N	As submitted sample	25/04/2024		GC-MS
Hexavalent chromium	N	As submitted sample	25/04/2024	110	Colorimetry
pH	M	Air dried sample	25/04/2024	113	Electromeric
Total Petroleum Hydrocarbons in solids	N	As submitted sample	25/04/2024	117	GC-FID
Water soluble anions	M	Air dried sample	25/04/2024	172	Ion Chromatography
Low range Aliphatic hydrocarbons soil	N	As submitted sample	25/04/2024	181	GC-MS
Low range Aromatic hydrocarbons soil	N	As submitted sample	25/04/2024	181	GC-MS
BTEX in solids	M	As submitted sample	25/04/2024	181A	GC-MS
Aliphatic hydrocarbons in soil	N	As submitted sample	25/04/2024	214	GC-FID
Aliphatic/Aromatic hydrocarbons in soil	N	As submitted sample	26/04/2024	214	GC-FID
Aromatic hydrocarbons in soil	N	As submitted sample	26/04/2024	214	GC-FID
Asbestos identification	U	Air dried sample	01/05/2024	281	Microscopy
Aqua regia extractable metals	M	Air dried sample	25/04/2024	300	ICPMS
Soil organic matter	U	Air dried sample	25/04/2024	BS1377:P3	Titrimetry

Tests marked N are not UKAS accredited

Report Information

Report No.: 24-53468, issue number 1

Key

U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
*	UKAS accreditation not applicable for sample matrix
S	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
NS	Subcontracted to approved laboratory. UKAS accreditation is not applicable.
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"
LOD	LOD refers to limit of detection, except in the case of pH soils and pH waters where it means limit of discrimination. Soil sample results are expressed on an air dried basis (dried at < 30°C), and are uncorrected for inert material removed. ELAB are unable to provide an interpretation or opinion on the content of this report. The results relate only to the sample received. PCB congener results may include any coeluting PCBs Uncertainty of measurement for the determinands tested are available upon request Unless otherwise stated, sample information has been provided by the client. This may affect the validity of the results.

Deviation Codes

- | | |
|---|--|
| a | No date of sampling supplied |
| b | No time of sampling supplied (Waters Only) |
| c | Sample not received in appropriate containers |
| d | Sample not received in cooled condition |
| e | The container has been incorrectly filled |
| f | Sample age exceeds stability time (sampling to receipt) |
| g | Sample age exceeds stability time (sampling to analysis) |

Where a sample has a deviation code, the applicable test result may be invalid.

Sample Retention and Disposal

All soil samples will be retained for a period of one month

All water samples will be retained for 7 days following the date of the test report

Charges may apply to extended sample storage

TPH Classification - HWOL Acronym System

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
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
2D	GC-GC - Double coil gas chromatography
#1	EH_Total but with humics mathematically subtracted
#2	EH_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry

End of Report

AG Geo-Consultants Ltd

Appendix F

AG Geo-Consultants Ltd

Appendix G