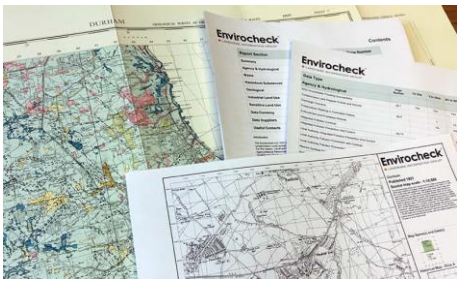



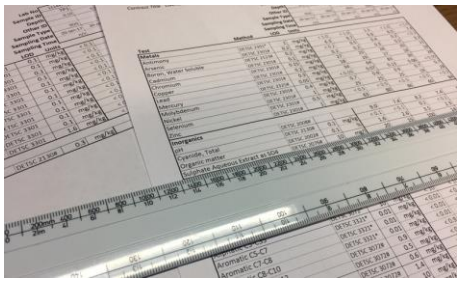

Phase 2: Site Investigation

Shawcross Business Park, Dewsbury

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PHASE 2 SITE INVESTIGATION REPORT

SHAWCROSS BUSINESS PARK, DEWSBURY

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APPENDICES

Revision	Date	Prepared by	Signed
Final	July 2024	M Atkins *Senior Geotechnical Engineer*	
		Checked by	
		R Woods *Managing Director*	
		Approved by	
		R Woods *Managing Director*	

1 EXECUTIVE SUMMARY

Site Address	• HS Components, Shawcross House Unit, 3 Horace Waller VC Parade, Dewsbury WF12 7RF.
Proposed Development	• The site is outlined for an extension to the car park and rear of the existing building and the car park. No new soft landscaping proposed.
Fieldwork	• 2no small percussive boreholes (BH01 & BH02) drilled to a depth of 5.00mbgl. • 2no monitoring pipes in BH01 and BH02. • 5no machine excavated trial pits (TP01, TP01A to TP04) to a maximum depth of 2.00mbgl. • 1no foundation exposure trial pit (FE01). • In-situ & laboratory testing.
Ground Conditions	• Made ground generally comprised slightly sandy slightly gravelly clayey topsoil to depths of between 0.30mbgl and 0.40mbgl with TP03 and TP04 underlain by stiff slightly sandy slightly gravelly clay to 1.30mbgl and 1.00mbgl respectively whist TP02 was underlain by clayey slightly gravelly sand to 0.95mbgl. • Within FE01, made ground comprised paving over sand to 0.10mbgl underlain by sandy gravel to 0.30mbgl. • Natural deposits comprised firm to stiff sandy (becoming slightly sandy) slightly gravelly medium to high strength clay of intermediate plasticity with a band of silty clay noted BH01 between 1.80mbgl and 2.10mbgl with TP02, comprising clayey slightly gravelly sand. • Groundwater was encountered locally as seepage in BH01 at a depth of 0.90mbgl.
Contamination Analysis	• Given the site's proposed commercial land use the levels of contamination recorded on site are unlikely to pose a risk to the current and future users of the site. • If any zones of odorous, brightly coloured or suspected contaminated ground or groundwater are encountered then work should cease in that area until the material has been investigated. The results of the investigation will therefore determine whether or not remediation will be required. • PPE for workers. Damping down of site during dry windy conditions. • Controlled waters unlikely to be at risk. • With respect to utilities pH was elevated precluding use of wrapped-steel, copper; as a minimum all services should be laid in clean trenches. • Sub surface concrete should be designed to DS-1 ACEC (Class AC-1). • Basic radon protection measures required.
Geotechnical Analysis & Foundation Recommendations	***Strip Foundations*** • A safe bearing capacity (SBC) of 120kN/m² has been determined for strip foundations 0.60m wide founding on the natural medium strength clay at a min. depth of 0.90mbgl. ***Pad Foundations*** • For 1.00m^2 pad foundations a SBC of 135kN/m² has been determined founding on the medium strength natural clay at a min. depth of 0.90mbgl. ***General Foundation Comments*** • Locally foundations may require deepening to found on competent natural strata given depth of made ground (up to 1.30mbgl) • Foundations near existing or proposed trees should be deepened and reinforced in accordance with current guidance. • Providing the SBC is not exceeded, settlements have been calculated to be less than 25mm.

2 INTRODUCTION

2.1 Authorisation

The site investigation described in this report was carried out by Solmek to the instructions Martin Walsh Architectural on behalf of Mr Paul Starling, on a parcel of land located HS Components, Shawcross House, Unit 3 Horace Waller VC Parade, Dewsbury, WF12 7RF. (Appendix A, Figure 1).

Sources of information, including previous work undertaken at the site, are detailed below:

- *Michael D Joyce Associates LLP Phase One Desk Study (Report No. 4377, April 2024)*

Reference should be made to the above report for details of the site's history and environmental setting.

2.2 Scope of Works

The site is outlined for an extension to the car park and rear of the existing building and the car park. No new soft landscaping proposed.

The following steps may be required in the investigation and remediation of potentially contaminated land:

- Phase 1: Desk Study
- Phase 2: Intrusive Investigation
- Phase 3: Remediation Statement
- Phase 4: Validation Reports

Phases 1 and 2 are generally required in the redevelopment of most sites. Phases 3 and 4 are subject to the findings of the initial stages.

A geotechnical and environmental (Phase 2) investigation including a ground gas risk assessment was requested. The fieldwork and testing was generally carried out according to:

- BS 5930:2015+A1:2020 Code of Practice for Ground Investigations
- BS 10175:2011+A1:2013 Investigation of Potentially Contaminated Sites – Code of Practice.
- CIRIA C665:2007 Assessing Risks Posed by Hazardous Ground Gas to Buildings
- BS 8485:2015+A1:2019 Code of Practice for the Characterization and Remediation from Ground Gas in Affected Developments
- Rock and soil descriptions shall be in accordance with BS EN ISO 14689-1:2003, BS EN ISO 14688-1:2002 and BS EN ISO 14688-2:2004
- CIRIA C758D Abandoned Mine Workings Manual

This report forms part of a Stage 1 Risk Assessment (Generic Quantitative Risk Assessment) with respect to the Environment Agency's guidance document Environment Agency *Land Contamination Risk Management*, which replaced the now-withdrawn *Contaminated Land Report 11 – Model Procedures for the Management of Land Contamination (2004)*.

The information provided in this report is based on the investigation fieldwork and is subject to the comments and approval of the various regulatory authorities. There may be other conditions prevailing on the site which have not been disclosed by this investigation and which have not been taken into account by this report. Solmek reserve the right to alter conclusions and recommendations should further information be available or provided. Any schematic representation or opinion of the possible configuration of ground conditions between exploratory holes is conjectural and given for guidance only and confirmation of intermediate ground conditions should be considered if deemed necessary.

3 SITE DESCRIPTION

Entrance to the site is via the gated access point within the southwest corner of the site and through the carpark leading to the grassy area within the north.

The site comprises of a mixture of soft and hardstanding areas and one large building located within the centre. The building is a two-story brick and corrugated metal workshop/car accessories shop and does not appear to incorporate any asbestos materials. An active carpark is noted along the north of the building.

Immediately to the east of the carpark is a small sloped piece of land leading onto an area of soft landscaping comprising of grass and trees. This is also noted around the south of the building. A small block paved path is noted to surround the whole of the building and several drains are identified.

Immediately to the south of the site is a steep slope which is presumed to lead to a culvert that runs under the east of the site. The surrounding land comprises predominantly of small industrial workshops and warehouses.

No obvious signs of surface contamination were noted at the time of the intrusive investigation, however, a number of services were located on and surrounding the site including drainage, manhole covers, streetlighting and overhead cables.

4 FIELDWORK

The fieldwork was carried out on 19th June 2024. The extent of the investigation was:

- 2no. small percussive boreholes (BH01 & BH02) drilled to a depth of 5.00m below ground level (bgl).
    - The boreholes were targeted to provide coverage in the area of the proposed footprint of the development to allow foundation design to take place and to provide samples for geotechnical and shallow contamination testing and analysis.

- Installation of ground-gas and groundwater monitoring pipes in the two small percussive boreholes (BH01 and BH02).
    - Installations evenly spaced around the site (25-50m distance) to capture potential ground gas from made ground and underlying deposits.

- 5no. machine excavated trial pits (TP01, TP01A to TP04 inclusive) to a maximum depth of 2.00mbgl.
    - The trial pits were targeted to appraise the shallow ground conditions and retrieve, bulk and environmental samples for laboratory testing.
    - In-situ CBR testing undertaken in each trial pit at depths ranging between 0.40mbgl and 1.20mbgl using a Mexi Probe.

- 1no. hand excavated foundation exposure trial pit (FE01) to a depth of 1.00mbgl.
    - The trial pit was undertaken to expose and log the existing building foundation.
    - A second exposure pit was proposed, however, this was abandoned to due to the locality of below ground services.

The boreholes were backfilled with bentonite, gravel and monitoring installations upon completion. Trial pits were backfilled in layers with arisings.

A plan showing the location of the boreholes and trial pits can be found in Appendix A (Figure 2).

5 GROUND CONDITIONS

A summary of the ground conditions encountered is given below. The exploratory hole logs are presented in Appendix B.

5.1 Made Ground

Made ground within the boreholes and trial pits generally comprised slightly sandy slightly gravelly clayey topsoil to depths of between 0.30mbgl and 0.40mbgl with TP03 and TP04 underlain by stiff slightly sandy slightly gravelly clay to 1.30mbgl and 1.00mbgl respectively whist TP02 was underlain by clayey slightly

gravelly sand to 0.95mbgl.

The made ground encountered in the foundation exposure pit (FE01) comprised paving over sand to 0.10mbgl underlain by sandy gravel to 0.30mbgl.

The gravel fraction in the made ground comprised limestone, coal, sandstone, glass, concrete, mudstone, and brick

5.2 Existing Foundations

One Foundation Exposure Pit was undertaken. Sketches are provided in Appendix B, whilst a summary is provided below in Table 1.

TABLE 1: SUMMARY OF EXISTING FOUNDATIONS

Hole Reference	Footing	Top of Foundation (m below ground)	Outstand from Face of Wall (m)	Foundation Thickness (m)	Founding Strata
FE01	Concrete	0.10	0.95	0.70	Brown slightly sandy gravelly CLAY

5.3 Obstructions

Within TP01 and TP01A the trial pits were abandoned as pea gravel was encountered at a shallow depth of 0.30mbgl raising suspicion of a below ground service.

5.4 Natural Deposits

Proven to underlie the made ground deposits across the site, natural ground generally comprised firm to stiff sandy (becoming slightly sandy) slightly gravelly medium to high strength clay of intermediate plasticity with a band of silty clay noted BH01 between 1.80mbgl and 2.10mbgl.

Within TP02, natural deposits comprised clayey slightly gravelly sand.

5.5 Groundwater

Groundwater was only encountered as seepage in BH01 at a depth of 0.90mbgl.

It should be noted the rapid rate of advancement of the exploratory holes may mask minor seepages and it should be borne in mind that water levels fluctuate with a number of influences including season, rainfall, dewatering and pumping activities. Therefore, water levels significantly higher than those found during this investigation may be encountered.

6 CONTAMINATION TESTING RESULTS

The site is outlined for an extension to the car park and rear of the existing building and the car park. No new soft landscaping proposed. The chemical samples were generally retrieved in line with BS ISO 18400-105:2017 *Soil Quality. Sampling*. The chemical results are presented in Appendix C.

6.1 Contamination Testing

To provide information upon the possibility of ground contamination three samples of made ground were selected for shallow contamination testing. This coupled with the end use being commercial means that three samples are considered appropriate for testing. The samples selected are detailed below:

- BH01 – 0.20-0.40m (Made ground – Topsoil)
- BH02 – 0.20-0.40m (Made ground – Topsoil)
- TP02 – 0.50-0.60m (Made ground – Sand)

The samples selected are considered to provide coverage of the made ground strata from across the site that would be most likely to be exposed during future site works. The samples were tested for the following contaminant suites:

- 3no Metals, semi-metals, non-metals, inorganic determinants
- 3no Asbestos identification screenings
- 3no Speciated Polyaromatic Hydrocarbons (PAHs)
- 2no Total Petroleum Hydrocarbon Criteria Working Group fractions (TPH CWG)

6.2 Test Results

Based on the proposed development at the site, the test results have been compared to a series of Land Quality Management (LQM) Suitable for Use Levels (S4UL) based on a commercial land use. These are the most up to date thresholds published in December 2014.

The value for lead has been compared with the Category 4 Screening Level (March 2014) developed by Contaminated Land: Applications In Real Environments (CL:AIRE).

The test results are presented in Appendix C, and a summary is provided below in Tables 2 & 3.

TABLE 2: SUMMARY OF INORGANIC CONTAMINATION TESTING RESULTS

Determinand	Units	Number of Samples above Level of Detection	Minimum Recorded Level	Maximum Recorded Level	Commercial Threshold Value	Number of Results Exceeding Threshold Value
Metals						
Cadmium	mg/kg	3	0.1	0.3	190	0
Chromium	mg/kg	3	20	31	8600	0
Copper	mg/kg	3	28	65	68000	0
Lead	mg/kg	3	21	100	2300*	0
Mercury	mg/kg	2	<0.05	0.30	1100	0
Nickel	mg/kg	3	19	27	980	0
Zinc	mg/kg	3	84	110	730000	0
Semi metals and non-metals						
Arsenic	mg/kg	3	18	57	640	0
Boron	mg/kg	2	<0.2	0.3	240000	0
Selenium	mg/kg	1	<0.5	0.5	12000	0
Inorganic chemicals						
Cyanide	mg/kg	0	<0.1	-	1580**	0
W.S. Sulphate	mg/l	3	20	48	2000^	0
Other						
pH	pH	-	7.5	8.4	<5.5^	0

* Category 4 Screening Levels, March 2014
** CLEA Software Version 1.06 (pH7 and 1%SOM)
^ EA Threshold Values

6.3 Metals, Semi Metals and Non Metals

None of the samples indicated raised levels of contamination above the S4UL threshold values, based on the three tested.

6.4 Inorganic Chemicals

Soluble sulphates (potentially aggressive to foundation concrete) were recorded between 20 and 48mg/l. None of the samples were elevated above levels affecting human health or the BRE Special Digest 1 500mg/l limit for the sulphate classification of concrete.

The results of the pH testing were between 7.5 and 8.4. These pH levels are consistent with slightly alkaline conditions.

6.5 Organic Chemicals

The organic thresholds vary depending on the levels of soil organic matter (SOM).

The average SOM recorded across the site was 4.16% therefore a SOM of 2.50% has been used to determine the S4UL thresholds. Table 3, below, summarises the results.

TABLE 3: SUMMARY OF ORGANIC CONTAMINATION TESTING RESULTS

Determinand	Units	Number of Samples above Level of Detection	Minimum Recorded Level	Maximum Recorded Level	Commercial Threshold Value at 2.5% SOM	Number of Results Exceeding Threshold Value
TPH Aliphatic Fractions						
Aliphatic (C5-C6)	mg/kg	0	<0.01	-	5900	0
Aliphatic (C6-C8)	mg/kg	0	<0.01	-	17000	0
Aliphatic (C8-C10)	mg/kg	0	<0.01	-	4800	0
Aliphatic (C10-C12)	mg/kg	0	<1.5	-	23000	0
Aliphatic (C12-C16)	mg/kg	0	<1.2	-	82000	0
Aliphatic (C16-C35)	mg/kg	0	<1.5	-	1700000	0
TPH Aromatic Fractions						
Aromatic (C5-C7)	mg/kg	0	<0.01	-	46000	0
Aromatic (C7-C8)	mg/kg	0	<0.01	-	110000	0
Aromatic (C8-C10)	mg/kg	0	<0.01	-	8100	0
Aromatic (C10-C12)	mg/kg	0	<0.9	-	28000	0
Aromatic (C12-C16)	mg/kg	0	<0.5	-	37000	0
Aromatic (C16-C21)	mg/kg	0	<0.6	-	28000	0
Aromatic (C21-C35)	mg/kg	0	<1.4	-	28000	0
Speciated PAH						
Naphthalene	mg/kg	1	<0.1	0.5	460	0
Acenaphthylene	mg/kg	1	<0.1	1.3	97000	0
Acenaphthene	mg/kg	2	<0.1	0.8	97000	0
Fluorene	mg/kg	1	<0.1	1.2	68000	0
Phenanthrene	mg/kg	3	0.3	14	22000	0
Anthracene	mg/kg	2	<0.1	1.9	540000	0
Fluoranthene	mg/kg	3	0.3	17	23000	0
Pyrene	mg/kg	3	0.2	15	54000	0
Benzo(a)anthracene	mg/kg	2	<0.1	5.8	170	0
Chrysene	mg/kg	2	<0.1	6.3	350	0
Benzo(b)fluoranthene	mg/kg	2	<0.1	10.7	44	0
Benzo(k)fluoranthene	mg/kg	2	<0.1	2.9	1200	0
Benzo(a)pyrene	mg/kg	2	<0.1	5.9	35	0
Indeno(123cd)pyrene	mg/kg	2	<0.1	3.4	4000	0
Dibenz(ah)anthracene	mg/kg	2	<0.1	0.6	3.6	0
Benzo(ghi)perylene	mg/kg	2	<0.1	3.3	510	0
PAH	mg/kg	2	<1.6	85	1000*	0
Phenols	mg/kg	1	<0.3	0.5	1500	0
* EA Threshold Values						

From the three samples tested for organic determinants, no exceedances were recorded.

6.6 Asbestos

From the three samples subject to asbestos screening, no asbestos was detected.

6.7 Environmental Protection Act 1990: Part 2A Revised Statutory Guidance (April 2012)

This revised document explains how the Local Authority should decide if land, based on a legal interpretation, is contaminated. The document replaces the previous guidance given in Annex 3 of DEFRA Circular 01/2006, issued in accordance with section 78YA of the 1990 Environmental Protection Act.

The main objectives of the Part 2A regime are to “identify and remove unacceptable risks to human health and the environment” and to “seek to ensure that contaminated land is made suitable for its current use”. Part 2A uses a risk based approach to defining contaminated land whereby the “risk” is interpreted as “the likelihood that harm, or pollution of water, will occur as a result of contaminants in, on or under the land” and by “the scale and seriousness of such harm or pollution if it did occur”.

For a relevant risk to exist a contaminant, pathway and receptor linkage must be present before the land can be considered to be contaminated. The document explains that *“for a risk to exist there must be contaminants present in, on or under the land in a form and quantity that poses a hazard, and one or more pathways by which they might significantly harm people, the environment, or property; or significantly pollute controlled waters.”*

A conceptual model is used to develop and communicate the risks associated with a particular site.

To determine if land is contaminated the local authority use various categories from 1 to 4. Categories 1 and 2 include “land which is capable of being determined as contaminated land on grounds of significant possibility of significant harm to human health.” Categories 3 and 4 “encompass land which is not capable of being determined on such grounds”.

See Appendix E for additional notes on contamination guidelines.

7 CONCEPTUAL MODEL AND CONTAMINATION ANALYSIS

The contamination conceptual model in Table 4 identifies the potential pollution linkages present on site based on source – pathway – receptor relationships.

TABLE 4: CONCEPTUAL MODEL

Source	Pathway	Receptor	Risk Rating	Comments
Asphyxiating or explosive ground gases • Made ground (<1.30m) • Deep coal mining • Landfills east of the site	**Ground gas migration** • Migration through permeable soils • Inhalation	**Future site users** • Transient Adult Workers	Moderate /Low	Gas monitoring in progress, source risk rating subject to change. **Basic Radion protection measures required**
		Users during development • Construction workers	Low	
Areas of contamination hazardous to human health (Commercial Thresholds) • 3no samples tested • No significantly elevated organic determinants • No significantly elevated inorganic determinants • No asbestos detected	• Inhalation • Dust ingestion • Dermal contact	**Future site users** • Transient Adult Workers	Low	Mitigated by proposed structure and hardstanding.
		Users during development • Construction workers	Moderate /Low	Consideration to be given to Health and Safety Executive: *Protection of Workers and the General Public During the Development of Contaminated Land.*
	• Inhalation • Dust ingestion	**Users of surrounding sites** • Transient Adult Workers	Low	Potential moderate risk during remediation/construction from dust generation. Consideration to be given to dust suppression, in line with BRE: *The Control of Dust and Emissions from Construction and Demolition, Best Practice Guidance.*
	• Leaching of mobilised contaminants	**Drift geology** • None Recorded	Very Low	The low permeability and the relatively low sensitivity aquifer is not considered to be a sensitive receptor.
		Solid geology • Secondary Aquifer – A	Low	The low permeability and the relatively low sensitivity aquifer is not considered to be a sensitive receptor.
	• Drainage • Lateral migration • Accumulation of contaminated sediment	**Surface water features** • Unknown feature within 50m	Low	The surface water is highly unlikely to be impacted by the low contamination levels recorded.
Areas of phytotoxic contamination • Locally phytotoxic arsenic	• Uptake via roots and leaf surfaces	**Vegetation** • No new proposed	Very Low	No potential for Vegetation impact as no vegetation is present or proposed.
Areas of contamination above service fabric or BRE Special Digest 1 thresholds • Elevated pH	• Direct contact	**Construction Materials** • Concrete	Moderate /Low	Mitigation through use of sulphate resistant concrete where in contact with made ground.
		Construction Materials • Service Fabric	Moderate /Low	Copper piping to be avoided and prudent to lay any service within a clean bedding.

In general terms, construction workers and construction materials are **potentially most** at risk as pollution linkages may be present for each of these receptors. Users of the site, users of the surrounding sites, and controlled waters are considered to be **potentially** at risk from contamination in the soils on site. Vegetation considered to be at **potentially less** of a risk.

Mitigation measures to reduce the risks identified for reach receptor are discussed in the following sections.

7.1 Users of the Site Once Development is Complete

The users of the site, particularly construction workers, are likely to be exposed to contaminants present in the soils beneath the site during redevelopment work. **Potential** exposure pathways include dermal absorption after contact with contaminated ground, inhalation of soil or dust, inhalation of volatised compounds, and inadvertent soil ingestion. Moreover, a risk to ground/surface water receptors exists through leaching of contaminants.

To establish if the levels of contaminants present on site may pose a risk to the health of the future users of the site the results of the contamination testing have been compared to a series of LQM S4UL and C4SL thresholds based on a commercial land use.

In terms of organics, metals, semi-metals, non-metals and inorganic determinants none of the three samples subject to testing returned values above relevant threshold values considered to cause long term harm to human health.

Based on the soil contamination testing on the three samples to date, it is considered that the results are generally unlikely to pose a significant risk to future users of the site.

7.2 Construction Workers and Users of Surrounding Sites

Short term human exposure to contaminants present in soils can occur via several pathways during the construction and ground works phase of the development. These include dermal absorption after contact with contaminated ground, inhalation of soil or dust (including windblown dust), inhalation of volatised compounds, inadvertent soil ingestion and contact with contaminated groundwater.

As good practice, full PPE must be employed in accordance with HSE guidance and safeguards should be taken to limit dust during ground works, and access to the public should be restricted. Construction workers should use gloves as a precaution when handling any fill materials. Provision of suitable hygiene facilities are needed for site workers.

Although asbestos was not detected from the soil samples subjected to testing within this investigation, the possibility exists that asbestos containing materials may still be present on site and currently lie undetected. It is therefore advised that a ‘watching brief’ is undertaken during the initial site strip and any excavation works and advice sought if asbestos is found or suspected.

During dry weather, any excavations may require clean water to be sprinkled at shallow depth to prevent excess dust escaping to offsite receptors. Monitoring of dust concentrations during construction should be given careful consideration to ensure occupational exposure levels are not exceeded.

7.3 Vegetation

Plants can be affected by soil contamination in a number of ways resulting in growth inhibition, nutrient deficiencies and yellowing of leaves. Contaminants are taken up by plants through the roots and through foliage. Contaminants identified as being highly phytotoxic include boron, cadmium, copper, nickel, and zinc.

For this development, as no vegetation is present or proposed, it is not considered to be a sensitive receptor.

7.4 Ground and Surface Water

The principal pathway by which soil contamination may reach the water environment is through a slow seepage or leaching to groundwater or surface water. The potential for contaminants to migrate along such pathways is dependent on the chemical and physical characteristics of the contaminants and the local hydrogeology.

From the site investigation undertaken, ground conditions broadly comprise made ground of topsoil (locally paving) underlain by cohesive and granular fill over predominantly clay, with local areas of sand noted. The cohesive deposits can be considered to have a low permeability.

The published geology indicates the site is underlain by solid geology of Thornhill Rock Sandstone of the Carboniferous Lower Pennine Middle Coal Measures, which is designated as a Secondary Aquifer – A by the Environment Agency and not located within a Source Protection Zone. Rockhead was not proven in the intrusive investigation.

No contamination was recorded based on the three samples tested.

Groundwater was only encountered locally as seepage in BH01 at a depth of 0.90mbgl during the intrusive investigation.

Given the low soil contamination concentrations to date, and the overlying cohesive deposits (low permeability) acting as an effective aquiclude; the development is considered to represent a low risk to groundwater and surface water receptors.

7.5 Construction Materials

Materials at risk from potential soil contamination include inorganic matrices such as cement and concrete and also organic material; e.g. plastics and rubbers. Acid ground conditions and elevated levels of sulphates can accelerate the corrosion of building materials. Plastics and rubbers are generally used for piping and service ducts and are potentially attacked by a range of chemicals, most of which are organic, particularly petroleum-based substances. Drinking water supplies can be tainted by substances that can penetrate piping and water companies enforce stringent threshold values.

7.5.1 *Concrete Classification*

BRE Special Digest One: *Concrete in Aggressive Ground*: 2005 3rd Edition has been used to assess the risks posed to underground concrete and to establish the design measures required to mitigate the risks. The results of the pH and water-soluble sulphate tests (when converted to total potential sulphate) fall into Class DS-1 ACEC (Class AC-1) requirements for concrete protection. This assumes mobile groundwater conditions.

7.5.2 *Water Supply Pipes Material Selection*

The levels of potential contaminants should be compared to thresholds supplied in the UK Water Industry Research (UKWIR) publication *Guidance for the selection of Water Supply Pipes to be used in Brownfield Sites* (January 2011). A Brownfield Site is defined in the document as “Land or premises that have previously been used or developed that may be vacant or derelict”. It should be noted that Brownfield sites may not be contaminated. The guidance does not apply to Greenfield Sites however water companies may have their own assessment criteria which should be checked by the developer.

Based on the samples tested during the site investigation, levels of slightly alkaline pH (7.4 and 8.4) were recorded across the site at depths of between 0.20mbgl and 2.00mbgl within the made ground and natural samples.

The concentrations of the selected determinants should be compared to the pipe material selection table in Appendix E, and consultation with the appropriate utility supply company is required to identify the most suitable service fabric. However, the pH levels may preclude the use of copper pipes.

7.6 Unexpected Contamination

If during the initial site strip or subsequent ongoing construction activities, any zones of odorous, brightly coloured or suspected contaminated ground are encountered, then the following procedure should be followed:

- Stop work in the affected area
- Contact Solmek and provide pictures of the affected area
- Solmek can visit site to investigate the material and provide guidance
- If required – Solmek can sample and test the material

- Once test results are returned, this will determine whether or not remediation will be required

7.7 Waste Classification

During the site strip and construction activities, material may be required to be removed from site. Any such material would require classification, in line with Environment Agency Technical Guidance *Waste Classification: Guidance on the classification and assessment of waste* (2015). This would classify the material as either Non-Hazardous or Hazardous Waste.

Once the material has been classified, determining the suitable landfill for disposal is governed by landfill directive Waste Acceptance Criteria (WAC) testing, with landfills categorized as Inert Waste, Stable Non-Reactive Hazardous Waste and Hazardous Waste.

If waste classification and/or WAC testing are not undertaken, material taken off site may be subject to WAC testing by the appropriate waste disposal company. The decision on whether or not to accept waste, or whether further testing is required, is at the discretion of the waste disposal company.

For this project, Waste Classification has not been requested by the client.

8 GROUND GAS ASSESSMENT

The site is outlined for an extension to the car park and the existing building.

Ground gases such as carbon dioxide (CO_2), methane (CH_4), carbon monoxide (CO) and volatile organic compounds (VOCs) can be classed as a form of contamination where there is a potential risk to human health.

For this report, gas monitoring is via measuring emissions from two standpipes (BH01 & BH02) that were installed during the sitework. The gas monitoring will consist of six visits over a period of three months.

The gas monitoring results will be presented as an addendum to this report.

However, based on the Phase One Desk Study Report (Ground Sure document), the site lies within an area where between 5% and 10% of properties are above the action level recommended by UK Health Security Agency (UKHSA). Therefore, basic radon protection measures are required.

9 GEOTECHNICAL TESTING AND ANALYSIS

Samples taken from the boreholes and trial pits underwent a series of geotechnical tests at a UKAS accredited laboratory to aid foundation design and soil description. In addition, in-situ Standard Penetration Tests (SPTs) were undertaken at regular intervals during drilling. The geotechnical results are presented in Appendix D.

9.1 Strength and Density

9.1.1 *SPT N Values*

Standard Penetration Tests undertaken within the natural cohesive deposits yielded N values of between 12 and 15. These N values can be correlated to provide approximate shear strengths, with these results indicating medium to high strength deposits.

9.2 Moisture Contents

Five samples recovered from the boreholes and trial pits have been subject to moisture content tests to determine the moisture profile at depths of between 0.50mbgl and 1.80mbgl. Moisture levels were between 14% and 21%.

9.3 Atterberg Limit Determinations

Four Atterberg Limit Determination tests were carried out on samples of cohesive material to classify the fine grained soils. The results were compared to the Casagrande Chart published in BS 5930 and showed the samples to generally be of intermediate plasticity.

The Plasticity Indices ranged from 14 to 21 with moisture contents recorded below the corresponding plastic limits. The cohesive material can be assessed as having a **medium** shrinkage potential in relation to current relevant guidance.

9.4 Particle Size Distribution Testing

One sample from the boreholes was subject to Particle Size Distribution (PSD) tests in accordance with BS1377 Part 2 to aid soil descriptions. The result has been used to prepare precise soil descriptions in accordance with BS5930:2015 Section 6 and are presented in Appendix D.

9.5 Dry Density / Moisture Content Relationship

One sample from TP05, 0.50m was subject to optimum moisture content (OMC) / dry density relationship testing using the 2.5kg rammer method. The OMC was 11% with a maximum dry density of 1.86Mg/m^3.

9.6 pH and Sulphate Results

Two samples of natural soil from the boreholes were tested for acidity and soluble sulphate content to assess whether the material may be potentially aggressive to building fabric. The results of the testing for pH were 7.4 and 8.1 indicating slightly alkaline conditions. Soluble sulphates were recorded at levels of 17mg/l and 46mg/l.

9.7 CBR Tests

CBR testing was undertaken within the trial pits. The in-situ CBR results are detailed below in Table 5.

TABLE 5: SUMMARY OF CBR TESTING RESULTS

Trial Pit	0.40mbgl result (%)	0.60mbgl result (%)	1.10mbgl result (%)
TP01	6.0	-	-
TP01A	6.0	-	-
TP02	1.00 (M/G)	2.0 (M/G)	-
TP03	1.00 (M/G)	3.0 (M/G)	2.0 (M/G)
TP04	2.00 (M/G)	3.0 (M/G)	1.00
M/G notes tests was undertaken in made ground.			

Where made ground was present, a conservative equilibrium CBR of 2% should be adopted for design purposes unless recorded lower.

9.8 Mining Assessment

The ten times seam thickness rule states that where competent rock exceeds ten times the extracted seam thickness then no major crown holing should occur at the surface (Structural Foundations Manual; M. F. Atkinson, *Spon Press* 2003). If the competent rock cover is less than ten times the extracted seam thickness, then recommendations suggest the workings must be grouted using a mixture of pulverised fuel ash (PFA) and cement placed into the area under pressure. Should the overlying rock be weak and/or faulting, a ratio in excess of 10x may be required, whilst weak basement rock underlying the works could cause a separate collapse mechanism via pillars sinking. For certain developments, a ratio of less than 10x may be addressed via using rafts, however this would be dependent on approval from the regulatory authorities. This may not be appropriate for steeply dipping seams and where strong flowing water is encountered.

For this site, the Phase 1 Desk Study/CMRA indicated that the site was within a Coal Mining Reporting Area. Subsequent review of the Coal Mining Report and Geological Mapping did not indicate that the site was at risk of historic shallow mine workings.

The Phase One Desk Study also stated that *"The report makes no mention of shallow workings being present or that shallow unrecorded workings might be present. The Coal Authority considers that the probability of unrecorded shallow workings is "none".*

Therefore further investigation was not considered necessary.

9.9 Foundations

Based on plasticity index results, all cohesive soils at the site should be regarded as being of **medium** volume change potential. Foundations should therefore be placed at a minimum depth of 0.90m below original or finished ground level, whichever is the lower.

However, given depth of made ground (up to 1.30m) locally foundations may require deepening to found on competent natural strata.

9.9.1 *Strip Foundations*

Based on a conservative undrained shear strength at 0.90mbgl of 60kN/m² a safe bearing capacity of 120kN/m² has been determined for strip foundations 0.60m wide founding on the natural medium strength clay at depths of around 0.90mbgl.

Providing the safe bearing capacity is not exceeded settlements have been calculated to be less than 25mm.

9.9.2 *Pad Foundations*

For pad foundations based on a conservative shear strength of 60kN/m² a safe bearing capacity SBC of 135kN/m² has been determined for 1.00m² pad foundations founding on the medium strength natural clay at a minimum depth of 0.90mbgl.

Providing the safe bearing capacity is not exceed settlements have been calculated to be less than 25mm.

9.9.3 *General Foundation Comments*

Foundations near existing or proposed trees should be deepened and provided with appropriate heave precautions in accordance with current guidance.

All deepened sections should be adequately stepped and reinforced, in accordance with current relevant guidance.

It should be recognised that clay rich soils can deteriorate fairly rapidly on exposure, particularly in periods of wet weather and frost. It would be prudent to protect all exposed soils in foundation excavations with a concrete blinding layer, particularly if they are likely to remain open for extended period of time.

Prior to placing foundation concrete, obvious soft or loose spots should be removed and replaced with suitably recompacted hardcore or lean mix concrete. In addition, all excavations should be inspected to ensure that they fully penetrate areas of disturbed ground.

Further advice should be sought from Solmek if unexpected ground conditions are encountered during redevelopment.

9.9.4 *Car Parking/Hard Standing etc*

If imported granular material is laid down and compacted in layers in accordance with the Specification for Highways Works (approximately 600mm total), this may yield an adequate CBR value. This should be verified with in-situ CBR testing.

9.10 Excavation

Based on the nature of the ground conditions encountered, excavations should be within the capacity of normal earthworks plant although breaking out of known and unknown obstructions should be anticipated. Stability of excavations will be poor in the made ground but should improve slightly in the natural stratum. Excavation sides should be designed, constructed and supported in accordance with the recommendations given in CIRIA Report No. 97: “Trenching Practice”.

9.11 Groundwater

Groundwater was only encountered a seepage in BH01 at a depth of 0.90mbgl.

It should be noted the rapid rate of advancement of the exploratory holes may mask minor seepages and it should be borne in mind that water levels fluctuate with a number of influences including season, rainfall, dewatering and pumping activities. Therefore, water levels significantly higher than those found during this investigation may be encountered.

SOLMEK

Appendix A

SOLMEK
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Figure Title

Site Location Plan

Project Number

S240612

Project Name

Shawcross Business Park Dewsbury

Client

Mr Paul Starling

Date

July 2024

DRG Number

Figure 1

Scale

1:5000 @ A4 [DO NOT SCALE]

Legend Key

Project Bounds - Project Bounds

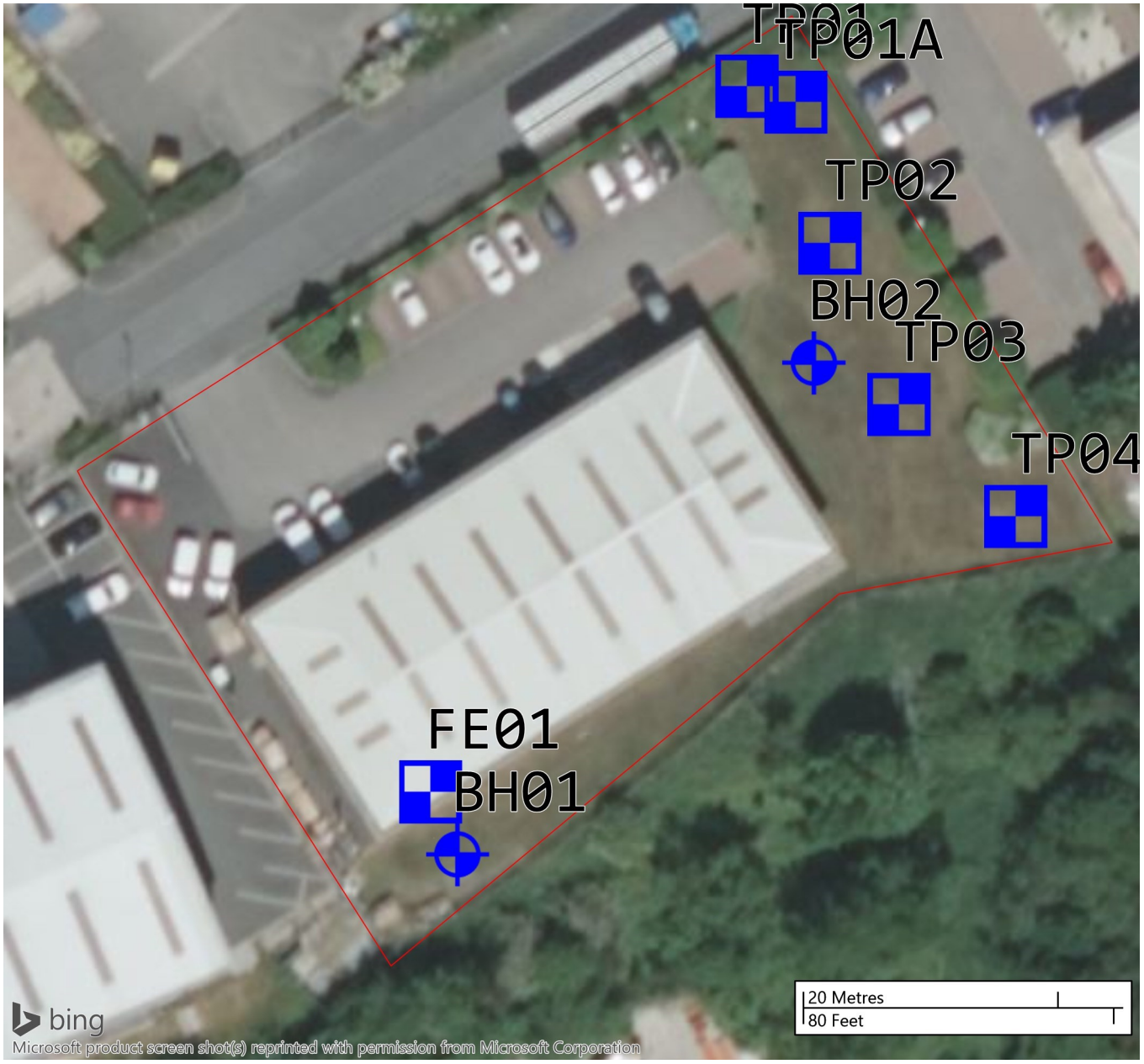

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Figure Title

Exploratory Location Plan

Project Number

S240612

Project Name

Shawcross Business Park Dewsbury

Client

Mr Paul Starling

Date

July 2024

DRG Number

Figure 2

Scale

1:500 @ A4 [DO NOT SCALE]

Legend Key

- Locations By Type - Empty
- Locations By Type - BH
- Locations By Type - TP
- Project Bounds - Project Bounds

Title	TP01 Trial Pit Photograph
Project	Shawcross Business Park, Dewsbury
Client	Martin Walsh Architectural
Date	July 2024
Fig No.	Figure 3
Scale	Do Not Scale
Key	

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e-mail: south@solmek.com
www.solmek.com

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Title	TP02 Trial Pit Photograph
Project	Shawcross Business Park, Dewsbury
Client	Martin Walsh Architectural
Date	July 2024
Fig No.	Figure 4
Scale	Do Not Scale
Key	

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Title	TP03 Trial Pit Photograph
Project	Shawcross Business Park, Dewsbury
Client	Martin Walsh Architectural
Date	July 2024
Fig No.	Figure 5
Scale	Do Not Scale
Key	

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Title	TP04 Trial Pit Photograph
Project	Shawcross Business Park, Dewsbury
Client	Martin Walsh Architectural
Date	July 2024
Fig No.	Figure 6
Scale	Do Not Scale
Key	

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Title
FE01 Foundation Exposure Trial Pit Photograph
Project
Shawcross Business Park, Dewsbury
Client
Martin Walsh Architectural
Date
July 2024
Fig No.
Figure 7
Scale
Do Not Scale
Key

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Appendix B

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Borehole Log

Scale 1:50 Sheet 1 of 1

BH01

Contract no:	S240612	**Site:**	Shawcross Business Park Dewsbury	**Driller:**	SR Drilling Ltd
				Plant used:	MIni Rig
				Started:	19/06/2024
Client:	Mr Paul Starling			**Ended:**	19/06/2024
Method:	Small Percussive			**Backfilled:**	19/06/2024

GL (AOD):	
Easting:	426142
Northing:	422699
Logged:	AL
Status:	FINAL

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing		
					Depth (m)	Type	Results
				MADE GROUND: Dark grey slightly sandy, slightly gravelly clayey topsoil. Gravel is fine to coarse subangular to angular of coal, sandstone, glass, mudstone and brick.	0.20 - 0.40	B	
		0.40		Firm brown sandy slightly gravelly medium strength CLAY of intermediate plasticity. Gravel is fine to coarse, subangular to angular of sandstone.	0.40 - 0.60	B	
					0.80 - 1.00	B	
					1.20 - 1.65	SPT (S)	N=12 (3,3/3,3,3,3)
					1.40 - 1.60	B	
		1.80		Firm grey medium strength silty CLAY of intermediate plasticity.	1.80 - 2.00	B	
		2.10			2.00 - 2.45	SPT (S)	N=14 (3,4/4,3,3,4)
				Firm to stiff light brown slightly sandy gravelly medium to high strength CLAY. Gravel is fine to coarse, subangular to angular of sandstone.	2.80 - 3.00	B	
G					3.00 - 3.45	SPT (S)	N=14 (4,3/3,3,4,4)
					3.80 - 4.00	B	
					4.00 - 4.45	SPT (S)	N=15 (4,5/4,3,4,4)
					4.80 - 5.00	B	
		5.00		End of Borehole at 5.000m			

Hole Diameter		Casing Depths		General Remarks	Chiselling			Ground Water				
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)		From (m)	To (m)	Time (hr)	Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)
				1.2m Hand excavated inspection pit dug. Slight groundwater seepage at 0.90m.				0.90				

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Borehole Log

Scale 1:50 Sheet 1 of 1

BH02

Contract no:	S240612	**Site:**	Shawcross Business Park Dewsbury	**Driller:**	SR Drilling Ltd
				Plant used:	Mini Rig
				Started:	19/06/2024
Client:	Mr Paul Starling			**Ended:**	19/06/2024
Method:	Small Percussive			**Backfilled:**	19/06/2024

GL (AOD):	
Easting:	426170
Northing:	422738
Logged:	AL
Status:	FINAL

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing		
					Depth (m)	Type	Results
				MADE GROUND: Dark grey slightly sandy, slightly gravelly clayey topsoil. Gravel is fine to coarse subangular to angular of coal, sandstone, glass, mudstone and brick.	0.20 - 0.40	B	
		0.40		Firm brown sandy slightly gravelly medium strength CLAY of intermediate plasticity. Gravel is fine to coarse, subangular to angular of sandstone.	0.40 - 0.60	B	
					0.80 - 1.00	B	
		1.10		Firm to stiff light brown slightly sandy gravelly medium to high strength CLAY of intermediate plasticity. Gravel is fine to coarse, subangular to angular of sandstone.	1.20 - 1.65	SPT (S)	N=12 (3,2/3,3,3,3)
					1.40 - 1.60	B	
					1.80 - 2.00	B	
					2.00 - 2.45	SPT (S)	N=12 (3,2/2,4,3,3)
					2.80 - 3.00	B	
G					3.00 - 3.45	SPT (S)	N=15 (3,4/4,3,4,4)
					3.80 - 4.00	B	
					4.00 - 4.45	SPT (S)	N=15 (3,3/3,4,4,4)
					4.80 - 5.00	B	
		5.00		End of Borehole at 5.000m			

Hole Diameter		Casing Depths		General Remarks	Chiselling			Ground Water				
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)		From (m)	To (m)	Time (hr)	Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)
				1.2m Hand excavated inspection pit dug. No groundwater encountered.								

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Trial Pit Log

TrialPit No
FE01
Sheet 1 of 1

Project Name:	Shawcross Business Park Dewsbury	Project No. S240612	Co-ords: 426140E - 422704N Level:
Plant Used:	Hand Tools	Dimensions (m): Depth 1.00	Scale 1:26
Client:	Mr Paul Starling		Logged AL

Date: 19/06/2024

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.10			MADE GROUND: Paving over sand.
				0.30			MADE GROUND: Grey sandy gravel. Gravel is fine to coarse, subangular to angular of limestone.
	0.80 - 1.00	B					Brown slightly sandy gravelly CLAY.
				1.00			End of Pit at 1.000m

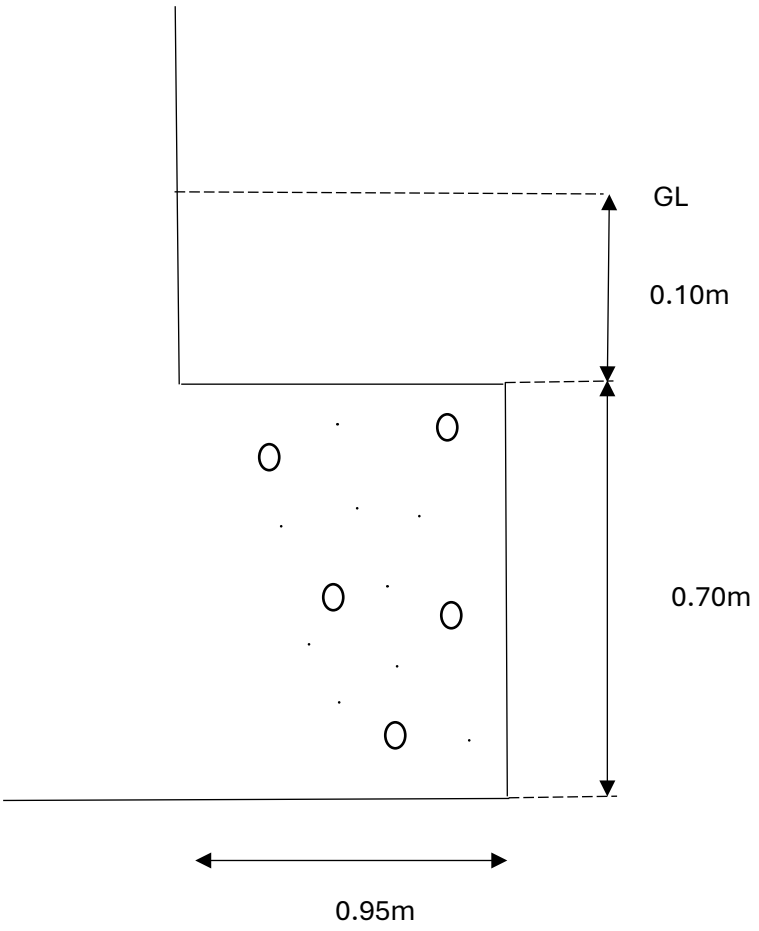
Remarks: No groundwater encountered.

Stability:

Shawcross Business Park Dewsbury

S240612

FE01 Sketch



NTS

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Trial Pit Log

TrialPit No
TP01
Sheet 1 of 1

Project Name:	Shawcross Business Park Dewsbury	Project No. S240612	Co-ords: 426165E - 422760N Level:
Plant Used:	360 Excavator	Dimensions (m): Depth 0.40	1.50 × 0.50
Client:	Mr Paul Starling		

Date: 19/06/2024
Scale: 1:26
Logged: AL

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10 - 0.20	B+ES					MADE GROUND: Dark grey slightly sandy, slightly gravelly clayey topsoil. Gravel is fine to coarse subangular to angular of coal, sandstone, glass, mudstone and brick.
				0.30			
	0.40	CBR	6.0%	0.40			Light grey to cream sandy GRAVEL. *Pea gravel*
							End of Pit at 0.400m

Remarks: No groundwater encountered.

Stability: Pit wall stable.

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Trial Pit Log

TrialPit No
TP01A
Sheet 1 of 1

Project Name:	Shawcross Business Park Dewsbury	Project No. S240612	Co-ords: 426169E - 422759N Level:
Date	19/06/2024		
Plant Used:	360 Excavator	Dimensions (m): Depth 0.40	1.50 × 0.50
Scale	1:26		
Client:	Mr Paul Starling		
Logged	AL		

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10 - 0.20	B+ES					MADE GROUND: Dark grey slightly sandy, slightly gravelly clayey topsoil. Gravel is fine to coarse subangular to angular of coal, sandstone, glass, mudstone and brick.
				0.30			
	0.40	CBR	6.0%	0.40			Light grey to cream sandy GRAVEL. *Pea gravel*
							End of Pit at 0.400m

Remarks: No groundwater encountered.

Stability: Pit wall stable.

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Trial Pit Log

TrialPit No
TP02
Sheet 1 of 1

Project Name:	Shawcross Business Park Dewsbury	Project No. S240612	Co-ords: 426171E - 422748N Level:
Plant Used:	360 Excavator	Dimensions (m): Depth 1.20	1.60 × 0.50
Client:	Mr Paul Starling		

Date: 19/06/2024
Scale: 1:26
Logged: AL

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10 - 0.20	B+ES		0.30			MADE GROUND: Dark grey slightly sandy, slightly gravelly clayey topsoil. Gravel is fine to coarse subangular to angular of coal, sandstone, glass, mudstone and brick.
	0.40	CBR	1.0%				MADE GROUND: Light brown clayey slightly gravelly sand. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of coal, glass, dolomite, sandstone and siltstone. Occasional cobbles of fine to coarse subangular to angular sandstone.
	0.50 - 0.60	B+ES					
	0.60	CBR	2.0%				
	1.00 - 1.10	B+ES		0.95			Greyish light brown clayey slightly gravelly SAND with frequent cobbles of sandstone. Sand is fine to coarse. Gravel is fine to coarse, subangular to angular of sandstone, marl and mudstone. Cobbles are fine to coarse subangular to angular of mudstone and sandstone.
				1.20			End of Pit at 1.200m

Remarks: No groundwater encountered.

Stability: Pit wall stable.

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Trial Pit Log

TrialPit No
TP03
Sheet 1 of 1

Project Name:	Shawcross Business Park Dewsbury	Project No. S240612	Co-ords: 426177E - 422735N Level:
Plant Used:	360 Excavator	Dimensions (m): Depth 2.00	1.56 × 0.50
Client:	Mr Paul Starling		

Date: 19/06/2024
Scale: 1:26
Logged: AL

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10 - 0.20	B+ES					MADE GROUND: Dark grey slightly sandy, slightly gravelly clayey topsoil. Gravel is fine to coarse subangular to angular of coal, sandstone, glass, mudstone and brick.
	0.40	CBR	1.0%	0.40			
	0.50 - 0.60	B+ES					MADE GROUND: Stiff light greyish, yellowish brown slightly sandy, lightly gravelly clay. Sand is fine to coarse. Gravel is fine to coarse, subangular of coal, mudstone, sandstone, concrete, large cuts of wood and brick fragments. Occasional cobbles of fine to coarse subangular to angular of sandstone.
	0.60	CBR	3.0%				
	1.10 - 1.20	B+ES					
▼	1.20	CBR	2.0%				
				1.30			
	1.40 - 1.50	B+ES					Stiff brownish light grey slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse subangular to angular of sandstone and mudstone.
	1.90 - 2.00	B					
				2.00			End of Pit at 2.000m

Remarks: Groundwater encountered at 1.20m.

Stability: Pit wall stable.

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Trial Pit Log

TrialPit No
TP04
Sheet 1 of 1

Project Name:	Shawcross Business Park Dewsbury	Project No. S240612	Co-ords: 426186E - 422726N Level:
Plant Used:	360 Excavator	Dimensions (m): Depth 1.65	2.10 × 0.50
Client:	Mr Paul Starling		Date 19/06/2024 Scale 1:26 Logged AL

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10 - 0.20	B+ES					MADE GROUND: Dark grey slightly sandy, slightly gravelly clayey topsoil. Gravel is fine to coarse subangular to angular of coal, sandstone, glass, mudstone and brick.
	0.40	CBR	2.0%	0.40			
	0.50 - 0.60	B+ES					MADE GROUND: Stiff light greyish, yellowish brown slightly sandy, lightly gravelly clay. Sand is fine to coarse. Gravel is fine to coarse, subangular of coal, mudstone, sandstone, concrete and brick fragments. Occasional cobbles of fine to coarse subangular to angular of sandstone.
	0.50	CBR	3.0%				
				1.00			
	1.10 - 1.20	B+ES					Firm greyish yellow, slightly sandy gravelly CLAY with frequent cobbles. Sand is fine to coarse. Gravel is fine to coarse, subangular to angular of sandstone and coal. Cobbles are fine to coarse, subangular to angular of sandstone.
	1.10	CBR	1.0%				
	1.50 - 1.60	B					
				1.65			End of Pit at 1.650m

Remarks: No groundwater encountered.

Stability: Pit wall stable.

Appendix C

Certificate of Analysis

Certificate Number	24-12861	*Issued:*	27-Jun-24
Client	SOLMEK 12 Yarm Road Stockton On Tees Cleveland TS18 3NA		

Our Reference	24-12861
Client Reference ~	S240612
Order No ~	SOL 8513
Contract Title ~	Shawcross Business Park, Dewsbury
Description	3 Soil samples.
Date Received	24-Jun-24
Date Started	24-Jun-24
Date Completed	27-Jun-24
Test Procedures	Identified by prefix DETSn (details on request).
Notes	Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Kirk Bridgewood
General Manager

2139

Summary of Chemical Analysis
Matrix Descriptions

Our Ref 24-12861
Client Ref ~ S240612
Contract Title ~ Shawcross Business Park, Dewsbury

Sample ID	Depth	Lab No	Completed	Matrix Description
BH01	0.20-0.40	2355207	27/06/2024	Brown gravelly, sandy CLAY
BH02	0.20-0.40	2355208	27/06/2024	Brown gravelly, sandy CLAY
TP02	0.50-0.60	2355209	27/06/2024	Brown gravelly, sandy CLAY

~Symbol key at end of report

Summary of Chemical Analysis
Soil Samples

Our Ref 24-12861
Client Ref ~ S240612
Contract Title ~ Shawcross Business Park, Dewsbury

			Lab No	2355207	2355208	2355209
			Sample ID ~	BH01	BH02	TP02
			Depth ~	0.20-0.40	0.20-0.40	0.50-0.60
			Other ID ~			
			Sample Type ~	ES	ES	ES
			Sampling Date ~	19/06/2024	19/06/2024	19/06/2024
			Sampling Time ~	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**			
Metals						
Arsenic	DETSC 2301#	0.2	mg/kg	57	21	18
Boron, Water Soluble (2.5:1)	DETSC 2311#	0.2	mg/kg	0.3	< 0.2	0.2
Cadmium	DETSC 2301#	0.1	mg/kg	0.3	0.3	0.1
Chromium	DETSC 2301#	0.15	mg/kg	31	20	20
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	65	30	28
Lead	DETSC 2301#	0.3	mg/kg	100	38	21
Mercury	DETSC 2325#	0.05	mg/kg	0.30	0.28	< 0.05
Nickel	DETSC 2301#	1	mg/kg	25	19	27
Selenium	DETSC 2301#	0.5	mg/kg	0.5	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	110	99	84
Inorganics						
pH	DETSC 2008#		pH	7.5	8.2	8.4
Cyanide, Free	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Organic matter	DETSC 2002#	0.1	%	7.7	2.8	2.0
Sulphate Aqueous Extract as SO4 (2:1)	DETSC 2076#	10	mg/l	48	20	30
Petroleum Hydrocarbons						
Aliphatic C5-C6: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01
Aliphatic C6-C8: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01
Aliphatic C8-C10: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01
Aliphatic C10-C12: EH_CU_1D_AL	DETSC 3072#	1.5	mg/kg	< 1.5		< 1.5
Aliphatic C12-C16: EH_CU_1D_AL	DETSC 3072#	1.2	mg/kg	< 1.2		< 1.2
Aliphatic C16-C21: EH_CU_1D_AL	DETSC 3072#	1.5	mg/kg	< 1.5		< 1.5
Aliphatic C21-C35: EH_CU_1D_AL	DETSC 3072#	3.4	mg/kg	< 3.4		< 3.4
Aliphatic C35-C40: EH_CU_1D_AL	DETSC 3072*	3.4	mg/kg	< 3.4		< 3.4
Aliphatic C5-C40: EH_CU+HS_1D_AL	DETSC 3072*	10	mg/kg	< 10		< 10
Aromatic C5-C7: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01
Aromatic C7-C8: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01
Aromatic C8-C10: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01
Aromatic C10-C12: EH_CU_1D_AR	DETSC 3072#	0.9	mg/kg	< 0.9		< 0.9
Aromatic C12-C16: EH_CU_1D_AR	DETSC 3072#	0.5	mg/kg	< 0.5		< 0.5
Aromatic C16-C21: EH_CU_1D_AR	DETSC 3072#	0.6	mg/kg	< 0.6		< 0.6
Aromatic C21-C35: EH_CU_1D_AR	DETSC 3072#	1.4	mg/kg	< 1.4		< 1.4
Aromatic C35-C40: EH_CU_1D_AR	DETSC 3072*	1.4	mg/kg	< 1.4		< 1.4
Aromatic C5-C40: EH_CU+HS_1D_AR	DETSC 3072*	10	mg/kg	< 10		< 10
TPH Ali/Aro C5-C40: EH_CU+HS_1D_Total	DETSC 3072*	10	mg/kg	< 10		< 10
PAHs						
Naphthalene	DETSC 3301	0.1	mg/kg	0.5	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	1.3	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	0.8	0.4	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	1.2	< 0.1	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	14	0.5	0.3

Symbol key at end of report

General

Summary of Chemical Analysis
Soil Samples

Our Ref 24-12861
Client Ref ~ S240612
Contract Title ~ Shawcross Business Park, Dewsbury

			Lab No	2355207	2355208	2355209
			Sample ID ~	BH01	BH02	TP02
			Depth ~	0.20-0.40	0.20-0.40	0.50-0.60
			Other ID ~			
			Sample Type ~	ES	ES	ES
			Sampling Date ~	19/06/2024	19/06/2024	19/06/2024
			Sampling Time ~	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**			
Anthracene	DETSC 3301	0.1	mg/kg	1.9	0.1	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	17	1.0	0.3
Pyrene	DETSC 3301	0.1	mg/kg	15	1.0	0.2
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	5.8	0.6	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	6.3	0.5	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	4.3	0.2	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	2.9	0.1	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	5.9	0.5	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	3.4	0.3	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	0.6	0.1	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	3.3	0.2	< 0.1
PAH 16 Total	DETSC 3301	1.6	mg/kg	85	5.7	< 1.6
Phenols						
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	0.5	< 0.3	< 0.3

Symbol key at end of report
General

Summary of Asbestos Analysis
Soil Samples

Our Ref 24-12861
Client Ref ~ S240612
Contract Title ~ Shawcross Business Park, Dewsbury

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
2355207	BH01 0.20-0.40	SOIL	NAD	none	Michael Kay
2355208	BH02 0.20-0.40	SOIL	NAD	none	Michael Kay
2355209	TP02 0.50-0.60	SOIL	NAD	none	Michael Kay

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * -not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 24-12861
Client Ref ~ S240612
Contract ~ Shawcross Business Park, Dewsbury

Containers Received & Deviating Samples

Lab No	Sample ID ~	Date Sampled ~	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
2355207	BH01 0.20-0.40 SOIL	19/06/24	GJ 250ml, PT 1L		
2355208	BH02 0.20-0.40 SOIL	19/06/24	GJ 250ml, PT 1L		
2355209	TP02 0.50-0.60 SOIL	19/06/24	GJ 250ml, PT 1L x2		

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Information in Support of the Analytical Results

List of HWOL Acronyms and Operators

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

Det	Acronym
Aliphatic C5-C6	HS_1D_AL

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETSC 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETSC 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETSC 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETSC 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETSC 2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC 2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETSC 2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC 2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETSC 2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETSC 2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC 2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETSC 2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETSC 2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 2311	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETSC 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETSC 3049	Sulphur (free)	mg/kg	0.75	As Received	No	Yes	Yes
DETSC 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETSC 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3321	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3521	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3521	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3521	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3521	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3521	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3521	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS

Key:
~ Sample details are provided by the client and can affect the validity of the results
***** -not accredited.
# -MCERTS (accreditation only applies if report carries the MCERTS logo).
$ -subcontracted.
n/s -not supplied.
I/S -insufficient sample.
U/S -unsuitable sample.
t/f -to follow.
nd -not detected.

End of Report

Appendix D

Laboratory Report Front Sheet

Site name	Job number
Shawcross Business Park, Dewsbury	S240612

G2M Testing (Stockton)
12-16 Yarm Road,
Stockton on Tees,
TS18 3NA
01642 033318
info@g2mtesting.co.uk

UKAS TESTING
10258

Client details:

Reference:	S240612
Name:	Solmek
Address:	12 Yarm Road, Stockton-on-tees, TS18 3NA
Telephone:	01642 607083
Email:	matkins@solmek.com
FAO:	Mark Atkins

Samples received: 05/07/2024

Date commenced: 20/06/2024

Date reported: 05/07/2024

Observations and interpretations are outside of the UKAS Accreditiation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced in full, without the prior written approval of the laboratory.

Samples will be held at the laboratory for a period of 4 weeks after the report date. After the above reporting date the samples will be disposed of. Should further testing be required then the office should be informed before the above date.

Signature:	Approved Signitories:
	☐ D.Anderson (Managing Director) ☑ J. Brischuk (Laboratory Manager) ☐

Summary of Classification Tests

G2M Testing (Stockton)
12-16 Yarm Road,
Stockton on Tees,
TS18 3NA
01642 033318
info@g2mtesting.co.uk

UKAS TESTING
10258

Site name	Job number
Shawcross Business Park, Dewsbury	S240612

Hole	Depth Top m	Depth Base m	Type	*w* %	Oven temp. oc	wa %	Pa %	Pr %	wL %	wP %	IP %	IL	Plasticity class	Preparation method
BH01	0.80		B	20	105	43	46	54	38-s	24	14	1.357	CI	Tested after washing to remove >425µm
BH01	1.80		B	19	105	23	81	19	45-s	24	21	-0.048	CI	Tested after >425µm removed by hand
BH02	0.80		B	15	105	26	58	42	41-s	26	15	0.000	MI	Tested after washing to remove >425µm
BH02	1.40		B	14	105	18	79	21	35-s	18	17	0.000	CI	Tested after >425µm removed by hand
TP04	0.50		B	21	105									

All tests found in G2M Testing UKAS Schedule of Accreditation are tested to standard unless otherwise indicated

Key	Description		Category	BS Test Code
w	Moisture content			BS 1377:1990 Part 2 Clause 3.2
wa	Equivalent moisture content passing 425µm sieve			BS 1377:1990 Part 2 Clause 3.2
wL	Liquid limit	Single point	-s	BS 1377:1990 Part 2 Clause 4.4
		Four point	-f	BS 1377:1990 Part 2 Clause 4.3
wP	Plastic limit			BS 1377:1990 Part 2 Clause 5.2
Pa	Percentage passing 425um sieve			
Pr	Percentage retained 425um sieve			
IP	Plasticity index			BS 1377:1990 Part 2 Clause 5.4
IL	Liquidity index			BS 1377:1990 Part 2 Clause 5.4
	Suffix indicating test is "Not UKAS Accredited"		*	

Approved by	D Anderson
Approval date	04/07/2024 13:49
Date report generated	
Report Number	

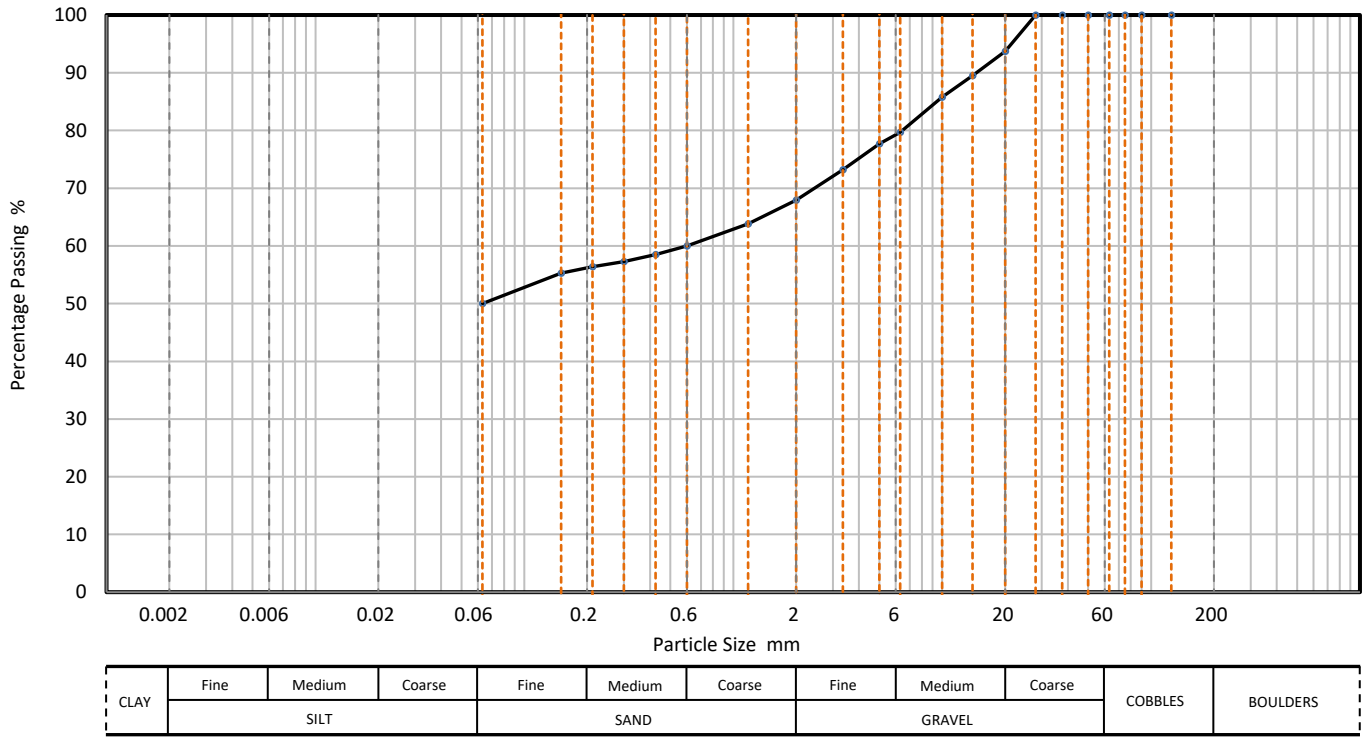
PARTICLE SIZE DISTRIBUTION

Site name	Job number
Shawcross Business Park, Dewsbury	S240612

G2M Testing (Stockton)
12-16 Yarm Road,
Stockton on Tees,
TS18 3NA
01642 033318
info@g2mtesting.co.uk

UKAS TESTING
10258

Hole		BH02	Lab sample ID	G2MT2024062016
Depth (Top)	m	1.40	Test Method	BS 1377 - 2 : 1990 Clause 9.2
Depth (Base)	m		Soil Description	Sandy, Very Gravelly SILT
Sample type		B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	94		
14	90		
10	86		
6.3	80		
5	78		
3.35	73		
2	68		
1.18	64		
0.6	60		
0.425	59		
0.3	57		
0.212	56		
0.15	55		
0.063	50		

Dry Mass of sample, g	1234

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	32.1
Sand	17.9
Fines <0.063mm	50.0

Grading Analysis		
D100	mm	
D60	mm	0.6
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with test method unless noted below

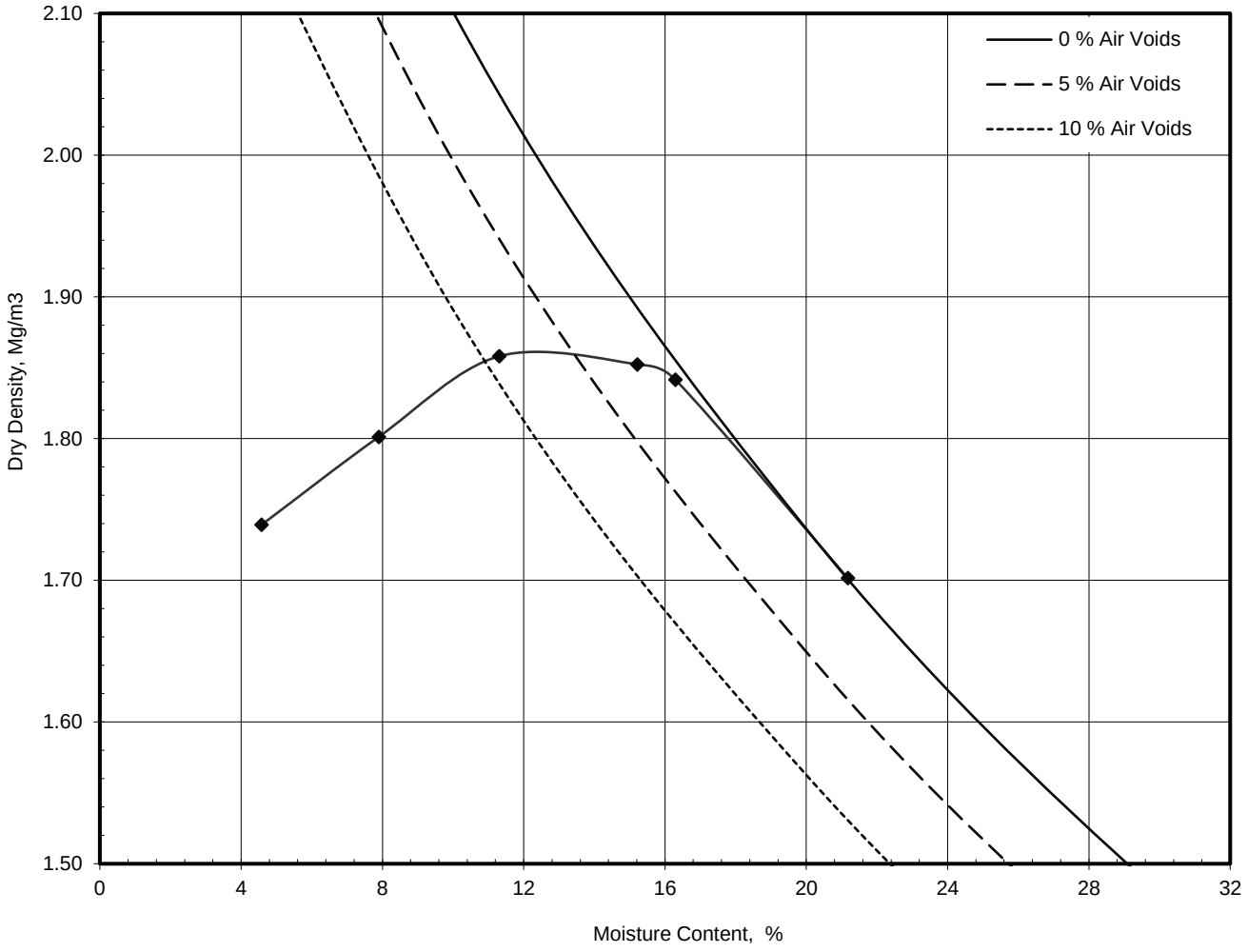
Sample tested was deviating in accordance with BS1377 test standard

Accreditation status

Hydrometer is the usual Sedimentation method carried out by G2M Testing and is part of the G2M Testing UKAS accreditation schedule.

Approved by	JBrischuk
Approval date	26/06/2024 07:54

UKAS TESTING 10258	**Dry Density / Moisture Content Relationship Light Compaction**				Job Ref	**S240612**
					Borehole / Pit No	TP04
Site Name	**Shawcross Business Park, Dewsbury**				Sample No	
Soil Description					Depth	0.50 m
Specimen Ref.	TP04	Specimen Depth	0.5	m	Sample Type	B
Test Method	BS1377:Part 4:1990, clause 3.4, 2.5kg rammer				Keylab ID	G2MT2024062017
					Compaction Test Reference/No.	



Mould Type		CBR
Samples Used		Single sample tested
Material Retained on 37.5 mm Sieve	%	6
Material Retained on 20.0 mm Sieve	%	8
Particle Density - Assumed	Mg/m³	2.66
Natural Moisture Content	%	
Maximum Dry Density	Mg/m³	**1.86**

Optimum Moisture Content	%	**11**

Operator	Checked	Approved	Remarks	Fig
M.Southgate	JBrischuk	JBrischuk		Sheet 1 of 1

Certificate of Analysis

Certificate Number	24-12859	*Issued:*	27-Jun-24

Client SOLMEK
12 Yarm Road
Stockton On Tees
Cleveland
TS18 3NA

Our Reference	24-12859
Client Reference ~	S240612
Order No ~	SOL 8513
Contract Title ~	Shawcross Business Park, Dewsbury
Description	2 Soil samples.
Date Received	24-Jun-24
Date Started	24-Jun-24
Date Completed	27-Jun-24
Test Procedures	Identified by prefix DETSn (details on request).

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

Approved By

Kirk Bridgewood
General Manager

mCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

ilac-MRA UKAS TESTING 2139

Summary of Chemical Analysis
Matrix Descriptions

Our Ref 24-12859
Client Ref ~ S240612
Contract Title ~ Shawcross Business Park, Dewsbury

Sample ID	Depth	Lab No	Completed	Matrix Description
BH01	1.80-2.00	2355200	27/06/2024	Brown gravelly, sandy CLAY
BH02	0.80-1.00	2355201	27/06/2024	Brown gravelly, sandy CLAY

Summary of Chemical Analysis
Soil Samples

Our Ref 24-12859
Client Ref ~ S240612
Contract Title ~ Shawcross Business Park, Dewsbury

			Lab No	2355200	2355201
			Sample ID ~	BH01	BH02
			Depth ~	1.80-2.00	0.80-1.00
			Other ID ~		
			Sample Type ~	D	D
			Sampling Date ~	19/06/2024	19/06/2024
			Sampling Time ~	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Inorganics					
pH	DETSC 2008#		pH	7.4	8.1
Sulphate Aqueous Extract as SO4 (2:1)	DETSC 2076#	10	mg/l	46	17

Information in Support of the Analytical Results

Our Ref 24-12859
Client Ref ~ S240612
Contract ~ Shawcross Business Park, Dewsbury

Containers Received & Deviating Samples

Lab No	Sample ID ~	Date Sampled ~	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
2355200	BH01 1.80-2.00 SOIL	19/06/24	PT 1L		
2355201	BH02 0.80-1.00 SOIL	19/06/24	PT 1L		

Key: P-Plastic T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETSC 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETSC 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETSC 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETSC 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETSC 2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC 2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETSC 2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC 2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETSC 2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETSC 2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC 2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETSC 2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETSC 2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 2311	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETSC 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETSC 3049	Sulphur (free)	mg/kg	0.75	As Received	No	Yes	Yes
DETSC 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETSC 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3321	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3521	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3521	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3521	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3521	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3521	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3521	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS

Key:
~ Sample details are provided by the client and can affect the validity of the results
***** -not accredited.
# -MCERTS (accreditation only applies if report carries the MCERTS logo).
$ -subcontracted.
n/s -not supplied.
I/S -insufficient sample.
U/S -unsuitable sample.
t/f -to follow.
nd -not detected.

End of Report

Appendix E

♣Solmek conditions of offer, notes on limitations & basis for contract (ref: version1/2024)

These conditions accompany our tender and supercede any previous conditions issued. Solmek will prepare a report solely for the use of the Client (the party invoiced) and its agent(s). No reliance should be placed on the contents of this report, in whole or in part by 3rd parties. The report, its content and format and associated data are copyright, and the property of Solmek. Photocopying of part or all of the contents, transfer or reproduction of any kind is forbidden without written permission from Solmek. A charge may be levied against such approval, the same to be made at the discretion of Solmek.

Solmek cannot be held liable and do not warrant, or otherwise guarantee the validity of information provided by third parties and subsequently used in our reports. Solmek are not responsible for the action negligent of otherwise of subcontractors or third parties.

Site investigation is a process of sampling. The scope and size of an investigation may be considered proportional to levels of confidence regarding the ground and groundwater conditions. The exploratory holes undertaken investigate only a small volume of the ground in relation to the overall size of the site, and can only provide a general indication of site conditions. The opinions provided and recommendations given in this report are based on the ground conditions as encountered within each of the exploratory holes. There may be different ground conditions elsewhere on the site which have not been identified by this investigation and which therefore have not been taken into account in this report. Reports are generally subject to the comments of the local authority and Environment Agency. The comments made on groundwater conditions are based on observations made at the time that site work was carried out. It should be noted that mobile contamination, ground gas levels and groundwater levels may vary owing to seasonal, tidal and/or weather related effects. Solmek cannot be held liable for any unrecorded or unforeseen obstructions between exploratory boreholes and trial pits. This includes instances where previous structures on the site (buried man made structures) or the presence of boulder clay (cobbles and/or boulder obstructions) have been anticipated. All types of piling operations should make allowance for obstructions within the construction budget to accommodate this. Unrecorded ancient mining may occur anywhere where seams that have been worked and influence the rock and soil above. Dissolution cavities can occur where gypsum or chalk is present. Rotary drilling is the recommended technique to prove the integrity of the rock.

Where the scope of the investigation is limited via access to information, time constraints, equipment limitations, testing, interpretation or by the client or his agents budgetary constraints, elements not set out in the proposal and excluded from the report are deemed to be omitted from the scope of the investigation.

Desk studies are generally prepared in accordance with RICS guidelines. Environmental site investigations are generally undertaken as 'exploratory investigations' in accordance with the definitions provided in paragraph 5.4 of BS 10175:2011 in order to confirm the conceptual assumptions. You are advised to familiarize yourself with the typical scope of such an investigation. No pumping of water will be undertaken unless a licence or facilities/equipment have been arranged by others.

Where the type, number or/and depth of exploratory hole is specified by others, Solmek cannot and will not be responsible for any subsequent shortfall or inadequacy in data, and any consequent shortfall in interpretation of environmental and geotechnical aspects which may be required at a later date in order to facilitate the design of permanent or temporary works.

All information acquired by Solmek in the course of investigation is the property of Solmek, and, only also becomes the joint property of the Client only on the complete settlement of all invoices relating to the project. Solmek reserve the right to use the information in commercial tendering and marketing, unless the Client expressly wishes otherwise in writing. The quoted rates do not include VAT, and payment terms are 30 days from dispatch of invoice from our offices. Quotes are subject to a site visit.

We have allowed for 1 mobilisation and normal working hours unless otherwise stated. The scope of the investigation may be reviewed following the desk study and/or fieldwork. The presence or otherwise of Japanese Knotweed or other invasive plants can be difficult to identify especially during winter months. If Japanese Knotweed or other invasive species are suspect, it should be confirmed by an ecologist. We have not allowed for acquiring services information, and cannot be responsible for damage to underground services or pipes not shown to us or not clearly shown on plans. Costs incurred will be passed on to you, and in commissioning Solmek you understand and accept that you/your agent have a contractual relationship with Solmek & you accept this. Our rates assume unobstructed, reasonably level and firm access to the exploratory positions and adequate clear working areas and headroom. We have priced on the basis that you or your client have the necessary permissions, wayleaves and approvals to access land. All boreholes and pits are backfilled with arisings except where gas monitoring pipes are installed with stopcock covers. Solmek are not responsible for any uneven surfaces as a result of siteworks and rutting and backfilled excavations may require re-levelling and/or making good by others after fieldwork is complete, and Solmek has not allowed for this. No price has been provided or requested for a return visit to remove pipework and covers. Hourly rates apply to consultancy only and do not include expenses unless otherwise shown. If warranties are required, legal costs incurred will be passed on to you assuming Solmek agree to complete such warranties, modified or otherwise and you understand and agree to pay all costs.

We reserve the right to pursue full payment of the invoice prior to release of any information including reports. We advise you/your client that we may elect to pursue our statutory rights under late payment legislation, and will apply 8% to the base rate for unreasonably late payments. Solmek are exempt from the CIS Scheme. Solmek offer to undertake work only in strict accordance with conditions covered by our current insurances, which are available for inspection. Solmek are not responsible for acts, negligent or otherwise of subcontractors and as a matter of policy cannot indemnify any other parties. Professional indemnity Insurance is limited to ten times the invoice net total except where stated otherwise by Solmek. Solmek give notice that consequential loss as a direct or indirect result of Solmek's activities or omission of the same are excluded.

UK BACKGROUND

Environmental Protection Act 1990: Part 2A Revised Statutory Guidance (April 2012)

This revised document explains how the Local Authority should decide if land, based on a legal interpretation, is contaminated. The document replaces the previous guidance given in Annex 3 of DEFRA Circular 01/2006, issued in accordance with section 78YA of the 1990 Environmental Protection Act.

The main objectives of the Part 2A regime are to *"identify and remove unacceptable risks to human health and the environment" and* to *"seek to ensure that contaminated land is made suitable for its current use".*

Part 2A uses a risk based approach to defining contaminated land whereby the "risk" is interpreted as *"the likelihood that harm, or pollution of water, will occur as a result of contaminants in, on or under the land"* and by *"the scale and seriousness of such harm or pollution if it did occur".*

For a relevant risk to exist a contaminant, pathway and receptor linkage must be present before the land can be considered to be contaminated. The document explains that *"for a risk to exist there must be contaminants present in, on or under the land in a form and quantity that poses a hazard, and one or more pathways by which they might significantly harm people, the environment, or property; or significantly pollute controlled waters."*

A conceptual model is used to develop and communicate the risks associated with a particular site.

To determine if land is contaminated the local authority use various categories from 1 to 4. Categories 1 and 2 include *"land which is capable of being determined as contaminated land on grounds of significant possibility of significant harm to human health."*

Categories 3 and 4 *"encompass land which is not capable of being determined on such grounds".*

PRELIMINARY CONCEPTUAL MODEL

Preliminary Conceptual Models are undertaken in accordance with CIRIA C552. The Preliminary Conceptual Model assesses the consequence and the likelihood of a risk being realised to provide a risk classification, using the tables detailed below.

CONSEQUENCE OF RISK BEING REALISED (Based on C552 CIRIA, 2001)

Classification	Definition	Example
Severe	Short-term (acute) risk to human health, the environment, an element of the development or other aspect with is likely to result in *significant harm*, damage or both.	High concentrations of cyanide on the surface of an informal recreational area. Major spills of contaminants from site into controlled water. High concentrations of explosive gas in the subsurface environment that have a clear unobstructed pathway into buildings.
Moderate	Chronic damage to human health, a plausible chance that an event will occur, although the timeline is not immediate to be in the short-term.	Appreciable concentration of contamination that over the longer-term will cause significant harm i.e. high lead concentration in topsoil. Shallow mine workings that are potentially unstable but may remain in a satisfactory or stable conditions for a number of years.
Mild	Low level pollution of non-sensitive water, a feasible hazardous scenario although the timeline of such occurring can probably be considered in 10's of years.	The effect of high sulphate concentrations on structural concrete. Pollution of non-classified groundwater.
Minor	Harm, although not necessarily significant to human health, or with respect to other aspects of the development, which are considered implausible in terms of occurrence, or will have little consequential impact.	The presence of contaminants at such low concentrations that protective equipment is required during site works. Any damage to structures is minimal and will not be structural in characteristics.

PROBABILITY OF RISK BEING REALISED (C552 CIRIA, 2001)

Classification	Definition
High Likelihood	There is a viable pollutant linkage and an event that either appears very likely in the short term and almost inevitable over the long term, or there is evidence that the receptor has been harmed or polluted.
Likely	There is a viable pollutant linkage and all elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low Likelihood	There is a viable pollutant linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term.
Unlikely	There is a viable pollutant linkage but circumstances are such that it is improbable that an event would occur even in the very long term.

RISK CLASSIFICATION MATRIX (C552 CIRIA, 2001)

Risk = Probability x Consequence		Consequence			
		Severe	Moderate	Mild	Minor
Probability	High likelihood	Very high risk	High risk	Moderate risk	Moderate/low risk
	Likely	High risk	Moderate risk	Moderate/low risk	Low risk
	Low likelihood	Moderate risk	Moderate/low risk	Low risk	Very low risk
	Unlikely	Moderate/low risk	Low risk	Very low risk	Very low risk

HUMAN RECEPTORS

Human exposure to contaminants present in soils can occur via several pathways. Direct exposure pathways include dermal absorption after contact with contaminated ground, inhalation of soil or dust, inhalation of volatised compounds, and inadvertent soil ingestion (or deliberate soil ingestion in the case of some children). Other indirect pathways include human ingestion of plants grown in contaminated soil or contaminated ground or surface water. Contaminants associated with wind blown dust can affect humans on surrounding sites.

VEGETATION

Plants can be affected by soil contamination in a number of ways resulting in growth inhibition, nutrient deficiencies and yellowing of leaves. Contaminants are taken up by plants through the roots and through foliage. Contaminants identified as being highly phytotoxic include boron, cadmium, copper, lead, nickel, and zinc.

To establish if the levels of contaminants present on a site may pose a risk to vegetation the results of the contamination testing are compared to a series of threshold values published in 'Code of Good Agricultural Practice for the Protection of Soil'.

GROUNDWATER AND SURFACE WATER RECEPTORS

The principal pathway by which soil contamination may reach the water environment is through a slow seepage or leaching to groundwater or surface water. The potential for contaminants to migrate along such pathways is dependent on the chemical and physical characteristics of the contaminants and the local hydrogeology. Surface watercourses may also accumulate contamination as contaminated sediments are deposited within the water body.

Where the site investigated overlies major/principal aquifers (and in some cases minor/secondary aquifers depending on certain conditions), groundwater Source Protection Zones and areas in close proximity to groundwater abstractions, contamination test results have been compared with the Water Supply (Water Quality) Regulations 1989 and The Water Supply (Water Quality) Regulations 2000.

Should a surface water receptor, such as a fresh water environment (river, canal, stream, lake etc), or marine environment be considered sensitive in relation to a site, then test results are compared with DEFRA & SEPA Environmental Quality Standards (2004). Many of the Environmental Quality Standards are hardness ($CaCO_3$) depended. Where no hardness values are available, Solmek assume conservative values (of between 0 and 50mg/l).

In the absence of vulnerable ground and surface water environments, Solmek may compare any test results with the Environment Agency Leachate Quality Threshold Values.

DETAILED QUANTITATIVE RISK ASSESSMENT (DQRA)

In line with Environment Agency's guidance document Environment Agency *Land Contamination Risk Management*, which replaced the now-withdrawn *Contaminated Land Report 11 – Model Procedures for the Management of Land Contamination (2004)*, a DQRA for groundwater/human health may be required following a Phase 2 investigation and before the preparation of a Phase 3 Remediation Strategy. For human health DQRA, a site specific assessment criteria is undertaken using CLEA Software Version 1.06. For groundwater DQRA, the Environment Agency Remedial Targets Worksheet Version 3.1 is used.

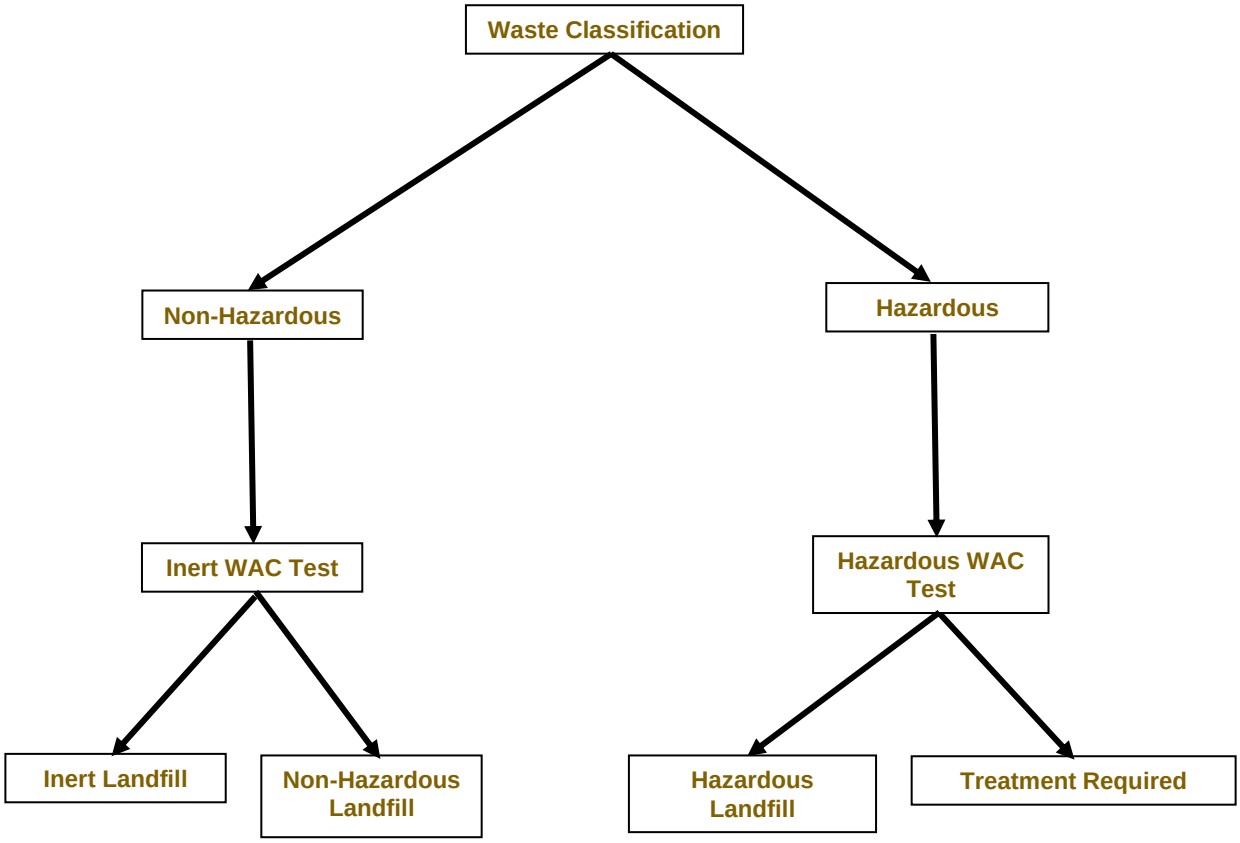
WASTE CLASSIFICATION AND WASTE ACCEPTANCE CRITERIA

During the site strip and construction activities, material may be required to be removed from site. Any such material would require classification, in line with Environment Agency Technical Guidance *Waste Classification: Guidance on the classification and assessment of waste (2015)*. This would classify the material as either Non-Hazardous or Hazardous Waste.

Once the material has been classified, determining the suitable landfill for disposal is governed by landfill directive Waste Acceptance Criteria (WAC) testing, with landfills categorized as Inert Waste, Stable Non-Reactive Hazardous Waste and Hazardous Waste. The WAC testing relates to materials that are to be exported from a site/development to landfill, and do not directly relate to human health specifically. The testing results are generally presented as certificates which can be used by site owners/contractors etc, which should be presented to the accepting waste facility or waste contractor.

If waste classification and/or WAC testing are not undertaken, material taken off site may be subject to WAC testing by the appropriate waste disposal company. The decision on whether or not to accept waste, or whether further testing is required, is at the discretion of the waste disposal company.

The below flow chart provides further information on the waste classification process.



CONSTRUCTION MATERIALS

Materials at risk from possible soil contaminants include inorganic matrices such as cement and concrete and also organic material such as plastics and rubbers. Acid ground conditions and high levels of sulphates can accelerate the corrosion of building materials. Where pH and soluble sulphate analysis has been undertaken, Solmek compare the test results with the guidelines presented within BRE Special Digest 1, 2005 (3rd Edition) 'Concrete in Aggressive Ground'. Plastics and rubbers are generally used for piping and service ducts and are potentially attacked by a range of chemicals, most of which are organic, particularly petroleum based substances. Drinking water supplies can be tainted by substances that can penetrate piping and water companies enforce stringent threshold values.

The levels of potential contaminants should be compared to thresholds supplied in the UK Water Industry Research (UKWIR) publication "Guidance for the selection of Water Supply Pipes to be used in Brownfield Sites" (January 2011). A Brownfield Site is defined in the document as "Land or premises that have not previously been used or developed that may be vacant or derelict". It should be noted that Brownfield sites may not be contaminated. The guidance does not apply to Greenfield Sites however water companies may have their own assessment criteria which should be checked by the developer. The table below outlines the pipe material selection threshold concentrations.

	Pipe Material (Threshold concentrations in mg/kg)					
Parameter group	**PE**	**PVC**	**Barrier pipe (PE-AL-PE)**	**Wrapped Steel**	**Wrapped Ductile Iron**	**Copper**
Extended VOC suite by purge and trap or head space and GC-MS with TIC	0.5	0.125	Pass	Pass	Pass	Pass
+ BTEX + MTBE	0.1	0.03	Pass	Pass	Pass	Pass
SVOCs TIC by purge and trap or head space and GC-MS with TIC (aliphatic and aromatic C5-C10)	2	1.4	Pass	Pass	Pass	Pass
+ Phenols	2	0.4	Pass	Pass	Pass	Pass
+ Cresols and chlorinated phenols	2	0.04	Pass	Pass	Pass	Pass
Mineral oil C11-C20	10	Pass	Pass	Pass	Pass	Pass
Mineral oil C21-C40	500	Pass	Pass	Pass	Pass	Pass
Corrosive (Conductivity, Redox and pH)	Pass	Pass	Pass	Corrosive if pH <7 and conductivity >400µS/cm	Corrosive if pH <5, Eh not neutral and conductivity >400µS/cm	Corrosive if pH <5 or >8 and Eh positive
Specific suite identified as relevant following site investigation						
Ethers	0.5	1	Pass	Pass	Pass	Pass
Nitrobenzene	0.5	0.4	Pass	Pass	Pass	Pass
Ketones	0.5	0.02	Pass	Pass	Pass	Pass
Aldehydes	0.5	0.02	Pass	Pass	Pass	Pass
Amines	Fail	Pass	Pass	Pass	Pass	Pass

REQUIREMENTS OF PARTIES WITHIN THE DEVELOPMENT PROCESS

Interested parties involved in the development process may use the data in different ways and there may be varying views and interpretation of the factual data. Local Authority staff may have a view on contamination and human health and the wider environment. The Environment Agency are concerned principally with the protection of Controlled waters. Building insurers, funders and purchasers may be primarily concerned with issues of potential commercial blight. Purchasers are also not always fully informed, and perceptions on issues associated with risk can affect the decision to purchase. Developers and construction organisations will focus on financial aspects of dealing with the contamination in the context of the development and construction programme.

RISKS & LIABILITIES FROM CONTAMINATION

In simple terms, risks associated with contamination may be considered in terms of 1) statutory risks and 2) development related risks. If contamination is severe or forms a potential hazard based on its potential to affect groundwater, surface water or human health, a statutory risk may be present, and as such, if the risk is not reduced, criminal proceedings may be instigated by a government body or local authority.

If the contamination is less severe or not considered to be mobile, it may be considered a commercial liability which could, in theory remain untreated, but which may at a later date affect the value of the property, or, with changing legislation, become a statutory risk. Commercial liabilities could give rise to civil proceedings by third parties if there are grounds for action.