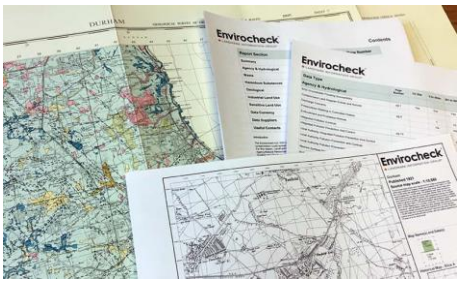



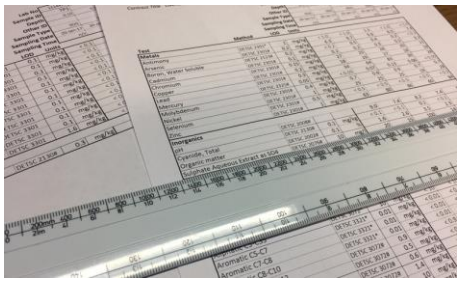

Phase 2: Site Investigation

Spaines Road Mosque, Huddersfield

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PHASE 2 SITE INVESTIGATION REPORT

SPAINES ROAD MOSQUE, HUDDERSFIELD

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APPENDICES

Revision	Date	Prepared by	Signed
Final	July 2019	D Simpson *Principal Geotechnical Engineer*	
		Checked by	
		M Atkins *Geotechnical Engineer*	
		Approved by	
		R Woods *Principal Geotechnical Engineer*	

1 EXECUTIVE SUMMARY

Site Address	Spaines Road, Fartown, Huddersfield, HD2 2SD.
Proposed Development	The proposed development is outlined to be the alteration and extension of an existing mosque with associated parking, access roads and soft landscaping.
Fieldwork	• 5no small percussive boreholes (BH1 to BH5 inclusive) to a maximum depth of 5.00m below ground level (bgl). Gas monitoring wells were installed in BH's 1, 2 & 3. • 3no boreholes (RBH1 to RBH3 inclusive) were sunk by rotary drilling to depths of 30.00mbgl. • 6no machine excavated trial pits (TP1 to TP6 inclusive) were dug to a maximum depth of 2.00mbgl.
Ground Conditions	• Made ground to a maximum depth of 1.70mbgl comprised a surface layer of either gravel, tarmac or concrete to depths of between 0.05mbgl and 0.40mbgl. This was underlain with either sandy slightly gravelly clay fill or slightly clayey gravelly sand fill. Locally a 0.50m thick layer of concrete underlay the gravel fill. Locally ash was recorded within the gravel fill. • Natural ground generally comprised firm to stiff consistency slightly sandy slightly gravelly, locally sandy, medium to high strength clay of medium plasticity to depths between 2.10mbgl and 4.30mbgl. In the trial pits the natural stratum comprised soft consistency slightly sandy clay. • Highly weathered sandstone recovered as clayey sandy gravel was noted across the site from 2.10mbgl to the base of each borehole at 5.00mbgl. In the trial pits completely weathered mudstone was recovered a sandy gravelly clay from between 1.50mbgl and 1.90mbgl to the bases at 2.00mbgl. In the rotary boreholes solid geology of sandstone with underlying beds of mudstone was proven to depths of 30.00mbgl. • Coal seams, were proven in RBH1 at 9.60mbgl and again at 12.90mbgl, in RBH2 at 12.30mbgl and also in RBH3 at 4.50mbgl.
Contamination Testing Results	• Five made ground samples tested. • Levels of TPH aromatic fraction C21-35, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranene, Dibenzo(ah)anthracene, Id'(123cd)pyrene and Total PAH in BH3 (0.20-0.40m) and/or BH5 (0.20-0.40m) are above the S4UL threshold values • No asbestos within the five samples screened. • Acidic to alkaline pH.
Contamination Analysis	• Levels of TPH aromatic fraction C21-35, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranene, Dibenzo(ah)anthracene, Id'(123cd)pyrene and Total PAH in BH3 (0.20-0.40m) and/or BH5 (0.20-0.40m) are above the S4UL threshold values, Based on the **shallow** soil contamination testing, it is considered that the levels of contamination are unlikely to pose a significant risk to future users of the site, as peripheral soft landscaping is proposed in the final development. This pollutant linkage however will be severed as long as all contaminated areas are covered either by buildings, hardstanding, or a clean cover system. • Full PPE must be employed. • Soft landscaped areas should be excavated to 0.45mbgl or natural ground (whichever is the shallowest). Any deleterious materials encountered (i.e. ash, slag, brick rubble and concrete) should be removed and placed beneath areas of permanent hardcover. A suitable growing medium should be provided for any new soft landscaped areas. This should include clean imported topsoil to a depth of 150mm over a further 300mm of imported subsoil. • With respect to utility suppliers, alkane pH precludes the use of the wrapped steel and copper pipes. • Controlled waters unlikely to be at risk. • Sub surface concrete should be designed to DS-1 ACEC (Class AC-2z) This assumes mobile groundwater conditions. • 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.
Geotechnical Testing Results	• Cohesive deposits medium to high strength (70kPa and 92kPa) based on in-situ tests. • Cohesive materials on site have a medium volume change potential. • Moisture contents between 23 and 34%. • Sulphates between 14-180mg/l, pH acidic to alkaline.
Geotechnical Analysis & Foundation Recommendations	• Foundation options considered as deep strips. • Based on a conservative shear strength of 72kN/m² a safe bearing capacity of 175kN/m² has been determined for strip foundations 0.60m wide founding on the natural clay at depths of around 1.70mbgl. • Providing the safe bearing capacity is not exceed settlements have been calculated to be less than 25mm. • Should the above safe bearing capacities be insufficient for the proposed loading, a piled foundation could be used. • An equilibrium CBR value of 2% should be adopted for both natural and made ground. • Normal earthworks plant for excavations although breaking out of boulders and other obstructions should be anticipated. Stability of excavations will be poor in the made ground but should improve in the natural clay.

2 INTRODUCTION

2.1 Authorisation

The site investigation described in this report was carried out by Solmek to the instructions of Design Studio North Architects on behalf of Ahmadiyya Association UK, on a parcel of land at Spaines Road, Fartown, Huddersfield, HD2 2SD.

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

- *Solmek Phase 1 Desk Study (S170702) July 2017.*

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

2.2 Scope of Works

The proposed development is outlined to be the alteration and extension of an existing mosque with associated parking, access roads and soft landscaping.

A geotechnical and environmental investigation including a ground gas risk assessment was requested. The fieldwork and testing was generally carried out according to the recommendations of BS5930: 2015 "Code of Practice for Ground Investigations" and where applicable BS EN 1997-2:2007 with soil descriptions to BS EN 14688-1:2013 where applicable. 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 AND FIELDWORK

The site is located on a parcel of land adjacent to Spaines Road in Huddersfield. The site is currently developed, and consists of two buildings, with the remainder of the site made up of hardstanding or soft landscaping.

The main building on the site, located within the northeast of the site, is the former pavilion which is currently used as a mosque and is proposed for extension. The second building on the site is a single storey rectangular brick building, the current use of which is unclear. Access to the site is via a gate on the sites southern border.

The site is bordered by residential housing to the north and west. A rugby ground is located to the north, whilst a cricket ground is located immediately east of the site. A road runs along the sites southern boundary.

3.1 Fieldwork

The fieldwork commenced on the 4th June 2019. The extent of the investigation was:

- 5no small percussive boreholes (BH1 to BH5 inclusive) to a maximum depth of 5.00m below ground level (bgl).
    - The boreholes were located by the client, evenly spread around the site to give a general indication of the underlying stratum and to allow foundation design to take place and provide samples for geotechnical and contamination testing and analysis. .
- 3no boreholes (RBH1 to RBH3 inclusive) were sunk by rotary drilling to depths of 30.00mbgl.
    - The boreholes were located to give a general indication of the underlying deeper stratum and to assess the risk from coal mining under the site.
- Gas monitoring wells were installed in BH's 1, 2 & 3.
    - The wells were spaced at <25m centres evenly around the site.

- 6no machine excavated trial pits (TP1 to TP6 inclusive) were dug to a maximum depth of 2.00mbgl.
  - The trial pits were excavated to supplement borehole information.
  - CBR testing was carried out within each trial pit at 0.30mbgl.
- Insitu testing in the exploratory positions as Hand Shear Vane Tests and Standard Penetration Tests (SPTs).
- 3no machine excavated foundation exposure pits (TP1 to TPC inclusive) were dug to a maximum depth of 1.24mbgl.
  - The pits were excavated to assess the conditions of the existing foundations..

The trial pits and boreholes were backfilled with clean arisings or installations upon completion.

Descriptions of the strata encountered in the boreholes and trial pits together with details of sampling and groundwater are presented in Appendix B of this report. A plan showing the location of the boreholes and trial pits can be found in Appendix A (Figure 2).

4 GROUND CONDITIONS

A summary of the ground conditions encountered is given below. The borehole and trial pit logs are presented in Appendix B.

4.1 Made Ground

Made ground was proven within the boreholes and trial pits to a maximum depth of 1.70mbgl. The made ground varied across the site and comprised a surface layer of either gravel, tarmac or concrete to depths of between 0.05mbgl (TP6) and 0.40mbgl (BH's 4 and 5). This was underlain with either sandy slightly gravelly clay fill or slightly clayey gravelly sand fill. Locally (BH2) a 0.50m thick layer of concrete underlay the gravel fill. The gravel components within the made ground comprised dolomite in the surfacing and concrete, sandstone in the clay fill and dolomite, brick and concrete in the gravel fill. Locally ash was recorded within the gravel fill within RBH2 and RBH3.

4.2 Natural Deposits

Proven to underlie the made ground deposits within the small percussive and rotary boreholes, natural ground generally comprised firm to stiff consistency slightly sandy slightly gravelly, locally sandy, medium to high strength clay of medium plasticity to depths between 2.10mbgl (BH1) and 4.30mbgl (BH2). In the trial pits the natural stratum comprised soft consistency slightly sandy clay. The gravel component within the cohesive stratum comprised sandstone.

4.3 Solid Geology

Within the small percussive boreholes highly weathered sandstone recovered as clayey sandy gravel was noted across the site from 2.10mbgl (BH1) to the base of each borehole at 5.00mbgl (BH's 2, 3, 4 and 5). In the trial pits completely weathered mudstone was recovered a sandy gravelly clay from between 1.50mbgl (TP1) and 1.90mbgl (TP6) to the bases at 2.00mbgl.

In the rotary boreholes solid geology of sandstone with underlying beds of mudstone was proven to depths of 30.00mbgl. Coal seams, were proven in RBH1 at 9.60mbgl and again at 12.90mbgl, in RBH2 at 12.30mbgl and also in RBH3 at 4.50mbgl. The seam depths, flush returns and notes are shown in Table 1 below:

TABLE 1: COAL SEAM SUMMARY

Location	Strata	Top of Strata (mbgl)	Bottom of Stata (mbgl)	Flush Returns	Notes
RBH1	Coal	9.60	10.10	100%	Intact
	Coal	12.90	13.30	100%	Intact
RBH2	Coal	12.30	12.80	100%	Intact
RBH3	Coal	4.50	5.00	100%	Intact

4.4 Groundwater

Groundwater was encountered in the rotary boreholes only at depths of between 2.80mbgl (RBH2) and 4.30mbgl (RBH3) during the investigation.

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.

4.5 Foundation Exposure Pits

Trial pits were undertaken to expose and record the foundation details of the existing property.

The section profiles are presented in Appendix B. Brief details of the foundations encountered are given below:

TABLE 2: SUMMARY OF EXISTING FOUNDATION DETAILS

Position	Footing	Top of Foundation (below ground level)	Outstand from Face of Wall (m)	Foundation Thickness
TPA	Concrete	1.16m	0.08m	0.08m
TPB	Concrete	1.04m	0.12m	0.15m
TPC	Concrete	1.06m	0.10m	0.18m

5 CONTAMINATION TESTING RESULTS

The proposed development is outlined to be the alteration and extension of an existing mosque with associated parking, access roads and soft landscaping. The chemical results are presented in Appendix C.

5.1 Site Characterisation

Within the Solmek Phase 1 Desk Study, a preliminary conceptual model was formed based on the information obtained. The initial risk was based on the site history from 1854 to 2017.

An overall low to moderate risk was provided for various receptors due to the development of the Mosque with no residential gardens:

- Human Health – Low to Moderate
- Controlled Water – Low
- Current Site Users (on-site workers/visitors) – Low to Moderate
- Vegetation – Low
- Construction Materials – Low to Moderate

5.2 Contamination Testing

To provide information upon the possibility of ground contamination five samples of made ground were selected for shallow contamination testing. A Low to Moderate overall contamination risk was highlighted in the Phase 1 Desk Study due to previous land uses. This coupled with the end use being a mosque means that five samples are considered appropriate for testing.

- BH1 – 0.20-0.40m (Made ground – clay fill)
- BH2 – 0.80-1.00m (Made ground – clay fill)
- BH3 – 0.20-0.40m (Made ground – granular fill)
- BH4 – 0.40-0.60m (Made ground – clay fill)
- BH5 – 0.20-0.40m (Made ground – granular fill)

The samples selected are considered to provide coverage of the made ground from across the site that would be most likely to be exposed during future site works.

- 5no Metals, semi-metals, non-metals, inorganic determinants
- 5no Asbestos identification screenings
- 5no Speciated Polyaromatic Hydrocarbons (PAHs)
- 1no Total Petroleum Hydrocarbon Criteria Working Group fractions (TPH CWG)

5.3 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 residential without home grown produce 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 3 and 4.

TABLE 3: SUMMARY OF INORGANIC CONTAMINATION TESTING RESULTS (RES WITHOUT HGP)

Determinand	Units	Number of Samples above Level of Detection	Minimum Level	Maximum Level	Residential Without HGP Value	Number of Results Exceeding Threshold Value
Metals						
Cadmium	mg/kg	4	<0.10	0.70	85	0
Chromium III	mg/kg	5	15	56	910	0
Copper	mg/kg	5	17	110	7100	0
Lead	mg/kg	5	17	130	310*	0
Inorganic Mercury	mg/kg	1	<0.10	0.21	56	0
Nickel	mg/kg	5	8.4	52	180	0
Zinc	mg/kg	5	26	74	40000	0
Semi metals and non metals						
Arsenic	mg/kg	5	11	57	40	0
Boron	mg/kg	5	0.46	1.2	11000	0
Selenium	mg/kg	4	<0.20	1.3	430	0
Inorganic chemicals						
Cyanide (total)	mg/kg	0	<0.50	-	73.8**	0
W.S. Sulphate	mg/l	4	<10	230	2000^	0
Other						
pH	pH	-	6.2	8.4	<5.5^	0

* *Category 4 Screening Levels, March 2014*
** *CLEA Software Version 1.06 (pH7 and 1%SOM)*
^ *EA Threshold Values*
+ *BRE Special Digest 1: 2005*
HGP Home Grown Produce

5.4 Metals, Semi Metals and Non-Metals

No samples indicated raised levels of contamination above the S4UL threshold values, based on the five samples tested.

5.5 Inorganic Chemicals

Soluble sulphates (potentially aggressive to foundation concrete) were recorded between <10 and 230mg/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 6.2 and 8.4, which is consistent with acidic to alkaline conditions.

5.6 Organic Chemicals

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

The average SOM recorded across the site was 11.10% therefore a SOM of 6.00% has been used to

determine the S4UL thresholds. Table 4, below, summarises the results.

TABLE 4: SUMMARY OF ORGANIC CONTAMINATION TESTING RESULTS (RES WITHOUT HGP)

Determinand	Units	Number of Samples above LOD	Minimum Level	Maximum Level	S4UL 1% SOM	S4UL 2.5% SOM	S4UL 6% SOM	Number of Results Exceeding Threshold Value
TPH Aliphatic Fractions								
C5-6	mg/kg	0	<1.0	-	42	78	160	0
C6-8	mg/kg	0	<1.0	-	100	230	530	0
C8-10	mg/kg	0	<1.0	-	27	65	150	0
C10-12	mg/kg	0	<1.0	-	130	330	770	0
C12-16	mg/kg	1	23	23	1100	2400	4400	0
C16-35	mg/kg	1	108	108	65000	92000	110000	0
TPH Aromatic Fractions								
C5-7 (Benzene)	mg/kg	0	<1.0	-	370	690	1400	0
C7-8 (Toluene)	mg/kg	0	<1.0	-	860	1800	3900	0
C8-10	mg/kg	0	<1.0	-	47	110	270	0
C10-12	mg/kg	0	<1.0	-	250	590	1200	0
C12-16	mg/kg	1	68	68	1800	2300	2500	0
C16-21	mg/kg	1	680	680	1900	1900	1900	0
C21-35	mg/kg	1	2900	2900	1900	1900	1900	1
Speciated PAH								
Naphthalene	mg/kg	3	<0.10	2.7	2.3	5.6	13	0
Acenaphthylene	mg/kg	3	<0.10	2.6	2900	4600	6000	0
Acenaphthene	mg/kg	3	<0.10	9.0	3000	4700	6000	0
Fluorene	mg/kg	2	<0.10	8.7	2800	3800	4500	0
Phenanthrene	mg/kg	4	<0.10	84	1300	1500	1500	0
Anthracene	mg/kg	3	<0.10	21	31000	35000	37000	0
Fluoranthene	mg/kg	5	0.98	200	1500	1600	1600	0
Pyrene	mg/kg	5	1.1	210	3700	3800	3800	0
Benz' (a)anth' ene	mg/kg	4	<0.10	77	11	14	15	2
Chrysene	mg/kg	4	<0.10	72	30	31	32	1
Benz' (b)fluor' ene	mg/kg	4	<0.10	110	3.9	4.0	4.0	2
Benz' (k)fluor' ene	mg/kg	4	<0.10	41	110	110	110	0
Benz' (a)pyrene	mg/kg	4	<0.10	84	3.2	3.2	3.2	2
Benz (ghi)per' ene	mg/kg	3	<0.10	60	360	360	360	0
Diben(ah)anth'ene	mg/kg	3	<0.10	18	0.31	0.32	0.32	2
Id' (123cd)pyrene	mg/kg	3	<0.10	59	45	46	46	1
Total PAH	mg/kg	5	2.1	1100	50*	50*	50*	2
Phenol	mg/kg	0	<0.3	-	750	1300	2300	0
* *EA Threshold Values*								

Levels of TPH aromatic fraction C21-35, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranene, Dibenzo(ah)anthracene, Id'(123cd)pyrene and Total PAH in BH3 (0.20-0.40m) and/or BH5 (0.20-0.40m) are above the S4UL threshold values, based on the five samples tested. The made ground within BH3 contained ash and clinker.

5.7 Asbestos

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

5.8 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.

6 CONCEPTUAL MODEL AND CONTAMINATION ANALYSIS

The contamination conceptual model in Table 5 identifies the potential pollution linkages present on site based on source – pathway – receptor relationships.

TABLE 5: CONCEPTUAL MODEL

Source	Pathway	Receptor	Risk Rating	Comments
Asphyxiating or explosive ground gases • Made ground (up to 1.70mbgl) • Landfills within 250m • Coal Mining	**Ground gas migration** • Migration through permeable soils • Inhalation	**Future site users** • Transient mosque users	Moderate	Gas monitoring underway. Six visits over three months proposed.
		Users during development • Construction workers	Low/Moderate	
Areas of contamination • exceedances of organic determinands in BH3 (0.20-0.40m) and BH5 (0.20-0.40m) • No asbestos detected	• Inhalation	**Future site users** • Transient mosque worshippers	Low	Mitigated by proposed structure hard standing – clean cover for peripheral soft landscaped areas
		Users during development • Construction workers	Moderate	Risks posed during construction – appropriate PPE adopted for the duration of the contractor works and good practice adopted.
	• Inhalation • Dust ingestion	**Users of surrounding sites** • Transient adult workers/nearby residents	Moderate	Significant risk during construction from dust generation. Consideration to be given to dust suppression in dry, windy conditions.
	• Leaching of mobilised contaminants	**Solid geology** • Secondary Aquifer – A	Low	Limited risk from contamination on site due to underlying clay.
	• Drainage • Lateral migration • Accumulation of contaminated sediment	**Surface water features** • Rivers located 196m west of the site.	Low	Very limited potential for contamination from site to reach surface water, either via surface run-off or groundwater movement.
	• Uptake via roots and leaf surfaces	**Vegetation** • Soft landscaped areas	Low	Clean cover system to be adopted.
Areas of contamination above service fabric or BRE Special Digest 1 thresholds	• Direct contact	**Construction Materials** • Concrete	Moderate /Low	Class DS-1 ACEC (Class AC-2z) requirements for concrete protection. This assumes mobile groundwater conditions..
	• Direct contact	**Construction Materials** • Service Fabric	Moderate /Low	Wrapped Steel and Copper pipes precluded due to pH.

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

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

6.1 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/CIEH S4UL based on residential without home grown produce.

In terms of metals, semi-metals, non-metals and inorganic determinants generally none of the five samples subject to testing returned any values above relevant threshold values considered to cause long term harm to human health. In terms of organic determinands, two 'hotspot' areas of concern within the shallow made ground where levels of TPH aromatic fraction C21-35, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranene, Dibenzo(ah)anthracene, Id'(123cd)pyrene and Total PAH in BH3 (0.20-0.40m) and/or BH5 (0.20-0.40m) are above the S4UL threshold values, based on the five samples tested. The made ground within BH3 contained ash and clinker.

The proposed development is outlined to be an extension to the existing mosque building with associated parking, access roads and peripheral soft landscaping. Based on the **shallow** soil contamination testing, it is considered that the levels of contamination are likely to pose a risk to future users of the site. This pollutant linkage however will be severed as long as all contaminated areas are covered either by buildings, hardstanding, or a clean cover system.

During the initial site strip if any zones of odorous, brightly coloured or suspected contaminated ground are encountered then work should cease in that area until the material has been tested. The results of the tests will determine whether or not remediation will be required.

6.2 Waste Acceptance Criteria Testing

The current legislation on waste involves the categorisation of materials into Inert Waste, Non-Reactive Hazardous Wastes and Hazardous Wastes. The determination of the category depends on DEFRA landfill directive WAC. Material taken off site may be subject to WAC testing by the appropriate waste disposal company.

WAC testing was carried out on one sample of soil (BH3, 0.20-0.40m). The results are presented in Appendix C.

The results show that the Total Organic Carbon and Loss on Ignition are above the Hazardous Waste threshold and TPH (Mineral Oil), Total PAH as well as pH fall above the inert waste threshold or the Stable Non-Reactive Waste category. Fluoride is above the Inert Waste threshold.

The decision of the waste category is purely down to the discretion of the particular waste company used to remove the spoil

6.3 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.

Raised levels of TPH aromatic C21-35 and several PAHs, in BH3 and BH5 were detected. It is considered that such levels of contamination may pose risk to construction workers and users of surrounding sites. 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 still 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 off-site receptors. Monitoring of dust concentrations during construction should be given careful consideration to ensure occupational exposure levels are not exceeded.

6.4 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.

To establish if the levels of contaminants present on site may pose a risk to vegetation the results of the contamination testing have been compared to a series of threshold values published in "*Code of Good Agricultural Practice for the Protection of Soil"*. Concentrations of the phytotoxic determinants Copper and Lead are shown as elevated from the six samples tested.

During the initial site strip, proposed soft landscaped areas should be excavated to 0.45mbgl or natural ground (whichever is the shallowest). Any deleterious materials encountered (i.e. ash, slag, brick rubble and concrete) should be removed and placed beneath areas of permanent hardcover. A suitable growing medium should be provided for any new soft landscaped areas. This should include clean imported topsoil to a depth of 150mm over a further 300mm of imported subsoil.

Appropriate certification would be required to ensure that the imported materials are clean and free from deleterious materials in accordance with the Local Authority Guidelines '*Verification Requirements for Cover Systems, Technical Guidance for developers, Landowners and Consultants'* (Yorkshire and Lincolnshire Pollution Advisory Group Version 3.4 – November 2017). Details of the clean cover system must be presented in a Phase 3 Remediation Statement.

6.5 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 generally made ground of up to 1.70mbgl over cohesive drift deposits. The drift deposits can be considered to have a low permeability.

The published geology indicates the site is underlain by solid geology designated as a Secondary A Aquifer by the Environment Agency.

The nearest surface water feature is a river ca. 196m west of the site.

Groundwater was encountered in the rotary boreholes only at depths of between 2.80mbgl (RBH2) and 4.30mbgl (RBH3) during the investigation.

Due to the generally low contamination found across the site, the low permeability clay acting as an aquiclude, and the distance to surface waters, the development is considered to represent a low risk to groundwater or surface water receptors.

6.6 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.

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-2z) requirements for concrete protection. This assumes mobile groundwater conditions.

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 Brownfields 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.

Acidic to alkaline pH levels were encountered across the site.

The concentrations of the selected determinants should be compared to the pipe material selection table in Appendix E and Consultation with the appropriate water supply company is required to identify the most suitable service fabric. However, the pH potentially precludes the use of wrapped steel and copper pipes.

7 GROUND GAS ASSESSMENT

The proposed development includes the construction of an extension to a mosque.

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 three standpipes (BH1, BH2 & BH3) 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.

8 GEOTECHNICAL TESTING AND ANALYSIS

Samples taken from the boreholes underwent a series of geotechnical tests (BS 1377:1990) to aid foundation design and soil description. In addition, insitu Standard Penetration Tests (SPTs) and hand shear vane tests were undertaken at regular intervals during drilling. CBR tests were also undertaken within the trial pits. The geotechnical results are presented in Appendix D.

8.1 Strength and Density

The natural shallow clay at depths of 1.20mbgl and 2.00mbgl (where made ground deeper), gave hand shear vane test results of between 70kPa and 92kPa can be assumed which indicate medium to high strength clays.

8.2 Moisture Contents

Five samples recovered from the boreholes have been subject to moisture content tests to determine the

moisture profile at depths of between 0.80 and 2.00mbgl. Moisture levels were between 23% and 34%.

8.3 Atterberg Limit Determinations

Five 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 clay of intermediate to high plasticity.

The Plasticity Indices ranged from 19 to 32 with equivalent moisture contents recorded above and below the corresponding plastic limits. The cohesive material can be assessed as having a **medium** shrinkage potential in relation to NHBC Guidance Chapter 4.2.

8.4 Particle Size Distribution and Sedimentation Testing

Two samples from the boreholes at depths of between 0.80mbgl and 2.00mbgl were subject to Particle Size Distribution (PSD) tests in accordance with BS1377 Part 2 to aid soil descriptions. The results have been used to prepare precise soil descriptions in accordance with BS5930:1999 Section 6 and are presented in Appendix D.

8.5 pH and Sulphate Results

Five natural samples 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 ranged from 6.1 to 7.5 indicating acidic to alkaline conditions. Soluble sulphates were recorded at levels ranging from 14mg/l to 180mg/l.

8.6 CBR Test Results

Plate bearing CBR tests were carried out within each trial pit at 0.30mbgl. The stratum encountered comprised natural cohesive deposits within TP's 1, 2, 3 and 5 (2.51% to 3.01%) with made ground in TP4 and TP6 (9.72% and 2.60% respectively). An equilibrium CBR value of 2% should be adopted for both natural and made ground.

8.7 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, the depth of made ground across the site of the proposed building is up to 1.40mbgl. Depending upon final proposed levels, it is assumed that the foundations will have to be deepened to accommodate the thickness of made ground.

Assuming conventional strip footing/pad foundations are adopted, and based on a conservative shear strength of 72kN/m² a safe bearing capacity of 175kN/m² has been determined for strip foundations 0.60m wide founding on the natural clay at depths of around 1.40mbgl. Providing the safe bearing capacity is not exceed settlements have been calculated to be less than 25mm.

Foundations near existing or proposed trees should be deepened and provided with appropriate heave precautions in accordance with NHBC Standards Chapter 4.2 current 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.

8.8 Excavation

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

8.9 Groundwater

Groundwater was encountered in the rotary boreholes only at depths of between 2.80mbgl (RBH2) and 4.30mbgl (RBH3) during the investigation.

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.

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Appendix A

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Figure Title

Site Location Plan

Project Number

S190527

Project Name

Spaines Road Mosque, Huddersfield

Client

Ahmadiyya Association UK

Date

July 2019

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

S190527

Project Name

Spaines Road Mosque, Huddersfield

Client

Ahmadiyya Association UK

Date

July 2019

DRG Number

Figure 2

Scale

1:1000 @ A4 [DO NOT SCALE]

Legend Key

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

Appendix B

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Borehole Log

Scale 1:50 Sheet 1 of 1

BH1

Contract no:	S190527	**Site:**	Spaines Road Mosque, Huddersfield	**Driller:**	SR Drilling Ltd
				Plant used:	Mini Rig
				Started:	04/06/2019
Client:	Ahmadiyya Association UK			**Ended:**	04/06/2019
Method:	Small Percussive			**Backfilled:**	04/06/2019

GL (AOD):	
Easting:	414255
Northing:	418459
Logged:	MA
Status:	FINAL

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing		
					Depth (m)	Type	Results
		0.10		MADE GROUND: Yellowish brown sandy gravel fill. Gravel is fine to coarse angular to sub angular dolomite.	0.20 - 0.40	D	
				MADE GROUND: Dark brown sandy slightly gravelly clay fill. Gravel is fine to medium sub angular concrete and sandstone.	0.40 - 0.60	D	
		0.80		Firm to stiff consistency brown mottled grey slightly sandy slightly gravelly medium to high strength CLAY of medium plasticity. Gravel is fine sub rounded sandstone.	0.80 - 1.00	D	
					1.20	HV	72kPa
					1.40 - 1.60	D	
					1.80 - 2.00	D	
		2.10		Brown highly weathered SANDSTONE (recovered as clayey sandy gravel).	2.00	HV	81kPa
					2.40 - 2.60	D	
					2.80 - 3.00	D	
G					3.00 - 3.45	SPT (S)	N=14 (3,4/3,3,4,4)
					3.80 - 4.00	D	
		4.10		End of Borehole at 4.100m			

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. No groundwater encountered.								

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Borehole Log

Scale 1:50 Sheet 1 of 1

BH2

Contract no:	S190527	**Site:**	Spaines Road Mosque, Huddersfield	**Driller:**	SR Drilling Ltd
				Plant used:	Mini Rig
				Started:	04/06/2019
Client:	Ahmadiyya Association UK			**Ended:**	04/06/2019
Method:	Small Percussive			**Backfilled:**	04/06/2019

GL (AOD):	
Easting:	414277
Northing:	418453
Logged:	MA
Status:	FINAL

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing		
					Depth (m)	Type	Results
		0.10		MADE GROUND: Tarmac.			
				MADE GROUND: Concrete.	0.20 - 0.40	D	
					0.40 - 0.60	D	
		0.60		MADE GROUND: Dark brown sandy slightly gravelly clay fill. Gravel is fine to medium sub angular concrete and sandstone.	0.80 - 1.00	D	
		1.10		Firm to stiff consistency brown mottled grey slightly sandy slightly gravelly medium to high strength CLAY of medium plasticity. Gravel is fine sub rounded sandstone.	1.20	HV	92kPa
					1.40 - 1.60	D	
					1.80 - 2.00	D	
					2.00	HV	87kPa
					2.40 - 2.60	D	
					2.80 - 3.00	D	
					3.00	HV	63kPa
					3.80 - 4.00	D	
					4.00	HV	62kPa
		4.30		Firm consistency brown slightly sandy gravelly CLAY. Gravel is fine to coarse angular sandstone.			
					4.80 - 5.00	D	
		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. No groundwater encountered.								

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Borehole Log

Scale 1:50 Sheet 1 of 1

BH3

Contract no:	S190527	**Site:**	Spaines Road Mosque, Huddersfield	**Driller:**	SR Drilling Ltd
				Plant used:	Mini Rig
				Started:	04/06/2019
Client:	Ahmadiyya Association UK			**Ended:**	04/06/2019
Method:	Small Percussive			**Backfilled:**	04/06/2019

GL (AOD):	
Easting:	414256
Northing:	418426
Logged:	MA
Status:	FINAL

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing		
					Depth (m)	Type	Results
		0.06		MADE GROUND: Tarmac.			
				MADE GROUND: Dark brown sandy gravel fill. Gravel is fine to coarse angular ash and clinker.	0.20 - 0.40	D	
		0.40		MADE GROUND: Dark brown sandy slightly gravelly clay fill. Gravel is fine to medium sub angular concrete and sandstone.	0.40 - 0.60	D	
					0.80 - 1.00	D	
					1.20	HV	67kPa
		1.40		Firm to stiff consistency brown mottled grey sandy medium to high strength CLAY.	1.40 - 1.60	D	
					1.80 - 2.00	D	
					2.00	HV	92kPa
					2.40 - 2.60	D	
		2.70		Brown highly weathered SANDSTONE (recovered as clayey sandy gravel).	2.80 - 3.00	D	
G					3.00 - 3.45	SPT (S)	N=9 (2,2/3,2,2,2)
					3.80 - 4.00	D	
					4.00 - 4.45	SPT (S)	N=12 (3,4/3,2,4,3)
					4.80 - 5.00	D	
		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)	1.2m hand excavated inspection pit. No groundwater encountered.	From (m)	To (m)	Time (hr)	Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)

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Borehole Log

Scale 1:50 Sheet 1 of 1

BH4

Contract no:	S190527	**Site:**	Spaines Road Mosque, Huddersfield	**Driller:**	SR Drilling Ltd
				Plant used:	Mini Rig
				Started:	04/06/2019
Client:	Ahmadiyya Association UK			**Ended:**	04/06/2019
Method:	Small Percussive			**Backfilled:**	04/06/2019

GL (AOD):	
Easting:	414267
Northing:	418414
Logged:	MA
Status:	FINAL

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing		
					Depth (m)	Type	Results
				MADE GROUND: Yellowish brown sandy gravel fill. Gravel is fine to coarse angular to sub angular dolomite.	0.20 - 0.40	D	
		0.40		MADE GROUND: Dark brown sandy slightly gravelly clay fill. Gravel is fine to medium sub angular concrete and sandstone.	0.40 - 0.60	D	
					0.80 - 1.00	D	
					1.20	HV	49kPa
					1.40 - 1.60	D	
		1.60		Firm to stiff consistency brown mottled grey slightly sandy slightly gravelly medium to high strength CLAY of low plasticity. Gravel is fine sub rounded sandstone.	1.80 - 2.00	D	
					2.00	HV	72kPa
					2.40 - 2.60	D	
		2.60		Brown highly weathered SANDSTONE (recovered as clayey sandy gravel).	2.80 - 3.00	D	
					3.00 - 3.45	SPT (S)	N=26 (3,3/3,4,4,15)
					3.80 - 4.00	D	
					4.00 - 4.45	SPT (S)	N=19 (2,4/3,2,3,11)
					4.80 - 5.00	D	
		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)	1.2m hand excavated inspection pit. No groundwater encountered.	From (m)	To (m)	Time (hr)	Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)

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Borehole Log

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BH5

Contract no:	S190527	**Site:**	Spaines Road Mosque, Huddersfield	**Driller:**	SR Drilling Ltd
				Plant used:	Mini Rig
				Started:	04/06/2019
Client:	Ahmadiyya Association UK			**Ended:**	04/06/2019
Method:	Small Percussive			**Backfilled:**	04/06/2019

GL (AOD):	
Easting:	414272
Northing:	418389
Logged:	MA
Status:	FINAL

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing		
					Depth (m)	Type	Results
				MADE GROUND: Yellowish brown sandy gravel fill. Gravel is fine to coarse angular to sub angular dolomite.	0.20 - 0.40	D	
		0.40		MADE GROUND: Dark brown sandy slightly gravelly clay fill. Gravel is fine to medium sub angular concrete and sandstone.	0.40 - 0.60	D	
					0.80 - 1.00	D	
					1.20	HV	52kPa
					1.40 - 1.60	D	
		1.70		Firm to stiff consistency brown mottled grey slightly sandy slightly gravelly medium to high strength CLAY of medium plasticity. Gravel is fine sub rounded sandstone.	1.80 - 2.00	D	
					2.00	HV	70kPa
					2.40 - 2.60	D	
		2.70		Brown highly weathered SANDSTONE (recovered as clayey sandy gravel).	2.80 - 3.00	D	
					3.00 - 3.45	SPT (S)	N=17 (3,4/4,4,5,4)
					3.80 - 4.00	D	
					4.00 - 4.45	SPT (S)	N=18 (4,5/5,4,4,5)
					4.80 - 5.00	D	
		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)	1.2m hand excavated inspection pit. No groundwater encountered.	From (m)	To (m)	Time (hr)	Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)

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Rotary Open Hole Log

Scale 1:50 Sheet 1 of 3

RBH1

Contract no:	S190527	**Site:**	Spaines Road Mosque, Huddersfield	**Driller:**	Bainbridge Brothers Ltd
				Plant used:	Beretta T41
				Started:	11/06/2019
Client:	Ahmadiyya Association UK			**Ended:**	11/06/2019
Method:	Rotary open hole			**Backfilled:**	11/06/2019

GL (AOD):
Easting: 414249.57
Northing: 418436.24
Logged: MA
Status: FINAL

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing: Depth (m)	Type	Results	Coring / Fractures: TCR (%)	SCR (%)	RQD (%)	Fracture
		0.30		MADE GROUND: Light brown slightly clayey sandy gravel fill. Gravel is fine to medium sub angular to sub rounded dolomite.							
				MADE GROUND: Dark brown sandy slightly gravelly clay fill. Gravel is fine to medium sub angular concrete and sandstone.							
		1.70		Brown mottled grey slightly sandy slightly gravelly CLAY.							
		3.90		Dark grey SANDSTONE.							
		7.50		Light grey MUDSTONE.							
		9.60		Intact COAL.							

Hole Diameter		Casing Depths		General Remarks
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	1.2m hand excavated inspection pit. Groundwater encountered at 3.90m.

Flush Returns				Ground Water				
From (m)	To (m)	Flush Type	Flush (%)	Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)
				3.90				

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Rotary Open Hole Log

Scale 1:50 Sheet 2 of 3

RBH1

Contract no:	S190527	**Site:**	Spaines Road Mosque, Huddersfield	**Driller:**	Bainbridge Brothers Ltd
				Plant used:	Beretta T41
				Started:	11/06/2019
Client:	Ahmadiyya Association UK			**Ended:**	11/06/2019
Method:	Rotary open hole			**Backfilled:**	11/06/2019

GL (AOD):		
Easting:	414249.57	
Northing:	418436.24	
Logged:	MA	
Status:	FINAL	

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing			Coring / Fractures			
					Depth (m)	Type	Results	TCR (%)	SCR (%)	RQD (%)	Fracture
		10.10		Intact COAL.							
				Dark grey MUDSTONE.							
		12.90		Intact COAL.							
		13.30		Light grey MUDSTONE.							

Hole Diameter		Casing Depths		General Remarks	Flush Returns				Ground Water				
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	1.2m hand excavated inspection pit. Groundwater encountered at 3.90m.	From (m)	To (m)	Flush Type	Flush (%)	Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)
									3.90				

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Rotary Open Hole Log

Scale 1:50 Sheet 3 of 3

RBH1

Contract no: S190527
Site: Spaines Road Mosque, Huddersfield
Client: Ahmadiyya Association UK
Method: Rotary open hole

Driller: Bainbridge Brothers Ltd
Plant used: Beretta T41
Started: 11/06/2019
Ended: 11/06/2019
Backfilled: 11/06/2019

GL (AOD):
Easting: 414249.57
Northing: 418436.24
Logged: MA
Status: FINAL

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing: Depth (m)	Type	Results	Coring / Fractures: TCR (%)	SCR (%)	RQD (%)	Fracture
				Light grey MUDSTONE.							
		30.00		End of Borehole at 30.000m							

Hole Diameter		Casing Depths		General Remarks
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	1.2m hand excavated inspection pit. Groundwater encountered at 3.90m.

Flush Returns				Ground Water				
From (m)	To (m)	Flush Type	Flush (%)	Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)
				3.90				

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Rotary Open Hole Log

Scale 1:50 Sheet 1 of 3

RBH2

Contract no:	S190527	**Site:**	Spaines Road Mosque, Huddersfield	**Driller:**	Bainbridge Brothers Ltd
				Plant used:	Beretta T41
				Started:	12/06/2019
Client:	Ahmadiyya Association UK			**Ended:**	12/06/2019
Method:	Rotary open hole			**Backfilled:**	12/06/2019

GL (AOD):
Easting: 414264.67
Northing: 418426.38
Logged: MA
Status: FINAL

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing: Depth (m)	Type	Results	Coring / Fractures: TCR (%)	SCR (%)	RQD (%)	Fracture
				MADE GROUND: Concrete.							
		0.30		MADE GROUND: Dark grey sandy gravel fill. Gravel is fine to coarse angular brick, ash and sandstone.							
		1.40		Brown mottled grey slightly sandy slightly gravelly CLAY.							
		3.80		Light grey SANDSTONE.							
		5.40		Dark grey MUDSTONE.							

Hole Diameter		Casing Depths		General Remarks
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	1.2m hand excavated inspection pit. Groundwater encountered at 2.80m.

Flush Returns				Ground Water				
From (m)	To (m)	Flush Type	Flush (%)	Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)
				2.80				

SOLMEK
12-16 Yarm Road
Stockton on Tees
TS18 3NA
01642 607083
info@solmek.com

Rotary Open Hole Log

Scale 1:50 Sheet 2 of 3

RBH2

Contract no:	S190527	**Site:**	Spaines Road Mosque, Huddersfield	**Driller:**	Bainbridge Brothers Ltd
				Plant used:	Beretta T41
				Started:	12/06/2019
Client:	Ahmadiyya Association UK			**Ended:**	12/06/2019
Method:	Rotary open hole			**Backfilled:**	12/06/2019

GL (AOD):	
Easting:	414264.67
Northing:	418426.38
Logged:	MA
Status:	FINAL

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing: Depth (m)	Type	Results	Coring / Fractures: TCR (%)	SCR (%)	RQD (%)	Fracture
				Dark grey MUDSTONE.							
		12.30		Intact COAL.							
		12.80		Light grey MUDSTONE.							
		15.20		Dark grey MUDSTONE.							

Hole Diameter		Casing Depths		General Remarks
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	1.2m hand excavated inspection pit. Groundwater encountered at 2.80m.

Flush Returns				Ground Water				
From (m)	To (m)	Flush Type	Flush (%)	Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)
				2.80				

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Rotary Open Hole Log

Scale 1:50 Sheet 3 of 3

RBH2

Contract no: S190527
Site: Spaines Road Mosque, Huddersfield
Client: Ahmadiyya Association UK
Method: Rotary open hole

Driller: Bainbridge Brothers Ltd
Plant used: Beretta T41
Started: 12/06/2019
Ended: 12/06/2019
Backfilled: 12/06/2019

GL (AOD):
Easting: 414264.67
Northing: 418426.38
Logged: MA
Status: FINAL

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing: Depth (m)	Type	Results	Coring / Fractures: TCR (%)	SCR (%)	RQD (%)	Fracture
				Dark grey MUDSTONE.							
		30.00		End of Borehole at 30.000m							

Hole Diameter		Casing Depths		General Remarks
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	1.2m hand excavated inspection pit. Groundwater encountered at 2.80m.

Flush Returns				Ground Water				
From (m)	To (m)	Flush Type	Flush (%)	Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)
				2.80				

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Rotary Open Hole Log

Scale 1:50 Sheet 1 of 3

RBH3

Contract no: S190527
Site: Spaines Road Mosque, Huddersfield
Client: Ahmadiyya Association UK
Method: Rotary open hole

Driller: Bainbridge Brothers Ltd
Plant used: Beretta T41
Started: 11/06/2019
Ended: 11/06/2019
Backfilled: 01/06/2019

GL (AOD):
Easting: 414244.65
Northing: 418421.02
Logged: MA
Status: FINAL

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing: Depth (m)	Type	Results	Coring / Fractures: TCR (%)	SCR (%)	RQD (%)	Fracture
		0.30		MADE GROUND: Light brown slightly clayey sandy gravel fill. Gravel is fine to medium sub angular to sub rounded dolomite.							
		0.60		MADE GROUND: Brown sandy gravel fill. Gravel is fine to coarse brick and ash.							
				Brown sandy CLAY.							
		3.60		Greyish brown MUDSTONE.							
		4.50		Intact COAL.							
		5.00		Light grey MUDSTONE.							

Hole Diameter		Casing Depths		General Remarks
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	1.2m hand excavated inspection pit. Groundwater encountered at 4.30m.

Flush Returns			
From (m)	To (m)	Flush Type	Flush (%)

Ground Water				
Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)
4.30				

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Rotary Open Hole Log

Scale 1:50 Sheet 2 of 3

RBH3

Contract no:	S190527	**Site:**	Spaines Road Mosque, Huddersfield	**Driller:**	Bainbridge Brothers Ltd
				Plant used:	Beretta T41
				Started:	11/06/2019
Client:	Ahmadiyya Association UK			**Ended:**	11/06/2019
Method:	Rotary open hole			**Backfilled:**	01/06/2019

GL (AOD):		
Easting:	414244.65	
Northing:	418421.02	
Logged:	MA	
Status:	FINAL	

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing: Depth (m)	Type	Results	Coring / Fractures: TCR (%)	SCR (%)	RQD (%)	Fracture
				Light grey MUDSTONE.							
		11.50		Dark grey MUDSTONE.							

Hole Diameter		Casing Depths		General Remarks
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	1.2m hand excavated inspection pit. Groundwater encountered at 4.30m.

Flush Returns				Ground Water				
From (m)	To (m)	Flush Type	Flush (%)	Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)
				4.30				

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Rotary Open Hole Log

Scale 1:50 Sheet 3 of 3

RBH3

Contract no:	S190527	**Site:**	Spaines Road Mosque, Huddersfield	**Driller:**	Bainbridge Brothers Ltd
				Plant used:	Beretta T41
				Started:	11/06/2019
Client:	Ahmadiyya Association UK			**Ended:**	11/06/2019
Method:	Rotary open hole			**Backfilled:**	01/06/2019

GL (AOD):		
Easting:	414244.65	
Northing:	418421.02	
Logged:	MA	
Status:	FINAL	

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing			Coring / Fractures			
					Depth (m)	Type	Results	TCR (%)	SCR (%)	RQD (%)	Fracture
				Dark grey MUDSTONE.							
		30.00		End of Borehole at 30.000m							

Hole Diameter		Casing Depths		General Remarks
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	1.2m hand excavated inspection pit. Groundwater encountered at 4.30m.

Flush Returns				Ground Water				
From (m)	To (m)	Flush Type	Flush (%)	Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)
				4.30				

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Trial Pit Log

TrialPit No
TP1
Sheet 1 of 1

Project Name:	Spaines Road Mosque, Huddersfield	Project No. S190527	Co-ords: 414278E - 418357N Level:
Plant Used:	3CX Digger	Dimensions (m): Depth 2.00	2.00 × 0.60
Client:	Ahmadiyya Association UK		Scale 1:26 Logged TP

Date: 05/06/2019

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.10			MADE GROUND: Grey sandy gravel fill. Gravel fine to medium subangular dolomite.
	0.20 - 0.50	B					MADE GROUND: Black slightly clayey gravelly sand fill. Gravel fine to coarse subangular dolomite, brick and concrete fragments.
	0.30	CBR	2.7%	0.30			Soft consistency orange mottled grey slightly sandy CLAY.
	0.70 - 1.00	B					
	1.20 - 1.50	B					
				1.50			Completely weathered grey MUDSTONE. (Recovered as sandy slightly gravelly CLAY) .
	1.70 - 2.00	B					
				2.00			End of Pit at 2.000m

1
2
3
4
5

Remarks: No groundwater encountered.

Stability:

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Trial Pit Log

TrialPit No
TP2
Sheet 1 of 1

Project Name:	Spaines Road Mosque, Huddersfield	Project No. S190527	Co-ords: 414262E - 418379N Level:
Plant Used:	3CX Digger	Dimensions (m): Depth 2.00	2.00 × 0.60
Client:	Ahmadiyya Association UK		Scale 1:26 Logged TP

Date
05/06/2019

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.10			MADE GROUND: Grey sandy gravel fill. Gravel fine to medium subangular dolomite.
	0.20 - 0.50	B					MADE GROUND: Black slightly clayey gravelly sand fill. Gravel fine to coarse subangular dolomite, brick and concrete fragments.
	0.30	CBR	2.9%	0.30			Soft consistency orange mottled grey slightly sandy CLAY.
	0.70 - 1.00	B					
	1.20 - 1.50	B					
				1.60			Completely weathered grey MUDSTONE. (Recovered as sandy slightly gravelly CLAY).
	1.70 - 2.00	B					
				2.00			End of Pit at 2.000m

1
2
3
4
5

Remarks: No groundwater encountered.

Stability:

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Trial Pit Log

TrialPit No
TP3
Sheet 1 of 1

Project Name:	Spaines Road Mosque, Huddersfield	Project No. S190527	Co-ords: 414255E - 418407N Level:
Date	05/06/2019		
Plant Used:	3CX Digger	Dimensions (m): Depth 2.00	2.00 × 0.60
Scale	1:26		
Client:	Ahmadiyya Association UK		
Logged	TP		

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.05			MADE GROUND: Tarmac.
	0.20 - 0.50	B					MADE GROUND: Black slightly clayey gravelly sand fill. Gravel fine to coarse subangular dolomite, brick and concrete fragments.
	0.30	CBR	3.0%	0.30			Soft consistency orange mottled grey slightly sandy CLAY.
	0.70 - 1.00	B					
	1.20 - 1.50	B					
	1.70 - 2.00	B		1.70			Completely weathered grey MUDSTONE. (Recovered as sandy slightly gravelly CLAY).
				2.00			End of Pit at 2.000m

1
2
3
4
5

Remarks: No groundwater encountered.

Stability:

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Trial Pit Log

TrialPit No
TP4
Sheet 1 of 1

Project Name:	Spaines Road Mosque, Huddersfield	Project No. S190527	Co-ords: 414240E - 418416N Level:
Plant Used:	3CX Digger	Dimensions (m): Depth 2.00	2.00 × 0.60
Client:	Ahmadiyya Association UK		Scale 1:26 Logged TP
			Date 05/06/2019

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.05			MADE GROUND: Tarmac.
	0.20 - 0.50	B					MADE GROUND: Black slightly clayey gravelly sand fill. Gravel fine to coarse subangular brick and concrete fragments. Moderate cobble content of brick and concrete fragments.
	0.30	CBR	9.7%				
				0.40			Soft consistency orange mottled grey slightly sandy CLAY.
	0.70 - 1.00	B					
	1.20 - 1.50	B					
	1.70 - 2.00	B					
				1.80			Completely weathered grey MUDSTONE. (Recovered as sandy slightly gravelly CLAY).
				2.00			End of Pit at 2.000m

Remarks: No groundwater encountered.

Stability:

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Email: info@solmek.com

Trial Pit Log

TrialPit No
TP5
Sheet 1 of 1

Project Name:	Spaines Road Mosque, Huddersfield	Project No. S190527	Co-ords: 414231E - 418443N Level:
Plant Used:	3CX Digger	Dimensions (m): Depth 2.00	2.00 × 0.60
Client:	Ahmadiyya Association UK		Scale 1:26 Logged TP

Date: 05/06/2019

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20 - 0.50			0.10			MADE GROUND: Light brown slightly clayey sandy gravel fill. Gravel is fine to medium subangular to sub rounded dolomite.
	0.30	CBR	2.5%	0.30			MADE GROUND: Black slightly clayey gravelly sand fill. Gravel is fine to coarse of subangular dolomite, brick and concrete fragments
	0.70 - 1.00						Soft consistency orange mottled grey slightly sandy CLAY.
	1.20 - 1.50						
	1.70 - 2.00			1.80			Completely weathered grey MUDSTONE. (Recovered as sandy slightly gravelly CLAY)
				2.00			End of Pit at 2.000m

Remarks: No groundwater encountered.

Stability:

SOLMEK
Solmek Ltd
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Email: info@solmek.com

Trial Pit Log

TrialPit No
TP6
Sheet 1 of 1

Project Name:	Spaines Road Mosque, Huddersfield	Project No. S190527	Co-ords: 414246E - 418455N Level:	Date 05/06/2019
Plant Used:	3CX Digger	Dimensions (m): Depth 2.00	2.00 × 0.60	Scale 1:26
Client:	Ahmadiyya Association UK			Logged TP

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.05			MADE GROUND: Light brown slightly clayey sandy gravel fill. Gravel is fine to medium subangular to sub rounded dolomite.
	0.20 - 0.50	B					
	0.30	CBR	2.6%	0.35			MADE GROUND: Black slightly clayey gravelly sand fill. Gravel is fine to coarse of subangular dolomite, brick and concrete fragments.
							Soft consistency orange mottled grey slightly sandy CLAY.
	0.70 - 1.00	B					
	1.20 - 1.50	B					
	1.70 - 2.00	B					
				1.90			Completely weathered grey MUDSTONE. (Recovered as sandy slightly gravelly CLAY).
				2.00			End of Pit at 2.000m

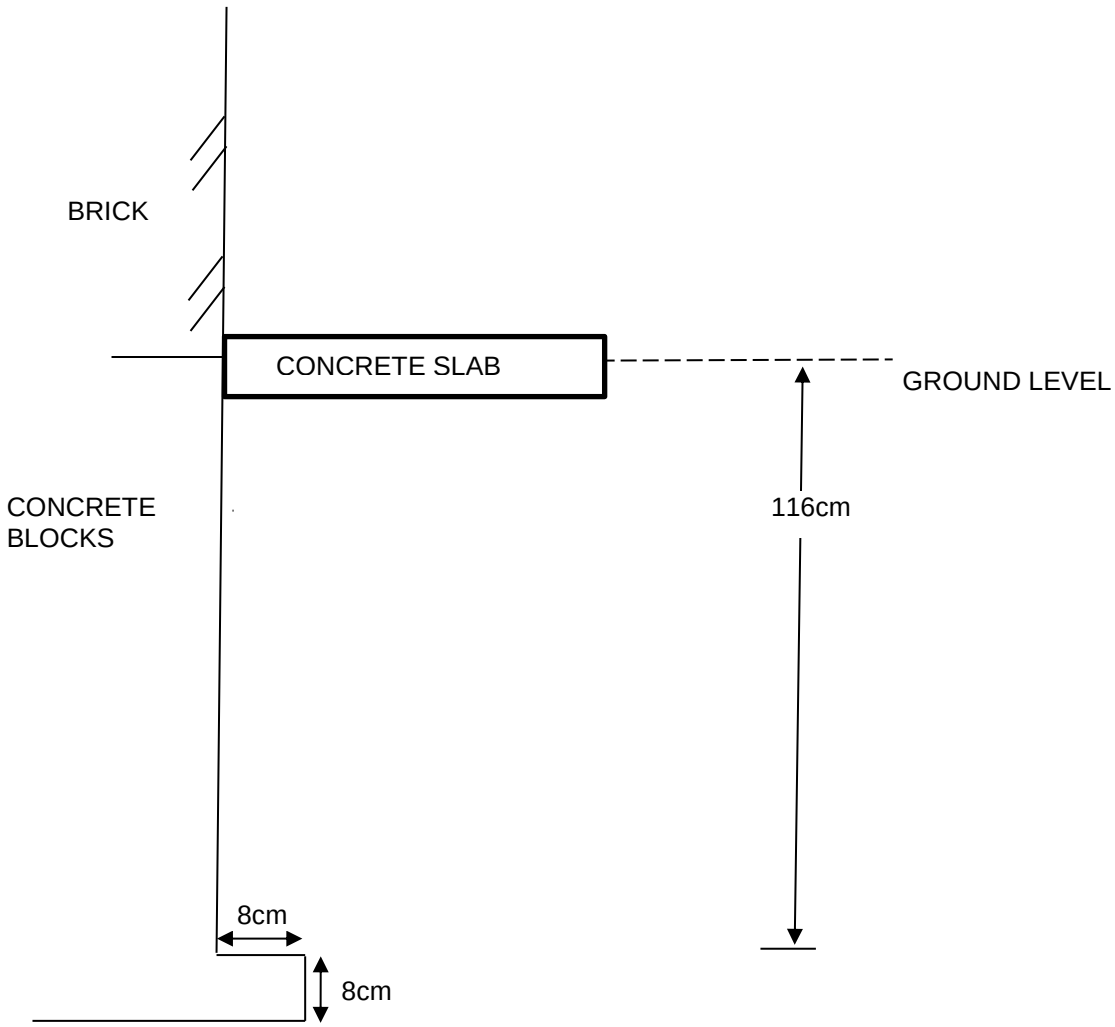
Remarks: No groundwater encountered.

Stability:

Spaines Road Mosque, Huddersfield

S190527

TPA

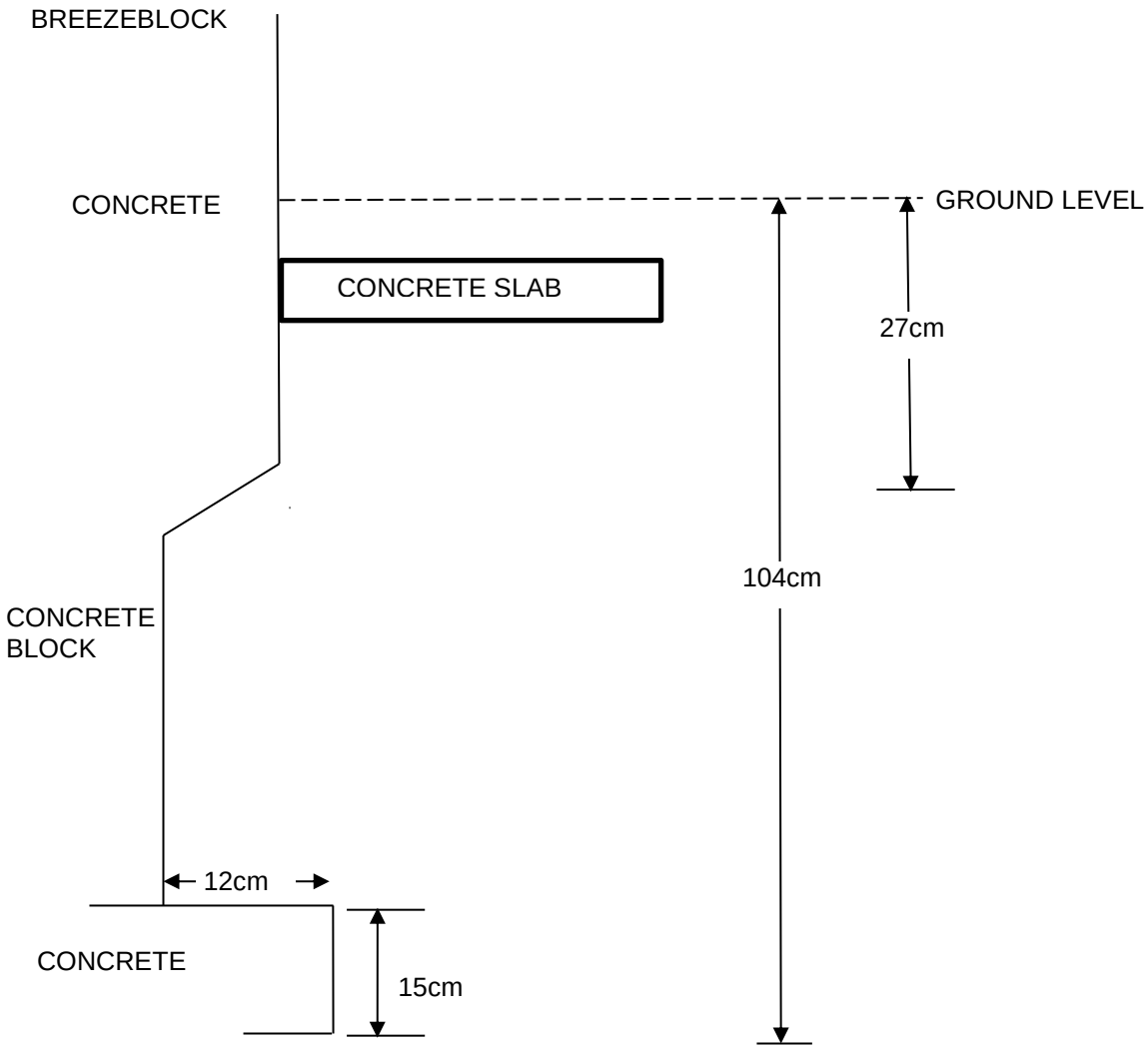


NTS

Spaines Road Mosque, Huddersfield

S190527

TPB

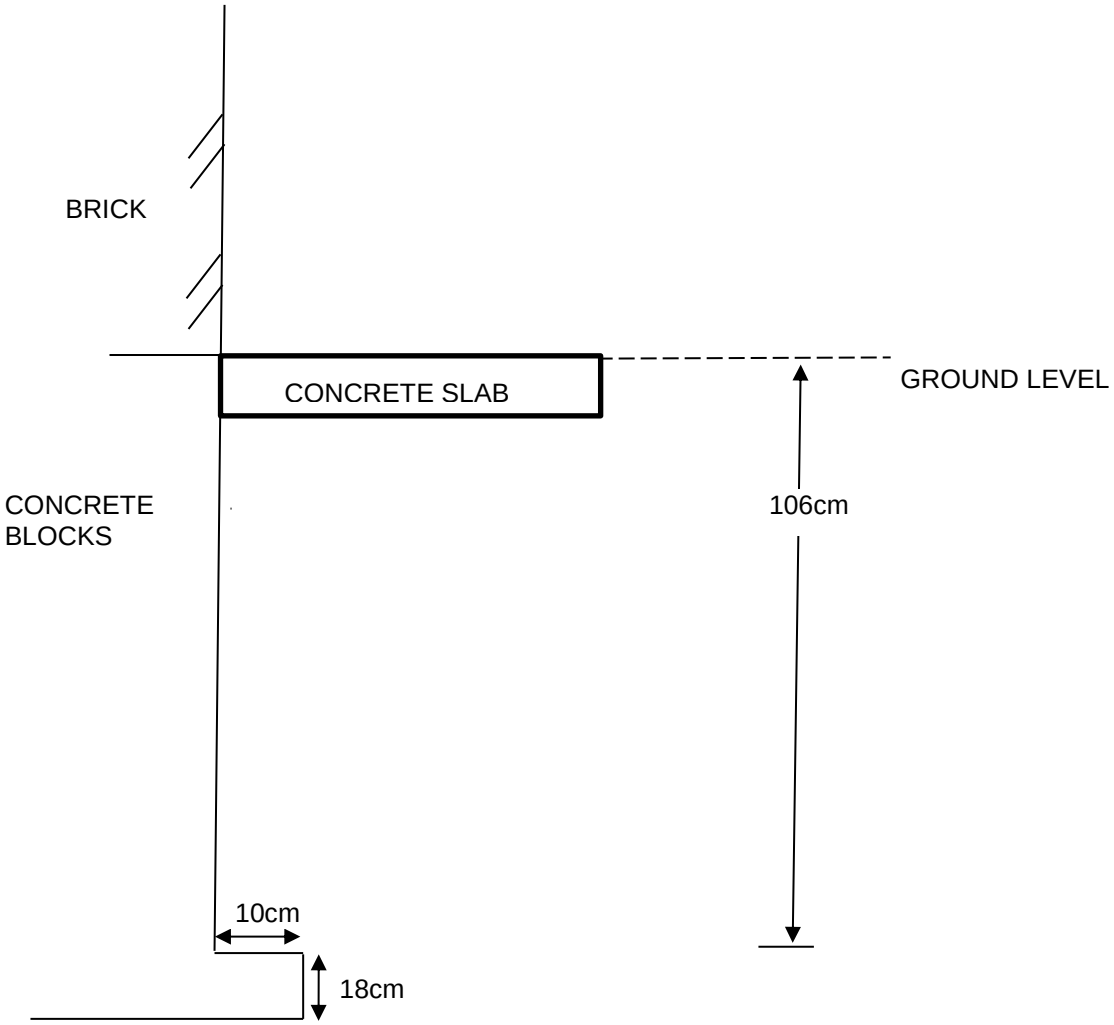


NTS

Spaines Road Mosque, Huddersfield

S190527

TPC



NTS

Appendix C

Chemtest
The right chemistry to deliver results
Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	19-20460-1
Initial Date of Issue:	25-Jun-2019
Client	Solmek Ltd
Client Address:	12 Yarm Road Stockton-on-Tees TS18 3NA
Contact(s):	Kathryn Watkin Mark Atkins Office
Project	S190527 Spaines Road, Huddersfield

Quotation No.:		**Date Received:**	19-Jun-2019
Order No.:	SOL 3173	**Date Instructed:**	19-Jun-2019
No. of Samples:	5		
Turnaround (Wkdays):	5	**Results Due:**	25-Jun-2019
Date Approved:	25-Jun-2019		

Approved By:

Details: Robert Monk, Technical Manager

Chemtest
The right chemistry to deliver results

Results - Soil

Project: S190527 Spaines Road, Huddersfield

Client: Solmek Ltd		**Chemtest Job No.:**			19-20460	19-20460	19-20460	19-20460	19-20460
Quotation No.:		**Chemtest Sample ID.:**			844510	844511	844512	844513	844514
			Sample Location:		BH1	BH2	BH3	BH4	BH5
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.20	0.80	0.20	0.40	0.20
			Bottom Depth (m):		0.40	1.00	0.40	0.60	0.40
			Date Sampled:		04-Jun-2019	04-Jun-2019	04-Jun-2019	04-Jun-2019	04-Jun-2019
			Asbestos Lab:		DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
ACM Type	U	2192		N/A	-	-	-	-	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
ACM Detection Stage	U	2192		N/A	-	-	-	-	-
Moisture	N	2030	%	0.020	21	24	18	21	9.8
Soil Colour	N	2040		N/A	Brown,	Brown	Brown	Brown	Brown
Other Material	N	2040		N/A	Stones	Stones	Stones	Stones	Stones
Soil Texture	N	2040		N/A	Clay,	Clay	Sand	Clay	Clay
pH	M	2010		N/A	6.2	7.6	8.2	7.5	8.4
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	1.2	1.1	0.59	0.46	0.52
Sulphate (2:1 Water Soluble) as SO4	M	2120	mg/l	10	230	79	71	60	< 10
Cyanide (Total)	M	2300	mg/kg	0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50
Arsenic	M	2450	mg/kg	1.0	11	28	57	15	22
Cadmium	M	2450	mg/kg	0.10	0.23	0.44	0.37	< 0.10	0.70
Chromium	M	2450	mg/kg	1.0	15	27	25	16	56
Copper	M	2450	mg/kg	0.50	17	42	110	32	24
Mercury	M	2450	mg/kg	0.10	< 0.10	0.21	< 0.10	< 0.10	< 0.10
Nickel	M	2450	mg/kg	0.50	10	25	52	8.4	16
Lead	M	2450	mg/kg	0.50	36	130	55	17	40
Selenium	M	2450	mg/kg	0.20	0.42	0.87	1.3	0.35	< 0.20
Zinc	M	2450	mg/kg	0.50	46	74	68	26	68
Organic Matter	M	2625	%	0.40	1.5	11	36	1.3	5.7
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0			[B] < 1.0		
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0			[B] < 1.0		
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0			[B] < 1.0		
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0			[B] < 1.0		
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0			[B] 23		
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0			[B] 40		
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0			[B] 68		
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0			[B] 56		
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0			[B] 190		
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0			[B] < 1.0		
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0			[B] < 1.0		
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0			[B] < 1.0		
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0			[B] < 1.0		
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0			[B] 68		
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0			[B] 680		
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0			[B] 2900		

Chemtest
The right chemistry to deliver results

Results - Soil

Project: S190527 Spaines Road, Huddersfield

Client: Solmek Ltd		**Chemtest Job No.:**			19-20460	19-20460	19-20460	19-20460	19-20460
Quotation No.:		**Chemtest Sample ID.:**			844510	844511	844512	844513	844514
			Sample Location:		BH1	BH2	BH3	BH4	BH5
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.20	0.80	0.20	0.40	0.20
			Bottom Depth (m):		0.40	1.00	0.40	0.60	0.40
			Date Sampled:		04-Jun-2019	04-Jun-2019	04-Jun-2019	04-Jun-2019	04-Jun-2019
			Asbestos Lab:		DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0			[B] 230		
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0			[B] 3800		
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0			[B] 4000		
Naphthalene	M	2700	mg/kg	0.10	< 0.10	< 0.10	2.7	0.17	1.7
Acenaphthylene	M	2700	mg/kg	0.10	< 0.10	< 0.10	2.6	0.18	1.4
Acenaphthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	9.0	0.14	7.9
Fluorene	M	2700	mg/kg	0.10	< 0.10	< 0.10	8.7	< 0.10	8.5
Phenanthrene	M	2700	mg/kg	0.10	< 0.10	0.51	84	1.0	81
Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	21	0.29	16
Fluoranthene	M	2700	mg/kg	0.10	0.98	1.2	200	1.9	57
Pyrene	M	2700	mg/kg	0.10	1.1	1.3	210	1.9	55
Benzo[a]anthracene	M	2700	mg/kg	0.10	< 0.10	0.67	77	1.1	29
Chrysene	M	2700	mg/kg	0.10	< 0.10	1.0	72	0.94	25
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	< 0.10	0.60	110	0.32	30
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	< 0.10	0.49	41	0.22	15
Benzo[a]pyrene	M	2700	mg/kg	0.10	< 0.10	0.65	84	0.70	31
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	< 0.10	0.33	59	< 0.10	21
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	< 0.10	0.14	18	< 0.10	5.9
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	< 0.10	0.35	60	< 0.10	23
Total Of 16 PAH's	M	2700	mg/kg	2.0	2.1	7.2	1100	8.9	410
Total Phenols	M	2920	mg/kg	0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30

Results - 2 Stage WAC

Project: S190527 Spaines Road, Huddersfield

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	19-20460								
Chemtest Sample ID:	844512								
Sample Ref:							**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:									
Sample Location:	BH3								
Top Depth(m):	0.20								
Bottom Depth(m):	0.40								
Sampling Date:	04-Jun-2019								
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	M	%			21	3	5	6
Loss On Ignition	2610	M	%			19	--	--	10
Total BTEX	2760	M	mg/kg			[B] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg			[B] 4000	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			1100	100	--	--
pH	2010	M				8.2	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.020	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	0.0034	0.0064	< 0.050	0.059	0.5	2	25
Barium	1450	U	0.050	0.084	< 0.50	0.78	20	100	300
Cadmium	1450	U	< 0.00010	< 0.00010	< 0.010	< 0.010	0.04	1	5
Chromium	1450	U	0.0022	< 0.0010	< 0.050	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.00050	< 0.0010	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.011	0.0075	< 0.050	0.081	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.06	0.7	5
Selenium	1450	U	0.0024	0.0020	< 0.010	0.021	0.1	0.5	7
Zinc	1450	U	< 0.0010	< 0.0010	< 0.50	< 0.50	4	50	200
Chloride	1220	U	3.2	< 1.0	< 10	< 10	800	15000	25000
Fluoride	1220	U	2.6	1.4	5.1	16	10	150	500
Sulphate	1220	U	54	19	110	250	1000	20000	50000
Total Dissolved Solids	1020	N	200	98	400	1100	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	14	8.1	< 50	91	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.175
Moisture (%)	18

Leachate Test Information	
Leachant volume 1st extract/l	0.310
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.300

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request.The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
844510			BH1	04-Jun-2019	B	Amber Glass 250ml
844510			BH1	04-Jun-2019	B	Plastic Tub 500g
844511			BH2	04-Jun-2019	B	Amber Glass 250ml
844511			BH2	04-Jun-2019	B	Plastic Tub 500g
844512			BH3	04-Jun-2019	B	Amber Glass 250ml
844512			BH3	04-Jun-2019	B	Plastic Tub 500g
844513			BH4	04-Jun-2019	B	Amber Glass 250ml
844513			BH4	04-Jun-2019	B	Plastic Tub 500g
844514			BH5	04-Jun-2019	B	Amber Glass 250ml
844514			BH5	04-Jun-2019	B	Plastic Tub 500g

Test Methods

SOP	Title	Parameters included	Method summary
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1450	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.

Test Methods

SOP	Title	Parameters included	Method summary
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

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Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Appendix D

Laboratory Report Front Sheet

Site name	Job number
Spaines Road Mosque, Huddersfield	S190527

Solmek
12-16 Yarm Road,
Stockton on Tees,
TS18 3NA
01642 607083
lab@solmek.com

UKAS TESTING
7607

Client details:

Reference: S190527
Name: Solmek
Address: 12 Yarm Road,
Stockton-on-tees,
TS18 3NA

Telephone: 01642 607083
Email: matkins@solmek.com

FAO: M Atkins

Date commenced: 13/06/2019

Date reported: 18/06/2019

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.

Solmek are not UKAS Accedited for the following tests; Density by Linear Measurement, Particle Density by Gas Jar, Point Load, Triaxial UU Multi Specimen, Triaxial UU Multistage and California Bearing Ratio.

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

Signature:	Approved Signitories:
K Watkin	☑ K Watkin (Lab Manager) ☐ U Mazhar (Assistant Lab Manager) ☐ I Nicholson (Technical Manager)

Summary of Classification Tests

Solmek
12-16 Yarm Road,
Stockton on Tees,
TS18 3NA
01642 607083
lab@solmek.com

UKAS TESTING
7607

Site name	Job number
Spaines Road Mosque, Huddersfield	S190527

Hole	Depth		Type	*w*	Oven temp.	wa	Pa	Pr	wL	wP	IP	IL	Plasticity class	Preparation method
	Top m	Base m		%	oc	%	%	%	%	%	%			
BH1	0.80	1.00	B	23	105	23	100	0	57-s	25	32	-0.063	CH	Tested in natural condition
BH2	1.40	1.60	B	32	105	32	100	0	59-s	27	32	0.156	CH	Tested in natural condition
BH3	1.80	2.00	B	27	105	27	100	0	50-s	23	27	0.148	CH	Tested in natural condition
BH4	1.80	2.00	B	34	105	51	67	33	41-s	22	19	1.526	CI	Tested after >425µm removed by hand
BH5	1.80	2.00	B	25	105	25	99	1	54-s	23	31	0.065	CH	Tested after >425µm removed by hand

All tests found in Solmek 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	UM
Approval date	13/06/2019 14:34
Date report generated	
Report Number	

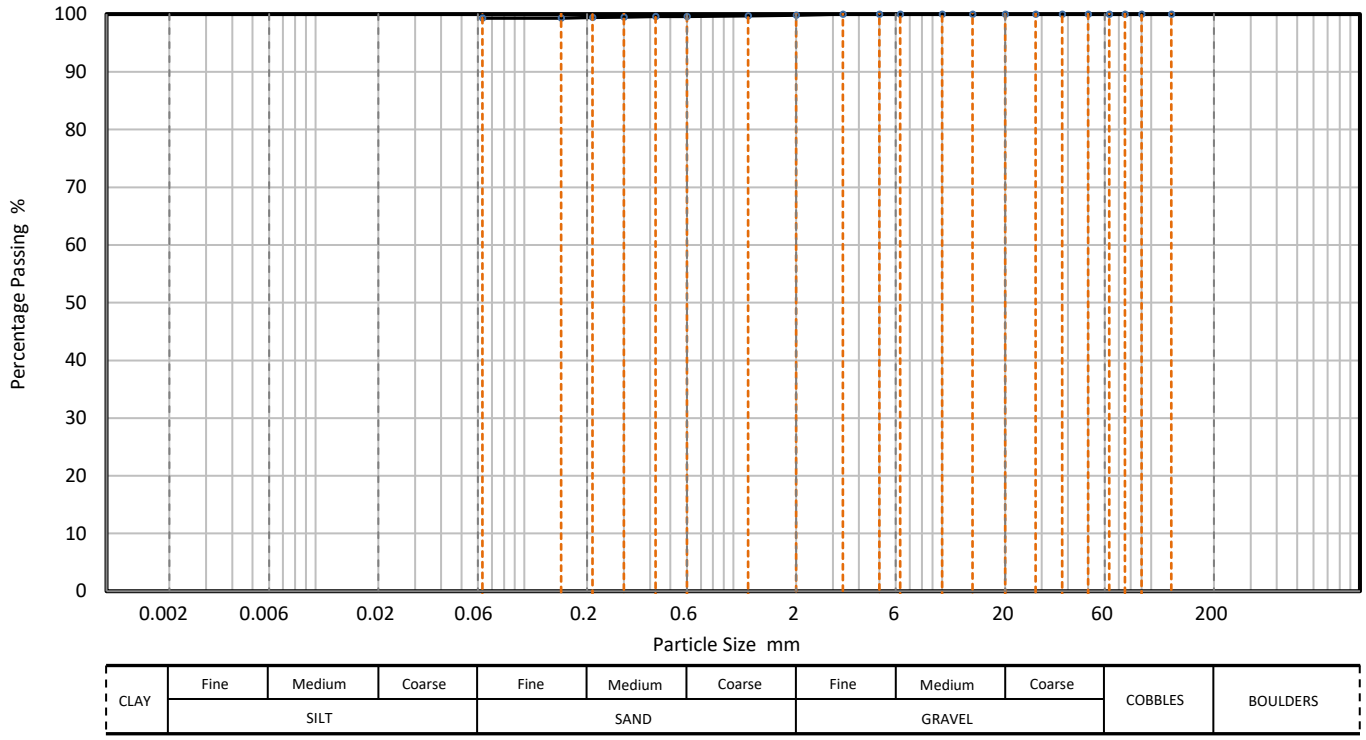
PARTICLE SIZE DISTRIBUTION

Site name	Job number
Spaines Road Mosque, Huddersfield	S190527

Solmek
12-16 Yarm Road,
Stockton on Tees,
TS18 3NA
01642 607083
lab@solmek.com

UKAS TESTING
7607

Hole	BH1	Lab sample ID	SLMK201906130
Depth (Top) m	0.80	Test Method	BS 1377 - 2 : 1990 Clause 9.2
Depth (Base) m	1	Soil Description	Brown, CLAY
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	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	100		
0.212	99		
0.15	99		
0.063	99		

Dry Mass of sample, g: 420

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	0.2
Sand	0.5
Fines <0.063mm	99.0

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

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Hydrometer is the usual Sedimentation method carried out by Solmek and is part of the Solmek UKAS accreditation schedule.

Approved by	KW
Approval date	17/06/2019 15:37

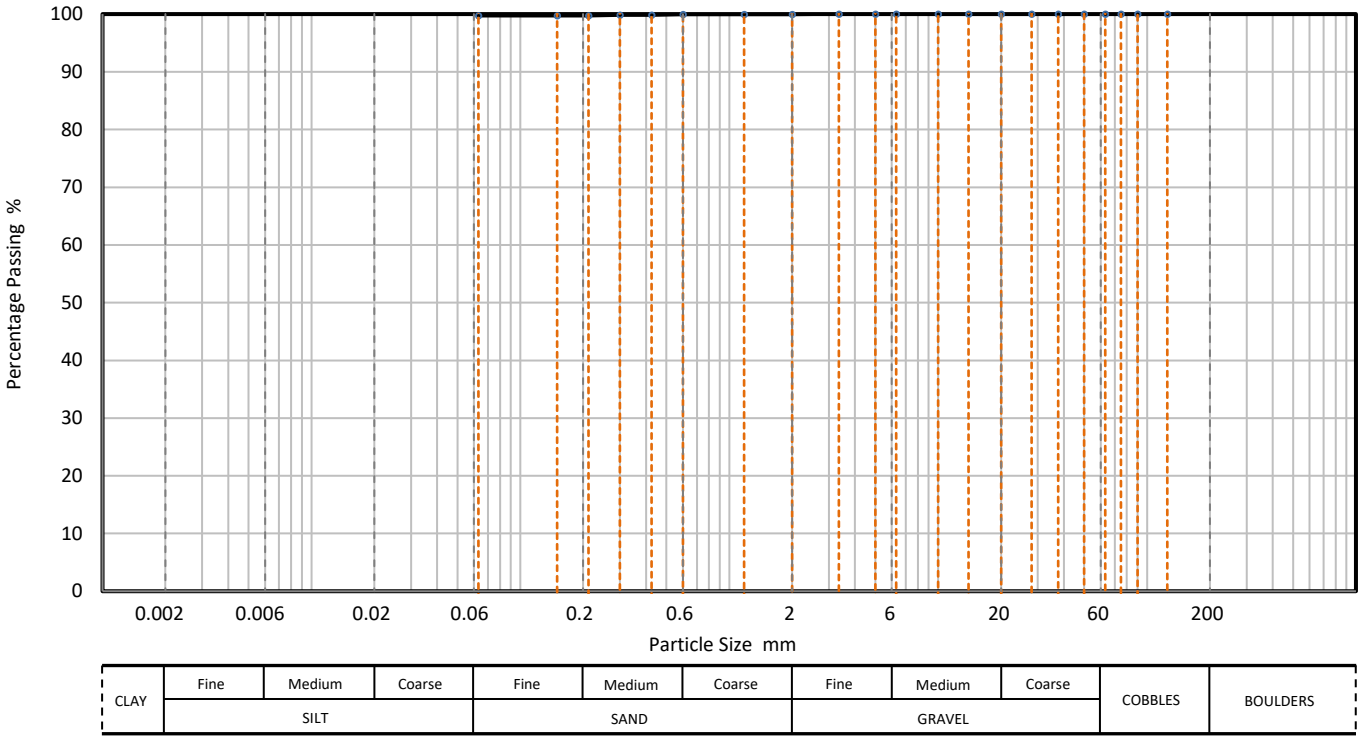
PARTICLE SIZE DISTRIBUTION

Site name	Job number
Spaines Road Mosque, Huddersfield	S190527

Solmek
12-16 Yarm Road,
Stockton on Tees,
TS18 3NA
01642 607083
lab@solmek.com

UKAS TESTING
7607

Hole	BH3	Lab sample ID	SLMK201906132
Depth (Top) m	1.80	Test Method	BS 1377 - 2 : 1990 Clause 9.2
Depth (Base) m	2	Soil Description	Brown CLAY
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	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	100		
0.212	100		
0.15	100		
0.063	100		

Dry Mass of sample, g	459

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	0.1
Sand	0.3
Fines <0.063mm	100.0

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

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Hydrometer is the usual Sedimentation method carried out by Solmek and is part of the Solmek UKAS accreditation schedule.

Approved by	KW
Approval date	17/06/2019 15:37

Chemtest
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Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

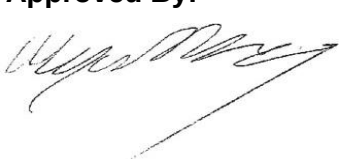
UKAS TESTING
2183

Final Report

Report No.:	19-19975-1
Initial Date of Issue:	18-Jun-2019
Client	Solmek Ltd
Client Address:	12 Yarm Road Stockton-on-Tees TS18 3NA
Contact(s):	Kathryn Watkin Mark Atkins Office
Project	S190527 Spaines Road Mosque, Huddersfield

Quotation No.:		**Date Received:**	14-Jun-2019
Order No.:		**Date Instructed:**	14-Jun-2019
No. of Samples:	5		
Turnaround (Wkdays):	5	**Results Due:**	20-Jun-2019
Date Approved:	18-Jun-2019		

Approved By:



Details: Glynn Harvey, Laboratory Manager

Chemtest
The right chemistry to deliver results

Results - Soil

Project: S190527 Spaines Road Mosque, Huddersfield

Client: Solmek Ltd		**Chemtest Job No.:**			19-19975	19-19975	19-19975	19-19975	19-19975
Quotation No.:		**Chemtest Sample ID.:**			842493	842494	842495	842496	842497
			Sample Location:		BH1	BH2	BH3	BH4	BH5
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.80	1.40	1.80	1.80	1.80
			Bottom Depth (m):		1.00	1.60	2.00	2.00	2.00
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Moisture	N	2030	%	0.020	17	20	21	17	20
pH	U	2010		N/A	[A] 6.8	[A] 6.8	[A] 6.7	[A] 7.5	[A] 6.1
Sulphate (2:1 Water Soluble) as SO4	U	2120	mg/l	10	180	14	14	20	93

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request.The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
842493			BH1		A	Plastic Tub 500g
842494			BH2		A	Plastic Tub 500g
842495			BH3		A	Plastic Tub 500g
842496			BH4		A	Plastic Tub 500g
842497			BH5		A	Plastic Tub 500g

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES

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Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
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S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation
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All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

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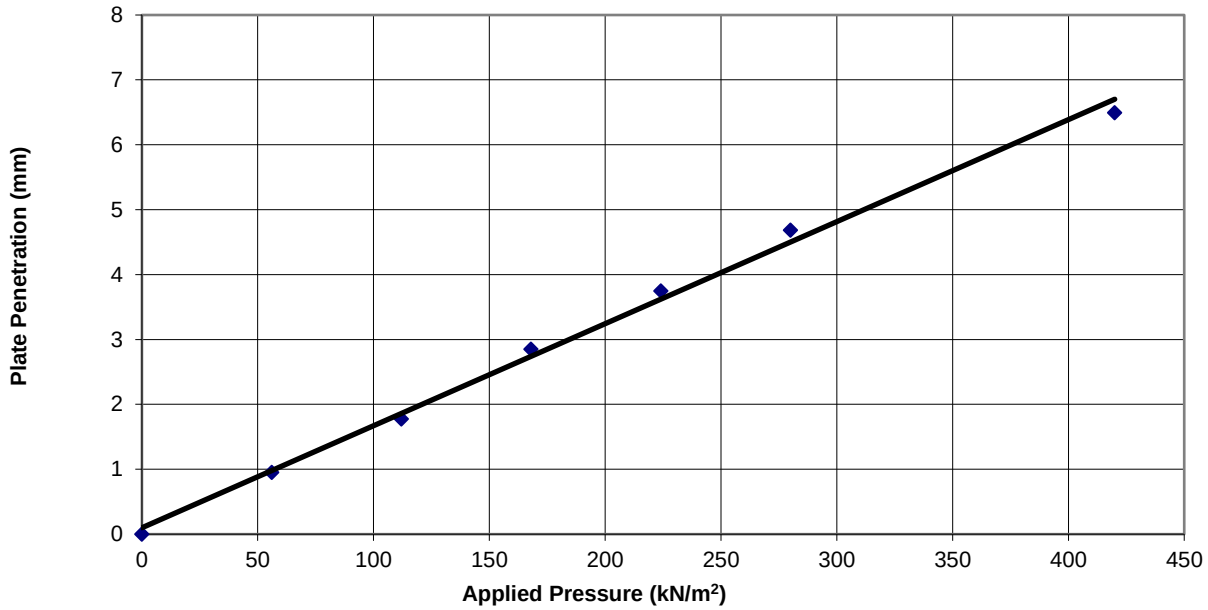
customerservices@chemtest.com

SOLMEK
GEOTECHNICAL TESTING LABORATORY

PLATE BEARING TEST		**Date:**	05/06/2019
Project Number:	S190527	**Test No:**	TP1
Project Name:	Spaines Road, Huddersfield	**Test Level:**	0.30mbgl
Test Method: BS 1377 : Part 9 : 1990 (Incremental Method)		**Weather:**	Dry, still
Plate Diameter:	0.305 m	**Load Applied:**	420 kPa
Kentledge Type:	JCB 3CX + Jack	**Remarks:**	Clay



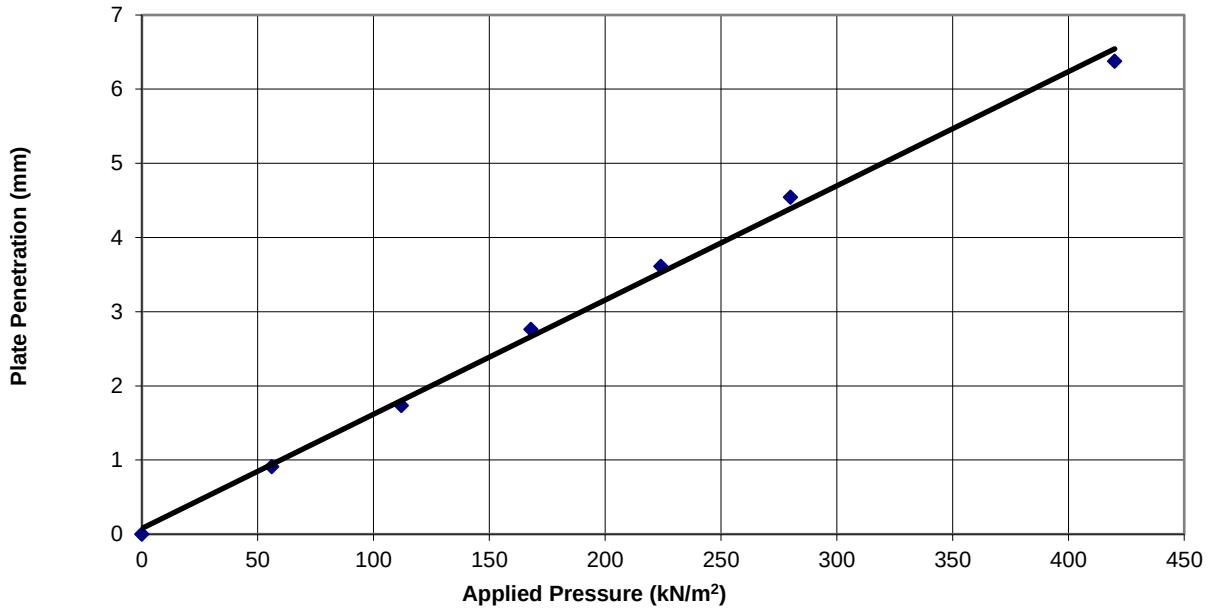
	Pressure (kN/m^2)	Plate Pentration (mm)
Initial	0	0
Stage 1	56	0.95
Stage 2	112	1.78
Stage 3	168	2.85
Stage 4	224	3.75
Stage 5	280	4.68
Stage 6	420	6.50
Stage 7		
Stage 8		
Stage 9		
Stage 10		

Conversion Factor	0.45	Produced by:	J Currie
Stress Applied @ 1.25mm	73.21 kN/m^2		
Total Plate Deflection	6.50 mm	Checked by:	R Woods
Plate Diameter	305 mm		
k305	58570		
k762	26224		
CBR	2.77 %		

SOLMEK

SOLMEK
GEOTECHNICAL TESTING LABORATORY

PLATE BEARING TEST		**Date:**	05/06/2019
Project Number:	S190527	**Test No:**	TP2
Project Name:	Spaines Road, Huddersfield	**Test Level:**	0.30mbgl
Test Method: BS 1377 : Part 9 : 1990 (Incremental Method)		**Weather:**	Dry, still
Plate Diameter:	0.305 m	**Load Applied:**	420 kPa
Kentledge Type:	JCB 3CX + Jack	**Remarks:**	Clay



	Pressure (kN/m^2)	Plate Pentration (mm)
Initial	0	0
Stage 1	56	0.91
Stage 2	112	1.74
Stage 3	168	2.76
Stage 4	224	3.61
Stage 5	280	4.54
Stage 6	420	6.38
Stage 7		
Stage 8		
Stage 9		
Stage 10		

Conversion Factor	0.45	Produced by:	J Currie
Stress Applied @ 1.25mm	76.15 kN/m^2		
Total Plate Deflection	6.38 mm	Checked by:	R Woods
Plate Diameter	305 mm		
k305	60916		
k762	27275		
CBR	2.97 %		

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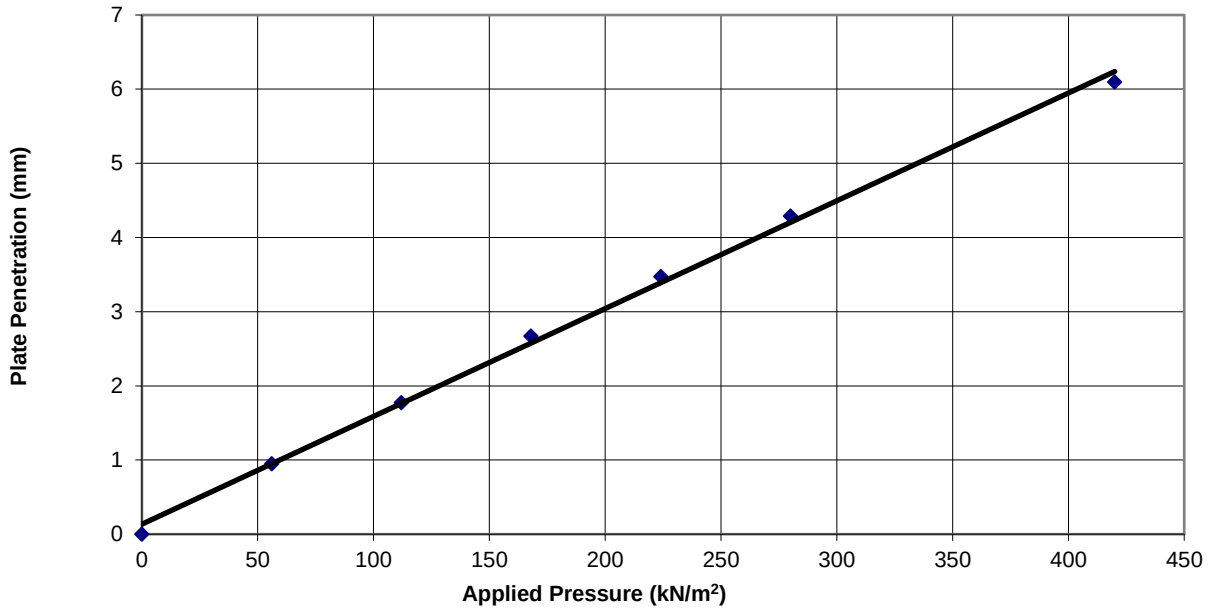
PLATE BEARING TEST		**Date:**	05/06/2019
Project Number:	S190527	**Test No:**	TP3
Project Name:	Spaines Road, Huddersfield	**Test Level:**	0.30mbgl
Test Method: BS 1377 : Part 9 : 1990 (Incremental Method)		**Weather:**	Dry, still
Plate Diameter:	0.305 m	**Load Applied:**	420 kPa
Kentledge Type:	JCB 3CX + Jack	**Remarks:**	Clay



	Pressure (kN/m^2)	Plate Pentration (mm)
Initial	0	0
Stage 1	56	0.95
Stage 2	112	1.78
Stage 3	168	2.67
Stage 4	224	3.48
Stage 5	280	4.29
Stage 6	420	6.10
Stage 7		
Stage 8		
Stage 9		
Stage 10		

Conversion Factor	0.45	Produced by:	J Currie
Stress Applied @ 1.25mm	76.74 kN/m^2		
Total Plate Deflection	6.10 mm	Checked by:	R Woods
Plate Diameter	305 mm		
k305	61389		
k762	27486		
CBR	3.01 %		

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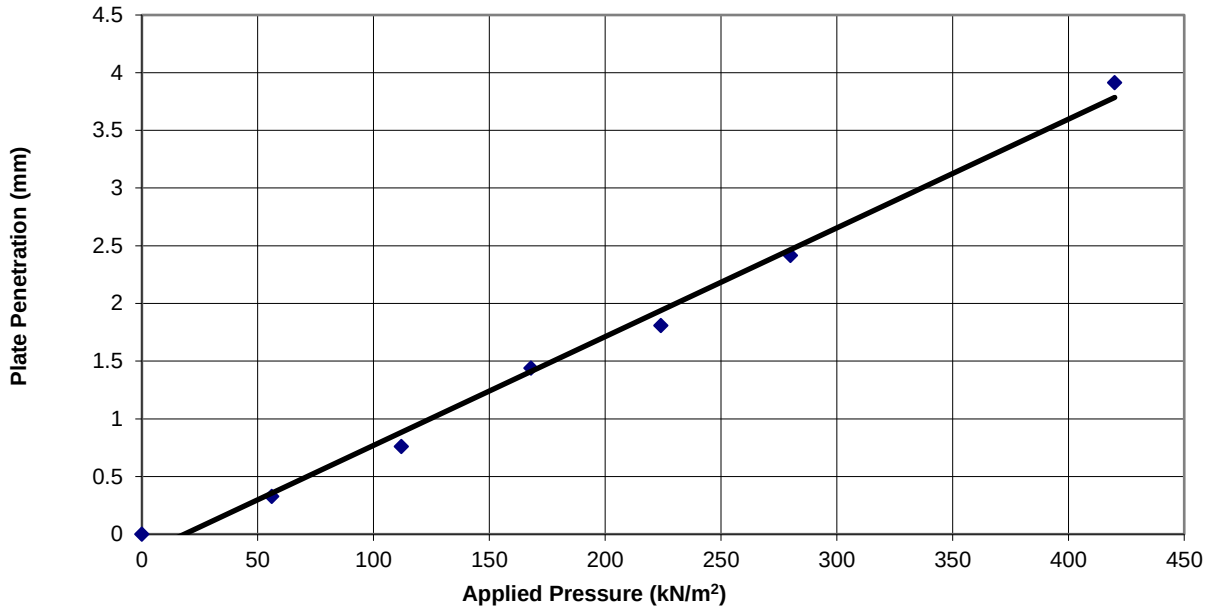
PLATE BEARING TEST		**Date:**	05/06/2019
Project Number:	S190527	**Test No:**	TP4
Project Name:	Spaines Road, Huddersfield	**Test Level:**	0.30mbgl
Test Method: BS 1377 : Part 9 : 1990 (Incremental Method)		**Weather:**	Dry, still
Plate Diameter:	0.305 m	**Load Applied:**	420 kPa
Kentledge Type:	JCB 3CX + Jack	**Remarks:**	Sand fill



	Pressure (kN/m^2)	Plate Pentration (mm)
Initial	0	0
Stage 1	56	0.33
Stage 2	112	0.76
Stage 3	168	1.44
Stage 4	224	1.81
Stage 5	280	2.42
Stage 6	420	3.91
Stage 7		
Stage 8		
Stage 9		
Stage 10		

Conversion Factor	0.45
Stress Applied @ 1.25mm	150.97 kN/m^2
Total Plate Deflection	3.91 mm
Plate Diameter	305 mm
k305	120778
k762	54078
CBR	9.72 %

Produced by: J Currie

Checked by: R Woods

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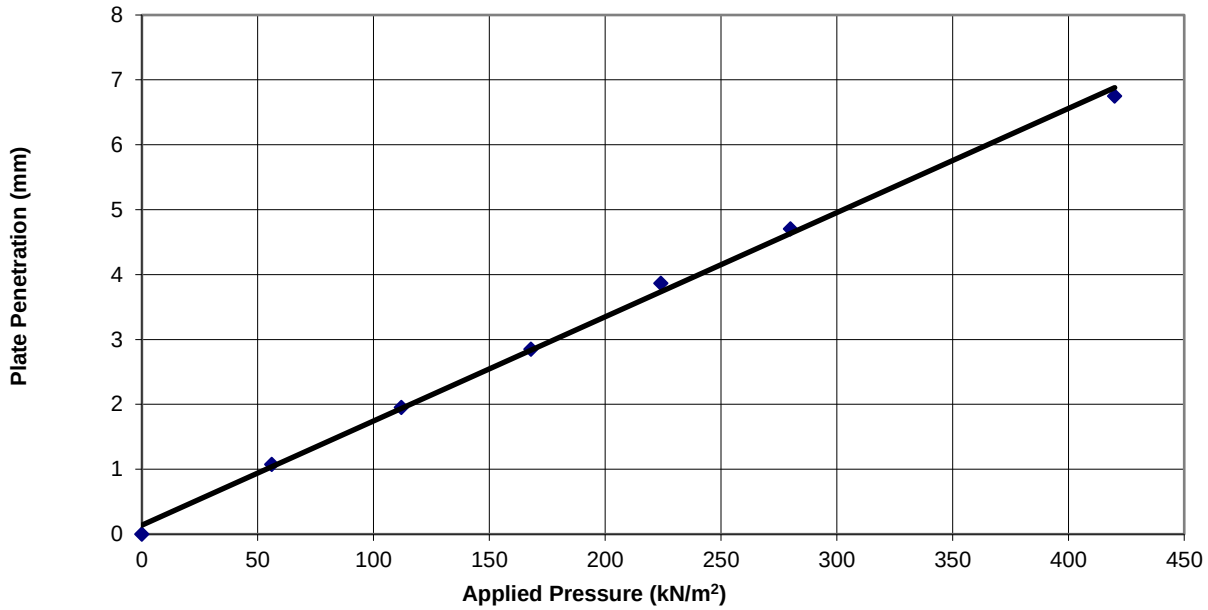
PLATE BEARING TEST		**Date:**	05/06/2019
Project Number:	S190527	**Test No:**	TP5
Project Name:	Spaines Road, Huddersfield	**Test Level:**	0.30mbgl
Test Method: BS 1377 : Part 9 : 1990 (Incremental Method)		**Weather:**	Dry, still
Plate Diameter:	0.305 m	**Load Applied:**	420 kPa
Kentledge Type:	JCB 3CX + Jack	**Remarks:**	Clay



	Pressure (kN/m^2)	Plate Pentration (mm)
Initial	0	0
Stage 1	56	1.08
Stage 2	112	1.96
Stage 3	168	2.85
Stage 4	224	3.87
Stage 5	280	4.70
Stage 6	420	6.75
Stage 7		
Stage 8		
Stage 9		
Stage 10		

Conversion Factor	0.45	Produced by:	J Currie
Stress Applied @ 1.25mm	69.20 kN/m^2		
Total Plate Deflection	6.75 mm	Checked by:	R Woods
Plate Diameter	305 mm		
k305	55356		
k762	24786		
CBR	2.51 %		

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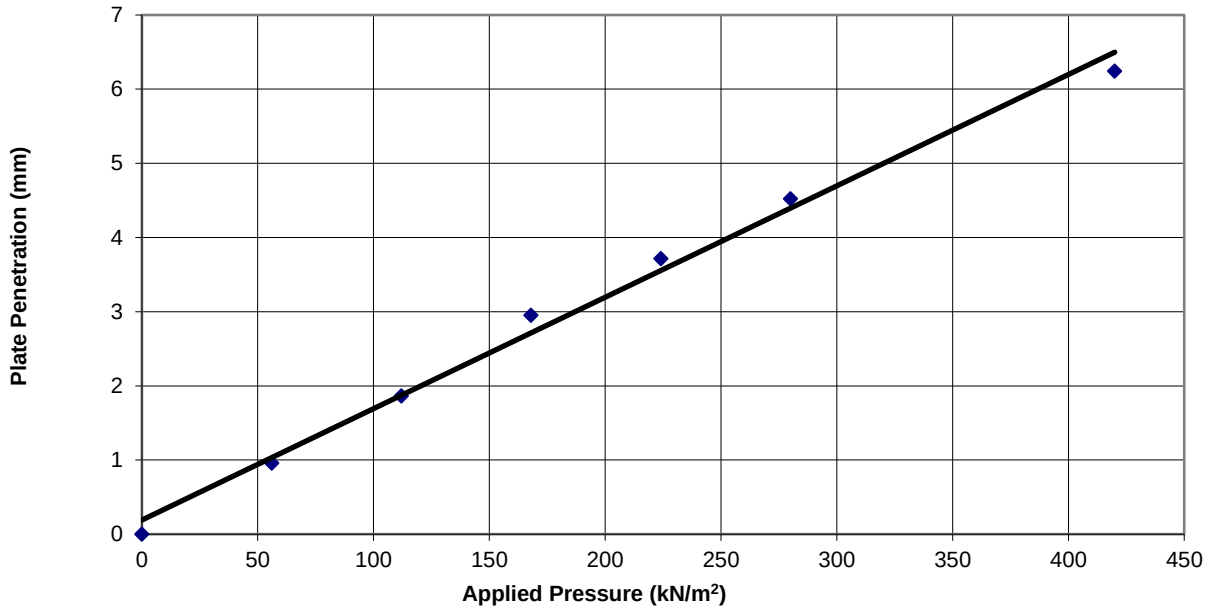
PLATE BEARING TEST		**Date:**	05/06/2019
Project Number:	S190527	**Test No:**	TP6
Project Name:	Spaines Road, Huddersfield	**Test Level:**	0.30mbgl
Test Method: BS 1377 : Part 9 : 1990 (Incremental Method)		**Weather:**	Dry, still
Plate Diameter:	0.305 m	**Load Applied:**	420 kPa
Kentledge Type:	JCB 3CX + Jack	**Remarks:**	Clay



	Pressure (kN/m^2)	Plate Pentration (mm)
Initial	0	0
Stage 1	56	0.96
Stage 2	112	1.87
Stage 3	168	2.95
Stage 4	224	3.72
Stage 5	280	4.52
Stage 6	420	6.25
Stage 7		
Stage 8		
Stage 9		
Stage 10		

Conversion Factor	0.45	Produced by:	J Currie
Stress Applied @ 1.25mm	70.54 kN/m^2		
Total Plate Deflection	6.25 mm	Checked by:	R Woods
Plate Diameter	305 mm		
k305	56435		
k762	25269		
CBR	2.6 %		

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Appendix E

♣Solmek conditions of offer, notes on limitations & basis for contract (ref: version1/2019)

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 was a trading name of Hymas Geoenvironmental Ltd.

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 10175:2001 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.

SOLMEK NOTES ON CONTAMINATION GUIDANCE (REF: VERSION 1/2019)

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 CLR 11- Model Procedures, 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 ACCEPTANCE CRITERIA

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 WAC test categorises materials as either inert waste, non-reactive hazardous waste, and hazardous waste.

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.

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.