

Phase 2: Site Investigation

Robin Hood Farm, Brompton-on-Swale

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PHASE 2 SITE INVESTIGATION REPORT

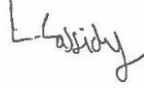


ROBIN HOOD FARM, BROMPTON-ON-SWALE

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Revision	Date	Prepared By	Signed
Final	January 2020	L Cassidy <i>Environmental Engineer</i>	
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1 EXECUTIVE SUMMARY

Site Address	Robin Hood Farm, Brompton-on-Swale
Proposed Development	The site is outlined for a residential development.
Fieldwork	<ul style="list-style-type: none"> • 8no small percussive boreholes (BH1 to BH8) drilled to a maximum of 5.20mbgl with 5no. monitoring pipes in BH1, BH2, BH3, BH5 & BH8. • 7no machine excavated trial pits (TP1 to TP7) to a maximum depth of 2.20mbgl.
Ground Conditions	<ul style="list-style-type: none"> • Made ground was encountered to depths of between 0.30mbgl and 0.60mbgl. • Generally firm consistency very sandy slightly gravelly clay was generally encountered down to a maximum depth of 5.20mbgl. • Locally cobbles/boulders noted. • Groundwater, where present, was noted between 2.50 and 4.20mbgl.
Contamination Testing Results	<ul style="list-style-type: none"> • Three made ground (topsoil) and three natural samples tested. • No exceedances of the relevant thresholds. • No asbestos fibres. • Slightly acidic to slightly alkaline pH.
Contamination Analysis	<ul style="list-style-type: none"> • Given the site's proposed residential land use, the levels of contamination recorded on site are unlikely to pose a risk to the current and future users of the site. • If any zones of odorous, brightly coloured or suspected contaminated ground or groundwater are encountered then work should cease in that area until the material has been investigated. The results of the investigation will therefore determine whether or not remediation will be required. • Made ground classed as uncontaminated with respect to construction workers. PPE for workers. Damping down of site during dry windy conditions. • Suitable growing medium system required for all proposed areas of soft landscaping. • Controlled waters unlikely to be at risk. • With respect to utilities pH was elevated; as a minimum all services should be laid in clean trenches. • Sub surface concrete should be designed to DS-1 ACEC (Class AC-1s). This assumes static groundwater conditions.
Geotechnical Testing Results	<ul style="list-style-type: none"> • Cohesive deposits low to high strength (34kPa-78kPa) based on in-situ hand vanes. • Cohesive materials on site have a medium volume change potential. • Moisture contents between 16 and 25%. • Sulphates between <10-12mg/l, pH slightly alkaline. • 1no. soakaway test returned an infiltration rate of 5.41×10^{-6} m/sec for both tests • CBRs between 1.5 and 3.5%.
Geotechnical Analysis & Foundation Recommendations	<ul style="list-style-type: none"> • Bearing capacity of 105kN/m² at minimum depth of 0.90mbgl on 0.60m wide strips. • Settlements within 25mm. • Normal earthworks plant for excavations.

2 INTRODUCTION

2.1 Authorisation

The site investigation described in this report was carried out by Solmek to the instructions of Billingham George & Partners, on behalf of Neil Pittaway Esq, on land at Robin Hood Farm, Brompton-on-Swale.

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

- *ID Geoenvironmental Limited Phase 1 Desk Study (4551-G-R001RevA).*

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

2.2 Scope of Works

The site is expected to be developed with approximately 32no new residential houses with associated parking 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

A site inspection, as recommended in BS 5930 and BS 10175, was undertaken by Solmek on 13th December 2019. The site is centred at Ordnance Survey Co-ordinates 422430, 500377 and covers approximately 1.43Ha.

The site is an irregularly shaped parcel of land of mostly level topography, comprising farm buildings in the west with the remainder of the site split across two large fields. Access to the site is via a road entering the southeast of the site.

The surrounding areas of the site is predominantly residential housing and garage sites.

3.1 Fieldwork

The fieldwork was carried out on 13th and 14th December 2019. The extent of the investigation was:

- 8no small percussive boreholes (BH1 to BH8 inclusive) to a maximum depth of 5.20m below ground level (bgl).
 - The boreholes were evenly spread around the site to achieve maximum site coverage.
- Gas monitoring wells were installed in BH's 1, 2, 3, 5 & 8.
 - The wells were spaced at <25m centres evenly around the site.
- 7no machine excavated trial pits (TP1 to TP7) were dug to a maximum depth of 2.20mbgl.
 - The boreholes were evenly spread around the site to achieve maximum site coverage.
 - In-situ soakaway testing carried out in TP6.
- Insitu testing in the exploratory positions as Standard Penetration Tests (SPTs) and hand shear vanes.
- Retrieval of samples for geotechnical and chemical testing.

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

plates of the trial pits are presented in Appendix A.

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.

4.1 Made Ground

Made ground was relatively uniform across the site and was encountered to a minimum depth of 0.30mbgl (TP2, TP5 & TP7) and a maximum depth of 0.60mbgl (BH1, BH5, BH8 & TP3). The made ground broadly consisted of sandy topsoil.

4.2 Natural Deposits

Proven to underlie the made ground deposits across the site, natural ground generally comprised generally firm, locally soft or stiff consistency, very sandy slightly gravelly low to high strength clay, which was encountered to a maximum determination depth of 5.20mbgl in the boreholes. Locally within the trial pits, a low to medium cobble content was noted, whilst within the boreholes, the refusals recorded within the SPTs are inferred to be the result of cobble/boulder content.

4.3 Groundwater

Groundwater was encountered within all boreholes, other than BH5, between 2.50 and 4.20mbgl. No groundwater was encountered within the trial pits.

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.

5 CONTAMINATION TESTING RESULTS

The proposed development of the site is to involve the construction of approximately 32no residential homes with areas of soft landscaping and an area of hardstanding. The chemical results are presented in Appendix C.

5.1 Site Characterisation

Within the ID Geo-environmental Phase 1 Desk Study, a preliminary conceptual model was formed based on the information obtained. The initial risk was based on the site history which recorded generally open/agricultural land throughout the sites history.

An overall low to moderate risk was provided for various receptors:

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

5.2 Contamination Testing and Rationale

To provide information upon the possibility of ground contamination three samples of topsoil and three samples of natural clay 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 Residential with Home Grown Produce means that six samples are considered appropriate for testing:

- BH1 – 0.20-0.40m (Made ground – topsoil)
- BH3 – 0.40-0.60m (Natural clay)
- BH4 – 0.20-0.40m (Made ground – topsoil)
- BH5 – 0.40-0.60m (Made ground – topsoil)
- BH6 – 0.40-0.60m (Natural clay)
- BH8 – 0.80-1.00m (Natural clay)

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

- 6no Metals, semi-metals, non-metals, inorganic determinants
- 6no Asbestos identification screenings
- 6no Speciated Polyaromatic Hydrocarbons (PAHs)
- 1no Total Petroleum Hydrocarbon Criteria Working Group fractions (TPHCWG)

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 with 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 1 and 2.

TABLE 1: SUMMARY OF INORGANIC CONTAMINATION TESTING RESULTS

Determinand	Units	Number of Samples above Level of Detection	Minimum Recorded Level	Maximum Recorded Level	Residential with HGP Threshold Value	Number of Results Exceeding Threshold Value
Metals						
Cadmium	mg/kg	6	0.4	0.9	11	0
Chromium	mg/kg	6	9.5	14	910	0
Copper	mg/kg	6	24	39	2400	0
Lead	mg/kg	6	37	62	200*	0
Mercury	mg/kg	0	<0.1	-	40	0
Nickel	mg/kg	6	12	30	180	0
Zinc	mg/kg	6	56	100	3700	0
Semi metals and non metals						
Arsenic	mg/kg	6	2.6	4.8	37**	0
Boron	mg/kg	2	<0.4	0.53	290	0
Selenium	mg/kg	6	0.39	0.59	250	0
Inorganic chemicals						
Cyanide (Total)	mg/kg	0	<1	-	1.49**	0
Sulphate (2:1 Water Soluble)	mg/l	0	<10	10	2000^	0
Other						
pH	pH	-	6.1	7.6	5.5^	0
* Category 4 Screening Levels, March 2014						
** CLEA Software Version 1.06 (pH7 and 1%SOM)						
^ EA Threshold Values						
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 six samples tested.

5.5 Inorganic Chemicals

Soluble sulphates (potentially aggressive to foundation concrete) were recorded between <10 and 10mg/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 6.1 and 7.6, which is consistent with slightly acidic to slightly 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 1.43% therefore a SOM of 1% has been used to determine the S4UL thresholds. Table 2, below, summarises the results.

TABLE 2: SUMMARY OF ORGANIC CONTAMINATION TESTING RESULTS

Determinand	Units	Number of Samples above Level of Detection	Minimum Recorded Level	Maximum Recorded Level	Residential with HGP Threshold Value at 1% SOM	Number of Results Exceeding Threshold Value
TPH Aliphatic Fractions						
Aliphatic (C5-C6)	mg/kg	0	<1	-	42	0
Aliphatic (C6-C8)	mg/kg	0	<1	-	100	0
Aliphatic (C8-C10)	mg/kg	0	<1	-	27	0
Aliphatic (C10-C12)	mg/kg	0	<1	-	130	0
Aliphatic (C12-C16)	mg/kg	0	<1	-	110	0
Aliphatic (C16-C21)	mg/kg	0	<1	-	65000	0
Aliphatic (C21-C35)	mg/kg	0	<1	-	65000	0
Aliphatic (C35-C44)	mg/kg	0	<1	-	65000	0
TPH Aromatic Fractions						
Aromatic (C5-C7)	mg/kg	0	<1	-	70	0
Aromatic (C7-C8)	mg/kg	0	<1	-	130	0
Aromatic (C8-C10)	mg/kg	0	<1	-	34	0
Aromatic (C10-C12)	mg/kg	0	<1	-	74	0
Aromatic (C12-C16)	mg/kg	0	<1	-	140	0
Aromatic (C16-C21)	mg/kg	0	<1	-	260	0
Aromatic (C21-C35)	mg/kg	0	<1	-	1100	0
Aromatic (C35-C44)	mg/kg	0	<1	-	1100	0
Speciated PAH						
Naphthalene	mg/kg	0	<0.1	-	2.3	0
Acenaphthylene	mg/kg	0	<0.1	-	170	0
Acenaphthene	mg/kg	0	<0.1	-	210	0
Fluorene	mg/kg	0	<0.1	-	170	0
Phenanthrene	mg/kg	0	<0.1	-	95	0
Anthracene	mg/kg	0	<0.1	-	2400	0
Fluoranthene	mg/kg	0	<0.1	-	280	0
Pyrene	mg/kg	0	<0.1	-	620	0
Benzo[a]anthracene	mg/kg	0	<0.1	-	7.2	0
Chrysene	mg/kg	0	<0.1	-	15	0
Benzo[b]fluoranthene	mg/kg	0	<0.1	-	2.6	0
Benzo[k]fluoranthene	mg/kg	0	<0.1	-	77	0
Benzo[a]pyrene	mg/kg	0	<0.1	-	2.2	0
Benzo[g,h,i]perylene	mg/kg	0	<0.1	-	27	0
Dibenz(a,h)Anthracene	mg/kg	0	<0.1	-	0.24	0
Indeno(1,2,3-c,d)Pyrene	mg/kg	0	<0.1	-	320	0
Total PAH	mg/kg	0	<2	-	50*	0
Total Phenol	mg/kg	0	<0.3	-	280	0
* EA Threshold Values						

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

5.7 Asbestos

From the six samples subject to asbestos screening, no asbestos fibres were recorded in any of the samples.

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 3 identifies the potential pollution linkages present on site based on source – pathway – receptor relationships.

TABLE 3: CONCEPTUAL MODEL

Source	Pathway	Receptor	Risk Rating	Comments	
Asphyxiating or explosive ground gases <ul style="list-style-type: none"> Thin made ground (<0.60mbgl) with TOC of 0.83% No coal mining Landfill located 275m southeast of site 	Ground gas migration <ul style="list-style-type: none"> Migration through permeable soils Inhalation 	Future site users <ul style="list-style-type: none"> Adult and infant residents 	Moderate /Low	Gas monitoring in progress, source risk rating subject to change.	
		Users during development <ul style="list-style-type: none"> Construction workers 	Low		
Areas of contamination hazardous to human health (Residential Thresholds) <ul style="list-style-type: none"> No elevated organic determinants No elevated inorganic determinants No asbestos fibres 	<ul style="list-style-type: none"> Inhalation 	Future site users <ul style="list-style-type: none"> Adult and infant residents 	Low	Low risk posed by the low contamination levels encountered.	
		Users during development <ul style="list-style-type: none"> Construction workers 	Low	Low risk posed by the low contamination levels encountered. As good practice, consideration to be given to Health and Safety Executive: <i>Protection of Workers and the General Public During the Development of Contaminated Land.</i>	
	<ul style="list-style-type: none"> Inhalation Dust ingestion 	Users of surrounding sites <ul style="list-style-type: none"> Transient adult workers 	Low	Potential low risk during any demolition/site strip works. Consideration to be given to dust suppression, in line with BRE: <i>The Control of Dust and Emissions from Construction and Demolition, Best Practice Guidance.</i>	
	<ul style="list-style-type: none"> Leaching mobilised contaminants 	of	Solid geology <ul style="list-style-type: none"> Secondary Aquifer - A 	Low	No elevated contamination encountered within soils overlying a medium sensitivity aquifer.
			Drift geology <ul style="list-style-type: none"> Secondary Aquifer - A 	Low	The low permeability and relatively low sensitivity aquifer is unlikely to be impacted by the low contamination levels recorded.
	<ul style="list-style-type: none"> Drainage Lateral migration Accumulation of contaminated sediment 	of	Surface water features <ul style="list-style-type: none"> River located 275m east of the site 	Low	River unlikely to be impacted by low contamination levels.
	<ul style="list-style-type: none"> Uptake via roots and leaf surfaces 		Vegetation <ul style="list-style-type: none"> Gardens proposed 	Low	No exceedances of phytotoxic thresholds.
Areas of contamination above service fabric or BRE Special Digest 1 thresholds	<ul style="list-style-type: none"> Direct contact 	Construction Materials <ul style="list-style-type: none"> Concrete 	Low	Made ground and natural ground not aggressive to concrete.	
		Construction Materials <ul style="list-style-type: none"> Service Fabric 	Moderate	Copper piping to be avoided and prudent to lay any service within a clean bedding.	

In general terms, future householders construction materials are **potentially most** at risk as pollution linkages may be present for each of these receptors. Users of the site, construction workers, users of the surrounding sites, controlled waters and vegetation 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 with home grown produce.

The levels of contaminants across the site are low with no exceedances of the relevant thresholds.

The new development is expected to comprise new residential properties with associated gardens/access roads. Based on the **shallow** soil contamination testing, it is considered that the levels of contamination are unlikely to pose a risk to future users of the site.

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.

The current legislation on waste involves the categorization of materials into inert waste, non reactive hazardous wastes and hazardous wastes. The determination of the category depends on DEFRA landfill directive waste acceptance criteria (WAC) testing. Material taken off site may be subject to WAC by the appropriate waste disposal company.

6.2 Construction Workers and Users of Surrounding Sites

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

It is considered that the encountered levels of contamination are unlikely to pose a risk to construction workers and users of surrounding sites. As good practice, full PPE must be employed in accordance with Health and Safety Executive: *Protection of Workers and the General Public During the Development of Contaminated Land* 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, though remote, 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.

6.3 Vegetation

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

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*”. No concentrations of the phytotoxic determinants are shown as elevated from the six samples tested.

Any proposed areas of soft landscaping will require a suitable growing medium. Proposed garden areas should be excavated to 0.50mbgl or natural ground, whichever is shallower. The suitable growing medium should comprise 200mm topsoil over up to 300mm of subsoil. The suitable growing medium may utilise on-site materials, based on the contamination testing undertaken to date (three topsoil samples and three subsoil samples), however care must be taken to stockpile any excavated material away from any potential sources of contamination. The topsoil and subsoil should be screened of any deleterious materials (i.e. ash, slag, brick rubble and concrete).

6.4 Ground and Surface Water

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

From the site investigation undertaken, ground conditions broadly comprise thin made ground of topsoil (<0.60m) over drift deposits of very sandy slightly gravelly clay. The drift deposits can be considered to have a low permeability. The drift deposits are designated as a Secondary Aquifer – A by the Environment Agency.

The published geology indicates the site is underlain by solid geology of Richmond Chert, which is designated as a Secondary Aquifer - A by the Environment Agency. Rockhead was not proven in the intrusive investigation, however drift deposits have been proven to 5.20mbgl.

Groundwater, where encountered, was at a depth of between 2.50-4.20mbgl.

Due to the generally low contamination found across the site, the aquifer designations beneath the site, and the distance to surface waters, the development is considered to represent a low risk to groundwater or surface water receptors.

6.5 Construction Materials

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

6.5.1 Concrete Classification

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

6.5.2 Water Supply Pipes Material Selection

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

Level of acidic to alkaline pH (6.1 to 8.1) were recorded across the site at depths of between 0.20mbgl and

2.00mbgl within the made ground and natural samples.

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

7 GROUND GAS ASSESSMENT

The proposed development includes the construction of 32no new residential houses.

Ground gases such as carbon dioxide (CO₂), methane (CH₄), 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. In addition, Radon can also be hazardous to human health, and this site is located within a High Risk Radon Affected Area (10 to 30% of properties are at or above the Action Level), which will necessitate the inclusion of Full Radon Protection Measures in the design.

Full Radon Protection Measures can meet the requirements for NHBC Amber-1, but only if an appropriate membrane is used, that has sufficient resistance to hazardous gases such as CO₂ and CH₄ as well as radon. Should the client wish to utilise such a membrane, the gas protection afforded may render gas monitoring unnecessary, as the inclusion of Amber-1 protection would sever any gas pollution linkages that may be present, however this should be confirmed with the relevant regulatory authority.

For this report, five standpipes (BH's 1, 2, 3, 5 & 8) were installed during the sitework. The gas monitoring, if required, 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 and trial pits underwent a series of geotechnical tests (BS 1377:1990) to aid foundation design and soil description. In addition, California Bearing Ratio Tests (CBRs), insitu Standard Penetration Tests (SPTs) and Hand Shear Vane Tests were undertaken at regular intervals during drilling. The geotechnical results are presented in Appendix D.

8.1 Strength and Density

Hand shear vane testing within the natural cohesive deposits returned results ranging 34kPa to 78kPa, which are indicative of low to high strength conditions. At approximate foundation depth (ca. 1.00-1.20mbgl) the results ranged between 46kPa and 78kPa.

Standard Penetration Tests undertaken within the natural cohesive deposits at termination depths of between 3.90 and 5.20mbgl yielded N values of 50+ (refusal), inferred to be the result of cobbles/boulders.

8.2 Moisture Contents

Nine 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 15% and 24%.

8.3 Atterberg Limit Determinations

Nine 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 low to intermediate plasticity.

The Plasticity Indices ranged from 15 to 21 with equivalent moisture contents recorded above and at 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

Four samples from the boreholes (BH1 0.80-1.00mbgl, BH3 0.80-1.00mbgl, BH5 0.80-1.00mbgl and BH7 0.80-1.00mbgl) 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 BS5930:2015 Section 6 and are presented in Appendix D.

8.5 pH and Sulphate Results

Nine 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 7.1 to 8.1 indicating slightly alkaline conditions. Soluble sulphates were recorded at levels ranging from <10mg/l to 12mg/l.

8.6 Percolation Tests

One soakaway test was undertaken within the base of TP6. The result returned an infiltration rate of 5.41×10^{-6} m/sec. The results are presented in Appendix D.

8.7 CBR Tests

CBR testing was undertaken within the trial pits using the MEXE probe. The in-situ CBR results are detailed below in Table 4.

TABLE 4: SUMMARY OF CBR TESTING RESULTS

Trial Pit	0.30mbgl result (%)	0.60mbgl result (%)	0.90mbgl result (%)
TP1	1.5 (M/G)	2.5	2.5
TP2	2.0	3.0	2.5
TP3	2.0 (M/G)	2.5	2.5
TP4	1.5 (M/G)	2.5	3.0
TP5	2.5	3.0	3.5
TP6	2.0 (M/G)	3.0	3.0
TP7	2.0	3.0	3.5
M/G denotes test within Made Ground: an equilibrium CBR of 2% should be adopted			

8.8 Preliminary Ground Model

The information gathered during the intrusive works has been collated and summarised in the below preliminary ground model.

TABLE 5: PRELIMINARY GROUND MODEL

Strata	Depth (mbgl)		Parameters Range (average)	Reference/Notes
	From	To		
Made Ground (topsoil)	0.00	0.30-0.60	CBR = 1.5-2.0% (1.75)	In-situ CBR
Glacial Till Deposits (sandy gravelly CLAY)	0.30-0.60	1.80-5.20	CBR = 2.5-3.5% (2.9)	
			N = 50+ (50+)	In-situ SPT
			$C_u = 34-78\text{kPa}$ (56)	In-situ Hand Shear Vane
			IP = 12-27% (18)	Atterberg Limit Testing
			Gravel = 7.2-21.7% (14.3)	Particle Size Distribution Testing
			Sand = 36.5-43% (39.2)	
			Fines = 42-50% (46.5)	
			pH = 7.1-8.1 (7.6)	Laboratory Chemical Analysis
$\text{SO}_4 = <10-12\text{mg/kg}$ (10.3)				

8.9 Foundations

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

Based on a conservative shear strength of 46kN/m² a safe bearing capacity of 105kN/m² has been determined for strip foundations 0.60m wide founding on the natural clay at depths of around 0.90mbgl. Providing the safe bearing capacity is not exceeded 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.

8.10 Excavation

Based on the nature of the ground conditions encountered, excavations should be within the capacity of normal earthworks plant although breaking out of cobbles 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".

8.11 Groundwater

Groundwater was encountered within all boreholes, other than BH5, between 2.50 and 4.20mbgl. No groundwater was encountered within the trial pits.

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:
Figures and Drawings**



12-16 Yarm Road, Stockton on Tees, TS18 3NA
 Tel: 01642 607083 Email: info@solmek.com

Figure Title
Site Location Plan
Project Number
S191209
Project Name
Robin Hood Farm, Brompton-on-Swale
Client
Billinghurst George and Partners
Date
January 2020
DRG Number
Figure 1
Scale
1:1000 @ A4 [DO NOT SCALE]

Legend Key

Project Bounds - Project Bounds



12-16 Yarm Road, Stockton on Tees, TS18 3NA
 Tel: 01642 607083 Email: info@solmek.com

Figure Title

Exploratory Hole Location Plan

Project Number

S191209

Project Name

Robin Hood Farm, Brompton-on-Swale

Client

Billinghurst George and Partners

Date

January 2020

DRG Number

Figure 2

Scale

1:1000 @ A4 [DO NOT SCALE]

- Legend Key
- Locations By Type - Empty
 - ◆ Locations By Type - BH
 - Locations By Type - TP
 - ▭ Project Bounds - Project Bounds



Figure 3: TP1



Figure 4: TP2

Title	Date
Figures 3 & 4	January 2020
Project	
Robin Hood Farm, Brompton-on-Swale	
Client	
Billinghurst George & Partners	

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 Fax: +44 (0) 1642 612355
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Figure 5: TP3



Figure 6: TP4

Title	Date
Figures 5 & 6	January 2020
Project	
Robin Hood Farm, Brompton-on-Swale	
Client	
Billinghurst George & Partners	

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Figure 7: TP5

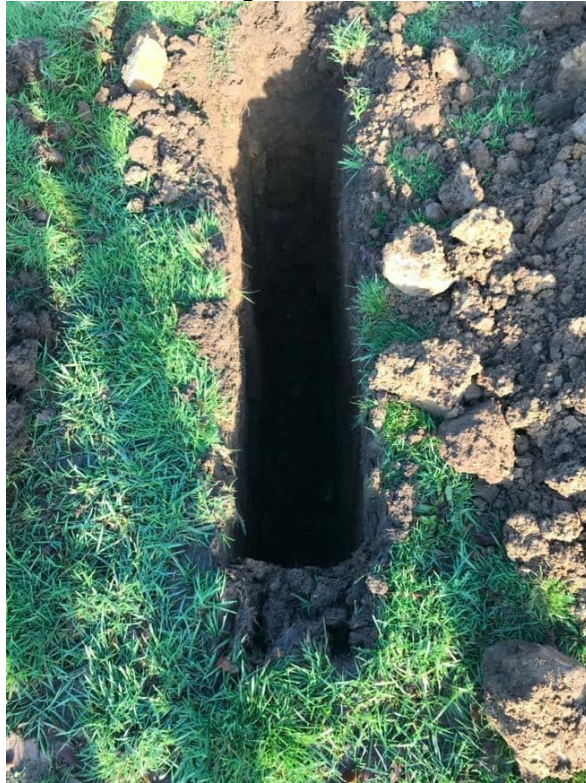


Figure 8: TP6

Title	Date
Figures 7 & 8	January 2020
Project	
Robin Hood Farm, Brompton-on-Swale	
Client	
Billinghurst George & Partners	

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Figure 9: TP7

Title	Date
Figure 9	January 2020
Project	
Robin Hood Farm, Brompton-on-Swale	
Client	
Billinghurst George & Partners	

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**APPENDIX B:
Borehole Logs & Trial Pit Logs**

Borehole Log

BH1

Contract no: S191209	Site: Robin Hood Farm, Brompton-on-Swale	Driller: SR Drilling Ltd	GL (AOD):
		Plant used: Mini Rig	Eastings:
Client: Billingham George and Partners		Started: 14/12/2019	Northing:
Method: Small Percussive		Ended: 14/12/2019	Logged: LC
		Backfilled: 14/12/2019	Status: FINAL

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing		
					Depth (m)	Type	Results
		0.60		MADE GROUND: Grey sandy topsoil.	0.20 - 0.40	B+ES	
				Firm consistency brown to dark brown very sandy slightly gravelly medium strength CLAY of medium plasticity. Gravel is fine to coarse angular to subangular of sandstone and mudstone.	0.40 - 0.60	B+ES	
					0.80 - 1.00	B+ES	
					1.20	HV	54kPa
					1.40 - 1.60	D	
					1.80 - 2.00	D	
					2.00	HV	64kPa
					2.40 - 2.60	D	
					2.80 - 3.00	D	
					3.00	HV	47kPa
					3.80 - 4.00	D	
					4.00	HV	42kPa
					4.20 - 4.40	D	
		4.40		End of Borehole at 4.400m	4.40 - 4.85	SPT (S)	N=50+ (25/50)

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)							
							4.00											



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Borehole Log

Scale 1:50 Sheet 1 of 1

BH2

Contract no: S191209	Site: Robin Hood Farm, Brompton-on-Swale	Driller: SR Drilling Ltd	GL (AOD):
Client: Billingham George and Partners		Plant used: Mini Rig	Easting:
Method: Small Percussive		Started: 14/12/2019	Northing:
		Ended: 14/12/2019	Logged: LC
		Backfilled: 14/12/2019	Status: FINAL

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing		
					Depth (m)	Type	Results
		0.40		MADE GROUND: Grey sandy topsoil.	0.20 - 0.40	B+ES	
				Firm consistency brown to dark brown very sandy slightly gravelly medium strength CLAY of medium plasticity. Gravel is fine to coarse angular to subangular of sandstone and mudstone.	0.40 - 0.60	B+ES	
					0.80 - 1.00	B+ES	
					1.20	HV	48kPa
					1.40 - 1.60	D	
					1.80 - 2.00	D	
					2.00	HV	54kPa
					2.40 - 2.60	D	
					2.80 - 3.00	D	
					3.00	HV	51kPa
					3.80 - 4.00	D	
					4.00	HV	45kPa
					4.80 - 5.00	D	
					5.00	HV	53kPa
		5.20		End of Borehole at 5.200m	5.20 - 5.65	SPT (S)	N=50+ (25/50)

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)						
							2.50										



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Borehole Log

Scale 1:50 Sheet 1 of 1

BH3

Contract no: S191209	Site: Robin Hood Farm, Brompton-on-Swale	Driller: SR Drilling Ltd	GL (AOD):
Client: Billingham George and Partners		Plant used: Mini Rig	Easting:
Method: Small Percussive		Started: 14/12/2019	Northing:
		Ended: 14/12/2019	Logged: LC
		Backfilled: 14/12/2019	Status: FINAL

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing		
					Depth (m)	Type	Results
		0.40		MADE GROUND: Grey sandy topsoil.	0.20 - 0.40	B+ES	
				Firm consistency brown to dark brown very sandy slightly gravelly medium strength CLAY of low plasticity. Gravel is fine to coarse angular to subangular of sandstone and mudstone.	0.40 - 0.60	B+ES	
					0.80 - 1.00	B+ES	
					1.20	HV	46kPa
					1.40 - 1.60	D	
					1.80 - 2.00	D	
					2.00	HV	51kPa
					2.40 - 2.60	D	
					2.80 - 3.00	D	
					3.00	HV	53kPa
					3.80 - 4.00	D	
					4.00	HV	63kPa
		4.20		End of Borehole at 4.200m	4.20 - 4.65	SPT (S)	N=50+ (25/50)

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. Groundwater encountered at 3.00m.				3.00				



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Borehole Log

Scale 1:50 Sheet 1 of 1

BH4

Contract no: S191209	Site: Robin Hood Farm, Brompton-on-Swale	Driller: SR Drilling Ltd	GL (AOD):
Client: Billingham George and Partners		Plant used: Mini Rig	Easting:
Method: Small Percussive		Started: 14/12/2019	Northing:
		Ended: 14/12/2019	Logged: LC
		Backfilled: 14/12/2019	Status: FINAL

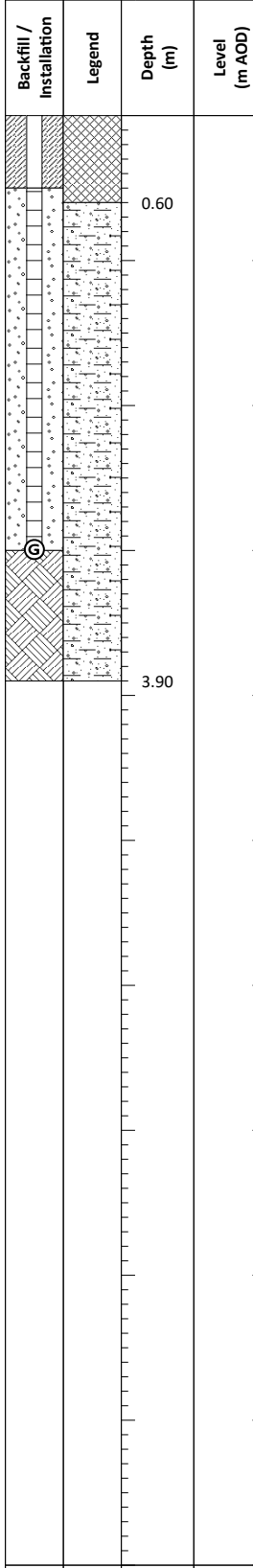
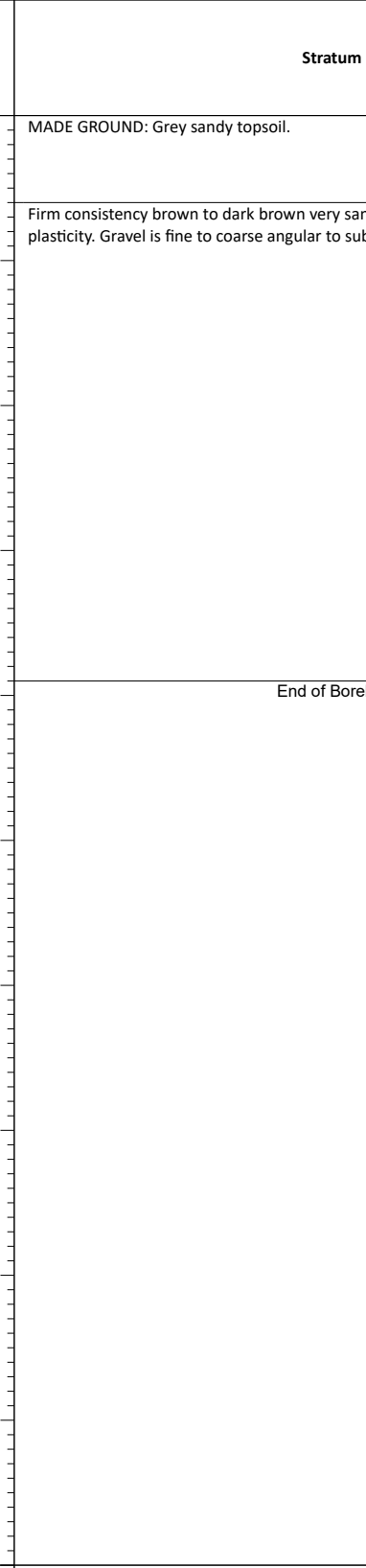
Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing		
					Depth (m)	Type	Results
		0.40		MADE GROUND: Grey sandy topsoil.	0.20 - 0.40	B+ES	
				Soft to firm consistency brown to dark brown very sandy slightly gravelly low to medium strength CLAY of medium plasticity. Gravel is fine to coarse angular to subangular of sandstone and mudstone.	0.40 - 0.60	B+ES	
					0.80 - 1.00	B+ES	
					1.20	HV	67kPa
					1.40 - 1.60	D	
					1.80 - 2.00	D	
					2.00	HV	58kPa
					2.40 - 2.60	D	
					2.80 - 3.00	D	
					3.00	HV	52kPa
					3.80 - 4.00	D	
					4.00	HV	36kPa
			4.20 - 4.50	D			
		4.50		End of Borehole at 4.500m	4.50 - 4.95	SPT (S)	N=50+ (25/50)

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)						
							3.70										

Borehole Log

BH5

Contract no: S191209	Site: Robin Hood Farm, Brompton-on-Swale	Driller: SR Drilling Ltd	GL (AOD):
Client: Billingham George and Partners		Plant used: Mini Rig	Easting:
Method: Small Percussive		Started: 14/12/2019	Northing:
		Ended: 14/12/2019	Logged: LC
		Backfilled: 14/12/2019	Status: FINAL

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing			
					Depth (m)	Type	Results	
		0.60		MADE GROUND: Grey sandy topsoil.	0.20 - 0.40	B+ES		
				Firm consistency brown to dark brown very sandy slightly gravelly medium strength CLAY of low plasticity. Gravel is fine to coarse angular to subangular of sandstone and mudstone.	0.40 - 0.60	B+ES		
					0.80 - 1.00	B+ES		
					1.20	HV		62kPa
					1.40 - 1.60	D		
					1.80 - 2.00	D		
					2.00	HV		73kPa
					2.40 - 2.60	D		
					2.80 - 3.00	D		
					3.00	HV		57kPa
		3.90		End of Borehole at 3.900m	3.70 - 3.90	D	N=50+ (25/50)	
					3.90 - 4.35	SPT (S)		

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.								

Borehole Log

BH6

Contract no: S191209	Site: Robin Hood Farm, Brompton-on-Swale	Driller: SR Drilling Ltd	GL (AOD):
Client: Billingham George and Partners		Plant used: Mini Rig	Easting:
Method: Small Percussive		Started: 14/12/2019	Northing:
		Ended: 14/12/2019	Logged: LC
		Backfilled: 14/12/2019	Status: FINAL



Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing		
					Depth (m)	Type	Results
		0.40		MADE GROUND: Grey sandy topsoil.	0.20 - 0.40	B+ES	
				Soft to firm consistency brown to dark brown very sandy slightly gravelly low to medium strength CLAY of medium plasticity. Gravel is fine to coarse angular to subangular of sandstone and mudstone.	0.40 - 0.60	B+ES	
					0.80 - 1.00	B+ES	
					1.20	HV	48kPa
					1.40 - 1.60	D	
					1.80 - 2.00	D	
					2.00	HV	34kPa
					2.40 - 2.60	D	
					2.80 - 3.00	D	
					3.00	HV	51kPa
					3.80 - 4.00	D	
				4.00	HV	49kPa	
				4.20 - 4.65	SPT (S)	N=50+ (25/50)	
		4.20		End of Borehole at 4.200m			

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. Groundwater encountered at 4.00m.				4.00				

Borehole Log

BH7

Contract no: S191209	Site: Robin Hood Farm, Brompton-on-Swale	Driller: SR Drilling Ltd	GL (AOD):
Client: Billingham George and Partners		Plant used: Mini Rig	Easting:
Method: Small Percussive		Started: 14/12/2019	Northing:
		Ended: 14/12/2019	Logged: LC
		Backfilled: 14/12/2019	Status: FINAL

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing		
					Depth (m)	Type	Results
		0.40		MADE GROUND: Grey sandy topsoil.	0.20 - 0.40	B+ES	
				Firm to stiff consistency brown to dark brown very sandy slightly gravelly medium to high strength CLAY of medium plasticity. Gravel is fine to coarse angular to subangular of sandstone and mudstone.	0.40 - 0.60	B+ES	
					0.80 - 1.00	B+ES	
					1.20	HV	78kPa
					1.40 - 1.60	D	
					1.80 - 2.00	D	
					2.00	HV	71kPa
					2.40 - 2.60	D	
					2.80 - 3.00	D	
					3.00	HV	54kPa
					3.80 - 4.00	D	
			4.00	HV	57kPa		
		4.30		End of Borehole at 4.300m	4.30 - 4.75	SPT (S)	N=50+ (25/50)

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)							
							4.00											

1.2m hand excavated inspection pit. Groundwater encountered at 4.00m.

Borehole Log

BH8

Contract no: S191209	Site: Robin Hood Farm, Brompton-on-Swale	Driller: SR Drilling Ltd	GL (AOD):
Client: Billingham George and Partners		Plant used: Mini Rig	Eastings:
Method: Small Percussive		Started: 14/12/2019	Northing:
		Ended: 14/12/2019	Logged: LC
		Backfilled: 14/12/2019	Status: FINAL

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing		
					Depth (m)	Type	Results
		0.60		MADE GROUND: Grey sandy topsoil.	0.20 - 0.40	B+ES	
				Firm consistency brown to dark brown very sandy slightly gravelly medium strength CLAY of low plasticity. Gravel is fine to coarse angular to subangular of sandstone and mudstone.	0.40 - 0.60	B+ES	
					0.80 - 1.00	B+ES	
					1.20	HV	63kPa
					1.40 - 1.60	D	
					1.80 - 2.00	D	
					2.00	HV	56kPa
					2.40 - 2.60	D	
					2.80 - 3.00	D	
					3.00	HV	42kPa
					3.80 - 4.00	D	
					4.00	HV	48kPa
					4.20 - 4.40	D	
		4.40		End of Borehole at 4.400m	4.40 - 4.85	SPT (S)	N=50+ (25/50)

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)						
							4.20										



SOLMEK

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Email: info@solmek.com

Trial Pit Log

Trial Pit No
TP1
Sheet 1 of 1

Project Name: Robin Hood Farm, Brompton-on-Swale

Project No.
S191209

Co-ords: E - N
Level:

Date
13/12/2019

Plant Used: 360 Mini Digger

Dimensions (m):

Scale
1:26

Client: Billingham George and Partners

Depth
1.80

Logged
LC

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.30	CBR	1.5%	0.40			MADE GROUND: Grey sandy topsoil.		
	0.50	B+ES					0.60		Firm consistency brown to dark brown very sandy slightly gravelly medium strength CLAY of low cobble content. Gravel is fine to coarse angular to subangular of sandstone and mudstone.
	0.60	CBR	2.5%						
	0.90	CBR	2.5%	1.80					
	1.00	B+ES					1.00		
	1.00	HV	50kPa						
	1.50	B							
End of Pit at 1.800m									

Remarks: No Groundwater Encountered

Stability:



SOLMEK

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Trial Pit Log

Trial Pit No
TP2
Sheet 1 of 1

Project Name: Robin Hood Farm, Brompton-on-Swale

Project No.
S191209

Co-ords: E - N
Level:

Date
13/12/2019

Plant Used: 360 Mini Digger









Dimensions (m):

Scale
1:26

Client: Billingham George and Partners

Depth
2.00

Logged
LC

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.30	CBR	2.0%	0.30			MADE GROUND: Grey sandy topsoil.	
	0.50	B+ES					Firm consistency brown to dark brown very sandy slightly gravelly medium strength CLAY. Gravel is fine to coarse angular to subangular of sandstone and mudstone.	
	0.60	CBR	3.0%					
	0.90	CBR	2.5%				1	
	1.00	B+ES						
	1.00	HV	55kPa					
	1.50	B						
	2.00	HV	60kPa	2.00			2	
	End of Pit at 2.000m							3
								4
								5

Remarks: No Groundwater Encountered

Stability:



SOLMEK

Solmek Ltd
12-16 Yarm Road
Stockton on Tees
TS18 3NA
Tel: 01642 607083
Email: info@solmek.com

Trial Pit Log

Trial Pit No
TP3
Sheet 1 of 1

Project Name: Robin Hood Farm, Brompton-on-Swale
Project No. S191209
Co-ords: E - N
Level:
Date: 13/12/2019

Plant Used: 360 Mini Digger
Dimensions (m):
Scale: 1:26

Client: Billingham George and Partners
Depth: 1.90
Logged: LC

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.30	CBR	2.0%	0.60			MADE GROUND: Grey sandy topsoil.
	0.50	B+ES					
	0.60	CBR	2.5%				
	0.90	CBR	2.5%	1.90			Firm consistency brown to dark brown very sandy slightly gravelly medium strength CLAY of medium cobble content. Gravel is fine to coarse angular to subangular of sandstone and mudstone.
	1.00	B+ES					
	1.00	HV	55kPa				
	1.50	B		1.90			
	1.50	HV	50kPa				
	End of Pit at 1.900m						

Remarks: No Groundwater Encountered
Stability:



SOLMEK

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Email: info@solmek.com

Trial Pit Log

Trial Pit No
TP4
Sheet 1 of 1

Project Name: Robin Hood Farm, Brompton-on-Swale
Project No. S191209
Co-ords: E - N
Level:
Date: 13/12/2019

Plant Used: 360 Mini Digger
Dimensions (m):
Scale: 1:26

Client: Billingham George and Partners
Depth: 2.10
Logged: LC

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.30	CBR	1.5%	0.50			MADE GROUND: Grey sandy topsoil.
	0.50	B+ES					
	0.60	CBR	2.5%				
	0.90	CBR	3.0%				
	1.00	B+ES		2.10			Firm consistency brown to dark brown very sandy slightly gravelly medium strength CLAY of low cobble content. Gravel is fine to coarse angular to subangular of sandstone and mudstone.
	1.00	HV	65kPa				
	1.50	B					
	2.00	B HV	55kPa				
	2.00						End of Pit at 2.100m

Remarks: No Groundwater Encountered
Stability:

**SOLMEK**

Solmek Ltd
 12-16 Yarm Road
 Stockton on Tees
 TS18 3NA
 Tel: 01642 607083
 Email: info@solmek.com

Trial Pit Log

Trial Pit No
TP5
 Sheet 1 of 1

Project Name: Robin Hood Farm, Brompton-on-Swale Project No. S191209 Co-ords: E - N Date 13/12/2019
 Level:

Plant Used: 360 Mini Digger Dimensions (m): Scale 1:26

Client: Billingham George and Partners Depth 2.20 Logged LC

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.30	CBR	2.5%	0.30			MADE GROUND: Grey sandy topsoil.	
	0.50	B+ES					Firm consistency brown to dark brown very sandy slightly gravelly medium to high strength CLAY. Gravel is fine to coarse angular to subangular of sandstone and mudstone.	
	0.60	CBR	3.0%					
	0.90	CBR	3.5%				1	
	1.00	B+ES						
	1.00	HV	75kPa					
	1.50	B						
	2.00	B					2	
	2.00	HV	65kPa	2.20				
	End of Pit at 2.200m							3
								4
								5

Remarks: No Groundwater Encountered

Stability:



SOLMEK

Solmek Ltd
12-16 Yarm Road
Stockton on Tees
TS18 3NA
Tel: 01642 607083
Email: info@solmek.com

Trial Pit Log

Trial Pit No
TP6
Sheet 1 of 1

Project Name: Robin Hood Farm, Brompton-on-Swale

Project No.
S191209

Co-ords: E - N
Level:

Date
13/12/2019

Plant Used: 360 Mini Digger

Dimensions (m):

Scale
1:26

Client: Billingham George and Partners

Depth
2.00

Logged
LC

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.30	CBR	2.0%	0.40			MADE GROUND: Grey sandy topsoil.	
	0.50	B+ES						
	0.60	CBR	3.0%					
	0.90	CBR	3.0%					
	1.00	B+ES					1	
	1.00	HV	70kPa					
	1.50	B						
	2.00	HV	60kPa	2.00			2	
							End of Pit at 2.000m	
								3
								4
								5

Remarks: No Groundwater Encountered

Stability:



SOLMEK

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

Trial Pit Log

Trial Pit No
TP7
Sheet 1 of 1

Project Name: Robin Hood Farm, Brompton-on-Swale

Project No.
S191209

Co-ords: E - N
Level:

Date
13/12/2019

Plant Used: 360 Mini Digger

Dimensions (m):

Scale
1:26

Client: Billingham George and Partners

Depth
2.00

Logged
LC

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.30	CBR	2.0%	0.30			MADE GROUND: Grey sandy topsoil.	
	0.50	B+ES					Firm consistency brown to dark brown very sandy slightly gravelly medium to high strength CLAY. Gravel is fine to coarse angular to subangular of sandstone and mudstone.	
	0.60	CBR	3.0%					
	0.90	CBR	3.5%				1	
	1.00	B+ES						
	1.00	HV	75kPa					
	1.50	B						
	2.00	HV	55kPa	2.00			2	
	End of Pit at 2.000m							3
								4
								5

Remarks: No Groundwater Encountered

Stability:

APPENDIX C:
Contamination Laboratory Results



Final Report

Report No.: 20-00222-1

Initial Date of Issue: 13-Jan-2020

Client: Solmek Ltd

Client Address: 12 Yarm Road
Stockton-on-Tees
TS18 3NA

Contact(s): Kathryn Watkin
Luke Richards
Office

Project: S191209 Brompton

Quotation No.:		Date Received:	07-Jan-2020
Order No.:	SOL-3754	Date Instructed:	07-Jan-2020
No. of Samples:	6		
Turnaround (Wkdays):	5	Results Due:	13-Jan-2020
Date Approved:	13-Jan-2020		

Approved By:

Details: Glynn Harvey, Laboratory Manager

Results - Soil

Client: Solmek Ltd	Chemtest Job No.:		20-00222	20-00222	20-00222	20-00222	20-00222	20-00222	20-00222
Quotation No.:	Chemtest Sample ID.:		949400	949401	949402	949403	949404	949405	949405
	Sample Location:		BH1	BH3	BH4	BH5	BH6	BH8	
	Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	
	Top Depth (m):		0.20	0.40	0.20	0.40	0.40	0.80	
	Bottom Depth (m):		0.40	0.60	0.40	0.60	0.60	1.00	
	Date Sampled:		14-Dec-2019	14-Dec-2019	14-Dec-2019	14-Dec-2019	14-Dec-2019	14-Dec-2019	
	Asbestos Lab:		COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	
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	15	16	19	16	19
Soil Colour	N	2040		N/A	Brown,	Brown,	Brown,	Brown,	Brown,
Other Material	N	2040		N/A	NONE,	NONE,	NONE,	NONE,	NONE,
Soil Texture	N	2040		N/A	Sand,	Sand,	Sand,	Sand,	Sand,
pH	M	2010		4.0	7.1	7.6	6.1	7.0	7.4
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	0.41	< 0.40	0.53	< 0.40	< 0.40
Sulphate (2:1 Water Soluble) as SO4	M	2120	mg/l	10	< 10	< 10	10	< 10	< 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	2.6	3.8	4.8	4.1	4.7
Cadmium	M	2450	mg/kg	0.10	0.40	0.68	0.46	0.70	0.90
Chromium	M	2450	mg/kg	1.0	9.5	9.7	11	12	14
Copper	M	2450	mg/kg	0.50	24	39	33	35	36
Mercury	M	2450	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Nickel	M	2450	mg/kg	0.50	12	19	15	22	30
Lead	M	2450	mg/kg	0.50	37	40	62	40	41
Selenium	M	2450	mg/kg	0.20	0.39	0.41	0.59	0.51	0.46
Zinc	M	2450	mg/kg	0.50	56	88	85	79	100
Organic Matter	M	2625	%	0.40	1.5	0.69	2.6	1.3	0.88
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] < 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0					[B] < 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0					[B] < 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0					[B] < 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0					[B] < 5.0
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] < 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0					[B] < 1.0
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0					[B] < 1.0

Project: S191209 Brompton

Client: Solmek Ltd	Chemtest Job No.:		20-00222	20-00222	20-00222	20-00222	20-00222	20-00222	20-00222
Quotation No.:	Chemtest Sample ID.:		949400	949401	949402	949403	949404	949405	949405
	Sample Location:		BH1	BH3	BH4	BH5	BH6	BH8	
	Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	
	Top Depth (m):		0.20	0.40	0.20	0.40	0.40	0.80	
	Bottom Depth (m):		0.40	0.60	0.40	0.60	0.60	1.00	
	Date Sampled:		14-Dec-2019	14-Dec-2019	14-Dec-2019	14-Dec-2019	14-Dec-2019	14-Dec-2019	
	Asbestos Lab:		COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	
Determinand	Accred.	SOP	Units	LOD					
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0					[B] < 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0					[B] < 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0					[B] < 10
Naphthalene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	M	2700	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Total Phenols	M	2920	mg/kg	0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30

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:
949400			BH1	14-Dec-2019	B	Amber Glass 250ml
949400			BH1	14-Dec-2019	B	Plastic Tub 500g
949401			BH3	14-Dec-2019	B	Amber Glass 250ml
949401			BH3	14-Dec-2019	B	Plastic Tub 500g
949402			BH4	14-Dec-2019	B	Amber Glass 250ml
949402			BH4	14-Dec-2019	B	Plastic Tub 500g
949403			BH5	14-Dec-2019	B	Amber Glass 250ml
949403			BH5	14-Dec-2019	B	Plastic Tub 500g
949404			BH6	14-Dec-2019	B	Amber Glass 250ml
949404			BH6	14-Dec-2019	B	Plastic Tub 500g
949405			BH8	14-Dec-2019	B	Amber Glass 250ml
949405			BH8	14-Dec-2019	B	Plastic Tub 500g

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.
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	Alkaline 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.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
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)
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.

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:
Geotechnical Laboratory Results**

Laboratory Report Front Sheet

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



Site name	Job number
Brompton	S191209

Client details:

Reference: S191209
Name: Solmek
Address: 12 Yarm Road,
Stockton-on-tees,
TS18 3NA

Telephone: 01642 607083
Email: lrichards@solmek.com

FAO: L Richards

Date commenced: 07/01/2020


Date reported: 14/01/2020

Observations and interpretations are outside of the UKAS Accreditation

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 Accredited 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 Signatories: <input checked="" type="checkbox"/> K Watkin (Lab Manager) <input type="checkbox"/> U Mazhar (Assistant Lab Manager) <input type="checkbox"/>
--	---

Summary of Classification Tests

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



Site name	Job number
Brompton	S191209

Hole	Depth		Type	w %	Oven temp. oc	wa %	Pa %	Pr %	wL %	wP %	IP %	IL	Plasticity class	Preparation method
	Top m	Base m												
BH1	0.80	1.00	B	22	105	23	96	4	39-s	18	21	0.238	CI	Tested after >425µm removed by hand
BH2	1.40	1.60	B	19	105	20	93	7	40-s	20	20	0.000	CI	Tested after >425µm removed by hand
BH3	0.80	1.00	B	24	105	25	96	4	33-s	18	15	0.467	CL	Tested after >425µm removed by hand
BH4	1.40	1.60	B	19	105	20	95	5	40-s	19	21	0.048	CI	Tested after >425µm removed by hand
BH5	0.80	1.00	B	20	105	24	83	17	34-s	16	18	0.444	CL	Tested after >425µm removed by hand
BH6	1.40	1.60	B	23	105	24	96	4	35-s	18	17	0.353	CI	Tested after >425µm removed by hand
BH6	1.80	2.00	B	15	105	16	91	9	31-s	14	17	0.118	CL	Tested after >425µm removed by hand
BH7	0.80	1.00	B	20	105	22	91	9	36-s	18	18	0.222	CI	Tested after >425µm removed by hand
BH8	1.40	1.60	B	17	105	18	93	7	29-s	14	15	0.267	CL	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 425µm sieve		
Pr	Percentage retained 425µm 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	KW
Approval date	13/01/2020 12:57
Date report generated	
Report Number	

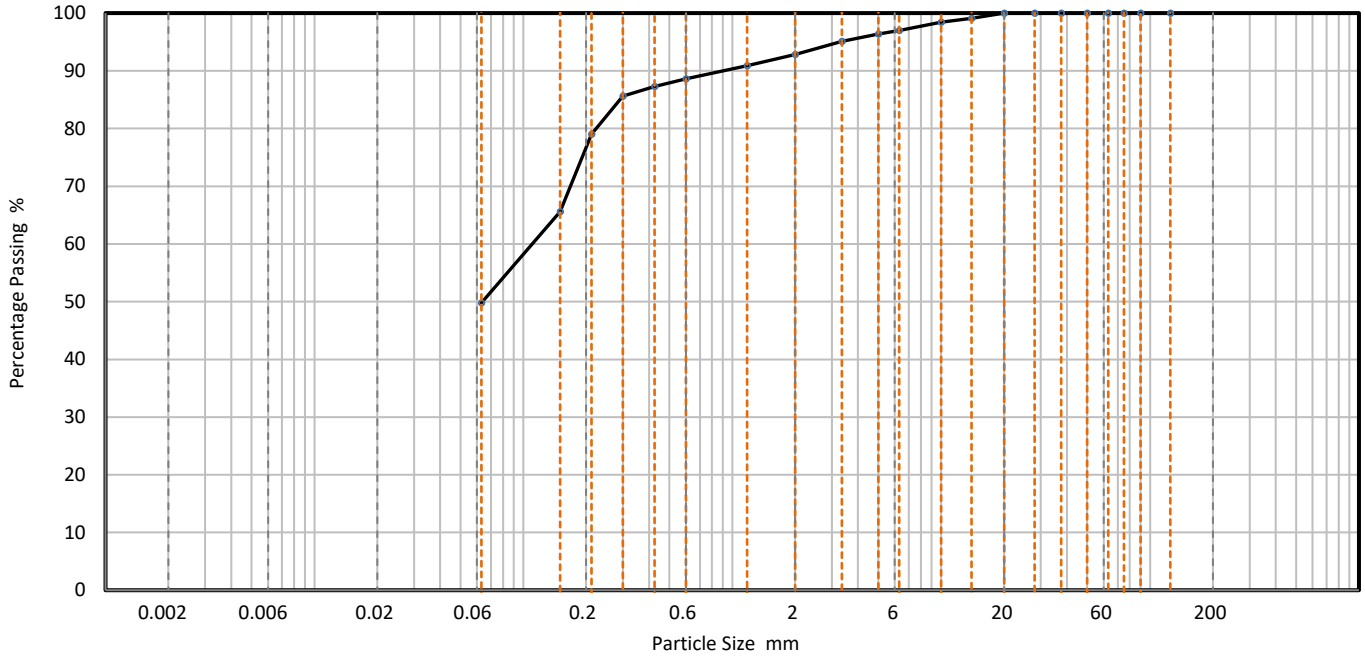
PARTICLE SIZE DISTRIBUTION

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



Site name	Job number
Brompton	S191209

Hole	BH1	Lab sample ID	SLMK202001070
Depth (Top) m	0.80	Test Method	BS 1377 - 2 : 1990 Clause 9.2
Depth (Base) m	1	Soil Description	Brown, slightly gravelly, Very Sandy CLAY
Sample type	B		



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES	BOULDERS
	SILT			SAND			GRAVEL				

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	99		
10	98		
6.3	97		
5	96		
3.35	95		
2	93		
1.18	91		
0.6	89		
0.425	87		
0.3	86		
0.212	79		
0.15	66		
0.063	50		

Dry Mass of sample, g 566

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	7.2
Sand	43.0
Fines <0.063mm	50.0

Grading Analysis	
D100	mm
D60	mm 0.11
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	13/01/2020 12:58

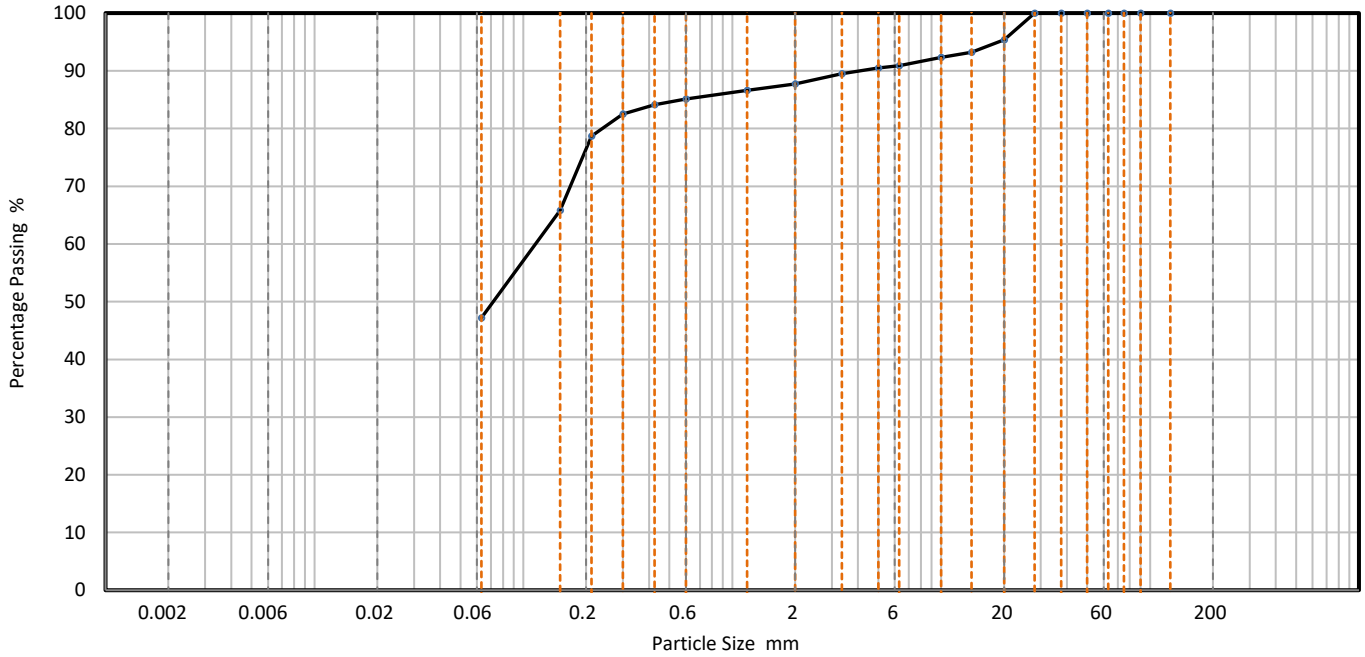
PARTICLE SIZE DISTRIBUTION

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



Site name	Job number
Brompton	S191209

Hole	BH3	Lab sample ID	SLMK202001072
Depth (Top) m	0.80	Test Method	BS 1377 - 2 : 1990 Clause 9.2
Depth (Base) m	1	Soil Description	Brown, slightly gravelly, very sandy CLAY
Sample type	B		



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES	BOULDERS
	SILT			SAND			GRAVEL				

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	95		
14	93		
10	92		
6.3	91		
5	91		
3.35	90		
2	88		
1.18	87		
0.6	85		
0.425	84		
0.3	83		
0.212	79		
0.15	66		
0.063	47		

Dry Mass of sample, g 620

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	12.3
Sand	40.5
Fines <0.063mm	47.0

Grading Analysis		
D100	mm	
D60	mm	0.115
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	13/01/2020 08:58

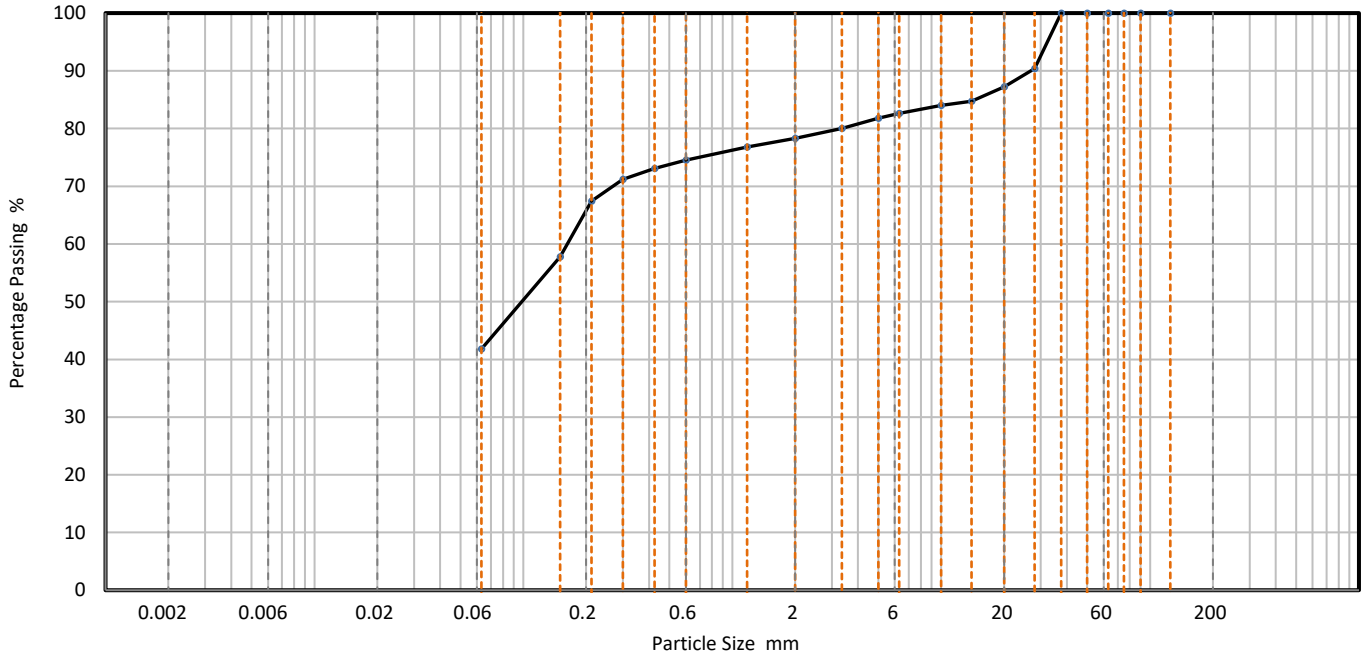
PARTICLE SIZE DISTRIBUTION

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



Site name	Job number
Brompton	S191209

Hole	BH5	Lab sample ID	SLMK202001074
Depth (Top) m	0.80	Test Method	BS 1377 - 2 : 1990 Clause 9.2
Depth (Base) m	1	Soil Description	Brown, slightly gravelly, Very Sandy CLAY
Sample type	B		



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES	BOULDERS
	SILT			SAND			GRAVEL				

Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	90		
20	87		
14	85		
10	84		
6.3	83		
5	82		
3.35	80		
2	78		
1.18	77		
0.6	75		
0.425	73		
0.3	71		
0.212	67		
0.15	58		
0.063	42		

Dry Mass of sample, g

710

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	21.7
Sand	36.5
Fines <0.063mm	42.0

Grading Analysis		
D100	mm	
D60	mm	0.162
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	13/01/2020 12:59

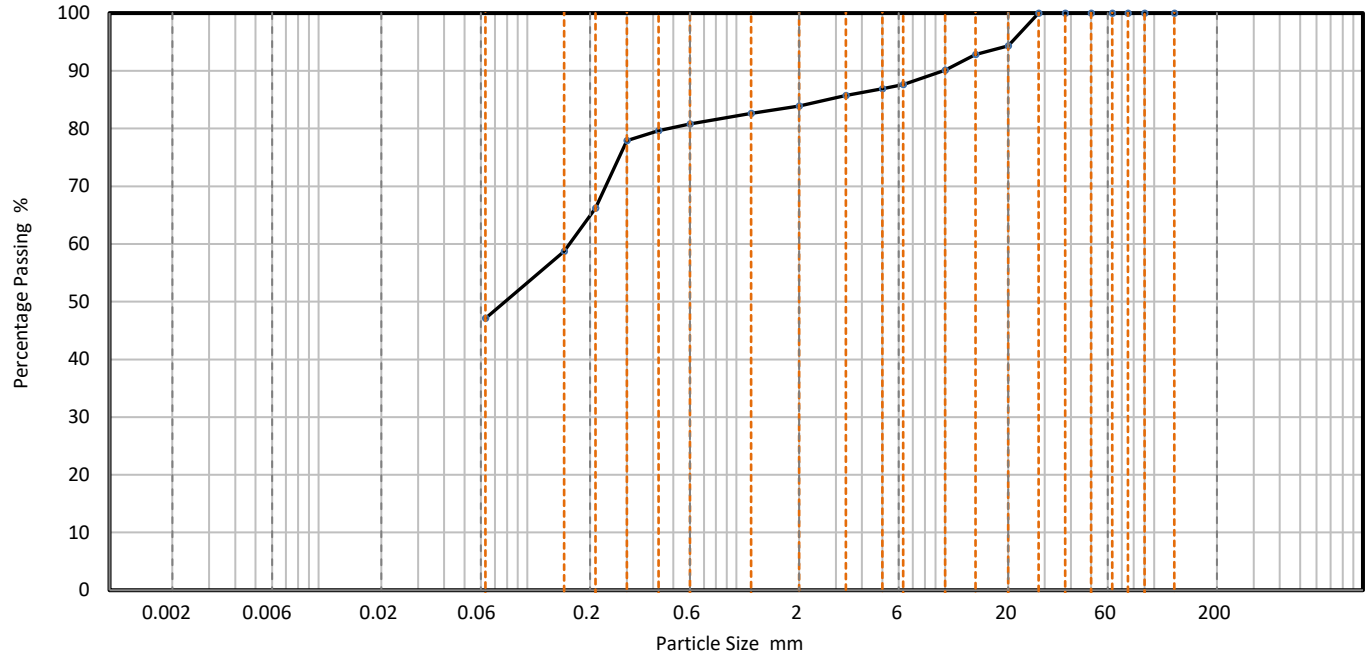
PARTICLE SIZE DISTRIBUTION

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



Site name	Job number
Brompton	S191209

Hole	BH7	Lab sample ID	SLMK202001076
Depth (Top) m	0.80	Test Method	BS 1377 - 2 : 1990 Clause 9.2
Depth (Base) m	1	Soil Description	Brown, slightly gravelly, Very Sandy CLAY
Sample type	B		



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES	BOULDERS
	SILT			SAND			GRAVEL				

Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	94		
14	93		
10	90		
6.3	88		
5	87		
3.35	86		
2	84		
1.18	83		
0.6	81		
0.425	80		
0.3	78		
0.212	66		
0.15	59		
0.063	47		

Dry Mass of sample, g

544

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	16.1
Sand	36.8
Fines <0.063mm	47.0

Grading Analysis		
D100	mm	
D60	mm	0.159
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	13/01/2020 13:01



2183

Final Report

Report No.: 20-00217-1

Initial Date of Issue: 10-Jan-2020

Client: Solmek Ltd

Client Address: 12 Yarm Road
Stockton-on-Tees
TS18 3NA

Contact(s): Kathryn Watkin
Office

Project: S191209 Brompton

Quotation No.: **Date Received:** 07-Jan-2020

Order No.: LAB191 **Date Instructed:** 07-Jan-2020

No. of Samples: 9

Turnaround (Wkdays): 5 **Results Due:** 13-Jan-2020

Date Approved: 10-Jan-2020

Approved By:



Details: Glynn Harvey, Laboratory Manager

Project: S191209 Brompton

Client: Solmek Ltd	Chemtest Job No.:												
Quotation No.:	Chemtest Sample ID.:												
	20-00217	20-00217	20-00217	20-00217	20-00217	20-00217	20-00217	20-00217	20-00217	20-00217	20-00217	20-00217	
	949386	949387	949388	949389	949390	949391	949392	949393	949394				
	Sample Location:												
	BH1	BH2	BH3	BH4	BH5	BH6	BH7	BH8	BH6				
	Sample Type:												
	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL			
	Top Depth (m):												
	0.80	1.40	0.80	1.40	0.80	1.40	0.80	1.40	1.80				
	Bottom Depth (m):												
	1.00	1.60	1.00	1.60	1.00	1.60	1.00	1.60	2.00				
Determinand	Accred.	SOP	Units	LOD									
Moisture	N	2030	%	0.020	16	15	14	17	15	18	14	15	14
pH	U	2010		4.0	[A] 7.5	[A] 7.1	[A] 7.7	[A] 7.5	[A] 7.3	[A] 7.3	[A] 7.6	[A] 8.1	[A] 7.9
Sulphate (2:1 Water Soluble) as SO ₄	U	2120	mg/l	10	11	< 10	< 10	< 10	< 10	< 10	< 10	12	< 10

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:
949386			BH1		A	Plastic Tub 500g
949387			BH2		A	Plastic Tub 500g
949388			BH3		A	Plastic Tub 500g
949389			BH4		A	Plastic Tub 500g
949390			BH5		A	Plastic Tub 500g
949391			BH6		A	Plastic Tub 500g
949392			BH7		A	Plastic Tub 500g
949393			BH8		A	Plastic Tub 500g
949394			BH6		A	Plastic Tub 500g

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

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

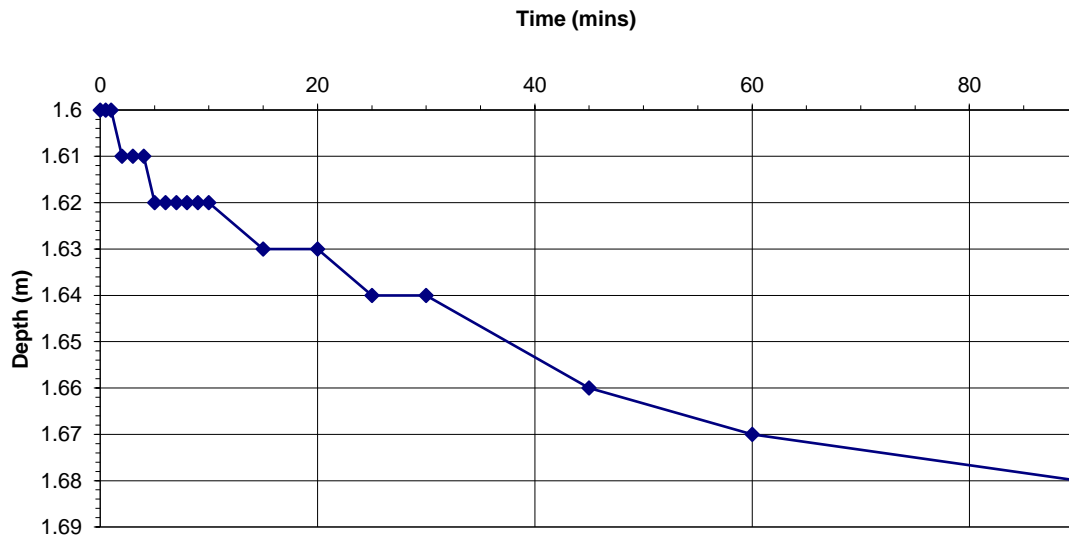
If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.com

SOAKAWAY DESIGN IN ACCORDANCE WITH BRE DIGEST 365: 1991

BRE Digest 365, Figure 2, Page 5

Client: Billinghamurst George & Partners			
Site: Robin Hood Farm, Brompton-on-Swale			
Job No:	S191209		
Pit No:	TP6	Test No:	1
CALCULATION OF SOIL INFILTRATION RATE			
Time (min)	Depth (m)	Pit Dimensions	Length (m) = 1.50
0	1.6		Width (m) = 0.45
0.5	1.6		Depth (m) = 2.00
1	1.6		
2	1.61	Depth at start of test (m) =	1.600
3	1.61	Depth at end of test (m) =	1.680
4	1.61	75% level (m) =	1.620
5	1.62	50% Effective Depth	0.360
6	1.62	25% level (m) =	1.660
7	1.62		
8	1.62	Base area of pit (m²) =	0.675
9	1.62	V_{p75-25} (m³) =	0.027
10	1.62	a_{n50} (m²) =	2.079
15	1.63		
20	1.63	From the graph:	
25	1.64	tp 75 (min) =	5
30	1.64	tp 25 (min) =	45
45	1.66		
60	1.67	Soil infiltration rate, f, (m/s) =	5.41E-06 normal test
90	1.68		
120			
150		Input by: LR	Date: 08/12/2019
180		Checked by: LC	Date: 08/12/2019



APPENDIX E:
Notes on Limitations & Contamination Guidance

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 <i>significant harm</i> , 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 volatilised 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 (CaCO₃) 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.

Parameter group	Pipe Material (Threshold concentrations in mg/kg)					
	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.

♣Solmek conditions of offer, notes on limitations & basis for contract (ref: version1/2020)

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

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

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

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

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

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

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

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

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