

Land at 40 Falstone Avenue, South Shields

Phase 2 Site Investigation Report

S170402/SI

Mr Ian Heron

Solmek Ltd
12 Yarm Road
Stockton-on-Tees
TS18 3NA
Tel: 01642 607083
Fax: 01642 612355
http://www.solmek.com

PHASE 2 SITE INVESTIGATION REPORT

LAND AT 40 FALSTONE AVENUE, SOUTH SHIELDS

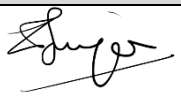
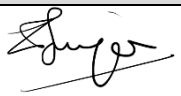
TABLE OF CONTENTS

1 EXECUTIVE SUMMARY 1
2 INTRODUCTION 2
3 SITE DESCRIPTION AND FIELDWORK 2
4 GROUND CONDITIONS 3
5 CONTAMINATION TESTING RESULTS 3
6 CONCEPTUAL MODEL AND CONTAMINATION ANALYSIS 7
7 GROUND GAS ASSESSMENT 9
8 GEOTECHNICAL TESTING AND ANALYSIS 10

TABLE 1: SUMMARY OF INORGANIC CONTAMINATION TESTING RESULTS 4
TABLE 2: SUMMARY OF ORGANIC CONTAMINATION TESTING RESULTS 5
TABLE 3: LEACHATE TESTING 5
TABLE 4: CONCEPTUAL MODEL 7

APPENDICES

Appendix A: Drawings
Appendix B: Borehole Logs
Appendix C: Contamination Laboratory Results
Appendix D: Geotechnical Laboratory Results
Appendix E: Notes on Limitations and Contamination Guidelines

Revision	Date	Prepared By	Signed
Final	July 2017	A Cutts *Senior Engineering Geologist*	
		Checked By	
		D Simpson *Principal Geotechnical Engineer*	
		Approved By	
		D Simpson *Principal Geotechnical Engineer*	

1 EXECUTIVE SUMMARY

Site Address	40 Falstone Avenue, South Shields, NE34 6SB.
Fieldwork	• 4no. small percussive boreholes (BH1 to BH4) drilled to a maximum depth of 2.20mbgl. • 2no. gas installations (BH1 and BH4). • Insitu testing. and • Laboratory geotechnical and contamination testing.
Ground Conditions	• Made ground proven to depths of 0.40mbgl across the site with a localised deeper area in BH1 to 1.00mbgl comprising grass over slightly clayey slightly gravelly topsoil with sandstone and brick fragments. In BH1 sandy slightly gravelly clay with sandstone and brick gravel was proven below the topsoil. • Drift deposits comprised stiff consistency slightly sandy slightly gravelly medium to high strength clay to depths of between 1.60mbgl in BH4 and 1.80mbgl in BH1. The gravel fraction consisted of sandstone and limestone fragments. • Completely weathered limestone rock head was proven across the site at depths of between 1.60mbgl and 1.80mbgl. The weathered zone was recorded to be between 400 to 500mm in thickness before SPT refusal was reached. • Groundwater was not encountered.
Contamination Testing Results	• 2no samples subject to a suite of metals, semi-metals, non-metals and inorganic determinants • 1no sample tested for PAHs, TPHCWG and asbestos analysis. • 1no sample tested for leachate. • The results of the soil tests and leachate were low. • No asbestos encountered.
Contamination Analysis	• The majority of the results are unlikely to pose a risk to the current and future users of the site beneath areas of hard cover or beneath building footprints. • Overall low risk based on conceptual site model. • Topsoil suitable for reuse. • 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. • No risk to groundwater or surface water. • The alkaline pH levels preclude the use of coper pipes. • Sub surface concrete should be designed to DS-1 ACEC (Class AC-1).
Ground Gas Assessment	• Ongoing site monitoring. • Not in a radon affected area.
Geotechnical Testing Results	• Hand Vane testing at 1.00mbgl indicate 56kPa-87kPa (medium to high strength). • Cohesive materials on site have a medium volume change potential. • Moisture contents between 7.2 and 29%. • pH slightly alkaline and low sulphates.
Geotechnical Analysis & Foundation Recommendations	• Strip footing at min depth of 0.90mbgl deepening towards BH1. A safe bearing capacity of 165kN/m² has been determined for strip foundations 0.60m wide founding on undisturbed medium to high strength natural clay. • Providing the safe bearing capacity is not exceeded settlements have been calculated to be less than 25mm. • Ground slabs can be adopted. • Based on the nature of the ground conditions encountered, excavations should be within the capacity of normal earthworks plant although a breaker may be required to remove relict foundations if encountered.

2 INTRODUCTION

2.1 Authorisation

The site investigation described in this report was carried out by Solmek to the instructions of KB Design on behalf of Mr Ian Heron on a parcel of land located adjacent to number 40 Falstone Avenue, South Shields, South Tyneside, NE34 6SB.

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

- *Solmek Phase 1 Desk Study Report (S170402, April 2017)*

Reference should be made to the above report for details of the site's history, environmental setting, and expected underlying geological conditions

2.2 Scope of Works

The proposed development comprises the construction of a single residential dwelling along with hardstanding as an access driveway and using the existing land as front and rear gardens. A drawing showing the position of the site is included in Appendix A (Figure 1).

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 14688-1:2002 where applicable. The information provided in this report is based on the investigation fieldwork, and is subject to the comments and approval of the various regulatory authorities.

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

3 SITE DESCRIPTION AND FIELDWORK

The centre of the site is located at OS Grid Ref 438330, 564970 and covers an area of approximately 0.08Ha. The site is an irregular shaped parcel of land of level topography comprising wholly of landscaped grassland. Two large bushes were noted at the southern and south-western border of the site. The site is secured by a ca. 1.80m high metal fence around the majority of its perimeter with wooden fencing at the southern boundary.

Access to the site is from Falstone Avenue to the west via a secured double metal gate. A BT telecoms exchange box was noted in the north-east corner of the site and a telegraph post with overhead cables was noted at the eastern boundary of the site.

The site is surrounded by residential housing on all sides with a public footpath located at the northern boundary.

No obvious signs of contamition were observed during the fieldwork.

3.1 Fieldwork

The fieldwork was carried out on 21st June 2017 and comprised:

- 4no. small percussive boreholes (BH1 to BH4 inclusive) drilled to depths of between 2.00 and 2.20m below ground level (bgl).
    - The borehole locations were spread across the area of the proposed new building footprint.
- Installation of 2no. ground gas wells in small percussive boreholes (BH1 and BH4).

- Installations spaced around the site to capture potential ground gas from the made ground.
- Response zones were placed in both the made ground deposits and natural strata.

Insitu hand vanes and Standard Penetration Tests (SPT) were undertaken within the small percussive boreholes and disturbed samples were retrieved for laboratory testing.

Descriptions of the strata encountered in the boreholes together with details of testing, sampling and groundwater are presented in Appendix B of this report. A plan showing the location of all the exploratory positions undertaken 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 generally proven to depths of 0.40mbgl across the site with a localised deeper area in BH1 to 1.00mbgl. The made ground comprised grass over slightly clayey slightly gravelly topsoil with sandstone and brick fragments. In BH1 the localised deeper area comprised sandy slightly gravelly clay with sandstone and brick gravel.

4.2 Natural Deposits

Drift deposits comprised stiff consistency slightly sandy slightly gravelly medium to high strength clay to depths of between 1.60mbgl in BH4 and 1.80mbgl in BH1. The gravel fraction consisted of sandstone and limestone fragments.

4.3 Rock Head

Completely weathered limestone rock head was proven across the site at depths of between 1.60mbgl and 1.80mbgl. The weathered zone was recorded to be between 400 to 500mm in thickness before SPT refusal was reached.

4.4 Groundwater

Groundwater was not encountered during the fieldwork.

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.

5 CONTAMINATION TESTING RESULTS

The proposed development is outlined for construction of a single house with driveway access from Falstone Avenue. It is assumed that the existing grassed areas will remain as front and rear gardens.

5.1 Contamination Testing and Rationale

To provide information upon the possibility of ground contamination two samples were selected for shallow contamination testing. A low overall contamination risk (former housing) was highlighted in the Phase 1 Desk Study, coupled with the sensitivity of the residential development the following selected two samples are considered appropriate for testing:

- BH1 – 0.20m (Topsoil)
- BH4– 0.20m (Topsoil)

The following suite of tests were undertaken:

- 2no Metals, semi-metals, non-metals, inorganic determinands
- 1no Asbestos identification screenings
- 1no Speciated Polyaromatic Hydrocarbons (PAHs)
- 1no Total Petroleum Hydrocarbon Criteria Working Group fractions (TPHCWG)
- 1no Leachate for the above suite of tests

5.2 Test Results

Given the sites end use, the test results have been compared to a series of LQM/CIEH Suitable 4 Use Levels (S4UL) based on a residential with home grown produce. The latest LQM/CIEH S4UL were published in December 2014. In the absence of LQM/CIEH S4UL, Category 4 Screening Levels (CL:AIRE, March 2014), EA CLEA Thresholds (from Version 1.06, May 2011) and EA Lower Tier Threshold values have been adopted.

The test results are presented in Appendix C, and a summary is provided below in Tables 1 and 2 below.

TABLE 1: SUMMARY OF INORGANIC CONTAMINATION TESTING RESULTS

Determinand	Units	Number of Samples above Level of Detection	Minimum Level	Maximum Level	Residential With HGP Value	Number of Results Exceeding Threshold Value
Metals						
Cadmium	mg/kg	2	0.3	0.5	11	0
Chromium III	mg/kg	2	60	78	910	0
Copper	mg/kg	2	27	38	2400	0
Lead	mg/kg	2	75	124	200*	0
Inorganic Mercury	mg/kg	0	<0.5	-	40	0
Molybdenum	mg/kg	2	3.1	5.5	665**	0
Nickel	mg/kg	2	24	25	180	0
Zinc	mg/kg	2	103	140	3700	0
Semi metals and non metals						
Arsenic	mg/kg	2	9.6	12	37	0
Boron	mg/kg	2	1.3	1.8	290	0
Selenium	mg/kg	2	0.9	1.1	250	0
Inorganic chemicals						
Cyanide (total)	mg/kg	0	<1	-	1.49**	0
W.S. Sulphate	mg/l	2	16	22	2000^	0
Other						
pH	pH	2	8.0	8.1	<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

5.1 Metals, Semi Metals and Non Metals

From the two samples tested to date, there were no raised levels of metals or metalloids exceeding the thresholds values for long term risk to human health.

5.2 Inorganic Chemicals

Soluble sulphates were recorded between 16 and 22mg/l, below the EA threshold value of 2000mg/l. The results of the pH testing were between 8.0 and 8.1. These pH levels are consistent with slightly alkaline conditions.

5.3 Organic Chemicals

One sample of topsoil (BH1 at 0.20mbgl) was subjected to organic testing for speciated PAH and TPHCWG. The test result has been compared to S4UL levels for a 1% organic matter content (OMC) as the test sample produced an OMC of 2.10%.

TABLE 2: SUMMARY OF ORGANIC CONTAMINATION TESTING RESULTS

Determinand	Units	Number of Samples above LOD	Minimum Level	Maximum Level	S4UL 1% SOM	S4UL 2.5% SOM	S4UL 6% SOM	Number of Results Exceeding Threshold Value
TPH Aliphatic Fractions (1no Sample)								
C5-6	mg/kg	0	<0.1	-	**42**	78	160	0
C6-8	mg/kg	0	<0.1	-	**100**	230	530	0
C8-10	mg/kg	0	<0.1	-	**27**	65	150	0
C10-12	mg/kg	0	<4	-	**130**	330	760	0
C12-16	mg/kg	0	<4	-	**110**	2400	4300	0
C16-35	mg/kg	1	46	-	**65000**	92000	110000	0
TPH Aromatic Fractions (1no Sample)								
C5-7 (Benzene)	mg/kg	0	<0.01	-	**70**	140	300	0
C7-8 (Toluene)	mg/kg	0	<0.01	-	**130**	290	660	0
C8-10	mg/kg	1	0.03	-	**34**	83	190	0
C10-12	mg/kg	0	<1	-	**74**	180	380	0
C12-16	mg/kg	0	<1	-	**140**	330	660	0
C16-21	mg/kg	1	3	-	**260**	540	930	0
C21-35	mg/kg	1	3	-	**1100**	1500	1700	0
Speciated PAH (1no Sample)								
Naphthalene	mg/kg	1	0.02	-	**2.3**	5.6	13	0
Acenaphthylene	mg/kg	0	<0.01	-	**170**	420	920	0
Acenaphthene	mg/kg	1	0.02	-	**210**	510	1100	0
Fluorene	mg/kg	1	0.02	-	**170**	400	860	0
Phenanthrene	mg/kg	1	0.57	-	**95**	220	440	0
Anthracene	mg/kg	1	0.10	-	**2400**	5400	11000	0
Fluoranthene	mg/kg	1	1.17	-	**280**	560	890	0
Pyrene	mg/kg	1	0.87	-	**620**	1200	2000	0
Benz' (a)anth' ene	mg/kg	1	0.45	-	**7.2**	11	13	0
Chrysene	mg/kg	1	0.47	-	**15**	22	27	0
Benz' (b)fluor' ene	mg/kg	1	0.61	-	**2.6**	3.3	3.7	0
Benz' (k)fluor' ene	mg/kg	1	0.23	-	**77**	93	100	0
Benz' (a)pyrene	mg/kg	1	0.42	-	**2.2**	2.7	3.0	0
Id' (123cd)pyrene	mg/kg	1	0.27	-	**27**	36	41	0
Diben(ah)anth'ene	mg/kg	0	<0.02	-	**0.24**	0.28	0.30	0
Benz (ghi)per' ene	mg/kg	1	0.26	-	**320**	340	350	0
Total PAH	mg/kg	1	5.49	-	**50***	50*	50*	0
Other (1no Sample)								
Phenol	mg/kg	0	<0.5	-	**280**	550	1100	0
* *EA Threshold Values*								

The TPHCWG and PAH levels were below LQM/CIEH S4UL threshold values.

5.4 Asbestos

One sample of topsoil (BH1, 0.20mbgl) was subject to asbestos screening. No asbestos was detected within the sample.

5.5 Leachates

The results of the single leachate test (BH1, 0.20mbgl) has been compared, where available, to UK Drinking Water Standards (DWS), otherwise EA Leachate Quality Thresholds, EQS Freshwater and WHO Guidelines (2005) have been used. The results are presented in Table 3 below.

TABLE 3: LEACHATE TESTING

Determinant	Units	Number of Samples above Level of Detection	Minimum Level	Maximum Level	UK DWS	Number of Results Exceeding Threshold Value
Inorganic Contaminants						
Cadmium	µg/l	0	<0.07	-	5	0
Chromium (Total)	µg/l	1	0.6	-	50	0
Copper	µg/l	1	5.4	-	2000	0
Lead	µg/l	1	2.2	-	25	0

Mercury	µg/l	0	<0.008	-	1	0
Nickel	µg/l	1	0.8	-	20	0
Zinc	µg/l	0	<1	-	5000	0
Arsenic	µg/l	1	1.46	-	10	0
Selenium	µg/l	1	0.23	-	10	0
Boron	µg/l	1	9	-	2000	0
PAH						
Naphthalene	µg/l	0	<0.1	-	PAH DWS is 0.1µg/l	0
Acenaphthylene	µg/l	0	<0.1	-		0
Acenaphthene	µg/l	0	<0.1	-		0
Fluorene	µg/l	0	<0.1	-		0
Phenanthrene	µg/l	0	<0.1	-		0
Anthracene	µg/l	0	<0.1	-		0
Fluoranthene	µg/l	0	<0.1	-		0
Pyrene	µg/l	0	<0.1	-		0
Benz' (a)anth' ene	µg/l	0	<0.1	-		0
Chrysene	µg/l	0	<0.1	-		0
Benz' (b)fluor' ene	µg/l	0	<0.1	-		0
Benz' (k)fluor' ene	µg/l	0	<0.1	-		0
Benz' (a)pyrene	µg/l	0	<0.1	-		0
Id' (123cd)pyrene	µg/l	0	<0.1	-		0
Diben(ah)anth'ene	µg/l	0	<0.1	-		0
Benz (ghi)per' ene	µg/l	0	<0.1	-		0
PAH Total	µg/l	0	<1.6	-	0.2**	0
Phenol	µg/l	0	<0.5	-	0.5	0
TPH Aliphatic Fractions						
C5-6	µg/l	0	<1.0	-	15000*	0
C6-8	µg/l	0	<1.0	-	15000*	0
C8-10	µg/l	0	<1.0	-	300*	0
C10-12	µg/l	0	<1.0	-	300*	0
C12-16	µg/l	0	<1.0	-	300*	0
C16-21	µg/l	0	<1.0	-	300*	0
C21-35	µg/l	0	<1.0	-	300*	0
TPH Aromatic Fractions						
C5-7	µg/l	0	<1.0	-	10*	0
C7-8	µg/l	0	<1.0	-	10*	0
C8-10	µg/l	0	<1.0	-	100*	0
C10-12	µg/l	0	<1.0	-	100*	0
C12-16	µg/l	0	<1.0	-	100*	0
C16-21	µg/l	0	<1.0	-	90*	0
C21-35	µg/l	0	<1.0	-	90*	0
** WHO Guidelines 2005* *** EA leachate quality thresholds* **** EQS Freshwater*						

Following comparison of the leachate results, none of the samples tested to date were recorded above relevant threshold values.

5.6 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."* See Appendix E for additional notes on contamination guidelines.

6 CONCEPTUAL MODEL AND CONTAMINATION ANALYSIS

The conceptual model in Table 4 collates the salient aspects of the site to form a model which should enable comparison after fieldwork and testing. This model identifies the potential pollution linkages that may influence the proposed development.

TABLE 4: CONCEPTUAL MODEL

Source	Pathway	Receptor
Ground gas • Shallow made ground up to 1.00mbgl averaging 0.45m • No shallow Coal Mining. • No Landfills within 500m • The site is not in a Radon Affected area.	**Ground gas migration** Through underlying soils and ingress into structures Underlying strata – natural cohesive materials over limestone.	**Users of the site after development is complete** • Adult and infant householders.
Contamination based on historic land use • Site undeveloped until the mid 1950's when housing occupied western area. • Housing demolished by the mid 1970's and site left undeveloped. **Ground Conditions** • Made ground 0.40mbgl and 1.00mbgl in BH1. Topsoil encountered across the site with clay fill in BH1. • Natural clay underlies made ground to 1.60-1.80mbgl. • Completely weathered limestone below clay layer. • No groundwater encountered during fieldwork. **Contamination Testing** • No raised levels of contamination. • No asbestos detected in sample tested. • No raised phytotoxic contamination. • Leachate results were below UKDWS Thresholds. • Concrete Class DS-1, ACEC (Class AC1). • Services: Alkaline pH.	Dermal absorption Inhalation of soils Soil ingestion Contaminated water contact Windblown dust contact	**Users of the site after development is complete** • Adult and infant householders **Users of the site during development** • Construction workforce • PPE to be adopted. **Users of surrounding sites** • Residential housing.
	Uptake via roots and leaf surfaces	**Vegetation** • Garden areas to retain existing topsoil and natural clay as subsoil.
	Slow seepage/leaching contaminants • Low permeability deposits beneath made ground. • Shallow Limestone • Low leachates.	**Groundwater** • Groundwater, none encountered. • Principal Aquifer Magnesian Limestone. • Zone III SPZ. • No abstractions within 500m.
	Slow seepage/leaching contaminants. Accumulation of contaminated sediments • Low permeability deposits beneath made ground, • Shallow Limestone • Low leachates.	**Surface water** • None in vicinity.
	Direct contact	**Construction materials** • Concrete • Service fabric

Risk Classification					
Very High	High	Moderate	Moderate/Low	Low	Very Low

In general terms the majority of receptors are considered potentially at a **low** risk. Surface water is considered a **very low** risk.

The Conceptual Model has been undertaken in accordance with CIRIA C552 and is based on Source, Pathway and Receptor analysis relating to EPA1990 (Part 2A, 2012). The Conceptual Model assesses the consequence and the likelihood of a risk being realised to provide a risk classification for each receptor. Full details of the tables used to assess consequence, likelihood and risk classification are presented in Appendix E.

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

6.1 Users of the Site Once Development is Complete

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 S4ULs based on residential with home grown produce land use.

The results indicate that the concentrations of the metals and organics within the made ground samples tested to date are below the threshold values for long term risk to human health. As such the current ground condition are unlikely to pose a risk to the current and future users of the site beneath areas of hard cover or beneath building footprints.

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

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

6.2 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 levels of contamination are unlikely to pose a significant risk to construction workers and users of surrounding sites providing that correct PPE is employed. It is recommended that appropriate PPE in accordance with HSE and Environment Agency guidance is adopted for the duration of the contractor works and good practice is adopted to minimise the release of potential contaminants during ground works.

Although asbestos was not detected from the soil samples subjected to testing within this investigation, the possibility exists that asbestos containing materials may still be present on site and currently lie undetected. This is based on the fact that housing (possibly containing asbestos based materials) previously occupied the site. 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 the soil becoming airborne and escaping to construction workers and off-site receptors.

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 arsenic, boron, cadmium, chromium, copper, lead, mercury, selenium, 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"*. None of the above phytotoxic elements were raised in the samples tested to date.

Given that no raised phytotoxic contaminants were recorded in the topsoil, this can be stockpiled for reuse as a suitable growing medium, minimum 300mm in thickness. The local authority may require further tests on the topsoil in line with the specification given in the Local Authority Guidelines '*Verification Requirements for Cover Systems, Technical Guidance for Developers, Landowners and Consultants'* (Yorkshire and Lincolnshire Pollution Advisory Group Version 3.3 – October 2016).

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.

The solid geology is classified as a Principal Aquifer and the site lies within Zone III Catchment Source Protection Zone. There are no surface water bodies in the vicinity. No groundwater was encountered during the drilling. There were no raised levels of contamination recorded in the shallow fill samples tested and a leachate result was also below UKDWS thresholds.

Given the distance of the site from surface waters, lack of ground water and low soil/leachate contaminant concentrations combined with the presence of the general underlying, low permeability, natural clay strata; ground and surface water are unlikely to be at risk from contamination.

6.5 Construction Materials and Water Service Pipes

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

Concrete Classification

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

Water Supply Pipes Material Selection

The levels of potential contaminants should be compared to thresholds supplied in the UK Water Industry Research (UKWIR) publication "Guidance for the selection of Water Supply Pipes to be used in Brownfield Sites" (January 2011). A Brownfield Site is defined in the document as "Land or premises that have 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 concentrations of the selected determinants should be compared to the pipe material selection table in Appendix E and consultation with the appropriate water supply company is required to identify the most suitable service fabric. However, pH is raised for copper pipes and these should therefore be avoided.

7 GROUND GAS ASSESSMENT

A period of six ground gas monitoring visits are currently being undertaken. The results will be reported as an addendum to this report.

8 GEOTECHNICAL TESTING AND ANALYSIS

Samples taken from the boreholes underwent a series of geotechnical tests (BS 1377:1990) to aid foundation design and soil description. In addition, hand shear vanes were undertaken at regular intervals during drilling and excavation. The geotechnical results are presented in Appendix D.

8.1 Strength and Density

Within the natural clay at a depth of 1.00mbgl the hand shear vane results within the boreholes ranged from 56kPa to 87kPa indicating medium to high strength conditions.

8.2 Moisture Contents

Three samples recovered from the boreholes were subject to moisture content tests to determine the moisture at depths of between 0.80mbgl and 2.00mbgl. Moisture levels were between 7.2% and 29%.

8.3 Atterberg Limit Determinations

Two samples of natural clay were subject to an Atterberg Limit Determination tests to classify the cohesive soils at depths of between 0.80 and 1.00mbgl. The results were compared to the Casagrande Chart published in BS 5930 and showed the samples to be clay of intermediate and high plasticity.

The Plasticity Indices were 31 and 37 with equivalent moisture contents recorded above 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 pH and Sulphate Results

Two samples were tested for acidity and soluble sulphate content to assess whether the material may be potentially aggressive to building fabric at depths of between 0.80 and 2.00mbgl. The results of the testing for pH were 7.9 and 8.6 indicating slightly alkaline conditions. The soluble sulphates were <10 and 31mg/l.

8.5 Foundations

Based on plasticity index results, all cohesive soils at the site should be regarded as being of medium volume change potential.

The ground conditions at depths of between 0.90 and 1.00mbgl comprise medium to high strength clay with shear strengths averaging 72kN/m^2.

Based on visual description, laboratory and insitu testing around the proposed foundation depth the average shear strength of 72kN/m^2 has been derived for calculations. Based on the shear strength the bearing capacity has been calculated across the site to be 165kN/m^2 within the medium strength to high strength natural clay. This assumes a 0.60m wide strip footing at 0.90mbgl.

Foundations should be locally deepened towards BH1 where made ground was up to 1.00mbgl in depth. Over deepened foundations should be stepped in accordance with NHBC Standards, Chapter 4.4.

Foundations near existing or proposed trees should be deepened in accordance with NHBC Standards Chapter 4.2 current guidance.

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

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.

Sub-surface concrete should be Design Sulphate Class DS-1, with the site allocated an ACEC Classification of AC-1.

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

8.6 Ground Slabs

Made ground is in excess of 600mm around BH1. However, if the made ground was removed from beneath the foot print of the building and a blanket of compacted inert granular fill was placed in accordance with an engineering specification, ground bearing slabs may be possible.

Ground slabs are suitable across the remainder of the site where the thickness of made ground was 600mm or less.

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

8.7 Excavation

Based on the nature of the ground conditions encountered, excavations should be within the capacity of normal earthworks plant although a breaker may be required to remove relict foundations from the previous buildings if encountered.

Stability of excavations will be poor in the made ground but should improve in the medium to high strength natural clay underlying the site. Excavation sides should be designed, constructed and supported in accordance with the recommendations given in CIRIA Report No. 97: “Trenching Practice”.

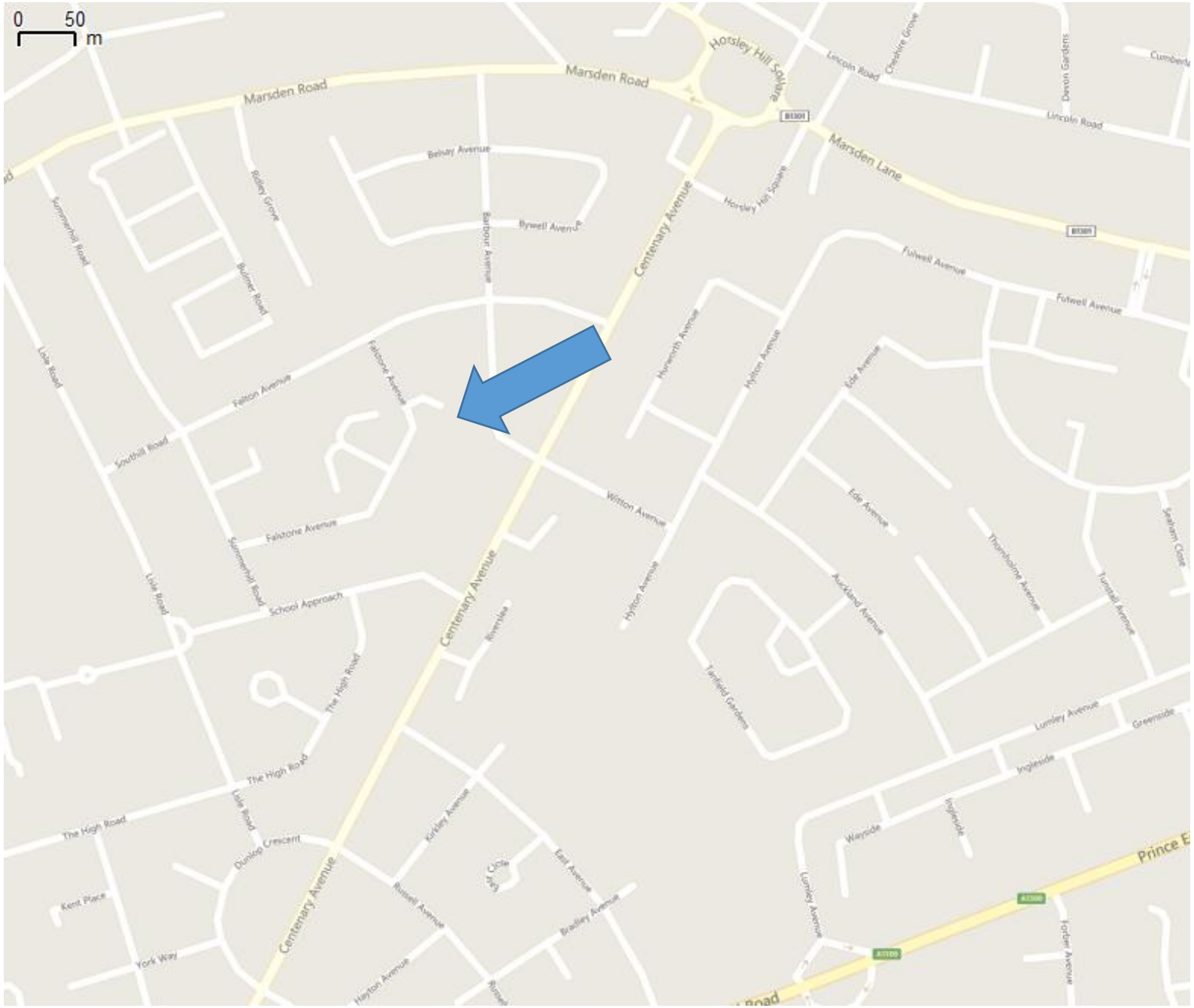
8.8 Groundwater

Groundwater was not encountered during the fieldwork.

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.

SOLMEK

APPENDIX A



Contains public sector information licensed under the Open Government Licence v3.0
OS data © Crown copyright and database right 2015

Title
Site Location Map

Project
40 Falstone Avenue, South Shields

Client
Mr I Heron

Date
July 2017

Fig No.
Figure 1

Scale
Do Not Scale

Key

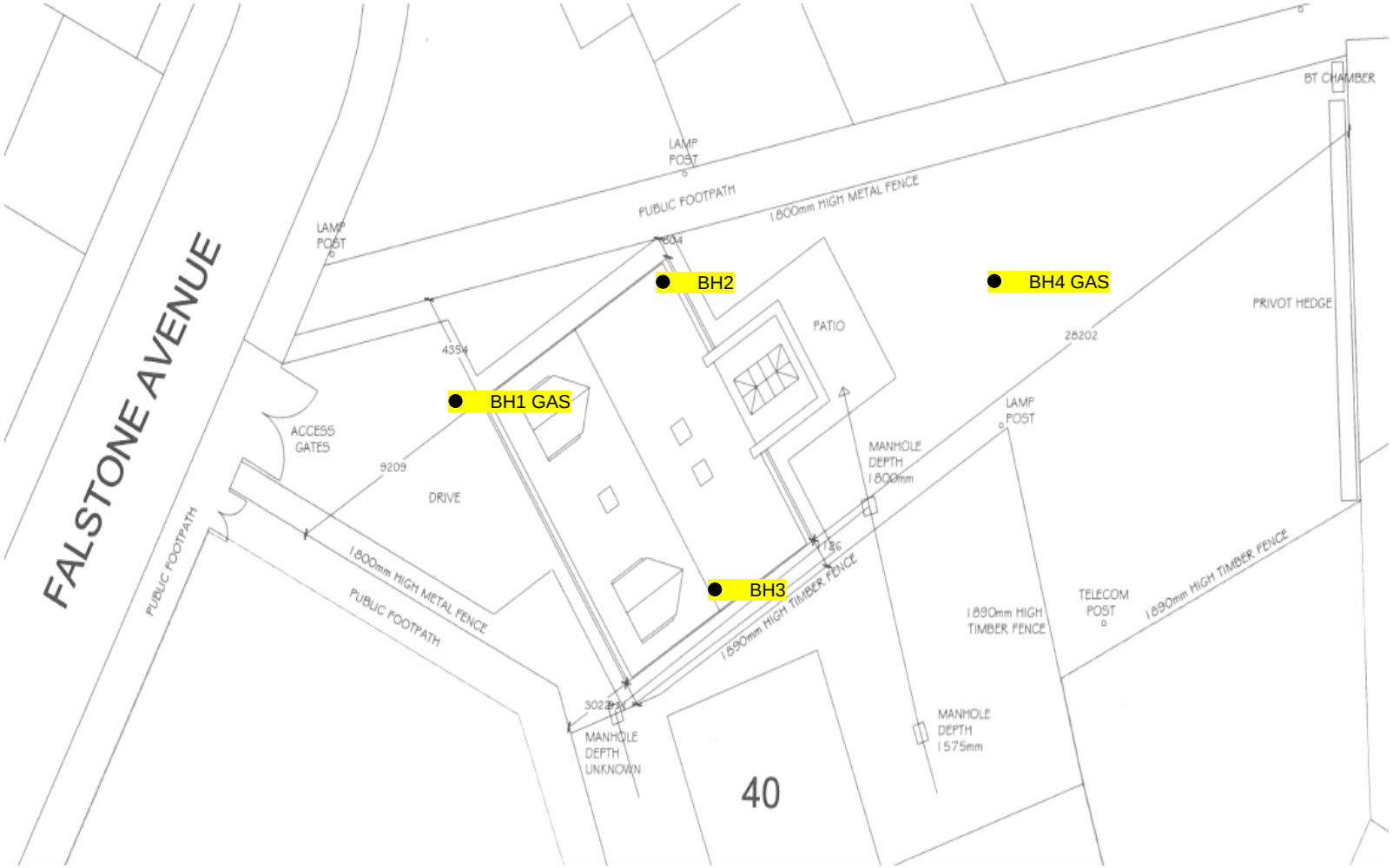
Site Location

N

Solmek Ltd.
12 Yarm Road
Stockton-on-Tees
TS18 3NA

Tel: +44 (0) 1642 607083
Fax: +44 (0) 1642 612355
e-mail: south@solmek.com
www.solmek.com

SOLMEK



Title
BH Location Plan

Project
40 Falstone Avenue, South shields

Client
Mr Ian Heron

Date
July 2017

Fig No.
Figure 2

Scale
Do Not Scale

Key

N

Solmek Ltd.
12 Yarm Road
Stockton-on-Tees
TS18 3NA

Tel: +44 (0) 1642 607083
Fax: +44 (0) 1642 612355
e-mail: south@solmek.com
www.solmek.com

SOLMEK

APPENDIX B

SOLMEK

Borehole Log

Scale 1:50 Sheet 1 of 1

BH1

Contract no:	S170402	**Site:**	40 Falstone Avenue, South Shields	**Driller:**	SR Drilling Ltd
				Plant used:	Mini rig
				Started:	21/06/2017
Client:	Mr Ian Heron			**Ended:**	21/06/2017
Method:	Small percussive			**Backfilled:**	21/06/2017

GL (AOD):
Easting:
Northing:
Logged: AC
Status: FINAL

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing		
					Depth (m)	Type	Results
				MADE GROUND: Grass over brown slightly clayey slightly gravelly topsoil. Gravel is angular to sub angular fine to coarse sandstone and brick.	0.20	B	
		0.50		MADE GROUND: Brown sandy slightly gravelly clay. Gravel is angular to sub rounded fine to coarse sandstone and brick.	0.50 - 1.00	B	
		1.00		Stiff consistency brown slightly sandy slightly gravelly medium strength CLAY. Gravel is angular to sub rounded fine to coarse sandstone and limestone.	1.00	HV	56kPa
					1.40 - 1.60	B	
					1.60 - 1.80	B	
		1.80			1.80 - 2.00	B	
G				Yellow white completely weathered LIMESTONE. Recovered as slightly clayey fine to medium sand.	2.00 - 2.28	SPT (S)	N=50+ (25/50)
		2.20		End of Borehole at 2.200m			

Hole Diameter		Casing Depths		General Remarks	Chiselling			Ground Water				
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	No groundwater encountered. Gas standpipe installed on completion.	From (m)	To (m)	Time (hr)	Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)

SOLMEK

Borehole Log

Scale 1:50 Sheet 1 of 1

BH2

Contract no:	S170402	**Site:**	40 Falstone Avenue, South Shields	**Driller:**	SR Drilling Ltd
				Plant used:	Mini rig
				Started:	21/06/2017
Client:	Mr Ian Heron			**Ended:**	21/06/2017
Method:	Small percussive			**Backfilled:**	21/06/2017

GL (AOD):	
Easting:	
Northing:	
Logged:	AC
Status:	FINAL

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing		
					Depth (m)	Type	Results
				MADE GROUND: Grass over brown slightly clayey slightly gravelly topsoil. Gravel is angular to sub angular fine to coarse sandstone and brick.	0.20	D	
		0.40		Stiff consistency brown slightly sandy slightly gravelly high strength CLAY of medium plasticity. Gravel is angular to sub rounded fine to coarse sandstone and limestone.	0.40 - 0.60	D	
					0.80 - 1.00	D	
					1.00	HV	87kPa
					1.40 - 1.60	D	
					1.60 - 1.80	D	
		1.70		Yellow white completely weathered LIMESTONE. Recovered as slightly clayey fine to medium sand.	1.80 - 2.00	D	
					2.00 - 2.28	SPT (S)	N=50+ (25/50)
		2.20		End of Borehole at 2.200m			

Hole Diameter		Casing Depths		General Remarks	Chiselling			Ground Water				
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	No groundwater encountered. Borehole backfilled on completion.	From (m)	To (m)	Time (hr)	Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)

SOLMEK

Borehole Log

Scale 1:50 Sheet 1 of 1

BH3

Contract no:	S170402	**Site:**	40 Falstone Avenue, South Shields	**Driller:**	SR Drilling Ltd
				Plant used:	Mini rig
				Started:	21/06/2017
Client:	Mr Ian Heron			**Ended:**	21/06/2017
Method:	Small percussive			**Backfilled:**	21/06/2017

GL (AOD):	
Easting:	
Northing:	
Logged:	AC
Status:	FINAL

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing		
					Depth (m)	Type	Results
				MADE GROUND: Grass over brown slightly clayey slightly gravelly topsoil. Gravel is angular to sub angular fine to coarse sandstone and brick.	0.20	D	
		0.40		Stiff consistency brown slightly sandy slightly gravelly high strength CLAY of medium plasticity. Gravel is angular to sub rounded fine to coarse sandstone and limestone.	0.40 - 0.60	D	
					0.80 - 1.00	D	
					1.00	HV	76kPa
					1.30 - 1.50	D	
					1.50 - 1.70	D	
		1.70		Yellow white completely weathered LIMESTONE. Recovered as slightly clayey fine to medium sand.	1.80 - 2.00	D	
					2.00 - 2.28	SPT (S)	N=50+ (25/50)
		2.20		End of Borehole at 2.200m			

Hole Diameter		Casing Depths		General Remarks	Chiselling			Ground Water				
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	No groundwater encountered. Borehole backfilled on completion.	From (m)	To (m)	Time (hr)	Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)

SOLMEK

Borehole Log

Scale 1:50 Sheet 1 of 1

BH4

Contract no:	S170402	**Site:**	40 Falstone Avenue, South Shields	**Driller:**	SR Drilling Ltd
				Plant used:	Mini rig
				Started:	21/06/2017
Client:	Mr Ian Heron			**Ended:**	21/06/2017
Method:	Small percussive			**Backfilled:**	21/06/2017

GL (AOD):	
Easting:	
Northing:	
Logged:	AC
Status:	FINAL

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing		
					Depth (m)	Type	Results
				MADE GROUND: Grass over brown slightly clayey slightly gravelly topsoil. Gravel is angular to sub angular fine to coarse sandstone and brick.	0.20	D	
		0.40		Stiff consistency brown slightly sandy slightly gravelly medium strength CLAY. Gravel is angular to sub rounded fine to coarse sandstone and limestone.	0.40 - 0.60	D	
					0.80 - 1.00	D	
					1.00	HV	69kPa
					1.40 - 1.60	D	
		1.60		Yellow white completely weathered LIMESTONE. Recovered as slightly clayey fine to medium sand.	1.60 - 1.80	D	
G					1.80 - 2.08	SPT (S)	N=50+ (25/75)
		2.00		End of Borehole at 2.000m			

Hole Diameter		Casing Depths		General Remarks	Chiselling			Ground Water				
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	No groundwater encountered. Gas standpipe installed on completion.	From (m)	To (m)	Time (hr)	Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)

APPENDIX C

2531

ANALYTICAL TEST REPORT

Contract no: 65602

Contract name: 40 Falstone Avenue, South Shields

Client reference: S170402

Clients name: Solmek

Clients address: 12 Yarm Road
Stockton-On-Tees
TS18 3NA

Samples received: 23 June 2017

Analysis started: 23 June 2017

Analysis completed 30 June 2017

Report issued: 30 June 2017

Notes:
Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.
Methods, procedures and performance data are available on request.
Results reported herein relate only to the material supplied to the laboratory.
This report shall not be reproduced except in full, without prior written approval.
Samples will be disposed of 6 weeks from initial receipt unless otherwise instructed.

Key:
U UKAS accredited test
M MCERTS & UKAS accredited test
$ Test carried out by an approved subcontractor
I/S Insufficient sample to carry out test
N/S Sample not suitable for testing
NAD No Asbestos Detected

Approved by:

James Spittle
Customer Services Team Leader

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

All results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.
Analytical results are inclusive of stones.

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
65602-1	BH1	0.20	Loamy Clayey Sand with Gravel & Roots	-	-	18.2
65602-2	BH4	0.20	Loamy Sandy Clay with Gravel & Roots	-	-	17.9

Chemtech Environmental Limited

SOILS

Lab number			65602-1	65602-2
Sample id			BH1	BH4
Depth (m)			0.20	0.20
Date sampled			21/06/2017	21/06/2017
Test	**Method**	**Units**		
Arsenic (total)	CE127 M	mg/kg As	9.6	12
Boron (water soluble)	CE063 M	mg/kg B	1.3	1.8
Cadmium (total)	CE127 M	mg/kg Cd	0.3	0.5
Chromium (total)	CE127 M	mg/kg Cr	60	78
Copper (total)	CE127 M	mg/kg Cu	27	38
Lead (total)	CE127 M	mg/kg Pb	75	124
Mercury (total)	CE127 M	mg/kg Hg	<0.5	<0.5
Molybdenum (total)	CE127 M	mg/kg Mo	3.1	5.5
Nickel (total)	CE127 M	mg/kg Ni	25	24
Selenium (total)	CE127 M	mg/kg Se	0.9	1.1
Zinc (total)	CE127 M	mg/kg Zn	103	140
pH	CE004 M	units	8.1	8.0
Sulphate (2:1 water soluble)	CE061 M	mg/l SO_4	16	22
Cyanide (total)	CE077 M	mg/kg CN	<1	<1
Phenols (total)	CE078	mg/kg PhOH	<0.5	<0.5
Total Organic Carbon (TOC)	CE072 M	% w/w C	2.10	-
Estimate of OMC (calculated from TOC)	CE072 M	% w/w	3.62	-
PAH				
Naphthalene	CE087 M	mg/kg	0.02	-
Acenaphthylene	CE087 M	mg/kg	<0.01	-
Acenaphthene	CE087 M	mg/kg	0.02	-
Fluorene	CE087 U	mg/kg	0.02	-
Phenanthrene	CE087 M	mg/kg	0.57	-
Anthracene	CE087 U	mg/kg	0.10	-
Fluoranthene	CE087 M	mg/kg	1.17	-
Pyrene	CE087 M	mg/kg	0.87	-
Benzo(a)anthracene	CE087 U	mg/kg	0.45	-
Chrysene	CE087 M	mg/kg	0.47	-
Benzo(b)fluoranthene	CE087 M	mg/kg	0.61	-
Benzo(k)fluoranthene	CE087 M	mg/kg	0.23	-
Benzo(a)pyrene	CE087 U	mg/kg	0.42	-
Indeno(123cd)pyrene	CE087 M	mg/kg	0.27	-
Dibenz(ah)anthracene	CE087 M	mg/kg	<0.02	-
Benzo(ghi)perylene	CE087 M	mg/kg	0.26	-
PAH (total of USEPA 16)	CE087	mg/kg	5.49	-
TPH				
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	<0.01	-
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	<0.01	-
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	0.03	-
EPH Aromatic (>EC10-EC12)	CE068	mg/kg	<1	-
EPH Aromatic (>EC12-EC16)	CE068	mg/kg	<1	-

Chemtech Environmental Limited

SOILS

Lab number			65602-1	65602-2
Sample id			BH1	BH4
Depth (m)			0.20	0.20
Date sampled			21/06/2017	21/06/2017
Test	**Method**	**Units**		
EPH Aromatic (>EC16-EC21)	CE068	mg/kg	3	-
EPH Aromatic (>EC21-EC35)	CE068	mg/kg	3	-
VPH Aliphatic (>C5-C6)	CE067	mg/kg	<0.1	-
VPH Aliphatic (>C6-C8)	CE067	mg/kg	<0.1	-
VPH Aliphatic (>C8-C10)	CE067	mg/kg	<0.1	-
EPH Aliphatic (>C10-C12)	CE068	mg/kg	<4	-
EPH Aliphatic (>C12-C16)	CE068	mg/kg	<4	-
EPH Aliphatic (>C16-C35)	CE068	mg/kg	46	-
Subcontracted analysis				
Asbestos (qualitative)	$	-	NAD	-

Chemtech Environmental Limited

PREPARED LEACHATES

Lab number			65602-1L
Sample id			BH1
Depth (m)			0.20
Test	**Method**	**Units**	
Arsenic (dissolved)	CE128 U	µg/l As	1.46
Boron (dissolved)	CE128 U	µg/l B	9
Cadmium (dissolved)	CE128 U	µg/l Cd	<0.07
Chromium (dissolved)	CE128 U	µg/l Cr	0.6
Copper (dissolved)	CE128 U	µg/l Cu	5.4
Lead (dissolved)	CE128 U	µg/l Pb	2.2
Mercury (dissolved)	CE128 U	µg/l Hg	<0.008
Nickel (dissolved)	CE128 U	µg/l Ni	0.8
Selenium (dissolved)	CE128 U	µg/l Se	0.23
Zinc (dissolved)	CE128 U	µg/l Zn	<1
PAH			
Naphthalene	CE051	µg/l	<0.1
Acenaphthylene	CE051	µg/l	<0.1
Acenaphthene	CE051	µg/l	<0.1
Fluorene	CE051	µg/l	<0.1
Phenanthrene	CE051	µg/l	<0.1
Anthracene	CE051	µg/l	<0.1
Fluoranthene	CE051	µg/l	<0.1
Pyrene	CE051	µg/l	<0.1
Benzo(a)anthracene	CE051	µg/l	<0.1
Chrysene	CE051	µg/l	<0.1
Benzo(b)fluoranthene	CE051	µg/l	<0.1
Benzo(k)fluoranthene	CE051	µg/l	<0.1
Benzo(a)pyrene	CE051	µg/l	<0.1
Indeno(123cd)pyrene	CE051	µg/l	<0.1
Dibenz(ah)anthracene	CE051	µg/l	<0.1
Benzo(ghi)perylene	CE051	µg/l	<0.1
PAH (total of USEPA 16)	CE051	µg/l	<1.6
TPH			
VPH Aromatic (>EC5-EC7)	CE067	µg/l	<1
VPH Aromatic (>EC7-EC8)	CE067	µg/l	<1
VPH Aromatic (>EC8-EC10)	CE067	µg/l	<1
EPH Aromatic (>EC10-EC12)	CE161	µg/l	<1
EPH Aromatic (>EC12-EC16)	CE161	µg/l	<1
EPH Aromatic (>EC16-EC21)	CE161	µg/l	<1
EPH Aromatic (>EC21-EC35)	CE161	µg/l	<1
EPH Aromatic (>EC35-EC44)	CE161	µg/l	<1
VPH Aliphatic (>C5-C6)	CE067	µg/l	<1
VPH Aliphatic (>C6-C8)	CE067	µg/l	<1
VPH Aliphatic (>C8-C10)	CE067	µg/l	<1
EPH Aliphatic (>C10-C12)	CE161	µg/l	<1
EPH Aliphatic (>C12-C16)	CE161	µg/l	<1

Chemtech Environmental Limited

PREPARED LEACHATES

Lab number			65602-1L
Sample id			BH1
Depth (m)			0.20
Test	**Method**	**Units**	
EPH Aliphatic (>C16-C35)	CE161	µg/l	<1
EPH Aliphatic (>C35-C44)	CE161	µg/l	<1

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE127	Arsenic (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg As
CE063	Boron (water soluble)	Hot water extract, ICP-OES	Dry	M	0.5	mg/kg B
CE127	Cadmium (total)	Aqua regia digest, ICP-MS	Dry	M	0.2	mg/kg Cd
CE127	Chromium (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cr
CE127	Copper (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cu
CE127	Lead (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Pb
CE127	Mercury (total)	Aqua regia digest, ICP-MS	Dry	M	0.5	mg/kg Hg
CE127	Molybdenum (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Mo
CE127	Nickel (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Ni
CE127	Selenium (total)	Aqua regia digest, ICP-MS	Dry	M	0.3	mg/kg Se
CE127	Zinc (total)	Aqua regia digest, ICP-MS	Dry	M	5	mg/kg Zn
CE004	pH	Based on BS 1377, pH Meter	Wet	M	-	units
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	M	10	mg/l SO_4
CE077	Cyanide (total)	Extraction, Continuous Flow Colorimetry	Wet	M	1	mg/kg CN
CE078	Phenols (total)	Extraction, Continuous Flow Colorimetry	Wet		0.5	mg/kg PhOH
CE072	Total Organic Carbon (TOC)	Removal of IC by acidification, Carbon Analyser	Dry	M	0.1	% w/w C
CE072	Estimate of OMC (calculated from TOC)	Calculation from Total Organic Carbon	Dry	M	0.1	% w/w
CE087	Naphthalene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Acenaphthylene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Acenaphthene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Fluorene	Solvent extraction, GC-MS	Wet	U	0.01	mg/kg
CE087	Phenanthrene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Anthracene	Solvent extraction, GC-MS	Wet	U	0.02	mg/kg
CE087	Fluoranthene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Pyrene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Benzo(a)anthracene	Solvent extraction, GC-MS	Wet	U	0.02	mg/kg
CE087	Chrysene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Benzo(b)fluoranthene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Benzo(k)fluoranthene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Benzo(a)pyrene	Solvent extraction, GC-MS	Wet	U	0.02	mg/kg
CE087	Indeno(123cd)pyrene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Dibenz(ah)anthracene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Benzo(ghi)perylene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	PAH (total of USEPA 16)	Solvent extraction, GC-MS	Wet		0.27	mg/kg
CE067	VPH Aromatic (>EC5-EC7)	Headspace GC-FID	Wet		0.01	mg/kg
CE067	VPH Aromatic (>EC7-EC8)	Headspace GC-FID	Wet		0.01	mg/kg
CE067	VPH Aromatic (>EC8-EC10)	Headspace GC-FID	Wet		0.01	mg/kg
CE068	EPH Aromatic (>EC10-EC12)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE068	EPH Aromatic (>EC12-EC16)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE068	EPH Aromatic (>EC16-EC21)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE068	EPH Aromatic (>EC21-EC35)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE068	EPH Aromatic (>EC35-EC44)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE067	VPH Aliphatic (>C5-C6)	Headspace GC-FID	Wet		0.1	mg/kg

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE067	VPH Aliphatic (>C6-C8)	Headspace GC-FID	Wet		0.1	mg/kg
CE067	VPH Aliphatic (>C8-C10)	Headspace GC-FID	Wet		0.1	mg/kg
CE068	EPH Aliphatic (>C10-C12)	Solvent extraction, GC-FID	Wet		4	mg/kg
CE068	EPH Aliphatic (>C12-C16)	Solvent extraction, GC-FID	Wet		4	mg/kg
CE068	EPH Aliphatic (>C16-C35)	Solvent extraction, GC-FID	Wet		4	mg/kg
CE068	EPH Aliphatic (>C35-C44)	Solvent extraction, GC-FID	Wet		10	mg/kg
$	Asbestos (qualitative)	HSG 248, Microscopy	Dry	U	-	-

Chemtech Environmental Limited

METHOD DETAILS

METHOD	PREPARED LEACHATES	METHOD SUMMARY	STATUS	LOD	UNITS
CE001	Leachate preparation (EA)	L:S 10:1		-	-
CE128	Arsenic (dissolved)	ICP-MS	U	0.06	µg/l As
CE128	Boron (dissolved)	ICP-MS	U	6	µg/l B
CE128	Cadmium (dissolved)	ICP-MS	U	0.07	µg/l Cd
CE128	Chromium (dissolved)	ICP-MS	U	0.2	µg/l Cr
CE128	Copper (dissolved)	ICP-MS	U	0.4	µg/l Cu
CE128	Lead (dissolved)	ICP-MS	U	0.2	µg/l Pb
CE128	Mercury (dissolved)	ICP-MS	U	0.008	µg/l Hg
CE128	Nickel (dissolved)	ICP-MS	U	0.5	µg/l Ni
CE128	Selenium (dissolved)	ICP-MS	U	0.07	µg/l Se
CE128	Zinc (dissolved)	ICP-MS	U	1	µg/l Zn
CE051	PAH (speciated)	Solvent extraction, GC-MS		0.1	µg/l
CE051	PAH (total of USEPA 16)	Solvent extraction, GC-MS		1.6	µg/l
CE067	VPH Aromatic (>EC5-EC7)	Headspace GC-FID		1	µg/l
CE067	VPH Aromatic (>EC7-EC8)	Headspace GC-FID		1	µg/l
CE067	VPH Aromatic (>EC8-EC10)	Headspace GC-FID		1	µg/l
CE161	EPH Aromatic (>EC10-EC12)	Solvent extraction, GC-FID		1	µg/l
CE161	EPH Aromatic (>EC12-EC16)	Solvent extraction, GC-FID		1	µg/l
CE161	EPH Aromatic (>EC16-EC21)	Solvent extraction, GC-FID		1	µg/l
CE161	EPH Aromatic (>EC21-EC35)	Solvent extraction, GC-FID		1	µg/l
CE161	EPH Aromatic (>EC35-EC44)	Solvent extraction, GC-FID		1	µg/l
CE067	VPH Aliphatic (>C5-C6)	Headspace GC-FID		1	µg/l
CE067	VPH Aliphatic (>C6-C8)	Headspace GC-FID		1	µg/l
CE067	VPH Aliphatic (>C8-C10)	Headspace GC-FID		1	µg/l
CE161	EPH Aliphatic (>C10-C12)	Solvent extraction, GC-FID		1	µg/l
CE161	EPH Aliphatic (>C12-C16)	Solvent extraction, GC-FID		1	µg/l
CE161	EPH Aliphatic (>C16-C35)	Solvent extraction, GC-FID		1	µg/l
CE161	EPH Aliphatic (>C35-C44)	Solvent extraction, GC-FID		1	µg/l

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments
Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.
For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.
Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
IT	Sample not cooled
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
65602-1	BH1	0.20	N	
65602-2	BH4	0.20	N	

APPENDIX D

Laboratory Report Front Sheet

Site name	Job number
Falstone Ave, South Shields	S170402

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

UKAS TESTING
7607

Client details:

Reference:	S170402
Name:	Solmek
Address:	12 Yarm Road, Stockton-on-tees, TS18 3NA
Telephone:	01642 607083
Email:	acutts@solmek.com
FAO:	A Cutts

Date commenced: 22/06/2017

Date reported: 05/07/2017

Observations and interpretations are outside of the UKAS Accreditiation

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

Samples will be held at the laboratory for a period of 4 weeks after the report date. After the 05-08-2017 all samples will be disposed of. Should further testing be required then the office should be informed before the above date.

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

Summary of Classification Tests

Site name	Job number
Falstone Ave, South Shields	S170402

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

UKAS TESTING
7607

Hole	Depth Top m	Depth Base m	Type	w %	Oven temp. oc	wa %	Pa %	Pr %	wL %	wP %	IP %	IL	Plasticity class	Preparation method
BH2	0.80	1.00	B	22	105	22	100	0	49-s	18	31	0.129	CI	Tested in natural condition
BH3	0.80	1.00	B	29	105	29	100	0	63-s	26	37	0.081	CH	Tested in natural condition
BH3	1.80	2.00	B	7.2	105									

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

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

Approved by	KW
Approval date	30/06/2017 10:10
Date report generated	
Report Number	

2531

ANALYTICAL TEST REPORT

Contract no:	65609
Contract name:	Falstone Ave, South Shields
Client reference:	S170402
Clients name:	Solmek
Clients address:	12 Yarm Road Stockton-On-Tees TS18 3NA
Samples received:	23 June 2017
Analysis started:	23 June 2017
Analysis completed	30 June 2017
Report issued:	30 June 2017

Notes:

Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.
Methods, procedures and performance data are available on request.
Results reported herein relate only to the material supplied to the laboratory.
This report shall not be reproduced except in full, without prior written approval.
Samples will be disposed of 6 weeks from initial receipt unless otherwise instructed.

Key:

U UKAS accredited test
M MCERTS & UKAS accredited test
$ Test carried out by an approved subcontractor
I/S Insufficient sample to carry out test
N/S Sample not suitable for testing

Approved by:

James Spittle
Customer Services Team Leader

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

All results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.
Analytical results are inclusive of stones.

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
65609-1	BH2	0.80-1.00	Clay	-	-	16.5
65609-2	BH3	1.80-2.00	Sand	-	-	6.4

Chemtech Environmental Limited

SOILS

Lab number			65609-1	65609-2
Sample id			BH2	BH3
Depth (m)			0.80-1.00	1.80-2.00
Date sampled			22/06/2017	22/06/2017
Test	Method	Units		
pH	CE004 M	units	7.9	8.6
Sulphate (2:1 water soluble)	CE061 M	mg/l SO_4	31	<10

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE004	pH	Based on BS 1377, pH Meter	Wet	M	-	units
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	M	10	mg/l SO_4

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments

Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.
For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.
Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
IT	Sample not cooled
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
65609-1	BH2	0.80-1.00	N	
65609-2	BH3	1.80-2.00	N	

APPENDIX E

SOLMEK NOTES ON CONTAMINATION GUIDANCE (REF: VERSION 2/2017)

UK BACKGROUND

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

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

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

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

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

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

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

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

PRELIMINARY CONCEPTUAL MODEL

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

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

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

PROBABILITY OF RISK BEING REALISED (C552 CIRIA, 2001)

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

RISK CLASSIFICATION MATRIX (C552 CIRIA, 2001)

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

HUMAN RECEPTORS

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

VEGETATION

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

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

GROUNDWATER AND SURFACE WATER RECEPTORS

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

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

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

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

DETAILED QUANTITATIVE RISK ASSESSMENT (DQRA)

In line with CLR 11- Model Procedures, a DQRA for groundwater/human health may be required following a Phase 2 investigation and before the preparation of a Phase 3 Remediation Strategy. For human health DQRA, a site specific assessment criteria is undertaken using CLEA Software Version 1.06. For groundwater DQRA, the Environment Agency Remedial Targets Worksheet Version 3.1 is used.

WASTE ACCEPTANCE CRITERIA

The WAC testing relates to materials that are to be exported from a site/development to landfill, and do not directly relate to human health specifically. The WAC test categorises materials as either inert waste, non-reactive hazardous waste, and hazardous waste.

The testing results are generally presented as certificates which can be used by site owners/contractors etc, which should be presented to the accepting waste facility or waste contractor.

CONSTRUCTION MATERIALS

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

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

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

REQUIREMENTS OF PARTIES WITHIN THE DEVELOPMENT PROCESS

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

RISKS & LIABILITIES FROM CONTAMINATION

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

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

♠Solmek conditions of offer, notes on limitations & basis for contract (ref: version1/2017)

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

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

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

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

Desk studies are generally prepared in accordance with RICS guidelines. Environmental site investigations are generally undertaken as 'exploratory investigations' in accordance with the definitions provided in paragraph 5.4 of BS 10175:2001 in order to confirm the conceptual assumptions. You are advised to familiarize yourself with the typical scope of such an investigation. No pumping of water will be undertaken unless a licence or facilities/equipment have been arranged by others.

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

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

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

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