



Phase 2: Site Investigation

CMS, Rockingham, Barnsley

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PHASE 2 SITE INVESTIGATION REPORT

CMS, ROCKINGHAM, BARNSELEY

TABLE OF CONTENTS

1	EXECUTIVE SUMMARY	2
2	INTRODUCTION.....	3
3	SITE DESCRIPTION	4
4	FIELDWORK.....	4
5	GROUND CONDITIONS	4
6	CONTAMINATION TESTING RESULTS	5
7	CONCEPTUAL MODEL AND CONTAMINATION ANALYSIS.....	9
8	GROUND GAS ASSESSMENT.....	13
9	GEOTECHNICAL TESTING AND ANALYSIS.....	13
TABLE 1: SUMMARY OF INORGANIC CONTAMINATION TESTING RESULTS (COMMERCIAL).....		7
TABLE 2: SUMMARY OF ORGANIC CONTAMINATION TESTING RESULTS (COMMERCIAL)		7
TABLE 3: LEACHATE TESTING.....		8
TABLE 4: CONCEPTUAL MODEL.....		10
TABLE 5: SUMMARY OF CBR TESTING RESULTS.....		14

APPENDICES

- Appendix A: Drawings
Appendix B: Borehole Logs, Trial Pit Logs & Photographs
Appendix C: Contamination Laboratory Results
Appendix D: Geotechnical Laboratory Results, Soakaway Results & Plate Bearing Test Results
Appendix E: Notes on Limitations & Contamination Guidelines

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1 EXECUTIVE SUMMARY

Site Address	Rockingham, Barnsley, South Yorkshire, S74 0SB.
Proposed Development	The proposed development involves the construction of 7no. commercial units with new access roads, service yards parking areas and peripheral soft landscaping.
Fieldwork	6no. cable percussive boreholes (BH01 to BH06 inclusive) drilled to a maximum of 4.50mbgl with in-situ testing as SPTs. 10no. small percussive boreholes (WS01 to WS10 inclusive) drilled to a maximum of 3.15mbgl with in-situ testing as SPTs. 6no. monitoring pipes in WS02, WS03, WS04, WS06, WS08 & WS10. 14no trial pits (TP01 to TP14 inclusive) to a maximum depth of 2.20mbgl with in-situ CBR testing and infiltration tests.
Ground Conditions	- Made ground, proven as engineered clay fill across the site between depths of 1.00mbgl and 2.50mbgl. - Clayey and sandy locally gravelly (TP02) topsoil was encountered across the majority of the site to depths of between 0.05mbgl and 0.40mbgl. Surfacing of gravelly sand hardstanding was proven in the northern and western areas of site to a maximum depth of 0.80mbgl. - The remainder of the made ground consisted of possible reworked deposits comprising firm and stiff generally grey or brown locally with yellowish and orangish colourations slightly sandy slightly gravelly to gravelly clay fill. - Natural clayey slightly sandy topsoil was encountered in the far south of the site in TP07 to a depth of 0.05mbgl. - Natural deposits were likely proven at four positions across the site. TP03, TP07, BH04 and WS06. The natural deposits comprised stiff yellowish to orangish brown and light grey mottled slightly sandy slightly gravelly medium to high strength clay. - Inferred highly to moderately weathered mudstone/siltstone rockhead was encountered at depths between 0.60mbgl (WS09) and 3.00mbgl (BH04). - Groundwater was encountered in BH03 at 1.10mbgl perched within the clay fill. Groundwater was not encountered in the remaining boreholes and trial pits during the site investigation.
Contamination Analysis	- Given the site's proposed commercial land use the levels of contamination recorded on site are unlikely to pose a risk to the current and future users of the site. - If any zones of odorous, brightly coloured or suspected contaminated ground or groundwater are encountered then work should cease in that area until the material has been investigated. The results of the investigation will therefore determine whether or not remediation will be required. - PPE for workers. Damping down of site during dry windy conditions. - Basic clean cover system required for all proposed areas of peripheral soft landscaping, to a depth of 0.50m. - Controlled waters unlikely to be at risk. - With respect to water utilities pH and phenol was elevated as a minimum all services should be laid in clean trenches. Copper and wrapped steel piping are unsuitable. - Sub surface concrete should be designed to DS2 ACEC (Class AC-1s).
Geotechnical Analysis & Foundation Recommendations	- Bearing capacity of 125kN/m² at minimum depth of 0.90mbgl on 0.60m wide strips on competent mudstone bedrock. - Deepening of foundations locally due to made ground depths. - Settlements within 25mm. - Normal earthworks plant for excavations although breaking out of surface hardstanding and possible relict sub surface structures anticipated. Excavations through the weathered limestone may require breaking out or larger plant to achieve the required depths. - Made ground is in excess of 600mm and a suspended reinforced ground slab or precast concrete floor should therefore be used. - Three percolation tests were carried out within the bases of TP01, TP07 and TP10. The results returned infiltration rates of between 4.42×10^{-6} and 39.60×10^{-6} m/sec. - CBR ranged from 1.1% to 37% at 0.40mbgl across the site.

2 INTRODUCTION

2.1 Authorisation

The site investigation described in this report was carried out by Solmek to the instructions of Wm Saunders on behalf of Carnell Management Service Ltd, on a parcel of undeveloped land located off the A6195, Rockingham, Barnsley, South Yorkshire, S74 0SB. A site location plan is presented as Figure 1 in Appendix A.

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

- *RSK Geosciences Preliminary Risk Assessment & Coal Mining Risk Assessment (350525-R01-00) August 2022*

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

2.2 Scope of Works

The proposed development involves the construction of 7no. commercial units with new access roads, service yards parking areas and peripheral soft landscaping.

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

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

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

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

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

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

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

3 SITE DESCRIPTION

The centre of the site is located at OS Grid Ref 434940, 400510 and covers an area of approximately 2.02ha. The site is located on a parcel of land northwest of the A6195 and to the east of Junction 36 of the M1.

The site is irregularly shaped and has a mostly flat and even topography. At the time of the fieldwork the areas was completely disused with some construction and demolition waste present across the site.

The north western area is covered by sand and gravel hardcore and a large vegetated mound is present in the north at the access road into the site.

A large area of ponded water was noted in the central and south eastern areas of the site with some construction waste noted around. A minor road runs into the north of the site but terminates abruptly upon entering the site perimeter. The remainder of the site consists of a vegetated area of grass and thin topsoil.

The site perimeter is secure with gated access to the north.

The surroundings consists of commercial warehouse buildings with the land immediately north and west particularly commercialised. Immediately northeast, a Costa Coffee is present adjacent to a fuel filling station.

4 FIELDWORK

The fieldwork was carried out between 24th and 26th March 2023. The extent of the investigation was:

- 6no. cable percussive boreholes (BH01 to BH06 inclusive) to a maximum depth of 4.50m below ground level (bgl).
 - The boreholes were evenly spread around the site, where access allowed, to target the proposed new building footprints.
- 10no. small percussive boreholes (WS01 to WS10 inclusive) to a maximum depth of 3.15bgl.
 - The boreholes were evenly spread around the site, where access allowed, to target the proposed new building footprints.
- Gas monitoring wells were installed in WS02, WS03, WS04, WS06, WS08 & WS10.
 - The wells were spaced at <25m centres evenly around the site in accordance with CIRIA C665.
- 14no. machine excavated trial pits (TP01 to TP14 inclusive) to a maximum depth of 2.20mbgl.
 - The trial pits were targeted, where access allowed, to appraise the shallow ground conditions across the site and retrieve bulk and environmental samples for geotechnical and shallow contamination testing and analysis.
 - 8no. In-situ CBR tests (Plate Bearing Test Method) were undertaken at depths of 0.40mbgl in TP's 02 to 06 inclusive, TP09, TP12 & TP14.
 - 3no. infiltration tests were undertaken in TP01, TP07 & TP10.
 - In-situ hand shear vanes was undertaken within cohesive deposits.
- In-situ testing in the exploratory boreholes as Standard Penetration Tests (SPTs).
- Retrieval of samples for geotechnical and chemical testing.

The boreholes were backfilled with bentonite/grout and/or monitoring installations upon completion. The trial pits were backfilled in layers using arisings.

A plan showing the location of the boreholes and trial pits can be found in Appendix A, Figure 2. Photographs of the trial pits are presented in Appendix B.

5 GROUND CONDITIONS

A summary of the ground conditions encountered is given below. The exploratory hole logs are presented in Appendix B. The RSK preliminary report suggests that the site had been regraded in the past using engineered fill.

5.1 Made Ground

Made ground, proven as engineered clay fill was encountered across the site between depths of 1.00mbgl and 2.50mbgl.

A surface layer of clayey and sandy locally gravelly (TP02) topsoil was encountered across the majority of the site to depths of between 0.05mbgl and 0.40mbgl. Surfacing of gravelly sand hardstanding was proven in the northern and western areas of site to a maximum depth of 0.80mbgl. The gravel fractions consisted of concrete, brick and glass.

The remainder of the made ground consisted of possible reworked deposits comprising firm and stiff generally grey or brown locally with yellowish and orangish colourations slightly sandy slightly gravelly to gravelly clay fill. The gravel fractions generally comprised mudstone and sandstone.

5.2 Topsoil

Natural clayey slightly sandy topsoil was encountered in the far south of the site in TP07 to a depth of 0.05mbgl.

5.3 Natural Deposits

Natural deposits were likely proven at four positions across the site. TP03 in the north west from 1.20mbgl to 2.20mbgl and in the south of the area; TP07 from 0.05mbgl to 1.50mbgl, BH04 from 1.30mbgl to 3.00mbgl and WS06 from 1.70mbgl to 2.80mbgl.

The natural deposits comprised stiff yellowish to orangish brown and light grey mottled slightly sandy slightly gravelly medium to high strength clay. The gravel fractions comprised sandstone, mudstone and siltstone.

5.4 Solid Geology

Inferred highly to moderately weathered mudstone (siltstone in BH02 between 3.00mbgl and 4.50mbgl) was encountered across the site at depths between 0.60mbgl (WS09) and 3.00mbgl (BH04) site within the boreholes and trial pits, however bedrock was not proven via rotary drilling methods.

The trial pits all terminated within the weathered mudstone at depths of 1.00mbgl and 2.20mbgl. SPT refusal was achieved at all borehole positions within the weathered zone up to termination depth. Chiselling for one hour was used to advance BH02 to a maximum depth of 4.50mbgl.

5.5 Groundwater

Groundwater was encountered in BH03 at 1.10mbgl perched within the clay fill. Groundwater was not encountered in the remaining boreholes and trial pits during the site investigation.

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

6 CONTAMINATION TESTING RESULTS

The proposed development involves the construction of 7no. commercial units with new access roads, service yards parking areas and peripheral soft landscaping.

The chemical samples were generally retrieved in line with BS ISO 18400-105:2017 *Soil Quality. Sampling*.

The chemical results are presented in Appendix C.

6.1 Site Characterisation

Within the RSK Geosciences report a preliminary conceptual model was formed based on the information obtained.

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

- Human Health – Moderate/Low
- Controlled Water – Low
- Current Site Users (on-site workers/visitors) – Moderate/Low
- Ground Gas – Moderate

6.2 Contamination Testing and Rationale

To provide information upon the possibility of ground contamination seven samples of made ground and one natural clay sample was selected for shallow contamination testing. A Moderate/Low overall contamination risk was highlighted in the RSK Geosciences preliminary assessment. This coupled with the end use being commercial means that eight samples are considered appropriate for testing. The samples selected are detailed below:

- TP01 – 0.30m (Made ground – clay fill)
- TP04 – 0.20m (Made ground – granular hardstanding)
- TP05 – 0.50m (Made ground – clay fill)
- TP06 – 0.20m (Made ground – granular)
- TP07 – 0.30m (Natural CLAY)
- TP09 – 0.30m (Made Ground – Clay fill)
- TP11 – 0.20m (Made Ground – Clay fill)
- TP14 – 0.20m (Made Ground – Clay fill)

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

- 8no. Metals, semi-metals, non-metals, inorganic determinants
- 8no. Asbestos identification screenings
- 8no. Speciated Polyaromatic Hydrocarbons (PAHs)
- 4no. Total Petroleum Hydrocarbon Criteria Working Group fractions (TPHCWG)

Limited TPHCWG was undertaken as no hydrocarbon product, visual or olfactory evidence was recorded during this investigation.

The following samples were subjected to leachate analysis:

- TP04 – 0.20m (Made ground – granular hardstanding)
- TP06 – 0.20m (Made ground – granular)
- TP14 – 0.20m (Made Ground – Clay fill)

6.3 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 commercial land use. These are the most up to date thresholds published in December 2014.

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

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

TABLE 1: SUMMARY OF INORGANIC CONTAMINATION TESTING RESULTS (COMMERCIAL)

Determinand	Units	Number of Samples above Level of Detection	Minimum Recorded Level	Maximum Recorded Level	Commercial Threshold Value	Number of Results Exceeding Threshold Value
Metals						
Cadmium	mg/kg	4	<0.10	2.40	190	0
Chromium	mg/kg	8	9.70	50	8600	0
Copper	mg/kg	8	16	440	68000	0
Lead	mg/kg	8	11	140	2300*	0
Mercury	mg/kg	0	<0.05	-	1100	0
Nickel	mg/kg	8	11	40	980	0
Zinc	mg/kg	8	36	800	730000	0
Semi metals and non metals						
Arsenic	mg/kg	8	2.90	7.80	640	0
Boron	mg/kg	7	<0.20	4.60	240000	0
Selenium	mg/kg	0	<0.50	-	12000	0
Inorganic chemicals						
Cyanide	mg/kg	3	<0.10	0.30	1580**	0
W.S. Sulphate	mg/l	8	35	460	2000^	0
Other						
pH	pH	-	6.1	11	<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						

6.4 Metals, Semi Metals and Non Metals

No significantly raised levels of contamination above the S4UL commercial threshold values were found, based on the eight samples tested.

6.5 Inorganic Chemicals

Soluble sulphates (potentially aggressive to foundation concrete) were recorded between 35 and 460mg/l. None of the samples were elevated above levels affecting human health or above 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 11. These pH levels are consistent with slightly acidic to highly alkaline conditions.

6.6 Organic Chemicals

The organic thresholds vary depending on the levels of soil organic matter (SOM). The average SOM recorded across the site was 2.05% therefore a SOM of 1.00% has been used to determine the S4UL thresholds. Table 2, below, summarises the results.

TABLE 2: SUMMARY OF ORGANIC CONTAMINATION TESTING RESULTS (COMMERCIAL)

Determinand	Units	Number of Samples above Level of Detection	Minimum Recorded Level	Maximum Recorded Level	Commercial Threshold Value at 1% SOM	Number of Results Exceeding Threshold Value
TPH Aliphatic Fractions (4no. samples)						
Aliphatic (C5-C6)	mg/kg	0	<0.01	-	3200	0
Aliphatic (C6-C8)	mg/kg	0	<0.01	-	77800	0
Aliphatic (C8-C10)	mg/kg	0	<0.01	-	2000	0
Aliphatic (C10-C12)	mg/kg	0	<1.50	-	9700	0
Aliphatic (C12-C16)	mg/kg	0	<1.20	-	59000	0

Aliphatic (C16-C35)	mg/kg	0	<1.50	-	1600000	0
TPH Aromatic Fractions (4no. samples)						
Aromatic (C5-C7)	mg/kg	0	<0.01	-	26000	0
Aromatic (C7-C8)	mg/kg	0	<0.01	-	56000	0
Aromatic (C8-C10)	mg/kg	0	<0.01	-	3500	0
Aromatic (C10-C12)	mg/kg	0	<0.90	-	16000	0
Aromatic (C12-C16)	mg/kg	0	<0.50	-	36000	0
Aromatic (C16-C21)	mg/kg	0	<0.60	-	28000	0
Aromatic (C21-C35)	mg/kg	0	<1.40	-	28000	0
Speciated PAH						
Naphthalene	mg/kg	3	<0.10	0.10	190	0
Acenaphthylene	mg/kg	1	<0.10	0.10	83000	0
Acenaphthene	mg/kg	1	<0.10	0.10	84000	0
Fluorene	mg/kg	1	<0.10	0.10	63000	0
Phenanthrene	mg/kg	2	<0.10	0.80	22000	0
Anthracene	mg/kg	2	<0.10	0.20	520000	0
Fluoranthene	mg/kg	2	<0.10	1.30	23000	0
Pyrene	mg/kg	2	<0.10	1.20	54000	0
Benzo(a)anthracene	mg/kg	2	<0.10	2.20	170	0
Chrysene	mg/kg	2	<0.10	1.20	350	0
Benzo(b)fluoranthene	mg/kg	2	<0.10	0.50	44	0
Benzo(k)fluoranthene	mg/kg	2	<0.10	0.40	1200	0
Benzo(a)pyrene	mg/kg	2	<0.10	0.60	35	0
Indeno(123cd)pyrene	mg/kg	2	<0.10	1.00	3900	0
Dibenz(ah)anthracene	mg/kg	1	<0.10	0.20	3.5	0
Benzo(ghi)perylene	mg/kg	2	<0.10	0.40	500	0
PAH	mg/kg	2	<1.60	9.70	1000*	0
Phenols	mg/kg	0	<0.30	-	760	0
* EA Threshold Values						

From the eight samples tested for organic determinants, no exceedances above the S4UL threshold values were recorded.

6.7 Asbestos

From the eight samples subject to asbestos screening to date, no asbestos fibres were recorded.

6.8 Leachates

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

TABLE 3: LEACHATE TESTING

Determinant	Units	Number of Samples above Level of Detection	Minimum Recorded Level	Maximum Recorded Level	UK DWS	Number of Results Exceeding Threshold Value
Inorganic Contaminants						
Cadmium	µg/l	0	<0.03	-	5	0
Chromium (Total)	µg/l	1	<0.25	1.40	50	0
Copper	µg/l	3	3.20	5.60	2000	0
Lead	µg/l	3	1.30	3.80	25	0
Mercury	µg/l	1	<0.01	0.01	1	0
Nickel	µg/l	0	<0.50	-	20	0
Zinc	µg/l	2	<1.30	1.90	5000	0
Arsenic	µg/l	3	0.23	1.10	10	0
Selenium	µg/l	3	0.27	0.60	10	0
Cyanide (Total)	µg/l	0	<40	-	50	0
Sulphate	mg/l	3	3	46	250	0
Boron	µg/l	1	<12	93	2000	0

PAH						
Naphthalene	µg/l	0	<0.05	-	PAH DWS is 0.10µg/l	0
Acenaphthylene	µg/l	0	<0.01	-		0
Acenaphthene	µg/l	1	<0.01	0.01		0
Fluorene	µg/l	1	<0.01	0.01		0
Phenanthrene	µg/l	3	0.02	0.04		0
Anthracene	µg/l	0	<0.01	-		0
Fluoranthene	µg/l	3	0.01	0.02		0
Pyrene	µg/l	3	0.01	0.02		0
Benz' (a)anth' ene	µg/l	0	<0.01	-		0
Chrysene	µg/l	0	<0.01	-		0
Benz' (b)fluor' ene	µg/l	0	<0.01	-		0
Benz' (k)fluor' ene	µg/l	0	<0.01	-		0
Benz' (a)pyrene	µg/l	0	<0.01	-		0
Benz (ghi)per' ene	µg/l	0	<0.01	-		0
Diben(ah)anth' ene	µg/l	0	<0.01	-		0
Id' (123cd)pyrene	µg/l	0	<0.01	-		0
PAH Total	µg/l	0	<0.20	-	0.2**	0
Phenol	µg/l	0	<100	-	0.5	0
TPH Aliphatic Fractions						
C5-6	µg/l	0	<0.10	-	15000*	0
C6-8	µg/l	0	<0.10	-	15000*	0
C8-10	µg/l	0	<0.10	-	300*	0
C10-12	µg/l	0	<1.00	-	300*	0
C12-16	µg/l	0	<1.00	-	300*	0
C16-21	µg/l	0	<1.00	-	300*	0
C21-35	µg/l	0	<1.00	-	300*	0
TPH Aromatic Fractions						
C5-7	µg/l	0	<0.10	-	10*	0
C7-8	µg/l	0	<0.10	-	10*	0
C8-10	µg/l	0	<0.10	-	100*	0
C10-12	µg/l	0	<1.00	-	100*	0
C12-16	µg/l	0	<1.00	-	100*	0
C16-21	µg/l	0	<1.00	-	90*	0
C21-35	µg/l	0	<1.00	-	90*	0
* WHO Guidelines 2005						
** EA leachate quality thresholds						
*** EQS Freshwater						

No raised leachate was recorded in the three samples tested.

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

This revised document explains how the Local Authority should decide if land, based on a legal interpretation, is contaminated. The document replaces the previous guidance given in Annex 3 of DEFRA Circular 01/2006, issued in accordance with section 78YA of the 1990 Environmental Protection Act. The main objectives of the Part 2A regime are to “identify and remove unacceptable risks to human health and the environment” and to “seek to ensure that contaminated land is made suitable for its current use”. Part 2A uses a risk based approach to defining contaminated land whereby the “risk” is interpreted as “the likelihood that harm, or pollution of water, will occur as a result of contaminants in, on or under the land” and by “the scale and seriousness of such harm or pollution if it did occur”.

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

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

7 CONCEPTUAL MODEL AND CONTAMINATION ANALYSIS

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

TABLE 4: CONCEPTUAL MODEL

Source	Pathway	Receptor	Risk Rating	Comments
Asphyxiating or explosive ground gases - Reworked made ground (<2.50m) - Potential mine workings - Landfill in vicinity	Ground gas migration - Migration through permeable soils - Inhalation	Future site users Transient adults	Moderate	Gas monitoring in progress, source risk rating subject to change.
		Users during development Construction workers	Moderate	
Areas of contamination hazardous to human health (Commercial) 8no. samples tested - No raised organic determinants - No raised inorganic determinants - No Asbestos noted in samples to date - Low leachates	- Inhalation - Dust ingestion - Dermal contact	Future site users Transient adults	Low	Mitigated by proposed structure hard standing and suitable growing medium required for peripheral soft landscaping.
		Users during development Construction workers	Low	Mitigation measures required during construction. Consideration to be given to Health and Safety Executive: Protection of Workers and the General Public During the Development of Contaminated Land. Asbestos awareness and suitable contractor required for groundworks.
	- Inhalation - Dust ingestion	Users of surrounding sites Adults	Low	Potential risk during remediation/construction from dust generation. Consideration to be given to dust suppression, in line with BRE: The Control of Dust and Emissions from Construction and Demolition, Best Practice Guidance.
		Drift geology Unclassified	Low	The low sensitivity aquifer is not considered to be a sensitive receptor. No groundwater encountered.
	Leaching of mobilised contaminants	Solid geology Secondary A Aquifer	Low	Low/medium sensitivity Aquifer under made ground and shallow bedrock. Lack of shallow groundwater to transport contaminants. Low levels of contaminants recorded. Not in a groundwater Source Protection Zone or near to ground/surface water abstractions). Limited source availability of contaminants in soil analysis and low leachate results.
		Surface water features None in vicinity	Low	Lack of notable surface water features. Limited source availability of contaminants in soil analysis and low leachate results.
Areas of phytotoxic contamination Zinc & copper	Uptake via roots and leaf surfaces	Vegetation Peripheral planting only	Moderate /Low	No potential for Vegetation impact. Suitable growing medium required for peripheral soft landscaping.
Areas of contamination above service fabric or BRE Special Digest 1 thresholds Elevated pH	Direct contact	Construction Materials Concrete	Moderate /Low	Moderate sulphate results.
		Construction Materials Service Fabric	Moderate	Copper and wrapped steel piping to be avoided and prudent to lay any service within a clean bedding.

In general terms ground gas and construction materials are **potentially most** at risk as pollution linkages may be present for these receptors. The remaining receptors 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.

7.1 Users of the Site Once Development is Complete

The users of the site, particularly construction workers, are likely to be exposed to contaminants present in the soils beneath the site during redevelopment work. **Potential** exposure pathways include dermal absorption after contact with contaminated ground, inhalation of soil or dust, inhalation of volatiles compounds, and inadvertent soil ingestion.

To establish if the levels of contaminants present on site may pose a risk to the health of the future users of the site the results of the contamination testing have been compared to a series of LQM S4UL thresholds based on commercial end use (see Tables 1, 2 and 3).

The levels of contaminants across the site are generally low with no exceedances recorded.

The new development is expected to comprise commercial buildings with hardstanding service yards, access roads and parking. Only limited new areas of soft landscaping are proposed.

Based on the **shallow** soil contamination testing to date, it is considered that the levels of contamination are unlikely to pose a risk to future users of the site once the development is complete and the site is covered either by buildings, hardstanding, or a basic clean cover system.

7.2 Construction Workers and Users of Surrounding Sites

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

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. Wheel washers should be provided and used for any vehicle entering or leaving site to prevent cross contamination.

Although asbestos was not detected from the soil samples subjected to testing within this investigation, the possibility exists that asbestos containing materials may still be present on site and currently lie undetected. It is therefore advised that a 'watching brief' is undertaken during the initial site strip and any excavation works and advice sought if asbestos is found or suspected. All works should be undertaken in accordance with the Control of Asbestos Regulations 2012.

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. Works should be undertaken in line with BRE: The Control of Dust and Emissions from Construction and Demolition, Best Practice Guidance.

7.3 Vegetation

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

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*. Zinc and copper were raised.

Proposed peripheral planting areas should be excavated to 0.50mbgl. The suitable growing medium should comprise 200mm of clean imported topsoil over 300mm of clean subsoil, sourced from the southern parts of the site if practical.

Appropriate certification would be required to ensure that the materials are clean and free from deleterious materials in accordance with the Local Authority Guidelines *Verification Requirements for Cover Systems, Technical Guidance for developers, Landowners and Consultants* (Yorkshire and Lincolnshire Pollution Advisory Group Version 4.1 – June 2021). Details of the clean cover must be presented in a Phase 3 Remediation Statement.

7.4 Ground and Surface Water

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

There are no major water features in the vicinity of the site. No contamination was recorded based on the eight samples tested both in the soil and leachate, and limited to no groundwater was encountered during the investigation.

Due to the low levels of contamination found across the site and the lack of groundwater and surface water features, the development is considered to represent a low risk to groundwater and surface water receptors.

7.5 Construction Materials

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

7.5.1 Concrete Classification

BRE Special Digest One: *Concrete in Aggressive Ground*: 2005 3rd Edition has been used to assess the risks posed to underground concrete and to establish the design measures required to mitigate the risks. The results of the pH and water-soluble sulphate tests (when converted to total potential sulphate) fall into Class DS-2 ACEC (Class AC-1s) requirements for concrete protection. This assumes static groundwater conditions.

7.5.2 Water Supply Pipes Material Selection

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

Based on the samples tested during the site investigation, levels of slightly acidic to highly alkaline pH (6.0 to 11) were recorded across the site at depths of between 0.20mbgl and 2.60mbgl within the made ground and natural ground samples.

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

7.6 Unexpected Contamination

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

- Stop work in the affected area
- Contact Solmek and provide pictures of the affected area
- Solmek can visit site to investigate the material and provide guidance
- If required – Solmek can sample and test the material
- Once test results are returned, this will determine whether or not remediation will be required

7.7 Waste Classification

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

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

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

8 GROUND GAS ASSESSMENT

The proposed development includes the construction of commercial premises.

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.

For this report, gas monitoring is via measuring emissions from six standpipes (WS02, WS03, WS04, WS06, WS08 & WS10) that were installed during the sitework. The gas monitoring will consist of six visits over a period of three months. The gas monitoring results will be presented as an addendum to this report.

9 GEOTECHNICAL TESTING AND ANALYSIS

Samples taken from the boreholes and trial pits underwent a series of geotechnical tests at a UKAS accredited laboratory to aid foundation design and soil description. In addition, in-situ Standard Penetration Tests (SPTs) and in-situ hand shear vanes were undertaken during the fieldwork.

The geotechnical results are presented in Appendix D.

9.1 Strength and Density

9.1.1 Hand Shear Vanes

Hand shear vane testing within the clay fill and natural cohesive deposits returned results ranging between 50kPa and 140kPa, which are indicative of medium to high strength conditions.

9.1.2 SPT N Values

Standard Penetration Tests (SPT) undertaken within the weathered bedrock at depths of between 1.00mbgl and 4.00mbgl yielded N values of 50+ (refusal), indicative of very dense deposits.

9.2 Moisture Contents

Ten samples recovered from the boreholes and trial pits have been subject to moisture content tests to determine the moisture profile at depths of between 0.70 and 1.30mbgl. Moisture levels were between 15% and 27%.

9.1 Atterberg Limit Determinations

Ten 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 be of intermediate to high plasticity.

The Plasticity Indices ranged from 10 to 27 with equivalent moisture contents recorded at, above and below the corresponding plastic limits. The cohesive material can be assessed as having a **medium** shrinkage potential in relation to current relevant guidance.

9.2 pH and Sulphate Results

Fourteen samples of soil from the boreholes and trial pits were tested for acidity and soluble sulphate content to assess whether the material may be potentially aggressive to building fabric. The results of the testing for pH ranged from 6.0 to 8.7 indicating slightly acidic to alkaline conditions. Soluble sulphates were recorded at levels ranging from 26mg/l to 650mg/l.

9.3 Dry Density / Moisture Content Relationship

One sample was subject to optimum moisture content (OMC) / dry density relationship testing using the 2.5kg rammer method. The OMC of the samples was 18% with a maximum dry density of 1.64Mg/m³.

9.4 Particle Size Distribution Testing and Sedimentation Testing

Seven samples from the trial pits at varying depths were subject to Particle Size Distribution (PSD) tests in accordance with BS1377 Part 2 to aid soil descriptions. In addition to the PSD tests, all samples were then subjected to sedimentation analysis using a hydrometer to further classify the fine grained soils (i.e. the quantities of clay and silt). The results have been used to prepare precise soil descriptions in accordance with BS5930:2015 Section 6 and are presented in Appendix D.

9.5 Percolation Tests

Three percolation tests were carried out within the bases of TP01, TP07 and TP10. The results returned infiltration rates of between 4.42×10^{-6} and 39.60×10^{-6} m/sec.

Given the results encountered and the significant thickness of low permeability cohesive fill deposits, soakaway drainage may not be suitable for the proposed development.

Soakaway drainage, if incorporated, should be designed in accordance with BRE *Special Digest 365 – Soakaway Design*. The results are presented in Appendix D.

9.6 CBR Tests

CBR testing was undertaken within the trial pits at depths of 0.40mbgl using plate bearing test methods. The in-situ CBR results are detailed below in Table 5.

TABLE 5: SUMMARY OF CBR TESTING RESULTS

Trial Pit	0.40mbgl result (%)
TP02	10
TP03	26

TP04	37
TP05	13
TP06	2.1
TP09	2.3
TP12	1.1
TP14	5.1

9.7 Mining Assessment

The site is within a Coal Mining Reporting Area and within a Development High Risk Area. The RSK Geosciences CMRA identifies a limited risk based on the following:

- Deep underground extraction took place in the past but has significant rock cover.
- No mine entries in the vicinity of the site.
- Outside shallow opencast coal extractions.

The Coal Authority Mining Consultants report does highlight the fact that the site lies within the opencast licenced area. It may be prudent to undertake limited probe drilling of each plot prior to foundation placement in order to satisfy The Coal Authority that no ground stability works are required.

9.8 Foundations

The following foundation option is discussed below.

9.8.1 Foundations within Bedrock

The site is underlain by inferred highly to moderately weathered coal measures rock namely mudstone and siltstone. Inferred rockhead within the area of the proposed building footprints was encountered, at depths of between 0.60mbgl and 3.00mbgl. This was generally proven below areas of engineered clay fill made ground and local natural clay deposits (in the south of the site).

It would therefore be prudent to situate the foundations directly upon competent mudstone bedrock.

Strip footings, 0.60m wide or 1-1.5m square pads should be adopted placed directly onto the inferred weathered mudstone rockhead at a minimum depth of 0.90mbgl. Locally, foundations will require deepening due to made ground depths. All deepened sections should be adequately stepped, in accordance with current guidance.

The shallow weathered limestone can be considered very weak to weak. Table 2.3 in *Foundation Design & Construction, 7th Edition*, M.J. Tomlinson outlines a bearing capacity of 125kN/m² for mudstone to be assumed.

Providing imposed loads do not exceed the bearing capacity then settlement have been calculated at less than 25mm. The developer should also ensure the footings are placed at sufficient depth through the weathered zone to more competent bedrock to achieve the desired 125kN/m² allowable bearing capacity.

9.8.2 Ground Slabs

Made ground is in excess of 600mm and a suspended reinforced ground slab or precast concrete floor should therefore be used. 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, if applicable.

9.9 Excavation

Based on the nature of the ground conditions encountered, excavations should be within the capacity of

normal earthworks plant although breaking out of surface hardstanding, relict foundations and other obstructions should be anticipated.

Stability of excavations will be poor in the made ground but should improve in the natural weathered limestone. Excavations through the weathered rock may require breaking out or larger plant to achieve the required depths. Excavation sides should be designed, constructed and supported in accordance with the recommendations given in CIRIA Report No. 97: "Trenching Practice".

9.10 Groundwater

Groundwater was encountered in BH03 at 1.10mbgl perched within the clay fill. Groundwater was not encountered in the remaining boreholes and trial pits during the site investigation.

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

SOLMEK

APPENDIX A



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

Figure Title

Site Location Plan

Project Number

S230417

Project Name

CMS, Rockingham, Barnsley

Client

Carnell Management Services Ltd

Date

May 2023

DRG Number

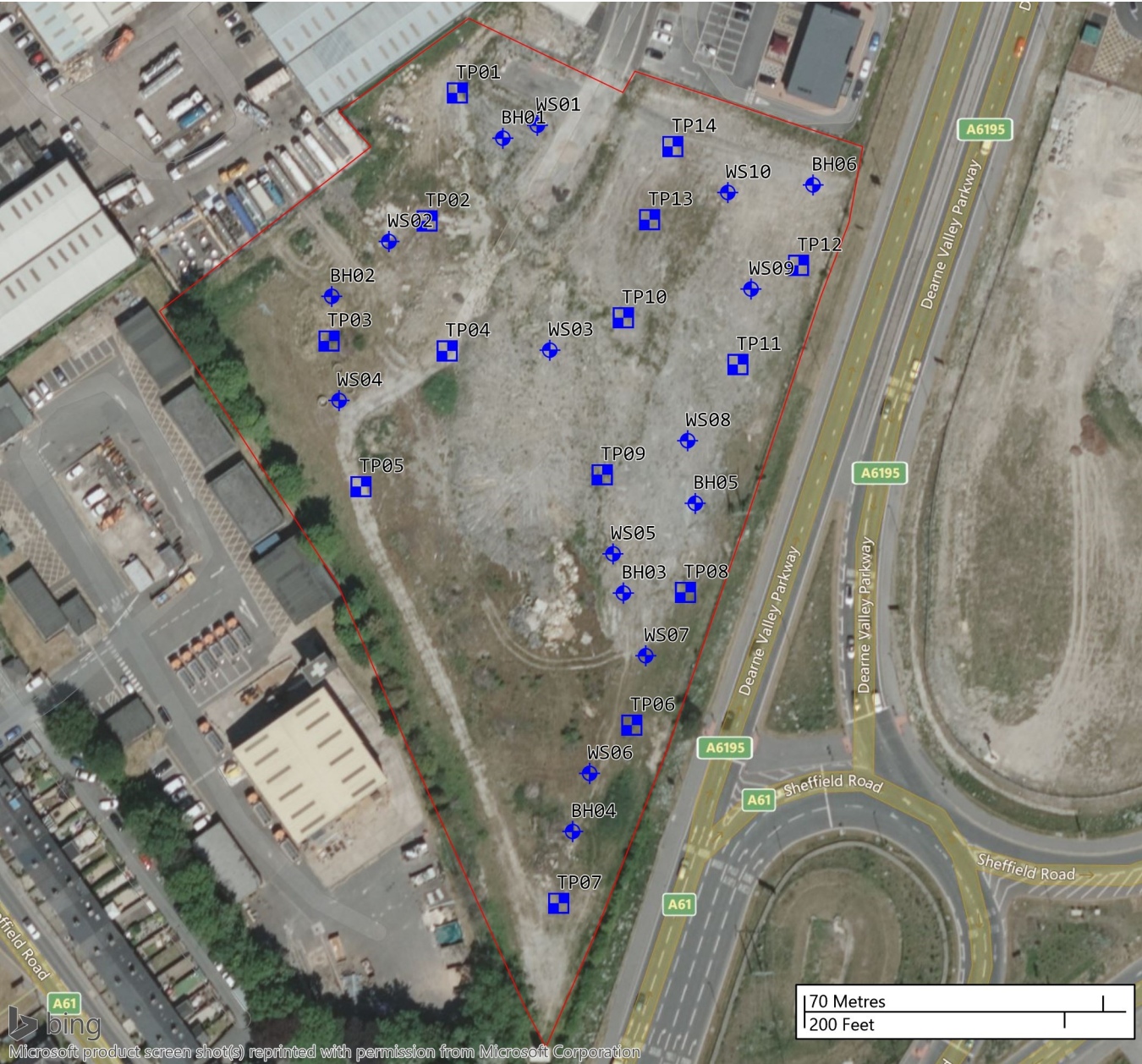
Figure 1

Scale

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Legend Key

 Project Bounds - Project Bounds



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

Figure Title

BH/TP Location Plan

Project Number

S230417

Project Name

CMS, Rockingham, Barnsley

Client

Carnell Management Services Ltd

Date

May 2023

DRG Number

Figure 2

Scale

1:1500 @ A4 [DO NOT SCALE]

Legend Key

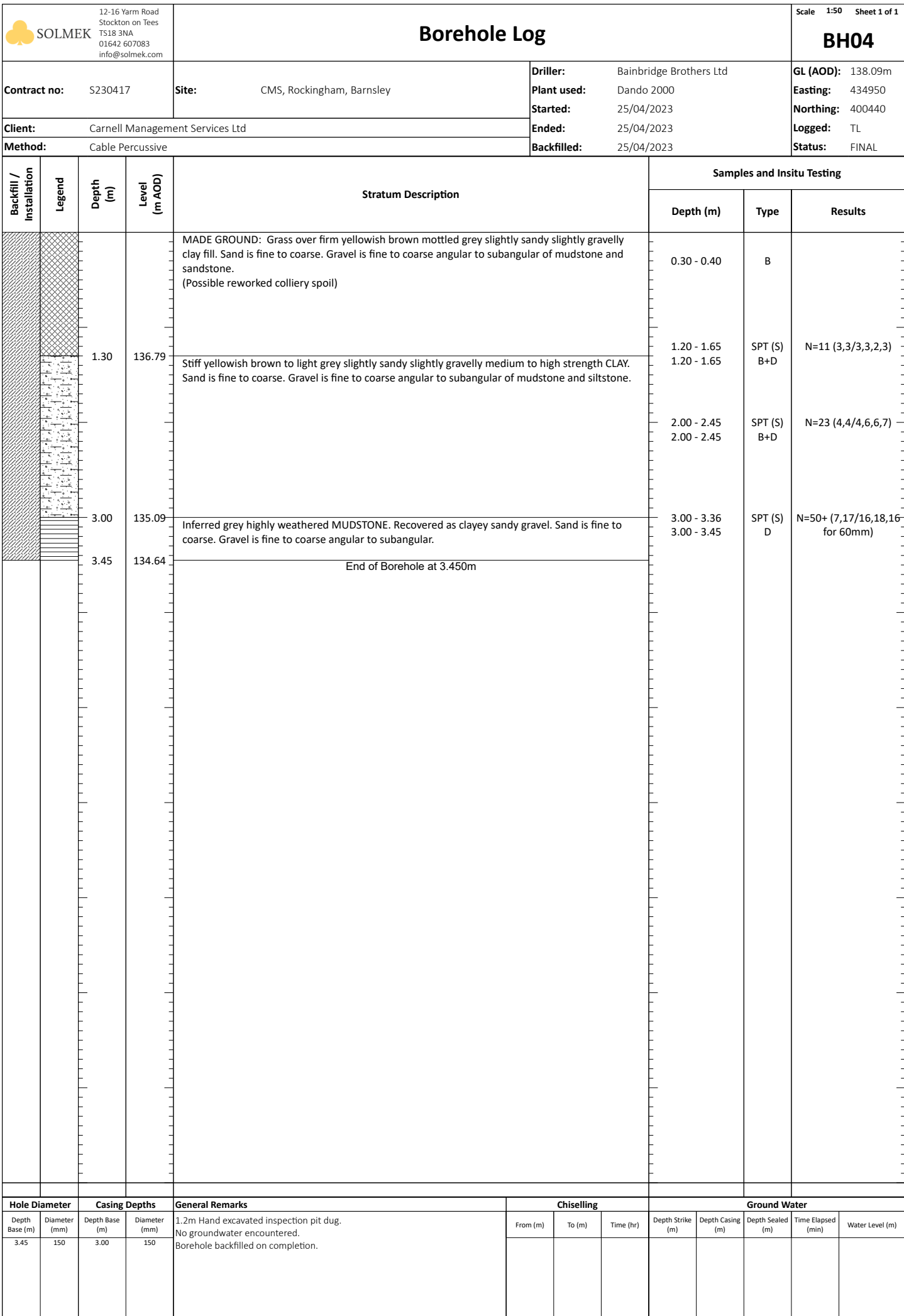
- ◆ Locations By Type - BH
- Locations By Type - TP
- ▭ Project Bounds - Project Bounds

APPENDIX B

12-16 Yarm Road Stockton on Tees TS18 3NA 01642 607083 info@solmek.com SOLMEK				Borehole Log							Scale 1:50 Sheet 1 of 1 BH01		
Contract no: S230417				Site: CMS, Rockingham, Barnsley				Driller: Bainbridge Brothers Ltd Plant used: Dando 2000 Started: 25/04/2023 Ended: 25/04/2023 Backfilled: 25/04/2023			GL (AOD): 138.18m Easting: 434932 Northing: 400603 Logged: TL Status: FINAL		
Client: Carnell Management Services Ltd				Method: Cable Percussive									
Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description			Samples and Insitu Testing						
							Depth (m)		Type	Results			
		1.40	136.78	MADE GROUND: Grass over stiff dark grey slightly sandy gravelly clay fill of intermediate plasticity. Sand is fine to coarse. Gravel is fine to coarse angular to subangular of mudstone. (Possible reworked colliery spoil)			0.30 - 0.40	B	N=11 (1,1/2,2,3,4)				
				Inferred grey highly weathered MUDSTONE. Recovered as clayey sandy gravel. Sand is fine to coarse. Gravel is fine to coarse angular to subangular.			0.70 - 0.80	B					
							1.20 - 1.65	SPT (S)					
							1.20 - 1.65	B+D					
		2.60	135.58	Inferred grey moderately weathered MUDSTONE. Recovered as sandy gravel. Sand is fine to coarse. Gravel is fine to coarse angular to subangular.			2.00 - 2.45	SPT (S)	N=41 (2,4/5,14,12,10)				
							2.00 - 2.45	B+D					
				2.60 - 2.68	SPT (S)	N=50+ (25 for 30mm/50 for 50mm)							
				2.60 - 3.05	D								
		3.05	135.13	End of Borehole at 3.050m									
								</					

12-16 Yarm Road Stockton on Tees TS18 3NA 01642 607083 info@solmek.com Borehole Log				Scale 1:50 Sheet 1 of 1			
BH02							
Contract no: S230417		Site: CMS, Rockingham, Barnsley		Driller: Bainbridge Brothers Ltd		GL (AOD): 138.74m	
				Plant used: Dando 2000		Easting: 434892	
				Started: 25/04/2023		Northing: 400565	
Client: Carnell Management Services Ltd				Ended: 25/04/2023		Logged: TL	
Method: Cable Percussive				Backfilled: 25/04/2023		Status: FINAL	
Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing		
					Depth (m)	Type	Results
		0.40	138.34	MADE GROUND: Brown gravelly sand. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of mudstone, concrete, brick and glass. (Hardstanding)	0.30 - 0.40	B	
				MADE GROUND: Stiff dark grey slightly sandy gravelly silty clay fill. Sand is fine to coarse. Gravel is fine to coarse angular to subangular of mudstone. (Possible reworked colliery spoil)	0.70 - 0.80	B	
		1.30	137.44	Inferred grey highly weathered MUDSTONE. Recovered as clayey sandy gravel. Sand is fine to coarse. Gravel is fine to coarse angular to subangular.	1.20 - 1.65	SPT (S)	N=9 (2,1/2,2,1,4)
					1.20 - 1.64	B	
					1.20 - 1.65	D	
					2.00 - 2.45	SPT (S)	N=11 (3,3/3,3,2,3)
					2.00 - 2.45	B	
					2.00 - 2.45	D	
		3.00	135.74	Inferred grey moderately weathered SILSTONE. Recovered as sandy gravel. Sand is fine to coarse. Gravel is fine to coarse angular to subangular.	3.00 - 3.45	SPT (S)	N=14 (3,4/4,3,3,4)
					3.00 - 3.45	B	
					3.00 - 3.45	D	
					4.00 - 4.34	SPT (S)	N=50+ (1,1/12,15,23 for 40mm)
					4.00 - 4.45	D	
4.50	134.24	End of Borehole at 4.500m					

 SOLMEK 12-16 Yarm Road Stockton on Tees TS18 3NA 01642 607083 info@solmek.com				Borehole Log					Scale 1:50 Sheet 1 of 1 BH03	
Contract no: S230417		Site: CMS, Rockingham, Barnsley			Driller: Bainbridge Brothers Ltd		GL (AOD): 138.63m			
					Plant used: Dando 2000		Easting: 434961			
					Started: 25/04/2023		Northing: 400496			
Client: Carnell Management Services Ltd					Ended: 25/04/2023		Logged: TL			
Method: Cable Percussive					Backfilled: 25/04/2023		Status: FINAL			
Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing					
					Depth (m)	Type	Results			
		0.40	138.23	MADE GROUND: Brown clayey slightly sandy topsoil. Sand is fine to coarse.	0.30 - 0.40	B	N=14 (4,4/3,2,4,5)			
				MADE GROUND: Firm to stiff orangish brown mottled grey slightly sandy slightly gravelly clay fill. Sand is fine to coarse. Gravel is fine to coarse angular to subangular of mudstone and sandstone.	0.70 - 0.80	B				
				(Possible reworked colliery spoil)	1.20 - 1.65	SPT (S)				
					1.20 - 1.65	B+D				
		2.50	136.13		2.00 - 2.45	SPT (S)	N=24 (4,5/5,6,6,7)			
					2.00 - 2.45	B+D				
					2.60	B				
					2.80 - 3.06	SPT (S)				
		3.25	135.38		2.80 - 3.25	D	N=50+ (20,5 for 10mm/21,13,16 for 20mm)			
				End of Borehole at 3.250m						



Contract no: S230417

Site: CMS, Rockingham, Barnsley

Driller:	Bainbridge Brothers Ltd
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Plant used: Mini Rig

Started: 25/04/2023

Ended: 25/04/2023

Backfilled: 25/04/2023

GL (AOD):	136.76m
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Easting: 434940

Northing: 400606

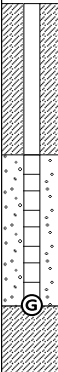
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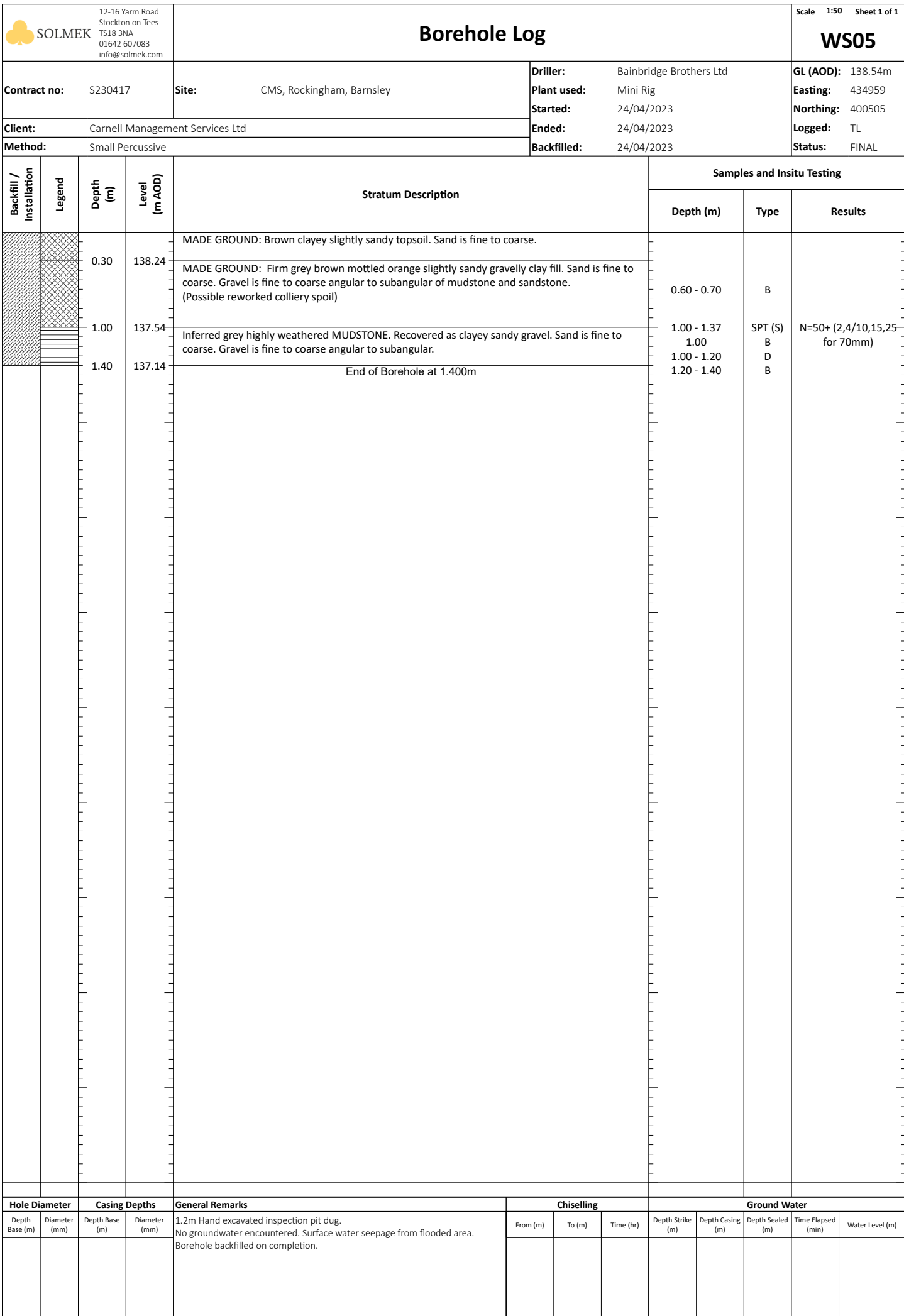
Client:	Carnell Management Services Ltd
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Method:	Small Percussive
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 12-16 Yarm Road Stockton on Tees TS18 3NA 01642 607083 info@solmek.com		Borehole Log					Scale 1:50 Sheet 1 of 1		WS04	
Contract no: S230417		Site: CMS, Rockingham, Barnsley			Driller: Bainbridge Brothers Ltd Plant used: Mini Rig Started: 24/04/2023			GL (AOD): 138.49m Easting: 434894 Northing: 400541		
Client: Carnell Management Services Ltd		Method: Small Percussive			Ended: 24/04/2023 Backfilled: 24/04/2023			Logged: TL Status: FINAL		
Backfill / Installation 	Legend 	Depth (m) 0.40 1.20 2.45	Level (m AOD) 138.09 137.29 136.04	Stratum Description MADE GROUND: Brown gravelly sand. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of mudstone, concrete, brick and glass. (Hardstanding) MADE GROUND: Stiff dark brown to dark yellowish brown slightly sandy gravelly silty clay fill. Sand is fine to coarse. Gravel is fine to coarse angular to subangular of mudstone and sandstone. (Possible reworked colliery spoil) Inferred grey highly weathered MUDSTONE. Recovered as clayey sandy gravel. Sand is fine to coarse. Gravel is fine to coarse angular to subangular. End of Borehole at 2.450m			Samples and Insitu Testing Depth (m) Type Results			
							0.20 - 0.40 B			
							0.50 - 0.60 B			
							0.60 - 0.70 B			
							1.00 - 1.20 B			
							1.20 - 1.65 SPT (S)			
							1.20 B			
							1.20 - 1.40 D			
							2.00 - 2.45 SPT (S)			
							2.00 D			
N=43 (3,14/14,7,4,18)										
N=50+ (7,9/11,14,15,10)										

Hole Diameter		Casing Depths		General Remarks 1.2m Hand excavated inspection pit dug. No groundwater encountered. Gas standpipe installed on completion.			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)

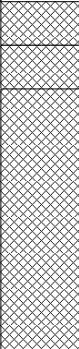


 SOLMEK Solmek Ltd 12-16 Yarm Road Stockton on Tees TS18 3NA Tel: 01642 607083 Email: info@solmek.com				Trial Pit Log				TrialPit No TP01 Sheet 1 of 1	
Project Name: CMS, Rockingham, Barnsley				Project No. S230417		Co-ords: 434921E - 400613N Level: 138.10		Date 25/04/2023	
Plant Used: Tracked JCB				Dimensions (m): 0.65		Scale 1:26		Logged TL	
Client: Carnell Management Services Ltd				Depth 1.50					

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
				0.05	138.05		MADE GROUND: Brown clayey slightly sandy topsoil. Sand is fine to coarse. MADE GROUND: Stiff dark grey slightly sandy gravelly clay fill. Sand is fine to coarse. Gravel is fine to coarse angular to subangular of mudstone. (Possible reworked colliery spoil)	1	
	0.30 0.30	B+ES HV	132kPa						
	0.80	HV	135kPa						
	1.30 1.30	B HV	140kPa						
				1.50	136.60		Inferred grey highly weathered MUDSTONE. Recovered as clayey sandy gravel. Sand is fine to coarse. Gravel is fine to coarse angular to subangular. TP abandoned. End of Pit at 1.500m	2	
								3	
								4	
								5	

Remarks: No groundwater encountered.
 Soakaway Test in trial pit.

Stability: Pit walls stable.

 SOLMEK Solmek Ltd 12-16 Yarm Road Stockton on Tees TS18 3NA Tel: 01642 607083 Email: info@solmek.com				Trial Pit Log				TrialPit No TP02 Sheet 1 of 1	
Project Name: CMS, Rockingham, Barnsley				Project No. S230417		Co-ords: 434914E - 400583N Level: 138.13		Date 24/04/2023	
Plant Used: Tracked JCB				Dimensions (m): 1.60 0.70				Scale 1:26	
Client: Carnell Management Services Ltd				Depth 1.20				Logged TL	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.20	B+ES		0.15	137.98		MADE GROUND: Brown slightly clayey sandy slightly gravelly topsoil. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of mudstone, concrete, brick and glass. MADE GROUND: Brown gravelly sand. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of mudstone, concrete, brick and glass. MADE GROUND: Stiff dark grey slightly sandy gravelly silty clay fill. Sand is fine to coarse. Gravel is fine to coarse angular to subangular of mudstone. (Possible reworked colliery spoil)		
	0.30	B+ES		0.30	137.83				
	0.30	HV	122kPa						
	0.40	CBR	10%						
	0.60	HV	95kPa						
				1.20	136.93		Inferred grey highly weathered MUDSTONE. Recovered as clayey sandy gravel. Sand is fine to coarse. Gravel is fine to coarse angular to subangular. TP abandoned. End of Pit at 1.200m		
Remarks: No groundwater encountered. Plate Bearing Test in trial pit.									
Stability: Pit walls stable.									



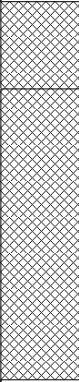
TrialPit No
TP03
Sheet 1 of 1

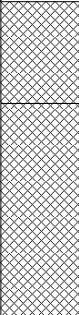
Date
24/04/2023

Logged
TL

5

Stability: Pit walls stable.

 SOLMEK Solmek Ltd 12-16 Yarm Road Stockton on Tees TS18 3NA Tel: 01642 607083 Email: info@solmek.com				Trial Pit Log				TrialPit No TP04 Sheet 1 of 1		
Project Name: CMS, Rockingham, Barnsley				Project No. S230417		Co-ords: 434919E - 400552N Level: 138.24		Date 24/04/2023		
Plant Used: Tracked JCB				Dimensions (m): 0.70 1.60		Scale 1:26				
Client: Carnell Management Services Ltd				Depth 1.30		Logged TL				
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
	Depth	Type	Results							
	0.20	B+ES		0.30	137.94		MADE GROUND: Brown gravelly sand. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of mudstone, concrete, brick and glass. (Hardstanding)		1	
	0.40	B+ES					MADE GROUND: Stiff dark grey slightly sandy gravelly silty clay fill of intermediate plasticity. Sand is fine to coarse. Gravel is fine to coarse angular to subangular of mudstone. (Possible reworked colliery spoil)			
	0.40	HV CBR	118kPa 37%							
	1.30 1.30	B HV	124kPa	1.30	136.94		Inferred grey highly weathered MUDSTONE. Recovered as clayey sandy gravel. Sand is fine to coarse. Gravel is fine to coarse angular to subangular. TP abandoned.		2	
							End of Pit at 1.300m			3
									4	
Remarks: No groundwater encountered. Plate Bearing Test in trial pit.										
Stability: Pit walls stable.										

 SOLMEK Solmek Ltd 12-16 Yarm Road Stockton on Tees TS18 3NA Tel: 01642 607083 Email: info@solmek.com				Trial Pit Log				TrialPit No TP05 Sheet 1 of 1	
Project Name: CMS, Rockingham, Barnsley				Project No. S230417		Co-ords: 434899E - 400520N Level: 138.42		Date 24/04/2023	
Plant Used: Tracked JCB				Dimensions (m): Depth 0.70		Scale 1:26		Logged TL	
Client: Carnell Management Services Ltd									
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.20	B+ES		0.35	138.07		MADE GROUND: Brown gravelly sand. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of mudstone, concrete, brick and glass. (Hardstanding)		
	0.40	CBR	13%				MADE GROUND: Stiff dark grey slightly sandy gravelly silty clay fill. Sand is fine to coarse. Gravel is fine to coarse angular to subangular of mudstone. (Possible reworked colliery spoil)		
	0.50	B+ES							
	0.50	HV	130kPa						
	1.10	B		1.10	137.32		Inferred grey highly weathered MUDSTONE. Recovered as clayey sandy gravel. Sand is fine to coarse. Gravel is fine to coarse angular to subangular. TP abandoned. End of Pit at 1.100m		
	1.10	HV	125kPa						
Remarks: No groundwater encountered. Plate Bearing Test in trial pit.									
Stability: Pit walls stable.									

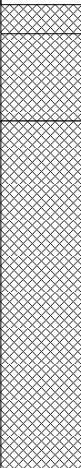


TrialPit No
TP06
Sheet 1 of 1

Date
24/04/2023

Scale
1:26

Logged
TL

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.20	B+ES	140kPa 2.1%	0.10	138.38		MADE GROUND: Brown clayey slightly sandy topsoil. Sand is fine to coarse.
	0.40	B+ES		0.40	138.08		MADE GROUND: Brown slightly clayey gravelly sand. Sand is fine to coarse. Gravel is fine to coarse of angular to subrounded of mudstone, concrete, brick, dolomite and glass.
	0.40	HV CBR					MADE GROUND: Firm to stiff dark grey slightly sandy gravelly silty clay fill. Sand is fine to coarse. Gravel is fine to coarse angular to subangular of mudstone. (Possible reworked colliery spoil)
	1.40	B		1.60	136.88		Inferred grey highly weathered MUDSTONE. Recovered as clayey sandy gravel. Sand is fine to coarse. Gravel is fine to coarse angular to subangular. TP abandoned.
							End of Pit at 1.600m

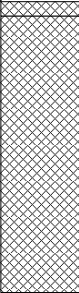
Stability: Pit walls stable.

 SOLMEK Solmek Ltd 12-16 Yarm Road Stockton on Tees TS18 3NA Tel: 01642 607083 Email: info@solmek.com				Trial Pit Log				TrialPit No TP07 Sheet 1 of 1	
Project Name: CMS, Rockingham, Barnsley				Project No. S230417		Co-ords: 434946E - 400423N Level: 138.04		Date 25/04/2023	
Plant Used: Tracked JCB				Dimensions (m): 1.70		Scale 1:26		Logged TL	
Client: Carnell Management Services Ltd				Depth 1.50		0.60			
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
				0.05	137.99		Brown clayey slightly sandy TOPSOIL. Sand is fine to coarse.		
	0.30 0.30	B+ES HV	135kPa				Stiff yellowish brown to light grey slightly sandy slightly gravelly high strength CLAY of high plasticity. Sand is fine to coarse. Gravel is fine to coarse angular to subangular of mudstone and siltstone.		
	0.80	HV	140kPa						
	1.30 1.30	B HV	140kPa	1.50	136.54		Inferred grey highly weathered MUDSTONE. Recovered as clayey sandy gravel. Sand is fine to coarse. Gravel is fine to coarse angular to subangular. TP abandoned.		
							End of Pit at 1.500m		
Remarks: No groundwater encountered. Soakaway Test in trial pit.									
Stability: Pit walls stable.									

 SOLMEK Solmek Ltd 12-16 Yarm Road Stockton on Tees TS18 3NA Tel: 01642 607083 Email: info@solmek.com				Trial Pit Log				TrialPit No TP08 Sheet 1 of 1	
Project Name: CMS, Rockingham, Barnsley				Project No. S230417		Co-ords: 434976E - 400496N Level: 138.76		Date 26/04/2023	
Plant Used: Tracked JCB				Dimensions (m): Depth 1.40		Scale 1:26		Logged TL	
Client: Carnell Management Services Ltd									
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
				0.05	138.71		MADE GROUND: Brown clayey slightly sandy topsoil. Sand is fine to coarse. MADE GROUND: Stiff yellowish brown to light grey brown slightly sandy slightly gravelly clay fill of intermediate plasticity. Sand is fine to coarse. Gravel is fine to coarse angular to subangular of mudstone and siltstone. (Possible reworked colliery spoil)		
	0.30 0.30	B+ES HV	126kPa						
	0.80	HV	130kPa						
	1.30 1.30	B HV	130kPa	1.40	137.36		Inferred grey highly weathered MUDSTONE. Recovered as clayey sandy gravel. Sand is fine to coarse. Gravel is fine to coarse angular to subangular. TP abandoned. End of Pit at 1.400m		
1 2 3 4 5									
Remarks: No groundwater encountered.									
Stability: Pit walls stable.									

 SOLMEK Solmek Ltd 12-16 Yarm Road Stockton on Tees TS18 3NA Tel: 01642 607083 Email: info@solmek.com				Trial Pit Log				TrialPit No TP09 Sheet 1 of 1	
Project Name: CMS, Rockingham, Barnsley				Project No. S230417		Co-ords: 434956E - 400524N Level: 138.67		Date 24/04/2023	
Plant Used: Tracked JCB						Dimensions (m): Depth 1.50		Scale 1:26	
Client: Carnell Management Services Ltd						0.70		Logged TL	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.05			0.05	138.62		MADE GROUND: Brown clayey slightly sandy topsoil. Sand is fine to coarse.		
	0.30	B+ES					MADE GROUND: Stiff yellowish brown to light grey brown slightly sandy slightly gravelly clay fill of intermediate plasticity. Sand is fine to coarse. Gravel is fine to coarse angular to subangular of mudstone and siltstone. (Possible reworked colliery spoil)		
	0.40	HV	122kPa						
	0.40	CBR	2.2%						
	1.00	HV	130kPa						
	1.30	B							
				1.50	137.17		Inferred grey highly weathered MUDSTONE. Recovered as clayey sandy gravel. Sand is fine to coarse. Gravel is fine to coarse angular to subangular. TP abandoned.		
							End of Pit at 1.500m		
Remarks: No groundwater encountered. Plate Bearing Test in trial pit.									
Stability: Pit walls stable.									

 SOLMEK Solmek Ltd 12-16 Yarm Road Stockton on Tees TS18 3NA Tel: 01642 607083 Email: info@solmek.com				Trial Pit Log				TrialPit No TP10 Sheet 1 of 1	
Project Name: CMS, Rockingham, Barnsley				Project No. S230417		Co-ords: 434961E - 400561N Level: 138.32		Date 25/04/2023	
Plant Used: Tracked JCB				Dimensions (m): 1.75		Scale 1:26		Logged TL	
Client: Carnell Management Services Ltd				Depth 1.40		0.65			
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
				0.05	138.27		MADE GROUND: Brown clayey slightly sandy topsoil. Sand is fine to coarse.		
	0.30 0.30	B+ES HV	50kPa				MADE GROUND: Firm to stiff dark grey slightly sandy gravelly silty clay fill. Sand is fine to coarse. Gravel is fine to coarse angular to subangular of mudstone. (Possible reworked colliery spoil)		
	0.80	HV	70kPa						
	1.30 1.30	B HV	130kPa	1.40	136.92		Inferred grey highly weathered MUDSTONE. Recovered as clayey sandy gravel. Sand is fine to coarse. Gravel is fine to coarse angular to subangular. TP abandoned.		
							End of Pit at 1.400m		
Remarks: No groundwater encountered. Soakaway Test in trial pit.									
Stability: Pit walls stable.									

 SOLMEK Solmek Ltd 12-16 Yarm Road Stockton on Tees TS18 3NA Tel: 01642 607083 Email: info@solmek.com				Trial Pit Log				TrialPit No TP11 Sheet 1 of 1	
Project Name: CMS, Rockingham, Barnsley				Project No. S230417		Co-ords: 434988E - 400550N Level: 138.12		Date 26/04/2023	
Plant Used: Tracked JCB						Dimensions (m): 0.70 1.60		Scale 1:26	
Client: Carnell Management Services Ltd						Depth 1.00		Logged TL	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
				0.05	138.07		MADE GROUND: Brown clayey slightly sandy topsoil. Sand is fine to coarse.		
	0.20 0.20	B+ES HV	130kPa				MADE GROUND: Stiff yellowish brown to light grey brown slightly sandy slightly gravelly clay fill. Sand is fine to coarse. Gravel is fine to coarse angular to subangular of mudstone and siltstone. (Possible reworked colliery spoil)		
	0.50	HV	135kPa						
	1.00 1.00	B HV	135kPa	1.00	137.12		Inferred grey highly weathered MUDSTONE. Recovered as clayey sandy gravel. Sand is fine to coarse. Gravel is fine to coarse angular to subangular. TP abandoned.		
							End of Pit at 1.000m		
1 2 3 4 5									
Remarks: No groundwater encountered.									
Stability: Pit walls stable.									

 SOLMEK Solmek Ltd 12-16 Yarm Road Stockton on Tees TS18 3NA Tel: 01642 607083 Email: info@solmek.com				Trial Pit Log				TrialPit No TP12 Sheet 1 of 1	
Project Name: CMS, Rockingham, Barnsley				Project No. S230417		Co-ords: 435002E - 400573N Level: 137.76		Date 24/04/2023	
Plant Used: Tracked JCB						Dimensions (m): 0.70		Scale 1:26	
Client: Carnell Management Services Ltd						Depth 1.00		Logged TL	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
				0.05	137.71		MADE GROUND: Brown clayey slightly sandy topsoil. Sand is fine to coarse.		
	0.30	B+ES					MADE GROUND: Stiff dark grey slightly sandy gravelly silty clay fill of intermediate plasticity. Sand is fine to coarse. Gravel is fine to coarse angular to subangular of mudstone. (Possible reworked colliery spoil)		
	0.40	HV	125kPa						
	0.40	CBR	1.1%						
	0.80	HV	130kPa						
	1.00	B		1.00	136.76		Inferred grey highly weathered MUDSTONE. Recovered as clayey sandy gravel. Sand is fine to coarse. Gravel is fine to coarse angular to subangular. TP abandoned.		
							End of Pit at 1.000m		
1 2 3 4 5									
Remarks: No groundwater encountered. Plate Bearing Test in trial pit.									
Stability: Pit walls stable.									

 SOLMEK Solmek Ltd 12-16 Yarm Road Stockton on Tees TS18 3NA Tel: 01642 607083 Email: info@solmek.com				Trial Pit Log				TrialPit No TP13 Sheet 1 of 1	
Project Name: CMS, Rockingham, Barnsley				Project No. S230417		Co-ords: 434967E - 400584N Level: 137.77		Date 26/04/2023	
Plant Used: Tracked JCB				Dimensions (m): Depth 1.60		Scale 1:26		Logged TL	
Client: Carnell Management Services Ltd									
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
				0.05	137.72		MADE GROUND: Brown clayey slightly sandy topsoil. Sand is fine to coarse. MADE GROUND: Stiff light greyish brown slightly sandy gravelly clay fill. Sand is fine to coarse. Gravel is fine to coarse angular to subangular of mudstone. (Possible reworked colliery spoil)		
	0.30 0.30	B+ES HV	140kPa						
	0.80	HV	130kPa						
	1.30 1.30	B HV	135kPa				MADE GROUND: Stiff light grey slightly sandy gravelly silty clay fill of intermediate plasticity. Sand is fine to coarse. Gravel is fine to coarse angular to subangular of mudstone. (Possible reworked colliery spoil)		
				1.00	136.77				
				1.60	136.17		Inferred grey highly weathered MUDSTONE. Recovered as clayey sandy gravel. Sand is fine to coarse. Gravel is fine to coarse angular to subangular. TP abandoned. End of Pit at 1.600m		
Remarks: No groundwater encountered.									
Stability: Pit walls stable.									

 SOLMEK Solmek Ltd 12-16 Yarm Road Stockton on Tees TS18 3NA Tel: 01642 607083 Email: info@solmek.com				Trial Pit Log				TrialPit No TP14 Sheet 1 of 1	
Project Name: CMS, Rockingham, Barnsley				Project No. S230417		Co-ords: 434972E - 400601N Level: 137.11		Date 24/04/2023	
Plant Used: Tracked JCB				Dimensions (m): 0.70 1.60		Scale 1:26		Logged TL	
Client: Carnell Management Services Ltd				Depth 1.50					
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
				0.05	137.06		MADE GROUND: Brown clayey slightly sandy topsoil. Sand is fine to coarse. MADE GROUND: Stiff light grey slightly sandy gravelly silty clay fill of intermediate plasticity. Sand is fine to coarse. Gravel is fine to coarse angular to subangular of mudstone. (Possible reworked colliery spoil)		1
	0.20	B+ES							
	0.40	HV	130kPa						
	0.40	CBR	5.1%						
	1.20	B							
	1.20	HV	130kPa						
				1.50	135.61		Inferred grey highly weathered MUDSTONE. Recovered as clayey sandy gravel. Sand is fine to coarse. Gravel is fine to coarse angular to subangular. TP abandoned. End of Pit at 1.500m		2
									3
									4
									5
Remarks: No groundwater encountered. Plate Bearing Test in trial pit.									
Stability: Pit walls stable.									



Plate 1: TP01 Faces



Plate 2: TP01 Spoil

Title	Date
Trial Pit Photographs	May 2023
Project	Plate No.
CMS, Rockingham, Barnsley	1
Client	
Carnell Management Services Ltd	

Solmek Ltd.
12 Yarm Road
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www.solmek.com





Plate 3: TP02 Faces



Plate 4: TP02 Spoil

Title	Date
Trial Pit Photographs	May 2023
Project	Plate No.
CMS, Rockingham, Barnsley	2
Client	
Carnell Management Services Ltd	

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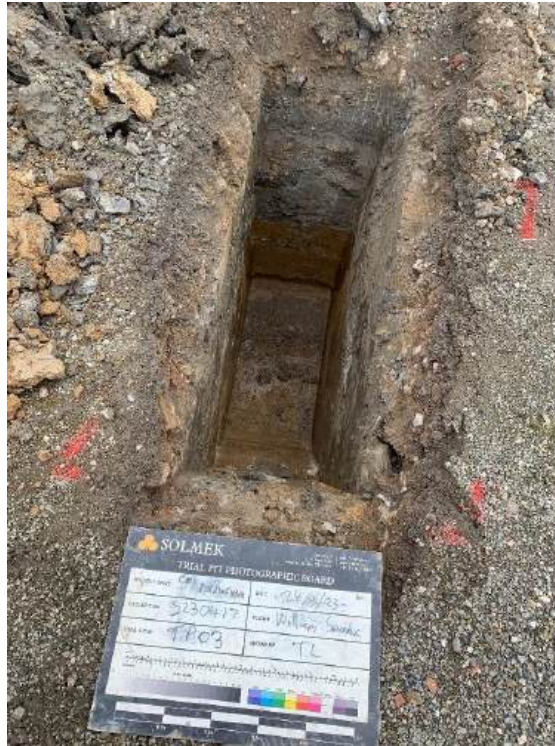


Plate 5: TP03 Faces



Plate 6: TP03 Spoil

Title	Date
Trial Pit Photographs	May 2023
Project	Plate No.
CMS, Rockingham, Barnsley	3
Client	
Carnell Management Services Ltd	

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Plate 7: TP04 Faces



Plate 8: TP04 Spoil

Title	Date
Trial Pit Photographs	May 2023
Project	Plate No.
CMS, Rockingham, Barnsley	4
Client	
Carnell Management Services Ltd	

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Plate 9: TP05 Faces



Plate 10: TP05 Spoil

Title	Date	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 
Trial Pit Photographs	May 2023	
Project	Plate No.	
CMS, Rockingham, Barnsley	5	
Client		
Carnell Management Services Ltd		



Plate 11: TP06 Faces



Plate 12: TP06 Spoil

Title	Date	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 
Trial Pit Photographs	May 2023	
Project	Plate No.	
CMS, Rockingham, Barnsley	6	
Client		
Carnell Management Services Ltd		



Plate 13: TP07 Faces



Plate 14: TP07 Spoil

Title	Date
Trial Pit Photographs	May 2023
Project	Plate No.
CMS, Rockingham, Barnsley	7
Client	
Carnell Management Services Ltd	

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Plate 15: TP08 Faces



Plate 16: TP08 Spoil

Title	Date	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 
Trial Pit Photographs	May 2023	
Project	Plate No.	
CMS, Rockingham, Barnsley	8	
Client		
Carnell Management Services Ltd		



Plate 17: TP09 Faces



Plate 18: TP09 Spoil

Title	Date	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 
Trial Pit Photographs	May 2023	
Project	Plate No.	
CMS, Rockingham, Barnsley	9	
Client		
Carnell Management Services Ltd		



Plate 19: TP10 Faces



Plate 20: TP10 Spoil

Title	Date	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
Trial Pit Photographs	May 2023	
Project	Plate No.	
CMS, Rockingham, Barnsley	10	
Client		
Carnell Management Services Ltd		



Plate 21: TP11 Faces



Plate 22: TP11 Spoil

Title	Date	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 
Trial Pit Photographs	May 2023	
Project	Plate No.	
CMS, Rockingham, Barnsley	11	
Client		
Carnell Management Services Ltd		



Plate 23: TP12 Faces



Plate 23: TP12 Spoil

Title	Date	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 
Trial Pit Photographs	May 2023	
Project	Plate No.	
CMS, Rockingham, Barnsley	12	
Client		
Carnell Management Services Ltd		



Plate 24: TP13 Faces



Plate 25: TP13 Spoil

Title	Date	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 
Trial Pit Photographs	May 2023	
Project	Plate No.	
CMS, Rockingham, Barnsley	13	
Client		
Carnell Management Services Ltd		



Plate 23: TP14 Faces



Plate 23: TP14 Spoil

Title	Date	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 
Trial Pit Photographs	May 2023	
Project	Plate No.	
CMS, Rockingham, Barnsley	14	
Client		
Carnell Management Services Ltd		

APPENDIX C



Certificate of Analysis

Certificate Number 23-10351

Issued: 09-May-23

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

Our Reference 23-10351

Client Reference S230417

Order No SOL7285CS230417

Contract Title CMS Rockingham, Barnsley

Description 8 Soil samples, 3 Leachate samples.

Date Received 02-May-23

Date Started 02-May-23

Date Completed 09-May-23

Test Procedures Identified by prefix DETSn (details on request).

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

Approved By

A handwritten signature in black ink, appearing to read "K. Bridgwood".

Kirk Bridgwood
General Manager



Summary of Chemical Analysis

Matrix Descriptions

Our Ref 23-10351

Client Ref S230417

Contract Title CMS Rockingham, Barnsley

Sample ID	Depth	Lab No	Completed	Matrix Description
TP01	0.3	2164671	09/05/2023	Brown gravelly, sandy CLAY including odd rootlets
TP04	0.2	2164672	09/05/2023	Brown gravelly, sandy CLAY including odd rootlets (Possible made ground - brick)
TP05	0.5	2164673	09/05/2023	Brown gravelly, sandy CLAY
TP06	0.2	2164674	09/05/2023	Brown gravelly, sandy CLAY including odd rootlets
TP07	0.3	2164675	09/05/2023	Brown gravelly, sandy CLAY including odd rootlets
TP09	0.3	2164676	09/05/2023	Brown gravelly, sandy CLAY including odd rootlets
TP11	0.2	2164677	09/05/2023	Brown gravelly, sandy CLAY including odd rootlets
TP14	0.2	2164678	09/05/2023	Brown gravelly, sandy CLAY including odd rootlets

Summary of Chemical Analysis

Soil Samples

Our Ref 23-10351

Client Ref S230417

Contract Title CMS Rockingham, Barnsley

Lab No	2164671	2164672	2164673	2164674	2164675	2164676
Sample ID	TP01	TP04	TP05	TP06	TP07	TP09
Depth	0.30	0.20	0.50	0.20	0.30	0.30
Other ID						
Sample Type	ES	ES	ES	ES	ES	ES
Sampling Date	26/04/2023	26/04/2023	26/04/2023	26/04/2023	26/04/2023	26/04/2023
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units						
Metals									
Arsenic	DETSC 2301#	0.2	mg/kg	6.5	3.6	4.1	5.1	2.9	6.9
Boron, Water Soluble (2.5:1)	DETSC 2311#	0.2	mg/kg	0.6	4.6	0.5	< 0.2	0.5	0.7
Cadmium	DETSC 2301#	0.1	mg/kg	0.1	2.4	< 0.1	< 0.1	< 0.1	0.2
Chromium	DETSC 2301#	0.15	mg/kg	25	50	12	9.7	16	24
Copper	DETSC 2301#	0.2	mg/kg	36	440	25	16	20	69
Lead	DETSC 2301#	0.3	mg/kg	19	140	12	11	13	42
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	40	37	25	11	17	33
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	99	800	64	36	53	110
Inorganics									
pH	DETSC 2008#		pH	8.3	11.0	8.4	8.0	6.1	9.2
Cyanide, Total	DETSC 2130#	0.1	mg/kg	0.1	0.2	< 0.1	< 0.1	< 0.1	0.3
Organic matter	DETSC 2002#	0.1	%	2.3	1.0	1.9	2.3	0.8	2.7
Sulphate Aqueous Extract as SO4 (2:1)	DETSC 2076#	10	mg/l	55	460	100	35	89	190
Petroleum Hydrocarbons									
Aliphatic C5-C6: HS_1D_AL	DETSC 3321*	0.01	mg/kg		< 0.01		< 0.01		
Aliphatic C6-C8: HS_1D_AL	DETSC 3321*	0.01	mg/kg		< 0.01		< 0.01		
Aliphatic C8-C10: HS_1D_AL	DETSC 3321*	0.01	mg/kg		< 0.01		< 0.01		
Aliphatic C10-C12: EH_CU_1D_AL	DETSC 3072#	1.5	mg/kg		< 1.5		< 1.5		
Aliphatic C12-C16: EH_CU_1D_AL	DETSC 3072#	1.2	mg/kg		< 1.2		< 1.2		
Aliphatic C16-C21: EH_CU_1D_AL	DETSC 3072#	1.5	mg/kg		< 1.5		< 1.5		
Aliphatic C21-C35: EH_CU_1D_AL	DETSC 3072#	3.4	mg/kg		< 3.4		< 3.4		
Aliphatic C5-C35: EH_CU+HS_1D_AL	DETSC 3072*	10	mg/kg		< 10		< 10		
Aromatic C5-C7: HS_1D_AR	DETSC 3321*	0.01	mg/kg		< 0.01		< 0.01		
Aromatic C7-C8: HS_1D_AR	DETSC 3321*	0.01	mg/kg		< 0.01		< 0.01		
Aromatic C8-C10: HS_1D_AR	DETSC 3321*	0.01	mg/kg		< 0.01		< 0.01		
Aromatic C10-C12: EH_CU_1D_AR	DETSC 3072#	0.9	mg/kg		< 0.9		< 0.9		
Aromatic C12-C16: EH_CU_1D_AR	DETSC 3072#	0.5	mg/kg		< 0.5		< 0.5		
Aromatic C16-C21: EH_CU_1D_AR	DETSC 3072#	0.6	mg/kg		< 0.6		< 0.6		
Aromatic C21-C35: EH_CU_1D_AR	DETSC 3072#	1.4	mg/kg		< 1.4		< 1.4		
Aromatic C5-C35: EH_CU+HS_1D_AR	DETSC 3072*	10	mg/kg		< 10		< 10		
TPH Ali/Aro Total C5-C35: EH_CU+HS_1D_Total	DETSC 3072*	10	mg/kg		< 10		< 10		
PAHs									
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	< 0.1	0.8	< 0.1	< 0.1	< 0.1	0.8
Anthracene	DETSC 3301	0.1	mg/kg	< 0.1	0.2	< 0.1	< 0.1	< 0.1	0.2

Summary of Chemical Analysis Soil Samples

Our Ref 23-10351

Client Ref S230417

Contract Title CMS Rockingham, Barnsley

Lab No	2164671	2164672	2164673	2164674	2164675	2164676
Sample ID	TP01	TP04	TP05	TP06	TP07	TP09
Depth	0.30	0.20	0.50	0.20	0.30	0.30
Other ID						
Sample Type	ES	ES	ES	ES	ES	ES
Sampling Date	26/04/2023	26/04/2023	26/04/2023	26/04/2023	26/04/2023	26/04/2023
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units						
Fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	1.3	< 0.1	< 0.1	< 0.1	1.0
Pyrene	DETSC 3301	0.1	mg/kg	< 0.1	1.2	< 0.1	< 0.1	< 0.1	1.0
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	2.2	< 0.1	< 0.1	< 0.1	0.6
Chrysene	DETSC 3301	0.1	mg/kg	< 0.1	1.2	< 0.1	< 0.1	< 0.1	0.5
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	0.4	< 0.1	< 0.1	< 0.1	0.5
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	0.3	< 0.1	< 0.1	< 0.1	0.4
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	0.5	< 0.1	< 0.1	< 0.1	0.6
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	1.0	< 0.1	< 0.1	< 0.1	0.5
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.2
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.1	0.3	< 0.1	< 0.1	< 0.1	0.4
PAH 16 Total	DETSC 3301	1.6	mg/kg	< 1.6	9.7	< 1.6	< 1.6	< 1.6	7.0
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3

Summary of Chemical Analysis

Soil Samples

Our Ref 23-10351

Client Ref S230417

Contract Title CMS Rockingham, Barnsley

Lab No	2164677	2164678
Sample ID	TP11	TP14
Depth	0.20	0.20
Other ID		
Sample Type	ES	ES
Sampling Date	26/04/2023	26/04/2023
Sampling Time	n/s	n/s

Test	Method	LOD	Units		
Metals					
Arsenic	DETSC 2301#	0.2	mg/kg	7.8	7.4
Boron, Water Soluble (2.5:1)	DETSC 2311#	0.2	mg/kg	0.3	0.3
Cadmium	DETSC 2301#	0.1	mg/kg	< 0.1	0.2
Chromium	DETSC 2301#	0.15	mg/kg	13	15
Copper	DETSC 2301#	0.2	mg/kg	25	42
Lead	DETSC 2301#	0.3	mg/kg	13	18
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	26	35
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	63	89
Inorganics					
pH	DETSC 2008#		pH	7.9	8.2
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1
Organic matter	DETSC 2002#	0.1	%	2.4	3.0
Sulphate Aqueous Extract as SO ₄ (2:1)	DETSC 2076#	10	mg/l	93	68
Petroleum Hydrocarbons					
Aliphatic C5-C6: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C6-C8: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C8-C10: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C10-C12: EH_CU_1D_AL	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5
Aliphatic C12-C16: EH_CU_1D_AL	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2
Aliphatic C16-C21: EH_CU_1D_AL	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5
Aliphatic C21-C35: EH_CU_1D_AL	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4
Aliphatic C5-C35: EH_CU+HS_1D_AL	DETSC 3072*	10	mg/kg	< 10	< 10
Aromatic C5-C7: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C7-C8: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C8-C10: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C10-C12: EH_CU_1D_AR	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9
Aromatic C12-C16: EH_CU_1D_AR	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5
Aromatic C16-C21: EH_CU_1D_AR	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6
Aromatic C21-C35: EH_CU_1D_AR	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4
Aromatic C5-C35: EH_CU+HS_1D_AR	DETSC 3072*	10	mg/kg	< 10	< 10
TPH Ali/Aro Total C5-C35: EH_CU+HS_1D_Total	DETSC 3072*	10	mg/kg	< 10	< 10
PAHs					
Naphthalene	DETSC 3301	0.1	mg/kg	0.1	0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1	0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1

Summary of Chemical Analysis

Soil Samples

Our Ref 23-10351

Client Ref S230417

Contract Title CMS Rockingham, Barnsley

Lab No	2164677	2164678
Sample ID	TP11	TP14
Depth	0.20	0.20
Other ID		
Sample Type	ES	ES
Sampling Date	26/04/2023	26/04/2023
Sampling Time	n/s	n/s

Test	Method	LOD	Units		
Fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
PAH 16 Total	DETSC 3301	1.6	mg/kg	< 1.6	< 1.6
Phenols					
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3

Summary of Chemical Analysis

Leachate Samples

Our Ref 23-10351

Client Ref S230417

Contract Title CMS Rockingham, Barnsley

Lab No	2164679	2164680	2164681
Sample ID	TP04	TP06	TP14
Depth	0.20	0.20	0.20
Other ID			
Sample Type	ES	ES	ES
Sampling Date	26/04/2023	26/04/2023	26/04/2023
Sampling Time	n/s	n/s	n/s

Test	Method	LOD	Units			
Preparation						
NRA Leachate Preparation	DETSC 1009*			Y	Y	Y
Metals						
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	1.1	0.93	0.23
Boron, Dissolved	DETSC 2306*	12	ug/l	93	< 12	< 12
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	< 0.03	< 0.03	< 0.03
Chromium, Dissolved	DETSC 2306	0.25	ug/l	1.4	< 0.25	< 0.25
Copper, Dissolved	DETSC 2306	0.4	ug/l	5.6	3.5	3.2
Lead, Dissolved	DETSC 2306	0.09	ug/l	3.8	1.3	1.6
Mercury, Dissolved	DETSC 2306	0.01	ug/l	0.01	< 0.01	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	< 0.5	< 0.5	< 0.5
Selenium, Dissolved	DETSC 2306	0.25	ug/l	0.50	0.27	0.60
Zinc, Dissolved	DETSC 2306	1.3	ug/l	1.9	< 1.3	1.9
Inorganics						
pH	DETSC 2008		pH	10.5	8.7	8.2
Cyanide, Total	DETSC 2130	40	ug/l	< 40	< 40	< 40
Sulphate as SO4	DETSC 2055	0.1	mg/l	46	3.0	13
Petroleum Hydrocarbons						
Aliphatic C5-C6: HS_1D_AL	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1
Aliphatic C6-C8: HS_1D_AL	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1
Aliphatic C8-C10: HS_1D_AL	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1
Aliphatic C10-C12: EH_CU_1D_AL	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0
Aliphatic C12-C16: EH_CU_1D_AL	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0
Aliphatic C16-C21: EH_CU_1D_AL	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0
Aliphatic C21-C35: EH_CU_1D_AL	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0
Aliphatic C5-C35: EH_CU+HS_1D_AL	DETSC 3072*	10	ug/l	< 10	< 10	< 10
Aromatic C5-C7: HS_1D_AR	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1
Aromatic C7-C8: HS_1D_AR	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1
Aromatic C8-C10: HS_1D_AR	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1
Aromatic C10-C12: EH_CU_1D_AR	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0
Aromatic C12-C16: EH_CU_1D_AR	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0
Aromatic C16-C21: EH_CU_1D_AR	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0
Aromatic C21-C35: EH_CU_1D_AR	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0
Aromatic C5-C35: EH_CU+HS_1D_AR	DETSC 3072*	10	ug/l	< 10	< 10	< 10
TPH Ali/Aro Total C5-C35: EH_CU+HS_1D_Total	DETSC 3072*	10	ug/l	< 10	< 10	< 10
PAHs						
Naphthalene	DETSC 3304	0.05	ug/l	< 0.05	< 0.05	< 0.05
Acenaphthylene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01
Acenaphthene	DETSC 3304	0.01	ug/l	< 0.01	0.01	< 0.01
Fluorene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	0.01
Phenanthrene	DETSC 3304	0.01	ug/l	0.02	0.02	0.04

Summary of Chemical Analysis

Leachate Samples

Our Ref 23-10351

Client Ref S230417

Contract Title CMS Rockingham, Barnsley

Lab No	2164679	2164680	2164681
Sample ID	TP04	TP06	TP14
Depth	0.20	0.20	0.20
Other ID			
Sample Type	ES	ES	ES
Sampling Date	26/04/2023	26/04/2023	26/04/2023
Sampling Time	n/s	n/s	n/s

Test	Method	LOD	Units			
Anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01
Fluoranthene	DETSC 3304	0.01	ug/l	0.02	0.02	0.01
Pyrene	DETSC 3304	0.01	ug/l	0.02	0.01	0.01
Benzo(a)anthracene	DETSC 3304*	0.01	ug/l	< 0.01	< 0.01	< 0.01
Chrysene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01
Benzo(g,h,i)perylene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01
PAH Total	DETSC 3304	0.2	ug/l	< 0.20	< 0.20	< 0.20
Phenols						
Phenol - Monohydric	DETSC 2130	100	ug/l	< 100	< 100	< 100

Summary of Asbestos Analysis Soil Samples

Our Ref 23-10351

Client Ref S230417

Contract Title CMS Rockingham, Barnsley

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
2164671	TP01 0.30	SOIL	NAD	none	Ben Rose
2164672	TP04 0.20	SOIL	NAD	none	Ben Rose
2164673	TP05 0.50	SOIL	NAD	none	Ben Rose
2164674	TP06 0.20	SOIL	NAD	none	Ben Rose
2164675	TP07 0.30	SOIL	NAD	none	Ben Rose
2164676	TP09 0.30	SOIL	NAD	none	Ben Rose
2164677	TP11 0.20	SOIL	NAD	none	Ben Rose
2164678	TP14 0.20	SOIL	NAD	none	Ben Rose

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

Information in Support of the Analytical Results

Our Ref 23-10351
 Client Ref S230417
 Contract CMS Rockingham, Barnsley

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
2164671	TP01 0.30 SOIL	26/04/23	GJ 250ml, GJ 60ml, PT 1L		
2164672	TP04 0.20 SOIL	26/04/23	GJ 250ml, GJ 60ml, PT 1L		
2164673	TP05 0.50 SOIL	26/04/23	GJ 250ml, GJ 60ml, PT 1L		
2164674	TP06 0.20 SOIL	26/04/23	GJ 250ml, GJ 60ml, PT 1L		
2164675	TP07 0.30 SOIL	26/04/23	GJ 250ml, GJ 60ml, PT 1L		
2164676	TP09 0.30 SOIL	26/04/23	GJ 250ml, GJ 60ml, PT 1L		
2164677	TP11 0.20 SOIL	26/04/23	GJ 250ml, GJ 60ml, PT 1L		
2164678	TP14 0.20 SOIL	26/04/23	GJ 250ml, GJ 60ml, PT 1L		
2164679	TP04 0.20 LEACHATE	26/04/23	GJ 250ml, GJ 60ml, PT 1L		
2164680	TP06 0.20 LEACHATE	26/04/23	GJ 250ml, GJ 60ml, PT 1L		
2164681	TP14 0.20 LEACHATE	26/04/23	GJ 250ml, GJ 60ml, PT 1L		

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

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

Soil Analysis Notes

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

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

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

Disposal

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

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

Information in Support of the Analytical Results

List of HWOL Acronyms and Operators

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

Det

Aliphatic C5-C6

Acronym

HS_1D_AL

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETSC 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETSC 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETSC 2076	Sulphate Aqueous Extract as SO ₄	mg/l	10	Air Dried	No	Yes	Yes
DETSC 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETSC 2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC 2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETSC 2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC 2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETSC 2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETSC 2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC 2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETSC 2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETSC 2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 2311	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC 2321	Total Sulphate as SO ₄	%	0.01	Air Dried	No	Yes	Yes
DETSC 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETSC 3049	Sulphur (free)	mg/kg	0.75	As Received	No	Yes	Yes
DETSC 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETSC 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes

Appendix A - Details of Analysis

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

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

End of Report

APPENDIX D

Laboratory Report Front Sheet		G2M Testing (Stockton) 12-16 Yarm Road, Stockton on Tees, TS18 3NA 01642 033318 info@g2mtesting.co.uk	 10258
Site name	Job number		
CMS, Rockingham, Barnsley	S230417		

Client details:

Reference: S230417
 Name: Solmek
 Address: 12 Yarm Road,
 Stockton-on-tees,
 TS18 3NA

 Telephone: 01642 607083
 Email: acutts@solmek.com

 FAO: Adrain Cutts

Samples received:

Date commenced: 05/05/2023
 Date reported: 19/05/2023

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.

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

Signature: 	Approved Signatories: ☐ D.Anderson (Managing Director) ☒ J. Brischuk (Laboratory Manager) ☐ T. Finnimore (Quality/Technical Manager)
--	---

Summary of Classification Tests

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



10258

[illegible]

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

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

Approved by	D Anderson
Approval date	16/05/2023 12:58
Date report generated	
Report Number	

PARTICLE SIZE DISTRIBUTION

G2M Testing (Stockton)

12-16 Yarm Road,

Stockton on Tees,

TS18 3NA

01642 033318

info@g2mtesting.co.uk



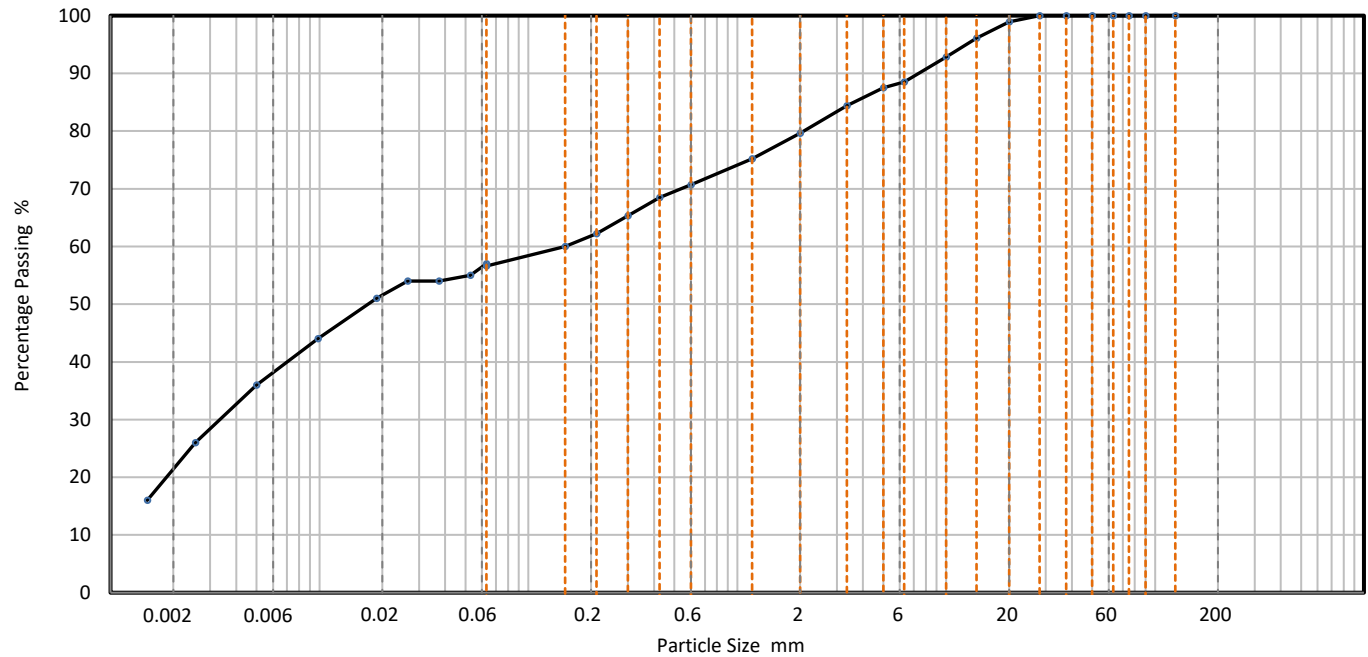
Site name

Job number

CMS, Rockingham, Barnsley

S230417

Hole		TP02	Lab sample ID	G2MT202305051
Depth (Top)	m	0.30	Test Method	BS 1377 - 2 : 1990 Clauses 9.2 and 9.5
Depth (Base)	m		Soil Description	Very Gravelly, very Clayey, very Sandy, SILT
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	0.0630	57
90	100	0.0527	55
75	100	0.0373	54
63	100	0.0264	54
50	100	0.0188	51
37.5	100	0.0098	44
28	100	0.0050	36
20	99	0.0025	26
14	96	0.0015	16
10	93		
6.3	89		
5	88		
3.35	84		
2	80		
1.18	75		
0.6	71	Particle density (assumed) 2.65 Mg/m ³	
0.425	69		
0.3	65		
0.212	62		
0.15	60		
0.063	57		

Dry Mass of sample, g

786

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	20.4
Sand	23.0
Silt	35.0
Clay	21.6

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

Remarks
Preparation and testing in accordance with test method unless noted below
Sample tested was deviating in accordance with BS1377 test standard

Accreditation status

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

Approved by	D Anderson
Approval date	19/05/2023 07:46

PARTICLE SIZE DISTRIBUTION

G2M Testing (Stockton)

12-16 Yarm Road,

Stockton on Tees,

TS18 3NA

01642 033318

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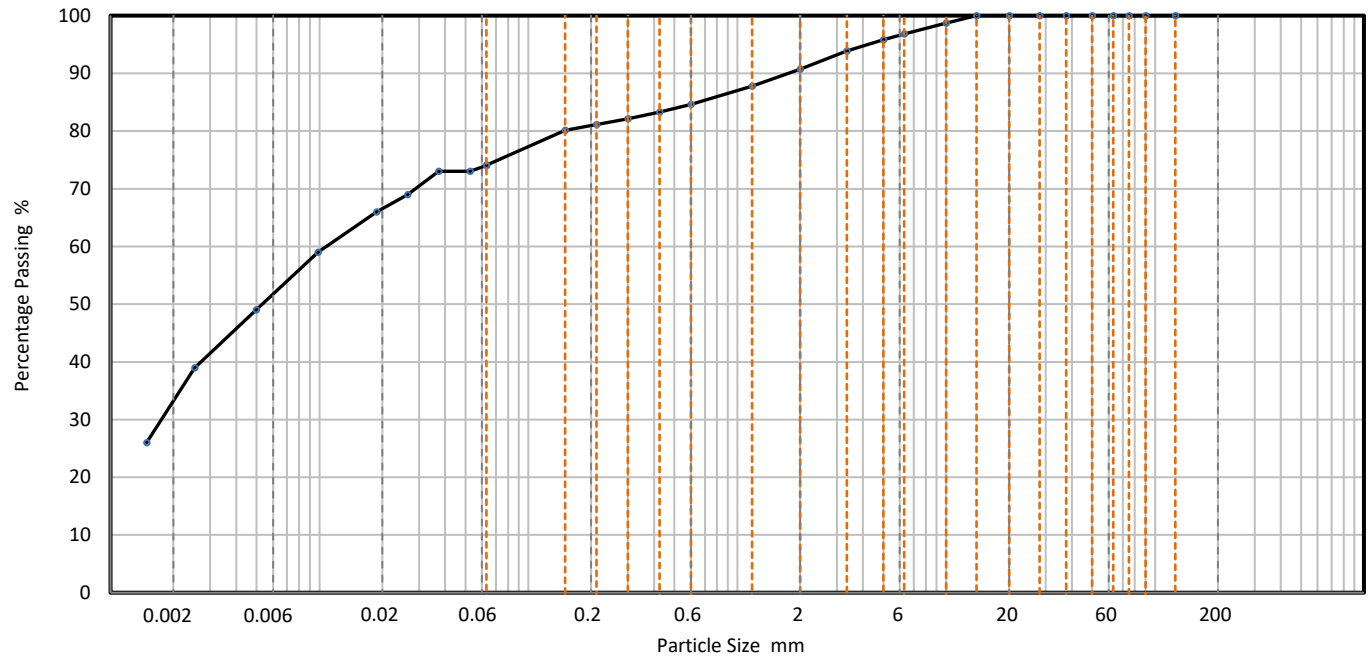
Site name

Job number

CMS, Rockingham, Barnsley

S230417

Hole		TP03	Lab sample ID	G2MT202305054
Depth (Top)	m	2.20	Test Method	BS 1377 - 2 : 1990 Clauses 9.2 and 9.5
Depth (Base)	m		Soil Description	Slightly Gravelly, Sandy, very Clayey, SILT
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	0.0630	74
90	100	0.0526	73
75	100	0.0372	73
63	100	0.0264	69
50	100	0.0188	66
37.5	100	0.0098	59
28	100	0.0050	49
20	100	0.0025	39
14	100	0.0015	26
10	99		
6.3	97		
5	96		
3.35	94		
2	91		
1.18	88		
0.6	85	Particle density (assumed) 2.65 Mg/m ³	
0.425	83		
0.3	82		
0.212	81		
0.15	80		
0.063	74		

Dry Mass of sample, g

1150

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	9.3
Sand	16.6
Silt	41.0
Clay	33.1

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

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

Accreditation status

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

Approved by	D Anderson
Approval date	19/05/2023 07:48

PARTICLE SIZE DISTRIBUTION

G2M Testing (Stockton)

12-16 Yarm Road,
Stockton on Tees,
TS18 3NA

01642 033318

info@g2mtesting.co.uk



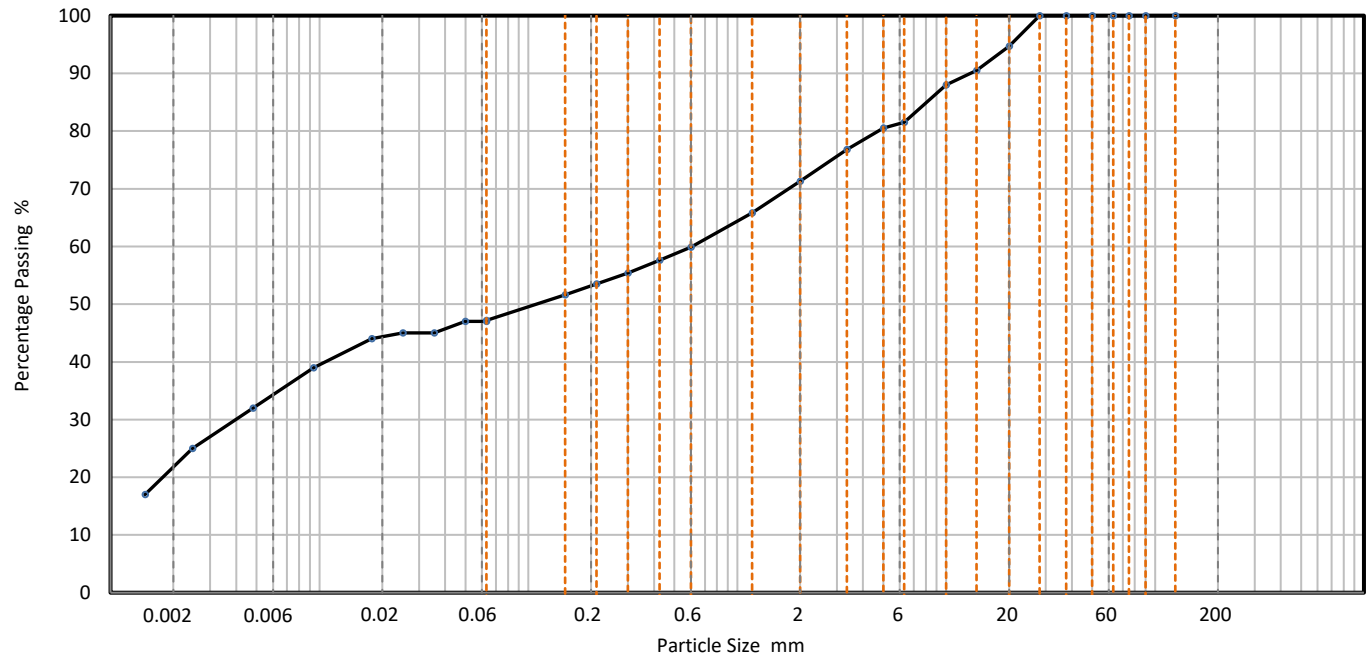
Site name

Job number

CMS, Rockingham, Barnsley

S230417

Hole		TP05	Lab sample ID	G2MT202305056
Depth (Top)	m	1.10	Test Method	BS 1377 - 2 : 1990 Clauses 9.2 and 9.5
Depth (Base)	m		Soil Description	Very Clayey, very Sandy, very Silty, GRAVEL
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	0.0630	47
90	100	0.0498	47
75	100	0.0354	45
63	100	0.0250	45
50	100	0.0178	44
37.5	100	0.0094	39
28	100	0.0048	32
20	95	0.0025	25
14	91	0.0015	17
10	88		
6.3	82		
5	81		
3.35	77		
2	71		
1.18	66		
0.6	60	Particle density (assumed) 2.65 Mg/m3	
0.425	58		
0.3	55		
0.212	54		
0.15	52		
0.063	47		

Dry Mass of sample, g

895

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	28.7
Sand	24.1
Silt	25.2
Clay	22.0

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

Remarks
Preparation and testing in accordance with test method unless noted below
Sample tested was deviating in accordance with BS1377 test standard

Accreditation status

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

Approved by	D Anderson
Approval date	19/05/2023 07:50

PARTICLE SIZE DISTRIBUTION

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TS18 3NA

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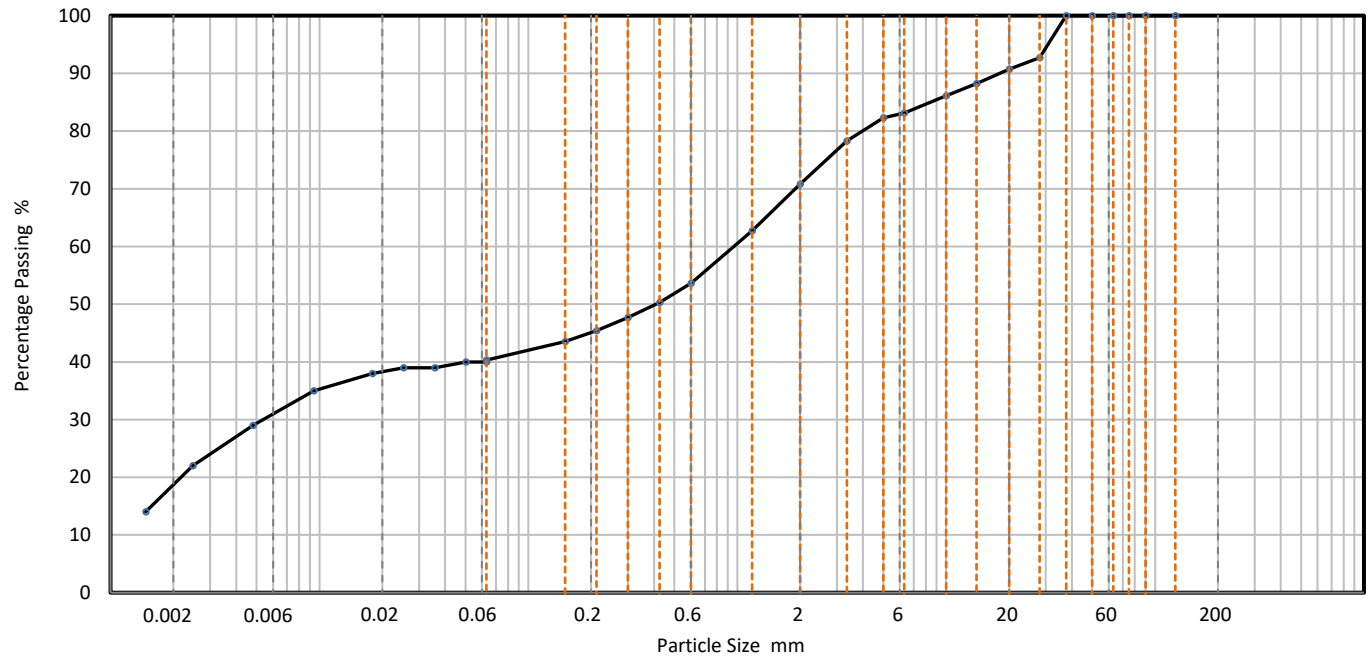
Site name

Job number

CMS, Rockingham, Barnsley

S230417

Hole		TP06	Lab sample ID	G2MT202305057
Depth (Top)	m	1.40	Test Method	BS 1377 - 2 : 1990 Clauses 9.2 and 9.5
Depth (Base)	m		Soil Description	Clayey, very Silty, very Gravelly, SAND
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	0.0630	40
90	100	0.0503	40
75	100	0.0357	39
63	100	0.0253	39
50	100	0.0179	38
37.5	100	0.0094	35
28	93	0.0048	29
20	91	0.0025	22
14	88	0.0015	14
10	86		
6.3	83		
5	82		
3.35	78		
2	71		
1.18	63		
0.6	54	Particle density (assumed) 2.65 Mg/m ³	
0.425	50		
0.3	48		
0.212	45		
0.15	44		
0.063	40		

Dry Mass of sample, g

1308

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	29.2
Sand	30.5
Silt	21.8
Clay	18.5

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

Remarks
Preparation and testing in accordance with test method unless noted below
Sample tested was deviating in accordance with BS1377 test standard

Accreditation status

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

Approved by	D Anderson
Approval date	19/05/2023 07:55

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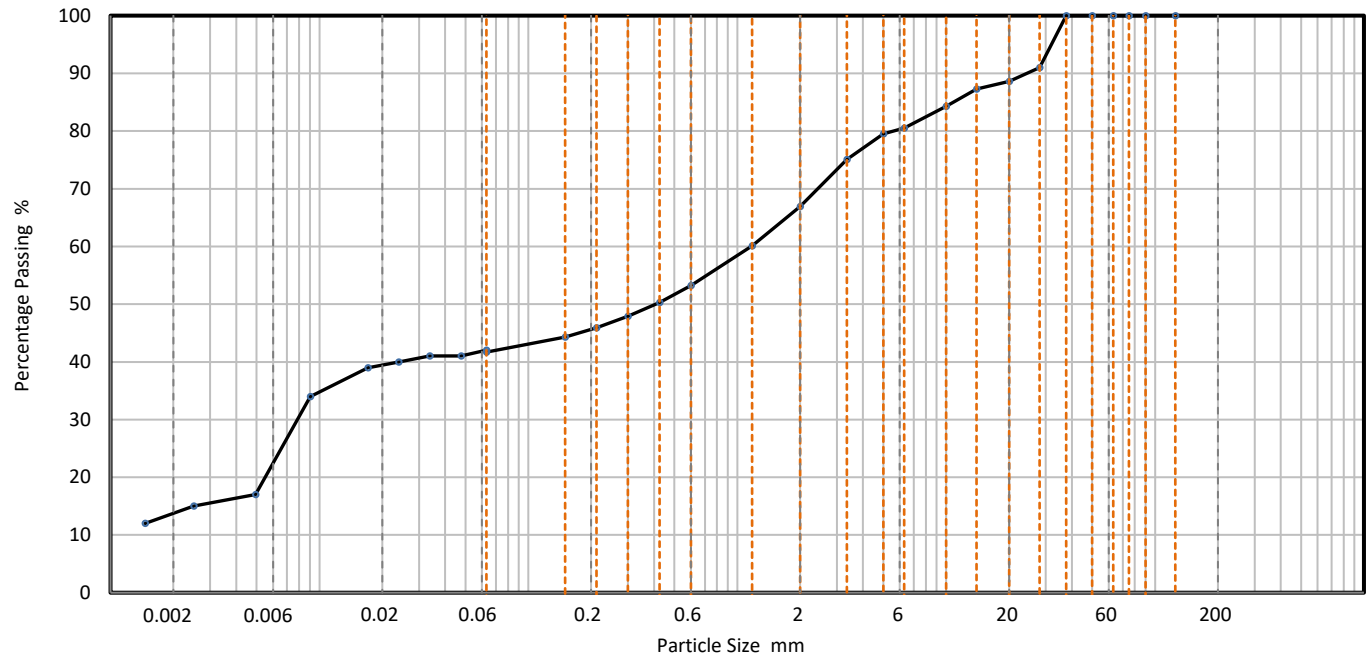
Site name

Job number

CMS, Rockingham, Barnsley

S230417

Hole	TP10	Lab sample ID	G2MT2023050511
Depth (Top)	m	Test Method	BS 1377 - 2 : 1990 Clauses 9.2 and 9.5
Depth (Base)	m	Soil Description	Clayey, very Sandy, very Silty, GRAVEL
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	0.0630	42
90	100	0.0476	41
75	100	0.0337	41
63	100	0.0240	40
50	100	0.0170	39
37.5	100	0.0090	34
28	91	0.0049	17
20	89	0.0025	15
14	87	0.0015	12
10	84		
6.3	81		
5	80		
3.35	75		
2	67		
1.18	60		
0.6	53	Particle density (assumed) 2.65 Mg/m ³	
0.425	50		
0.3	48		
0.212	46		
0.15	44		
0.063	42		

Dry Mass of sample, g

1208

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	33.1
Sand	25.1
Silt	28.1
Clay	13.7

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

Remarks
Preparation and testing in accordance with test method unless noted below
Sample tested was deviating in accordance with BS1377 test standard

Accreditation status

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

Approved by	D Anderson
Approval date	19/05/2023 07:56

PARTICLE SIZE DISTRIBUTION

G2M Testing (Stockton)

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Stockton on Tees,
TS18 3NA

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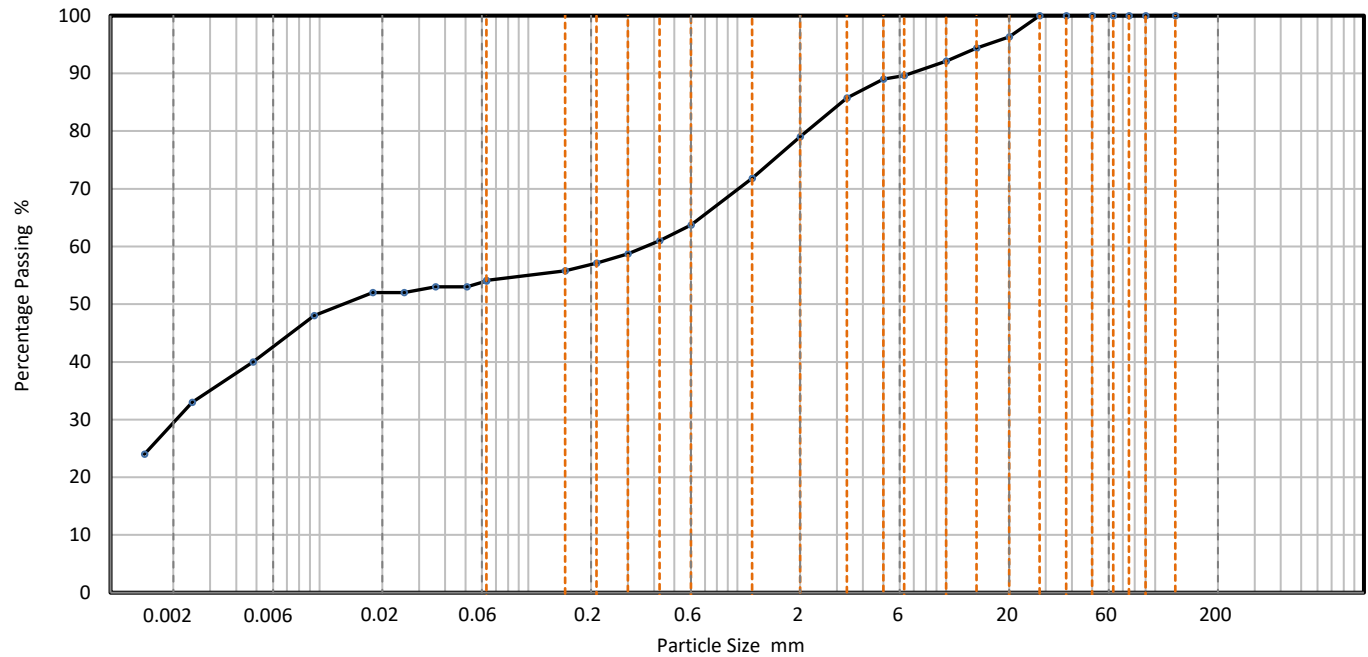
Site name

Job number

CMS, Rockingham, Barnsley

S230417

Hole		TP13	Lab sample ID	G2MT2023050513
Depth (Top)	m	1.30	Test Method	BS 1377 - 2 : 1990 Clauses 9.2 and 9.5
Depth (Base)	m		Soil Description	Very Gravelly, very Silty, 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	0.0630	54
90	100	0.0507	53
75	100	0.0359	53
63	100	0.0254	52
50	100	0.0180	52
37.5	100	0.0094	48
28	100	0.0048	40
20	96	0.0025	33
14	94	0.0015	24
10	92		
6.3	90		
5	89		
3.35	86		
2	79		
1.18	72		
0.6	64	Particle density (assumed) 2.65 Mg/m ³	
0.425	61		
0.3	59		
0.212	57		
0.15	56		
0.063	54		

Dry Mass of sample, g

824

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	21.0
Sand	24.9
Silt	24.8
Clay	29.3

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

Remarks
Preparation and testing in accordance with test method unless noted below
Sample tested was deviating in accordance with BS1377 test standard

Accreditation status

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

Approved by	D Anderson
Approval date	19/05/2023 07:57

PARTICLE SIZE DISTRIBUTION

G2M Testing (Stockton)

12-16 Yarm Road,

Stockton on Tees,

TS18 3NA

01642 033318

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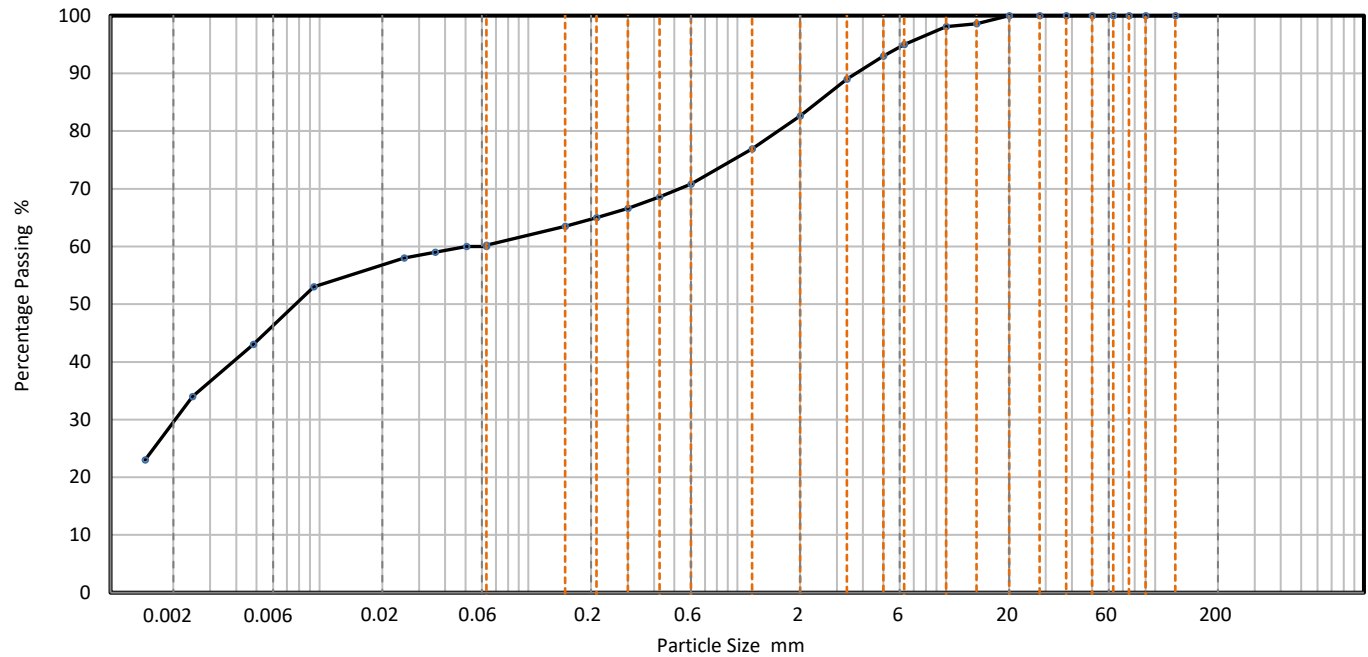
Site name

Job number

CMS, Rockingham, Barnsley

S230417

Hole		TP14	Lab sample ID	G2MT2023050514
Depth (Top)	m	1.20	Test Method	BS 1377 - 2 : 1990 Clauses 9.2 and 9.5
Depth (Base)	m		Soil Description	Gravelly, very Sandy, very Clayey, SILT
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	0.0630	60
90	100	0.0505	60
75	100	0.0358	59
63	100	0.0254	58
50	100	0.0094	53
37.5	100	0.0048	43
28	100	0.0025	34
20	100	0.0015	23
14	99		
10	98		
6.3	95		
5	93		
3.35	89		
2	83		
1.18	77		
0.6	71	Particle density (assumed) 2.65 Mg/m3	
0.425	69		
0.3	67		
0.212	65		
0.15	64		
0.063	60		

Dry Mass of sample, g

578

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	17.4
Sand	22.4
Silt	30.2
Clay	30.0

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

Remarks
Preparation and testing in accordance with test method unless noted below
Sample tested was deviating in accordance with BS1377 test standard

Accreditation status

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

Approved by	D Anderson
Approval date	19/05/2023 07:59



10258

**Dry Density / Moisture Content Relationship
Light Compaction**

Job Ref

S230417

Borehole / Pit No

TP07

Site Name

CMS, Rockingham, Barnsley

Sample No

Soil Description

Depth

1.30 m

Specimen Ref.

TP07

Specimen Depth

1.3 m

Sample Type

B

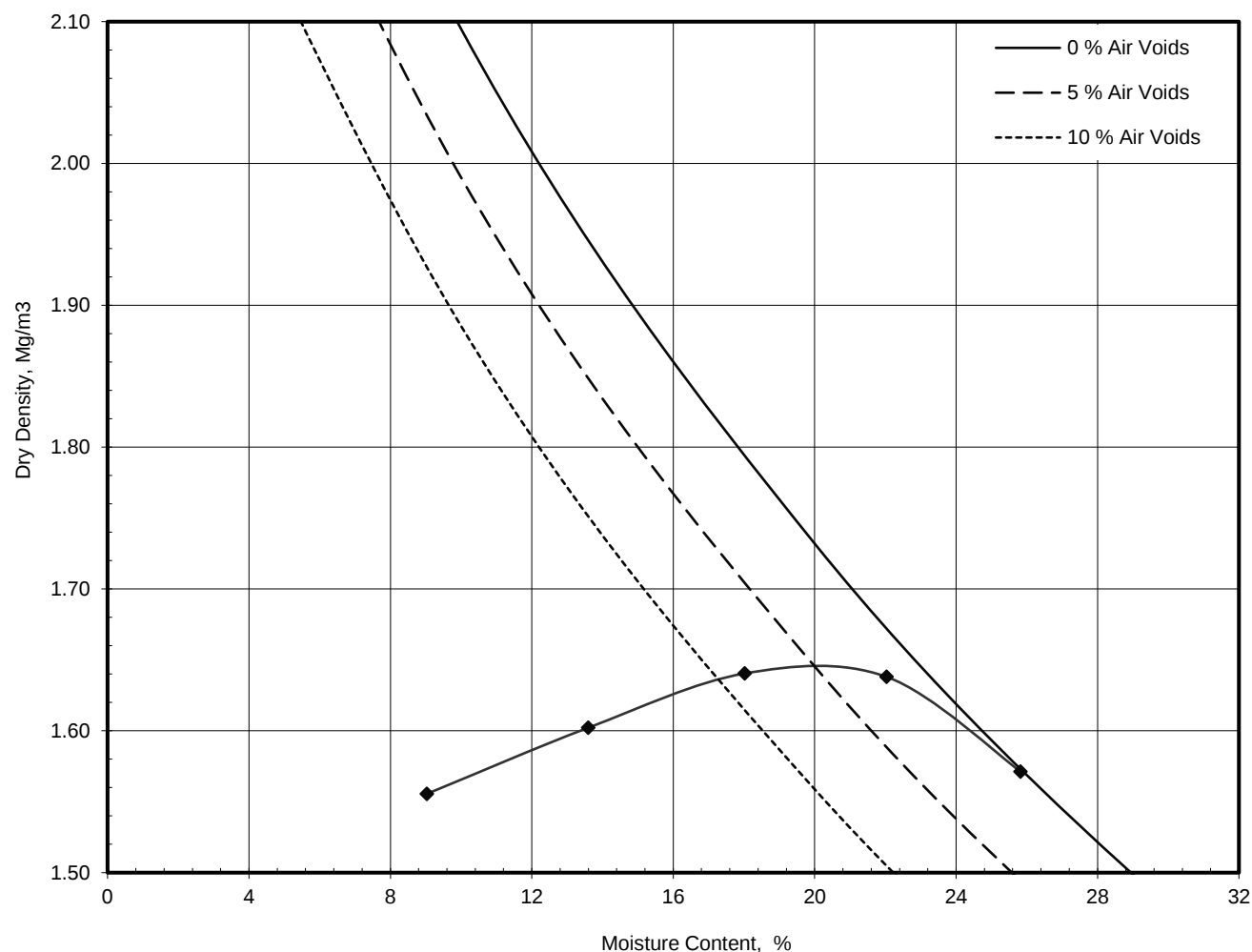
Test Method

BS1377:Part 4:1990, clause 3.3, 2.5kg rammer

Keylab ID

G2MT202305058

Compaction Test Reference/No.



Mould Type	1 LITRE
Samples Used	Single sample tested
Material Retained on 37.5 mm Sieve	%
Material Retained on 20.0 mm Sieve	%
Particle Density - Assumed	Mg/m³
Natural Moisture Content	%
Maximum Dry Density	Mg/m³
Optimum Moisture Content	%

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



Certificate of Analysis

Certificate Number 23-10829

Issued: 16-May-23

Client G2M Testing Ltd
12 Yarm Road
Stockton On Tees
Cleveland
TS18 3NA

Our Reference 23-10829

Client Reference S230417

Order No LAB1874

Contract Title CMS, ROCKINGHAM, BARNLEY

Description 14 Soil samples.

Date Received 09-May-23

Date Started 09-May-23

Date Completed 16-May-23

Test Procedures Identified by prefix DETSn (details on request).

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

Approved By

A handwritten signature in black ink, appearing to read "Kirk Bridgewood".

Kirk Bridgewood
General Manager



Summary of Chemical Analysis

Soil Samples

Our Ref 23-10829

Client Ref S230417

Contract Title CMS, ROCKINGHAM, BARNSELY

Lab No	2167606	2167607	2167608	2167609	2167610	2167611	2167612	2167613	2167614	2167615	2167616
Sample ID	TP01	TP03	TP04	TP07	TP08	TP09	TP12	TP13	TP14	BH01	BH03
Depth	1.30	2.20	1.30	1.30	1.30	1.30	1.00	1.30	1.20	1.20	2.60
Other ID											
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date	05/05/2023	05/05/2023	05/05/2023	05/05/2023	05/05/2023	05/05/2023	05/05/2023	05/05/2023	05/05/2023	05/05/2023	05/05/2023
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units											
Inorganics														
pH	DETSC 2008#		pH	8.5	6.0	7.9	7.2	7.5	8.7	7.7	8.4	7.5	8.0	8.6
Sulphate Aqueous Extract as SO ₄ (2:1)	DETSC 2076#	10	mg/l	210	79	76	52	170	87	260	92	650	140	34

Summary of Chemical Analysis

Soil Samples

Our Ref 23-10829

Client Ref S230417

Contract Title CMS, ROCKINGHAM, BARNSELY

Lab No	2167617	2167618	2167619
Sample ID	BH04	BH05	BH06
Depth	3.00	1.60	0.70
Other ID			
Sample Type	SOIL	SOIL	SOIL
Sampling Date	05/05/2023	05/05/2023	05/05/2023
Sampling Time	n/s	n/s	n/s

Test	Method	LOD	Units			
Inorganics						
pH	DETSC 2008#		pH	6.9	8.0	8.2
Sulphate Aqueous Extract as SO ₄ (2:1)	DETSC 2076#	10	mg/l	26	64	300

Information in Support of the Analytical Results

Our Ref 23-10829
 Client Ref S230417
 Contract CMS, ROCKINGHAM, BARNSELEY

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
2167606	TP01 1.30 SOIL	05/05/23	PT 1L		
2167607	TP03 2.20 SOIL	05/05/23	PT 1L		
2167608	TP04 1.30 SOIL	05/05/23	PT 1L		
2167609	TP07 1.30 SOIL	05/05/23	PT 1L		
2167610	TP08 1.30 SOIL	05/05/23	PT 1L		
2167611	TP09 1.30 SOIL	05/05/23	PT 1L		
2167612	TP12 1.00 SOIL	05/05/23	PT 1L		
2167613	TP13 1.30 SOIL	05/05/23	PT 1L		
2167614	TP14 1.20 SOIL	05/05/23	PT 1L		
2167615	BH01 1.20 SOIL	05/05/23	PT 1L		
2167616	BH03 2.60 SOIL	05/05/23	PT 1L		
2167617	BH04 3.00 SOIL	05/05/23	PT 1L		
2167618	BH05 1.60 SOIL	05/05/23	PT 1L		
2167619	BH06 0.70 SOIL	05/05/23	PT 1L		

Key: P-Plastic T-Tub

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

Soil Analysis Notes

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

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

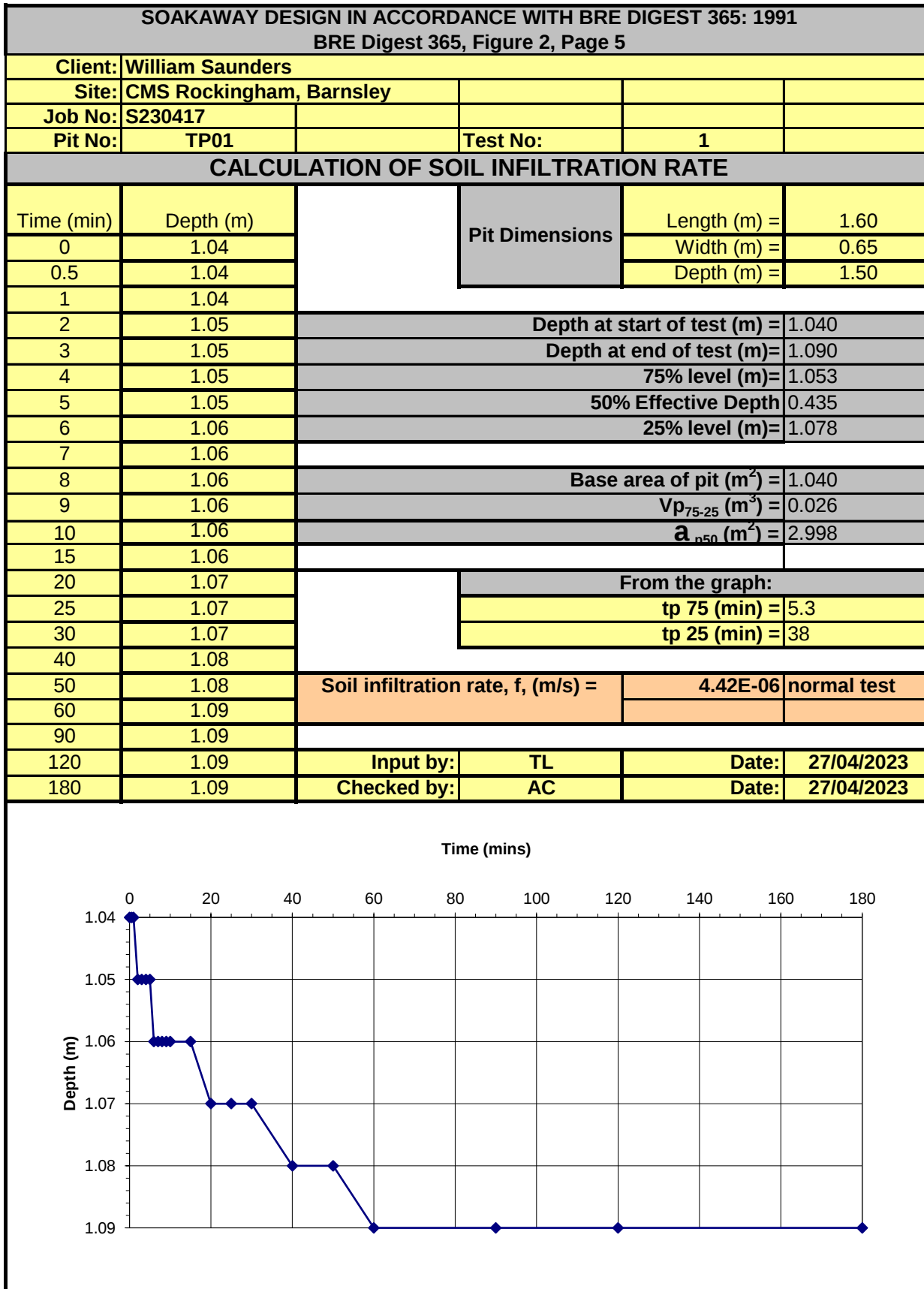
The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

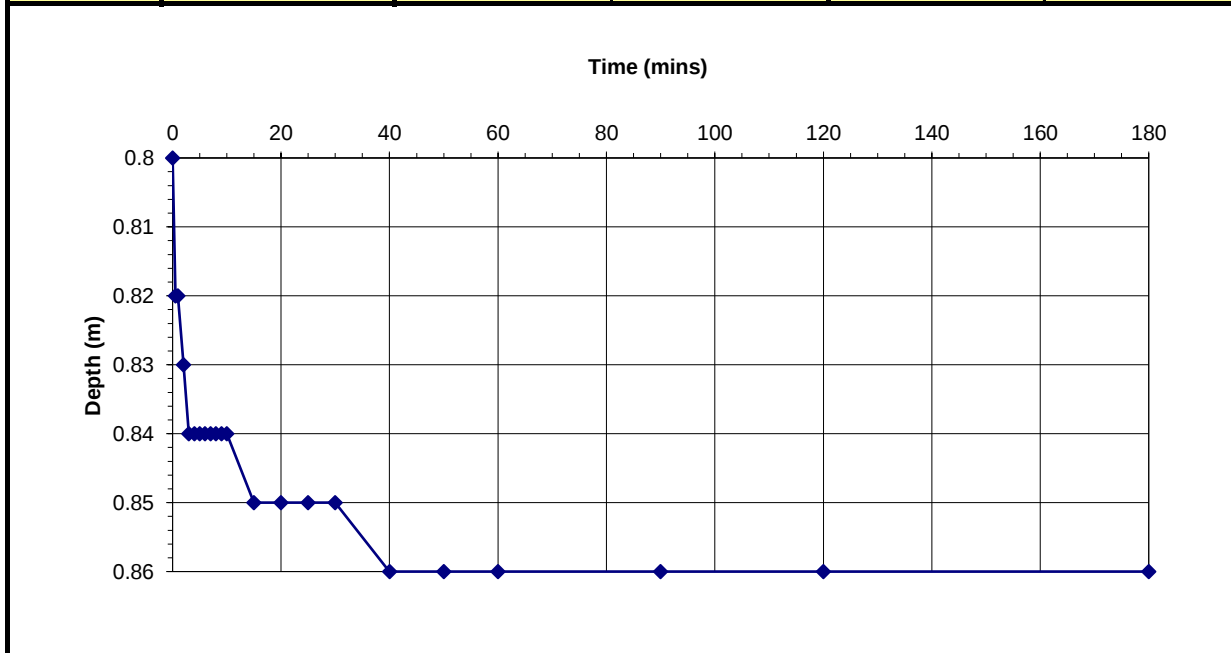
From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

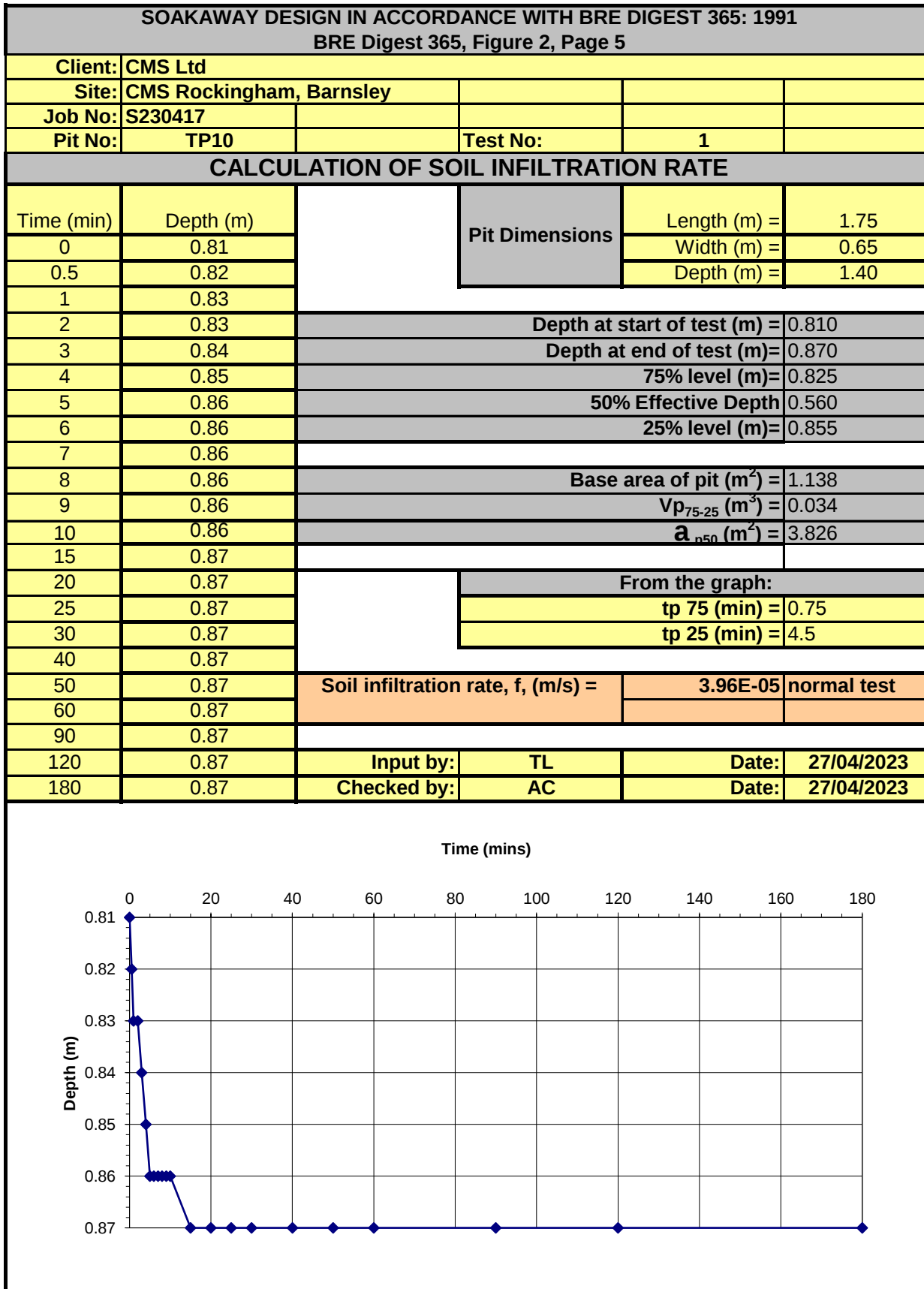
Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

End of Report



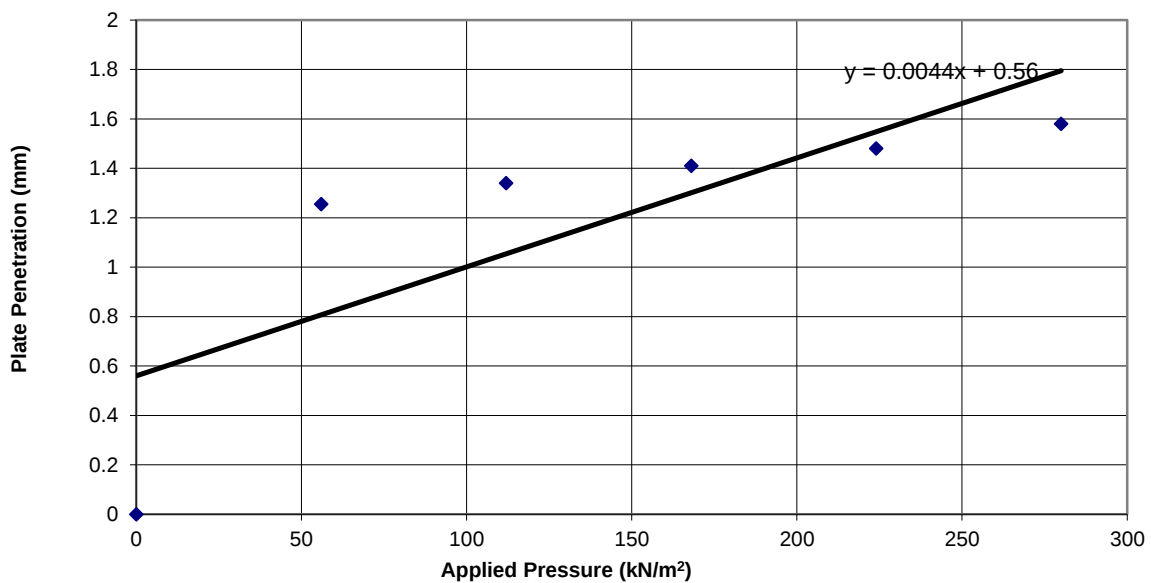
SOAKAWAY DESIGN IN ACCORDANCE WITH BRE DIGEST 365: 1991					
BRE Digest 365, Figure 2, Page 5					
Client:	CMS Ltd				
Site:	CMS Rockingham, Barnsley				
Job No:	S230417				
Pit No:	TP07		Test No:	1	
CALCULATION OF SOIL INFILTRATION RATE					
Time (min)	Depth (m)		Pit Dimensions	Length (m) =	1.70
0	0.8			Width (m) =	0.60
0.5	0.82			Depth (m) =	1.50
1	0.82				
2	0.83	Depth at start of test (m) =			0.800
3	0.84	Depth at end of test (m)=			0.860
4	0.84	75% level (m)=			0.815
5	0.84	50% Effective Depth			0.670
6	0.84	25% level (m)=			0.845
7	0.84				
8	0.84	Base area of pit (m ²) =			1.020
9	0.84	V _{p75-25} (m ³) =			0.031
10	0.84	a _{p50} (m ²) =			4.102
15	0.85				
20	0.85		From the graph:		
25	0.85		tp 75 (min) = 0.3		
30	0.85		tp 25 (min) = 12.5		
40	0.86				
50	0.86	Soil infiltration rate, f, (m/s) =		1.02E-05	normal test
60	0.86				
90	0.86				
120	0.86	Input by:	TL	Date:	27/04/2023
180	0.86	Checked by:	AC	Date:	27/04/2023





SOLMEK
GEOTECHNICAL TESTING LABORATORY

PLATE BEARING TEST			Date:	24/04/2023
Project Number:	S230417		Test No:	TP02
Project Name:	CMS Rockingham, Barnsley		Test Level:	0.40m
Test Method: BS 1377 : Part 9 : 1990 (Incremental Method)			Weather:	Overcast
Plate Diameter:	0.305 m		Load Applied:	280 kPa
Kentledge Type:	8T JCB		Remarks:	Clay (Possibly reworked)

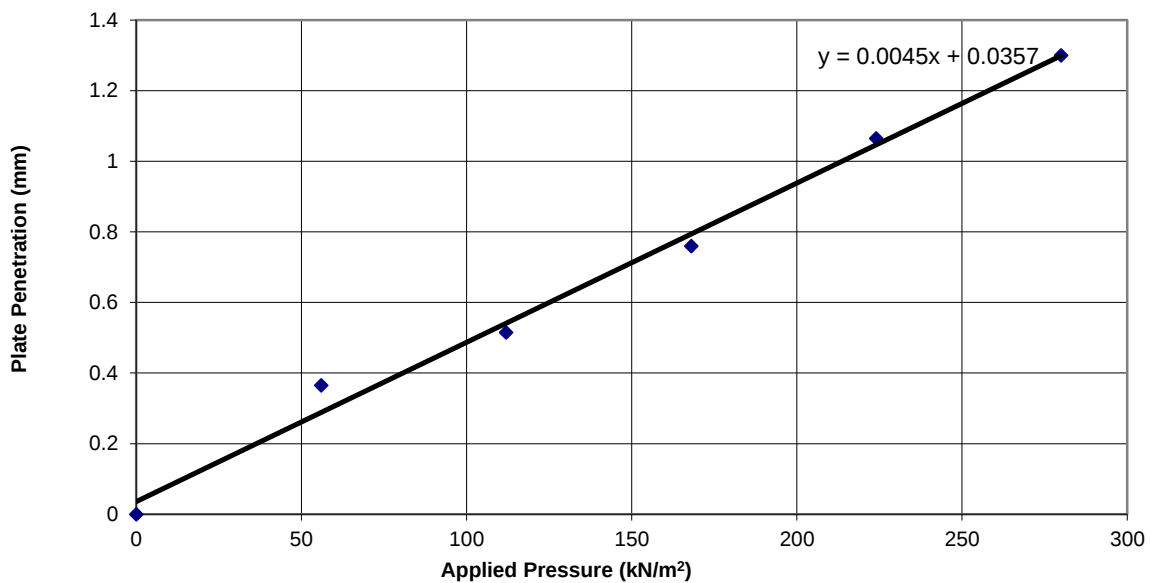


	Pressure (kN/m ²)	Plate Penetration (mm)
Initial	0	0
Stage 1	56	1.26
Stage 2	112	1.34
Stage 3	168	1.41
Stage 4	224	1.48
Stage 5	280	1.58
Stage 6		
Stage 7		
Stage 8		

Conversion Factor	0.45	Produced by: T. Little
Stress Applied @ 1.25mm	156.44 kN/m ²	
Total Plate Deflection	1.58 mm	Checked by: [Signature]
Plate Diameter	305 mm	
k305	125150	 SOLMEK
k762	56035	
CBR	10 %	

SOLMEK
GEOTECHNICAL TESTING LABORATORY

PLATE BEARING TEST			Date:	24/04/2023
Project Number:	S230417		Test No:	TP03
Project Name:	CMS Rockingham, Barnsley		Test Level:	0.40m
Test Method: BS 1377 : Part 9 : 1990 (Incremental Method)			Weather:	Overcast
Plate Diameter:	0.305 m		Load Applied:	280 kPa
Kentledge Type:	8T JCB		Remarks:	Clay (Possibly reworked)

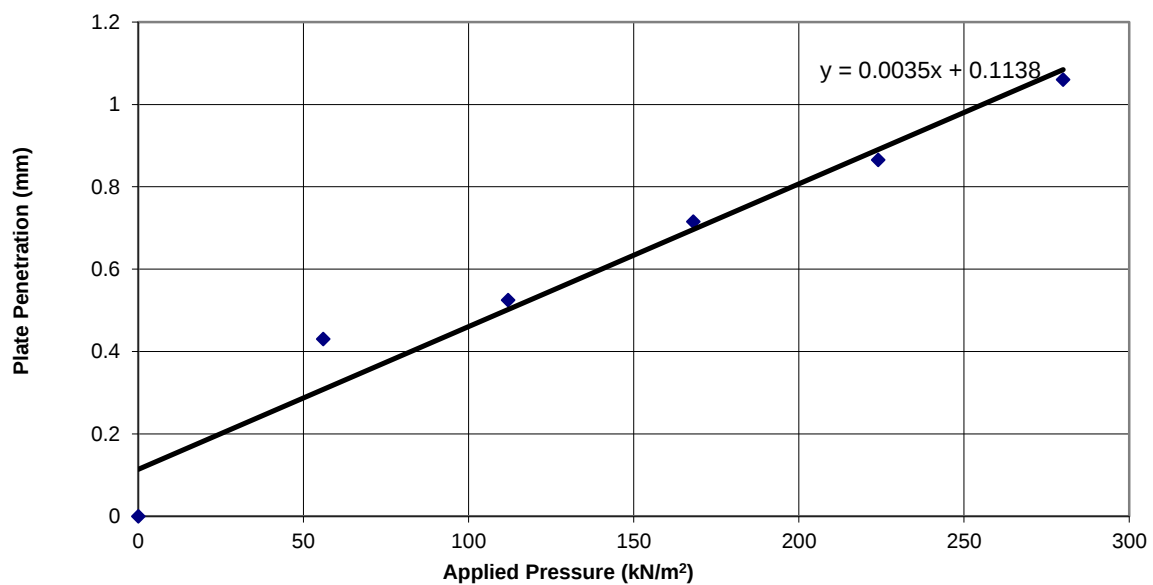


	Pressure (kN/m ²)	Plate Penetration (mm)
Initial	0	0
Stage 1	56	0.37
Stage 2	112	0.52
Stage 3	168	0.76
Stage 4	224	1.07
Stage 5	280	1.30
Stage 6		
Stage 7		
Stage 8		

Conversion Factor	0.45	Produced by: T. Little
Stress Applied @ 1.25mm	269.08 kN/m ²	
Total Plate Deflection	1.30 mm	Checked by: [Signature]
Plate Diameter	305 mm	
k305	215263	 SOLMEK
k762	96383	
CBR	26 %	

SOLMEK
GEOTECHNICAL TESTING LABORATORY

PLATE BEARING TEST			Date:	24/04/2023
Project Number:	S230417		Test No:	TP04
Project Name:	CMS Rockingham, Barnsley		Test Level:	0.40m
Test Method: BS 1377 : Part 9 : 1990 (Incremental Method)			Weather:	Overcast
Plate Diameter:	0.305 m		Load Applied:	280 kPa
Kentledge Type:	8T JCB		Remarks:	Clay (Possibly reworked)

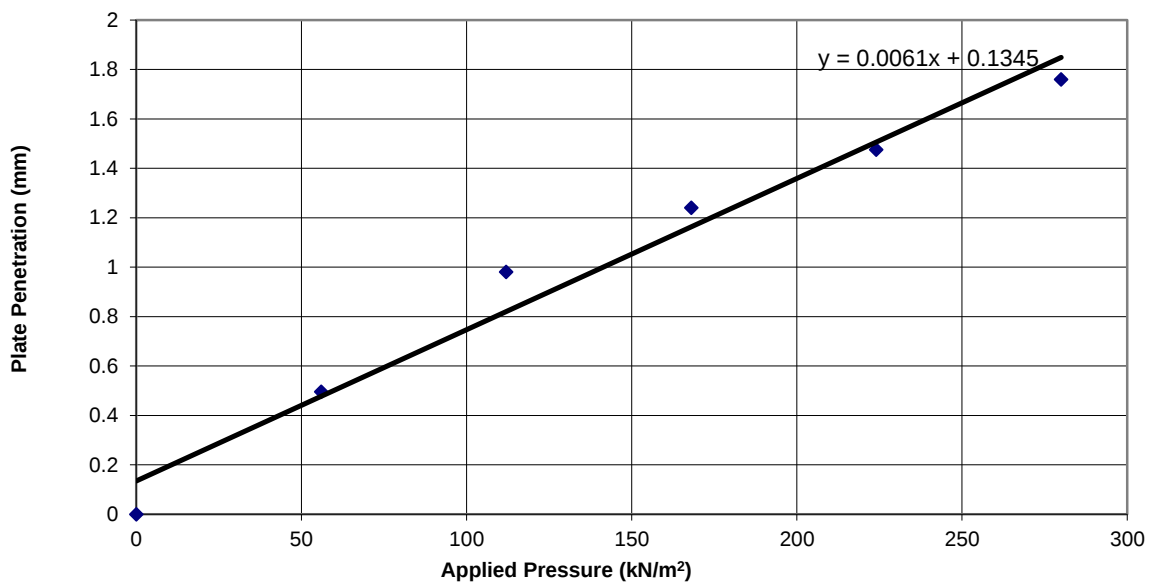


	Pressure (kN/m ²)	Plate Penetration (mm)
Initial	0	0
Stage 1	56	0.43
Stage 2	112	0.53
Stage 3	168	0.72
Stage 4	224	0.87
Stage 5	280	1.06
Stage 6		
Stage 7		
Stage 8		

Conversion Factor	0.45	Produced by: T. Little
Stress Applied @ 1.25mm	327.73 kN/m ²	
Total Plate Deflection	1.06 mm	Checked by: [Signature]
Plate Diameter	305 mm	
k305	262185	 SOLMEK
k762	117392	
CBR	37 %	

SOLMEK
GEOTECHNICAL TESTING LABORATORY

PLATE BEARING TEST			Date:	24/04/2023
Project Number:	S230417		Test No:	TP05
Project Name:	CMS Rockingham, Barnsley		Test Level:	0.40m
Test Method: BS 1377 : Part 9 : 1990 (Incremental Method)			Weather:	Overcast
Plate Diameter:	0.305 m		Load Applied:	280 kPa
Kentledge Type:	8T JCB		Remarks:	Clay (Possibly reworked)

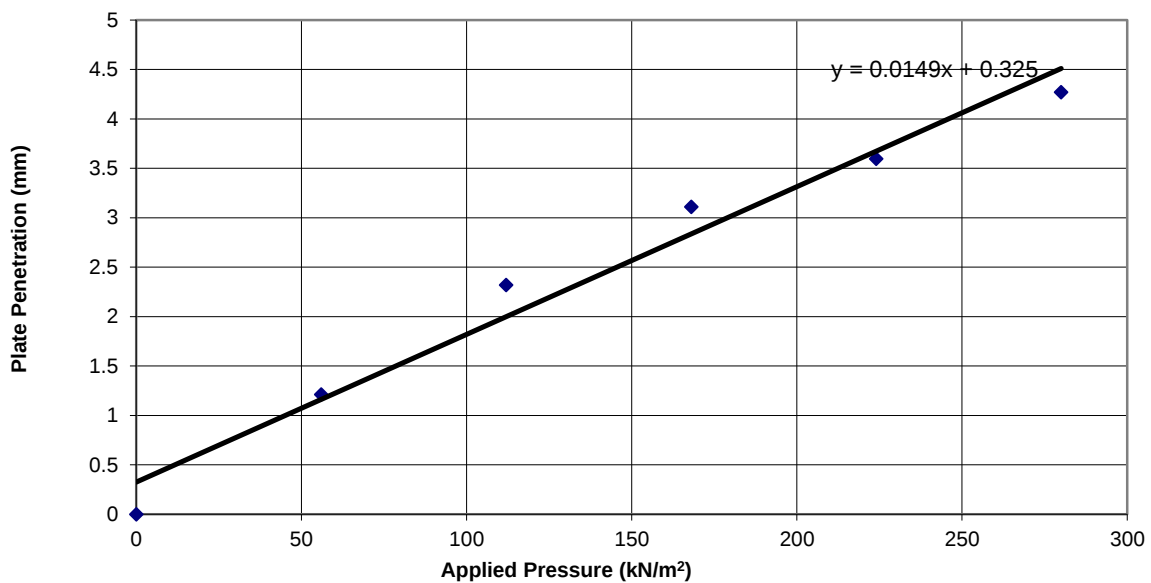


	Pressure (kN/m ²)	Plate Penetration (mm)
Initial	0	0
Stage 1	56	0.50
Stage 2	112	0.98
Stage 3	168	1.24
Stage 4	224	1.48
Stage 5	280	1.76
Stage 6		
Stage 7		
Stage 8		

Conversion Factor	0.45	Produced by: T. Little
Stress Applied @ 1.25mm	182.19 kN/m ²	
Total Plate Deflection	1.76 mm	Checked by: [Signature]
Plate Diameter	305 mm	
k305	145756	 SOLMEK
k762	65261	
CBR	13 %	

SOLMEK
GEOTECHNICAL TESTING LABORATORY

PLATE BEARING TEST			Date:	24/04/2023
Project Number:	S230417		Test No:	TP06
Project Name:	CMS Rockingham, Barnsley		Test Level:	0.40m
Test Method: BS 1377 : Part 9 : 1990 (Incremental Method)			Weather:	Overcast
Plate Diameter:	0.305 m		Load Applied:	280 kPa
Kentledge Type:	8T JCB		Remarks:	Clay (Possibly reworked)

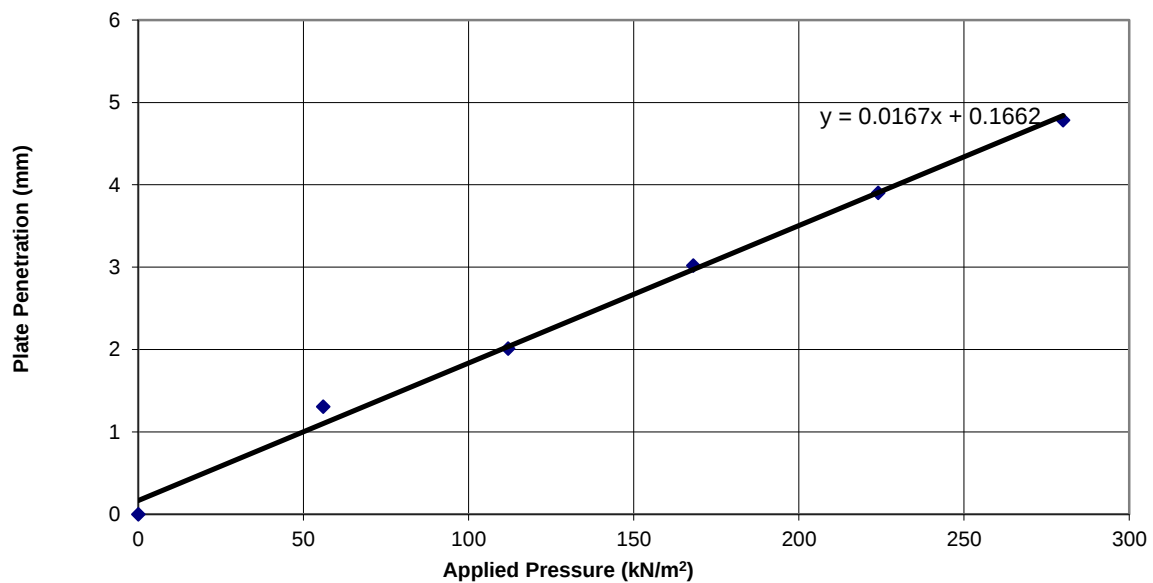


	Pressure (kN/m ²)	Plate Penetration (mm)
Initial	0	0
Stage 1	56	1.21
Stage 2	112	2.32
Stage 3	168	3.11
Stage 4	224	3.60
Stage 5	280	4.27
Stage 6		
Stage 7		
Stage 8		

Conversion Factor	0.45	Produced by: T. Little
Stress Applied @ 1.25mm	61.89 kN/m ²	
Total Plate Deflection	4.27 mm	Checked by: [Signature]
Plate Diameter	305 mm	
k305	49510	 SOLMEK
k762	22168	
CBR	2.07 %	

SOLMEK
GEOTECHNICAL TESTING LABORATORY

PLATE BEARING TEST			Date:	24/04/2023
Project Number:	S230417		Test No:	TP09
Project Name:	CMS Rockingham, Barnsley		Test Level:	0.40m
Test Method: BS 1377 : Part 9 : 1990 (Incremental Method)			Weather:	Overcast
Plate Diameter:	0.305 m		Load Applied:	280 kPa
Kentledge Type:	8T JCB		Remarks:	Clay (Possibly reworked)

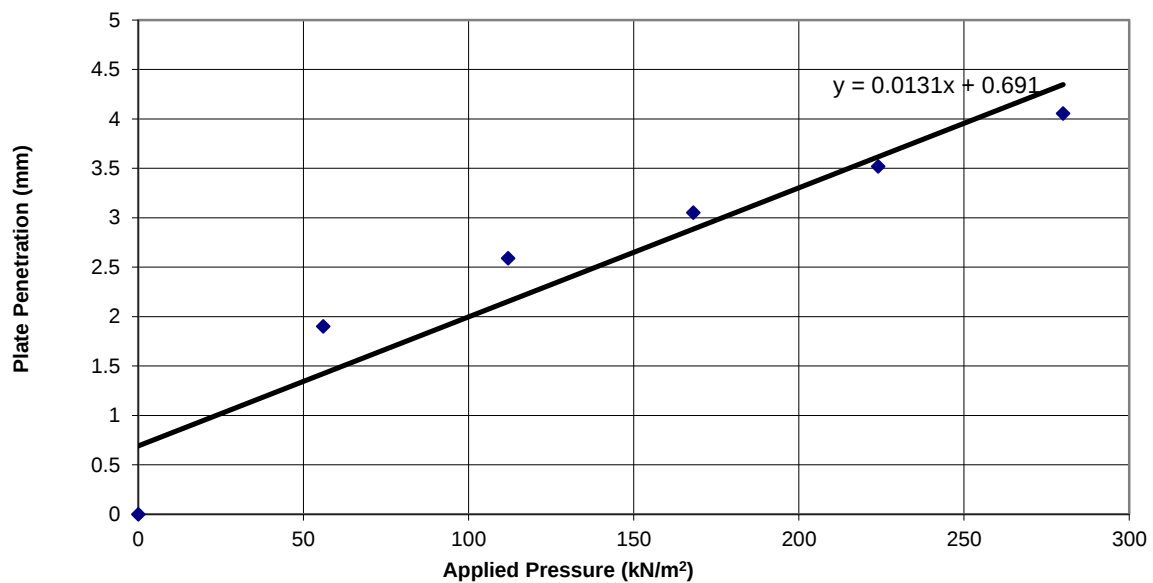


	Pressure (kN/m²)	Plate Penetration (mm)
Initial	0	0
Stage 1	56	1.31
Stage 2	112	2.01
Stage 3	168	3.02
Stage 4	224	3.90
Stage 5	280	4.79
Stage 6		
Stage 7		
Stage 8		

Conversion Factor	0.45	Produced by: T. Little
Stress Applied @ 1.25mm	64.92 kN/m²	
Total Plate Deflection	4.79 mm	Checked by: [Signature]
Plate Diameter	305 mm	
k305	51938	 SOLMEK
k762	23255	
CBR	2.25 %	

SOLMEK
GEOTECHNICAL TESTING LABORATORY

PLATE BEARING TEST			Date:	24/04/2023
Project Number:	S230417		Test No:	TP12
Project Name:	CMS Rockingham, Barnsley		Test Level:	0.40m
Test Method: BS 1377 : Part 9 : 1990 (Incremental Method)			Weather:	Overcast
Plate Diameter:	0.305 m		Load Applied:	280 kPa
Kentledge Type:	8T JCB		Remarks:	Clay (Possibly reworked)

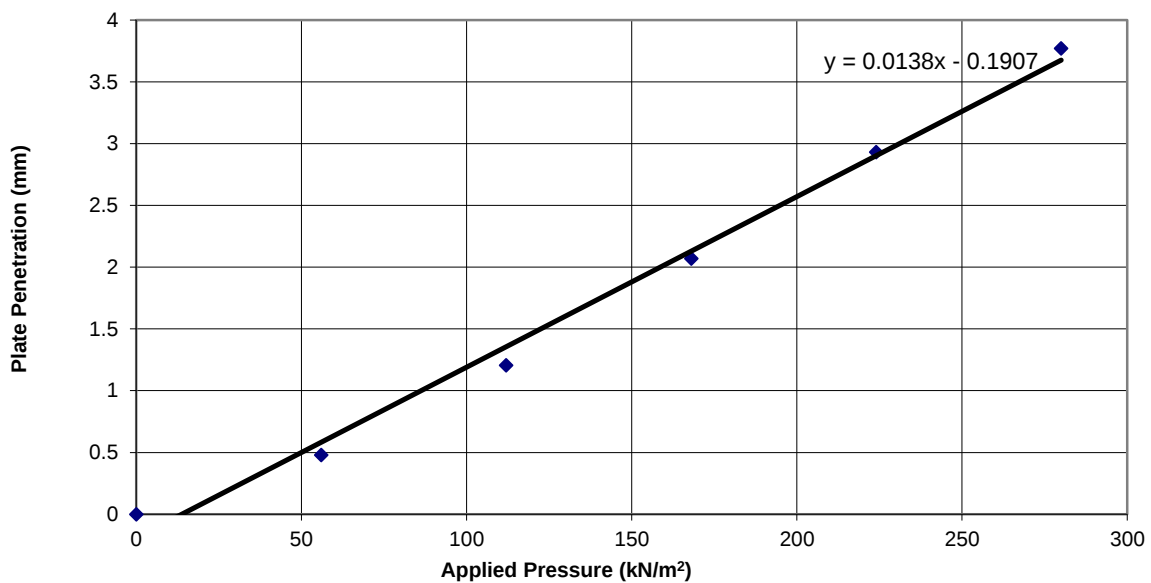


	Pressure (kN/m ²)	Plate Penetration (mm)
Initial	0	0
Stage 1	56	1.90
Stage 2	112	2.59
Stage 3	168	3.05
Stage 4	224	3.52
Stage 5	280	4.06
Stage 6		
Stage 7		
Stage 8		

Conversion Factor	0.45	Produced by: T. Little
Stress Applied @ 1.25mm	42.81 kN/m ²	
Total Plate Deflection	4.06 mm	Checked by: [Signature]
Plate Diameter	305 mm	
k305	34248	 SOLMEK
k762	15335	
CBR	1.09 %	

SOLMEK
GEOTECHNICAL TESTING LABORATORY

PLATE BEARING TEST			Date:	24/04/2023
Project Number:	S230417		Test No:	TP14
Project Name:	CMS Rockingham, Barnsley		Test Level:	0.40m
Test Method: BS 1377 : Part 9 : 1990 (Incremental Method)			Weather:	Overcast
Plate Diameter:	0.305 m		Load Applied:	280 kPa
Kentledge Type:	8T JCB		Remarks:	Clay (Possibly reworked)



	Pressure (kN/m ²)	Plate Penetration (mm)
Initial	0	0
Stage 1	56	0.48
Stage 2	112	1.21
Stage 3	168	2.07
Stage 4	224	2.93
Stage 5	280	3.77
Stage 6		
Stage 7		
Stage 8		

Conversion Factor	0.45	Produced by: T. Little
Stress Applied @ 1.25mm	104.33 kN/m ²	
Total Plate Deflection	3.77 mm	Checked by: [Signature]
Plate Diameter	305 mm	
k305	83467	 SOLMEK
k762	37372	
CBR	5.12 %	

APPENDIX E

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 (CaCO_3) depended. Where no hardness values are available, Solmek assume conservative values (of between 0 and 50mg/l).

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

DETAILED QUANTITATIVE RISK ASSESSMENT (DQRA)

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

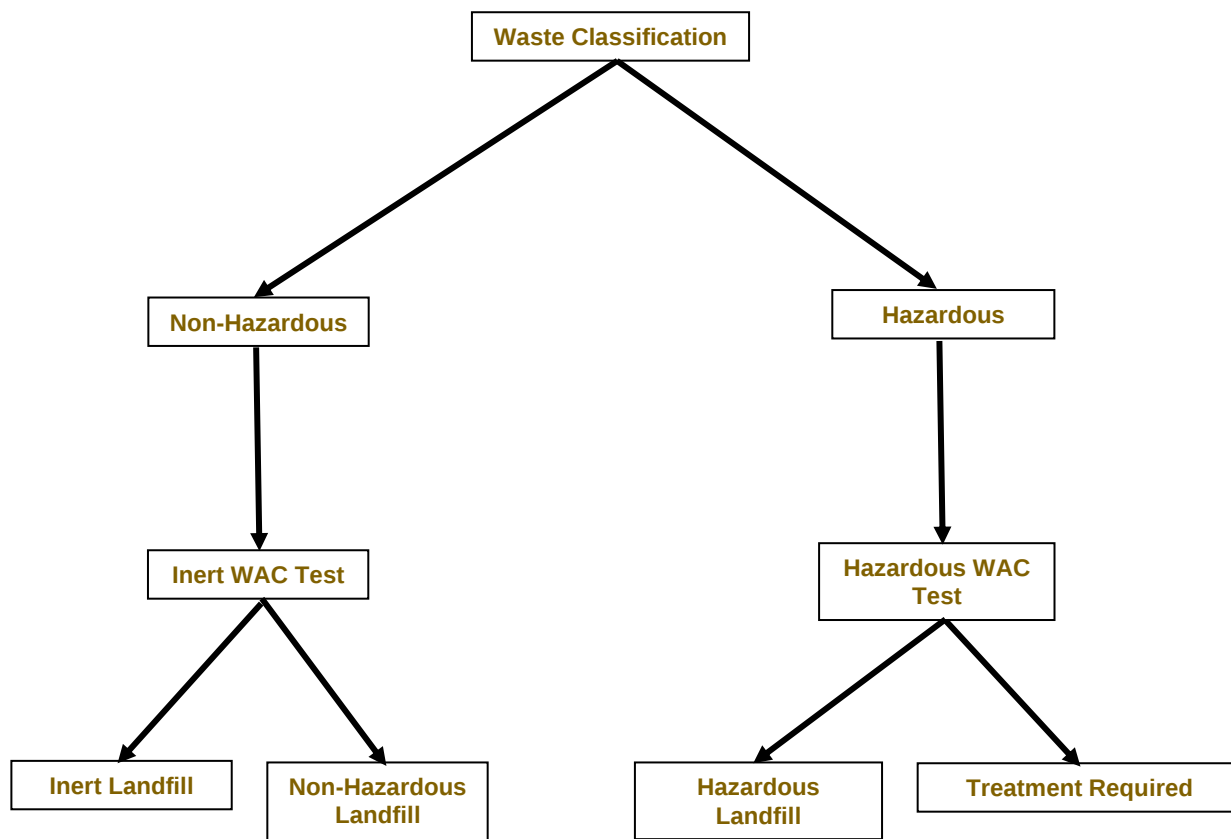
WASTE CLASSIFICATION AND WASTE ACCEPTANCE CRITERIA

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

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

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

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



CONSTRUCTION MATERIALS

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

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

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: version1/2023)

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.