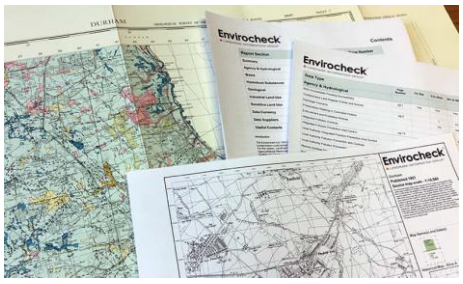
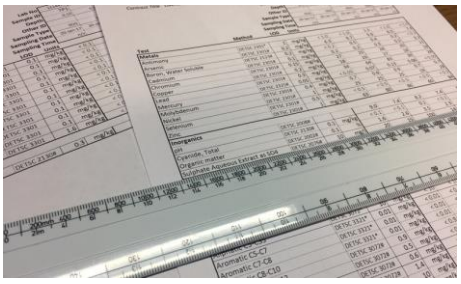
SOLMEK







Phase 2: Site Investigation

Project Meridian, Fujifilm, Billingham

Turner and Townsend

S190632

Solmek Ltd

12 Yarm Road
Stockton-on-Tees
TS18 3NA
Tel: 01642 607083

www.solmek.com

info@solmek.com

PHASE 2 SITE INVESTIGATION REPORT

PROJECT MERIDIAN, FUJIFILM, BILLINGHAM

TABLE OF CONTENTS

APPENDICES

Revision	Date	Prepared By	Signed
Final	August 2019	L Cassidy *Environmental Engineer*	
		Checked By	
		R Woods *Principal Geotechnical Engineer*	
		Approved By	
		R Woods *Principal Geotechnical Engineer*	

1 EXECUTIVE SUMMARY

Site Address	Fujifilm, Belasis Avenue, Billingham
Proposed Development	The site is outlined for a commercial development.
Fieldwork	• 7no. cable percussive boreholes (BH1 to BH7) drilled to a maximum of 20.00mbgl with 3no. monitoring pipes in BH3, BH4 and BH5. • 11no. small percussive boreholes (WS1 to WS11) drilled to a maximum depth of 6.00mbgl. • 4no machine excavated trial pits (ST1 to ST4) to a maximum depth of 2.00mbgl. • 6no machine excavated trial pits (TP1 to TP6) to a maximum depth of 2.50mbgl.
Ground Conditions	• Made ground was encountered to depths of between 0.40mbgl and 3.00mbgl in BH3. • Firm becoming stiff consistency locally slightly sandy locally slightly gravelly locally silty clay was generally encountered down to a maximum depth of 20.00mbgl. • In the east of the site, a band of loose slightly clayey slightly gravelly silty sand was encountered. • Groundwater, where encountered, was between 1.10 and 2.80mbgl.
Contamination Testing Results	• Seven made ground and one natural samples tested. • No exceedances of organic or inorganic thresholds. • Asbestos fibres in two samples (<0.001-0.003%) in WS08 and WS09. • Elevated total PAH in both leachate samples tested. • Slightly alkaline pH.
Contamination Analysis	• Given the site's proposed commercial land use, the levels of contamination recorded on site may pose a risk to the current and future users of the site. • If any zones of odorous, brightly coloured or suspected contaminated ground or groundwater are encountered then work should cease in that area until the material has been investigated. The results of the investigation will therefore determine whether or not remediation will be required. • Made ground classed as uncontaminated locally slightly contaminated (asbestos) with respect to construction workers. PPE for workers. Damping down of site during dry windy conditions. • Suitable growing medium required for all proposed areas of soft landscaping, to 0.50m • Controlled waters unlikely to be at risk. • With respect to utilities pH was elevated; as a minimum all services should be laid in clean trenches. • Sub surface concrete should be designed to DS-3 ACEC (Class AC-2). This assumes mobile groundwater conditions.
Geotechnical Testing Results	• Cohesive deposits low to high strength (30kPa-110kPa) based on in-situ hand vanes. • Triaxial tests indicate high to very high strength cohesive deposits at depth. • SPTs within the granular deposits indicate loose deposits. • Cohesive materials on site have a medium volume change potential. • Moisture contents between 14 and 30%. • Sulphates between 75-1600mg/l, pH slightly alkaline. • 6no. soakaway tests returned infiltration rates of 0.23 to 4.92 x 10^{-6} m/sec.
Geotechnical Analysis & Foundation Recommendations	Shallow Foundations • On cohesive deposits, bearing capacity of 115kN/m^2 at minimum depth of 0.90mbgl on 0.60m wide strips. • On loose granular deposits, adopt a raft or piles. • Local deepening of foundations to 3.00mbgl due to depth of made ground. Alternatives • Piled foundations may be necessary if design loads are excessive. • Normal earthworks plant for excavations but breaking out of relic concrete to be expected.

2 INTRODUCTION

2.1 Authorisation

The site investigation described in this report was carried out by Solmek to the instructions of Billinghurst George & Partners, on behalf of Turner and Townsend, on land located at Fujifilm, Belasis Avenue, Billingham.

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

- *Solmek Phase 1 Desk Study (S190632) July 2019.*

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

2.2 Scope of Works

The site is expected to be developed with a new commercial building with associated parking and peripheral soft landscaping.

A geotechnical and environmental investigation including a ground gas risk assessment was requested. The fieldwork and testing was generally carried out according to the recommendations of BS5930: 2015 "Code of Practice for Ground Investigations" and where applicable BS EN 1997-2:2007 with soil descriptions to BS EN 14688-1:2013 where applicable. The information provided in this report is based on the investigation fieldwork, and is subject to the comments and approval of the various regulatory authorities.

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

3 SITE DESCRIPTION AND FIELDWORK

A site inspection, as recommended in BS 5930 and BS 10175, was undertaken on 27th June 2019. The site is centred at Ordnance Survey Co-ordinates 446540, 522750 and covers approximately 3.36Ha.

The site is located on a parcel of land between Central Avenue and Belasis Avenue.

The site is triangular in shape and has a mostly flat and even topography. The site is currently mostly disused following the demolition of the former structures. The eastern portion of the site is used for carparking.

Hardstanding is present across much of the site, with some soft landscaping present around the site perimeter.

The site is secure with fencing on all sides.

The site is bordered by roads on all sides. Industrial land is present to the south and east whilst land to the north and west is generally residential.

3.1 Fieldwork

The fieldwork was commenced on 3rd July 2019. The extent of the investigation was:

- 7no cable percussive boreholes (BH1 to BH7 inclusive) to a maximum depth of 20.00m below ground level (bgl).
    - The boreholes were evenly spread around the site to achieve maximum site coverage.
- Gas monitoring wells were installed in BH's 3, 4 & 5.
    - The wells were spaced at <25m centres evenly around the site.
- 11no window sample boreholes (WS1 to WS11 inclusive) to a maximum depth of 6.00m below

ground level (bgl).
    - The boreholes were evenly spread around the site to achieve maximum site coverage.
    - In-situ soakaway testing carried out in WS10.
- 6no machine excavated trial pits (TP1 to TP5 and TP1B) were dug to a maximum depth of 2.50mbgl.
    - The trial pits were spaced to locate potential deeper areas of made ground from the former building footprints as well as relict footings and other potential obstructions.
    - In-situ soakaway testing carried out in TP1B, TP2, TP3, TP4 & TP5.
- 4no machine excavated slip trenches (ST1 to ST4) were dug to a maximum depth of 2.00mbgl.
    - The slip trenches were spaced to locate the extent of remaining foundations
- In-situ testing as Standard Penetration Tests, Hand Shear Vanes and retrieval of U100 samples.
- Retrieval of samples for geotechnical and chemical testing.
- Topographical survey of exploratory locations.

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

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

4 GROUND CONDITIONS

A summary of the ground conditions encountered is given below.

4.1 Made Ground

Made ground was variable across the site and was proven to be deepest within the area of the historic building footprint. Made ground was encountered to a minimum depth of 0.40mbgl (WS10) and a maximum depth of 3.00mbgl (BH2). The made ground broadly consisted of a surface covering of tarmac, topsoil or demolition rubble generally overlying granular fill, with the granular material variably comprising brick, slag and concrete, with ash noted locally.

Across the site, a band of locally sandy locally gravelly locally organic clay fill was generally encountered beneath the granular fill.

4.2 Obstructions

Concrete obstructions were encountered within BH1 (2.40mbgl), BH2 (3.00mbgl), TP1 (0.90mbgl), WS05 (1.00mbgl) WS08 (1.50mbgl) and WS11 (1.40mbgl). Relic strip foundations were noted within ST1 at 1.10mbgl.

Within BH5, a sandstone boulder resulted in no recovery of samples between 15.50 and 17.50mbgl as the boulder was pushed through the clay preventing sampling. This boulder resulted in the borehole refusing at 17.50mbgl.

4.3 Natural Deposits

Proven to underlie the made ground deposits across the site, natural ground generally comprised firm becoming stiff consistency locally sandy locally gravelly locally low to high strength (locally silty) clay, which was encountered to a maximum determination depth of 20.00mbgl in the cable percussive boreholes.

In the east of the site (WS09 and WS10), a band of loose slightly clayey slightly gravelly silty sand was present between 0.80 to 3.10mbgl and 0.40 to 3.50mbgl, respectively.

4.4 Groundwater

Groundwater was encountered within BH2 (2.50mbgl), BH3 (1.10mbgl), BH4 (4.00mbgl), ST2 (2.00mbgl), WS02 (2.50mbgl), WS07 (2.50mbgl), WS09 (2.50mbgl) and WS10 (2.80mbgl). No groundwater was encountered within the remainder of the positions.

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

5 CONTAMINATION TESTING RESULTS

The proposed development of the site is to involve the construction of a commercial building with provision of areas of parking and peripheral landscaping. The chemical results are presented in Appendix C.

5.1 Site Characterisation

Within the Solmek Phase 1 Desk Study, a preliminary conceptual model was formed based on the information obtained. The initial risk was based on the site history which recorded the site as being first developed in the 1930s, with buildings added in the 1950s before the site was cleared and extensively redeveloped with an L shaped building, which was demolished by 2019.

An overall Low to Moderate risk was provided for various receptors:

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

5.2 Contamination Testing and Rationale

To provide information upon the possibility of ground contamination seven samples of made ground and one sample of natural clay were selected for shallow contamination testing. A Low to Moderate overall contamination risk was highlighted in the Phase 1 Desk Study due to previous land uses. This coupled with the end use being Commercial means that eight samples are considered appropriate for testing:

- TP1 – 0.20m (Made ground – topsoil)
- TP2 – 0.40m (Made ground – ash fill)
- TP3 – 0.65m (Natural clay)
- TP4 – 0.30m (Made ground – clay fill)
- TP5 – 0.50m (Made ground – clay fill)
- ST2 – 0.30m (Made ground – granular fill, asbestos noted)
- WS08 – 0.50m (Made ground – clay fill)
- WS09 – 0.40m (Made ground – clay fill)

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

- 8no Metals, semi-metals, non-metals, inorganic determinants
- 8no Asbestos identification screenings
- 8no Speciated Polyaromatic Hydrocarbons (PAHs)
- 8no Total Petroleum Hydrocarbon Criteria Working Group fractions (TPHCWG)
- 2no Volatile Organic Compounds (VOCs)
- 2no Semi-Volatile Organic Compounds (SVOCs)

In addition, two samples were sent for Leachate Testing:

- TP1 – 0.20m (Made ground – topsoil)
- TP3 – 0.65m (Natural clay)

5.3 Test Results

Based on the proposed development at the site, the test results have been compared to a series of Land Quality Management (LQM) Suitable for Use Levels (S4UL) based on a 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 and 2.

TABLE 1: SUMMARY OF INORGANIC CONTAMINATION TESTING RESULTS

Determinand	Units	Number of Samples above Level of Detection	Minimum Recorded Level	Maximum Recorded Level	Commercial Threshold Value	Number of Results Exceeding Threshold Value
Metals						
Cadmium	mg/kg	7	<0.1	0.4	190	0
Chromium	mg/kg	8	15	89	8600	0
Copper	mg/kg	8	8.0	32	68000	0
Lead	mg/kg	8	5.0	110	2300*	0
Mercury	mg/kg	4	<0.05	0.28	1100	0
Nickel	mg/kg	8	5.2	27	980	0
Zinc	mg/kg	8	13	220	730000	0
Semi metals and non metals						
Arsenic	mg/kg	8	4.2	13	640	0
Boron	mg/kg	8	0.6	3.4	240000	0
Selenium	mg/kg	5	<0.5	3.1	12000	0
Inorganic chemicals						
Cyanide	mg/kg	1	<0.1	0.3	1580**	0
W.S. Sulphate	mg/l	8	21	1600	2000^	0
Other						
pH	pH	-	7.0	11.6	5.5^	0

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

5.4 Metals, Semi Metals and Non Metals

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

5.5 Inorganic Chemicals

Soluble sulphates (potentially aggressive to foundation concrete) were recorded between 21 and 1600mg/l. None of the samples were elevated above levels affecting human health or the BRE Special Digest 1 500mg/l limit for the sulphate classification of concrete.

The results of the pH testing were between 7.0 and 11.6, which is consistent with slightly alkaline conditions.

5.6 Organic Chemicals

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

The average SOM recorded across the site was 3.13% therefore a SOM of 6% has been used to determine the S4UL thresholds. Table 2, below, summarises the results.

TABLE 2: SUMMARY OF ORGANIC CONTAMINATION TESTING RESULTS

Determinand	Units	Number of Samples above Level of Detection	Minimum Recorded Level	Maximum Recorded Level	Commercial Threshold Value at 2.5% SOM	Number of Results Exceeding Threshold Value
TPH Aliphatic Fractions						
Aliphatic (C5-C6)	mg/kg	0	<0.01	-	5900	0
Aliphatic (C6-C8)	mg/kg	0	<0.01	-	17000	0
Aliphatic (C8-C10)	mg/kg	0	<0.01	-	4800	0
Aliphatic (C10-C12)	mg/kg	1	<1.5	4.5	23000	0
Aliphatic (C12-C16)	mg/kg	1	<1.2	17	82000	0
Aliphatic (C16-C35)	mg/kg	2	<4.9	144	1700000	0
TPH Aromatic Fractions						
Aromatic (C5-C7)	mg/kg	0	<0.01	-	46000	0
Aromatic (C7-C8)	mg/kg	0	<0.01	-	110000	0
Aromatic (C8-C10)	mg/kg	0	<0.01	-	8100	0
Aromatic (C10-C12)	mg/kg	0	<0.9	-	28000	0
Aromatic (C12-C16)	mg/kg	1	<0.5	4.6	37000	0
Aromatic (C16-C21)	mg/kg	1	<0.6	16	28000	0
Aromatic (C21-C35)	mg/kg	1	<1.4	190	28000	0
Speciated PAH						
Naphthalene	mg/kg	1	<0.1	2.0	460	0
Acenaphthylene	mg/kg	2	<0.1	1.4	97000	0
Acenaphthene	mg/kg	5	<0.1	0.5	97000	0
Fluorene	mg/kg	2	<0.1	0.6	68000	0
Phenanthrene	mg/kg	4	<0.1	5.3	22000	0
Anthracene	mg/kg	2	<0.1	1.4	540000	0
Fluoranthene	mg/kg	4	<0.1	8.4	23000	0
Pyrene	mg/kg	5	<0.1	8.4	54000	0
Benzo(a)anthracene	mg/kg	5	<0.1	2.8	170	0
Chrysene	mg/kg	5	<0.1	4.3	350	0
Benzo(b)fluoranthene	mg/kg	5	<0.1	4.6	44	0
Benzo(k)fluoranthene	mg/kg	5	<0.1	3.6	1200	0
Benzo(a)pyrene	mg/kg	5	<0.1	3.3	35	0
Indeno(123cd)pyrene	mg/kg	5	<0.1	3.4	4000	0
Dibenz(ah)anthracene	mg/kg	4	<0.1	1.0	3.6	0
Benzo(ghi)perylene	mg/kg	5	<0.1	3.4	510	0
PAH	mg/kg	5	<1.6	55	1000*	0
Phenols	mg/kg	0	<0.5	-	1500	0
* EA Threshold Values						

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

5.7 Asbestos

From the eight samples subject to asbestos screening, asbestos fibres were recorded within WS08 (0.50m) and WS09 (0.40m). Both of these samples are recorded in the east of the site, with chrysotile and amosite noted in WS08 and chrysotile noted in WS09. Both of these samples were sent for quantification testing, with the results showing 0.003% asbestos by mass in WS08 and <0.001% in WS09.

5.8 Volatile Organic Compounds and Semi-Volatile Organic Compounds

Two samples were scheduled for VOC and SVOC testing, with all results below the limits of detection, with the only exception being 4-nitrophenol, which was recorded at the limit of detection.

5.9 Leachates

Two samples have been subject to leachate testing. The results have been compared, where available, to UK Drinking Water Standards (DWS), otherwise EA Leachate Quality Thresholds and WHO Guidelines

(2005) have been used. Results are summarised within Table 3 below.

TABLE 3: SUMMARY OF LEACHATE CONTAMINATION TESTING RESULTS

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	2	1.7	-	50	0
Copper	µg/l	2	1.0	1.1	2000	0
Lead	µg/l	2	2.4	2.5	25	0
Mercury	µg/l	0	<0.01	-	1	0
Nickel	µg/l	2	1.1	1.2	20	0
Zinc	µg/l	2	3.8	5.2	5000	0
Arsenic	µg/l	2	0.40	0.44	10	0
Selenium	µg/l	0	<0.25	-	10	0
Sulphate	mg/l	2	1.2	150	250	0
PAH0						
Acenaphthene	µg/l	2	0.02	0.03	PAH DWS is 0.1µg/l	0
Acenaphthylene	µg/l	0	<0.01	-		0
Anthracene	µg/l	2	0.03	-		0
Benzo[a]anthracene	µg/l	1	<0.01	0.01		0
Benzo[a]pyrene	µg/l	0	<0.01	-		0
Benzo[b]fluoranthene	µg/l	0	<0.01	-		0
Benzo[k]fluoranthene	µg/l	1	<0.01	0.02		0
Benzo[g,h,i]perylene	µg/l	1	<0.01	0.01		0
Chrysene	µg/l	1	<0.01	0.03		0
Dib'[a,h]anthracene	µg/l	0	<0.01	-		0
Fluoranthene	µg/l	2	0.03	0.05		0
Fluorene	µg/l	2	0.02	0.03		0
Indeno[123cd]pyrene	µg/l	1	<0.01	0.01		0
Naphthalene	µg/l	2	0.06	-		0
Phenanthrene	µg/l	2	0.05	0.06		0
Pyrene	µg/l	2	0.03	0.04		0
PAH Total	µg/l	2	0.28	0.37	0.2**	2
Phenol	µg/l	0	<100	-	0.5	0
TPH Aliphatic Fractions						
C5-6	µg/l	0	<0.1	-	15000*	0
C6-8	µg/l	0	<0.1	-	15000*	0
C8-10	µg/l	0	<0.1	-	300*	0
C10-12	µg/l	0	<1.0	-	300*	0
C12-16	µg/l	0	<1.0	-	300*	0
C16-21	µg/l	0	<1.0	-	300*	0
C21-35	µg/l	0	<1.0	-	300*	0
TPH Aromatic Fractions						
C5-7	µg/l	0	<0.1	-	10*	0
C7-8	µg/l	0	<0.1	-	10*	0
C8-10	µg/l	0	<0.1	-	100*	0
C10-12	µg/l	0	<1.0	-	100*	0
C12-16	µg/l	0	<1.0	-	100*	0
C16-21	µg/l	0	<1.0	-	90*	0
C21-35	µg/l	0	<1.0	-	90*	0
** WHO Guidelines 2005* *** EA leachate quality thresholds* **** EQS Freshwater*						

Total PAH was elevated within both samples.

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

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

The main objectives of the Part 2A regime are to *"identify and remove unacceptable risks to human health and the environment" and* to *"seek to ensure that contaminated land is made suitable for its current use".* Part 2A uses a risk based approach to defining contaminated land whereby the "risk" is interpreted as *"the likelihood that*

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

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

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

See Appendix E for additional notes on contamination guidelines.

6 CONCEPTUAL MODEL AND CONTAMINATION ANALYSIS

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

TABLE 4: CONCEPTUAL MODEL

Source	Pathway	Receptor	Risk Rating	Comments
Asphyxiating or explosive ground gases • Made ground • Shallow coal mining	**Ground gas migration** • Migration through permeable soils • Inhalation	**Future site users** • Transient adult workers	Moderate /Low	Gas monitoring in progress, source risk rating subject to change.
		Users during development • Construction workers	Low	
Areas of contamination hazardous to human health (Commercial Thresholds) • Asbestos in WS08 and WS09 • No exceedances of organic thresholds • No exceedances of inorganic thresholds	• Inhalation	**Future site users** • Transient adult workers	Moderate /Low	Possible contamination risks can be mitigated by hardstanding/clean cover systems.
		Users during development • Construction workers	High	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.*
	• Inhalation • Dust ingestion	**Users of surrounding sites** • Transient adult workers	Moderate /Low	Potential moderate risk during remediation/construction from dust generation. Consideration to be given to dust suppression, in line with BRE: *The Control of Dust and Emissions from Construction and Demolition, Best Practice Guidance.*
Areas of elevated Leachate contamination • Elevated PAH within both leachate samples	• Leaching of mobilised contaminants	**Solid geology** • Principal Aquifer	Moderate /Low	Limited leachable contamination overlying a sensitive aquifer (Principal Aquifer but not in a groundwater Source Protection Zone). Limited availability of contaminants in soil analysis.
		Drift geology • Secondary Aquifer – A	Low	The low permeability and the relatively low sensitivity of the aquifer.
	• Drainage • Lateral migration • Accumulation of contaminated sediment	**Surface water features** • River 805m northeast	Low	Surface waters unlikely to be impacted by contamination from site.
	• Uptake via roots and leaf surfaces	**Vegetation** • Some peripheral landscaping proposed	Moderate /Low	Some peripheral landscaping proposed for development/retention.
Areas of contamination above service fabric or BRE Special Digest 1 thresholds	• Direct contact	**Construction Materials** • Concrete	Moderate	DS-3 AC-2 concrete required due to elevated sulphates.
		Construction Materials • Service Fabric	Moderate	Copper piping to be avoided and prudent to lay any service within a clean bedding.

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

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

6.1 Users of the Site Once Development is Complete

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

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

The levels of contaminants across the site are generally low with only two 'hotspot' areas of concern, in WS08 and WS09 where asbestos fibres were detected.

The new development is expected to comprise new commercial buildings with associated parking/access roads and peripheral soft landscaping. Based on the **shallow** soil contamination testing, it is considered that the levels of contamination may pose a risk to future users of the site, as soft landscaping is proposed in the final development. This pollutant linkage however will be severed as long as all contaminated areas are covered either by buildings, hardstanding, or a clean cover system.

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

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

6.2 Construction Workers and Users of Surrounding Sites

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

Chrysotile asbestos fibres were detected in the samples from WS08 and WS09 with amosite also detected in WS08. These samples were sent for asbestos quantification testing. The results of the screening and further testing are presented in Appendix C. This indicated that there was 0.003% and <0.001% by mass of asbestos within the samples.

Based on the guidance set forth in the Interdepartmental Committee for the Redevelopment of Contaminated Land (ICRCL), 1990, Guidance note 64/85 "Asbestos on Contaminated Sites" asbestos contaminated soil should be considered as a hazardous waste if the percentage by mass exceeds 0.1%. Should it have a mass of >0.001% it is considered as a risk to human health. Given that the sample from WS08 showed 0.003% by mass, it is possible that the soil may present a risk to human health.

It is considered that the encountered levels of contamination may pose risk to construction workers and users of surrounding sites. As good practice, full PPE must be employed in accordance with HSE guidance and safeguards should be taken to limit dust during ground works, and access to the public should be restricted. Construction workers should use gloves as a precaution when handling any fill materials. Provision of suitable hygiene facilities are needed for site workers.

Further asbestos may be present elsewhere on the site that has not been sampled or tested during this investigation. It is therefore advised that having a qualified asbestos surveyor present during the initial site

strip and any excavation works is given careful consideration. All works should be undertaken in accordance with the Control of Asbestos Regulations 2012. Any strata found to contain asbestos will be considered unsuitable for re-use on-site.

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

6.3 Vegetation

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

To establish if the levels of contaminants present on site may pose a risk to vegetation the results of the contamination testing have been compared to a series of threshold values published in "*Code of Good Agricultural Practice for the Protection of Soil"*. No concentrations of the phytotoxic determinants are shown as elevated from the eight samples tested.

Any areas of soft landscaping will require a suitable growing medium. Proposed planting areas should be excavated to 0.50mbgl or natural ground, whichever is shallower. The suitable growing medium should comprise 200mm topsoil over up to 300mm of subsoil. With the exception of WS08 and WS09 (asbestos), the suitable growing medium may utilise on-site materials, based on the contamination testing undertaken to date, however care must be taken to stockpile any excavated material away from any potential sources of contamination. The topsoil and subsoil should be screened of any deleterious materials (i.e. ash, slag, brick rubble and concrete).

6.4 Ground and Surface Water

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

From the site investigation undertaken, ground conditions broadly comprise made ground over drift deposits of sandy gravelly clay, with local areas of sand noted in the east of the site. The cohesive deposits can be considered to have a low permeability, whilst the granular deposits can be considered to have a moderate to high permeability. The drift deposits are variably designated as an Unproductive Strata in the west of the site and as a Secondary Aquifer – A in the east of the site by the Environment Agency.

The published geology indicates the site is underlain by solid geology of Sherwood Sandstone, which is designated as a Principal Aquifer by the Environment Agency. Rockhead was not proven in the intrusive investigation, however drift deposits have been proven to 20.00mbgl.

The nearest surface water feature is an unnamed river located 805m northeast of the site.

Groundwater was encountered within BH2 (2.50mbgl), BH3 (1.10mbgl), BH4 (4.00mbgl), WS02 (2.50mbgl), WS07 (2.50mbgl), WS09 (2.50mbgl) and WS10 (2.80mbgl). No groundwater was encountered within the remainder of the positions.

No contamination was recorded within the soil samples considered to impact groundwater, however the leachate analysis of two samples indicated exceedances for total PAH, however, the exceedances were noted to be minor and the mobility of PAH in groundwater is low, due to its low solubility and high preference for sorption to organic carbon.

Due to the generally low contamination found across the site, the absence of shallow groundwater, the low permeability deposits underlying the site and the distance to surface waters, the development is considered to represent a low risk to groundwater or surface water receptors.

6.5 Construction Materials

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

6.5.1 Concrete Classification

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

6.5.2 Water Supply Pipes Material Selection

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

Level of neutral to alkaline pH (7.0 to 11.6) were recorded across the site at depths of between 0.20mbgl and 13.45mbgl within the made ground and natural samples.

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

7 GROUND GAS ASSESSMENT

The proposed development includes the construction of a commercial building.

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

For this report, gas monitoring is via measuring emissions from three standpipes (BH3, BH4 & BH5) that were installed during the sitework. The gas monitoring will consist of six visits over a period of three months. The gas monitoring results will be presented as an addendum to this report.

8 GEOTECHNICAL TESTING AND ANALYSIS

Samples taken from the boreholes and trial pits underwent a series of geotechnical tests (BS 1377:1990) to aid foundation design and soil description. In addition, insitu Standard Penetration Tests (SPTs) and Hand Shear Vane Tests were undertaken at regular intervals during drilling whilst U100 samples were retrieved for testing. The geotechnical results are presented in Appendix D.

8.1 Strength and Density

Standard Penetration Tests undertaken within the made ground in the BH01 at 1.50 and 2.50mbgl both yielded N values of 50+ (refusal).

Standard Penetration Tests undertaken within the natural cohesive deposits of the cable percussive boreholes yielded N values of between 6 and 50+. These can be multiplied by 5 to provide an approximate

indication of shear strengths, with the results indicating low to very high strength conditions.

Three samples were subjected to quick, undrained triaxial testing from BH3 (5.00m), BH5 (13.00m) and BH7 (11.50m). The results were 117kPa, 212kPa and 116kPa, indicating high and very high strength conditions. The results of the triaxial tests should not be used a basis for foundation design, instead they provide an indication of the insitu shear strengths for soil classification.

Hand shear vane testing within the natural cohesive deposits returned results ranging from 30kPa to 110kPa, which are indicative of medium to high strength conditions. At approximate foundation depth (ca. 1.00mbgl) the results ranged between 35kPa and 110kPa.

Standard Penetration Tests undertaken within the natural granular deposits in WS09 and WS10 yielded N values of between 4 and 6, indicative of loose deposits. An additional SPT within BH1 at 1.00mbgl recorded an N value of 50+ (refusal).

8.2 Consolidation Testing

Three samples of natural clay were selected for one dimensional consolidation testing at depths ranging from 4.00 to 14.50mbgl. Testing was undertaken in six stages at incremental pressure increases from 0, to 100, to 200, up to 400kPa, with an unload of 200kPa in stage five. The coefficients of volume compressibility (m_v) results for the pressure range 0-100kPa ranged from 0.044 to 0.460m^2/MN. The m_v results ranged from 0.170 to 0.340m^2/MN for the pressure range 100-200kPa. The m_v results ranged from 0.095 to 0.130m^2/MN for the pressure range 200-400kPa. The m_v results ranged from 0.042 to 0.065m^2/MN for the pressure range 400-800kPa.

The remainder of the results for each pressure increment and pressure unloads are provided in the appendices, with m_v values generally decreasing with increasing pressure and over the unload stage.

8.3 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 0.50 and 14.95mbgl. Moisture levels were between 6.7% and 30%.

8.4 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 generally be clay of low to intermediate plasticity.

The Plasticity Indices ranged from 10 to 25 with equivalent moisture contents recorded at and above the corresponding plastic limits. The cohesive material can be assessed as having a **medium** shrinkage potential in relation to NHBC Guidance Chapter 4.2.

8.5 Particle Size Distribution and Sedimentation Testing

Four samples from the boreholes and trial pits (BH3 2.00-2.50mbgl, TP1B 1.40m, TP3 0.50m and WS09 1.50mbgl) were subject to Particle Size Distribution (PSD) tests in accordance with BS1377 Part 2 to aid soil descriptions. The results have been used to prepare precise soil descriptions in accordance with BS5930:2015 Section 6 and are presented in Appendix D.

8.6 pH and Sulphate Results

Seven natural samples from the boreholes were tested for acidity and soluble sulphate content to assess whether the material may be potentially aggressive to building fabric. The results of the testing for pH ranged from 7.8 to 9.6 indicating slightly alkaline conditions. Soluble sulphates were recorded at levels ranging from 75mg/l to 1600mg/l.

8.7 Percolation Tests

Five soakaway tests were carried out within the bases of TP1B, TP2, TP3, TP4 & TP5, with an additional

soakaway undertaken within WS10. The results returned infiltration rates of between 0.23 and 4.92 x 10^{-6} m/sec. The results are presented in Appendix D.

8.8 CBR Tests

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

TABLE 5: SUMMARY OF CBR TESTING RESULTS

Trial Pit	0.30mbgl result (%)	0.60mbgl result (%)	0.90mbgl result (%)
TP1	3.5 (M/G)	4.0 (M/G)	-
TP1B	3.0 (M/G)	3.5 (M/G)	4.0 (M/G)
TP2	2.0 (M/G)	3.0	2.5
TP3	2.5 (M/G)	2.0	3.0
TP4	3.0 (M/G)	4.0 (M/G)	2.0
TP5	2.0 (M/G)	3.0 (M/G)	2.5
M/G denotes test within made ground – prudent to adopt an equilibrium CBR of 2%			

8.9 Foundations

Detailed design loads have not been made available to Solmek. Consideration has been given conventional foundations, however made ground depths and excessive design loads may preclude this, so consideration has also been given to piled foundations.

In addition, in the east of the site, loose granular deposits were indicated as being present by the Desk Study, and were subsequently proven within WS09 and WS10. Recommendations have been provided for foundations upon granular material to cover the possibility of development occurring in the east of the site. Should any foundations span both cohesive and granular deposits, they should be adequately reinforced to accommodate for differential settlement.

8.9.1 *Strip Foundations upon Cohesive Deposits*

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

Locally (TP4, WS03, WS04, WS06, WS07) soft low strength pockets of clay were encountered, which may necessitate deepening foundations to ca 1.50mbgl in these areas.

Based on a conservative shear strength of 50kN/m² a safe bearing capacity of 115kN/m² has been determined for strip foundations 0.60m wide founding on the natural clay at depths of around 0.90mbgl. Providing the safe bearing capacity is not exceeded settlements have been calculated to be less than 25mm.

Made ground beneath the historic building footprint was proven to 3.00mbgl and not fully penetrated. In such areas, consideration could be given to deep trench fill foundations, with any stepped sections of foundations incorporating reinforcement.

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

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

8.9.2 *Strip Foundations upon Granular Deposits*

SPT results in the shallow granular deposits in the east of the site indicate loose densities (N values 4 to 6).

Given the low N values recorded, raft foundations could be considered as an alternative to strip foundations.

In order to minimise disturbance of the base of foundation excavations in sand, the excavator should be fitted with a machine bucket without teeth.

8.9.3 *Piled Foundations*

For any heavily loaded structures, the shallow ground conditions may not be suitable to support traditional foundations. Instead, piled foundations should be adopted. Information provided in this report should be made available to a competent piling contractor who can design appropriate foundations in accordance with Section 7: Pile foundations of BS EN 1997 – 1:2004 which applies to end-bearing piles, friction piles, tension piles and transversely loaded piles installed by driving, by jacking, and by screwing or boring. The piling contractor will need to take into consideration the possible effects of negative skin friction from made ground and very soft to soft alluvial silt deposits. Allowance should be made for breaking through known and unknown buried obstructions, including the suspected basement floor beneath the historic building.

Given the close proximity of sensitive industrial land use in the area, consideration may be given to a bored CFA pile. Consultation with Fujifilm is recommended prior to installing any piled foundations to determine limits of ground vibration/disturbance when installing the piles. In addition, consideration should be given to the amount and type of waste produced from CFA piling operations on the site and the safe disposal of potentially contaminative arisings (asbestos locally).

The precise method of pile installation and the applicability of proprietary systems, diameters and depths required would need to be determined by a specialist piling contractor.

The piled foundations are likely to penetrate the groundwater table in which limited, isolated hydrocarbon (PAH) contamination is present. The piling contractor should follow EA guidance and consult EA publication “Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination (2001)” prior to commencing intrusive piling works. To achieve this, the piling contractor may consider the use of adopt sleeved piles. It should also be noted that piled foundations can create preferential pathways for gas migration, however gas monitoring is ongoing and risks related to gas migration will be assessed later.

8.9.4 *General Foundation Comments*

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

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

8.10 Excavation

Based on the nature of the ground conditions encountered, excavations should be within the capacity of normal earthworks plant although breaking out of relic foundations (BH1 & BH2) and other obstructions should be anticipated. Stability of excavations will be poor in the made ground and the granular deposits in the east of the site but should improve in the natural clay. Excavation sides should be designed, constructed and supported in accordance with the recommendations given in CIRIA Report No. 97: “Trenching Practice”.

8.11 Groundwater

Groundwater was encountered within BH2 (2.50mbgl), BH3 (1.10mbgl), BH4 (4.00mbgl), ST2 (2.00mbgl), WS02 (2.50mbgl), WS07 (2.50mbgl), WS09 (2.50mbgl) and WS10 (2.80mbgl). No groundwater was encountered within the remainder of the positions.

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:
Figures and Drawings

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

Figure Title

Site Location Plan

Project Number

S190632

Project Name

Fujifilm, Billingham

Client

Turner and Townsend

Date

August 2019

DRG Number

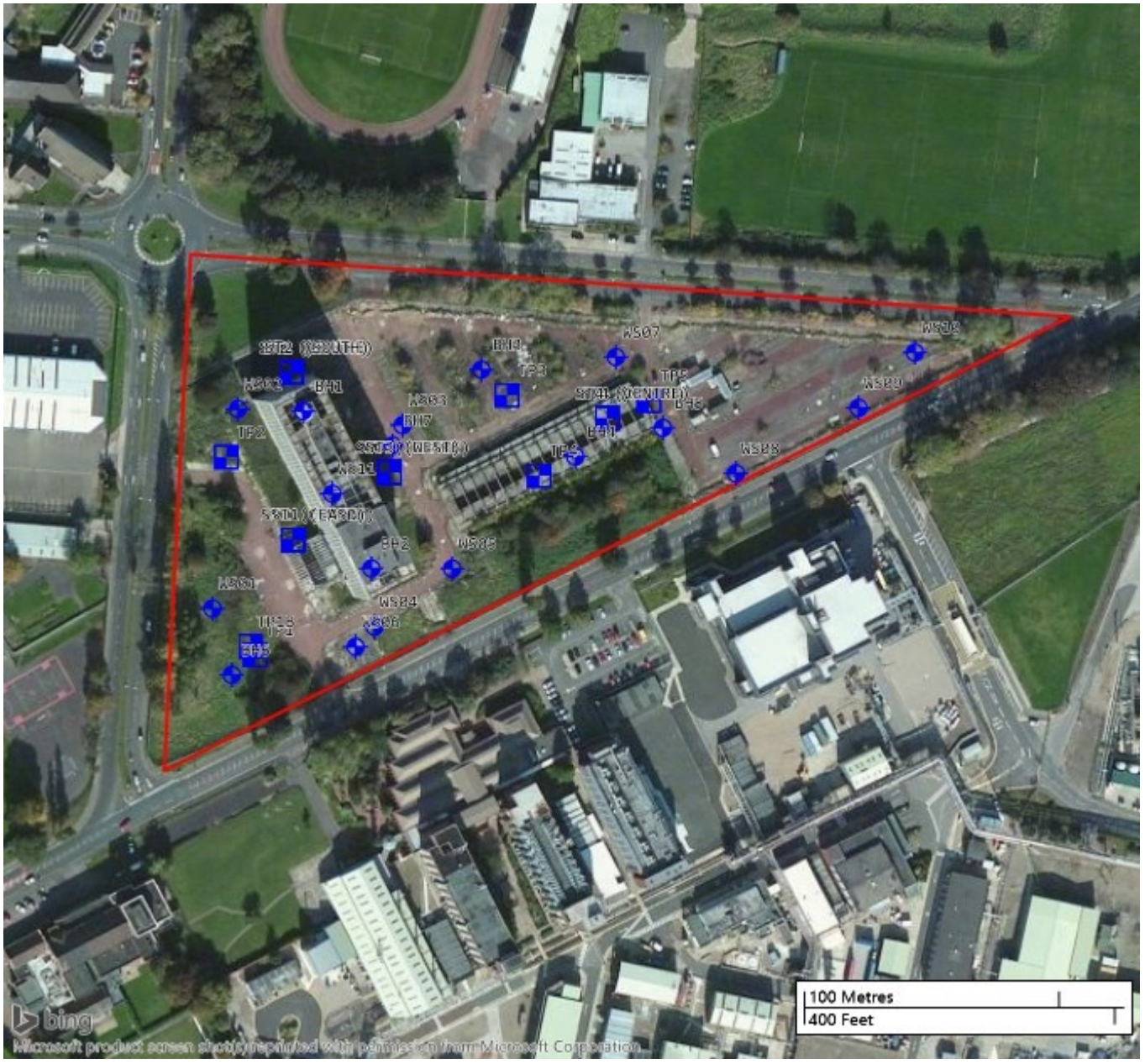
Figure 1

Scale

1:3000 @ A4 [DO NOT SCALE]

Legend Key

Project Bounds - Project Bounds



SOLMEK

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

Figure Title

Exploratory Hole Location Plan

Project Number

S190632

Project Name

Fujifilm, Billingham

Client

Turner and Townsend

Date

August 2019

DRG Number

Figure 2

Scale

1:2500 @ A4 [DO NOT SCALE]

Legend Key

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

APPENDIX B:
Borehole Logs & Trial Pit Logs

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

Borehole Log

Scale 1:100 Sheet 1 of 1

BH1

Contract no:	S190632	**Site:**	Fujifilm, Billingham	**Driller:**	RD Drilling Ltd
				Plant used:	Dando 2000
				Started:	05/07/2019
Client:	Turner and Townsend			**Ended:**	05/07/2019
Method:	Cable Percussive			**Backfilled:**	05/07/2019

GL (AOD):	16.27m	
Easting:	446456	
Northing:	522774	
Logged:	PF	
Status:	FINAL	

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing		
					Depth (m)	Type	Results
				MADE GROUND: Grey sandy gravel of angular to sub angular fine to coarse crushed concrete.	1.50 - 1.95	SPT (S)	N=50+ (16,9/21,29)
		2.40	13.87	Concrete Obstruction	2.50 - 2.95	SPT (S)	N=50+ (25/50)
				End of Borehole at 2.400m			

Hole Diameter

Depth Base (m)	Diameter (mm)
2.50	150

Casing Depths

Depth Base (m)	Diameter (mm)

General Remarks

1.2m hand excavated inspection pit.

Chiselling

From (m)	To (m)	Time (hr)
2.40	2.50	01:00

Ground Water

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

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

Borehole Log

Scale 1:100 Sheet 1 of 1

BH2

Contract no:	S190632	**Site:**	Fujifilm, Billingham	**Driller:**	RD Drilling Ltd
				Plant used:	Dando 2000
				Started:	05/07/2019
Client:	Turner and Townsend			**Ended:**	05/07/2019
Method:	Cable Percussive			**Backfilled:**	05/07/2019

GL (AOD):	16.39m
Easting:	446482
Northing:	522712
Logged:	PF
Status:	FINAL

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing		
					Depth (m)	Type	Results
				MADE GROUND: Grey sandy gravel of angular to sub angular fine to coarse crushed concrete.	0.20	B+ES	
					0.50	B+ES	
					0.50 - 1.20	B+ES	
					1.20 - 1.70	B	
					2.00 - 2.50	B	
		3.00	13.39	Concrete Obstruction			
				End of Borehole at 3.000m			
					4.00 - 4.45	SPT (S)	N=50+ (25/50)
					6.00 - 6.45	SPT (S)	N=50+ (25/50)

Hole Diameter

Depth Base (m)	Diameter (mm)
3.00	150

Casing Depths

Depth Base (m)	Diameter (mm)

General Remarks

1.2m hand excavated inspection pit.

Chiselling

From (m)	To (m)	Time (hr)
1.20	3.00	02:30
2.90	3.00	00:30

Ground Water

Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)
2.50			20	0.80

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

Borehole Log

Scale 1:100 Sheet 1 of 1

BH3

Contract no:	S190632	**Site:**	Fujifilm, Billingham	**Driller:**	RD Drilling Ltd
				Plant used:	Dando 2000
				Started:	08/07/2019
Client:	Turner and Townsend			**Ended:**	08/07/2019
Method:	Cable Percussive			**Backfilled:**	08/07/2019

GL (AOD):	15.76m
Easting:	446526
Northing:	522791
Logged:	PF
Status:	FINAL

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing		
					Depth (m)	Type	Results
		0.20	15.56	MADE GROUND: Black tarmac.	0.30 - 0.60	B+ES	
		0.60	15.16	MADE GROUND: Black to grey ashy fine to coarse gravel of angular to sub angular slag and brick.			
		1.10	14.66	MADE GROUND: Black to brown organic silty clay.			
				Firm becoming soft consistency brown mottled grey thinly laminated slightly sandy slightly gravelly low to high strength silty CLAY of medium plasticity. Gravel is fine to coarse angular to subangular of sandstone and mudstone.	1.20	D	
					1.50 - 1.95	U	20 blows [450mm]
					2.00 - 2.45	SPT (S)	N=6 (1,2/1,2,1,2)
					2.00 - 2.50	B	
					3.00	D	35 blows [450mm]
					3.00 - 3.45	U	
					3.50	D	
					4.00 - 4.45	SPT (S)	N=8 (1,1/1,2,2,3)
					4.00 - 4.50	B	
					5.00	D	30 blows [450mm]
					5.00 - 5.45	U	
					5.50	D	
					6.00 - 6.45	SPT (S)	N=18 (2,3/3,3,3,9)
					6.00 - 6.50	B	
		7.00	8.76	Stiff consistency reddish brown slightly sandy slightly gravelly high strength CLAY with occasional bands of thinly laminated clay. Gravel is angular to sub rounded fine to coarse of sandstone and limestone.	7.00	D	
					7.50 - 7.95	SPT (S)	N=13 (2,2/3,3,4,3)
					7.50 - 8.00	B	
					8.50	D	
					9.00 - 9.45	SPT (S)	N=12 (2,2/3,3,3,3)
					9.00 - 9.50	B	
					10.00	D	
					10.50 - 10.95	U	95 blows [350mm]
					11.00	D	
					12.00 - 12.45	SPT (S)	N=20 (3,3/4,5,5,6)
					12.00 - 12.50	B	
					13.00	D	
					13.50 - 13.95		70 blows [450mm]
					14.00	D	
		14.20	1.56	Very stiff brown very sandy slightly gravelly high strength CLAY. Gravel is rounded to sub rounded fine to coarse of sandstone.			
					15.00 - 15.45	SPT (S)	N=50+
		15.50	0.26		15.00 - 15.50	B	(3,5/7,10,15,18)
				Very stiff consistency brown slightly sandy slightly gravelly high strength CLAY. Gravel is angular to sub rounded fine to coarse of sandstone and limestone.	16.00	D	
					16.50 - 16.95	U	70 blows [95mm]
					17.00	D	
					18.00 - 18.45	SPT (S)	N=31 (3,5/6,8,8,9)
		20.00	-4.24	End of Borehole at 20.000m			

Hole Diameter		Casing Depths		General Remarks	Chiselling			Ground Water				
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)		From (m)	To (m)	Time (hr)	Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)
20.00	150			1.2m hand excavated inspection pit.				1.10				

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

Borehole Log

Scale 1:100 Sheet 1 of 1

BH4

Contract no:	S190632	**Site:**	Fujifilm, Billingham	**Driller:**	RD Drilling Ltd
				Plant used:	Dando 2000
				Started:	05/07/2019
Client:	Turner and Townsend			**Ended:**	08/07/2019
Method:	Cable Percussive			**Backfilled:**	08/07/2019

GL (AOD):	16.04m
Easting:	446564
Northing:	522757
Logged:	PF
Status:	FINAL

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing: Depth (m)	Type	Results
		0.10	15.94	MADE GROUND: Black tarmac.	0.10	B+ES	
				MADE GROUND: Black to grey ashy fine to coarse gravel of angular to sub angular slag and brick.	0.50	B+ES	
					0.50 - 1.00	B+ES	
		1.10	14.94	Firm consistency brown mottled grey slightly sandy silty medium strength CLAY.			
					1.50	B	
					1.50 - 1.95	D	
					1.50 - 2.00	U	N=9 (2,2/2,2,3,2)
					2.00 - 2.45	SPT (S)	
					2.00 - 2.50	B	
					3.00 - 3.45	SPT (S)	N=9 (1,2/3,2,2,2)
					3.00	D	
					3.50 - 4.00	B	
		4.10	11.94	Firm becoming soft consistency brown mottled grey thinly laminated slightly sandy silty low to medium strength CLAY of intermediate plasticity.	4.00	D	50 blows [450mm]
					4.00 - 4.45	U	
					4.50	D	
G					5.00 - 5.45	SPT (S)	N=9 (1,2/2,2,2,3)
					5.00 - 5.50	B	
					6.00 - 6.45	U	50 blows [450mm]
					6.50	D	
		7.50	8.54	Stiff consistency reddish brown slightly sandy slightly gravelly high strength CLAY with occasional bands of thinly laminated clay. Gravel is angular to sub rounded fine to coarse of sandstone and mudstone.	7.50 - 7.95	SPT (S)	N=15 (3,3/4,3,4,4)
					7.50 - 8.00	D	
					8.50	D	
					9.00 - 9.45	B	80 blows [NR]
					9.00 - 9.50	U	
					10.00 - 10.45	SPT (S)	N=19 (3,3/4,5,5,5)
					10.00	B	
					10.00 - 10.50	D	
					11.50 - 11.95	U	65 blows [350mm]
					12.00	D	
					13.00 - 13.45	SPT (S)	N=21 (2,3/4,4,6,7)
					13.00 - 13.50	B	
		14.50	1.54	Very stiff consistency brown slightly sandy slightly gravelly high strength CLAY of low plasticity. Gravel is angular to sub rounded fine to coarse of sandstone and limestone.	14.50 - 14.95	U	80 blows [430mm]
					15.00	D	
					16.00 - 16.45	SPT (S)	N=39 (5,7/9,9,10,11)
					16.00 - 16.50	B	
					17.00	D	
					17.50 - 17.95	B	100 blows [NR]
					17.50 - 18.00	U	
					19.00 - 19.33	SPT (S)	N=50+ (10,13/15,15,20 for 33mm)
					19.00 - 19.50	B	
		20.00	-3.96	End of Borehole at 20.000m	20.00	D	

Hole Diameter		Casing Depths		General Remarks	Chiselling			Ground Water				
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)		From (m)	To (m)	Time (hr)	Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)
7.50	150			1.2m hand excavated inspection pit.				4.00				

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

Borehole Log

Scale 1:100 Sheet 1 of 1

BH5

Contract no:	S190632	**Site:**	Fujifilm, Billingham	**Driller:**	RD Drilling Ltd
				Plant used:	Dando 2000
				Started:	08/07/2019
Client:	Turner and Townsend			**Ended:**	09/07/2019
Method:	Cable Percussive			**Backfilled:**	09/07/2019

GL (AOD):	15.87m
Easting:	446598
Northing:	522768
Logged:	PF
Status:	FINAL

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing		
					Depth (m)	Type	Results
				MADE GROUND: Black to grey ashy fine to coarse gravel of angular to sub angular slag and brick.	0.50 - 1.00	B+ES	
		0.90	14.97	Firm becoming soft consistency brown mottled grey thinly laminated slightly sandy silty low to medium strength CLAY.	1.00	D	
					1.50 - 1.95	SPT (S)	N=4 (1,1/0,1,1,2)
					1.50 - 2.00	B	
					2.00	D	
					2.50 - 2.95	U	30 blows [350mm]
					3.00	D	
					3.50 - 3.95	SPT (S)	N=6 (1,1/1,1,2,2)
					3.50 - 4.00	B	
G					5.00	D	
					5.50 - 5.95	SPT (S)	N=15 (1,1/1,2,3,9)
					5.50 - 6.00	B	
					7.00	D	
					7.50 - 7.95	U	95 blows [350mm]
					8.00	D	
		8.20	7.67	Stiff consistency reddish brown slightly sandy slightly gravelly high strength CLAY with occasional bands of thinly laminated clay. Gravel is angular to sub rounded fine to coarse of sandstone and limestone.	8.50 - 8.95	SPT (S)	N=23 (3,3/3,9,5,6)
					9.00 - 9.50	B	
					10.00 - 10.95	U	50 blows [NR]
					10.50	D	
					11.50 - 11.95	SPT (S)	N=26 (2,3/9,5,5,7)
					11.50 - 12.00	B	
					12.58	D	
		12.80	3.07	Very stiff consistency brown thinly laminated very high strength silty CLAY of low plasticity.	13.00 - 13.45	U	75 blows [450mm]
					13.50	D	
		14.40	1.47	SANDSTONE boulder (pushing down).	14.50 - 14.80	SPT (S)	N=50+ (18,7 for 60mm/50 for 19mm)
					14.50 - 15.50	B	
					17.00 - 17.13	SPT (S)	N=50+ (25 for 38mm/50)
		17.50	-1.63	End of Borehole at 17.500m			

Hole Diameter

Depth Base (m)	Diameter (mm)
12.00	150
17.50	150

Casing Depths

Depth Base (m)	Diameter (mm)

General Remarks

1.2m hand excavated inspection pit.

Chiselling

From (m)	To (m)	Time (hr)
16.70	16.90	00:30
17.20	17.50	01:00

Ground Water

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

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

Borehole Log

Scale 1:100 Sheet 1 of 1

BH6

Contract no:	S190632	**Site:**	Fujifilm, Billingham	**Driller:**	RD Drilling Ltd
				Plant used:	Dando 2000
				Started:	04/07/2019
Client:	Turner and Townsend			**Ended:**	04/07/2019
Method:	Cable Percussive			**Backfilled:**	04/07/2019

GL (AOD):	15.94m	
Easting:	446428	
Northing:	522669	
Logged:	PF	
Status:	FINAL	

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing: Depth (m)	Type	Results
		0.20	15.74	MADE GROUND: Brown topsoil.	0.10	B+ES	
				MADE GROUND: Firm consistency brown to black gravelly clay. Gravel is angular to sub rounded fine to coarse of brick.	0.20 - 0.80	B+ES	
		0.80	15.14	Firm consistency brown mottled grey slightly sandy medium strength silty CLAY.	1.20 - 1.65	SPT (S)	N=8 (1,1/1,2,2,3)
		1.50	14.44		1.20 - 1.70	B	
				Firm becoming soft consistency brown mottled grey thinly laminated slightly sandy silty low to medium strength CLAY of medium plasticity.	2.00 - 2.45	U	40 blows [270mm]
					2.50	D	
					3.00 - 3.45	SPT (S)	N=8 (1,1/2,2,2,2)
					3.00 - 3.50	B	
					4.00 - 4.45	B	60 blows [NR]
					4.00 - 4.50	U	
					5.00 - 5.45	SPT (S)	N=9 (1,2/2,2,2,3)
					5.00	B	
					5.00 - 5.50	D	
					6.50 - 6.95	U	60 blows [360mm]
					7.00	D	
					8.00 - 8.45	SPT (S)	N=13 (2,3/3,3,3,4)
		8.50	7.44	Stiff consistency reddish brown slightly sandy slightly gravelly high strength CLAY with occasional bands of thinly laminated clay. Gravel is angular to sub rounded fine to coarse of sandstone and limestone.	8.50	D	
					9.50 - 9.95	U	70 blows [360mm]
					10.00	D	
					11.00 - 11.45	SPT (S)	N=17 (2,3/3,4,4,6)
					11.00 - 11.50	B	
					12.50 - 12.95	U	80 blows [405mm]
					13.00	D	
					14.00 - 14.45	SPT (S)	N=26 (3,5/6,6,7,7)
		14.20	1.74	Very stiff consistency brown slightly sandy slightly gravelly high strength CLAY. Gravel is angular to sub rounded fine to coarse of sandstone and limestone.	14.00 - 14.50	B	
					15.00	D	
					15.50 - 15.95	U	80 blows [225mm]
					16.00	D	
					17.00 - 17.45	SPT (S)	N=27 (3,6/6,6,7,8)
					17.00 - 17.50	B	
					18.50 - 18.95	U	85 blows [405mm]
					19.00	D	
					19.50 - 19.95	SPT (S)	N=26 (3,5/5,6,7,8)
		20.00	-4.06	End of Borehole at 20.000m	20.00	D	

Hole Diameter

Depth Base (m)	Diameter (mm)
1.50	150

Casing Depths

Depth Base (m)	Diameter (mm)

General Remarks

1.2m hand excavated inspection pit.

Chiselling

From (m)	To (m)	Time (hr)

Ground Water

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

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

Borehole Log

Scale 1:100 Sheet 1 of 1

BH7

Contract no:	S190632	**Site:**	Fujifilm, Billingham	**Driller:**	RD Drilling Ltd
				Plant used:	Dando 2000
				Started:	09/07/2019
Client:	Turner and Townsend			**Ended:**	10/07/2019
Method:	Cable Percussive			**Backfilled:**	10/07/2019

GL (AOD):	15.80m	
Easting:	446491	
Northing:	522760	
Logged:	PF	
Status:	FINAL	

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing		
					Depth (m)	Type	Results
				MADE GROUND: Black to grey ashy fine to coarse gravel of angular to sub angular slag and brick.	0.80	B+ES	
		0.90	14.90	Firm becoming soft consistency brown mottled grey thinly laminated slightly sandy silty low to medium strength CLAY.	0.80 - 0.90	B+ES	
					1.50 - 1.95	U	30 blows [350mm]
					2.00	D	
					2.50 - 2.95	SPT (S)	N=7 (1,1/1,2,2,2)
					2.50 - 3.00	B	
					3.00	D	
					3.50 - 3.95	U	30 blows [450mm]
					4.00	D	
					4.50 - 4.95	SPT (S)	N=12 (1,2/2,3,3,4)
					4.50 - 5.00	B	
					5.50 - 5.95	U	
					6.00	D	
		6.60	9.20	Stiff consistency reddish brown slightly sandy slightly gravelly high strength CLAY of low plasticity with occasional bands of thinly laminated clay. Gravel is angular to sub rounded fine to coarse of sandstone and limestone. Thinly laminated 9.80-10.60m.	7.00 - 7.45	SPT (S)	N=20 (3,3/4,5,5,6)
					7.00 - 7.50	B	
					8.00	D	
					8.50 - 8.95	U	45 blows [450mm]
					9.00	D	
					10.00 - 10.45	SPT (S)	N=15 (3,3/3,3,4,5)
					10.00 - 10.50	B	
					11.00	D	
					11.50 - 11.95	U	50 blows [400mm]
					12.00 - 12.45	SPT (S)	N=23 (3,9/5,6,6,6)
					12.00	D	
					13.00 - 13.50	B	
		13.70	2.10	Very stiff consistency brown slightly sandy slightly gravelly high strength CLAY. Gravel is angular to sub rounded fine to coarse of sandstone and limestone.			
					14.50 - 14.95	SPT (S)	N=31 (5,6/6,7,7,11)
					14.50 - 15.00	B	
					15.50	D	
					16.00 - 16.20	SPT (S)	N=50+ (13,12 for 41mm/34,16 for 14mm)
					16.00 - 16.50	B	
					17.00	D	
					17.50 - 17.70	SPT (S)	N=50+ (16,9 for 25mm/38,12 for 28mm)
					17.50 - 18.00	B	
					18.50	D	
					19.00 - 19.14	SPT (S)	N=50+ (25 for 38mm/36,14 for 25mm)
		20.00	-4.20	End of Borehole at 20.000m	20.00	D	

Hole Diameter		Casing Depths		General Remarks	Chiselling			Ground Water				
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)		From (m)	To (m)	Time (hr)	Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)
20.00	150			1.2m hand excavated inspection pit.								

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

Trial Pit Log

TrialPit No ST1 (CENTRE)
Sheet 1 of 1

Project Name:	Fujifilm, Billingham	Project No. S190632	Co-ords: 446452E - 522723N Level: 16.44
Plant Used:	JCB 3CX	Dimensions (m): Depth 1.30	Scale 1:26
Client:	Turner and Townsend		Logged PF

Date 04/07/2019

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							MADE GROUND: Black to grey ashy slag.
				1.20	15.24		Firm becoming soft consistency brown mottled grey medium to low strength silty CLAY.
				1.30	15.14		End of Pit at 1.300m

Remarks: High voltage cable at 0.70m (relict).

Stability:

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

Trial Pit Log

TrialPit No
ST1 (EAST)
Sheet 1 of 1

Project Name:	Fujifilm, Billingham	Project No. S190632	Co-ords: 446452E - 522723N Level: 16.44
Plant Used:	JCB 3CX	Dimensions (m): Depth 1.50	Scale 1:26
Client:	Turner and Townsend		Logged PF

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.30	16.14		MADE GROUND: Grey sandy gravel of angular to sub angular crushed concrete.
	0.80	B+ES					MADE GROUND: Black to grey ashy slag. Fragments of asbestos and coal tar below 0.70m.
				1.50	14.94		End of Pit at 1.500m

Remarks: Relict strip foundation and thick brick wall noted at 1.10m.

Stability:

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

Trial Pit Log

TrialPit No ST1 (WEST)
Sheet 1 of 1

Project Name:	Fujifilm, Billingham	Project No. S190632	Co-ords: 446452E - 522723N Level: 16.44	Date 04/07/2019
Plant Used:	JCB 3CX		Dimensions (m): Depth 1.30	Scale 1:26
Client:	Turner and Townsend			Logged PF

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							MADE GROUND: Black to grey ashy slag.
				1.20	15.24		
				1.30	15.14		Firm becoming soft consistency brown mottled grey medium to low strength silty CLAY.
							End of Pit at 1.300m

1
2
3
4
5

Remarks: Relict strip foundation noted at 1.10mbgl.

Stability:

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

Trial Pit Log

TrialPit No ST2 (CENTRE)
Sheet 1 of 1

Project Name:	Fujifilm, Billingham	Project No. S190632	Co-ords: 446451E - 522789N Level: 16.17
Plant Used:	JCB 3CX	Dimensions (m): Depth 2.00	Scale 1:26
Client:	Turner and Townsend		Logged PF

Date 04/07/2019

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							MADE GROUND: Grey sandy fine to coarse gravel of concrete and rare brick. Fragments of ACM noted.
				2.00	14.17		End of Pit at 2.000m

1
2
3
4
5

Remarks: Asbestos fragments noted at 0.30m.

Stability:

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

Trial Pit Log

TrialPit No ST2 (NORTH)
Sheet 1 of 1

Project Name:	Fujifilm, Billingham	Project No. S190632	Co-ords: 446451E - 522789N Level: 16.17
Plant Used:	JCB 3CX	Dimensions (m): Depth 2.00	Scale 1:26
Client:	Turner and Townsend		Logged PF

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							MADE GROUND: Grey sandy fine to coarse gravel of concrete and rare brick.
▼				2.00	14.17		End of Pit at 2.000m

1
2
3
4
5

Remarks: Groundwater encountered at 2.00m.

Stability:

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

Trial Pit Log

TrialPit No: ST2 (SOUTH)
Sheet 1 of 1

Project Name:	Fujifilm, Billingham	Project No. S190632	Co-ords: 446451E - 522789N Level: 16.17
Plant Used:	JCB 3CX	Dimensions (m): Depth 2.00	Scale 1:26
Client:	Turner and Townsend		Logged PF

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.30	B+ES					MADE GROUND: Grey sandy fine to coarse gravel of concrete and rare brick.
	1.00	B					
				2.00	14.17		End of Pit at 2.000m

Remarks:

Stability:

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

Trial Pit Log

TrialPit No ST3 (CENTRE)
Sheet 1 of 1

Project Name:	Fujifilm, Billingham	Project No. S190632	Co-ords: 446489E - 522750N Level: 15.86
Plant Used:	JCB 3CX	Dimensions (m): Depth 1.60	Scale 1:26
Client:	Turner and Townsend		Logged PF

Date 04/07/2019

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.60	B+ES		0.65	15.21		MADE GROUND: Grey fine to coarse sandy gravel of angular to sub rounded crushed concrete.
				1.20	14.66		MADE GROUND: Firm consistency brown gravelly clay. Gravel is angular to sub rounded fine to coarse of concrete brick and slag.
				1.60	14.26		Firm becoming soft consistency brown mottled grey slightly sandy medium to low strength silty CLAY.
							End of Pit at 1.600m

1 2 3 4 5

Remarks:

Stability:

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

Trial Pit Log

TrialPit No
ST3 (EAST)
Sheet 1 of 1

Project Name:	Fujifilm, Billingham	Project No. S190632	Co-ords: 446489E - 522750N Level: 15.86
Plant Used:	JCB 3CX	Dimensions (m): Depth 1.00	Scale 1:26
Client:	Turner and Townsend		Logged PF

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							MADE GROUND: Firm consistency brown gravelly clay. Gravel is angular to sub rounded fine to coarse of concrete brick and slag.
				0.50	15.36		Firm consistency black to grey organic CLAY.
				0.70	15.16		Firm becoming soft consistency brown mottled grey slightly sandy medium to low strength silty CLAY.
				1.00	14.86		End of Pit at 1.000m

1
2
3
4
5

Remarks: Kerb edge noted at 0.20-0.40m.

Stability:

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

Trial Pit Log

TrialPit No ST3 (WEST)
Sheet 1 of 1

Project Name:	Fujifilm, Billingham	Project No. S190632	Co-ords: 446489E - 522750N Level: 15.86
Plant Used:	JCB 3CX	Dimensions (m): Depth 1.30	Scale 1:26
Client:	Turner and Townsend		Logged PF

Date 04/07/2019

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							MADE GROUND: Grey fine to coarse sandy gravel of angular to sub rounded crushed concrete.
				1.00	14.86		Firm becoming soft consistency brown mottled grey medium to low strength silty CLAY.
				1.15	14.71		Firm becoming soft consistency brown mottled grey medium to low strength silty CLAY.
				1.30	14.56		End of Pit at 1.300m

Remarks:

Stability:

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

Trial Pit Log

TrialPit No ST4 (CENTRE)
Sheet 1 of 1

Project Name:	Fujifilm, Billingham	Project No. S190632	Co-ords: 446576E - 522772N Level: 16.04
Plant Used:	JCB 3CX	Dimensions (m): Depth 1.60	Scale 1:26
Client:	Turner and Townsend		Logged PF

Date 04/07/2019

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.15	15.89		MADE GROUND: Black tarmac.
							MADE GROUND: Firm consistency brown gravelly clay. Gravel is angular to sub rounded fine to coarse of concrete brick and slag.
				0.80	15.24		Soft consistency dark grey organic CLAY.
				0.90	15.14		Firm becoming soft consistency brown mottled grey sandy medium to low strength silty CLAY.
				1.60	14.44		End of Pit at 1.600m

Remarks:

Stability:

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

Trial Pit Log

TrialPit No ST4 (NORTH)
Sheet 1 of 1

Project Name:	Fujifilm, Billingham	Project No. S190632	Co-ords: 446576E - 522772N Level: 16.04
Plant Used:	JCB 3CX	Dimensions (m): Depth 1.60	Scale 1:26
Client:	Turner and Townsend		Logged PF

Date 04/07/2019

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.10	15.94		MADE GROUND: Black tarmac.
	0.30	B+ES					MADE GROUND: Firm consistency brown gravelly clay. Gravel is angular to sub rounded fine to coarse of concrete brick and slag.
				0.70	15.34		Soft consistency dark grey organic CLAY.
				0.80	15.24		Firm becoming soft consistency brown mottled grey medium to low strength silty CLAY.
				1.60	14.44		End of Pit at 1.600m

Remarks:

Stability:

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

Trial Pit Log

TrialPit No
TP1
Sheet 1 of 1

Project Name:	Fujifilm, Billingham	Project No. S190632	Co-ords: 446437E - 522677N Level: 16.05
Plant Used:	JCB 3CX	Dimensions (m): Depth 0.90	Date 05/07/2019 Scale 1:26
Client:	Turner and Townsend		Logged PF

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.30	CBR	3.5%	0.25	15.80		MADE GROUND: Brown topsoil.
	0.60	CBR	4.0%				MADE GROUND: Firm consistency brown gravelly clay. Gravel is angular to sub rounded fine to coarse of concrete brick and slag. Foundation at 0.90m.
				0.90	15.15		End of Pit at 0.900m

1
2
3
4
5

Remarks:

Stability:

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

Trial Pit Log

TrialPit No: TP1B
Sheet 1 of 1

Project Name:	Fujifilm, Billingham	Project No. S190632	Co-ords: 446436E - 522681N Level: 16.02
Plant Used:	JCB 3CX	Dimensions (m): Depth 2.50	1.40 × 0.40
Client:	Turner and Townsend		Scale 1:26 Logged PF

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	B+ES		0.25	15.77		MADE GROUND: Brown topsoil.
	0.30	CBR	3.0%				MADE GROUND: Firm consistency brown gravelly clay. Gravel is angular to sub rounded fine to coarse of concrete brick and slag.
	0.60	CBR	3.5%				
	0.80	B+ES					
	0.90	CBR	4.0%				
	1.10	HV	58kPa	1.00	15.02		Firm becoming soft consistency brown mottled grey slightly sandy slightly gravelly medium strength silty CLAY of medium plasticity. Gravel is fine to coarse angular to subangular of sandstone and mudstone.
	1.40	B					
	1.40	HV	78kPa				
	1.60	HV	42kPa	1.60	14.42		Soft consistency brown mottled grey thinly laminated silty CLAY.
				2.50	13.52		End of Pit at 2.500m

Remarks:

Stability:

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

Trial Pit Log

TrialPit No
TP2
Sheet 1 of 1

Project Name:	Fujifilm, Billingham	Project No. S190632	Co-ords: 446425E - 522755N Level: 16.04
Plant Used:	JCB 3CX	Dimensions (m): Depth 2.20	1.60 × 0.40
Client:	Turner and Townsend		

Date: 05/07/2019
Scale: 1:26
Logged: PF

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.30	B+ES					MADE GROUND: Brown topsoil with brick fragments.
	0.30	CBR	2.0%	0.40	15.64		
	0.50	B+ES					MADE GROUND: Black ash fill with blockwood floor.
	0.60	CBR	3.0%	0.60	15.44		
	0.70	B+ES					Firm consistency grey slightly sandy organic CLAY.
	0.90	HV	55kPa	0.85	15.19		
	0.90	CBR	2.5%				Firm becoming soft consistency brown mottled grey medium strength silty CLAY.
	1.10	B					
	1.40	HV	42kPa				
	1.60	HV	68kPa				
				2.20	13.84		End of Pit at 2.200m

1
2
3
4
5

Remarks:

Stability:

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

Trial Pit Log

TrialPit No
TP3
Sheet 1 of 1

Project Name:	Fujifilm, Billingham	Project No. S190632	Co-ords: 446536E - 522781N Level: 15.73
Plant Used:	JCB 3CX	Dimensions (m): Depth 1.60	2.00 × 0.40
Client:	Turner and Townsend		

Date: 05/07/2019
Scale: 1:26
Logged: PF

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.15	15.58		MADE GROUND: Black tarmac.
	0.30	CBR	2.5%				MADE GROUND: Firm consistency brown gravelly clay. Gravel is angular to sub rounded fine to coarse of concrete brick and slag.
	0.50	B+ES					
	0.60	CBR	2.0%	0.60	15.13		
	0.65	B+ES					Soft consistency black slightly sandy organic CLAY.
	0.80	HV	72kPa	0.75	14.98		Firm becoming soft consistency brown mottled grey slightly sandy medium strength silty CLAY.
	0.90	CBR	3.0%				
	1.00	B+ES					
	1.10	HV	62kPa				
				1.60	14.13		End of Pit at 1.600m

Remarks:

Stability:

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

Trial Pit Log

TrialPit No: TP4
Sheet 1 of 1

Project Name:	Fujifilm, Billingham	Project No. S190632	Co-ords: 446549E - 522749N Level: 15.99
Plant Used:	JCB 3CX	Dimensions (m): Depth 2.40	1.60 × 0.40
Client:	Turner and Townsend		Date: 05/07/2019 Scale: 1:26 Logged: PF

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.10	15.89		MADE GROUND: Black tarmac.
	0.30	B+ES					MADE GROUND: Firm consistency brown gravelly clay. Gravel is angular to sub rounded fine to coarse of concrete brick and slag. Compact below 0.40m.
	0.30	CBR	3.0%				
	0.60	CBR	4.0%				
	0.90	B+ES		0.85	15.14		Soft consistency black organic CLAY.
	0.90	HV	48kPa				
	0.90	CBR	2.0%				
	1.20	HV	62kPa	1.10	14.89		Firm becoming soft consistency brown mottled grey medium strength silty CLAY.
	1.60	HV	46kPa				
				2.40	13.59		End of Pit at 2.400m

Remarks:

Stability:

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

Trial Pit Log

TrialPit No
TP5
Sheet 1 of 1

Project Name:	Fujifilm, Billingham	Project No. S190632	Co-ords: 446592E - 522779N Level: 15.92
Plant Used:	JCB 3CX	Dimensions (m): Depth 1.90	1.80 × 0.40
Client:	Turner and Townsend		Date 05/07/2019 Scale 1:26 Logged PF

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.10	15.82		MADE GROUND: Black tarmac.
	0.30	CBR	2.0%				MADE GROUND: Firm consistency brown gravelly clay. Gravel is angular to sub rounded fine to coarse of concrete brick and slag.
	0.50	B+ES					
	0.60	CBR	3.0%				
				0.80	15.12		Firm becoming soft consistency brown mottled grey slightly sandy medium to low strength silty CLAY.
	0.90	CBR	2.5%				
	1.00	HV	54kPa				
	1.50	HV	58kPa				
				1.90	14.02		End of Pit at 1.900m

Remarks:

Stability:

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

Borehole Log

Scale 1:50 Sheet 1 of 1

WS01

Contract no:	S190632	**Site:**	Fujifilm, Billingham	**Driller:**	RD Drilling Ltd
				Plant used:	Mini Rig
				Started:	08/07/2019
Client:	Turner and Townsend			**Ended:**	08/07/2019
Method:	Window sampler			**Backfilled:**	08/07/2019

GL (AOD):	16.09m	
Easting:	446421	
Northing:	522695	
Logged:	PF	
Status:	FINAL	

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing		
					Depth (m)	Type	Results
				MADE GROUND: Brown topsoil.	0.20	B+ES	
		0.25	15.84	MADE GROUND: Firm consistency brown to grey slightly gravelly clay. Gravel is angular to sub rounded fine to coarse of brick and slag.	0.50	B+ES	
		0.90	15.19	Firm becoming soft consistency brown mottled grey medium to low strength silty CLAY.	1.00	HV	110kPa
					1.00	D	
					1.50	D	
		2.10	13.99	Soft consistency brown mottled grey thinly laminated slightly sandy medium strength silty CLAY of intermediate plasticity.	2.00	HV	52kPa
					2.50	D	
					3.00	HV	60kPa
					3.50	D	
					4.00	HV	45kPa
					4.50	D	
					5.00	HV	42kPa
					5.50	D	
		6.00	10.09	End of Borehole at 6.000m	6.00	HV	48kPa

Hole Diameter		Casing Depths		General Remarks	Chiselling			Ground Water				
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	- Hand Dug Inspection Pit to 1.20mbgl	From (m)	To (m)	Time (hr)	Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)

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

Borehole Log

Scale 1:50 Sheet 1 of 1

WS02

Contract no:	S190632	**Site:**	Fujifilm, Billingham	**Driller:**	RD Drilling Ltd
				Plant used:	Mini Rig
				Started:	08/07/2019
Client:	Turner and Townsend			**Ended:**	08/07/2019
Method:	Window sampler			**Backfilled:**	08/07/2019

GL (AOD):	15.81m	
Easting:	446430	
Northing:	522774	
Logged:	PF	
Status:	FINAL	

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing		
					Depth (m)	Type	Results
				MADE GROUND: Pavement, sand and ash.	0.20	B+ES	
		0.30	15.51	MADE GROUND: Firm consistency brown to grey slightly gravelly clay. Gravel is angular to sub rounded fine to coarse of brick and slag.	0.50	B+ES	
		0.90	14.91	Firm becoming soft consistency brown mottled grey slightly sandy medium to low strength silty CLAY.	1.00	HV	58kPa
					1.00	D	
					1.50	D	
		1.90	13.91	Soft consistency brown mottled grey thinly laminated low to medium strength silty CLAY.	2.00	HV	52kPa
					2.50	D	
					3.00	HV	48kPa
					3.50	D	
					4.00	HV	42kPa
					4.50	D	
					5.00	HV	35kPa
					5.50	D	
		6.00	9.81	End of Borehole at 6.000m	6.00	HV	45kPa

Hole Diameter		Casing Depths		General Remarks	Chiselling			Ground Water				
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)		From (m)	To (m)	Time (hr)	Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)
				- Hand Dug Inspection Pit to 1.20mbgl				2.50				

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

Borehole Log

Scale 1:50 Sheet 1 of 1

WS03

Contract no:	S190632	**Site:**	Fujifilm, Billingham	**Driller:**	RD Drilling Ltd
				Plant used:	Mini Rig
				Started:	08/07/2019
Client:	Turner and Townsend			**Ended:**	08/07/2019
Method:	Window sampler			**Backfilled:**	08/07/2019

GL (AOD):	15.80m	
Easting:	446495	
Northing:	522768	
Logged:	PF	
Status:	FINAL	

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing		
					Depth (m)	Type	Results
		0.15	15.65	MADE GROUND: Black tarmac.			
				MADE GROUND: Firm consistency brown gravelly clay. Gravel is angular to sub rounded fine to coarse of concrete brick and slag.	0.50	B+ES	
					1.00	B+ES	
		1.10	14.70	Firm becoming soft consistency brown mottled grey medium to low strength silty CLAY.			
					1.50	HV	45kPa
					1.50	D	
		1.90	13.90	Soft consistency brown mottled grey thinly laminated medium strength silty CLAY.	2.00	HV	48kPa
					2.50	D	
					3.00	HV	40kPa
					3.50	D	
					4.00	HV	44kPa
					4.50	D	
					5.00	HV	50kPa
					5.50	D	
		6.00	9.80	End of Borehole at 6.000m	6.00	HV	52kPa

Hole Diameter		Casing Depths		General Remarks	Chiselling			Ground Water				
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	- Hand Dug Inspection Pit to 1.20mbgl	From (m)	To (m)	Time (hr)	Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)

SOLMEK
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:	S190632	**Site:**	Fujifilm, Billingham	**Driller:**	RD Drilling Ltd
				Plant used:	Mini Rig
				Started:	08/07/2019
Client:	Turner and Townsend			**Ended:**	08/07/2019
Method:	Window sampler			**Backfilled:**	08/07/2019

GL (AOD):	15.80m	
Easting:	446484	
Northing:	522689	
Logged:	PF	
Status:	FINAL	

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing		
					Depth (m)	Type	Results
		0.10	15.70	MADE GROUND: Black tarmac.			
				MADE GROUND: Firm consistency brown gravelly clay. Gravel is angular to sub rounded fine to coarse of concrete brick and slag.	0.50	B+ES	
		0.80	15.00	Soft consistency grey slightly sandy organic low strength CLAY.			
					1.00	HV	35kPa
		1.20	14.60	Firm becoming soft consistency brown mottled grey medium to low strength silty CLAY.	1.00	B+ES	
					1.50	HV	52kPa
					1.50	D	
		2.10	13.70	Soft consistency brown mottled grey thinly laminated low to medium strength silty CLAY.	2.00	HV	48kPa
					2.50	D	
					3.00	HV	40kPa
					3.50	D	
					4.00	HV	38kPa
					4.50	D	
					5.00	HV	42kPa
					5.50	D	
		6.00	9.80	End of Borehole at 6.000m	6.00	HV	45kPa

Hole Diameter		Casing Depths		General Remarks	Chiselling			Ground Water				
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	- Hand Dug Inspection Pit to 1.20mbgl	From (m)	To (m)	Time (hr)	Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)

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

Borehole Log

Scale 1:50 Sheet 1 of 1

WS05

Contract no:	S190632	**Site:**	Fujifilm, Billingham	**Driller:**	RD Drilling Ltd
				Plant used:	Mini Rig
				Started:	08/07/2019
Client:	Turner and Townsend			**Ended:**	08/07/2019
Method:	Window sampler			**Backfilled:**	08/07/2019

GL (AOD):	16.01m
Easting:	446515
Northing:	522712
Logged:	PF
Status:	FINAL

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing		
					Depth (m)	Type	Results
		0.10	15.91	MADE GROUND: Black tarmac.			
				MADE GROUND: Firm consistency brown gravelly clay. Gravel is angular to sub rounded fine to coarse of concrete brick and slag.	0.50	B+ES	
		1.00	15.01	End of Borehole at 1.000m	1.10 - 1.55	SPT (S)	N=50+ (25/50)

Hole Diameter		Casing Depths		General Remarks	Chiselling			Ground Water				
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	- Hand Dug Inspection Pit to 1.00mbgl	From (m)	To (m)	Time (hr)	Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)

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

Borehole Log

Scale 1:50 Sheet 1 of 1

WS06

Contract no:	S190632	**Site:**	Fujifilm, Billingham	**Driller:**	RD Drilling Ltd
				Plant used:	Mini Rig
				Started:	08/07/2019
Client:	Turner and Townsend			**Ended:**	08/07/2019
Method:	Window sampler			**Backfilled:**	08/07/2019

GL (AOD):	16.03m	
Easting:	446477	
Northing:	522681	
Logged:	PF	
Status:	FINAL	

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing		
					Depth (m)	Type	Results
		0.15	15.88	MADE GROUND: Pavement and sand.			
				MADE GROUND: Firm consistency brown gravelly clay. Gravel is angular to sub rounded fine to coarse of concrete brick and slag.	0.50	B+ES	
		0.90	15.13				
				Firm consistency grey sandy medium strength CLAY.	1.00	HV	40kPa
		1.10	14.93	Firm becoming soft consistency brown mottled grey medium to low strength silty CLAY.	1.00	B	
					1.50	HV	52kPa
					1.50	B	
		1.80	14.23				
				Soft consistency brown mottled grey thinly laminated slightly sandy low to medium strength silty CLAY. Very sandy 1.80-2.10m.	2.00	HV	30kPa
					2.50	B	
					3.00	HV	30kPa
					3.50	B	
		4.00	12.03				
				End of Borehole at 4.000m	4.00	HV	42kPa

Hole Diameter		Casing Depths		General Remarks	Chiselling			Ground Water				
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	- Hand Dug Inspection Pit to 1.20mbgl	From (m)	To (m)	Time (hr)	Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)

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

Borehole Log

Scale 1:50 Sheet 1 of 1

WS07

Contract no:	S190632	**Site:**	Fujifilm, Billingham	**Driller:**	RD Drilling Ltd
				Plant used:	Mini Rig
				Started:	08/07/2019
Client:	Turner and Townsend			**Ended:**	08/07/2019
Method:	Window sampler			**Backfilled:**	08/07/2019

GL (AOD):	15.92m	
Easting:	446579	
Northing:	522796	
Logged:	PF	
Status:	FINAL	

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing		
					Depth (m)	Type	Results
		0.10	15.82	MADE GROUND: Black tarmac.			
				MADE GROUND: Firm consistency brown gravelly clay. Gravel is angular to sub rounded fine to coarse of concrete brick and slag.	0.50	B+ES	
		0.90	15.02	Firm becoming soft consistency brown mottled grey medium to low strength silty CLAY.	1.00	HV	52kPa
					1.00	D	
					1.50	D	
		1.90	14.02	Soft consistency brown mottled grey thinly laminated low to medium strength silty CLAY.	2.00	HV	40kPa
					2.50	D	
					3.00	HV	30kPa
					3.50	D	
					4.00	HV	35kPa
					4.50	D	
					5.00	HV	30kPa
					5.50	D	
		6.00	9.92	End of Borehole at 6.000m	6.00	HV	42kPa

Hole Diameter		Casing Depths		General Remarks	Chiselling			Ground Water				
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	- Hand Dug Inspection Pit to 1.20mbgl	From (m)	To (m)	Time (hr)	Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)
								2.50				

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

Borehole Log

Scale 1:50 Sheet 1 of 1

WS08

Contract no:	S190632	**Site:**	Fujifilm, Billingham	**Driller:**	RD Drilling Ltd
				Plant used:	Mini Rig
				Started:	08/07/2019
Client:	Turner and Townsend			**Ended:**	08/07/2019
Method:	Window sampler			**Backfilled:**	08/07/2019

GL (AOD):	16.09m
Easting:	446626
Northing:	522751
Logged:	PF
Status:	FINAL

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing: Depth (m)	Type	Results
		0.10	15.99	MADE GROUND: Black tarmac.			
		0.25	15.84	MADE GROUND: Firm consistency brown gravelly clay. Gravel is angular to sub rounded fine to coarse of concrete brick and slag.			
				MADE GROUND: Firm consistency brown to grey slightly gravelly clay. Gravel is angular to sub rounded fine to coarse of brick and slag.	0.50	B+ES	
					1.00	B+ES	
					1.20 - 1.44	SPT (S)	N=50+ (3,3/6,48)
		1.50	14.59	Concrete obstruction.	1.50	B+ES	
				End of Borehole at 1.500m			

Hole Diameter		Casing Depths		General Remarks	Chiselling			Ground Water				
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	- Hand Dug Inspection Pit to 1.20mbgl	From (m)	To (m)	Time (hr)	Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)

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

Borehole Log

Scale 1:50 Sheet 1 of 1

WS09

Contract no:	S190632	**Site:**	Fujifilm, Billingham	**Driller:**	RD Drilling Ltd
				Plant used:	Mini Rig
				Started:	08/07/2019
Client:	Turner and Townsend			**Ended:**	08/07/2019
Method:	Window sampler			**Backfilled:**	08/07/2019

GL (AOD):	15.98m	
Easting:	446674	
Northing:	522777	
Logged:	PF	
Status:	FINAL	

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing: Depth (m)	Type	Results
		0.10	15.88	MADE GROUND: Black tarmac.			
				MADE GROUND: Firm consistency brown gravelly clay. Gravel is angular to sub rounded fine to coarse of concrete brick and slag.	0.40	B+ES	
		0.50	15.48	Firm consistency grey silty CLAY.	0.60	B+ES	
		0.80	15.18	Loose brown slightly clayey slightly gravelly silty SAND. Gravel is fine to coarse angular to subangular of sandstone and mudstone.	1.00 - 1.45	SPT (S)	N=4 (1,0/1,1,1,1)
					1.00	D	
					1.50	D	
					2.00 - 2.45	SPT (S)	N=6 (1,0/1,2,1,2)
					2.50	D	
					3.00 - 3.45	SPT (S)	N=6 (1,1/1,1,2,2)
		3.10	12.88	Soft consistency brown mottled grey thinly laminated low to medium strength silty CLAY.			
					3.50	D	
					4.00	HV	35kPa
					5.00	HV	42kPa
		5.50	10.48	End of Borehole at 5.500m	5.50	D	

Hole Diameter		Casing Depths		General Remarks	Chiselling			Ground Water				
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	- Hand Dug Inspection Pit to 1.20mbgl	From (m)	To (m)	Time (hr)	Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)
								2.50				

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

Borehole Log

Scale 1:50 Sheet 1 of 1

WS10

Contract no:	S190632	**Site:**	Fujifilm, Billingham	**Driller:**	RD Drilling Ltd
				Plant used:	Mini Rig
				Started:	08/07/2019
Client:	Turner and Townsend			**Ended:**	08/07/2019
Method:	Window sampler			**Backfilled:**	08/07/2019

GL (AOD):	15.97m
Easting:	446697
Northing:	522799
Logged:	PF
Status:	FINAL

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing		
					Depth (m)	Type	Results
				MADE GROUND: Brown topsoil.			
		0.40	15.57	Loose brown slightly clayey slightly gravelly silty SAND. Gravel is fine to coarse angular to subangular of sandstone and mudstone.			
					1.00 - 1.45	SPT (S)	N=4 (1,0/1,1,1,1)
					2.00 - 2.45	SPT (S)	N=4 (1,0/1,0,1,2)
					3.00 - 3.45	SPT (S)	N=6 (1,1/1,2,1,2)
		3.50	12.47	Soft consistency brown mottled grey thinly laminated low to medium strength silty CLAY.			
					4.00	HV	35kPa
		5.00	10.97	End of Borehole at 5.000m	5.00	HV	45kPa

Hole Diameter		Casing Depths		General Remarks	Chiselling			Ground Water				
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	- Hand Dug Inspection Pit to 1.20mbgl	From (m)	To (m)	Time (hr)	Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)
								2.80				

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

Borehole Log

Scale 1:50 Sheet 1 of 1

WS11

Contract no:	S190632	**Site:**	Fujifilm, Billingham	**Driller:**	RD Drilling Ltd
				Plant used:	Mini Rig
				Started:	08/07/2019
Client:	Turner and Townsend			**Ended:**	08/07/2019
Method:	Window sampler			**Backfilled:**	08/07/2019

GL (AOD):	16.45m		
Easting:	446467		
Northing:	522741		
Logged:	PF		
Status:	FINAL		

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing		
					Depth (m)	Type	Results
				MADE GROUND: Grey sandy gravel fine to coarse angular to sub angular crushed concrete.			
					0.50	B+ES	
					1.00	B+ES	
		1.40	15.05	Concrete obstruction			
				End of Borehole at 1.400m			

Hole Diameter		Casing Depths		General Remarks	Chiselling			Ground Water				
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	- Hand Dug Inspection Pit to 1.20mbgl	From (m)	To (m)	Time (hr)	Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)

APPENDIX C:
Contamination Laboratory Results

Certificate of Analysis

Certificate Number	19-13749-1	31-Jul-19
Client	SOLMEK 12 Yarm Road Stockton On Tees Cleveland TS18 3NA	

Our Reference	19-13749-1
Client Reference	S190632
Order No	SOL-3267
Contract Title	Fujifilm, Billingham
Description	8 Soil samples, 2 Leachate samples.

Date Received	19-Jul-19
Date Started	19-Jul-19
Date Completed	31-Jul-19
Test Procedures	Identified by prefix DETSn (details on request).
Notes	This test supersedes 19-13749, extra testing. 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

Adam Fenwick
Contracts Manager

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

UKAS TESTING
2139

Summary of Chemical Analysis
Matrix Descriptions

Our Ref 19-13749-1
Client Ref S190632
Contract Title Fujifilm, Billingham

Sample ID	Depth	Lab No	Completed	Matrix Description
TP1	0.2	1534224	29/07/2019	Dark brown gravelly CLAY
TP2	0.4	1534225	29/07/2019	Dark brown gravelly, sandy CLAY including odd rootlets
TP3	0.65	1534226	29/07/2019	Brown slightly gravelly, sandy CLAY
TP4	0.3	1534227	29/07/2019	Dark grey very gravelly SAND
ST2	0.3	1534228	29/07/2019	Brown very gravelly SAND
TP5	0.5	1534229	29/07/2019	Dark brown slightly gravelly, sandy CLAY
WS08	0.5	1534230	29/07/2019	Dark brown gravelly, sandy CLAY including odd rootlets
WS09	0.4	1534231	29/07/2019	Dark brown gravelly, sandy CLAY

Summary of Chemical Analysis
Soil Samples

Our Ref 19-13749-1
Client Ref S190632
Contract Title Fujifilm, Billingham

			Lab No	1534224	1534225	1534226	1534227	1534228	1534229
			Sample ID	TP1	TP2	TP3	TP4	ST2	TP5
			Depth	0.20	0.40	0.65	0.30	0.30	0.50
			Other ID						
			Sample Type	ES	ES	ES	ES	ES	ES
			Sampling Date	17/07/19	17/07/19	17/07/19	17/07/19	17/07/19	17/07/19
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Asbestos Quantification	DETSC 1102	0							
Metals									
Arsenic	DETSC 2301#	0.2	mg/kg	7.1	13	6.5	5.6	4.2	6.3
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	1.0	0.7	2.2	3.4	0.8	3.2
Cadmium	DETSC 2301#	0.1	mg/kg	0.4	0.3	0.1	< 0.1	0.2	0.1
Chromium	DETSC 2301#	0.15	mg/kg	15	27	16	15	17	19
Copper	DETSC 2301#	0.2	mg/kg	20	32	14	8.0	15	14
Lead	DETSC 2301#	0.3	mg/kg	68	61	24	5.0	11	22
Mercury	DETSC 2325#	0.05	mg/kg	0.27	0.12	0.08	< 0.05	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	15	27	12	5.2	13	13
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	0.5	< 0.5	3.1	< 0.5	1.2
Zinc	DETSC 2301#	1	mg/kg	87	110	56	13	34	43
Inorganics									
pH	DETSC 2008#		pH	7.0	8.1	8.2	10.7	11.6	9.6
Cyanide, Total	DETSC 2130#	0.1	mg/kg	0.3	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Organic matter	DETSC 2002#	0.1	%	8.5	2.9	2.5	1.6	0.8	2.5
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	21	81	480	1600	250	1600
Petroleum Hydrocarbons									
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	4.5	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2	17	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	14	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4	130	12	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	170	12	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	4.6	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6	16	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4	190	< 1.4	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	220	< 10	< 10
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	380	12	< 10
PAHs									
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	2.0	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	0.1	< 0.1	< 0.1	1.4	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	0.1	0.1	< 0.1	0.5	< 0.1	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	0.6	< 0.1	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	0.7	0.2	< 0.1	5.3	< 0.1	< 0.1
Anthracene	DETSC 3301	0.1	mg/kg	0.2	< 0.1	< 0.1	1.4	< 0.1	< 0.1

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 19-13749-1
Client Ref S190632
Contract Title Fujifilm, Billingham

			Lab No	1534224	1534225	1534226	1534227	1534228	1534229
			Sample ID	TP1	TP2	TP3	TP4	ST2	TP5
			Depth	0.20	0.40	0.65	0.30	0.30	0.50
			Other ID						
			Sample Type	ES	ES	ES	ES	ES	ES
			Sampling Date	17/07/19	17/07/19	17/07/19	17/07/19	17/07/19	17/07/19
			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	1.8	0.4	< 0.1	8.4	< 0.1	< 0.1
Pyrene	DETSC 3301	0.1	mg/kg	1.7	0.5	< 0.1	8.4	< 0.1	< 0.1
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	0.9	1.1	< 0.1	2.8	< 0.1	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	0.9	0.2	< 0.1	4.3	< 0.1	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	0.8	0.3	< 0.1	4.6	< 0.1	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	0.4	0.1	< 0.1	3.6	< 0.1	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	1.0	0.3	< 0.1	3.3	< 0.1	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	0.7	0.9	< 0.1	3.4	< 0.1	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	0.3	0.1	< 0.1	1.0	< 0.1	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	0.7	0.2	< 0.1	3.4	< 0.1	< 0.1
PAH Total	DETSC 3301	1.6	mg/kg	11	4.7	< 1.6	55	< 1.6	< 1.6
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	0.8	< 0.3	< 0.3	< 0.3	< 0.3	1.8

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 19-13749-1
Client Ref S190632
Contract Title Fujifilm, Billingham

			Lab No	1534230	1534231
			Sample ID	WS08	WS09
			Depth	0.50	0.40
			Other ID		
			Sample Type	ES	ES
			Sampling Date	17/07/19	17/07/19
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Asbestos Quantification	DETSC 1102	0		Y	Y
Metals					
Arsenic	DETSC 2301#	0.2	mg/kg	7.2	7.0
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.6	1.5
Cadmium	DETSC 2301#	0.1	mg/kg	0.2	0.4
Chromium	DETSC 2301#	0.15	mg/kg	28	89
Copper	DETSC 2301#	0.2	mg/kg	24	18
Lead	DETSC 2301#	0.3	mg/kg	16	110
Mercury	DETSC 2325#	0.05	mg/kg	0.28	< 0.05
Nickel	DETSC 2301#	1	mg/kg	13	12
Selenium	DETSC 2301#	0.5	mg/kg	2.3	2.9
Zinc	DETSC 2301#	1	mg/kg	48	220
Inorganics					
pH	DETSC 2008#		pH	10.6	11.1
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1
Organic matter	DETSC 2002#	0.1	%	2.0	1.9
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	370	860
Petroleum Hydrocarbons					
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10
TPH Ali/Aro 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	0.2
Anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 19-13749-1
Client Ref S190632
Contract Title Fujifilm, Billingham

			Lab No	1534230	1534231
			Sample ID	WS08	WS09
			Depth	0.50	0.40
			Other ID		
			Sample Type	ES	ES
			Sampling Date	17/07/19	17/07/19
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	0.4
Pyrene	DETSC 3301	0.1	mg/kg	0.3	0.4
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	0.2	0.2
Chrysene	DETSC 3301	0.1	mg/kg	0.2	0.2
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	0.2	0.2
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	0.1	0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	0.2	0.2
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	0.3	0.4
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	0.2	0.3
PAH Total	DETSC 3301	1.6	mg/kg	2.3	3.1
Phenols					
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil VOC/SVOC Samples

Our Ref 19-13749-1
Client Ref S190632
Contract Title Fujifilm, Billingham

			Lab No	1534224	1534226
			Sample ID	TP1	TP3
			Depth	0.20	0.65
			Other ID		
			Sample Type	ES	ES
			Sampling Date	17/07/19	17/07/19
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
VOCs					
Vinyl Chloride	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,1 Dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Trans-1,2-dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,1-dichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Cis-1,2-dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
2,2-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Bromochloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Chloroform	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,1,1-trichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,1-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Carbon tetrachloride	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Benzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2-dichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Trichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Dibromomethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Bromodichloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
cis-1,3-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Toluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
trans-1,3-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,1,2-trichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Tetrachloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,3-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Dibromochloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2-dibromoethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Chlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,1,1,2-tetrachloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Ethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
m+p-Xylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
o-Xylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Styrene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
Bromoform	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Isopropylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Bromobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2,3-trichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
n-propylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
2-chlorotoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,3,5-trimethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
4-chlorotoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Tert-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2,4-trimethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01

Key: * -not accredited. n/s -not supplied.

Summary of Chemical Analysis
Soil VOC/SVOC Samples

Our Ref 19-13749-1
Client Ref S190632
Contract Title Fujifilm, Billingham

			Lab No	1534224	1534226
			Sample ID	TP1	TP3
			Depth	0.20	0.65
			Other ID		
			Sample Type	ES	ES
			Sampling Date	17/07/19	17/07/19
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
sec-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
p-isopropyltoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,3-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,4-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
n-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2-dibromo-3-chloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2,4-trichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Hexachlorobutadiene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2,3-trichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
MTBE	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
SVOCs					
Phenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
Aniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2-Chlorophenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
Benzyl Alcohol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
2-Methylphenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
Bis(2-chloroisopropyl)ether	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
3&4-Methylphenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
2,4-Dimethylphenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
Bis-(dichloroethoxy)methane	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
2,4-Dichlorophenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
1,2,4-Trichlorobenzene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
4-Chloro-3-methylphenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
2-Methylnaphthalene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
Hexachlorocyclopentadiene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2,4,6-Trichlorophenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
2,4,5-Trichlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2-Chloronaphthalene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
2-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2,4-Dinitrotoluene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
3-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
4-Nitrophenol	DETSC 3433*	0.1	mg/kg	0.1	0.1
Dibenzofuran	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
2,6-Dinitrotoluene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
2,3,4,6-Tetrachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Diethylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
4-Chlorophenylphenylether	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
4-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2-Methyl-4,6-Dinitrophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Diphenylamine	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
4-Bromophenylphenylether	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1

Key: * -not accredited. n/s -not supplied.

Summary of Chemical Analysis
Soil VOC/SVOC Samples

Our Ref 19-13749-1
Client Ref S190632
Contract Title Fujifilm, Billingham

			Lab No	1534224	1534226
			Sample ID	TP1	TP3
			Depth	0.20	0.65
			Other ID		
			Sample Type	ES	ES
			Sampling Date	17/07/19	17/07/19
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Hexachlorobenzene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
Pentachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Di-n-butylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
Butylbenzylphthalate	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Bis(2-ethylhexyl)phthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
Di-n-octylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
1,4-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Dimethylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
1,3-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
1,2-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2,3,5,6-Tetrachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Azobenzene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
Carbazole	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1

Key: * -not accredited. n/s -not supplied.

Summary of Chemical Analysis
Leachate Samples

Our Ref 19-13749-1
Client Ref S190632
Contract Title Fujifilm, Billingham

			Lab No	1535955	1535956
			Sample ID	TP1	TP3
			Depth	0.20	0.65
			Other ID		
			Sample Type	ES	ES
			Sampling Date	17/07/19	17/07/19
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Preparation					
NRA Leachate Preparation	DETSC 1009*			Y	Y
Metals					
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	0.44	0.40
Boron	DETSC 2123	100	ug/l	< 100	< 100
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	< 0.03	< 0.03
Chromium, Dissolved	DETSC 2306	0.25	ug/l	1.7	1.7
Copper, Dissolved	DETSC 2306	0.4	ug/l	1.1	1.0
Lead, Dissolved	DETSC 2306	0.09	ug/l	2.5	2.4
Mercury, Dissolved	DETSC 2306	0.01	ug/l	< 0.01	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	1.2	1.1
Selenium, Dissolved	DETSC 2306	0.25	ug/l	< 0.25	< 0.25
Zinc, Dissolved	DETSC 2306	1.3	ug/l	5.2	3.8
Inorganics					
pH	DETSC 2008		pH	6.6	6.4
Sulphate as SO4	DETSC 2055	0.1	mg/l	150	1.2
Total Organic Carbon	DETSC 2085	1	mg/l	2.4	2.4
Petroleum Hydrocarbons					
Aliphatic C5-C6	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aliphatic C6-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aliphatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aliphatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C5-C35	DETSC 3072*	10	ug/l	< 10	< 10
Aromatic C5-C7	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aromatic C7-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aromatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aromatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C5-C35	DETSC 3072*	10	ug/l	< 10	< 10
TPH Ali/Aro Total	DETSC 3072*	10	ug/l	< 10	< 10
PAHs					
Naphthalene	DETSC 3304	0.05	ug/l	0.06	0.06
Acenaphthylene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Acenaphthene	DETSC 3304	0.01	ug/l	0.02	0.03
Fluorene	DETSC 3304	0.01	ug/l	0.02	0.03
Phenanthrene	DETSC 3304	0.01	ug/l	0.05	0.06
Anthracene	DETSC 3304	0.01	ug/l	0.03	0.03

Key: * -not accredited. n/s -not supplied.

Summary of Chemical Analysis
Leachate Samples

Our Ref 19-13749-1
Client Ref S190632
Contract Title Fujifilm, Billingham

			Lab No	1535955	1535956
			Sample ID	TP1	TP3
			Depth	0.20	0.65
			Other ID		
			Sample Type	ES	ES
			Sampling Date	17/07/19	17/07/19
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Fluoranthene	DETSC 3304	0.01	ug/l	0.05	0.03
Pyrene	DETSC 3304	0.01	ug/l	0.04	0.03
Benzo(a)anthracene	DETSC 3304	0.01	ug/l	0.01	< 0.01
Chrysene	DETSC 3304	0.01	ug/l	0.03	< 0.01
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	0.02	< 0.01
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	DETSC 3304	0.01	ug/l	0.01	< 0.01
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Benzo(g,h,i)perylene	DETSC 3304	0.01	ug/l	0.01	< 0.01
PAH Total	DETSC 3304	0.2	ug/l	0.37	0.28
Phenols					
Phenol - Monohydric	DETSC 2130	100	ug/l	< 100	< 100

Key: * -not accredited. n/s -not supplied.

Summary of Chemical Analysis
Leachate Samples

Our Ref 19-13749-1
Client Ref S190632
Contract Title Fujifilm, Billingham

			Lab No	1535955	1535956
			Sample ID	TP1	TP3
			Depth	0.20	0.65
			Other ID		
			Sample Type	ES	ES
			Sampling Date	17/07/19	17/07/19
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
VOCs					
Dichlorodifluoromethane	DETSC 3432	1	ug/l	< 1	< 1
Chloromethane	DETSC 3432	1	ug/l	< 1	< 1
Vinyl Chloride	DETSC 3432	1	ug/l	< 1	< 1
Bromomethane	DETSC 3432	1	ug/l	< 1	< 1
Chloroethane	DETSC 3432	1	ug/l	< 1	< 1
Trichlorofluoromethane	DETSC 3432*	1	ug/l	< 1	< 1
1,1-dichloroethylene	DETSC 3432	1	ug/l	< 1	< 1
Trans-1,2-dichloroethylene	DETSC 3432	1	ug/l	< 1	< 1
1,1-dichloroethane	DETSC 3432	1	ug/l	< 1	< 1
Cis-1,2-dichloroethylene	DETSC 3432	1	ug/l	< 1	< 1
2,2-dichloropropane	DETSC 3432	2	ug/l	< 2	< 2
Bromochloromethane	DETSC 3432	4	ug/l	< 4	< 4
Chloroform	DETSC 3432	1	ug/l	< 1	< 1
1,1,1-trichloroethane	DETSC 3432	1	ug/l	< 1	< 1
1,1-dichloropropene	DETSC 3432	1	ug/l	< 1	< 1
Carbon tetrachloride	DETSC 3432	1	ug/l	< 1	< 1
Benzene	DETSC 3432	1	ug/l	< 1	< 1
1,2-dichloroethane	DETSC 3432	1	ug/l	< 1	< 1
Trichloroethylene	DETSC 3432*	1	ug/l	< 1	< 1
1,2-dichloropropane	DETSC 3432	1	ug/l	< 1	< 1
Dibromomethane	DETSC 3432	1	ug/l	< 1	< 1
Bromodichloromethane	DETSC 3432	4	ug/l	< 4	< 4
cis-1,3-dichloropropene	DETSC 3432	1	ug/l	< 1	< 1
Toluene	DETSC 3432	1	ug/l	< 1	< 1
trans-1,3-dichloropropene	DETSC 3432	1	ug/l	< 1	< 1
1,1,2-trichloroethane	DETSC 3432	1	ug/l	< 1	< 1
Tetrachloroethylene	DETSC 3432	1	ug/l	< 1	< 1
1,3-dichloropropane	DETSC 3432	1	ug/l	< 1	< 1
Dibromochloromethane	DETSC 3432	1	ug/l	< 1	< 1
1,2-dibromoethane	DETSC 3432	1	ug/l	< 1	< 1
Chlorobenzene	DETSC 3432	1	ug/l	< 1	< 1
1,1,1,2-tetrachloroethane	DETSC 3432	1	ug/l	< 1	< 1
Ethylbenzene	DETSC 3432	1	ug/l	< 1	< 1
m+p-Xylene	DETSC 3432	2	ug/l	< 2	< 2
o-Xylene	DETSC 3432	1	ug/l	< 1	< 1
Styrene	DETSC 3432	1	ug/l	< 1	< 1
Bromoform	DETSC 3432	1	ug/l	< 1	< 1
Isopropylbenzene	DETSC 3432	1	ug/l	< 1	< 1
1,1,2,2-tetrachloroethane	DETSC 3432	1	ug/l	< 1	< 1
Bromobenzene	DETSC 3432	1	ug/l	< 1	< 1
1,2,3-trichloropropane	DETSC 3432	1	ug/l	< 1	< 1

Key: * -not accredited. n/s -not supplied.

Summary of Chemical Analysis
Leachate Samples

Our Ref 19-13749-1
Client Ref S190632
Contract Title Fujifilm, Billingham

			Lab No	1535955	1535956
			Sample ID	TP1	TP3
			Depth	0.20	0.65
			Other ID		
			Sample Type	ES	ES
			Sampling Date	17/07/19	17/07/19
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
n-propylbenzene	DETSC 3432	1	ug/l	< 1	< 1
2-chlorotoluene	DETSC 3432	1	ug/l	< 1	< 1
1,3,5-trimethylbenzene	DETSC 3432	1	ug/l	< 1	< 1
4-chlorotoluene	DETSC 3432	1	ug/l	< 1	< 1
Tert-butylbenzene	DETSC 3432	1	ug/l	< 1	< 1
1,2,4-trimethylbenzene	DETSC 3432	1	ug/l	< 1	< 1
sec-butylbenzene	DETSC 3432	1	ug/l	< 1	< 1
p-isopropyltoluene	DETSC 3432	1	ug/l	< 1	< 1
1,3-dichlorobenzene	DETSC 3432	2	ug/l	< 2	< 2
1,4-dichlorobenzene	DETSC 3432	1	ug/l	< 1	< 1
n-butylbenzene	DETSC 3432	1	ug/l	< 1	< 1
1,2-dichlorobenzene	DETSC 3432	1	ug/l	< 1	< 1
1,2-dibromo-3-chloropropane	DETSC 3432	1	ug/l	< 1	< 1
1,2,4-trichlorobenzene	DETSC 3432	1	ug/l	< 1	< 1
Hexachlorobutadiene	DETSC 3432	1	ug/l	< 1	< 1
1,2,3-trichlorobenzene	DETSC 3432	1	ug/l	< 1	< 1
MTBE	DETSC 3432*	1	ug/l	< 1	< 1
SVOCs					
Phenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0
Aniline	DETSC 3434*	1	ug/l	< 1.0	< 1.0
2-Chlorophenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0
Benzyl Alcohol	DETSC 3434*	1	ug/l	< 1.0	< 1.0
2-Methylphenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0
Bis(2-chloroisopropyl)ether	DETSC 3434*	1	ug/l	< 1.0	< 1.0
3&4-Methylphenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0
Bis(2-chloroethoxy)methane	DETSC 3434*	1	ug/l	< 1.0	< 1.0
2,4-Dimethylphenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0
2,4-Dichlorophenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0
1,2,4-Trichlorobenzene	DETSC 3434*	1	ug/l	< 1.0	< 1.0
4-Chloro-3-methylphenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0
2-Methylnaphthalene	DETSC 3434*	1	ug/l	< 1.0	< 1.0
Hexachlorocyclopentadiene	DETSC 3434*	1	ug/l	< 1.0	< 1.0
2,4,6-Trichlorophenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0
2,4,5-Trichlorophenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0
2-Chloronaphthalene	DETSC 3434*	1	ug/l	< 1.0	< 1.0
2-Nitroaniline	DETSC 3434*	1	ug/l	< 1.0	< 1.0
2,4-Dinitrotoluene	DETSC 3434*	1	ug/l	< 1.0	< 1.0
3-Nitroaniline	DETSC 3434*	1	ug/l	< 1.0	< 1.0
4-Nitrophenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0
Dibenzofuran	DETSC 3434*	1	ug/l	< 1.0	< 1.0
2,6-Dinitrotoluene	DETSC 3434*	1	ug/l	< 1.0	< 1.0
2,3,4,6-Tetrachlorophenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0

Key: * -not accredited. n/s -not supplied.

Summary of Chemical Analysis
Leachate Samples

Our Ref 19-13749-1
Client Ref S190632
Contract Title Fujifilm, Billingham

			Lab No	1535955	1535956
			Sample ID	TP1	TP3
			Depth	0.20	0.65
			Other ID		
			Sample Type	ES	ES
			Sampling Date	17/07/19	17/07/19
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Diethylphthalate	DETSC 3434*	1	ug/l	< 1.0	< 1.0
4-Chlorophenylphenylether	DETSC 3434*	1	ug/l	< 1.0	< 1.0
4-Nitroaniline	DETSC 3434*	1	ug/l	< 1.0	< 1.0
Diphenylamine	DETSC 3434*	1	ug/l	< 1.0	< 1.0
4-Bromophenylphenylether	DETSC 3434*	1	ug/l	< 1.0	< 1.0
Hexachlorobenzene	DETSC 3434*	1	ug/l	< 1.0	< 1.0
Bis(2-ethylhexyl)ester	DETSC 3434*	1	ug/l	< 1.0	< 1.0
Pentachlorophenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0
Di-n-butylphthalate	DETSC 3434*	1	ug/l	< 1.0	< 1.0
Butylbenzylphthalate	DETSC 3434*	1	ug/l	< 1.0	< 1.0
Bis(2-ethylhexyl)phthalate	DETSC 3434*	1	ug/l	< 1.0	< 1.0
Di-n-octylphthalate	DETSC 3434*	1	ug/l	< 1.0	< 1.0
1,4-Dinitrobenzene	DETSC 3434*	1	ug/l	< 1.0	< 1.0
Dimethylphthalate	DETSC 3434*	1	ug/l	< 1.0	< 1.0
1,3-Dinitrobenzene	DETSC 3434*	1	ug/l	< 1.0	< 1.0
2,3,5,6-Tetrachlorophenol	DETSC 3434*	1	ug/l	< 1.0	< 1.0
Azobenzene	DETSC 3434*	1	ug/l	< 1.0	< 1.0
Carbazole	DETSC 3434*	1	ug/l	< 1.0	< 1.0
1-Methylnaphthalene	DETSC 3434*	1	ug/l	< 1.0	< 1.0

Key: * -not accredited. n/s -not supplied.

Summary of Asbestos Analysis
Soil Samples

Our Ref 19-13749-1
Client Ref S190632
Contract Title Fujifilm, Billingham

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1534224	TP1 0.20	SOIL	NAD	none	Jordan Eadington
1534225	TP2 0.40	SOIL	NAD	none	Jordan Eadington
1534226	TP3 0.65	SOIL	NAD	none	Jordan Eadington
1534227	TP4 0.30	SOIL	NAD	none	Jordan Eadington
1534228	ST2 0.30	SOIL	NAD	none	Jordan Eadington
1534229	TP5 0.50	SOIL	NAD	none	Jordan Eadington
1534230	WS08 0.50	SOIL	Chrysotile Amosite	Bundles of Chrysotile	Jordan Eadington
1534231	WS09 0.40	SOIL	Chrysotile	Small bundles of Chrysotile present	Jordan Eadington

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.

Summary of Asbestos Quantification Analysis
Soil Samples

Our Ref 19-13749-1
Client Ref S190632
Contract Title Fujifilm, Billingham

			Lab No	1534230	1534231
			Sample ID	WS08	WS09
			Depth	0.50	0.40
			Other ID		
			Sample Type	SOIL	SOIL
			Sampling Date	17/07/19	17/07/19
			Sampling Time		
Test	**Method**	**Units**			
Total Mass% Asbestos (a+b+c)	DETSC 1102	Mass %		**0.003**	**< 0.001**
Gravimetric Quantification (a)	DETSC 1102	Mass %		na	na
Detailed Gravimetric Quantification (b)	DETSC 1102	Mass %		0.003	<0.001
Quantification by PCOM (c)	DETSC 1102	Mass %		na	na
Potentially Respirable Fibres (d)	DETSC 1102	Fibres/g		na	na
Breakdown of Gravimetric Analysis (a)					
Mass of Sample		g		885.19	721.24
ACMs present*		type			
Mass of ACM in sample		g			
% ACM by mass		%			
% asbestos in ACM		%			
% asbestos in sample		%			
Breakdown of Detailed Gravimetric Analysis (b)					
% Amphibole bundles in sample		Mass %		<0.001	na
% Chrysotile bundles in sample		Mass %		0.003	<0.001
Breakdown of PCOM Analysis (c)					
% Amphibole fibres in sample		Mass %		na	na
% Chrysotile fibres in sample		Mass %		na	na
Breakdown of Potentially Respirable Fibre Analysis (d)					
Amphibole fibres		Fibres/g		na	na
Chrysotile fibres		Fibres/g		na	na

* Denotes test or material description outside of UKAS accreditation.
% asbestos in Asbestos Containing Materials (ACMs) is determined by
by reference to HSG 264.
Recommended sample size for quantification is approximately 1kg
# denotes deviating sample

Information in Support of the Analytical Results

Our Ref 19-13749-1
Client Ref S190632
Contract Fujifilm, Billingham

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1534224	TP1 0.20 SOIL	17/07/19	GJ 250ml, GJ 60ml, PT 1L		
1534225	TP2 0.40 SOIL	17/07/19	GJ 250ml, GJ 60ml, PT 1L		
1534226	TP3 0.65 SOIL	17/07/19	GJ 250ml, GJ 60ml, PT 1L		
1534227	TP4 0.30 SOIL	17/07/19	GJ 250ml, GJ 60ml, PT 1L		
1534228	ST2 0.30 SOIL	17/07/19	GJ 250ml, GJ 60ml, PT 1L		
1534229	TP5 0.50 SOIL	17/07/19	GJ 250ml, GJ 60ml, PT 1L		
1534230	WS08 0.50 SOIL	17/07/19	GJ 250ml, GJ 60ml, PT 1L		
1534231	WS09 0.40 SOIL	17/07/19	GJ 250ml, GJ 60ml, PT 1L		
1535955	TP1 0.20 LEACHATE	17/07/19	GJ 250ml, GJ 60ml, PT 1L		
1535956	TP3 0.65 LEACHATE	17/07/19	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

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 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETSC 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETSC 2084	Total Carbon	%	0.5	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 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETSC 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETSC 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETSC2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETSC2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETSC2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETSC2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETSC2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETSC2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETSC2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC2301	Zinc	mg/kg	1	Air Dried	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-C12	mg/kg	10	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 C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	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-C12	mg/kg	10	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 C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 062	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	o Xylene	mg/kg	0.01	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

Appendix A - Details of Analysis

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

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

APPENDIX D:
Geotechnical Laboratory Results

Laboratory Report Front Sheet

Site name	Job number
Fujifilm, Billingham	S190632

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

UKAS TESTING
7607

Client details:

Reference: S190632
Name: Solmek
Address: 12 Yarm Road,
Stockton-on-tees,
TS18 3NA

Telephone: 01642 607083
Email: lcassidy@solmek.com

FAO: L Cassidy

Date commenced: 22/07/2019

Date reported: 31/07/2019

Observations and interpretations are outside of the UKAS Accreditiation

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

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

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

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

Summary of Classification Tests

Site name	Job number
Fujifilm, Billingham	S190632

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

UKAS TESTING
7607

Hole	Depth		Type	*w*	Oven temp.	wa	Pa	Pr	wL	wP	IP	IL	Plasticity class	Preparation method
	Top m	Base m		%	oc	%	%	%	%	%	%			
BH3	2.00	2.50	B	26	105	27	98	2	42-s	20	22	0.318	CI	Tested after >425µm removed by hand
BH3	5.00	5.45	U	30	105	30	100	0	41-s	20	21	0.476	CI	Tested in natural condition
BH4	4.00	4.45	U	29	105	29	100	0	41-s	21	20	0.400	CI	Tested in natural condition
BH4	14.50	14.95	U	15	105	16	92	8	27-s	16	11	0.000	CL	Tested after >425µm removed by hand
BH5	13.00	13.45	U	13	105	14	93	7	26-s	11	15	0.200	CL	Tested after >425µm removed by hand
BH6	6.50	6.95	U	29	105	29	100	0	40-s	20	20	0.450	CI	Tested in natural condition
BH7	11.50	11.95	U	15	105	18	85	15	23-s	13	10	0.500	CL	Tested after >425µm removed by hand
TP1B	1.40		B	26	105	26	99	1	48-s	23	25	0.120	CI	Tested after >425µm removed by hand
TP3	0.50		B	6.7	105								NP	Tested in natural condition
WS01	2.50		D	30	105	30	99	1	46-s	21	25	0.360	CI	Tested after >425µm removed by hand

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

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

Approved by	KW
Approval date	24/07/2019 16:10
Date report generated	
Report Number	

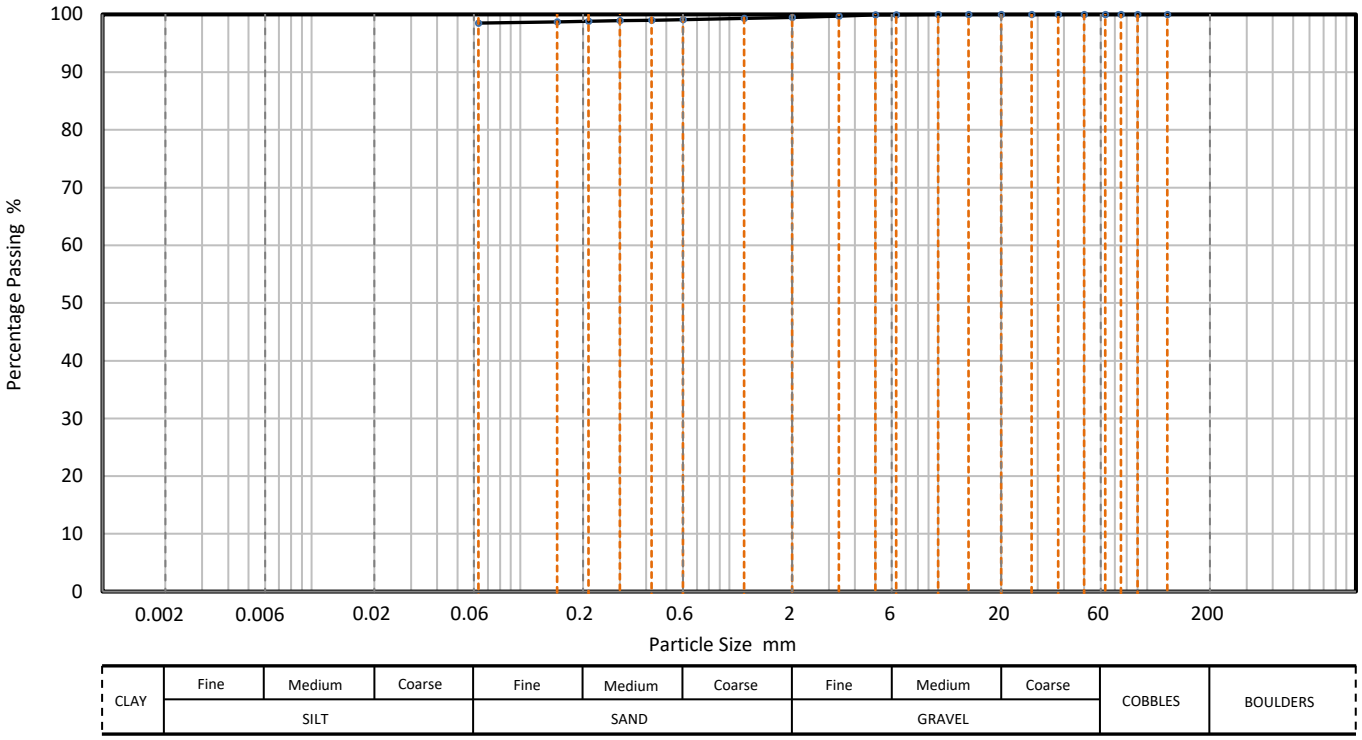
PARTICLE SIZE DISTRIBUTION

Site name	Job number
Fujifilm, Billingham	S190632

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

UKAS TESTING
7607

Hole	BH3	Lab sample ID	SLMK201907220
Depth (Top) m	2.00	Test Method	BS 1377 - 2 : 1990 Clause 9.2
Depth (Base) m	2.5	Soil Description	Brown, slightly gravelly, slightly sandy CLAY
Sample type	B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	99		
0.6	99		
0.425	99		
0.3	99		
0.212	99		
0.15	99		
0.063	99		

Dry Mass of sample, g	468

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	0.5
Sand	1.0
Fines <0.063mm	98.0

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

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

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

Approved by	KW
Approval date	29/07/2019 11:07

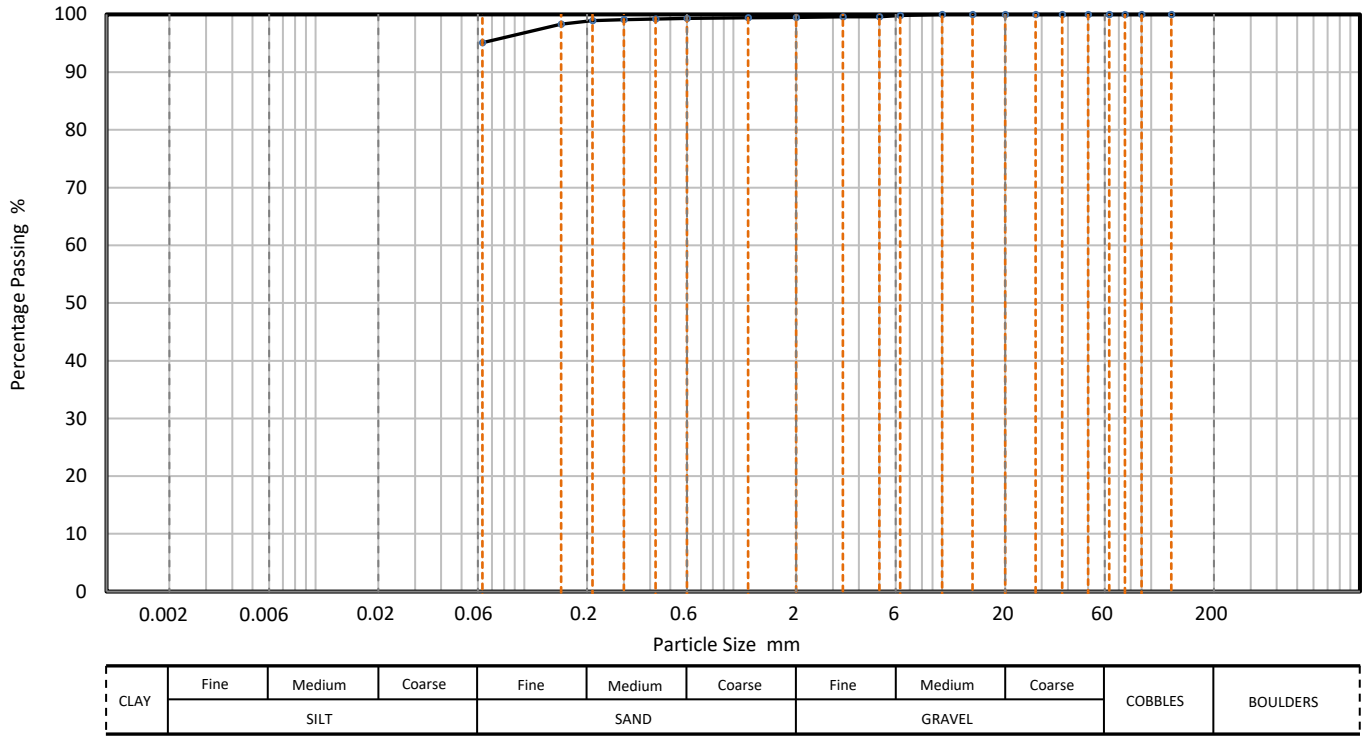
PARTICLE SIZE DISTRIBUTION

Site name	Job number
Fujifilm, Billingham	S190632

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

UKAS TESTING 7607

Hole		TP1B	Lab sample ID	SLMK201907226
Depth (Top)	m	1.40	Test Method	BS 1377 - 2 : 1990 Clause 9.2
Depth (Base)	m		Soil Description	Brown, slightly gravelly, slightly sandy CLAY
Sample type		B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	99		
0.6	99		
0.425	99		
0.3	99		
0.212	99		
0.15	98		
0.063	95		

Dry Mass of sample, g	544

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	0.5
Sand	4.4
Fines <0.063mm	95.0

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

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

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

Approved by	KW
Approval date	29/07/2019 11:08

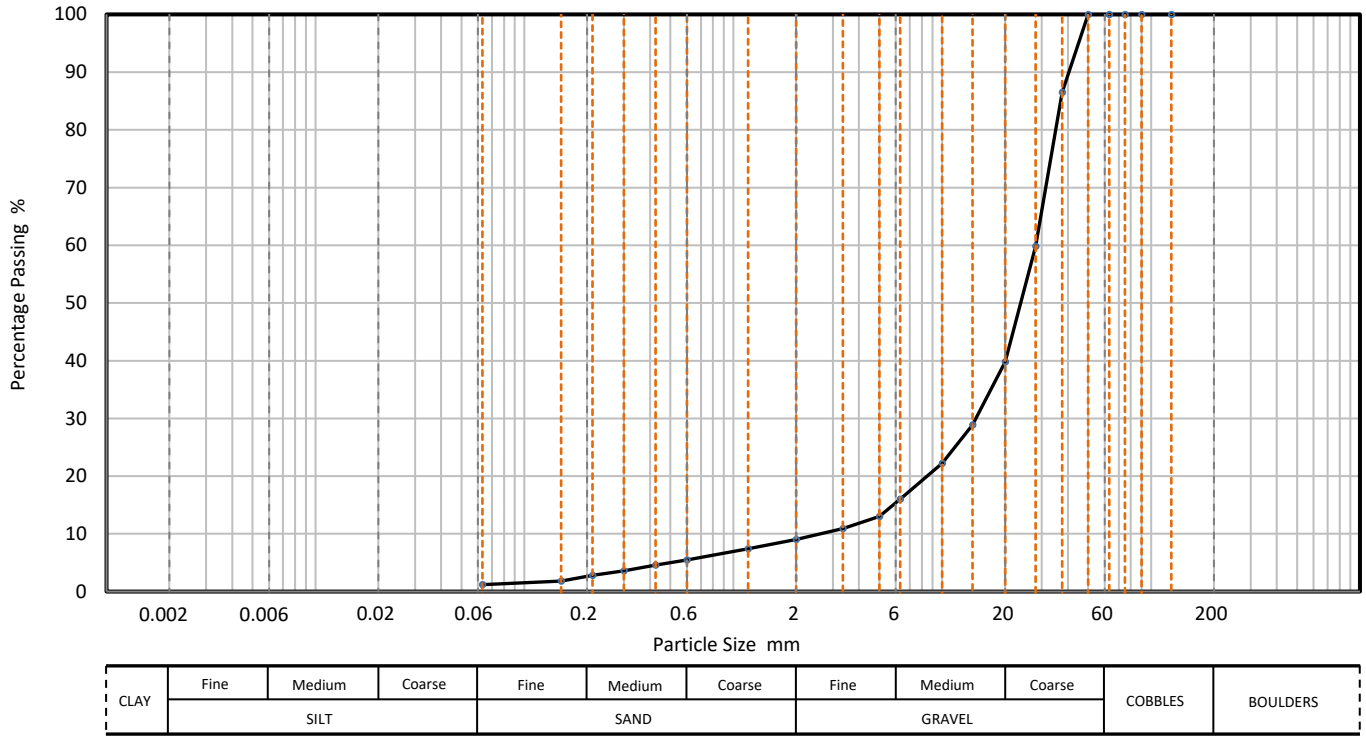
PARTICLE SIZE DISTRIBUTION

Site name	Job number
Fujifilm, Billingham	S190632

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

UKAS TESTING 7607

Hole	TP3	Lab sample ID	SLMK201907227
Depth (Top) m	0.50	Test Method	BS 1377 - 2 : 1990 Clause 9.2
Depth (Base) m		Soil Description	Brown, slightly sandy GRAVEL
Sample type	B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	87		
28	60		
20	40		
14	29		
10	22		
6.3	16		
5	13		
3.35	11		
2	9		
1.18	7		
0.6	6		
0.425	5		
0.3	4		
0.212	3		
0.15	2		
0.063	1		

Dry Mass of sample, g: 4124

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	91.0
Sand	7.8
Fines <0.063mm	1.0

Grading Analysis		
D100	mm	
D60	mm	28.1
D30	mm	14.5
D10	mm	2.63
Uniformity Coefficient		11
Curvature Coefficient		2.9

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

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

Approved by	KW
Approval date	30/07/2019 09:40

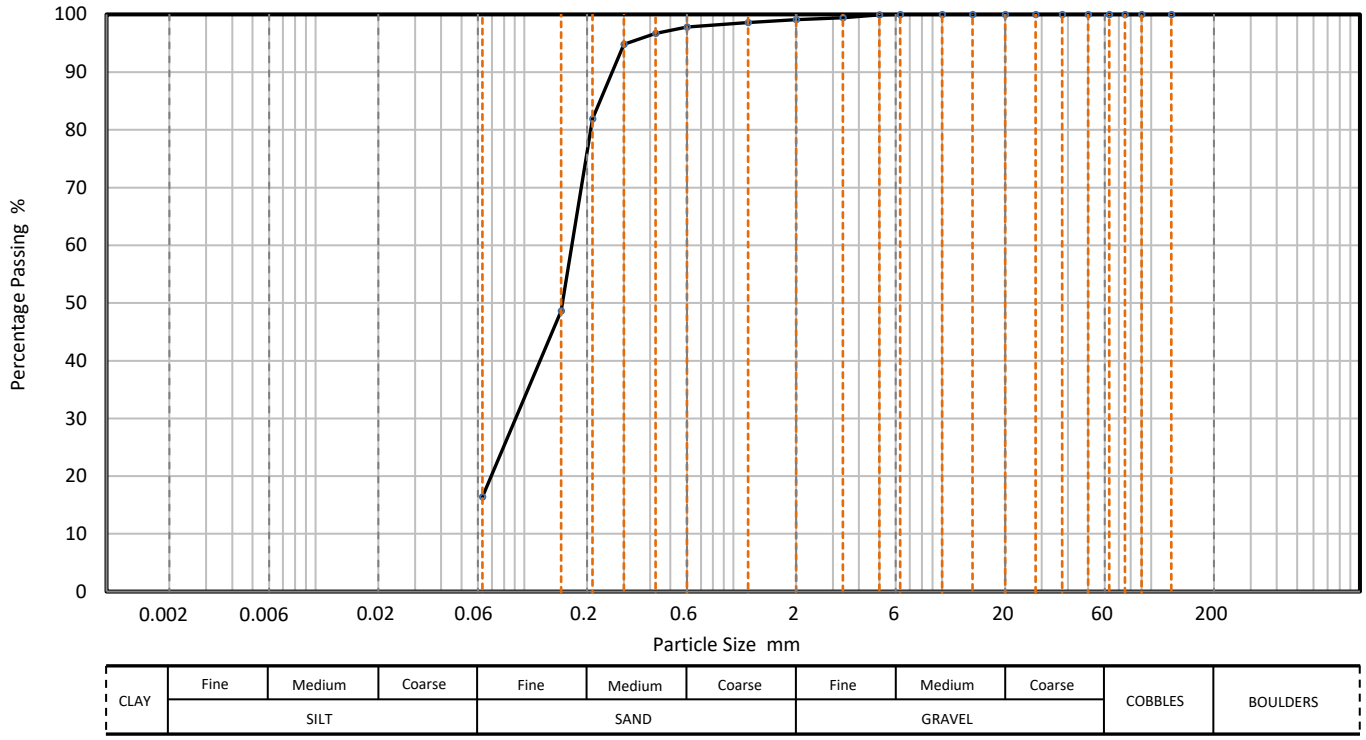
PARTICLE SIZE DISTRIBUTION

Site name	Job number
Fujifilm, Billingham	S190632

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

UKAS TESTING 7607

Hole	WS09	Lab sample ID	SLMK201907229
Depth (Top) m	1.50	Test Method	BS 1377 - 2 : 1990 Clause 9.2
Depth (Base) m		Soil Description	Brown, slightly gravelly, slightly clayey SAND
Sample type	D		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	99		
2	99		
1.18	99		
0.6	98		
0.425	97		
0.3	95		
0.212	82		
0.15	49		
0.063	16		

Dry Mass of sample, g	152

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	0.9
Sand	82.7
Fines <0.063mm	16.0

Grading Analysis		
D100	mm	
D60	mm	0.169
D30	mm	0.0909
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

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

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

Approved by	KW
Approval date	25/07/2019 12:11

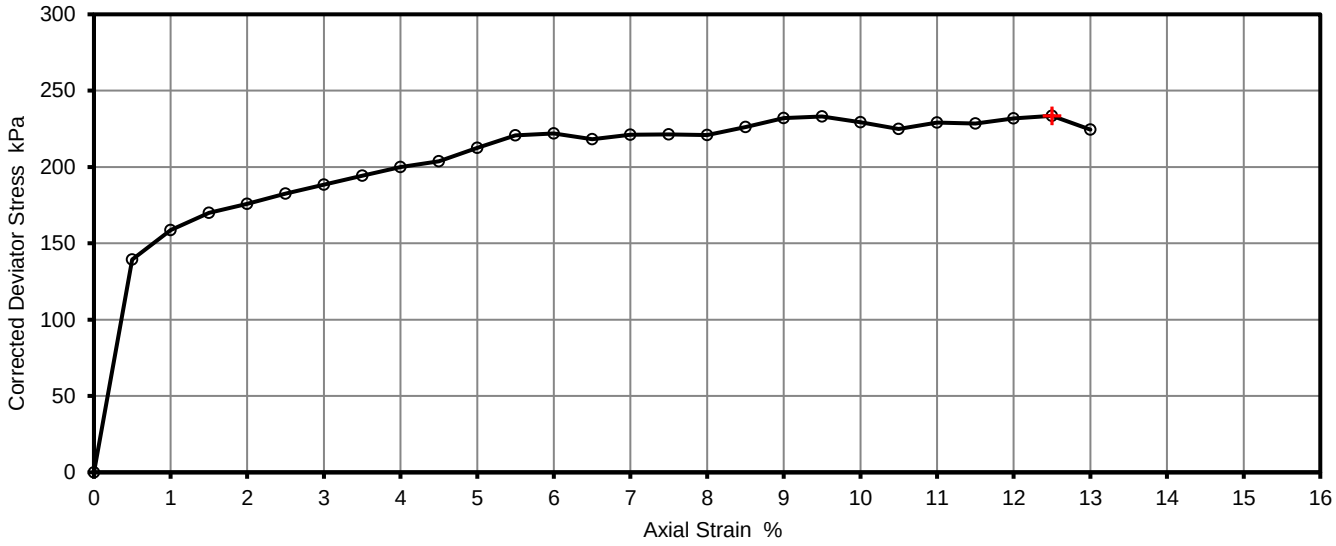
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	S190632
				Borehole/Pit No.	BH3
Site Name	Fujifilm, Billingham			Sample No.	
Soil Description				Depth	5.00
Specimen Reference		Specimen Depth	m	Sample Type	U
Specimen Description	Firm to stiff, brown, silty High Strength CLAY			KeyLAB ID	SLMK201907221
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	26/07/2019

Test Number		1	
Length		76.0	mm
Diameter		38.0	mm
Bulk Density		1.94	Mg/m3
Moisture Content		30.4	%
Dry Density		1.49	Mg/m3
Rate of Strain		1.0	%/min
Cell Pressure		100	kPa
At failure	Axial Strain	12.5	%
	Deviator Stress, (σ1 - σ3)f	234	kPa
	Undrained Shear Strength, cu	117	kPa ½(σ1 - σ3)f
	Mode of Failure	Plastic	

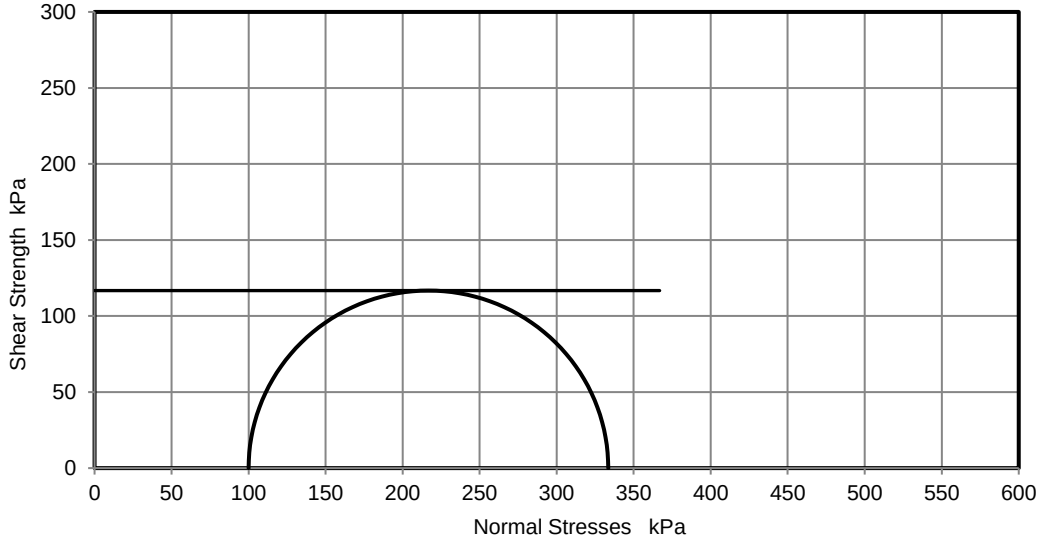
Tracable Equipment Record

Test Frame	TRI 004
Load Ring	LOAD CELL 003
Pressure Gauge	PRE 006
Digital Caliper	CAL-005
Balance	BAL-001

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

Mohr circles and their interpretation is not covered by BS1377.
This is provided for information only.

No of membranes used
1
Total thickness (mm)
0.26

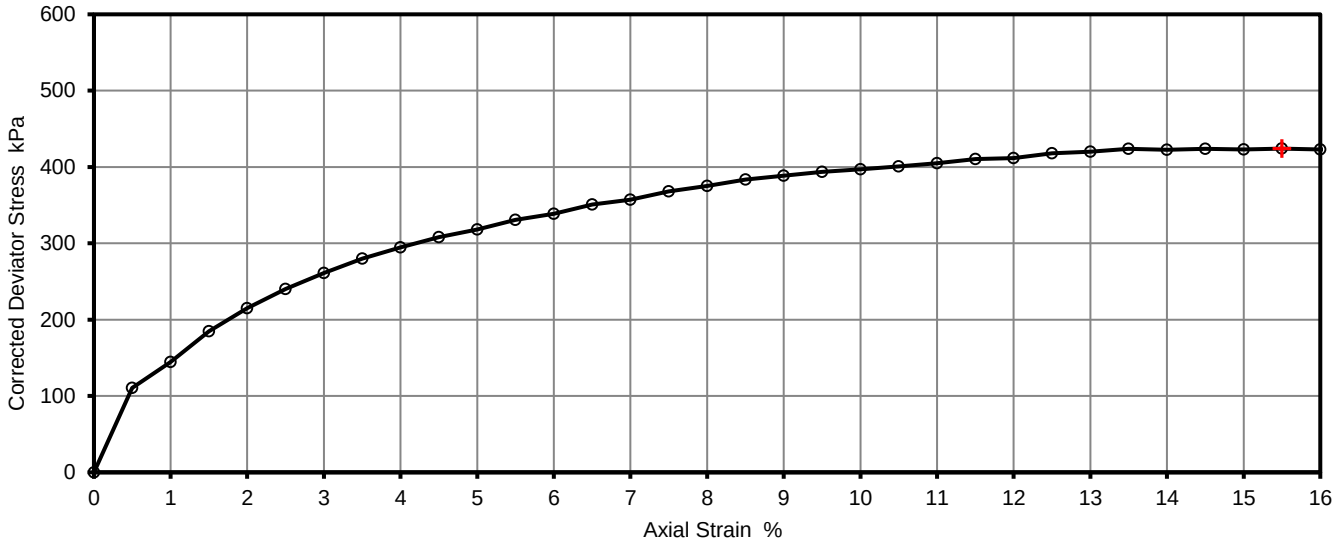
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	S190632
				Borehole/Pit No.	BH5
Site Name	Fujifilm, Billingham			Sample No.	
Soil Description				Depth	13.00
Specimen Reference		Specimen Depth	m	Sample Type	U
Specimen Description	Firm to stiff, brown, slightly gravelly, slightly sandy EXT High Strength CLAY			KeyLAB ID	SLMK201907223
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	26/07/2019

Test Number		1	
Length		76.0	mm
Diameter		38.0	mm
Bulk Density		2.04	Mg/m3
Moisture Content		12.6	%
Dry Density		1.81	Mg/m3
Rate of Strain		1.0	%/min
Cell Pressure		260	kPa
At failure	Axial Strain	15.5	%
	Deviator Stress, (σ1 - σ3)f	424	kPa
	Undrained Shear Strength, cu	212	kPa ½(σ1 - σ3)f
	Mode of Failure	Plastic	

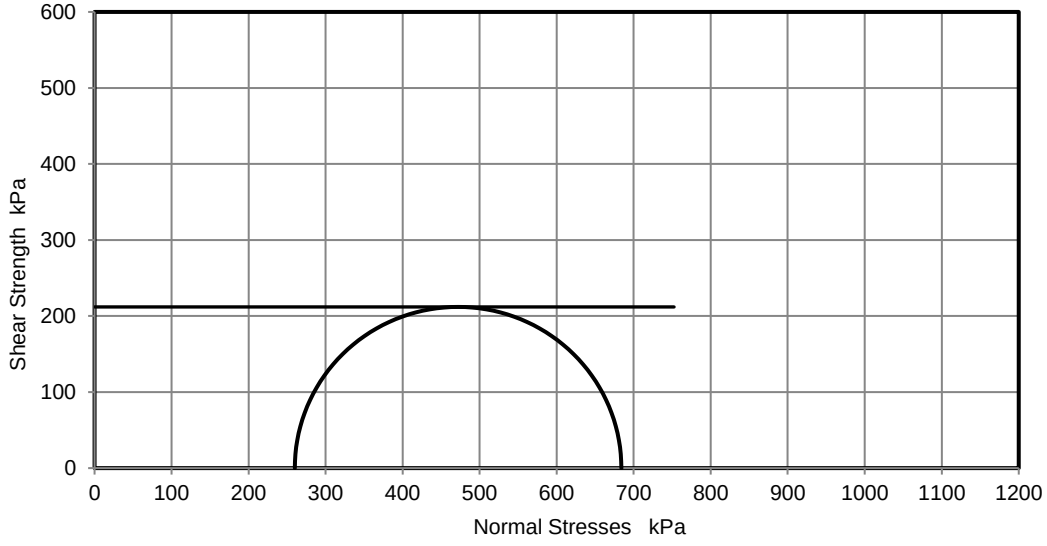
Tracable Equipment Record

Test Frame	TRI 004
Load Ring	LOAD CELL 003
Pressure Gauge	PRE 006
Digital Caliper	CAL-005
Balance	BAL-001

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

Mohr circles and their interpretation is not covered by BS1377.
This is provided for information only.

No of membranes used
1
Total thickness (mm)
0.26

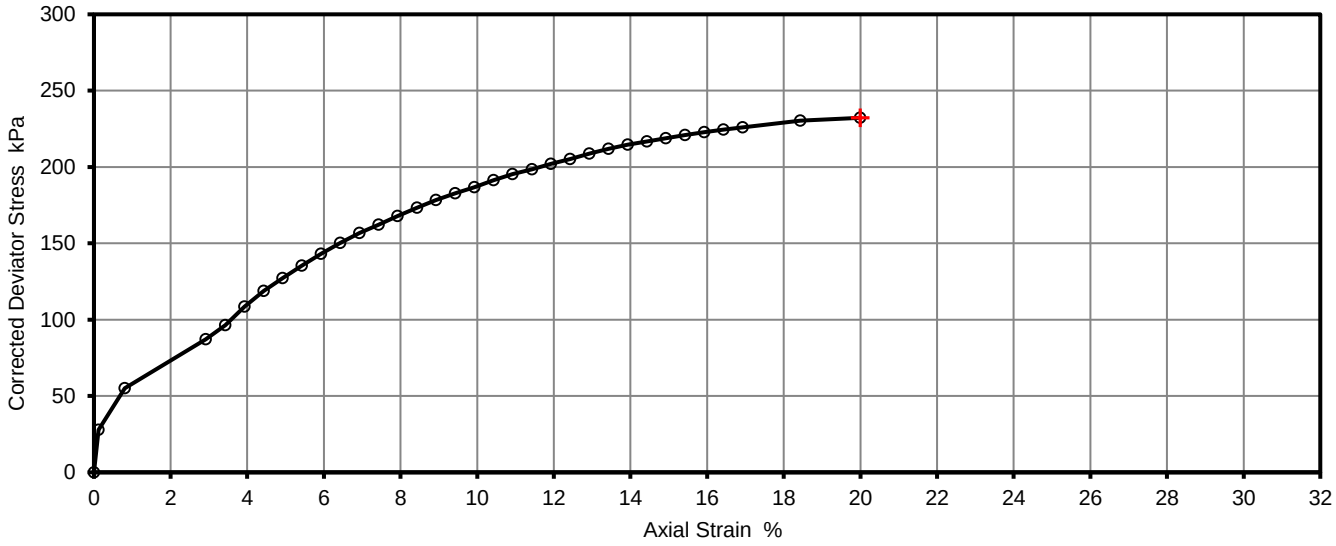
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	S190632
				Borehole/Pit No.	BH7
Site Name	Fujifilm, Billingham			Sample No.	
Soil Description				Depth	11.50
Specimen Reference		Specimen Depth	m	Sample Type	U
Specimen Description	Firm to stiff, brown, CLAY (HV: 110, 112 kPa)			KeyLAB ID	SLMK201907225
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	23/07/2019

Test Number	1	
Length	203.0	mm
Diameter	103.0	mm
Bulk Density	2.15	Mg/m3
Moisture Content	27.9	%
Dry Density	1.68	Mg/m3
Rate of Strain	1.0	%/min
Cell Pressure	230	kPa
At failure: Axial Strain	20.0	%
At failure: Deviator Stress, (σ1 - σ3)f	232	kPa
At failure: Undrained Shear Strength, cu	116	kPa ½(σ1 - σ3)f
At failure: Mode of Failure	Plastic	

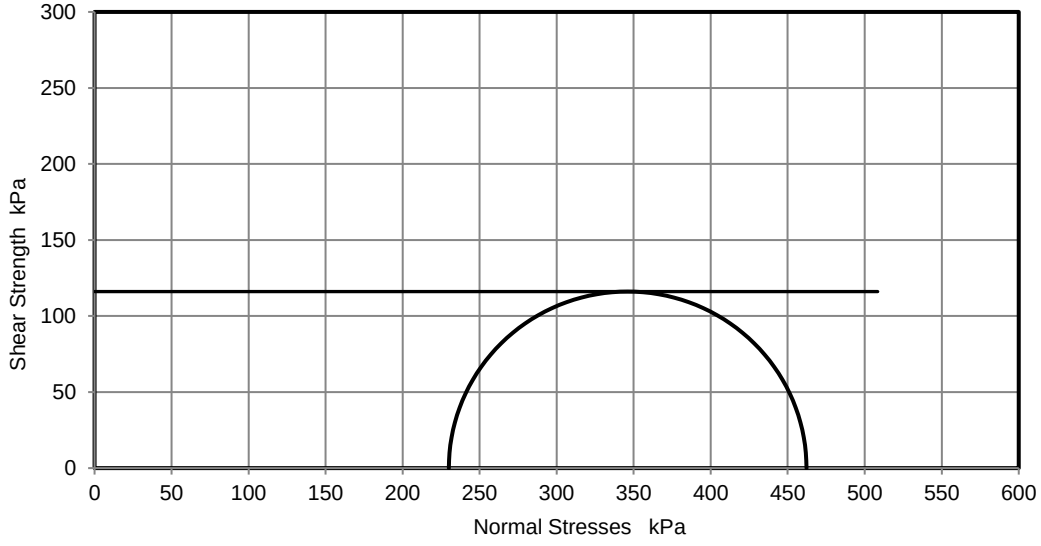
Tracable Equipment Record

Test Frame	TRI 004
Load Ring	LOAD CELL 003
Pressure Gauge	PRE 006
Digital Caliper	CAL-005
Balance	BAL-001

Deviator Stress v Axial Strain



Mohr Circles

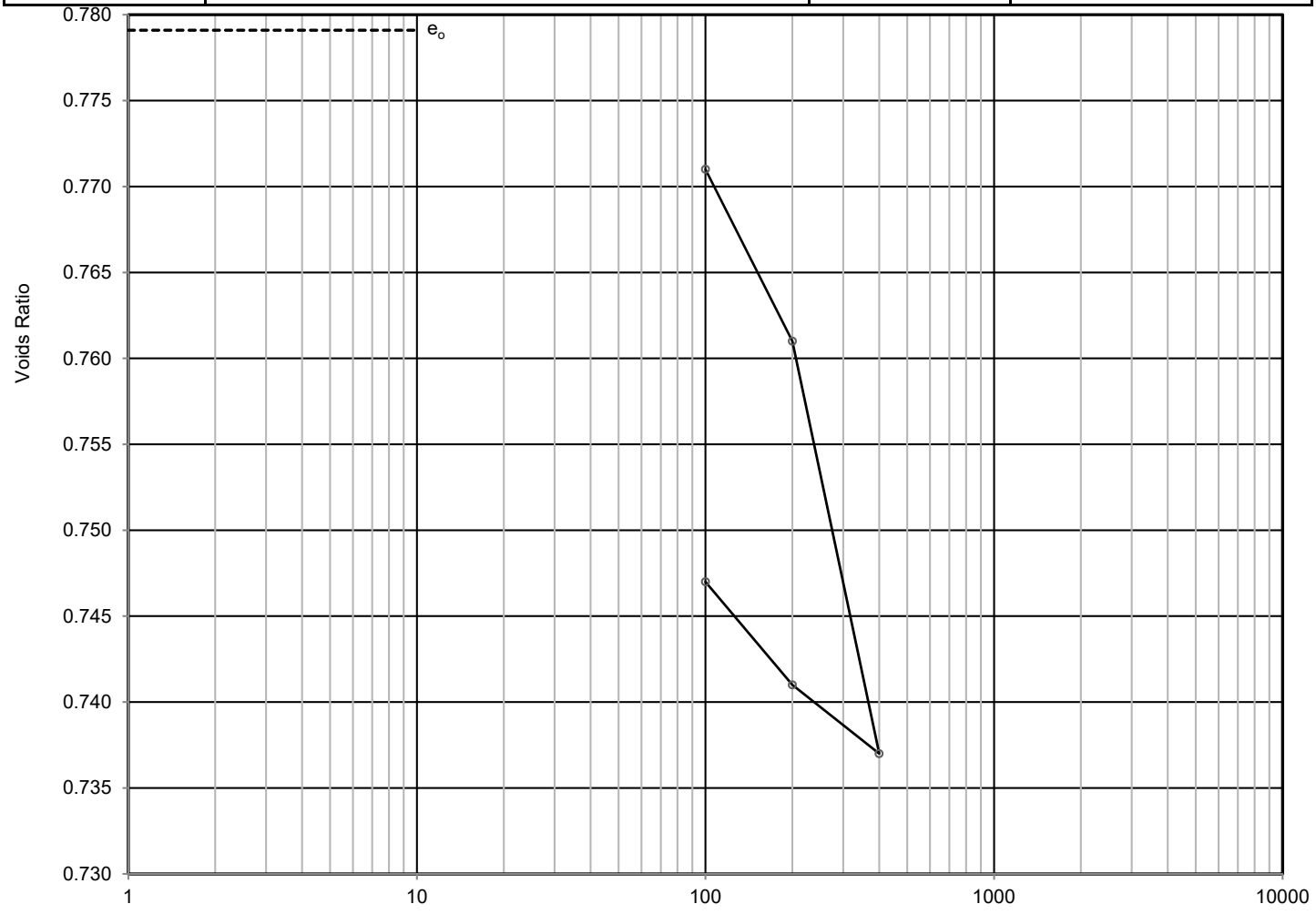


Deviator stress corrected for area change and membrane effects

Mohr circles and their interpretation is not covered by BS1377.
This is provided for information only.

No of membranes used
1
Total thickness (mm)
0.35

	ONE DIMENSIONAL CONSOLIDATION TEST BS1377:Part 5:1990, clause 3			Job Ref	S190632
				Borehole/Pit No.	BH4
Site Name	Fujifilm, Billingham			Sample No.	
Soil Description				Depth	4
Specimen Reference		Specimen Depth	m	Sample Type	U
Specimen Description	very soft, brown CLAY			KeyLAB ID	SLMK201907222
Test Method	BS1377:Part 5:1990, clause 3			Date started	26/07/2019



Applied Pressure kPa	Voids ratio	M_v m^2/MN	C_v ($t_{90, root}$) m^2/yr	C_{sec}
0.0	0.779	-	-	-
100	0.771	0.044	71	0.000079
200	0.761	0.057	60	0.00034
400	0.737	0.070	13	0.0010
200	0.741	0.012		
100	0.747	0.038		

Preparation

Index tests Liquid limit % Plastic limit %

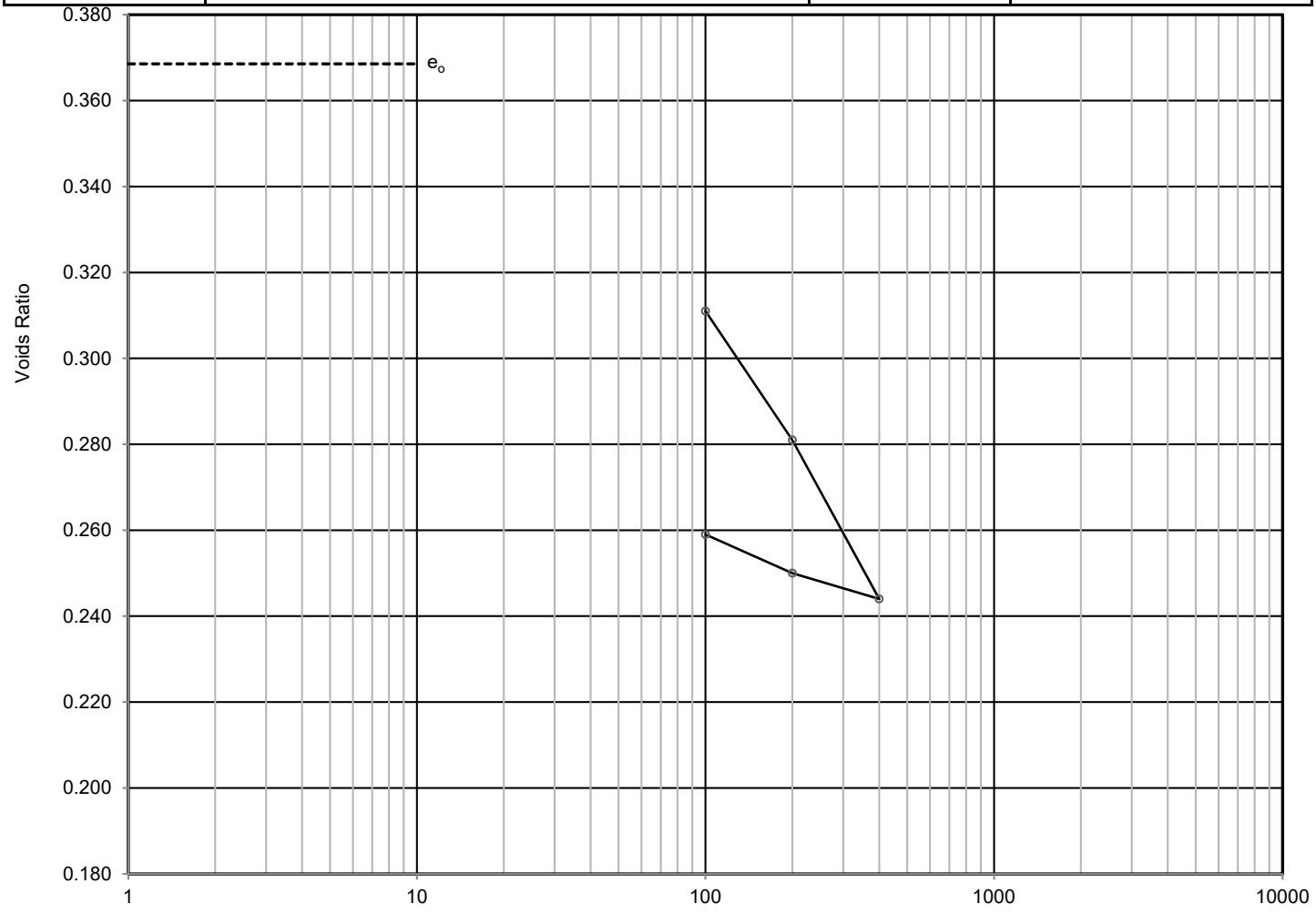
Particle density assumed 2.65 Mg/m^3

Specimen details	Initial	Final	
Diameter	75.00	-	mm
Height	20.00	19.64	mm
Moisture Content	30.4	22.5	%
Bulk density	1.94		Mg/m^3
Dry density	1.49		Mg/m^3
Voids Ratio	0.779		
Saturation	103		%
Average temperature for test	19		°C
Swelling Pressure			kPa
Settlement on saturation			%

Remarks

Final values should be used with caution C_v plotted at mid point of load increments C_v corrected to 20°C	Tested	Checked	Approved	Printed :	Fig. No
	DS	KW	KW	31/07/2019 13:20	

	ONE DIMENSIONAL CONSOLIDATION TEST BS1377:Part 5:1990, clause 3			Job Ref	S190632
				Borehole/Pit No.	BH4
Site Name	Fujifilm, Billingham			Sample No.	
Soil Description				Depth	14.5
Specimen Reference		Specimen Depth	m	Sample Type	U
Specimen Description	soft, brown CLAY			KeyLAB ID	SLMK2019072210
Test Method	BS1377:Part 5:1990, clause 3			Date started	26/07/2019



Applied Pressure kPa	Voids ratio	M_v m^2/MN	C_v ($t_{90, root}$) m^2/yr	C_{sec}
0.0	0.369	-	-	-
100	0.311	0.420		0.00050
200	0.281	0.230	23	0.00013
400	0.244	0.140	2.4	0.0017
200	0.250	0.023		
100	0.259	0.072		

Preparation

Index tests Liquid limit % Plastic limit %

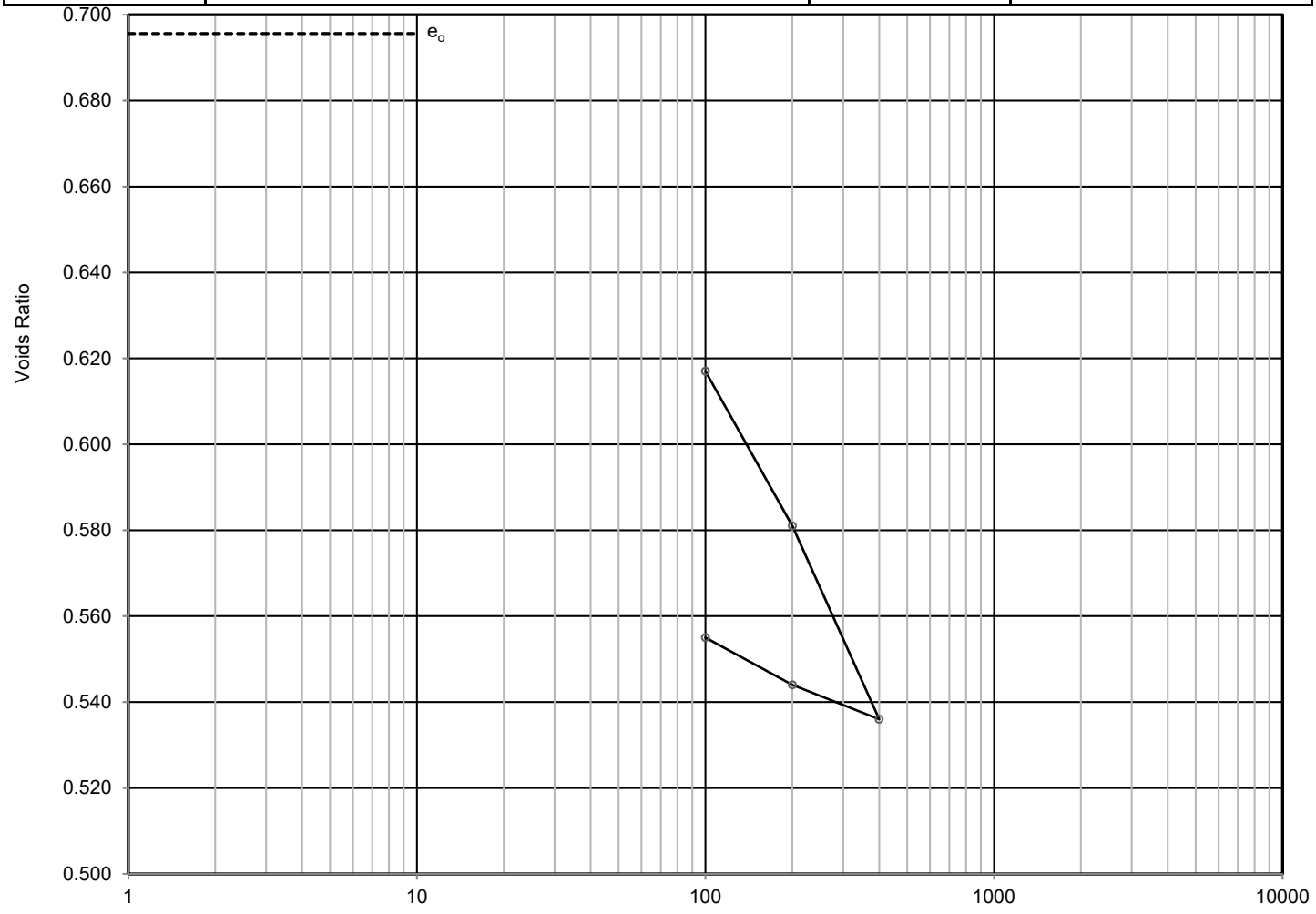
Particle density assumed 2.65 Mg/m^3

Specimen details	Initial	Final	
Diameter	75.00	-	mm
Height	20.00	18.40	mm
Moisture Content	16.4	15.5	%
Bulk density	2.25		Mg/m^3
Dry density	1.94		Mg/m^3
Voids Ratio	0.369		
Saturation	118		%
Average temperature for test	19		°C
Swelling Pressure			kPa
Settlement on saturation			%

Remarks

Final values should be used with caution C_v plotted at mid point of load increments C_v corrected to 20°C	Tested	Checked	Approved	Printed :	Fig. No
	DS	KW	KW	31/07/2019 14:31	

	ONE DIMENSIONAL CONSOLIDATION TEST BS1377:Part 5:1990, clause 3			Job Ref	S190632
				Borehole/Pit No.	BH6
Site Name	Fujifilm, Billingham			Sample No.	
Soil Description				Depth	6.5
Specimen Reference		Specimen Depth	m	Sample Type	U
Specimen Description	soft to firm, brown CLAY			KeyLAB ID	SLMK201907224
Test Method	BS1377:Part 5:1990, clause 3			Date started	26/07/2019



Applied Pressure kPa	Voids ratio	M_v m^2/MN	C_v ($t_{90, root}$) m^2/yr	C_{sec}
0.0	0.696	-	-	-
100	0.617	0.460	8.9	0.00074
200	0.581	0.230	7.8	0.0011
400	0.536	0.140	3.3	0.0017
200	0.544	0.024		
100	0.555	0.074		

Preparation

Index tests Liquid limit % Plastic limit %

Particle density assumed 2.65 Mg/m^3

Specimen details	Initial	Final	
Diameter	75.00	-	mm
Height	20.00	18.34	mm
Moisture Content	27.4	25.9	%
Bulk density	1.99		Mg/m^3
Dry density	1.56		Mg/m^3
Voids Ratio	0.696		
Saturation	104		%
Average temperature for test	19		°C
Swelling Pressure			kPa
Settlement on saturation			%

Remarks

Final values should be used with caution C_v plotted at mid point of load increments C_v corrected to 20°C	Tested	Checked	Approved	Printed :	Fig. No
	DS	KW	KW	31/07/2019 13:21	

Certificate of Analysis

Certificate Number 19-13941

25-Jul-19

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

Our Reference 19-13941

Client Reference S190632

Order No (not supplied)

Contract Title Fujifilm, Billingham

Description 7 Soil samples.

Date Received 23-Jul-19

Date Started 23-Jul-19

Date Completed 25-Jul-19

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

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 19-13941
Client Ref S190632
Contract Title Fujifilm, Billingham

Lab No				1535663	1535664	1535665	1535666	1535667	1535668	1535669
Sample ID				BH3	BH5	BH7	TP1B	TP3	WS01	WS09
Depth				2.00-2.50	13.00-13.45	11.50-11.95	1.40	0.50	2.50	1.50
Other ID										
Sample Type				B	U	U	B	B	D	D
Sampling Date				n/s	n/s	n/s	n/s	n/s	n/s	n/s
Sampling Time				n/s	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**							
Inorganics										
pH	DETSC 2008#		pH	8.1	8.5	8.6	7.8	9.7	8.0	9.6
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	86	75	78	94	1600	140	230

Key: # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Information in Support of the Analytical Results

Our Ref 19-13941
Client Ref S190632
Contract Fujifilm, Billingham

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1535663	BH3 2.00-2.50 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	
1535664	BH5 13.00-13.45 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	
1535665	BH7 11.50-11.95 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	
1535666	TP1B 1.40 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	
1535667	TP3 0.50 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	
1535668	WS01 2.50 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	
1535669	WS09 1.50 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	

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

SOAKAWAY DESIGN IN ACCORDANCE WITH BRE DIGEST 365: 1991
BRE Digest 365, Figure 2, Page 5

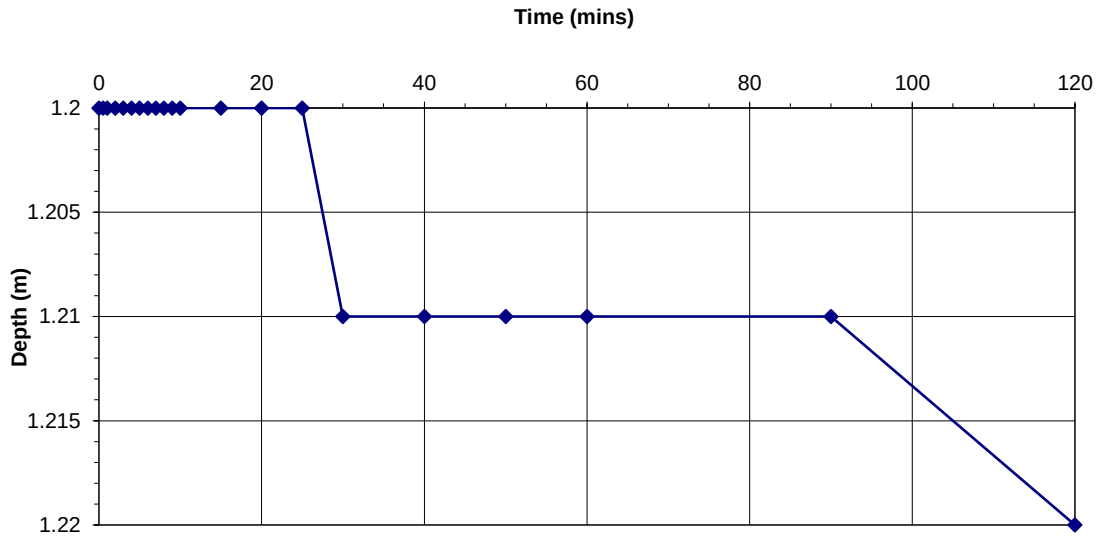
Client:	**Turner and Townsend**				
Site:	**Fujifilm, Billingham**				
Job No:	**S190632**				
Pit No:	**TP1B**		**Test No:**	**1**	

CALCULATION OF SOIL INFILTRATION RATE

Time (min)	Depth (m)
0	1.2
0.5	1.2
1	1.2
2	1.2
3	1.2
4	1.2
5	1.2
6	1.2
7	1.2
8	1.2
9	1.2
10	1.2
15	1.2
20	1.2
25	1.2
30	1.21
40	1.21
50	1.21
60	1.21
90	1.21
120	1.22

Pit Dimensions	
Length (m) =	1.40
Width (m) =	0.40
Depth (m) =	2.50
Depth at start of test (m) =	2.000
Depth at end of test (m)=	2.000
75% level (m)=	1.205
50% Effective Depth	1.290
25% level (m)=	1.215
Base area of pit (m^2) =	0.560
Vp_{75-25} (m^3) =	0.006
a_{p50} (m^2) =	5.204
From the graph:	
tp 75 (min) =	27.5
tp 25 (min) =	105

Soil infiltration rate, f, (m/s) =	**2.31E-07**	**normal test**	
Input by:	**PF**	**Date:**	**22/07/2019**
Checked by:	**LC**	**Date:**	**22/07/2019**



SOAKAWAY DESIGN IN ACCORDANCE WITH BRE DIGEST 365: 1991
BRE Digest 365, Figure 2, Page 5

Client:	**Turner and Townsend**				
Site:	**Fujifilm, Billingham**				
Job No:	**S190632**				
Pit No:	**TP2**		**Test No:**	**1**	

CALCULATION OF SOIL INFILTRATION RATE

Time (min)	Depth (m)
0	0.8
0.5	0.8
1	0.8
2	0.81
3	0.81
4	0.81
5	0.81
6	0.82
7	0.82
8	0.82
9	0.82
10	0.82
15	0.82
20	0.82
25	0.82
30	0.82
40	0.83
50	0.83
60	0.83
90	0.83
120	0.84

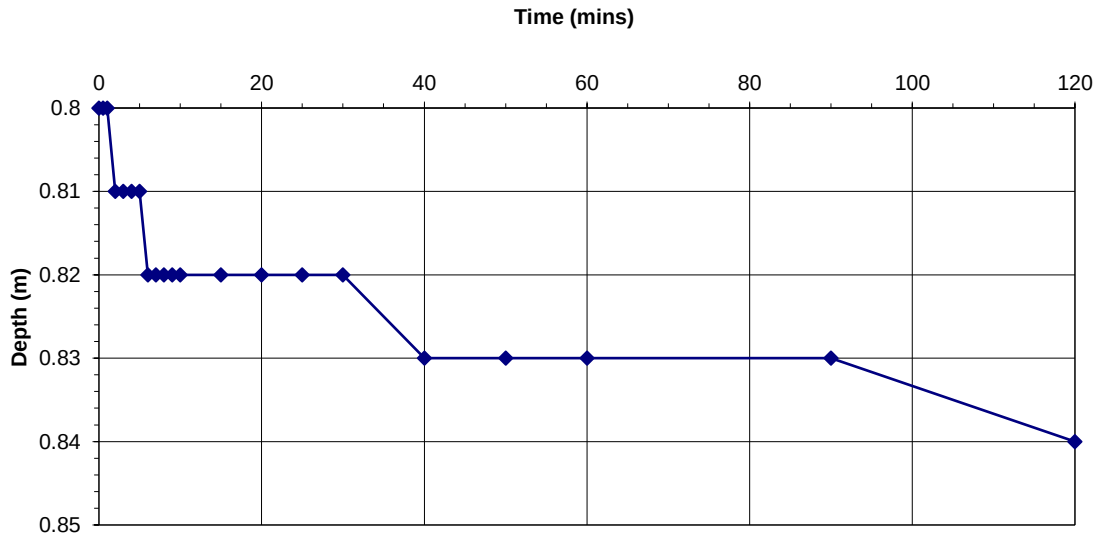
Pit Dimensions		
	Length (m) =	1.60
	Width (m) =	0.40
	Depth (m) =	2.20

Depth at start of test (m) =	2.000
Depth at end of test (m)=	2.000
75% level (m)=	0.810
50% Effective Depth	1.380
25% level (m)=	0.830
Base area of pit (m^2) =	0.640
Vp_{75-25} (m^3) =	0.013
a_{p50} (m^2) =	6.160

From the graph:	
tp 75 (min) =	2
tp 25 (min) =	40

Soil infiltration rate, f, (m/s) =	**9.11E-07**	**normal test**

Input by:	**PF**	**Date:**	**22/07/2019**
Checked by:	**LC**	**Date:**	**22/07/2019**



SOAKAWAY DESIGN IN ACCORDANCE WITH BRE DIGEST 365: 1991
BRE Digest 365, Figure 2, Page 5

Client:	**Turner and Townsend**				
Site:	**Fujifilm, Billingham**				
Job No:	**S190632**				
Pit No:	**TP4**		**Test No:**	**1**	

CALCULATION OF SOIL INFILTRATION RATE

Time (min)	Depth (m)
0	0.94
0.5	0.94
1	0.94
2	0.94
3	0.94
4	0.95
5	0.95
6	0.95
7	0.95
8	0.95
9	0.95
10	0.96
15	0.96
20	0.96
25	0.96
30	0.96
40	0.97
50	0.97
60	0.97
90	0.98
120	0.98

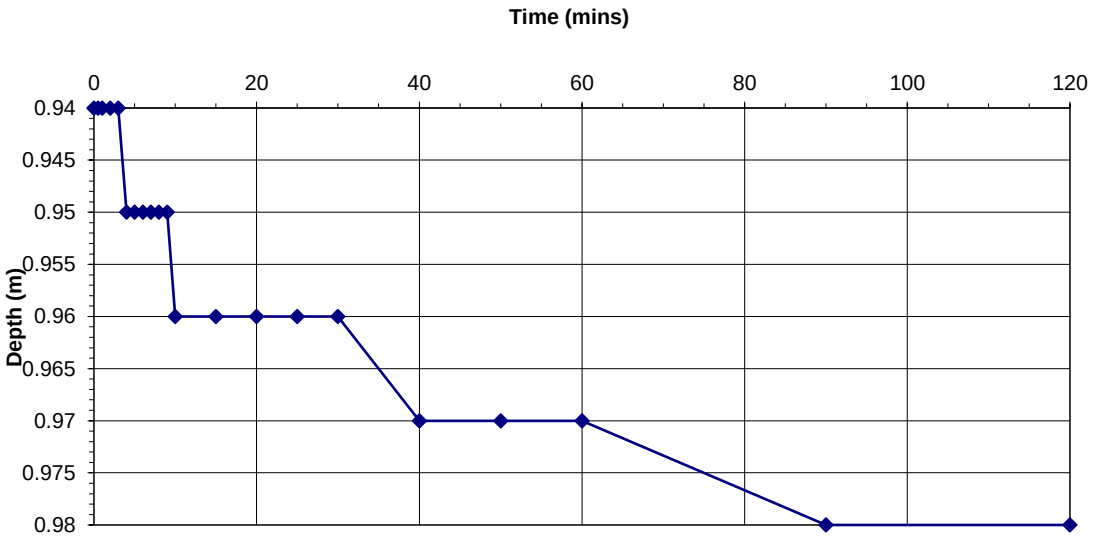
Pit Dimensions	Length (m) =	1.60
	Width (m) =	0.40
	Depth (m) =	2.40

Depth at start of test (m) =	2.000
Depth at end of test (m)=	2.000
75% level (m)=	0.950
50% Effective Depth	1.440
25% level (m)=	0.970
Base area of pit (m^2) =	0.640
Vp_{75-25} (m^3) =	0.013
a_{p50} (m^2) =	6.400

From the graph:	
tp 75 (min) =	4
tp 25 (min) =	40

Soil infiltration rate, f, (m/s) =	**9.26E-07**	**normal test**

Input by:	**PF**	**Date:**	**22/07/2019**
Checked by:	**LC**	**Date:**	**22/07/2019**



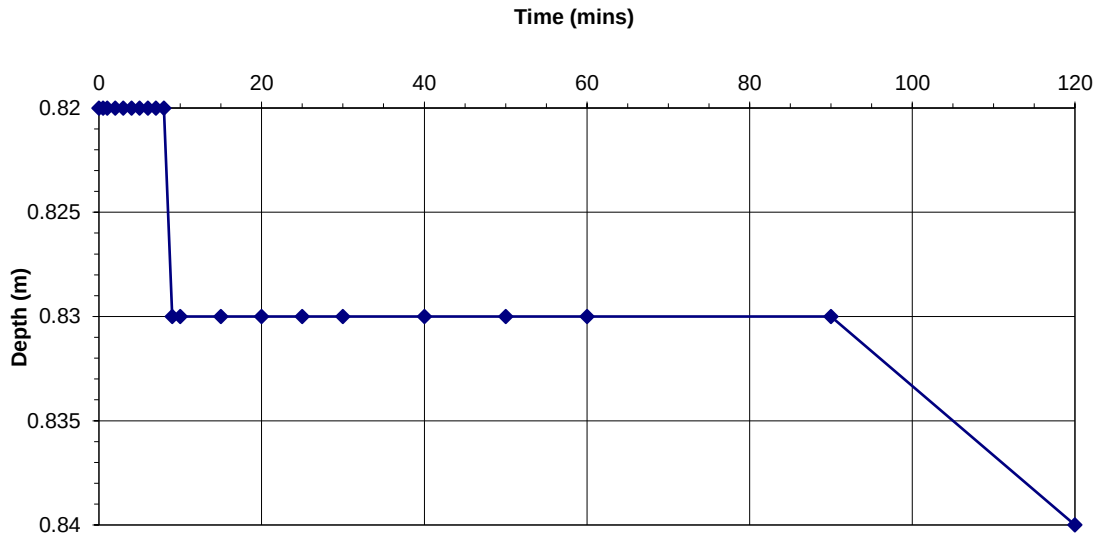
SOAKAWAY DESIGN IN ACCORDANCE WITH BRE DIGEST 365: 1991
BRE Digest 365, Figure 2, Page 5

Client:	**Turner and Townsend**				
Site:	**Fujifilm, Billingham**				
Job No:	**S190632**				
Pit No:	**TP3**		**Test No:**	**1**	

CALCULATION OF SOIL INFILTRATION RATE

Time (min)	Depth (m)
0	0.82
0.5	0.82
1	0.82
2	0.82
3	0.82
4	0.82
5	0.82
6	0.82
7	0.82
8	0.82
9	0.83
10	0.83
15	0.83
20	0.83
25	0.83
30	0.83
40	0.83
50	0.83
60	0.83
90	0.83
120	0.84

Pit Dimensions	Length (m) =	2.00	
	Width (m) =	0.40	
	Depth (m) =	1.60	
Depth at start of test (m) =		2.000	
Depth at end of test (m)=		2.000	
75% level (m)=		0.825	
50% Effective Depth		0.770	
25% level (m)=		0.835	
Base area of pit (m^2) =		0.800	
Vp_{75-25} (m^3) =		0.008	
a_{p50} (m^2) =		4.496	
From the graph:			
tp 75 (min) =		8.5	
tp 25 (min) =		105	
Soil infiltration rate, f, (m/s) =		**3.07E-07**	**normal test**
Input by:	**PF**	**Date:**	**22/07/2019**
Checked by:	**LC**	**Date:**	**22/07/2019**



SOAKAWAY DESIGN IN ACCORDANCE WITH BRE DIGEST 365: 1991
BRE Digest 365, Figure 2, Page 5

Client:	**Turner and Townsend**				
Site:	**Fujifilm, Billingham**				
Job No:	**S190632**				
Pit No:	**TP5**		**Test No:**	**1**	

CALCULATION OF SOIL INFILTRATION RATE

Time (min)	Depth (m)
0	0.95
0.5	0.95
1	0.95
2	0.95
3	0.95
4	0.95
5	0.95
6	0.95
7	0.95
8	0.95
9	0.95
10	0.95
15	0.95
20	0.96
25	0.96
30	0.96
40	0.96
50	0.96
60	0.96
90	0.96
120	0.96

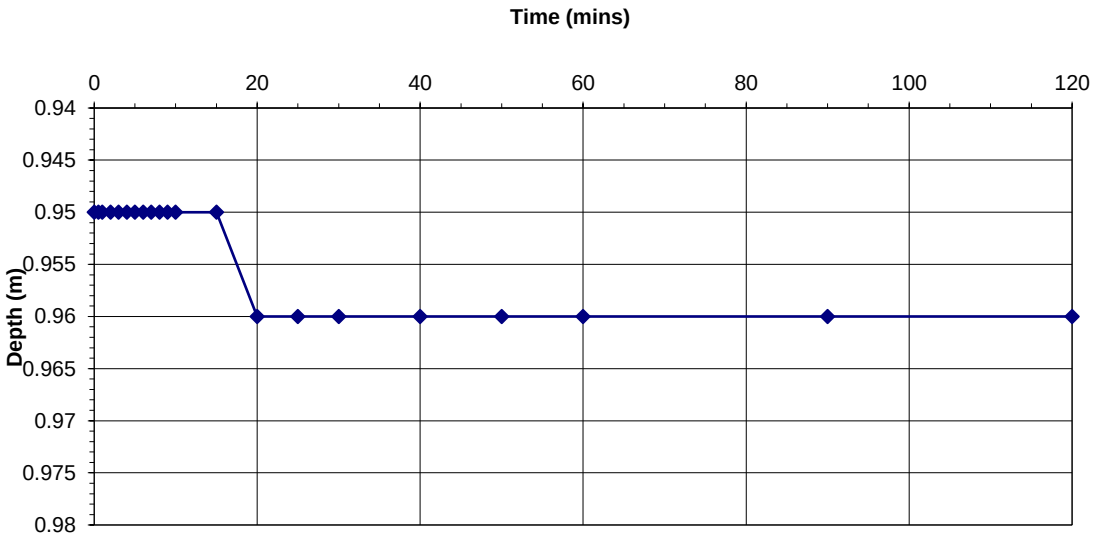
Pit Dimensions	Length (m) =	1.80
	Width (m) =	0.40
	Depth (m) =	1.90

Depth at start of test (m) =	2.000
Depth at end of test (m)=	2.000
75% level (m)=	0.953
50% Effective Depth	0.945
25% level (m)=	0.958
Base area of pit (m^2) =	0.720
Vp_{75-25} (m^3) =	0.004
a_{p50} (m^2) =	4.878

From the graph:	
tp 75 (min) =	16.5
tp 25 (min) =	19

Soil infiltration rate, f, (m/s) =	**4.92E-06**	**normal test**

Input by:	**PF**	**Date:**	**22/07/2019**
Checked by:	**LC**	**Date:**	**22/07/2019**



SOAKAWAY DESIGN IN ACCORDANCE WITH BRE DIGEST 365: 1991
BRE Digest 365, Figure 2, Page 5

Site:	**Fujifilm, Billingham**		
Job No:	**S190632**		
Hole No:	**WS10**	**Test No:**	**1**

CALCULATION OF SOIL INFILTRATION RATE

Time (min)	Depth (m)
0	1.00
0.5	1.01
1	1.02
2	1.03
3	1.04
4	1.05
5	1.06
6	1.07
7	1.08
8	1.09
9	1.10
10	1.11
15	1.13
20	1.15
25	1.17
30	1.19
40	1.21
50	1.23
60	1.25

TEST HALTED DUE TO COLLAPSING MATERIAL

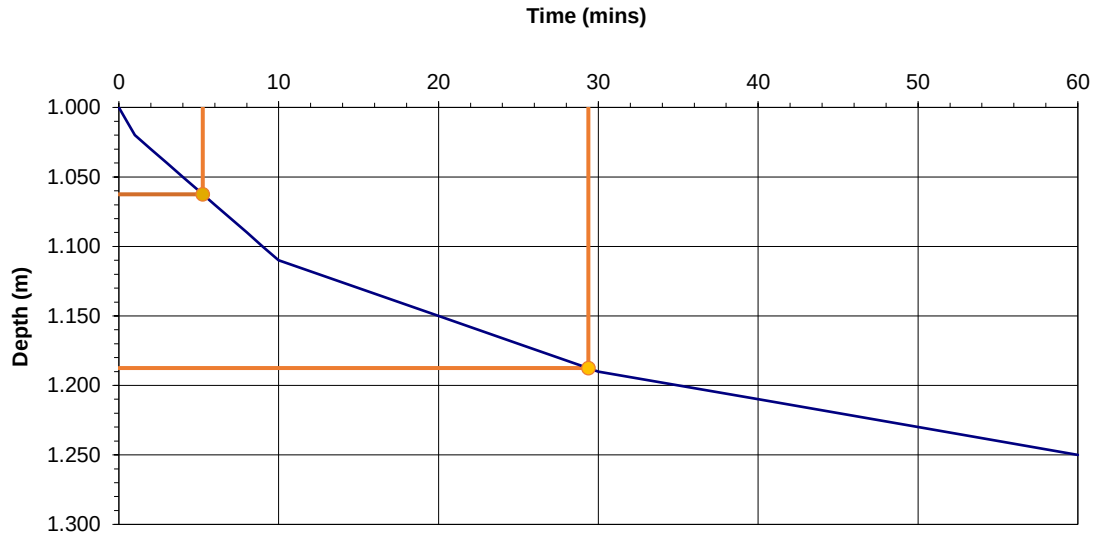
Size of Borehole	
Diameter (m) =	0.10
Eff. Depth (m) =	4.00
Radius (m) =	0.05

Depth at start of test (m) =	1.000
Depth at end of test (m)=	1.250
75% level (m)=	1.063
50% level (m)=	1.125
25% level (m)=	1.188
Base area of hole (m^2) =	0.00785
Vp_{75-25} (m^3) =	0.0010
a_{p50} (m^2) =	1.2645

TAKE VALUES FROM THE GRAPH:	
tp 75 (min) =	5.25
tp 25 (min) =	29.38

Soil infiltration rate, f, (m/s) =	**5.36E-07**	**normal test**

Input by:	**PF**	**Date:**	**22/07/2019**
Checked by:	**LC**	**Date:**	**22/07/2019**



Notes:

APPENDIX E:
Notes on Limitations & Contamination Guidance

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

UK BACKGROUND

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

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

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

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

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

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

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

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

PRELIMINARY CONCEPTUAL MODEL

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

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

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

PROBABILITY OF RISK BEING REALISED (C552 CIRIA, 2001)

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

RISK CLASSIFICATION MATRIX (C552 CIRIA, 2001)

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

HUMAN RECEPTORS

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

VEGETATION

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

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

GROUNDWATER AND SURFACE WATER RECEPTORS

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

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

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

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

DETAILED QUANTITATIVE RISK ASSESSMENT (DQRA)

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

WASTE ACCEPTANCE CRITERIA

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

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

CONSTRUCTION MATERIALS

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

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

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

REQUIREMENTS OF PARTIES WITHIN THE DEVELOPMENT PROCESS

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

RISKS & LIABILITIES FROM CONTAMINATION

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

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

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

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

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

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

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

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

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

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

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

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