THORNTON PARK:

ENVIRONMENTAL PERMIT APPLICATION

Site Condition Report

Prepared for: **Thorntons Limited**
Client Ref 416.08504.00001

SLR

SLR Ref: 416.08504.00001
Version No: FINAL
April 2020

BASIS OF REPORT

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1.0 INTRODUCTION

SLR Consulting Limited (SLR) has been commissioned by Thorntons Limited (Thorntons) to prepare a Site Condition Report (SCR) in support of the Environmental Permit (EP) application for the Thorntons chocolate and confectionery manufacturing facility in Alfreton, Derbyshire, DE55 4XJ, hereafter referred to as 'the Site'.

This SCR aims to record and describe the condition of the land at the Site prior to the commencement of any Environmental Permitted operations within the Environmental Permit (EP) Installation boundary. The SCR will capture the conditions of the Site at the start of the EP with particular attention paid to contamination levels in the underlying and surrounding soil and groundwater.

This will provide a point of reference and baseline environmental data so that when the EP is surrendered it can be demonstrated that there has been no deterioration in the condition of the land as a result of the Installation operations and ensure that the condition of the land is in a 'satisfactory state'.

The location of the Site is illustrated in Drawing 001 and the Site Layout and Emission Points are illustrated in Drawing 003.

Sections 1 to 3 of the Environment Agency's SCR template have been completed within this document and comprise the following aspects:

- Site details;
- Condition of the land at permit issue;
  - Geology
  - Hydrology
  - Hydrogeology
  - Pollution history; and
  - Evidence of historic contamination
- Permitted activities.

Sections 4 to 7 of the SCR template will be maintained during the life of the permit and Sections 8 to 10 will be completed and submitted in support of the application to surrender the EP.

1.1 Site Details

1.0 SITE DETAILS	
Name of the applicant	Thorntons Limited
Activity address	Thornton Park, Somercotes, Alfreton Derbyshire DE55 4XJ
National grid reference	SK 41096 54474
Document reference and dates for Site Condition Report at permit application and surrender	Site Condition Report - 416.08504.00001/April 2020

Document references for site plans (including location and boundaries)	Site Location Plan – 416.08504.00001/Drawing 001 March 2019 Site and Installation Boundary - 416.08504.00001/Drawing 002 March 2019 Site Layout and Emission Points - 416.08504.00001/Drawing 003 March 2019 Sources, Pathways and Receptors - 416.08504.00001/Drawing 004 March 2019 Natural and Cultural Heritage - 416.08504.00001/Drawing 005 March 2019 Drainage Plan – SCR, Appendix B.

Note:

In Part A of the application form you must give us details of the site's location and provide us with a site plan. We need a detailed site plan (or plans) showing:

- Site location, the area covered by the site condition report, and the location and nature of the activities and/or waste facilities on the site.
- Locations of receptors, sources of emissions/releases, and monitoring points.
- Site drainage.
- Site surfacing.

If this information is not shown on the site plan required by Part A of the application form, then you should submit the additional plan or plans with this Site Condition Report.

1.2 Condition of the Land at Permit Issue

2.0 CONDITION OF THE LAND AT PERMIT ISSUE	
Environmental setting including: • geology • hydrogeology • surface waters	The Site is situated on Thornton Park, Somercotes, Alfreton, Derbyshire, DE55 4XJ and is located approximately 2.6km north of Ripley and 15km northeast Derby City Centre. The site is situated within the greater Thornton Park, which is itself located within a mixed residential, industrial and agricultural area. The Site is accessed via Wimsey Way to the east and Old Swanswick Colliery Road to west through the site. **Geology** A review of the British Geological Survey (BGS) map[1] reveals that the site is underlain by a bedrock of Pennine Middle Coal Measures Formation comprising Mudstone, Siltstone and Sandstone formed in fluvial and palustrine environments during the Carboniferous Period approximately 310-318 million years ago. There are no recorded superficial deposits. **Hydrogeology** **Aquifer Designations** The bedrock underlying the site is classified as a Secondary A aquifer, defined as "*permeable strata capable of supporting water supplies at a local rather than strategic scale and in some cases forming an important source of base flow to rivers*" on the MAGIC map website.

[1] British Geological Survey map, available at www.bgs.ac.uk, accessed in April 2019

	The MAGIC map reveals that the site is situated within a Minor Aquifer Low. **Source Protection Zones** The Site does not lie within a Source Protection Zone. **Hydrology** **Surface Water Features** The nearest surface water feature to the Site are the drains located approximately adjacent to the south and east of the site; Oakerthorpe Brook is located approximately 50m north of the site. **Flood Risk** The Flood Map for Planning[2] reveals that the site lies in a Flood Zone 1, which has a less than 1 in 1,000 annual probability of river or sea flooding.
Pollution history including: • pollution incidents that may have affected land • historical land-uses and associated contaminants • any visual/olfactory evidence of existing contamination • evidence of damage to pollution prevention measures	Appendix A – Site Investigation Summary Ref. 416.08504.00001/SIS March 2019
Evidence of historic contamination, for example, historical site investigation, assessment, remediation and verification reports (where available)	Appendix A – Site Investigation Summary Ref. 416.08504.00001/SIS March 2019
Baseline soil and groundwater reference data	Appendix A – Site Investigation Summary Ref. 416.08504.00001/SIS March 2019
Supporting information	Appendix A – Site Investigation Summary Ref. 416.08504.00001/SIS March 2019

1.3 Permitted Activities

3.0 PERMITTED ACTIVITIES	
Permitted activities	The facility will be permitted under Schedule 1, Part A1 of the Environmental Permitting (England and Wales) Regulations (EPR) 2016 (as amended), as follows:

[2] Flood Map for Planning, available at https://flood-map-for-planning.service.gov.uk/, accessed in December 2018.

	• Section 6.8 A(1)(d) Treatment and processing, other than exclusively packaging, of the following raw materials, whether previously processed or unprocessed, intended for the production of food or feed (where the weight of the finished product excludes packaging) – (iii) Animal and vegetable raw materials (other than milk only), both in combined and separate products, with a finished production capacity in tonnes per day greater than – (aa) 75 where [the portion of animal material in percent of weight of the finished production capacity] is equal to 10 or more. • Section 5.4 Part A(1)(a)(ii) Disposal of non-hazardous waste with a capacity exceeding 50 tonnes per day (or 100 tonnes per day if the only waste treatment activity is anaerobic digestion) involving one or more of the following activities, and excluding activities covered by Council Directive 91/271/EEC concerning urban waste-water treatment(a)— (ii) physico-chemical treatment. The facility will include the following Directly Associated Activities (DAA): • The use of gas fired boilers to raise steam and generate hot water for production activities; • Storage of raw materials; and • Handling of waste (waste collection within the Installation and storage prior to removal off-site).
Non-permitted activities undertaken	• The manufacture of hollow chocolate figures. • Office buildings and associated staff car parking areas are excluded from the Installation boundary as manufacturing and storage activities are not undertaken in these areas. An exception to this is the staff car park to the north east of the site via which surface water from operational areas of the site drain prior to off sit discharge (via discharge point SW1).
Document references for: • plan showing activity layout; and • environmental risk assessment.	Site Layout and Emission Points - 416.08504.00001/Drawing 003 March 2019 Environmental Risk Assessment - 416.08504.00001/ERA April 2020

Note:

In Part B of the application form you must tell us about the activities that you will undertake at the site. You must also give us an environmental risk assessment. This risk assessment must be based on our guidance (*Environmental Risk Assessment - EPR H1*) or use an equivalent approach.

It is essential that you identify in your environmental risk assessment all the substances used and produced that could pollute the soil or groundwater if there were an accident, or if measures to protect land fail.

These include substances that would be classified as 'dangerous' under the Control of Major Accident Hazards (COMAH) regulations and also raw materials, fuels, intermediates, products, wastes and effluents.

If your submitted environmental risk assessment does not adequately address the risks to soil and groundwater we may need to request further information from you or even refuse your permit application.

APPENDIX A: SITE INVESTIGATION SUMMARY REF. 416.08504.00001/SIS MARCH 2019

THORNTONS PARK

Summary of Previous Ground Investigation Data

Prepared for: Thorntons Limited

SLR Ref: 416.08504.00001
Version No: 1.0
March 2019

BASIS OF REPORT

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1.0 Introduction

1.1 Appointment

SLR Consulting Limited (SLR) was commissioned in July 2018 by Thorntons Limited to prepare the necessary documentation and risk assessments to support the Environmental Permit (EP) application for their premises at Thornton Park, Alfreton, Derby, DE55 4XJ (the Site).

This report is intended to summarise the soil and groundwater data obtained during previous investigations at the Site to provide baseline environmental data for the Site Condition Report (SCR) that is required to support the Environmental Permit application.

1.2 Background

Thorntons operate a chocolate and other confectionary products manufacturing facility at the Site. The manufacturing processes involve the following:

- Receipt and storage of raw materials;
- Chocolate and confectionary manufacture;
- Packaging and storage of manufactured chocolates and confectionary products;
- Basic treatment (settlement) of process effluent on-site prior to consented discharge to municipal sewer.

The facility has refuelling facilities on-site for the fuelling of delivery HGVs with diesel, this is operated and maintained by the contracted third-party haulage company.

The Site has recently exceeded the threshold which brings it under the requirements of the Environmental Permitting Regulations.

1.3 Objectives

The objective of this report is to summarise the information obtained during the previous environmental investigations that were completed at the Site, and provide a baseline of existing soil and groundwater information to support the SCR.

This information will also be screened against any relevant generic assessment criteria to assess potential risks to human health associated with continued use of the Site as an industrial facility.

1.4 Scope of Work

The scope of work for this Environmental Site Assessment (ESA) includes:

- A desk-based review of the existing environmental reports relating to the Site;
- Data assessment of previous contamination sampling against current commercial Generic Assessment Criteria (GAC); and
- Data assessment and reporting of results.

2.0 Environmental Setting

2.1 Site Details

Table 2-1 provides a summary of the site details, location and environmental setting.

Table 2-1: Site Details

Detail	Description	
Location	Thorntons Park, Wimsey Way, Alfreton, Derbyshire DE55 4XJ. National Grid Reference 441100, 354610 identifies the approximate site location.	
Site Description and Use	The Site is currently used as a chocolate and confectionary manufacturing facility. The majority of the bulk materials storage on site relates to edible product and food grade chemicals, although the Site also has above ground diesel storage tanks, a HGV refuelling area and vehicle maintenance facilities. The Site is circa 28 hectares in area and broadly rectangular in shape. Approximately 50% of the Site is covered with buildings and hardstanding, with undeveloped vegetated areas in the southern and north-western parts of the Site	
Surrounding Land Use	North	A38 and residential housing.
	East	Sleetmoor Wood with an industrial estate approximately 100m beyond.
	South	Playing fields and residential properties.
	West	Turnpike Business Park, including a service area for the A38 and a fire station. A crematorium is located to the southwest.
Geography and Hydrology	Topography and gradient	The Site is constructed on a levelled platform of Made Ground that falls from approximately 128m AOD (Above Ordnance Datum) in the south to 118m AOD in the north. The topography in the surrounding area falls to the north with a gradient of approximately 5%.
	Elevation	The site elevation varies between approximately 118m and 128m AOD.
	Surface Water	There are two drainage ditches located adjacent to the site boundaries to the southwest and the east. These drains appear to feed into the Oakerthorpe Brook located approximately 50m to the north.
Published Geology and Hydrogeology	Superficial Drift Geology	Superficial deposits are not mapped as being present beneath the Site.
	Solid Geology	The Site is directly underlain by the Pennine Middle Coal Measures Formation which consists of mudstone, siltstone and sandstone.
	Aquifer Status	The Pennine Middle Coal Measures Formation is classified as a secondary A aquifer.

Detail	Description	
	Source Protection Zone (SPZ)	The Site is not located within a groundwater SPZ.

2.2 Site History

The results of the desk study information indicate that the Site was subject to underground mining since the 17th Century, with at least ten seams of the East Midlands Coalfield extracted ranging from 40m to 380m below ground level. There are no known shafts within the current site boundary, although underground workings continued in the area until the early 1960s.

Opencast workings were present on site from 1956 to 1957 as part of Alfred Street Colliery, and the workings were backfilled from 1958 with material from adjacent sites and workings.

Between 1964 to 1967, colliery spoil was tipped on Site over a “Tip A”, covering the complete southeast of the Site and is believed to have attained a height of up to 15m. Opencast mining was resumed on the Site between 1977 and 1978.

The Site was initially developed as a chocolate and confectionary manufacturing facility for Thorntons Limited between 1982 and 1983, and the facility has continued to be extended and modified since that time.

3.0 Previous Ground Investigation Results

3.1 General

The Site has been subject to at least 12 phases of previous assessment work since 1970, and the previous reports are listed in Table 3-1 below.

Table 3-1: Previous Assessment Reports

Date	Report Title	Reference	Prepared for	Completed by
Apr-70	Swanwick Opencast Restoration Site - Site Investigation	Report 1	Derbyshire County Council	County Surveyor's Department
May-72	(No copies of this report were available)	-	-	Cementation Ground Engineering Ltd
Jun-82	Site Investigation at Swanwick Opencast Site, Alfreton	1540	J. W. Thornton Ltd / Norder Design Associates Ltd	Harrison & Co.
Jan-85	Site Investigation at Swanwick Opencast Site, Alfreton	1540A	J. W. Thornton & Sons / Norder Design Associates Ltd	Harrison & Co.
Oct-86	Site Investigation at Thornton Park, Alfreton, Derbyshire	2851	Norder Design Associates Ltd	Harrison & Co.
Jul-87	Investigation for Proposed Office Building, Alfreton	3145	J. W. Thornton Ltd / Norder Design Associates Ltd	Harrison & Co.
Dec-88	Site Investigation for Proposed Office Block, Alfreton	3432	Thornton Plc / Norder Design Associates Ltd	Harrison & Co.
May-89	Site Investigation at Thornton Park, Alfreton, Derbyshire	3633	Thornton Plc / Norder Design Associates Ltd	Harrison & Co.
Oct-92	Site Investigation at Thornton Park, Alfreton, Derbyshire	4660	Thornton Plc / Norder Design Associates Ltd	Harrison & Co.
Jun-97	Site Investigation for a proposed Car Park at Thornton Park, Alfreton, Derbyshire	6295	Thornton Plc / Norder Design Associates Ltd	Harrison & Co.
Jan-03	Geotechnical Site Investigation	GN8050	Thornton Plc / Norder Design Associates Ltd	Harrison Geotechnical Engineering
Apr-17	Geotechnical Investigation for Norder Design Associates on the Site of the Proposed Chocolate Tank Project	MJH/J1552 /D1/1	Norder Design Associates Ltd	Emcus Ltd

These investigations included advancing 112 boreholes to a maximum depth of 20m, 18 of which were installed as piezometers/monitoring wells, and 33 trial pits were excavated to a maximum 3.8m depth.

All of the investigations undertaken at the Site prior to 1992 focused on geotechnical data and do not contain a significant amount of information relating to soil or groundwater quality, apart from a round of methane monitoring undertaken at the Site in 1988 that did not detect any elevated gas readings.

The four investigations undertaken since 1992 all included soil analysis for a suite of potential contaminants of concern.

Four out of the five investigations undertaken by Harrison & Company between 1988 and 2003 included ground gas monitoring, and depth to groundwater is recorded in several of the reports. However, the only groundwater laboratory analysis results relate to three samples tested for pH and sulphate concentrations by Harrison in 1992.

The key environmental information obtained in the investigations completed at the Site since 1992 are summarised below.

3.2 Exploratory Hole Locations

Locations of the exploratory holes completed since 1992 are presented on Drawing 01. None of the investigations refer to the previous investigations and each series of exploratory holes starts at BH1 or TP1. In order to differentiate between exploratory holes with the same name, the date of the investigation will be added to the location reference (i.e. BH1-1992).

The 2003 report completed by Harrison Geotechnical Engineering does not contain a borehole location plan and consequently these investigation locations have not been included on Drawing 01.

Due to the primary geotechnical objectives of these investigations, sources of contamination were not being specifically targeted although samples of Made Ground were retained for geochemical analysis.

3.3 Stratigraphy

The strata encountered are presented on the trial pit and borehole logs included in Appendix 01 and summarised in Table 3-2.

Table 3-2:
Summary of Strata Encountered

Strata	Description	Depth (m)
Made Ground	Concrete and asphalt	0 to 0.3m
	Stiff grey/brown clay fill with inclusions of coal, sandstone, mudstone and occasional wood fragments.	0m to 8.86m
Weathered Coal Measures	Stiff grey brown sandy gravelly clay above mixed sedimentary sequences of light grey SILTSTONE and dark grey MUDSTONE (Pennine Middle Coal Measures Formation)	2.5m to >20m

Made Ground

Intrusive investigations show the depth of Made Ground is variable across the Site with up to 8.86m in the centre of the Site and is shown to be colliery spoil of grey/brown stiff clay with inclusions of coal, sandstone and mudstone

gravels, and occasional fragments of wood. This form of Made Ground is common around the Site and likely relates to the spreading of Tip A in all directions around the Site as part of the backfill and colliery regeneration scheme.

Pennine Middle Coal Measures

Natural material below the Made Ground is present as a stiff grey brown sandy gravelly clay, interpreted to be weathered mudstone, grading into mudstone and proven to a depth of 20m by Emcus in 2017. This forms the strata of the Middle Coal Measures bedrock which is classified as a secondary A aquifer.

The weathered bedrock of the Pennine Middle Coal Formation beneath the Site is present as a layered sedimentary sequence. The units comprise a stiff grey brown sandy gravelly clay above mixed sedimentary sequences of light grey siltstones and dark grey mudstone.

3.4 Field Observations

During all phases of intrusive investigations, no visual or olfactory indications of hydrocarbon impact were recorded in any of the boreholes for either soil or water samples.

3.5 Analytical Chemistry Results - Soils

A total of 13 soil samples were retained for geochemical analysis during the site investigations completed since 1992, primarily from the deposits of Made Ground.

The samples were tested for selected contaminants of concern including:

- Petroleum hydrocarbons,
- Heavy metals;
- Phenols;
- Polycyclic Aromatic Hydrocarbons (PAHs); and
- Asbestos.

The results of the analysis are summarised below with available laboratory certificates presented in Appendix 02.

October 1992

Three soil samples (BH1-1992, BH3-1992 and BH7-1992) were collected from 2.5m to 4.5m depth within the Made Ground from Tip A, located in the southern part of the Site, during the 1992 investigation. The concentrations of metals were relatively low and did not exceed the Inter Departmental Committee for the Redevelopment of Contaminated Land (ICRCL) trigger levels.

June 1997

Sixteen samples from the northern part of the Site were analysed for a suite of contaminants of concern as part of the 1997 investigation, although the laboratory certificates were not included in the appendix of the report. The report indicates that elevated concentrations of arsenic were recorded above ICRCL trigger levels in 15 out of the 16 samples tested, with the highest concentrations of arsenic (278mg/kg) recorded at location CBR5-1997 at 0.45m depth.

Twelve of the locations also contained elevated levels of sulphate, and eight of the locations recorded acidic pH results (<pH5).

January 2003

Three samples of Made Ground (BH1-2003 to BH3-2003) collected from 1.6m to 1.65m depth were submitted for laboratory analysis for a range of contaminants of concern, although the location of these sampling points is currently unknown.

The three samples contained elevated concentrations of mineral oil, PAHs and resin / nitrogen, sulphur, and oxygen (NSO) compounds. The highest concentrations were recorded in BH2 with 541mg/kg mineral oil, 1,639mg/kg total PAHs and 2,664mg/kg NSO/resin.

Asbestos was not detected in the three samples in the area of the proposed factory extension during the 2003 investigation, and only trace to low concentrations of metals were detected.

One of the shallow soil samples tested recorded trace concentrations of phenols, although the other two samples recorded concentrations below the minimum laboratory detection limits (MDL).

Sulphate analysis was undertaken on seven soil samples, with elevated concentrations of total and water-soluble sulphate recorded in all but one of the samples tested.

April 2017

Seven samples were collected from the two borehole locations (BH1-2017 and BH2-2017) adjacent to the Ferro chocolate tanks and tested for a range of contaminants of concern including metals, PAHs, phenol, cyanides, total sulphate, sulphur, sulphides & pH as part of the investigations undertaken in 2017. Five of the samples were also tested for asbestos and petroleum hydrocarbons (TPH CWG), and one of the samples was submitted for Waste Acceptance Criteria (WAC) testing.

The concentrations of metals detected were generally low, and no evidence of asbestos was detected in any of the samples tested.

Detectable concentrations of PAHs were recorded in six out of the seven samples tested, with the highest concentrations recorded in BH1 at 4.0m depth (157mg/kg). Trace concentrations of petroleum hydrocarbons (<72mg/kg) were detected in all five of the soil samples tested.

3.6 Groundwater Monitoring Data

Groundwater monitoring was undertaken at the Site in August 1992 and January 2003, although only the recently installed wells were monitored during each visit. The gas monitoring wells installed in 1997 were found to be dry; no monitoring wells were installed in 2017.

The groundwater monitoring results are presented in Table 3-3 below.

Table 3-3:
Groundwater Monitoring Data

Well No.	Screened Interval (m)	Strata	Surface elevation (m aTBM)	Date	Depth to water (m)	Water elevation (m aTBM)	LNAPL (mm)
BH3a-1992	GL - 9.0	Coal Measures	-	Aug-92	6.50	-	0
BH4-1992	GL - 8.0	Made Ground	-	Aug-92	3.80	-	0
BH5-1992	GL - 7.0	Made Ground	-	Aug-92	4.00	-	0
BH7-1992	GL - 9.0	Coal Measures	-	Aug-92	Dry	-	0
BH1-2003	1.0 - 5.0	Made Ground?	117.5	Jan-03	2.28	115.22	0
BH2-2003	1.0 - 5.0	Made Ground	117.5	Jan-03	0.88	116.62	0
BH3-2003	1.0 - 5.0	Made Ground	117.5	Jan-03	Dry	-	0

Surface elevation is relative to ordnance survey datum.
LNAPL – Light non-aqueous phase liquid thickness

Discontinuous perched groundwater was recorded within the Made Ground between 0.88m and 4.0m depth, with a deeper water table within the Coal Measures at approximately 6.5m depth. This discontinuous nature of the perched water within the Made Ground is consistent with the water strike observations made during the 1997 trial pit investigation and the drilling works in 2017.

The groundwater monitoring data was insufficient to calculate a definitive hydraulic gradient.

No evidence of LNAPL (i.e. floating product) was recorded in any of the monitoring wells.

3.7 Analytical Chemistry Results - Waters

Groundwater samples were collected for pH and sulphate analysis in by Harrison in 1992. These are presented in Appendix 02 for reference and summarised below:

- ***pH*** – pH levels recorded in water samples between pH7.4 and pH7.9.
- ***Sulphate*** – sulphate concentrations measured within water varied from 1.60g/l to 1.67g/l.

3.8 Ground Gas Monitoring

Ground gas monitoring was undertaken during the investigations carried out by Harrison in 1992, 1997, and 2003. The gas monitoring was undertaken to assess the potential risk from gas ingress into the proposed buildings from ground gasses associated with the underlying Pennine Coal Measures and the reworked colliery spoil.

Parameters recorded during the monitoring included:

- measurement of methane (% LEL and % volume), carbon dioxide (% volume), and oxygen (% volume);
- measurement of flow rate and atmospheric pressure.

The peak results of the monitoring are provided in Table 3-4 and summarised below:

Table 3-4:
Ground Gas Monitoring Results

Sample Point	Date	Barometric Pressure (mb)	Oxygen (%)	Methane (%)	Carbon Dioxide (%)	Lower Explosive Limit (%)	Relative Pressure (mb)	Flow Rate (l/hr)
BH3-1992	26/06/1992	-	20.6	0	0	0	-	-
	23/07/1992	-	21.4	0	0	0	-	-
	25/08/1992	-	5.2	8	25	43	-	-
BH4-1992	26/06/1992	-	13.9	-	1	15	-	-
	23/07/1992	-	2.6	-	1	13	-	-
	25/08/1992	-	19.4	-	0	3	-	-
BH5-1992	26/06/1992	-	11	-	2	7	-	-
	23/07/1992	-	19.5	-	0	0.5	-	-
	25/08/1992	-	20.3	0	0	0	-	-
BH7-1992	26/06/1992	-	16.2	6	0	70	-	-
	23/07/1992	-	5	10	0.75	>100	-	-
	25/08/1992	-	18.2	2	<1	37	-	-
MW1-1997	04/06/1997	-	-	2	-	62	-	-
	20/06/1997	-	-	2	-	58	-	-
MW2-1997	04/06/1997	-	-	0	-	14	-	-
	20/06/1997	-	-	0	-	16	-	-
MW3-1997	04/06/1997	-	-	0	-	0.25	-	-
	20/06/1997	-	-	0	-	0	-	-
MW4-1997	04/06/1997	-	-	0	-	0	-	-
	20/06/1997	-	-	0	-	0	-	-
MW5-1997	04/06/1997	-	-	0	-	4	-	-
	20/06/1997	-	-	0	-	4	-	-
BH1-2003	24/01/2003	1020	0	85.8	13.3	-	4.22	0.1
	28/01/2003	1000	0	56.4	13.5	-	-0.1	0.2
	30/01/2003	996	0	62.1	14.7	-	7.34	1.3
BH2-2003	24/01/2003	1019	18.4	0.1	0	-	-0.1	-4
	28/01/2003	1000	17.9	0.1	0.5	-	3.6	1.7
	30/01/2003	996	17.9	0	0.4	-	2.58	0.4
BH3-2003	24/01/2003	1020	1.6	1.2	5.6	-	3.06	0
	28/01/2003	999	0	1.2	7	-	0.41	0.9
	30/01/2003	996	0	1	7.2	-	5.02	7.4

Atmospheric Pressure

Atmospheric pressure was only recorded during the rounds of gas monitoring completed in January 2003. The readings ranging from 996mb to 1020mb, and the atmospheric pressure appeared to be falling over the monitoring period with the lowest pressure readings recorded on the 30th January 2019.

Methane & Lower Explosive Limit (LEL)

Eight rounds of gas monitoring were completed as part of the investigations undertaken by Harrison in 1992, 1997 and 2003. Localised concentrations of methane were recorded during all of the gas monitoring rounds, and flammable gasses (LEL) were also detected at various locations during the visits completed in 1992 and 1997.

The highest concentrations of methane were recorded in BH1-2003 with 62.1% to 85.8% methane, although the exact location of this monitoring well was not recorded. The borehole log indicates that the Made Ground was approximately 2.5m thick in this location and contained fragments of charcoal, fibrous material and wood, and it is the anaerobic degradation of this material that is the most likely source of the methane.

Elevated readings of methane were also recorded in at BH7-1992 between June and August 1992, and methane was also detected in BH3-1992 during the August monitoring round. BH7-1992 and BH3-1992 were both located in the southern part of the Site within the original extent of Tip A.

Elevated concentrations of flammable gas (58% to 62% LEL) were also recorded in MW1-1997 in the 1997 report, this sample point was located to the far north of the Site, outside the original tip extent. The Made Ground in this location was also found to contain fragments of coal and chipboard.

Carbon Dioxide

The highest concentration of carbon dioxide (25%) was recorded in BH3-1992 in August 1992, although this was an isolated occurrence. BH3-1992 was located within the extent of Tip A and was found to contain up to 4.3m of Made Ground (colliery spoil).

Elevated levels of carbon dioxide were also recorded in BH1-2003 (14.7%) and BH3-2003 (7.2%) on the 30th January 2003, are potentially associated with the breakdown of methane and anaerobic degradation of the organic materials.

Flow Rate

Positive borehole flow rates ranged from less than 0.2l/hr to 7.4l/hr during the monitoring rounds completed in January 2003, although the flow rates in BH1-2003 where the highest concentrations of methane were recorded were less than 1.3l/hr.

3.8.1 Summary

Elevated concentrations of methane and carbon dioxide were recorded in the deposits of Made Ground beneath the Site, primarily associated with anaerobic activity on buried carbonaceous materials within the fill material rather than in relation to domestic waste or peat.

The reports completed by Harrison between 1992 and 2003 recommended that specialist gas protection measures should be installed as part of the proposed developments at the Site to mitigate against the potential risks associated with elevated concentrations of explosive and asphyxiant ground gases.

4.0 Generic Quantitative Risk Assessment (GQRA)

SLR compiled the available historic soil analysis data and compared the results to current generic assessment criteria (GAC) comprising published soil guideline values (SGVs) and in-house screening criteria derived using CLEA UK.

The GACs are drawn from several sources of guidance, some statutory and some informal. SLR used a combination of assessment criteria that were available at the time to assist in the screening of soil data prior to determining whether further action was required. The following assessment criteria were used for the assessment of contaminant levels in soil:

- Soil Guideline Values – since March 2002, the Department for Environment, Food and Rural Affairs (Defra) and the EA have been involved in publishing a series of reports that provide a scientifically based framework for the assessment of risks to human health from land contamination;
- LQM/CIEH Generic Assessment Criteria (2009) – Land Quality Management and the Chartered Institute of Environmental Health have published GACs derived following CLR technical guidance and using the EA's CLEA UK model; and
- SLR's own in-house screening criteria (version 4a) derived following CLR technical guidance using the CLEA UK model (v1.04).

The SGVs and GAC were developed as a guide for regulators and developers; if the concentrations recorded on site are lower than the SGV / GAC it is generally accepted that the contaminants in question are present at acceptable concentrations which are not capable of putting human health at significant risk - as long as the humans make normal use of the land. An exceedance of these values indicates to an assessor that soil contaminant concentrations need to be considered further. SGVs combine both authoritative science and policy judgements.

The SGVs and GAC used were derived using the CLEA model according to four typical land uses:

- residential (with vegetable growth);
- residential (without vegetable growth);
- allotments; and
- commercial/industrial.

The proposed future land use of commercial/industrial was assumed for the purpose of the assessment.

4.1 Summary of GQRA Results

The results of the assessment are shown in Appendix 03 and indicate that none of the recorded contaminant concentrations exceeded the relevant GAC for a commercial/industrial site use.

It was not possible to screen the elevated concentrations of total mineral oil, total PAHs and resins recorded during the 2003 investigation as these testing suites that were routinely used in the past do not directly correlate with current speciated GAC values. However, these localised concentrations in soil are unlikely to present a significant risk in the context of the continued industrial use of the Site.

5.0 Conclusions

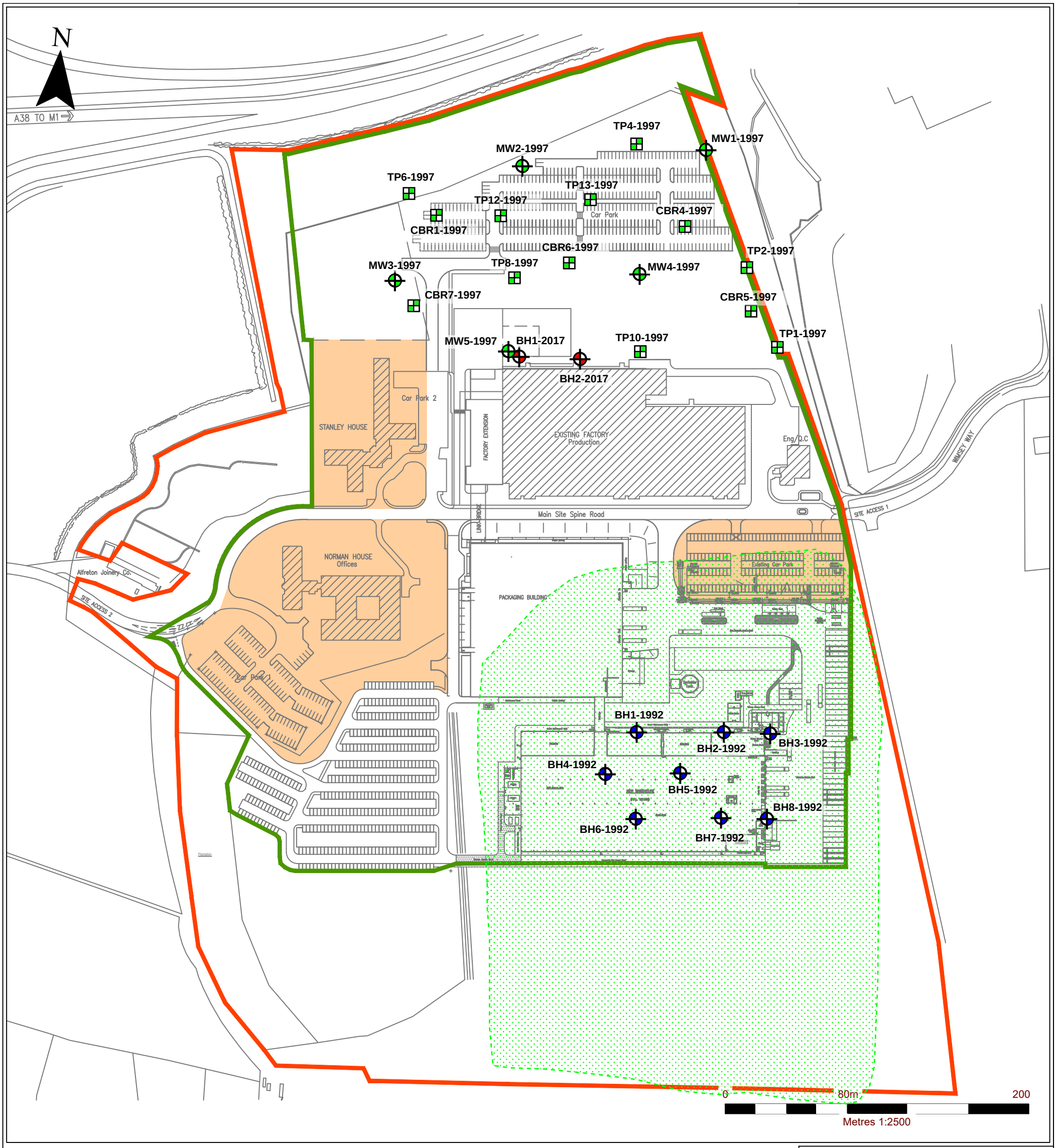
Based on the review of the available information, Table 5-1 provides a summary of the previous environmental investigation results.

Table 5-1: Summary and Conclusions

Site Setting, Existing Use and Planned Development	The Site is located Thorntons Park, Wimsey Way, Alfreton, BE55 4XS (National Grid Reference 441100, 354610). The Site is currently used as a chocolate and confectionary manufacturing and processing facility.
History	The Site has previously been mined for coal with underground workings active from the 17th Century until the 1950s, with active opencast mining until the 1970s. The Site was initially developed as a chocolate and confectionary manufacturing facility between 1982 and 1983, and the facility has continued to be extended and modified since that time. The colliery spoil on Site was landscaped and capped with a stiff clay topsoil as part of the continued industrial development in the 1990s.
Previous Investigations	The Site has been subject to at least 12 phases of previous assessment work since 1970. These investigations included advancing 112 boreholes to a maximum depth of 20m; 18 of which were installed as piezometers/monitoring wells, and 33 trial pits were excavated to a maximum 3.8m depth. However, the investigations were primarily completed for geotechnical purposes and only four of the investigations completed since 1992 contain significant amounts of information relating soil and groundwater quality.
Geology	Geology consists of a layer of Made Ground (Colliery spoil proven to a depth of 8.86m) overlying the Pennine Middle Coal Measures of interbedded mudstones, sandstones and siltstones. There are no natural superficial deposits recorded on site.
Hydrogeology	Discontinuous perched groundwater was recorded within the Made Ground between 0.88m and 4.0m depth, with a deeper water table within the Coal Measures at approximately 6.5m depth. The groundwater monitoring data was insufficient to calculate a definitive hydraulic gradient. The Pennine Middle Coal Measures are a secondary A aquifer and the Site is not located within a groundwater source protection zone.
Hydrology	There are two drainage ditches located adjacent to the site boundaries to the southwest and east. These drains appear to feed into the Oakerthorpe Brook located approximately 50m to the north.

Soil Quality	Previously recorded soil quality showed elevated arsenic concentrations were recorded in the northern part of the Site during the 1997 investigation, with a maximum arsenic concentration of 278mg/kg. The soils in this area were also found to be acidic (<5 pH). Three samples of Made Ground (BH1-2003 to BH3-2003) collected from 1.6m to 1.65m depth recorded elevated concentrations of mineral oil, PAHs and resin / nitrogen, sulphur, and oxygen (NSO) compounds, although the location of these boreholes is uncertain. All of the other results recorded low levels of contaminants of concern or concentrations below minimum detection limits.
Groundwater Quality	Groundwater monitoring has recorded no light non-aqueous phase liquid (LNAPL) in any of the monitoring wells on-site. The only round of groundwater analysis was completed in 1992 when three samples were submitted for pH and sulphate analysis. The results recorded pH results between pH7.4 and pH7.9, and sulphate concentrations varied from 1.60g/l to 1.67g/l.
Ground Gas	Elevated concentrations of methane and carbon dioxide were recorded in the deposits of Made Ground (colliery spoil) beneath the Site, and the reports from 1992 to 2003 indicated that specialist gas protection measures should be installed as part of the proposed developments at the Site.
Generic Quantitative Risk Assessment (GQRA) Results	None of the available laboratory results exceeded the relevant generic assessment criteria (GAC) for a commercial/industrial site use, although no relevant GAC values were available to screen against the elevated concentrations of mineral oil, total PAHs and resins recorded during the 2003 investigation.

DRAWINGS



SITE BOUNDARY

INSTALLATION BOUNDARY

AREAS EXCLUDED FROM INSTALLATION

APPROXIMATE EXTENT OF TIP A

BOREHOLE LOCATION (1992)

BOREHOLE LOCATION (1997)

TRIAL PIT LOCATION (1997)

BOREHOLE LOCATION (2017)

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SUMMARY OF PREVIOUS INVESTIGATIONS

EXPLORATORY HOLE LOCATIONS

DRAWING 001

Scale	Date
1:2,500 @ A3	MARCH 2019

08504.00001.13.002.0_SITE&INSTALLATION_BDY.dwg

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APPENDIX 01

Site Investigation Logs

HARRISON & COMPANY	Borehole Record	Report No. 4660	Borehole No. 1
	Location : Thornton Park, Alfreton, Derby.	Dates : 20/6/92	
Client : Thorntons plc.	Plant : Dando 150 Percussion Boring Rig	Diameter : 150mm	Coordinates : -

Description	Legend	Depth (m)	O.D. Level	Sample Test type	Sample Test depth	Remarks
		G.L.				
TOPSOIL		0.1		D1	0.1	
MADE GROUND (Mottled brown and grey silty clay with some coal and mudstone fragments).		0.3		D2	0.3	
MADE GROUND (Firm to stiff dark grey silty clay containing numerous subangular sand and gravel sized fragments of mudstone and coal).				U1	1.0-1.45	50 Blows
				D3	1.5	
				CPT1	2.0-2.45	7/4/4/3/3 N=14
				D4	2.5	
				B1	2.5-3.0	
				W1	2.8	
				U2	3.0-3.45	40 Blows
				D5	3.5	
				CPT2	4.0-4.5	11/7/5/3/6 N=21
				D6	4.5	
				B2	4.5-5.0	
Firm/stiff, mottled brown grey silty CLAY with fragments of mudstone (Made Ground?).		5.0		U3	5.0-5.45	150 Blows
		5.5		D7	5.5	
Stiff, fissured, mottled light grey and light brown CLAY with occasional black carbonaceous speckles.		5.7		D8	5.7	
				U4	6.0-6.45	150 Blows, Failed
Stiff, mottled grey and brown, laminated CLAY with some thin coal partings and ironstone fragments/nodules.				B3	6.0-6.3	
		6.8		CPT3	6.8-7.25	21/20/25/24/35 N=50+
				B4	6.8-7.2	
Light brown, fine to medium grained, weathered micaceous impure, shaley SANDSTONE, weak.				CPT4	7.3-7.75	46/31/50+ N=50+
		8.0		D10	8.0	
Borehole Complete.						

D	Disturbed Sample
B	Bulk Sample
U	Undisturbed Sample (100mm ∅)
W	Water Sample
SPT	Standard Penetration Test
CPT	Cone Penetration Test
N	No. of blows per 300 mm penetration in SPT/CPT
V	Vane Test
C	Undrained Shear Strength

Water Level Observations

Date	Time	Depth of Hole (m)	Depth of Casing (m)	Water Strike (m)	Standing Level (m)
20/6/92	15:00	3.5	1.5	3.5 Slow	2.8
20/6/92	-	8.0	Removed	-	2.8

Remarks
Chiselling : between 7.5m and 8.0m, 1hr.
Removed spoil from B.H. postion, 1hr.

HARRISON & COMPANY	Borehole Record	Report No. 4660	Borehole No. 2
	Location : Thornton Park, Alfreton, Derby.	Dates : 17/6/92	

Client : Thorntons plc.	Plant : Dando 150 Percussion Boring Rig	Diameter : 150mm	Coordinates : -

Description	Legend	Depth (m)	O.D. Level	Sample Test type	Sample Test depth	Remarks
TOPSOIL		G.L. 0.1				
MADE GROUND (Mottled brown grey silty clay with some fragments of mudstone and coal)		0.5		D1	0.1	
				D2	0.5	
MADE GROUND (Firm/stiff, dark grey silty clay containing numerous subangular fragments of mudstone and coal).				U1	1.0-1.45	80 Blows
				D3	1.5	
				CPT1	2.0-2.45	6/4/2/3/3 N=12
				D4	2.5	
				B1	2.5-3.0	
				U2	3.0-3.45	50 Blows
				D5	3.5	
		4.1		CPT2	4.0-4.5	11/6/6/10/8 N=30
				W1	4.0	
				D6	4.1	
Stiff light grey and occasionally mottled dark grey and brown, fissured CLAY with scattered subangular fragments of sandstone and coal).				B2	4.1-5.0	
				U3	5.0-5.45	150 Blows
		5.5		D7	5.5	
Stiff dark grey and brown, laminated CLAY with scattered fragments of sandstone coal and ironstone.				CPT3	6.0-6.45	28/20/18/22/29 N=50+
		6.1		D8	6.1	
Light brown fine to medium grained very weathered, micaceous, impure shaley SANDSTONE, very weak, sometimes with a clayey matrix.				B3	6.5-7.0	
		7.5		CPT4 D10	7.2-7.425 7.5	50/20/50+ N=50+
Borehole Complete.						

D	Disturbed Sample
B	Bulk Sample
U	Undisturbed Sample (100mm ∅)
W	Water Sample
SPT	Standard Penetration Test
CPT	Cone Penetration Test
N	No. of blows per 300 mm penetration in SPT/CPT
V	Vane Test
C	Undrained Shear Strength

Water Level Observations

Date	Time	Depth of Hole (m)	Depth of Casing (m)	Water Strike (m)	Standing Level (m)
17/6/92	09:00	4.1	1.5	4.1 V.Slow	4.0
17/6/92	-	7.5	Removed	-	6.1

Remarks
Chiselling : between 7.2m and 7.5m, 1hr.

HARRISON & COMPANY	Borehole Record	Report No. 4660	Borehole No. 3
	Location : Thornton Park, Alfreton, Derby.	Dates : 18/6/92	
Client : Thorntons plc.	Plant : Dando 150 Percussion Boring Rig	Diameter : 150mm	Coordinates : -

Description	Legend	Depth (m)	O.D. Level	Sample Test type	Sample Test depth	Remarks
		G.L.				
TOPSOIL		0.2		D1	0.2	
MADE GROUND (Mottled brown grey sandy clay with fragments of mudstone and coal).		0.6		D2	0.6	
MADE GROUND (Firm/stiff, dark grey silty clay containing numerous subangular fragments of mudstone and coal).				U1	1.0-1.45	100 Blows
				D3	1.5	
				CPT1	2.0-2.45	8/6/5/8/8 N = 27
				D4	2.5	
		2.9		B1	2.5-2.8	
Obstruction. Borehole position moved to 3A.						

D	Disturbed Sample
B	Bulk Sample
U	Undisturbed Sample (100mm ∅)
W	Water Sample
SPT	Standard Penetration Test
CPT	Cone Penetration Test
N	No. of blows per 300 mm penetration in SPT/CPT
V	Vane Test
C	Undrained Shear Strength

Water Level Observations

Date	Time	Depth of Hole (m)	Depth of Casing (m)	Water Strike (m)	Standing Level (m)
18/6/92				None	

Remarks
Chiselling : between 2.8m and 2.9m, 1.5hrs.
Borehole position moved to position 3A.

HARRISON & COMPANY	Borehole Record	Report No. 4660	Borehole No. 3A
	Location : Thornton Park, Alfreton, Derby.	Dates : 18/6/92	
Client : Thorntons plc.	Plant : Dando 150 Percussion Boring Rig	Diameter : 150mm	Coordinates : -

Description	Legend	Depth (m)	O.D. Level	Sample Test type	Sample Test depth	Remarks
		G.L.				
TOPSOIL		0.2				
MADE GROUND (Mottled brown grey sandy clay with fragments of mudstone and coal).		0.5				
MADE GROUND (Firm/stiff dark grey silty clay containing numerous subangular fragments of mudstone and coal).				D1 U1 D2 CPT1	3.0 3.0-3.45 3.5 4.0-4.45	11/6/8/4/4 N=22
Stiff, mottled brown and grey, sightly sandy silty CLAY containing fragments of sandstone, shale and occasional coal).		4.3		D3 B1 U2 D4 CPT2 D5 B2 U3	4.3 4.3-5.0 5.0-5.45 5.5 6.0-6.45 6.5 6.5-7.0 7.5-7.95	120 Blows 13/9/8/12/11 N=40 150 Blows
Stiff, grey shaley CLAY with orange staining on fissures.		7.7		D7	7.7	
Light brown fine to medium grained silty weathered micaceous impure shaley SANDSTONE, weak.		8.3 9.0		D9	9.0	
Borehole Complete.						

D	Disturbed Sample
B	Bulk Sample
U	Undisturbed Sample (100mm Ø)
W	Water Sample
SPT	Standard Penetration Test
CPT	Cone Penetration Test
N	No. of blows per 300 mm penetration in SPT/CPT
V	Vane Test
C	Undrained Shear Strength

Water Level Observations

Date	Time	Depth of Hole (m)	Depth of Casing (m)	Water Strike (m)	Standing Level (m)
18/6/92	-	-	-	None	-
23/7/92	-	9.0	Standpipe	-	6.30
25/8/92	-	9.0	Standpipe	-	6.50

Remarks
Chiselling : between 8.3m and 9.0m, 1hr.
Standpipe installed to 9.0m with pea shingle surround and stopcock cover.

HARRISON & COMPANY	Borehole Record	Report No. 4660	Borehole No. 4
	Location : Thornton Park, Alfreton, Derby.	Dates : 19/6/92	
Client : Thorntons Plc.	Plant : Dando 150 Percussion Boring Rig	Diameter : 150mm	Coordinates : -

Description	Legend	Depth (m)	O.D. Level	Sample Test type	Sample Test depth	Remarks
		G.L.				
TOPSOIL		0.1		D1	0.1	
MADE GROUND (Mottled brown sandy clay with fragments of sandstone and coal).		0.5		D2	0.3	
MADE GROUND (Stiff, dark grey silty clay containing numerous subangular fragments of mudstone and coal).				U1	1.0-1.45	50 Blows
				D3	1.5	
				CPT1	2.0-2.45	5/3/4/4/3 N = 14
				D4 B1	2.5 2.5-3.0	
				U2	3.0-3.45	60 Blows
				D5	3.5	
				CPT2 W1	4.0-4.45 4.0	8/4/5/5/3 N = 17
				D6 B2	4.5 4.5-5.0	
Stiff, mottled brown grey, slightly sandy CLAY with scattered fragments of sandstone.		5.0		D7	5.0	
Stiff, orange brown mottled grey slightly sandy CLAY with fragments of sandstone and mudstone.		5.5		D8	5.5	
				U4	6.0-6.45	150 Blows
Stiff, pale brown, friable sandy CLAY with fragments of sandstone.		6.4		D9	6.4	
Pale brown, fine to medium grained very weathered, micaceous, impure SANDSTONE, weak.		7.4		D10 CPT3	8.0 7.5-7.95	34/20/36/48/40 N = 50+
				D11 B3	8.0 8.0-8.5	
		8.7				
Borehole Complete.						

D	Disturbed Sample
B	Bulk Sample
U	Undisturbed Sample (100mm ∅)
W	Water Sample
SPT	Standard Penetration Test
CPT	Cone Penetration Test
N	No. of blows per 300 mm penetration in SPT/CPT
V	Vane Test
C	Undrained Shear Strength

Water Level Observations

Date	Time	Depth of Hole (m)	Depth of Casing (m)	Water Strike (m)	Standing Level (m)
19/6/92	18:10	5.0	1.5	5.0 Slow	4.0
19/6/92	-	-	Removed	-	3.8
23/7/92	-	8.0	Standpipe	-	3.8
25/8/92	-	8.0	Standpipe	-	3.8

Remarks
Chiselling : between 7.4m and 8.7m, 1hr.
Standpipe installed to 8.0m with pea shingle surround and stopcock cover.

HARRISON & COMPANY	Borehole Record	Report No. 4660	Borehole No. 5
	Location : Thornton Park, Alfreton, Derby.	Dates : 20/6/92	
Client : Thorntons plc.	Plant : Dando 150 Percussion Boring Rig	Diameter : 150mm	Coordinates : -

Description	Legend	Depth (m)	O.D. Level	Sample Test type	Sample Test depth	Remarks
		G.L.				
TOPSOIL		0.3		D1	0.1	
				D2	0.3	
MADE GROUND(Stiff, dark grey silty clay containing numerous subangular fragments of mudstone and coal).				U1	1.0-1.45	85 Blows
				D3	1.5	
				CPT1	2.0-2.45	12/8/6/6/5 N=25
				D4	2.5	
				B1	2.5-3.0	
				U2	3.0-3.45	75 Blows
				D5	3.5	
				CPT2	4.0-4.45	5/5/4/4/4 N=17
				D6	4.5	
				B2	4.5-5.0	
				U3	5.0-5.45	90 Blows
				D7	5.5	
		5.7		D8	5.7	
Stiff, light grey mottled orange brown, CLAY with occasional iron staining and concretions.				U4	6.0-6.45	150 Blows
				D9	6.4	
		6.8		D10	6.8	
Stiff, grey and brown, laminated friable CLAY with iron staining, concretions and occasional thin partings of coal dust.				U5	7.5-7.65	150 Blows, Failed
		7.65		D11	7.6-7.65	
Pale grey brown, fine to medium grained weathered, micaceous, impure SANDSTONE, weak.				D12	8.2	
				CPT3	8.2-8.425	26/25/50+ N=50+
		8.4				
Borehole Complete.						

D	Disturbed Sample
B	Bulk Sample
U	Undisturbed Sample (100mm ∅)
W	Water Sample
SPT	Standard Penetration Test
CPT	Cone Penetration Test
N	No. of blows per 300 mm penetration in SPT/CPT
V	Vane Test
C	Undrained Shear Strength

Water Level Observations

Date	Time	Depth of Hole (m)	Depth of Casing (m)	Water Strike (m)	Standing Level (m)
20/6/92	12:00	5.5	1.5	5.5 Slow	5.2
20/6/92	-	-	Removed	-	4.9
23/7/92	-	7.0	Standpipe	-	3.8
25/8/92	-	7.0	Standpipe	-	4.0

Remarks
Chiselling : between 0.5m and 1.0m, 0.5hrs.
: between 8.2m and 8.4m, 0.75hrs.
Standpipe installed to 7.0m with pea shingle surround and stopcock cover.

HARRISON & COMPANY	Borehole Record	Report No. 4660	Borehole No. 6
	Location : Thornton Park, Alfreton, Derby.	Dates : 19/6/92	
Client : Thorntons plc.	Plant : Dando 150 Percussion Boring Rig	Diameter : 150mm	Coordinates : -

Description	Legend	Depth (m)	O.D. Level	Sample Test type	Sample Test depth	Remarks
		G.L.				
TOPSOIL		0.1		D1	0.1	
MADE GROUND (Mottled brown slightly sandy clay with scattered fragments of mudstone and coal).		0.4		D2	0.4	
MADE GROUND (Stiff, dark grey silty clay containing numerous subangular fragments of mudstone and coal).				U1	1.0-1.45	50 Blows
				D3	1.5	
				CPT1	2.0-2.45	7/4/3/5/5 N=17
				D4	2.5	
				B1	2.5-3.0	
				U2	3.0-3.45	60 Blows
				D5	3.5	
				CPT2	4.0-4.45	8/6/10/8/12 N=36
				D6	4.5	
				B2	4.5-5.0	
				U3	5.0-5.45	150 Blows
				D7	5.5	
		5.8		D8	5.8	
Stiff, mottled orange brown and grey slightly sandy CLAY with scattered fragments of sandstone and some small carbonaceous speckles.				U4	6.0-6.275	150 Blows
				D9	6.3	
		6.4		D10	6.4	
				CPT3	6.6-7.05	27/20/18/22/25 N=50+
				B6	6.6-7.0	
				CPT4	7.5-7.95	32/17/19/22/30 N=50+
Pale brown, fine to medium grained highly weathered, micaceous impure SANDSTONE, very weak becoming weak.				D11	8.0	
				B4	8.0-8.5	
				CPT5	9.0-9.225	42/28/50+ N=50+
				D12	9.3	
		9.8		CPT6	9.7-9.725	50+ N=50+
Borehole Complete.						

D	Disturbed Sample
B	Bulk Sample
U	Undisturbed Sample (100mm ∅)
W	Water Sample
SPT	Standard Penetration Test
CPT	Cone Penetration Test
N	No. of blows per 300 mm penetration in SPT/CPT
V	Vane Test
C	Undrained Shear Strength

Water Level Observations

Date	Time	Depth of Hole (m)	Depth of Casing (m)	Water Strike (m)	Standing Level (m)
19/6/92	-	-	-	none	-

Remarks

Chiselling : between 5.0m and 5.6m, 0.5hrs.
: between 6.4m and 6.6m, 1hr.
: between 9.3m and 9.8m, 1hr.

HARRISON & COMPANY	Borehole Record	Report No. 4660	Borehole No. 7
	Location : Thornton Park, Alfreton, Derby.	Dates : 16/6/92	
Client : Thorntons plc.	Plant : Dando 150 Percussion Boring Rig	Diameter : 150mm	Coordinates : -

Description	Legend	Depth (m)	O.D. Level	Sample Test type	Sample Test depth	Remarks
		G.L.				
TOPSOIL		0.3		D1	0.3	
MADE GROUND (Stiff, brown sandy clay with fragments of mudstone and coal).				U1	1.0-1.45	120 Blows
		1.5		D2	1.5	
MADE GROUND (Stiff, dark grey silty clay containing numerous subangular fragments of mudstone and coal).				CPT1	2.0-2.45	6/4/5/3/5 N=17
				D3	2.5	
				B1	2.5-3.0	
				U2	3.0-3.45	60 Blows
				D4	3.5	
				CPT2	4.0-4.45	11/7/5/6/8 N=26
				D5	4.5	
				B2	4.5-5.0	
				U3	5.0-5.45	100 Blows
Stiff, mottled light brown and light grey CLAY with scattered subrounded fragments of sandstone.		5.5		D6	5.5	
		5.9		D7	5.9	
Grey fine to medium grained micaceous SANDSTONE with some small carbonaceous speckles.		6.0		CPT3	6.0-6.45	9/8/6/8/7 N=29
				D8	6.0	
				B3	6.5-7.0	
Stiff, grey, slightly sandy CLAY with scattered fragments of sandstone, mudstone and coal.						
		7.3		D9	7.3	
Stiff, orange brown mottled grey fissured CLAY with scattered subrounded fragments of sandstone and mudstone.				U4	7.5-7.75	150 Blows
				D10	7.5-7.8	
		8.0		D11	8.0	
Light brown, fine to medium grained highly weathered, micaceous, impure SANDSTONE, very weak with some sandy clay pockets. Becoming less weathered below 9.4m.				CPT4	8.5-8.95	46/33/20/37/40 N=50+
				D12	9.0	
				B4	9.0-9.4	
				D13	9.4	
				CPT5	9.4-9.775	37/29/33/40/50= N=50+
		10.1				
Borehole Complete.						

D	Disturbed Sample
B	Bulk Sample
U	Undisturbed Sample (100mm ∅)
W	Water Sample
SPT	Standard Penetration Test
CPT	Cone Penetration Test
N	No. of blows per 300 mm penetration in SPT/CPT
V	Vane Test
C	Undrained Shear Strength

Water Level Observations

Date	Time	Depth of Hole (m)	Depth of Casing (m)	Water Strike (m)	Standing Level (m)
16/6/92	-	-	-	none	-
23/7/92	-	9.0	Standpipe	-	-
25/8/92	-	9.0	Standpipe	-	-

Remarks
Chiselling : between 9.0m and 10.1m, 1.75hrs.
Standpipe installed to 9.0m with pea shingle surround and stopcock cover.

HARRISON & COMPANY	Borehole Record	Report No. 4660	Borehole No. 8
	Location : Thornton Park, Alfreton, Derby.	Dates : 18/6/92	
Client : Thorntons plc.	Plant : Dando 150 Percussion Boring Rig	Diameter : 150mm	Coordinates : -

Description	Legend	Depth (m)	O.D. Level	Sample Test type	Sample Test depth	Remarks
		G.L.				
TOPSOIL		0.2		D1	0.2	
MADE GROUND (Mottled brown and grey sandy clay with fragments of mudstone and coal).		0.5		D2	0.5	
MADE GROUND(Stiff, dark grey silty clay containing numerous subangular fragments of mudstone and coal).				D3	1.0-1.4	
				U1	1.5-1.95	140 Blows
				D4	2.0	
				CPT1	2.0-2.45	11/6/6/6/6 N=24
				D5	2.5	
				B1	2.5-3.0	
				U2	3.0-3.45	110 Blows
				D6	3.5	
				CPT2	4.0-4.45	14/15/8/6/6 N=35
				D7	4.5	
				B2	4.5-5.0	
				U3	5.0-5.45	100 Blows
		5.5		D8	5.5	
Stiff, mottled brown and grey CLAY with many fragments of mudstone and coal. (Made Ground?).				U4	6.0-6.45	135 Blows
		6.5		D9	6.5	
Stiff, grey and mottled brown slightly sandy CLAY with fragments of mudstone, sandstone and coal. (Made Ground?).				D10	7.5	
				U5	7.5-7.95	150 Blows, Failed
				B3	7.5-8.0	
				CPT3	8.0-8.45	10/8/13/19/20 N=50+
				U6	9.0-9.45	110 Blows
				D11	9.5	
		9.7		CPT4	9.7	50+ N=50+
Grey, Medium grained, highly weathered micaceous SANDSTONE, very weak.				D12	9.7	
		10.2		D10	10.0	
Borehole Complete.						

D	Disturbed Sample
B	Bulk Sample
U	Undisturbed Sample (100mm ∅)
W	Water Sample
SPT	Standard Penetration Test
CPT	Cone Penetration Test
N	No. of blows per 300 mm penetration in SPT/CPT
V	Vane Test
C	Undrained Shear Strength

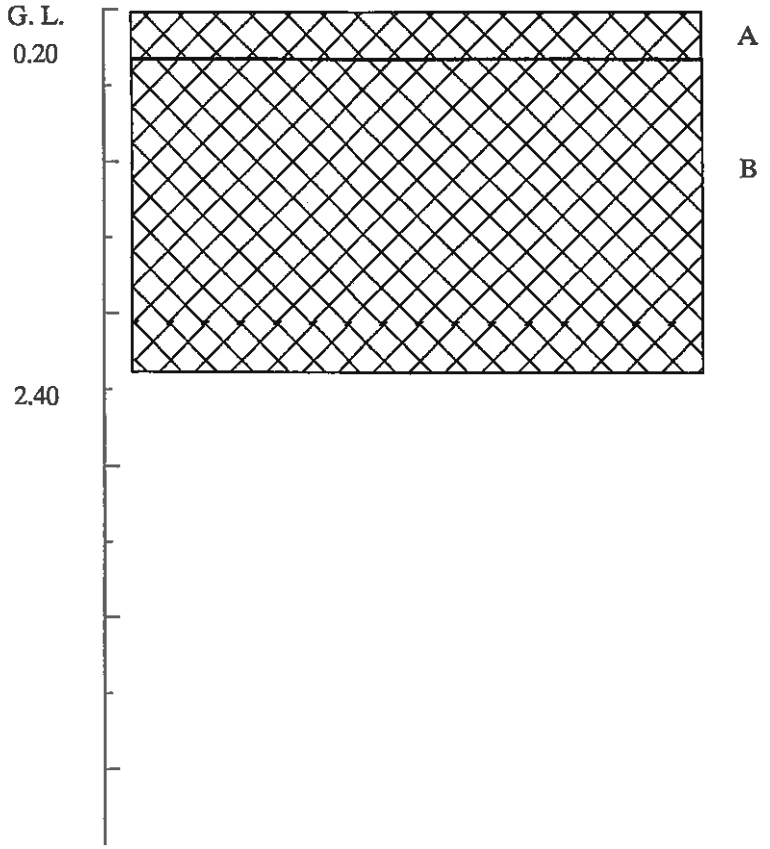
Water Level Observations

Date	Time	Depth of Hole (m)	Depth of Casing (m)	Water Strike (m)	Standing Level (m)
18/6/92	-	-	-	None	-

Remarks
Chiselling : between 1.0m and 1.4m, 1hr.
: between 9.7m and 10.2m, 1hr.

HARRISON & COMPANY	Trial Pit Record	Report No 6295	Trial Pit No 1
	Location : Thornton Park, Swanwick	Date : 04/06/97	
Client: Thornton Plc	Plant : JCB	Reduced Level : 117.05m	

SECTION/~~PLAN~~



Sample / Test		Remarks
Type	Depth(m)	
B1	2.00	

LITHOLOGY

A : TOPSOIL (Brown slightly sandy silty clay with much roots and rootlets)

B : MADE GROUND (Dark grey occasional mottled orange brown silty clay with fine to coarse sub angular to sub rounded gravel of coal, limestone, mudstone, brick, metal and polythene with very occasional rootlets).

KEY

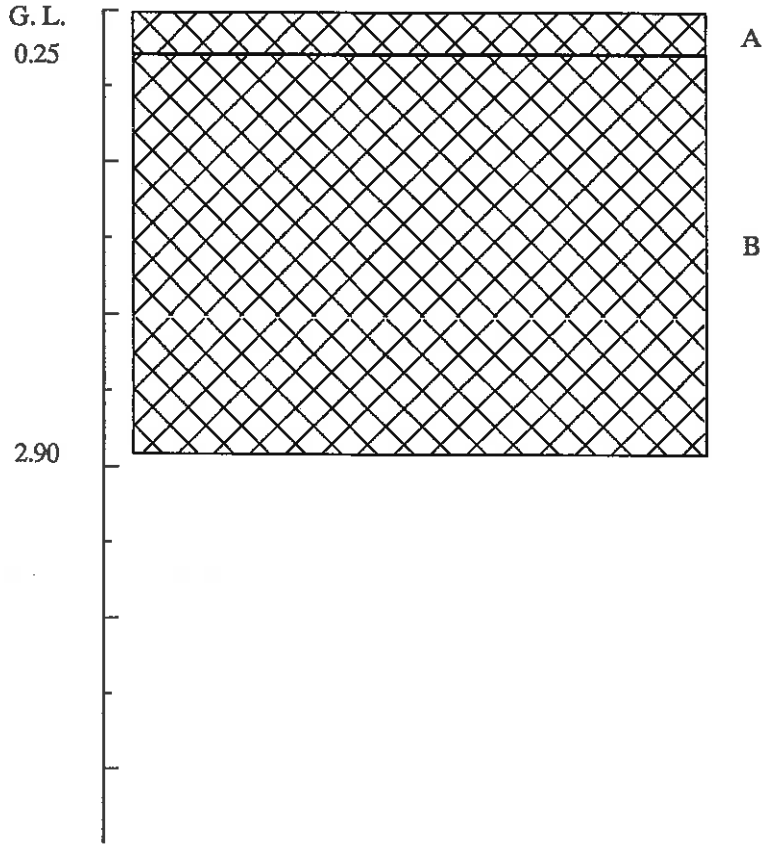
D	Disturbed Sample
B	Bulk Sample
U	Undisturbed Sample
W	Water Sample
V	Vane Test
C	Apparent Cohesion
S	Soakaway Test

REMARKS

Pit size approx 4.0m x 0.5m in plan.
No groundwater.
Pit sides stable.

HARRISON & COMPANY	Trial Pit Record	Report No 6295	Trial Pit No 2
	Location : Thornton Park, Swanwick	Date : 04/06/97	
Client: Thornton Plc	Plant : JCB	Reduced Level : 117.49m	

SECTION/~~PLAN~~



Sample / Test		Remarks
Type	Depth(m)	

LITHOLOGY

A : TOPSOIL (Brown occasionally orange brown slightly sandy silty clay with many roots and rootlets)

B : MADE GROUND (Very dark grey silty clay with fine to coarse/cobble sized sub angular gravel of coal, limestone and fossiliferous mudstone).

KEY

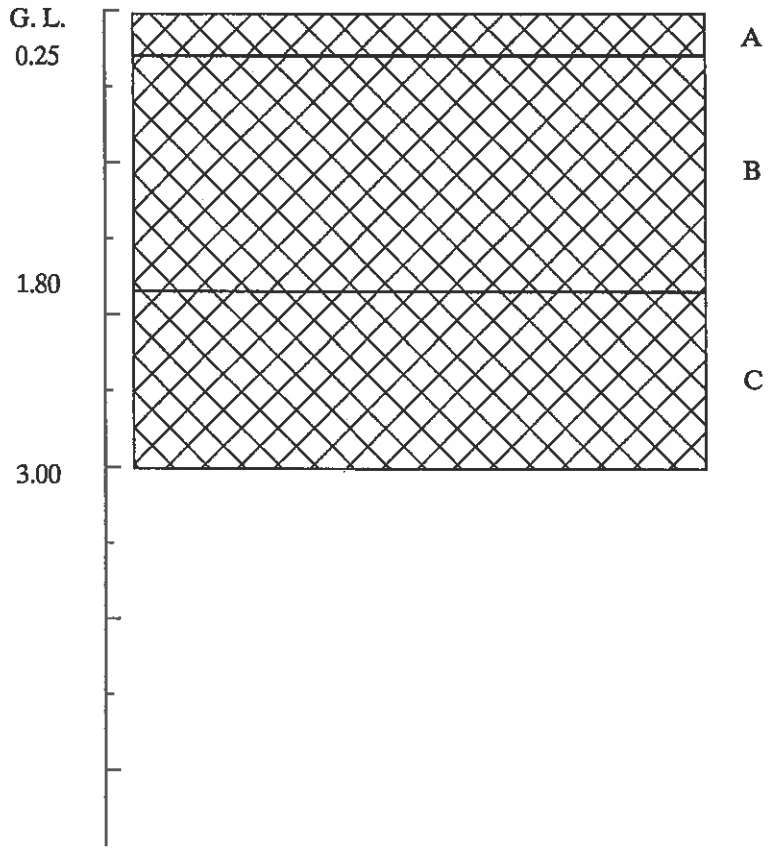
D	Disturbed Sample
B	Bulk Sample
U	Undisturbed Sample
W	Water Sample
V	Vane Test
C	Apparent Cohesion
S	Soakaway Test

REMARKS

Pit size approx 4.0m x 0.5m in plan.
No groundwater.
Pit sides stable.

HARRISON & COMPANY	Trial Pit Record	Report No 6295	Trial Pit No 3/MW1
	Location : Thornton Park, Swanwick	Date : 04/06/97	
Client: Thornton Plc	Plant : JCB	Reduced Level : 117.97m	

SECTION/~~PLAN~~



Sample / Test		Remarks
Type	Depth(m)	
B1	1.80-2.00	

LITHOLOGY

A : TOPSOIL (Brown occasionally orange brown slightly sandy silty clay with many roots and rootlets)

B : MADE GROUND (Very dark grey occasionally mottled brown silty clay with much fine to coarse/cobble sized sub angular gravel of coal, limestone, mudstone and occasionally chipboard).

C : MADE GROUND (Very dark grey silty clay with much fine to coarse sub angular to angular gravel of mudstone and coal).

KEY

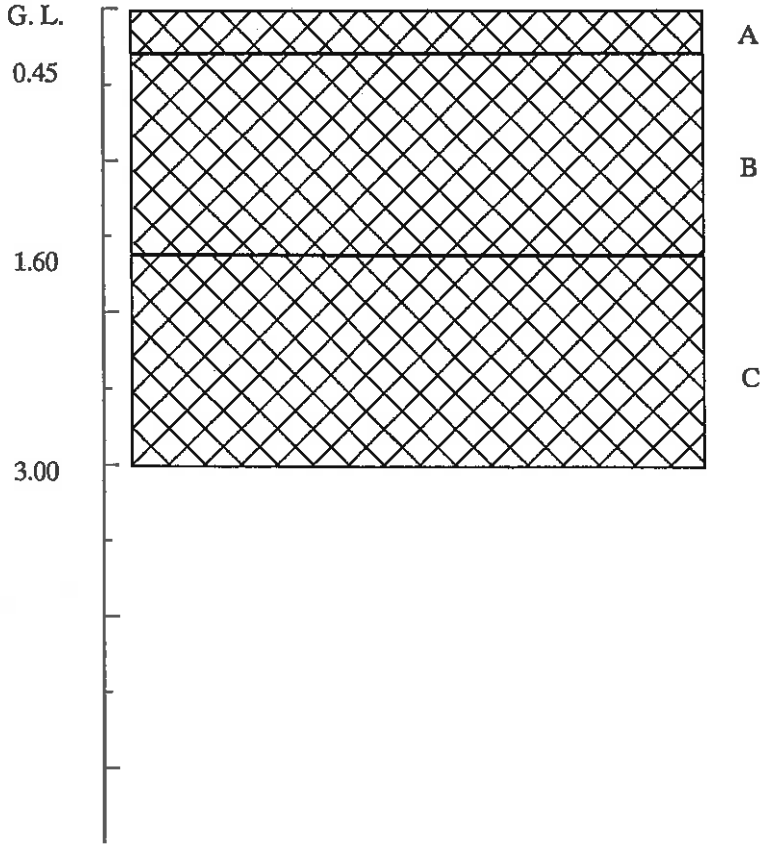
D	Disturbed Sample
B	Bulk Sample
U	Undisturbed Sample
W	Water Sample
V	Vane Test
C	Apparent Cohesion
S	Soakaway Test

REMARKS

Pit size approx 4.0m x 0.5m in plan.
No groundwater.
Pit sides stable.
50mm slotted pipe installed to 2.70m.

HARRISON & COMPANY	Trial Pit Record	Report No 6295	Trial Pit No 4
	Location : Thornton Park, Swanwick	Date : 04/06/97	
Client: Thornton Plc	Plant : JCB	Reduced Level : 118.22m	

SECTION/~~PLAN~~



Sample / Test		Remarks
Type	Depth(m)	

LITHOLOGY

A : TOPSOIL (Brown occasionally orange brown slightly sandy silty clay with many roots and rootlets)

B : MADE GROUND (Very dark grey occasionally mottled brown silty clay with much fine to coarse/cobble sized sub angular gravel of coal, limestone and mudstone).

C : MADE GROUND (Grey silty clay with much fine to coarse sub angular gravel of mudstone, coal and brick fragments).

KEY

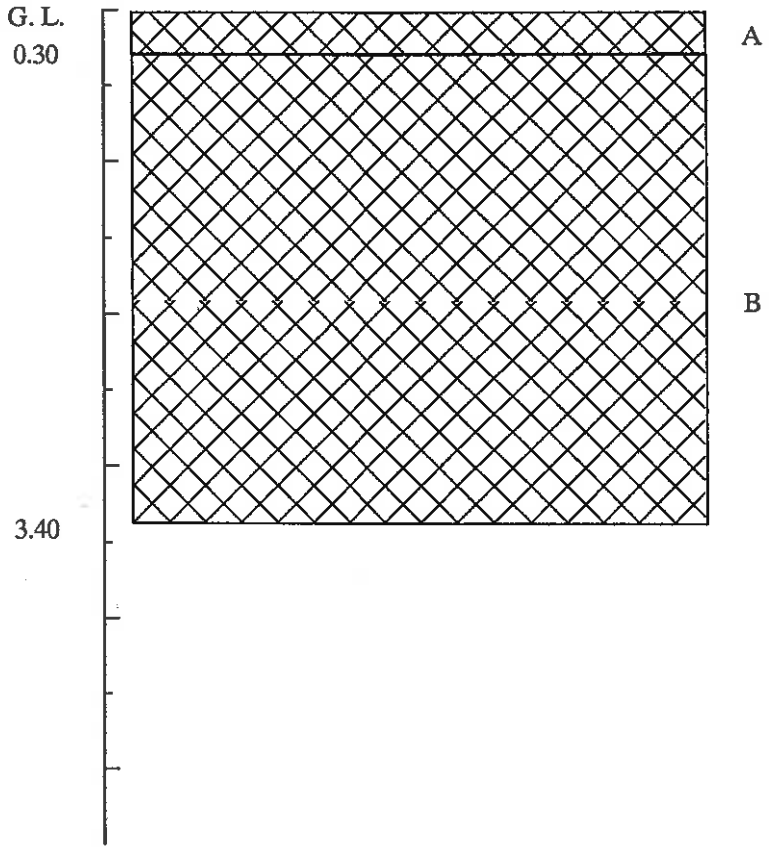
D	Disturbed Sample
B	Bulk Sample
U	Undisturbed Sample
W	Water Sample
V	Vane Test
C	Apparent Cohesion
S	Soakaway Test

REMARKS

Pit size approx 4.0m x 0.5m in plan.
Slow groundwater inflow at 1.60m.
Pit sides collasping at 1.60m.

HARRISON & COMPANY	Trial Pit Record	Report No 6295	Trial Pit No 5/MW2
	Location : Thornton Park, Swanwick	Date : 04/06/97	
Client: Thornton Plc	Plant : JCB	Reduced Level : 118.20m	

SECTION/~~PLAN~~



Sample / Test		Remarks
Type	Depth(m)	
B1	3.40	

LITHOLOGY

A : TOPSOIL (Brown occasionally orange brown slightly sandy silty clay with many roots and rootlets)

B : MADE GROUND (Very dark grey occasionally mottled yellow brown silty clay with much fine to coarse/cobble sized sub angular to angular gravel of coal, mudstone and brick fragments).

KEY

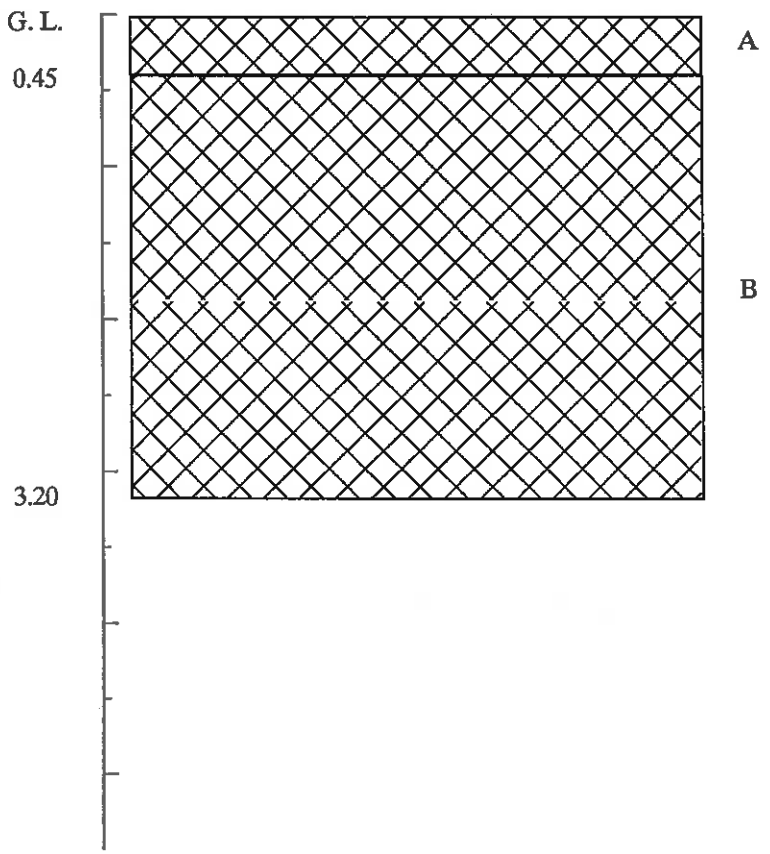
D	Disturbed Sample
B	Bulk Sample
U	Undisturbed Sample
W	Water Sample
V	Vane Test
C	Apparent Cohesion
S	Soakaway Test

REMARKS

Pit size approx 4.0m x 0.5m in plan.
Slightly damp at depth.
Sides stable.
50mm slotted pipe installed to 3.00m.

HARRISON & COMPANY	Trial Pit Record	Report No 6295	Trial Pit No 6
	Location : Thornton Park, Swanwick	Date : 04/06/97	
Client: Thornton Plc	Plant : JCB	Reduced Level : 118.22m	

SECTION/~~PLAN~~



Sample / Test		Remarks
Type	Depth(m)	
B1	2.80-3.00	

LITHOLOGY

A : TOPSOIL (Brown green mottled grey silty clay with occasional fine angular coal fragments with much rootlets)

B : MADE GROUND (Very dark grey silty clay with much fine to coarse/cobble sized sub angular to sub rounded gravel of coal, limestone, ironstone, mudstone and brick fragments).

KEY

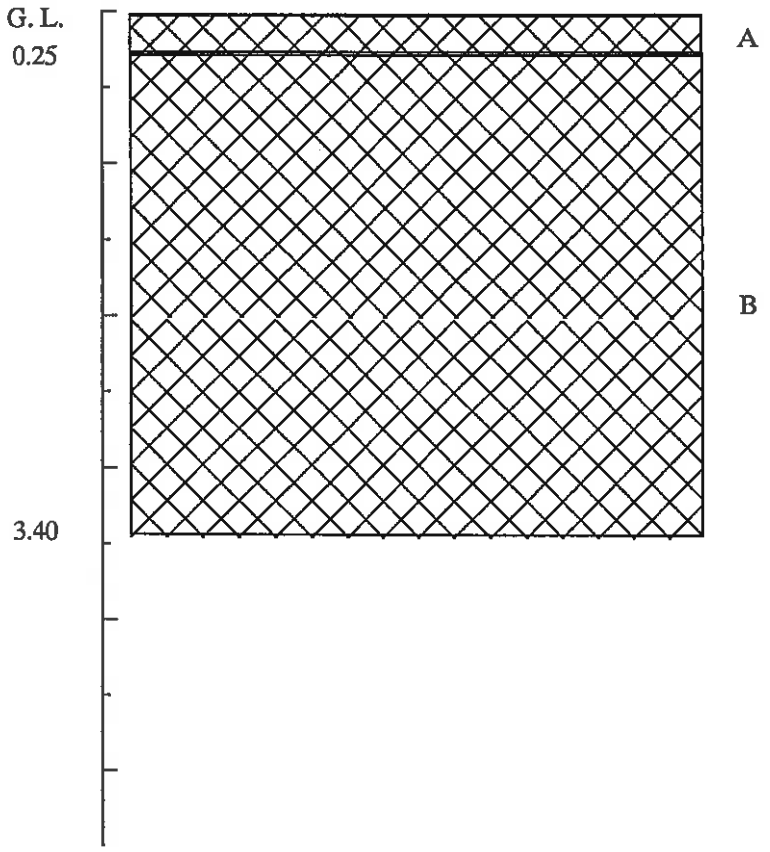
D	Disturbed Sample
B	Bulk Sample
U	Undisturbed Sample
W	Water Sample
V	Vane Test
C	Apparent Cohesion
S	Soakaway Test

REMARKS

Pit size approx 4.0m x 0.5m in plan.
Slightly damp/wet at depth.
Sides stable.

HARRISON & COMPANY	Trial Pit Record	Report No 6295	Trial Pit No 7/MW3
	Location : Thornton Park, Swanwick	Date : 04/06/97	
Client: Thornton Plc	Plant : JCB	Reduced Level : 117.55m	

SECTION/~~PLAN~~



Sample / Test		Remarks
Type	Depth(m)	

LITHOLOGY

A : TOPSOIL (Orange brown mottled grey slightly sandy silty clay with some fine angular gravel of mudstone, coal and brick fragments with much rootlets)

B : MADE GROUND (Very dark grey silty clay with much fine to coarse/cobble sized sub angular to sub rounded gravel of coal, limestone, ironstone, mudstone and brick fragments).

KEY

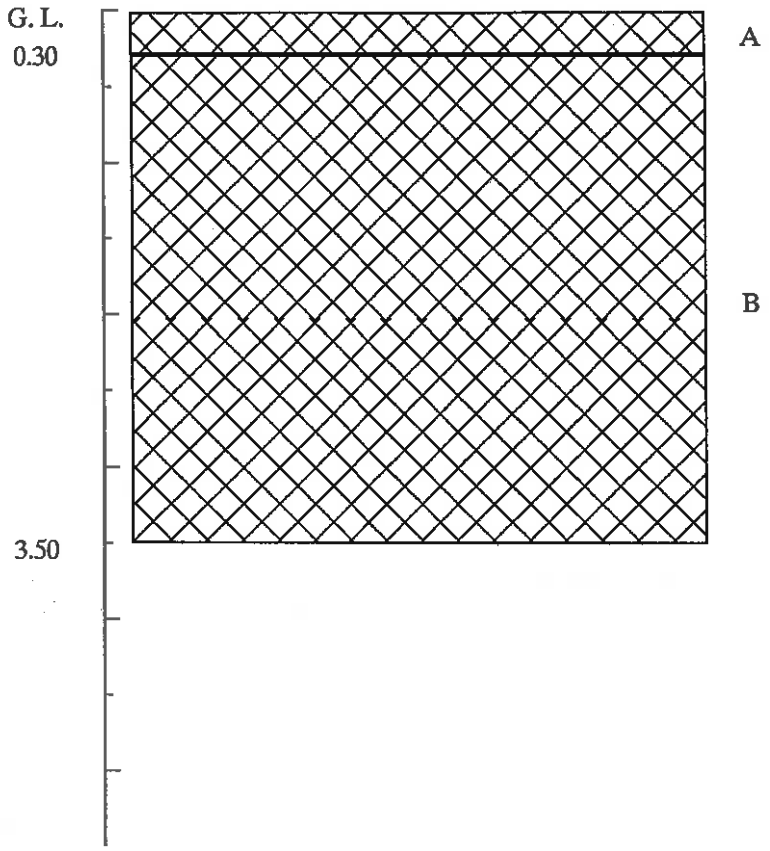
D	Disturbed Sample
B	Bulk Sample
U	Undisturbed Sample
W	Water Sample
V	Vane Test
C	Apparent Cohesion
S	Soakaway Test

REMARKS

Pit size approx 4.0m x 0.5m in plan.
Slightly damp/wet at depth.
Sides stable.
50mm slotted pipe installed to 3.50m.

HARRISON & COMPANY	Trial Pit Record	Report No 6295	Trial Pit No 8
	Location : Thornton Park, Swanwick	Date : 04/06/97	
Client: Thornton Plc	Plant : JCB	Reduced Level : 117.53m	

SECTION/~~PLAN~~



Sample / Test		Remarks
Type	Depth(m)	

LITHOLOGY

A : TOPSOIL (Orange brown mottled brown slightly sandy silty clay with much fine angular gravel of mudstone and occasionally brick fragments with much roots/rootlets)

B : MADE GROUND (Dark grey silty clay with very much fine to coarse/cobble sized angular to sub rounded gravel of coal, limestone, wood, mudstone, sandstone, rubber, pottery pipe and very occasionally brick fragments. Pockets of brown mottled grey silty clay).

KEY

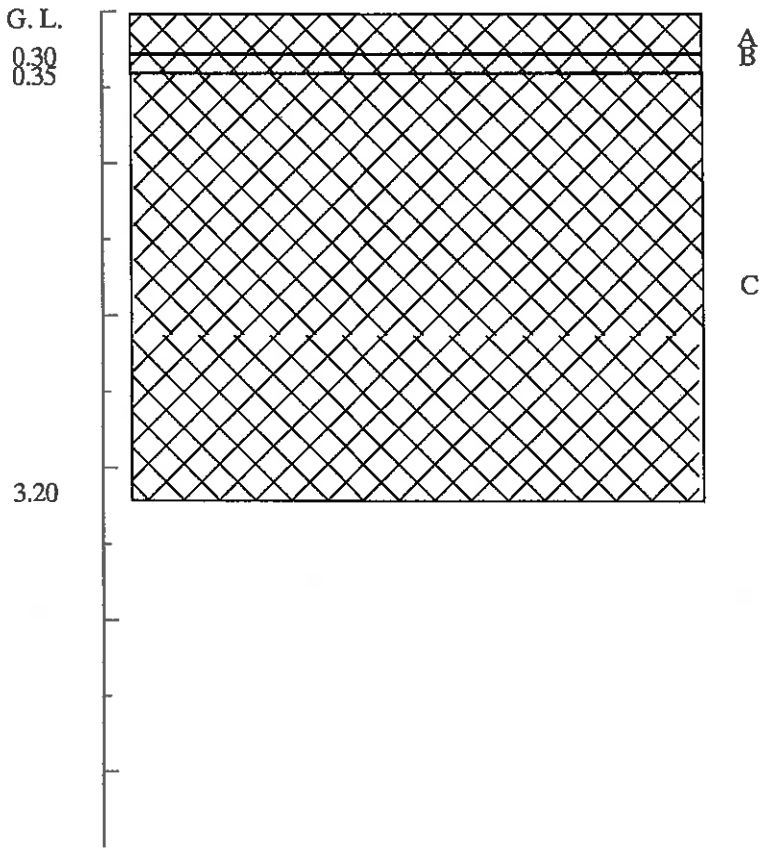
D	Disturbed Sample
B	Bulk Sample
U	Undisturbed Sample
W	Water Sample
V	Vane Test
C	Apparent Cohesion
S	Soakaway Test

REMARKS

Pit size approx 4.0m x 0.5m in plan.
Slightly damp/wet at depth.
Sides stable.

HARRISON & COMPANY	Trial Pit Record	Report No 6295	Trial Pit No 9/MW4
	Location : Thornton Park, Swanwick	Date : 04/06/97	
Client: Thornton Plc	Plant : JCB	Reduced Level : 117.56m	

SECTION/~~PLAN~~



Sample / Test		Remarks
Type	Depth(m)	
B1	2.20-2.50	

LITHOLOGY

A : TOPSOIL (Brown mottled orange slightly sandy silty clay with much with much roots/rootlets)

B : MADE GROUND (Grey mottled orange brown silty clay).

C : MADE GROUND (Dark grey silty clay with very much fine to coarse/cobble sized angular to sub rounded gravel of coal, mudstone and some brick fragments).

KEY

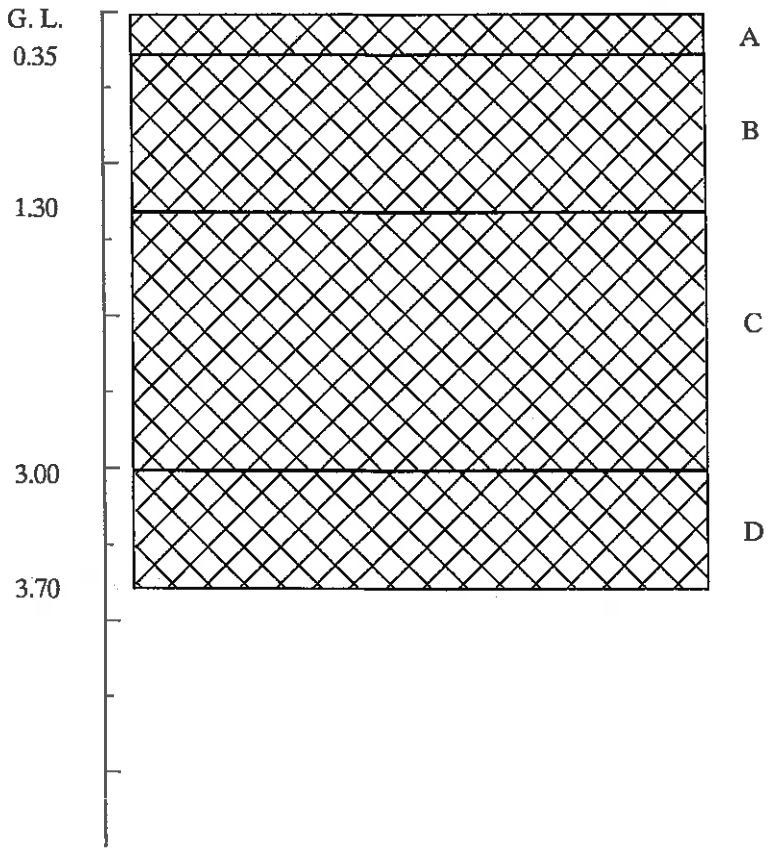
D	Disturbed Sample
B	Bulk Sample
U	Undisturbed Sample
W	Water Sample
V	Vane Test
C	Apparent Cohesion
S	Soakaway Test

REMARKS

Pit size approx 4.0m x 0.5m in plan.
Water inflow slow at 1.95m.
Sides unstable below 1.40m.
Standpipe installed to 3.00m.

HARRISON & COMPANY	Trial Pit Record	Report No 6295	Trial Pit No 10
	Location : Thornton Park, Swanwick	Date : 04/06/97	
Client: Thornton Plc	Plant : JCB	Reduced Level : 117.11m	

SECTION/~~PLAN~~



Sample / Test		Remarks
Type	Depth(m)	
B1	3.00-3.20	

LITHOLOGY

A : TOPSOIL (Brown grey mottled with some fine angular coal and mudstone gravel and much rootlets).

B : MADE GROUND (Light grey mottled blue brown silty clay with fine to coarse gravel/cobble sized of limestone, coal, mudstone, sandstone, wood, brick and material with occasional rootlets).

C : MADE GROUND (Very dark grey silty clay with much fine to coarse gravel/cobble sized angular to sub angular gravelof coal, mudstone and brick fragments).

D : MADE GROUND (Light grey mottled orange brown silty clay with fine to medium sub angular to sub rounded ironstone gravel).

KEY

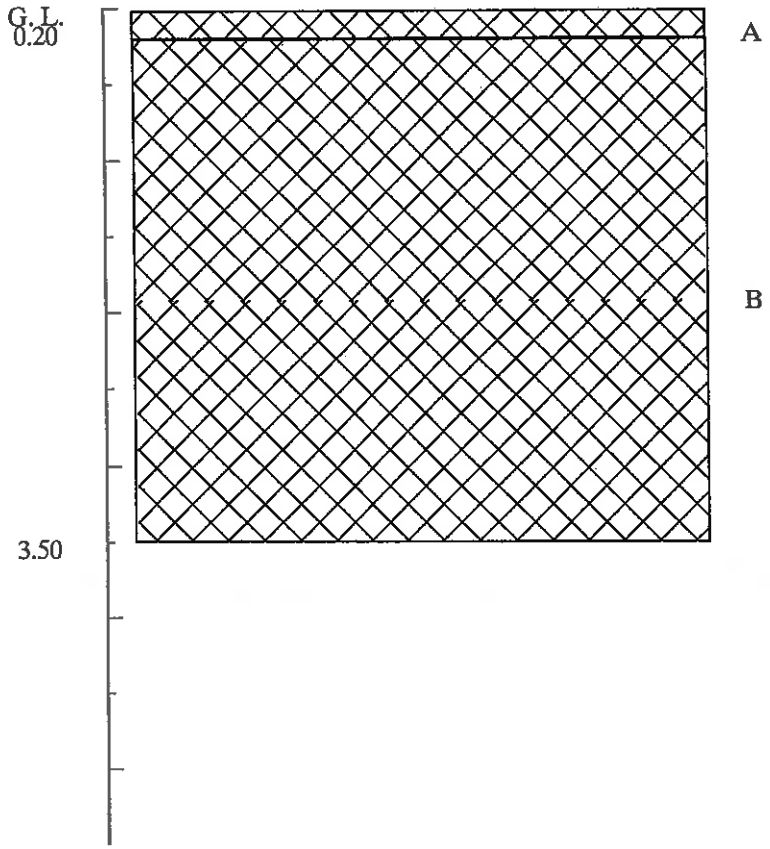
D	Disturbed Sample
B	Bulk Sample
U	Undisturbed Sample
W	Water Sample
V	Vane Test
C	Apparent Cohesion
S	Soakaway Test

REMARKS

Pit size approx 4.0m x 0.5m in plan.
Slightly damp below 2.40m
Sides stable.

HARRISON & COMPANY	Trial Pit Record	Report No 6295	Trial Pit No 11/MW5
	Location : Thornton Park, Swanwick	Date : 04/06/97	
Client: Thornton Plc	Plant : JCB	Reduced Level : 117.37m	

SECTION/~~PLAN~~



Sample / Test		Remarks
Type	Depth(m)	

LITHOLOGY

A : TOPSOIL (Brown slightly sandy very silty clay with occasional fine to medium coal and mudstone gravel and much roots/rootlets).

B : MADE GROUND (Dark grey silty clay with very much fine to coarse gravel/cobble sized of coal, mudstone, limestone, and brick fragments).

KEY

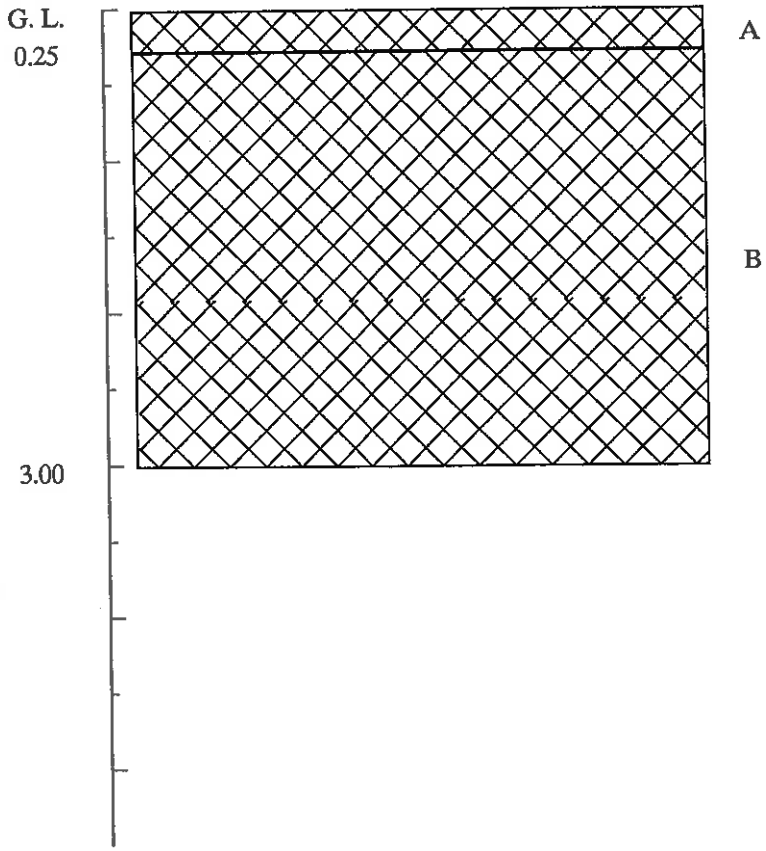
D	Disturbed Sample
B	Bulk Sample
U	Undisturbed Sample
W	Water Sample
V	Vane Test
C	Apparent Cohesion
S	Soakaway Test

REMARKS

Pit size approx 4.0m x 0.5m in plan.
Slightly damp below 1.50m
Sides stable.
Standpipe installed to 2.00m

HARRISON & COMPANY	Trial Pit Record	Report No 6295	Trial Pit No 12
	Location : Thornton Park, Swanwick	Date : 04/06/97	
Client: Thornton Plc	Plant : JCB	Reduced Level : 117.88m	

SECTION/~~PLAN~~



Sample / Test		Remarks
Type	Depth(m)	

LITHOLOGY

A : TOPSOIL (Brown slightly sandy very silty clay with occasional fine to medium coal and mudstone gravel and much roots/rootlets).

B : MADE GROUND (Dark grey silty clay with very much fine to coarse gravel/cobble sized of coal, mudstone, limestone, ironstone and brick fragments. Occasional pockets of brown mottled grey silty clay).

KEY

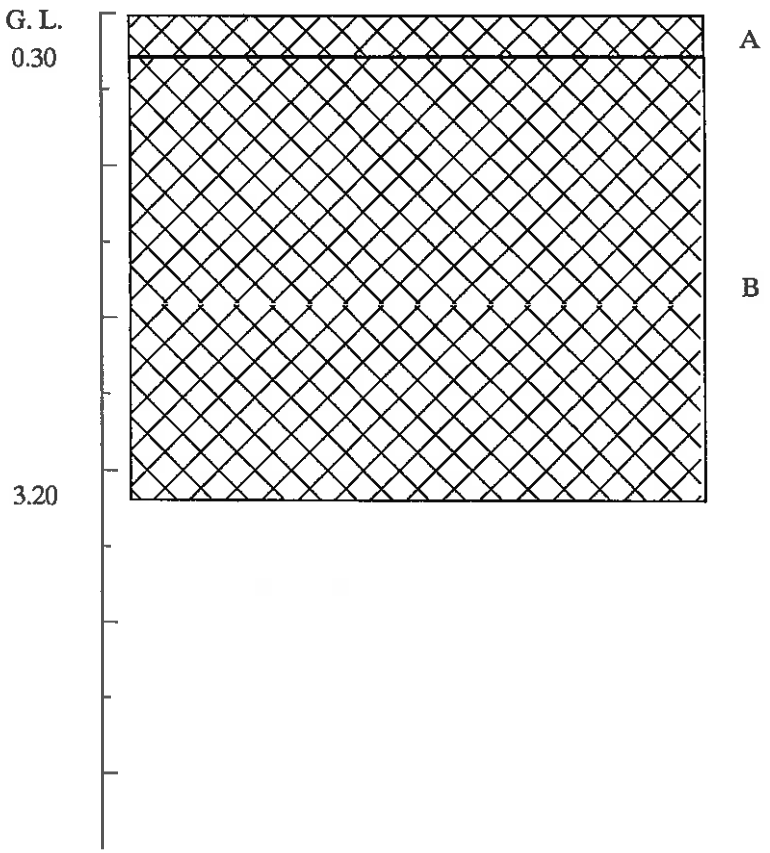
D	Disturbed Sample
B	Bulk Sample
U	Undisturbed Sample
W	Water Sample
V	Vane Test
C	Apparent Cohesion
S	Soakaway Test

REMARKS

Pit size approx 4.0m x 0.5m in plan.
Slightly damp below 1.50m
Sides stable.
Standpipe installed to 2.00m

HARRISON & COMPANY	Trial Pit Record	Report No 6295	Trial Pit No 13
	Location : Thornton Park, Swanwick	Date : 04/06/97	
Client: Thornton Plc	Plant : JCB	Reduced Level : 116.12m	

SECTION/~~PLAN~~



Sample / Test		Remarks
Type	Depth(m)	
B1	3.00-3.20	

LITHOLOGY

A : TOPSOIL (Brown slightly sandy very silty clay with occasional fine to medium coal and mudstone gravel and much roots/rootlets).

B : MADE GROUND (Very dark grey silty clay with very much fine to coarse angular to sub rounded gravel/cobble sized of coal, mudstone, limestone, ironstone, material and brick fragments. Occasional pockets of brown mottled grey silty clay).

KEY

D	Disturbed Sample
B	Bulk Sample
U	Undisturbed Sample
W	Water Sample
V	Vane Test
C	Apparent Cohesion
S	Soakaway Test

REMARKS

Pit size approx 4.0m x 0.5m in plan.
Slightly damp below 1.25m
Sides stable.

harrisongroup

Percussion Borehole Record

Contract No. GN8050

BH1
Sheet 1 of 1

Location: Phase 4, Thornton Park, Alfreton.

Dates: 29/10/2002

Client: Thorntons

Plant: Dando 150 Cable Percussion Rig

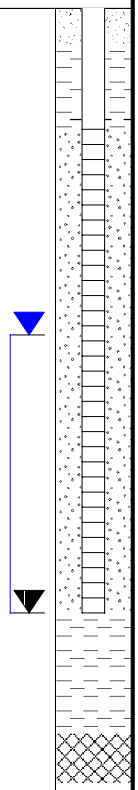
Diameter: 150mm to 6.10m

Coordinates: 441100E 354610N

Description	Depth (m)	O.D. Level (m)	Sample Type	Sample Depth (m)	Casing Depth (m)	Remarks
TOPSOIL - Drillers description.	0.00	117.50		0.00		
	0.25	117.25				
MADE GROUND (Firm dark grey silty CLAY with occasional charcoal pockets, fibrous fragments, sand pockets and wood fragments).			B1	0.50-1.00		
			S1	1.20-1.65	6.10	1,2,2,3,2,3, N=10
			D1	1.65		
			S2	2.10-2.55	6.10	1,2,2,3,3,4, N=12
Closely fissured at 2.50m.						
Firm and stiff yellow brown and light grey thinly laminated silty CLAY.	2.50	115.00	D2	2.55		
			S3	3.05-3.50	6.10	2,3,3,5,8,10, N=26
Thinly laminated at 3.50m.			D3	3.50		
			S4	4.10-4.55	6.10	2,4,3,4,6,5, N=18
			D4	4.55		
	5.00	112.50	S5	5.00-5.45	6.10	13,17,16,23,26, N=50
Very weak thinly bedded grey fine sandy MUDSTONE.			D5	5.40		
Weak at 5.50m			B2	5.50-6.00		
			S6	6.10-6.40	6.10	15,19,26,32, N=50
Borehole Complete at 6.40 m	6.40	111.10	D6	6.40		

Legend

Installations



Water Level Observations

Date	Time	Water Strike (m)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
29/10/02	1100	5.00	2.70	5.00	

KEY

D	Disturbed Sample
J	Jar Sample
B	Bulk Sample
U	Undisturbed Sample (102mm)
W	Water Sample
S	Standard Penetration Test
C	Cone Penetration Test
N=	No of blows/300mm penetration in SPT/CPT
V	In-situ Vane Test
▼	Water Strike
▼	Standing Water Level

Remarks:
1. Groundwater encountered at 5.00m, rose to 2.70m.
2. Installation details: 50mm pipe installed to 5.00m, GL-1.0m plain, 1.0m-5.0m slotted, gastap bung and cover fitted.
3. Backfill details: GL-0.30m concrete, 0.30m-1.0m bentonite, 1.0m-5.0m gravel, 5.0m gravel, 5.0m-6.0m bentonite, 6.0m-6.4m spoil.

Drilled By: CTJ | Logged By: KJT | Checked By: JML

harrisongroup

Percussion Borehole Record

Contract No. GN8050

BH2
Sheet 1 of 1

Location: Phase 4, Thornton Park, Alfreton.

Dates: 30/10/2002

Client: Thorntons

Plant: Dando 150 Cable Percussion Rig

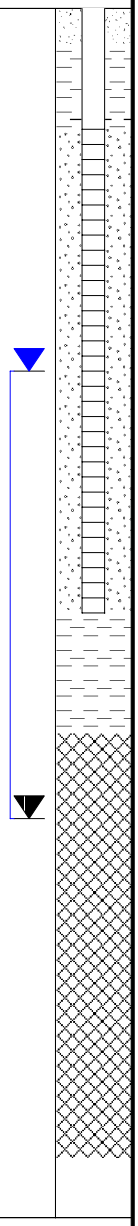
Diameter: 150mm to 9.50m

Coordinates: 441100E 354610N

Description	Depth (m)	O.D. Level (m)	Sample Type	Sample Depth (m)	Casing Depth (m)	Remarks
TOPSOIL - Drillers description.	0.00	117.50		0.00		
Brown stoney clay - Drillers description.	0.20	117.30				
MADE GROUND (Firm very dark grey silty gravelly CLAY, gravel is of fine mudstone, coal and pyrite).	0.70	116.80	B1	0.70-1.10		
			S1	1.15-1.60	6.70	2,3,3,4,4,5, N=16
			D1	1.60		
			S2	2.20-2.65	6.70	3,4,5,4,5,5, N=19
			D2	2.65		
			S3	3.15-3.60	6.70	2,3,4,4,5,5, N=18
Stiff to very stiff pale grey and greenish grey silty CLAY.	3.60	113.90	D3	3.60		
			S4	4.20-4.65	6.70	3,5,5,6,7,7, N=25
			S5	5.30-5.75	6.70	4,6,5,6,7,9, N=27
Closely fissured at 5.75m.			D5	5.75		
			B2	6.00-6.50		
Very stiff/hard fissured dark grey brown silty CLAY.	6.70	110.80	S6	6.80-7.25	6.70	4,6,8,9,11,12, N=40
			D6	7.25		
			B3	7.50-8.00		
			S7	8.30-8.70	6.70	5,11,13,14,21, N=48
			D7	8.70		
Strong grey sandy MUDSTONE with some very dark grey pyritised fossil wood remains.	8.80	108.70				
			C8	9.20-9.50	6.70	11,18,21,30, N=50
			B4	9.20-9.50		
Borehole Complete at 9.50 m	9.50	108.00				

Legend

Installations



Water Level Observations

Date	Time	Water Strike (m)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
30/10/02	1100	6.70	3.00	6.70	

Remarks:
1. Groundwater encountered at 6.70m, rose to 3.00m.
2. Installation details: 50mm pipe installed to 5.00m, GL-1.0m plain, 1.0m-5.0m slotted, gastap bung and cover fitted.
3. Backfill details: GL-0.30m concrete, 0.30m-1.0m bentonite, 1.0m-5.0m gravel, 5.0m-6.0m bentonite, 6.0m-9.5m spoil.

KEY

D	Disturbed Sample
J	Jar Sample
B	Bulk Sample
U	Undisturbed Sample (102mm)
W	Water Sample
S	Standard Penetration Test
C	Cone Penetration Test
N=	No of blows/300mm penetration in SPT/CPT
V	In-situ Vane Test
▼	Water Strike
▼	Standing Water Level

Drilled By: CTJ | Logged By: KJT | Checked By: JML

harrisongroup

Percussion Borehole Record

Contract No. GN8050

BH3
Sheet 1 of 1

Location: Phase 4, Thornton Park, Alfreton.

Dates: 28/10/2002

Client: Thorntons

Plant: Dando 150 Cable Percussion Rig

Diameter: 150mm to 10.00m

Coordinates: 441100E 354610N

Description	Depth (m)	O.D. Level (m)	Sample Type	Sample Depth (m)	Casing Depth (m)	Remarks
TOPSOIL - Drillers description.	0.00	117.50		0.00		
MADE GROUND (Very stiff very dark grey silty gravelly CLAY, gravel is of fine to medium mudstone, coal and pyrite).	0.40	117.10	B1	0.50-1.00		
			S1	1.20-1.65	5.00	5,7,6,5,4,5, N=20
			D1	1.65		
			S2	2.10-2.55	5.00	4,5,4,3,4,6, N=17
			D2	2.55		
			S3	3.05-3.50	5.00	3,4,5,4,3,4, N=16
			D3	3.50		
			S4	4.10-4.55	5.00	2,3,3,4,3,4, N=14
Firm to very stiff grey brown and orange brown CLAY with some fine mudstone gravel.	4.50	113.00	D4	4.55		
			S5	5.20-5.65	5.00	3,3,4,5,4,4, N=17
Fissured at 5.65m.			D5	5.65		
Very stiff/hard fissured dark grey silty CLAY.	6.00	111.50	D6	6.00		
			B2	6.50-6.95	5.00	5,8,10,10,12,16, N=48
			S6	6.50-6.95		
Thinly bedded at 7.50m.			D7	7.50		
			B3	8.00-8.45	5.00	4,7,8,10,12,14, N=44
			C7	8.00-8.45		
			D8	9.00		
Strong grey sandy MUDSTONE.	9.40	108.10	B4	9.40-9.60	5.00	12,18,24,32, N=50
			C8	9.40-9.70		
			B5	9.70-10.00	5.00	10,16,21,29, N=50
			C9	9.70-10.00		

Borehole Complete at 10.00 m

Water Level Observations

Date	Time	Water Strike (m)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)

KEY

D	Disturbed Sample
J	Jar Sample
B	Bulk Sample
U	Undisturbed Sample (102mm)
W	Water Sample
S	Standard Penetration Test
C	Cone Penetration Test
N=	No of blows/300mm penetration in SPT/CPT
V	In-situ Vane Test
▼	Water Strike
▼	Standing Water Level

Remarks:
1. No groundwater encountered, slight seepage at 6.0m.
2. Installation details: 50mm pipe installed to 5.00m, GL-1.0m plain, 1.0m-5.0m slotted, gastap bung and cover fitted.
3. Backfill details: GL-0.30m concrete, 0.30m-1.0m bentonite, 1.0m-5.0m gravel, 5.0m-6.0m bentonite, 6.0m-10.0m spoil.

Drilled By: CTJ | Logged By: KJT | Checked By: JML

Borehole Log

Borehole No. **BH1**

Sheet 1 of 1

Project Name: Chocolate Tank Project	Project No. J1552	Co-ords: -	Hole Type CP
Location: Thorntons, Somercotes		Level:	Scale 1:50
Client: Thorntons		Dates: 03/01/2017 - 03/01/2017	Logged By JST

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.25			MADE GROUND: Black asphalt.
					0.60			MADE GROUND: Grey - brown sandy gravel (sub-base).
		1.00 1.00 - 2.00	D	N=20 (1,1/3,5,6,6)				MADE GROUND: 'Stiff' brown clay fill with occasional gravel of mudstone, siltstone & sandstone.
		2.00 2.00 - 3.00	D	N=12 (3,3/3,3,3,3)				
		3.00 3.00 - 4.00	D	N=33 (3,4/7,8,8,10)				
		4.00		N=30 (2,4/5,7,8,10)				
		5.00 5.00 - 5.45	D	N=23 (5,4/5,5,6,7)				
		6.40 6.50 6.50 - 6.95	D D	N=23 (5,4/5,5,6,7)	6.30			Very stiff brown and grey CLAY
		7.50 7.50 7.50 - 7.95	D D	N=35 (8,7/7,8,10,10)	7.00			Weak brown and grey MUDSTONE. Becoming moderately strong below 7.3m bgl.
		8.00	D					
		8.30 8.30	D	50 (25 for 140mm/50 for 130mm)				
		8.60 8.65 8.65 - 8.86	D D	50 (25 for 125mm/50 for 85mm)	8.86			End of borehole at 8.86 m

Remarks

1) Borehole advanced at 0.15m diameter. 2) Slight water seepage from Made Ground at 0.5m bgl. 3) Borehole backfilled with arisings.

Borehole Log

emcus geotechnical & geo-environmental			Borehole No. **BH2** Sheet 1 of 1
Project Name: Chocolate Tank Project	Project No. J1552	Co-ords: -	Hole Type CP
Location: Thorntons, Somercotes		Level:	Scale 1:50
Client: Thorntons		Dates: 04/01/2017 - 04/01/2017	Logged By JST

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
		0.00 - 0.70	D					MADE GROUND: Grey - brown sandy gravel (sub-base).
		0.70 - 1.00	D		0.70			MADE GROUND: Poorly compacted grey clay based fill with mudstone.
		1.00		N=4 (1,0/1,1,0,2)				
		1.00 - 2.00	D					
		2.00		N=6 (2,1/2,1,2,1)				
					2.20			MADE GROUND: Grey and brown rounded gravel. (Pea gravel)
					2.45			End of borehole at 2.45 m

Remarks

1) Borehole advanced at 0.15m diameter. 2) Borehole terminated on encountering possible drain / service surround. 3) No groundwater encountered. 4) Borehole backfilled with arisings.

AGS

Borehole Log

Borehole No. **BH2A**

Sheet 1 of 1

Project Name: Chocolate Tank Project	Project No. J1552	Co-ords: -	Hole Type CP
Location: Thorntons, Somercotes		Level:	Scale 1:50
Client: Thorntons		Dates: 04/01/2017 - 04/01/2017	Logged By JST

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
								MADE GROUND: Grey - brown sandy gravel (sub-base).
					0.80			MADE GROUND: 'Stiff' brown clay fill with much mudstone and occasional siltstone & sandstone.
		2.00		N=17 (2,3/4,5,4,4)				
		2.00 - 3.00	D					
		3.00		N=18 (4,4/4,4,4,6)				
		4.00		N=34 (3,5/7,9,9,9)				
		5.00		N=17 (3,3/3,4,5,5)				
		5.00 - 5.50	D		5.10			Stiff light brown and grey CLAY
		5.60		N=39 (7,7/9,9,9,12)	5.50			Weak brown and grey MUDSTONE. Becoming moderately strong below 5.9m bgl.
		5.60	D					
		5.60 - 6.05	D					
		6.30	D					
		6.30		50 (25 for 115mm/50 for 90mm)				
		6.30 - 6.50	D					
		6.60	D					
		6.85		50 (25 for 85mm/50 for 115mm)	7.05			End of borehole at 7.05 m
		6.85 - 7.05	D					

Remarks

1) Borehole advanced at 0.15m diameter. 2) No groundwater encountered. 3) Borehole backfilled with arisings.

Borehole Log

Borehole No. **BH1**

Project Name: Chocolate Tank Project	Project No. J1552A	Co-ords: -	Hole Type RO
Location: Thorntons, Somercotes		Level:	Scale 1:50
Client: Norder Design Associates		Dates: 23/01/2017 - 23/01/2017	Logged By MJH

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								MADE GROUND: Brown and grey gravelly clay fill (Cable percussion hole backfill).
					8.86			Brown MUDSTONE
					9.80			Light grey MUDSTONE

Continued on next sheet

Remarks

1) Borehole advanced in location of cable percussion borehole BH1. - see separate log sheet 2) Borehole advanced by rotary openhole drilling with water mist flush. 3) Borehole backfilled with clean stone.

Borehole Log

Borehole No. **BH1**

Project Name: Chocolate Tank Project	Project No. J1552A	Co-ords: -	Hole Type RO
Location: Thorntons, Somercotes		Level:	Scale 1:50
Client: Norder Design Associates		Dates: 23/01/2017 - 23/01/2017	Logged By MJH

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	
		10.00		50 (25 for 100mm/50 for 75mm)					11
		11.50		50 (25 for 80mm/50 for 70mm)					12
		13.00		50 (25 for 75mm/50 for 85mm)					13
									14
		14.50		50 (25 for 65mm/50 for 95mm)					15
		16.00		50 (25 for 65mm/50 for 75mm)					16
					16.30			Light grey SILTSTONE	
					16.50			Light grey MUDSTONE	17
					17.20			Dark grey MUDSTONE	
		17.50		50 (25 for 45mm/50 for 45mm)					18
		19.00		50 (25 for 40mm/50 for 45mm)					19
					19.20			Dark grey SILTSTONE	
					19.60			Dark grey MUDSTONE	
					20.00			Continued on next sheet	20

Remarks

1) Borehole advanced in location of cable percussion borehole BH1. - see separate log sheet 2) Borehole advanced by rotary openhole drilling with water mist flush. 3) Borehole backfilled with clean stone.

Borehole Log

Borehole No. **BH1**

Project Name: Chocolate Tank Project	Project No. J1552A	Co-ords: -	Hole Type RO
Location: Thorntons, Somercotes		Level:	Scale 1:50
Client: Norder Design Associates		Dates: 23/01/2017 - 23/01/2017	Logged By MJH

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		20.00		50 (25 for 35mm/50 for 40mm)				End of borehole at 20.00 m

21
22
23
24
25
26
27
28
29
30

Remarks
1) Borehole advanced in location of cable percussion borehole BH1. - see separate log sheet 2) Borehole advanced by rotary openhole drilling with water mist flush. 3) Borehole backfilled with clean stone.

Borehole Log

Borehole No. **BH2A**

Project Name: Chocolate Tank Project	Project No. J1552A	Co-ords: -	Hole Type RO
Location: Thorntons, Somercotes		Level:	Scale 1:50
Client: Norder Design Associates		Dates: 23/01/2017 - 24/01/2017	Logged By MJH

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								MADE GROUND: Brown and grey gravelly clay fill (Cable percussion hole backfill).
					7.05			Brown MUDSTONE
		8.50		50 (25 for 100mm/50 for 70mm)				
					9.00			Light grey SILTSTONE
					9.30			Light grey MUDSTONE

Continued on next sheet

Remarks

1) Borehole advanced in location of cable percussion borehole BH2A. - see separate log sheet. 2) Borehole advanced by rotary openhole drilling with water mist flush. 3) Borehole backfilled with clean stone.

Borehole Log

Borehole No. **BH2A**

Project Name: Chocolate Tank Project	Project No. J1552A	Co-ords: -	Hole Type RO
Location: Thorntons, Somercotes		Level:	Scale 1:50
Client: Norder Design Associates		Dates: 23/01/2017 - 24/01/2017	Logged By MJH

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		10.00		50 (25 for 90mm/50 for 80mm)					11
		11.50		50 (25 for 80mm/50 for 80mm)					12
		13.00		50 (25 for 100mm/50 for 145mm)					13
		14.50		50 (25 for 95mm/50 for 150mm)					14
		16.00		50 (13,11/50 for 145mm)					15
					16.90			Dark grey MUDSTONE	16
		17.50		50 (10,11/50 for 190mm)					17
		19.00		50 (25 for 45mm/50 for 40mm)					18
					20.00				19
								Continued on next sheet	20

Remarks

1) Borehole advanced in location of cable percussion borehole BH2A. - see separate log sheet. 2) Borehole advanced by rotary openhole drilling with water mist flush. 3) Borehole backfilled with clean stone.

Borehole Log

Borehole No. **BH2A**

Project Name: Chocolate Tank Project	Project No. J1552A	Co-ords: -	Hole Type RO
Location: Thorntons, Somercotes		Level:	Scale 1:50
Client: Norder Design Associates		Dates: 23/01/2017 - 24/01/2017	Logged By MJH

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		20.00		50 (25 for 35mm/50 for 35mm)				End of borehole at 20.00 m	
									21
									22
									23
									24
									25
									26
									27
									28
									29
									30

Remarks

1) Borehole advanced in location of cable percussion borehole BH2A. - see separate log sheet. 2) Borehole advanced by rotary openhole drilling with water mist flush. 3) Borehole backfilled with clean stone.

APPENDIX 02

Laboratory Results

HARRISON & COMPANY

Sulphate and pH Test Results

Date : July 1992

Job No. : 4660

Client: Thornton plc.

Location : Thornton Park, Alfreton

Borehole Trial pit No.	Sample Depth (m)	Sample No.	Fraction < 2mm (%)	Concentration of Sulphate expressed as SO_3			pH	Sample Description / Remarks
				In Soil		In Ground water		
				Total SO_3 (%)	SO_3 in 2:1 water extract (g/l)			
1	W1	2.8	-			1.67	7.4	-
1	U1	1.0	38		1.12		6.9	MADE GROUND (Dark grey silty claywith numerous fragments of mudstone and coal).
2	U1	1.0	41		0.61		7.6	MADE GROUND (Dark grey silty clay with numerous fragments of mudstone and coal).
2	U3	5.0	73		0.10		7.2	Grey mottled brown CLAY with scattered fragments of sandstone.
3	U1	1.0	52		2.27		6.4	MADE GROUND (Dark grey silty clay with numerous fragments of mudstone and coal).
3A	U2	5.0	83		0.04		6.3	Mottled brown grey slightly sandy CLAY with fragments of sandstone, mudstone and occasional coal.
4	U2	3.0	45		0.65		7.3	MADE GROUND (Dark grey silty clay with numerous fragments of mudstone and coal).
4	B2	4.5	10		0.98		6.5	MADE GROUND (Dark grey silty clay with numerous fragments of mudstone and coal).
4	W1	4.0	-			1.60	7.5	-
5	B2	4.5	>98		0.41		5.6	MADE GROUND (Dark grey silty clay with numerous fragments of mudstone and coal).
5	W1	5.2	-			1.69	7.9	-
5	U4	6.0	85		0.01		4.5	Light grey mottled orange brown CLAY with some iron concretions.
6	B2	4.5	40		0.74		7.1	MADE GROUND (Dark grey silty clay with numerous fragments of mudstone and coal).
6	B3	6.6	69		0.19		6.8	Pale brown weathered impure sandstone fragments with a sandy clay matrix.
7	B2	4.5	48		0.83		6.7	MADE GROUND (Dark grey silty clay with numerous fragments of mudstone and coal).
7	D9	7.3	>98		0.05		5.3	Orange brown mottled grey CLAY withscattered fragments of sandstone and mudstone.
8	B2	4.5	41		0.79		6.7	MADE GROUND (Dark grey silty clay with numerous fragments of mudstone and coal).
8	B3	7.5	70		0.11		7.5	Grey mottled brown slightly sandy CLAY with fragments of mudstone sandstone and coal.

HARRISON & COMPANY

CONTAMINATION TESTING RESULTS

Job No. : 4660

Fig No. : N/A

Location : Thornton Park, Alfreton, Derbyshire

Client : Thornton P.L.C.

Date : July 1992

Sheet No. : 1 of 1

Sample				Contaminants															
BH/T	Type	Depth From	Depth To	Total Chromium	Total Cyanide	Monohydric Phenol	Sulphide as S	Total Copper	Total Zinc	Total Nickel	Total Lead	Total Cadmium	Total Arsenic	Total Mercury	Toluene Extract	Total Iron	Soluble Boron	Calorific Value kj/kg	Remarks/Description
1	B1	2.5	3.0	30	<1	0.6	<10	80	45	40	35	<0.5	35	0.25	1700	2.8%	1.8	5660	MADE GROUND (Dark grey silty clay with numerous fragments of mudstone and coal)
3	B1	2.5	3.0	30	<1	1.6	31	80	55	35	35	<0.5	27	<0.2	1000	2.5%	1.3	5200	MADE GROUND (Dark grey silty clay with numerous fragments of mudstone and coal)
7	B2	4.5	5.0	30	<1	0.6	<10	60	65	40	40	<0.5	22	<0.2	1000	2.4%	1.0	4280	MADE GROUND (Dark grey silty clay with numerous fragments of mudstone and coal)

KEY

< denotes less than.
ND denotes none detected

Results relate to air dried samples
All results except pH and sulphate expressed as mg per kg (ppm), unless otherwise stated.
Total sulphate determined in accordance with BS1377 and expressed as %age SO_4
Soluble sulphate determined as 2:1 water:soil extract BRE CP2/79 and expressed as gm per litre SO_4

☐ Preliminary

☐ Validated

ALcontrol Geochem Analytical Services

Table Of Results

Job Number: **03/00761/02/01**

Client: Harrison Group Env. Ltd.

Date of Receipt: 22/01/03
(of first sample)

Sample Type: **SOIL**

Location: Alfreton

Client Contact: Jim Harrison

Client Ref. No.: GN 8050

	UKAS Accredited		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	
	Units		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
	Detection Method		ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	Soxtec	TLC	TLC	TLC	Spectro
	Method Detection Limit		<1	<1	<1	<1	<1	<1	<1	<1	<1	<50	<1	<10	<10	<10	<10	<5
Sample Number	**Sample Identity**	**Depth (m)**	**Arsenic**	**Boron (Water Soluble)**	**Cadmium**	**Chromium**	**Copper**	**Mercury**	**Nickel**	**Lead**	**Selenium**	**Total Sulphate by ICP**	**Zinc**	**Solvent Extractable Matter**	**Min. Oil / Paraffin by TLC**	**Total PAH Screen by TLC**	**NSO / Resins**	**Acid Soluble Sulphide**
1	BH 1 D1	1.65	24	1	<1	14	33	<1	26	33	2	3139	83	2986	420	769	1797	<5
2	BH 1 D3	3.50	-	-	-	-	-	-	-	-	-	466	-	-	-	-	-	-
3	BH 1 B2	5.50-6.00	-	-	-	-	-	-	-	-	-	367	-	-	-	-	-	-
4	BH 2 D1	1.60	61	2	1	12	42	<1	30	43	<1	3491	42	4844	541	1639	2664	<5
5	BH 2 B4	9.20-9.50	-	-	-	-	-	-	-	-	-	<50	-	-	-	-	-	-
6	BH 3 D1	1.65	33	2	<1	13	39	<1	33	20	2	2155	50	2719	466	733	1519	<5
7	BH 3 D4	4.55	-	-	-	-	-	-	-	-	-	668	-	-	-	-	-	-

Note: METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL.

NDP = NO DETERMINATION POSSIBLE

NFP = NO FIBRES PRESENT

Checked By _____ Usman Jabbar

☐ Preliminary

☐ Validated

ALcontrol Geochem Analytical Services

Table Of Results

Job Number: 03/00761/02/01

Client: Harrison Group Env. Ltd.

Date of Receipt: 22/01/03
(of first sample)

Sample Type: SOIL

Location: Alfreton

Client Contact: Jim Harrison

Client Ref. No.: GN 8050

	UKAS Accredited				✓		✓		✓	✓		✓	✓					
	Units		mg/kg	mg/kg	mg/kg	%	mg/kg	mg/kg	%	pH Units	KJ/Kg	g/l	mg/kg					
	Detection Method		Spectro	Spectro	Spectro	Grav	HPLC	IR	Leco	Meter		Spectro1	Spectro2					
	Method Detection Limit		<0.3	<1	<1	<0.1	<0.01	<10	<0.01	<1.00	<100	<0.003	<2.5					
Sample Number	**Sample Identity**	**Depth (m)**	**Hexavalent Chrome**	**Free Cyanide Soil**	**Thiocyanate**	**Moisture Content**	**Total Phenols HPLC**	**TPH By Infra Red**	**Total Sulphur**	**pH Value In Soil**	**Calorific Value**	**Water Soluble Sulphate as SO4**	**Total Cyanide**	**Asbestos Presence Screen**				
1	BH 1 D1	1.65	<0.3	<1	<1	-	<0.01	88	0.17	7.59	33867	0.428	<2.5	NFP				
2	BH 1 D3	3.50	-	-	-	12.2	-	-	-	7.90	-	0.042	-	-				
3	BH 1 B2	5.50-6.00	-	-	-	-	-	-	-	7.95	-	0.049	-	-				
4	BH 2 D1	1.60	<0.3	<1	<1	8.4	<0.01	178	2.10	7.58	5229	1.066	<2.5	NFP				
5	BH 2 B4	9.20-9.50	-	-	-	-	-	-	-	7.56	-	0.026	-	-				
6	BH 3 D1	1.65	<0.3	<1	<1	-	0.06	152	0.87	7.87	-	-	<2.5	NFP				
7	BH 3 D4	4.55	-	-	-	-	-	-	-	8.10	153	0.102	-	-				

Note: METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL.

NDP = NO DETERMINATION POSSIBLE

NFP = NO FIBRES PRESENT

Checked By _____ Usman Jabbar

2531

ANALYTICAL TEST REPORT

Contract no: 62784

Contract name: Thorntons, CBR tests Somercotes

Client reference: J1552

Clients name: Emcus

Clients address: 42 Mount Pleasant Drive
Belper
Derbyshire
DE56 2TH

Samples received: 23 December 2016

Analysis started: 23 December 2016

Analysis completed 10 January 2017

Report issued: 10 January 2017

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

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

Approved by:
James Spittle
Customer Services Team Leader

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):

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

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

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
62784-1	LOC 4	0.20	Sandy Clay with Gravel & Roots	-	-	19.2
62784-2	LOC 6	0.40	Sandy Clay	-	-	17.0

Chemtech Environmental Limited

SOILS

Lab number			62784-1	62784-2
Sample id			LOC 4	LOC 6
Depth (m)			0.20	0.40
Date sampled			22/12/2016	22/12/2016
Test	**Method**	**Units**		
Arsenic (total)	CE127 M	mg/kg As	16	25
Boron (water soluble)	CE063 M	mg/kg B	1.0	1.1
Cadmium (total)	CE127 M	mg/kg Cd	3.5	3.6
Chromium (total)	CE127 M	mg/kg Cr	61	31
Chromium (VI)	CE146	mg/kg CrVI	<1	<1
Copper (total)	CE127 M	mg/kg Cu	35	35
Lead (total)	CE127 M	mg/kg Pb	162	47
Mercury (total)	CE127 M	mg/kg Hg	<0.5	<0.5
Nickel (total)	CE127 M	mg/kg Ni	29	46
Selenium (total)	CE127 M	mg/kg Se	1.0	1.0
Zinc (total)	CE127 M	mg/kg Zn	543	250
pH	CE004 M	units	8.0	7.5
Sulphate (2:1 water soluble)	CE061 M	mg/l SO_4	138	176
Sulphate (total)	CE062 M	mg/kg SO_4	1535	1024
Sulphide	CE079	mg/kg S^{2-}	<10	<10
Cyanide (free)	CE077	mg/kg CN	<1	<1
Cyanide (total)	CE077 M	mg/kg CN	<1	<1
Thiocyanate	CE145 M	mg/kg SCN	<1	<1
Phenols (total)	CE078	mg/kg PhOH	<0.5	<0.5
Total Organic Carbon (TOC)	CE072 M	% w/w C	4.08	5.00
Estimate of OMC (calculated from TOC)	CE072 M	% w/w	7.03	8.62
PAH				
Naphthalene	CE087 M	mg/kg	0.16	0.05
Acenaphthylene	CE087 M	mg/kg	<0.01	<0.01
Acenaphthene	CE087 M	mg/kg	0.01	<0.01
Fluorene	CE087 U	mg/kg	0.01	<0.01
Phenanthrene	CE087 M	mg/kg	0.15	0.15
Anthracene	CE087 U	mg/kg	0.04	<0.02
Fluoranthene	CE087 M	mg/kg	0.29	0.08
Pyrene	CE087 M	mg/kg	0.27	0.08
Benzo(a)anthracene	CE087 U	mg/kg	0.15	0.04
Chrysene	CE087 M	mg/kg	0.18	0.05
Benzo(b)fluoranthene	CE087 M	mg/kg	0.22	0.06
Benzo(k)fluoranthene	CE087 M	mg/kg	0.10	<0.02
Benzo(a)pyrene	CE087 U	mg/kg	0.21	0.04
Indeno(123cd)pyrene	CE087 M	mg/kg	0.14	0.03
Dibenz(ah)anthracene	CE087 M	mg/kg	0.03	<0.02
Benzo(ghi)perylene	CE087 M	mg/kg	0.12	0.04
PAH (total of USEPA 16)	CE087	mg/kg	2.09	0.62

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE127	Arsenic (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg As
CE063	Boron (water soluble)	Hot water extract, ICP-OES	Dry	M	0.5	mg/kg B
CE127	Cadmium (total)	Aqua regia digest, ICP-MS	Dry	M	0.2	mg/kg Cd
CE127	Chromium (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cr
CE146	Chromium (VI)	Acid extraction, Colorimetry	Dry		1	mg/kg CrVI
CE127	Copper (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cu
CE127	Lead (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Pb
CE127	Mercury (total)	Aqua regia digest, ICP-MS	Dry	M	0.5	mg/kg Hg
CE127	Nickel (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Ni
CE127	Selenium (total)	Aqua regia digest, ICP-MS	Dry	M	0.3	mg/kg Se
CE127	Zinc (total)	Aqua regia digest, ICP-MS	Dry	M	5	mg/kg Zn
CE004	pH	Based on BS 1377, pH Meter	Wet	M	-	units
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	M	10	mg/l SO_4
CE062	Sulphate (total)	Acid extraction, ICP-OES	Dry	M	100	mg/kg SO_4
CE079	Sulphide	Extraction, Continuous Flow Colorimetry	Wet		10	mg/kg S^{2-}
CE077	Cyanide (free)	Extraction, Continuous Flow Colorimetry	Wet		1	mg/kg CN
CE077	Cyanide (total)	Extraction, Continuous Flow Colorimetry	Wet	M	1	mg/kg CN
CE145	Thiocyanate	Weak acid extraction, Colorimetry	Dry	M	1	mg/kg SCN
CE078	Phenols (total)	Extraction, Continuous Flow Colorimetry	Wet		0.5	mg/kg PhOH
CE072	Total Organic Carbon (TOC)	Removal of IC by acidification, Carbon Analyser	Dry	M	0.1	% w/w C
CE072	Estimate of OMC (calculated from TOC)	Calculation from Total Organic Carbon	Dry	M	0.1	% w/w
CE087	Naphthalene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Acenaphthylene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Acenaphthene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Fluorene	Solvent extraction, GC-MS	Wet	U	0.01	mg/kg
CE087	Phenanthrene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Anthracene	Solvent extraction, GC-MS	Wet	U	0.02	mg/kg
CE087	Fluoranthene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Pyrene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Benzo(a)anthracene	Solvent extraction, GC-MS	Wet	U	0.02	mg/kg
CE087	Chrysene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Benzo(b)fluoranthene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Benzo(k)fluoranthene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Benzo(a)pyrene	Solvent extraction, GC-MS	Wet	U	0.02	mg/kg
CE087	Indeno(123cd)pyrene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Dibenz(ah)anthracene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Benzo(ghi)perylene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	PAH (total of USEPA 16)	Solvent extraction, GC-MS	Wet		0.27	mg/kg

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DEVIATING SAMPLE INFORMATION

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

Key

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

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
62784-1	LOC 4	0.20	N	
62784-2	LOC 6	0.40	N	

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ANALYTICAL TEST REPORT

Contract no: 62866

Contract name: Thorntons, BHs Somercotes

Client reference: J1552

Clients name: Emcus

Clients address: 42 Mount Pleasant Drive
Belper
Derbyshire
DE56 2TH

Samples received: 09 January 2017

Analysis started: 10 January 2017

Analysis completed 17 January 2017

Report issued: 17 January 2017

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

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

Approved by:
James Spittle
Customer Services Team Leader

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):

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

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

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
62866-1	BH1	0.30	Sandy Clay with Gravel	-	-	7.5
62866-3	BH1	4.00	Clay with Mudstone	-	-	11.7
62866-4	BH2A	0.30	Clayey Sand with Gravel	-	-	8.4
62866-5	BH2A	1.50	Sandy Clay with Gravel & Mudstone	-	-	13.3
62866-6	BH2A	5.10	Clay	-	-	19.8

Chemtech Environmental Limited

SOILS

Lab number			62866-1	62866-2	62866-3	62866-4	62866-5	62866-6
Sample id			BH1	BH1	BH1	BH2A	BH2A	BH2A
Depth (m)			0.30	0.70	4.00	0.30	1.50	5.10
Date sampled			03/01/2017	03/01/2017	04/01/2017	04/01/2017	04/01/2017	04/01/2017
Test	**Method**	**Units**						
Arsenic (total)	CE127 M	mg/kg As	2.0	-	60	4.8	23	14
Boron (water soluble)	CE063 M	mg/kg B	<0.5	-	1.8	0.6	1.4	0.9
Cadmium (total)	CE127 M	mg/kg Cd	4.4	-	<0.2	3.8	0.7	0.2
Chromium (total)	CE127 M	mg/kg Cr	34	-	23	29	53	38
Chromium (VI)	CE146	mg/kg CrVI	<1	-	<1	<1	<1	<1
Copper (total)	CE127 M	mg/kg Cu	7.2	-	52	15	29	31
Lead (total)	CE127 M	mg/kg Pb	169	-	59	130	82	27
Mercury (total)	CE127 M	mg/kg Hg	<0.5	-	<0.5	<0.5	<0.5	<0.5
Nickel (total)	CE127 M	mg/kg Ni	14	-	38	13	26	21
Selenium (total)	CE127 M	mg/kg Se	0.3	-	2.4	0.4	1.0	0.8
Zinc (total)	CE127 M	mg/kg Zn	187	-	52	163	74	82
pH	CE004 M	units	10.1	-	7.9	9.1	8.7	7.4
Sulphate (2:1 water soluble)	CE061 M	mg/l SO_4	44	-	1687	142	621	233
Sulphate (total)	CE062 M	mg/kg SO_4	468	-	3807	1884	1999	828
Sulphide	CE079	mg/kg S^{2-}	<10	-	<10	<10	<10	<10
Cyanide (free)	CE077	mg/kg CN	<1	-	<1	<1	<1	<1
Cyanide (total)	CE077 M	mg/kg CN	<1	-	<1	<1	<1	<1
Thiocyanate	CE145 M	mg/kg SCN	<1	-	<1	<1	<1	<1
Phenols (total)	CE078	mg/kg PhOH	<0.5	-	<0.5	<0.5	<0.5	<0.5
Total Organic Carbon (TOC)	CE072 M	% w/w C	0.75	-	15.43	2.15	7.82	1.58
Estimate of OMC (calculated from TOC)	CE072 M	% w/w	1.29	-	26.60	3.71	13.48	2.72
PAH								
Naphthalene	CE087 M	mg/kg	<0.01	-	1.92	0.01	0.34	7.66
Acenaphthylene	CE087 M	mg/kg	<0.01	-	<0.01	<0.01	<0.01	<0.01
Acenaphthene	CE087 M	mg/kg	<0.01	-	55.70	3.11	0.06	<0.01
Fluorene	CE087 U	mg/kg	<0.01	-	99.38	2.69	0.06	<0.01
Phenanthrene	CE087 M	mg/kg	0.02	-	0.30	0.09	0.59	<0.02
Anthracene	CE087 U	mg/kg	<0.02	-	<0.02	0.03	0.16	<0.02
Fluoranthene	CE087 M	mg/kg	<0.02	-	0.04	0.17	2.24	<0.02
Pyrene	CE087 M	mg/kg	<0.02	-	0.05	0.16	2.50	<0.02
Benzo(a)anthracene	CE087 U	mg/kg	<0.02	-	0.03	20.54	5.77	<0.02
Chrysene	CE087 M	mg/kg	0.01	-	0.03	18.91	7.89	<0.01
Benzo(b)fluoranthene	CE087 M	mg/kg	<0.02	-	0.02	0.08	12.97	<0.02
Benzo(k)fluoranthene	CE087 M	mg/kg	<0.02	-	<0.02	0.03	5.42	<0.02
Benzo(a)pyrene	CE087 U	mg/kg	<0.02	-	0.02	0.06	11.22	<0.02
Indeno(123cd)pyrene	CE087 M	mg/kg	<0.02	-	<0.02	<0.02	<0.02	<0.02
Dibenz(ah)anthracene	CE087 M	mg/kg	<0.02	-	<0.02	<0.02	2.05	<0.02
Benzo(ghi)perylene	CE087 M	mg/kg	<0.02	-	<0.02	0.04	6.60	<0.02
PAH (total of USEPA 16)	CE087	mg/kg	<0.27	-	157	45.9	57.9	7.66

Chemtech Environmental Limited

SOILS

Lab number			62866-1	62866-2	62866-3	62866-4	62866-5	62866-6
Sample id			BH1	BH1	BH1	BH2A	BH2A	BH2A
Depth (m)			0.30	0.70	4.00	0.30	1.50	5.10
Date sampled			03/01/2017	03/01/2017	04/01/2017	04/01/2017	04/01/2017	04/01/2017
Test	**Method**	**Units**						
TPH								
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	<0.01	-	0.10	<0.01	0.03	<0.01
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	0.01	-	0.07	<0.01	0.03	<0.01
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	<0.01	-	0.11	<0.01	0.06	<0.01
EPH Aromatic (>EC10-EC12)	CE068	mg/kg	<0.01	-	2	0	0	8
EPH Aromatic (>EC12-EC16)	CE068	mg/kg	0	-	56	3	0	0
EPH Aromatic (>EC16-EC21)	CE068	mg/kg	0	-	100	3	6	0
EPH Aromatic (>EC21-EC35)	CE068	mg/kg	0	-	0	40	45	0
EPH Aromatic (>EC35-EC44)	CE068	mg/kg	<0.02	-	<0.02	0	7	<0.02
VPH Aliphatic (>C5-C6)	CE067	mg/kg	<0.1	-	<0.1	<0.1	<0.1	<0.1
VPH Aliphatic (>C6-C8)	CE067	mg/kg	<0.1	-	<0.1	<0.1	<0.1	<0.1
VPH Aliphatic (>C8-C10)	CE067	mg/kg	0.1	-	0.1	0.1	<0.1	<0.1
EPH Aliphatic (>C10-C12)	CE068	mg/kg	5	-	31	<4	17	<4
EPH Aliphatic (>C12-C16)	CE068	mg/kg	71	-	72	6	45	<4
EPH Aliphatic (>C16-C35)	CE068	mg/kg	1001	-	186	129	219	12
EPH Aliphatic (>C35-C44)	CE068	mg/kg	345	-	48	74	92	12
Subcontracted analysis								
Asbestos (qualitative)	$	-	NAD	NAD	NAD	NAD	NAD	-

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE127	Arsenic (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg As
CE063	Boron (water soluble)	Hot water extract, ICP-OES	Dry	M	0.5	mg/kg B
CE127	Cadmium (total)	Aqua regia digest, ICP-MS	Dry	M	0.2	mg/kg Cd
CE127	Chromium (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cr
CE146	Chromium (VI)	Acid extraction, Colorimetry	Dry		1	mg/kg CrVI
CE127	Copper (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cu
CE127	Lead (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Pb
CE127	Mercury (total)	Aqua regia digest, ICP-MS	Dry	M	0.5	mg/kg Hg
CE127	Nickel (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Ni
CE127	Selenium (total)	Aqua regia digest, ICP-MS	Dry	M	0.3	mg/kg Se
CE127	Zinc (total)	Aqua regia digest, ICP-MS	Dry	M	5	mg/kg Zn
CE004	pH	Based on BS 1377, pH Meter	Wet	M	-	units
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	M	10	mg/l SO_4
CE062	Sulphate (total)	Acid extraction, ICP-OES	Dry	M	100	mg/kg SO_4
CE079	Sulphide	Extraction, Continuous Flow Colorimetry	Wet		10	mg/kg S^{2-}
CE077	Cyanide (free)	Extraction, Continuous Flow Colorimetry	Wet		1	mg/kg CN
CE077	Cyanide (total)	Extraction, Continuous Flow Colorimetry	Wet	M	1	mg/kg CN
CE145	Thiocyanate	Weak acid extraction, Colorimetry	Dry	M	1	mg/kg SCN
CE078	Phenols (total)	Extraction, Continuous Flow Colorimetry	Wet		0.5	mg/kg PhOH
CE072	Total Organic Carbon (TOC)	Removal of IC by acidification, Carbon Analyser	Dry	M	0.1	% w/w C
CE072	Estimate of OMC (calculated from TOC)	Calculation from Total Organic Carbon	Dry	M	0.1	% w/w
CE087	Naphthalene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Acenaphthylene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Acenaphthene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Fluorene	Solvent extraction, GC-MS	Wet	U	0.01	mg/kg
CE087	Phenanthrene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Anthracene	Solvent extraction, GC-MS	Wet	U	0.02	mg/kg
CE087	Fluoranthene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Pyrene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Benzo(a)anthracene	Solvent extraction, GC-MS	Wet	U	0.02	mg/kg
CE087	Chrysene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Benzo(b)fluoranthene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Benzo(k)fluoranthene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Benzo(a)pyrene	Solvent extraction, GC-MS	Wet	U	0.02	mg/kg
CE087	Indeno(123cd)pyrene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Dibenz(ah)anthracene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Benzo(ghi)perylene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	PAH (total of USEPA 16)	Solvent extraction, GC-MS	Wet		0.27	mg/kg
CE067	VPH Aromatic (>EC5-EC7)	Headspace GC-FID	Wet		0.01	mg/kg
CE067	VPH Aromatic (>EC7-EC8)	Headspace GC-FID	Wet		0.01	mg/kg
CE067	VPH Aromatic (>EC8-EC10)	Headspace GC-FID	Wet		0.01	mg/kg
CE068	EPH Aromatic (>EC10-EC12)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE068	EPH Aromatic (>EC12-EC16)	Solvent extraction, GC-FID	Wet		1	mg/kg

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METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE068	EPH Aromatic (>EC16-EC21)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE068	EPH Aromatic (>EC21-EC35)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE068	EPH Aromatic (>EC35-EC44)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE067	VPH Aliphatic (>C5-C6)	Headspace GC-FID	Wet		0.1	mg/kg
CE067	VPH Aliphatic (>C6-C8)	Headspace GC-FID	Wet		0.1	mg/kg
CE067	VPH Aliphatic (>C8-C10)	Headspace GC-FID	Wet		0.1	mg/kg
CE068	EPH Aliphatic (>C10-C12)	Solvent extraction, GC-FID	Wet		4	mg/kg
CE068	EPH Aliphatic (>C12-C16)	Solvent extraction, GC-FID	Wet		4	mg/kg
CE068	EPH Aliphatic (>C16-C35)	Solvent extraction, GC-FID	Wet		4	mg/kg
CE068	EPH Aliphatic (>C35-C44)	Solvent extraction, GC-FID	Wet		10	mg/kg
$	Asbestos (qualitative)	HSG 248, Microscopy	Dry	U	-	-

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DEVIATING SAMPLE INFORMATION

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

Key

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

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
62866-1	BH1	0.30	N	
62866-3	BH1	4.00	N	
62866-4	BH2A	0.30	N	
62866-5	BH2A	1.50	N	
62866-6	BH2A	5.10	N	

Waste Acceptance Criteria Testing
BS EN 12457-Part 3, 2 Stage Process

CHEMTECH environmental

Sample Details		**Test Values**	
Contract Name	Thorntons, CBR Tests Somercotes	Mass of Raw Test Portion (MW) kg	0.217
Lab Number	62798-1	Mass of Dried Test Portion (MD) kg	0.175
Sample ID	LOC 4	Moisture Content Ratio (MC) %	23.81
Date Sampled	22 December 2016	Dry Matter Content Ratio (DR) %	80.77
Date Received	23 December 2016	Leachant Volume (1) (L2) Litre	0.308
Particle Size (<4mm)	-	Leachant Volume (2) (L8) Litre	1.400
Method of size reduction	N/A	Eluate Volume (1) (VE1) Litre	0.245
Non-crushable matter	N/A	Eluate Volume (2) (VE2) Litre	1.295

Eluate Analysis	**Conc in Eluate**		**Amount Leached**		**BS EN 12457-3 Limit Values mg/kg at L:S 10:1**		
Liquid : Waste Ratio	2:1	8:1					
pH (units)	8.3	8.2			Inert	Non-reactive	Hazardous
Temperature (°C)	20	20	2:1	10:1	Waste	Hazardous	Waste
Conductivity (µS/cm)	277	154	**mg/kg**	**mg/kg**		Waste	
Antimony (µg/l Sb)	0.5	0.4	0.001	**0.004**	*0.06*	*0.7*	*5*
Arsenic (µg/l As)	1.70	1.07	0.003	**0.012**	*0.5*	*2*	*25*
Barium (µg/l Ba)	31.7	19.5	0.063	**0.219**	*20*	*100*	*300*
Cadmium (µg/l Cd)	0.08	<0.07	0.0002	**<0.0008**	*0.04*	*1*	*5*
Chromium (µg/l Cr)	1.4	0.7	0.003	**0.009**	*0.5*	*10*	*70*
Copper (µg/l Cu)	6.8	4.7	0.014	**0.051**	*2*	*50*	*100*
Lead (µg/l Pb)	3.4	2.3	0.007	**0.025**	*0.5*	*10*	*50*
Mercury (µg/l Hg)	<0.008	<0.008	<0.00002	**<0.00008**	*0.01*	*0.2*	*2*
Molybdenum (µg/l Mo)	3.0	3.2	0.006	**0.032**	*0.5*	*10*	*30*
Nickel (µg/l Ni)	2.6	1.4	0.005	**0.016**	*0.4*	*10*	*40*
Selenium (µg/l Se)	0.34	0.22	0.001	**0.002**	*0.1*	*0.5*	*7*
Zinc (µg/l Zn)	13	7	0.026	**0.078**	*4*	*50*	*200*
Chloride (mg/l Cl)	2.9	1.2	5.8	**15**	*800*	*15000*	*25000*
Fluoride (mg/l F)	2.1	1.7	4.2	**18**	*10*	*150*	*500*
Sulphate (mg/l SO_4)	29	<10	58	**<127**	*1000*	*20000*	*50000*
Total Dissolved Solids (mg/l TDS)	210	115	420	**1340**	*4000*	*60000*	*100000*
Phenol Index (mg/l PhOH)	<0.01	<0.01	<0.02	**<0.1**	*1*		
Dissolved Organic Carbon (mg/l C	5.2	5.6	10	**55**	*500*	*800*	*1000*

Waste Analysis	**Units**	**Result**			
Total Organic Carbon	% w/w	**4.1**	3%	5%	6%
Loss on Ignition	% w/w	**11.1**			10%
BTEX	mg/kg	**<0.06**	6		
PCBs (7 congeners)	mg/kg	**<0.045**	1		
TPH (C10 - C40)	mg/kg	**258**	500		
PAH (total)	mg/kg	**<5**	100		
pH	pH units	**8.0**		>6	
Acid Neutralisation Capacity (pH4)	mol/kg	**0.16**		To be evaluated	
Acid Neutralisation Capacity (pH7)	mol/kg	**0.04**		To be evaluated	

Disclaimer : The Landfill Waste Acceptance Criteria limits in this report are provided for guidance only.
Chemtech Environmental Ltd does not take responsibility for any errors or omissions. Data is correct as of 01/09/2005.
Samples will be disposed of 6 weeks from initial receipt unless written instructions are received and further storage is agreed
Waste Acceptance Criteria testing is outside the scope of the laboratory's UKAS accreditation.

Comments

Authorised by: Name: John Campbell

Report date: 12 January 2017 Position: Director

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APPENDIX 03

Generic Risk Screening – S4UL Commercial

Generic Risk Assessment - Soils
Lab Data Screening

SLR

Exceeds GAC
Exceeds LOD

Client Name	Thorntons
Site Name	Thornton Park, Alfreton
Job Number	416.08504.00001
Date	Jul-92
Selected Screening Value and Land Use	S4UL - Commercial / Industrial

Sample ID	BH1-1992	BH3-1992	BH7-1992
Depth	2.5	2.5	4.5
Sample Type	-	-	-
Sampled Date	Jul-92	Jul-92	Jul-92
Sample Received Date	-	-	-
J E Sample No	-	-	-
Batch Number	-	-	-
Strata / Zone	Made Ground	Made Ground	Made Ground

Test	**Units**	**LOD**	**Selected GAC**	**No. Above GAC**			
Arsenic	mg/kg	<1.0	640	0	35	27	22
Total Boron	mg/kg	<1.0			1.8	1.3	1
Cadmium	mg/kg	<1.0	190	0	<0.5	<0.5	<0.5
Copper	mg/kg	<1.0	68000	0	80	80	60
Chromium	mg/kg	<1.0	8600	0	30	30	30
Lead	mg/kg	<1.0	2330	0	35	35	40
Mercury	mg/kg	<0.17	1100	0	0.25	<0.2	<0.2
Nickel	mg/kg	<1.0	980	0	40	35	40
Zinc	mg/kg	<1.0	730000	0	45	55	65
Sulphide	mg/kg	<10			<10	31	<10
Phenol	mg/kg	<0.1	760	0	0.6	1.6	0.6

Generic Risk Assessment - Soils
Lab Data Screening

SLR

Exceeds GAC
Exceeds LOD

Client Name	Thorntons
Site Name	Thornton Park, Alfreton
Job Number	416.08504.00001
Date	Jan-03
Selected Screening Value and Land Use	S4UL - Commercial / Industrial

Sample ID	BH1-2003	BH2-2003	BH3-2003
Depth	1.65	1.6	1.65
Sample Type	-	-	-
Sampled Date	22/01/2003	22/01/2003	22/01/2003
Sample Received Date	-	-	-
J E Sample No	-	-	-
Batch Number	-	-	-
Strata / Zone	Made Ground	Made Ground	Made Ground

Test	**Units**	**LOD**	**Selected GAC**	**No. Above GAC**			
Arsenic	mg/kg	<1.0	640	0	24	61	33
Total Boron	mg/kg	<1.0			1	2	2
Cadmium	mg/kg	<1.0	190	0	<1	1	<1
Chromium	mg/kg	<1.0	8600	0	14	12	13
Copper	mg/kg	<1.0	68000	0	33	42	39
Mercury	mg/kg	<0.17	1100	0	<1	<1	<1
Nickel	mg/kg	<1.0	980	0	26	30	33
Lead	mg/kg	<1.0	2330	0	33	43	20
Selenium	mg/kg	<10	12000	0	2	<1	2
Total Sulphate	mg/kg	<0.1			3139	3491	2155
Zinc	mg/kg	<0.1	730000	0	83	42	50
					-	-	-
Mineral Oil	mg/kg	<0.1			420	541	466
PAH 16 Total	mg/kg	<0.1			769	1639	733
Resins (Heterocyclics)	mg/kg	<0.1			1797	2664	1519
Sulphide	mg/kg	<0.1			<5	<5	<5

Generic Risk Assessment - Soils
Lab Data Screening

SLR

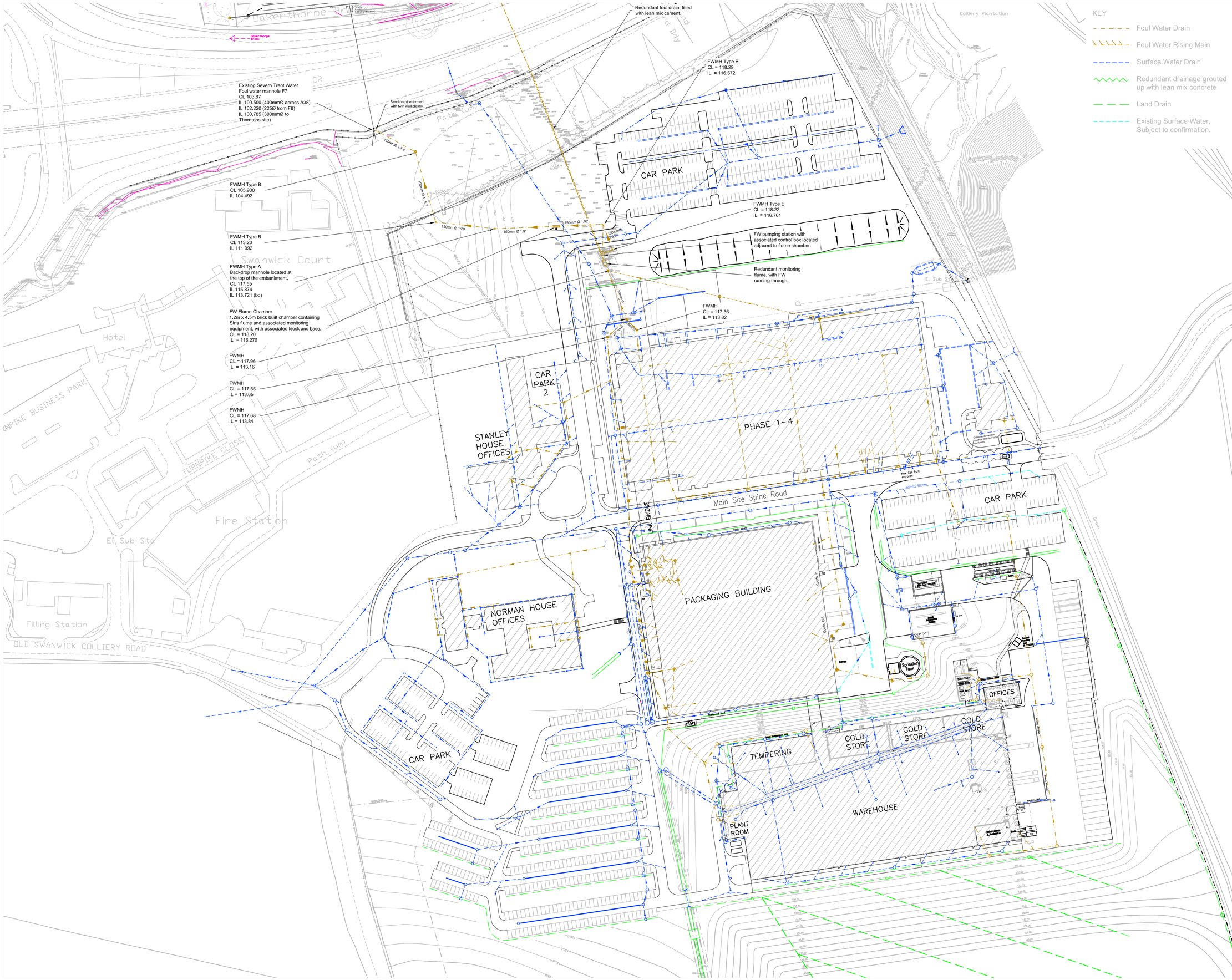
Exceeds GAC
Exceeds LOD

Client Name	Thorntons
Site Name	Thornton Park, Alfreton
Job Number	416.08504.00001
Date	Jan-17
Selected Screening Value and Land Use	S4UL - Commercial / Industrial

Sample ID	BH1-2017	BH1-2017	BH2A-2017	BH2A-2017	BH2A-2017	LOC 4-2016	LOC 6-2016
Depth	0.3	4	0.3	1.5	5.1	0.2	0.4
Sample Type	-	-	-	-	-	-	-
Sampled Date	Jan-17	Jan-17	Jan-17	04/01/2017	04/01/2017	22/12/2016	22/12/2016
Sample Received Date	-	-	-	-	-	-	-
J E Sample No	-	-	-	-	-	-	-
Batch Number	-	-	-	-	-	-	-
Strata / Zone	Made Ground	Made Ground	Made Ground	Made Ground	Coal Measures	Made Ground	Made Ground

Test	**Units**	**LOD**	**Selected GAC**	**No. Above GAC**							
Arsenic	mg/kg As	<0.01	640	0	2	60	4.8	23	14	16	25
Total Boron	mg/kg B	<0.01			<0.5	1.8	0.6	1.4	0.9	1	1.1
Cadmium	mg/kg Cd	<0.01	190	0	4.4	<0.2	3.8	0.7	0.2	3.5	3.6
Chromium	mg/kg Cr	<0.01	8600	0	34	23	29	53	38	61	31
Hexavalent Chromium	mg/kg CrVI	<0.01	33	0	<1	<1	<1	<1	<1	<1	<1
Copper	mg/kg Cu	<0.01	68000	0	7.2	52	15	29	31	35	35
Lead	mg/kg Pb	<0.01	2330	0	169	59	130	82	27	162	47
Mercury	mg/kg Hg	<0.01	1100	0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel	mg/kg Ni	<0.01	980	0	14	38	13	26	21	29	46
Selenium	mg/kg Se	<0.01	12000	0	0.3	2.4	0.4	1	0.8	1	1
Zinc	mg/kg Zn	<0.01	730000	0	187	52	163	74	82	543	250
pH	units	<0.01			10.1	7.9	9.1	8.7	7.4	8	7.5
Sulphate	mg/kg SO4	<0.01			468	3807	1884	1999	828	1535	1024
Sulphide	mg/kg S2-	<0.01			<10	<10	<10	<10	<10	<10	<10
Total Cyanide	mg/kg CN	<0.01	-	0	<1	<1	<1	<1	<1	<1	<1
Total Cyanide	mg/kg CN	<0.01	-	0	<1	<1	<1	<1	<1	<1	<1
Thiocyanate*	mg/kg SCN	<0.01			<1	<1	<1	<1	<1	<1	<1
Phenol	mg/kg PhOH	<0.01	760	0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Carbon	% w/w C	<0.01			0.75	15.43	2.15	7.82	1.58	4.08	5
Organic Matter	% w/w	<0.01			1.29	26.6	3.71	13.48	2.72	7.03	8.62
					-	-	-	-	-	-	-
PAH					-	-	-	-	-	-	-
Naphthalene	mg/kg	<0.01	190	0	<0.01	1.92	0.01	0.34	7.66	0.16	0.05
Acenaphthylene	mg/kg	<0.01	83000	0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthene	mg/kg	<0.01	84000	0	<0.01	55.7	3.11	0.06	<0.01	0.01	<0.01
Fluorene	mg/kg	<0.01	63000	0	<0.01	99.38	2.69	0.06	<0.01	0.01	<0.01
Phenanthrene	mg/kg	<0.01	22000	0	0.02	0.3	0.09	0.59	<0.02	0.15	0.15
Anthracene	mg/kg	<0.01	520000	0	<0.02	<0.02	0.03	0.16	<0.02	0.04	<0.02
Fluoranthene	mg/kg	<0.01	23000	0	<0.02	0.04	0.17	2.24	<0.02	0.29	0.08
Pyrene	mg/kg	<0.01	54000	0	<0.02	0.05	0.16	2.5	<0.02	0.27	0.08
Benzo(a)anthracene	mg/kg	<0.01	170	0	<0.02	0.03	20.54	5.77	<0.02	0.15	0.04
Chrysene	mg/kg	<0.01	350	0	0.01	0.03	18.91	7.89	<0.01	0.18	0.05
Benzo(b)fluoranthene	mg/kg	<0.01	44	0	<0.02	0.02	0.08	12.97	<0.02	0.22	0.06
Benzo(k)fluoranthene	mg/kg	<0.01	1200	0	<0.02	<0.02	0.03	5.42	<0.02	0.1	<0.02
Benzo(a)pyrene	mg/kg	<0.01	35	0	<0.02	0.02	0.06	11.22	<0.02	0.21	0.04
Indeno(123cd)pyrene	mg/kg	<0.01	500	0	<0.02	<0.02	<0.02	<0.02	<0.02	0.14	0.03
Dibenzo(ah)anthracene	mg/kg	<0.01	3.5	0	<0.02	<0.02	<0.02	2.05	<0.02	0.03	<0.02
Benzo(ghi)perylene	mg/kg	<0.01	3900	0	<0.02	<0.02	0.04	6.6	<0.02	0.12	0.04
PAH 16 Total	mg/kg	<0.01			<0.27	157	45.9	57.9	7.66	2.09	0.62
					-	-	-	-	-	-	-
TPH CWG					-	-	-	-	-	-	-
aromatics >EC5-EC7	mg/kg	<0.01	26000	0	<0.01	0.1	<0.01	0.03	<0.01	-	-
aromatics >EC7-EC8	mg/kg	<0.01	56000	0	0.01	0.07	<0.01	0.03	<0.01	-	-
aromatics >EC8-EC10	mg/kg	<0.01	3500	0	<0.01	0.11	<0.01	0.06	<0.01	-	-
aromatics >EC10-EC12	mg/kg	<0.01	16000	0	<0.01	2	-	-	8	-	-
aromatics >EC12-EC16	mg/kg	<0.01	36000	0	-	56	3	-	-	-	-
aromatics >EC16-EC21	mg/kg	<0.01	28000	0	-	100	3	6	-	-	-
aromatics >EC21-EC35	mg/kg	<0.01	28000	0	-	-	40	45	-	-	-
Aromatics >EC35-EC44	mg/kg	<0.01	28000	0	<0.02	<0.02	-	7	<0.02	-	-
aliphatics >C5-C6	mg/kg	<0.01	3200	0	<0.1	<0.1	<0.1	<0.1	<0.1	-	-
aliphatics >C6-C8	mg/kg	<0.01	7800	0	<0.1	<0.1	<0.1	<0.1	<0.1	-	-
aliphatics >C8-C10	mg/kg	<0.01	2000	0	0.1	0.1	0.1	<0.1	<0.1	-	-
aliphatics >C10-C12	mg/kg	<0.01	9700	0	5	31	<4	17	<4	-	-
aliphatics >C12-C16	mg/kg	<0.01	59000	0	71	72	6	45	<4	-	-
aliphatics >C16-C35	mg/kg	<0.01	1600000	0	1001	186	129	219	12	-	-
Aliphatics >C35-C44	mg/kg	<0.01	1600000	0	345	48	74	92	12	-	-

APPENDIX B: DRAINAGE PLAN



KEY

- Foul Water Drain
- Foul Water Rising Main
- Surface Water Drain
- Redundant drainage grouted up with lean mix concrete
- Land Drain
- Existing Surface Water, Subject to confirmation.

Notes

1. The drawings, design and all information contained therein are the sole copyright of Norder Design Associates (NDA) and reproduction in any form is forbidden unless permission is obtained in writing.
2. This drawing is to be read in conjunction with all other relevant Architects, Engineers and specialists drawings, details and specifications.
3. Conflicting information shown on the NDA drawings or discrepancies between the information given by NDA and that provided by others must be referred to NDA before work proceeds.
4. Dimensions must not be scaled from this drawing.
5. Dimensions marked 'dimension to be site checked' are subject to confirmation by site measurement before construction proceeds.
6. Subcontractor surveys, such as for the purposes of steelwork installation, take precedence over `site dimensions' indicated on this drawing. All surveys should ensure an accurate fit of components.
7. Temporary works associated with the construction of the project shall be the responsibility of the Principal Contractor.
8. Where any temporary works or scaffolding are required the Principal Contractor shall appoint a competent and suitably experienced Temporary Works Coordinator (TWC). Refer to BS 5975 for guidance on temporary works and the role of a TWC.
9. Calculations and drawings of all Contractor designed structural items associated with NDA's design responsibilities shall be submitted to the Engineer for comment at least 10 days prior to manufacture. Any comments made by NDA do not absolve the Contractor of his design responsibilities.

REV.	DATE	AMENDMENT	BY
A	15 Feb 16	Phase 4 added and Car Park Entrance relocated	MJG

CLIENT

Thorntons

PROJECT

Thorntons, Swanwick
Existing Drainage

DRAWING TITLE

Combined Drainage Layout Plan

NORDER
Structural and Civil Engineering Consultants
Beech Lawn, Green Lane, Belper, Derby DE56 1BY
Tel: 01773 824414 Fax: 01773 823305
e-mail: enquiries@norder.co.uk

SCALE	SHEET SIZE	
1:1000	A1	
DATE	DRAWN	CHECKED
Oct 15	AF	AF
JOB No.	DRAWING No.	REV.
7601	001	A

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