Supplementary Ground Investigation

Land at Middlegate Road West
Frampton
Kirton
Lincolnshire
PE20 1DA

Prepared for:

Larkfleet Homes
Falcon Way
Bourne
Lincolnshire
PE10 0FF

EPS Reference Number:	UK16.2241 B
Date Issued:	25th January 2019
Report Status:	Issue 1

LAND AT MIDDLEGATE ROAD WEST - KIRTON

NON TECHNICAL ENGINEERING SUMMARY

- Previous investigations identified the use of shallow foundations may be applicable across the site. However, it is understood the proposed development for the site requires the raising of site levels by between 1.0 and 1.7m and it is therefore suggested that a piled foundation solution would be the most applicable.
- A preliminary analysis of allowable bearing capacity from a piled foundation solution is provided below. This takes into account the raising of site levels by around 1.5m with a compressible fill material.

Depth of Pile Below Existing Ground Level (m bgl)	Pile Length (m, allowing for raising levels)	Allowable Working Load (kN) (CFA Pile)	
		300mm Diameter Pile	400mm Diameter Pile
10	12	85	135
12	14	170	250
14	16	250	365

- Given the presence of compressible materials across the site an analysis of settlement due to the filling of the site has been undertaken. The settlements stated should be allowed for in the design of services and utilities whereby the differential between settlements of buildings and the wider site will be to be considered.
- The River Terrace Deposits have a Design Sulphate Class (DS) of DS-1 with an aggressive chemical environment for concrete (ACEC) of AC-1. For the lower Ampthill Clay, a classification of DS-5 and AC-4s is given, which is a particularly high concrete grade and may require special protective measures. However, the most suitable class will be defined by the foundation solution chosen and the use of piles may be able to mitigate this high somewhat.

The above points represent a simplified summary of the findings of this assessment and should not form the basis for key decisions for the proposed development. A thorough review of the details is contained within the following report, or alternatively get in touch and we'll talk you through it.

Project Reference:	UK16.2241 B	
Title:	Supplementary Ground Investigation Land at Belton Lane, Manthorpe	
Client:	Larkfleet Homes	
Date:	25th January 2019	
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Status:	Issue 1	

Author:	**Reviewed:**	**Authorised:**
		
Sam Setchell	Steve Bullock	Steve Bullock
Senior Consultant	Director	Director

Where ground investigations have been conducted, these have been limited to the level of detail required for the site in order to achieve the objectives of the investigation.

The report has been written, reviewed and authorised by the persons listed above. It has also undergone EPS' quality management inspection. Should you require any further assistance regarding the information provided within the report, please do not hesitate to contact us.

The National Planning Policy Framework 2012 requires a competent person to prepare site investigation information, which is defined as a person with a recognised relevant qualification, sufficient experience in dealing with the type(s) of pollution or land instability, and membership of a relevant professional organisation. EPS considers that it fulfils these criteria and would welcome any request for staff CVs or case studies to demonstrate it.

As stated within DEFRA's Contaminated Land Statutory Guidance (2012), with any complex risk assessment it is possible that different suitably qualified people may reach slightly different conclusions when interpreting the same information. EPS recognises this and considers the conclusions presented within this report to be robust and appropriate but input from the Local Authority and their judgement in line with this guidance would still be welcomed.

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1 INTRODUCTION

Environmental Protection Strategies Ltd (EPS) was commissioned by Larkfleet Homes to complete a Supplementary Ground Investigation for a plot of land to the north of Middlegate Road, Kirton, Lincolnshire, PE20 1DA (the 'site'); see Figure 1.

The work was commissioned to provide supplementary geotechnical information on subsurface soil conditions across the site in order to allow the assessment of suitable foundation solutions and to assess potential settlements associated with raising levels. Supplementary geotechnical assessment was recommended within a previous *Phase I and II Geo-Environmental Assessment* undertaken by EPS in April 2017 (Ref: UK16.2241), in conjunction with which this report should be read.

The proposed development plans including external elevations and site drainage are included as Appendix A.

This report presents the findings, conclusions, and recommendations of the Supplementary Ground Investigation, undertaken as instructed.

The objectives of this investigation were as follows:

a) To collect information on ground conditions/ strength and make appropriate recommendations for design of the proposed scheme.

1.1 Scope of Work

To perform an exploratory assessment of the site in accordance with the principles and requirements of BS5930:2015 'Code of Practice for Ground Investigation' the following tasks were undertaken:

Site Work:

- Site walkover, inspection and obtaining photographic records.
- Health and safety briefing/ site supervision.
- Drilling of 6 boreholes to a maximum depth of 20m bgl using cable percussive (shell and auger) drilling rig.

Reporting:

- Data collection and Interpretation
- Reporting.

The findings and conclusions of these investigations are presented in the following sections.

1.2 Limitations and Constraints

The purpose of this report is to present the findings of a geotechnical investigation conducted at the location(s) specified. When examining the data collected from the investigations made during the assessment, Environmental Protection Strategies Ltd (EPS) makes the following statements:

No investigation method is capable of completely identifying all ground conditions that might be present in the soil or groundwater under a site. Where outlined in our report, we have examined the ground beneath a site by constructing a number of invasive ground probing. The locations of these probing's are considered to be representative of the condition of the whole site subsurface however, ground conditions are naturally variable and it may be possible that the ground conditions encountered may differ to those encountered during the investigation.

No visible evidence of Japanese Knotweed was identified during the site walkover, however this plant can be difficult to identify in the early stages of growth and therefore it is not always possible to identify its presence at certain times of the year. For this reason EPS cannot confirm that Japanese Knotweed rhizomes do not exist and it is recommended that if it is suspected that this species, or other similarly invasive plants are present at the site, a specialist contractor should be commissioned to make a detailed assessment.

The investigation was carried out to assess the significance of the underlying ground conditions as identified in this report. Unless EPS has otherwise indicated, no assessment of potential impact of any other previous uses has been made.

If third parties have been contracted / consulted during compilation of this report, the validity of any data they may have supplied, and which are included in the report, have been assessed as far as possible by EPS. However, EPS cannot guarantee the validity of these data.

2 SUMMARY OF PREVIOUS REPORTS

A previous Phase I and II Geo-Environmental Assessment was undertaken by EPS in April 2017 (Ref: UK16.2241). The pertinent geotechnical findings of which are outlined below:

Ground conditions were found to consist of a layer of topsoil underlain by Tidal Flat Deposits. These deposits were encountered as very loose to medium dense, clayey silts and sands and were found to the maximum depth of the boreholes undertaken (4.0m). Groundwater was recorded at approximately 2-3m across the site, within the tidal flat deposits.

It was concluded that, while shallow soils may be suitable for the use of conventional spread foundation at a low allowable bearing capacity (50kN/m^2), the requirement to raise levels across the site reduce this capacity due to the increase in overburden and settlements that would be induced.

It was therefore considered that the option of a piled foundation would be more appropriate, with possible founding strata as the underlying Ampthill Clay which was not identified in the investigation. The report recommended that deep boreholes be undertaken across the site in order to inform the pile design.

3 SUMMARY OF INTRUSIVE INVESTIGATIONS

Intrusive ground investigations were undertaken between the 10th and 19th of October 2018 in accordance with EPS standard operating procedures, copies of which will be made available on request. A summary of all site activities is presented in the following sections:

3.1 Exploratory Hole Locations

Exploratory hole locations were selected through consideration of the proposed development layout, the location of below ground utilities as well as operational and health & safety considerations. Borehole locations were agreed with the client prior to proceeding with the works.

A borehole location plan is presented as Figure 2.

3.2 In Situ Testing & Soil Sampling

Each borehole was logged for ground conditions encountered and inspected for any physical evidence of contamination, such as soil staining, odour and the presence of separate phase liquids on a precautionary basis. Borehole logs are presented in Appendix B.

Standard or cone penetration tests (SPT / CPT) were carried out in all materials using an automatic trip hammer. The number of blows required to advance a standard split spoon, (or solid 60° nose cone for the CPT test) over the final 300mm of a 450mm total drive was recorded, and is shown on the borehole records at the penetration resistance ("N" value).

3.3 Laboratory Testing

Geotechnical testing was undertaken by Soil Property Testing, Huntingdon, a UKAS accredited laboratory. Samples obtained for analysis of pH and Sulphate content were submitted to Exova Jones Environmental of Flintshire, who hold appropriate UKAS / MCERT accreditation for the required testing. Samples were transported in laboratory supplied containers and delivered to the laboratory by approved courier.

Copies of chain of custody documentation are held by EPS and will be made available on request.

The schedule of testing is included as Table 1. The results of classification and strength testing are also shown on the borehole logs (Appendix B).

4 FINDINGS OF THE INVESTIGATION

This section of the report provides a summary of the findings of the various aspects of the ground investigation.

4.1 Ground Conditions

A total of six cable percussive (shell & auger) boreholes were formed, three to a depth of 20m and three to a depth of 15m, the ground conditions encountered, from ground level, were found to comprise:

- Topsoil
- Tidal Flat Deposits
- Ampthill Clay

Site specific borehole logs are included as Appendix B with cross sections in Appendix C and give descriptions and depths of strata encountered. A summary of the general strata encountered across the site is provided in the table below, with more detailed description given in the following sub sections:

Geological Strata	Maximum Depth to Base of Strata(m bgl)	Strata Thickness (m)
Topsoil	0.6	0.3-0.6
Tidal Flat Deposits	8.3	6.8-8.0
Ampthill Clay Formation	>20.0m	Unproven (>12.9m)

4.1.1 Topsoil

Topsoil was encountered in all borehole locations and extended to between 0.3 and 0.6m depth. Topsoil was a light brown silty clay in the field to the east where a potato crop had recently been harvested. To the west of and centre of the site the topsoil was a darker brown silty clay and when wet was found to become soft and difficult to track across with the drilling rig (clayey).

4.1.2 Tidal Flat Deposits

Tidal flat deposits were found to underlie the site beneath the topsoil. This material comprised predominately soft to firm silts and clays with sand lenses. Very soft organic (peaty) clay layers have also been identified within these deposits between 4-6m as well as beds of fine sands. The base of the deposits is marked by a bed of brown fine sand in the west of the site (BH03-BH06) but this is not seen to the east (BH01 & BH02). Tidal flat deposits were fully penetrated between 7.1m (BH04) and 8.3m in BH03. Adjusting for site levels suggests that this depth is relatively consistent at between -5 and -6m AOD.

A generalised profile of the Tidal flat deposits is as follows:

Soil Type	Inferred Soil Strength	Approximate Depth Range (m bgl)
Silty CLAY	Soft to Firm (20-40kPa)	0.3-2.5
Clayey /sandy SILT (occasionally peaty)	Very Soft to Soft (15-25kPa)	2.5-6
Sandy CLAY/SAND (occasional gravel)	Firm /Medium Dense (40-75kPa)	6-8

Further details on the lateral variation of this profile can be seen in the provided geological cross sections in Appendix C.

4.1.3 Ampthill Clay

A stiff to very stiff brown slightly gravelly slightly sandy silty calcareous clay was identified beneath the tidal flat deposits in all boreholes to the maximum extent (>20m). The gravel within this material was identified as chalk and flint and the drillers described the material as a 'boulder clay'. A flint bounder was identified at 19m in BH03.

This materials has been initially classified as representative of the Ampthill Clay, which is shown to be present in geological mapping. The field and laboratory description of the material, particularly in relation to the presence of chalk and flint gravels, suggest that this material may well be glacial in origin. However, for simplicity, this has been henceforth referred to as the Ampthill Clay.

This material has been found to be stiff (high strength) at the top of the unit becoming very stiff (very high strength).

4.2 Groundwater

Groundwater was struck within the tidal flat deposits in all boreholes. Two to three strikes were noted in each location and were found to be associated with beds in which sand lenses or more granular materials were noted. The shallowest water strike was at 2.2m within BH04 which showed slow ingress. This was sealed out at 6.3m. At the end drilling the boreholes, which were cased until the Ampthill clay was encountered, all boreholes were dry. This suggests all water strikes were associated with perched water within the superficial deposits.

4.3 Physical Evidence of Contamination

No made or reworked ground was identified other than the recently worked topsoil materials. There was therefore no palpable evidence of contamination, waste or putrefiable material encountered in any of the sampling locations during the investigation including no visual or olfactory evidence of hydrocarbon staining.

4.4 Geotechnical Testing

4.4.1 Laboratory Testing

The results of geotechnical laboratory testing are summarised in the table below and all geotechnical sample results obtained from the laboratory are included as Appendix D. The key results of laboratory testing on geotechnical soil samples are summarised below.

Strata	Range of Parameters									
	Moisture Content (%)		Plasticity Index (%)		Soil Fraction (%)				Cu (kPa)	
	Min	Max	Min	Max	Gravel	Sand	Silt	Clay	Min	Max
Tidal Flat Deposits	14.1	57.1	9(6)	16(14)	0-10	15-82	5-51	2-34	-	-
Ampthill Clay	13.6	18.9	23(16)	24 (22)	-	-	-	-	87	302

(#) = Modified Plasticity Index

The natural moisture content was established for five samples of cohesive soil in accordance with BS1377 Part 1:7.3 and BS1377: Part 2:3.2.

Atterberg limit tests were undertaken on six samples of cohesive soils in accordance with BS1377: Part 1:7.4 and BS1377: Part 2:3.2&4.2.

Particle size distribution tests were undertaken on five samples of granular material in accordance with BS1377: Part 2: 1990. Clause 9.2.

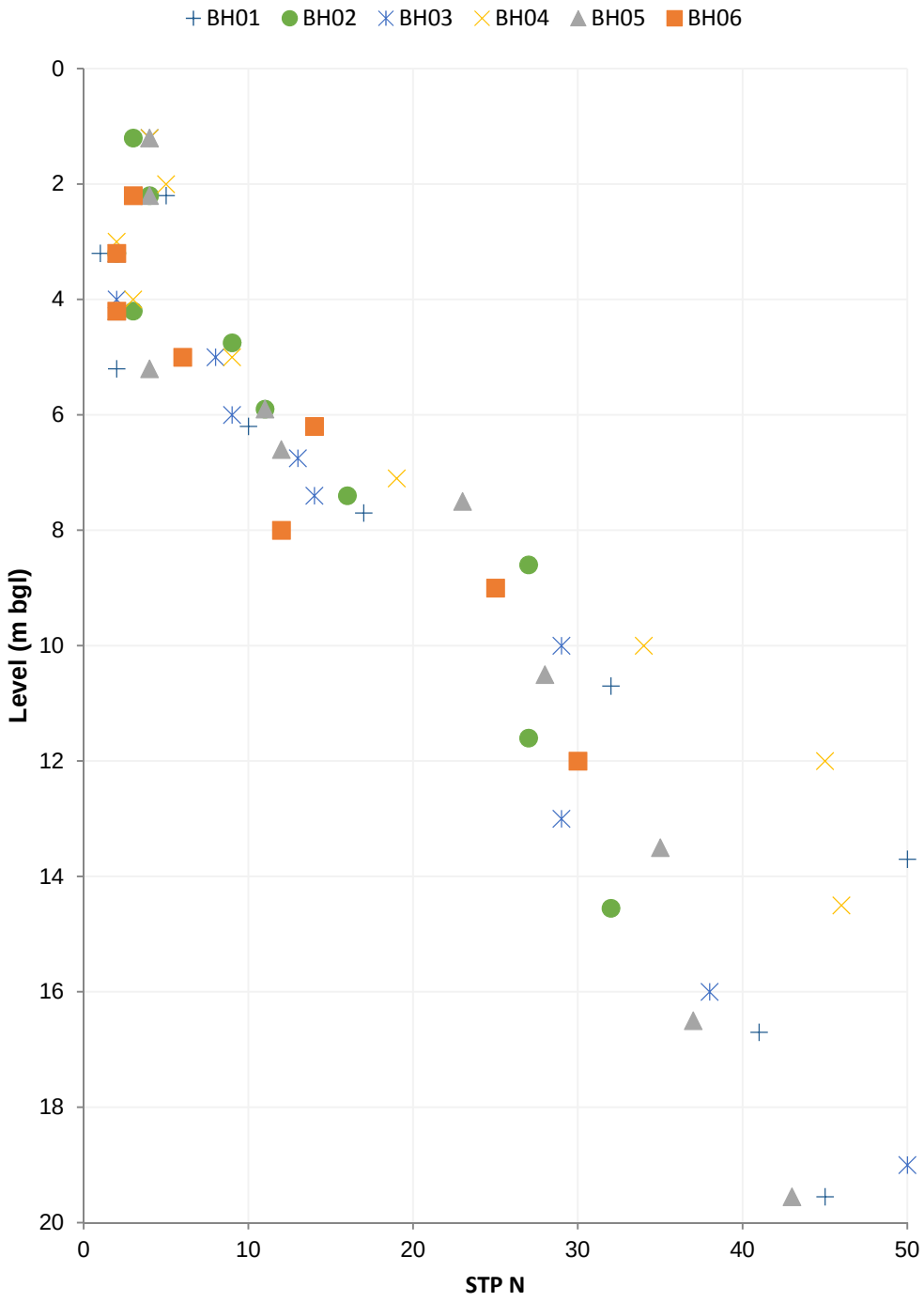
Multistage undrained triaxial compression tests (without measurement of pore pressure) were undertaken on eleven undisturbed samples. Tests were carried out in accordance with BS1377: Part 7: 1990:8.

One-Dimensional Consolidation testing was undertaken on one undisturbed sample. Tests were carried out in accordance with BS1377: Part 5: 1990:3.5.

A laboratory analysis testing schedule is presented as Table 1.

4.4.2 In Situ Testing

Standard or cone penetration tests (SPT / CPT) were carried out in all materials using an automatic trip hammer. These tests were undertaken at alternative depths within cohesive materials in order to allow for undisturbed sampling. The results of this testing are summarised in the chart below:



The in-situ testing highlights the present of soft materials (SPT N<5) within to top 5m of surficial deposits. A general increase is seen within the granular materials between 5-8m from which point the stiff Ampthill Clay is encountered and SPT N vales increase with depth.

5 GEOTECHNICAL APPRAISAL

This investigation has confirmed that the predominantly soft silty tidal flat deposits are present across the site and are found to continue to a depth of around 8m. Underlying this material stiff clay becoming very stiff clay is identified. Triaxial testing has shown this material to be of very high to extremely high strength. As noted in the previous phase of investigation, it is possible that shallow foundations may be suitable for use across the site with a low bearing capacity. However, it is understood that the proposed development scheme requires that at least 1m of fill materials are to be placed on existing soils (post stripping of topsoil) in order to reach design levels to meet minimum floor levels stipulated in the site specific planning requirements. Therefore, the influence of this additional loading will have an effect on the performance of any foundation or ground improvement options presented below.

5.1.1 Spread Foundations

As stated in the previous investigation, shallow subsurface soils may be suitable for low bearing capacity traditional foundations. However due to the requirement for site levels to be raised by up to 1.7m of using imported materials (As detailed in Appendix A) the underlying soil is expected to be excessively loaded, thus negating their use.

5.1.2 Raft Foundation

Raft foundations may also be considered for the site, but would need to be designed for a low bearing capacity, in the region of 30-40kN/m^2. This bearing capacity would effectively be restrained by the quality of the imported fill materials as well as the presence of the underlying compressible silts and clay. Consideration should also be given to the presence of these soft materials throughout the top 6.0m of the soil profile, settlements in excess 30mm are to be expected with the predicted loadings related to the requirement for raising of site levels any further addition to this loading may result in settlements deemed unacceptable.

5.2 Ground Improvement

5.2.1 Vibro-Compaction

Vibro-compaction is a ground improvement technique that works by re-arranging the grains of a granular soil into a denser configuration by vibrating them to depth with a specially designed tool. This technique is only suitable for granular soils and is not recommended for this site due to the presence of cohesive soils throughout the soil profile as well as the requirement to raise levels.

5.2.2 Vibro Stone Columns

Vibro Stone Columns work on a similar principal to the vibro-compaction technique, however a hollow vibrating poker is used to create a cavity in the soil which is then backfilled with hard inert stone, free of clay and silt fines. The technique requires the host soils to be capable of retaining the stone inserted and subsequently compacted.

The soft silts and clays present at the targeted improvement depths are likely to be unsuitable for the insertion of stone columns as they are of low strength and may not provide the lateral confinement required for the columns to be formed. However, specialist advice on the suitability of this technique from a ground improvement contractor should be sought.

Specialist contractors suggest that this technique is not suitable for '*organic soils, peat and very soft clays*'.

5.2.3 *Vibro-Concrete Columns*

Vibro Concrete Columns (VCC) offer a ground improvement method similar to the above without the risk of losing the included material amongst the soft soils. This is achieved by the insertion of fresh concrete into the hole via the vibro poker head with the additional control of designed pumping and withdrawal rates. This technique may be suitable and may present a cost effective alternative solution to traditional piling methods. However, it is a technique best suited for limited thicknesses of weak or soft soils, and the depths seen at this site may be too great, specialist advice on suitability from a ground improvement contractor should be sought.

5.2.4 *Controlled Modulus Columns*

Controlled Modulus Columns (CMC) are a semi-rigid inclusion similar to VCC whereby concrete grouting is undertaken after displacing the surrounding soils with a specially adapted hollow stem auger. This improvement method is designed to be applicable in difficult soil types such as peat and soft organic clays. The ultimate aim being an improved site in which standard strip footings could be installed with slabs-on-grade. This technique may be applicable at this site but given the application of a proprietary technology specialist advice on suitability and design from the contractor should be sought.

5.2.5 *Piles*

Given the low strength of the superficial soils and the requirement to raise site levels by in excess of 1.0m across the area, the use of a piled foundation should be considered, and may well be the most appropriate, in order to transfer the load of the proposed buildings across the variable tidal flat deposits and into the underlying stiff clay.

Piles are considered likely to terminate in the underlying Ampthill Clay Formation, and carry their loads in a combination of end bearing and skin friction, although only limited positive contribution to pile capacity is likely through the Tidal Flat Deposits. Where levels are raised, the effects of negative skin friction will also need to be considered. Furthermore, it should be noted that the groundwater was recorded at shallow depth and care must be taken to ensure that the piling method provides sound piles below groundwater.

A preliminary assessment of potential pile capacities has been provided in the table below, although in view of the wide variety of piles sizes available, and the range of installation plant and techniques, the design of the piles should be carried out by, and should remain the responsibility of the specialist piling contractor, who will reflect their own methods, experience and design procedures within their proposals.

Depth of Pile Below Existing Ground Level (m bgl)	Pile Length (m bgl, allowing for raising levels)	Allowable Working Load (kN) (CFA Pile)	
		300mm Diameter Pile	400mm Diameter Pile
10	12	85	135
12	14	170	250
14	16	250	365

Notes: A Factor of Safety of 2.5 has been adopted.

It should be noted that the above pile capacities take into account the effect of negative skin friction due to raising of levels and consolidation of underlying soft soils. Reductions as based on a raise in levels by 1.5m using a compressible fill as well as a groundwater level 2m below existing.

5.3 Ground Floor Construction

Given the presence of low strength soils and the requirement to raise levels throughout the proposed development, the use of suspended ground floor construction is recommended.

5.4 Settlement Assessment

As detailed above, it is intended that levels will be raised across the site, predominantly to relieve flood risk issues. This will lead to settlement of the underlying sensitive soils, particularly given their very soft to soft nature.

A summary of approximate settlement undertaken for subsurface soils present in relation to potential loadings is included within the following table:

Applied Vertical Stress (kN/m^2)	Potential Magnitude of Total Settlement (mm)
10 (0.5m fill)	5-10
20 (1.0m fill)	15-20
30 (1.5m fill)	20-25
40 (2.0m fill)	30-35

This table indicates the calculated range of magnitude of total settlement of the underlying soils expected for a defined load; which have been estimated to represent potential construction scenarios given the nature of current development proposals. The settlements for loadings of up to 40kN/m^2 are presented to show anticipated settlement resulting from raising site levels. The range in magnitudes has been calculated using 'typical' and 'worst case' consolidation factors reported by the laboratory for soils at a given depth, which gives an indication of potential variation in settlement which could be expected depending on the composition of the soils recovered.

5.5 Impacts of Settlement

Services will have to be designed to allow for settlement in the range of the above quoted figures. Particular consideration should be given to the connections of services that run from proposed buildings (which are assumed to be piled) and external areas. The difference in settlements between these two locations will have to be allowed for in utility and service design.

5.6 Groundworks

5.6.1 Excavations

Whilst excavations in cohesive soils may remain stable for short periods during construction the long term stability of these and any excavations in made or disturbed ground should not be relied upon in unsupported excavations. Excavations in granular material will require proposer design and support.

Heavy plant and stockpiles of materials should not be permitted close to the edges of unsupported excavations.

Further reference may be made to CIRIA Report No. 97 '*Trenching Practice*' 1992.

On the basis of the findings of the ground investigation, significant quantities of groundwater are unlikely to be encountered within shallow excavations for foundations however in deeper excavations, such as may be required for drainage, some dewatering may be required.

5.6.2 Raising Levels

It is understood that around 1.5m of fill material will be placed over the sites surface in order to raise levels. Detailed below are some generic recommendation for the filling process.

- In general, any fill should comply with the '*Manual of Contact Documents for Highways Works, Volume 1, Specification for Highways Works*', amended November 2007. Compaction of the fill materials shall be in accordance with Table 6/4 of the Specification for Highways Works.
- Immediately prior to placing the first layer of fill, all surfaces upon which fill is to be placed should be cleaned of all objectionable materials in an approved manner. Such surfaces shall have all water removed from depressions and shall be properly monitored to obtain a suitable bond with the fill.
- Fill should be prepared by levelling, moistening (if required) and rolling so that the surface materials will be compacted and will provide a satisfactory bonding surface.
- Materials to be used for fill, which for whatever reason become, or when placed are too wet for immediate compaction shall be placed in temporary stockpiles or removed until the moisture content is reduced sufficiently to permit adequate compaction. Conversely, excavated material with a moisture content lower than that required, to ensure adequate compaction shall be wetted before placement.

Prior to placement, it is recommended that the fill shall be tested for the following:-

- Classification (Particle Size Distribution/Plasticity Index)
- Optimum Dry Density (2.5kg compaction)
- Natural Moisture Content
- Chemical Suitability

The in-situ competency of any fill should be checked at regular intervals to ensure that they are placed to the required effort.

5.7 Concrete Grade

Sulphate contents and pH values determinations were carried out by the analytical laboratory, the results of which are also included within Appendix D. Results for concrete grade are summarised within the following table, and have been divided into results applicable to soils recovered from both strata of natural soils to assess different properties of the two materials and subsequent design classifications.

Strata	Water Soluble Sulphate (mg/l SO_4)		pH		Total Potential Sulphate (%)	
	Min	Max	Min	Max	Min	Max
Tidal Flat Deposits	37.2	194.9	8.35	8.63	NA	
Ampthill Clay	217.8	326.5	8.46	9.09	2.91	11.4

The above suggest that Tidal Flat Deposits have a Design Sulphate Class (DS) of DS-1 with an aggressive chemical environment for concrete (ACEC) of AC-1.

For the lower Ampthill Clay, a classification of DS-5 and AC-4s is given, which is a particularly high concrete grade and will require special protective measures. This classification is based on analysis of 6 samples taken from across the depth of the unit, all of which had Total Potential Sulphate levels within the DS-5 classification.

It should be noted that the classification for the Ampthill Clay (DS-5, AC-4s) has been driven by the total potential sulphate value. The values for pH and the water-soluble sulphate, however, give a class of DS-1 with AC-1s.

The most suitable class will ultimately depend on the nature of the final foundation solution, given the potential use of piling at the site, it should be noted that the BRE Special Digest 1 'Concrete in Aggressive Ground' 2005 states *"Concrete in pyritic ground which is initially low in soluble sulphate does not have to be designed to withstand a high potential sulphate class unless it is exposed to ground which has been disturbed to the extent that contained pyrite might oxidise and the resultant sulphate ions reach the concrete. This may prompt redesign of the structure or construction process to avoid ground disturbance; for example, by using precast or cast in-situ piles instead of constructing a spread footing within an excavation".*

FIGURES

Approximate Site Location

Title:	**Site Location Plan**	
Project:	Middlegate Road, Kirton	Scale: NTS
		Drawn By: SSe / Approved By: MB
Fig No:	1	Job No: UK16.2241 B
		Dwg No: Kirton/0119/01
		Date: January 2019

Project Id:	UK16.2241 B	Title:	Figure 2: Borehole Location Plan
Project Title:	Middlegate Road, Kirton	Scale:	1:5000
Location:	Kirton, Lincolnshire	Engineer:	Sam Setchell
Client:	Larkfleet Homes	Contractor:	T. Bedford Drilling

Legend Key

Locations By Type - CP

TABLES

Table 1 – Laboratory Testing Schedule (Geotechnical)

Sample ID	Top Depth (m bgl)	Moisture Content	Liquid / Plastic Limits	PSD	Triaxial Test	1D Consolidation
BH01	3.20			1		
BH01	6.10	1	1			
BH01	6.70	1	1			
BH01	9.20				1	
BH01	15.20				1	
BH01	18.20				1	
BH02	7.90	1	1			
BH02	10.10				1	
BH02	13.10				1	
BH03	5.00			1		
BH03	6.75	1	1			
BH03	7.40			1		
BH03	8.50				1	
BH03	11.50				1	
BH04	8.50				1	
BH05	2.20			1		
BH05	4.20			1		
BH05	9.00				1	
BH05	18.00				1	
BH06	1.20					1
BH06	10.50	1	1			
BH06	13.50		1		1	

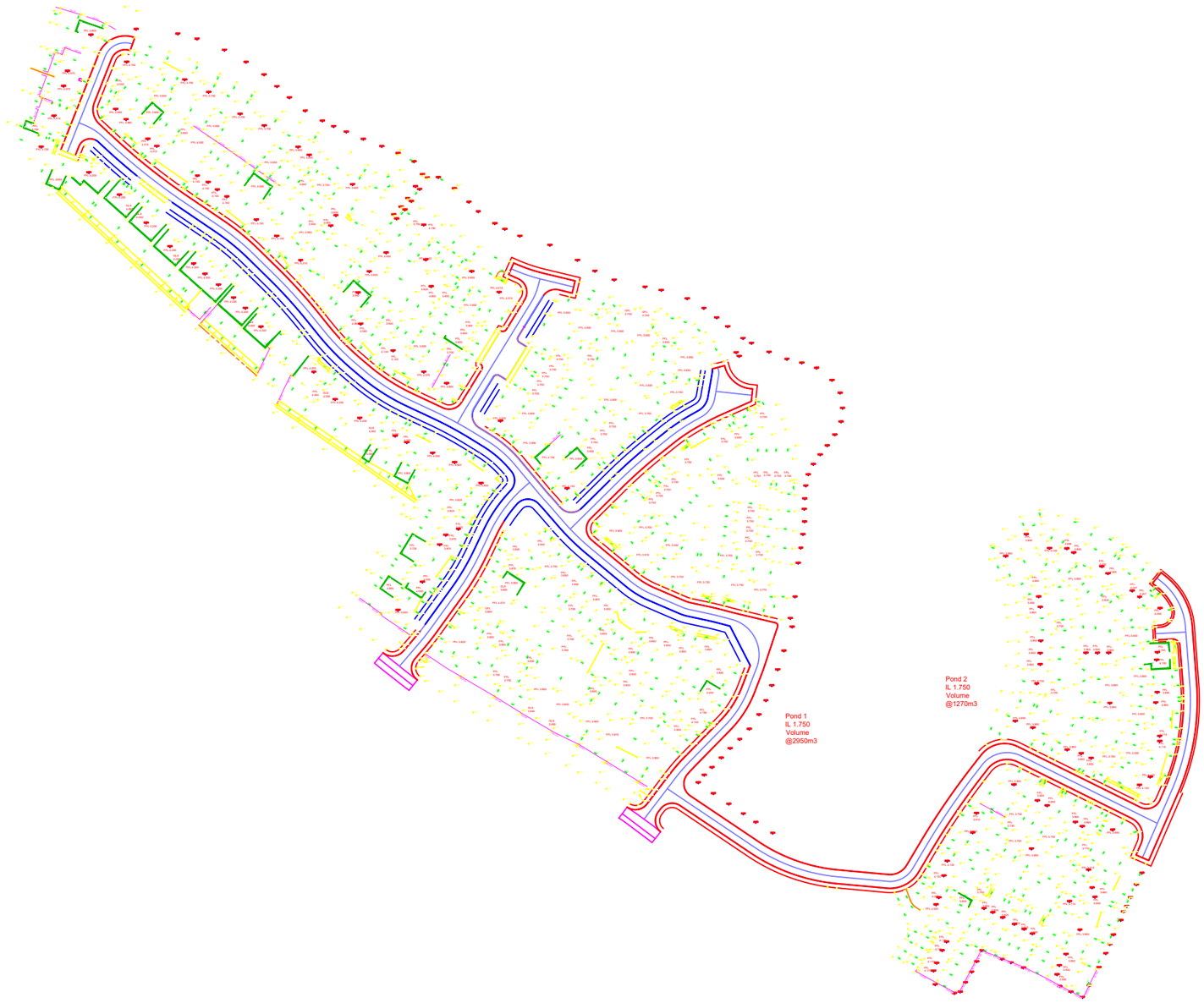
Notes

mbgl	meters below ground level
1	Sample Taken
-	Sample Not Analysed
PSD	Particle Size Distribution (by wet sieve)
CBR	California Bearing Ration Test
EPS Geotechnical Suite	**Dissolved and Total Sulphates**

APPENDICES

APPENDIX A

Proposed Development Plans



Key

Assumed 110mm upstand + 1:30 footway

Assumed 25mm upstand + 1:25 VC or 1:30 Footway

Assumed flush + Flat across swale + 1:30 footwat

Title: Proposed Development Development Plan

Project: Middlegate Road, Kirton

Appendix A

Job No: UK16.2241 B

Date: January 2019

APPENDIX B

Site Specific Borehole Logs

Borehole Log

Borehole No. **BH01**

Sheet 1 of 2

Project Name:	Middlegate Road, Kirton	Project No. UK16.2241 B	Co-ords:	-5426E - 6970974N	Hole Type CP
Location:	Kirton, Lincolnshire		Level:	2.66 m AOD	Scale 1:50
Client:	Larkfleet Homes		Dates:	10-10-2018	Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	In Situ Results				
					0.30	2.66		TOPSOIL
								Firm brown friable silty CLAY
		1.20 - 1.65 1.20	D SPT	N=3 (1,2/1,1,0,1)				
		2.20	SPT	N=5 (1,1/1,1,1,2)				
					2.50	2.36		Soft brown sandy slightly clayey SILT with sand lenses
		3.20 - 3.70 3.20	B SPT	N=1 (1,0/1,0,0,0) PSD CL: 4 PSD SI: 37 PSD SA: 59 PSD GR: 0				
		4.20 - 4.65 4.20	D SPT	N=3 (1,1/1,1,1,0)				
		5.20 - 5.65 5.20	D SPT	N=2 (1,0/1,0,1,0)				
		6.10 - 6.20	D	PI: 16 MC: 57.1	6.05 6.25	0.16 -3.39		Very soft dark grey slightly gravelly slightly sandy slightly peaty organic CLAY. Gravel is fine to medium black flint.
		6.20 - 6.65 6.20 6.70 - 8.20	D SPT B	N=10 (2,2/2,2,3,3) PI: 9 MC: 14.1				Soft to firm light olive brown slightly gravelly sandy silty slightly organic CLAY with occasional grey mottling. Gravel is brown, black and white fine to coarse angular to subrounded flint.
		7.70	SPT	N=17 (1,2/2,4,6,5)				
					7.90	-3.59		Stiff brown grey gravelly CLAY . Gravel is chalk
		8.70 - 8.80	D		8.50	-5.24		Very stiff to hard (Very high strength to Extremely hight strength) dark grey slightly gravelly slightly sandy silty calcareous CLAY with occasional dark greyish brown mottling. Gravel is white fine to coarse subangular to rounded chalk and rare flint.
		9.20 - 9.65	U	Ublow=90 UU: 234.0 UU: 245.0 UU: 257.0				

Remarks

Borehole Log

Borehole No. **BH01**

Sheet 2 of 2

Project Name:	Middlegate Road, Kirton	Project No. UK16.2241 B	Co-ords:	-5426E - 6970974N	Hole Type CP
Location:	Kirton, Lincolnshire		Level:	2.66 m AOD	Scale 1:50
Client:	Larkfleet Homes		Dates:	10-10-2018	Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	In Situ Results				
		10.70	SPT	N=32 (4,4/7,8,8,9)				Very stiff to hard (Very high strength to Extremely hight strength) dark grey slightly gravelly slightly sandy silty calcareous CLAY with occasional dark greyish brown mottling. Gravel is white fine to coarse subangular to rounded chalk and rare flint.
		12.20 - 12.65	U	Ublow=90				
		13.70	SPT	N=50 (5,6/50 for 170mm)				
		15.20 - 15.65	U	Ublow=90 UU: 256.0 UU: 269.0 UU: 274.0				
		16.70	SPT	N=41 (6,7/9,10,10,12)				
		18.20 - 18.65	U	Ublow=90 UU: 332.0 UU: 346.0 UU: 352.0				
		19.55	SPT	N=45 (6,7/10,11,12,12)				
					20.00	-5.84		End of Borehole at 20.000m

11 12 13 14 15 16 17 18 19 20

Remarks

Borehole Log

Borehole No. **BH02**

Sheet 1 of 2

Project Name:	Middlegate Road, Kirton	Project No. UK16.2241 B	Co-ords:	-5554E - 6970803N	Hole Type CP
Location:	Kirton, Lincolnshire		Level:	2.71 m AOD	Scale 1:50
Client:	Larkfleet Homes		Dates:	11-10-2018	Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	In Situ Results				
					0.35	2.71		TOPSOIL
		1.20	SPT	N=3 (1,1/1,0,1,1)				Firm brown friable SILT/CLAY
		2.20	SPT	N=4 (1,1/1,1,1,1)				
					2.45	2.36		Soft grey SILT with rare sand beds
		3.20	SPT	N=2 (1,0/1,0,1,0)				
		4.20	SPT	N=3 (1,1/1,1,1,0)				
		4.75	SPT	N=9 (1,2/2,2,2,3)	4.70	0.26		Loose to medium dense grey fine SAND
		5.90	SPT	N=11 (2,2/2,3,3,3)	5.75	-1.99		Firm brown to grey slightly organic sandy gravelly CLAY with sand lenses
		7.40	SPT	N=16 (1,2/2,3,5,6)				
		7.90 - 8.40	B	PI: 23 MC: 18.9	7.55	-3.04		Firm olive slightly gravelly slightly sandy silty CLAY with occasional dark grey mottling, and orange staining. Gravel is fine to coarse chalk and flint.
		8.60	SPT	N=27 (4,4/5,7,8,7)	8.40	-4.84		Very stiff (Very high strength) dark grey slightly gravelly slightly sandy silty calcareous CLAY with occasional dark greyish brown mottling, and rare decayed roots. Gravel is white fine to coarse subangular to rounded chalk and light grey mudstone.

Remarks

Borehole Log

Borehole No. **BH02**

Sheet 2 of 2

Project Name:	Middlegate Road, Kirton	Project No. UK16.2241 B	Co-ords:	-5554E - 6970803N	Hole Type CP
Location:	Kirton, Lincolnshire		Level:	2.71 m AOD	Scale 1:50
Client:	Larkfleet Homes		Dates:	11-10-2018	Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	In Situ Results				
		10.10 - 10.55	U	Ublow=85 UU: 214.0 UU: 229.0 UU: 242.0				Very stiff (Very high strength) dark grey slightly gravelly slightly sandy silty calcareous CLAY with occasional dark greyish brown mottling, and rare decayed roots. Gravel is white fine to coarse subangular to rounded chalk and light grey mudstone.
		11.60	SPT	N=27 (4,4/5,7,6,9)				
		13.10 - 13.55	U	Ublow=90 UU: 230.0 UU: 262.0 UU: 281.0				
		14.55	SPT	N=32 (5,6/7,8,8,9)				
					15.00	-5.69		End of Borehole at 15.000m

11 12 13 14 15 16 17 18 19 20

Remarks

AGS

Borehole Log

Borehole No. **BH03**

Sheet 1 of 2

Project Name:	Middlegate Road, Kirton	Project No. UK16.2241 B	Co-ords:	-5841E - 6970950N	Hole Type CP
Location:	Kirton, Lincolnshire		Level:	2.82 m AOD	Scale 1:50
Client:	Larkfleet Homes		Dates:	12-10-2018	Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	In Situ Results				
					0.30	2.82		TOPSOIL
								Firm brown friable SILT/CLAY
		1.20	SPT	N=4 (1,2/1,1,1,1)				
		2.20	SPT	N=3 (1,1/1,1,1,1,0)				
		3.20	SPT	N=2 (1,0/1,1,0,0)				
					3.75	2.52		Soft grey SILT
	▼	4.00	SPT	N=2 (1,0/1,0,1,0)				
					4.80	-0.93		Loose to medium dense brown silty slightly clayey SAND.
		5.00 - 5.45	D					
		5.00	SPT	N=8 (1,1/2,1,2,3) PSD CL: 2 PSD SI: 16 PSD SA: 82 PSD GR: 0				
					5.80	-1.98		Soft to firm grey slightly organic sandy CLAY with occasional gravel
		6.00	SPT	N=9 (1,2/2,2,2,3)				
	▼				6.60	-2.98		Firm to Stiff light olive brown slightly gravelly slightly sandy silty CLAY with rare bluish grey mottling. Gravel is fine to medium chalk and flint.
		6.75 - 7.20	D					
		6.75	SPT	N=13 (2,2/2,3,4,4) PI: 15 MC: 16.4				
					7.30	-3.78		Medium dense brown gravelly silty clayey SAND. Gravel is brown, black and white angular to subangular flint and occasional white and brown subrounded quartzite.
		7.40 - 7.90	B					
		7.40	SPT	N=14 (1,2/2,3,5,4) PSD CL: 6 PSD SI: 5 PSD SA: 79 PSD GR: 10				
					8.30	-4.48		Stiff (High strength) very dark grey slightly gravelly slightly sandy silty calcareous CLAY. Gravel is white fine to medium subangular to rounded chalk and rare fine to coarse flint.
		8.50 - 8.95	U	Ublow=75 UU: 111.0 UU: 132.0 UU: 145.0	8.60	-5.48		Very stiff (Very high strength) brown slightly gravelly slightly sandy silty calcareous CLAY. Gravel is white fine to medium chalk and flint.
		10.00	SPT	N=29 (4,5/8,7,6,8)				

Remarks

Borehole Log

Borehole No. **BH03**

Sheet 2 of 2

Project Name:	Middlegate Road, Kirton	Project No. UK16.2241 B	Co-ords:	-5841E - 6970950N	Hole Type CP
Location:	Kirton, Lincolnshire		Level:	2.82 m AOD	Scale 1:50
Client:	Larkfleet Homes		Dates:	12-10-2018	Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	In Situ Results				
								Very stiff (Very high strength) brown slightly gravelly slightly sandy silty calcareous CLAY. Gravel is white fine to medium chalk and flint.
		11.50 - 11.95	U	Ublow=80 UU: 203.0 UU: 226.0 UU: 246.0				
		13.00	SPT	N=29 (5,5/8,7,6,8)				
		14.50 - 14.95	U	Ublow=85				
		16.00	SPT	N=38 (6,6/9,8,10,11)				
		17.50 - 17.95	U	Ublow=90				
		19.00	SPT	N=50 (9,10/50 for 145mm)				
								Flint Boulder
					20.00	-5.78		End of Borehole at 20.000m

11 12 13 14 15 16 17 18 19 20

Remarks

AGS

Borehole Log

Borehole No. **BH04**

Sheet 1 of 2

Project Name:	Middlegate Road, Kirton	Project No. UK16.2241 B	Co-ords:	-5798E - 6971154N	Hole Type CP
Location:	Kirton, Lincolnshire		Level:	2.72 m AOD	Scale 1:50
Client:	Larkfleet Homes		Dates:	19-10-2018	Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	In Situ Results				
					0.30	2.72		TOPSOIL
					0.80	2.42		Brown sandy clayey SILT
		1.20	SPT	N=4 (1,1/1,1,1,1)				Brown sandy SILT
		2.00	SPT	N=5 (1,0/1,1,2,1)				
		3.00	SPT	N=2 (1,0/0,1,0,1)				
		4.00	SPT	N=3 (1,1/1,0,1,1)				
		5.00	SPT	N=9 (1,1/2,2,3,2)	4.90	1.92		Grey silty SAND
					5.60	-2.18		Soft grey brown peaty SILT
					5.80	-2.88		Soft grey sandy silt with occasional gravel
					6.10	-3.08		Soft CLAY/SILT with occasional gravel and sand
					6.30	-3.38		Stiff grey brown slightly gravelly CLAY with chalk gravel
					6.60	-3.58		Brown fine SAND
		7.10	SPT	N=19 (2,2/3,5,5,6)	7.10	-3.88		Stiff brown grey gravelly CLAY. Gravel is chalk
		8.50 - 8.90	U	Ublow=74 UU: 168.0 UU: 187.0 UU: 199.0	8.00	-4.38		Very stiff very dark grey slightly gravelly slightly sandy silty calcareous CLAY. Gravel is white fine to medium subangular to rounded chalk and rare fine to medium flint.
		10.00	SPT	N=34 (4,5/8,8,9,9)				

Remarks

Borehole Log

Borehole No. **BH04**

Sheet 2 of 2

Project Name:	Middlegate Road, Kirton	Project No. UK16.2241 B	Co-ords:	-5798E - 6971154N	Hole Type CP
Location:	Kirton, Lincolnshire		Level:	2.72 m AOD	Scale 1:50
Client:	Larkfleet Homes		Dates:	19-10-2018	Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	In Situ Results				
		12.00	SPT	N=45 (6,6/10,10,11,14)				Very stiff very dark grey slightly gravelly slightly sandy silty calcareous CLAY. Gravel is white fine to medium subangular to rounded chalk and rare fine to medium flint.
		13.50 - 13.90	U	Ublow=100				
		14.50	SPT	N=46 (7,7/11,11,12,12)				
					15.00	-5.28		End of Borehole at 15.000m

Remarks

Borehole Log

Borehole No. **BH05**

Sheet 1 of 2

Project Name:	Middlegate Road, Kirton	Project No. UK16.2241 B	Co-ords:	-6117E - 6971344N	Hole Type CP
Location:	Kirton, Lincolnshire		Level:	2.59 m AOD	Scale 1:50
Client:	Larkfleet Homes		Dates:	15-10-2018	Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	In Situ Results				
								TOPSOIL
					0.60	2.59		Firm dark yellowish brown sandy slightly clayey SILT.
		1.20	SPT	N=4 (1,1/1,1,1,1)				
		2.20 - 2.65	D					
		2.20	SPT	N=4 (1,1/1,1,1,1) PSD CL: 3 PSD SI: 34 PSD SA: 62 PSD GR: 0				
		3.20	SPT	N=2 (1,0/1,0,1,0)				
	▼	4.20 - 4.45	D		4.10	1.99		Soft to firm dark brownish grey slightly sandy silty organic CLAY.
		4.20	SPT	N=2 (1,0/1,0,1,0) PSD CL: 34 PSD SI: 51 PSD SA: 15 PSD GR: 0				
		5.20	SPT	N=4 (1,1/1,1,1,1)				
		5.90	SPT	N=11 (1,2/2,3,3,3)	5.70	-1.51		FIrm to soft brown grey gravelly CLAY with sand lenses and rare organics
	▼	6.60	SPT	N=12 (1,1/2,3,3,4)	6.60	-3.11		Medium dense brown clayey SAND with rare gravel
		7.50	SPT	N=23 (2,3/4,6,7,6)	7.20	-4.01		Stiff brown grey gravelly CLAY. Gravel is chalk
		9.00 - 9.45	U	Ublow=90 UU: 208.0 UU: 231.0 UU: 246.0	8.30	-4.61		Very stiff (Very high strength) very dark grey slightly gravelly slightly sandy silty calcareous CLAY. Gravel is white fine to medium subangular to rounded chalk and rare fine to medium flint.

Remarks

Borehole Log

Borehole No. **BH05**

Sheet 2 of 2

Project Name:	Middlegate Road, Kirton	Project No. UK16.2241 B	Co-ords:	-6117E - 6971344N	Hole Type CP
Location:	Kirton, Lincolnshire		Level:	2.59 m AOD	Scale 1:50
Client:	Larkfleet Homes		Dates:	15-10-2018	Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	In Situ Results				
		10.50	SPT	N=28 (4,4/6,8,7,7)				Very stiff (Very high strength) very dark grey slightly gravelly slightly sandy silty calcareous CLAY. Gravel is white fine to medium subangular to rounded chalk and rare fine to medium flint.
		12.00 - 12.20	U	Ublow=90				
		13.50	SPT	N=35 (6,6/7,9,8,11)				
		15.00 - 15.45	U	Ublow=95				
		16.50	SPT	N=37 (6,7/7,10,9,11)				
		18.00	U	Ublow=95 UU: 238.0 UU: 250.0 UU: 261.0				
		19.55	SPT	N=43 (6,7/10,10,11,12)				
					20.00	-5.71		End of Borehole at 20.000m

11 12 13 14 15 16 17 18 19 20

Remarks

AGS

Borehole Log

Borehole No. **BH06**

Sheet 1 of 2

Project Name:	Middlegate Road, Kirton	Project No. UK16.2241 B	Co-ords:	-6043E - 6971134N	Hole Type CP
Location:	Kirton, Lincolnshire		Level:	2.76 m AOD	Scale 1:50
Client:	Larkfleet Homes		Dates:	16-10-2018	Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	In Situ Results				
					0.40	2.76		TOPSOIL
								Firm to stiff brown friable SILT/CLAY (Possibly reworked)
					1.00	2.36		
		1.20 - 1.65	U	Ublow=40				Firm brown sandy clayey SILT with rare grey mottling, orange staining, and ferruginous sandstone.
		2.20	SPT	N=3 (1,1/1,1,1,0)				
		3.20	SPT	N=2 (1,0/1,0,1,0)				
					3.50	1.76		Soft grey SILT
		4.20	SPT	N=2 (1,0/1,0,1,0)				
	▼							
	▽	5.00	SPT	N=6 (1,1/1,1,2,2)	4.90	-0.74		Loose to medium dense fine grey SAND
					5.90	-2.14		Firm to soft grey brown sandy CLAY with rare gravel and sand lenses
		6.20	SPT	N=14 (1,2/2,3,4,5)				
					6.50	-3.14		Stiff to firm grey brown gravelly CLAY. Gravel is chalk
	▼							
		7.70 - 8.00	U	Ublow=60				
	▽	8.00	SPT	N=12 (1,1/2,2,4,4)	8.00	-3.74		Medium dense brown SAND with rare fine gravel
					8.75	-5.24		Stiff to firm grey brown gravelly CLAY. Gravel is chalk
		9.00	SPT	N=25 (2,3/5,7,6,7)				
					9.75	-5.99		Very stiff (Very high strength) dark grey slightly gravelly slightly

Remarks

Borehole Log

Borehole No. **BH06**

Sheet 2 of 2

Project Name:	Middlegate Road, Kirton	Project No. UK16.2241 B	Co-ords:	-6043E - 6971134N	Hole Type CP
Location:	Kirton, Lincolnshire		Level:	2.76 m AOD	Scale 1:50
Client:	Larkfleet Homes		Dates:	16-10-2018	Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	In Situ Results				
		10.50 - 10.95	U	Ublow=85 PI: 23 MC: 14.7				Very stiff (Very high strength) dark grey slightly gravelly slightly sandy silty calcareous CLAY with occasional dark greyish brown mottling. Gravel is white fine to coarse subangular to rounded chalk, light grey fine to coarse subangular to subrounded mudstone, and white and grey flint.
		12.00	SPT	N=30 (5,4/5,7,8,10)				
		13.50 - 13.95	U	Ublow=95 PI: 24 MC: 13.6 UU: 287.0 UU: 306.0 UU: 320.0				
					15.00	-6.99		End of Borehole at 15.000m

11 12 13 14 15 16 17 18 19 20

Remarks

APPENDIX C

Geological Cross Sections

Project Id:	UK16.2241 B	Title:	Site Plan
Project Title:	Middlegate Road, Kirton	Scale:	1:4000
Location:	Kirton, Lincolnshire	Engineer:	Sam Setchell
Client:	Larkfleet Homes	Contractor:	T. Bedford Drilling

Legend Key

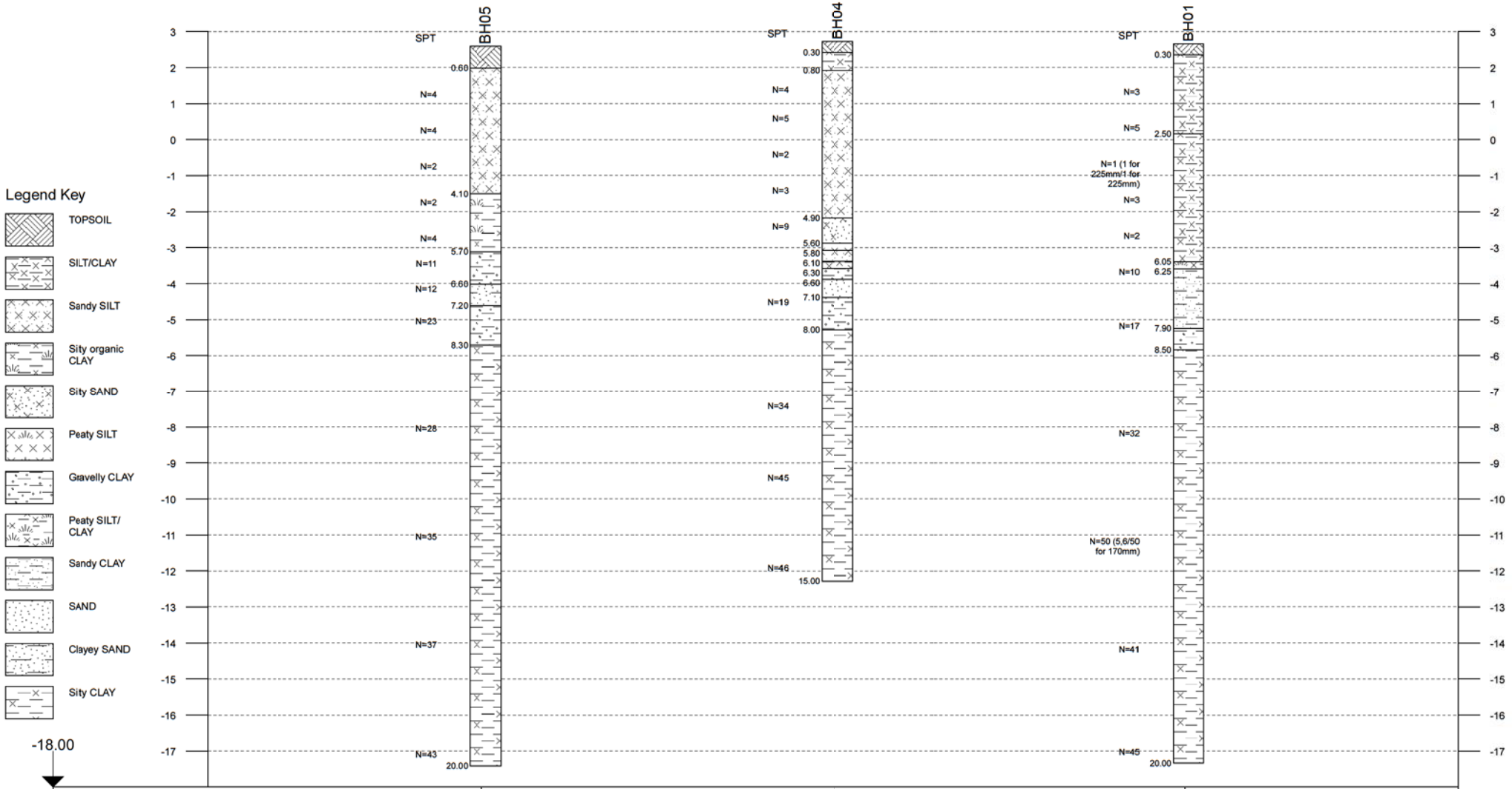
- Sections - Section line 1
- Sections - Section line 2
- Locations By Type - CP

Project No: UK16.2241 B
Location: Kirton, Lincolnshire
Client: Larkfleet Homes

Title: Middlegate Road, Kirton

Engineer: Sam Setchell

Scale
Vertical: 1:156
Horizontal: Not to scale



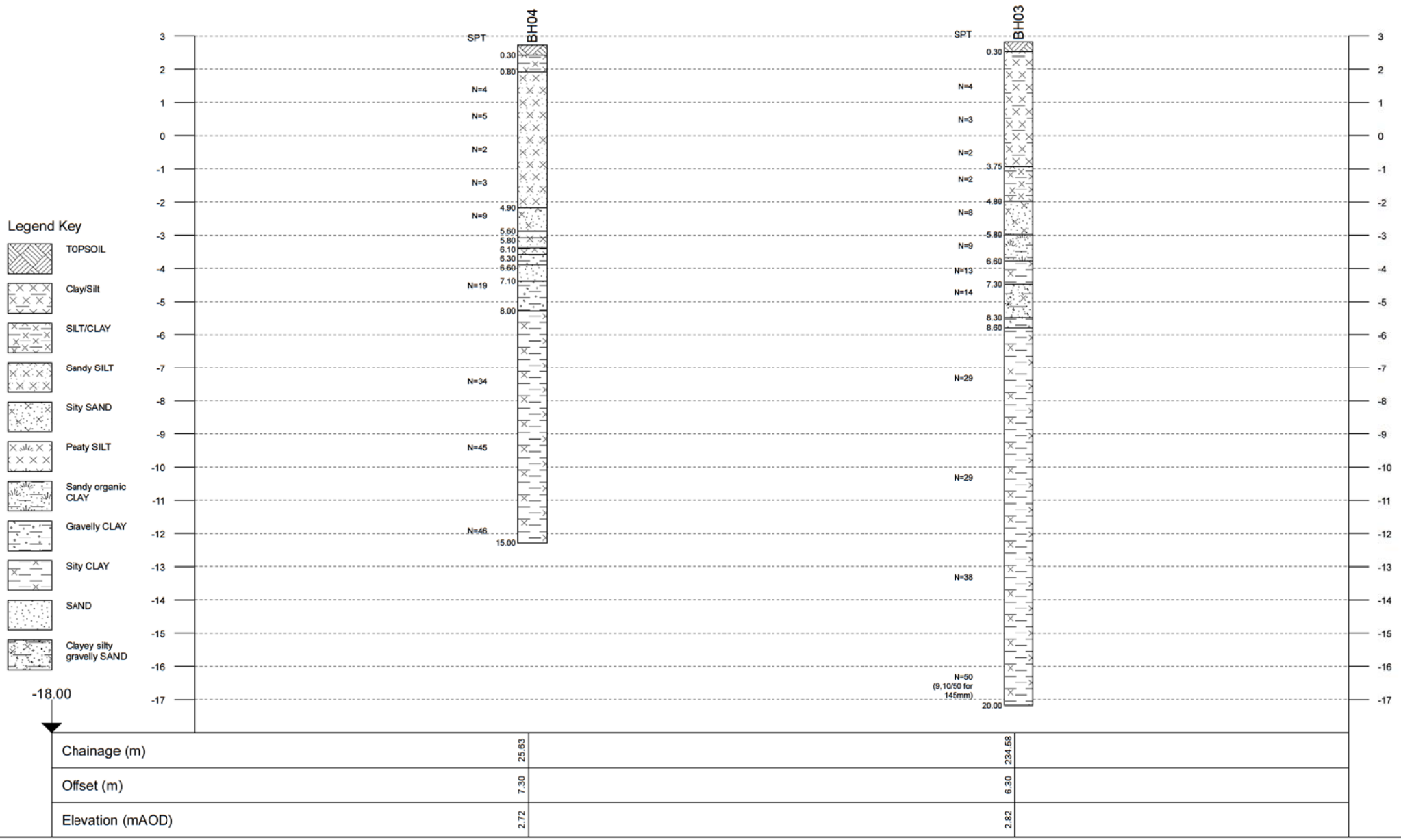
Chainage (m)	4.14	375.21	788.30
Offset (m)	0.47	18.55	4.13
Elevation (mAOD)	2.59	2.72	2.66

Project No: UK16.2241 B
Location: Kirton, Lincolnshire
Client: Larkfleet Homes

Title: Middlegate Road, Kirton

Engineer: Sam Setchell

Scale
Vertical: 1:156
Horizontal: Not to scale



Chainage (m)	25.63	234.58
Offset (m)	7.30	6.30
Elevation (mAOD)	2.72	2.82

APPENDIX D

Laboratory Results-Geotechnical

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 06/11/2018

0998

Contract	**UK16.2241B - Middlegate Road, Kirton**
Serial No.	**S33960**

Client:

Environmental Protection Strategies Ltd
Unit 7
Caxton House
Broad Street
Great Cambourne
Cambridge
CB23 6JN

Soil Property Testing Ltd

15, 16, 18 Halcyon Court, St Margaret's Way, Stukeley Meadows, Huntingdon, Cambridgeshire, PE29 6DG

Tel: 01480 455579
Email: enquiries@soilpropertytesting.com
Website: www.soilpropertytesting.com

Samples Submitted By:

Environmental Protection Strategies Ltd

Samples Labelled:

UK16.2241B - Middlegate Road, Kirton

Approved Signatories:

- ☑ **J.C. Garner B.Eng (Hons) FGS** Technical Director
- ☐ **S.P. Townend FGS** Quality Manager
- ☐ **W. Johnstone** Materials Lab Manager
- ☐ **D. Sabnis** Operations Manager

Date Received: 23/10/2018

Samples Tested Between: 23/10/2018 **and** 06/11/2018

Remarks:

For the attention of Mr S Setchell
Your Reference No: UK16.2241B

Notes:

1 All remaining samples or remnants from this contract will be disposed of after 21 days from today, unless we are notified to the contrary.

2 (a) UKAS - United Kingdom Accreditation Service
(b) Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

3 Tests marked "NOT UKAS ACCREDITED" in this test report are not included in the UKAS Accreditation Schedule for this testing laboratory.

4 This test report may not be reproduced other than in full except with the prior written approval of the issuing laboratory.

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 06/11/2018

0998

Contract	**UK16.2241B - Middlegate Road, Kirton**		
Serial No.	**S33960**	**Target Date**	05/11/2018
Scheduled By	Environmental Protection Strategies Ltd		

SCHEDULE OF LABORATORY TESTS

Schedule Remarks

Bore Hole No.	Type	Sample Ref.	Top Depth	PSD by Hydro inc. Pre-sieve	PSD by Wet Sieve & Hydro	Water Content (BSEN)	Liquid/Plastic Limits	Wet Sieve Preparation	Triaxial Test Multistage	One Dimensional Consolidation																Sample Remarks
BH01	B	3	3.20	1																						
BH01	D	5	6.10			1	1	1																		
BH01	B	4	6.70			1	1	1																		
BH01	U	1	9.20						1																	
BH01	U	3	15.20						1																	
BH01	U	4	18.20						1																	
BH02	B	6	7.90			1	1	1																		
BH02	U	1	10.10						1																	
BH02	U	2	13.10						1																	
BH03	D	5	5.00	1																						
BH03	D	9	6.75			1	1	1																		
BH03	B	7	7.40		1																					
BH03	U	1	8.50						1																	
BH03	U	2	11.50						1																	
BH04	U	2	8.50						1																	
BH05	D	2	2.20	1																						
BH05	D	5	4.20	1																						
BH05	U	1	9.00						1																	
BH05	U	4	18.00						1																	
BH06	U	1	1.20							1																
BH06	U	3	10.50			1	1	1																		
BH06	U	4	13.50				1	1	1																	
Totals				**4**	**1**	**5**	**6**	**6**	**11**	**1**																**End of Schedule**

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 06/11/2018

0998

Contract	**UK16.2241B - Middlegate Road, Kirton**
Serial No.	**S33960**

SUMMARY OF WATER CONTENT, LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole /Pit No.	Depth (m)	Type	Ref.	Water Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasti-city Index (%)	Liquid-ity Index (%)	SAMPLE PREPARATION				Description	CLASS
									Method	Ret'd 0.425mm (%)	Corr'd W/C <0.425mm	Curing Time (hrs)		
BH01	6.10 - 6.20	D	5	**57.1**	51	35	16	1.38	Wet Sieved	11 (M)	64.1*	24	Very soft dark grey slightly gravelly slightly sandy slightly peaty organic CLAY. Gravel is fine to medium black flint.	MHO
BH01	6.70 - 8.20	B	4	**14.1**	18	9	9	0.57	Wet Sieved	32 (M)	20.7*	30	Very soft light olive brown slightly gravelly sandy silty slightly organic CLAY with occasional grey mottling. Gravel is brown, black and white fine to coarse angular to subrounded flint.	CLO
BH02	7.90 - 8.40	B	6	**18.9**	39	16	23	0.12	Wet Sieved	6 (M)	20.1*	24	Firm olive slightly gravelly slightly sandy silty CLAY with occasional dark grey mottling, and orange staining. Gravel is fine to coarse chalk and flint.	CI
BH03	6.75 - 7.20	D	9	**16.4**	27	12	15	0.29	Wet Sieved	29 (M)	23.1*	24	Soft light olive brown slightly gravelly slightly sandy silty CLAY with rare bluish grey mottling. Gravel is fine to medium chalk and flint.	CL
BH06	10.50	U	3	**14.7**	40	17	23	-0.10	Wet Sieved	30 (M)	21.0*	24	Very stiff dark grey slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse chalk and flint.	CI
BH06	13.50	U	4	**13.6**	42	18	24	-0.18	Wet Sieved	11 (M)	15.3*	24	Very stiff (Very high strength) dark grey slightly gravelly slightly sandy silty calcareous CLAY with occasional dark greyish brown mottling. Gravel is white fine to coarse subangular to rounded chalk, light grey fine to coarse subangular to subrounded mudstone, and white and grey flint.	CI

Method Of Preparation: BS EN ISO: 17892-1: 2014 & BS 1377: Part 2:1990:4.2

Method of Test: BS EN ISO: 17892-1: 2014 & BS 1377: Part 2:1990:3.2, 4.4, 5.3, 5.4

Type of Sample Key: U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter

Comments: *Corrected water content assume material greater than 0.425mm is non-porous. See BS1377: Part 2: 1990 Clause 3 Note 1.

Remarks to Include: Sample disturbance, loss of water, variation from test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110C

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Contract	**UK16.2241B - Middlegate Road, Kirton**
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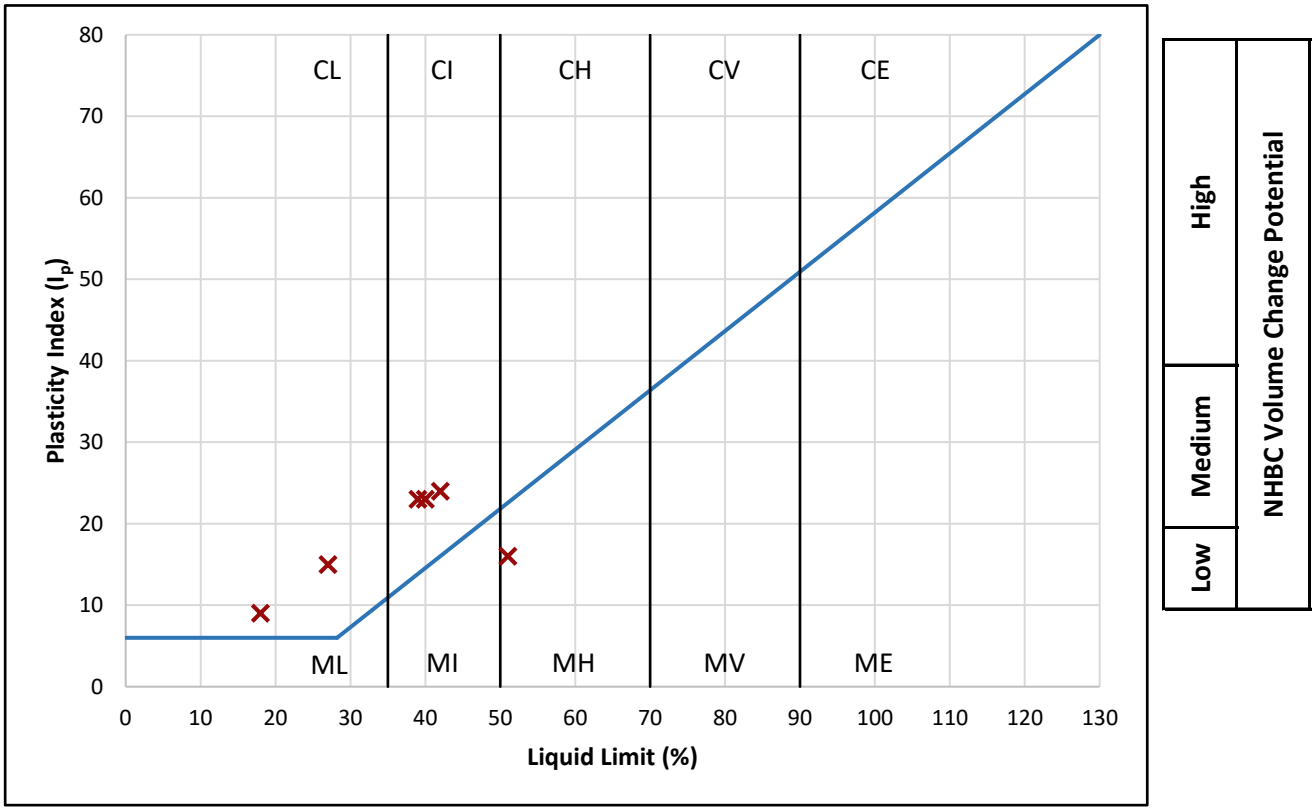
PLOT OF PLASTICITY INDEX AGAINST LIQUID LIMIT USING CASAGRANDE CLASSIFICATION CHART

Plasticity				
Low	Medium	High	Very High	Extremely High



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS1377: Part 2: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	Volume Change Potential: NHBC Standards Chapter 4.2 Unmodified Plasticity Index

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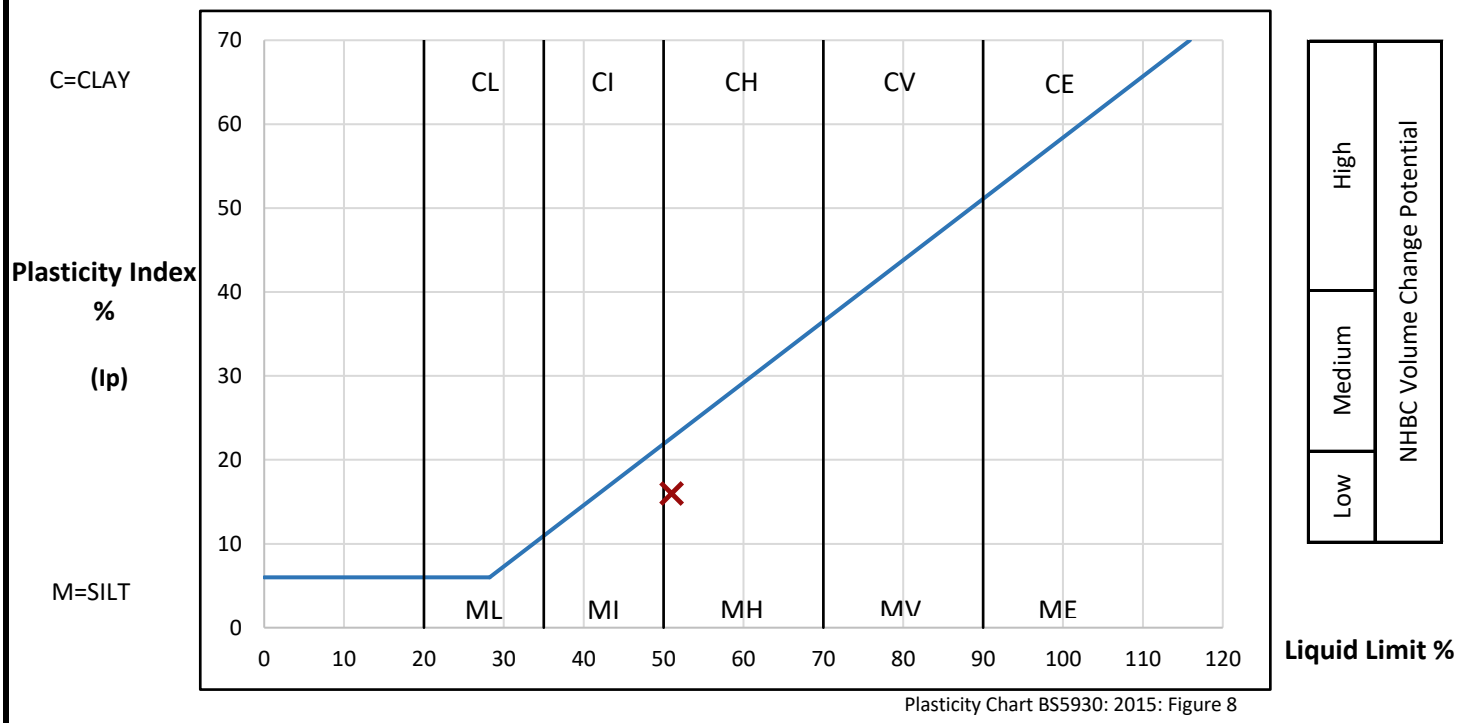
DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
BH01	6.10 - 6.20	D	5	57.1	Very soft dark grey slightly gravelly slightly sandy slightly peaty organic CLAY. Gravel is fine to medium black flint.	Material noted as plotting below the A-Line Specimen oven dried at 50°C due to high organic content.

PREPARATION				Liquid Limit	51 %
Method of preparation	Wet sieved over 0.425mm sieve			Plastic Limit	35 %
Sample retained 0.425mm sieve	(Measured)	11 %		Plasticity Index	16 %
Corrected water content for material passing 0.425mm	Not reported			Liquidity Index	1.38
Sample retained 2mm sieve	(Measured)	7 %		NHBC Modified (I'p)	14 %
Curing time	24 hrs	Clay Content	Not analysed	Derived Activity	Not analysed



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:	Corrected water content assume material greater than 0.425mm non-porous. See BS1377: Part2: 1990 Clause 3 Note 1 Volume Change Potential: NHBC Standards Chapter 4.2 Unmodified Plasticity Index Note: Modified Plasticity Index I'p = Ip x (% less than 425microns/100)

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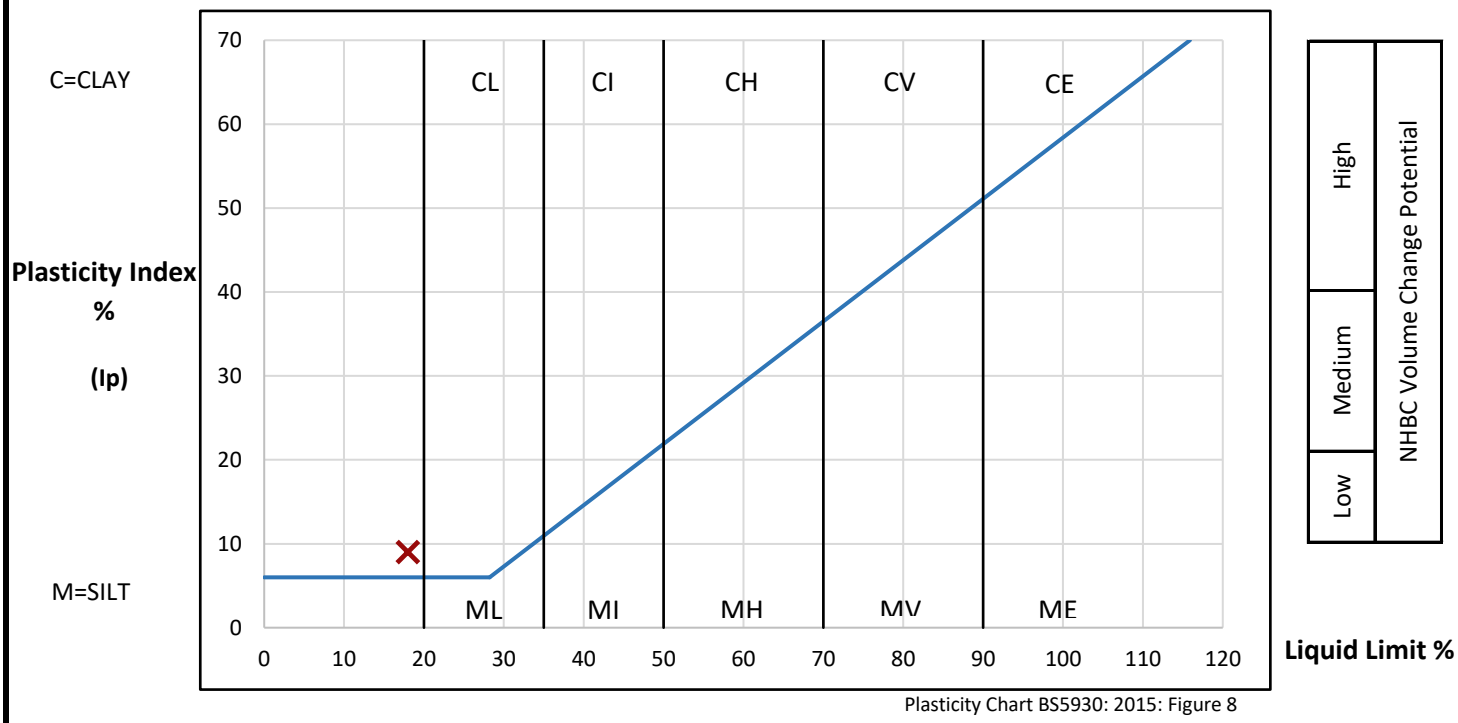
DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
BH01	6.70 - 8.20	B	4	14.1	Very soft light olive brown slightly gravelly sandy silty slightly organic CLAY with occasional grey mottling. Gravel is brown, black and white fine to coarse angular to subrounded flint.	

PREPARATION				Liquid Limit	18 %
Method of preparation	Wet sieved over 0.425mm sieve			Plastic Limit	9 %
Sample retained 0.425mm sieve	(Measured)	32 %		Plasticity Index	9 %
Corrected water content for material passing 0.425mm		20.7 %		Liquidity Index	0.57
Sample retained 2mm sieve	(Measured)	20 %		NHBC Modified (I'p)	6 %
Curing time	30 hrs	Clay Content	Not analysed	Derived Activity	Not analysed



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:	Corrected water content assume material greater than 0.425mm non-porous. See BS1377: Part2: 1990 Clause 3 Note 1 Volume Change Potential: NHBC Standards Chapter 4.2 Unmodified Plasticity Index Note: Modified Plasticity Index I'p = Ip x (% less than 425microns/100)

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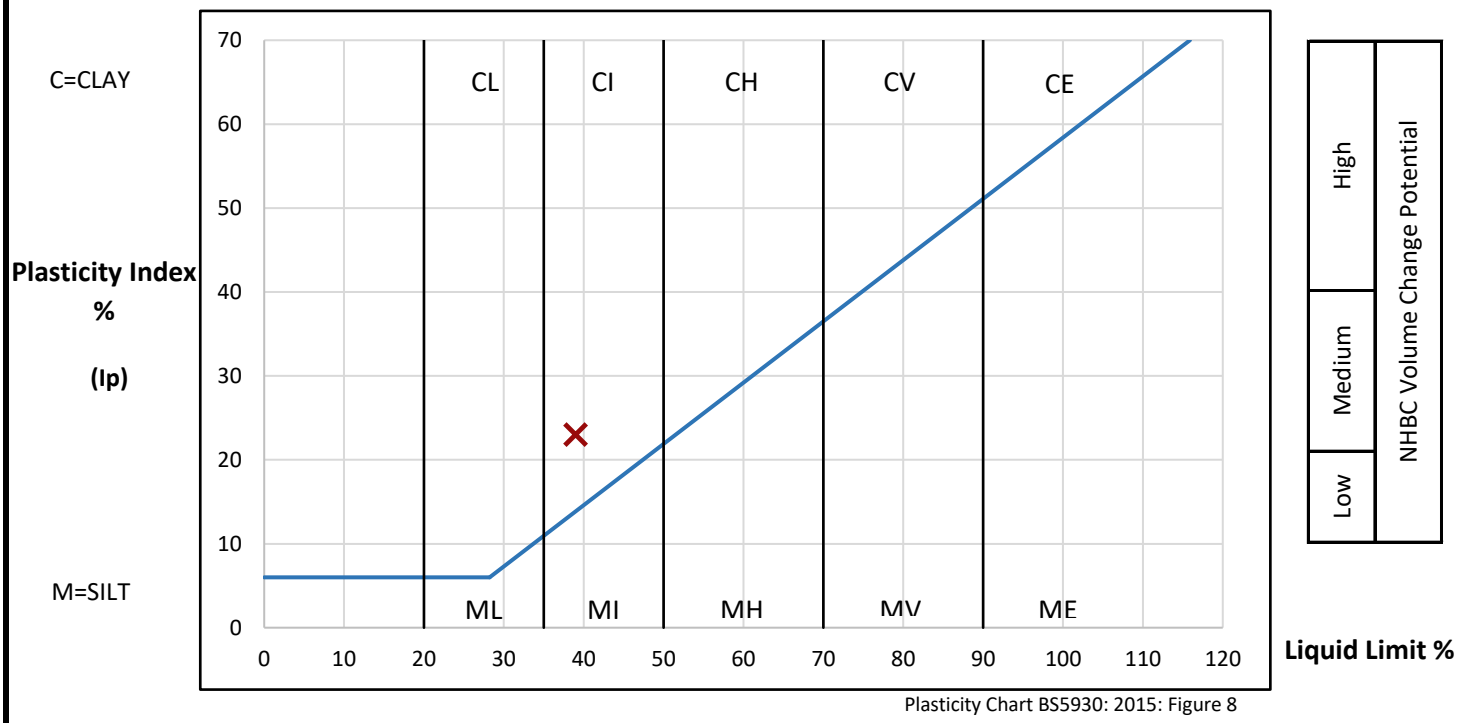
DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
BH02	7.90 - 8.40	B	6	18.9	Firm olive slightly gravelly slightly sandy silty CLAY with occasional dark grey mottling, and orange staining. Gravel is fine to coarse chalk and flint.	

PREPARATION				Liquid Limit	39 %
Method of preparation	Wet sieved over 0.425mm sieve			Plastic Limit	16 %
Sample retained 0.425mm sieve	(Measured)	6 %		Plasticity Index	23 %
Corrected water content for material passing 0.425mm		20.1 %		Liquidity Index	0.13
Sample retained 2mm sieve	(Measured)	4 %		NHBC Modified (I'p)	22 %
Curing time	24 hrs	Clay Content	Not analysed	Derived Activity	Not analysed



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:	Corrected water content assume material greater than 0.425mm non-porous. See BS1377: Part2: 1990 Clause 3 Note 1 Volume Change Potential: NHBC Standards Chapter 4.2 Unmodified Plasticity Index Note: Modified Plasticity Index I'p = Ip x (% less than 425microns/100)

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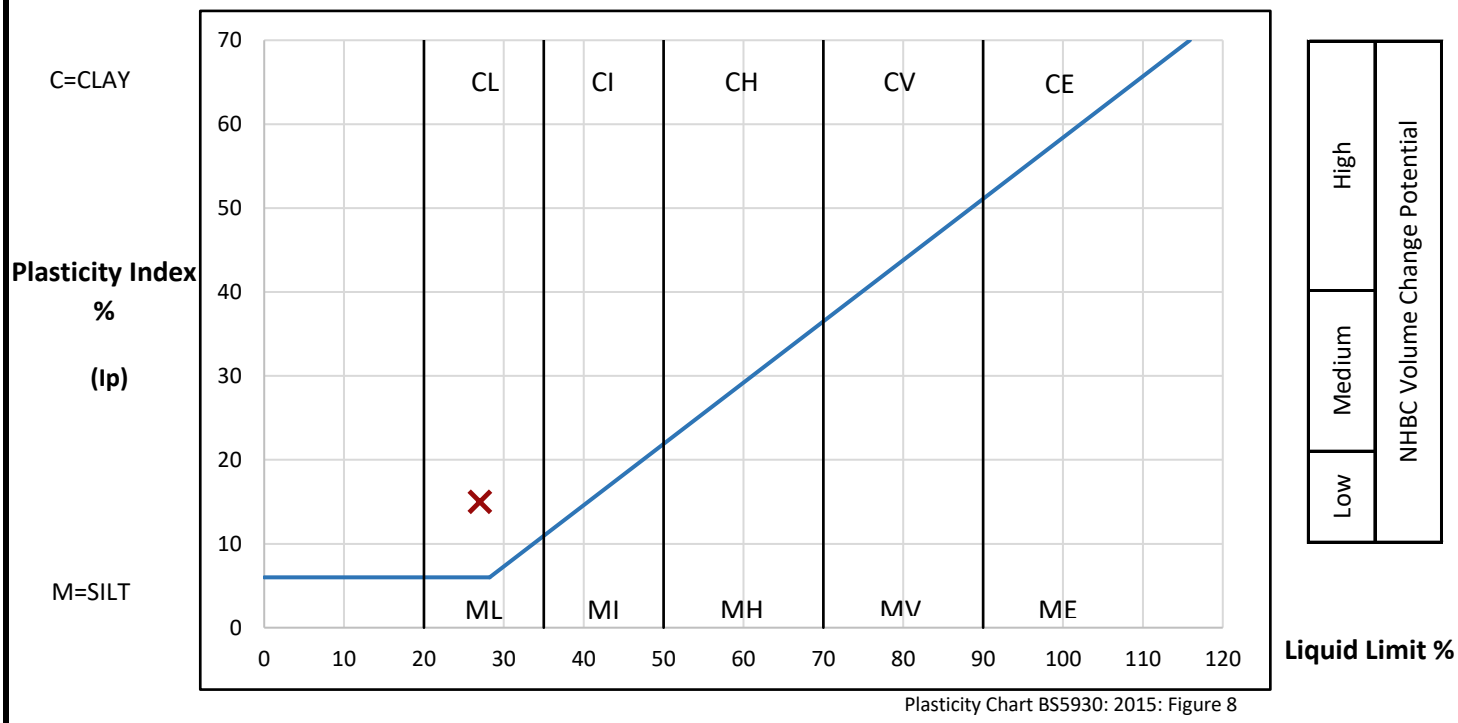
DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
BH03	6.75 - 7.20	D	9	16.4	Soft light olive brown slightly gravelly slightly sandy silty CLAY with rare bluish grey mottling. Gravel is fine to medium chalk and flint.	

PREPARATION				Liquid Limit	27 %
Method of preparation	Wet sieved over 0.425mm sieve			Plastic Limit	12 %
Sample retained 0.425mm sieve	(Measured)	29 %		Plasticity Index	15 %
Corrected water content for material passing 0.425mm		23.1 %		Liquidity Index	0.29
Sample retained 2mm sieve	(Measured)	8 %		NHBC Modified (I'p)	11 %
Curing time	24 hrs	Clay Content	Not analysed	Derived Activity	Not analysed



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:	Corrected water content assume material greater than 0.425mm non-porous. See BS1377: Part2: 1990 Clause 3 Note 1 Volume Change Potential: NHBC Standards Chapter 4.2 Unmodified Plasticity Index Note: Modified Plasticity Index I'p = Ip x (% less than 425microns/100)

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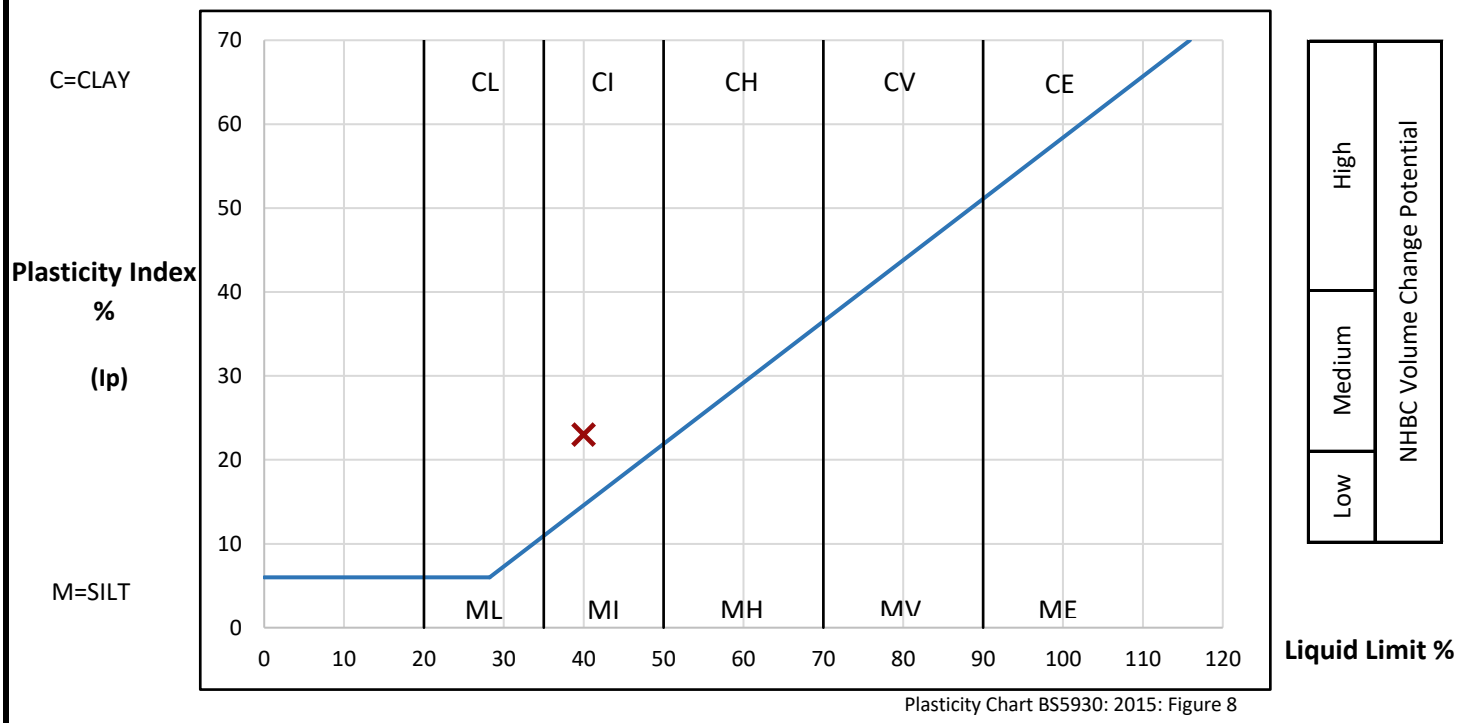
Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
BH06	10.50	U	3	14.7	Very stiff dark grey slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse chalk and flint.	

PREPARATION				Liquid Limit	40 %
Method of preparation	Wet sieved over 0.425mm sieve			Plastic Limit	17 %
Sample retained 0.425mm sieve	(Measured)	30 %		Plasticity Index	23 %
Corrected water content for material passing 0.425mm		21.0 %		Liquidity Index	-0.10
Sample retained 2mm sieve	(Measured)	7 %		NHBC Modified (I'p)	16 %
Curing time	24 hrs	Clay Content	Not analysed	Derived Activity	Not analysed



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:	Corrected water content assume material greater than 0.425mm non-porous. See BS1377: Part2: 1990 Clause 3 Note 1 Volume Change Potential: NHBC Standards Chapter 4.2 Unmodified Plasticity Index Note: Modified Plasticity Index I'p = Ip x (% less than 425microns/100)

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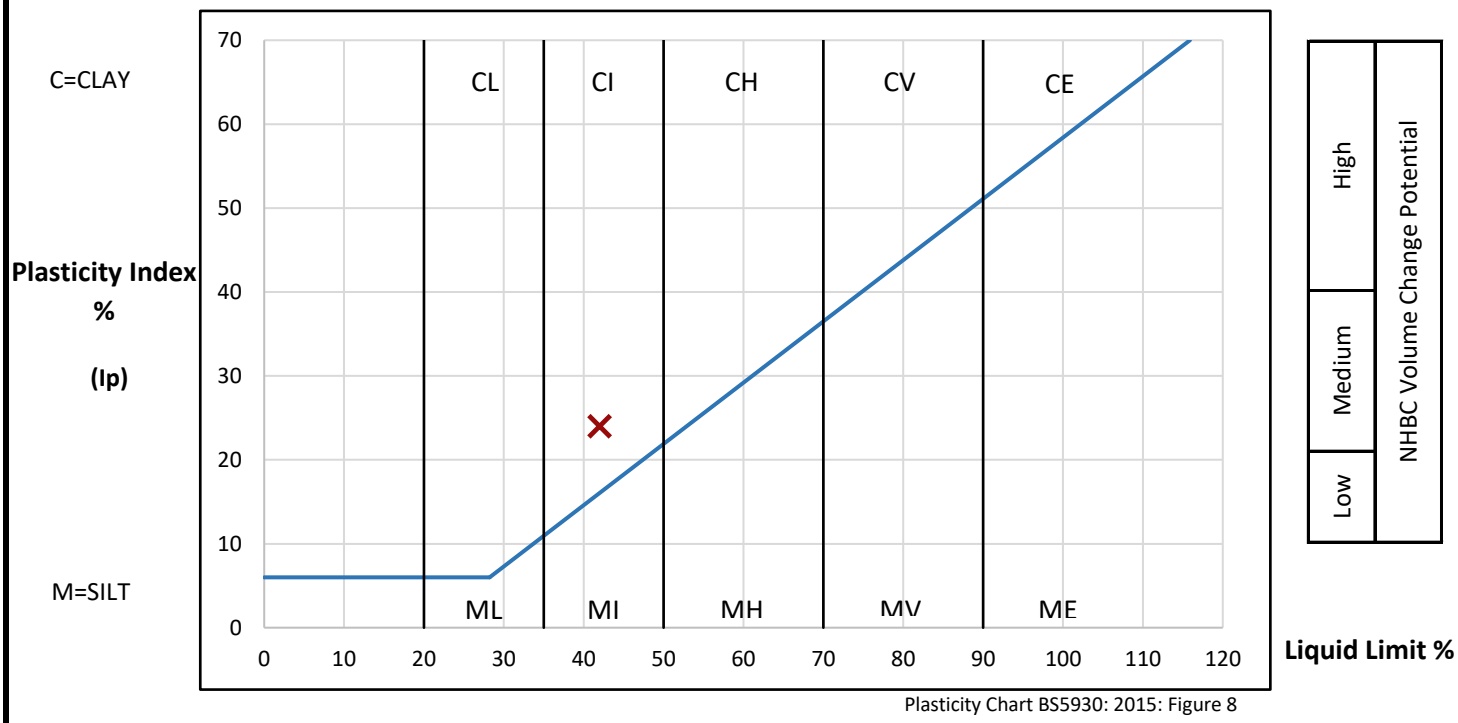
DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
BH06	13.50	U	4	13.6	Very stiff (Very high strength) dark grey slightly gravelly slightly sandy silty calcareous CLAY with occasional dark greyish brown mottling. Gravel is white fine to coarse subangular to rounded chalk, light grey fine to coarse subangular to subrounded mudstone, and white and	

PREPARATION				Liquid Limit	42 %
Method of preparation		Wet sieved over 0.425mm sieve		Plastic Limit	18 %
Sample retained 0.425mm sieve	(Measured)	11 %		Plasticity Index	24 %
Corrected water content for material passing 0.425mm		15.3 %		Liquidity Index	-0.18
Sample retained 2mm sieve	(Measured)	8 %		NHBC Modified (I'p)	21 %
Curing time	24 hrs	Clay Content	Not analysed	Derived Activity	Not analysed



Plasticity Chart BS5930: 2015: Figure 8

Method of Preparation:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS 1377: Part 2: 1990: 3.2, 4.4, 5.3, 5.4
Type of Sample Key:	U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:	Corrected water content assume material greater than 0.425mm non-porous. See BS1377: Part2: 1990 Clause 3 Note 1 Volume Change Potential: NHBC Standards Chapter 4.2 Unmodified Plasticity Index Note: Modified Plasticity Index I'p = Ip x (% less than 425microns/100)

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Contract	**UK16.2241B - Middlegate Road, Kirton**
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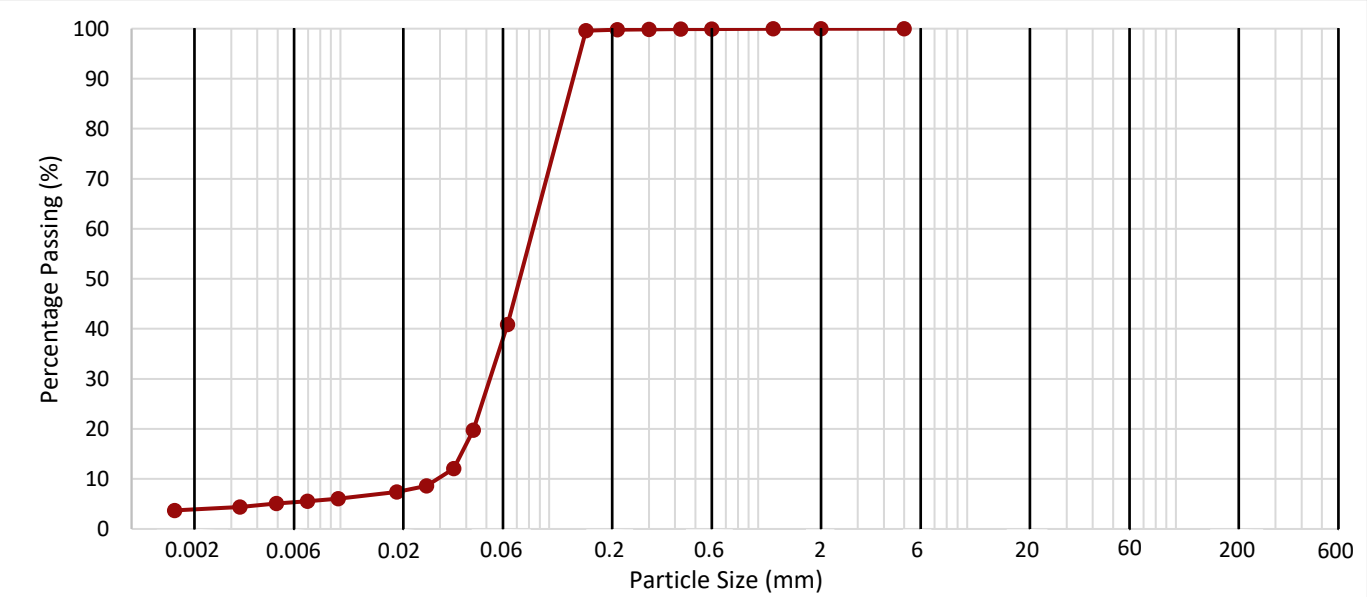
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Pit No.	Depth (m)	Sample Type	Sample Reference	Description	Remarks
BH01	3.20 - 3.70	B	3	Brown sandy slightly clayey SILT.	

Method of Test:	Hydrometer + Pre-sieve	Method of Pretreatment:	Not required



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

Hydrometer	Particle Size (mm)	Passing (%)	Silt by Dry Mass (%)	Clay by Dry Mass (%)
	0.0432	20	37	
	0.0348	12		
	0.0259	9		
	0.0186	7		4
	0.0098	6		
	0.0069	6		
	0.0049	5		
	0.0033	4		
	0.0016	4		

Sieve Size (mm)	Passing (%)	Sand By Dry Mass (%)
2.00	100	59
1.18	100	
0.600	100	
0.425	100	
0.300	100	
0.212	100	
0.150	100	
0.063	41	

Fines By Dry Mass (%)	
<0.063mm	41

Sieve Size (mm)	Passing (%)	Gravel By Dry Mass (%)
150		0
125		
90		
63		
50		
37.5		
28		
20		
14		
10		
6.3		
5	100	

Method of Preparation: BS1377: Part 1: 2016: 8.3 & 8.4.5
Method of test: BS1377: Part2: 1990: 9.2, 9.5
Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:

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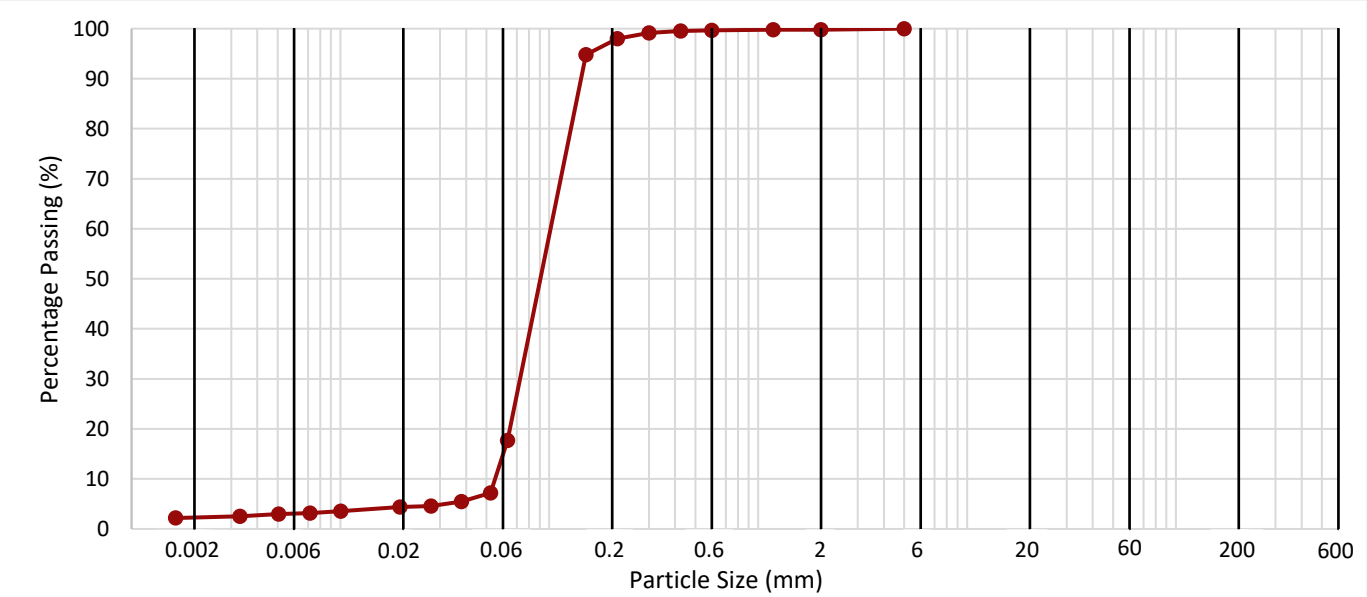
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Pit No.	Depth (m)	Sample Type	Sample Reference	Description	Remarks
BH03	5.00 - 5.45	D	5	Brown silty slightly clayey SAND.	

Method of Test:	Hydrometer + Pre-sieve	Method of Pretreatment:	Not required



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

Hydrometer	Particle Size (mm)	Passing (%)	Silt by Dry Mass (%)	Clay by Dry Mass (%)
	0.0524	7	16	
	0.0380	5		
	0.0272	5		
	0.0193	4		2
	0.0100	4		
	0.0071	3		
	0.0051	3		
	0.0033	3		
	0.0016	2		

Sieve Size (mm)	Passing (%)	Sand By Dry Mass (%)
2.00	100	82
1.18	100	
0.600	100	
0.425	100	
0.300	99	
0.212	98	
0.150	95	
0.063	18	

Fines By Dry Mass (%)	
<0.063mm	18

Sieve Size (mm)	Passing (%)	Gravel By Dry Mass (%)
150		0
125		
90		
63		
50		
37.5		
28		
20		
14		
10		
6.3		
5	100	

Method of Preparation: BS1377: Part 1: 2016: 8.3 & 8.4.5
Method of test: BS1377: Part2: 1990: 9.2, 9.5
Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:

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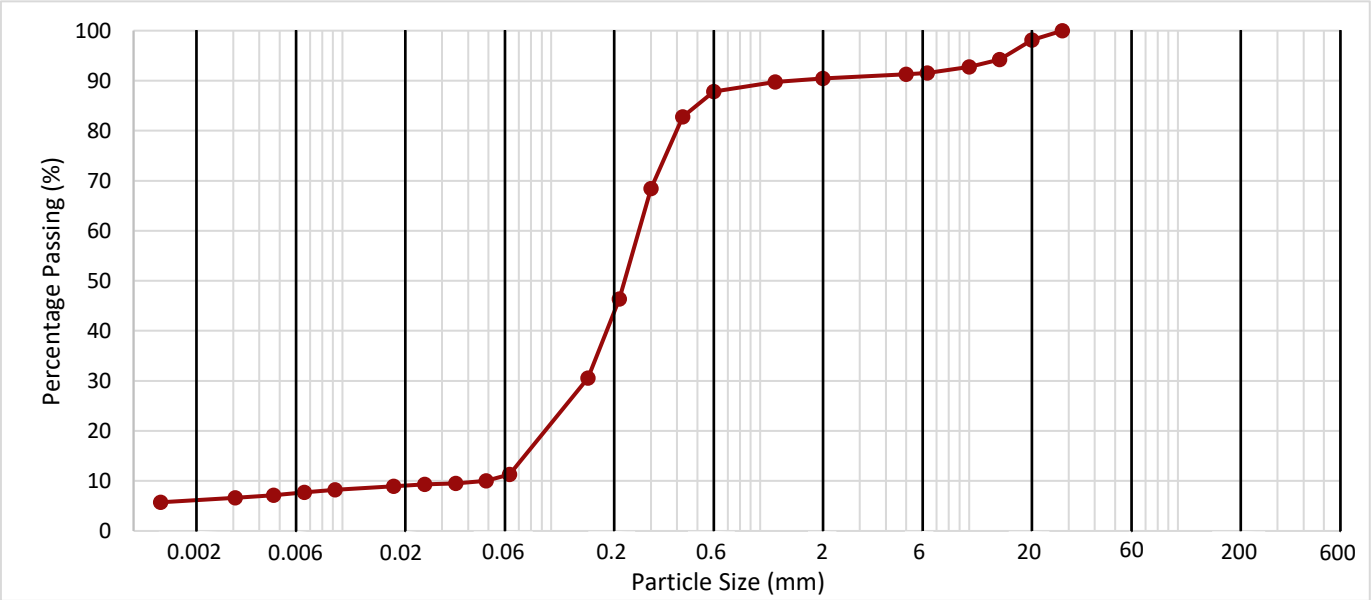
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Pit No.	Depth (m)	Sample Type	Sample Reference	Description	Remarks
BH03	7.40 - 7.90	B	7	Brown gravelly silty clayey SAND. Gravel is brown, black and white angular to subangular flint and occasional white and brown subrounded quartzite.	

Method of Test:	Wet Sieve + Hydrometer	Method of Pretreatment:	Not required



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

Hydrometer	Particle Size (mm)	Passing (%)	Silt by Dry Mass (%)	Clay by Dry Mass (%)
	0.0488	10	5	
	0.0349	9		
	0.0247	9		
	0.0176	9		6
	0.0092	8		
	0.0066	8		
	0.0047	7		
	0.0031	7		
	0.0013	6		

Sieve Size (mm)	Passing (%)	Sand By Dry Mass (%)
2.00	90	79
1.18	90	
0.600	88	
0.425	83	
0.300	68	
0.212	46	
0.150	31	
0.063	11	

Fines By Dry Mass (%)	
<0.063mm	11

Sieve Size (mm)	Passing (%)	Gravel By Dry Mass (%)
150		10
125		
90		
63		
50		
37.5		
28	100	
20	98	
14	94	
10	93	
6.3	92	
5	91	

Method of Preparation: BS1377: Part 1: 2016: 8.3 & 8.4.5
Method of test: BS1377: Part2: 1990: 9.2, 9.5
Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:

TEST REPORT

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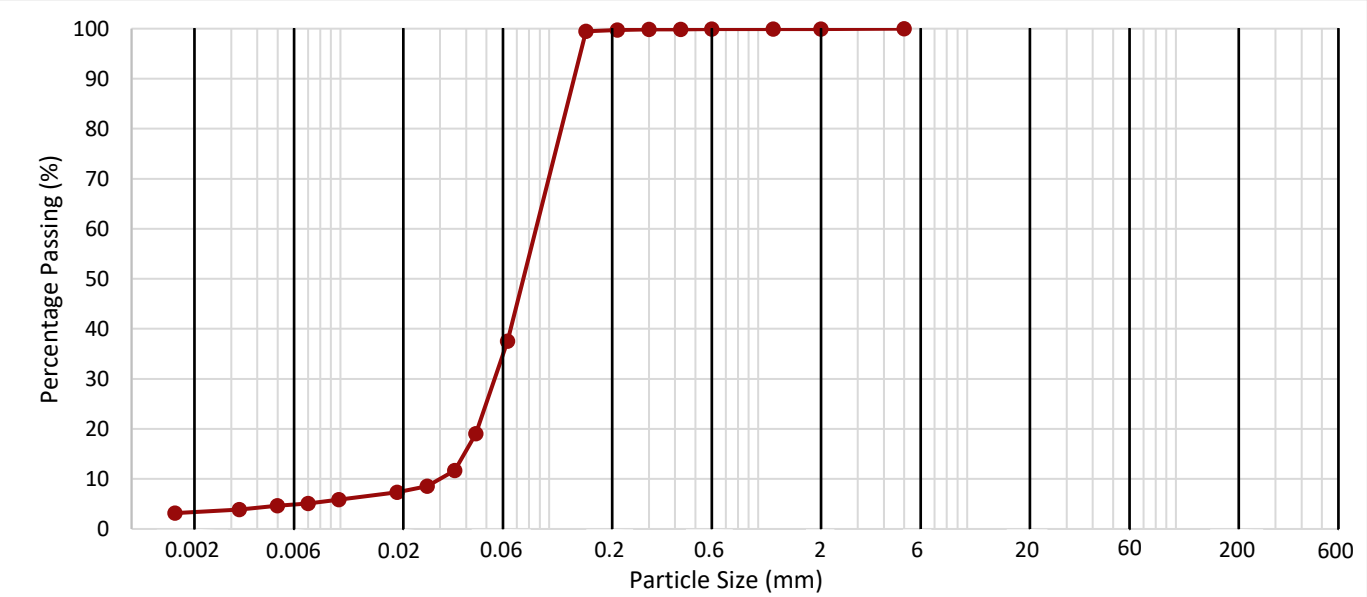
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Pit No.	Depth (m)	Sample Type	Sample Reference	Description	Remarks
BH05	2.20 - 2.65	D	2	Dark yellowish brown sandy slightly clayey SILT.	

Method of Test:	Hydrometer + Pre-sieve	Method of Pretreatment:	Not required



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

Hydrometer	Particle Size (mm)	Passing (%)	Silt by Dry Mass (%)	Clay by Dry Mass (%)
	0.0446	19	35	
	0.0353	12		
	0.0260	9		
	0.0187	7		3
	0.0098	6		
	0.0070	5		
	0.0050	5		
	0.0033	4		
	0.0016	3		

Sieve Size (mm)	Passing (%)	Sand By Dry Mass (%)
2.00	100	62
1.18	100	
0.600	100	
0.425	100	
0.300	100	
0.212	100	
0.150	99	
0.063	38	

Fines By Dry Mass (%)	
<0.063mm	38

Sieve Size (mm)	Passing (%)	Gravel By Dry Mass (%)
150		0
125		
90		
63		
50		
37.5		
28		
20		
14		
10		
6.3		
5	100	

Method of Preparation: BS1377: Part 1: 2016: 8.3 & 8.4.5
Method of test: BS1377: Part2: 1990: 9.2, 9.5
Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 06/11/2018

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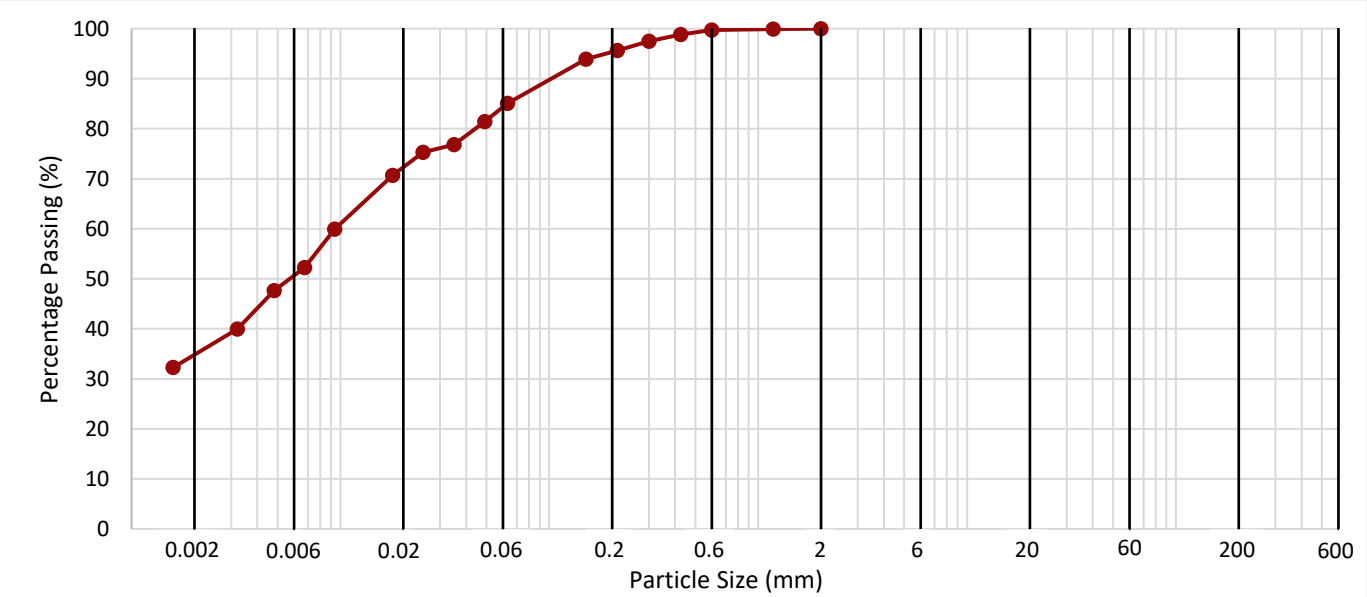
Contract	**UK16.2241B - Middlegate Road, Kirton**
Serial No.	**S33960**

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Pit No.	Depth (m)	Sample Type	Sample Reference	Description	Remarks
BH05	4.20 - 4.45	D	5	Soft dark brownish grey slightly sandy silty organic CLAY.	

Method of Test:	Hydrometer + Pre-sieve	Method of Pretreatment:	Tested from natural - pretreatment for organics not carried out



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

Hydrometer

Particle Size (mm)	Passing (%)	Silt by Dry Mass (%)
0.0491	81	51
0.0351	77	
0.0249	75	
0.0178	71	Clay by Dry Mass (%)
0.0094	60	
0.0067	52	
0.0048	48	34
0.0032	40	
0.0016	32	

Sieve Size (mm)	Passing (%)	Sand By Dry Mass (%)
2.00	100	15
1.18	100	
0.600	100	
0.425	99	
0.300	97	
0.212	96	
0.150	94	
0.063	85	

Fines By Dry Mass (%)	
<0.063mm	85

Sieve Size (mm)	Passing (%)	Gravel By Dry Mass (%)
150		0
125		
90		
63		
50		
37.5		
28		
20		
14		
10		
6.3		
5		

Method of Preparation: BS1377: Part 1: 2016: 8.3 & 8.4.5
Method of test: BS1377: Part2: 1990: 9.2, 9.5
Type of Sample Key: U=Undisturbed, B=Bulk, D=Disturbed, J=Jar, W=Water, SPT=Split Spoon Sample, C=Core Cutter
Comments:

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UKAS TESTING

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Contract	**UK16.2241B - Middlegate Road, Kirton**
Serial No.	**S33960**

DETERMINATION OF DENSITY, WATER CONTENT AND UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASURMENT OF PORE PRESSURE

Borehole /Pit No.	Depth (m)	Type	Reference	Water Content (%)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)	Lateral Pressure (kPa)	Deviator Stress (kPa)	Shear Stress (kPa)	Mohrs Circle Analysis Cu (kPa)	Mohrs Circle Analysis Ø degrees	Description
BH01	9.20	U	1	16.4	2.18	1.87	187 373 558	468 489 514	234 245 257	209	3.3	Very stiff (Very high strength) dark grey slightly gravelly slightly sandy silty calcareous CLAY with occasional dark greyish brown mottling. Gravel is white fine to coarse subangular to rounded chalk.
BH01	15.20	U	3	16.1	2.22	1.91	308 607 804	511 538 548	256 269 274	236	2.0	Very stiff (Very high strength) dark grey slightly gravelly slightly sandy silty calcareous CLAY with occasional dark greyish brown mottling. Gravel is white fine to coarse subangular to rounded chalk and rare fine to coarse flint.
BH01	18.20	U	4	14.4	2.21	1.93	367 604 806	664 692 704	332 346 352	302	2.5	Hard (Eztremely high strength) dark grey slightly gravelly slightly sandy silty calcareous CLAY with occasional dark greyish brown mottling. Gravel is white fine to coarse subangular to rounded chalk and rare flint.
BH02	10.10	U	1	15.6	2.17	1.88	200 404 598	428 457 483	214 229 242	187	3.8	Very stiff (Very high strength) dark grey slightly gravelly slightly sandy silty calcareous CLAY with occasional dark greyish brown mottling, and rare decayed roots. Gravel is white fine to coarse subangular to rounded chalk and light grey mudstone.
BH02	13.10	U	2	14.9	2.17	1.89	265 531 794	460 523 562	230 262 281	188	5.0	Very stiff (Very high strength) dark grey slightly gravelly slightly sandy silty calcareous CLAY. Gravel is white fine to coarse subangular to rounded chalk and rare fine to medium flint.
BH03	8.50	U	1	17.6	2.17	1.85	170 340 513	222 264 290	111 132 145	87	5.2	Stiff (High strength) very dark grey slightly gravelly slightly sandy silty calcareous CLAY. Gravel is white fine to medium subangular to rounded chalk and rare fine to coarse flint.
BH03	11.50	U	2	16.3	2.16	1.86	232 459 692	406 451 491	203 226 246	166	4.9	Very stiff (Very high strength) brown slightly gravelly slightly sandy silty calcareous CLAY. Gravel is white fine to medium chalk and flint.

Method of Preparation:	BS 1377: Part 1: 1990: 7.4.2 & 8, Part 2: 1990: 7.2, Part 7: 1990: 8.3
Method of Test:	BS 1377: Part 2: 1990:3 Determination of Moisture Content, Part2: 1990:7 Determination of Density, Part 7: 1990: 8 Undrained Shear Strenth, 9 Multistage Loading
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	
Remarks to Include:	Sample disturbance, loss of moisture, variation from test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110°C

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UKAS TESTING

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Contract	**UK16.2241B - Middlegate Road, Kirton**
Serial No.	**S33960**

DETERMINATION OF DENSITY, WATER CONTENT AND UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASURMENT OF PORE PRESSURE

Borehole /Pit No.	Depth (m)	Type	Reference	Water Content (%)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)	Lateral Pressure (kPa)	Deviator Stress (kPa)	Shear Stress (kPa)	Mohrs Circle Analysis Cu (kPa)	Mohrs Circle Analysis Ø degrees	Description
BH04	8.50	U	2	15.8	2.23	1.93	173 344 512	336 374 398	168 187 199	140	4.8	Very stiff (Very high strength) dark grey slightly gravelly slightly sandy silty calcareous CLAY. Gravel is white fine to medium subangular to rounded chalk.
BH05	9.00	U	1	16.8	2.21	1.89	180 364 544	416 462 492	208 231 246	172	5.4	Very stiff (Very high strength) very dark grey slightly gravelly slightly sandy silty calcareous CLAY. Gravel is white fine to medium subangular to rounded chalk and rare fine to medium flint.
BH05	18.00	U	4	15.4	2.16	1.87	361 597 801	475 499 521	238 250 261	208	2.8	Very stiff (Very high strength) very dark grey slightly gravelly slightly sandy silty calcareous CLAY. Gravel is white fine to medium subangular to rounded chalk.
BH06	13.50	U	4	13.6	2.18	1.92	272 541 805	574 612 639	287 306 320	255	3.3	Very stiff (Very high strength) dark grey slightly gravelly slightly sandy silty calcareous CLAY with occasional dark greyish brown mottling. Gravel is white fine to coarse subangular to rounded chalk, light grey fine to coarse subangular to subrounded mudstone, and white and grey flint.

Method of Preparation:	BS 1377: Part 1: 1990: 7.4.2 & 8, Part 2: 1990: 7.2, Part 7: 1990: 8.3
Method of Test:	BS 1377: Part 2: 1990:3 Determination of Moisture Content, Part2: 1990:7 Determination of Density, Part 7: 1990: 8 Undrained Shear Strenth, 9 Multistage Loading
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	
Remarks to Include:	Sample disturbance, loss of moisture, variation from test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110°C

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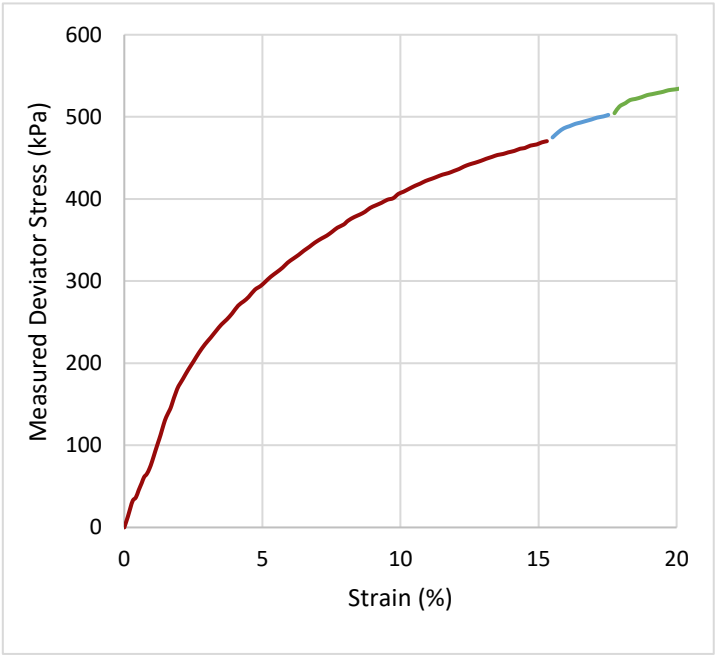
Contract	**UK16.2241B - Middlegate Road, Kirton**
Serial No.	**S33960**

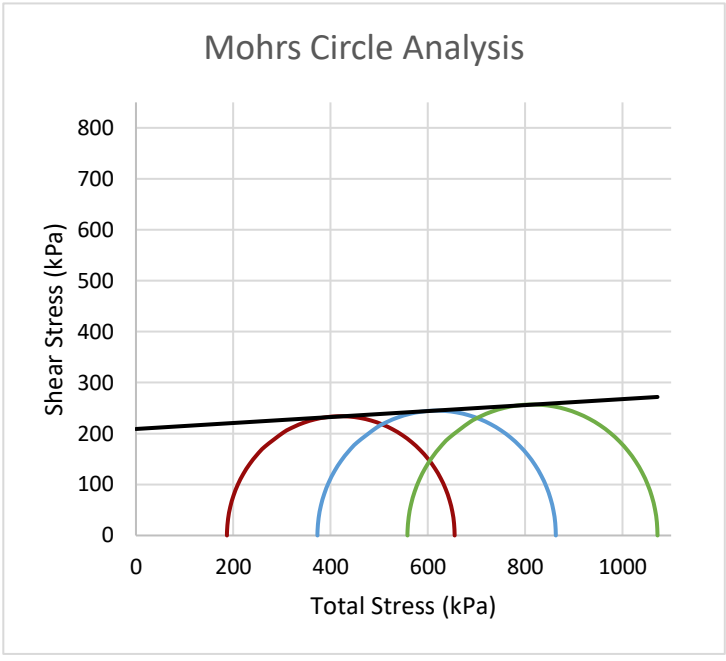
DETERMINATION OF UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

Borehole /Pit No.	Depth (m)	Type	Reference	Description	Remarks
BH01	9.20	U	1	Very stiff (Very high strength) dark grey slightly gravelly slightly sandy silty calcareous CLAY with occasional dark greyish brown mottling. Gravel is white fine to coarse subangular to rounded chalk.	Coarse gravel noted in sample after testing.

Initial Specimen	Height (mm)	Diameter (mm)	Weight (g)	Water Content (%)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)
Depth of Top of Specimen (m) 9.27	199.0	102.3	3574	16.4	2.18	1.87

TEST INFORMATION	Rate of Strain	2.0	% per Min	Rubber Membrane Thickness	0.6 mm





Specimen at failure	Measured Cell Pressure, σ3 (kPa)	Strain at Failure (%)	Stress Corrections (kPa)		Corrected Max. Deviator Stress, (σ1-σ3)f (kPa)	Shear Stress Cu, ½(σ1-σ3)f (kPa)	Mohrs Circle Analysis	
			Rubber Membrane	Piston Friction			Cu (kPa)	PHI (degrees)
	187	15.3	1.8	/	468	234		
	373	17.5	2.0	11.0	489	245	209	3.3
	558	20.2	2.3	18.4	514	257		

Method of Preparation:	BS 1377: Part 1: 1990
Method of Test:	BS 1377: Part 7: 1990: 8 Definitive Method, 1990: 9 Multi-stage loading
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	Tested in Vertical Condition UKAS Calibration - loads from 0.2 to 10kN
Remarks to Include:	Sample disturbance, loss of moisture, variation form test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110°C

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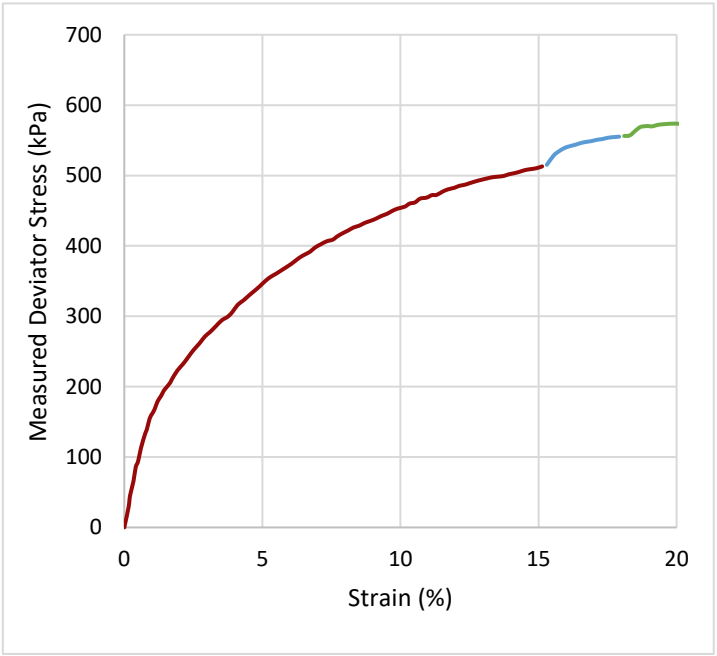
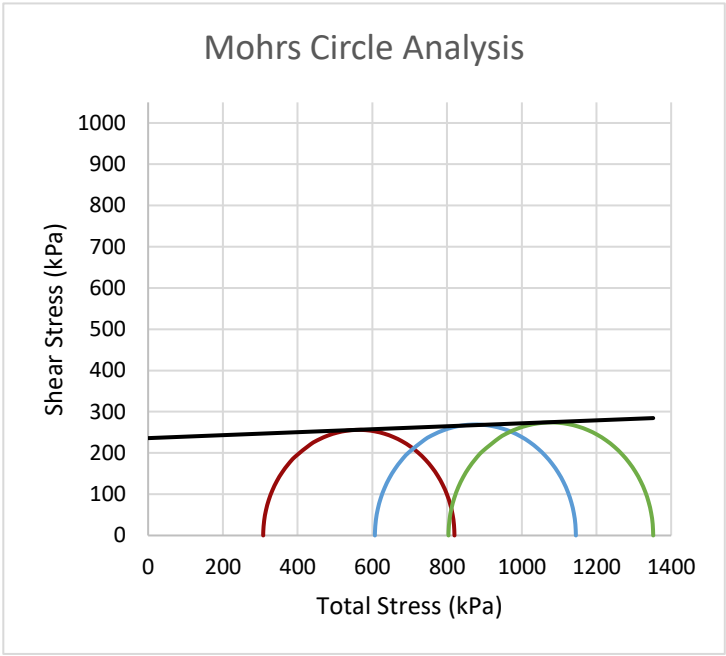
DETERMINATION OF UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

Borehole /Pit No.	Depth (m)	Type	Reference	Description	Remarks
BH01	15.20	U	3	Very stiff (Very high strength) dark grey slightly gravelly slightly sandy silty calcareous CLAY with occasional dark greyish brown mottling. Gravel is white fine to coarse subangular to rounded chalk and rare fine to coarse flint.	Coarse gravel noted in sample after testing.

Initial Specimen	Height (mm)	Diameter (mm)	Weight (g)	Water Content (%)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)
Depth of Top of Specimen (m) 15.31	165.4	102.7	3045	16.1	2.22	1.91

TEST INFORMATION — Rate of Strain 2.0 % per Min — Rubber Membrane Thickness 0.6 mm





Specimen at failure	Measured Cell Pressure, σ3 (kPa)	Strain at Failure (%)	Stress Corrections (kPa)		Corrected Max. Deviator Stress, (σ1-σ3)f (kPa)	Shear Stress Cu, ½(σ1-σ3)f (kPa)	Mohrs Circle Analysis	
			Rubber Membrane	Piston Friction			Cu (kPa)	PHI (degrees)
	308	15.1	1.8	/	511	256		
	607	17.9	2.1	15.3	538	269	236	2.0
	804	19.9	2.2	23.8	548	274		

Method of Preparation:	BS 1377: Part 1: 1990
Method of Test:	BS 1377: Part 7: 1990: 8 Definitive Method, 1990: 9 Multi-stage loading
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	Tested in Vertical Condition UKAS Calibration - loads from 0.2 to 10kN
Remarks to Include:	Sample disturbance, loss of moisture, variation form test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110°C

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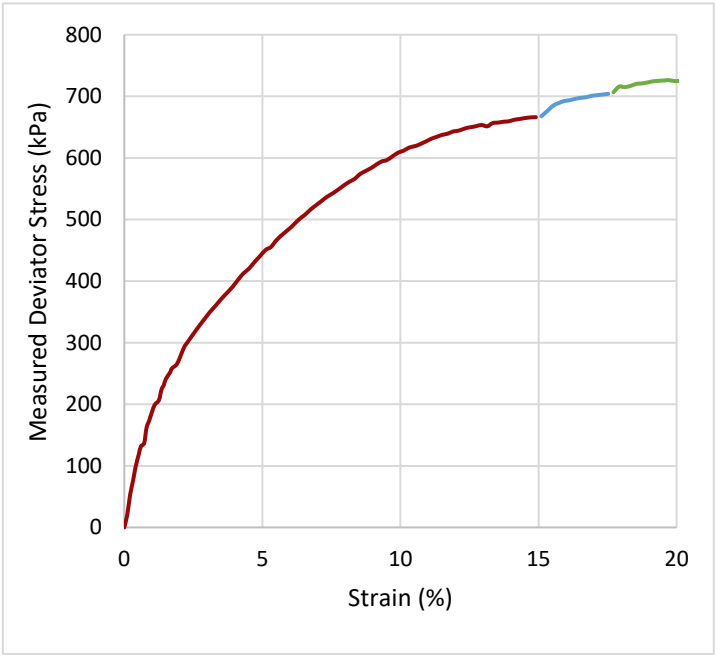
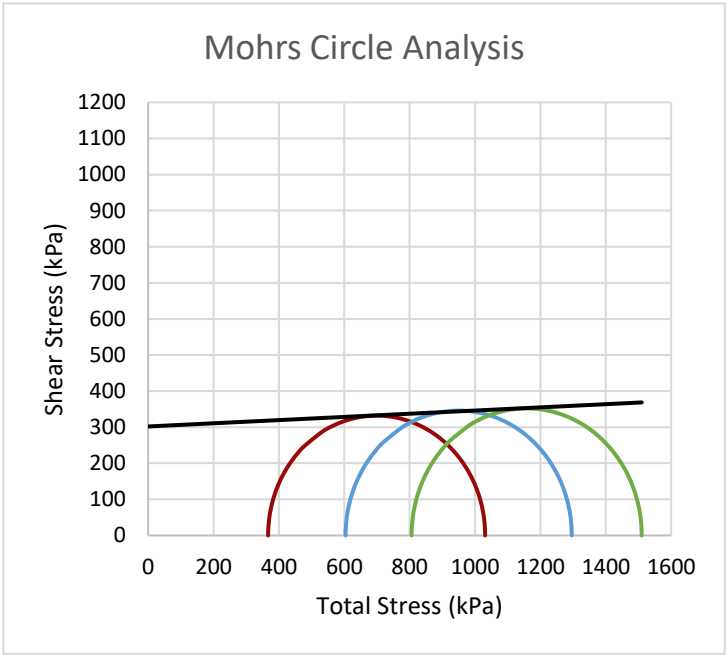
DETERMINATION OF UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

Borehole /Pit No.	Depth (m)	Type	Reference	Description	Remarks
BH01	18.20	U	4	Hard (Extremely high strength) dark grey slightly gravelly slightly sandy silty calcareous CLAY with occasional dark greyish brown mottling. Gravel is white fine to coarse subangular to rounded chalk and rare flint.	Coarse gravel noted in sample after testing.

Initial Specimen	Height (mm)	Diameter (mm)	Weight (g)	Water Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)
Depth of Top of Specimen (m) 18.36	167.3	102.4	3041	14.4	2.21	1.93

TEST INFORMATION — Rate of Strain 2.0 % per Min — Rubber Membrane Thickness 0.6 mm





Specimen at failure	Measured Cell Pressure, σ3 (kPa)	Strain at Failure (%)	Stress Corrections (kPa)		Corrected Max. Deviator Stress, (σ1-σ3)f (kPa)	Shear Stress Cu, ½(σ1-σ3)f (kPa)	Mohrs Circle Analysis	
			Rubber Membrane	Piston Friction			Cu (kPa)	PHI (degrees)
	367	14.9	1.8	/	664	332		
	604	17.5	2.0	9.8	692	346	302	2.5
	806	19.7	2.2	20.2	704	352		

Method of Preparation: BS 1377: Part 1: 1990

Method of Test: BS 1377: Part 7: 1990: 8 Definitive Method, 1990: 9 Multi-stage loading

Type of Sample Key: U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter

Comments: Tested in Vertical Condition

UKAS Calibration - loads from 0.2 to 10kN

Remarks to Include: Sample disturbance, loss of moisture, variation form test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110°C

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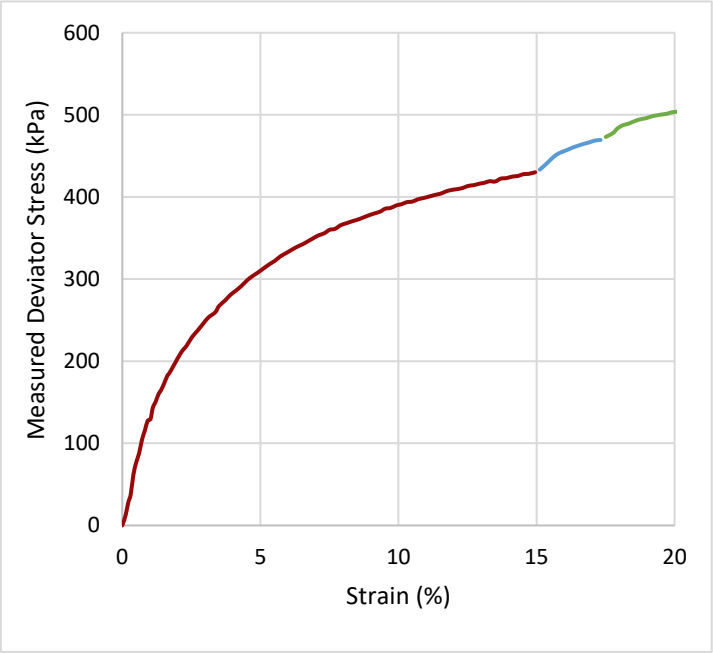
Serial No.	**S33960**

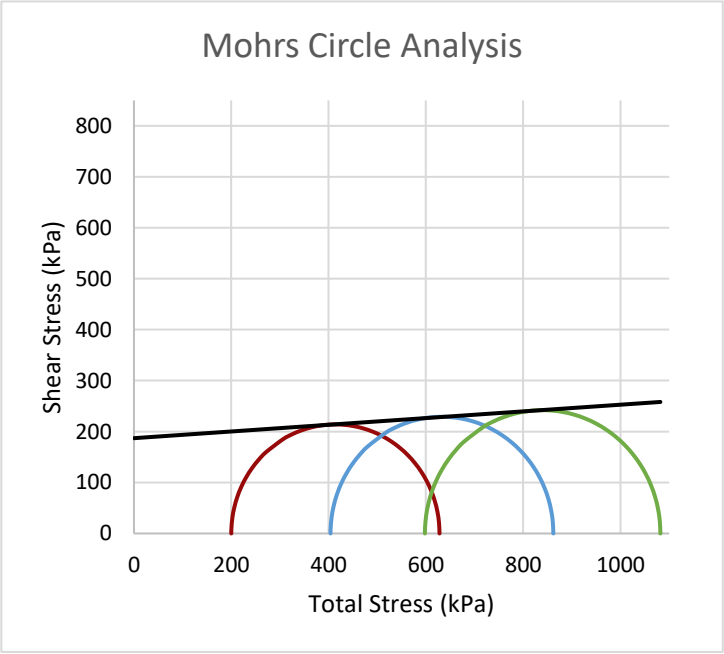
DETERMINATION OF UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

Borehole /Pit No.	Depth (m)	Type	Reference	Description	Remarks
BH02	10.10	U	1	Very stiff (Very high strength) dark grey slightly gravelly slightly sandy silty calcareous CLAY with occasional dark greyish brown mottling, and rare decayed roots. Gravel is white fine to coarse subangular to rounded chalk and light grey mudstone.	Coarse gravel noted in sample after testing.

Initial Specimen	Height (mm)	Diameter (mm)	Weight (g)	Water Content (%)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)
Depth of Top of Specimen (m) 10.11	198.4	102.2	3537	15.6	2.17	1.88

TEST INFORMATION — Rate of Strain 2.0 % per Min — Rubber Membrane Thickness 0.6 mm





Specimen at failure	Measured Cell Pressure, σ3 (kPa)	Strain at Failure (%)	Stress Corrections (kPa)		Corrected Max. Deviator Stress, (σ1-σ3)f (kPa)	Shear Stress Cu, ½(σ1-σ3)f (kPa)	Mohrs Circle Analysis	
			Rubber Membrane	Piston Friction			Cu (kPa)	PHI (degrees)
	200	15.0	1.8	/	428	214		
	404	17.3	2.0	9.9	457	229	187	3.8
	598	20.2	2.3	18.5	483	242		

Method of Preparation: BS 1377: Part 1: 1990

Method of Test: BS 1377: Part 7: 1990: 8 Definitive Method, 1990: 9 Multi-stage loading

Type of Sample Key: U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter

Comments: Tested in Vertical Condition

UKAS Calibration - loads from 0.2 to 10kN

Remarks to Include: Sample disturbance, loss of moisture, variation form test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110°C

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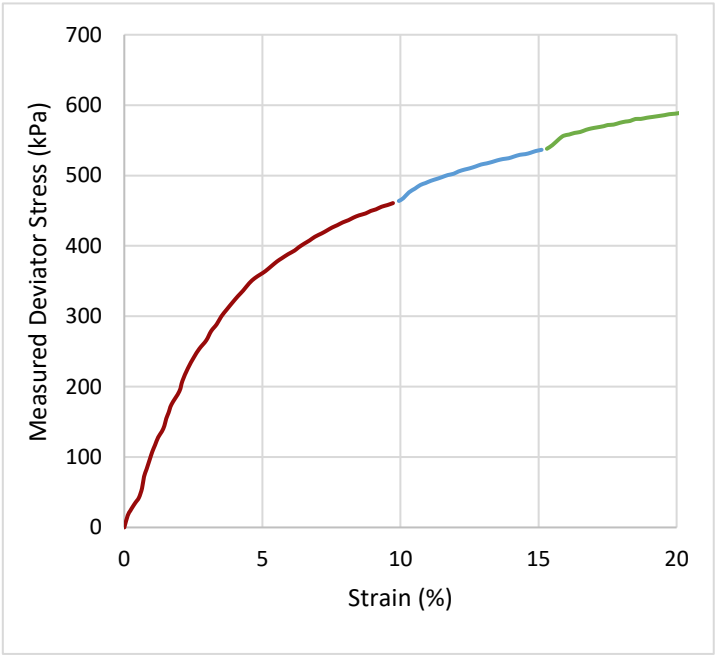
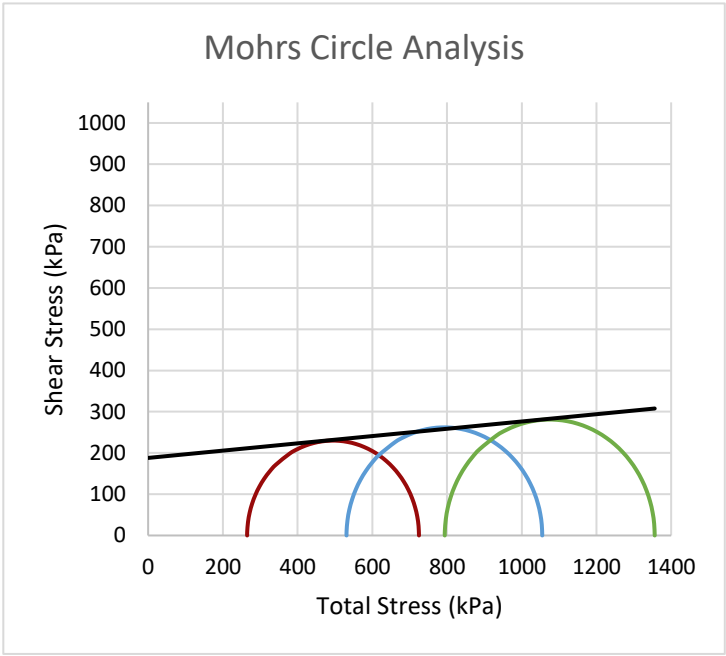
DETERMINATION OF UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

Borehole /Pit No.	Depth (m)	Type	Reference	Description	Remarks
BH02	13.10	U	2	Very stiff (Very high strength) dark grey slightly gravelly slightly sandy silty calcareous CLAY. Gravel is white fine to coarse subangular to rounded chalk and rare fine to medium flint.	Coarse gravel noted in sample after testing.

Initial Specimen	Height (mm)	Diameter (mm)	Weight (g)	Water Content (%)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)
Depth of Top of Specimen (m) 13.18	200.1	101.0	3485	14.9	2.17	1.89

TEST INFORMATION	Rate of Strain	2.0	% per Min	Rubber Membrane Thickness	0.6	mm





Specimen at failure	Measured Cell Pressure, σ3 (kPa)	Strain at Failure (%)	Stress Corrections (kPa)		Corrected Max. Deviator Stress, (σ1-σ3)f (kPa)	Shear Stress Cu, ½(σ1-σ3)f (kPa)	Mohrs Circle Analysis	
			Rubber Membrane	Piston Friction			Cu (kPa)	PHI (degrees)
	265	9.7	1.3	/	460	230		
	531	15.1	1.8	12.3	523	262	188	5.0
	794	20.1	2.3	25.1	562	281		

Method of Preparation:	BS 1377: Part 1: 1990
Method of Test:	BS 1377: Part 7: 1990: 8 Definitive Method, 1990: 9 Multi-stage loading
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	Tested in Vertical Condition UKAS Calibration - loads from 0.2 to 10kN
Remarks to Include:	Sample disturbance, loss of moisture, variation form test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110°C

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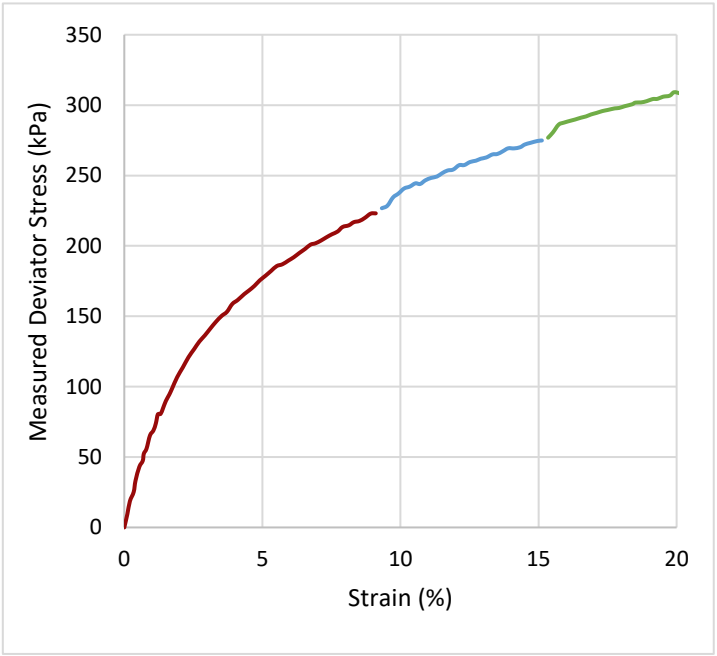
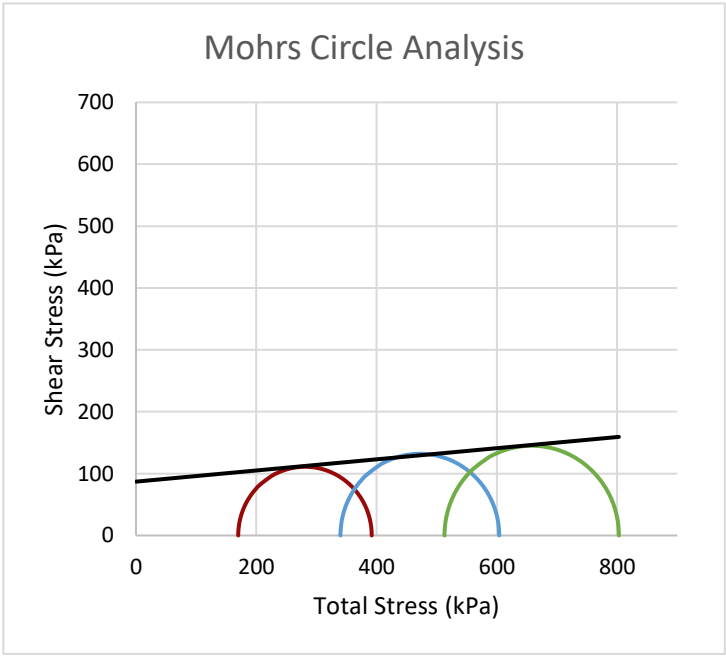
DETERMINATION OF UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

Borehole /Pit No.	Depth (m)	Type	Reference	Description	Remarks
BH03	8.50	U	1	Stiff (High strength) very dark grey slightly gravelly slightly sandy silty calcareous CLAY. Gravel is white fine to medium subangular to rounded chalk and rare fine to coarse flint.	Coarse gravel noted in sample after testing.

Initial Specimen	Height (mm)	Diameter (mm)	Weight (g)	Water Content (%)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)
Depth of Top of Specimen (m) 8.61	200.0	101.5	3512	17.6	2.17	1.85

TEST INFORMATION	Rate of Strain	2.0	% per Min	Rubber Membrane Thickness	0.6	mm





Specimen at failure	Measured Cell Pressure, σ3 (kPa)	Strain at Failure (%)	Stress Corrections (kPa)		Corrected Max. Deviator Stress, (σ1-σ3)f (kPa)	Shear Stress Cu, ½(σ1-σ3)f (kPa)	Mohrs Circle Analysis	
			Rubber Membrane	Piston Friction			Cu (kPa)	PHI (degrees)
	170	9.1	1.2	/	222	111		
	340	15.1	1.8	9.0	264	132	87	5.2
	513	19.9	2.3	16.4	290	145		

Method of Preparation:	BS 1377: Part 1: 1990
Method of Test:	BS 1377: Part 7: 1990: 8 Definitive Method, 1990: 9 Multi-stage loading
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	Tested in Vertical Condition UKAS Calibration - loads from 0.2 to 10kN
Remarks to Include:	Sample disturbance, loss of moisture, variation form test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110°C

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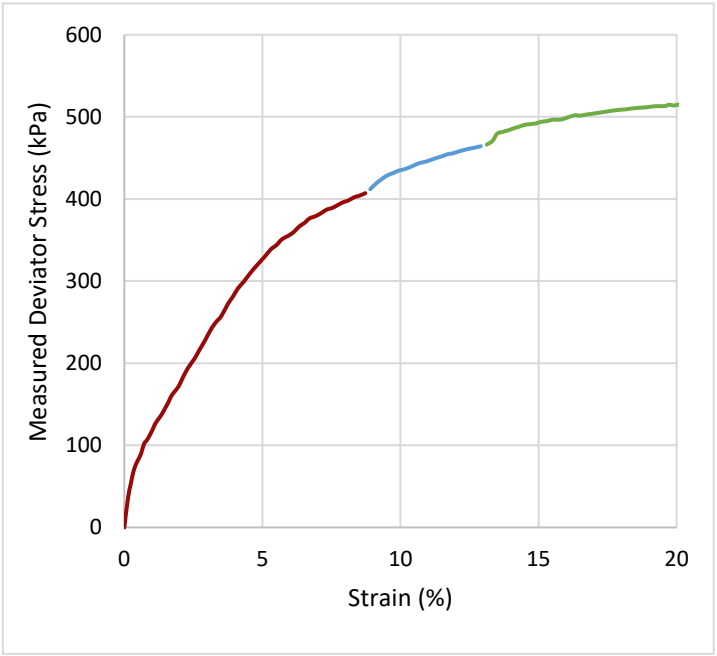
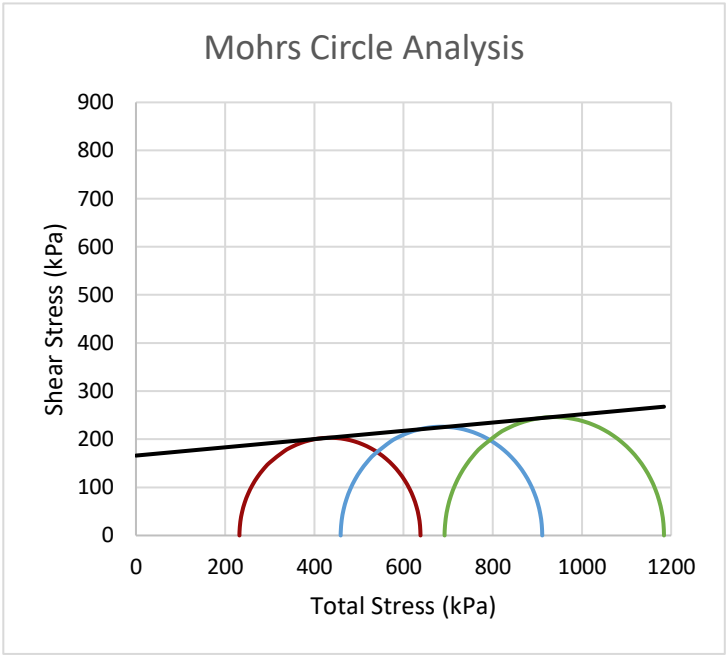
DETERMINATION OF UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

Borehole /Pit No.	Depth (m)	Type	Reference	Description	Remarks
BH03	11.50	U	2	Very stiff (Very high strength) brown slightly gravelly slightly sandy silty calcareous CLAY. Gravel is white fine to medium chalk and flint.	

Initial Specimen	Height (mm)	Diameter (mm)	Weight (g)	Water Content (%)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)
Depth of Top of Specimen (m) 11.57	198.9	102.7	3554	16.3	2.16	1.86

TEST INFORMATION — Rate of Strain 2.0 % per Min — Rubber Membrane Thickness 0.6 mm





Specimen at failure	Measured Cell Pressure, σ3 (kPa)	Strain at Failure (%)	Stress Corrections (kPa)		Corrected Max. Deviator Stress, (σ1-σ3)f (kPa)	Shear Stress Cu, ½(σ1-σ3)f (kPa)	Mohrs Circle Analysis	
			Rubber Membrane	Piston Friction			Cu (kPa)	PHI (degrees)
	232	8.7	1.2	/	406	203		
	459	12.9	1.6	11.9	451	226	166	4.9
	692	20.1	2.3	22.0	491	246		

Method of Preparation: BS 1377: Part 1: 1990

Method of Test: BS 1377: Part 7: 1990: 8 Definitive Method, 1990: 9 Multi-stage loading

Type of Sample Key: U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter

Comments: Tested in Vertical Condition

UKAS Calibration - loads from 0.2 to 10kN

Remarks to Include: Sample disturbance, loss of moisture, variation form test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110°C

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 06/11/2018

0998

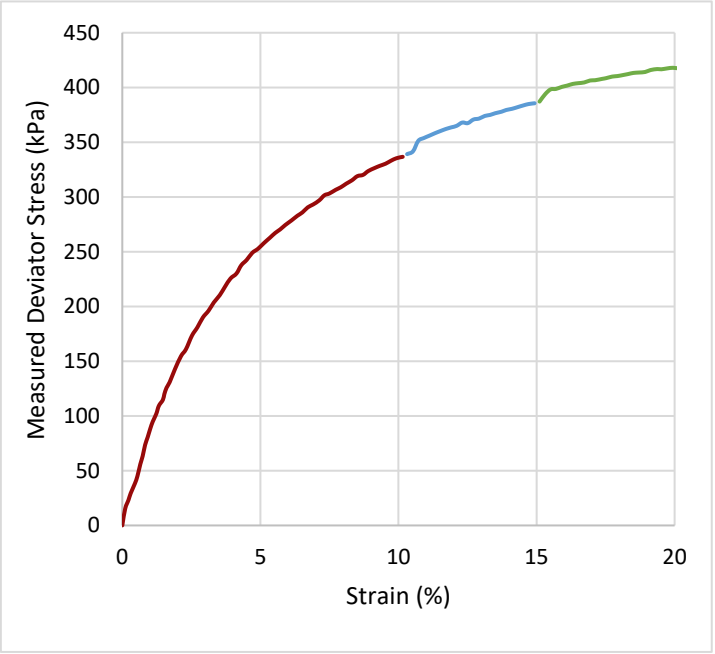
Contract	**UK16.2241B - Middlegate Road, Kirton**
Serial No.	**S33960**

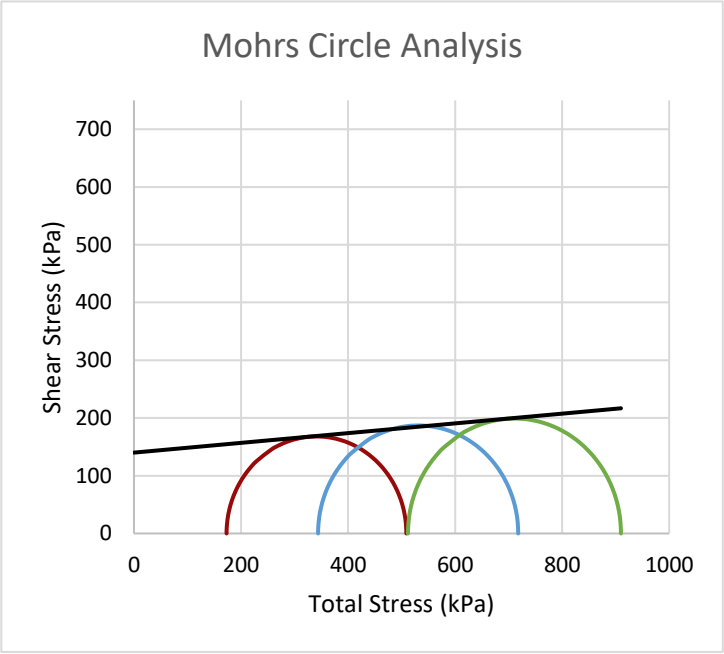
DETERMINATION OF UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

Borehole /Pit No.	Depth (m)	Type	Reference	Description	Remarks
BH04	8.50	U	2	Very stiff (Very high strength) dark grey slightly gravelly slightly sandy silty calcareous CLAY. Gravel is white fine to medium subangular to rounded chalk.	

Initial Specimen	Height (mm)	Diameter (mm)	Weight (g)	Water Content (%)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)
Depth of Top of Specimen (m) 8.57	199.0	102.7	3676	15.8	2.23	1.93

TEST INFORMATION — Rate of Strain 2.0 % per Min — Rubber Membrane Thickness 0.6 mm





Specimen at failure	Measured Cell Pressure, σ3 (kPa)	Strain at Failure (%)	Stress Corrections (kPa)		Corrected Max. Deviator Stress, (σ1-σ3)f (kPa)	Shear Stress Cu, ½(σ1-σ3)f (kPa)	Mohrs Circle Analysis	
			Rubber Membrane	Piston Friction			Cu (kPa)	PHI (degrees)
	173	10.2	1.3	/	336	168		
	344	14.9	1.8	9.8	374	187	140	4.8
	512	19.9	2.2	17.5	398	199		

Method of Preparation:	BS 1377: Part 1: 1990
Method of Test:	BS 1377: Part 7: 1990: 8 Definitive Method, 1990: 9 Multi-stage loading
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	Tested in Vertical Condition UKAS Calibration - loads from 0.2 to 10kN
Remarks to Include:	Sample disturbance, loss of moisture, variation form test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110°C

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 06/11/2018

0998

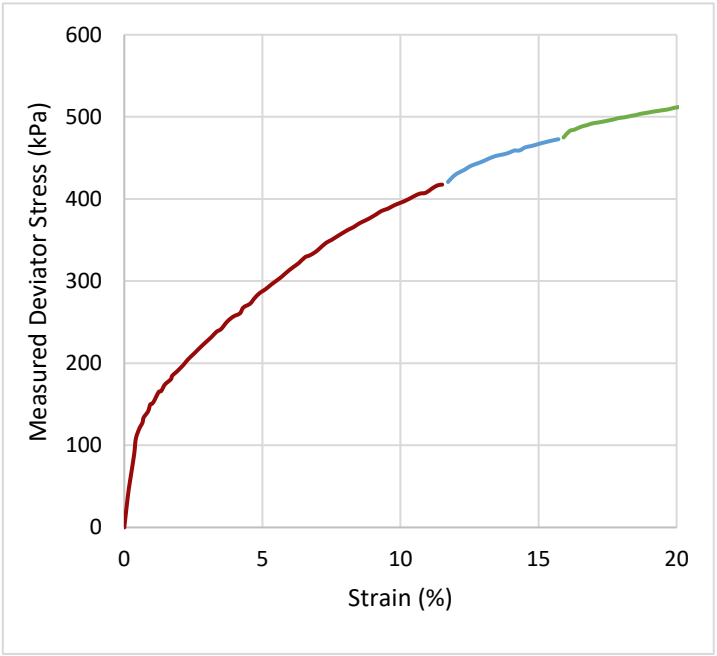
Contract	**UK16.2241B - Middlegate Road, Kirton**
Serial No.	**S33960**

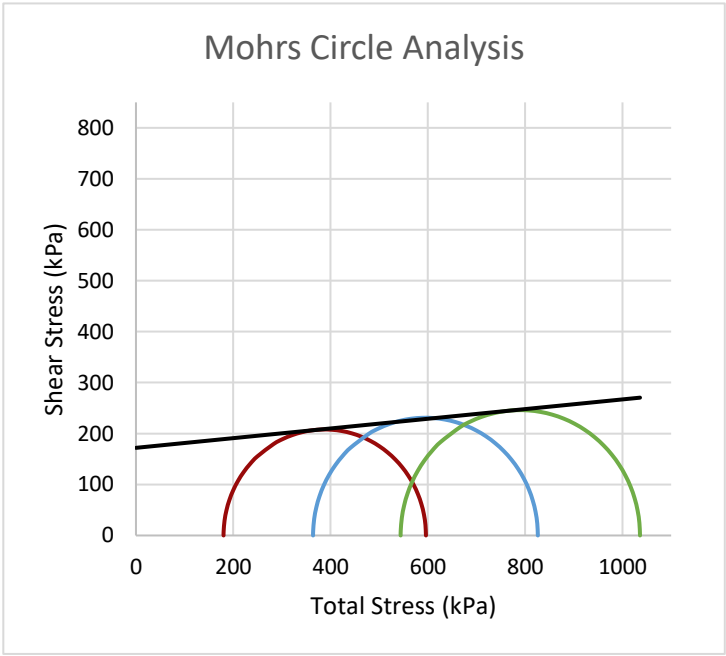
DETERMINATION OF UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

Borehole /Pit No.	Depth (m)	Type	Reference	Description	Remarks
BH05	9.00	U	1	Very stiff (Very high strength) very dark grey slightly gravelly slightly sandy silty calcareous CLAY. Gravel is white fine to medium subangular to rounded chalk and rare fine to medium flint.	

Initial Specimen	Height (mm)	Diameter (mm)	Weight (g)	Water Content (%)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)
Depth of Top of Specimen (m) 9.09	151.0	102.3	2746	16.8	2.21	1.89

TEST INFORMATION	Rate of Strain	1.9	% per Min	Rubber Membrane Thickness	0.6	mm





Specimen at failure	Measured Cell Pressure, σ3 (kPa)	Strain at Failure (%)	Stress Corrections (kPa)		Corrected Max. Deviator Stress, (σ1-σ3)f (kPa)	Shear Stress Cu, ½(σ1-σ3)f (kPa)	Mohrs Circle Analysis	
			Rubber Membrane	Piston Friction			Cu (kPa)	PHI (degrees)
	180	11.5	1.5	/	416	208		
	364	15.7	1.9	9.4	462	231	172	5.4
	544	20.1	2.3	18.2	492	246		

Method of Preparation:	BS 1377: Part 1: 1990
Method of Test:	BS 1377: Part 7: 1990: 8 Definitive Method, 1990: 9 Multi-stage loading
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	Tested in Vertical Condition UKAS Calibration - loads from 0.2 to 10kN
Remarks to Include:	Sample disturbance, loss of moisture, variation form test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110°C

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 06/11/2018

0998

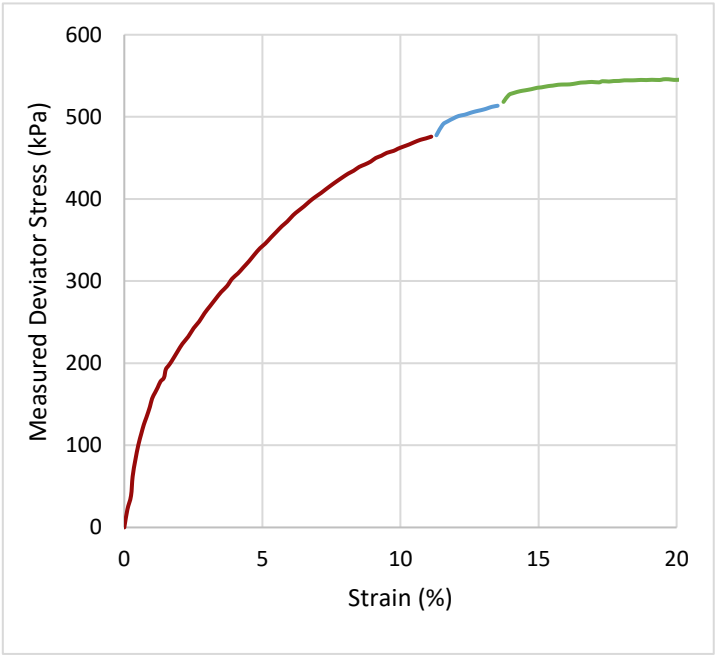
Contract	**UK16.2241B - Middlegate Road, Kirton**
Serial No.	**S33960**

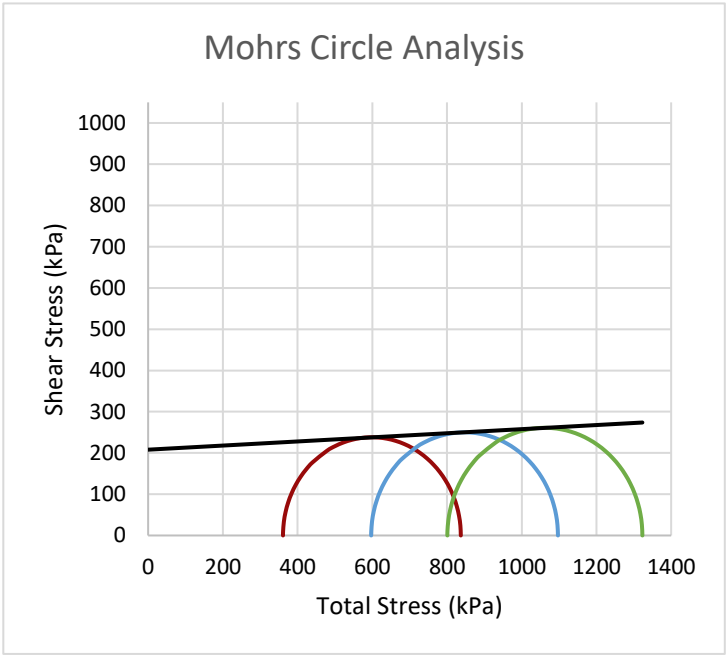
DETERMINATION OF UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

Borehole /Pit No.	Depth (m)	Type	Reference	Description	Remarks
BH05	18.00	U	4	Very stiff (Very high strength) very dark grey slightly gravelly slightly sandy silty calcareous CLAY. Gravel is white fine to medium subangular to rounded chalk.	

Initial Specimen	Height (mm)	Diameter (mm)	Weight (g)	Water Content (%)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)
Depth of Top of Specimen (m) 18.12	199.4	102.8	3572	15.4	2.16	1.87

TEST INFORMATION	Rate of Strain	1.0	% per Min	Rubber Membrane Thickness	0.6	mm





Specimen at failure	Measured Cell Pressure, σ3 (kPa)	Strain at Failure (%)	Stress Corrections (kPa)		Corrected Max. Deviator Stress, (σ1-σ3)f (kPa)	Shear Stress Cu, ½(σ1-σ3)f (kPa)	Mohrs Circle Analysis	
			Rubber Membrane	Piston Friction			Cu (kPa)	PHI (degrees)
	361	11.1	1.4	/	475	238		
	597	13.5	1.6	13.6	499	250	208	2.8
	801	19.7	2.2	22.7	521	261		

Method of Preparation:	BS 1377: Part 1: 1990
Method of Test:	BS 1377: Part 7: 1990: 8 Definitive Method, 1990: 9 Multi-stage loading
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	Tested in Vertical Condition UKAS Calibration - loads from 0.2 to 10kN
Remarks to Include:	Sample disturbance, loss of moisture, variation form test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110°C

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 06/11/2018

0998

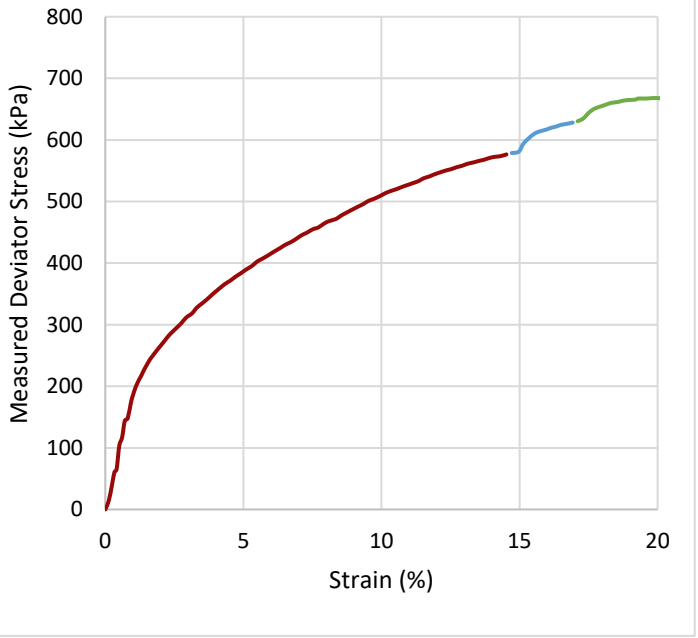
Contract	**UK16.2241B - Middlegate Road, Kirton**
Serial No.	**S33960**

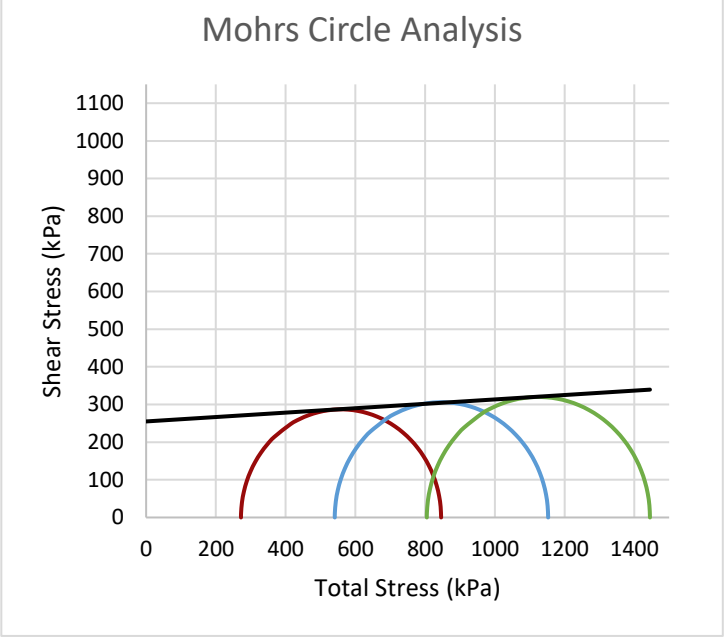
DETERMINATION OF UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

Borehole /Pit No.	Depth (m)	Type	Reference	Description	Remarks
BH06	13.50	U	4	Very stiff (Very high strength) dark grey slightly gravelly slightly sandy silty calcareous CLAY with occasional dark greyish brown mottling. Gravel is white fine to coarse subangular to rounded chalk, light grey fine to coarse subangular to subrounded mudstone, white and grey flint.	Coarse gravel noted in sample after testing.

Initial Specimen	Height (mm)	Diameter (mm)	Weight (g)	Water Content (%)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)
Depth of Top of Specimen (m) 13.65	198.5	102.3	3554	13.6	2.18	1.92

TEST INFORMATION	Rate of Strain	2.0	% per Min	Rubber Membrane Thickness	0.6	mm





Specimen at failure	Measured Cell Pressure, σ3 (kPa)	Strain at Failure (%)	Stress Corrections (kPa)		Corrected Max. Deviator Stress, (σ1-σ3)f (kPa)	Shear Stress Cu, ½(σ1-σ3)f (kPa)	Mohrs Circle Analysis	
			Rubber Membrane	Piston Friction			Cu (kPa)	PHI (degrees)
	272	14.5	1.7	/	574	287		
	541	16.9	2.0	13.8	612	306	255	3.3
	805	19.9	2.3	26.6	639	320		

Method of Preparation:	BS 1377: Part 1: 1990
Method of Test:	BS 1377: Part 7: 1990: 8 Definitive Method, 1990: 9 Multi-stage loading
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	Tested in Vertical Condition UKAS Calibration - loads from 0.2 to 10kN
Remarks to Include:	Sample disturbance, loss of moisture, variation form test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110°C

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 06/11/2018

0998

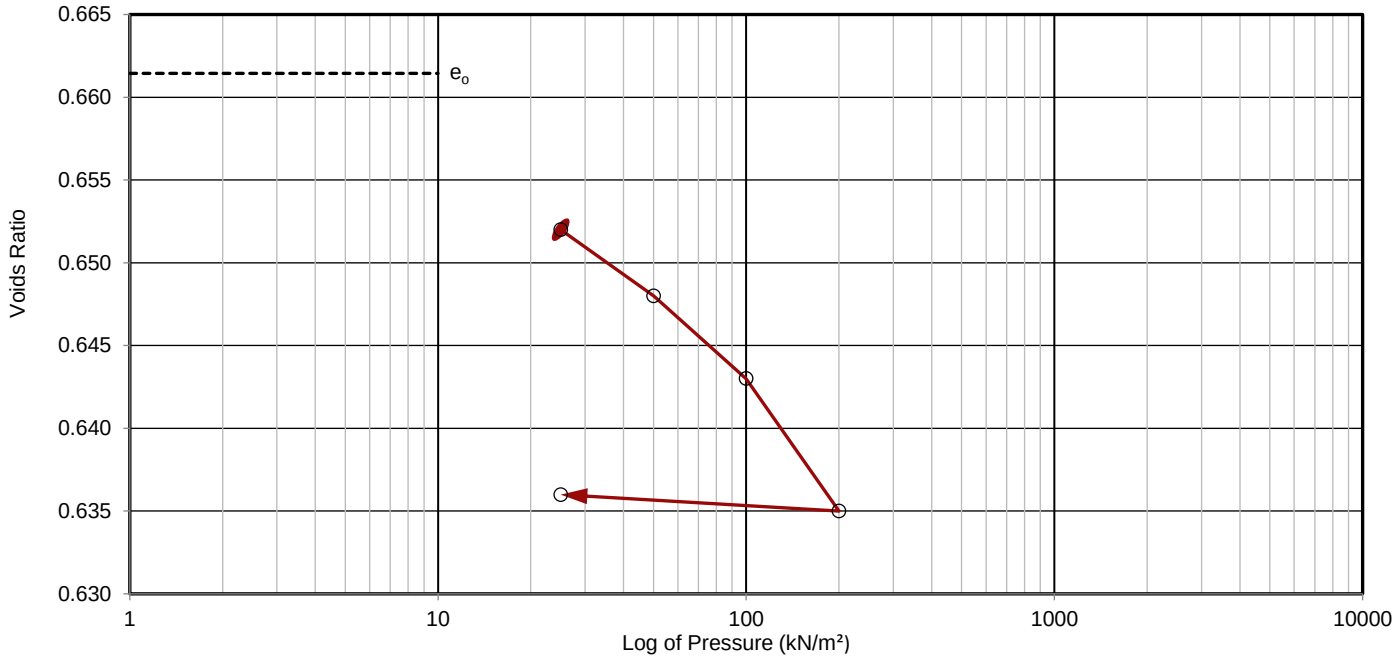
Contract	**UK16.2241B - Middlegate Road, Kirton**
Serial No.	**S33960**

DETERMINATION OF THE ONE-DIMENSIONAL CONSOLIDATION PROPERTIES

Borehole/ Pit No.	Depth (m)	Type	Ref.	Specimen Depth (m) and Orientation	Water Content (%)	Description	Remarks
BH06	1.20	U	1	1.23 Horizontal	23.5	Brown sandy clayey SILT with rare grey mottling, orange staining, and ferruginous sandstone.	Visible gravel picked out by hand and replaced with matrix material

Initial Conditions		
Height	mm	18.99
Diameter	mm	74.99
Wet Weight	g	162.08
Water Content	%	23.5
Bulk Density	Mg/m³	1.93
Particle Density		Assumed 2.60
Voids Ratio		0.661
Degree of Saturation	%	92
Swelling Pressure	kN/m²	<25
Dry Density	Mg/m³	1.56

Increment No.	Load (kN/m²)	Change in Height (mm)	Void Ratio	Cv (m²/yr)	Mv (m²/MN)	Temp (°C)	Corrected Cv
1	25	0.105	0.652	67.20	0.22	21	65.00
2	50	0.149	0.648	0.62	0.09	21	0.60
3	100	0.215	0.643	2.17	0.07	21	2.10
4	200	0.300	0.635	2.00	0.05	20	2.00
5	25	0.294	0.636		0.00	20	



Method of Preparation:	BS 1377: Part 5: 1990: 3.3 & 3.4
Method of Test:	BS 1377: Part 5: 1990: 3.5
Method of Time Fitting Used:	Square root
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	
Remarks to Include:	Sample disturbance, loss of water, variation from test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110 °C.

Exova Jones Environmental

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EPS Ltd
7B Caxton House
Broad Street
Cambourne
Cambridgeshire
CB23 6JN

4225

Attention :	Sam Setchell
Date :	2nd November, 2018
Your reference :	UK16.2241B
Our reference :	Test Report 18/17370 Batch 1
Location :	Kirton
Date samples received :	27th October, 2018
Status :	Final report
Issue :	1

Twelve samples were received for analysis on 27th October, 2018 of which twelve were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

Lucas Halliwell
Project Co-ordinator

Client Name: EPS Ltd
Reference: UK16.2241B
Location: Kirton
Contact: Sam Setchell
JE Job No.: 18/17370

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	1	2	3	4	5	6	7	8	9	10	LOD/LOR	Units	Method No.
Sample ID	BH01	BH01	BH01	BH01	BH01	BH01	BH01	BH01	BH01	BH01			
Depth	1.20-1.65	2.20-2.65	4.20-4.65	5.20-5.65	6.20-6.65	7.70-8.15	8.70	10.20	11.70	14.70			
COC No / misc													
Containers	B	B	B	B	B	B	B	B	B	B			
Sample Date	<>	<>	<>	<>	<>	<>	<>	<>	<>	<>			
Sample Type	Sand	Sand	Sand	Sand	Clay	Clay	Clay	Clay	Clay	Clay			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	27/10/2018	27/10/2018	27/10/2018	27/10/2018	27/10/2018	27/10/2018	27/10/2018	27/10/2018	27/10/2018	27/10/2018			
Sulphur as S	0.03	0.04	0.07	0.25	0.31	0.03	3.80	1.11	0.98	1.04	<0.01	%	TM30/PM15
Total Sulphate as SO4 #M	306	428	636	1174	955	361	7794	6748	3809	6153	<50	mg/kg	TM50/PM29
Sulphate as SO4 (2:1 Ext) #M	0.0372	0.0682	0.0885	0.1415	0.1949	0.0516	0.3183	0.3273	0.2178	0.3017	<0.0015	g/l	TM38/PM20
pH #M	8.50	8.58	8.35	8.40	8.63	9.09	9.09	8.90	8.68	8.66	<0.01	pH units	TM73/PM11
Sample Type	Sand	Sand	Sand	Sand	Clay	Clay	Clay	Clay	Clay	Clay		None	PM13/PM0
Sample Colour	Light Brown	Medium Brown	Medium Brown	Medium Brown	Medium Brown	Light Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown		None	PM13/PM0
Other Items	none	none	none	none	sand, stones	sand, stones	chalk	chalk	chalk	chalk		None	PM13/PM0

Please see attached notes for all abbreviations and acronyms

Client Name: EPS Ltd
Reference: UK16.2241B
Location: Kirton
Contact: Sam Setchell
JE Job No.: 18/17370

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	11	12											
Sample ID	BH01	BH01											
Depth	16.20	17.70											
COC No / misc													
Containers	B	B											
Sample Date	<>	<>											
Sample Type	Clay	Clay											
Batch Number	1	1											
Date of Receipt	27/10/2018	27/10/2018											
Sulphur as S	0.97	1.29										<0.01	%	TM30/PM15
Total Sulphate as SO4 #M	5418	5219										<50	mg/kg	TM50/PM29
Sulphate as SO4 (2:1 Ext) #M	0.2984	0.3265										<0.0015	g/l	TM38/PM20
pH #M	8.46	8.63										<0.01	pH units	TM73/PM11
Sample Type	Clay	Clay											None	PM13/PM0
Sample Colour	Dark Brown	Dark Brown											None	PM13/PM0
Other Items	chalk	chalk											None	PM13/PM0

Please see attached notes for all abbreviations and acronyms

Client Name: EPS Ltd

Matrix : Solid

Reference: UK16.2241B

Location: Kirton

Contact: Sam Setchell

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
18/17370	1	BH01	1.20-1.65	1	All analyses	No sampling date given
18/17370	1	BH01	2.20-2.65	2	All analyses	No sampling date given
18/17370	1	BH01	4.20-4.65	3	All analyses	No sampling date given
18/17370	1	BH01	5.20-5.65	4	All analyses	No sampling date given
18/17370	1	BH01	6.20-6.65	5	All analyses	No sampling date given
18/17370	1	BH01	7.70-8.15	6	All analyses	No sampling date given
18/17370	1	BH01	8.70	7	All analyses	No sampling date given
18/17370	1	BH01	10.20	8	All analyses	No sampling date given
18/17370	1	BH01	11.70	9	All analyses	No sampling date given
18/17370	1	BH01	14.70	10	All analyses	No sampling date given
18/17370	1	BH01	16.20	11	All analyses	No sampling date given
18/17370	1	BH01	17.70	12	All analyses	No sampling date given

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.

Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 18/17370

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to an Exova Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

JE Job No: 18/17370

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM13	A visual examination of the solid sample is carried out to ascertain sample make up, colour and any other inclusions. This is not a geotechnical description.	PM0	No preparation is required.			AR	
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes	Yes	AD	Yes
TM50	Acid soluble sulphate (Total Sulphate) analysed by ICP-OES	PM29	Dried and ground solid sample is boiled with dilute hydrochloric acid, the resulting liquor is then analysed.	Yes	Yes	AD	Yes
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes	Yes	AR	No

Exova Jones Environmental

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Broad Street
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Cambridgeshire
CB23 6JN

4225

Attention :	Sam Setchell
Date :	2nd November, 2018
Your reference :	UK16.2241B
Our reference :	Test Report 18/17370 Batch 1
Location :	Kirton
Date samples received :	27th October, 2018
Status :	Final report
Issue :	1

Twelve samples were received for analysis on 27th October, 2018 of which twelve were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

Lucas Halliwell
Project Co-ordinator

Client Name: EPS Ltd
Reference: UK16.2241B
Location: Kirton
Contact: Sam Setchell
JE Job No.: 18/17370

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	1	2	3	4	5	6	7	8	9	10	LOD/LOR	Units	Method No.
Sample ID	BH01	BH01	BH01	BH01	BH01	BH01	BH01	BH01	BH01	BH01			
Depth	1.20-1.65	2.20-2.65	4.20-4.65	5.20-5.65	6.20-6.65	7.70-8.15	8.70	10.20	11.70	14.70			
COC No / misc													
Containers	B	B	B	B	B	B	B	B	B	B			
Sample Date	<>	<>	<>	<>	<>	<>	<>	<>	<>	<>			
Sample Type	Sand	Sand	Sand	Sand	Clay	Clay	Clay	Clay	Clay	Clay			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	27/10/2018	27/10/2018	27/10/2018	27/10/2018	27/10/2018	27/10/2018	27/10/2018	27/10/2018	27/10/2018	27/10/2018			
Sulphur as S	0.03	0.04	0.07	0.25	0.31	0.03	3.80	1.11	0.98	1.04	<0.01	%	TM30/PM15
Total Sulphate as SO4 #M	306	428	636	1174	955	361	7794	6748	3809	6153	<50	mg/kg	TM50/PM29
Sulphate as SO4 (2:1 Ext) #M	0.0372	0.0682	0.0885	0.1415	0.1949	0.0516	0.3183	0.3273	0.2178	0.3017	<0.0015	g/l	TM38/PM20
pH #M	8.50	8.58	8.35	8.40	8.63	9.09	9.09	8.90	8.68	8.66	<0.01	pH units	TM73/PM11
Sample Type	Sand	Sand	Sand	Sand	Clay	Clay	Clay	Clay	Clay	Clay		None	PM13/PM0
Sample Colour	Light Brown	Medium Brown	Medium Brown	Medium Brown	Medium Brown	Light Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown		None	PM13/PM0
Other Items	none	none	none	none	sand, stones	sand, stones	chalk	chalk	chalk	chalk		None	PM13/PM0

Please see attached notes for all abbreviations and acronyms

Client Name: EPS Ltd
Reference: UK16.2241B
Location: Kirton
Contact: Sam Setchell
JE Job No.: 18/17370

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	11	12											
Sample ID	BH01	BH01											
Depth	16.20	17.70											
COC No / misc													
Containers	B	B											
Sample Date	<>	<>											
Sample Type	Clay	Clay											
Batch Number	1	1											
Date of Receipt	27/10/2018	27/10/2018											
Sulphur as S	0.97	1.29										<0.01	%	TM30/PM15
Total Sulphate as SO4 #M	5418	5219										<50	mg/kg	TM50/PM29
Sulphate as SO4 (2:1 Ext) #M	0.2984	0.3265										<0.0015	g/l	TM38/PM20
pH #M	8.46	8.63										<0.01	pH units	TM73/PM11
Sample Type	Clay	Clay											None	PM13/PM0
Sample Colour	Dark Brown	Dark Brown											None	PM13/PM0
Other Items	chalk	chalk											None	PM13/PM0

Please see attached notes for all abbreviations and acronyms

Client Name: EPS Ltd

Matrix : Solid

Reference: UK16.2241B

Location: Kirton

Contact: Sam Setchell

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
18/17370	1	BH01	1.20-1.65	1	All analyses	No sampling date given
18/17370	1	BH01	2.20-2.65	2	All analyses	No sampling date given
18/17370	1	BH01	4.20-4.65	3	All analyses	No sampling date given
18/17370	1	BH01	5.20-5.65	4	All analyses	No sampling date given
18/17370	1	BH01	6.20-6.65	5	All analyses	No sampling date given
18/17370	1	BH01	7.70-8.15	6	All analyses	No sampling date given
18/17370	1	BH01	8.70	7	All analyses	No sampling date given
18/17370	1	BH01	10.20	8	All analyses	No sampling date given
18/17370	1	BH01	11.70	9	All analyses	No sampling date given
18/17370	1	BH01	14.70	10	All analyses	No sampling date given
18/17370	1	BH01	16.20	11	All analyses	No sampling date given
18/17370	1	BH01	17.70	12	All analyses	No sampling date given

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.

Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 18/17370

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

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