Phase II Geo-Environmental Assessment

Land Adjacent to 1 Hall Lane
Moulton Seas End
Spalding
Lincolnshire
PE12 6LB

Prepared for:

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LAND ADJACENT TO 1 HALL LANE, MOULTON SEAS END

NON-TECHNICAL CLIENT SUMMARY

This report presents the findings of a Phase II Geo-Environmental Investigation undertaken to determine ground conditions, establish the gassing regime of the site, and provide a geotechnical appraisal. Pertinent findings and conclusions may be summarised as follows:

- The site currently comprises a former agricultural field with no structures present. The proposed development comprises the construction of six new residential dwellings with associated gardens and roads. A previous desk study identified potential risks from ground gases associated with a nearby recorded landfill and therefore recommended that an intrusive investigation be undertaken including a series of return gas monitoring visits.
- Intrusive investigations comprised the forming of four boreholes and three trial pits, with ground conditions identified to comprise a limited thickness of topsoil overlying superficial Tidal Flats Deposits of sandy silty clay and clayey silty sand. Details are provided in the table below. Ground water was found to rest between 1.3m and 2.38m.

Geological Strata	Maximum Depth to Base of Strata (m bgl)	Strata Thickness (m)
Topsoil	0.6	0.4-0.6
Tidal Flats Deposits	>4.0	>3.6

- Following a period of gas monitoring, it has been established that there is no risk to human health from the potential accumulation of ground gases. No special gas protection measures are therefore considered necessary.

ENGINEERING SUMMARY

- Allowable bearing capacities have been calculated for the Tidal Flats Deposits at various depths and are summarised below:

Depth (m bgl)	Allowable Bearing Capacity (kN/m^2)
1.0	60
1.5	70
2.0	80

- Suspended Ground Floor Construction is recommended.
- A CBR value of 2% is considered suitable for the site.
- Design Sulphate Class (DS) of DS-1 with an aggressive chemical environment for concrete (ACEC) of AC-1 are considered suitable for the Tidal Flats Deposits.

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.

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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 2019 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

In August 2019, Environmental Protection Strategies Ltd (EPS) was commissioned by Wilf Hammond Homes Ltd. to complete a Phase II Geo-Environmental Assessment Report for land adjacent to 1 Hall Lane, Moulton Seas End, Spalding, Lincolnshire, PE12 6LB ('the site'); see Figure 1. An aerial photograph is included as Figure 2.

The work was commissioned in order to support development proposals for the construction of six new residential properties and associated landscaping, under South Holland District Council's Planning Reference H13-1202-17. An indicative proposed development plan is presented as Appendix B.

This report presents a summary of a previous Phase I Environmental Desk Study undertaken by EPS, together with the findings, conclusions, and recommendations of this phase of intrusive investigation.

1.1 Previous Reports

This investigation supplements a Phase I Desk Study undertaken by EPS in July 2019. A summary of these reports is provided in Section 2. For more detailed background information, it is recommended that the reader review the following document:

- *Phase I Geo-Environmental Desk Study, Land Adjacent to 1 Hall Lane, Moulton Seas End, Spalding, PE12 6LB (Ref: UK19.4517)* – Issue 1 (5th July 2019)

1.2 Objectives

The objectives of this investigation were as follows:

a) Investigate potential contaminant linkages by means of an Intrusive Investigation and Generic Quantitative Risk Assessment.
b) Collect information on ground conditions and strength in order to make appropriate recommendations for geotechnical design.

1.3 Scope of Work

To perform an exploratory assessment of the site in accordance with the principles and requirements of DEFRAs *'Contaminated Land Statutory Guidance'* (2012), BS10175 –'*Investigation of Potentially Contaminated Sites'*, BS5930:2015 *'Code of practice for ground investigations'* and BS EN 1997 '*Geotechnical Design'*

Intrusive Investigation:

- Site walkover, inspection of any visual evidence of contamination at the site, obtaining photographic records.
- Health and safety briefing / site supervision.
- Drilling of four boreholes via tracked window sampler rig to a maximum depth of 4.0m below ground level (bgl).
- Excavation of three trial pits via mechanical excavator to a maximum depth of 1.5m bgl and subsequent soil infiltration testing.

- Installation of standpipes in each borehole to monitor ground gases.
- Continual logging of ground conditions including inspection of samples for any visual and olfactory contamination, and laboratory analysis of selected soil samples.
- In-situ testing, including shear vane tests to assist with geotechnical design.

Reporting:

- Data collection
- Interpretation of data including completion of Generic Quantitative Risk Assessment
- Reporting.

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

1.4 Limitations and Constraints

The purpose of this report is to present the findings of a soil sampling 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 boreholes and / or trial pits to recover soil and / or groundwater samples. The locations of these excavations and sampling points 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 conditions encountered may differ to those found 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.

This report does not include specific investigation for the presence of Potential Asbestos Containing Material (PACM). Specialist contractors should be commissioned to make detailed assessments and recommendations if these materials are suspected.

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

2 BACKGROUND & PREVIOUS REPORTS

This investigation supplements a Phase I Desk Study undertaken by EPS in July 2019.

A summary of the information contained within the previous reports is presented below:

Detail	Description
Location & Description of Site (at time of investigation)	The site lies to the south of Hall Lane and west of Seas End Road in the village of Moulton Seas End, located 8km northeast of the centre of Spalding and 3.2km northwest of Holbeach, Lincolnshire. The site was found to be a largely overgrown fallow field. The field is open to the north on the border with Hall Lane, consisting of a grass verge along the road and a row of telegraph poles. The south and west edges of the field are bounded by hedges, with the eastern limit delineated by a wooden fence. The field itself has been ploughed and is now overgrown with weeds, wildflowers and grass. There is a large, mature coniferous tree in the garden of the adjacent property, 15 Hall Lane, and a cluster of smaller, semi- mature deciduous trees in the southwest corner of the site. On all sides the site is bordered by residential properties, apart from the southwest corner that is adjacent to an arable field. The property immediately to the south of the site has three large greenhouse buildings; it is unknown if these are used for private or commercial use.
Geology	Geological maps of the area show the site to lie on Tidal Flat Deposits (clay & silt) overlying the West Walton Formation (mudstone & siltstone).
Hydrogeology	Groundwater vulnerability maps for the area show that the underlying geology (both superficial and bedrock) are classified as Unproductive Strata. The site does not lie within a Source Protection Zone for local groundwater abstraction and no groundwater abstraction points are listed within 1km.
Hydrology	The site is located within an area with a developed (fen) drainage system for irrigation, with the nearest ditch located roughly 60m to south. There are no reports of surface water abstractions within 500m. The Envirocheck report lists 16 discharge consents within 250m, typically pertaining to treated sewage discharges from domestic properties or unknown discharges. The nearest active discharge is roughly 115m to the northwest.
Landfill & Waste	The EA public database lists a single historic landfill approximately 15m southwest of the site. The site was used to dispose of commercial waste.
Site History	Historical mapping has shown that the site has remained undeveloped from 1887 onwards, whilst numerous residential properties have been constructed around the site over time. Greenhouses associated with the property immediately south of the site are first noted during the early 1990's.

2.1 Previous Findings and Conclusions

The EPS Phase I Geo-Environmental Desk Study undertaken in July 2019 found the only plausible contaminant linkage that may impact future site users was the possible onsite migration of ground gas to indoor and outdoor air, originating from the historic landfill site less than 15m south-west.

Therefore, an intrusive investigation was recommended in order to drill a number of boreholes, install ground gas monitoring standpipes and undertake a series of monitoring visits.

3 SUMMARY OF INTRUSIVE INVESTIGATIONS

Intrusive ground investigations were undertaken on the 10th September 2019 in accordance with EPS standard operating procedures, copies of which will be made available on request. Photographs of the site works are included in Appendix A. A summary of all site activities is presented in the following sections:

3.1 Exploratory Hole Locations

Borehole locations were decided through consideration of the findings of the previous Phase I Desk Study, the location of below ground utilities, and operational and health & safety considerations, to provide a representative coverage across the areas where the redevelopment is proposed.

Four window sample boreholes (WS1 to WS4) were drilled during the investigation in order to assess the nature and quality of underlying soils to maximum depths of 4.0m using a track mounted window sampling rig.

Gas monitoring wells were installed at all borehole locations (WS1 to WS4) using 50mm diameter uPVC well casing and fitted with a gas tap. Slotted casing (1mm slot) was installed at each location to approximately 1.0m below the surface. The installations were left partially protruding above ground level for ease of identification on subsequent monitoring visits. A filter pack of 2-3mm of washed gravel extended from the base of the boreholes to approximately 0.1m above the slotted section with a bentonite seal to surface.

Three trial pits (TP1 to TP3) were also formed via mechanical excavator to a maximum depth of 1.5m bgl, with soakaway testing performed in all three pits.

The overall objective in terms of exploratory hole locations was to provide an appropriate lateral coverage of the site in order to obtain suitable ground gas data, and to provide lateral and vertical coverage of the soils underlying the site in order to gather information relating to their quality, nature and infiltration characteristics.

A borehole location plan is presented as Figure 3. Borehole logs are presented in Appendix C.

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. Soil samples were obtained from across the site to provide geotechnical information for foundation design.

Standard or cone penetration tests (SPT / CPT) were carried out in all materials at 1m intervals 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).

Where potentially volatile organic compounds are suspected, EPS carries a Photoionization Detector (PID), which can be used to measure the relative concentrations of vapour associated with soil samples collected from different depths and locations at the site. In this case, no physical evidence of contamination, including evidence of volatile organic compounds was encountered. Therefore, the PID was not used.

3.3 Laboratory Testing

Samples obtained for analysis of pH/sulphates were submitted to Element Materials Technology 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. Geotechnical testing was undertaken by Soil Property Testing, Huntingdon, a UKAS accredited laboratory.

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

Laboratory testing schedules are included as Table 1 and 2.

3.4 Ground Gas and Vapour Monitoring

Due to the presence of an historic landfill site within 15m south-west of the site, the presence and concentration of soil gases including carbon dioxide, oxygen and methane, along with borehole flow rate, were recorded on three separate occasions following completion of the initial intrusive works. These ground gas monitoring visits were completed on an approximate weekly basis between the 17th September and the 3rd October 2019.

A summary of the field measurements recorded during the soil gas monitoring programme are summarised in Table 3 of this report.

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 four window sampler boreholes and three trial pits were formed at the site and the ground conditions encountered, from ground level, were found to comprise:

- Topsoil
- Tidal Flats Deposits

Site specific borehole logs are included as 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	0.4-0.6
Tidal Flats Deposits	>4.0	>3.6

4.1.1 Topsoil

Dark brown sandy, silty, clay topsoil with active rootlets was found at the surface of all borehole and trial pit locations onsite. No evidence of any Made Ground materials (i.e. brick fragments, bituminous material) was observed.

4.1.2 Tidal Flats Deposits

Underlying the topsoil in each borehole and trial pit, brown to yellowish brown sandy, silty clay was found, which typically became more granular with depth. In places, the silt and clay content were of comparable quantities, but generally became sandier with depth beyond 2m.

In WS1 the layer transitioned from a silty, sandy clay into a clayey, sandy silt around 3.0m, whereas in WS2 the layer comprised clayey silt/sand from 1.0m to the bottom of the borehole. In WS4 the layer initially comprised silty, sandy clay between 0.5m and 1.0m before transitioning into silty, clayey sand and silty sand to the base of the borehole at 4.0m.

This natural material has been interpreted as being representative of the superficial Tidal Flats Deposits.

4.2 Groundwater

During the intrusive investigation, groundwater was struck in all boreholes between 1.5m and 1.9m. Groundwater was not encountered in any of the trial pits.

During the period of ground gas monitoring, groundwater levels were observed between 1.30m and 2.38m.

4.3 Physical Evidence of Contamination

No palpable evidence of contamination, waste or putrefiable material was encountered in any of the sampling locations during the investigation including no visual or olfactory evidence of hydrocarbon staining.

4.4 Geotechnical Testing

The results of geotechnical laboratory and field testing are summarised in the table below.

Strata	Range of Parameters													
	Moisture Content (%)		Plasticity Index (%)		Particle Size Distribution (%)									
					Clay		Silt		Fines*		Sand		Gravel	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Tidal Flats Deposits	20.5	30.2	6	10	3		26		10	29	71	90	0	

*Fines represents combined silt and clay values

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

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

A laboratory California Bearing Ratio test was performed on two samples of shallow cohesive soils in accordance with BS1377: Part 4:1990: 7.

Particle Size Distribution testing was performed on two samples of granular soils in accordance with BS1377: Part 2: 1990: 9.2 & 9.5

A geotechnical laboratory analysis testing schedule is presented as Table 2 and all geotechnical sample results obtained from the laboratory are included as Appendix D.

4.5 Soil Gas and Organic Vapour Results

Ground gas monitoring was conducted on three occasions following the initial intrusive investigation between the 17th September and 3rd October 2019.

The results of the monitoring programme identified minor concentrations of carbon dioxide being measured during the first visit (<5.0% v/v) with negligible levels (<0.1% v/v) thereafter. Methane was not detected above minimum detection levels (<0.1% v/v) in any of the boreholes during the entire monitoring period.

Results of soil gas monitoring are summarised below and presented in full in Table 3, along with calculated gas screening values, set out in CIRIA guidance *'Assessing Risks Posed by Hazardous Ground Gases to Buildings'*.

Borehole	CH_4 Range of Detections (%v/v)	CO_2 Range of Detections (%v/v)	O_2 Range of Detections (%v/v)
BH1	<0.1	0.1-1.3	19.2-21.3
BH2	<0.1	<0.1-5.0	18.9-21.0
BH3	<0.1	<0.1-2.2	17.7-21.3
BH4	<0.1	<0.1-1.0	18.9-21.2

Notes: CH_4 Methane CO_2 Carbon Dioxide O_2 Oxygen

No discernible flow rates (borehole push) were detected during any of the monitoring visits during varying atmospheric pressures and conditions.

5 GEOTECHNICAL APPRAISAL

The ground conditions have been found to comprise a layer of topsoil underlain by Tidal Flats Deposits (silty clays/clayey sand) to at least 4.0m bgl.

It should be noted that groundwater was typically encountered between 1.5 and 2.0m during the ground investigation and subsequent site visits, and is anticipated to be shallower during the winter months.

5.1 Structural Foundations

5.1.1 Spread Foundations

The ground conditions are considered suitable for the use of conventional spread foundations, either strip footings or pad foundations bearing on the underlying Tidal Flats Deposits.

Allowable bearing capacities for the Tidal Flats Deposits are provided in the table below. The allowable bearing capacity is the permissible increase in vertical stress at the level of the underside of the foundation, above existing overburden pressure, which may be calculated on the basis of a soil density of 18kN/m^3.

Depth (m bgl)	Allowable Bearing Capacity (kN/m^2)
1.0	60
1.5	70
2.0	80

Care should be taken to ensure that foundations are not constructed below groundwater level, as this will lead to a lowering of allowable bearing pressures through loosening of granular soils and the creation of 'running sands', which will also produce difficult excavation conditions.

At the above bearing pressure, total settlements are unlikely to exceed approximately 25mm. Settlements in cohesive (clay) soils will comprise both immediate and long term (consolidation) settlement and will take place over a long period of time, whilst settlements in granular soils will occur rapidly as loadings increase.

Given the presence of both the cohesive and granular deposits around foundation depth, consideration should be given to the impacts of differential settlement on the foundation design and it is recommended that where foundations cross a change in strata, from cohesive to granular, nominal reinforcement is incorporated to control the effects of differential settlements.

A minimum foundation depth of 0.8m, below existing or proposed ground level is considered suitable for the site, subject to the following provisos: -

a) The clay deposits should be considered as having a low volume change potential and therefore, where affected by trees, foundations should be designed in accordance within Chapter 4.2 of NHBC Standard "*Building Near Trees*".

Where foundations exceed 1.5 in depth, due to the presence of trees, anti-heave protection will be required.

5.2 Ground Floor Construction

Given the presence of near surface cohesive soils, suspended ground floor slabs are recommended for the site.

5.3 External Works

5.3.1 Pavement Design

The sub-grade across the site comprises typically cohesive Tidal Flats Deposits, although it contains a high proportion of granular material.

To initially assess California Bearing Ratio (CBR) values for the shallow soils, reference has been made to the *Department of Transport Design Manual for Roads and Bridges, Volume 7, Pavement Design and Maintenance*. This publication gives estimates of CBR values based upon plasticity index and grading. For a sandy clay with a plasticity index of roughly 10%, a CBR value of roughly 3% is recommended for a thin pavement, constructed under average conditions. This gives an indication of the range of parameters which may be applicable for the site, but was supplemented by laboratory testing, as outlined below.

Laboratory CBR testing was conducted on two bulk samples of shallow soils recovered from TP2 (0.4-0.8m) and WS3 (0.8-1.0m), returning a range of values between 1.2% and 2.6%.

Given consideration of all the sources of information outlined above, a design CBR value of 2% is considered suitable for the site.

Once the formation level for the new pavement has been achieved, proof rolling should be carried out using a heavy roller, and any soft or loose areas revealed should be excavated and a greater depth of sub-base provided.

Exposed subgrades will likely deteriorate rapidly on exposure to wet weather and should be shaped to shed water. Sub-base should be placed as soon as possible to minimise the exposure of the subgrade to adverse weather conditions.

5.3.2 Drainage

Infiltration testing was attempted in all trial pit locations (TP1-3) formed across the site, and in general accordance with *BRE Digest 365,* although it should be appreciated that the slow rates of infiltration limited the amount of testing possible. A summary of the results is provided in the table below:

Trial Pit Location	Test Depth (m bgl)	Approximate Infiltration Rate (m/s)	Notes
TP1	1.5	$2.15x10^{-6}$	Tests failed to reach target depth (75% effective test depth)
TP2	0.85	$5.46x10^{-6}$	
TP3	1.5	$<1.0x10^{-6}$	

None of the infiltration tests in any of the trial pits were able to reach the target depth (75% of the effective depth) during the course of the tests (between 3 to 5.3 hours). Therefore, the calculated rates involved notable data extrapolation, with the conditions considered to be representative of 'low to very low permeability' soils.

It should also be noted that groundwater was observed during subsequent monitoring visits at depths ranging between 1.30m and 2.38m, which may well have influenced the testing and during winter months, shallower groundwater can be expected.

5.4 Groundworks

Whilst excavations in cohesive soils may remain stable for short periods during construction, the long-term stability of these should not be relied upon in unsupported excavations.

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, intrusions of groundwater may be encountered within shallow excavations for foundations or drainage, and may require dewatering controls such as sump pumping.

5.5 Concrete Grade

Sulphate contents and pH values determinations were carried out by the analytical laboratory, the results of which are also included within Appendix E. Results for concrete grade are summarised within the following table.

Strata	Water Soluble Sulphate (mg/l SO_4)		pH	
	Min	Max	Min	Max
Tidal Flats Deposits	4.4	25.3	8.68	9.14

In accordance with Part 1 of the BRE Special Digest 1 '*Concrete in Aggressive Ground*' 2005, the mean of the highest two water soluble sulphate values has been used. For Tidal Flats Deposits this gives a Design Sulphate Class (DS) of DS-1 with an aggressive chemical environment for concrete (ACEC) of AC-1 which does not require special protective measures.

6 GROUND GAS RISK ASSESSMENT

The results of soil gas monitoring are presented in Table 3 along with calculated gas screening values, set out in CIRIA guidance '*Assessing Risks Posed by Hazardous Ground Gases to Buildings*'. Three rounds of monitoring were conducted over three weeks, with two of the three visits performed at falling barometric pressures, whilst the other visit was performed during a period of increasing barometric pressure.

Results of the ground gas monitoring show that no detectable concentration of methane or hydrogen sulphide were encountered above instrument detection limits across the entire monitoring period, and no flow rates above 0.1l/hr were recorded. However, during one visit, some minor levels of CO_2 were recorded within all boreholes between 1.0 and 5.0% v/v. During the other two visits, CO_2 was not recorded above 0.1% v/v.

Residential dwellings are understood to be proposed, therefore the *'Modified Wilson and Card Classification System'* has been used to assess the risks from ground gases, (in accordance with CIRIA C665) on a precautionary basis.

The maximum individual Gas Screening Value (GSV) is calculated by multiplying the maximum borehole flow rate (l/hr) by the maximum gas concentration (%).

This gives a gas screening value for carbon dioxide of <0.005l/hr, which falls into the 'very low risk' category and Characteristic Situation 1 (CS1) conditions. The worst-case gas screening value for methane was calculated at <0.0001l/hr, which also falls into the 'very low risk' category and CS1. However, given that carbon dioxide was identified at 5.0% further consideration has been given to increasing this to CS2 as is required by CIRIA C665.

This concentration was only identified on only one occasion and much lower concentrations were generally identified across the site on all of the visits, with no flow recorded on any visit. Moreover, very little information is available on the landfill, with no evidence of it on any historic mapping and the EA public database indicates it to be very small. On this basis, along with variable but generally low permeability of soils identified, EPS considers it reasonable to conclude that CS1 it is appropriate for the site.

These conditions will not require any gas protection measures to be installed within the floor-slab or foundations of any new buildings at the site.

7 CONCLUSIONS AND RECOMMENDATIONS

The previous Phase I Geo-Environmental Desk Study found the migration of ground gases from an adjacent landfill may pose an unacceptable risk to future site users health and therefore recommended an intrusive investigation in order to perform a period of ground gas monitoring.

A total of four window sampler boreholes were drilled to a maximum depth of 4.0m across the site, with three trial pits excavated to a maximum depth of 1.5m. Standpipes were installed in all four boreholes in order to assess the gassing regime of the site. Ground conditions were found to comprise topsoil underlain by Tidal Flats Deposits, which varied in composition, typically comprising sandy silty clay overlying clayey silt/sand although the depth of this transition varied between the boreholes; granular deposits were first encountered at 1.0m bgl in WS2 and WS4, but were first encountered at 3.0m and 2.0m in WS1 and WS3 respectively. Groundwater levels were recorded during the course of the monitoring programme and were found to lie between 1.30m and 2.38m below ground level.

On the basis of geotechnical testing and analysis, the ground conditions are considered suitable for the use of conventional spread foundations, with allowable bearing capacities ranging between 60 kN/m^2 and 80kN/m^2 depending on the depth and nature of the foundation.

In accordance with Part 1 of the BRE Special Digest 1 '*Concrete in Aggressive Ground*' 2005, a Design Sulphate Class (DS) of DS-1 with an aggressive chemical environment for concrete (ACEC) of AC-1 is recommended, which does not require special protective measures.

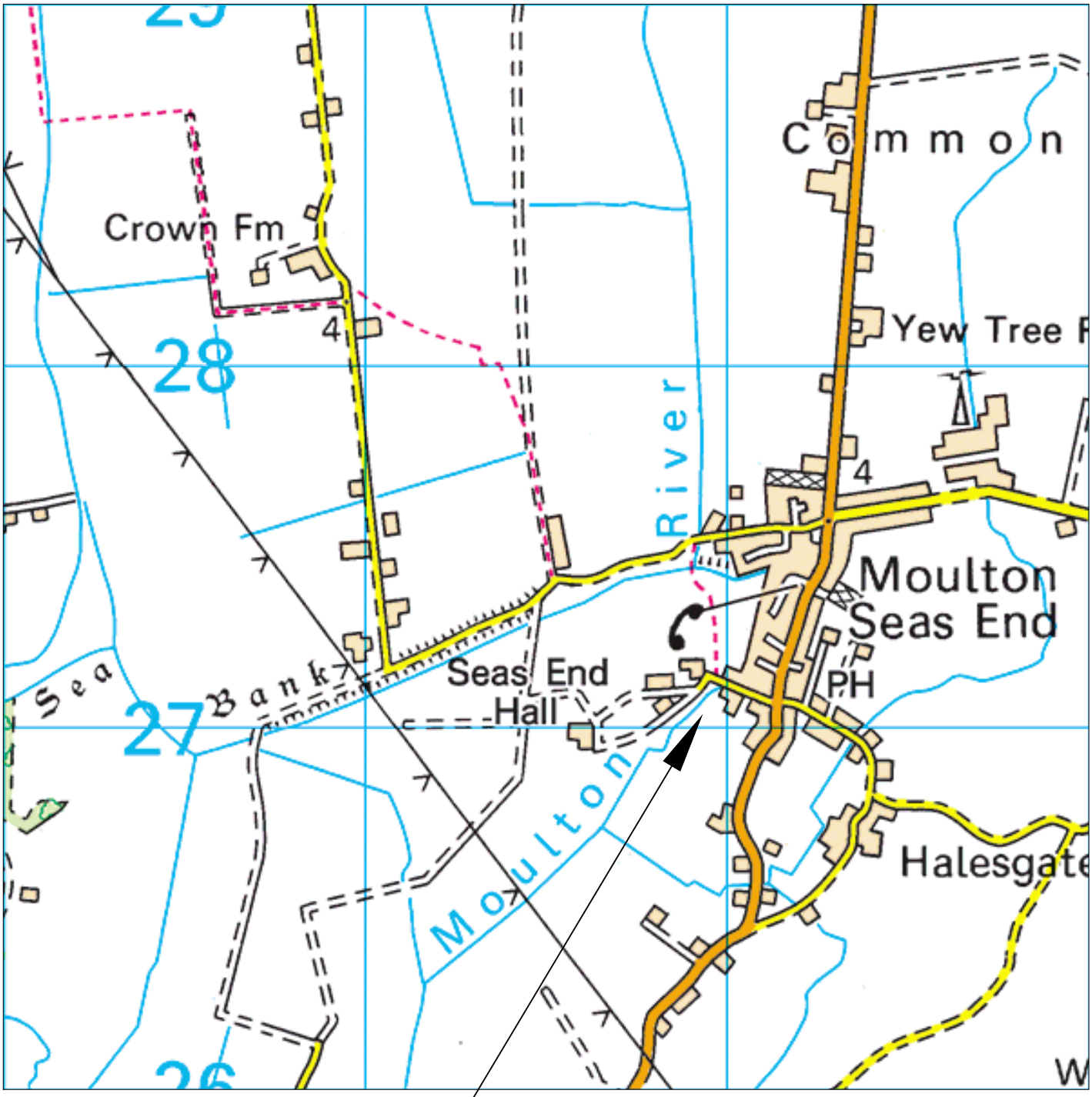
A soil gas monitoring programme consisting of three return visits was undertaken and confirmed the site to fall into the 'very low risk' category and Characteristic Situation 1 (CS1) conditions. Therefore, the installation of special protective gas measures is not considered necessary for the proposed redevelopment.

In accordance with the Model Procedures for Management of Land Contamination (Contaminated Land Report 11), the site will not require any further investigation, and is deemed suitable for the proposed development.

In the unlikely event that any palpable evidence of unexpected contamination be encountered during the redevelopment work, it should be reported to EPS so that an inspection can be made and appropriate sampling and assessment work carried out. A method statement for this is provided as Appendix F.

It is recommended that a copy of this report be provided to the Environmental Health Department of South Holland District Council so that the information may be incorporated into their land quality records and used to support the current planning application.

FIGURES



Approximate Site Location

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Licence Number: 100054115

Title: Site Location Plan

Project: Land Adjacent 1 Hall Lane, Moulton Seas End, Spalding, PE12 6LB

Fig No: 1

Scale:	NTS
Drawn By: WR	Approved By: WE
Job No:	UK19.4517b
Dwg No:	MoultonSeasEnd/1019/01
Date:	October 2019



Approximate Site Boundary

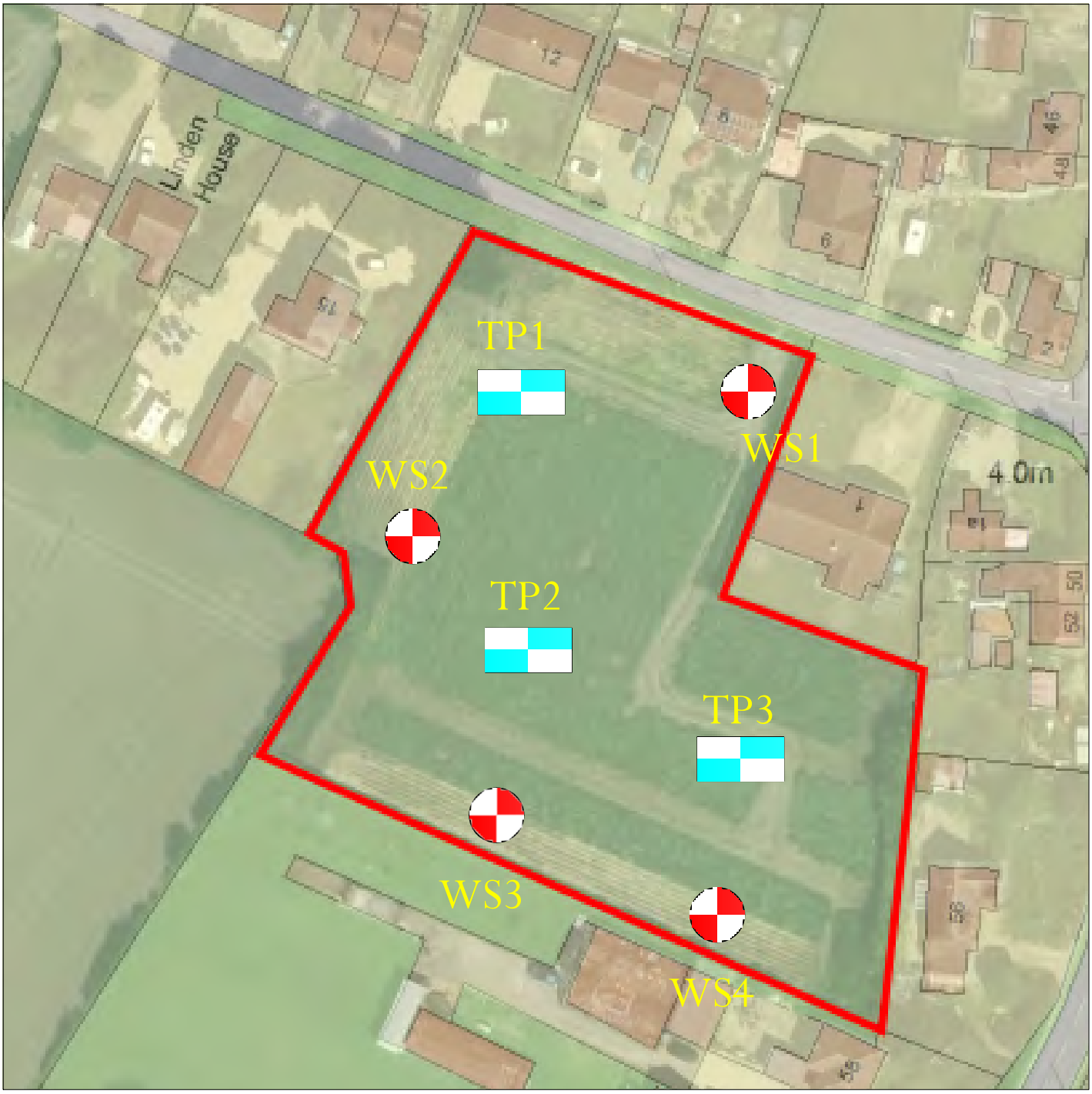
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Licence Number: 100054115

Title: **Aerial Photograph**

Project: Land Adjacent 1 Hall Lane, Moulton Seas End, Spalding, PE12 6LB

Fig No: 2

Scale:	NTS
Drawn By: WR	Approved By: WE
Job No:	UK19.4517b
Dwg No:	MoultonSeasEnd/1019/02
Date:	October 2019



Approximate Site Boundary
Approximate Borehole Location
Approximate Trial Pit Location

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Title: Borehole Location Plan

Project: Land Adjacent 1 Hall Lane, Moulton Seas End, Spalding, PE12 6LB

Fig No: 3

Scale: NTS

Drawn By: WR | Approved By: WE

Job No: UK19.4517b

Dwg No: MoultonSeasEnd/1019/03

Date: October 2019

TABLES

Table 1 – Laboratory Testing Schedule (Environmental)

Sample ID	Sample Depth (m bgl)	pH & Sulphate
WS1-ES1	2.7-2.9	X
WS1-ES2	3.1-3.3	X
WS2-ES1	1.3-1.5	X
WS3-ES1	1.2-1.4	X
WS3-ES2	3.6-3.8	-
WS4-ES1	3.8-4.0	X

Notes

mbgl	meters below ground level
X	Sample Taken
-	Sample Not Analysed

Table 2 – Laboratory Testing Schedule (Geotechnical)

Sample ID	Sample Depth (m bgl)	Moisture Content	Atterberg Limits	Particle Size Distribution	California Bearing Ratio Test
TP2-B1	0.4	X	X	X	-
TP3-D1	1.5	X	X	-	-
WS1-B1	0.6	X	X	X	-
WS2-D2	2.4	X	-	-	X
WS3-D1	0.8	X	X	-	-
WS4-D1	3.5	X	-	-	X

Notes

mbgl	meters below ground level
X	Sample Taken
-	Sample Not Analysed

Table 3 – Gas Monitoring Well Analysis

(17/09/2019)

Sample ID	BH1	BH2	BH3	BH4
CH_4 (%)	<0.1	<0.1	<0.1	<0.1
CO_2 (%)	1.3	5.0	2.2	1.0
O_2 (%)	19.2	15.9	17.7	15.9
Flow Rate (l/hr)	<0.1	<0.1	<0.1	<0.1
Gas Screening Value (l/hr) (CH_4)	<0.0001	<0.0001	<0.0001	<0.0001
Gas Screening Value (l/hr) (CO_2)	<0.0013	<0.005	<0.0022	<0.001

Readings collected on 17th September 2019 at an atmospheric pressure of 1026 (rising).

(27/09/2019)

Sample ID	BH1	BH2	BH3	BH4
CH_4 (%)	<0.1	<0.1	<0.1	<0.1
CO_2 (%)	0.1	<0.1	<0.1	<0.1
O_2 (%)	20.4	20.7	20.7	20.8
Flow Rate (l/hr)	<0.1	<0.1	<0.1	<0.1
Gas Screening Value (l/hr) (CH_4)	<0.0001	<0.0001	<0.0001	<0.0001
Gas Screening Value (l/hr) (CO_2)	0.0001	<0.0001	<0.0001	<0.0001

Readings collected on 27th September 2019 at an atmospheric pressure of 1002 (falling).

(3/10/2019)

Sample ID	BH1	BH2	BH3	BH4
CH_4 (%)	<0.1	<0.1	<0.1	<0.1
CO_2 (%)	0.1	<0.1	<0.1	<0.1
O_2 (%)	21.3	21.0	21.3	21.2
Flow Rate (l/hr)	<0.1	<0.1	<0.1	<0.1
Gas Screening Value (l/hr) (CH_4)	<0.0001	<0.0001	<0.0001	<0.0001
Gas Screening Value (l/hr) (CO_2)	0.0001	<0.0001	<0.0001	<0.0001

Readings collected on 3rd October 2019 at an atmospheric pressure of 1020 (falling).

APPENDICES

APPENDIX A

Selected Site Photographs & Photograph Location Plan



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Title: **Photograph Location Plan**

Project: Land Adjacent 1 Hall Lane, Moulton Seas End, Spalding, PE12 6LB

Fig No: A

Scale:	NTS
Drawn By: WR	Approved By: WE
Job No:	UK19.4517b
Dwg No:	MoultonSeasEnd/1019/A
Date:	October 2019

Photo 1: Image of the site's northern boundary along Hall Lane, facing north-west.	Photo 2: Image of site's western boundary, facing west.
	
Photo 3: Image of site boundary with 1 Hall Lane (left), with greenhouse from the neighbouring southern property in the background.	Photo 4: Image of site's eastern boundary, with 1 Hall Lane to the far left of the image.
	
Photo 5: Image of Tidal Flats Deposits recovered from WS1. Core becomes deeper from right to light, with shallowest material at the top of the image.	Photo 6: Image of Tidal Flats Deposits recovered from WS1 between 1.0 and 2.0m
	

APPENDIX B

Proposed Development Plan

Indicative Site Layout

1:500 scale



Adjacent Site has benefit of Outline Planning Consent Ref H13 - 0544 -17

mlp Moulton Land and Planning

moultonlandandplanning.co.uk 7 Broad Lane Moulton Lincs PE12 6PN

tel 01406 370081 mob 07484 101655 e-mail alan@moultonland.co.uk

Project

Proposed Residential Development

land adjacent No. 1 Hall Lane, Moulton Seas End, Spalding

for Mr. A. Cooley

Drawing

Indicative Site Layout

date	nov 2017
scale(s)	1:500 @A3
DRG. No.	CLY01 / pl 002

APPENDIX C

Site Specific Borehole Logs

Borehole Log

Borehole No. **TP1**

Sheet 1 of 1

Project Name:	Land Adj 1 Hall Lane, Moulton Seas End	Project No. UK19.4517b	Co-ords: -	Hole Type TP
Location:	Land Adj 1 Hall Lane, Moulton Seas End, Spalding, PE12 6LB		Level:	Scale 1:10
Client:	Wilf Hammond Homes Ltd		Dates: 10/09/2019 - 10/09/2019	Logged By

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								TOPSOIL: Dark brown slightly sandy, silty clayey topsoil. Active rootlets present.
					0.60			Light yellowish brown sandy, very silty CLAY. (TIDAL FLATS DEPOSITS)
					1.50			End of borehole at 1.50 m

Remarks

Borehole Log

Borehole No. **TP2**

Sheet 1 of 1

Project Name:	Land Adj 1 Hall Lane, Moulton Seas End	Project No. UK19.4517b	Co-ords: -	Hole Type TP
Location:	Land Adj 1 Hall Lane, Moulton Seas End, Spalding, PE12 6LB		Level:	Scale 1:10
Client:	Wilf Hammond Homes Ltd		Dates: 10/09/2019 - 10/09/2019	Logged By

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.00			TOPSOIL: Dark brown slightly sandy, silty clayey topsoil. Active rootlets present.
		0.40 - 0.80	B		0.40			Light brown to yellowish brown slightly clayey, very silty SAND.(TIDAL FLATS DEPOSITS)
					0.85			End of borehole at 0.85 m

Remarks

Borehole Log

Borehole No. **TP3**

Sheet 1 of 1

Project Name:	Land Adj 1 Hall Lane, Moulton Seas End	Project No. UK19.4517b	Co-ords: -	Hole Type TP
Location:	Land Adj 1 Hall Lane, Moulton Seas End, Spalding, PE12 6LB		Level:	Scale 1:10
Client:	Wilf Hammond Homes Ltd		Dates: 10/09/2019 - 10/09/2019	Logged By WR

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								TOPSOIL: Dark brown slightly sandy, silty, clayey topsoil. Active rootlets present.
					0.50			Light yellowish brown to greyish brown sandy, silty CLAY.(TIDAL FLATS DEPOSITS)
		1.50	D		1.50			End of borehole at 1.50 m

Remarks

Borehole Log

Borehole No. **WS1**

Sheet 1 of 1

Project Name:	Land Adj 1 Hall Lane, Moulton Seas End	Project No. UK19.4517b	Co-ords: -	Hole Type WS
Location:	Land Adj 1 Hall Lane, Moulton Seas End, Spalding, PE12 6LB		Level:	Scale 1:20
Client:	Wilf Hammond Homes Ltd		Dates: 10/09/2019 - 10/09/2019	Logged By WR

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
								TOPSOIL: Dark brown slight sandy clayey topsoil. Active rootlets present.	
		0.60 - 1.00	B		0.60				
								Soft, dark brown to light brown sandy, silty CLAY. (TIDAL FLATS DEPOSITS)	
		1.00		N=8 (1,1/1,1,3,3)	1.00				1
								Soft ,light brown to yellowish brown sandy, silty CLAY. (TIDAL FLATS DEPOSITS)	
		1.50 - 1.70	D					*Soils became wet @ 1.5m bgl.*	
		2.00		N=10 (2,3/3,2,3,2)	2.00				2
								Soft brown, silty sandy CLAY. (TIDAL FLATS DEPOSITS)	
		2.50 - 2.70	D						
		2.70 - 2.90	ES						
		3.00		N=19 (2,4/3,5,5,6)	3.00				3
		3.10 - 3.30	ES					Medium dense, brown clayey, sandy SILT. (TIDAL FLATS DEPOSITS)	
		4.00		N=17 (3,4/3,5,5,4)	4.00			End of borehole at 4.00 m	4

Remarks

AGS

Borehole Log

Borehole No. **WS2**

Sheet 1 of 1

Project Name:	Land Adj 1 Hall Lane, Moulton Seas End	Project No. UK19.4517b	Co-ords: -	Hole Type WS
Location:	Land Adj 1 Hall Lane, Moulton Seas End, Spalding, PE12 6LB		Level:	Scale 1:20
Client:	Wilf Hammond Homes Ltd		Dates: 10/09/2019 - 10/09/2019	Logged By WR

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
								TOPSOIL: Dark brown silty clayey topsoil. Active rootlets present.	
					0.60			Soft light yellowish brown sandy, silty CLAY. (TIDAL FLATS DEPOSITS)	
		1.00		N=8 (1,0/1,2,3,2)	1.00			Loose to medium dense, light yellowish brown to brown clayey SILT/SAND. (TIDAL FLATS DEPOSITS)	1
		1.30 - 1.50	ES						
	▼	1.80 - 2.00	D						
		2.00		N=10 (2,3/2,3,3,2)					2
		2.40 - 2.60	D						
		3.00		N=20 (4,4/5,4,5,6)					3
		4.00		N=15 (3,3/3,4,4,4)	4.00			End of borehole at 4.00 m	4

Remarks

AGS

Borehole Log

Borehole No. **WS3**

Sheet 1 of 1

Project Name:	Land Adj 1 Hall Lane, Moulton Seas End	Project No. UK19.4517b	Co-ords: -	Hole Type WS
Location:	Land Adj 1 Hall Lane, Moulton Seas End, Spalding, PE12 6LB		Level:	Scale 1:20
Client:	Wilf Hammond Homes Ltd		Dates: 10/09/2019 - 10/09/2019	Logged By WR

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								TOPSOIL: Dark brown silty clayey silty topsoil. Active rootlets present.
					0.40			Light brown to yellowish brown sandy silty CLAY. (TIDAL FLATS DEPOSITS)
		0.80 - 1.00	D					
		1.00		N=10 (2,2/2,2,3,3)				
		1.20 - 1.40	ES					
		2.00		N=11 (2,1/2,3,2,4)	2.00			Medium dense, brown to yellowish brown clayey silty SAND. (TIDAL FLATS DEPOSITS)
		3.00		N=13 (2,2/2,3,4,4)				
		3.60 - 3.80	ES					
		4.00		N=13 (2,3/3,3,4,3)	4.00			End of borehole at 4.00 m

1 2 3 4

Remarks

AGS

Borehole Log

Borehole No. **WS4**

Sheet 1 of 1

Project Name:	Land Adj 1 Hall Lane, Moulton Seas End	Project No. UK19.4517b	Co-ords: -	Hole Type WS
Location:	Land Adj 1 Hall Lane, Moulton Seas End, Spalding, PE12 6LB		Level:	Scale 1:20
Client:	Wilf Hammond Homes Ltd		Dates: 10/09/2019 - 10/09/2019	Logged By WR

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
								TOPSOIL: Dark brown silty clayey topsoil. Active rootlets present.	
					0.50			Soft light brown to orangish brown silty sandy CLAY. (TIDAL FLATS DEPOSITS)	
		1.00		N=7 (1,1/1,1,2,3)	1.00			Loose, light brown to orangish brown silty, clayey SAND. (TIDAL FLATS DEPOSITS)	1
		2.00		N=10 (2,3/3,3,2,2)					2
		3.00		N=12 (1,2/3,3,3,3)	3.00			Medium dense, brown silty SAND. (TIDAL FLATS DEPOSITS)	3
		3.50 - 3.70	D						
		3.80 - 4.00	ES						
		4.00		N=14 (3,3/2,4,4,4)	4.00			End of borehole at 4.00 m	4

Remarks

APPENDIX D

Laboratory Results – Geotechnical

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 01/10/2019

0998

Contract	**UK19.4517b - 1 Hall Lane, Moulton Seas End**
Serial No.	**35844**

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:

UK19.4517b - 1 Hall Lane, Moulton Seas End

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: 17/09/2019

Samples Tested Between: 17/09/2019 **and** 01/10/2019

Remarks:

For the attention of Wiliam Reese
Your Reference No: UK19.4517b
Your Order No: 22872

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: 01/10/2019

0998

Contract	**UK19.4517b - 1 Hall Lane, Moulton Seas End**		
Serial No.	**35844**	**Target Date**	30/09/2019
Scheduled By	Environmental Protection Strategies Ltd		

SCHEDULE OF LABORATORY TESTS

Schedule Remarks

Bore Hole No.	Type	Sample Ref.	Top Depth	Water Content (BSEN)	Liquid/Plastic Limits	California Bearing Ratio Test	Particle Size Distribution (BS1377)														Sample Remarks
TP2	B	1	0.40	1	1	1															
TP3	D	1	1.50	1	1																
WS1	B	1	0.60	1	1	1															
WS2	D	2	2.40	1			1														
WS3	D	1	0.80	1	1																
WS4	D	1	3.50	1			1														
Totals				**6**	**4**	**2**	**2**														**End of Schedule**

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 01/10/2019

0998

Contract	**UK19.4517b - 1 Hall Lane, Moulton Seas End**
Serial No.	**35844**

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)		
TP2	0.40 - 0.80	B	1	**20.5**	29	23	6	-0.42	From Natural	0 (A)		29	Yellowish brown slightly clayey very silty SAND	ML
TP3	1.50	D	1	**30.2**	34	24	10	0.62	From Natural	0 (A)		29	Soft brown and greyish brown sandy CLAY/SILT with rare slightly organic pockets	CL/ML
WS1	0.60 - 1.00	B	1	**21.8**	31	23	8	-0.15	From Natural	0 (A)		29	Soft yellowish brown sandy CLAY/SILT	CL/ML
WS2	2.40 - 2.60	D	2	**25.9**									Brown slghtly clayey very silty SAND	
WS3	0.80 - 1.00	D	1	**24.3**	33	23	10	0.13	From Natural	0 (A)		28	Soft brown sandy silty CLAY with rare grey and orangish brown mottling	CL
WS4	3.50 - 3.70	D	1	**22.3**									Brown silty SAND	

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 2:1990:3.2, 4.4
Type of Sample Key: U = Undisturbed, L = Liner, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:

Table Notation: Ret'd 0.425mm: (A) = Assumed, (M) = Measured

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

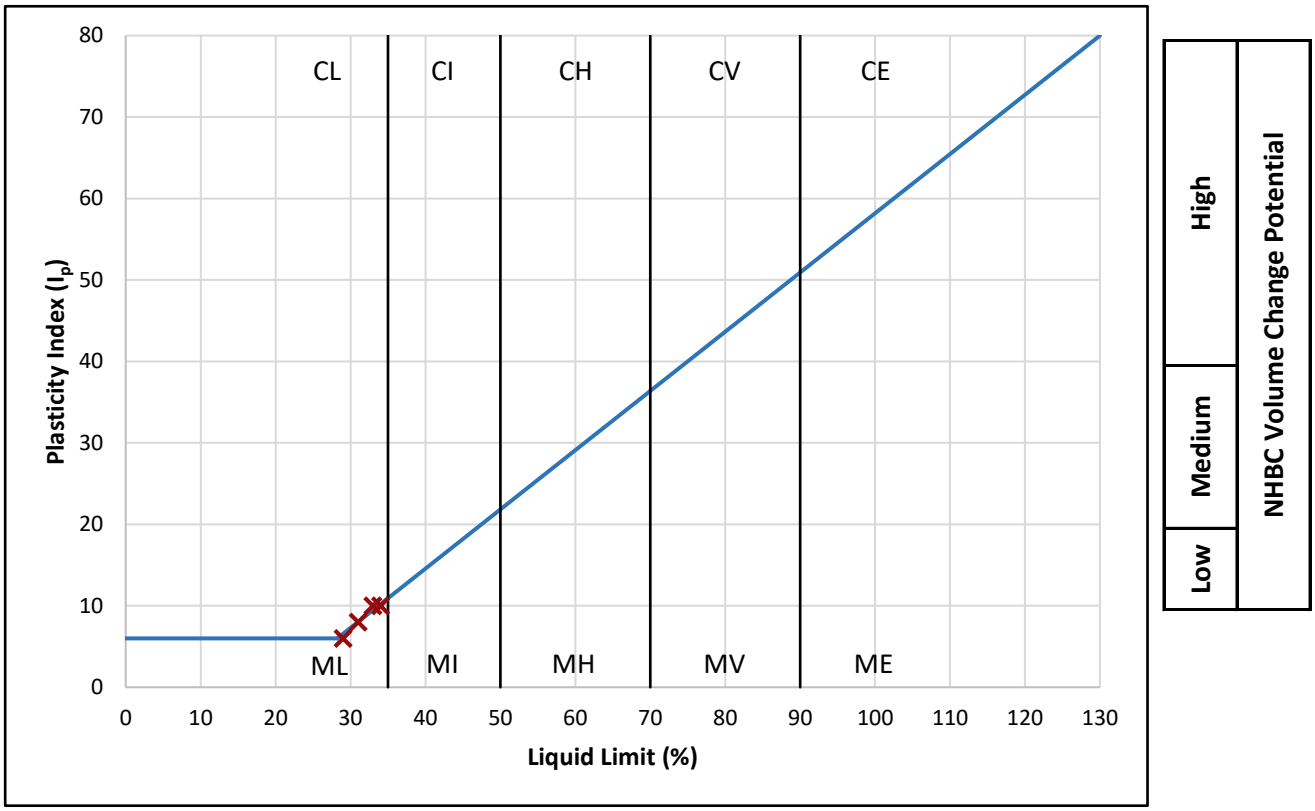
DATE ISSUED: 01/10/2019

0998

Contract	**UK19.4517b - 1 Hall Lane, Moulton Seas End**
Serial No.	**35844**

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

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 01/10/2019

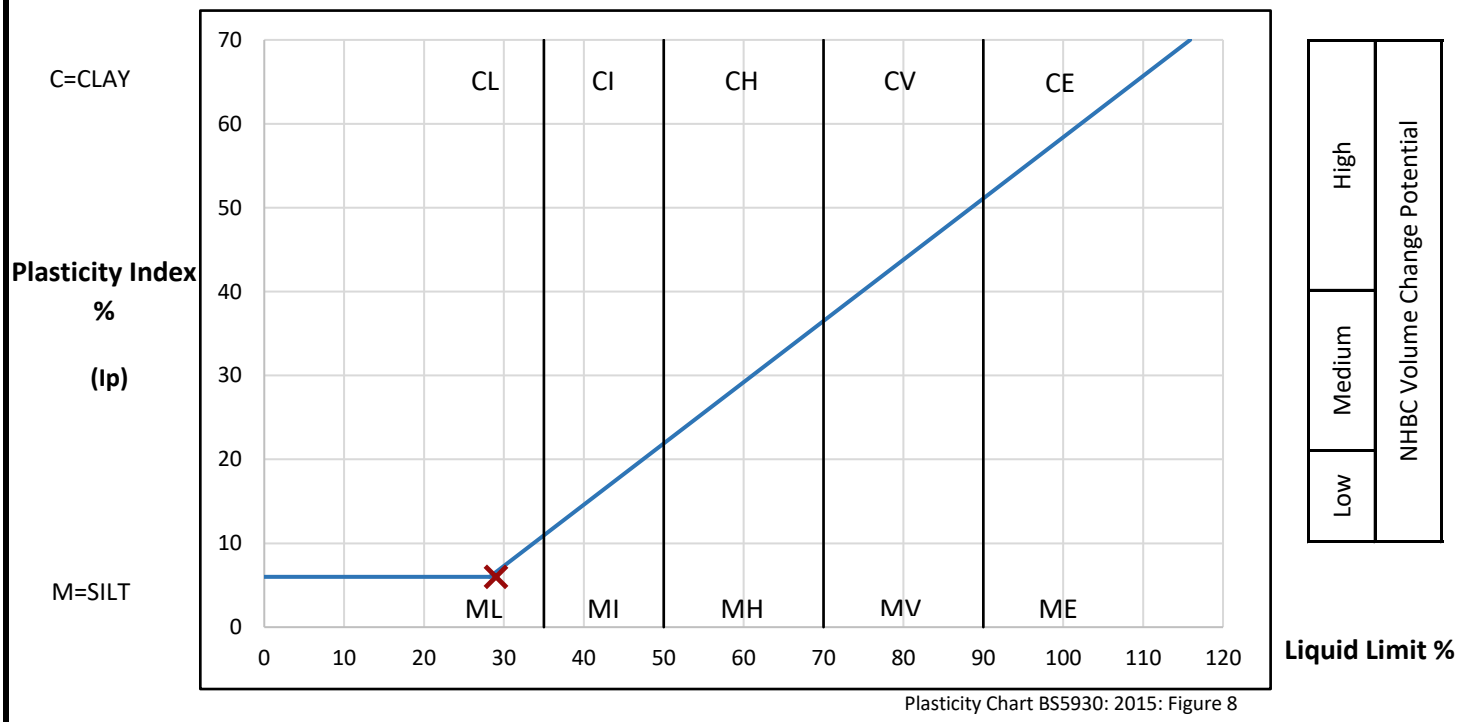
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Contract	**UK19.4517b - 1 Hall Lane, Moulton Seas End**
Serial No.	**35844**

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
TP2	0.40 - 0.80	B	1	20.5	Yellowish brown slightly clayey very silty SAND	

PREPARATION				Liquid Limit	29 %
Method of preparation		From natural		Plastic Limit	23 %
Sample retained 0.425mm sieve	(Assumed)	0 %		Plasticity Index	6 %
Corrected water content for material passing 0.425mm				Liquidity Index	-0.42
Sample retained 2mm sieve	(Assumed)	0 %		NHBC Modified (I'p)	n/a
Curing time	29 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:	

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 01/10/2019

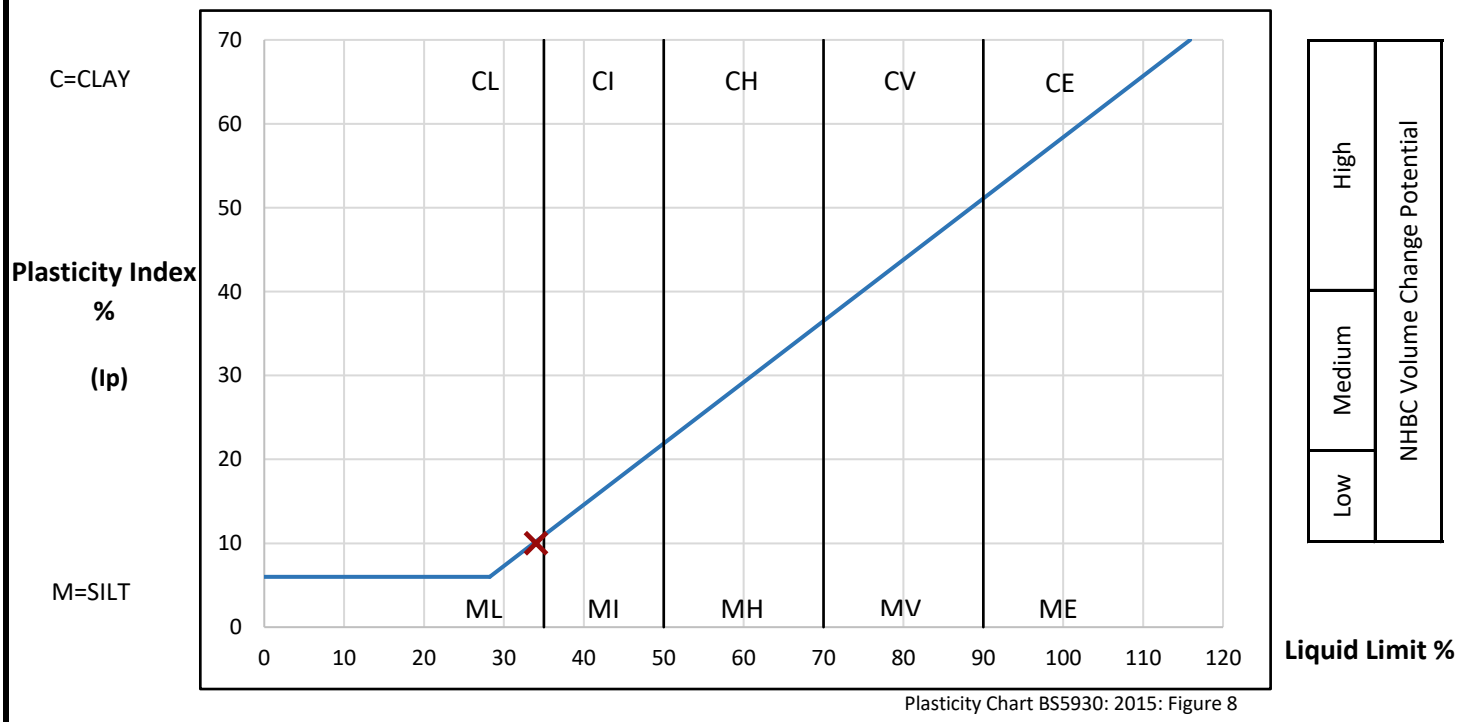
0998

Contract	**UK19.4517b - 1 Hall Lane, Moulton Seas End**
Serial No.	**35844**

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
TP3	1.50	D	1	30.2	Soft brown and greyish brown sandy CLAY/SILT with rare slightly organic pockets	

PREPARATION				Liquid Limit	34 %
Method of preparation		From natural		Plastic Limit	24 %
Sample retained 0.425mm sieve	(Assumed)	0 %		Plasticity Index	10 %
Corrected water content for material passing 0.425mm				Liquidity Index	0.62
Sample retained 2mm sieve	(Assumed)	0 %		NHBC Modified (I'p)	n/a
Curing time	29 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:	

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 01/10/2019

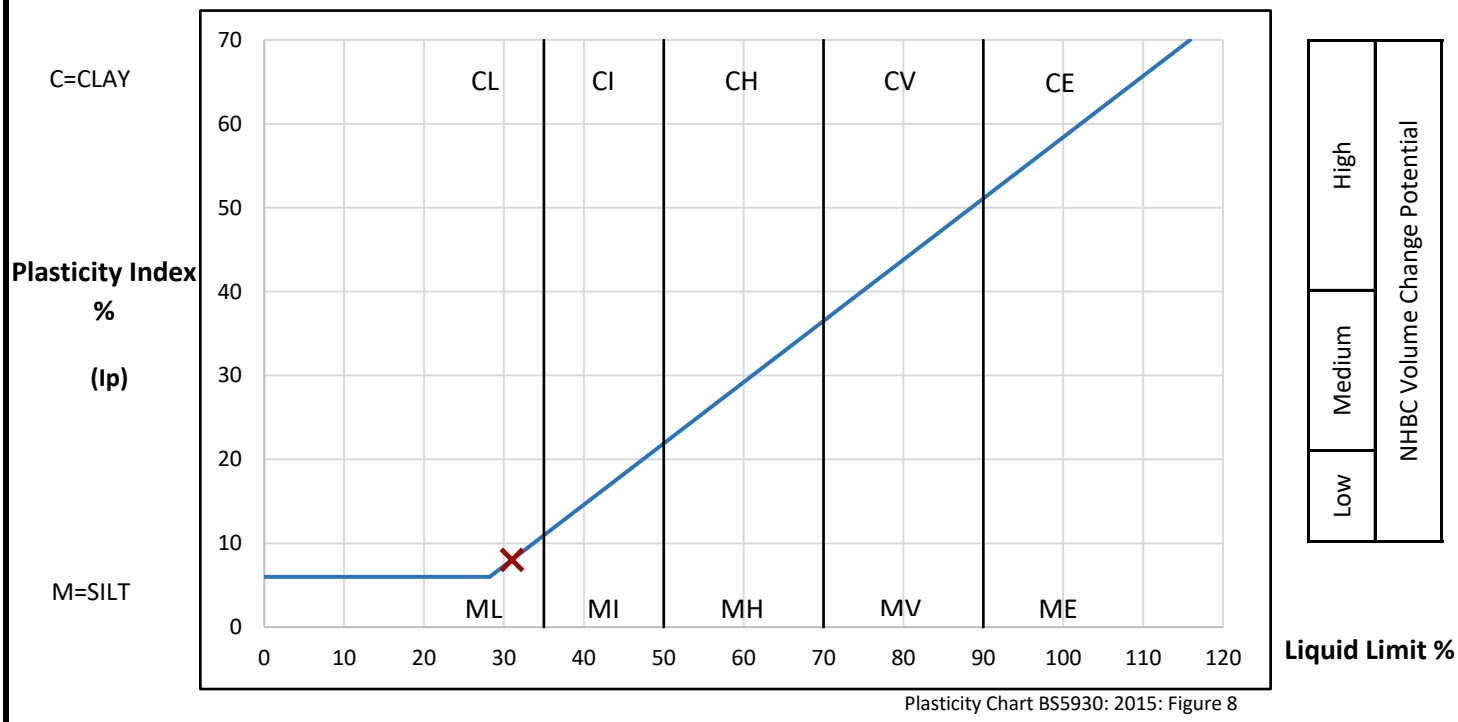
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Contract	**UK19.4517b - 1 Hall Lane, Moulton Seas End**
Serial No.	**35844**

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
WS1	0.60 - 1.00	B	1	21.8	Soft yellowish brown sandy CLAY/SILT	

PREPARATION			Liquid Limit	31 %
Method of preparation		From natural	Plastic Limit	23 %
Sample retained 0.425mm sieve	(Assumed)	0 %	Plasticity Index	8 %
Corrected water content for material passing 0.425mm			Liquidity Index	-0.15
Sample retained 2mm sieve	(Assumed)	0 %	NHBC Modified (I'p)	n/a
Curing time	29 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:

TEST REPORT

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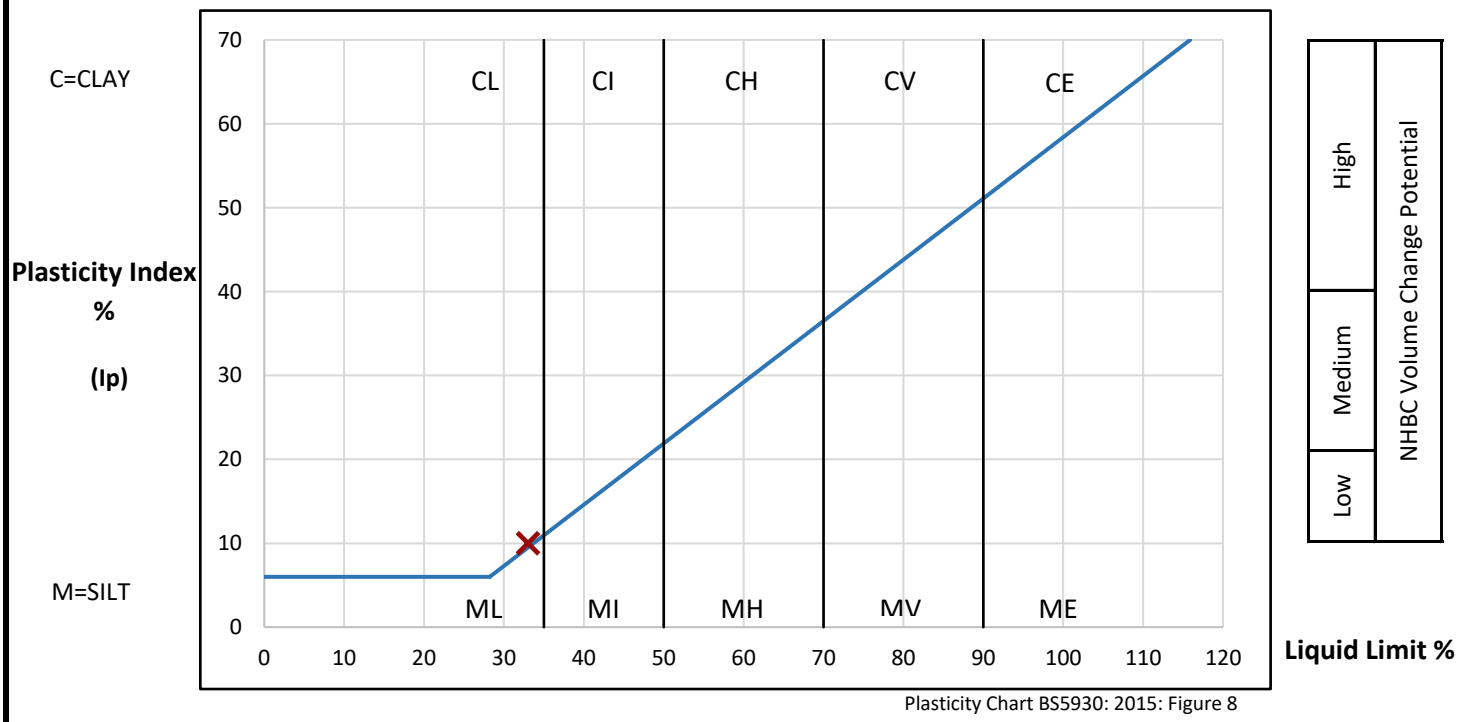
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Contract	**UK19.4517b - 1 Hall Lane, Moulton Seas End**
Serial No.	**35844**

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
WS3	0.80 - 1.00	D	1	24.3	Soft brown sandy silty CLAY with rare grey and orangish brown mottling	

PREPARATION				Liquid Limit	33 %
Method of preparation		From natural		Plastic Limit	23 %
Sample retained 0.425mm sieve	(Assumed)	0 %		Plasticity Index	10 %
Corrected water content for material passing 0.425mm				Liquidity Index	0.13
Sample retained 2mm sieve	(Assumed)	0 %		NHBC Modified (I'p)	n/a
Curing time	28 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:	

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

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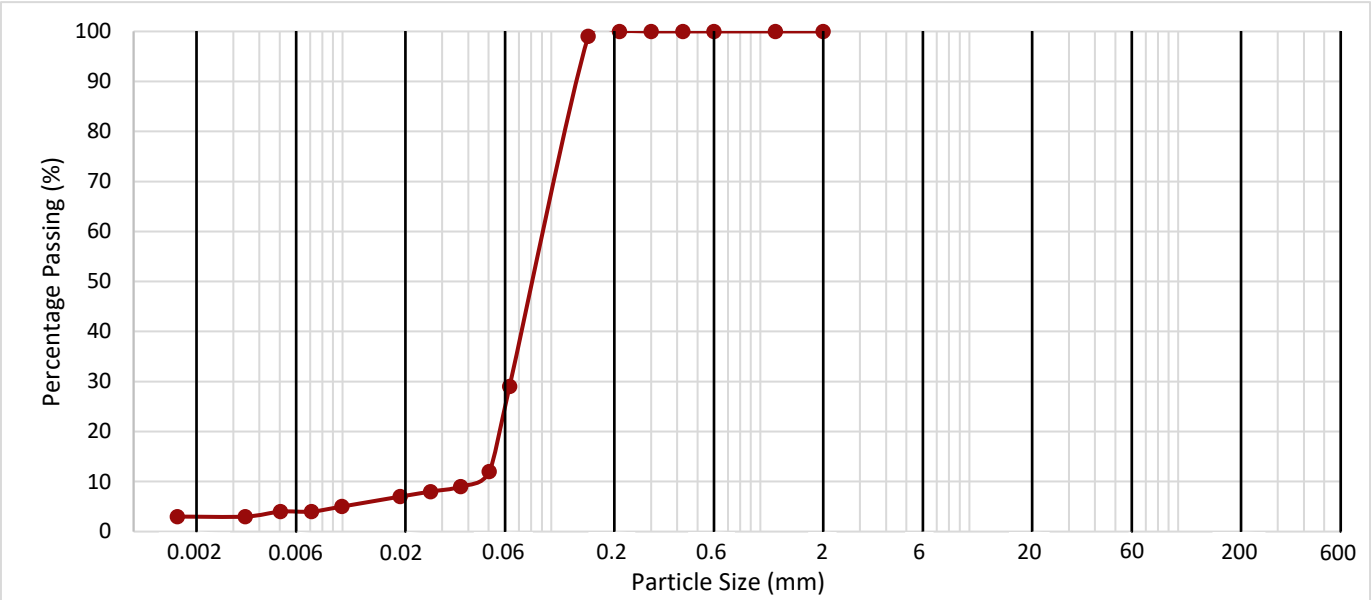
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Contract	**UK19.4517b - 1 Hall Lane, Moulton Seas End**
Serial No.	**35844**

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Pit No.	Depth (m)	Sample Type	Sample Reference	Description	Remarks
WS2	2.40 - 2.60	D	2	Brown slghtly clayey very silty 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 (%)
0.0504	12	26
0.0368	9	
0.0264	8	
0.0189	7	Clay by Dry Mass (%)
0.0099	5	
0.0071	4	
0.0051	4	3
0.0034	3	
0.0016	3	

Sieve Size (mm)	Passing (%)	Sand By Dry Mass (%)
2.00	100	71
1.18	100	
0.600	100	
0.425	100	
0.300	100	
0.212	100	
0.150	99	
0.063	29	

Fines By Dry Mass (%)	
<0.063mm	29

Sieve Size (mm)	Passing (%)	2mm+ By Dry Mass (%)
300		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: Part 2: 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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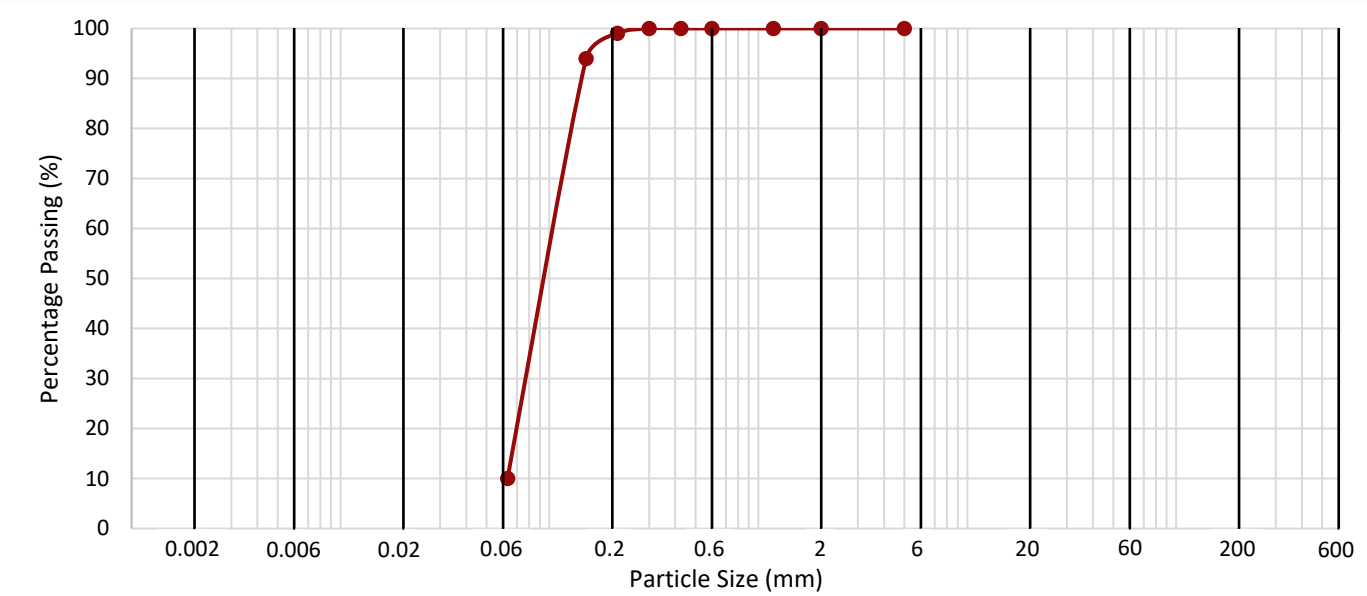
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Contract	**UK19.4517b - 1 Hall Lane, Moulton Seas End**
Serial No.	**35844**

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Pit No.	Depth (m)	Sample Type	Sample Reference	Description	Remarks
WS4	3.50 - 3.70	D	1	Brown silty SAND	

Method of Test:	Wet 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 (%)

Sieve Size (mm)	Passing (%)	**Sand By Dry Mass (%)**
2.00	100	**90**
1.18	100	
0.600	100	
0.425	100	
0.300	100	
0.212	99	
0.150	94	
0.063	10	

Fines By Dry Mass (%)	
<0.063mm	**10**

Sieve Size (mm)	Passing (%)	**2mm+ By Dry Mass (%)**
300		**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: Part 2: 1990: 9.2
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: 01/10/2019

0998

Contract	**UK19.4517b - 1 Hall Lane, Moulton Seas End**
Serial No.	**35844**

LABORATORY CALIFORNIA BEARING RATIO TESTS ADJUSTED FOR SEASONAL WATER CONTENT CHANGES

Due to seasonal variations of water content in near surface soils, many clients require CBR test samples to be subjected to sample preparation in the laboratory before testing. With Clay soils, liquid and plastic limits and water contents are carried out to classify them on material passing 20mm. The plastic limit is then compared against the water content with due regard to the proportion of material then retained on a 0.425mm sieve. If the water content is already 2% or more above the plastic limit, compaction may take place immediately. If this is not the case a calculated amount of water is added to the sample and cured for 24 hours before compaction. The samples are then cured for a further 24 hours before CBR tests are carried out at both the top and bottom of the sample.

Calculation of Adjusted Water Content for CBR testing

When a significant proportion of a basically clay material is >0.425mm, the adjusted water content (WC) for test shall be derived as follows:

Obtain test specimens for CBR, Limits and Water Content from Material Passing 20mm. (If the sample is large enough a water content may also be carried out on a representative portion of the whole sample including material greater than 20mm, and reported for information)

The Plastic Limit (PL) for the fine fraction is obtained by testing material passing the 0.425mm sieve. A notional 5% Water Content is to be allowed for material passing 20mm, and retained on the 0.425mm sieve. The proportion passing the 0.425mm is obtained by the wet sieve preparation method.

If X% passes 0.425mm, (100-X) % is retained on 0.425mm and with the 5% WC required to be incorporated for the retained 0.425mm portion, the adjusted WC for test shall be at least:

$$\frac{X(PL+2) + (100-X)5}{100} \%$$ for the sample passing 20mm

BH/ TP No.	Depth (m)	Type	Reference	WC as received* (%)	Plastic Limit (%)	Passing 0.425mm (%)	>20mm excluded (%)	WC req. for CBR (%)	WC after CBR Test (%)	Remarks
TP2	0.40 - 0.80	B	1	20.5	23	100	0.0		20.5	I'p = 6. No adjustment req.
WS1	0.60 - 1.00	B	1	21.8	23	100	0.0		21.8	I'p = 8. No adjustment req.

* Water content excluding material +20mm

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 01/10/2019

0998

Contract	**UK19.4517b - 1 Hall Lane, Moulton Seas End**
Serial No.	**35844**

CALIFORNIA BEARING RATIO TEST

Borehole /Pit No.	Depth (m)	Sample Type	Sample Reference	Description	Remarks
TP2	0.40 - 0.80	B	1	Yellowish brown slightly clayey very silty SAND	

Specimen Preparation

Condition	Remoulded
Details	Recompacted with specified standard effort using 2.5kg rammer

Material Retained on 20mm Sieve Removed		0.0	%
Initial Specimen Details:	Bulk Density	1.93	Mg/m³
	Dry Density	1.60	Mg/m³

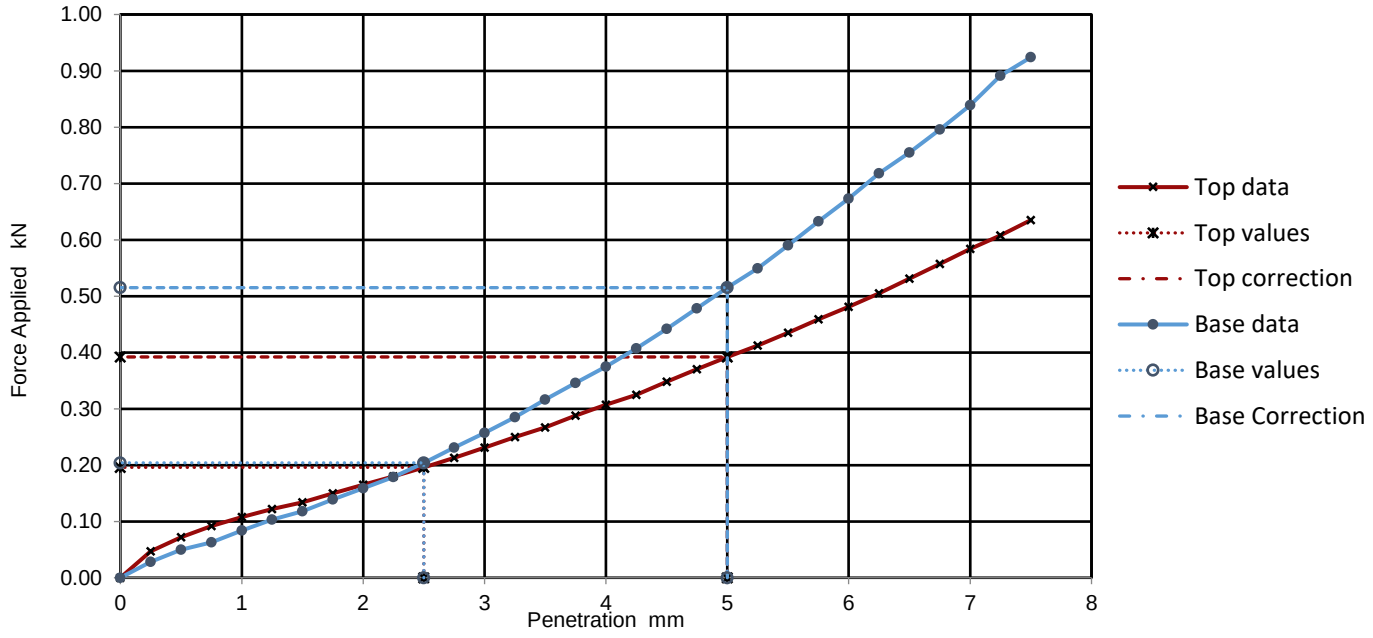
Soaking Details	Not Soaked	
Period of Soaking		days
Time to Surface		days
Amount of Swell Recorded		mm
Initial Water Content		%

Surcharge Applied	15	kg

Test Results

	Curve Correction	CBR Values (%) 2.5mm	5.0mm	Highest	Mean*	Water Content (%)
TOP	No	1.5	2.0	2.0		20.7
BASE	No	1.5	2.6	2.6		20.3

Force v Penetration Plots



Method of Preparation: BS1377: Part1: 2016 & BS1377: Part 4: 1990: 7.2.4.4

Method of Test: BS 1377: Part 4: 1990: 7

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

Comments: *Only reported if the results from each end of the sample are within ±10% of the mean value.
Note:- CBR Results are water content dependent - an increase in water content will result in a decrease of CBR value.

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.

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 01/10/2019

0998

Contract	**UK19.4517b - 1 Hall Lane, Moulton Seas End**
Serial No.	**35844**

CALIFORNIA BEARING RATIO TEST

Borehole /Pit No.	Depth (m)	Sample Type	Sample Reference	Description	Remarks
WS1	0.60 - 1.00	B	1	Soft yellowish brown sandy CLAY/SILT	

Specimen Preparation

Condition	Remoulded
Details	Recompacted with specified standard effort using 2.5kg rammer

Material Retained on 20mm Sieve Removed		0.0	%
Initial Specimen Details:	Bulk Density	1.95	Mg/m³
	Dry Density	1.60	Mg/m³

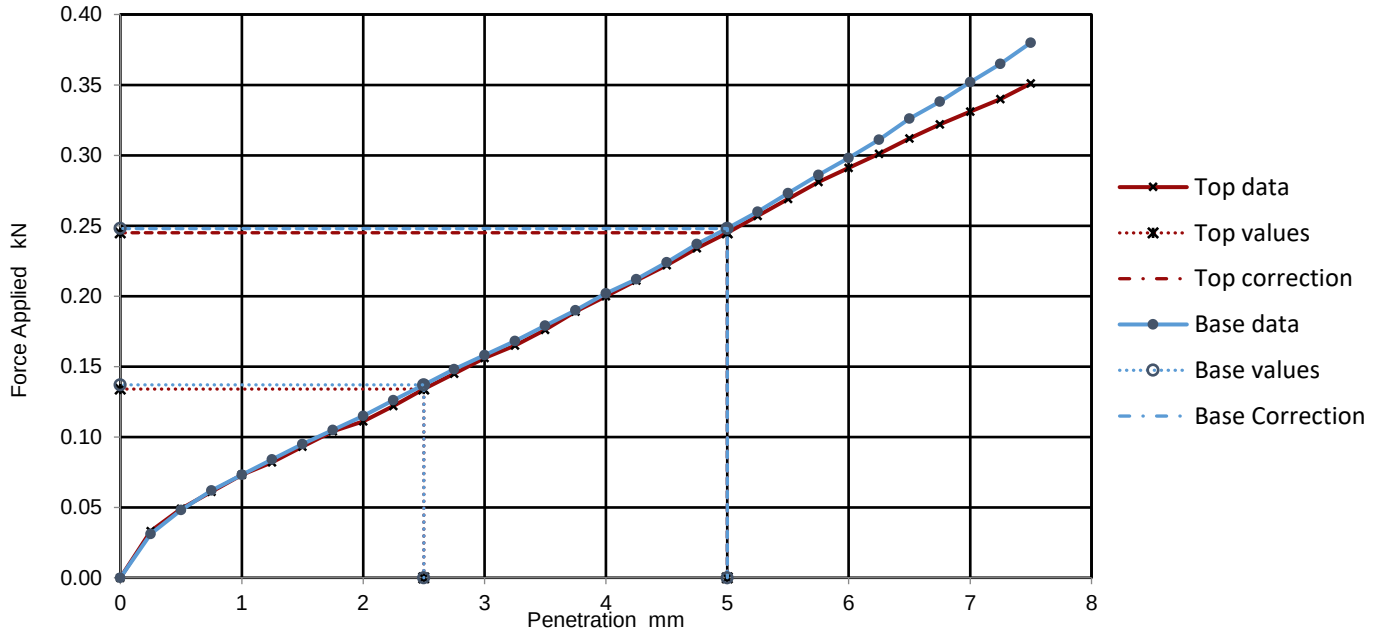
Soaking Details	Not Soaked	
Period of Soaking		days
Time to Surface		days
Amount of Swell Recorded		mm
Initial Water Content		%

Surcharge Applied	15	kg

Test Results

	Curve Correction	CBR Values (%) 2.5mm	5.0mm	Highest	Mean*	Water Content (%)
TOP	No	1.0	1.2	1.2	1.2	21.9
BASE	No	1.0	1.2	1.2		21.7

Force v Penetration Plots



Method of Preparation: BS1377: Part1: 2016 & BS1377: Part 4: 1990: 7.2.4.4

Method of Test: BS 1377: Part 4: 1990: 7

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

Comments: *Only reported if the results from each end of the sample are within ±10% of the mean value.
Note:- CBR Results are water content dependent - an increase in water content will result in a decrease of CBR value.

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.

APPENDIX E

Laboratory Results - Environmental

Element Materials Technology
Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

P: +44 (0) 1244 833780
F: +44 (0) 1244 833781
W: www.element.com

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

Attention :	William Reese
Date :	17th September, 2019
Your reference :	UK19.4517B
Our reference :	Test Report 19/14740 Batch 1
Location :	1 Hall Lane, Moulton Seas End
Date samples received :	12th September, 2019
Status :	Final report
Issue :	1

Six samples were received for analysis on 12th September, 2019 of which six 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.

Authorised By:

Phil Sommerton BSc
Senior Project Manager

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: EPS Ltd
Reference: UK19.4517B
Location: 1 Hall Lane, Moulton Seas End
Contact: William Reese
EMT Job No: 19/14740

Report : Solid

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

EMT Sample No.	1	2	3	4	5	6					LOD/LOR	Units	Method No.
Sample ID	WS1	WS1	WS2	WS3	WS3	WS4							
Depth	2.70-2.90	3.10-3.30	1.30-1.50	1.20-1.40	3.60-3.80	3.80-4.00							
COC No / misc													
Containers	J	J	J	J	J	J							
Sample Date	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019	10/09/2019							
Sample Type	Clayey Silt	Clayey Silt	Clay	Clayey Silt	Clayey Silt	Clayey Silt							
Batch Number	1	1	1	1	1	1							
Date of Receipt	12/09/2019	12/09/2019	12/09/2019	12/09/2019	12/09/2019	12/09/2019							
Sulphur as S	0.05	0.02	0.02	0.01	0.02	0.02					<0.01	%	TM30/PM15
Total Sulphate as SO4 #M	405	222	391	116	185	195					<50	mg/kg	TM50/PM29
Sulphate as SO4 (2:1 Ext) #M	0.0253	0.0228	0.0089	0.0044	0.0141	0.0123					<0.0015	g/l	TM38/PM20
pH #M	8.97	9.11	8.68	8.95	8.97	9.14					<0.01	pH units	TM73/PM11
Sample Type	Clayey Silt	Clayey Silt	Clay	Clayey Silt	Clayey Silt	Clayey Silt						None	PM13/PM0
Sample Colour	Medium Brown	Medium Brown	Medium Brown	Medium Brown	Medium Brown	Medium Brown						None	PM13/PM0
Other Items	stones	none	silt	none	none	none						None	PM13/PM0

Please see attached notes for all abbreviations and acronyms

Client Name: EPS Ltd
Reference: UK19.4517B
Location: 1 Hall Lane, Moulton Seas End
Contact: William Reese

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 19/14740						

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

EMT Job No.: 19/14740

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. Limits of detection for analyses carried out on as received samples are not moisture content corrected. 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.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

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

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

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.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

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.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	Analysis subcontracted to an Element Materials Technology 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

EMT Job No: 19/14740

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	No
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

APPENDIX F

Method Statement for Encountering Unexpected Contamination

METHOD STATEMENT

ACTIONS TO BE TAKEN IN THE EVENT OF DISCOVERING UNEXPECTED CONTAMINATION DURING INTRUSIVE GROUNDWORKS

If at any point during intrusive groundworks at a site, evidence of unforeseen contamination is encountered in the form of significant noxious odours, discolouration, or instability within soils or sheen/ discolouration in groundwater, the following actions will be taken:

- Intrusive works in the immediate area of the impacted ground will be suspended and the continuation of work in other areas of the site will be considered within the context of the site specific health & safety plan.
- Environmental Protection Strategies Ltd (EPS) will be contacted and appraised of the situation so that arrangements can be made to characterise the impact and determine what action may be necessary in addition to the scheduled site works. Where possible / health & safety plan permits, digital photographs of the impacted ground will be taken and emailed to EPS at the address below to assist in the initial assessment
- It may well be necessary for EPS to attend site to undertake visual inspection and obtain samples for field and/or laboratory analysis, although the actions taken will be dependent on the nature of what is encountered
- In cases where EPS consider the unforeseen contamination likely to pose a significant risk of significant harm to adjacent site users or local environmental receptors, the local authority and the Environment Agency will be informed of the situation and the actions being taken
- Once appropriate action has been agreed and undertaken, a written summary will be produced by EPS for submission to the Local Authority, (and where relevant, the Environment Agency) in accordance with planning requirements. The submission will include details of work undertaken, analytical results of investigative and validation samples obtained and conclusions and recommendations for any further actions considered necessary
- Where regulatory bodies have been involved, site works should only recommence following their agreement and in all cases should only recommence when the site manager considers it safe to do so within the context of the site specific health & safety plan.

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