A REPORT ON A GROUND INVESTIGATION FOR
CLEVE HILL SOLAR FARM, GRAVENEY, KENT
(FACTUAL)

CLIENT: WIRSOL Energy Limited

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CONTENTS

1. INTRODUCTION 1

2. FIELDWORK 2

3. LABORATORY TESTING 4
   3.1 GENERAL 4
   3.2 TEST PROCEDURES 4

APPENDICES

APPENDIX A: COPYRIGHT
APPENDIX B: REFERENCES
APPENDIX C: EXPLORATORY HOLE RECORDS
APPENDIX D: LABORATORY TESTING
APPENDIX E: DRAWINGS
2. FIELDWORK

Fieldwork was carried out from 19 to 23 March 2018 and comprised three cable percussive boreholes, twenty two trial pits and seven dynamic cone penetrometer tests. Soakage testing was subsequently undertaken in two of the trial pits.

The exploratory hole positions were set out in general accordance with the requirements of the proposals, as shown on drawing 18.103/02. The National Grid references and, the elevations of the positions relative to Ordnance Datum, were measured using a Hemisphere S320 VRS GPS (RTK) system. The RTK system was also used to determine the profile of the existing sea defence embankment as shown on drawing 18.103/03.

The cable percussive boreholes, referenced BH01 to BH03, were each taken to a depth of 15.5 m. They were advanced using conventional cable percussive techniques (‘shell and auger’), initially in 200 mm diameter casing and then reducing to 150 mm diameter casing. A starter pit was excavated by hand to a depth of 1.2 m at the borehole locations prior to the commencement of drilling to inspect for services. A cable avoidance tool (CAT) was also used to sweep all the positions and the immediate surrounding area to locate any potential services and the location adjusted as necessary. During subsequent advance of the borehole sampling and in situ testing were carried out and subsequent soil descriptions made in general accordance with the recommendations of BS EN1997-2:2007 Eurocode 7 (BSI, 2007) and its UK National Annex supported by BS 5930:2015 (BSI, 2015). In particular, open tube drive samples (U100) were taken in cohesive materials to allow laboratory testing of undisturbed material, while disturbed samples were taken for further laboratory testing and to allow later inspection of the materials encountered and facilitate accurate logging. Standard penetration tests (SPT) were carried out in cohesionless soils or materials where undisturbed samples could not be obtained, using a split barrel sampler or a solid cone as appropriate. The SPT N value was taken as the number of blows for 300 mm of penetration, following a seating drive of 150 mm or 25 blows. On completion, the boreholes were backfilled with arisings.

The boreholes were monitored for groundwater ingress during drilling. Upon encountering groundwater, drilling was temporarily stopped to allow the level to stabilise, recording the water level at five minute intervals for a period of twenty minutes. Water levels were also recorded at the start and end of each shift.
The trial pits, referenced TP01 to TP22, were excavated utilising a mechanical 360 excavated equipped with a 1.2 m wide bucket and advanced to depths between 2.0 m and 3.2 m below ground level (bgl). The pits were logged in situ to about 1.0 m bgl, with soils below this depth described at surface from excavated material. Disturbed samples were taken for appropriate laboratory testing and to allow later inspection of the material encountered and facilitate accurately logging. Index strength tests utilising a hand shear vane, serial no. DR-2743 with a 19 mm vane, were performed in suitable cohesive material to provide an estimate of the undrained shear strength.

Soakage testing was anticipated to be undertaken at TP01 to TP03, but groundwater ingress in TP01 deemed it unsuitable for testing. To facilitate testing TP02 and TP03 were filled with 20 mm diameter gravel from 1.0 m to 2.0 m to provide a suitable test section. The tests were carried out in accordance with Building Research Establishment Report 365 (BRE, 2016) by filling the test sections with water and recording the time taken for it to drain away. In addition to manual dipping, data loggers were installed to record the level of the water. However, both tests failed due to insufficient drainage over a 24 hour monitoring period.

Seven dynamic cone penetrometer (DCP) tests were also undertaken, referenced DCP01 to DCP07. These were carried out utilising hand held equipment with an 8 kg hammer dropped through a height of 575 mm. The tests were taken to depths of between 1.24 m and 1.50 m. The dropped weight hammers a cone with an angle of 60° and maximum diameter of 20 mm into the ground to determine the in situ California Bearing Ratio (CBR). The instrument is held vertically and the hammer raised to the specified height and left to drop freely. Readings were taken of the penetration rate per blow. After completing the tests, the DCP is removed by tapping the hammer upwards against the handle.

The CBR value was calculated based on the following:

\[ \text{TRI equation: } \log 10 (\text{CBR}) = 2.48 - 1.057 \times \log 10 (\text{penetration rate}) \]

Following completion of the tests, the soils were excavated to the base of the tests.

Details of the strata encountered, the sampling, in situ and laboratory testing are shown on records appended to this report.

3. LABORATORY TESTING

3.1 GENERAL

Subsequent to the fieldwork, a programme of laboratory testing was carried out to provide additional quantitative data on the materials encountered. The tests were completed in accordance with the procedures laid down in the pertinent British Standards unless stated otherwise and consisted of:

- Natural moisture content
- Atterberg limits
- Particle size distribution
- Undrained shear strength in triaxial compression without measurement of pore pressure
- One dimensional consolidation test
- Dry density/moisture content relationship
- California Bearing Ratio test
- Sulphate content and pH value
- Total sulphur
- Chloride
- Nitrate
- Ammonia

3.2 TEST PROCEDURES

3.2.1 NATURAL MOISTURE CONTENT

The natural moisture content is determined according to BS EN ISO 17892: Part 1: 2014: clause 5.2 (BSI, 2014). This represents the mass of moisture content retained by the soil in its natural state as a percentage of its dry mass. For organic soils and peats care should be taken to avoid heating the sample above 50°C to prevent irreversible physical changes to the material.

3.2.2 ATTERBERG LIMITS

The Atterberg limits are determined in the laboratory by the procedures given in BS 1377: Part 2: 1990 (BSI, 1990). The liquid limit (LL) is the moisture content of the soil at the point that its behaviour passes from that of a plastic solid to that of a liquid. The test procedure given as clause 4.4 was used based on the cone penetrometer in which the
penetration of a free-fall cone into moistened and cured samples of the soil is measured. The plastic limit (PL) is the moisture content of the soil at the point that its behaviour passes from a plastic solid to a brittle solid. This point is measured according to clause 5.3 and is the point at which a thread of the soil rolled to 3 mm diameter begins to crumble.

Together the Atterberg limits can be used to define the plastic range of the soil. The plasticity index (PI) is the difference between the liquid and plastic limit and is broadly correlated to the engineering behaviour of the soil. When used with the natural moisture content of the soil they can also give an indication of its in situ condition.

3.2.3 PARTICLE SIZE DISTRIBUTION

A quantitative assessment of the particle size distribution of the soil down to the fine grained sand size is made according to BS EN ISO 17892: Part 4: 2016: clause 5.2 (BSI, 2016). In this the percentage of certain sized fractions of the soil are found by determining the weight retained on a variety of sieve sizes through which the material is allowed to pass. The combined silt and clay fraction is determined by the difference between the sum of the retained weights and the original sample weight. Variations of the test procedure allow the silt and clay fraction to be removed from the coarser fraction by wet sieving during which the fine material is washed from the surface of the coarser material.

The quantitative determination of the particle size distribution for fine soils, from coarse silt to clay size, is made according to BS EN ISO 17892: Part 4: 2016: clause 5.3 or 5.4, using either the sedimentation by hydrometer method or pipette method. These tests are generally carried out if greater than 10% of the material passes the BS test sieve size of 63 μm. The percentages of the constituents of the fine soil can be linked to the curve obtained by sieving to provide a single curve for the whole material.

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

The undrained shear strength of the soil was measured, as stated in BS 1377: Part 7: 1990: clause 8 (BSI, 1990), by axial compression of 100 mm diameter cylindrical specimens cut from the U100 undisturbed samples. The nature of the test is such that no change in moisture content of the specimen is allowed during shear.

The theory of behaviour of saturated clay materials in undrained shear failure gives that the strength will not be influenced by the confining pressure such that the measured angle of internal friction for the material will apparently be equal to zero. Experience has shown that this is true only for samples of unweathered heavily overconsolidated pure clays. Where the material is weathered or it contains a significant granular content a plastic rather than a brittle failure develops which produces a strain hardening during shear. In this situation measurable apparent undrained angle of internal friction is produced. A similar situation develops in partially saturated materials. The test results are also influenced by sample variation, and in particular the presence of natural fissures or inclusions within the sample.

The use of large diameter specimens is preferred as this compensates for the scale effects of random features in smaller specimens. One of two tests are carried out according to the soil characteristic. Unweathered specimens of heavily overconsolidated clays which have a brittle failure in shear are tested in a single stage. The confining pressure is taken as the total overburden pressure of the sample in situ. It is then failed by axial compression and the measured deviator stress reported as the apparent undrained cohesion. Specimens of weathered clay or the clays with granular contents are tested in a multistage manner according to BS 1377: Part 7: 1990: clause 9.

The test procedure is similar to the single stage but at the point that failure begins the confining pressure is increased and the specimen compressed for a further 2% of vertical strain at which point the confining pressure is again increased and held for a further 2% strain. The deviator stresses at each of the confining pressures are used to plot the Mohr envelope and the apparent undrained cohesion and if appropriate the undrained angle of internal friction.

3.2.5 ONE DIMENSIONAL CONSOLIDATION TEST

This determines the rate and magnitude of the consolidation of a saturated specimen of the soil in the form of a disc, confined laterally and subjected to a vertical axial pressure and which is allowed to drain freely from the top and bottom surfaces. The procedure is carried out according to BS EN ISO 17892: Part 5: 2017: clause 6.5 (BSI, 2017) in which the total load is applied incrementally.
3.2.6 DRY DENSITY/MOISTURE CONTENT RELATIONSHIP

The determination of the dry density of a sample of soil when compacted in a closely defined and specified manner over a range of moisture contents enables the maximum dry density of the soil to be determined for any one level of compaction effort. Three methods of compaction are described in BS 1377: Part 4: 1990: clause 3 (BSI, 1990), using a 2.5 kg hand plunger (clauses 3.3 3.4), a 4.5 kg hand plunger (clauses 3.5 3.6) and a vibrating hammer (clause 3.7).

3.2.7 CALIFORNIA BEARING RATIO TEST

A measure of the strength of a soil can be made by determination of its California bearing ratio (CBR). This is determined according to the procedure set out in BS 1377: Part 4: 1990: clause 7 (BSI, 1990) in which a relationship is determined between the force required to drive a cylindrical plunger a given distance into the prepared sample of the soil and the force required to drive a similar plunger into a standard sample of prepared crushed rock. The ratio is determined at penetrations of 2.5 and 5 mm and the higher value used.

The test cannot be directly related to other shear strength parameters and is most suitable for the empirical determination of the strength of a material for pavement design by the use of standard design charts. The test is best carried out on a sample which reproduces the worst conditions likely to occur in the field situation and can be carried out on in situ material in the field or on undisturbed or recompacted samples in the laboratory.

3.2.8 SULPHATE CONTENT AND pH VALUE

In order to evaluate any aggressive tendency of the subsoil or groundwater to buried concrete the pH and soluble sulphate of a number of samples were determined. The pH of either a groundwater sample or a soil suspension was determined electrometrically according to BS 1377: Part 3: 1990: clause 9.5 (BSI, 1990). The sulphate content was found by the gravimetric test procedure (BS 1377: Part 3: 1990: clause 5.5) in which the sulphate is precipitated as barium sulphate from either a water extract taken from the soil or a groundwater sample.

3.2.9 TOTAL SULPHUR CONTENT

To aid the evaluation of aggressive tendency of the subsoil to buried concrete as a result of its pyritic potential, the total potential sulphate content can be determined from the relationship between the total (acid soluble) sulphate content and the amount of total sulphur present. The total sulphur content is determined by a laboratory in-house method based on the Methods for the Examination of Waters and Associated Materials (MEWAM Environment Agency, 2006).

A dried portion of the soil is extracted at 115 °C for 75 minutes using 100% aqua regia and potassium bromate/bromide oxidizing mixture. The principle of this digest is to oxidize all sulphur to sulphate, and use the aqua regia acid mixture to digest the sample. The resultant digest solution is then filtered and analysed by ICP-OES. The results are expressed as % S, and include water soluble and acid soluble sulphates and total reduced sulphur, as well as insoluble sulphates and organic sulphur.

3.2.10 CHLORIDE

The chloride content was determined by an in-house procedure based on colorimetric methods using a spectrophotometric discrete analyser. The sample preparation is in generally accordance to those outlined in BR 279 (BRE, 1995) and BS 1377-3 Section 7 (BSI, 1990), but the analysis differs as these suggest using ion chromatography. Both methods give comparable results. A soil sample is dried at < 40°C and then a 2:1 water: soil extract is prepared by shaking 20 g soil plus 40 ml water. The chloride ions react with mercury (II) thiocyanate to form a soluble non-ionic compound. The thiocyanate ions released react in acid solution with iron (III) nitrate to form a red / brown iron (III) thiocyanate complex which is measured spectrophotometrically at 450 nm.

3.2.11 NITRATE

The nitrate content was determined by an in-house procedure based on colorimetric methods using a spectrophotometric discrete analyser, whereby it is calculated from the total oxidised nitrogen (TON) by subtraction of the nitrite content, in general accordance with methods outlined in BR 279 (BRE, 1995). A soil sample is dried at < 40°C and then a 2:1 water: soil extract is prepared by shaking 20 g soil plus 40 ml water. The nitrite ions react with sulphanilamide and N-1-naphthylethylene diazidine dihydrochloride under acidic
3.2.12 AMMONIA

The ammonia content was determined by an in-house procedure based on the colorimetric salicylate/nitroprusside method using a spectrophotometric discrete analyser, in general accordance to methods outlined in BR 279 (BRE, 1995). A 2:1 water: soil extract is prepared by shaking 20 g soil, as received, plus 40 ml water. The ammonia ions react with salicylate in the presence of hypochlorite and nitroprusside to form a coloured solution which is analysed by spectrophotometric measurement at a wavelength of 660 nm. The results are expressed as mg/l NH4⁺.

3.2.13 LOSS ON IGNITION

The organic content of peats or organic clays containing more than about 10% organic matter or sandy soils containing only limited quantities of clay or chalk can be related to the loss in the mass of the soil on ignition. This is carried out according to BS 1377: Part 3: 1990: Clause 4 (BSI, 1990). The test involves a previously dried and weighed sample being burned at a temperature of 440°C, the result is then reported as the ratio of mass before and after burning.
APPENDIX B: REFERENCES


APPENDIX C: EXPLORATORY HOLE RECORDS

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>U</td>
<td>Nominal 100 mm diameter undisturbed open tube sample</td>
</tr>
<tr>
<td>X</td>
<td>The associated figure ‘X’ is the number of blows to drive the sample tube over the given depth range</td>
</tr>
<tr>
<td>XF</td>
<td>Undisturbed sample not recovered after ‘X’ number of blows to drive the sample tube</td>
</tr>
<tr>
<td>HV</td>
<td>Hand vane test</td>
</tr>
<tr>
<td>B</td>
<td>Bulk disturbed sample</td>
</tr>
<tr>
<td>D</td>
<td>Small disturbed sample (suffix ‘P’ denotes inspection pit sample)</td>
</tr>
<tr>
<td>W</td>
<td>Water sample</td>
</tr>
<tr>
<td>SPT</td>
<td>Standard penetration test using a split spoon sampler</td>
</tr>
<tr>
<td>SPT (C)</td>
<td>Standard penetration test using 60 degree solid cone</td>
</tr>
<tr>
<td>X,X/XXX</td>
<td>Blows per increment during the standard penetration test. The initial value relates to the seating drive (150 mm) and the remaining four to the 75 mm increments of the test length</td>
</tr>
<tr>
<td>N</td>
<td>SPT blow count ‘N’ given by the summation of the blows ‘X’ required to drive the full test length (300 mm)</td>
</tr>
<tr>
<td>X+Y</td>
<td>Incomplete standard penetration test where the seating drive could not be completed. The blows ‘X’ represent the total blows for the given length of seating drive ‘Y’ (mm)</td>
</tr>
<tr>
<td>X/Z</td>
<td>Incomplete standard penetration test where the seating drive was achieved but the full test length was not. The blows ‘X’ represent the total blows for the given test length ‘Z’ (mm)</td>
</tr>
<tr>
<td>dd/mm/yy: 1.0</td>
<td>Date, water level at the borehole depth at the end of shift</td>
</tr>
<tr>
<td>dd/mm/yy: dry</td>
<td>Date, water level at the borehole depth at the start of the following shift</td>
</tr>
</tbody>
</table>

Each sample type is numbered sequentially with depth and relates to the depth range quoted.

All depths and measurements are given in metres, except as noted.

Strata descriptions compiled by visual examination of samples obtained during boring, after BS 5930:1999+A2:2010 and modified in accordance with laboratory test results where applicable.
### Table

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Sample / Tests</th>
<th>Casing / Core</th>
<th>Water / Silt</th>
<th>Field Records</th>
<th>Level (mCD)</th>
<th>Depth (mCD) (THD/mLs)</th>
<th>Description</th>
<th>Legend</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td>D1</td>
<td>Casing</td>
<td></td>
<td></td>
<td>0.00</td>
<td>0.20</td>
<td>TOPSOL, Dark brown mottled orange clay slightly gravelly, clay, gravel is subangular to subrounded to subrounded free to loose and mud</td>
<td>B1</td>
</tr>
<tr>
<td>0.05</td>
<td>D2</td>
<td>SPT</td>
<td>72.94, 69.6, 65.8</td>
<td></td>
<td>0.09</td>
<td>0.20</td>
<td>Brown mottled grey clay, gravel is subangular to subrounded free to loose and mud</td>
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<td>D3</td>
<td>SPT</td>
<td>54.66, 72.9, 64.0</td>
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<td>1.30</td>
<td>Firm grey mottled clayey silt</td>
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<td>0.15</td>
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<td>2.00</td>
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<td>B5</td>
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<td>D6</td>
<td>SPT</td>
<td>32.95, 32.2, 31.5</td>
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<td>2.50</td>
<td>2.50</td>
<td>Firm clayey silt</td>
<td>B6</td>
</tr>
<tr>
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<td>D7</td>
<td>SPT</td>
<td>28.95, 28.2, 27.5</td>
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<td>3.00</td>
<td>3.00</td>
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<td>B7</td>
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<td>D8</td>
<td>SPT</td>
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<td>3.50</td>
<td>3.50</td>
<td>Firm clayey silt</td>
<td>B8</td>
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<td>SPT</td>
<td>20.95, 20.2, 19.5</td>
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<td>4.00</td>
<td>4.00</td>
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<td>B9</td>
</tr>
<tr>
<td>0.45</td>
<td>D10</td>
<td>SPT</td>
<td>16.95, 16.2, 15.5</td>
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<td>4.50</td>
<td>4.50</td>
<td>Firm clayey silt</td>
<td>B10</td>
</tr>
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<td>0.50</td>
<td>D11</td>
<td>SPT</td>
<td>12.95, 12.2, 11.5</td>
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<td>5.00</td>
<td>5.00</td>
<td>Firm clayey silt</td>
<td>B11</td>
</tr>
<tr>
<td>0.55</td>
<td>D12</td>
<td>SPT</td>
<td>8.95, 8.2, 7.5</td>
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<td>SPT</td>
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<td></td>
<td>7.00</td>
<td>7.00</td>
<td>Firm clayey silt</td>
<td>B15</td>
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</tbody>
</table>

**Remarks**

1. Location CAT scanned prior to excavation.
2. Raw data log inspection of 1.0 m core face is 5.0 m in 5 mm, 3.75 m in 10 mm, 2.50 m in 15 mm, and 2.00 m in 20 mm, and 2.00 m in 25 mm.
3. SPT Hammer Energy Ratio = 450.
4. SPT Vane Penetration Rate = 1.0 m/s.
5. Raw data log inspection of 0.1 m core face is 0.15 m in 5 mm, 0.10 m in 10 mm, and 0.05 m in 15 mm.

**Scale (approx.)**

1.90 DM

**Figure No.**

18.123.BH01

**Legend**

B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11, B12, B13, B14, B15

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<table>
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<tr>
<th>Depth (m)</th>
<th>Sample / Tests</th>
<th>Water (mm Hg)</th>
<th>Field Records</th>
<th>Level (mOD)</th>
<th>Depth (mTVD)</th>
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<tbody>
<tr>
<td>0.20</td>
<td>D1</td>
<td></td>
<td></td>
<td></td>
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<td>TOPSOL (Brown silt clay)</td>
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<tr>
<td>0.40</td>
<td>HV 97.86kPa</td>
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<td>0.40-0.50</td>
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<td>HV 75.94kPa</td>
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<td>HV 97.86kPa</td>
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<td></td>
<td></td>
<td>3.00</td>
<td>3.00</td>
<td>Complete at 3.00m</td>
</tr>
</tbody>
</table>

Scale (approx) 1:20  Logged By: JLM  Figure No. 1813.7001

 Remarks:
5. Location CAT scanned prior to excavation.
6. No groundwater encountered.
7. Trial pit remained open and water level stable during excavation.
8. Tank backfilled with gravel to 1.5 m and then backfilled to 2.0 m.
9. Skips were performed between 1.2 m and 2.0 m.
10. 10 mm hand sewer - weir no. 09/29/14, Correction factor 1.052.
<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Sample / Tests</th>
<th>Water Table (m)</th>
<th>Field Records</th>
<th>Level (mNN)</th>
<th>Depth (mMSL)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.20</td>
<td>D1</td>
<td>0.65</td>
<td></td>
<td>0.20</td>
<td>0.65</td>
<td>TOPSOIL (brown silt clay, with rare subangular fine chalk gravel and fragments)</td>
</tr>
<tr>
<td>0.50</td>
<td>D2</td>
<td>0.65</td>
<td>79.95</td>
<td>0.50</td>
<td>79.95</td>
<td>Firm grey moulded orange brown silt sandy CLAY</td>
</tr>
<tr>
<td>1.00</td>
<td>D3</td>
<td>0.65</td>
<td>92.00</td>
<td>1.00</td>
<td>92.00</td>
<td>Firm grey moulded orange brown silt sandy CLAY</td>
</tr>
<tr>
<td>1.50</td>
<td>D4</td>
<td>0.65</td>
<td>92.00</td>
<td>1.50</td>
<td>92.00</td>
<td>Firm grey moulded orange brown silt sandy CLAY</td>
</tr>
<tr>
<td>2.00</td>
<td>D5</td>
<td>0.65</td>
<td>92.00</td>
<td>2.00</td>
<td>92.00</td>
<td>Firm grey moulded orange brown silt sandy CLAY</td>
</tr>
</tbody>
</table>

**Remarks**
1. Location CAT scanned prior to excavation.
2. No groundwater encountered.
3. Trial pit remained open and sidewells stable during excavation.
4. Pit backfilled with gravel to 1.00 m and then strata to surface.
5. Soil tests performed between 1.00 m and 3.00 m.
6. 19 mm sand analysis - sample no. SR-2743, Correction factor 1.052.

**Scale (approx)** 1:20
**Logged By** DJM
**Figure No.** 18153.7123

---

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Sample / Tests</th>
<th>Water Table (m)</th>
<th>Field Records</th>
<th>Level (mNN)</th>
<th>Depth (mMSL)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.20</td>
<td>D1</td>
<td>0.65</td>
<td>79.95</td>
<td>0.20</td>
<td>79.95</td>
<td>TOPSOIL (brown silt clay, Orangea is equilibrated and subrounded fine to coarse fragments)</td>
</tr>
<tr>
<td>0.50</td>
<td>D2</td>
<td>0.65</td>
<td>92.00</td>
<td>0.50</td>
<td>92.00</td>
<td>Firm grey moulded orange brown silt sandy CLAY</td>
</tr>
<tr>
<td>1.00</td>
<td>D3</td>
<td>0.65</td>
<td>92.00</td>
<td>1.00</td>
<td>92.00</td>
<td>Firm grey moulded orange brown silt sandy CLAY</td>
</tr>
<tr>
<td>1.50</td>
<td>D4</td>
<td>0.65</td>
<td>92.00</td>
<td>1.50</td>
<td>92.00</td>
<td>Firm grey moulded orange brown silt sandy CLAY</td>
</tr>
<tr>
<td>2.00</td>
<td>D5</td>
<td>0.65</td>
<td>92.00</td>
<td>2.00</td>
<td>92.00</td>
<td>Firm grey moulded orange brown silt sandy CLAY</td>
</tr>
<tr>
<td>2.50</td>
<td>D6</td>
<td>0.65</td>
<td>92.00</td>
<td>2.50</td>
<td>92.00</td>
<td>Firm grey moulded orange brown silt sandy CLAY</td>
</tr>
<tr>
<td>3.00</td>
<td>D7</td>
<td>0.65</td>
<td>92.00</td>
<td>3.00</td>
<td>92.00</td>
<td>Complete at 3.25m</td>
</tr>
</tbody>
</table>

**Remarks**
1. Location CAT scanned prior to excavation.
2. No groundwater encountered.
3. Trial pit remained open and sidewells stable during excavation.
4. Trial pit backfilled with gravel upon completion.
5. 19 mm sand analysis - sample no. SR-2743, Correction factor 1.052.
6. Trial pit accessed to avoid fill greased timber at 3.0 m depth + possible banded drain.

**Scale (approx)** 1:20
**Logged By** DJM
**Figure No.** 18153.7123
<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Sample / Tests</th>
<th>Water Table Depth (m)</th>
<th>Field Records</th>
<th>Level (mO.D.)</th>
<th>Depth (mO.D.)</th>
<th>Description</th>
<th>Legend</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.10</td>
<td>D1</td>
<td></td>
<td></td>
<td>(0.10)</td>
<td>(0.10)</td>
<td>TOPSOIL, (Dark brown silty clay)</td>
<td>D1</td>
</tr>
<tr>
<td>0.20</td>
<td>D2</td>
<td>73.60, 62.60, 71.33</td>
<td></td>
<td>(0.40)</td>
<td>(0.40)</td>
<td>Firm, soft to firm in places, brown mottled clay CUY</td>
<td>B1</td>
</tr>
<tr>
<td>0.80</td>
<td>D3</td>
<td></td>
<td></td>
<td>0.80</td>
<td>0.80</td>
<td>Firm grey mottled orange brown silty CUY</td>
<td>B2</td>
</tr>
<tr>
<td>1.00</td>
<td>D4</td>
<td>52.62, 54.60, 58.60</td>
<td></td>
<td>1.00</td>
<td>1.00</td>
<td>HV 62.42, 62.82, 59.33</td>
<td>B3</td>
</tr>
<tr>
<td>1.50</td>
<td>D5</td>
<td>20.10, 20.20, 19.30</td>
<td></td>
<td>1.50</td>
<td>1.50</td>
<td>HV 28.30, 28.48, 28.67</td>
<td>B3</td>
</tr>
<tr>
<td>1.75-1.90</td>
<td>D6</td>
<td></td>
<td></td>
<td>1.75</td>
<td>1.75</td>
<td>Brown clayey sandy shelly, S41</td>
<td>D0</td>
</tr>
<tr>
<td>2.00</td>
<td>D7</td>
<td></td>
<td></td>
<td>2.00</td>
<td>2.00</td>
<td>Firm blackish grey w CHL, with occasional black carbonaceous pockets at top of deposit</td>
<td>D0</td>
</tr>
<tr>
<td>3.00</td>
<td>D8</td>
<td></td>
<td></td>
<td>3.00</td>
<td>3.00</td>
<td>Complet at 3.0m</td>
<td>D0</td>
</tr>
</tbody>
</table>

**Remarks:**
1. Location CAT scanned prior to excavation.
2. No groundwater encountered.
3. Trial pit remains open in southwestern edge during excavation.
4. Trial pit backfilled with silts upon completion.
5. 19 mm fine valve, sand and gravel, DO-274, Correction factor 1.082

**Scale (approx)**: 1:20

**Logged By**: D.M.

**Figure No.**: 18.135.71/75

---

**Scale (approx)**: 1:20

**Logged By**: D.M.

**Figure No.**: 18.135.71/75
### Excavation Method

**Machine excavated trial pit**

### Dimensions

- **L:** 2.1 m
- **W:** 1.3 m
- **D:** 0.3 m

### Ground Level

- **m (OD):** 1.95

### Client

- WRSOL Energy Limited

### Job Number

- 18.103

### Location

- 604833 E, 164289 N

### Dates

- 21/03/2018

### Engineer

- Sheet 1/1

---

### Depth (m) | Sample / Tests | Water (m) Depth | Field Records | Level (mOD) | Description | Legend | Remarks
---|---|---|---|---|---|---|---
0.20 | D1 | | | (0.45) | TOPSOL (brown silty clay) | | 1. Location CAT scanned prior to excavation,
2. Groundwater seepage at 2.25m and 2.35m,
3. Trial pit monitored in open and wide area during excavation,
4. Trial pit backfilled with ashing upon completion,
5. 16 mm hard valve, serial no.: 0582743, Correction factor /0.52 |

---

### Depth (m) | Sample / Tests | Water (m) Depth | Field Records | Level (mOD) | Description | Legend | Remarks
---|---|---|---|---|---|---|---
2.40 | 2.45 | 2.50 | B1 | | B2 | | |

---

### Scale (approx) | Lagged By | Figure No.
---|---|---
1:20 | DYM | 18.123.7109

---

**No image available**

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### Excavation Method

**Machine excavated trial pit**

### Dimensions

- **L:** 2.2 m
- **W:** 1.3 m
- **D:** 0.3 m

### Ground Level

- **m (OD):** 1.40

### Client

- WRSOL Energy Limited

### Job Number

- 18.103

### Location

- 604842 E, 164350 N

### Dates

- 21/03/2018

### Engineer

- Sheet 1/1

---

### Depth (m) | Sample / Tests | Water (m) Depth | Field Records | Level (mOD) | Description | Legend | Remarks
---|---|---|---|---|---|---|---
0.20 | D1 | | | | TOPSOL (brown silty clay, gravelly clay, gravelly clay)

---

### Scale (approx) | Lagged By | Figure No.
---|---|---
1:20 | DYM | 18.103.3F10

---

**No image available**
**Excavation Method**
Machine excavated trial pit

**Dimensions**
1.1 m x W 0.9 m x 0.3 m

**Ground Level (mO.D.)**
1.93

**Client**
WRISOL Energy Limited

**Job Number**
18.103

**Location**
644751 E 164330 N

---

**Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mO.D.) | Description | Legend**
--- | --- | --- | --- | --- | --- | ---
0.20 | D1 | (0.20) | TOPSOIL (brown silty clay) | |
0.50 | HV 69.66kPa D2 | 69.62 /64kPa, 71.23 | fine brown mottled grey silty CLAY | |
0.60 | B1 | b/ | fine brown mottled grey silty CLAY | |
0.80 | SV 0.15, 10 | 0.68, 10 B4 | fine grey mottled brown silty sandy CLAY, with occasional sand patches | |
1.00 | HV 44.89kPa D3 | 42.66 /64kPa, 51.38 | ...becoming soft to firm | |
1.50 | HV 21.05kPa D4 | 22.10, 20/64kPa, 29.95 | ...becoming soft | |
1.50 | B5 | 1.49, 1.45 | fine grey mottled dark grey silty very sandy CLAY | |
1.80 | B6 | 1.55 | fine grey mottled dark grey silty very sandy CLAY | |
2.00 | D7 | 10.10, 12/64kPa, 10.67 | ...lending to clayey sandy silts in places | |
2.00 | D8 | 2.00 | ...becoming shelly and with very sandy pockets | |
2.00 | D9 | 2.00 | soft to very stiff black grey silty moderately sandy CLAY | |
2.50 | D10 | 2.50 | Complete at 3.20m | |
<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Sample / Tests</th>
<th>Water Content (%)</th>
<th>Field Records</th>
<th>Level (mO)</th>
<th>Depth (mO)</th>
<th>Description</th>
<th>Legend</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.20</td>
<td>D1</td>
<td></td>
<td></td>
<td>(0.20)</td>
<td></td>
<td>TOPSOIL (brown silty clay)</td>
<td></td>
</tr>
<tr>
<td>0.60</td>
<td>HV 69.7%</td>
<td>56.78</td>
<td></td>
<td>(0.60)</td>
<td></td>
<td>Fine brown mottled grey silty CLAY</td>
<td></td>
</tr>
<tr>
<td>0.80</td>
<td>HV 56.8%</td>
<td>56.48</td>
<td></td>
<td>(0.80)</td>
<td></td>
<td>Fine grey mottled orange brown silty slightly sandy CLAY</td>
<td></td>
</tr>
<tr>
<td>1.40</td>
<td>HV 31.6%</td>
<td>30.28</td>
<td></td>
<td>(1.40)</td>
<td></td>
<td>Very soft grey mottled orange grey slightly sandy slightly gritty CLAY</td>
<td></td>
</tr>
<tr>
<td>2.20</td>
<td>HV 15.4%</td>
<td>16.14</td>
<td></td>
<td>(2.20)</td>
<td></td>
<td>Very soft grey mottled dark grey slightly sandy slightly gritty CLAY</td>
<td></td>
</tr>
<tr>
<td>2.80</td>
<td>D7</td>
<td></td>
<td></td>
<td>(2.80)</td>
<td></td>
<td>Complete at 2.70m</td>
<td></td>
</tr>
</tbody>
</table>

**Remarks:**
1. Location CAT scanned prior to excavation.
2. Groundwater seepage at 1.20 m.
3. Trial pit remained open and sidewalls stable during excavation.
4. Trial pit backfilled with a mixture upon completion.
5. 18-mm hard valve, serial no. 05,2742, Correction factor 1.052.
### Excavation Method
- **Machine excavated trial pit**

### Dimensions
- L: 2.1 m x W: 1.3 m x H: 3.2 m

### Ground Level (mOD)
- 1.54

### Client
- WRSL Energy Limited

### Job Number
- 18.103

### Location
- 604523 E 160492 N

### Dates
- 23/03/2018

### Engineering Sheet
- 1/1

### Water Quality

<table>
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<tr>
<th>Depth (m)</th>
<th>Sample / Tests</th>
<th>Water Quality</th>
<th>Field Records</th>
<th>Level (mDO)</th>
<th>Depth (1st)</th>
<th>Description</th>
<th>Legend</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.20</td>
<td>D1</td>
<td>Seepage(1) at 0.20m</td>
<td></td>
<td>0.20</td>
<td>(0.20)</td>
<td>TOPSOL (brown silty clay)</td>
<td>D1</td>
</tr>
<tr>
<td>0.20</td>
<td>H67,762Pa</td>
<td></td>
<td></td>
<td>0.20</td>
<td>(0.20)</td>
<td>Firm brown mottled grey silty CLAY</td>
<td>D1</td>
</tr>
<tr>
<td>0.20</td>
<td>H56,832Pa</td>
<td></td>
<td></td>
<td>0.20</td>
<td>(0.20)</td>
<td>Firm grey mottled orange brown silty sandy CLAY</td>
<td>D1</td>
</tr>
<tr>
<td>0.20</td>
<td>D3</td>
<td></td>
<td></td>
<td>0.20</td>
<td>(0.20)</td>
<td>With occasional sand partings</td>
<td>D1</td>
</tr>
<tr>
<td>0.50</td>
<td>H66,452Pa</td>
<td></td>
<td></td>
<td>0.50</td>
<td>(0.50)</td>
<td>TOPSOL (brown silty clay)</td>
<td>D1</td>
</tr>
<tr>
<td>0.50</td>
<td>H66,432Pa</td>
<td></td>
<td></td>
<td>0.50</td>
<td>(0.50)</td>
<td>Firm brown mottled grey silty CLAY</td>
<td>D1</td>
</tr>
<tr>
<td>0.50</td>
<td>H56,452Pa</td>
<td></td>
<td></td>
<td>0.50</td>
<td>(0.50)</td>
<td>Firm grey mottled orange brown silty sandy CLAY</td>
<td>D1</td>
</tr>
<tr>
<td>1.00</td>
<td>H66,452Pa</td>
<td></td>
<td></td>
<td>1.00</td>
<td>(1.00)</td>
<td>With occasional sand partings</td>
<td>D1</td>
</tr>
<tr>
<td>1.00</td>
<td>H66,452Pa</td>
<td></td>
<td></td>
<td>1.00</td>
<td>(1.00)</td>
<td>With occasional sand partings</td>
<td>D1</td>
</tr>
<tr>
<td>1.50</td>
<td>H66,452Pa</td>
<td></td>
<td></td>
<td>1.50</td>
<td>(1.50)</td>
<td>becoming soft to firm</td>
<td>D1</td>
</tr>
<tr>
<td>2.00</td>
<td>H66,452Pa</td>
<td></td>
<td></td>
<td>2.00</td>
<td>(2.00)</td>
<td>becoming soft to firm</td>
<td>D1</td>
</tr>
<tr>
<td>2.50</td>
<td>H66,452Pa</td>
<td></td>
<td></td>
<td>2.50</td>
<td>(2.50)</td>
<td>becoming soft to firm</td>
<td>D1</td>
</tr>
</tbody>
</table>

### Remarks
1. Location CAT scanned prior to excavation.
2. Groundwater seepage at 0.20 m
3. Tight mottled grey silty sandy CLAY, with occasional sand partings.
4. TOPSOL (brown silty clay) at 0.20 m, with occasional sand partings.
5. Firm brown mottled grey silty CLAY at 0.20 m, with occasional sand partings.
6. Firm grey mottled orange brown silty sandy CLAY at 0.20 m, with occasional sand partings.

### Scale (approx)
- 1:20

### Figure No.
- 18.153.7715
### Excavation Method
- **Machine excavated trial pit**

### Dimensions
- **L: 2.1 m**, **W: 1.3 m**, **D: 3.5 m**

### Ground Level (m O.D.)
- **1.65**

### Client
- **WRSOL Energy Limited**

### Location
- 6044/18 E 164210 N

### Details

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Sample / Tests</th>
<th>Water Table (m O.D.)</th>
<th>Field Records</th>
<th>Level (m O.D.)</th>
<th>Depth (m O.D.)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.10</td>
<td>D1</td>
<td></td>
<td>(0.05)</td>
<td></td>
<td>1.20</td>
<td>TOPSOIL (brown silty clay: With rare subangular fine to very fine gravel)</td>
</tr>
<tr>
<td>0.70</td>
<td>HV 67.73kPa</td>
<td></td>
<td>0.30</td>
<td>0.20</td>
<td>1.20</td>
<td>Fine brown mottled grey silty CLAY</td>
</tr>
<tr>
<td>0.80</td>
<td>D1</td>
<td></td>
<td>(0.40)</td>
<td>0.30</td>
<td>0.70</td>
<td>Fine grey mottled orange brown silty CLAY</td>
</tr>
<tr>
<td>0.90</td>
<td>HV 46.56kPa</td>
<td></td>
<td>0.30</td>
<td>0.80</td>
<td>0.90</td>
<td>Very soft grey mottled dark grey silty sand CLAY</td>
</tr>
<tr>
<td>1.40</td>
<td>D4</td>
<td></td>
<td>(1.00)</td>
<td>1.40</td>
<td>1.40</td>
<td>Very soft grey mottled dark grey silty sand CLAY</td>
</tr>
<tr>
<td>1.30</td>
<td>D5</td>
<td></td>
<td>(1.20)</td>
<td>1.30</td>
<td>1.30</td>
<td>Very soft grey mottled dark grey silty sand CLAY</td>
</tr>
<tr>
<td>2.20</td>
<td>B1</td>
<td></td>
<td>(2.20)</td>
<td>2.20</td>
<td>2.20</td>
<td>Grey clayey silt: very greasy and slightly sticky to coarse sand: With occasional fine sand montmorillonitic clay: Swell is surrounded to nodules fine to coarse CLAY</td>
</tr>
</tbody>
</table>

### Scale (approx) - 1:50
- **Logged By:** DJM
- **Figure No.:** 13, 115, 117

### Remarks
1. Location CAT scanned prior to excavation.
2. Groundwater struck at 1.10 m and rose to 1.80 m in 20 mins.
3. Trial pit backfilled with strata in situ, stratified and aligned.
<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Sample / Tests</th>
<th>Water Tension (kPa)</th>
<th>Field Records</th>
<th>Level (mOGR)</th>
<th>Description</th>
<th>Depth (mOGR)</th>
<th>Legend</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.10</td>
<td>D1</td>
<td></td>
<td></td>
<td></td>
<td>TOPSOIL, brown silt, slightly sandy, clayey. Groundwater not observed, no free water present.</td>
<td>D1</td>
<td></td>
</tr>
<tr>
<td>2.00</td>
<td>HV 79,996 Pa</td>
<td>68.60, 60.60, 70.50</td>
<td></td>
<td></td>
<td>Fish brown mottled grey CLAY</td>
<td>HV 77,744 Pa</td>
<td></td>
</tr>
<tr>
<td>2.00</td>
<td>D2</td>
<td>0.70</td>
<td></td>
<td></td>
<td>Fish grey mottled orange brown CLAY</td>
<td>B3</td>
<td></td>
</tr>
<tr>
<td>2.00</td>
<td>D3</td>
<td>0.73</td>
<td></td>
<td></td>
<td>Fish grey mottled orange brown CLAY</td>
<td>D5</td>
<td></td>
</tr>
<tr>
<td>2.00</td>
<td>D4</td>
<td>0.71</td>
<td></td>
<td></td>
<td>Very soft brown grey mottled silt CLAY</td>
<td>D4</td>
<td></td>
</tr>
<tr>
<td>2.00</td>
<td>D5</td>
<td>10.11</td>
<td></td>
<td></td>
<td>Very soft grey mottled silt CLAY</td>
<td>D6</td>
<td></td>
</tr>
<tr>
<td>1.75</td>
<td>D6</td>
<td>1.20</td>
<td></td>
<td></td>
<td>Very soft grey mottled silt CLAY</td>
<td>D6</td>
<td></td>
</tr>
</tbody>
</table>

**Remarks:**
1. Location CAT scan prior to excavation.
2. No groundwater encountered.
3. Toolpath remained open and suitable for subsequent excavation.
4. Toolpath backfilled with sandbags after completion.
5. Survey by 16 mm handline, serial no. 05.744, Correction factor 1.052.

*Image of excavation pit*
<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Sample / Tests</th>
<th>Layer</th>
<th>CBR Value</th>
<th>Per Blow (%/100)</th>
<th>Depth (m) (THickness)</th>
<th>Description</th>
<th>Legend</th>
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<td>5.2</td>
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<td>TOPSOIL (brown silt) gravelly silt; gravel is scattered to fine (B)</td>
<td></td>
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<td>6.3</td>
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<td>Firm brown mortared gray silty CLAY</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>7.0</td>
<td></td>
<td>Firm gray mortared gravelly brown and brown silty clayey CLAY, with rare small fragments</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Complete at 1.29m

**Remarks:**
1. CBR % value equated from TRL method: \[ \text{CBR} = 2.49 \times (\text{CPR}) \] (100)
2. Location CAT scanned prior to excavation.
3. Groundwater level at 1.15 m.
4. Trench remained open and sidewalls stable during excavation.
5. Trench backfilled with earth after completion.
6. Undertaken at same location as TPO - see associated record.

**Plan:**

**Scale (approx):** 1:20  
**Logged By:** DUM  
**Figure No.:** 18103DCP03

---

**Remarks:**
1. CBR % value equated from TRL method: \[ \text{CBR} = 2.49 \times (\text{CPR}) \] (100)
2. Location CAT scanned prior to excavation.
3. No groundwater encountered.
4. Trench remained open and sidewalls stable during excavation.
5. Trench backfilled with earth after completion.
6. 15 mm hand valve, serial no. G92x743, Correction factor 1.062

**Scale (approx):** 1:20  
**Logged By:** DUM  
**Figure No.:** 18103DCP04
APPENDIX D: LABORATORY TESTING

Natural moisture content
Atterberg limits
Particle size distribution
One-dimensional consolidation test
Dry density moisture content
Undrained shear strength in triaxial compression without measurement of pore pressure
California bearing ratio test
Sulphate content and pH value
Total sulphur
Chloride, nitrate and ammonia
Loss on ignition
### DETERMINATION OF MOISTURE CONTENT, LIQUID LIMIT AND PLASTIC LIMIT

#### AND DERIVATION OF PLASTICITY AND LIQUIDITY INDEX

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Depth</th>
<th>Sample Description</th>
<th>Liquid Limit %</th>
<th>Plastic Limit %</th>
<th>Shrinkage Limit %</th>
<th>Liquidity Index</th>
<th>Group Symbol</th>
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<td>B101</td>
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#### Laboratory Description

- CL: Silt-floated brown silt CLAY.
- CE: Dark grey CLAY.
- CV: Silt-floated grey CLAY.
- CI: Dark grey CLAY.
- CH: Stiff brown CLAY.
- B2: Moulded brown grey silt CLAY.
- B1: Silt-floated grey silt CLAY.
- B3: Moulded brown clayey silt.
- B4: Moulded brown silt CLAY.
- B5: Moulded brown CLAY.

### Method of Preparation:

- BS EN ISO 17892 PART 1:2014 5.2 Test execution (moisture content).
- BS 1377 PART 2:1984 Determination of moisture content.
- BS 1377 PART 2:1984 Determination of the plastic limit and plasticity index, Modified plastic index SME Digest 241 (1983).

### Method of Test:

- BS EN ISO 17892 PART 1:2014 5.2 Test execution (moisture content).
- BS 1377 PART 2:1984 Determination of moisture content.
- BS 1377 PART 2:1984 Determination of the plastic limit and plasticity index, Modified plastic index SME Digest 241 (1983).
DETERMINATION OF PARTICLE SIZE DISTRIBUTION

<table>
<thead>
<tr>
<th>Borehole / Total Pit</th>
<th>Depth (m)</th>
<th>Sample</th>
<th>Laboratory Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SH02</td>
<td>1,70</td>
<td>E6</td>
<td>Brown Silt and Clay.</td>
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<table>
<thead>
<tr>
<th>Size / Particle Size</th>
<th>% Passing</th>
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</thead>
<tbody>
<tr>
<td>150 μm</td>
<td>100%</td>
</tr>
<tr>
<td>90 μm</td>
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<td>63 μm</td>
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<td>21 μm</td>
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<td>10 μm</td>
<td>97,5%</td>
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<td>5 μm</td>
<td>97,5%</td>
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<td>2 μm</td>
<td>97,5%</td>
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<tr>
<td>1 μm</td>
<td>97,5%</td>
</tr>
<tr>
<td>Silt</td>
<td>24.5%</td>
</tr>
<tr>
<td>Clay</td>
<td>43.5%</td>
</tr>
</tbody>
</table>

Method of Preparation: BS 1377 PART 1:1997 7,2 Initial preparation 1990,7,4,5 Particle size tests
Method of Test: BS 1377 PART 2:1999 9 Determination of particle size distribution

Grading Analysis

- D85 150 μm
- D60 90 μm
- D30 60 μm
- Uniformity Coefficient -

Particle Proportions

- Gravel
- Sand
- Silt
- Clay

Method of Preparation: BS 1377:PART 1:1997 7,2 Initial preparation 1990,7,4,5 Particle size tests
Method of Test: BS 1377:PART 2:1999 9 Determination of particle size distribution

Grading Analysis

- D85 150 μm
- D60 90 μm
- D30 60 μm
- Uniformity Coefficient -

Particle Proportions

- Gravel
- Sand
- Silt
- Clay
Determination of Particle Size Distribution

Site: Cleve Hill Solar Farm, Greenway, Kent

Laboratory Test Results

Sample: D10

Parameters:
- Depth: 2.50 m
- Sample: Grey Silty Clay with shells

Laboratory Description:

Grading Analysis:
- CLAY: 6, 8, 12, 15, 21, 25, 50, 100, 200, 300, 500, 750, 1000, 2000, 3000, 5000, 10000, 20000
- Particle Proportions:
  - 6 µm: 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%
  - 8 µm: 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%
  - 12 µm: 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%
  - 15 µm: 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%
  - 21 µm: 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%
  - 25 µm: 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%
  - 50 µm: 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%
  - 100 µm: 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%
  - 200 µm: 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%
  - 500 µm: 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%
  - 1000 µm: 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%
  - 2000 µm: 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%
  - 3000 µm: 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%
  - 5000 µm: 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%, 0.0%

Remarks:
- Method of Preparation: BS 1377 PART 1:1990 7.3 Initial preparation 1990 7.4 Particle size tests
- Method of Test: BS 1377 PART 2:1990 9 Determination of particle size distribution
- Remarks:
### DETERMINATION OF PARTICLE SIZE DISTRIBUTION

<table>
<thead>
<tr>
<th>Borehole / Total Pit</th>
<th>Depth (m)</th>
<th>Sample</th>
<th>Laboratory Description</th>
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<tbody>
<tr>
<td>TPI1</td>
<td>2.00</td>
<td>E6</td>
<td>Grey sandy silt CLAY with rare shell fragments.</td>
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#### Laboratory Test Results

<table>
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<tr>
<th>Size / Particle Size</th>
<th>% Passing</th>
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<tbody>
<tr>
<td>0.005 mm</td>
<td>8.5</td>
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<tr>
<td>0.05 mm</td>
<td>1.5</td>
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<tr>
<td>0.1 mm</td>
<td>3.0</td>
</tr>
<tr>
<td>0.25 mm</td>
<td>12.0</td>
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<tr>
<td>0.5 mm</td>
<td>27.5</td>
</tr>
<tr>
<td>1.0 mm</td>
<td>62.0</td>
</tr>
<tr>
<td>2.0 mm</td>
<td>100.0</td>
</tr>
</tbody>
</table>

#### Grading Analysis

- **Particle Proportions**
  - **Cobble + Boulders**: 0%
  - **Gravel**: 0%
  - **Sand**: 3.0%
  - **Silt**: 44.0%
  - **Clay**: 27.5%

- **Uniformity Coefficient**: ND

#### Method of Preparation
- BS 1377: PART 1:1990 7.3 Initial preparation: 1990.7.4 Particle size tests

#### Method of Test
- BS 1377: PART 2:1990 9 Determination of particle size distribution

#### Remarks

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### DETERMINATION OF PARTICLE SIZE DISTRIBUTION

<table>
<thead>
<tr>
<th>Borehole / Total Pit</th>
<th>Depth (m)</th>
<th>Sample</th>
<th>Laboratory Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TPI2</td>
<td>2.00</td>
<td>D3</td>
<td>Greyish brown sandy silt CLAY with rare shells.</td>
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#### Laboratory Test Results

<table>
<thead>
<tr>
<th>Size / Particle Size</th>
<th>% Passing</th>
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</thead>
<tbody>
<tr>
<td>0.005 mm</td>
<td>8.5</td>
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<tr>
<td>0.05 mm</td>
<td>1.5</td>
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<tr>
<td>0.1 mm</td>
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<tr>
<td>0.25 mm</td>
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<td>1.0 mm</td>
<td>62.0</td>
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<tr>
<td>2.0 mm</td>
<td>100.0</td>
</tr>
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#### Grading Analysis

- **Particle Proportions**
  - **Cobble + Boulders**: 0%
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  - **Clay**: 27.5%

- **Uniformity Coefficient**: ND

#### Method of Preparation
- BS 1377: PART 1:1990 7.3 Initial preparation: 1990.7.4 Particle size tests

#### Method of Test
- BS 1377: PART 2:1990 9 Determination of particle size distribution

#### Remarks
**DETERMINATION OF PARTICLE SIZE DISTRIBUTION**

<table>
<thead>
<tr>
<th>Borehole</th>
<th>Depth (m)</th>
<th>Sample</th>
<th>Laboratory Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP20</td>
<td>1.60</td>
<td>E4</td>
<td>Grey and greyish brown sandy silty CLAY with occasional shells and shell fragments.</td>
</tr>
</tbody>
</table>

**Grading Analysis**

<table>
<thead>
<tr>
<th>Size (μm)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLAY</td>
<td>0%</td>
</tr>
<tr>
<td>SAND</td>
<td>0%</td>
</tr>
<tr>
<td>GRAVEL</td>
<td>0%</td>
</tr>
<tr>
<td>COBLES</td>
<td>0%</td>
</tr>
<tr>
<td>BOULDER</td>
<td>0%</td>
</tr>
</tbody>
</table>

**Particle Proportions**

- Cobbles + Boulders: -
- Gravel: 3.0%
- Sand: 17.0%
- Silt: 42.5%
- Clay: 29.5%

**Method of Preparation**: BS 1377 PART 1: 1990 7.3 Initial preparation 1000 7.4.5 Particle size tests
**Method of Test**: BS 1377 PART 2: 1990 9 Determination of particle size distribution

---

**DETERMINATION OF PARTICLE SIZE DISTRIBUTION**

<table>
<thead>
<tr>
<th>Borehole</th>
<th>Depth (m)</th>
<th>Sample</th>
<th>Laboratory Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP22</td>
<td>2.00</td>
<td>D4</td>
<td>Brown mottled grey sandy silty CLAY.</td>
</tr>
</tbody>
</table>

**Grading Analysis**

<table>
<thead>
<tr>
<th>Size (μm)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLAY</td>
<td>0%</td>
</tr>
<tr>
<td>SAND</td>
<td>0%</td>
</tr>
<tr>
<td>GRAVEL</td>
<td>0%</td>
</tr>
<tr>
<td>COBLES</td>
<td>0%</td>
</tr>
<tr>
<td>BOULDER</td>
<td>0%</td>
</tr>
</tbody>
</table>

**Particle Proportions**

- Cobbles + Boulders: -
- Gravel: 3.0%
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- Silt: 42.5%
- Clay: 29.5%

**Method of Preparation**: BS 1377 PART 1: 1990 7.3 Initial preparation 1000 7.4.5 Particle size tests
**Method of Test**: BS 1377 PART 2: 1990 9 Determination of particle size distribution

---

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Incremental Loading Oedometer Test

**Description:**
- Soft brown CLAY.

**Initial Conditions:**
- Height: 18.21 mm
- Diameter: 76.23 mm
- Area: 4564 mm²
- Volume: 83.11 cm³
- Laboratory Temperature: 20.4 °C

**Results:**
- Water Content: 48.6 % (from trimmings)
- Voids Ratio: 1.353
- Bulk Density: 1.72 Mg/m³
- Dry Density: 1.16 Mg/m³
- Particle density: 2.72 (Assumed)
- Degree of Saturation: 97.8%

**Pressure Range:**
- 0 - 25 kPa: 0.57 M/MN
- 25 - 50 kPa: 0.60 M/MN
- 50 - 100 kPa: 0.68 M/MN
- 100 - 200 kPa: 0.87 M/MN
- 200 - 300 kPa: 0.41 (Sv)

**Time Filling:**
- Method: IS0
- minutes: 9.44
- Void Ratio: 1.319
- IS0: 11.7
- Void Ratio: 1.277
- IS0: 11.7
- Void Ratio: 1.199
- IS0: 15.0
- Void Ratio: 1.077
- IS0: 16.9
- Void Ratio: 1.195

**Notes:**
- Results have been corrected for equipment deformation.
**INCREMENTAL LOADING OEDOMETRTEST**

<table>
<thead>
<tr>
<th>BH / TP</th>
<th>Sample Ref.</th>
<th>Depth (m)</th>
<th>Sample Type</th>
<th>Depth within original (mm)</th>
<th>Orientation within original</th>
<th>Specimen preparation</th>
</tr>
</thead>
<tbody>
<tr>
<td>BH02</td>
<td>U1</td>
<td>1.20</td>
<td>U</td>
<td>50</td>
<td>Vertical</td>
<td>Undisturbed</td>
</tr>
</tbody>
</table>

**Description:** Soft brown CLAY.

---

**Results have been corrected for equipment deformation.**

**Initial Conditions:**
- Height (mm): 18.34
- Diameter (mm): 76.10
- Area (mm²): 4548
- Volume (cm³): 83.42
- Laboratory Temperature (°C): 21.1

Water Content (%): 46.8 (from trimmings)

Voids Ratio: 1.287

Bulk Density (Mg/m³): 1.75

Dry Density (Mg/m³): 1.19

Particle density (Mg/m³): 2.72 (Assumed)

Degree of Saturation (%): 98.9

---

**Pressure Range (kPa) | ñ (m³/MN) | ñ (m³/year) | Time Filling (Method: minutes) | Void Ratio**
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 25</td>
<td>0.71</td>
<td>0.71</td>
<td>IS0 12.1</td>
<td>1.246</td>
</tr>
<tr>
<td>25 - 50</td>
<td>0.68</td>
<td>0.63</td>
<td>IS0 13.1</td>
<td>1.288</td>
</tr>
<tr>
<td>50 - 100</td>
<td>0.58</td>
<td>0.75</td>
<td>IS0 10.8</td>
<td>1.143</td>
</tr>
<tr>
<td>100 - 200</td>
<td>0.40</td>
<td>0.76</td>
<td>IS0 9.66</td>
<td>1.057</td>
</tr>
<tr>
<td>200 - 250</td>
<td>0.18</td>
<td>0.71 (SV)</td>
<td>IS0 10.3</td>
<td>1.122</td>
</tr>
</tbody>
</table>
**INCREMENTAL LOADING OEDOMETR TEST**

**Sample**
- BH / TP: BH02
- Sample Ref.: U2
- Depth (m): 2.00
- Sample Type: U
- Depth within original (mm): 60
- Orientation within original: Vertical
- Specimen preparation: Undisturbed

**Description:**
Soft grey silty CLAY with an organic odour.

**Results**

<table>
<thead>
<tr>
<th>Pressure Range (kPa)</th>
<th>m (m/MN)</th>
<th>c (kPa/yr)</th>
<th>Time Filling Method</th>
<th>Time Filling (minutes)</th>
<th>Void Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 40</td>
<td>1.7</td>
<td>0.90</td>
<td>IS0</td>
<td>9.92</td>
<td>1.123</td>
</tr>
<tr>
<td>40 - 80</td>
<td>0.98</td>
<td>0.69</td>
<td>IS0</td>
<td>11.0</td>
<td>1.046</td>
</tr>
<tr>
<td>80 - 160</td>
<td>0.58</td>
<td>0.93</td>
<td>IS0</td>
<td>7.54</td>
<td>0.945</td>
</tr>
<tr>
<td>160 - 320</td>
<td>0.33</td>
<td>1.1</td>
<td>IS0</td>
<td>5.90</td>
<td>0.842</td>
</tr>
<tr>
<td>320 - 400</td>
<td>0.075</td>
<td>1.6 (kN)</td>
<td>IS0</td>
<td>3.75</td>
<td>0.881</td>
</tr>
</tbody>
</table>

Initial Conditions:
- Height: 18.75 mm
- Diameter: 76.07 mm
- Area: 4545 mm²
- Laboratory Temperature: 20.3°C
- Voids Ratio: 1.274
- Water Content: 47.4% (from trimmings)
- Bulk Density: 1.75 (kN/m³)
- Dry Density: 1.19 (kN/m³)
- Wet Density: 2.70 (Assumed)
- Degree of Saturation: 100.4%

Results have been corrected for equipment deformation.

**Checked and Approved by**
- Project Number: GEO / 27270
- Project Name: CLEVE HILL SOLAR FARM, GRAVENEY, KENT 18.103
- Checked and Approved by: GEO / 27270
- Project Name: CLEVE HILL SOLAR FARM, GRAVENEY, KENT 18.103
INCIDENTAL LOADING OEDOMETER TEST

BH / TP  BH03
Sample Ref.  U2
Depth (m)  2.00
Sample Type  U
Depth within original (mm)  60
Orientation within original  Vertical
Specimen preparation  Undisturbed

Description:
Soft slightly organic grey CLAY.

<table>
<thead>
<tr>
<th>Pressure Range (kPa)</th>
<th>( \sigma_1 ) (m/MN)</th>
<th>( c_v ) (m/year)</th>
<th>Time Filling Method</th>
<th>Void Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 40</td>
<td>3.1</td>
<td>0.24</td>
<td>ISO 32.7</td>
<td>1.488</td>
</tr>
<tr>
<td>40 - 80</td>
<td>1.8</td>
<td>0.18</td>
<td>ISO 36.8</td>
<td>1.324</td>
</tr>
<tr>
<td>80 - 160</td>
<td>0.91</td>
<td>0.20</td>
<td>ISO 27.7</td>
<td>1.155</td>
</tr>
<tr>
<td>160 - 320</td>
<td>0.53</td>
<td>0.20</td>
<td>ISO 24.0</td>
<td>0.973</td>
</tr>
<tr>
<td>320 - 40</td>
<td>0.19</td>
<td>0.23 (SV)</td>
<td>ISO 20.1</td>
<td>1.076</td>
</tr>
</tbody>
</table>

Initial Conditions:
Height (mm) 18.56
Diameter (mm) 76.18
Area (mm²) 4658
Volume (cm³) 84.69
Laboratory Temperature (°C) 20.5

Water Content (%) 69.7 (from trimmings)
Voids Ratio 1.836
Bulk Density (Mg/m³) 1.62
Dry Density (Mg/m³) 0.95
Particle density (Mg/m³) 2.70 (Assumed)
Degree of Saturation (%) 102.5

Results have been corrected for equipment deformation.

Checked and Approved by: GEO / 27270
Project Name: CLEVE HILL SOLAR FARM, GRAVENEY, KENT
18.103

[Ref. 7.210.026]

General - Geodams Limited
2019/306
Client: A F Howard Associates, The Old Exchange, Newmarket Road, Coggeshall, North, NN4 6UF

(Ref 7.210.026)
BS1377 Part 4:1990 Clause 3.5

MOISTURE CONTENT / DRY DENSITY RELATIONSHIP

<table>
<thead>
<tr>
<th>BH/TP</th>
<th>TP08</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Ref</td>
<td>B1 + B2</td>
</tr>
<tr>
<td>Depth (m)</td>
<td>0.30</td>
</tr>
<tr>
<td>Sample Type</td>
<td>B</td>
</tr>
</tbody>
</table>

**Description:** Greyish brown CLAY

**Preparation:** 4.5kg Rammer for soils with particles up to medium-gravel size

**Test Method:**
- Single / Multiple

<table>
<thead>
<tr>
<th>Samples Used</th>
<th>Mass Retained on 37.5 mm Sieve (%)</th>
<th>Mass Retained on 20.0 mm Sieve (%)</th>
<th>Particle Density - Assumed (Mg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single / Multiple</td>
<td>16.5</td>
<td>20.4</td>
<td>1.65</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maximum Dry Density (Mg/m³)</th>
<th>Optimum Moisture Content (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.65</td>
<td>20.2</td>
</tr>
</tbody>
</table>

**Graph:**
- Moisture Content: %
- Dry Density: Mg/m³

**Determination:**
- Trial 1: 17.2 %, 1.62 Mg/m³
- Trial 2: 18.5 %, 1.64 Mg/m³
- Trial 3: 20.4 %, 1.66 Mg/m³
- Trial 4: 22.7 %, 1.62 Mg/m³
- Trial 5: 25.5 %, 1.55 Mg/m³

---

BS1377 Part 4:1990 Clause 3.5

MOISTURE CONTENT / DRY DENSITY RELATIONSHIP

<table>
<thead>
<tr>
<th>BH/TP</th>
<th>TP08</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Ref</td>
<td>B3 + B4</td>
</tr>
<tr>
<td>Depth (m)</td>
<td>0.90</td>
</tr>
<tr>
<td>Sample Type</td>
<td>B</td>
</tr>
</tbody>
</table>

**Description:** Greyish brown CLAY

**Preparation:** 4.5kg Rammer for soils with particles up to medium-gravel size

**Test Method:**
- Single / Multiple

<table>
<thead>
<tr>
<th>Samples Used</th>
<th>Mass Retained on 37.5 mm Sieve (%)</th>
<th>Mass Retained on 20.0 mm Sieve (%)</th>
<th>Particle Density - Assumed (Mg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single / Multiple</td>
<td>16.5</td>
<td>20.4</td>
<td>1.65</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maximum Dry Density (Mg/m³)</th>
<th>Optimum Moisture Content (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.81</td>
<td>17.0</td>
</tr>
</tbody>
</table>

**Graph:**
- Moisture Content: %
- Dry Density: Mg/m³

**Determination:**
- Trial 1: 8.2 %, 1.71 Mg/m³
- Trial 2: 14.9 %, 1.79 Mg/m³
- Trial 3: 17.3 %, 1.81 Mg/m³
- Trial 4: 19.2 %, 1.76 Mg/m³
- Trial 5: 19.8 %, 1.74 Mg/m³

---

Test Report By: GEOLABS Limited
Bucknells Lane, Garston, Wallingford, Oxfordshire, OX9 2BIK
Client: A.F. Haward Associates, The Old Exchange, Newnham Road, Coggeshall, Norfolk, NR6 6UF
Page 1 of 1
(Ref 15/52505018)
MOISTURE CONTENT / DRY DENSITY RELATIONSHIP

**BH/TP**

**TP20**

Sample Ref: B1 + B2

Depth (m): 0.30

Sample Type: B

Description: Brown CLAY

Preparation: Oven dried

Test Method: 4.5kg Rammer for soils with particles up to medium-gravel size

Samples Used: Single / Multiple

Mass Retained on 37.5 mm Sieve: %

Mass Retained on 20.0 mm Sieve: %

Particle Density - Assumed: Mg/m³

Maximum Dry Density: Mg/m³

Optimum Moisture Content: %

---

MOISTURE CONTENT / DRY DENSITY RELATIONSHIP

**BH/TP**

**TP20**

Sample Ref: B3 + B4

Depth (m): 0.80

Sample Type: B

Description: Mottled grey and brown CLAY

Preparation: Oven dried

Test Method: 4.5kg Rammer for soils with particles up to medium-gravel size

Samples Used: Single / Multiple

Mass Retained on 37.5 mm Sieve: %

Mass Retained on 20.0 mm Sieve: %

Particle Density - Assumed: Mg/m³

Maximum Dry Density: Mg/m³

Optimum Moisture Content: %

---

Determination

<table>
<thead>
<tr>
<th>Moisture Content</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>18.0</td>
<td>19.0</td>
<td>20.3</td>
<td>22.4</td>
<td>25.6</td>
</tr>
<tr>
<td>Dry Density, Mg/m³</td>
<td>1.61</td>
<td>1.62</td>
<td>1.63</td>
<td>1.64</td>
<td>1.55</td>
</tr>
</tbody>
</table>

---

Determination

<table>
<thead>
<tr>
<th>Moisture Content</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>14.8</td>
<td>19.2</td>
<td>20.0</td>
<td>21.1</td>
<td>25.4</td>
</tr>
<tr>
<td>Dry Density, Mg/m³</td>
<td>1.66</td>
<td>1.74</td>
<td>1.74</td>
<td>1.72</td>
<td>1.59</td>
</tr>
</tbody>
</table>
### BS1377: Part 4:1990 Clause 3.5

#### MOISTURE CONTENT / DRY DENSITY RELATIONSHIP

<table>
<thead>
<tr>
<th>BH/TP</th>
<th>TP22</th>
<th>Sample Ref</th>
<th>B1 + B2</th>
<th>Depth (m)</th>
<th>0.30</th>
<th>Sample Type</th>
<th>B</th>
</tr>
</thead>
</table>

**Description:** Greyish brown CLAY

**Preparation:** Oven dried

**Test Method:** 4.5kg Rammer for soils with particles up to medium-gravel size

**Samples Used:** Single / Multiple

<table>
<thead>
<tr>
<th>Mass Retained on 37.5 mm Sieve</th>
<th>%</th>
<th>Mass Retained on 20.0 mm Sieve</th>
<th>%</th>
<th>Particle Density - Assumed</th>
<th>Mg/m³</th>
<th>Maximum Dry Density</th>
<th>Mg/m³</th>
<th>Optimum Moisture Content</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

#### Determination

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Moisture Content</th>
<th>%</th>
<th>Dry Density</th>
<th>Mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.58</td>
</tr>
</tbody>
</table>

#### Graph

- **Y-axis:** Dry Density, Mg/m³
- **X-axis:** Moisture Content, %

- **Legend:**
  - 5% Air Voids
  - 10% Air Voids

**Checked and Approved by:** GEO / 2720

**Project Name:** CLEVE HILL SOLAR FARM, GRAVENEY, KENT

**Client:** A F Holders Associates, The Old Exchange, Newnham Road, Congresford, Norfolk, NR4 6UF

**Project Number:** 18.103

---

### BS1377: Part 4:1990 Clause 3.5

#### MOISTURE CONTENT / DRY DENSITY RELATIONSHIP

<table>
<thead>
<tr>
<th>BH/TP</th>
<th>TP22</th>
<th>Sample Ref</th>
<th>B3 + B4</th>
<th>Depth (m)</th>
<th>0.75</th>
<th>Sample Type</th>
<th>B</th>
</tr>
</thead>
</table>

**Description:** Greyish brown CLAY

**Preparation:** Air dried

**Test Method:** 4.5kg Rammer for soils with particles up to medium-gravel size

**Samples Used:** Single / Multiple

<table>
<thead>
<tr>
<th>Mass Retained on 37.5 mm Sieve</th>
<th>%</th>
<th>Mass Retained on 20.0 mm Sieve</th>
<th>%</th>
<th>Particle Density - Assumed</th>
<th>Mg/m³</th>
<th>Maximum Dry Density</th>
<th>Mg/m³</th>
<th>Optimum Moisture Content</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Determination

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Moisture Content</th>
<th>%</th>
<th>Dry Density</th>
<th>Mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.59</td>
</tr>
</tbody>
</table>

#### Graph

- **Y-axis:** Dry Density, Mg/m³
- **X-axis:** Moisture Content, %

- **Legend:**
  - 5% Air Voids
  - 10% Air Voids

**Checked and Approved by:** GEO / 2720

**Project Name:** CLEVE HILL SOLAR FARM, GRAVENEY, KENT

**Client:** A F Holders Associates, The Old Exchange, Newnham Road, Congresford, Norfolk, NR4 6UF

**Project Number:** 18.103
### Laboratory Test Results

**Laboratory Description**

**Test Details**
- Top Surcharge: 12.0 kg
- Base Seating load: 10 N
- Moisture content: 40 %
- CBR Value: 3.1 %

**PREPARATION DETAILS**

The specimen was tested in an unsaturated condition. The specimen was tested at its existing moisture content. The specimen was prepared by dynamic compaction using a 2.5 kg rammer. Prepared bulk density 1.77 Mg/m³. Prepared dry density 1.26 Mg/m³.

### DETERMINATION OF DENSITY, MOISTURE CONTENT AND UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

<table>
<thead>
<tr>
<th>Sample</th>
<th>Blk</th>
<th>Depth (mm)</th>
<th>Moisture Content (%)</th>
<th>Bulk Density (Mg/m³)</th>
<th>Dry Density (Mg/m³)</th>
<th>Cal. Pressure (kPa)</th>
<th>Apparent Density (Mg/m³)</th>
<th>Degree of Draining (Carr)</th>
<th>Laboratory Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRH01</td>
<td>U1</td>
<td>120</td>
<td>54</td>
<td>1.72</td>
<td>1.12</td>
<td>24</td>
<td>29</td>
<td>14</td>
<td>Soft fissured brown silty CLAY</td>
</tr>
<tr>
<td>BRH01</td>
<td>U2</td>
<td>90</td>
<td>39</td>
<td>1.01</td>
<td>1.41</td>
<td>60</td>
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**Method of Preparation**: BS 1377 PART 1: 1990 T4,3 Moisture content. 1990 Preparation of undisturbed samples for testing BS 1377 PART 2: 1990 T,3

**Method of Test**: BS 1377 PART 2: 1990 3 Determination of moisture content. 1990 3 Determination of density. BS 1377 PART 7: 1990 3 Unstrained shear strength

1990 3 Multinage testing

**Remarks**: 

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BS1377: Part 4: Clause 7: 1990

CALIFORNIA BEARING RATIO

BH/TP No.:  DCP06  
Sample No.:  B2  
Depth (m):  0.70  
Sample Type:  B  

Description:  Brown CLAY

PREPARATION DETAILS

The specimen was tested in an unsaturated condition.
The specimen was tested at its existing moisture content.
The specimen was prepared by dynamic compaction using a 2.5 kg rammer.
Prepared dry density 1.14 Mg/m³

Test Details

<table>
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<tr>
<th>Top</th>
<th>Base</th>
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<tbody>
<tr>
<td>Surcharge</td>
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<tr>
<td>Seating load</td>
<td>10 N</td>
</tr>
<tr>
<td>Moisture content</td>
<td>44 %</td>
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<tr>
<td>CBR Value</td>
<td>2.0 %</td>
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</table>

Top of Specimen

Base of Specimen

GEO / 27270

CLEVE HILL SOLAR FARM, GRAVENEY, KENT

18.103

Check and Approved by:

Project Number:

Project Name:

GEOLABS

Test Report By: GEOLABS Limited  
Bucknells Lane, Garsden, Watford, Hertfordshire, WD25 9XG
Client: A.W. Howland Associates, The Old Exchange, Newmarket Road, Cogingford, Norfolk, NR4 6XG

(Ref 1529584797)
CALIFORNIA BEARING RATIO

BH/TP No.: TP01
Sample No.: 82
Depth (m): 0.80
Sample Type: B
Description: Brown CLAY with pockets of silt.

PREPARATION DETAILS

The specimen was tested in an unsoaked condition.
The specimen was tested at its existing moisture content
The specimen was prepared by dynamic compaction using a 2.5 kg rammer
Prepared dry density 1.71 Mg/m³
Prepared dry density 1.26 Mg/m³

Test Details

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<th>Base</th>
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Top of Specimen

Base of Specimen

Method of Preparation: BS 1377:PART 1:1990:7.5 Preparation of soil for chemical tests BS 1377:PART 3:1990:5.2, 5.3, 5.4 & 5.6

Remarks:

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### DETERMINATION OF pH, SULPHATE, TOTAL SULPHUR, MAGNESIUM, CHLORIDE, NITRATE AND AMMONIUM CONTENT

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<tr>
<th>Borehole</th>
<th>Depth (m)</th>
<th>Sample</th>
<th>Sulphate</th>
<th>Acid</th>
<th>Water</th>
<th>Chloride</th>
<th>Water</th>
<th>Magnesium</th>
<th>Water</th>
<th>Total</th>
<th>Sodium</th>
<th>Chloride</th>
<th>Nitrate</th>
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Laboratory Description: Water sample

- **Method of Preparation:** BS 1377: PART 1: 1994 7.5 Preparation of soil for chemical tests, BS 1377: PART 2: 1995 5.3, 5.4 & 6.4.
- **Method of Test:** Lab in-house methods based on BS 1377: Part 3 for pH and chloride. Lab in-house method based on BS 274 2005 for Nitrate and Ammonium.
- **Remarks:**

### DETERMINATION OF CHLORIDE CONTENT, ORGANIC MATTER CONTENT, LOSS ON IGNITION AND PH

<table>
<thead>
<tr>
<th>Borehole</th>
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<th>Sample</th>
<th>Chloride</th>
<th>Groundwater</th>
<th>Percentage</th>
<th>Organic</th>
<th>Loss on</th>
<th>pH</th>
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- **Method of Preparation:** BS 1377: PART 1: 1994 7.5 Preparation of soil for chemical tests, BS 1377: PART 2: 1995 7.3, 7.4, Water-soluble, 7.5, 7.6 Acid-soluble.
- **Method of Test:** Lab in-house method based on BS 1377: Part 2: 1995 7.5 Determination of chloride content, 7.6, 7.7 Determination of organic matter content, BS 1377: PART 2: 1995 7.8 Determination of loss on ignition and determination of pH value.
- **Remarks:**

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APPENDIX E: DRAWINGS

Drawing 18.103/01  Site Location Plan
Drawing 18.103/02  Exploratory Hole Location Plan
Drawing 18.103/03  Sea Defence Embankment Section and Plan
Total area = 3.0 ha

Existent ditch to be diverted

Access required to cross flood defence bund

Existent ditch to remain in place

Key:
- **Red** - Location and reference
- **Blue** - Trail feature location and reference
- **Green** - Seek away test location and reference
- **Orange** - DCP location and reference
- **Pink** - DCP and trial pit location and reference