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Colomendy Industrial Estate Extension

Plot 1; Supplementary Ground Investigation & Geotechnical Report

Cyngor Sir Ddinbych

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1.0 INTRODUCTION

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Daear GeoConsulting (Daear) has been appointed to carry out a supplementary ground investigation and interpretative geotechnical report for the proposed development.

This report presents the findings of the supplementary ground investigation and provides updated, firm geotechnical recommendations for the proposed development. It is intended as an addendum to the Geotechnical report issued in March 2019.

2.0 THE SITE

2.1 Site Location and Description

The site is located directly north, and adjacent to the Colomendy industrial estate, on the northern fringe of the Town of Denbigh, at approximate national grid reference SJ053674. A small narrow field separates it from the industrial estate along the western half of the southern site boundary, see below.

The site is rectangular in shape, measuring approximately 250m E-W and 85m N-S. It is accessed from Ffordd y Graig road, which runs along the western site boundary. Agricultural fields lie to the north and east, and the industrial estate to the south; a limestone quarry lies approximately 250m west of the site, separated by a densely wooded slope.

Ffordd y Graig road is at an elevation of approximately 94mAD adjacent to the NW site boundary, falling to approximately 90.5mAD by the SW boundary, and is on a slight embankment, 0.5m – 1.0m above the site level.

The gradient of the site generally falls from west to east, with ground levels (mAD) falling from approximately 92.5m (NW) to 90.5m (SW) along the western boundary to between 81.5m (NE) and 80m (SE) at the eastern site boundary. The gradient in the western third of the site is slightly steeper at approximately 1:15, reducing to approximately 1:30 in the East.

Overhead electricity cables cross the eastern site area, and a high pressure gas main crosses the center of the site.

There is a small ditch running along the southern site boundary and a small stream, likely seasonal, originating from a pond mid way along the northern site boundary and running adjacent to the northern site boundary.

It is also proposed to widen Ffordd y Graig road to the west to form a new entrance into the site, which is not considered in this supplementary report.

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It is also proposed to widen Ffordd y Graig road to the west to form a new entrance into the site, which is not considered in this supplementary report.

2.2 Geology and Hydrogeology

The geology of the site has been studied on the BGS geoindex online database using the 1:50,000 scale coverage, Ref. 1.

Superficial deposits are shown to comprise glacial till which are likely to be present beneath the entire site area.

The bedrock is shown to comprise Carboniferous Limestone beneath the West of the site and Kinnerton Sandstone beneath the East of the site. A fault separates the two rock types, which runs across the site in a N-S direction.

The limestone is quarried approximately 250m west of the site.

Groundwater and surface water flows are likely to be to the east, following the local topography.

The glacial till is likely to be a low permeability stratum, with groundwater flows limited to the near surface topsoil and subsoils and any granular horizons within the strata.

Groundwater flows are likely to be controlled by fissure flows within the limestone and intergranular flows within the sandstone.

2.3 History

The history of the site has been researched from Ordnance Survey maps dating from 1880.

The historical maps do not show any evidence of development on the site itself, which has remained as agricultural land since the first edition OS map in 1879, without any significant change to the field boundaries.

The Colomendy industrial estate, which is present along the southern site boundary was first shown on OS maps in 1978, comprising a number of small units identified as small factories, engineering works, warehouses and a bakery. The industrial estate is currently made of a mixture of light industrial, commercial and retail premises.

A large limestone quarry measuring approximately 750m NS and up to 300mEW is located approximately 250m west of the site. The quarry was shown on the first OS map in 1879, when it was a small quarry approximately 600m SSW of the site. The quarry gradually extended northwards over the years. There are no records of any landfilling at the quarry site.

2.4 Radon

The radon risk at the site has been researched from interactive maps accessed on ukradon.org. The site is shown to lie within a Radon Affected Area. A site specific radon report has been purchased from the British Geological Survey (BGS) specifically for the main structures, and is presented in Appendix D.

The report concludes that basic radon measutres are requied for the report area. Details on protective measures are available *in BR211 Radon: Guidance on protective measures for new buildings (2015 Edition).*

2.5 Potential Contamination

The historical review shows that the site has remained undeveloped while some light industrial development has been carried out up to the southern site boundary.

No made ground was encountered during the previous ground investigation.

The site is therefore considered as greenfield.

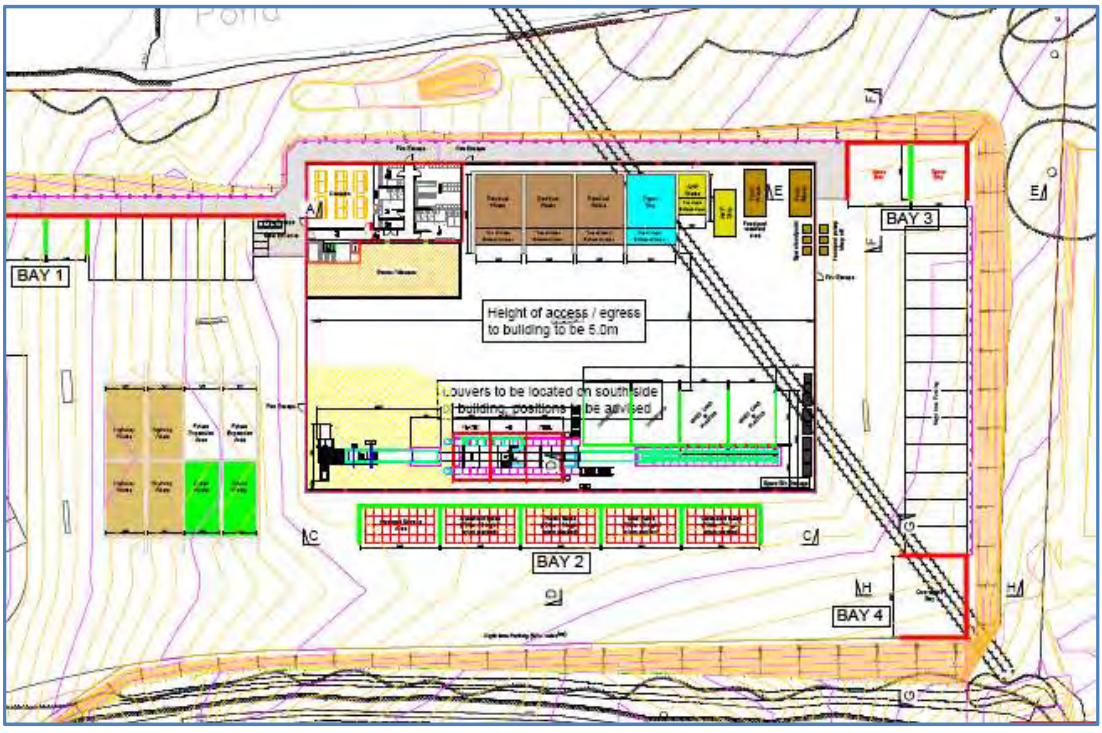
It is therefore recommended that no specific targeted investigation is required in relation to potentially contaminated land, however, the supplementary ground investigation shall include a watching brief for potential contamination and selected samples shall be obtained for chemical testing of near surface made ground if encountered.

3.0 PROPOSED DEVELOPMENT

It is proposed to construct a new depot as part of the Local Authority waste re-organisation program. The structure has been rotated since the completion of the preliminary GI, but is in the same general area of the site. The proposed layout is shown on drawing Series 100 - H4-18404-D-01-06-01-02 – GA, which is presented in Appendix A, with extracts below.

Western Area – mainly parking/hardstanding:

Eastern Area – Recycling Facility and Storage Bays



The western of the site will occupy parking areas for cars and refuse vehicles and a highways depot. A waste segregation/recycling unit, measuring approximately 40m x 60m is positioned in the east of the site, with associated storage areas. The building is a steel portal framed structure with modest column loads.

Other structures on the site comprise storage bays with 4m high pre-cast concrete segregating push walls. No imposed loads have been provided at this stage.

Due to the sloping nature of the site there are a number of retaining walls and earthworks required to accommodate the development, the earthworks are shown on Drawing *D23-Finished Surface Contours-FSC-01,* which is presented in Appendix A. Earthworks embankments are present around much of the perimeter of the eastern site area, where fill levels increase gradually to approximately 2.5m in the SE. Four retaining walls are proposed; 1A, 1B, 2 and 3:

- Wall 1a & 1b – In western site area to separate the parking areas;
- Wall 2 – in NE of site to support fill embankment;
- Wall 3 – in SE of site to support fill embankment.

These are discussed in Section 6 of this report, however a separate earthworks report encompassing Plots 1- 5 of the proposed Colomendy Extension has been prepared, as the advanced earthworks and infrastructure will be constructed together as a single contract.

4.0 GROUND INVESTIGATION

4.1 Previous Ground Investigations

The preliminary ground investigation was carried out on the 24th and 25th January 2019 and comprised the following:

- 18 machine excavated trial pits to establish shallow ground conditions;
- Five window sample boreholes which were advanced to a maximum depth of 5m;
- 17 TRRL Dynamic Probe tests to provide CBR values;
- SPT test were carried out at 1m intervals in the window samples;
- One Infiltration test, which was carried out in TP07;
- Two groundwater monitoring standpipes.

The findings of the investigation were reported in the 2019 Geotechnical Report (**Ref 1**).

Further works were carried out on Graig Road; these are not discussed further in this report.

4.2 This Investigation

The supplementary ground investigation was carried out between the 24th and 25th January 2019 and comprised the following:

- 12 machine excavated trial pits to establish shallow ground conditions;
- 2 cable percussive boreholes which were advanced to a maximum depth of 5.9m

The fieldwork was carried out and logged by CCGeotechnical Ltd. Under the supervision of a chartered engineering geologist from Daear, Samples were logged in general accordance with BS 5930, Reference 2.

The location of the exploratory holes are shown on Drawing H3-18304-D-133B, which is presented in Appendix A, with an extract provided over. The exploratory hole logs are presented in the Factual Report in Appendix B.

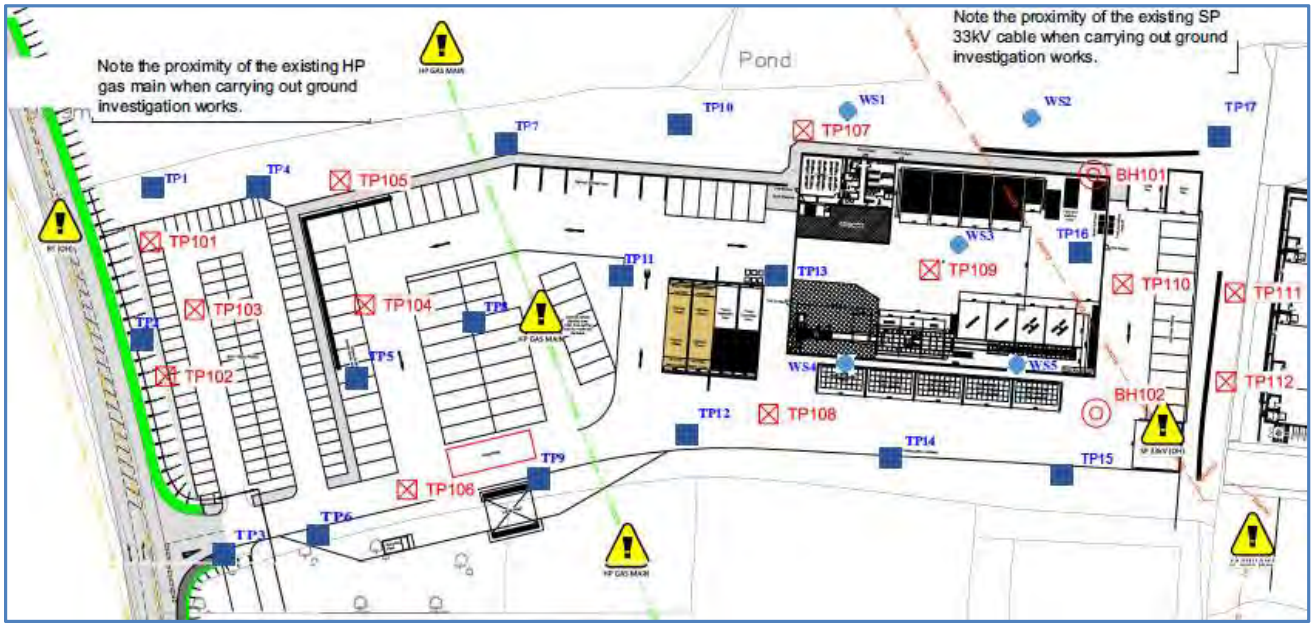
4.3 Laboratory Testing

Samples were selected for geotechnical classification testing, which were carried out at the UKAS accredited laboratories of CCG Ltd. (2020 – all samples / 2019 Borehole and hand pit samples) and Celtest Ltd. (2019 trial pit samples). The following tests were carried out:

Test	Numbers	
	2019	2020
Moisture content	15	32
Atterberg Limits	11	15
Particle Size Distribution (PSD)	7	
pH & Sulphate	7	
Compaction & Particle Density	2	
One Dimensional Oedometer	-	1

The tests were carried out in accordance with BS1377. The results are discussed in Section 5 of this report and presented in full in the Factual Report in Appendix B.

Contamination testing - One sample of made ground, two samples of topsoil and two samples of natural subsoil were selected for a general suite of contamination testing in the 2019 GI, no contamination testing was carried out in 2020. Contamination is not discussed further in this report



Exploratory Hole Locations; 2020 (Red) & 2019 (Blue)

5.0 GROUND CONDITIONS

This section incorporates the data from both the preliminary and supplementary ground investigations carried out on Plot 1; except the preliminary works on Ffordd y Graig widening.

5.1 General Stratigraphy

The ground conditions generally comprise a relatively uniform horizon of topsoil overlying cohesive glacial till with non-persistent horizons of granular soils of various thicknesses. No bedrock was encountered.

Ground Conditions are summarised in Table 5.1 and discussed in more detail below:

2020 GI:

Ref	Depth of Stratum (m)			Ground water (m)	Comment
	Topsoil	Clay	Granular		
BH101	0.2	4.45	-	dry	
BH102	0.2	0.2 - 2.4 3.5 - 5.9	2.4 - 3.5	2.4m, rising to 2.2m	
TP101	0.2	-	0.2 - 2	dry	stable
TP102	0.2	1.75 - 2.1	0.2 - 1.75	dry	
TP103	0.2	-	2	dry	
TP104	0.15	-	1.6	1.2m slight seepage	
TP105	0.25	0.4 - 1.3 1.4 - 1.5	0.25 - 0.4 1.3 - 1.4	1.4m slight seepage	soft 0.4 - 1.3. Deep clay is stiff
TP106	0.2	0.6 - 1.6	0.2 - 0.6 1.6 - 1.7	1.6 - standing water	Firm, but becoming soft between 1m & 1.6m
TP107	0.25	2	-	dry	firm to 0.7 stiff below
TP108	0.2	2.1	-	dry	soft to 0.7m, stiff below
TP109	0.2	0.4 - 1.3	0.2 - 0.4	dry	stiff from top of clay
TP110	0.15	1.8	-	dry	firm to 0.7 stiff below
TP111	0.2	0.9 - 1.6	0.2 - 0.6	dry	*land drain gravel surround
TP112	0.2	0.75 - 1.6	0.2 - 0.6	dry	*land drain gravel surround
TP113	0.1	1.5	-	dry	soft to 0.3m
Notes.	* Base of Stratum not proven				
Table 5.1a – Summary of Ground Conditions (2020 GI)					

2019 GI:

Ref	Depth of Stratum (m)			Ground water (m) / Comment
	Topsoil	Clay	Granular	
WS01	0.3	5*	3.0-3.4	seepage @ 2.7m; standpipe installed
WS02	0.4	4.1*	-	dry
WS03	0.3	3.6*	-	dry
WS04	0.4	3.9*	-	dry
WS05	0.4	2.5*	-	dry; standpipe installed
TP01	0.23	1.2*	0.6-0.9	dry
TP02	0.25	1.9*	0.8-1.3	local seepage 1.6m

Ref	Depth of Stratum (m)			Ground water (m) / Comment
	Topsoil	Clay	Granular	
TP03	0.25	1.4*	0.75-1.1	localised seepage
TP04	0.22	0.9	1.4*	0.9m after 3hrs
TP05	0.25	1.3*	-	dry
TP06	0.32	1.4*	-	dry
TP07	0.25	2*	0.9-1.7	1.4
TP08	0.25	1.7	0.9-1.3	seepage from base below 1.3m
TP09	0.2	1.1	1.3*	inflow from 1.1, standing at 0.75m
TP10	0.25	1.5*	-	seepage from 1.2m
TP11	0.23	1.3*	-	dry
TP12	0.25	1.2*	-	surface water from topsoil
TP13	0.22	1.2*	-	upwelling from base (slight) below 1.1m
TP14	0.22	1.2*	-	dry
TP15	0.2	1.1*	-	dry
TP16	0.2	1.3*	-	dry
TP17	0.18	1.3*	-	dry
TP18	-	0.6	1.3*	Dry / Made ground (old track) to 0.15
Notes.	* Base of Stratum not proven			

Table 5.1b – Summary of Ground Conditions (2019 GI)

5.2 Made Ground

Made ground was only encountered in TP18 (2019 GI), and represented hardstanding aggregate from an old farm track, which had fallen into disuse and was covered by a thin layer of topsoil and turf.

5.3 Topsoil

Topsoil was encountered in all exploratory holes.

In the trial pits the topsoil was recorded to depths of between 180mm and 320mm. In the boreholes the topsoil was recorded to between 200mm and 400mm.

The depth variation between the trial pits and boreholes is likely to be due to varying interpretation rather than significant changes in topsoil thickness.

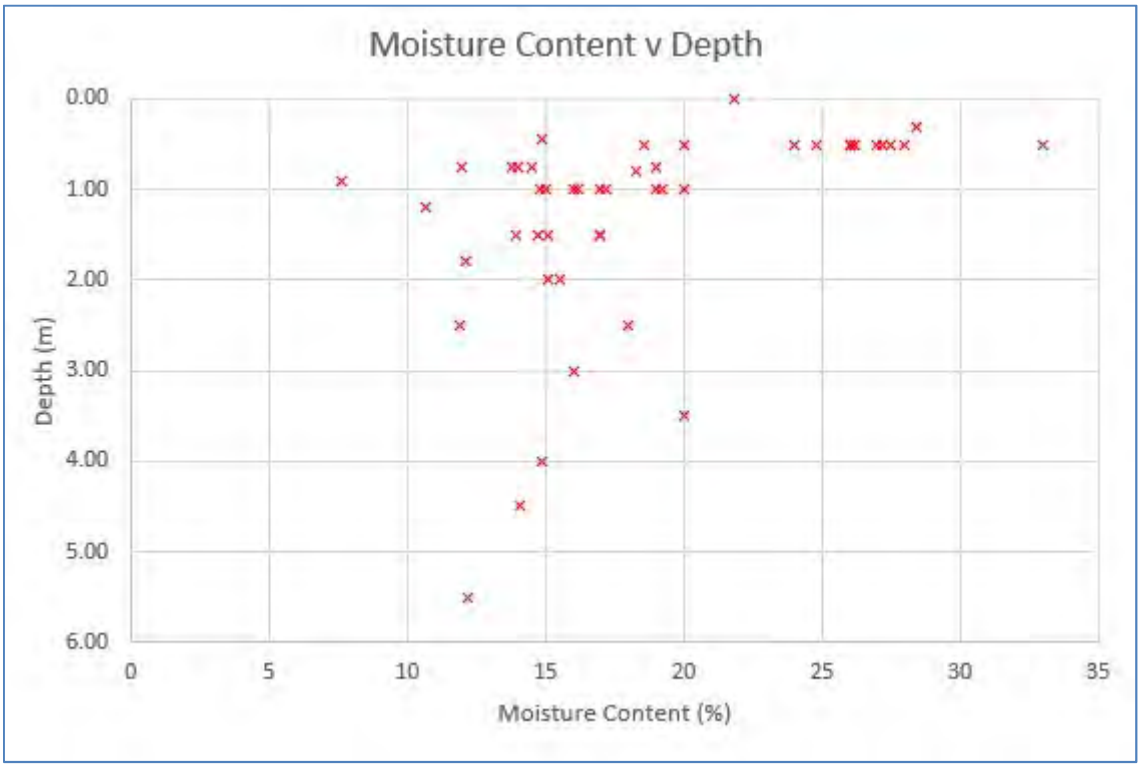
5.4 Cohesive Superficial Deposits

The cohesive superficial deposits were the dominant fraction of the glacial till in Plot 1, and typically comprised slightly sandy silty clay with discreet gravels and localised cobbles, which was encountered in each of the exploratory holes, which ranged from 1.2m to 5.9m depth.

Local, subordinate, granular horizons were recorded, which tended to be more prevalent in certain areas of the Plot are discussed in section 5.5 below.

The stratum was typically of stiff to very stiff consistency, with localised soft and soft to firm consistency noted near surface and very locally with depth in the boreholes.

Forty-Eight (48No.) moisture content tests were carried out on the cohesive soils. The results displayed significant variation, ranging from 8% to 33%, and averaging 19%. The results are presented on the chart below, which shows that the major variation in the moisture content was in the near surface soils, with no samples below 0.8m depth recording a moisture content above 20%.



Twenty-Six (26No.) Atterberg limit tests were carried out on the cohesive soils. As part of the plasticity test, the samples are sieved to remove all particles coarser than 425microns i.e. everything coarser than a 'fine' sand. The percentage of each sample retained on the 425micron sieve was between 2% and 43%, averaging 19%; the results are summarised below.

BH/TP Ref	Depth (m)	Natural MC %	Liquid Limit%	Plastic Limit %	Plasticity index %	% passing 425mm sieve	Modified PI %	Volume Change Potential
2020 GI								
TP102	1.80	12	32	16	16	74	11.84	LOW
TP105	1.00	19	28	18	10	71	7.1	LOW
TP106	1.00	17	31	16	15	71	10.65	LOW
TP107	1.00	16	35	17	18	78	14.04	LOW
TP108	0.50	24	34	20	14	91	12.74	LOW
TP108	1.00	19	38	17	21	88	18.48	LOW
TP110	1.00	17	29	16	13	71	9.23	LOW
TP111	1.00	16	29	15	14	68	9.52	LOW
TP113	1.00	20	29	18	11	78	8.58	LOW
BH101	0.5	27	39	22	17	81	13.77	LOW
BH101	1.5	17	31	16	15	83	12.45	LOW
BH101	2.5	18	32	17	15	88	13.2	LOW
BH102	0.5	26	40	22	18	88	15.84	LOW
BH102	1.5	17	31	17	14	90	12.6	LOW
BH102	4.5	14	23	13	10	76	7.6	LOW

BH/TP	Depth	Natural	Liquid	Plastic	Plasticity	% passing	Modified	Volume
2019 GI								
TP4	0.5	21.8	27	17	10	71	7.1	LOW
TP6	0.4 - 0.6	18.6	31	18	13	83	10.79	LOW
TP10	0.3 - 0.5	28.4	36	19	17	57	9.69	LOW
TP11	0.5	27.5	36	22	14	88	12.32	LOW
TP13	0.4 - 0.6	24.8	29	17	12	81	9.72	LOW
TP13	0.7 - 0.9	18.3	27	16	11	77	8.47	LOW
WS1	1	15	35	17	18	88	15.84	LOW
WS1	2	15	36	16	20	85	17	LOW
WS2	4	15	33	15	18	89	16.02	LOW
WS3	0.75	19	38	15	23	98	22.54	MEDIUM
WS5	1	15	35	15	20	93	18.6	LOW

Table 5.2 – Summary of Index properties

The Plastic Limit results are relatively consistent across the site, ranging between 13% and 22%, averaging 17% with the Liquid Limit ranging between 23% and 40%, averaging 32%, which result in Plasticity Index values of between 10% and 23%, averaging 15%.

The moisture content in samples obtained from the upper 0.8m is up to 9.4% higher (average 4.74%) than the Plastic Limit. In samples obtained from 1m or lower, the moisture content is generally between 1% lower to 2% higher (average 0.2% higher than PL), with only one result out of this range at 4% lower than the Plastic Limit. This reflects the increased variation in near surface soils compared to the deeper soils.

The samples were generally classed as Low plasticity clays on the Cassagrande Chart. The NHBC volume change potential (VCP) was classed as Low, with the exception of 1 sample from 0.75m in WS3, which was classed as 'medium' VCP.

Twenty-Six (26 No.) SPT tests were carried out in the cohesive deposits at depths between 1m and 5m. The SPT 'N' values are summarised below. SPT 'N' values may be used to derive approximate values of mass shear strength (c) = f1 x N (kN/m^2). The recorded plasticity index values of 15% to 20% indicate that a conversion factor (f1) of approximately 5.5 would be appropriate.

On this basis the SPT 'N' values may be used to derive mass shear strength values as indicated in the table below:

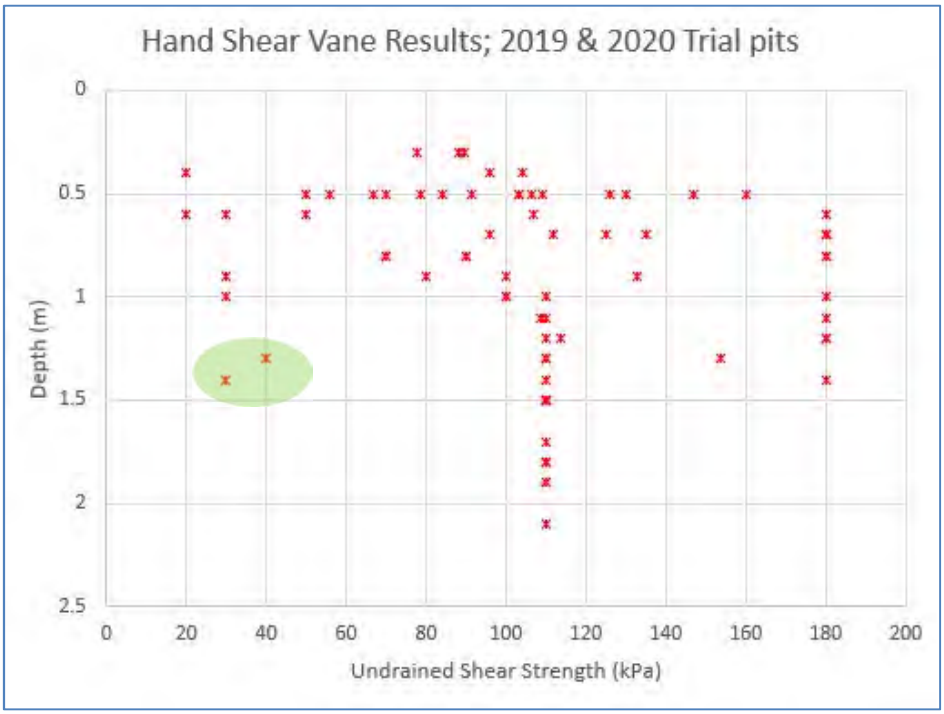
Commencement Depth	No. of tests	SPT 'N' value			Mass shear strength (kPa)		
		min	max	average	min	max	average
1m	7	13	21	16.9	72	116	93
2m	6	18	23	19.7	99	127	108
3m	5	19	50	29.8	105	275	164
4m	6	25	50	44.0	138	275	242
5m	1	29	29	29.0	160	160	160
6m1	1	37	37	37.0	204	204	204

Table 5.3 – summary of SPT Tests

The derived mass shear strength values indicate the cohesive deposits, based on the average values, are high strength, increasing to very high strength, which are broadly consistent with the field descriptions of stiff to very stiff consistency below 1m depth.

Shear strength tests using a hand shear vane (HSV) were obtained from various depths within the trial pits and boreholes, which are presented on the logs in Appendix B and C. The HSV values are broadly consistent with the mass shear strength values derived above for soils below 1m depth, and also confirm the locally soft and soft to firm consistency in the near surface soils.

The hand shear vane results are presented on the chart below.



The HSV results confirm the wide range of consistency in the upper 1m and the generally stiff consistency below 1m. The two results recording soft consistency at 1.3m and 1.4m (green highlight above) were in TP103 and TP106. The large number of results recording 110kPa and 180kPa reflect the maximum readings of the shear vane during the 2020 and 2019 GI respectively.

Five PSD tests were carried out on cohesive soil samples and five on granular soil, which are summarised below; results for both cohesive and granular included.

TP Ref.	Depth	Stratum	Clay %	Silt %	Sand %	Gravel %	DMRB Class
2	0.3-0.6	Cohesive*	14	18	43	25	2C
13	0.4-0.6	Cohesive	11	57	25	7	2A
13	0.7-0.9	Cohesive	12	53	21	14	2B
TP103	0.75	Cohesive	34		42	24	2C
TP105	1	Cohesive	45		39	16	2A/B
TP2	0.8-1.0	Granular	10		47	37	1A
TP4	1 – 1.4	Granular	24		34	42	2C
BH102	2.5	Granular	17		24	60	2C

TP Ref.	Depth	Stratum	Clay %	Silt %	Sand %	Gravel %	DMRB Class
TP101	0.75	Granular	28		38	34	2C
TP102	0.75	Granular	22		34	45	2C

Table 5.4 – Summary of PSD Results

Earthworks are described in more detail in the site wide (plot 1-5 Earthworks Assessment Report, issued under separate cover.

5.5 Granular Horizons

Granular horizons were recorded in 19 of the 31 exploratory holes (9 of 18 in 2019 and 10 of 13 in 2020), and were most prevalent in the western site area. Of the 19 locations, the underlying cohesive glacial till was proven in 13, with the granular soils present as relatively thin horizons while six trial pits (TP4, 9 & 18; 2019 and 101, 103 & 104; 2020) all generally encountered granular soils terminated in the granular soils at depths of 1.3m to 2m.

The granular soils were generally described as slightly silty, slightly clayey to clayey, gravelly SAND or sandy GRAVEL with localised cobbles and boulders. Five PSD tests were carried out on the granular soil and the results are summarised in table 5.4 above.

5.6 Bedrock

No Bedrock was encountered during the ground investigation.

5.7 Groundwater

Significant groundwater inflows were recorded in a number of trial pits, coinciding with granular horizons. Groundwater observations are summarised in Section 5.1 and on the exploratory hole logs.

The granular horizons are not in continuity with each other therefore the volume of water in each horizon will be finite.

Two standpipes were installed in boreholes WS01 and WS05. The groundwater has been monitored twice following completion of site work:

BH Ref	Standpipe Depth (m)	Groundwater Depth (m)			
		20/02/2019	11/03/2019	14/2/2020	10/7/2020
WS01	3.60	0.51	0.56	1.75	1.88
WS05	2.45	1.15	1.24	2.01	1.46

Table 5.5 – Groundwater monitoring

A groundwater infiltration test was carried out in TP07 in 2019. The test was abandoned due to rising water levels. The results are presented in Reference 1.

6.0 GEOTECHNICAL RECOMMENDATIONS

At the time of writing the report, proposed ground levels and contours had been received, however no structural loads have been provided for the building or the external storage bays. The geotechnical recommendations should be reviewed against structural loads when available and if there are any further modifications to the development.

6.1 RETAINING WALLS

There are three retaining walls proposed in Plot 1; Wall 1-1, 1-2 and 1-3.

- Wall 1-1 - The wall is positioned in the west of Plot 1, it is a linear wall separating the car parking area in the west from the vehicle parking area.
- Wall 1-2 - The wall is positioned in the east of Plot 1, it is a linear wall separating the curtilage of the proposed sorting shed, which is constructed on engineered fill, from the landscape area to the north
- Wall 1-3 - This linear retaining wall is positioned along the southern half of the eastern boundary of Plot 1. It retains the elevated development platform constructed of engineered fill from the land to the east which is retained at existing ground levels and comprises a corridor for the diverted HV electricity cables, with plot 2 beyond.

A detailed assessment table for each of the retaining walls is presented in Appendix C, which contains the following information:

- Wall Dimensions and proposed construction;
- Existing and proposed elevations;
- Ground conditions and relevant exploratory holes;
- Presumed Bearing capacity;
- Temporary Works Considerations;
- Potential Value Engineering Opportunities;
- Additional Ground Investigation / geotechnical assessments

6.2 EXCAVATIONS AND SITE PREPARATIONS

Due to the sloping nature of the ground, significant site preparation will be required to form the various development platforms, which is proposed to be carried out as a site wide earthworks contract. The excavations will be through glacial till, which will be excavated with relative ease using conventional earthmoving equipment.

Bedrock is not anticipated to be encountered, however boulders are anticipated in the deeper excavation in the southern half of the plot.

Based on the findings of the ground investigation it is unlikely that significant groundwater will be encountered in excavations, however localised inflows may be encountered in isolated granular horizons within the predominantly cohesive glacial till.

Groundwater levels will vary seasonally, therefore the extent of groundwater control will vary depending on the time of the groundworks, however it is anticipated that pumping from shallow sumps will be sufficient.

It is anticipated that excavation sidewalls will be stable in the short to medium term, however manual entry should not be permitted unless an assessment of sidewall stability has been carried out by a suitably qualified person.

6.3 FOUNDATION RECOMMENDATIONS

6.3.1 Proposed Structure

The propose structure is a steel portal famed structure with discreet pad foundation. It is proposed to raise ground levels beneath the building to achieve a level development platform. Beneath the western walls ground levels will be raised by between 0.25 and 0.5m, increasing gradually to approximately 1.9m in the NE corner and 2.3m in the SE corner.

Current Foundation Strategy

The pads are all founded in the natural glacial till and have been designed based on a presumed bearing capacity of 125kPa, based on the recommendations in the preliminary geotechnical report.

The pads sizes are up to 3mx3m, however it is understood that the large size is due to the requirement for lateral/sliding resistance on the base rather than bearing capacity and vertical loads due to large spans and integrated pushwalls; therefore, it is likely that imposed pressures on these large pads will be less than 125kPa. The various loads have not been received and it is not understood what geotechnical design parameters have been used or the geotechnical design carried out in relation to the foundation design.

The coefficient of consolidation value (m_v) of the soils has been calculated based on lab data and empirical relationships, and a settlement analysis has been carried out based on a presumed imposed pressures of 125kPa and 165kPa over different foundations sizes to highlight variations the foundations sizes and imposed load from the earthworks fill has on the settlement; the calculation has been carried out using both minimum and average design parameters. The results are summarised below:

Design parameters Used	Imposed Load (kPa)	Calculated Settlement for various pad size								
		3m x 3m Pad			2m x 2m Pad			2m x 1m Pad		
		Corners	Centre	Average	Corners	Centre	Average	Corners	Centre	Average
Minimum Calculated Values	125	11	33	26	10	26	21	8	20	16
	165	15	44	34	13	35	27	10	26	21
Average Calculated Values	125	8	23	18	7	18	14	5	13	11
	165	10	30	24	9	24	19	7	18	14

The table demonstrates that there is significant variation in the settlement for the various pad sizes and also that the calculated settlement increases by between 25% and 45% when the maximum load

from the earthworks is considered, depending on the foundation size and design parameters considered.

It is therefore strongly recommended that detailed settlement analysis is included as part of the foundation design if not already carried out; we would be happy to review and comment, or provide the m_v values we have derived to assist.

The construction methodology of the pads should also be considered. If they are to be constructed after the placement of the fill, the backfilling of the excavations should be carried out in a manner that will not result in unacceptable differential settlement beneath the slab, particularly in the areas of deepest fill and large foundations.

Alternative Foundation Strategy

The possibility of positioning the foundations on the earthworks fill is discussed below.

It is generally accepted that foundations for a building should, where possible, be founded on similar or uniform strata, with foundations sizes adjusted where necessary so that similar settlements are calculated for different imposed loads. However, this is not always cost effective, practical or possible, for example due to natural variations in ground conditions or due to sloping ground resulting in cut-fill platforms.

Beneath the proposed structure there is between 0.2 and 2.2m of engineered fill to be placed over the existing ground level to create a level development platform. The engineered fill will comprise reworked site won soils; which comprise either cohesive glacial till, or granular glacial soils (which are widespread in Plot 3). Therefore, there will be up to approximately 40kPa of imposed pressure from the fill onto the original ground.

Guidance on building on fill is provided in CIRIA Document Building on Fill: geotechnical aspects. The main consideration of building on engineered fill is the selection and adequate compaction of the material. Assuming that both aspects are controlled there is no geotechnical reason why the foundations can't be founded on the fill.

There will of course be some additional settlement in areas of increased fill material, as settlement magnitude is directly proportional to load, however this would be the case regardless of foundation position/elevation as the additional fill will be present either above or beneath the proposed foundation, therefore the net loading would be the same.

It is difficult to provide design parameters for the engineered fill at this stage, without knowing the exact source of the fill material. However, compaction tests recorded maximum dry density values for compacted fill, which were generally greater than the dry density of in-situ soils; indicating that the engineered fill will have characteristics which are similar, if not slightly more favorable than the in-situ soils.

If clay soil is used as engineering fill it will have similar properties and settlement characteristics to the underlying soils and if granular soils are used as engineering soils any settlement will occur rapidly and as such will the self-settlement of the engineered fill will have a negligible impact on the building.

It is therefore recommended that the following presumed bearing capacity values are used for preliminary foundation design on fill and natural soils, please note that the values include the load contribution from engineered fill:

Foundation Size	Presumed Bearing Capacity (kPa)
1m x 1m	200*
1.5m x 1.5m	175*
2m x 2m	150*
3m x 3m	125*
Notes. * Contribution of engineered fill included @ 20kN/m^2 Detailed Foundation design to consider each pad individually for both bearing capacity and settlement	

If positioning the foundation on the engineered fill is to be considered further the following should be carried out:

- Ensure adequate earthworks specification;
- Ensure formation is inspected and any near surface soft or soft to firm material is removed to reveal a minimum of firm to stiff cohesive soils with a minimum HSV value of 60kPa;
- Ensure Earthworks specification is adhered to and that materials are placed and compacted to achieve optimum moisture content;
- Validation of earthworks with ground investigation to confirm design assumptions in relation to settlement and bearing capacity.

6.3.2 Proposed Loading Bays

A number of loading bays are located across the site, which have push walls up to 4m high. No loading shave been received, however it is anticipated that maximum loadings from the stored material will not exceed 80kPa, with additional load contribution from the retaining walls.

It is very likely that both the engineered fill and the natural glacial till will provide a suitable formation; the presumed bearing values provided for the structure above are considered appropriate for preliminary design purposes.

6.3.3 Infill Walls

No details have been received of any walls extending between columns; these are likely to result in relatively low line loads and strip footings in the engineered fill are likely to be suitable.

6.3.4 Floor Slab

A ground bearing slab on the engineered fill is considered to be suitable, however it should be noted that there will be some differential settlement across the length of the structure due to the variable thickness of fill, which is considered to be of the order of 10mm or so.

6.4 SLOPE STABILITY

All slopes in the natural glacial till or earthworks fill will be designed at gradients of 1v:2h (c.26^{o}) or shallower, which are considered to be stable in the long term, and may be approved by inspection at the time of construction to confirm the ground investigation findings are representative.

It may be necessary to install surface water drainage locally if persistent seepages occur from granular horizons.

Steeper gradients may be possible subject to geotechnical design.

6.5 EARTHWORKS CONSIDERATIONS

Earthworks are discussed in detail in the site wide (plot 1-5) geotechnical report relating to earthworks.

6.6 PROTECTION OF BURIED CONCRETE

A total of five pH and water soluble sulphate tests were carried out on samples of natural soils recovered from the boreholes in the vicinity of the proposed building. The following range of results was recorded:

- pH 7.3 – 8.9
- Water Sol. Sulphate <23mg/l

The results have been compared to BRE SD1 (Ref 5). The site is considered as greenfield, and the groundwater conditions are considered mobile due to the water bearing granular horizons. The following design classification is recommended.

- DS-1
- AC-1

6.7 PAVEMENT DESIGN

Due to the proposed level changes at the site, no insitu CBR testing was carried out as part of the current investigation, as proposed levels and therefore hardstanding will generally either be in cuttings below existing ground level or on compacted earthworks fill above existing site levels.

CBR testing of the current ground level was carried out as part of the preliminary ground investigation in 2019. The tests were carried out over a depth of approximately 900mm. All test results recorded a relatively low CBR value of between 2% and 4% to depths of up to approximately 400mm, generally corresponding to the topsoil and soft subsoils.

There is variation between each position, the recorded values at the top of the glacial till are typically between 4% and 6%, locally up to 12%, and increasing to between approximately 8% to in excess of 15% with increasing depth of the test. Some very high values over 50% were recorded, which are likely to represent cobbles or boulders, or potentially very stiff glacial till.

Laboratory CBR testing was carried out on five re-molded samples of cohesive and granular glacial till, which are summarised below:

Ref	Depth (m)	Moisture content (%)	CBR (%)	Comment
TP307	1.5	20	1.2	Sandy gravelly silty CLAY. Test carried out at NMC
TP307	1.5	12	3.8	Sandy gravelly silty CLAY. Test carried out at OMC
TP306	1.0	13.4	0.6	Very clayey, very sandy GRAVEL
TP306	2.5	12.1	0.6	Sandy silty GRAVEL
TP305	3	12.7	0.5	Sandy silty GRAVEL

The CBR results on samples at natural moisture content returned low CBR values indicating that they were wet of optimum, and that some air drying would be required prior to compaction. However, the GI was carried out following a prolonged period of rainfall therefore natural moisture contents are likely to be lower, particularly in shallow cohesive soils if earthworks are carried out in drier months.

Guidance on the selection of equilibrium CBR values is provided in Table 5.1 of Interim Advice Note 73/06 (2009) from the DMRB (withdrawn and replaced with CD225 in March 2020). Based on the soil descriptions and plasticity index, the estimated equilibrium CBR values for the cohesive soils encountered on site, for thin pavement construction is 4%.

The equilibrium CBR value accounts for future moisture content increases that would result in a reduction of in-site CBR, however, as it is proposed to cover the site with impermeable hard-standing and surface water will be diverted off site there is no feasible mechanism for future increases in moisture content of the subgrade.

Denbighshire County Council Highways Department provide the following guidance on road foundations relating to CBR Values.

CBR%	INDUSTRIAL			RESIDENTIAL		
	Capping		Sub-base	Capping		Sub-base
1.6-2.0	600 mm	+	150 mm	500 mm	+	150 mm
2.1-2.5	400 mm	+	150 mm	350mm	+	150 mm
2.6-3.0	-		350mm	-		350mm
3.1-3.5	-		325mm	-		325mm
3.6-4.0	-		300 mm	-		300 mm
4.1-4.5	-		275mm	-		275mm
4.6-5.0	-		250mm	-		250mm
5.1-6.9	-		225 mm	-		225 mm
7.0-8.9	-		210mm	-		210mm
9.0-10.9	-		195mm	-		195mm
11.0-12.9	-		180mm	-		180mm
13.0-14.9	-		165mm	-		165mm
>15.0	-		150 mm	-		150 mm

Design CBR Value – Fill Areas

The CBR value achieved in the fill areas will be subject to the quality of the earthworks operation. If the fill is placed and compacted in accordance with an appropriate earthworks specification at optimum moisture contents it is very likely that CBR values in excess of 5% will be achieved with cohesive soils, and even higher with granular soils.

A design CBR value of 5%, which equates to the requirement for 250mm of sub-base, is considered suitable in fill areas subject to:

- Earthworks carried out in accordance with a specification with acceptance testing on the fill material;
- Formation inspection by a competent person;
- Confirmatory on site CBR testing of compacted fill;

It is strongly recommended that CBR tests are carried out on lower layers on the fill to establish what CBR values are achievable, which will allow design CBR values to be confirmed, or varied if required prior to achieving the formation level.

Design CBR Value - Cut Areas

The insitu CBR testing during the preliminary GI identified CBR values between approximately 4 and 12% in the glacial till below the topsoil and softened subsoils, therefore a design CBR value of 5% is considered suitable in cut areas subject to:

- Formation inspection to remove any soft spots;
- Confirmatory on site CBR testing of the sub-grade.

The thickness of capping and sub-base may be reduced by incorporating geogrid reinforcement, or by modifying the glacial till subgrade with lime and/or cement, which may provide program and cost savings.

6.8 SURFACE WATER DRAINAGE

Based on the findings of the ground investigation; low permeability soils and shallow groundwater in granular horizons, the of widespread soakaway drainage at the site is not considered feasible.

6.9 POTENTIAL CONTAMINATION

The desk study identified that the site is previously undeveloped.

The only made ground comprised hardstanding from a former access track, encountered in TP18, in the area of proposed widening for the new access. The contamination test results did not identify any significantly elevated concentrations.

Contamination testing was carried out on the topsoil and near surface glacial deposits in the area of the propose building to provide baseline conditions.

No particular measures are anticipated in relation to contamination, however a watching brief should be maintained for made ground during groundworks.

6.10 ADDITIONAL GROUND INVESTIGATON / GEOTECHNICAL ASSESSMENT

Subject to there being no further significant changes in the proposed layout, it is recommended that the following additional geotechnical investigations are allowed for:

- Topsoil – contamination testing may be required prior to off-site disposal to confirm suitability for receiving sites, depending on the nature of those sites and any particular specification that may be in place on imported topsoil.
- Formation Inspection prior to placing earthworks fill;
- Hand shear vane (HSV) testing of formation for building footprint, building foundations and retaining wall foundations;
- Earthworks classification and suitability testing, to comply with Earthworks Specification;
- In-situ CBR testing on engineered fill at different elevations as fill placed;
- Windowless sample boreholes to validate engineered fill quality beneath building foundations, if strategy is to found on engineered fill.

REFERENCES

1. Daear Geo Consulting. Colomendy Industrial Estate Depot; Geotechnical Report, March 2019.
2. 1:50,000 scale geological map. British Geological Society,
3. BS 5930, 1999, Code of Practice for Site Investigation,
4. CIRIA / BRE424; Building on Fill; Geotechnical Aspects' 2nd Edition, 2001
5. BRE Special Digest 1, 2005, Concrete in Aggressive Ground,

DRAWINGS

APPENDICES

Appendix A	DCC Drawing H3-18304-D-133B - Plot 1 Exploratory Hole locations
	Series 100 - H4-18404-D-01-06-01-02 – General Arrangement
	D23-Finished Surface Contours-FSC-01 - Earthworks
Appendix B	Factual Report
Appendix C	Plot 1 Retaining Wall Assessments
Appendix D	BGS Radon Report

Appendix A (DCC Drawings)

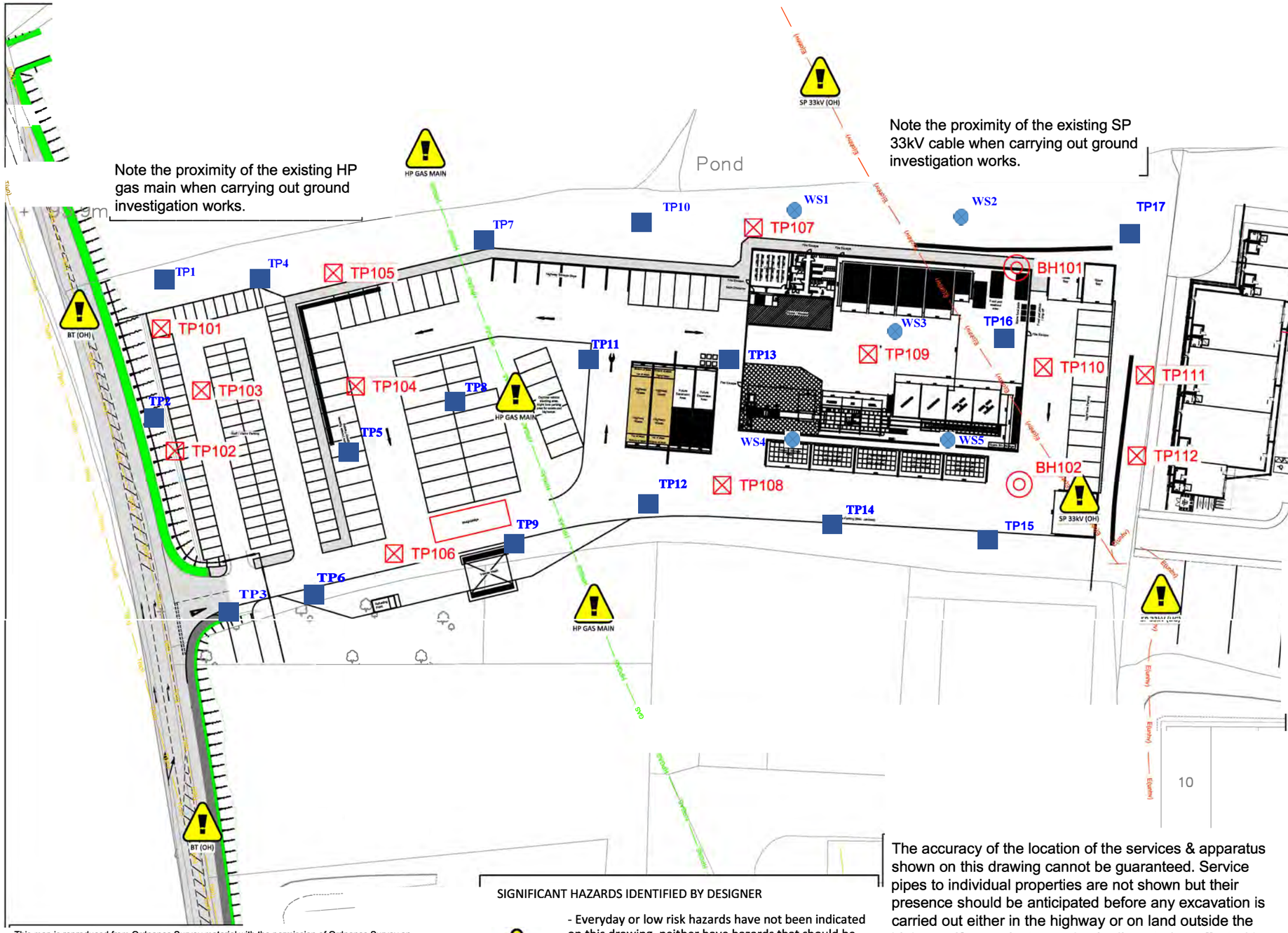
H3-18304-D-133B - Plot 1 Exploratory Hole locations

Series 100 - H4-18404-D-01-06-01-02 – General Arrangement

D23-Finished Surface Contours-FSC-01 - Earthworks

Note the proximity of the existing HP gas main when carrying out ground investigation works.

Note the proximity of the existing SP 33kV cable when carrying out ground investigation works.



	EASTING	NORTHING
TP101	305287.274	367442.157
TP102	305290.480	367413.808
TP103	305296.631	367427.850
TP104	305332.495	367428.838
TP105	305327.302	367455.054
TP106	305341.425	367390.008
TP107	305424.984	367465.595
TP108	305417.712	367405.910
TP109	305451.648	367436.228
TP110	305492.379	367433.228
TP111	305116.024	367431.406
TP112	305514.131	367412.717
TP113	305405.000	367440.000
BH101	305486.184	367456.256
BH102	305486.789	367406.100

KEY

- TP / TP — Trial Pit (2020 / 2019)
- BH — Cable Percussive Borehole (2020)
- WS5 — Window Sample Borehole (2019 GI)
- HPGAS — High Pressure Gas Main
- T(oh) — Telephone Cable (Overhead)
- T(un) — Telephone Cable (Underground)
- E(ohhv) — Electricity Cable (Overhead) High Voltage
- E(ohlv) — Electricity Cable (Overhead) Low Voltage
- E(unhv) — Electricity Cable (Underground) High Voltage
- E(unlv) — Electricity Cable (Underground) Low Voltage

SIGNIFICANT HAZARDS IDENTIFIED BY DESIGNER

- Everyday or low risk hazards have not been indicated on this drawing, neither have hazards that should be obvious to a competent contractor.

- Should any additional hazards be identified the contractor should notify all the relevant project team members.

The accuracy of the location of the services & apparatus shown on this drawing cannot be guaranteed. Service pipes to individual properties are not shown but their presence should be anticipated before any excavation is carried out either in the highway or on land outside the highway. If any private service is disrupted or affected by the *Works*, the services shall be maintained by the Main Contractor. The representative of each service must be contacted so that the service location can be ascertained on site.

Cyngor sir ddinbych denbighshire County Council

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HEAD OF HIGHWAYS AND ENVIRONMENTAL SERVICES
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DEPARTMENT OF HIGHWAYS AND ENVIRONMENTAL SERVICES

RHIF LLUNIAD/DRAWING NUMBER: H3/18304/D/133B

RHIF GWAITH/JOB NUMBER: 18304

GRADDFEYDD/DRAWING SCALES: 1:1000 @A3

RHIF GRID/NATIONAL GRID REFERENCE: SJ0565

DYLUNIWYD GAN/DRAWN BY: RT

CYMERADWYWYD GAN/APPROVED BY: EP

NEWIDIAU/AMENDMENTS

A	Original Drawing	28/01/20
B	Positions Amended	09/04/20

CYNLLUN/SCHEME: WASTE RE-ORGANISATION

TEITL LLUNIAD/DRAWING TITLE: PLOT 1 GROUND INVESTIGATION

STATWS LLUNIAD/DRAWING STATUS: ISSUE

DYDDIAD NEWID OLAF/LAST EDIT DATE: 09/04/20

RHIF LLUNIAD/DRAWING NUMBER: H3/18304/D/133B

NOTES

1) ALL DIMENSIONS ARE IN METRES UNLESS STATED OTHERWISE
2) ALL WORK IS TO BE CARRIED OUT IN ACCORDANCE WITH THE SPECIFICATION FOR HIGHWAY WORKS AND LOCAL AUTHORITY GUIDANCE
3) UNDERGROUND SERVICES ARE PRESENT IN THE AREA. CONTRACTOR IS TO CONFIRM THE PRECISE LINE AND DEPTH OF ANY SERVICES PRIOR TO THE COMMENCEMENT OF ANY EXCAVATION WORKS
4) FOR SURVEY DATUM AND CONTROL STATIONS REF. TO THE TOPOGRAPHIC SURVEY DRAWING NOS. 1375/TP/01:07 & 1375/TP/01:07

KEY

57.0 MAJOR CONTOUR AT 0.5m INTERVAL

MINOR CONTOUR AT 0.1m INTERVAL

62.200 SPOT LEVEL ON SURFACE

PLOT BOUNDARY

Pond

El Sub Sta

Norparc

1:500

REVISIONS

REV	Drawn by:	DESCRIPTION	DATE	Chked by:	Aprvd by:
A	HG	Changes & Comments space example	03.02.20		

SIGNIFICANT HAZARDS IDENTIFIED BY DESIGNER

- Everyday or low risk hazards have not been indicated on this drawing, neither have hazards that should be obvious to a competent contractor.
- Should any additional hazards be identified the contractor should notify all the relevant project team members.

RHIF LLUNIAD/DRAWING NUMBER: H4/18404/D/FSC-01

Cyngor sir ddinbych denbighshire County Council

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DEPARTMENT OF HIGHWAYS AND ENVIRONMENTAL SERVICES

RHIF GWAITH/JOB NUMBER	18404
DYLUNIWYD/DRAWING SCALES	1:500 @A1
RHIF GRID/NATIONAL GRID REFERENCE	SJ0565
DYLUNIWYD GAN/DRAWN BY	HG
CYMERADWYWYD GAN/APPROVED BY	KB

NEWIDIADU/AMENDMENTS

A	Original Drawing

STATWS LLUNIAD/DRAWING STATUS: ISSUE

DYDDIAD NEWID OLAF/LAST EDIT DATE: 04/03/20

CYNLLUN/SCHEME: WASTE RE-ORGANISATION

TEITL LLUNIAD/DRAWING TITLE: SURFACE CONTOURS PLOT 2 – FINISHED SURFACE SHEET 1 OF 1

RHIF LLUNIAD/DRAWING NUMBER: H4/18404/D/FSC-01

D:\Working\Colemendy\Plot 1\Base Model Plot 1 - 02 06 20.dwg

Notes

1) All dimensions are in metres unless stated otherwise
2) All work is to be carried out in accordance with the specification for highway works and local authority guidance
3) Underground services are present in the area. Contractor is to confirm the precise line and depth of any services prior to the commencement of any excavation works

Key

- Proposed Kerb line / footway edging
- Proposed Tactile Paving
- Proposed Footway
- Proposed Car Park (Porous Paving)
- Proposed Carriageway (Hardicrete)
- Proposed Weld Mesh Fence
- Proposed Double Gate (Landscape Area)
- Proposed Site Entrance Gate
- Proposed Retaining wall
- Proposed Pond

SIGNIFICANT HAZARDS IDENTIFIED BY DESIGNER

- Everyday or low risk hazards have not been indicated on this drawing, neither have hazards that should be obvious to a competent contractor.
- Should any additional hazards be identified the contractor should notify all the relevant project team members.

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DEPARTMENT OF HIGHWAYS AND ENVIRONMENTAL SERVICES

RHIF LLUNIAD/DRAWING NUMBER: H4/18404/D/01/01/02

RHIF GWAITH/JOB NUMBER: 18404

DYLUNIWYD/DRAWING SCALES: 1:400 @A1

RHIF GRID/NATIONAL GRID REFERENCE: SJ0565

DYLUNIWYD GAN/DRAWN BY: RT

CYMERADWYWYD GAN/APPROVED BY:

NEWIDIADU/AMENDMENTS

A	Original Drawing	

CYNLLUN/SCHEME: WASTE RE-ORGANISATION

TEITL LLUNIAD/DRAWING TITLE: GENERAL ARRANGEMENT PLOT 1

STATWS LLUNIAD/DRAWING STATUS: DRAFT

DYDDIAD NEWID OLAF/LAST EDIT DATE: 20/03/20

RHIF LLUNIAD/DRAWING NUMBER: H4/18404/D/01/01/02

V:\schemes\18404 Waste Re-Organisation\07 Drawings\DCC drawings\Tender\Plot 1\100 - Preliminaries\Sortex 100 - H4-18404-D-01-06-01-02 - GA.dwg

Appendix B

Factual Report

CCG-C-20-11469

GROUND INVESTIGATION ON LAND LOCATED IMMEDIATELY TO THE NORTH OF COLOMENDY INDUSTRIAL ESTATE RHYL ROAD DENBIGH LL16 5TA

MARCH 2020

Prepared for:

DAEAR GEO **CONSULTING**

on behalf of COLOMENDY CONSORTIUM

By:

CC GEOTECHNICAL LIMITED
Unit 1
Deltic Way
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L33 7BA

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Facsimile: 0151 548 7892

DOCUMENT CONTROL FORM	
Client:	Daer Geo
Project Title:	Ground investigation land located immediately to the north of Colomendy Industrial Estate, Rhyl Road, Denbigh LL16 5TA.
Reference Number:	CCG-C-20-11469
Main Author:	Anthony Gerrard BSc (Hons) MSc FGS
Signature:	
Reviewed by:	Chris Bolan CEng MICE CEnv
Signature:	
Approved for Issue by:	Chris Bolan CEng MICE CEnv
Signature	
For and behalf of CC GEOTECHNICAL LTD	
Date:	March 2020
Revision Number:	0
Comments:	
Status:	Final
Distribution:	Daer Geo

1.0 INTRODUCTION

CC GEOTECHNICAL LIMITED (***CCG***) was commissioned by ***DAER GEO*** (*The Client*) to provide geotechnical fieldwork investigation and laboratory testing services in connection with the proposed development of land located immediately to the north of Colomendy Industrial Estate, Rhyl Road, Denbigh LL16 5TA.

It is understood that the site is to be developed for commercial use as a waste re-organisation depot together with associated newly created hard paved access/egress roadway and areas of peripheral landscaping. The existing and proposed layouts of the development site are as annotated on ***DENBIGHSHIRE COUNTY COUNCIL*** drawings contained herein.

The approximate ***ORDNANCE SURVEY*** for the approximate overall site centre are 305688, 367407.

2.0 PURPOSE OF THE INVESTIGATION

The purpose of the site investigation works was to provide factual geotechnical and geochemical information pertaining to the existing ground conditions at the site.

Site investigation works were undertaken under the supervision of the *Client*, and this report is a factual compilation of the data obtained during the December 2019 – January 2020 ground investigation, and no interpretations have been placed on the findings.

The data contained herein should be read in conjunction with the Notes on Limitations, presented in Appendix H.

3.0 DOCUMENTED GEOLOGY

The geology at the site is summarised on ***British Geological Survey*** (***BGS***) Sheet 107, Denbigh, 1: 50,000 Scale Solid and Drift Editions (1985).

These indicate that the study site is underlain with natural drift deposits comprising diamicton (*boulder clay*) of glacial origin (*Pleistocene Epoch - Late Quaternary - Devensian Sub Age*).

The solid geology is documented as being predominantly the Kinnerton Sandstone Formation (*formerly the Lower Mottled Sandstone*) of the Sherwood Sandstone Group comprising red-brown generally pebble free fine to medium grained cross stratified sandstone of the Late Permian Epoch (*Lopingian – Changhsingian Stage*) and the Early Triassic Period (*Induan – Olenekian Age*), with the limestones associated with the Clwyd Limestone Group (*formerly the Dyserth Limestone Group*) of the Lower Carboniferous Period (*Tournaisian > Visean Series - Chadian - Brigantian Sub Ages*) encroaching along the western section of the study site.

3.0 FIELDWORK

3.1 Introduction

The fieldwork associated with this intrusive investigation commenced on the 3rd February 2020. The fieldwork comprised the following:

- The pre/post investigation surveying of all exploratory sampling positions for ***ORDNANCE SURVEY*** coordinates and elevation
- The CAT scanning and manual excavation and sampling of 7nr borehole starter / service avoidance pits GL-1.2mbgl
- The subsampling of borehole starter pit arisings for soil contamination and/or classification testing
- The advancement of boreholes from the base of 5nr service pits by light cable percussive boring methods with associated in-situ testing and sampling
- The advancement of 2nr borehole starter pits using rotary open hole methods
- The installation of 50mm HDPE plain and slotted standpipes complete with non-lime pea gravel surround and bentonite seal and associated headworks at 1nr borehole position
- The reinstatement of remaining boreholes to ground level
- The monitoring of standpipe installations on 1nr occasion for standing water levels, gas flow and gas composition
- The CAT scanning and mechanical excavation of 63nr trial pits using a Hitachi Zaxis 70LC tracked excavator
- The subsampling of trial pit arisings for soil contamination / classification testing
- The reinstatement of trial pit locations

The fieldwork was carried out in accordance with the UK Specification for Ground Investigation: 2nd Edition: 2011, and BS10175: 2011, BS5930: 2015, and BS EN 1997-2: 2007 Eurocode 7, insofar as they related to the scope of the investigation.

The locations of the exploratory positions were instructed by *The Client* at locations as annotated on ***DENBIGHSHIRE COUNTY COUNCIL*** Drawing No. 18304 '*Plot 1 Ground Investigation*' contained herein.

3.2 Ordnance Survey Coordinates

Prior to the commencement and on completion of fieldworks, each exploratory sampling position was surveyed for ***ORDNANCE SURVEY*** (***OS***) and elevation using a '*Lecia*' GPS instrument. A tabulation of ***OS*** coordinates and elevation (maOD) is presented in Table 1 hereunder:

Table 2: Exploratory Sampling Position Coordinates & Elevation (maOD)

Position	X	Y	(maOD)	Position	X	Y	(maOD)
BH101	305486.184	367456.256	82.133	TP307	305727.790	367365.438	68.231
BH102	305486.789	367406.100	81.131	TP308	305679.529	367342.528	71.212
BH301	305704.498	367403.952	70.537	TP401	305751.968	367450.288	67.821
BH302	305682.148	367376.743	72.082	TP402	305744.072	367399.990	67.646
BH303	305701.045	367338.717	69.349	TP403	305743.589	367371.508	67.249
BH304	305678.092	367399.062	72.383	TP404	305739.878	367340.166	66.942
BH305	305673.913	367345.012	71.720	TP405	305770.738	367424.119	66.154
TP101	305287.274	367442.157	90.894	TP406	305768.225	367385.063	66.124
TP102	305290.480	367413.808	90.281	TP407	305807.933	367451.630	64.567
TP103	305296.631	367427.85	90.037	TP408	305795.822	367410.000	64.316
TP104	305332.495	367428.838	87.342	TP409	305795.508	367368.898	64.178
TP105	305327.302	367455.054	87.659	TP501	305833.875	367456.787	63.385
TP106	305341.425	367390.008	86.411	TP502	305820.574	367429.283	63.392
TP107	305424.984	367465.595	83.771	TP503	305846.758	367409.504	62.089
TP108	305417.712	367405.910	83.347	TP504	305845.242	367371.513	61.952
TP109	305451.648	367436.228	82.676	TP505	305815.681	367352.677	63.057
TP110	305492.379	367433.228	81.630	TP506	305882.850	367455.731	61.213
TP111	305516.024	367431.406	80.711	TP507	305921.226	367453.668	60.112
TP112	305514.131	367412.717	80.368	TP508	305879.369	367422.290	60.600
TP201	305532.483	367454.287	80.926	TP509	305909.525	367428.747	59.680
TP202	305535.952	367400.449	79.381	TP510	305943.665	367400.776	57.838
TP203	305552.247	367437.302	79.826	TP511	305864.625	367384.914	61.023
TP204	305563.206	367455.316	79.993	TP512	305898.738	367396.783	59.479
TP205	305558.889	367409.622	78.927	TP513	305885.608	367366.583	59.867
TP206	305594.599	367428.055	77.803	TP514	305917.475	367367.864	58.594
TP207	305604.691	367457.649	78.340	TP515	305916.568	367353.213	58.343
TP208	305601.713	367407.766	77.160	TP516	305957.046	367380.529	56.412
TP209	305633.303	367425.244	75.645				
TP210	305643.780	367447.379	75.626				
TP211	305637.192	367402.681	75.217				
TP212	305669.652	367453.510	73.675				
TP213	305663.488	367421.428	73.492				
TP214	305552.027	367383.048	78.305				
TP215	305583.884	367378.892	77.124				
TP216	305616.850	367354.557	74.799				
TP217	305660.715	367372.896	73.445				
TP301	305684.057	367429.375	72.051				
TP302	305708.475	367450.226	70.434				
TP303	305738.969	367427.135	68.266				
TP304	305687.308	367391.638	71.863				
TP305	305709.178	367380.856	70.003				
TP306	305708.428	367352.253	69.470				

3.2 Light Cable Percussive Boreholes

In accordance with the ground investigation plan, 5nr boreholes were sunk using light cable percussive boring methods using a Dando 150 shell and auger rig deploying 150mm diameter boring tools and casings.

Each borehole location positioned clear of known buried and overhead services and was scanned using a CAT service detector before and during manual excavation of a 1.2m deep service clearance pit.

Boring tools were decontaminated prior to commencement.

Standard Penetration Tests (SPT) / U100 sampling were undertaken at regular intervals throughout the borehole depth.

Bulk samples were recovered at regular incremental depths and at changes of stratum within the boreholes.

Logs of the boreholes, annotated with sampling details, SPT`N' values and standpipe construction details are given in Appendix C.

3.3 Rotary Open Hole Boreholes

2nr boreholes (BH304 and BH305) were sunk using rotary open hole methods using an *'Apageo'* rotary drilling rig and associated tools.

Each borehole location positioned clear of known buried and overhead services and was scanned using a CAT service detector before and during manual excavation of a 1.2m deep service clearance pit.

Logs of the boreholes, annotated with sampling details, SPT`N' values and standpipe construction details are given in Appendix C.

3.4 Monitoring Installations

A standpipe comprising 50mm diameter HDPE plain and slotted well-tube set in bentonite and non-limestone pea gravel surround was installed at 1nr borehole position. The standpipe was fitted with a gas valve connector and was protected by a flush cover set in concrete. Details of the standpipe installation is as tabulated hereunder.

Table 2: Borehole Installation Details

BOREHOLE	DEPTH OF BOREHOLE (mbgl)	DEPTH OF STANDPIPE [mbgl]	RESPONSE ZONE	
			FROM [mbgl]	TO [mbgl]
BH302	10.0m	6.7m	0.5m	6.7m

At the time of reporting, CCG were not instructed to monitor gas- groundwater monitoring installations for standing water levels, gas flow or composition.

3.5 Trial Pit Excavations

In accordance with the ground investigation plan, 63nr trial pits were excavated using a Hitachi Zaxis 70LC tracked excavator deploying a 600mm bucket.

Each trial pit location was positioned clear of any overhead services and was scanned using a CAT service detector before and during the excavation of soil arisings.

Soils were excavated in thin layers, and arisings placed adjacent to the excavation.

The stratigraphy of each position was carefully logged and photographed, and bulk disturbed / small environmental samples were recovered at appropriate depth increments and at changes of strata as specified by the *Client*.

On completion of sampling and testing, soil arisings were returned to the excavation in the reverse sequence of their excavation to preserve insofar as was possible the original stratigraphy. Te location was then surveyed for ***ORDNANCE SURVEY*** coordinates and elevation.

Trial pit logs annotated with general ground conditions are presented in Appendix D.

Photographs illustrating trial pit soil profile and arisings are presented in Appendix E.

4.0 LABORATORY TESTING

A programme of soil classification / engineering testing was undertaken at an *UKAS* / *MCERT* accredited laboratory . The programme comprised the following determinations:

- Determination of Moisture Content BS 1377-2:1990 (a)– 117nr test
- Determination of Liquid & Plastic Limits BS 1377-2:1990 (a) – 28nr tests
- Particle Size Distribution BS 1377-2:1990 (a) – 30nr tests
- One-Dimensional Consolidation BS 1377-5:1990 (a) – 1nr test
- Consolidated Undrained Triaxial Compression Test BS 1377-8:1990 (s) – 2nr tests
- Particle Density BS 1377-2:1990 (s) – 5nr tests
- Determination of California Bearing Ratio BS 1377-4:1990 (#) – 4nr tests
- Dry Density / Moisture Content Relationship (one point) BS 1377-4:1990 (#) – 7nr tests
- Dry Density / Moisture Content Relationship (five point) BS 1377-4:1990 (#) – 10nr tests
- Determination of pH on soils – 22nr tests
- Determination of water-soluble sulphate content on soils – 22nr tests

The soil engineering test results are presented in Appendix F.

APPENDIX A: DRAWINGS

DO NOT SCALE

Notes: Study Site

CC GEOTECHNICAL LIMITED
UNIT 1 DELTIC WAY
KNOWSLEY INDUSTRIAL ESTATE
LIVERPOOL
L33 7BA
0151 545 2750

Client:
Daer Geo

Project:
Ground Inve g on on Land at the rear of Co-lomendy Industrial Estate

Title:
Site Loc on Plan

Scale:	Issue:
NTS	01
Drawn by:	Date:
DG	March 2020
Project No.	Drawing No.
CCG-C-20-11469	01

DO NOT SCALE

Notes: Study Site

CC GEOTECHNICAL LIMITED
UNIT 1 DELTIC WAY
KNOWSLEY INDUSTRIAL ESTATE
LIVERPOOL
L33 7BA
0151 545 2750

Client:
Daer Geo

Project:
Ground Inve g on on Land at the rear of Co-lomendy Industrial Estate

Title:
Aerial Photograph

Scale:	Issue:
NTS	01
Drawn by:	Date:
DG	March 2020
Project No.	Drawing No.
CCG-C-20-11469	02

Note the proximity of the existing HP gas main when carrying out ground investigation works.

Note the proximity of the existing SP 33kV cable when carrying out ground investigation works.

Pond

TP101 TP102 TP103 TP104 TP105 TP106 TP107 TP108 TP109 TP110 TP111 TP112

BH101 BH102

HP GAS MAIN

SP 33kV (OH)

SP 33kV (UG)

BT (OH)

	EASTING	NORTHING
TP101	305287.274	367442.157
TP102	305290.480	367413.808
TP103	305296.631	367427.850
TP104	305332.495	367428.838
TP105	305327.302	367455.054
TP106	305341.425	367390.008
TP107	305424.984	367465.595
TP108	305417.712	367405.910
TP109	305451.648	367436.228
TP110	305492.379	367433.228
TP111	305116.024	367431.406
TP112	305514.131	367412.717
TP113	305405.000	367440.000
BH101	305486.184	367456.256
BH102	305486.789	367406.100

KEY

TP304	Trial Pit
BH301	Borehole
	Existing WS (2019 GI)
HPGAS	High Pressure Gas Main
T(oh)	Telephone Cable (Overhead)
T(un)	Telephone Cable (Underground)
E(ohhv)	Electricity Cable (Overhead) High Voltage
E(ohlv)	Electricity Cable (Overhead) Low Voltage
E(unhv)	Electricity Cable (Underground) High Voltage
E(unlv)	Electricity Cable (Underground) Low Voltage

SIGNIFICANT HAZARDS IDENTIFIED BY DESIGNER

- Everyday or low risk hazards have not been indicated on this drawing, neither have hazards that should be obvious to a competent contractor.

- Should any additional hazards be identified the contractor should notify all the relevant project team members.

The accuracy of the location of the services & apparatus shown on this drawing cannot be guaranteed. Service pipes to individual properties are not shown but their presence should be anticipated before any excavation is carried out either in the highway or on land outside the highway. If any private service is disrupted or affected by the *Works*, the services shall be maintained by the Main Contractor. The representative of each service must be contacted so that the service location can be ascertained on site.

RHIF LLUNIAD/DRAWING NUMBER H3/18304/D/133B

Cyngor sir ddinbych denbighshire County Council

PENNAETH PRIFFYRDD A GWASANAETHAU AMGYLCHEDDOL
HEAD OF HIGHWAYS AND ENVIRONMENTAL SERVICES
ADRAN PRIFFYRDD A GWASANAETHAU AMGYLCHEDDOL
DEPARTMENT OF HIGHWAYS AND ENVIRONMENTAL SERVICES

RHIF GWAITH/JOB NUMBER 18304

GRADDFEYDD/DRAWING SCALES 1:1000 @A3

RHIF GRID/NATIONAL GRID REFERENCE SJ0565

DYLUNIWYD GAN/DRAWN BY RT

CYMERADWYWYD GAN/APPROVED BY EP

NEWIDIAU/AMENDMENTS

A	Original Drawing	28/01/20
B	Positions Amended	09/04/20

STATWS LLUNIAD/DRAWING STATUS ISSUE

DYDDIAD NEWID OLAF/LAST EDIT DATE 09/04/20

CYNLLUN/SCHEME WASTE RE-ORGANISATION

TEITL LLUNIAD/DRAWING TITLE

PLOT 1
GROUND INVESTIGATION

RHIF LLUNIAD/DRAWING NUMBER H3/18304/D/133B

	EASTING	NORTHING
TP201	305532.483	367454.287
TP202	305535.952	367400.449
TP203	305552.247	367437.302
TP204	305563.206	367455.316
TP205	305558.889	367409.622
TP206	305594.599	367428.055
TP207	305604.691	367457.649
TP208	305601.713	367407.766
TP209	305633.303	367425.244
TP210	305643.780	367447.379
TP211	305637.192	367402.681
TP212	305669.652	367453.510
TP213	305663.488	367421.428
TP214	305552.027	367383.048
TP215	305583.884	367378.892
TP216	305616.850	367354.557
TP217	305660.715	367372.896
TP301	305684.057	367429.375
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TP513	305885.608	367366.583
TP514	305917.475	367367.864
TP515	305916.568	367353.213
TP516	305957.046	367380.529

Note the proximity of the existing SP 33kV cable when carrying out ground investigation works.

Note the proximity of the existing SP 11kV cable when carrying out ground investigation works.

SIGNIFICANT HAZARDS IDENTIFIED BY DESIGNER

- Everyday or low risk hazards have not been indicated on this drawing, neither have hazards that should be obvious to a competent contractor.

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The accuracy of the location of the services & apparatus shown on this drawing cannot be guaranteed. Service pipes to individual properties are not shown but their presence should be anticipated before any excavation is carried out either in the highway or on land outside the highway. If any private service is disrupted or affected by the *Works*, the services shall be maintained by the Main Contractor. The representative of each service must be contacted so that the service location can be ascertained on site.

KEY

- TP304 — Trial Pit
- BH301 — Borehole
- Existing WS (2019 GI)
- Sewer Mains and Apparatus
- Water Mains and Apparatus
- High Pressure Gas Main
- Low Pressure Gas Main
- Telephone Cable (Overhead)
- Telephone Cable (Underground)
- Telephone Cable (Underground Diverted)
- Electricity Cable (Overhead) High Voltage
- Electricity Cable (Overhead) Low Voltage
- Electricity Cable (Underground) High Voltage
- Electricity Cable (Underground) Low Voltage
- Street Lighting
- Illuminated Sign
- Illuminated Bollard

H3/18304/D/132B

Cyngor sir ddinbych denbighshire County Council

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GRADDFEYDD/DRAWING SCALES	1:1000 @A2
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TIETL LLUNIAD/DRAWING TITLE: PLOTS 2-5 GROUND INVESTIGATION

RHIF LLUNIAD/DRAWING NUMBER: H3/18304/D/132B

APPENDIX B: SAMPLING METHODOLOGIES

SAMPLING, SAMPLE TRANSPORTATION, AND FIELD MONITORING PROTOCOLS

Soil, water and gas sampling and monitoring methodologies employed by ***CC GEOTECHNICAL LTD*** are presented hereunder.

SAMPLING OF SOIL FOR CHEMICAL ANALYSIS

Soil samples may be recovered from a variety of intrusive investigation methods including *inter alia* dynamic sampling boreholes, cable percussion boreholes, machine or manual excavation of trial pits.

All equipment which has the potential to introduce extraneous materials into soils – borehole casings, sampling drilling rods, borehole sampling tools, hand tools such as trowels and spades etc. – must be cleaned by jet washing before initial use and between sampling positions.

Cable Percussion Boreholes

In this method of investigation disturbed bulk and small disturbed samples are recovered at regular depth increments throughout the length of the borehole. Each bulk/small disturbed sample is uniquely labelled with the Project Name / Project No / Borehole No / Depth / Date. Where possible, samples are immediately scanned by PID.

Light Dynamic Sampling Boreholes

In this method of investigation samples are recovered in relatively undisturbed 1m long Perspex liners. Each liner is uniquely labelled with the Project Name / Project No / Borehole No / Depth / Date. The liner tubes are sealed by air tight caps fitted at each end, and are temporarily stored out of sunlight. Where possible, samples are immediately split, scanned by PID, logged and subsampled. In the event that splitting and logging on site is not practicable, then the liners are immediately transported to the laboratory where they are immediately split, scanned by PID, logged and subsampled

Trial Pits

Samples are to be taken from the bucket of an excavator and placed in appropriate airtight containers. Each container is uniquely labelled with the Project No / Trial Pit No / Depth / Date. The samples are then immediately placed in a cool box chilled by ice packs, and the boxes are sealed for transportation to the chemical laboratory.

Sampling Containers

Containers used to store soil samples are selected dependant on the required analysis. The testing laboratory will be consulted should there be any doubt as to the correct sampling container. Typically, a minimum of 1nr 1kg plastic tub, 1nr 500g plastic tub, 1nr 250g amber glass jar and 2nr glass vials are taken at each sample depth. Samples held on site awaiting same day courier collection are stored at $4^{O}C$ in a cool box. Only in circumstances where same day collection cannot be arranged are samples held overnight, and in this event all samples are refrigerated at $4\ ^{O}C$ either on site (if a refrigerator is available) or at CC GEOTECHNICAL soil laboratory. Courier collection is then arranged for immediate pick up the following day.

Chain of Custody records

A Chain of Custody Record (CoC) is to be sent with each batch of samples submitted to the testing laboratory. A copy of the CoC will be made available for inspection by the client, their agents, or any requesting regulatory authority.

HEADSPACE ANALYSES

Duplicate subsamples of all soil samples selected for laboratory analysis may be taken for headspace analyses.

Headspace analysis is undertaken using a MiniRae 2000 Photo Ionisation Detector (PID). In the test method, an amber glass jar is half filled with soil, and the lid is sealed with aluminium foil secured by an elastic band. The jar and contents are agitated for 30 seconds and left for a minimum of 30 minutes out of direct sunlight for the headspace to achieve equilibrium. The PID then pierces the seal and the maximum reading is recorded. Prevailing weather conditions and ambient air temperature are also recorded.

The PID headspace results are recorded on the exploratory borehole or trial pit logs.

PID headspace data is then used to inform the chemical testing schedule for volatile organic compounds analyses.

SAMPLING OF GROUNDWATER FOR CHEMICAL ANALYSIS

Groundwater is sampled from standpipes or piezometers installed during borehole drilling. On completion of the construction of the standpipe, the installation is initially developed by removing up to 10 x the internal volume of the

installation. The volume of water purged is recorded. The installation is then typically left for a week for hydraulic equilibrium to be restored.

Prior to sampling the standpipe, the depth to the water table, and the depth to the base of the installation are monitored using an electronic dipmeter. In circumstances where free phase product is suspected to be present, then an 'Interface Meter' is used to determine the free phase film thickness.

A minimum of 3 x the installation volume is then removed. The pH of the water is then monitored and the sample is taken when the change in pH between any two consecutive extracts is less than 10%. The volume of water removed is recorded.

A sample comprises of a minimum of 3 litres. Two litres are taken in amber glass bottles, and one litre in a plastic bottle.

To avoid cross-contamination one bailer is used per position.

The samples are uniquely labelled with Project Name / Project No / Borehole No / Depth / Date Sampled. They are placed in a cool box chilled by ice packs, and the containers are sealed for transportation to the laboratory.

Once the samples are received in the ***CC GEOTECHNICAL LTD*** laboratory, the samples are stored in a refrigerator and returned to the cool boxes once collected.

Water taken from the installations are taken back to the ***CC GEOTECHNICAL LTD*** laboratory and disposed.

Other data recorded in the sampling comprises:

- Volume of water removed during development of well
- Volume of water removed during purging of the well
- Results of on-site pH analyses
- Sample appearance – colour, suspended solids

MONITORING OF GAS

Prior to embarking on a gas-monitoring round, all equipment is checked for functionality and the calibration status is confirmed.

At the commencement of the monitoring round, the prevailing weather conditions, air temperature, barometric pressure and direction of movement of barometric pressure are recorded.

The flow meter is first attached to the standpipe valve, and the flow rate is measured (peak and steady flow) for 1 minute. The results are recorded in $l.hr^{-1}$. The flow meter tube is protected from the effects of wind by aligning the exhaust downwind.

Following measurement of borehole flow rate, the installation is left for a minimum of 10 minutes for the headspace to restore equilibrium.

Once the gas in the installation has regained equilibrium, the gas analyser is connected and monitoring commences. The peak and steady state readings for CH_4, CO_2, CO, H_2S and CO are recorded. The steady state is monitored for a minimum of one minute, and possibly up to a maximum of 10 minutes where fluctuations continue.

When the monitoring is complete, the depth to the water table, and the depth to the base of the well are monitored using an electronic dipmeter. In circumstances where free phase product is suspected to be present, then an 'Interface Meter' is used to determine the free phase film thickness.

APPENDIX C: BOREHOLE LOGS

Contract Name: Colomendy		Client: Daer Geo		Borehole ID: **BH101**
Contract Number: CCG-C-20-11469	Date Started: 07-02-2020	Logged By: AR	Checked By: CB	Status: DRAFT
Cable Percussion Borehole Log	Easting: 305486.2	Northing: 367456.3	Ground Level: 82.13mAOD	Plant Used: Dando 150 S&A
Rig Crew: AR/LC	Scale: 1:50			Sheet 1 of 1
Weather: Dry / Windy	Termination:	SPT Hammer: N/R, Energy Ratio: N/R		

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
			81.93	0.20		Grassed brown TOPSOIL		
0.50	B					Stiff varying to very stiff brown slightly gravelly slightly sandy silty CLAY with low - medium cobble content. Gravel is fine to coarse of various angularities and lithologies		
0.50	ES							
		SPT(S) 1.20m, N=21 (3,4/5,5,5,6)						
1.50	B							
1.50 - 1.95	U							
		SPT(S) 2.00m, N=23 (2,6/5,7,5,6)						
				(4.25)				
2.50	B							
2.50 - 2.95	U							
3.00 - 3.45	U	SPT(S) 3.00m, N=21 (4,3/6,4,6,5)						
3.50	B							
		SPT(S) 4.00m, N=39 (4,8/8,10,11,10)						
4.50	B		77.68	4.45		End of Borehole at 4.45m		

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Chiselling			
From (m)	To (m)	Duration	Remarks

Installation			
Top (m)	Base (m)	Type	Dia (mm)

Remarks:
1 hour hand excavating 1.20mbgl service avoidance pit

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Contract Name: Colomendy			Client: Daer Geo	Borehole ID: **BH102**
Contract Number: CCG-C-20-11469	Date Started: 03-02-2020	Logged By: AR	Checked By: CB	Status: DRAFT
Cable Percussion Borehole Log	Easting: 305486.8	Northing: 367406.1	Ground Level: 81.13mAOD	Plant Used: Dando 150 S&A
Rig Crew: AR/LC	Scale: 1:50	Sheet 1 of 1		
Weather: Dry / Windy	Termination:	SPT Hammer: N/R, Energy Ratio: N/R		

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
			80.93	0.20		Grassed dark brown sandy clayey TOPSOIL		
0.50 0.50	B ES					Firm very sandy slightly gravelly CLAY with medium cobble content. Gravel is fine to coarse of various angularities & lithologies including sandstone and limestone		
		SPT(S) 1.20m, N=13 (2,3/3,4,3,3)		(2.20)				
1.50	B							
2.00 - 2.45	U					*Chiselling on cobble / boulder (1hr)*		
			78.73	2.40		Medium dense brown very sandy clayey GRAVEL. Gravel is fine to coarse of various angularities and lithologies including sandstone and limestone		
2.50	B							
		SPT(S) 3.00m, N=25 (4,6/6,7,6,6)		(1.10)				
3.50	B		77.63	3.50		Stiff brown slightly sandy locally gravelly silty CLAY with low cobble content. Gravel is fine to coarse of various angularities & lithologies including sandstone and limestone		
		SPT(S) 4.00m, N=50 (5,10/50 for 265mm)						
4.50	B			(2.40)				
5.00 - 5.45	U					*No recovery in U100 sample*		
5.50	B							
		SPT(S) 5.90m, N=37 (4,9/8,10,9,10)	75.23	5.90		End of Borehole at 5.90m		

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)
					5.00	200		

Remarks:
1 hour hand excavating 1.20mbgl service avoidance pit

Chiselling			
From (m)	To (m)	Duration	Remarks
2.00	2.30	01:00	

Installation			
Top (m)	Base (m)	Type	Dia (mm)

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
2.40	2.40	3.60	20	2.20	

Contract Name: Colomendy			Client: Daer Geo	Borehole ID: **BH301**
Contract Number: CCG-C-20-11469	Date Started: 05-02-2020	Logged By: AR	Checked By: CB	Status: DRAFT
Cable Percussion Borehole Log	Easting: 305704.5	Northing: 367404.0	Ground Level: 70.54mAOD	Plant Used: Dando 150 S&A
Rig Crew: AR/LC	Scale: 1:50	Sheet 1 of 1		
Weather: Dry / Windy	Termination:	SPT Hammer: N/R, Energy Ratio: N/R		

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
				(0.30)		Grassed brown TOPSOIL		
			70.24	0.30				
0.50	B					Stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse of various angularities and lithologies including sandstone		
0.50	ES							
				(1.10)				
		SPT(S) 1.20m, N=17 (2,4/3,4,5,5)						
			69.14	1.40				
1.50	B					Medium dense brown very clayey very sandy GRAVEL. Gravel is fine to coarse of various angularities and lithologies including sandstone		
2.00 - 2.45	U							
				(2.00)				
2.50	B							
		SPT(S) 3.00m, N=15 (3,3/4,3,4,4)						
			67.14	3.40				
3.50	B					Medium dense brown very silty very sandy GRAVEL. Gravel is fine to coarse of various angularities and lithologies including sandstone		
				(0.90)				
4.00 - 4.45	U							
			66.24	4.30				
4.50	B					Medium dense becoming very dense brown very clayey gravelly fine to coarse grained SAND. Gravel is fine to coarse of various angularities and lithologies including sandstone		
				(1.00)				
5.00	B	SPT(S) 5.00m, N=100 (12,13/100 for 255mm)						
5.30	B		65.24	5.30		LIMESTONE BOULDER. Recovered at the surface as very dense clayey gravelly sand (drilling-induced)		
		SPT(S) 5.50m, 50 (25 for 10mm/50 for 40mm)	65.04	5.50		End of Borehole at 5.50m		

Start & End of Shift Observations				
Date	Time	Depth (m)	Casing (m)	Water (m)

Borehole Diameter	
Depth (m)	Dia (mm)

Casing Diameter	
Depth (m)	Dia (mm)

Remarks:
1 hour hand excavating 1.20mbgl service avoidance pit

Chiselling			
From (m)	To (m)	Duration	Remarks
5.40	5.80	01:00	

Installation			
Top (m)	Base (m)	Type	Dia (mm)
0.00	0.50	PLAIN	50
0.50	5.50	SLOTTED	50

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Contract Name: Colomendy			Client: Daer Geo	Borehole ID: **BH302**
Contract Number: CCG-C-20-11469	Date Started: 06-02-2020	Logged By: AR	Checked By: CB	Status: DRAFT
Cable Percussion & Rotary O/H BH Log	Easting: 305682.1	Northing: 367376.7	Ground Level: 72.08mAOD	Plant Used: Dando 150 S&A
Rig Crew: AR/LC	Scale: 1:50	Sheet 1 of 1		
Weather: Dry / Windy	Termination:	SPT Hammer: N/R, Energy Ratio: N/R		

Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description
			71.88	0.20		Grassed brown clayey TOPSOIL
0.50	B					Brown slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse of various angularities and lithologies
0.50	ES			(1.25)		
1.00 - 1.45	U					
1.50	B		70.63	1.45		Medium dense light brown very gravelly very clayey fine to medium grained SAND. Gravel is fine to coarse sub-rounded sandstone
		SPT(S) 2.00m, N=22 (3,5/5,5,6,6)		(0.95)		
2.50	B		69.68	2.40		Medium dense very clayey very sandy GRAVEL. Gravel is fine to coarse sub-angular to sub-rounded sandstone
3.00 - 3.45	U			(0.90)		
3.50	B		68.78	3.30		Medium dense to dense grey slightly sandy slightly silty GRAVEL. Gravel is fine to coarse sub-angular to sub-rounded sandstone and quartz
		SPT(S) 4.00m, N=37 (4,8/8,10,9,10)		(1.60)		
4.50	B					
		SPT(S) 5.00m, N=18 (3,5/4,5,4,5)	67.18	4.90		Medium dense becoming dense brown slightly silty very clayey SAND
5.50	B			(1.40)		
		SPT(S) 6.00m, N=100 (10,15/100 for 255mm)				
6.50	B	SPT(S) 6.50m, 100 (25 for 15mm/100 for 40mm)	65.78	6.30		LIMESTONE BOULDER
				(0.60)		Rotary Open Hole Drilling from 6.4m to 10m.
			65.18	6.90		Very dense brown slightly silty SAND and GRAVEL (based on Drillers Description of limited arisings from SPT test - treat with caution)
7.80	B					
		SPT(S) 8.00m, 50 (9,15/50 for 190mm)				
				(3.10)		
		SPT(S) 9.50m, 50 (7,12/50 for 180mm)				
			62.08	10.00		End of Borehole at 10.00m

Groundwater: Water Strike; Backfill/ Installation

Start & End of Shift Observations

Date	Time	Depth (m)	Casing (m)	Water (m)

Borehole Diameter

Depth (m)	Dia (mm)

Casing Diameter

Depth (m)	Dia (mm)

Chiselling

From (m)	To (m)	Duration	Remarks
6.30	6.30	01:00	

Installation

Top (m)	Base (m)	Type	Dia (mm)
0.00	0.50	PLAIN	
0.50	6.70	SLOTTED	

Remarks:
1 hour hand excavating 1.20mbgl service avoidance pit

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
3.30			0		Slight seepage
4.50	4.50		20	4.20	

CCG	Contract Name: Colomendy		Client: Daer Geo		Borehole ID: **BH303**
	Contract Number: CCG-C-20-11469	Date Started: 04/02/2020	Logged By: AR	Checked By: CB	Status: DRAFT — Sheet 1 of 1
Cable Percussion Borehole Log	Easting: 305701.0	Northing: 367338.7	Ground Level: 69.35mAOD	Plant Used: Dando 150 S&A	Rig Crew: AR/LC — Scale: 1:50
Weather: Rain / Windy		Termination:		SPT Hammer: N/R, Energy Ratio: N/R	

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
			69.15	0.20		Grassed dark brown TOPSOIL		
0.50	B					Firm brown slightly gravelly silty CLAY		
0.50	ES			(1.20)				
1.00 - 1.45	U							
			67.95	1.40		Very dense brown/red very silty becoming clayey gravelly fine to medium grained SAND. Gravel is fine to coarse angular to sub-rounded sandstone, limestone and quartz		
1.50	B			(0.90)				
		SPT(S) 2.00m, N=51 (4,7/10,9,15,17)						
			67.05	2.30		Dense grey / brown very clayey very gravelly SAND. Gravel is fine to coarse of various angularities and lithologies including sandstone and limestone		
2.50	B			(0.60)				
			66.45	2.90		Stiff grey/brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse angular to sub-rounded of various lithologies		
		SPT(S) 3.00m, N=43 (5,6/8,10,11,14)						
3.50	B			(1.40)				
		SPT(S) 4.00m, N=48 (6,10/10,13,12,13)						
			65.05	4.30		Very dense grey/brown very clayey very sandy GRAVEL. Gravel is fine to coarse angular to sub-rounded sandstone, limestone and quartz		
4.50	B			(1.10)				
		SPT(S) 5.00m, 50 (25 for 100mm/50 for 200mm)						
			63.95	5.40		LIMESTONE BOULDER recovered at the surface as very dense clayey gravelly sand (drilling-induced)		
				(0.40)				
5.80	D	SPT(S) 5.80m, 100 (25 for 10mm/100 for 50mm)	63.55	5.80		End of Borehole at 5.80m		

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Chiselling			
From (m)	To (m)	Duration	Remarks
5.40	5.60	01:00	
5.60	5.80	01:00	

Installation			
Top (m)	Base (m)	Type	Dia (mm)

Remarks:
1 hour hand excavating 1.20mbgl service avoidance pit
1hr chiselling 5.4m-5.6mbgl

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

	Contract Name: Colomendy		Client: Daer Geo		Borehole ID: **BH304**
	Contract Number: CCG-C-20-11469	Date Started: 13-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT — Sheet 1 of 1
Rotary Open Hole Borehole Log	Easting: 305678.1	Northing: 367399.1	Ground Level: 72.38mAOD	Plant Used: Dando 150 S/A Rig	Rig Crew: AR/LN — Scale: 1:50
Weather:		Termination:		SPT Hammer: N/R, Energy Ratio: N/R	

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
			72.18	0.20		Grassed TOPSOIL		
				(5.80)		Description of Soil not possible due to drilling method, which was employed to investigate suspected shallow bedrock; see BH301 - 303 for ground conditions in this area. Arisings comprised mixture of silt, sand clay and gravel, consistent with glacial deposits encountered locally	▼	
		SPT(S)N=25 (4,5/5,7,6,7)	66.38	6.00		End of Borehole at 6.00m		

1 2 3 4 5 6 7 8 9

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Chiselling			
From (m)	To (m)	Duration	Remarks

Installation			
Top (m)	Base (m)	Type	Dia (mm)

Remarks:
1 hour hand excavating 1.20mbgl service avoidance pit

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
3.00			0		Seepage

	Contract Name: Colomendy		Client: Daer Geo		Borehole ID: **BH305**
	Contract Number: CCG-C-20-11469	Date Started: 13-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT
Rotary Open Hole Borehole Log	Easting: 305673.9	Northing: 367345.0	Ground Level: 71.72mAOD	Plant Used: Dando 150 S/A Rig	Rig Crew: AR/LN
					Sheet 1 of 1
					Scale: 1:50

Weather: | Termination: | SPT Hammer: N/R, Energy Ratio: N/R

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
			71.52	0.20		Grassed TOPSOIL		
						Description of Soil not possible due to drilling method, which was employed to investigate suspected shallow bedrock; see BH301 - 303 for ground conditions in this area. Arisings comprised mixture of silt, sand clay and gravel, consistent with glacial deposits encountered locally.		
				(5.80)				
		SPT(S)N=28 (3,5/7,6,8,7)	65.72	6.00		End of Borehole at 6.00m		

1 2 3 4 5 6 7 8 9

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Chiselling			
From (m)	To (m)	Duration	Remarks

Installation			
Top (m)	Base (m)	Type	Dia (mm)

Remarks:
1 hour hand excavating 1.20mbgl service avoidance pit

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
3.00			0		Seepage

APPENDIX D: TRIAL PIT LOGS

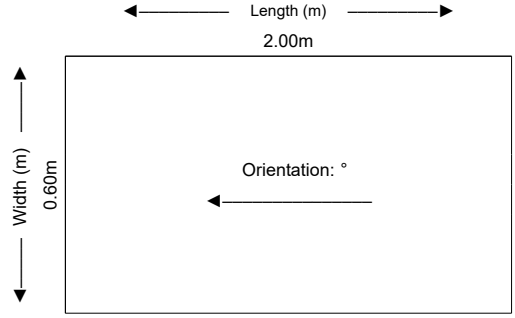
Contract Name: Colomendy		Client: Daer Geo			Trial Pit ID: TP111
Contract Number: CCG-C-20-11469	Date Started: 03-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305516.0	Northing: 367431.4	Ground Level: 80.71mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			80.51	0.20		Grassed sandy clayey TOPSOIL		
				(0.40)		Brown clayey SAND with occasional limestone gravels		
0.50	ES		80.11	0.60		Grey slightly silty slightly sandy GRAVEL (land drain capping layer). Gravel is fine to coarse angular to subangular of limestone (MADE GROUND)		
			79.86	0.85		50mm Plastic land drain (extending on north-south alignment)		
			79.81	0.90		Stiff brown locally grey slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse of various angularities and lithologies		
1.00	B	HVP=110kPa						
		HVP=110kPa		(0.70)				
		HVP=110kPa						
			79.11	1.60		End of Trial Pit at 1.60m		

1 2 3

Dimensions:

Final Depth: 1.60m



Inclination: °

General Remarks:

50mm plastic land drain standing at 0.85mbgl

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

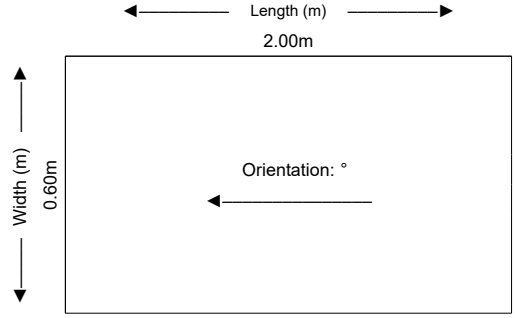
	Contract Name: Colomendy		Client: Daer Geo		Trial Pit ID: TP101
	Contract Number: CCG-C-20-11469	Date Started: 03-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT
Trial Pit Log	Easting: 305287.3	Northing: 367442.2	Ground Level: 90.89mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020
					Sheet 1 of 1
					Scale: 1:25
Weather:		Hole Termination:		Stability: Stable	

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			90.69	0.20		Grassed brown sandy clayey TOPSOIL with occasional small limestone gravels		
0.50	ES					Brown slightly gravelly silty locally clayey SAND. Gravel is fine to coarse angular to subround of limestone and mudstone		
0.75	B							
0.76	B			(1.40)				
			89.29	1.60		Brown gravelly SAND with low cobble content. Gravel is fine to coarse angular to subround of limestone and mudstone		
				(0.40)				
			88.89	2.00		End of Trial Pit at 2.00m		

1
2
3

Dimensions:

Final Depth: 2.00m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

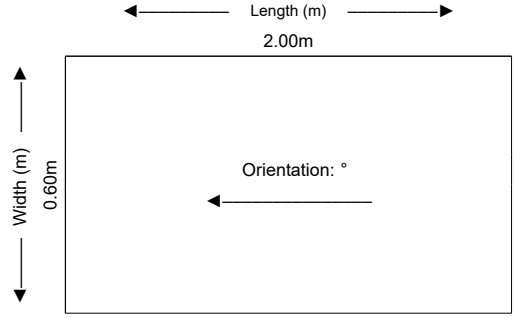
Contract Name: Colomendy		Client: Daer Geo			Trial Pit ID: TP102
Contract Number: CCG-C-20-11469	Date Started: 03-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305290.5	Northing: 367413.8	Ground Level: 90.28mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details					
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description	Water	Backfill
			90.08	0.20		Grassed dark brown sandy clayey TOPSOIL with occasional small-medium grained limestone / mudstone gravels		
0.50	ES			(0.80)		Brown slightly gravelly silty fine and medium grained SAND. Gravel content increasing with depth. Gravel is fine to coarse of various angularities & lithologies		
0.75	B							
0.76	B							
			89.28	1.00		Brown silty clayey SAND with medium cobble content & occasional small boulders. Gravel is fine to coarse of limestone & mudstone		
				(0.75)				
1.80	B	HVP=110kPa	88.53	1.75		Stiff brown slightly sandy gravelly CLAY. Gravel is fine to coarse angular to subround of various lithologies		
				(0.35)				
		HVP=110kPa	88.18	2.10		End of Trial Pit at 2.10m		

1 2 3

Dimensions:

Final Depth: 2.10m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

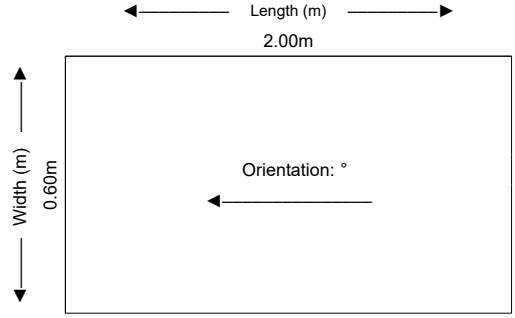
Contract Name: Colomendy			Client: Daer Geo		Trial Pit ID: TP103
Contract Number: CCG-C-20-11469	Date Started: 03-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305296.6	Northing: 367427.8	Ground Level: 90.04mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			89.84	0.20		Grassed dark brown sandy clayey TOPSOIL		
0.50	ES					Dark brown varying to brown slightly gravelly clayey SAND with low cobble content and occasional pockets of clay		
0.75	B							
0.76	B							
				(1.80)				
			88.04	2.00		End of Trial Pit at 2.00m		

1
2
3

Dimensions:

Final Depth: 2.00m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

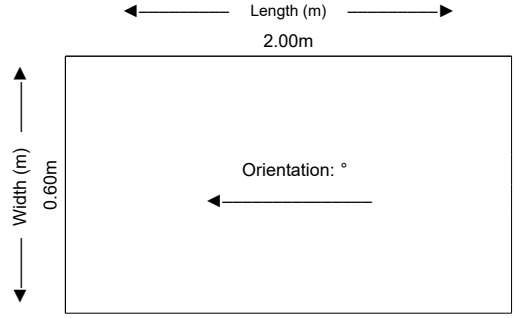
Contract Name: Colomendy			Client: Daer Geo		Trial Pit ID: TP104
Contract Number: CCG-C-20-11469	Date Started: 03-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305332.5	Northing: 367428.8	Ground Level: 87.34mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			87.19	0.15		Grassed dark brown sandy TOPSOIL		
0.50	ES			(0.75)		Dark brown varying to brown slightly gravelly silty fine and medium grained SAND with occasional pockets of soft to firm clay		
0.75	B							
			86.44	0.90		Brown slightly gravelly locally clayey silty fine and medium grained SAND		
				(0.70)				
			85.74	1.60		End of Trial Pit at 1.60m		

1 2 3

Dimensions:

Final Depth: 1.60m



Inclination: °

General Remarks:

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
1.20			0		Slight seepage

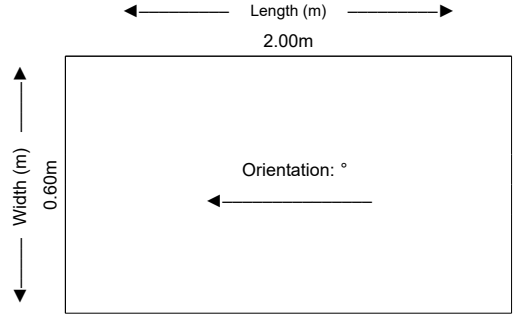
	Contract Name: Colomendy		Client: Daer Geo		Trial Pit ID: TP105
	Contract Number: CCG-C-20-11469	Date Started: 03-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT — Sheet 1 of 1
Trial Pit Log	Easting: 305327.3	Northing: 367455.1	Ground Level: 87.66mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020 — Scale: 1:25
Weather:		Hole Termination:		Stability: Stable	

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			87.66			Grassed dark brown sandy TOPSOIL		
			87.41	0.25		Dark brown silty fine and medium grained SAND		
			87.26	0.40		Soft locally soft to firm brown locally gravelly silty CLAY. Gravel is fine to coarse of various angularities and lithologies		
0.50	ES	HVP=20kPa						
		HVP=30kPa		(0.90)				
1.00	B							
		HVP=40kPa	86.36	1.30		Brown slightly silty gravelly SAND. Gravel is fine to coarse angular to subround of limestone		
			86.26	1.40		Stiff brown slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse angular to subround of mudstone quartz and limestone		
		HVP=110kPa	86.16	1.50		End of Trial Pit at 1.50m		

1 2 3

Dimensions:

Final Depth: 1.50m



Inclination: °

General Remarks:

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
1.40			0		Slight seepage

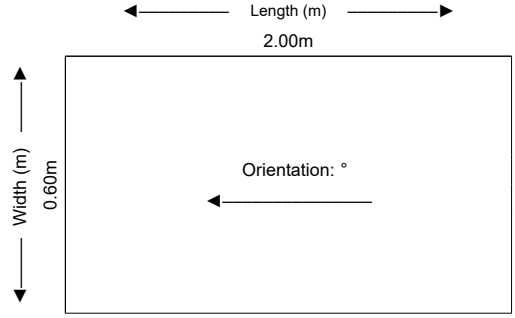
Contract Name: Colomendy			Client: Daer Geo		Trial Pit ID: TP106
Contract Number: CCG-C-20-11469	Date Started: 03-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305341.4	Northing: 367390.0	Ground Level: 86.41mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			86.21	0.20		Grassed dark brown sandy TOPSOIL with occasional limestone gravels		
				(0.40)		Brown silty locally clayey fine and medium grained SAND		
0.50	ES		85.81	0.60		Firm becoming soft brown slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse of various angularities and lithologies		
		HVP=70kPa						
1.00	B	HVP=30kPa		(1.00)				
		HVP=30kPa						
			84.81	1.60		Brown slightly gravelly silty SAND. Gravel is fine to coarse of various angularities and lithologies		
			84.71	1.70		End of Trial Pit at 1.70m		

1 2 3

Dimensions:

Final Depth: 1.70m



Inclination: °

General Remarks:

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
1.60			0		Standing water level

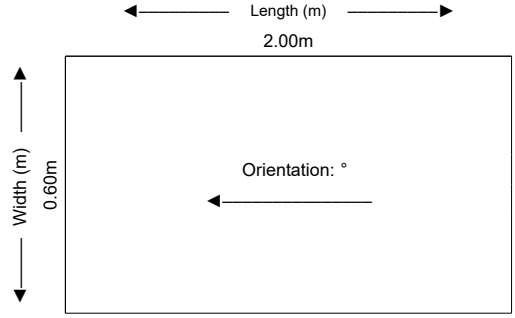
Contract Name: Colomendy			Client: Daer Geo		Trial Pit ID: TP107
Contract Number: CCG-C-20-11469	Date Started: 03-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305425.0	Northing: 367465.6	Ground Level: 83.77mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			83.52	0.25		Grassed dark brown clayey TOPSOIL		
0.50	ES	HVP=50kPa				Firm varying to stiff brown CLAY with low cobble content (1.6mbgl) and occasional small boulders. Cobble content increasing at depth. Gravel is fine to coarse of various angularities and lithologies		
		HVP=90kPa						
1.00	B			(1.75)				
		HVP=110kPa						
		HVP=110kPa						
		HVP=110kPa						
			81.77	2.00		End of Trial Pit at 2.00m		

1 2 3

Dimensions:

Final Depth: 2.00m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

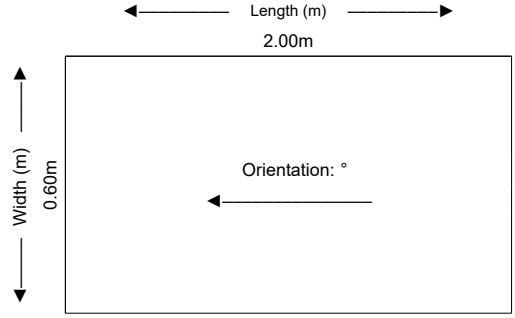
Contract Name: Colomendy			Client: Daer Geo		Trial Pit ID: TP108
Contract Number: CCG-C-20-11469	Date Started: 03-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305417.7	Northing: 367405.9	Ground Level: 83.35mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather: Dry / Windy	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			83.15	0.20		Grassed sandy clayey TOPSOIL		
0.50	ES	HVP=20kPa HVP=30kPa		(0.50)		Soft light brown varying to brown silty CLAY with low gravel content. Gravel is fine to coarse of various angularities and lithologies		
1.00	B	HVP=100kPa	82.65	0.70		Stiff brown slightly gravelly slightly sandy silty CLAY with occasional thin fine and medium grained sand horizons. Gravel is fine to coarse of various angularities and lithologies		
		HVP=110kPa		(1.40)				
		HVP=110kPa	81.25	2.10		End of Trial Pit at 2.10m		

1 2 3

Dimensions:

Final Depth: 2.10m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Contract Name: Colomendy			Client: Daer Geo		Trial Pit ID: TP109
Contract Number: CCG-C-20-11469	Date Started: 03-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305451.6	Northing: 367436.2	Ground Level: 82.68mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			82.48	0.20		Grassed dark brown sandy TOPSOIL		
						Light brown clayey fine and medium grained SAND		
			82.28	0.40		Black HDPE water pipe		
0.50	ES	HVP=70kPa				Stiff brown slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse of various angularities and lithologies		
		HVP=100kPa		(0.90)				
1.00	B							
		HVP=110kPa						
			81.38	1.30		End of Trial Pit at 1.30m		

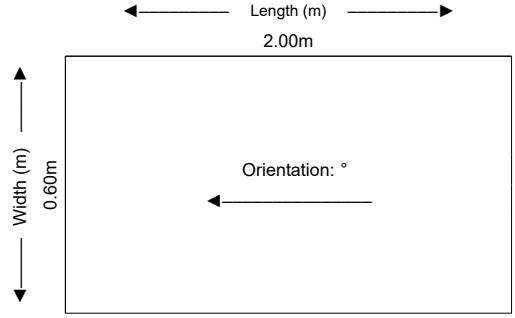
1

2

3

Dimensions:

Final Depth: 1.30m



Inclination: °

General Remarks:

30mm black HDPE water pipe encountered at 0.35mbgl (live).
Pipe being on NNW-SSE alignment

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

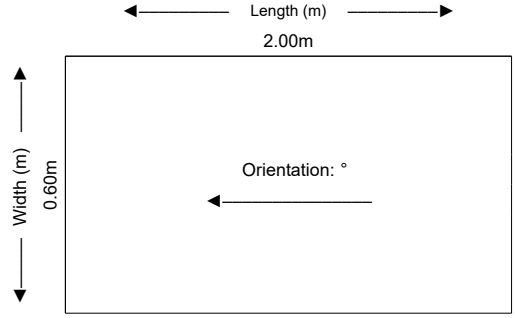
	Contract Name: Colomendy		Client: Daer Geo		Trial Pit ID: TP110
	Contract Number: CCG-C-20-11469	Date Started: 03-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT
Trial Pit Log	Easting: 305492.4	Northing: 367433.2	Ground Level: 81.63mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020
					Scale: 1:25
Weather: Dry / Wet		Hole Termination:		Stability: Stable	Sheet 1 of 1

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			81.48	0.15		Grassed dark brown sandy clayey TOPSOIL		
						Firm becoming stiff brown slightly gravelly slightly sandy silty CLAY with high cobble content from 1.4mbgl. Gravel is fine to coarse of various angularities and lithologies		
0.50	ES	HVP=50kPa						
		HVP=70kPa						
		HVP=100kPa		(1.65)				
1.20	B							
		HVP=110kPa						
		HVP=110kPa	79.83	1.80		End of Trial Pit at 1.80m		

1
2
3

Dimensions:

Final Depth: 1.80m



Inclination: °

General Remarks:

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

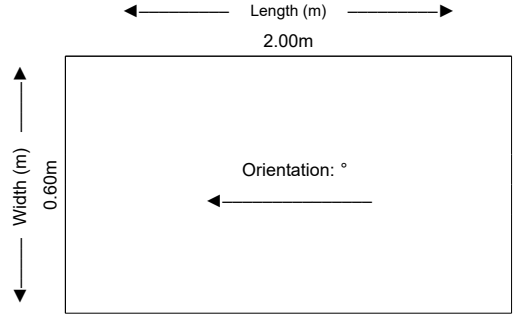
Contract Name: Colomendy			Client: Daer Geo		Trial Pit ID: TP112
Contract Number: CCG-C-20-11469	Date Started: 03-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305514.1	Northing: 367412.7	Ground Level: 80.37mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather: Dry / Windy		Hole Termination:		Stability: Stable	

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			80.17	0.20		Grassed dark brown sandy clayey TOPSOIL		
0.50	ES			(0.40)		Dark brown varying to brown clayey fine and medium grained SAND		
			79.77	0.60		Grey slightly silty slightly sandy GRAVEL (land drain capping layer). Gravel is fine to coarse angular to subangular of limestone (MADE GROUND)		
			79.67	0.70		50mm Plastic land drain		
		HVP=90kPa	79.62	0.75		Stiff brown locally grey slightly gravelly slightly sandy silty CLAY with low cobble content. Gravel is fine to coarse of various angularities and lithologies		
		HVP=110kPa		(0.85)				
		HVP=110kPa						
			78.77	1.60		End of Trial Pit at 1.60m		

1 2 3

Dimensions:

Final Depth: 1.60m



Inclination: °

General Remarks:

50mm plastic land drain standing at 0.7m-0.75mbgl

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

	Contract Name: Colomendy		Client: Daer Geo		Trial Pit ID: TP113
	Contract Number: CCG-C-20-11469	Date Started: 12-02-2020	Logged By: AR	Checked By: CB	Status: DRAFT
Trial Pit Log	Easting:	Northing:	Ground Level:	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020
					Scale: 1:25
Weather:		Hole Termination:		Stability: Stable	Sheet 1 of 1

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
				0.10		Grassed brown TOPSOIL		
						Soft brown slightly gravelly sandy silty CLAY		
				0.30		Firm becoming stiff brown slightly gravelly slightly sandy silty CLAY		
0.50	B							
0.50	ES							
				(1.20)				
1.00	B							
1.50	B			1.50		End of Trial Pit at 1.50m		

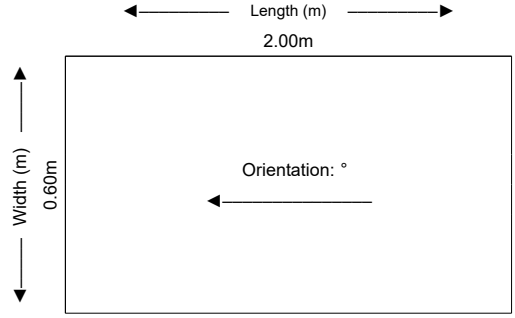
1

2

3

Dimensions:

Final Depth: 1.50m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

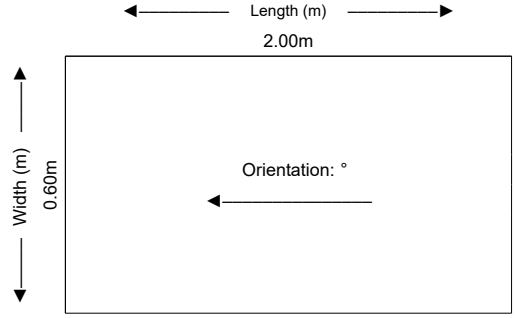
Contract Name: Colomendy			Client: Daer Geo		Trial Pit ID: TP201
Contract Number: CCG-C-20-11469	Date Started: 04-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305532.5	Northing: 367454.3	Ground Level: 80.93mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			80.78	0.15		Grassed brown TOPSOIL		
		HVP=40kPa				Firm becoming stiff brown slightly sandy slightly gravelly silty CLAY. Low cobble content.; Gravel is fine to coarse angular to sub-rounded of various lithologies including sandstone		
0.50	ES							
0.75	B	HVP=60kPa						
1.00	ES			(1.85)				
1.25	B	HVP=100kPa						
1.50	ES							
		HVP=110kPa						
2.00	ES		78.93	2.00		End of Trial Pit at 2.00m		

1 2 3

Dimensions:

Final Depth: 2.00m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

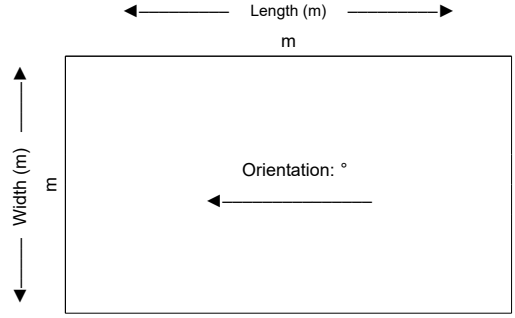
Contract Name: Colomendy		Client: Daer Geo			Trial Pit ID: TP202
Contract Number: CCG-C-20-11469	Date Started: 07-02-2020	Logged By:	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305536.0	Northing: 367400.4	Ground Level: 79.38mAOD	Plant Used:	Date Printed: 02-03-2020
		Hole Termination:			Scale: 1:25

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			79.23	0.15		Grassed brown TOPSOIL		
						Firm becoming stiff brown slightly sandy slightly gravelly silty CLAY. Low cobble content. Gravel is fine to coarse angular to sub-rounded of various angularities and lithologies including sandstone		
0.50	ES	HVP=45kPa						
0.75	B			(1.35)				
		HVP=90kPa						
1.00	ES							
		HVP=110kPa						
1.50	ES		77.88	1.50		End of Trial Pit at 1.50m		

1
2
3

Dimensions:

Final Depth: 1.50m



Inclination: °

General Remarks:

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

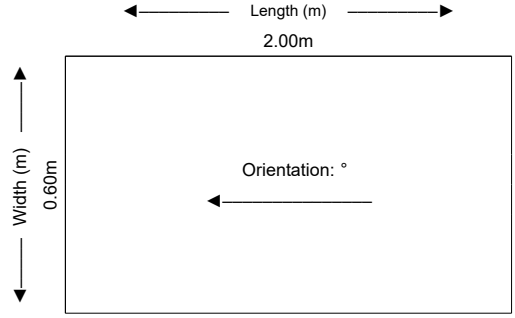
Contract Name: Colomendy			Client: Daer Geo		Trial Pit ID: TP203
Contract Number: CCG-C-20-11469	Date Started: 04-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305552.2	Northing: 367437.3	Ground Level: 79.83mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details					
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description	Water	Backfill
			79.68	0.15		Grassed TOPSOIL		
		HVP=15kPa	79.43	0.40		Soft brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium sub-angular to sub-rounded of various lithologies		
0.50	ES	HVP=50kPa				Firm becoming stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse angular to sub-rounded of various lithologies		
		HVP=90kPa		(1.20)				
		HVP=110kPa						
1.50	ES		78.23	1.60		End of Trial Pit at 1.60m		

1
2
3

Dimensions:

Final Depth: 1.60m



Inclination: °

General Remarks:

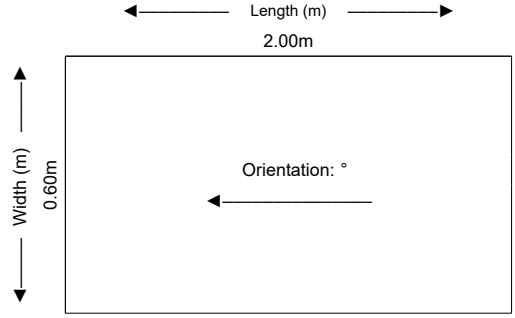
Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Contract Name: Colomendy			Client: Daer Geo		Trial Pit ID: TP204
Contract Number: CCG-C-20-11469	Date Started: 05-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305563.2	Northing: 367455.3	Ground Level: 79.99mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details					
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description	Water	Backfill
			79.89	0.10		Grassed TOPSOIL		
				(0.30)		Soft brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium angular to sub-angular of various lithologies		
		HVP=35kPa	79.59	0.40				
0.50	ES					Firm becoming stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse angular to sub-angular limestone and slate		
		HVP=70kPa						
0.75	B							
1.00	ES	HVP=100kPa		(1.20)				1
1.25	B							
1.50	ES	HVP=110kPa						
			78.39	1.60		Stiff brown slightly gravelly sandy silty CLAY. Gravel is fine to coarse sub-angular limestone		
		HVP=110kPa		(0.40)				
2.00	ES		77.99	2.00		End of Trial Pit at 2.00m		2
								3

Dimensions:

Final Depth: 2.00m



Inclination: °

General Remarks:

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
1.20			0		Seepage

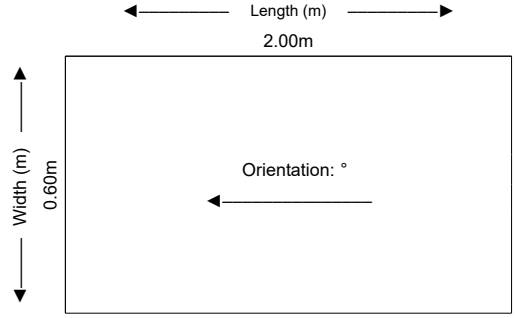
Contract Name: Colomendy			Client: Daer Geo		Trial Pit ID: TP205
Contract Number: CCG-C-20-11469	Date Started: 04-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305558.9	Northing: 367409.6	Ground Level: 78.93mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			78.83	0.10		Grassed TOPSOIL		
				(0.40)		Soft to firm brown slightly gravelly sandy silty CLAY. Gravel is fine to coarse angular to sub-rounded of various lithologies		
		HVP=40kPa						
0.50	ES		78.43	0.50		Firm becoming stiff brown slightly sandy slightly gravelly silty CLAY with occasional thin sand horizons. Gravel is fine to coarse angular to sub-rounded of various lithologies		
0.75	B	HVP=60kPa						
		HVP=100kPa						
				(1.50)				
1.50	ES	HVP=110kPa						
		HVP=110kPa						
2.00	ES		76.93	2.00		End of Trial Pit at 2.00m		

1
2
3

Dimensions:

Final Depth: 2.00m



Inclination: °

General Remarks:

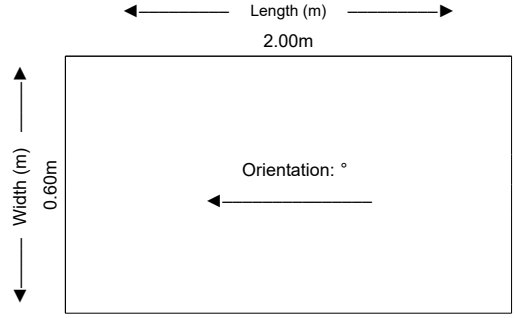
Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Contract Name:		Client:			Trial Pit ID:
Colomendy		Daer Geo			TP206
Contract Number:	Date Started:	Logged By:	Checked By:	Status:	Sheet 1 of 1
CCG-C-20-11469	04-02-2020	TG	CB	DRAFT	
Trial Pit Log	Easting: 305594.6	Northing: 367428.1	Ground Level: 77.80mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:	Stability: Stable			

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			77.65	0.15		Grassed brown TOPSOIL		
		HVP=40kPa				Soft to firm becoming stiff brown locally grey slightly sandy slightly gravelly silty CLAY with medium to high cobble content. Gravel is fine to coarse angular to sub-rounded of various lithologies		
		HVP=80kPa						
		HVP=100kPa		(1.85)				1
		HVP=110kPa						
		HVP=110kPa						
			75.80	2.00		End of Trial Pit at 2.00m		2
								3

Dimensions:

Final Depth: 2.00m



Inclination: °

General Remarks:

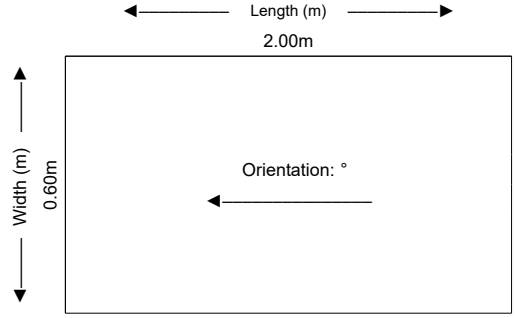
Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Contract Name: Colomendy		Client: Daer Geo			Trial Pit ID: TP207
Contract Number: CCG-C-20-11469	Date Started: 04-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305604.7	Northing: 367457.6	Ground Level: 78.34mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			78.19	0.15		Grassed TOPSOIL		
		HVP=40kPa				Soft to firm becoming firm brown varying to grey slightly sandy slightly gravelly silty CLAY with medium cobble content. gravel is fine to coarse angular to sub-rounded of various lithologies		
0.50	ES			(0.65)				
0.75	B	HVP=50kPa						
			77.54	0.80		Stiff grey varying to brown slightly sandy slightly gravelly silty CLAY with medium cobble content. Gravel is fine to coarse angular to sub-rounded of various lithologies including sandstone		
1.00	ES	HVP=80kPa					1	
1.25	B	HVP=100kPa						
				(1.20)				
1.50	ES							
		HVP=110kPa						
			76.34	2.00		End of Trial Pit at 2.00m	2	
							3	

Dimensions:

Final Depth: 2.00m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

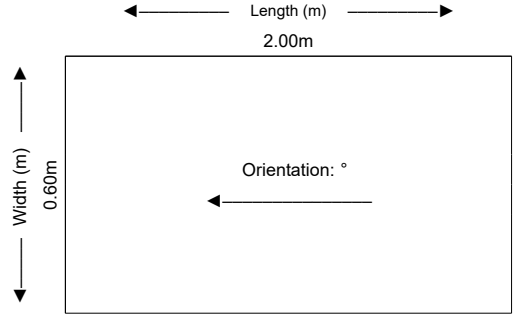
Contract Name: Colomendy		Client: Daer Geo			Trial Pit ID: TP208
Contract Number: CCG-C-20-11469	Date Started: 04-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305601.7	Northing: 367407.8	Ground Level: 77.16mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details					
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description	Water	Backfill
			77.06	0.10		Grassed TOPSOIL		
		HVP=20kPa				Soft becoming firm then stiff brown varying to grey slightly sandy slightly gravelly silty CLAY with low cobble content. Gravel is fine to coarse angular to sub-rounded of various lithologies including sandstone and mudstone		
0.50	ES	HVP=55kPa		(1.10)				
0.75	B							
		HVP=90kPa						
1.00	ES							
		HVP=110kPa	75.96	1.20		Very stiff grey varying to brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse angular to sub-rounded of various lithologies including sandstone and mudstone		
				(0.30)				
1.50	ES	HVP=110kPa	75.66	1.50		End of Trial Pit at 1.50m		

1
2
3

Dimensions:

Final Depth: 1.50m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

	Contract Name: Colomendy		Client: Daer Geo		Trial Pit ID: TP209
	Contract Number: CCG-C-20-11469	Date Started: 05-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT
Trial Pit Log	Easting: 305633.3	Northing: 367425.2	Ground Level: 75.64mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020
					Scale: 1:25
Weather:		Hole Termination:		Stability: Stable	Sheet 1 of 1

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			75.44	0.20		Grassed TOPSOIL		
		HVP=50kPa		(0.30)		Firm brown sandy gravelly silty CLAY		
			75.14	0.50		Stiff brown slightly sandy slightly gravelly silty friable CLAY with high cobble content. Gravel is fine to coarse sub-angular to sub-rounded limestone		
		HVP=100kPa						
				(1.00)				
		HVP=110kPa						
			74.14	1.50		End of Trial Pit at 1.50m		

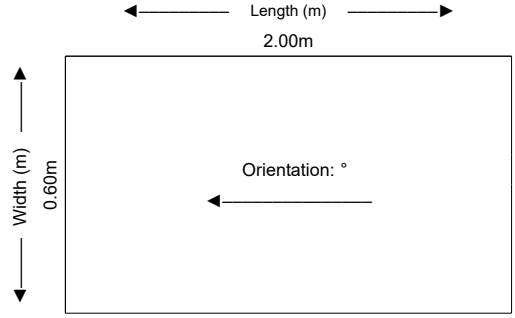
1

2

3

Dimensions:

Final Depth: 1.50m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

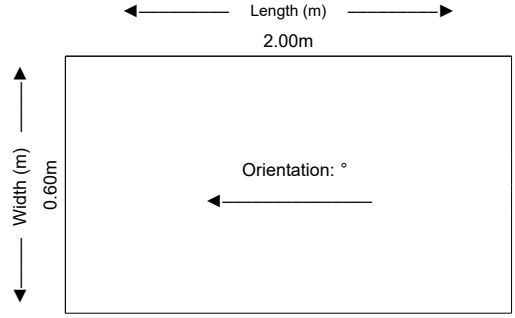
Contract Name: Colomendy		Client: Daer Geo			Trial Pit ID: TP210
Contract Number: CCG-C-20-11469	Date Started: 04-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305643.8	Northing: 367447.4	Ground Level: 75.63mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			75.43	0.20		Grassed TOPSOIL		
		HVP=40kPa				Soft to firm becoming stiff brown slightly sandy slightly gravelly silty CLAY with medium cobble content within bottom third. Gravel is fine to coarse of various angularities and lithologies including sandstone and mudstone		
0.50	ES							
0.75	B	HVP=60kPa						
1.00	ES							
		HVP=110kPa		(1.80)				
1.50	ES	HVP=110kPa						
		HVP=110kPa						
2.00	ES		73.63	2.00		End of Trial Pit at 2.00m		

1 2 3

Dimensions:

Final Depth: 2.00m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

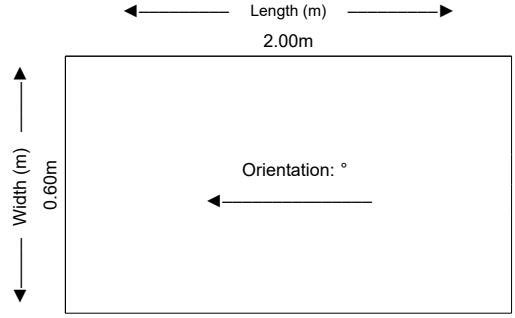
Contract Name: Colomendy			Client: Daer Geo		Trial Pit ID: TP211
Contract Number: CCG-C-20-11469	Date Started: 05-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305637.2	Northing: 367402.7	Ground Level: 75.22mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			75.02	0.20		Grassed TOPSOIL		
		HVP=45kPa	74.82	0.40		Brown slightly sandy slightly gravelly silty CLAY		
0.50	ES	HVP=70kPa		(0.60)		Firm becoming stiff brown slightly sandy slightly gravelly silty friable CLAY. Gravel is fine to coarse sub-angular to sub-rounded limestone, slate and various lithologies		
0.75	B	HVP=100kPa						
1.00	ES		74.22	1.00		Stiff mottled slightly sandy gravelly silty CLAY with medium cobble content. Gravel is fine to coarse angular to sub-rounded of limestone		
1.50	ES	HVP=100kPa		(1.00)				
2.00	ES	HVP=110kPa	73.22	2.00		End of Trial Pit at 2.00m		

1
2
3

Dimensions:

Final Depth: 2.00m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

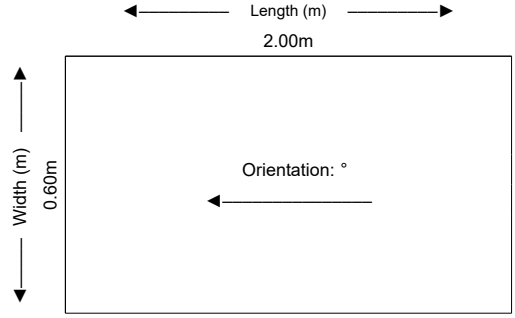
Contract Name: Colomendy			Client: Daer Geo		Trial Pit ID: TP212
Contract Number: CCG-C-20-11469	Date Started: 05-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305669.7	Northing: 367453.5	Ground Level: 73.68mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			73.42	0.25		Grassed TOPSOIL		
		HVP=50kPa				Firm becoming stiff brown slightly sandy slightly gravelly silty CLAY with medium cobble content at around 1.50mbgl. Gravel is fine to coarse angular to sub-rounded of various lithologies		
		HVP=75kPa						
		HVP=100kPa		(1.75)				
		HVP=110kPa						
		HVP=110kPa						
			71.68	2.00		End of Trial Pit at 2.00m		

1
2
3

Dimensions:

Final Depth: 2.00m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

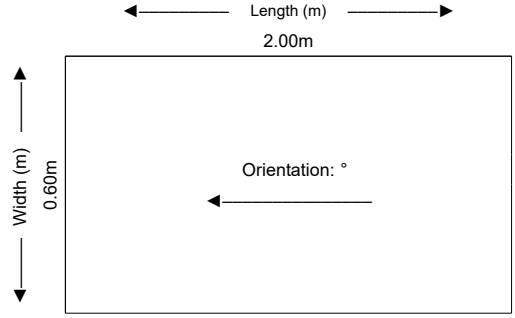
Contract Name: Colomendy			Client: Daer Geo		Trial Pit ID: TP213
Contract Number: CCG-C-20-11469	Date Started: 05-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305663.5	Northing: 367421.4	Ground Level: 73.49mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			73.34	0.15		Grassed brown TOPSOIL		
						Firm becoming stiff brown slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse of various angularities and lithologies including sandstone		
0.50	ES	HVP=50kPa						
0.75	B	HVP=95kPa		(1.45)				
1.00	ES							
		HVP=110kPa						
1.50	ES							
			71.89	1.60		End of Trial Pit at 1.60m		

1 2 3

Dimensions:

Final Depth: 1.60m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

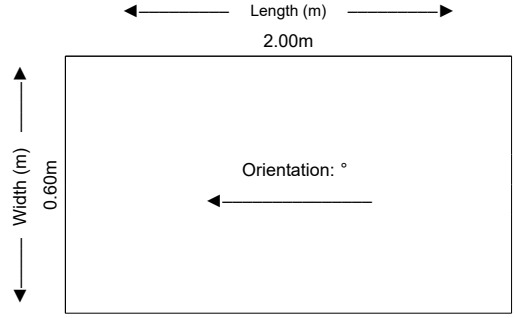
Contract Name: Colomendy			Client: Daer Geo		Trial Pit ID: TP214
Contract Number: CCG-C-20-11469	Date Started: 04-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305552.0	Northing: 367383.0	Ground Level: 78.31mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details					
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description	Water	Backfill
			78.16	0.15		Grassed brown TOPSOIL		
				(0.55)		Stiff brown slightly sandy slightly sandy slightly gravelly silty CLAY with medium cobble content. Gravel is fine to coarse angular to sub-rounded of various lithologies		
0.50	B	HVP=90kPa						
			77.60	0.70		Stiff brown locally grey slightly sandy slightly gravelly silty CLAY with occasional thin sand bands and medium cobble content. Gravel is fine to coarse angular to sub-rounded of various lithologies		
1.00	B	HVP=90kPa						
		HVP=110kPa		(1.10)				
		HVP=110kPa	76.50	1.80		Stiff brown slightly gravelly locally sandy silty CLAY. Gravel is fine to coarse angular to sub-rounded of various lithologies		
2.00	B		76.31	2.00		End of Trial Pit at 2.00m		

1 2 3

Dimensions:

Final Depth: 2.00m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

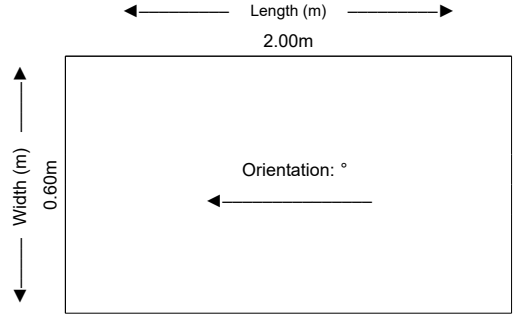
Contract Name: Colomendy			Client: Daer Geo		Trial Pit ID: TP215
Contract Number: CCG-C-20-11469	Date Started: 04-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305583.9	Northing: 367378.9	Ground Level: 77.12mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			77.02	0.10		Grassed TOPSOIL		
		HVP=45kPa				Soft to firm becoming stiff brown slightly sandy slightly gravelly silty CLAY with medium cobble content. Gravel is fine to coarse of various angularities and lithologies including sandstone and mudstone		
0.50	ES							
0.75	B	HVP=70kPa						
1.00	ES	HVP=100kPa		(1.90)				
1.50	ES	HVP=110kPa						
		HVP=110kPa						
2.00	ES		75.12	2.00		End of Trial Pit at 2.00m		

1
2
3

Dimensions:

Final Depth: 2.00m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

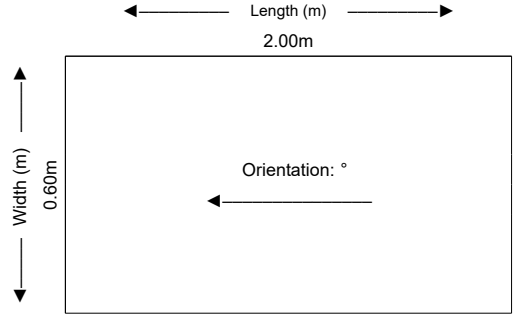
	Contract Name: Colomendy		Client: Daer Geo		Trial Pit ID: TP216
	Contract Number: CCG-C-20-11469	Date Started: 05-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT
Trial Pit Log	Easting: 305616.8	Northing: 367354.6	Ground Level: 74.80mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020
					Sheet 1 of 1
					Scale: 1:25
Weather:		Hole Termination:		Stability: Stable	

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			74.60	0.20		Grassed TOPSOIL		
		HVP=80kPa				Stiff brown slightly sandy slightly gravelly silty CLAY		
		HVP=110kPa		(1.50)				
		HVP=110kPa						
		HVP=110kPa	73.10	1.70		Stiff light brown slightly gravelly sandy silty CLAY		
				(0.30)				
			72.80	2.00		End of Trial Pit at 2.00m		

1
2
3

Dimensions:

Final Depth: 2.00m



Inclination: °

General Remarks:

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

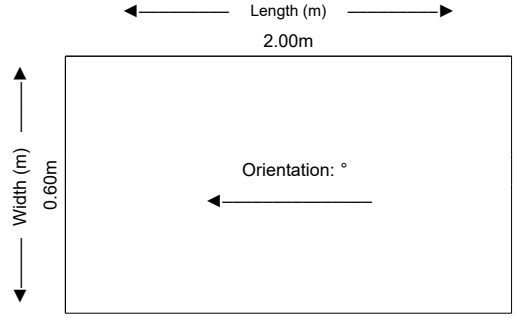
Contract Name: Colomendy			Client: Daer Geo		Trial Pit ID: TP217
Contract Number: CCG-C-20-11469	Date Started: 05-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305660.7	Northing: 367372.9	Ground Level: 73.44mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			73.24	0.20		Grassed TOPSOIL		
		HVP=45kPa				Firm becoming stiff brown slightly sandy slightly gravelly silty CLAY		
		HVP=90kPa						
				(1.50)				
		HVP=110kPa						
		HVP=110kPa						
			71.74	1.70		Stiff light brown locally sandy slightly gravelly		
		HVP=110kPa		(0.30)				
			71.44	2.00		End of Trial Pit at 2.00m		

1 2 3

Dimensions:

Final Depth: 2.00m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

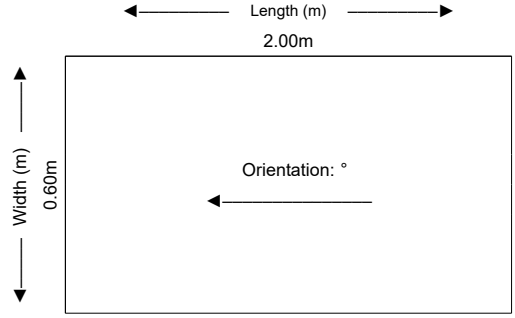
Contract Name: Colomendy			Client: Daer Geo		Trial Pit ID: TP301
Contract Number: CCG-C-20-11469	Date Started: 05-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305684.1	Northing: 367429.4	Ground Level: 72.05mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			71.85	0.20		Grassed TOPSOIL		
						Firm becoming stiff brown slightly sandy slightly gravelly silty CLAY		
0.50	ES	HVP=65kPa						
0.75	B			(1.30)				
		HVP=75kPa						
1.00	ES							
		HVP=100kPa						
1.50	ES		70.55	1.50		Stiff light brown slightly gravelly very sandy silty CLAY. Becoming gravelly silty depth		
		HVP=100kPa						
		HVP=110kPa						
				(1.50)				
		HVP=110kPa						
			69.05	3.00		End of Trial Pit at 3.00m		

1 2 3

Dimensions:

Final Depth: 3.00m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

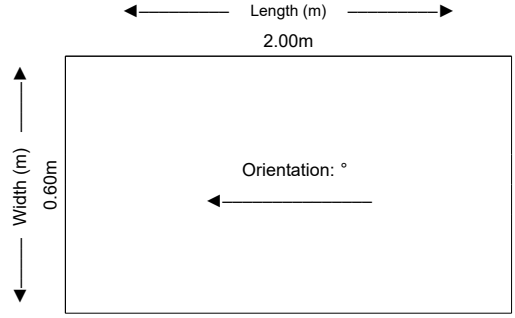
Contract Name: Colomendy		Client: Daer Geo			Trial Pit ID: TP302
Contract Number: CCG-C-20-11469	Date Started: 06-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305708.5	Northing: 367450.2	Ground Level: 70.43mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			70.23	0.20		Grassed TOPSOIL		
		HVP=45kPa				Firm becoming stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse angular to sub-rounded of various lithologies		
		HVP=70kPa						
		HVP=100kPa		(1.40)				
		HVP=110kPa						
			68.83	1.60		Stiff locally sandy slightly gravelly silty CLAY. Gravel is fine to coarse angular to sub-rounded of various lithologies		
		HVP=110kPa		(0.40)				
			68.43	2.00		End of Trial Pit at 2.00m		

1 2 3

Dimensions:

Final Depth: 2.00m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

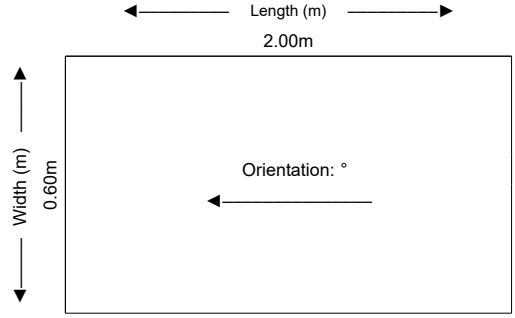
Contract Name: Colomendy			Client: Daer Geo		Trial Pit ID: TP303
Contract Number: CCG-C-20-11469	Date Started: 06-02-2020	Logged By: TG	Checked By:	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305739.0	Northing: 367427.1	Ground Level: 68.27mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			68.17	0.10		Grassed TOPSOIL		
		HVP=30kPa				Soft becoming firm then stiff brown locally light brown slightly sandy slightly gravelly silty CLAY with medium cobble content within bottom third. Gravel is fine to coarse angular to sub-rounded of various lithologies		
0.50	ES	HVP=60kPa		(1.10)				
0.75	B							
1.00	ES	HVP=90kPa						
			67.07	1.20		Light brown slightly silty gravelly locally clayey SAND with medium cobble content. Gravel is fine to coarse angular to sub-rounded of various lithologies		
1.50	ES			(0.80)				
2.00	ES		66.27	2.00		End of Trial Pit at 2.00m		

1
2
3

Dimensions:

Final Depth: 2.00m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

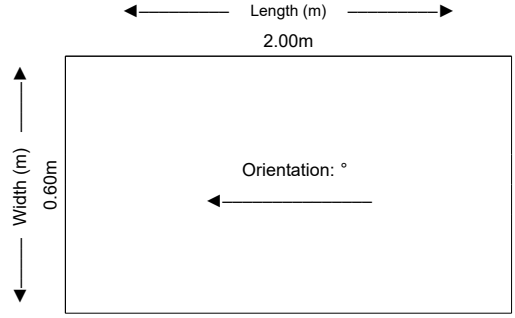
Contract Name: Colomendy			Client: Daer Geo		Trial Pit ID: TP304
Contract Number: CCG-C-20-11469	Date Started: 06-02-2020	Logged By: TG	Checked By:	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305687.3	Northing: 367391.6	Ground Level: 71.86mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			71.61	0.25		Grassed TOPSOIL		
0.50	ES	HVP=70kPa		(1.15)		Firm becoming stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse angular to sub-rounded of various lithologies		
1.00	ES	HVP=95kPa						
		HVP=100kPa	70.46	1.40				
1.50	ES					Brown varying to light brown slightly gravelly clayey fine to coarse grained SAND with low cobble content. Gravel content increasing from c.2.30mbgl		
2.00	ES			(1.10)				
2.50	ES		69.36	2.50		End of Trial Pit at 2.50m		

1 2 3

Dimensions:

Final Depth: 2.50m



Inclination: °

General Remarks:

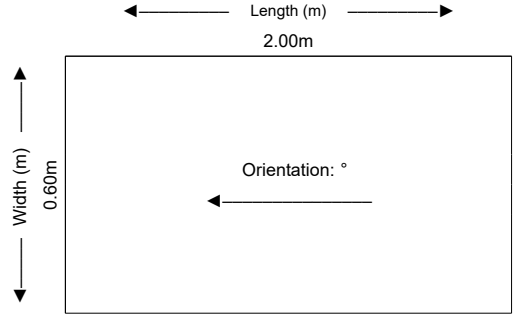
Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

	Contract Name: Colomendy		Client: Daer Geo		Trial Pit ID: TP305
	Contract Number: CCG-C-20-11469	Date Started: 06-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT
Trial Pit Log	Easting: 305709.2	Northing: 367380.9	Ground Level: 70.00mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020
					Sheet 1 of 2
					Scale: 1:25
Weather:		Hole Termination:		Stability: Stable	

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			69.80	0.20		Grassed TOPSOIL		
0.50	ES	HVP=50kPa		(0.70)		Firm becoming stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse angular to sub-rounded of various lithologies including sandstone and mudstone		
			69.10	0.90				
1.00	ES					Brown very clayey sandy GRAVEL. Gravel is fine to coarse of various angularities and lithologies including sandstone and mudstone	1	
1.50	B			(1.00)				
1.50	ES							
			68.10	1.90				
2.00	ES	HVP=110kPa				Stiff brown slightly gravelly sandy silty CLAY. Gravel is fine to coarse angular to sub-rounded of various lithologies including sandstone and mudstone	2	
				(0.50)				
			67.60	2.40				
2.50	ES					Brown very clayey gravelly SAND. Gravel is fine to coarse of various angularities and lithologies including sandstone		
3.00	B						3	
3.00	ES			(1.40)				
3.50	ES							
			66.20	3.80				
						Continued in same stratum		

Dimensions:

Final Depth: 4.00m



Inclination: °

General Remarks:

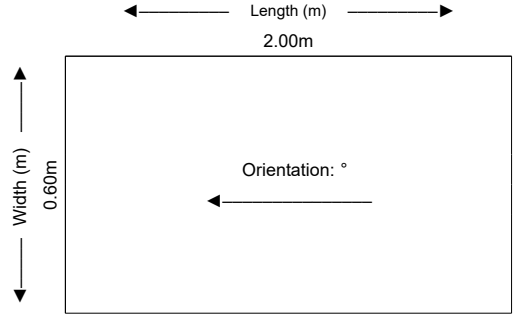
Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

	Contract Name: Colomendy		Client: Daer Geo		Trial Pit ID: TP305
	Contract Number: CCG-C-20-11469	Date Started: 06-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT
Trial Pit Log	Easting: 305709.2	Northing: 367380.9	Ground Level: 70.00mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020
					Scale: 1:25
Weather:		Hole Termination:		Stability: Stable	Sheet 2 of 2

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
4.00	ES		66.00	4.00		Brown sandy clayey SILT End of Trial Pit at 4.00m		

Dimensions:

Final Depth: 4.00m



Inclination: °

General Remarks:

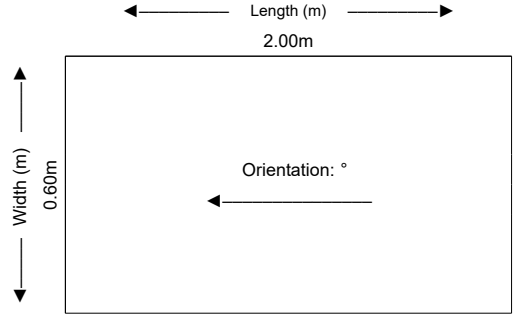
Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Contract Name: Colomendy		Client: Daer Geo			Trial Pit ID: TP306
Contract Number: CCG-C-20-11469	Date Started: 06/02/2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305708.4	Northing: 367352.3	Ground Level: 69.47mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 04/03/2020	Scale: 1:50
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			69.32	0.15		Grassed TOPSOIL		
0.50	ES	HVP=35kPa				Soft to firm becoming firm then stiff brown locally orange slightly sandy slightly gravelly silty CLAY with occasional thin sand bands		
		HVP=70kPa						
1.00	B			(1.55)				
1.00	ES							
1.50	ES	HVP=100kPa						
			67.77	1.70		Red/brown slightly gravelly silty SAND. Gravel is fine to coarse angular to sub-rounded of various lithologies		
2.00	ES			(0.60)				
			67.17	2.30		Grey/brown gravelly clayey SAND. Gravel is fine to coarse angular to sub-rounded of various lithologies		
2.50	B							
2.50	ES			(1.00)				
3.00	ES							
			66.17	3.30		Brown clayey sandy GRAVEL. Gravel is fine to coarse of various angularities and lithologies including sandstone and mudstone		
3.50	B			(0.50)				
3.50	ES							
			65.67	3.80		Stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse angular to sub-rounded of various lithologies		
		HVP=110kPa	65.47	4.00		End of Trial Pit at 4.00m		

Dimensions:

Final Depth: 4.00m



Inclination: °

General Remarks:

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
2.00			0		Seepage

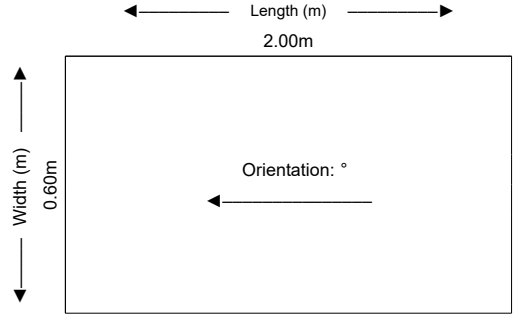
Contract Name: Colomendy			Client: Daer Geo		Trial Pit ID: TP307
Contract Number: CCG-C-20-11469	Date Started: 06-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305727.8	Northing: 367365.4	Ground Level: 68.23mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			68.03	0.20		Grassed TOPSOIL		
		HVP=40kPa				Soft to firm becoming firm then stiff brown slightly sandy slightly gravelly silty CLAY with medium cobble content in bottom third. Gravel is fine to coarse angular to sub-rounded of various lithologies		
0.50	ES							
		HVP=65kPa						
1.00	ES							
		HVP=80kPa						
1.50	B							
1.50 - 3.00	ES			(2.80)				
		HVP=110kPa						
2.00	ES							
		HVP=110kPa						
2.50	ES							
		HVP=110kPa						
3.00	ES		65.23	3.00		End of Trial Pit at 3.00m		

1
2
3

Dimensions:

Final Depth: 3.00m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

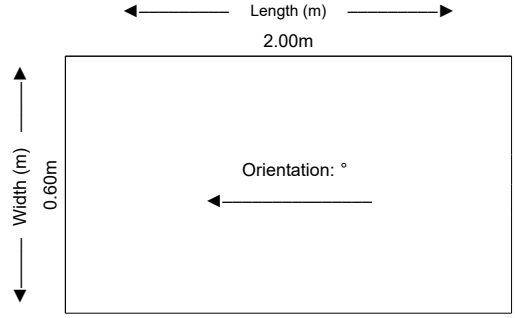
Contract Name: Colomendy			Client: Daer Geo		Trial Pit ID: TP308
Contract Number: CCG-C-20-11469	Date Started: 07-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305679.5	Northing: 367342.5	Ground Level: 71.21mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			71.16	0.05		Grassed TOPSOIL		
						Brown very silty gravelly fine to medium grained SAND with occasional thin clay horizons. Gravel is fine to coarse of various angularities and lithologies including sandstone		
0.50	ES							
1.00	ES							
				(2.35)				
1.50	B							
1.50	ES							
2.00	ES							
			68.81	2.40		Greyish brown silty sandy GRAVEL. Gravel is fine to coarse angular to sub-rounded of various lithologies including sandstone		
2.50	ES							
				(0.60)				
3.00	B		68.21	3.00		End of Trial Pit at 3.00m		
3.00	ES							

1
2
3

Dimensions:

Final Depth: 3.00m



Inclination: °

General Remarks:

Water Strikes

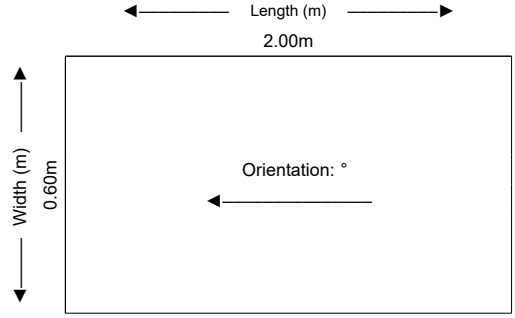
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Contract Name: Colomendy			Client: Daer Geo		Trial Pit ID: TP401
Contract Number: CCG-C-20-11469	Date Started: 06-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305752.0	Northing: 367450.3	Ground Level: 67.82mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			67.67	0.15		Grassed TOPSOIL		
						Soft becoming firm then stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse angular to sub-rounded of various lithologies		
0.50	ES	HVP=30kPa						
				(1.15)				
		HVP=70kPa						
1.00	B							
1.00	ES					1		
		HVP=70kPa						
			66.52	1.30		Light brown slightly gravelly locally clayey fine to coarse grained SAND		
1.50	ES							
				(0.50)				
			66.02	1.80		Firm to stiff light brown varying to brown slightly sandy slightly gravelly silty CLAY with occasional thin sand bands		
		HVP=75kPa						
2.00	B							
2.00	ES					2		
		HVP=110kPa						
				(1.20)				
2.50	ES							
		HVP=110kPa						
		HVP=110kPa						
3.00	ES		64.82	3.00		End of Trial Pit at 3.00m		
						3		

Dimensions:

Final Depth: 3.00m



Inclination: °

General Remarks:

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
2.20			0		Slight seepage

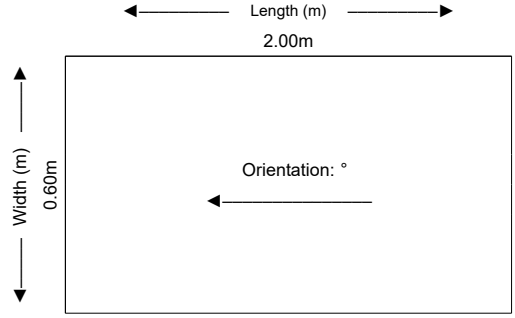
Contract Name: Colomendy			Client: Daer Geo		Trial Pit ID: TP402
Contract Number: CCG-C-20-11469	Date Started: 06-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305744.1	Northing: 367400.0	Ground Level: 67.65mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			67.50	0.15		Grassed TOPSOIL		
						Firm becoming stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse angular to sub-rounded of various lithologies		
0.50	ES	HVP=60kPa						
		HVP=90kPa						
1.00	B							
1.00	ES			(1.95)				
		HVP=100kPa						
1.50	ES							
		HVP=90kPa						
2.00	ES							
			65.55	2.10		Grey/brown clayey SAND and GRAVEL. Gravel is fine to coarse angular to sub-rounded of various lithologies		
2.30	ES			(0.40)				
2.50	ES		65.15	2.50		End of Trial Pit at 2.50m		

1 2 3

Dimensions:

Final Depth: 2.50m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

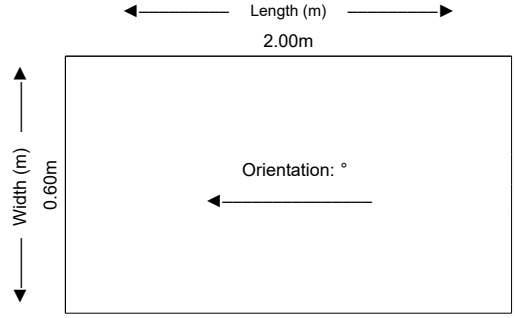
Contract Name: Colomendy			Client: Daer Geo		Trial Pit ID: TP403
Contract Number: CCG-C-20-11469	Date Started: 07-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305743.6	Northing: 367371.5	Ground Level: 67.25mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			67.15	0.10		Grassed TOPSOIL		
						Firm becoming stiff brown slightly sandy slightly gravelly silty friable CLAY		
0.50	ES	HVP=65kPa HVP=90kPa						
0.75	B			(1.30)				
1.00	ES							
		HVP=100kPa						
			65.85	1.40		Brown gravelly silty fine to medium grained SAND. Gravel is fine to coarse of various angularities and lithologies including sandstone		
1.50	ES							
				(0.50)				
			65.35	1.90		Stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse of various angularities and lithologies including sandstone		
2.00	ES							
		HVP=110kPa						
				(0.50)				
		HVP=110kPa	64.85	2.40		Brown clayey gravelly fine to medium grained SAND. Gravel is fine to coarse of various angularities and lithologies including sandstone		
2.50	ES		64.75	2.50		End of Trial Pit at 2.50m		

1
2
3

Dimensions:

Final Depth: 2.50m



Inclination: °

General Remarks:

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

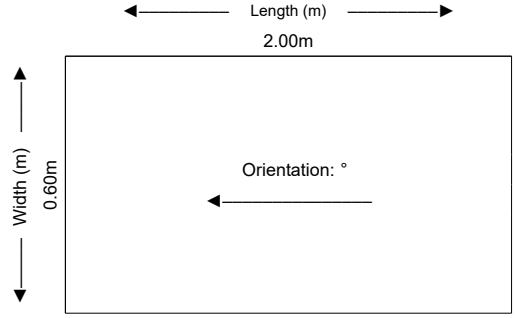
	Contract Name: Colomendy		Client: Daer Geo		Trial Pit ID: TP404
	Contract Number: CCG-C-20-11469	Date Started: 06-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT
Trial Pit Log	Easting: 305739.9	Northing: 367340.2	Ground Level: 66.94mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020
					Scale: 1:25
Weather:		Hole Termination:		Stability: Stable	Sheet 1 of 1

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			66.84	0.10		Grassed TOPSOIL		
						Firm becoming stiff brown varying to grey slightly sandy slightly gravelly silty CLAY with occasional thin sand bands. Gravel is fine to coarse angular to sub-rounded of various lithologies including sandstone		
0.50	ES	HVP=40kPa						
0.75	B							
1.00	ES	HVP=70kPa		(1.70)				
		HVP=70kPa						
1.50	ES							
		HVP=90kPa	65.14	1.80		Stiff grey varying to brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse angular to sub-rounded of various lithologies including sandstone		
2.00	ES							
		HVP=110kPa		(0.70)				
			64.44	2.50		End of Trial Pit at 2.50m		

1 2 3

Dimensions:

Final Depth: 2.50m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

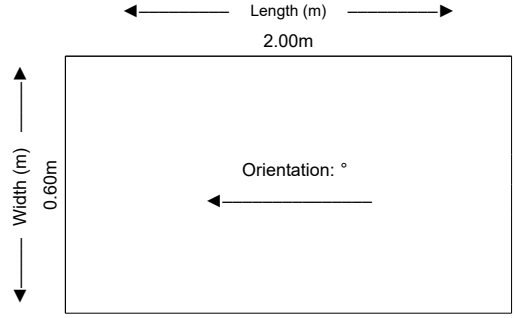
	Contract Name: Colomendy		Client: Daer Geo		Trial Pit ID: TP405
	Contract Number: CCG-C-20-11469	Date Started: 06-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT
Trial Pit Log	Easting: 305770.7	Northing: 367424.1	Ground Level: 66.15mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020
					Scale: 1:25
Weather:		Hole Termination:		Stability: Stable	Sheet 1 of 1

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			66.00	0.15		Grassed TOPSOIL		
						Firm becoming stiff brown slightly sandy slightly gravelly silty CLAY		
		HVP=50kPa						
0.50	ES							
0.75	B	HVP=80kPa						
1.00	ES			(1.85)				
		HVP=110kPa						
1.50	ES							
		HVP=110kPa						
		HVP=110kPa						
2.00	ES		64.15	2.00		End of Trial Pit at 2.00m		

1 2 3

Dimensions:

Final Depth: 2.00m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

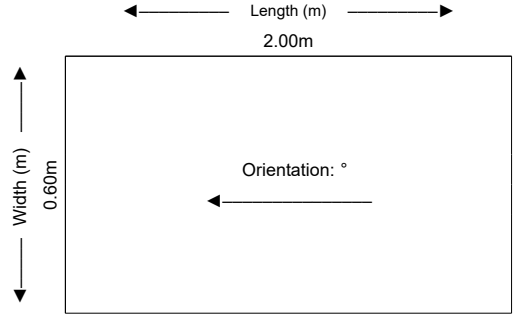
Contract Name: Colomendy			Client: Daer Geo		Trial Pit ID: TP406
Contract Number: CCG-C-20-11469	Date Started: 06-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305768.2	Northing: 367385.1	Ground Level: 66.12mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			65.92	0.20		Grassed TOPSOIL		
						Firm becoming stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse angular to sub-rounded of various lithologies including sandstone		
0.50	ES	HVP=65kPa						
0.75	B							
		HVP=80kPa						
1.00	ES			(1.80)				
		HVP=100kPa						
1.50	ES							
		HVP=110kPa						
		HVP=110kPa						
2.00	ES		64.12	2.00		End of Trial Pit at 2.00m		

1 2 3

Dimensions:

Final Depth: 2.00m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

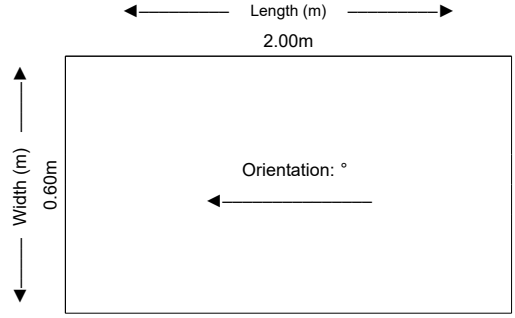
	Contract Name: Colomendy		Client: Daer Geo		Trial Pit ID: TP407
	Contract Number: CCG-C-20-11469	Date Started: 06-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT
Trial Pit Log	Easting: 305807.9	Northing: 367451.6	Ground Level: 64.57mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020
					Scale: 1:25
Weather:		Hole Termination:		Stability: Stable	Sheet 1 of 1

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			64.47	0.10		Grassed TOPSOIL		
		HVP=45kPa		(0.30)		Soft to firm brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse angular to sub-rounded of various lithologies		
			64.17	0.40		Poorly compacted locally silty fine to medium grained SAND (water bearing)		
				(0.50)				
			63.67	0.90		Firm becoming stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse angular to sub-rounded of various lithologies		
		HVP=50kPa		(0.60)				
		HVP=90kPa						
		HVP=110kPa						
			63.07	1.50		End of Trial Pit at 1.50m		

1
2
3

Dimensions:

Final Depth: 1.50m



Inclination: °

General Remarks:

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

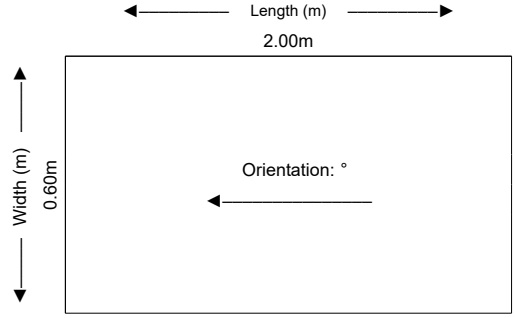
Contract Name: Colomendy			Client: Daer Geo		Trial Pit ID: TP408
Contract Number: CCG-C-20-11469	Date Started: 06-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305795.8	Northing: 367410.0	Ground Level: 64.32mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			64.07	0.25		Grassed TOPSOIL		
		HVP=55kPa				Firm becoming stiff brown slightly sandy slightly gravelly silty CLAY with low cobble content and occasional thin sand bands. Gravel is fine to coarse angular to sub-rounded of various lithologies		
				(1.25)				
		HVP=90kPa						
		HVP=110kPa	62.82	1.50		End of Trial Pit at 1.50m		

1
2
3

Dimensions:

Final Depth: 1.50m



Inclination: °

General Remarks:

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
1.30			0		Slight seepage

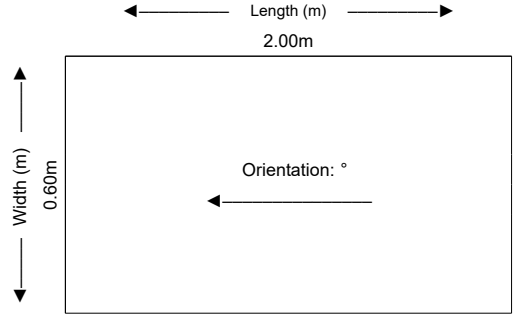
Contract Name: Colomendy		Client: Daer Geo			Trial Pit ID: TP409
Contract Number: CCG-C-20-11469	Date Started: 06-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305795.5	Northing: 367368.9	Ground Level: 64.18mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			63.93	0.25		Grassed TOPSOIL		
		HVP=40kPa				Soft becoming firm to stiff locally soft brown slightly sandy slightly gravelly silty CLAY with low cobble content. Gravel is fine to coarse angular to sub-rounded of various lithologies		
		HVP=60kPa						
		HVP=35kPa		(1.25)				
		HVP=100kPa						
		HVP=110kPa						
			62.68	1.50		End of Trial Pit at 1.50m		

1
2
3

Dimensions:

Final Depth: 1.50m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

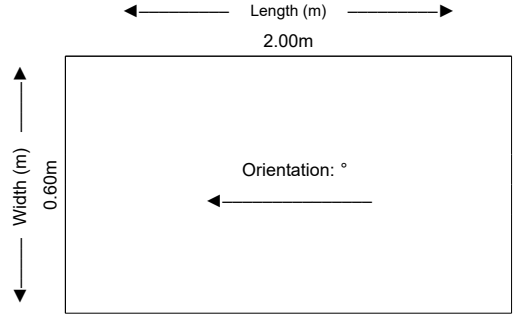
Contract Name: Colomendy			Client: Daer Geo		Trial Pit ID: TP501
Contract Number: CCG-C-20-11469	Date Started: 07-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305833.9	Northing: 367456.8	Ground Level: 63.38mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			63.24	0.15		Grassed TOPSOIL		
						Brown slightly gravelly sandy CLAY with occasional thin sand bands. Gravel is fine to coarse angular to sub-rounded of various lithologies including sandstone and mudstone		
0.50	ES	HVP=75kPa						
		HVP=70kPa						
1.00	B							
1.00	ES	HVP=75kPa						
		HVP=100kPa		(2.35)				
1.50	ES							
		HVP=100kPa						
2.00	B							
2.00	ES							
		HVP=110kPa						
2.50	ES		60.88	2.50		End of Trial Pit at 2.50m		

1 2 3

Dimensions:

Final Depth: 2.50m



Inclination: °

General Remarks:

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
1.50			0		Slight seepage

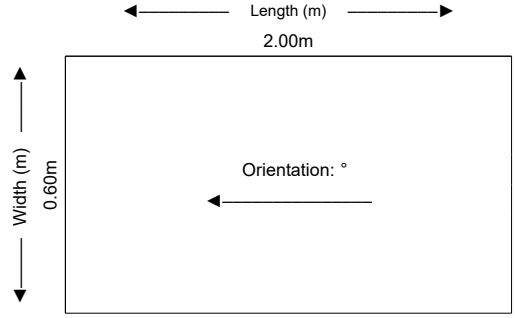
Contract Name: Colomendy			Client: Daer Geo		Trial Pit ID: TP502
Contract Number: CCG-C-20-11469	Date Started: 07-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305820.6	Northing: 367429.3	Ground Level: 63.39mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			63.24	0.15		Grassed TOPSOIL		
			63.09	0.30		Brown slightly gravelly sandy CLAY. Gravel is fine to coarse angular to sub-rounded of various lithologies including sandstone		
		HVP=25kPa				Soft becoming firm then stiff brown locally sandy slightly gravelly silty CLAY with occasional thin sand bands. Gravel is fine to coarse angular to sub-rounded of various lithologies		
0.50	ES							
		HVP=50kPa						
1.00	B	HVP=80kPa						
1.00	ES			(1.50)				
		HVP=90kPa						
1.50	ES							
		HVP=110kPa						
			61.59	1.80		Stiff slightly sandy slightly gravelly silty CLAY with medium cobble content. Gravel is fine to coarse angular to sub-rounded of various lithologies		
		HVP=110kPa						
2.00	B		61.39	2.00		End of Trial Pit at 2.00m		
2.00	ES							

1 2 3

Dimensions:

Final Depth: 2.00m



Inclination: °

General Remarks:

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
1.00			0		Seepage

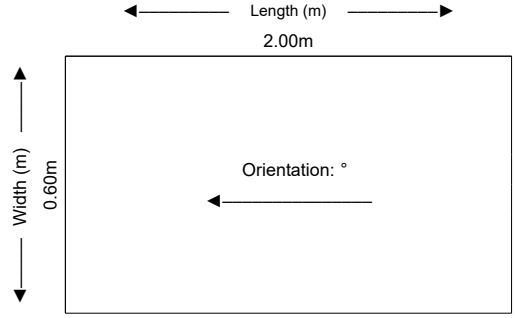
Contract Name: Colomendy			Client: Daer Geo		Trial Pit ID: TP503
Contract Number: CCG-C-20-11469	Date Started: 07-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305846.8	Northing: 367409.5	Ground Level: 62.09mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			61.89	0.20		Grassed TOPSOIL		
0.50	ES	HVP=60kPa				Firm becoming stiff brown slightly sandy slightly gravelly silty CLAY with low cobble content. Gravel is fine to coarse angular to sub-rounded of various lithologies including sandstone and mudstone		
0.75	B			(1.30)				
		HVP=75kPa						
1.00	ES							
		HVP=100kPa						
1.50	ES	HVP=110kPa	60.59	1.50		End of Trial Pit at 1.50m		

1 2 3

Dimensions:

Final Depth: 1.50m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

	Contract Name: Colomendy		Client: Daer Geo		Trial Pit ID: TP504
	Contract Number: CCG-C-20-11469	Date Started: 07-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT
Trial Pit Log	Easting: 305845.2	Northing: 367371.5	Ground Level: 61.95mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020
					Scale: 1:25
Weather: Overcast		Hole Termination:		Stability: Stable	Sheet 1 of 1

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			61.85	0.10		Grassed TOPSOIL		
						Brown slightly gravelly sandy CLAY		
			61.60	0.35		Firm varying to stiff brown locally grey slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse angular to sub-rounded of various lithologies		
		HVP=50kPa						
		HVP=60kPa		(1.15)				
		HVP=90kPa						
		HVP=110kPa						
			60.45	1.50		End of Trial Pit at 1.50m		

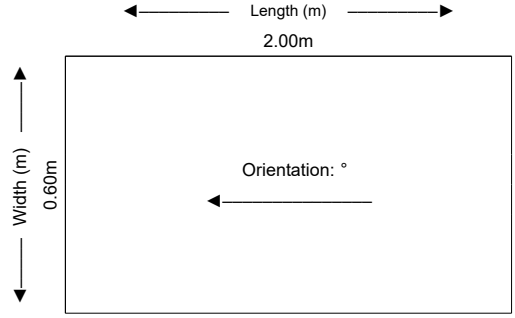
1

2

3

Dimensions:

Final Depth: 1.50m



Inclination: °

General Remarks:

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

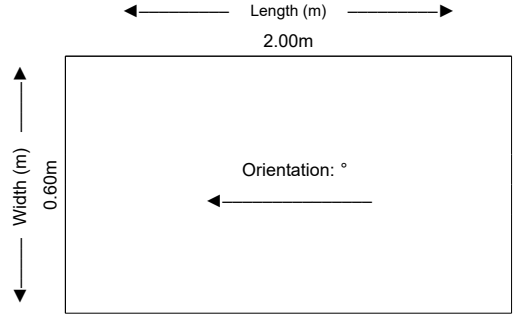
Contract Name: Colomendy			Client: Daer Geo		Trial Pit ID: TP505
Contract Number: CCG-C-20-11469	Date Started: 07-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305815.7	Northing: 367352.7	Ground Level: 63.06mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			62.86	0.20		Grassed TOPSOIL		
		HVP=60kPa				Firm to stiff becoming stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse angular to sub-rounded of various lithologies including sandstone		
0.50	ES							
0.75	B	HVP=90kPa		(1.30)				
1.00	ES							
		HVP=110kPa						
		HVP=110kPa						
1.50	ES		61.56	1.50		End of Trial Pit at 1.50m		

1 2 3

Dimensions:

Final Depth: 1.50m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

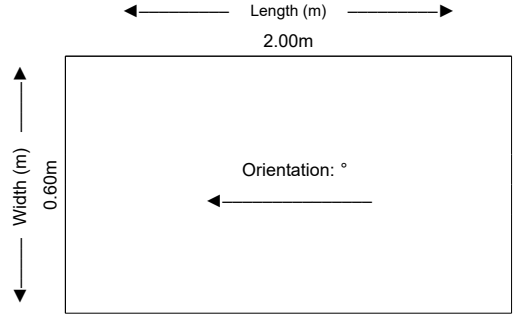
CCG	Contract Name: Colomendy		Client: Daer Geo		Trial Pit ID: TP506
	Contract Number: CCG-C-20-11469	Date Started: 07-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT — Sheet 1 of 1
Trial Pit Log	Easting: 305882.8	Northing: 367455.7	Ground Level: 61.21mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020 — Scale: 1:25
Weather:		Hole Termination:		Stability: Stable	

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			61.06	0.15		Grassed TOPSOIL		
		HVP=40kPa				Soft to firm becoming stiff brown slightly sandy slightly gravelly silty CLAY with occasional thin sand bands. Gravel is fine to coarse angular to sub-rounded of various lithologies		
		HVP=60kPa		(1.35)				
		HVP=100kPa						
		HVP=110kPa						
			59.71	1.50		End of Trial Pit at 1.50m		

1 2 3

Dimensions:

Final Depth: 1.50m



Inclination: °

General Remarks:

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
0.80			0		Slight seepage

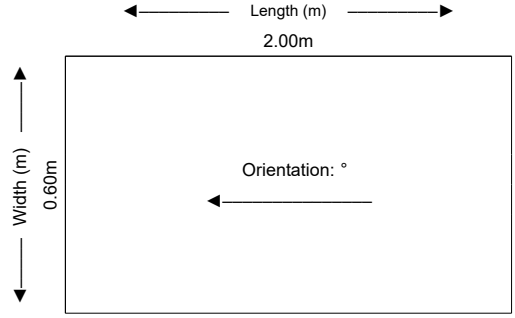
Contract Name: Colomendy			Client: Daer Geo		Trial Pit ID: TP507
Contract Number: CCG-C-20-11469	Date Started: 07-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305921.2	Northing: 367453.7	Ground Level: 60.11mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			59.91	0.20		Grassed TOPSOIL		
		HVP=15kPa				Soft varying to firm then stiff brown slightly sandy slightly gravelly silty CLAY with occasional thin sand bands. Gravel is fine to coarse of various angularities and lithologies including sandstone mudstone and quartz		
0.50	ES							
		HVP=35kPa						
1.00	B	HVP=50kPa						
1.00	ES			(1.80)				
1.50	ES	HVP=100kPa						
		HVP=110kPa						
2.00	ES		58.11	2.00		End of Trial Pit at 2.00m		

1 2 3

Dimensions:

Final Depth: 2.00m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

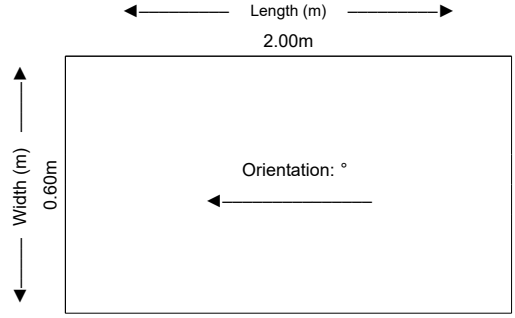
Contract Name: Colomendy			Client: Daer Geo		Trial Pit ID: TP508
Contract Number: CCG-C-20-11469	Date Started: 07-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305879.4	Northing: 367422.3	Ground Level: 60.60mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			60.45	0.15		Grassed TOPSOIL		
		HVP=20kPa				Soft becoming firm then stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse angular to sub-rounded of various lithologies		
0.50	ES	HVP=45kPa						
		HVP=80kPa		(1.35)				
1.00	ES							
		HVP=100kPa						
1.50	ES	HVP=110kPa	59.10	1.50		End of Trial Pit at 1.50m		

1 2 3

Dimensions:

Final Depth: 1.50m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

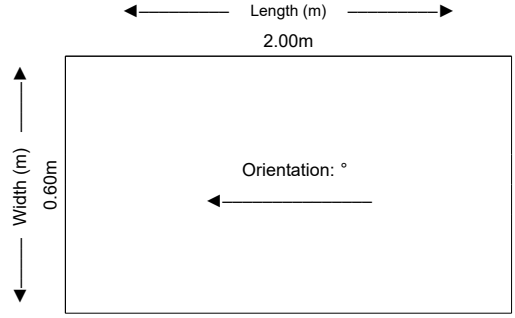
Contract Name: Colomendy		Client: Daer Geo			Trial Pit ID: TP509
Contract Number: CCG-C-20-11469	Date Started: 07-02-2020	Logged By: TG	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305909.5	Northing: 367428.7	Ground Level: 59.68mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details					
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description	Water	Backfill
			59.53	0.15		Grassed TOPSOIL		
						Firm becoming stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse angular to sub-rounded of various lithologies including sandstone and mudstone		
0.50	ES	HVP=50kPa						
		HVP=65kPa						
1.00	B							
1.00	ES			(1.85)				
		HVP=80kPa						
1.50	ES							
		HVP=110kPa						
2.00	ES		57.68	2.00		End of Trial Pit at 2.00m		

1 2 3

Dimensions:

Final Depth: 2.00m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

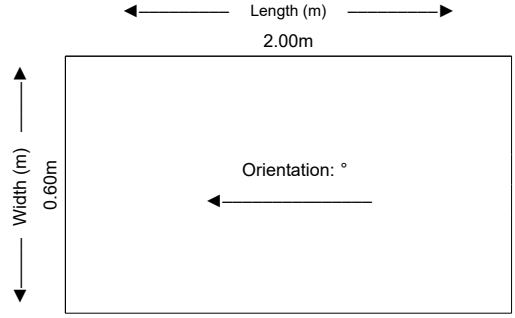
Contract Name: Colomendy			Client: Daer Geo		Trial Pit ID: TP510
Contract Number: CCG-C-20-11469	Date Started: 07-02-2020	Logged By: TG	Checked By:	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305943.7	Northing: 367400.8	Ground Level: 57.84mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			57.64	0.20		Grassed TOPSOIL		
		HVP=20kPa		(0.30)		Soft brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse sub-angular to rounded of various lithologies		
0.50	ES	HVP=50kPa	57.34	0.50		Firm becoming stiff brown slightly sandy slightly gravelly silty CLAY with low cobble content. Gravel is fine to coarse angular to sub-rounded of various lithologies		
		HVP=80kPa						
1.00	ES			(1.00)				
		HVP=110kPa						
		HVP=110kPa						
			56.34	1.50		End of Trial Pit at 1.50m		

1
2
3

Dimensions:

Final Depth: 1.50m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

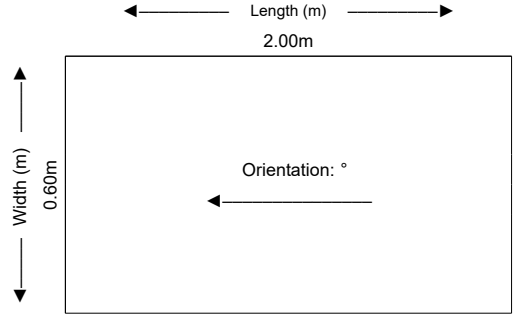
	Contract Name: Colomendy		Client: Daer Geo		Trial Pit ID: TP511
	Contract Number: CCG-C-20-11469	Date Started: 07-02-2020	Logged By: TG	Checked By:	Status: DRAFT
Trial Pit Log	Easting: 305864.6	Northing: 367384.9	Ground Level: 61.02mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020
					Scale: 1:25
Weather:		Hole Termination:		Stability: Stable	Sheet 1 of 1

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			60.87	0.15		Grassed TOPSOIL		
						Firm to stiff becoming stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse angular to sub-rounded of various lithologies		
0.50	ES	HVP=75kPa		(1.35)				
		HVP=100kPa						
1.00	ES							
		HVP=110kPa						
		HVP=110kPa						
			59.52	1.50		End of Trial Pit at 1.50m		

1 2 3

Dimensions:

Final Depth: 1.50m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

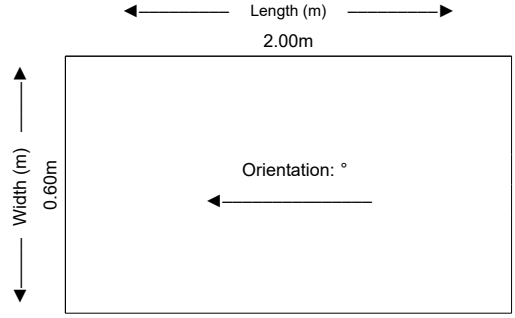
Contract Name: Colomendy			Client: Daer Geo		Trial Pit ID: TP512
Contract Number: CCG-C-20-11469	Date Started: 07-02-2020	Logged By: TG	Checked By:	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305898.7	Northing: 367396.8	Ground Level: 59.48mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			59.38	0.10		Grassed TOPSOIL		
		HVP=40kPa				Soft to firm becoming firm then stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse angular to sub-rounded of various lithologies		
0.50	ES							
0.75	B	HVP=75kPa		(1.50)				
1.00	ES							
		HVP=100kPa						
1.50	ES	HVP=110kPa						
			57.88	1.60		End of Trial Pit at 1.60m		

1
2
3

Dimensions:

Final Depth: 1.60m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Contract Name: Colomendy			Client: Daer Geo		Trial Pit ID: TP513
Contract Number: CCG-C-20-11469	Date Started: 07-02-2020	Logged By: TG	Checked By:	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305885.6	Northing: 367366.6	Ground Level: 59.87mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			59.72	0.15		Grassed TOPSOIL		
						Stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse angular to sub-rounded of various lithologies		
0.50	ES	HVP=80kPa						
		HVP=110kPa		(1.35)				
1.00	ES							
		HVP=110kPa						
1.50	B	HVP=110kPa	58.37	1.50				
1.50	ES					End of Trial Pit at 1.50m		

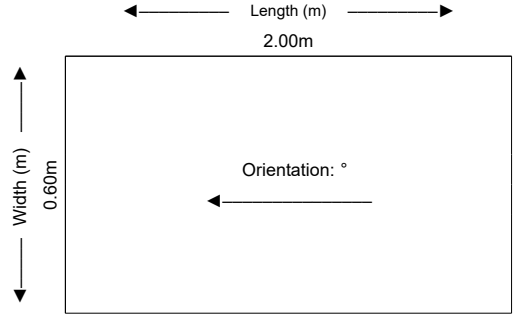
1

2

3

Dimensions:

Final Depth: 1.50m



Inclination: °

General Remarks:

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

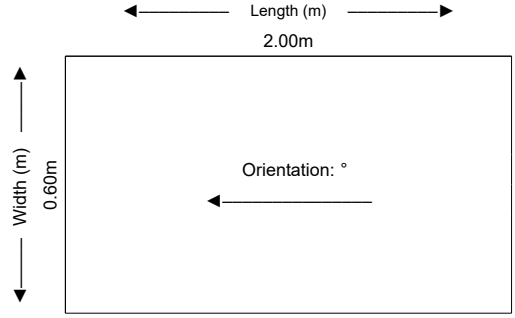
	Contract Name: Colomendy		Client: Daer Geo		Trial Pit ID: TP514
	Contract Number: CCG-C-20-11469	Date Started: 07-02-2020	Logged By: TG	Checked By:	Status: DRAFT
Trial Pit Log	Easting: 305917.5	Northing: 367367.9	Ground Level: 58.59mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020
					Scale: 1:25
Weather:		Hole Termination:		Stability: Stable	Sheet 1 of 1

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			58.49	0.10		Grassed TOPSOIL		
		HVP=40kPa		(0.40)		Soft to firm light brown slightly gravelly slightly sandy silty friable CLAY		
			58.09	0.50		Firm becoming stiff mottled brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse angular to sub-rounded of various lithologies		
		HVP=70kPa						
				(1.00)				
		HVP=80kPa						
		HVP=100kPa						
			57.09	1.50		End of Trial Pit at 1.50m		

1
2
3

Dimensions:

Final Depth: 1.50m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

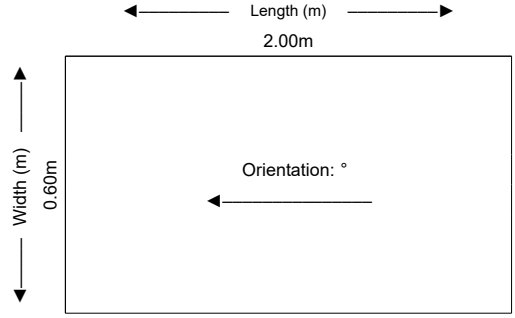
Contract Name: Colomendy		Client: Daer Geo			Trial Pit ID: TP515
Contract Number: CCG-C-20-11469	Date Started: 07-02-2020	Logged By: TG	Checked By:	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305916.6	Northing: 367353.2	Ground Level: 58.34mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
			58.19	0.15		Grassed TOPSOIL		
		HVP=50kPa				Soft to firm varying to stiff brown locally grey slightly sandy slightly gravelly silty CLAY with occasional thin sand bands. gravel is fine to coarse angular to sub-rounded of various lithologies		
		HVP=75kPa		(1.35)				
		HVP=100kPa						
		HVP=110kPa						
			56.84	1.50		End of Trial Pit at 1.50m		

1 2 3

Dimensions:

Final Depth: 1.50m



Inclination: °

General Remarks:

Water Strikes					
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

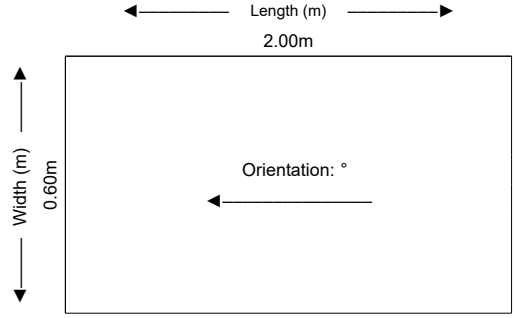
Contract Name: Colomendy		Client: Daer Geo			Trial Pit ID: TP516
Contract Number: CCG-C-20-11469	Date Started: 07-02-2020	Logged By: TG	Checked By:	Status: DRAFT	Sheet 1 of 1
Trial Pit Log	Easting: 305957.0	Northing: 367380.5	Ground Level: 56.41mAOD	Plant Used: Hitachi Zaxis 70LC	Date Printed: 02-03-2020	Scale: 1:25
Weather:	Hole Termination:		Stability: Stable		

Samples & In Situ Testing			Strata Details					
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description	Water	Backfill
			56.21	0.20		Grassed TOPSOIL		
0.50	ES	HVP=10kPa HVP=20kPa		(0.60)		Soft brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse sub-angular to rounded of various lithologies		
			55.61	0.80				
1.00	ES	HVP=50kPa HVP=100kPa		(0.70)		Firm becoming stiff brown slightly sandy slightly gravelly silty CLAY with gravel content increasing with depth. Gravel is fine to coarse angular to rounded of various lithologies		
			54.91	1.50		End of Trial Pit at 1.50m		

1 2 3

Dimensions:

Final Depth: 1.50m



Inclination: °

General Remarks:

Pit filling with perched surface water

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

APPENDIX E: TRIAL PIT PHOTOGRAPHS

TP101 Soil profile
TP101 Soil Arisings

TP102 Soil profile
TP102 Soil Arisings

TP103 Soil profile
TP103 Soil Arisings

TP104 Soil profile
TP104 Soil Arisings

TP105 Soil profile
TP105 Soil Arisings

TP106 Soil profile
TP106 Soil Arisings

TP107 Soil Profile
TP107 Soil Arisings

TP108 Soil profile
TP108 Soil Arisings

TP109 Soil arisings. Buried water line set at 0.35mbgl.
Pipe fully repaired before reburying and reinstatement works
Trial pit base set at 1mbgl on stiff clay (HSV at 1mbgl = 110 Cu(kN/m^2)

TP110 Soil Profile
TP110 Soil Arisings

TP111 Soil Profile
TP111 Soil Arisings

TP112 Soil Profile
TP112 Soil Arisings

TP113 Soil Profile
TP113 Soil Arisings

TP201 Soil Profile
TP202 Soil Profile

TP203 Soil Profile
TP204 Soil Profile

TP206 Soil Profile
TP207 Soil Profile

TP208 Soil Profile
TP209 Soil Profile

TP210 Soil Profile
TP211 Soil Profile

TP212 Soil Profile
TP213 Soil Profile

TP214 Soil Profile
TP215 Soil Profile

TP216 Soil Profile
TP217 Soil Profile

TP301 Soil Profile
TP302 Soil Profile

TP303 Soil Profile
TP304 Soil Profile

TP305 Soil Profile
TP306 Soil Profile

TP307 Soil Profile
TP308 Soil Profile

TP401 Soil Profile
TP402 Soil Profile

TP403 Soil Profile
TP404 Soil Profile

TP405 Soil Profile
TP406 Soil Profile

TP407 Soil Profile
TP408 Soil Profile

TP409 Soil Profile
TP501 Soil Profile

TP502 Soil Profile
TP503 Soil Profile

TP504 Soil Profile
TP505 Soil Profile

TP506 Soil Profile
TP507 Soil Profile

TP508 Soil Profile
TP509 Soil Profile

TP510 Soil Profile
TP511 Soil Profile

TP512 Soil Profile
TP513 Soil Profile

TP514 Soil Profile
TP515 Soil Profile

TP516 Soil Profile

APPENDIX F: SOIL CLASSIFICATION TESTS RESULTS

Units 1 & 2
Deltic Place
Deltic Way
Knowsley Industrial Estate
Liverpool
L33 7BU

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www.ccgeotechnical.com

CC GEOTECHNICAL LTD
Consulting Geoenvironmental and Geotechnical Engineers

LABORATORY REPORT

CONTRACT NUMBER: CCG-C-20-11469

CONTRACT TITLE: COLOMENDY EXTENSION, DENBIGH

CLIENT: DAEAR GEO CONSULTING

DATE RECEIVED: 19/02/20
DATE COMMENCED: 19/02/20
DATE COMPLETED: 20/03/20
REPORT DATE: 20/03/20

Test Description	Qty
Determination of Moisture Content BS 1377-2:1990 (a)	117
Determination of Liquid & Plastic Limits BS 1377-2:1990 (a)	28
Particle Size Distribution BS 1377-2:1990 (a)	30
One-Dimensional Consolidation BS 1377-5:1990 (a)	1
Consolidated Undrained Triaxial Compression Test BS 1377-8:1990 (s)	2
Particle Density BS 1377-2:1990 (s)	5
Determination of California Bearing Ratio BS 1377-4:1990 (#)	4
Dry Density / Moisture Content Relationship (one point) BS 1377-4:1990 (#)	7
Dry Density / Moisture Content Relationship (five point) BS 1377-4:1990 (#)	10

Notes: Observations and interpretations are not accredited by UKAS
All testing undertaken at laboratory permanent facilities
# denotes non-accredited test
a denotes UKAS accredited test
s denotes test undertaken by approved subcontractor

Test results only relate to the samples tested

Approved Signatories: Chris Bolan (Managing Director) – Daniel Kerfoot (Laboratory Manager)

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Shear Strength (kN/m^2)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
BH101	B	0.50	0.50	27	-	-	-	39	22	17	81	CI	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse subangular to subrounded sandstone. (BS1377Pt2:3.2,4.4,5)
BH101	B	1.50	1.50	17	-	-	-	31	16	15	83	CL	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse subangular to subrounded sandstone. (BS1377Pt2:3.2,4.4,5)
BH101	B	2.50	2.50	18	-	-	-	32	17	15	88	CL	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse subangular to subrounded sandstone. (BS1377Pt2:3.2,4.4,5)
BH101	U	3.00	3.45	16	-	-	>110	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse subangular to subrounded sandstone. (BS1377Pt2:3.2)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 27.02.20

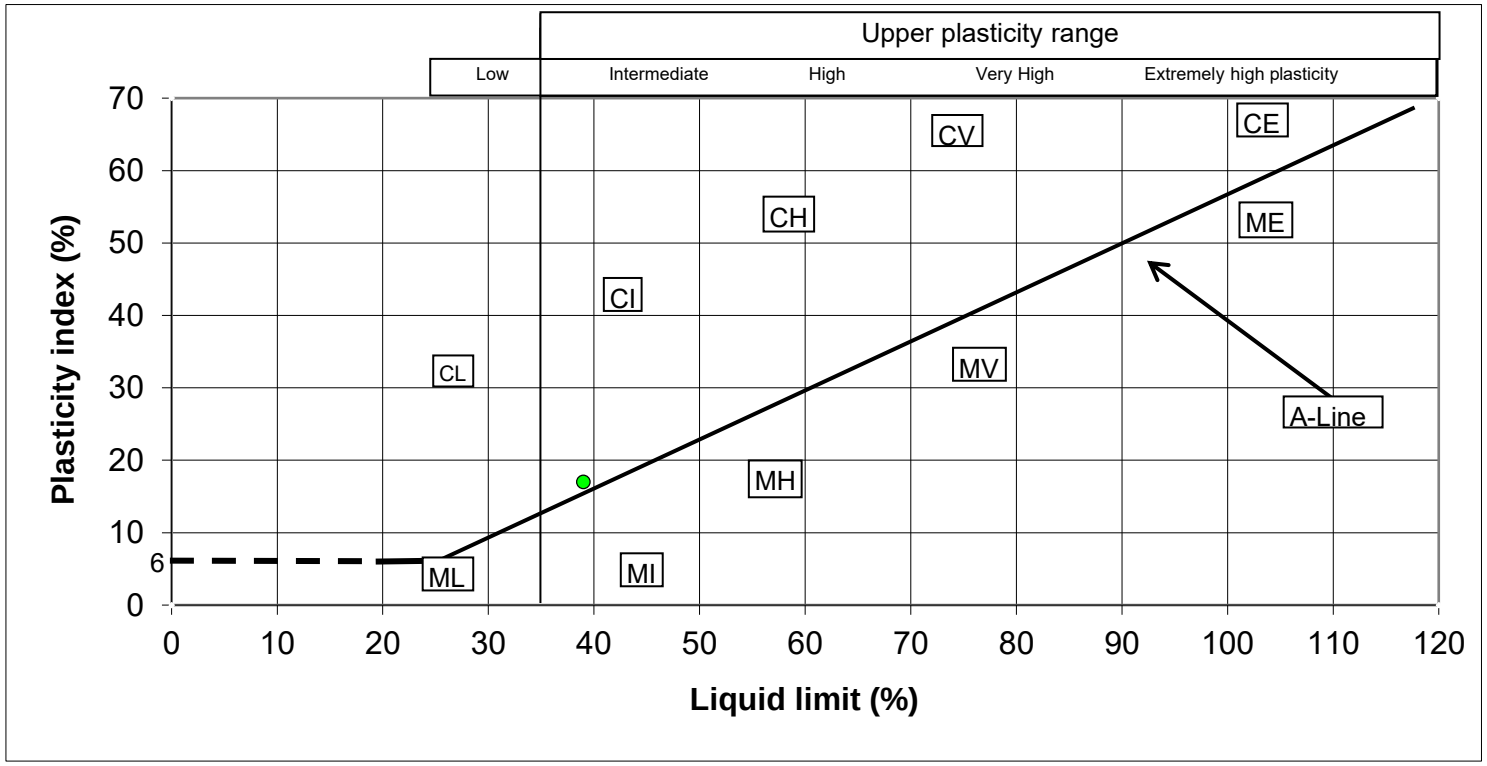
CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

ATTERBERG TEST RESULT SHEET
BS 1377:Part 2:1990:cl 4.4,5

SILT (M-SOIL), M plots below A-Line , CLAY,C, plots above A-Line, M and C may be combined as FINE SOIL, F.



BH	Sample Depth	Liquid limit	Plasticity index
BH101	0.50	39.0	17.0

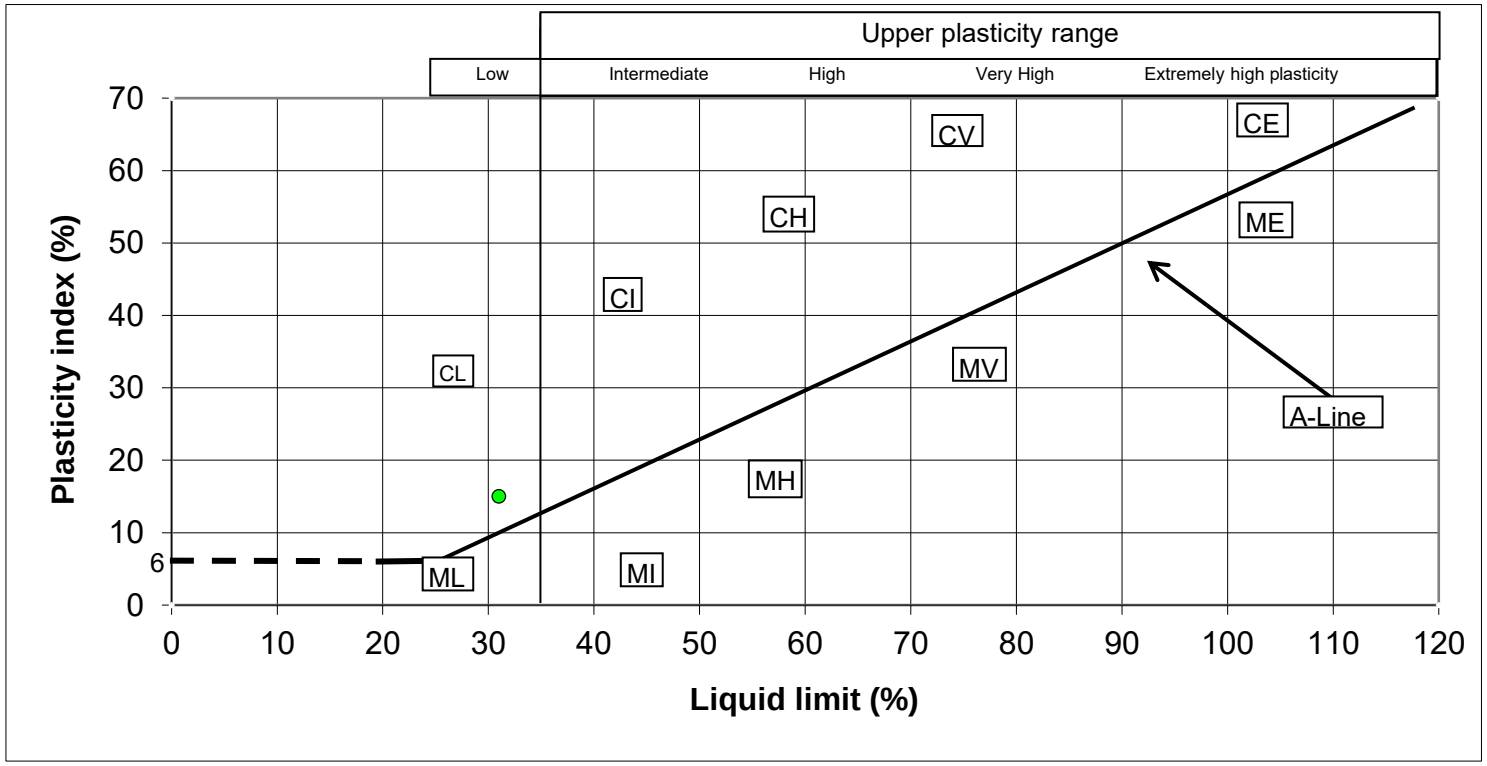
UKAS TESTING
4514

APPROVED BY	DK

CLIENT: DAEAR GEO CONSULTING	SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469)

ATTERBERG TEST RESULT SHEET
BS 1377:Part 2:1990:cl 4.4,5

SILT (M-SOIL), M plots below A-Line , CLAY,C, plots above A-Line, M and C may be combined as FINE SOIL, F.



BH	Sample Depth	Liquid limit	Plasticity index
BH101	1.50	31.0	15.0

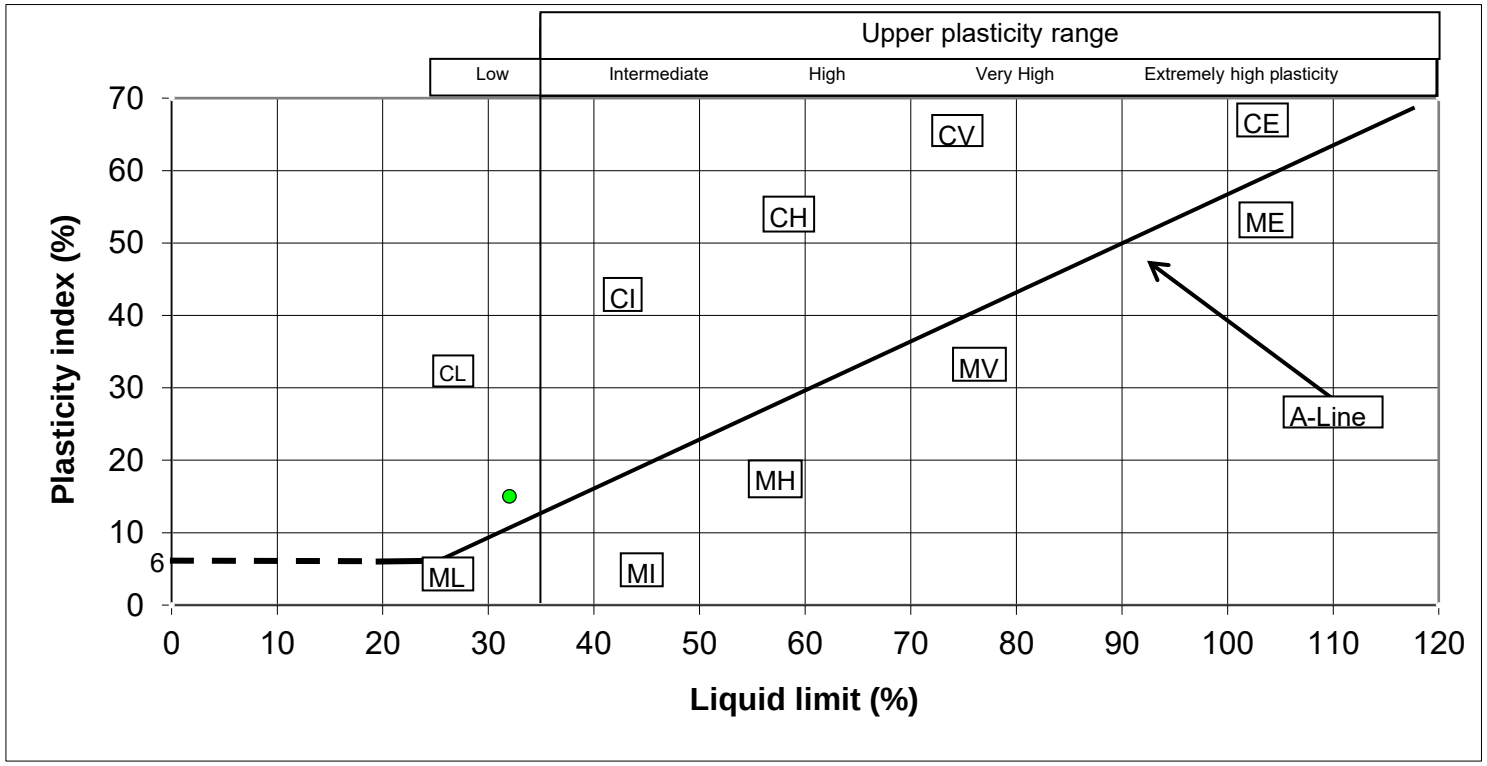
UKAS TESTING
4514

APPROVED BY	DK

CLIENT: DAEAR GEO CONSULTING	SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469)

ATTERBERG TEST RESULT SHEET
BS 1377:Part 2:1990:cl 4.4,5

SILT (M-SOIL), M plots below A-Line , CLAY,C, plots above A-Line, M and C may be combined as FINE SOIL, F.



BH	Sample Depth	Liquid limit	Plasticity index
BH101	2.50	32.0	15.0

UKAS TESTING
4514

APPROVED BY	DK

CLIENT: DAEAR GEO CONSULTING	SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469)

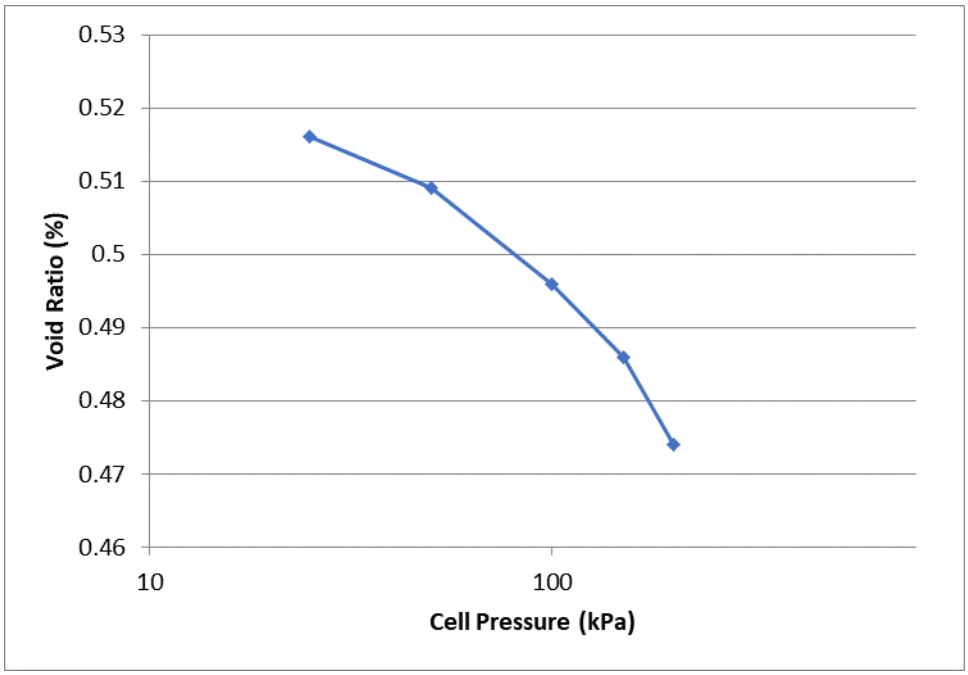
One Dimensional Consolidation Properties
(Oedometer)

Client	DAEAR CONSULTING	**Lab Ref**	
Project	COLOMENDY EXTENSION, DENBIGH	**Job**	CCG C 20 11469
Borehole	BH101	**Sample**	4

Test Details			
Standard	BS 1377: Part 5: 1990: Clause 3	**Particle Density**	2.65 Mg/m3
Sample Type	Undisturbed sample - open drive	**Lab Temperature**	20.0 deg.C
Sample Depth	1.50 m		
Sample Description	Brown slightly sandy slightly gravelly silty CLAY		
Variations from Procedure	None		

Specimen Details			
Specimen Reference	A	**Description**	
Depth within Sample	0.00 mm	**Orientation within Sample**	
Specimen Mass	187.81 g	**Condition**	Natural Moisture
Specimen Height	20.22 mm	**Preparation**	
Comments			

Test Apparatus			
Ring Number	9	**Ring Diameter**	75.01 mm
Ring Height	20.22 mm	**Ring Weight**	127.43 g
Lever Ratio	9.00: 1		



Height of Solid Particles	13.28 mm	**Swelling Pressure**	

One Dimensional Consolidation Properties
(Oedometer)

Client	DAEAR CONSULTING	**Lab Ref**	
Project	COLOMENDY EXTENSION, DENBIGH	**Job**	CCG C 20 11469
Borehole	BH101	**Sample**	144

Initial Moisture Content*	20.8 %	**Final Moisture Content**	20.9 %
Initial Bulk Density	2.10 Mg/m^3	**Final Bulk Density**	2.17 Mg/m^3
Initial Dry Density	1.74 Mg/m^3	**Final Dry Density**	1.80 Mg/m^3
Initial Void Ratio	0.5231	**Final Void Ratio**	0.4736
Initial Degree of Saturation	105.41 %	**Final Degree of Saturation**	116.75 %

* Calculated from initial and dry weights of whole specimen

Pressure (Loading Stages)	**Coefficient of Volume Compressibility (m_v)**	**Coefficient of Consolidation (c_v)**
0.00		
25.0 kPa	Sample swelled	-------
50.0 kPa	0.20 m^2/MN	**2.26 m^2/ yr**
100.0 kPa	0.17 m^2/MN	**1.69 m^2/ yr**
150.0 kPa	0.13 m^2/MN	**1.26 m^2/ yr**
200.0 kPa	0.17 m^2/MN	**0.37 m^2/ yr**

Method of Time Fitting Used	Log time

Tested by and Date:	DK 09.03.20
Checked by and Date:	DK 09.03.20
Approved by and Date:	CB 09.03.20

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Shear Strength (kN/m^2)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
BH102	B	0.50	0.50	26	-	-	-	40	22	18	88	CI	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse subangular to subrounded sandstone. (BS1377Pt2:3.2,4.4,5)
BH102	B	1.50	1.50	17	-	-	-	31	17	14	90	CL	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse subangular to subrounded sandstone. (BS1377Pt2:3.2,4.4,5)
BH102	B	2.50	2.50	-	-	-	-	-	-	-	-	-	Y	Brown very sandy clayey GRAVEL. Gravel is fine to coarse subangular limestone and sandstone. (BS1377Pt2:9.2)
BH102	B	3.50	3.50	20	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse subangular to subrounded sandstone and limestone. (BS1377Pt2:3.2)
BH102	B	4.50	4.50	14	-	-	-	23	13	10	76	CL	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse subangular to subrounded sandstone. (BS1377Pt2:3.2,4.4,5)
BH102	B	5.50	5.50	12	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse subangular to subrounded sandstone. (BS1377Pt2:3.2)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 27.02.20

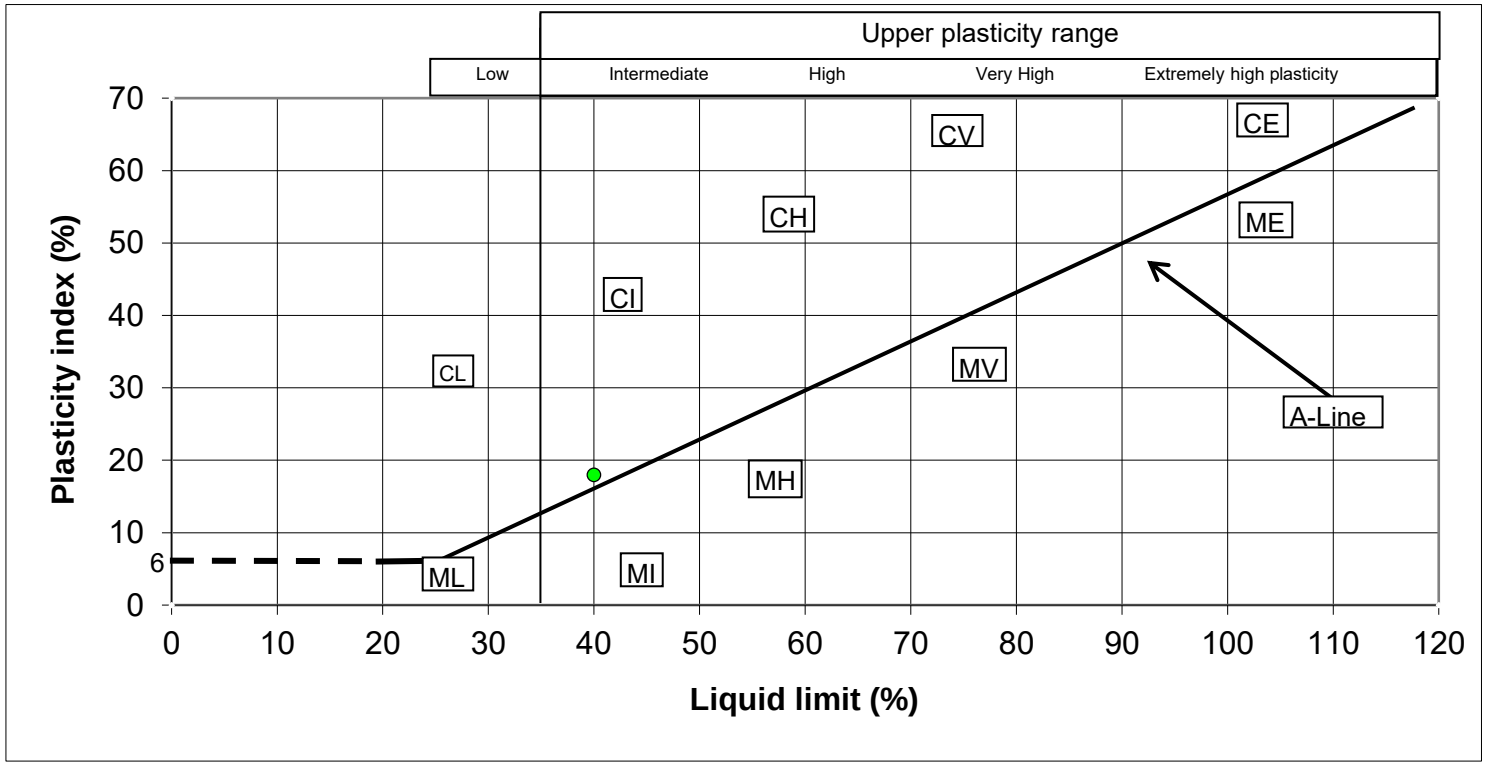
CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

ATTERBERG TEST RESULT SHEET
BS 1377:Part 2:1990:cl 4.4,5

SILT (M-SOIL), M plots below A-Line , CLAY,C, plots above A-Line, M and C may be combined as FINE SOIL, F.



BH	Sample Depth	Liquid limit	Plasticity index
BH102	0.50	40.0	18.0

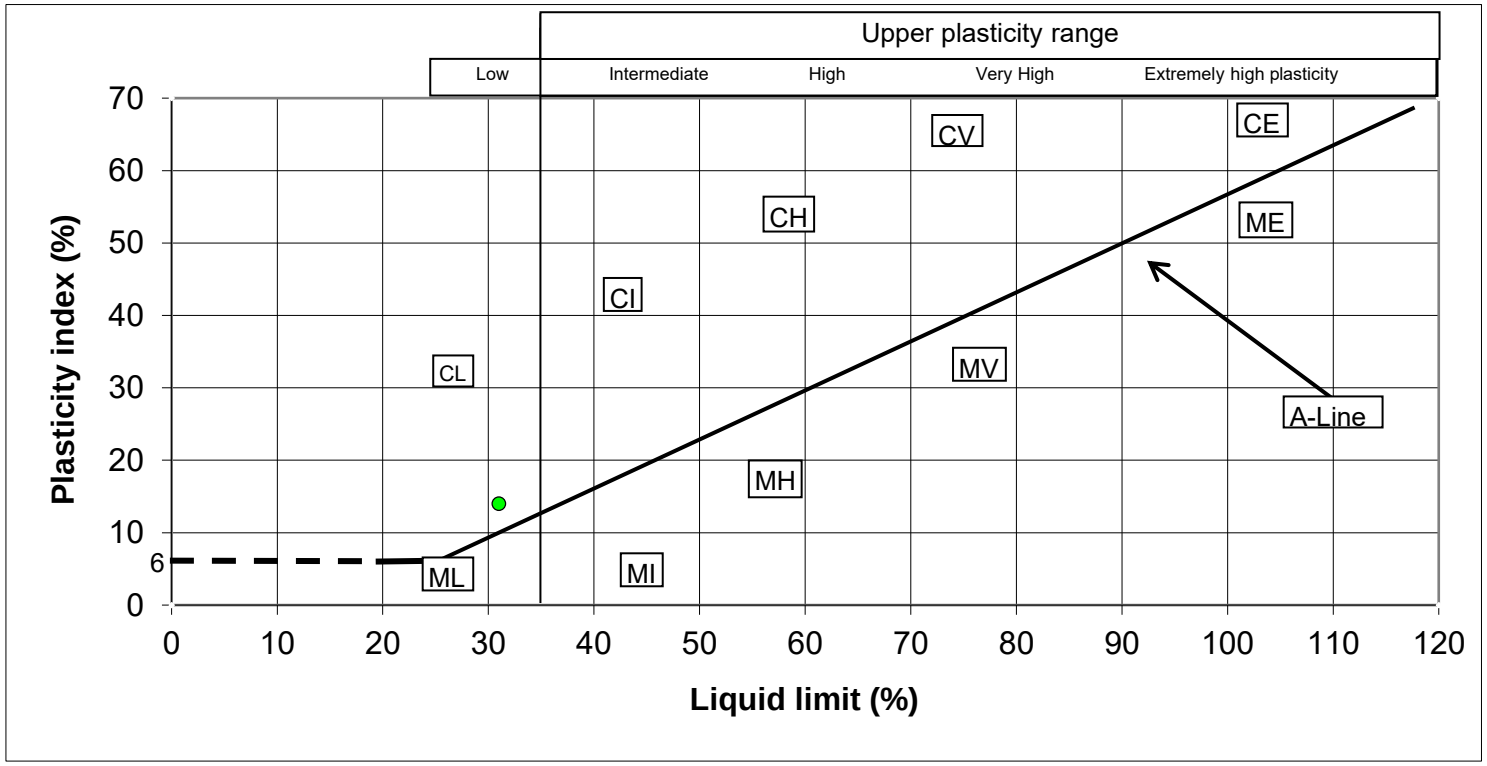
UKAS TESTING
4514

APPROVED BY	DK

CLIENT: DAEAR GEO CONSULTING	SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469)

ATTERBERG TEST RESULT SHEET
BS 1377:Part 2:1990:cl 4.4,5

SILT (M-SOIL), M plots below A-Line , CLAY,C, plots above A-Line, M and C may be combined as FINE SOIL, F.



BH	Sample Depth	Liquid limit	Plasticity index
BH102	1.50	31.0	14.0

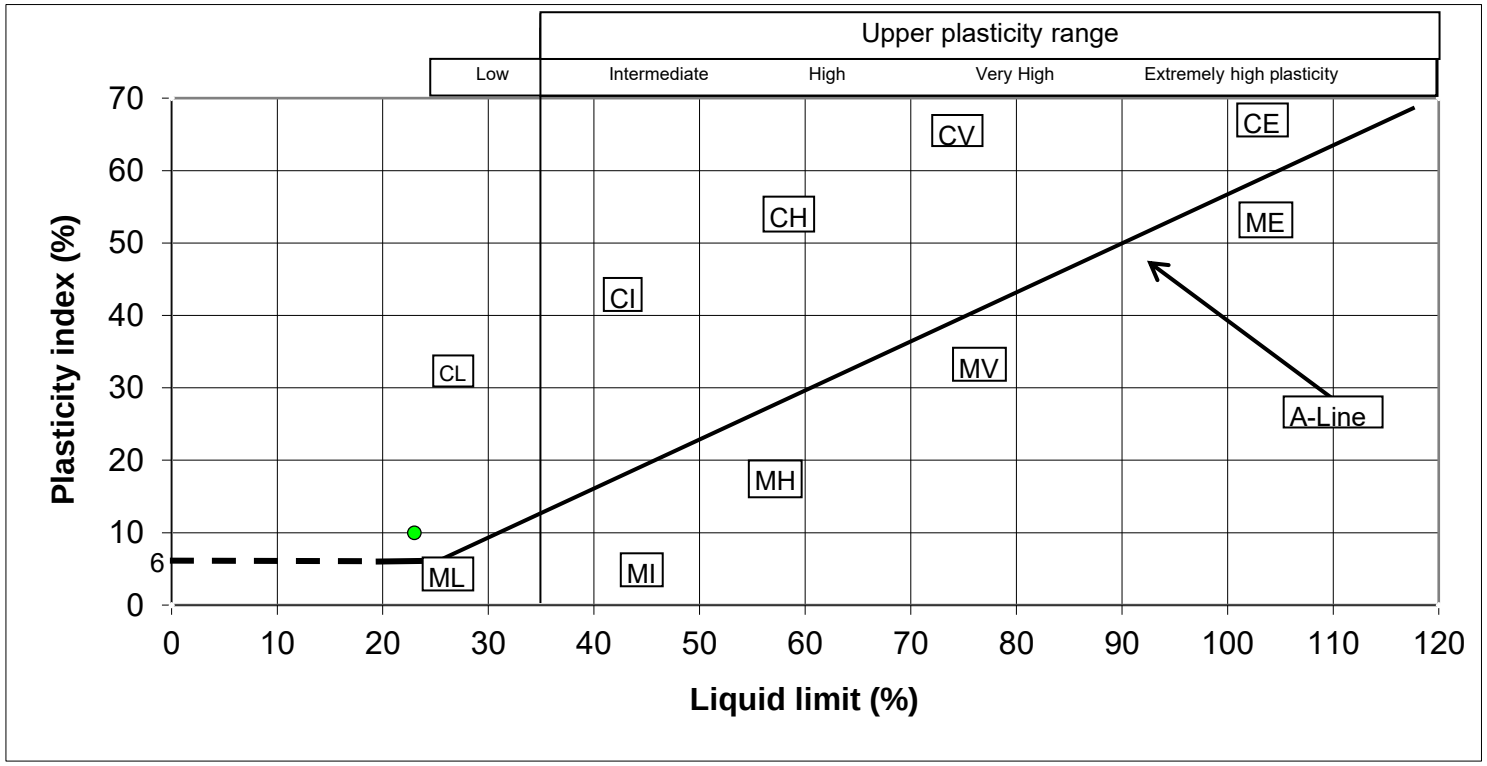
UKAS TESTING
4514

APPROVED BY	DK

CLIENT: DAEAR GEO CONSULTING	SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469)

ATTERBERG TEST RESULT SHEET
BS 1377:Part 2:1990:cl 4.4,5

SILT (M-SOIL), M plots below A-Line , CLAY,C, plots above A-Line, M and C may be combined as FINE SOIL, F.



BH	Sample Depth	Liquid limit	Plasticity index
BH102	4.50	23.0	10.0

UKAS TESTING
4514

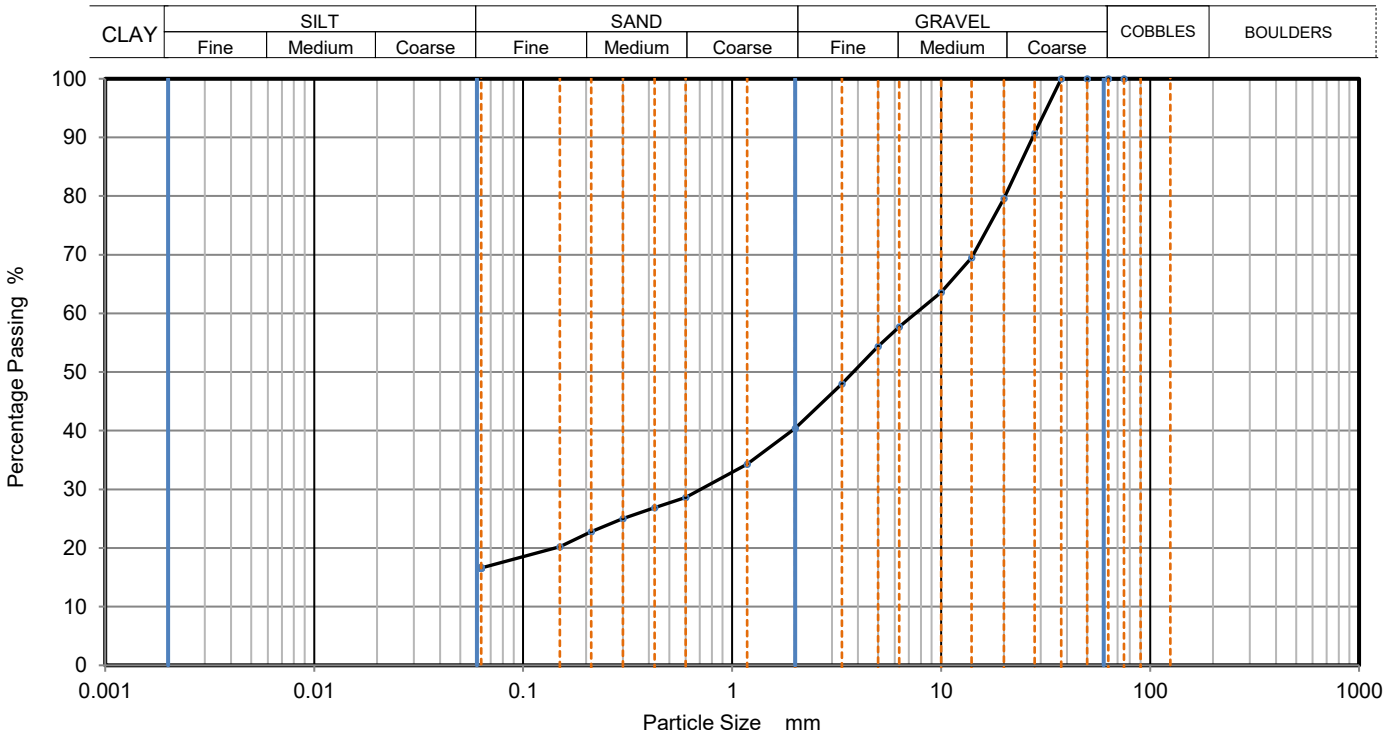
APPROVED BY	DK

CLIENT: DAEAR GEO CONSULTING	SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469)

CC Geotechnical Ltd
Tel: 0151 545 2750
e: lab@ccgeotechnical.com

PARTICLE SIZE DISTRIBUTION

Job Ref	CCG-C-20-11469		
Borehole/Pit No.	BH102		
Site Name	COLOMENDY EXTENSION, DENBIGH	Sample No.	1
Specimen Description	Brown very sandy clayey GRAVEL	Depth, m	2.50
Specimen Reference	Specimen Depth: m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2	KeyLAB ID	CCGL202002270



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	91		
20	80		
14	70		
10	64		
6.3	58		
5	54		
3.35	48		
2	40		
1.18	34		
0.6	29		
0.425	27		
0.3	25		
0.212	23		
0.15	20		
0.063	17		

Dry Mass of sample, g

Sample Proportions	% dry mass
Very coarse	0
Gravel	60
Sand	24
Fines <0.063mm	17

Grading Analysis		
D100	mm	
D60	mm	7.52
D30	mm	0.711
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	Fig 1
JE	DK	DK	27/02/2020 09:42	Sheet

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Shear Strength (kN/m^2)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
BH301	B	0.50	0.50	25	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular sandstone. (BS1377Pt2:3.2)
BH301	B	1.50	1.50	15	-	-	-	28	17	11	36	CL	Y	Brown very clayey very sandy GRAVEL. Gravel is fine to coarse subangular to subrounded sandstone. (BS1377Pt2:3.2,4.4,5,9.2)
BH301	B	2.50	2.50	16	-	-	-	-	-	-	-	-	Y	Brown very clayey very sandy GRAVEL. Gravel is fine to coarse subangular to subrounded sandstone. (BS1377Pt2:3.2)
BH301	B	3.50	3.50	19	-	-	-	-	-	-	-	-	Y	Brown very silty very sandy GRAVEL. Gravel is fine to coarse subangular to subrounded sandstone. (BS1377Pt2:3.2,9.2)
BH301	B	4.50	4.50	14	-	-	-	-	-	-	-	-	Y	Brown very clayey gravelly fine to coarse grained SAND. Gravel is fine to medium subrounded to subangular sandstone. (BS1377Pt2:3.2,9.2)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 20.03.20

CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

CC Geotechnical Ltd
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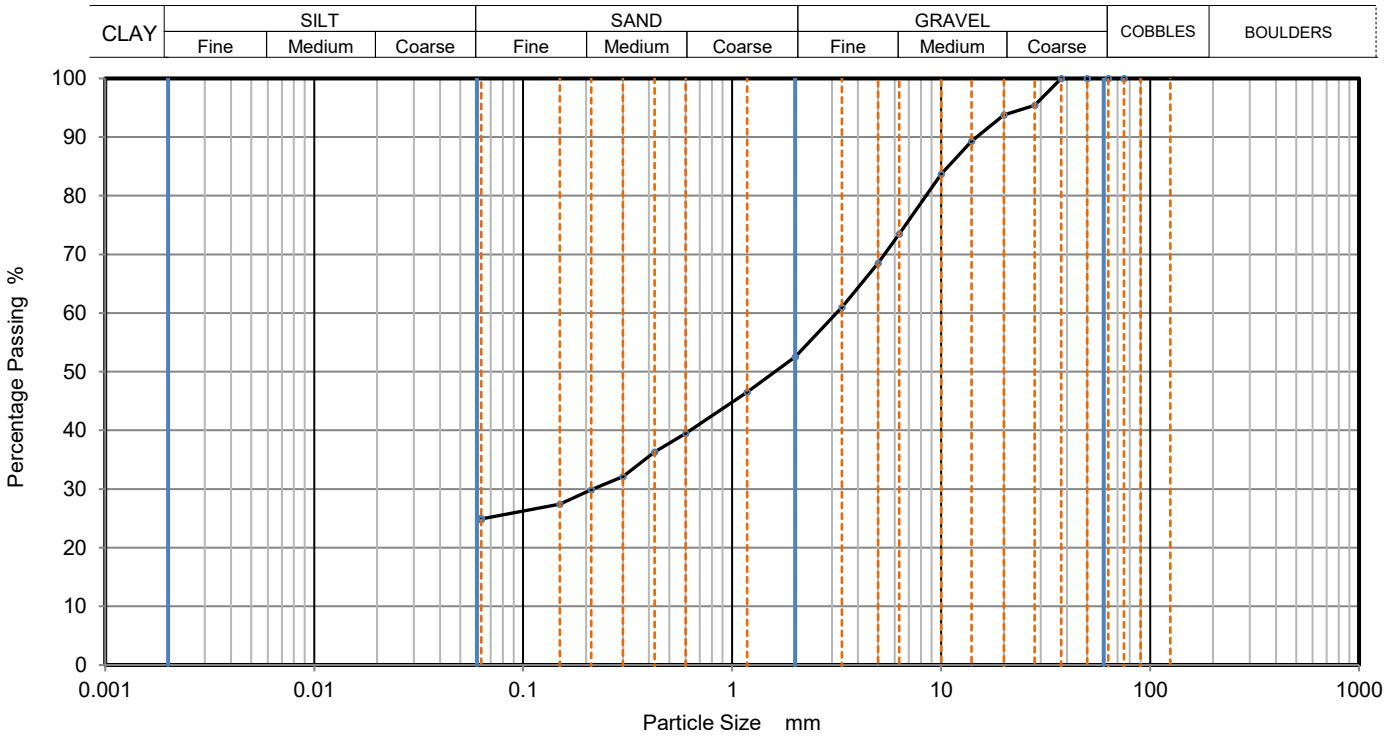
PARTICLE SIZE DISTRIBUTION

Job Ref	CCG-C-20-11469		
Borehole/Pit No.	BH301		
Site Name	COLOMENDY EXTENSION, DENBIGH	Sample No.	1
Specimen Description	Brown very silty very sandy GRAVEL	Depth, m	1.50
Specimen Reference	Specimen Depth: m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2	KeyLAB ID	CCGL202002280



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	95		
20	94		
14	89		
10	84		
6.3	74		
5	69		
3.35	61		
2	53		
1.18	47		
0.6	40		
0.425	36		
0.3	32		
0.212	30		
0.15	27		
0.063	25		

Dry Mass of sample, g

Sample Proportions	% dry mass
Very coarse	0
Gravel	48
Sand	28
Fines <0.063mm	25

Grading Analysis		
D100	mm	
D60	mm	3.16
D30	mm	0.214
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	Fig 1
JE	DK	DK	28/02/2020 14:14	Sheet

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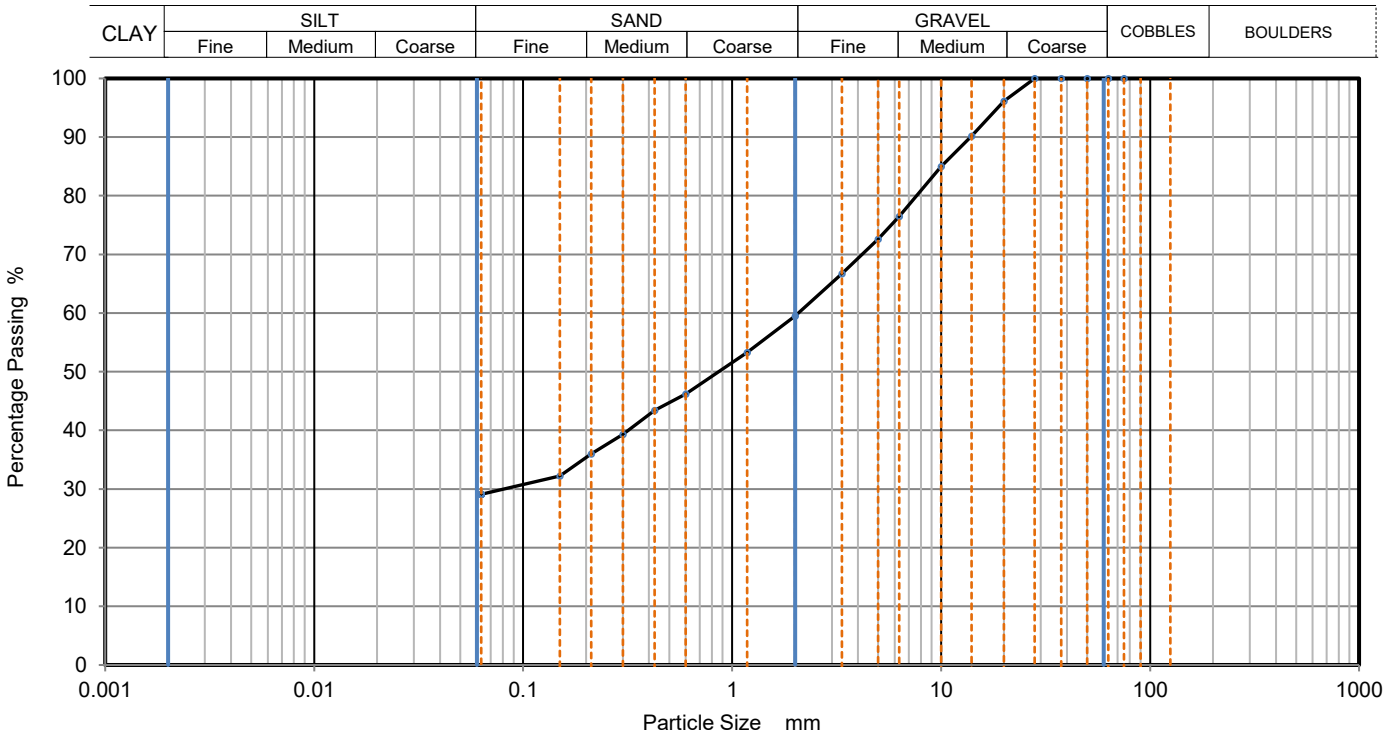
PARTICLE SIZE DISTRIBUTION

Job Ref	CCG-C-20-11469		
Borehole/Pit No.	BH301		
Site Name	COLOMENDY EXTENSION, DENBIGH	Sample No.	1
Specimen Description	Brown very silty very sandy GRAVEL	Depth, m	3.50
Specimen Reference	Specimen Depth: m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2	KeyLAB ID	CCGL202002281



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	96		
14	90		
10	85		
6.3	77		
5	73		
3.35	67		
2	60		
1.18	53		
0.6	46		
0.425	43		
0.3	39		
0.212	36		
0.15	32		
0.063	29		

Dry Mass of sample, g

Sample Proportions	% dry mass
Very coarse	0
Gravel	41
Sand	30
Fines <0.063mm	29

Grading Analysis		
D100	mm	
D60	mm	2.08
D30	mm	0.0817
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

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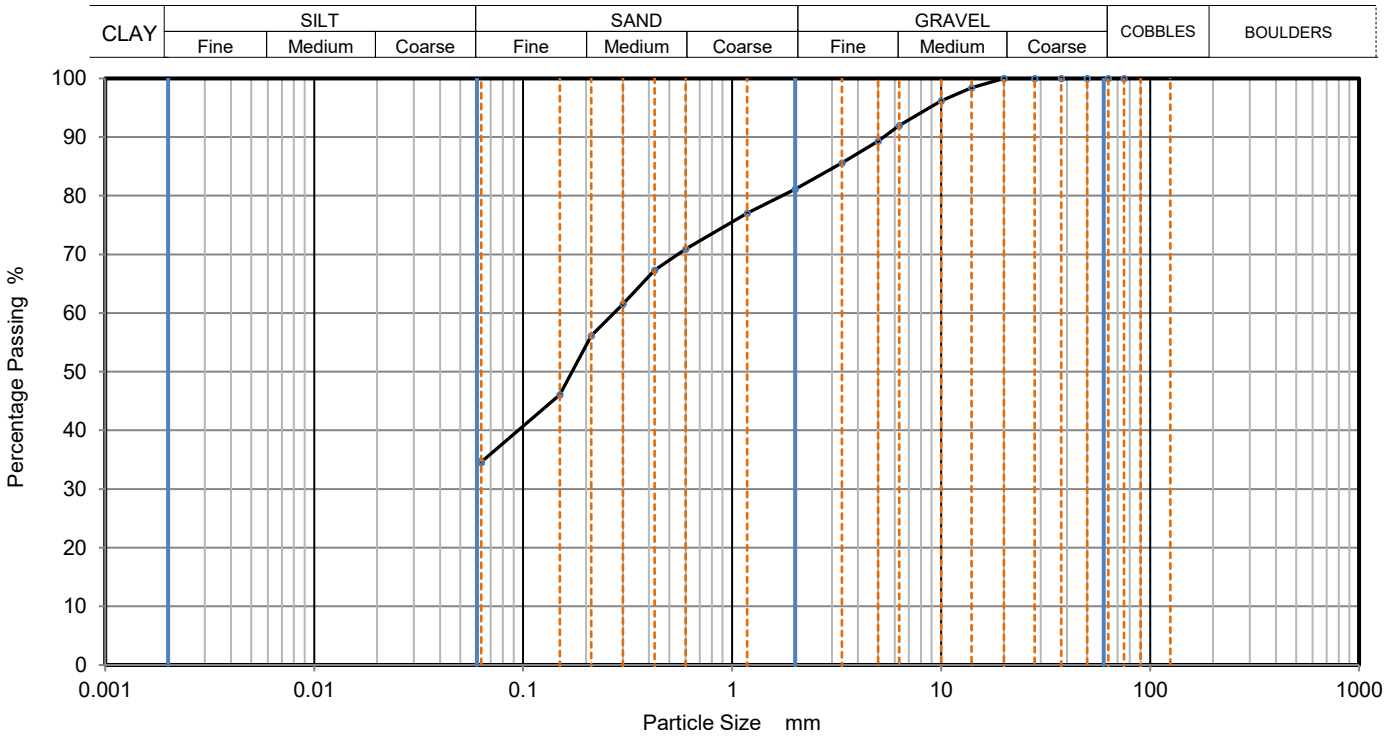
PARTICLE SIZE DISTRIBUTION

Job Ref	CCG-C-20-11469		
Borehole/Pit No.	BH301		
Site Name	COLOMENDY EXTENSION, DENBIGH	Sample No.	1
Specimen Description	Brown very clayey gravelly fine to coarse grained SAND	Depth, m	4.50
Specimen Reference	Specimen Depth: m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2	KeyLAB ID	CCGL202002282



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	98		
10	96		
6.3	92		
5	89		
3.35	86		
2	81		
1.18	77		
0.6	71		
0.425	67		
0.3	62		
0.212	56		
0.15	46		
0.063	35		

Dry Mass of sample, g

Sample Proportions	% dry mass
Very coarse	0
Gravel	19
Sand	47
Fines <0.063mm	35

Grading Analysis		
D100	mm	
D60	mm	0.272
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

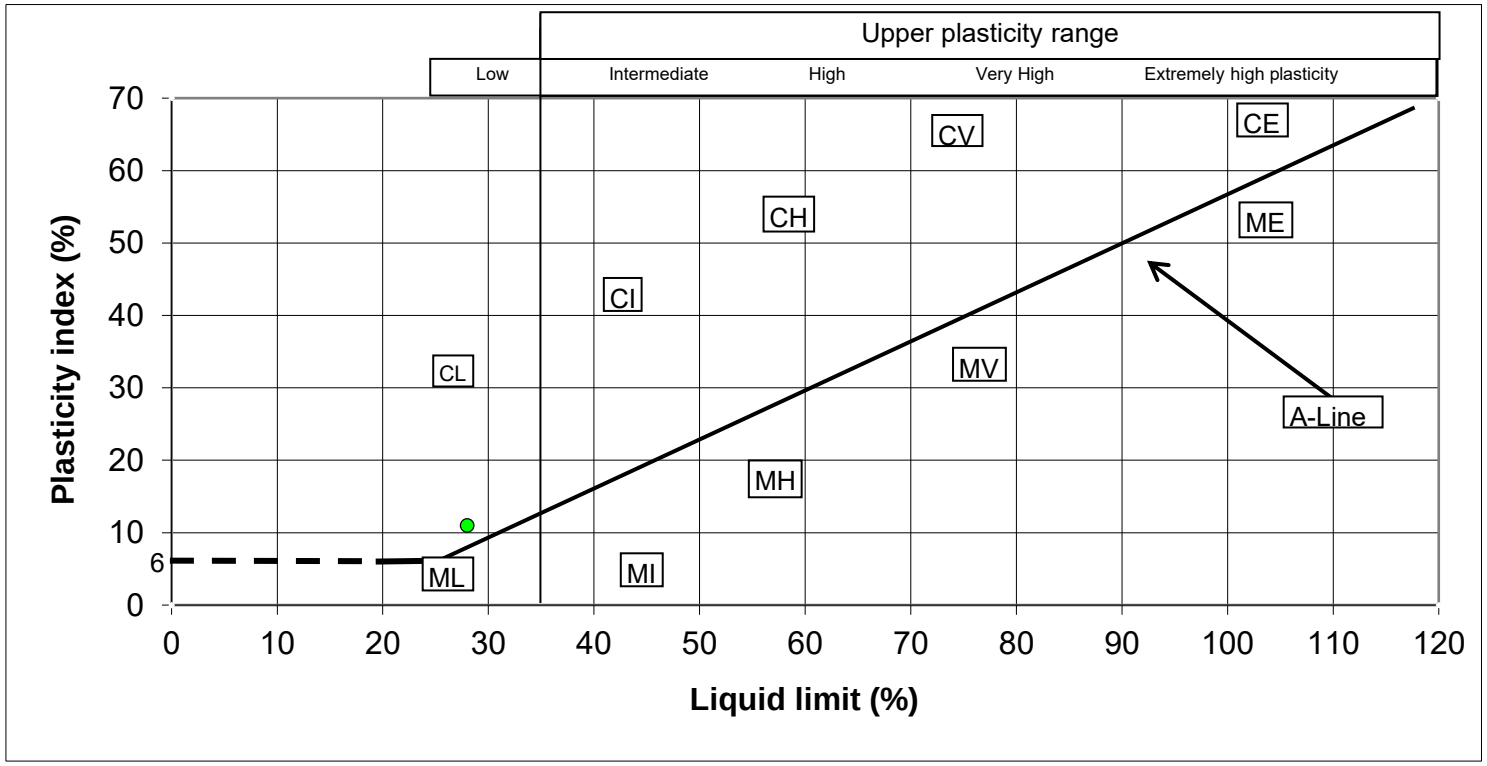
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	Fig 1
JE	DK	DK	28/02/2020 14:14	Sheet

ATTERBERG TEST RESULT SHEET
BS 1377:Part 2:1990:cl 4.4,5

SILT (M-SOIL), M plots below A-Line , CLAY,C, plots above A-Line, M and C may be combined as FINE SOIL, F.



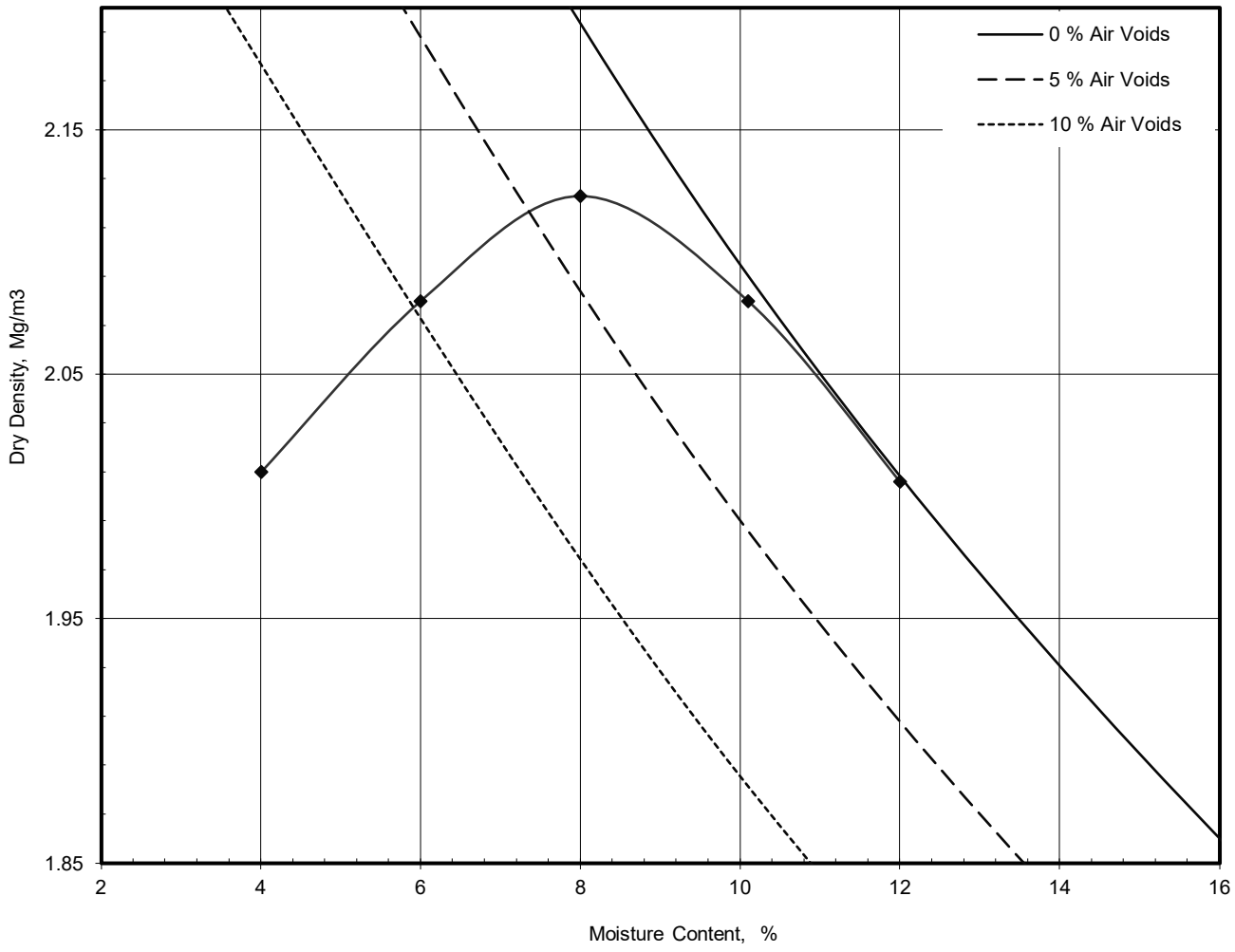
BH	Sample Depth	Liquid limit	Plasticity index
BH301	1.50	28.0	11.0

UKAS TESTING
4514

APPROVED BY	DK

CLIENT: DAEAR GEO CONSULTING	SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469)

	Dry Density / Moisture Content Relationship Light Compaction			Job Ref	CCG-C-20-11469
				Borehole / Pit No	BH301
Site Name	**COLOMENDY EXTENSION, DENBIGH**			Sample No	4
Soil Description	Brown very silty very sandy GRAVEL			Depth	3.50 m
Specimen Ref.		Specimen Depth	m	Sample Type	B
Test Method	BS1377:1990:Part 4 3.4			Keylab ID	
				Compaction Test Reference/No.	

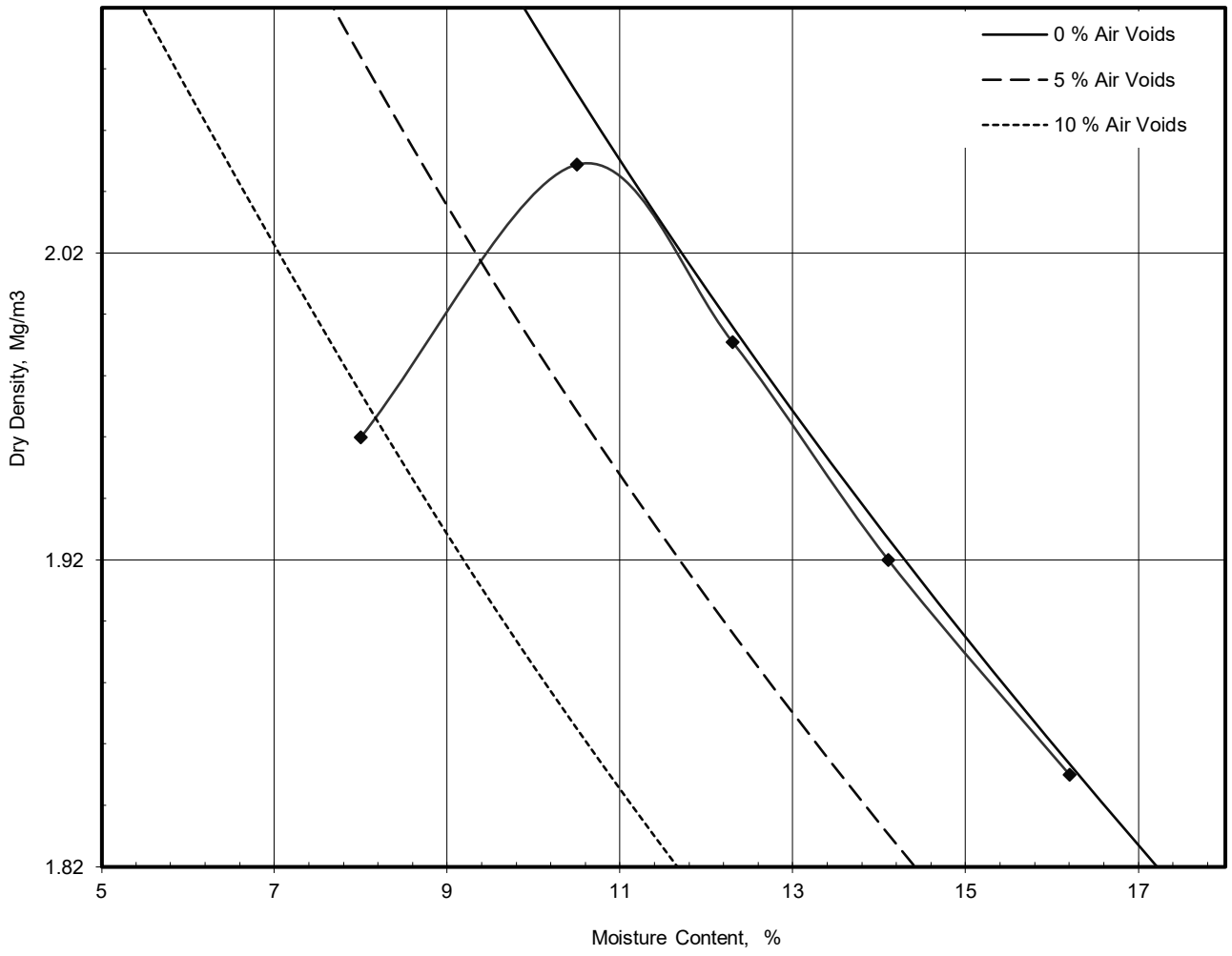


Preparation		
Mould Type		1 litre
Samples Used		1
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	4
Particle Density -	Mg/m³	2.65

Maximum Dry Density	Mg/m³	**2.12**
Optimum Moisture Content	%	**8.0**

Operator	Checked	Approved	Remarks	Fig
MH	DK	DK		Sheet 1 of 1

	Dry Density / Moisture Content Relationship Light Compaction			Job Ref	CCG-C-20-11469
				Borehole / Pit No	BH301
Site Name	**COLOMENDY EXTENSION, DENBIGH**			Sample No	5
Soil Description	Brown very clayey gravelly fine to coarse grained SAND			Depth	4.50 m
Specimen Ref.		Specimen Depth	m	Sample Type	B
Test Method	BS1377:1990:Part 4 3.4.4.2			Keylab ID	
				Compaction Test Reference/No.	



Preparation		
Mould Type		1 litre
Samples Used		5
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	6
Particle Density -	Mg/m³	2.65

Maximum Dry Density	Mg/m³	**2.05**
Optimum Moisture Content	%	**11**

Operator	Checked	Approved	Remarks	Fig
MH	DK	DK		Sheet 1 of 1

Effective Stress Triaxial Compression

Consolidated Undrained

Summary Report

Sample Details				
	Depth			2.00m
	Description			See summary of soil descriptions
	Type			Undisturbed, vertical orientation
	Initial Sample Length	L_0	(mm)	212.0
	Initial Sample Diameter	D_0	(mm)	105.9
	Initial Sample Weight	W_0	(gr)	4264.0
	Initial Bulk Density	ρ_0	(Mg/m3)	2.28
	Particle Density	ρ_s	(Mg/m3)	2.66

sketch showing specimen location in original sample

Initial Conditions			Stage 1	2	3	4
Initial Cell Pressure	σ_{3i}	(kPa)	525	550	575	
Initial Back Pressure	U_{bi}	(kPa)	500	500	500	
Membrane Thickness	m_b	(mm)	0.600			
Displacement Input	L_{IP}	(mm)	CH 2			
Load Input	N_{IP}	(N)	CH 1			
Pore Water Pressure Input	u_{pwp}	(kPa)	CH 3			
Sample Volume	V	(cc)	CH 6			
Initial Moisture	ω_i	(%)	8.88			
Initial Dry Density	ρ_{di}	(Mg/m3)	2.10			
Initial Voids Ratio	e_i	.	0.268			
Initial Degree of Saturation	S_i	(%)	88			
B Value	B	.	0.95			

Final Conditions						
Final Moisture	ω_f	(%)	9.27			
Final Dry Density	ρ_{df}	(Mg/m3)	2.12			
Final Voids Ratio	e_f	.	0.256			
Final Degree of Saturation	S_f	(%)	96.5			
			Stage 1	2	3	4
Failure Criteria		.	Max. Dev. Stress	Max. Dev. Stress	Max. Dev. Stress	
Strain At Failure	ε_f	(%)	1.99	3.47	19.89	
Stress At Failure	$(\sigma_1-\sigma_3)$	(kPa)	223.5	382.6	779.9	
Minor Stress At Failure	σ_3'	(kPa)	42.0	86.0	241.0	
Major Stress At Failure	σ_1'	(kPa)	265.5	468.6	1020.9	
Principal Stress At Failure	σ_1'/σ_3'		6.322	5.449	4.236	

Notes

Composite

Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH301 2.00m
		Test Date	12/03/2020
		Borehole	BH301
Jobfile	Colomendy Extension Denbigh	Sample	2.00m
Client	CC Geotechnical LTD	Depth	2.00m

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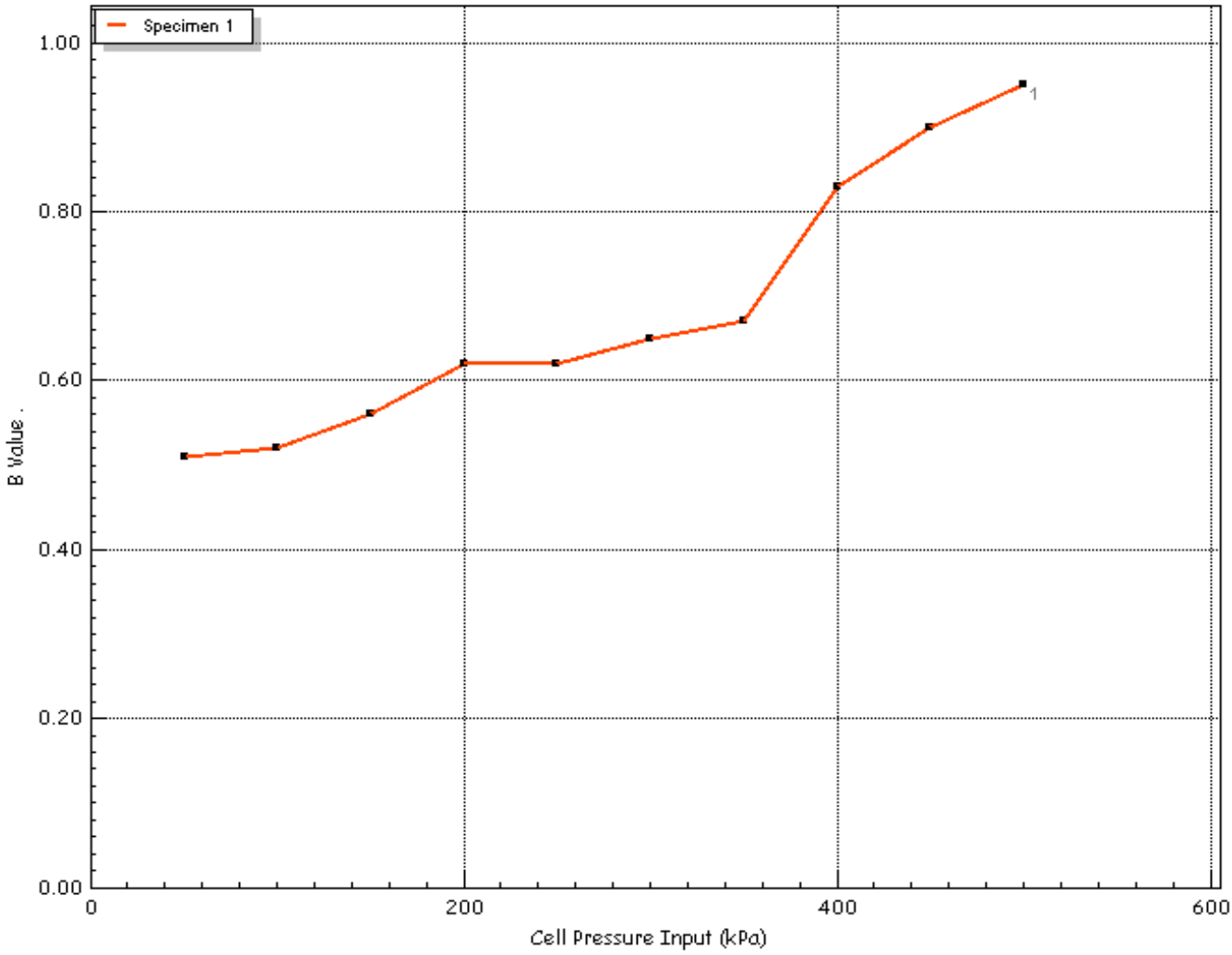
Effective Stress Triaxial Compression

Consolidated Undrained

Saturation Plots

Saturation Method			Stepped
Cell Pressure Input	σ	(kPa)	500
Pore Water Pressure Input	u pwp	(kPa)	498
B Value	B	.	0.95



Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH301 2.00m
		Test Date	12/03/2020
		Borehole	BH301
Jobfile	Colomendy Extension Denbigh	Sample	2.00m
Client	CC Geotechnical LTD	Depth	2.00m

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Effective Stress Triaxial Compression

Consolidated Undrained

Consolidation Plots

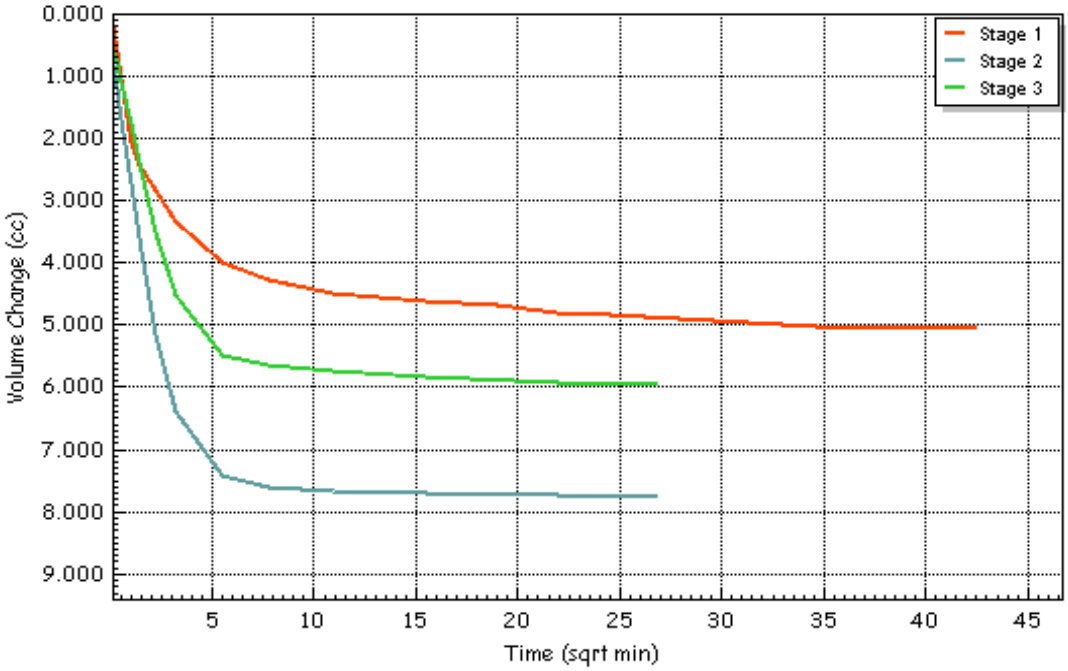
Initial Conditions

			Stage 1	2	3
Initial Cell Pressure	σ_3	(kPa)	525	550	575
Initial Back Pressure	u_{bi}	(kPa)	500	500	500
Pore Water Pressure Input	u_{pwp}	(kPa)	525	538	548
Drainage Method			Radial+One End		

Final Conditions

			Stage 1	2	3
PWP Dissipation %	U%	(%)	100.00	100.00	100.00
Volumetric Strain	ε_v%	(%)	0.27	0.69	1.00
Corrected Length	L_C	(mm)	211.8	207.1	202.3
Corrected Area	A_C	(cm2)	87.92	89.30	90.74
Corrected Volume	V_C	(cc)	1862.268	1854.505	1848.564
T100 Time to Failure	t_{100}	(min)	79.84	79.84	79.84
Consolidation	c_v	(m2/year)	2.901	2.901	2.901
Compressibility	m_v	(m2/MN)	0.110	0.179	0.209
Test Time	t_F	(h:m:s)	02:23:42	02:23:42	02:23:42
Estimated Strain to Failure	ε%	(%)	5.0	5.0	5.0
Shear Machine Speed	d_r	(mm/min)	0.07369	0.07206	0.07039

Notes



Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH301 2.00m
		Test Date	12/03/2020
		Borehole	BH301
Jobfile	Colomendy Extension Denbigh	Sample	2.00m
Client	CC Geotechnical LTD	Depth	2.00m

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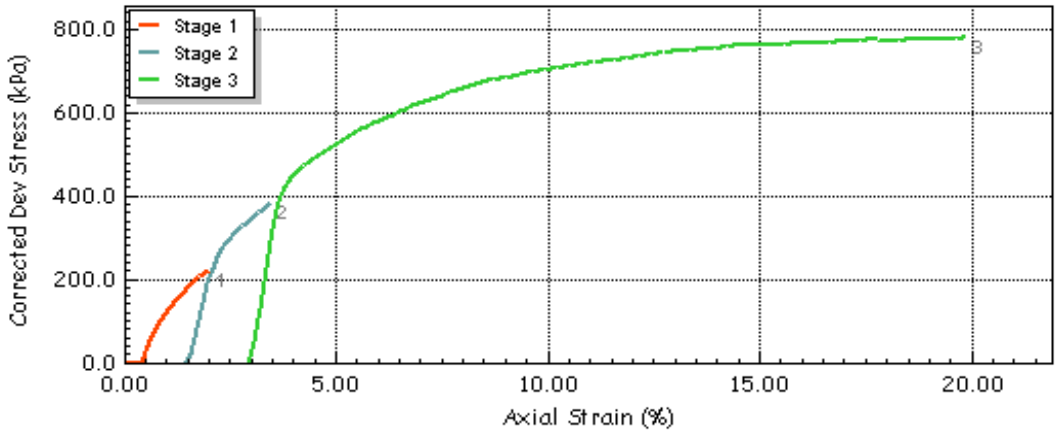
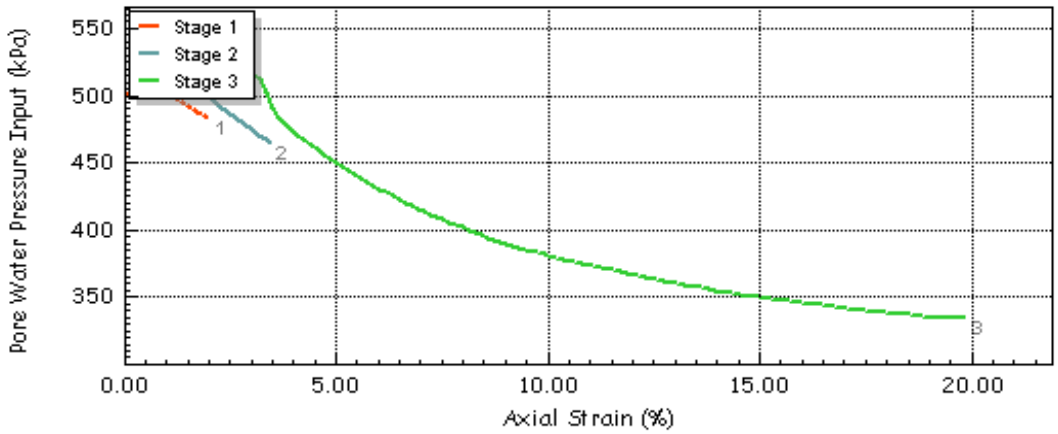
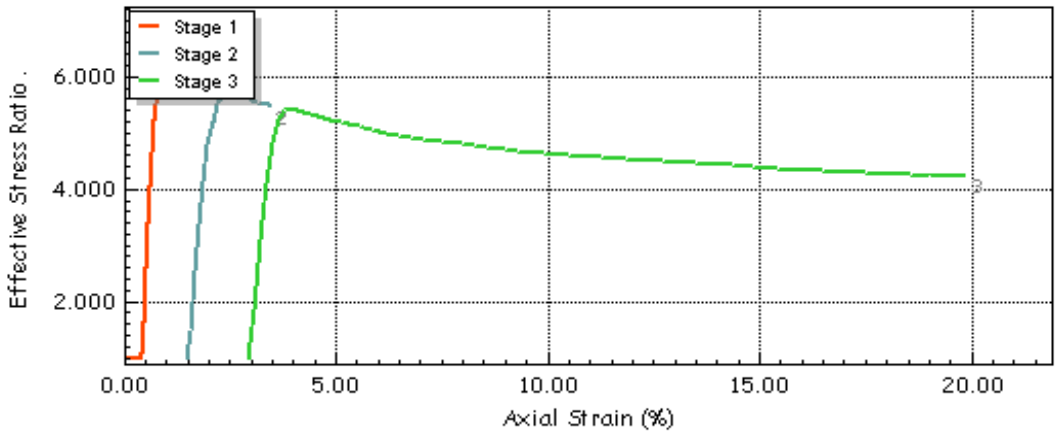
Effective Stress Triaxial Compression

Consolidated Undrained

Shear Stage Plots







Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH301 2.00m
		Test Date	12/03/2020
Jobfile	Colomerdy Extension Denbigh	Borehole	BH301
Client	CC Geotechnical LTD	Sample	2.00m
		Depth	2.00m

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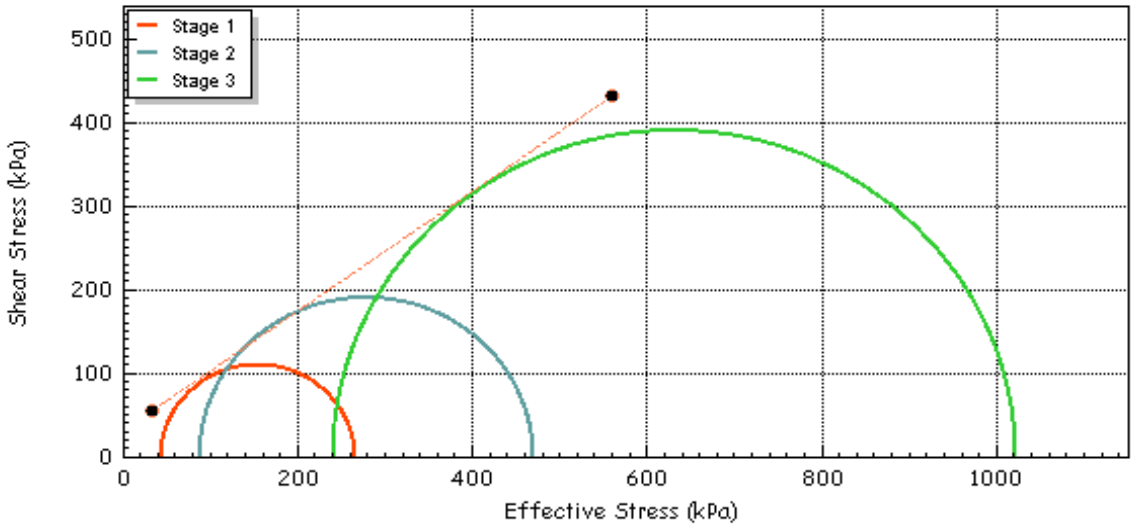
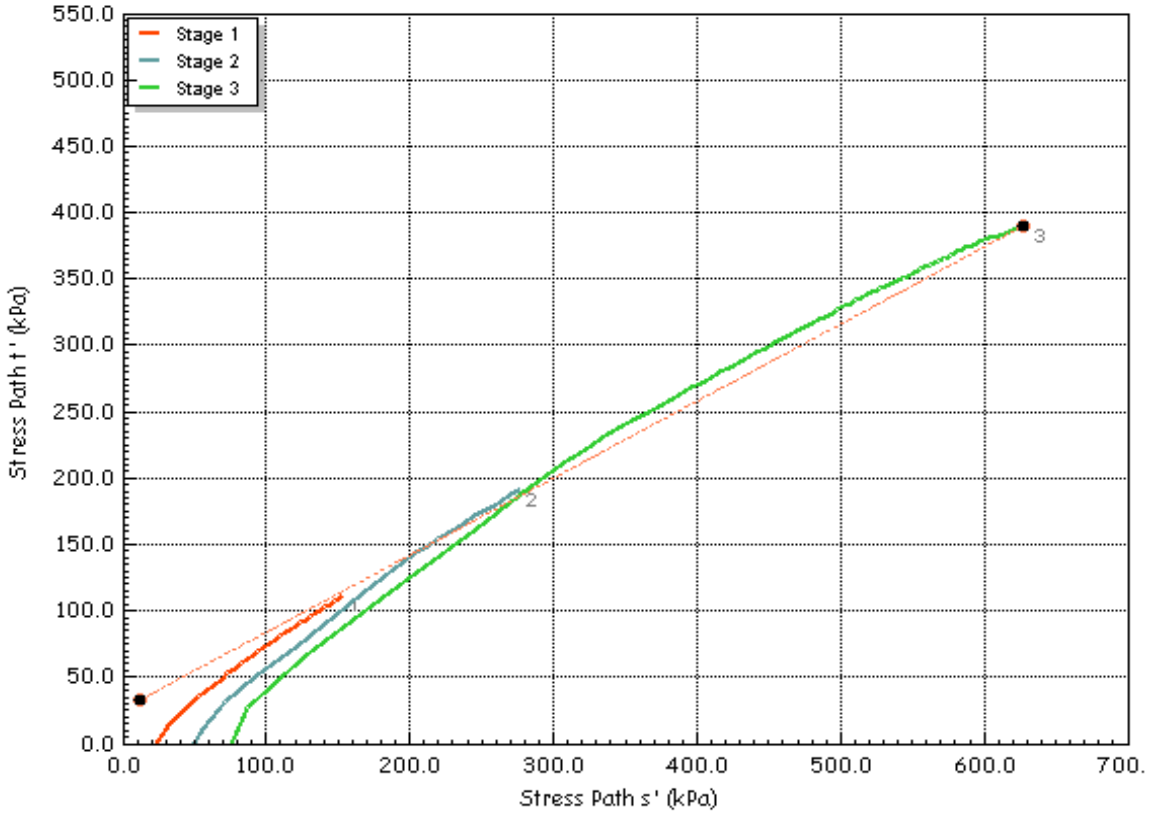
Effective Stress Triaxial Compression

Consolidated Undrained

Shear Stage Plots

Effective	c'	(kPa)	31.71	Effective Cohesion	c'	(kPa)	31.71
Effective Friction	ϕ'	(deg)	35.5	Effective Friction	ϕ'	(deg)	35.5





Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH301 2.00m
		Test Date	12/03/2020
Jobfile	Colomendy Extension Denbigh	Borehole	BH301
Client	CC Geotechnical LTD	Sample	2.00m
		Depth	2.00m

UKAS TESTING 4043

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Effective Stress Triaxial Compression

Consolidated Undrained

Summary Report

Sample Details				
	Depth			4.00m
	Description			See summary of soil descriptions
	Type			Undisturbed, vertical orientation
	Initial Sample Length	L_0	(mm)	212.0
	Initial Sample Diameter	D_0	(mm)	105.7
	Initial Sample Weight	W_0	(gr)	3912.0
	Initial Bulk Density	ρ_0	(Mg/m3)	2.10
	Particle Density	ρ_s	(Mg/m3)	2.66

sketch showing specimen location in original sample

Initial Conditions			Stage 1	2	3	4
Initial Cell Pressure	σ_{3i}	(kPa)	625	650	700	
Initial Back Pressure	U_{bi}	(kPa)	600	600	600	
Membrane Thickness	m_b	(mm)	0.600			
Displacement Input	L_{IP}	(mm)	CH 2			
Load Input	N_{IP}	(N)	CH 1			
Pore Water Pressure Input	u_{pwp}	(kPa)	CH 3			
Sample Volume	V	(cc)	CH 2			
Initial Moisture	ω_i	(%)	15			
Initial Dry Density	ρ_{di}	(Mg/m3)	1.83			
Initial Voids Ratio	e_i	.	0.452			
Initial Degree of Saturation	S_i	(%)	87			
B Value	B	.	0.95			

Final Conditions						
Final Moisture	ω_f	(%)	15			
Final Dry Density	ρ_{df}	(Mg/m3)	1.86			
Final Voids Ratio	e_f	.	0.430			
Final Degree of Saturation	S_f	(%)	89.8			
			Stage 1	2	3	4
Failure Criteria		.	Max. Dev. Stress	Max. Dev. Stress	Max. Dev. Stress	
Strain At Failure	ε_f	(%)	2.24	3.51	15.45	
Stress At Failure	$(\sigma_1-\sigma_3)$	(kPa)	120.4	235.9	569.1	
Minor Stress At Failure	σ_3'	(kPa)	34.0	73.9	250.0	
Major Stress At Failure	σ_1'	(kPa)	154.4	309.8	819.1	
Principal Stress At Failure	σ_1'/σ_3'		4.542	4.192	3.276	

Notes

Composite

Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH301 4.00m
		Test Date	11/03/2020
		Borehole	BH301
Jobfile	Colmendy Extension Denbigh	Sample	4.00m
Client	CC Geotechnical LTD	Depth	4.00m

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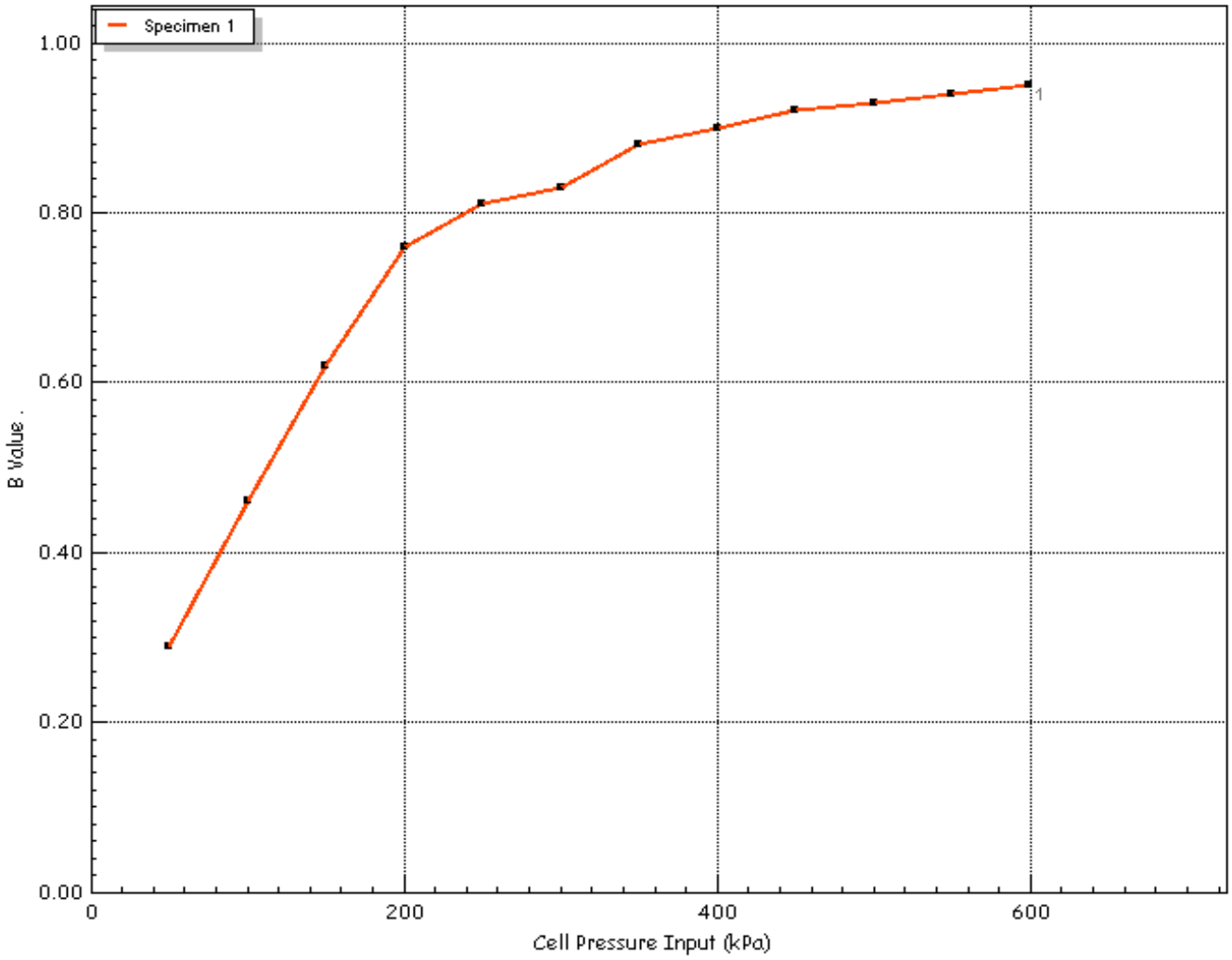
Effective Stress Triaxial Compression

Consolidated Undrained

Saturation Plots

Saturation Method			Stepped
Cell Pressure Input	σ	(kPa)	599
Pore Water Pressure Input	u pwp	(kPa)	586
B Value	B	.	0.95



Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH301 4.00m
		Test Date	11/03/2020
		Borehole	BH301
Jobfile	Colmendy Extension Denbigh	Sample	4.00m
Client	CC Geotechnical LTD	Depth	4.00m

UKAS TESTING 4043

PSL Professional Soils Laboratory

Effective Stress Triaxial Compression

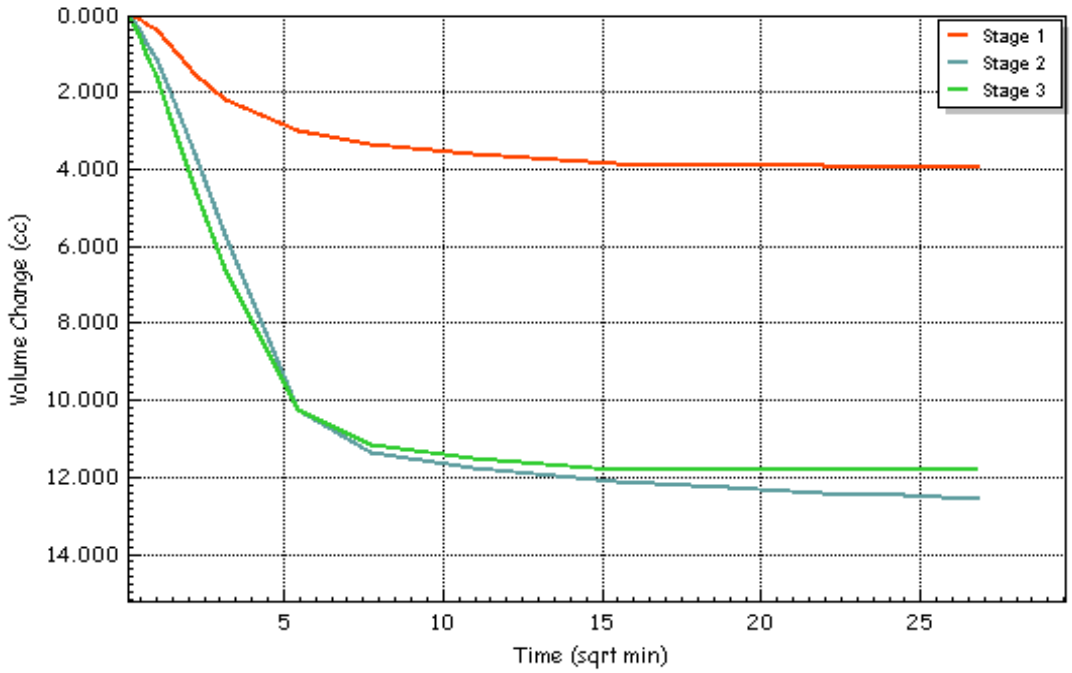
Consolidated Undrained

Consolidation Plots

Initial Conditions			Stage 1	2	3
Initial Cell Pressure	σ_3	(kPa)	625	650	700
Initial Back Pressure	u_{bi}	(kPa)	600	600	600
Pore Water Pressure Input	u_{pwp}	(kPa)	610	639	673
Drainage Method			Radial+One End		

Final Conditions			Stage 1	2	3
PWP Dissipation %	U%	(%)	100.00	100.00	100.00
Volumetric Strain	ε_v%	(%)	0.21	0.91	1.54
Corrected Length	L_C	(mm)	211.9	206.5	201.1
Corrected Area	A_C	(cm2)	87.62	89.09	90.23
Corrected Volume	V_C	(cc)	1856.324	1843.400	1831.584
T100 Time to Failure	t_{100}	(min)	23.47	23.47	23.47
Consolidation	c_v	(m2/year)	9.830	9.830	9.830
Compressibility	m_v	(m2/MN)	0.206	0.231	0.211
Test Time	t_F	(h:m:s)	02:00:00	02:00:00	02:00:00
Estimated Strain to Failure	ε%	(%)	5.0	5.0	5.0
Shear Machine Speed	d_r	(mm/min)	0.08827	0.08603	0.08381

Notes



Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH301 4.00m
		Test Date	11/03/2020
		Borehole	BH301
Jobfile	Colmendy Extension Denbigh	Sample	4.00m
Client	CC Geotechnical LTD	Depth	4.00m

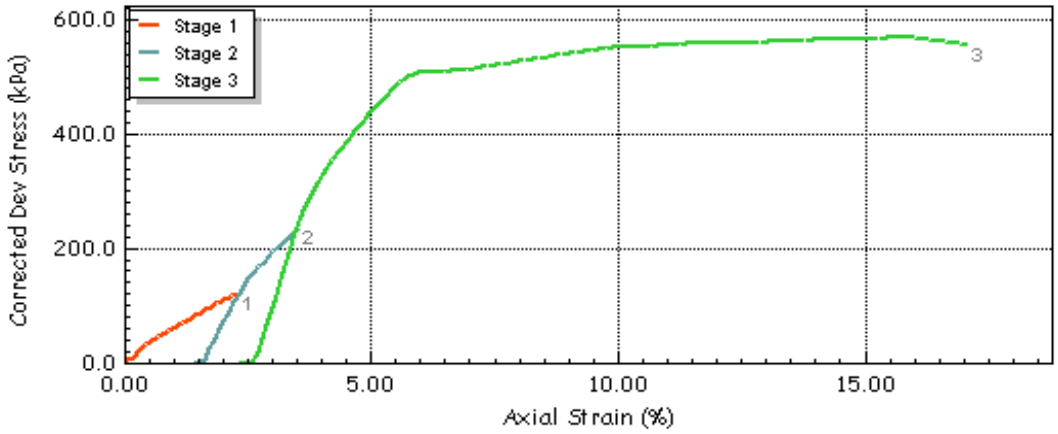
UKAS TESTING 4043

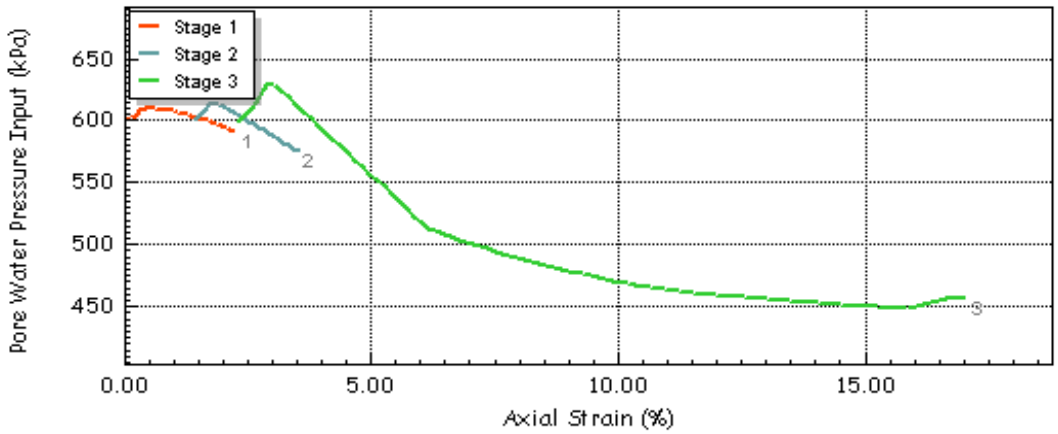
PSL Professional Soils Laboratory

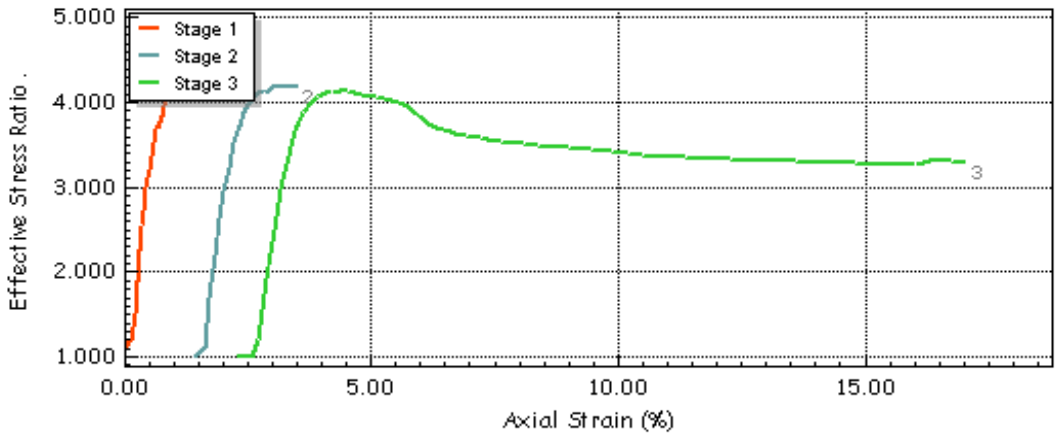
Effective Stress Triaxial Compression

Consolidated Undrained

Shear Stage Plots







Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH301 4.00m
		Test Date	11/03/2020
Jobfile	Colmendy Extension Denbigh	Borehole	BH301
Client	CC Geotechnical LTD	Sample	4.00m
		Depth	4.00m

UKAS TESTING 4043

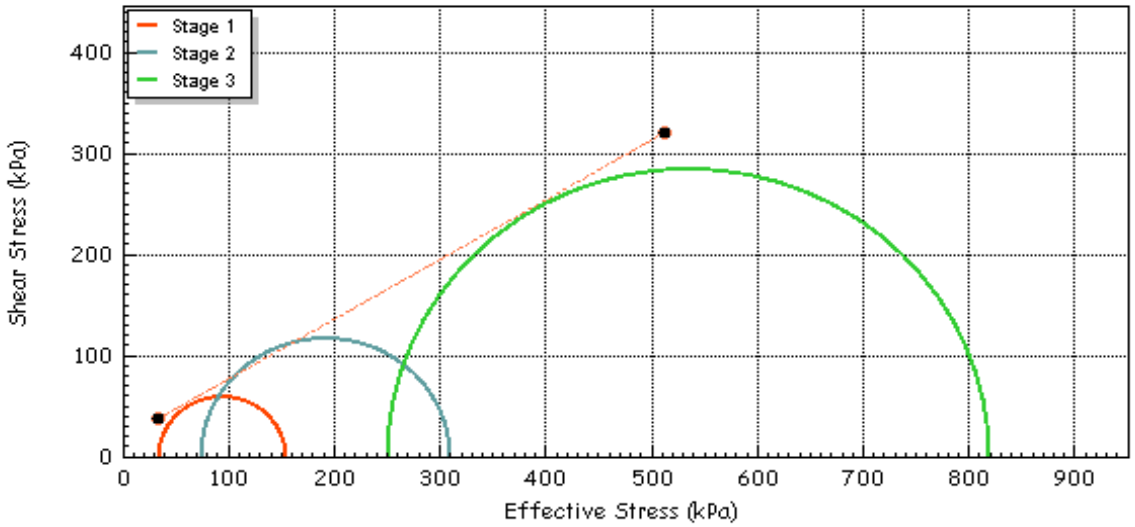
PSL Professional Soils Laboratory

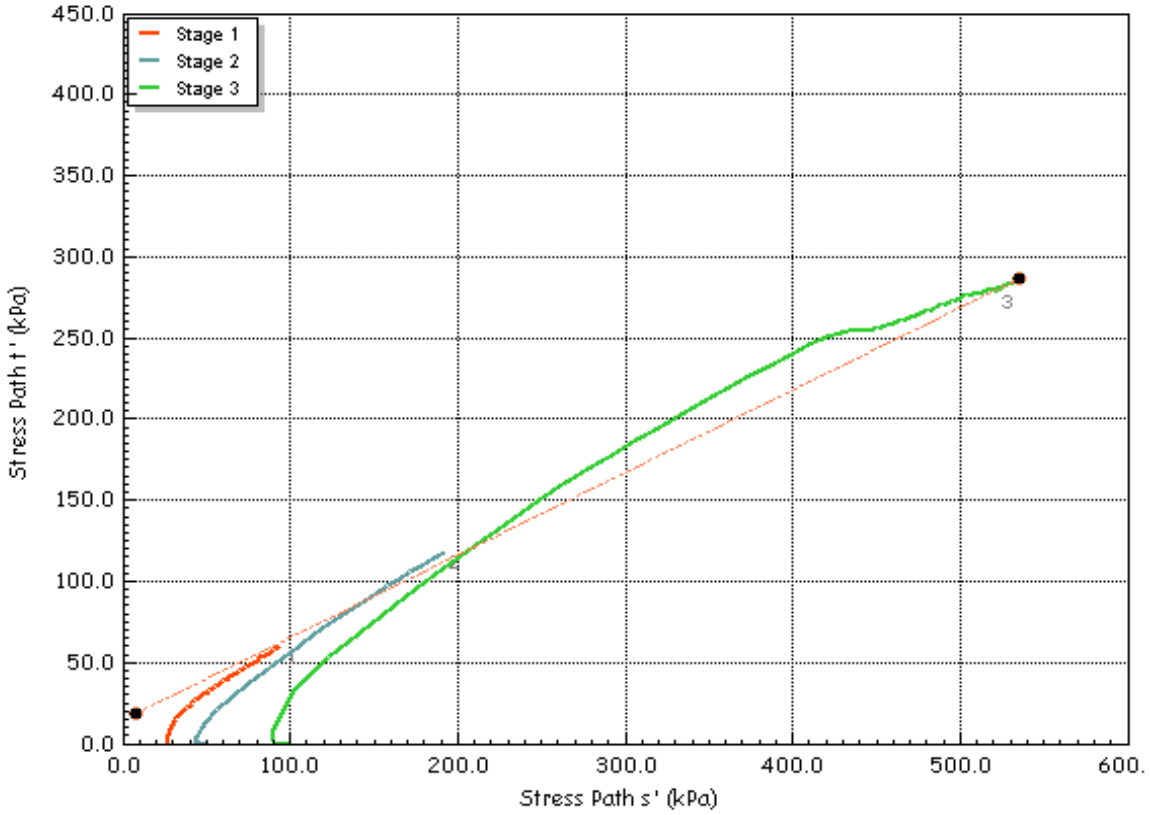
Effective Stress Triaxial Compression

Consolidated Undrained

Shear Stage Plots

Effective	c'	(kPa)	17.90	Effective Cohesion	c'	(kPa)	17.90
Effective Friction	ϕ'	(deg)	30.5	Effective Friction	ϕ'	(deg)	30.5





Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH301 4.00m
		Test Date	11/03/2020
Jobfile	Colmendy Extension Denbigh	Borehole	BH301
Client	CC Geotechnical LTD	Sample	4.00m
		Depth	4.00m

UKAS TESTING 4043

PSL Professional Soils Laboratory

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Shear Strength (kN/m^2)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
BH302	B	0.50	0.50	23	-	-	-	38	18	20	38	CI	Y	Brown very clayey very sandy GRAVEL. Gravel is fine to medium subangular to subrounded sandstone and quartz. (BS1377Pt2:3.2,4.4,5,9.2)
BH302	U	1.00	1.45	7.8	-	-	-	-	-	-	-	-	Y	Brown very clayey very sandy GRAVEL. Gravel is fine to medium subangular to subrounded sandstone and quartz. (BS1377Pt2:3.2)
BH302	B	1.50	1.50	13	-	-	-	-	-	-	-	-	Y	Brown very sandy silty GRAVEL. Gravel is fine to coarse subangular to subrounded sandstone. (BS1377Pt2:3.2,9.2)
BH302	B	2.50	2.50	11	-	-	-	31	17	14	35	CL	Y	Brown very clayey very sandy GRAVEL. Gravel is fine to coarse subangular to subrounded sandstone and quartz. (BS1377Pt2:3.2,4.4,5,9.2)
BH302	U	3.00	3.45	7.6	-	-	-	-	-	-	-	-	Y	Brown very clayey very sandy GRAVEL. Gravel is fine to coarse subangular to subrounded sandstone and quartz. (BS1377Pt2:3.2)
BH302	B	3.50	3.50	8.5	-	-	-	-	-	-	-	-	Y	Grey very sandy slightly silty GRAVEL. Gravel is fine to coarse subangular to subrounded sandstone and quartz. (BS1377Pt2:3.2,9.2)
BH302	B	5.50	5.50	25	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subangular to subrounded sandstone and quartz. (BS1377Pt2:3.2,9.2)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 27.02.20

CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

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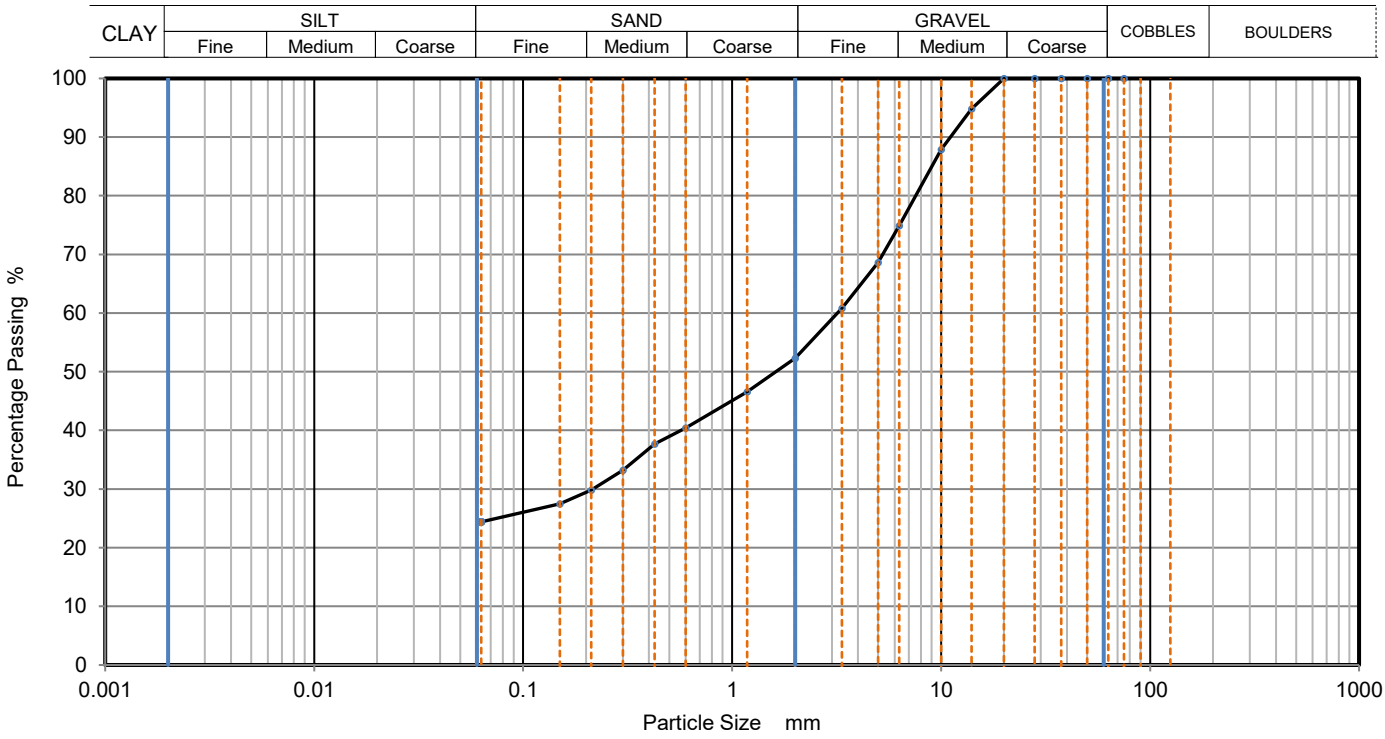
PARTICLE SIZE DISTRIBUTION

Job Ref	CCG-C-20-11469		
Borehole/Pit No.	BH302		
Site Name	COLOMENDY EXTENSION, DENBIGH	Sample No.	1
Specimen Description	Brown very clayey very sandy GRAVEL	Depth, m	0.50
Specimen Reference	Specimen Depth: m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2	KeyLAB ID	CCGL202003103



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	95		
10	88		
6.3	75		
5	69		
3.35	61		
2	52		
1.18	47		
0.6	40		
0.425	38		
0.3	33		
0.212	30		
0.15	28		
0.063	24		

Dry Mass of sample, g

Sample Proportions	% dry mass
Very coarse	0
Gravel	48
Sand	28
Fines <0.063mm	24

Grading Analysis		
D100	mm	
D60	mm	3.2
D30	mm	0.216
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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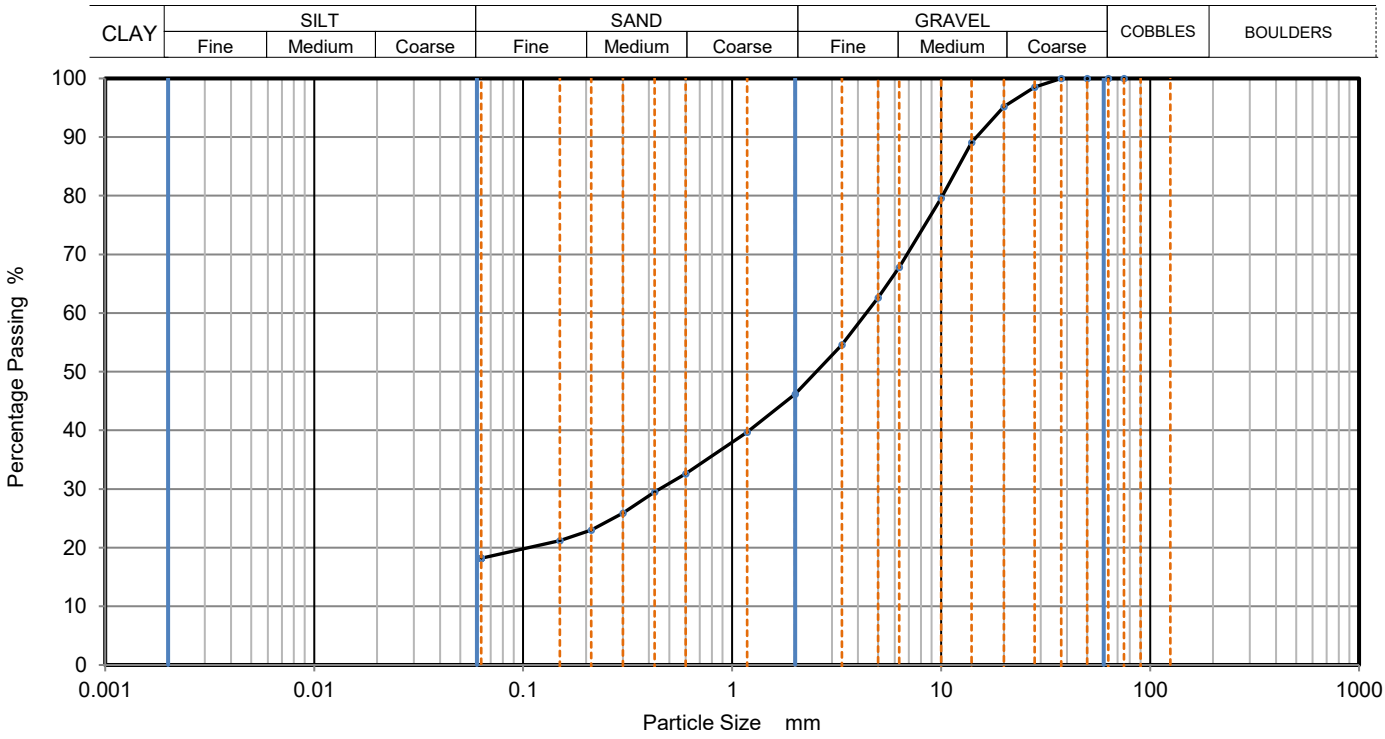
PARTICLE SIZE DISTRIBUTION

Job Ref	CCG-C-20-11469		
Borehole/Pit No.	BH302		
Site Name	COLOMENDY EXTENSION, DENBIGH	Sample No.	1
Specimen Description	Brown very sandy silty GRAVEL	Depth, m	1.50
Specimen Reference	Specimen Depth: m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2	KeyLAB ID	CCGL202003104



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	99		
20	95		
14	89		
10	80		
6.3	68		
5	63		
3.35	55		
2	46		
1.18	40		
0.6	33		
0.425	30		
0.3	26		
0.212	23		
0.15	21		
0.063	18		

Dry Mass of sample, g

Sample Proportions	% dry mass
Very coarse	0
Gravel	54
Sand	28
Fines <0.063mm	18

Grading Analysis		
D100	mm	
D60	mm	4.39
D30	mm	0.448
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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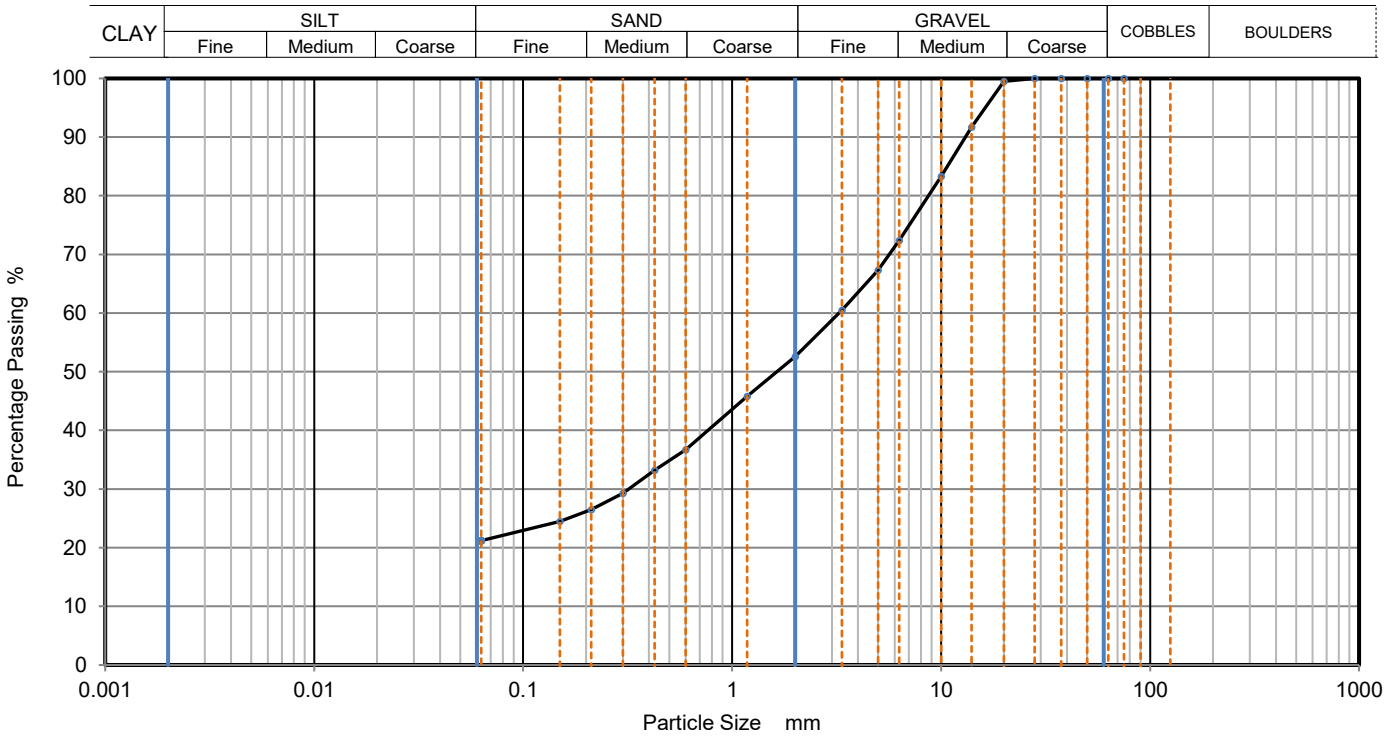
PARTICLE SIZE DISTRIBUTION

Job Ref	CCG-C-20-11469		
Borehole/Pit No.	BH302		
Site Name	COLOMENDY EXTENSION, DENBIGH	Sample No.	1
Specimen Description	Brown very clayey very sandy GRAVEL	Depth, m	2.50
Specimen Reference	Specimen Depth: m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2	KeyLAB ID	CCGL202003105



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	92		
10	83		
6.3	72		
5	67		
3.35	61		
2	53		
1.18	46		
0.6	37		
0.425	33		
0.3	29		
0.212	27		
0.15	25		
0.063	21		

Dry Mass of sample, g

Sample Proportions	% dry mass
Very coarse	0
Gravel	47
Sand	31
Fines <0.063mm	21

Grading Analysis		
D100	mm	
D60	mm	3.24
D30	mm	0.32
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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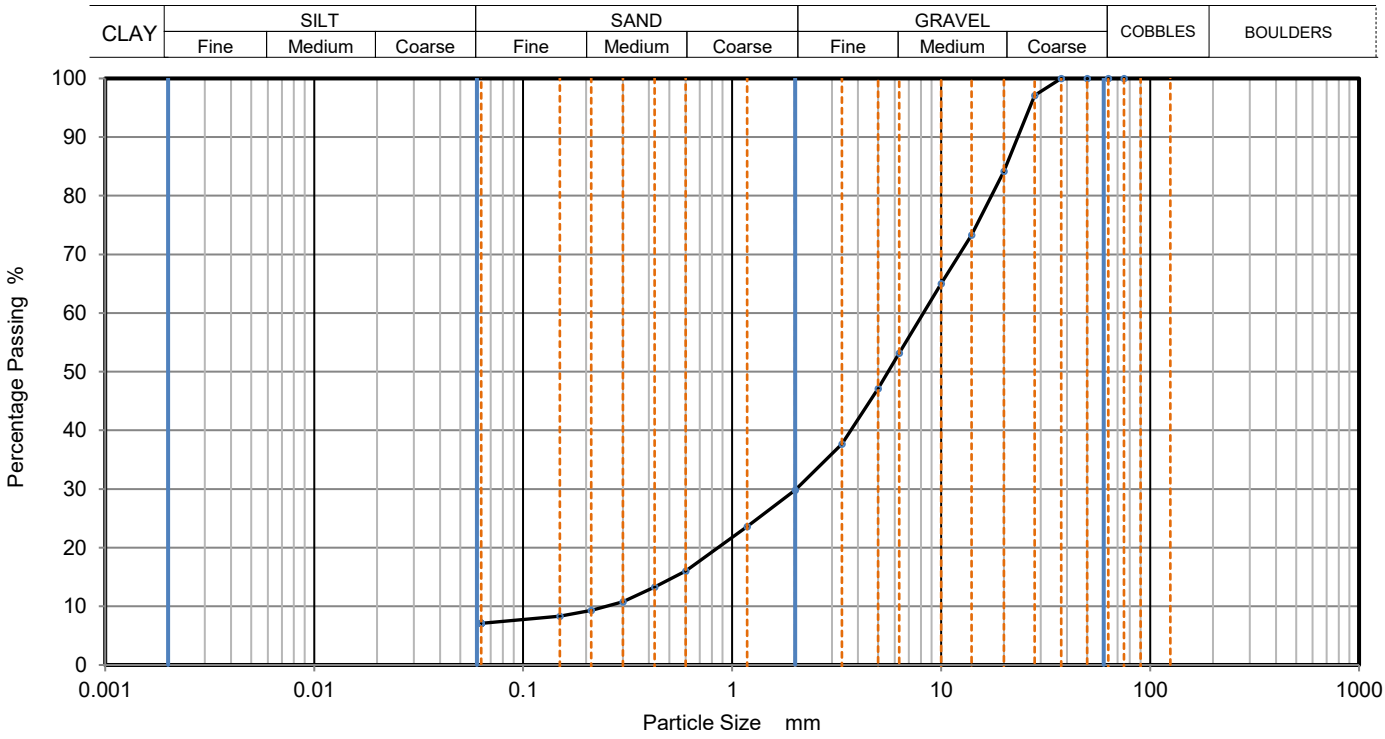
PARTICLE SIZE DISTRIBUTION

Job Ref	CCG-C-20-11469		
Borehole/Pit No.	BH302		
Site Name	COLOMENDY EXTENSION, DENBIGH	Sample No.	1
Specimen Description	Grey very sandy slightly silty GRAVEL	Depth, m	3.50
Specimen Reference	Specimen Depth: m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2	KeyLAB ID	CCGL202003106



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	97		
20	84		
14	73		
10	65		
6.3	53		
5	47		
3.35	38		
2	30		
1.18	24		
0.6	16		
0.425	13		
0.3	11		
0.212	9		
0.15	8		
0.063	7		

Dry Mass of sample, g

Sample Proportions	% dry mass
Very coarse	0
Gravel	70
Sand	23
Fines <0.063mm	7

Grading Analysis		
D100	mm	
D60	mm	8.23
D30	mm	2.03
D10	mm	0.25
Uniformity Coefficient		33
Curvature Coefficient		2

Remarks

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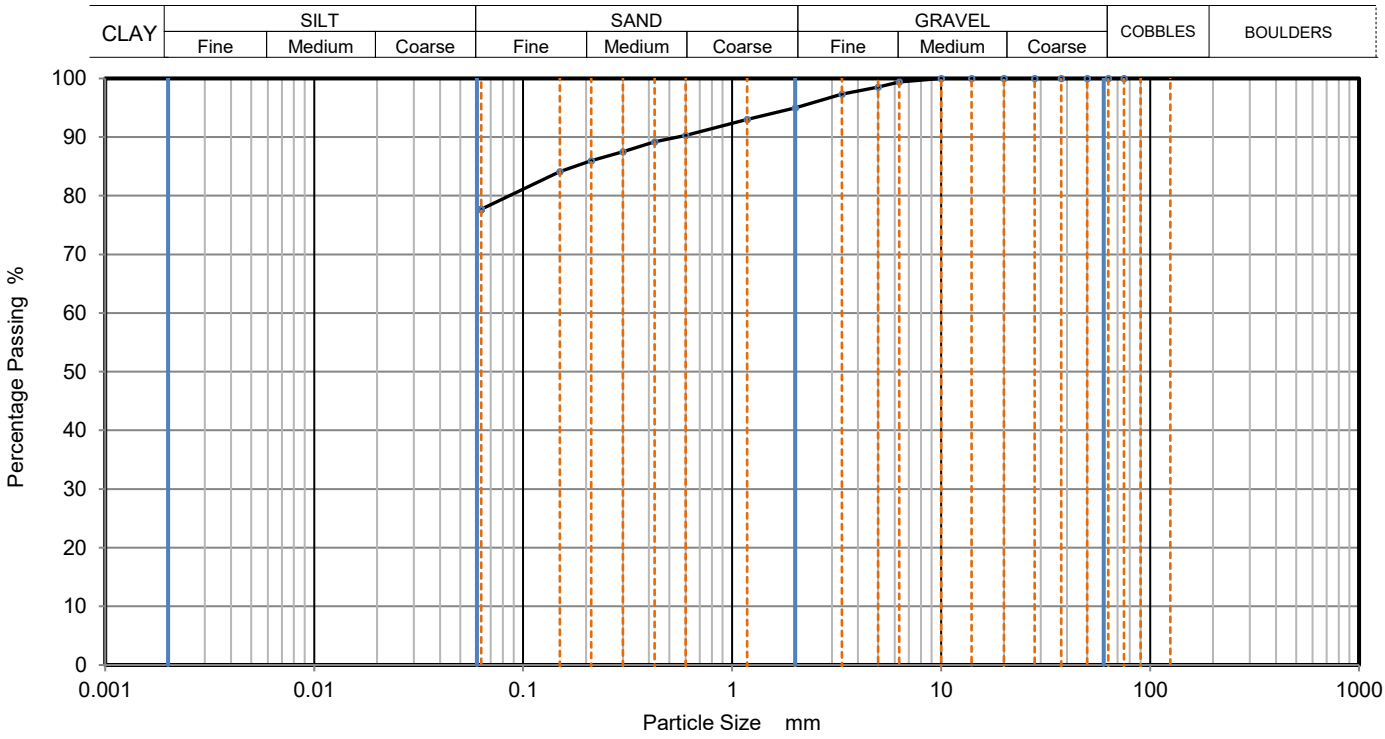
PARTICLE SIZE DISTRIBUTION

Job Ref	CCG-C-20-11469		
Borehole/Pit No.	BH302		
Site Name	COLOMENDY EXTENSION, DENBIGH	Sample No.	1
Specimen Description	Brown slightly sandy slightly gravelly silty CLAY	Depth, m	5.50
Specimen Reference	Specimen Depth: m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2	KeyLAB ID	CCGL202003107



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	99		
5	99		
3.35	97		
2	95		
1.18	93		
0.6	90		
0.425	89		
0.3	88		
0.212	86		
0.15	84		
0.063	78		

Dry Mass of sample, g

Sample Proportions	% dry mass
Very coarse	0
Gravel	5
Sand	17
Fines <0.063mm	78

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

Remarks

Preparation and testing in accordance with BS1377 unless noted below

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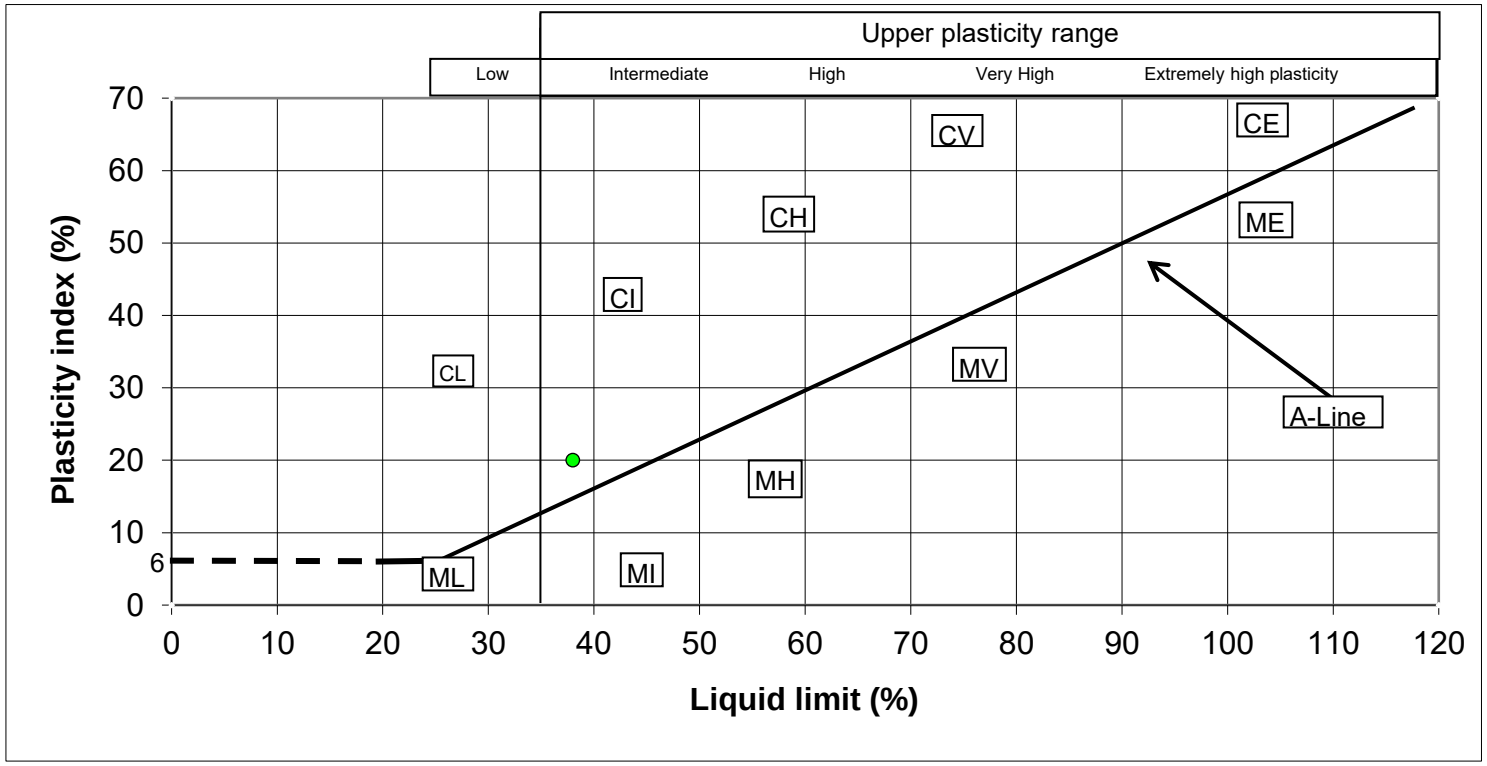
ATTERBERG TEST RESULT SHEET
BS 1377:Part 2:1990:cl 4.4,5

SILT (M-SOIL), M plots below A-Line , CLAY,C, plots above A-Line, M and C may be combined as FINE SOIL, F.



BH	Sample Depth	Liquid limit	Plasticity index
BH302	0.50	38.0	20.0

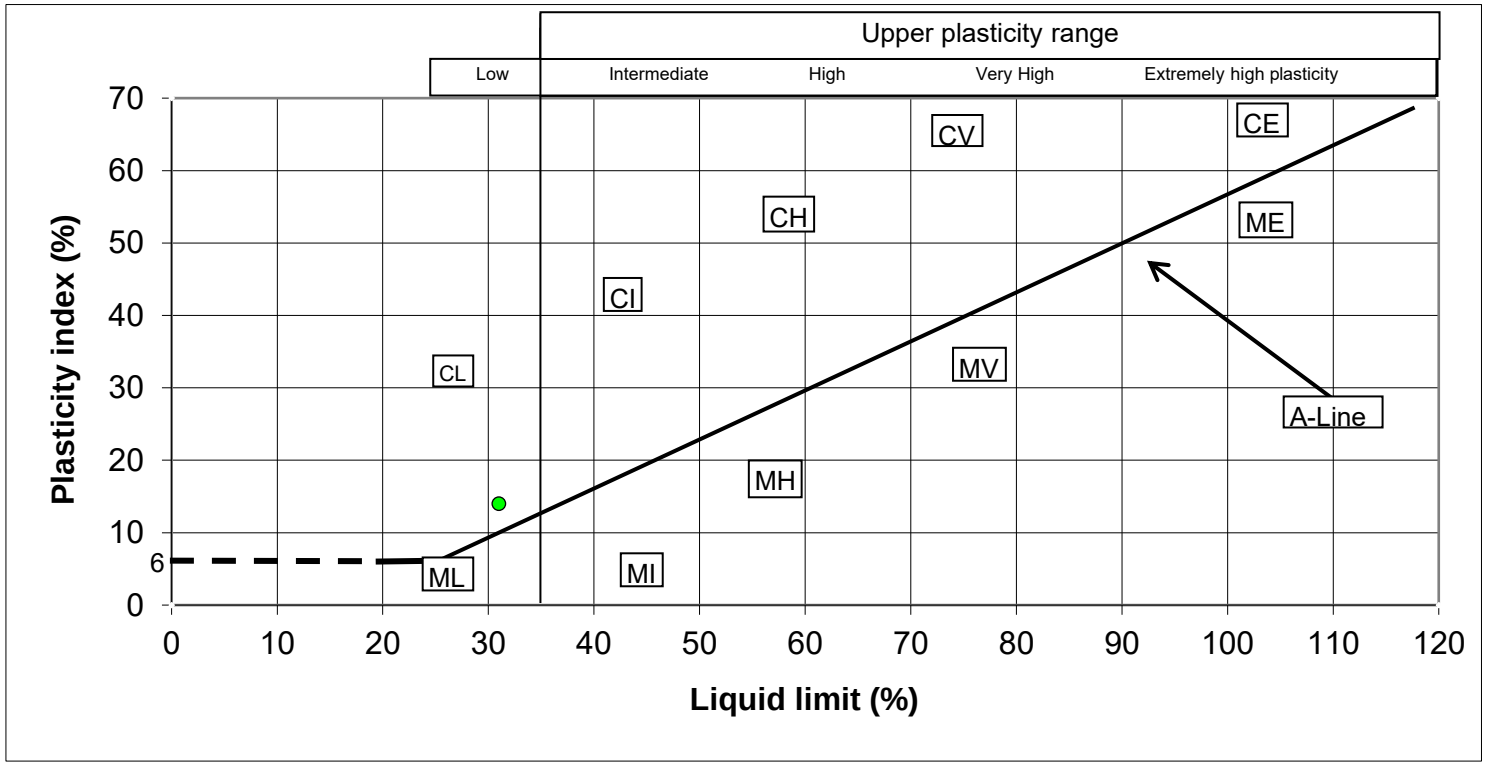
UKAS TESTING
4514

APPROVED BY	DK

CLIENT: DAEAR GEO CONSULTING	SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469)

ATTERBERG TEST RESULT SHEET
BS 1377:Part 2:1990:cl 4.4,5

SILT (M-SOIL), M plots below A-Line , CLAY,C, plots above A-Line, M and C may be combined as FINE SOIL, F.



BH	Sample Depth	Liquid limit	Plasticity index
BH302	2.50	31.0	14.0

UKAS TESTING
4514

APPROVED BY	DK

CLIENT: DAEAR GEO CONSULTING	SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469)

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Shear Strength (kN/m^2)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
BH303	B	0.50	0.50	15	-	-	-	-	-	-	-	-	Y	Brown sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded sandstone. (BS1377Pt2:3.2)
BH303	B	1.50	1.50	20	-	-	-	-	-	-	-	-	Y	Reddish brown very silty gravelly fine to medium grained SAND. Gravel is fine to medium subangular to subrounded sandstone and quartz. (BS1377Pt2:3.2,9.2)
BH303	B	2.50	2.50	13	-	-	-	-	-	-	-	-	Y	Brown very clayey very sandy GRAVEL. Gravel is fine to coarse subangular sandstone, limestone, quartz. (BS1377Pt2:3.2,9.2)
BH303	B	3.50	3.50	12	-	-	-	-	-	-	-	-	Y	Brown very clayey very sandy GRAVEL. Gravel is fine to coarse subrounded to subangular sandstone and quartz. (BS1377Pt2:3.2,9.2)
BH303	B	4.50	4.50	13	-	-	-	-	-	-	-	-	Y	Brown sandy slightly gravelly silty CLAY. Gravel is fine to coarse subangular to subrounded sandstone and quartz. (BS1377Pt2:3.2,9.2)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 16.03.20

CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

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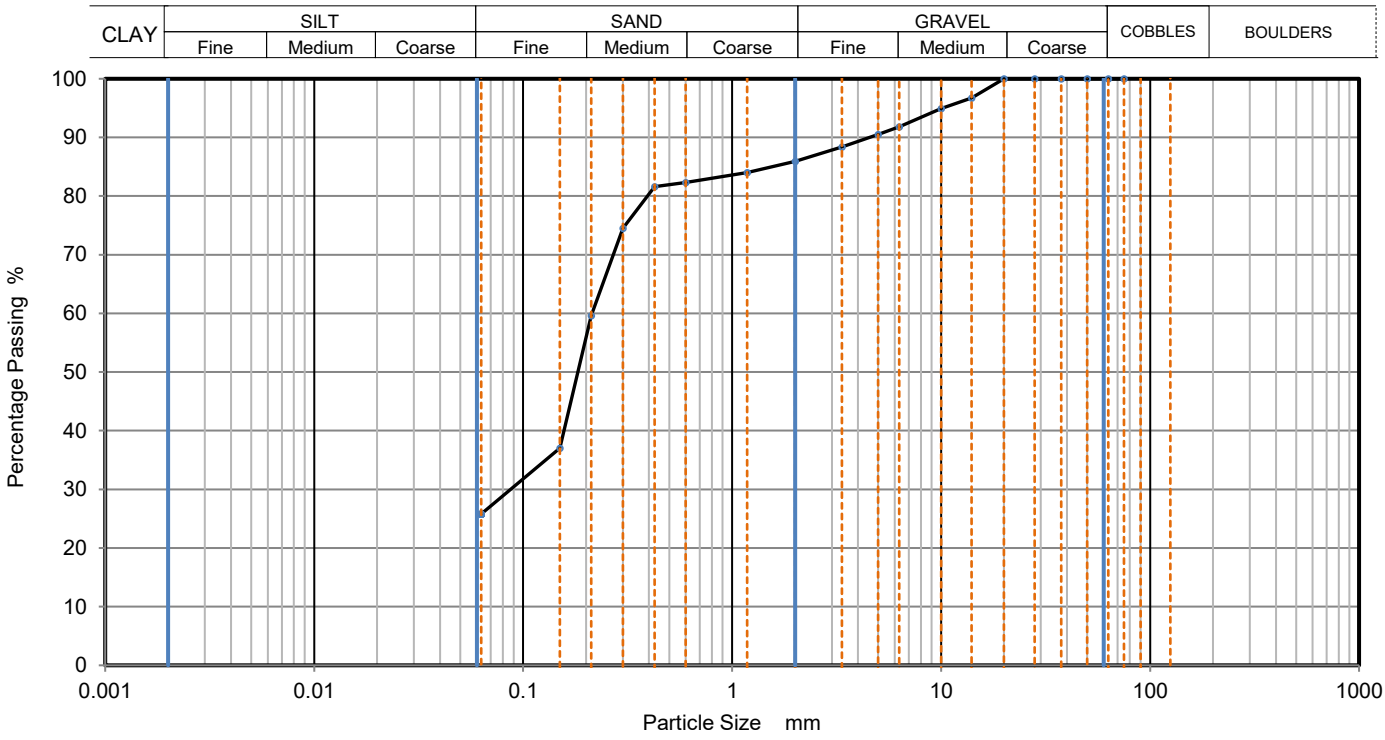
PARTICLE SIZE DISTRIBUTION

Job Ref	CCG-C-20-11469		
Borehole/Pit No.	BH303		
Site Name	COLOMENDY EXTENSION, DENBIGH	Sample No.	1
Specimen Description	Reddish brown very silty gravelly fine to medium grained SAND	Depth, m	1.50
Specimen Reference	Specimen Depth: m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2	KeyLAB ID	CCGL202003111



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	97		
10	95		
6.3	92		
5	91		
3.35	88		
2	86		
1.18	84		
0.6	82		
0.425	82		
0.3	75		
0.212	60		
0.15	37		
0.063	26		

Dry Mass of sample, g

Sample Proportions	% dry mass
Very coarse	0
Gravel	14
Sand	60
Fines <0.063mm	26

Grading Analysis		
D100	mm	
D60	mm	0.214
D30	mm	0.0873
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

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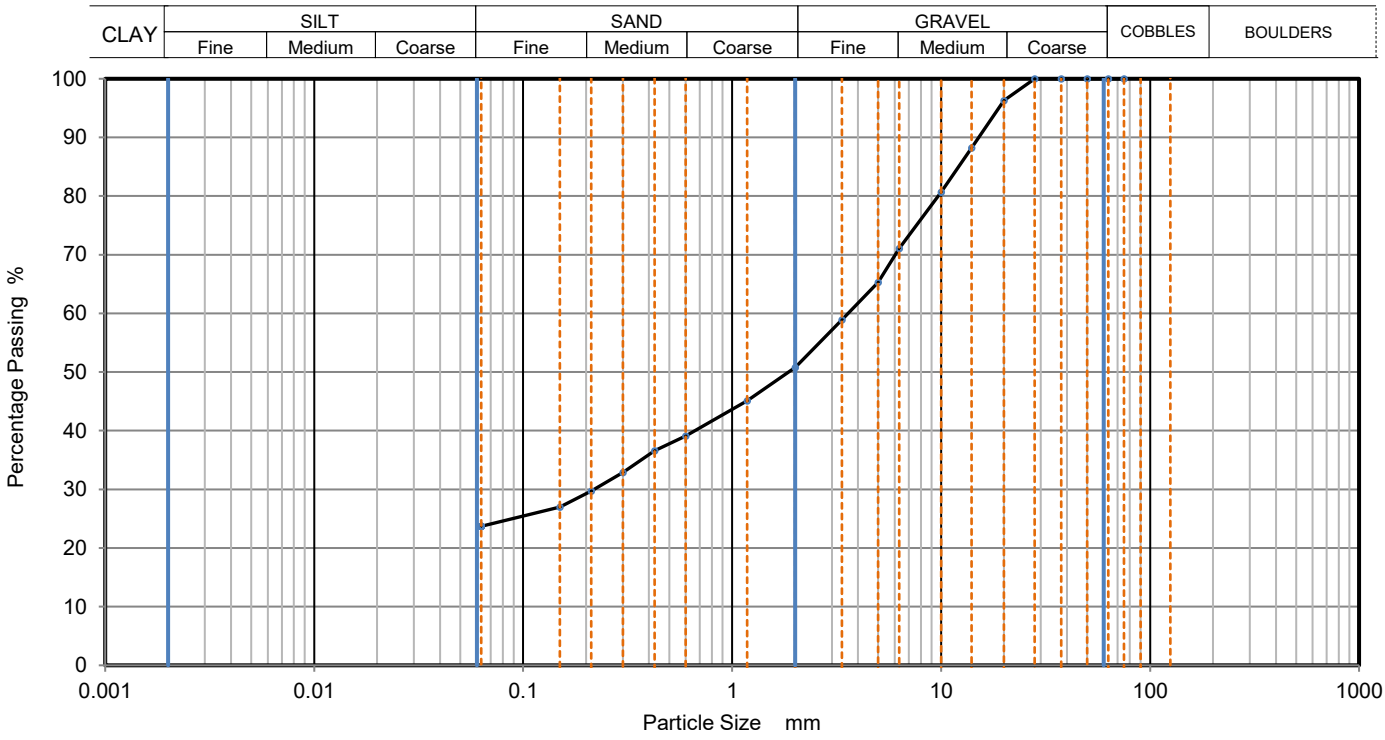
PARTICLE SIZE DISTRIBUTION

Job Ref	CCG-C-20-11469		
Borehole/Pit No.	BH303		
Site Name	COLOMENDY EXTENSION, DENBIGH	Sample No.	1
Specimen Description	Brown very clayey very sandy GRAVEL	Depth, m	2.50
Specimen Reference	Specimen Depth: m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2	KeyLAB ID	CCGL202003112



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	96		
14	88		
10	81		
6.3	71		
5	65		
3.35	59		
2	51		
1.18	45		
0.6	39		
0.425	37		
0.3	33		
0.212	30		
0.15	27		
0.063	24		

Dry Mass of sample, g

Sample Proportions	% dry mass
Very coarse	0
Gravel	49
Sand	27
Fines <0.063mm	24

Grading Analysis		
D100	mm	
D60	mm	3.59
D30	mm	0.219
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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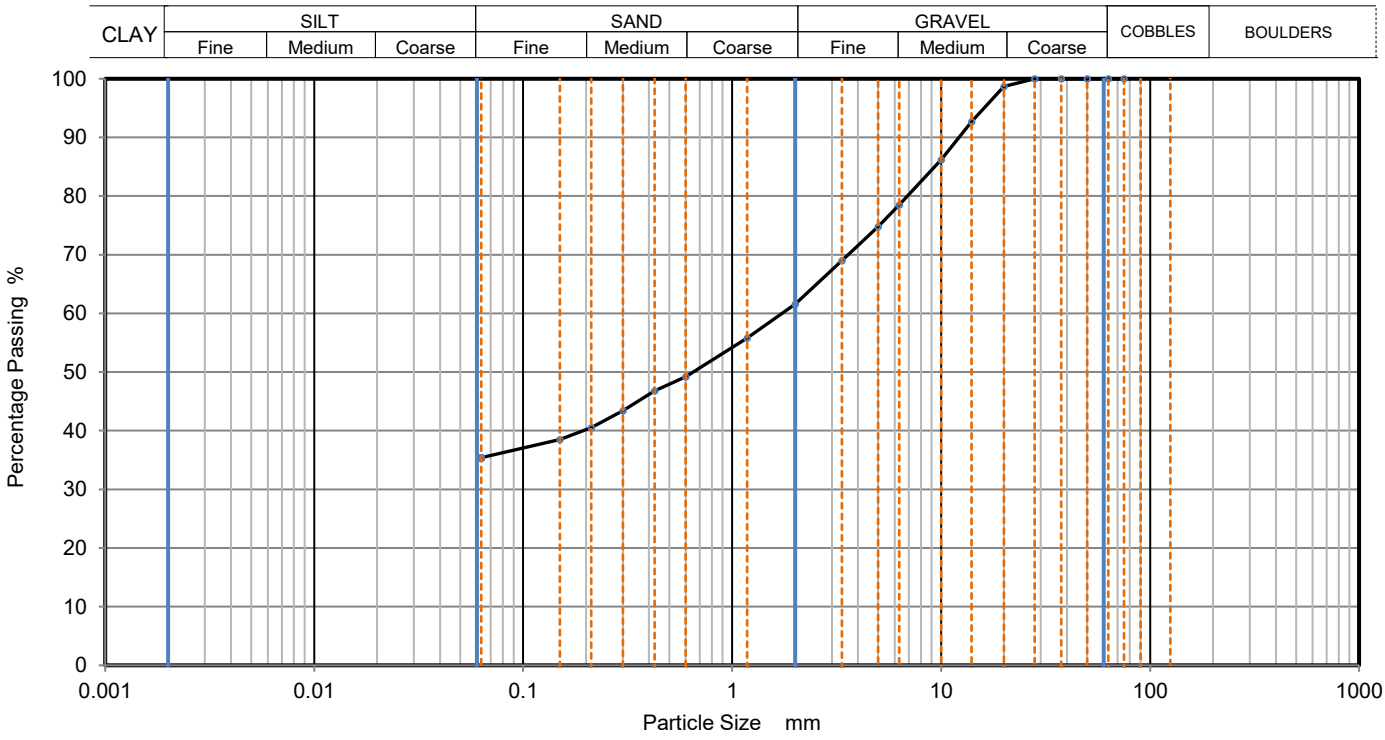
PARTICLE SIZE DISTRIBUTION

Job Ref	CCG-C-20-11469		
Borehole/Pit No.	BH303		
Site Name	COLOMENDY EXTENSION, DENBIGH	Sample No.	1
Specimen Description	Brown very clayey very sandy GRAVEL	Depth, m	3.50
Specimen Reference	Specimen Depth: m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2	KeyLAB ID	CCGL202003113



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	99		
14	93		
10	86		
6.3	79		
5	75		
3.35	69		
2	62		
1.18	56		
0.6	49		
0.425	47		
0.3	43		
0.212	41		
0.15	39		
0.063	35		

Dry Mass of sample, g

Sample Proportions	% dry mass
Very coarse	0
Gravel	38
Sand	26
Fines <0.063mm	35

Grading Analysis		
D100	mm	
D60	mm	1.73
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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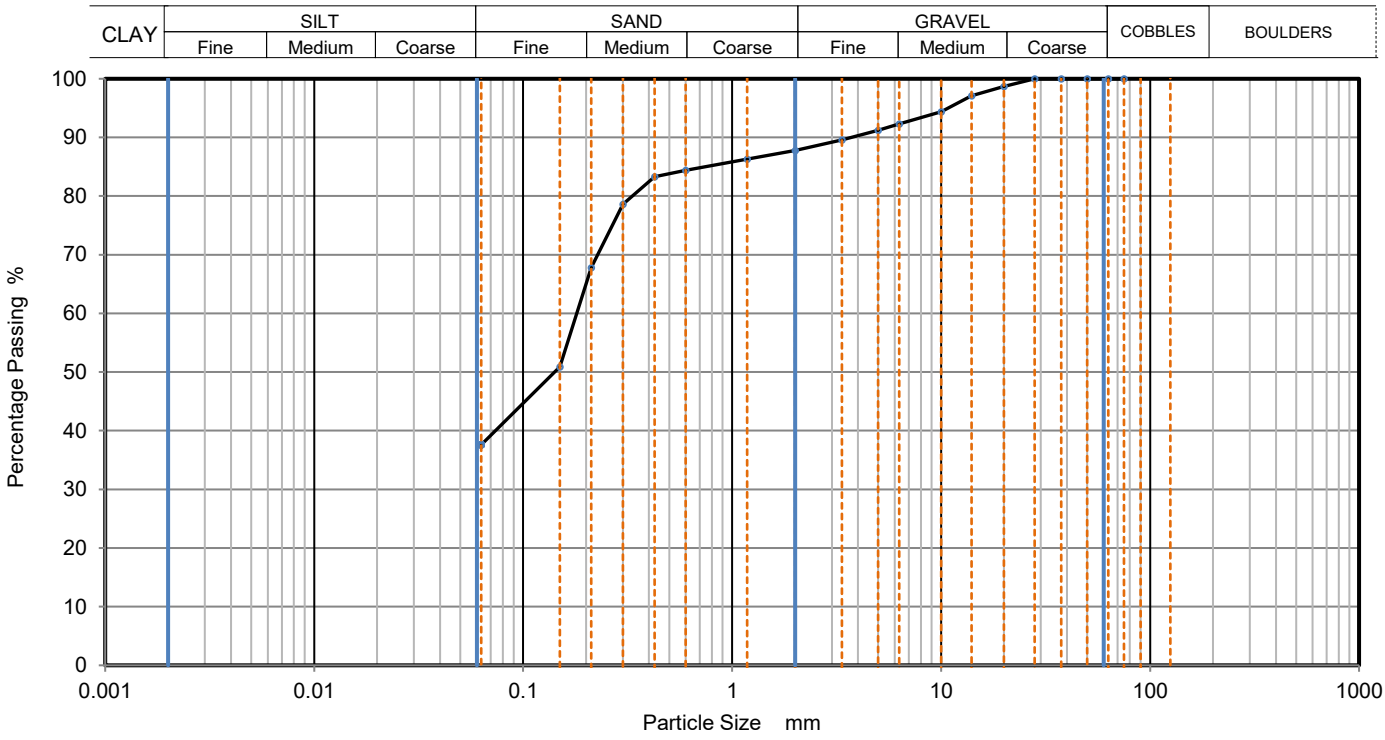
PARTICLE SIZE DISTRIBUTION

Job Ref	CCG-C-20-11469		
Borehole/Pit No.	BH303		
Site Name	COLOMENDY EXTENSION, DENBIGH	Sample No.	1
Specimen Description	Brown sandy slightly gravelly silty CLAY	Depth, m	4.50
Specimen Reference	Specimen Depth: m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2	KeyLAB ID	CCGL202003114



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	99		
14	97		
10	94		
6.3	92		
5	91		
3.35	90		
2	88		
1.18	86		
0.6	84		
0.425	83		
0.3	79		
0.212	68		
0.15	51		
0.063	38		

Dry Mass of sample, g

Sample Proportions	% dry mass
Very coarse	0
Gravel	12
Sand	50
Fines <0.063mm	38

Grading Analysis		
D100	mm	
D60	mm	0.181
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

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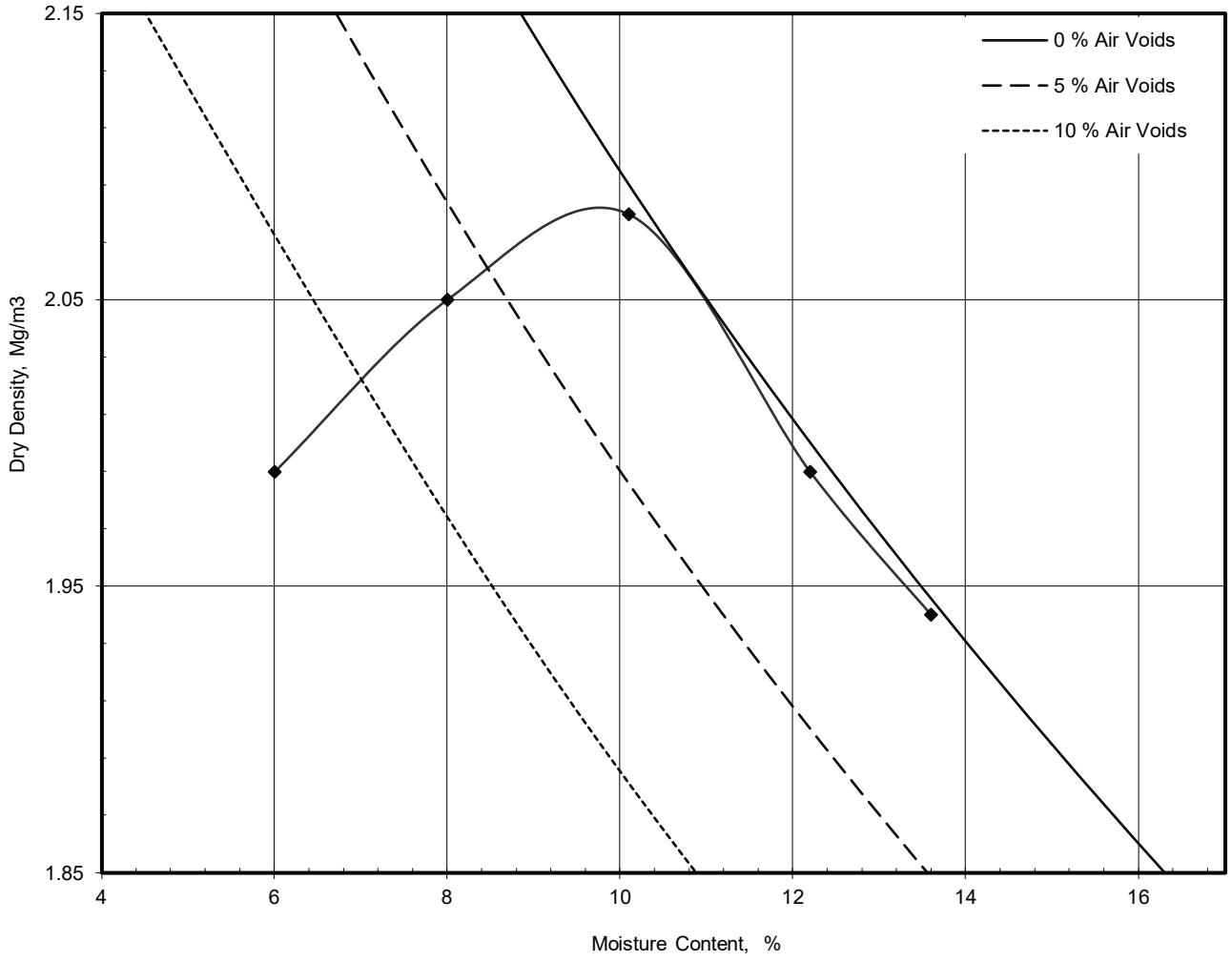
	Dry Density / Moisture Content Relationship Light Compaction			Job Ref	CCG-C-20-11469
				Borehole / Pit No	BH303
Site Name	**COLOMENDY EXTENSION, DENBIGH**			Sample No	6
Soil Description	Brown very clayey very sandy GRAVEL			Depth	3.50 m
Specimen Ref.		Specimen Depth	m	Sample Type	B
Test Method	BS1377:1990:Part 4 3.3			Keylab ID	
				Compaction Test Reference/No.	



Preparation		
Mould Type		1 litre
Samples Used		1
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	1
Particle Density -	Mg/m³	2.65

Maximum Dry Density	Mg/m³	**2.08**
Optimum Moisture Content	%	**10**

Operator	Checked	Approved	Remarks	Fig
MH	DK	DK		Sheet 1 of 1

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)	Shear Strength (kN/m²)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
TP101	B	0.75	0.75	14	-	-	-	-	-	-	-	-	Y	Brown very clayey very gravelly fine to coarse grained SAND. Gravel is fine to coarse subangular to subrounded sandstone. (BS1377Pt2:3.2,9.2,Pt4:3.3)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 12.03.20

CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

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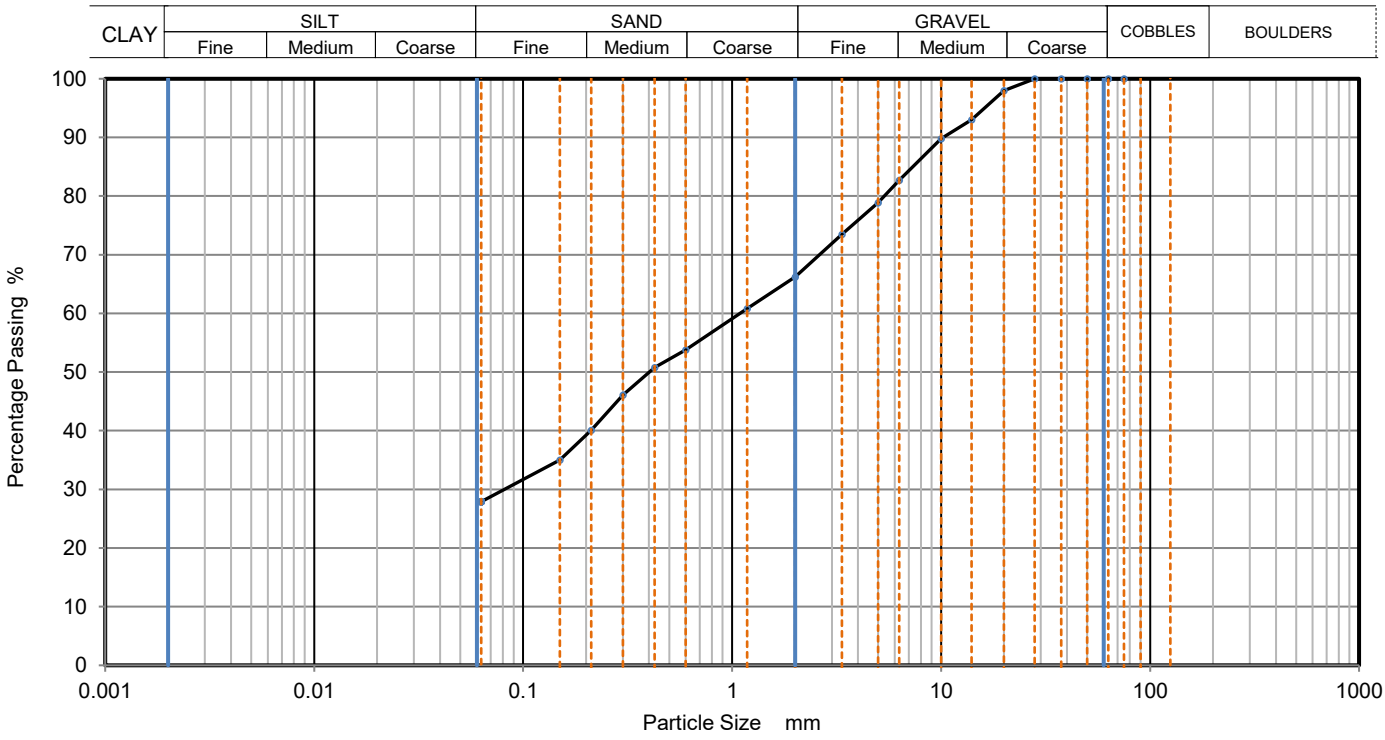
PARTICLE SIZE DISTRIBUTION

Job Ref	CCG-C-20-11469		
Borehole/Pit No.	TP101		
Site Name	COLOMENDY EXTENSION, DENBIGH	Sample No.	1
Specimen Description	Brown very clayey very gravelly fine to coarse grained SAND	Depth, m	0.75
Specimen Reference	Specimen Depth: m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2	KeyLAB ID	CCGL202002268



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	98		
14	93		
10	90		
6.3	83		
5	79		
3.35	74		
2	66		
1.18	61		
0.6	54		
0.425	51		
0.3	46		
0.212	40		
0.15	35		
0.063	28		

Dry Mass of sample, g

Sample Proportions	% dry mass
Very coarse	0
Gravel	34
Sand	38
Fines <0.063mm	28

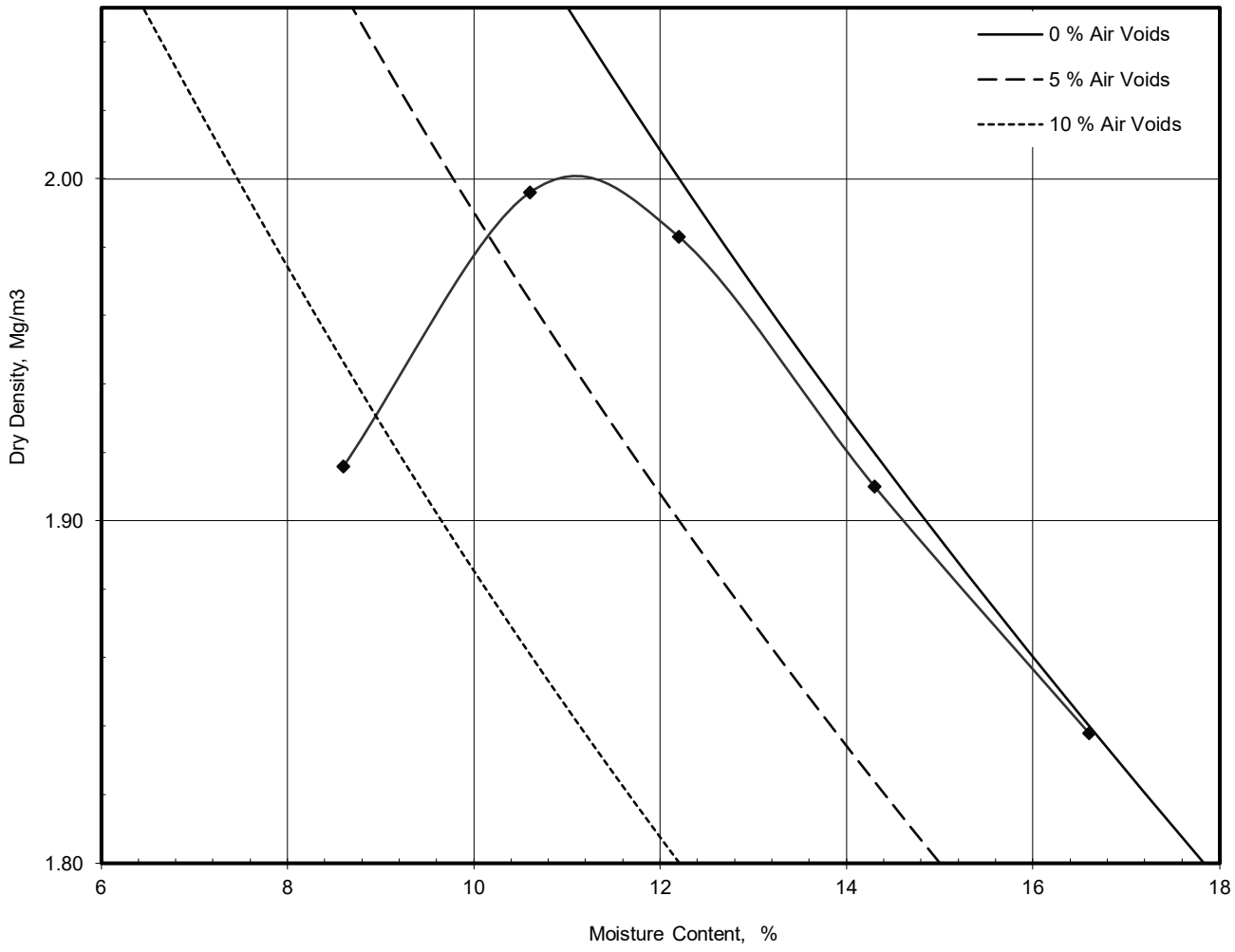
Grading Analysis		
D100	mm	
D60	mm	1.09
D30	mm	0.0815
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	Fig 1
JE	DK	DK	26/02/2020 15:03	Sheet

	Dry Density / Moisture Content Relationship Light Compaction			Job Ref	CCG-C-20-11469
				Borehole / Pit No	TP101
Site Name	COLOMENDY EXTENSION, DENBIGH			Sample No	2
Soil Description	Brown very clayey very gravelly fine to coarse grained SAND			Depth	0.75 m
Specimen Ref.		Specimen Depth	m	Sample Type	B
Test Method	BS1377:1990:Part 4 3.3			Keylab ID	
				Compaction Test Reference/No.	



Preparation		
Mould Type		1 litre
Samples Used		5
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	2
Particle Density -	Mg/m³	2.65

Maximum Dry Density	Mg/m³	**2.00**
Optimum Moisture Content	%	**11**

Operator	Checked	Approved	Remarks	Fig
MH	DK	DK		Sheet 1 of 1

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Shear Strength (kN/m^2)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
TP102	B	0.75	0.75	12	-	-	-	-	-	-	-	-	Y	Brown very clayey very sandy GRAVEL. Gravel is fine to coarse subangular sandstone. (BS1377Pt2:3.2,9.2,Pt4:3.3)
TP102	B	1.80	1.80	12	2.20	1.96	-	32	16	16	74	CL	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular sandstone. (BS1377Pt2:3.2,4.4,5,Pt4:3.3)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 26.02.20

CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

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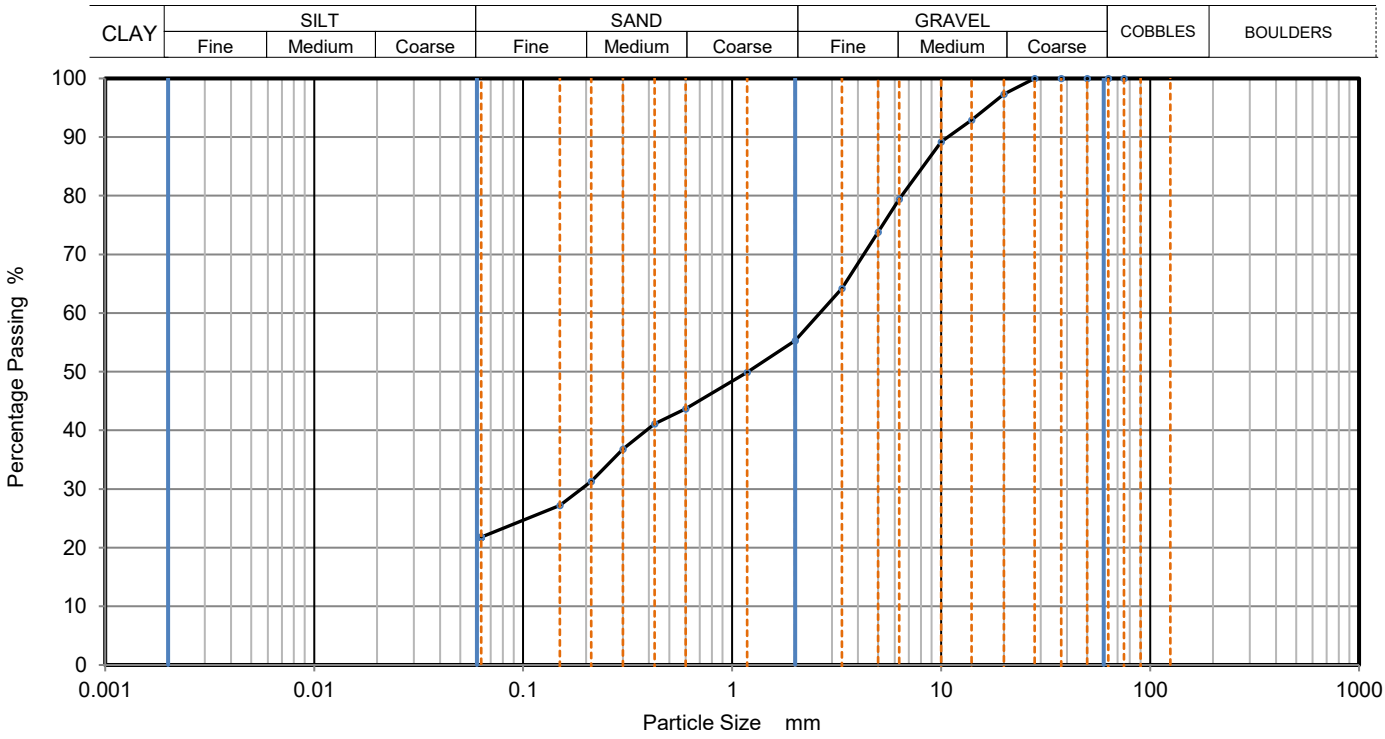
PARTICLE SIZE DISTRIBUTION

Job Ref	CCG-C-20-11469		
Borehole/Pit No.	TP102		
Site Name	COLOMENDY EXTENSION, DENBIGH	Sample No.	1
Specimen Description	Brown very clayey very sandy GRAVEL	Depth, m	0.75
Specimen Reference	Specimen Depth: m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2	KeyLAB ID	CCGL202002265



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	97		
14	93		
10	89		
6.3	79		
5	74		
3.35	64		
2	55		
1.18	50		
0.6	44		
0.425	41		
0.3	37		
0.212	31		
0.15	27		
0.063	22		

Dry Mass of sample, g

Sample Proportions	% dry mass
Very coarse	0
Gravel	45
Sand	34
Fines <0.063mm	22

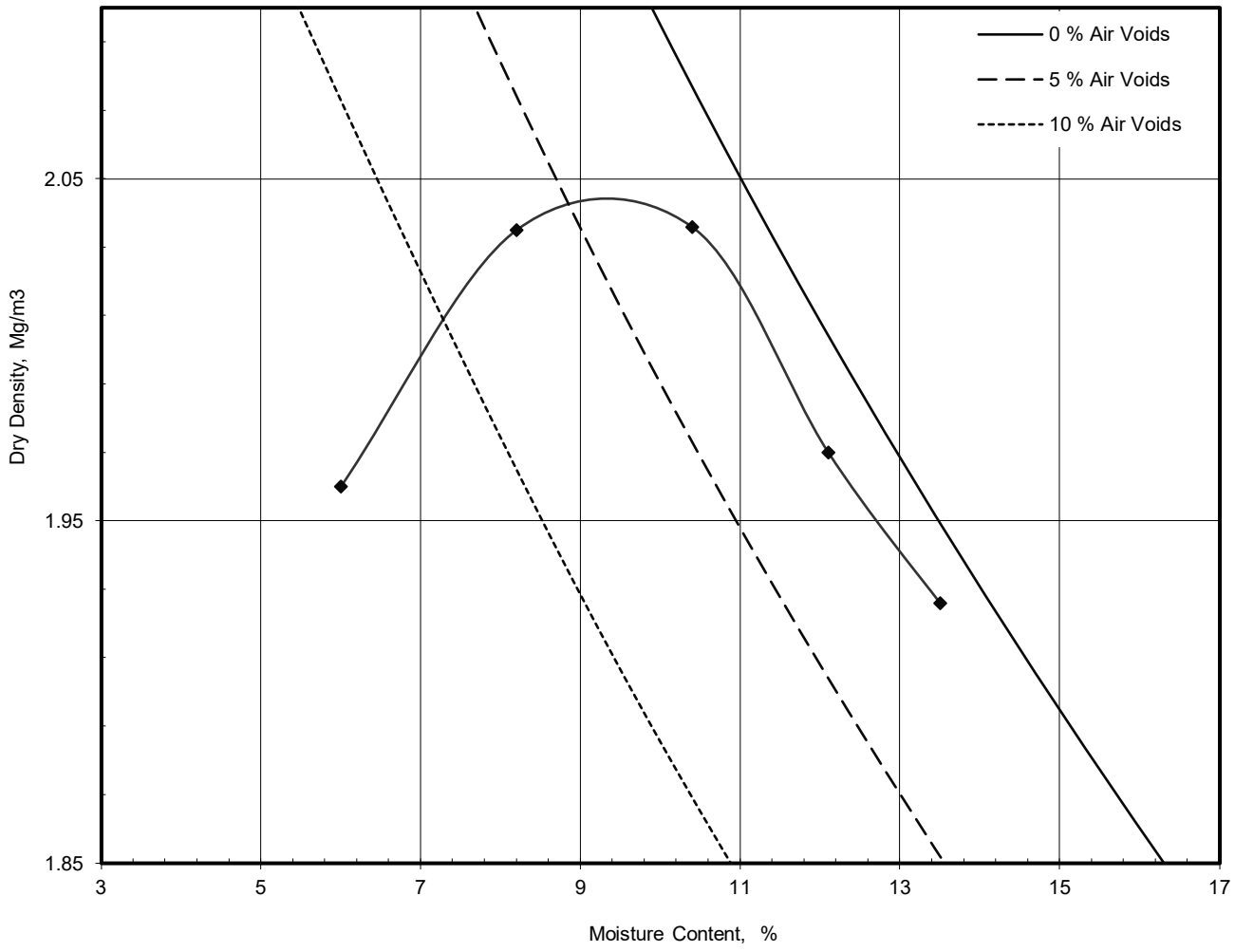
Grading Analysis		
D100	mm	
D60	mm	2.62
D30	mm	0.19
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	Fig 1
JE	DK	DK	26/02/2020 11:51	Sheet

	Dry Density / Moisture Content Relationship Light Compaction			Job Ref	CCG-C-20-11469
				Borehole / Pit No	TP102
Site Name	**COLOMENDY EXTENSION, DENBIGH**			Sample No	1
Soil Description	Brown very clayey very sandy GRAVEL			Depth	0.75 m
Specimen Ref.		Specimen Depth	m	Sample Type	B
Test Method	BS1377:1990:Part 4 3.3			Keylab ID	
				Compaction Test Reference/No.	



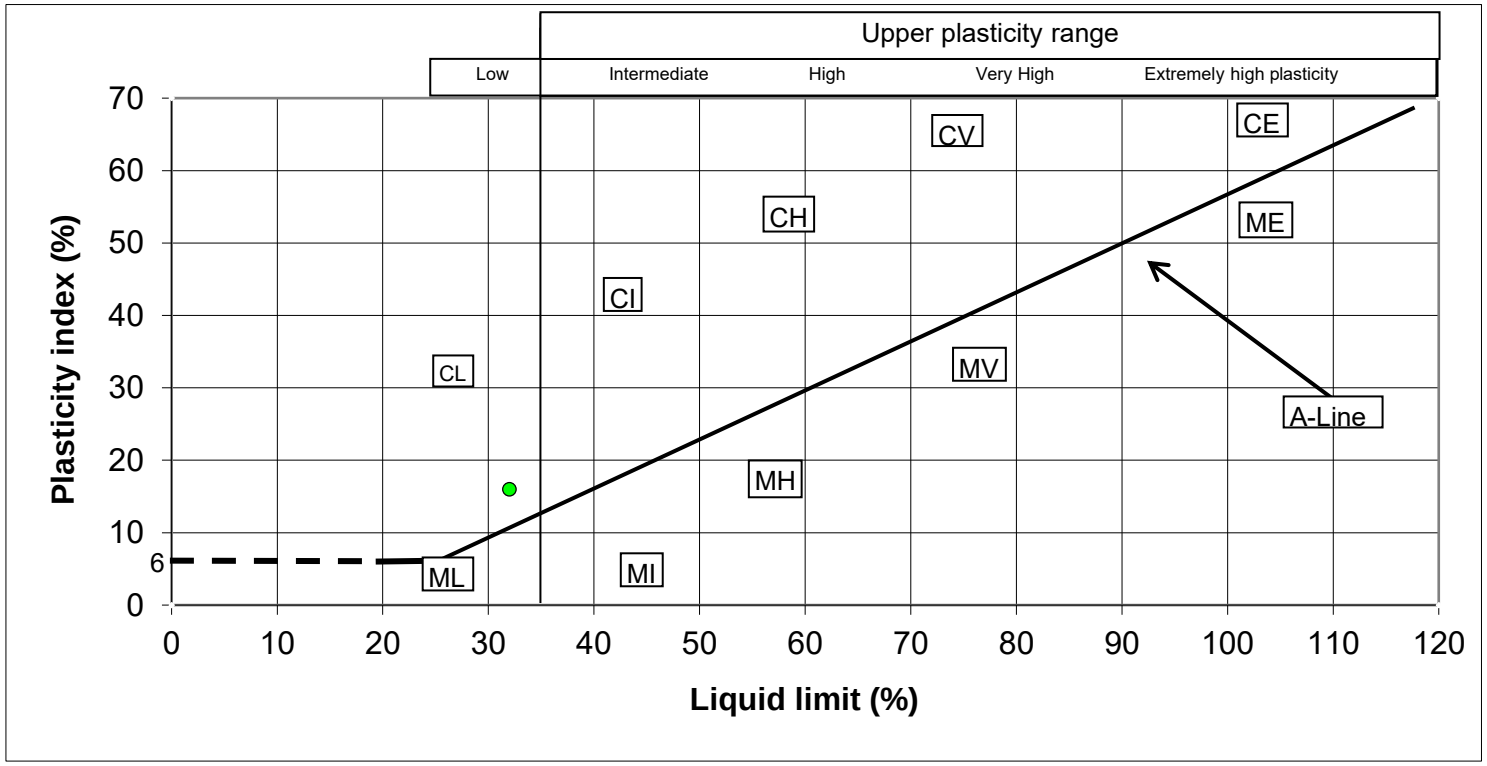
Preparation		
Mould Type		1 litre
Samples Used		5
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	3
Particle Density -	Mg/m³	2.65

Maximum Dry Density	Mg/m³	**2.04**
Optimum Moisture Content	%	**9.2**

Operator	Checked	Approved	Remarks	Fig
AS	DK	DK		Sheet 1 of 1

ATTERBERG TEST RESULT SHEET
BS 1377:Part 2:1990:cl 4.4,5

SILT (M-SOIL), M plots below A-Line , CLAY,C, plots above A-Line, M and C may be combined as FINE SOIL, F.



BH	Sample Depth	Liquid limit	Plasticity index
TP102	1.80	32.0	16.0

UKAS TESTING
4514

APPROVED BY	DK

CLIENT: DAEAR GEO CONSULTING	SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469)

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Shear Strength (kN/m^2)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
TP103	B	0.75	0.75	15	2.21	1.93	-	-	-	-	-	-	Y	Brown sandy slightly gravelly silty CLAY. Gravel is fine to coarse subangular sandstone. (BS1377Pt2:3.2,9.2,Pt4:3.3)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 26.02.20

CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

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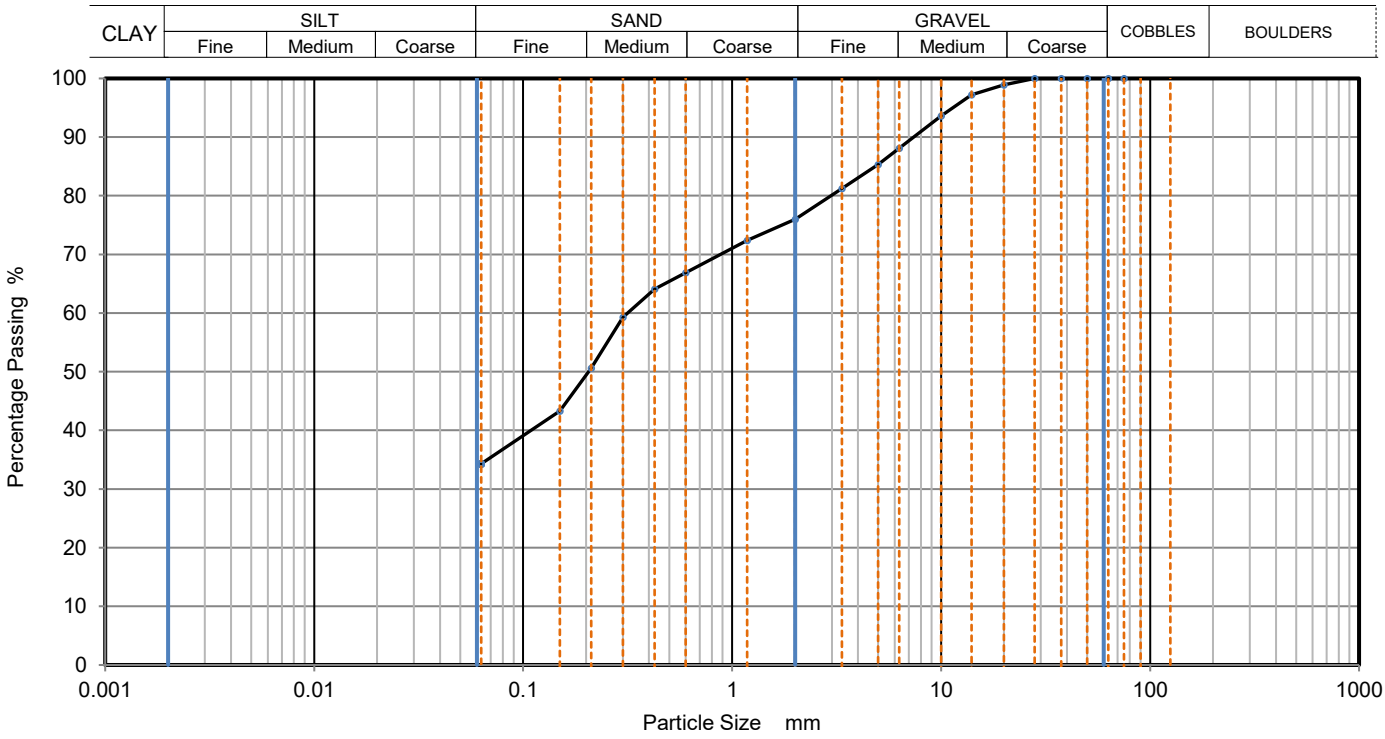
PARTICLE SIZE DISTRIBUTION

Job Ref	CCG-C-20-11469		
Borehole/Pit No.	TP103		
Site Name	COLOMENDY EXTENSION, DENBIGH	Sample No.	1
Specimen Description	Brown sandy slightly gravelly silty CLAY	Depth, m	0.75
Specimen Reference	Specimen Depth: m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2	KeyLAB ID	CCGL202002263



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	99		
14	97		
10	94		
6.3	88		
5	85		
3.35	81		
2	76		
1.18	72		
0.6	67		
0.425	64		
0.3	59		
0.212	51		
0.15	43		
0.063	34		

Dry Mass of sample, g

Sample Proportions	% dry mass
Very coarse	0
Gravel	24
Sand	42
Fines <0.063mm	34

Grading Analysis		
D100	mm	
D60	mm	0.316
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	Fig 1
JE	DK	DK	26/02/2020 11:11	Sheet

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)	Shear Strength (kN/m²)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
TP104	ES	0.50	0.50	26	-	-	-	-	-	-	-	-	Y	Brown sandy slightly gravelly silty CLAY. Gravel is fine to coarse subangular sandstone. (BS1377Pt2:3.2)
TP104	B	0.75	0.75	14	-	-	-	-	-	-	-	-	Y	Brown sandy slightly gravelly silty CLAY. Gravel is fine to coarse subangular sandstone. (BS1377Pt2:3.2)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 26.02.20

CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)	Shear Strength (kN/m²)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
TP105	ES	0.50	0.50	26	-	-	-	-	-	-	-	-	Y	Brown sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular sandstone and mudstone. (BS1377Pt2:3.2)
TP105	B	1.00	1.00	19	-	-	-	28	18	10	71	CL	Y	Brown sandy slightly gravelly silty CLAY. Gravel is fine to coarse subrounded to subangular sandstone and mudstone. (BS1377Pt2:3.2,4.4,5,9.2)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 29.02.20

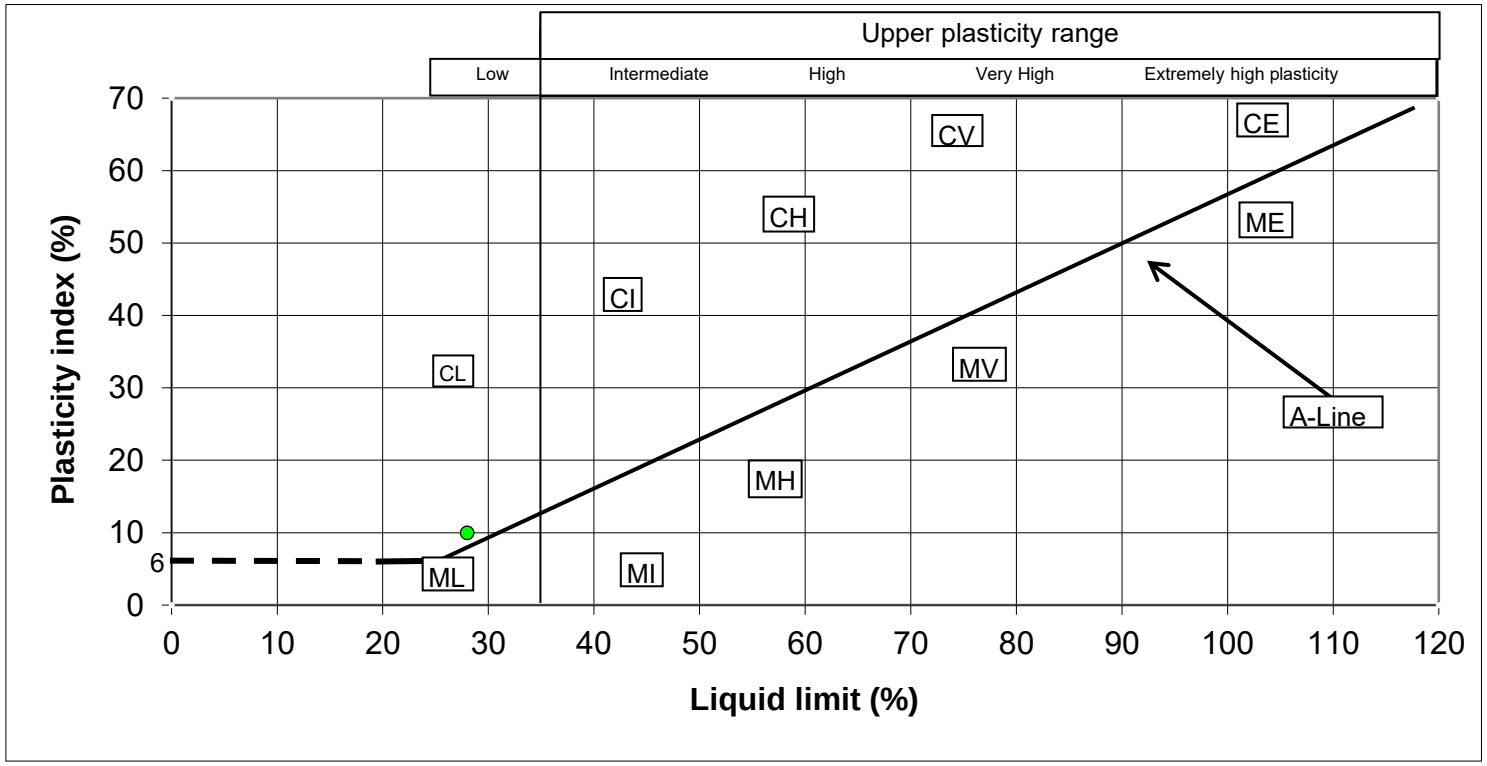
CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

ATTERBERG TEST RESULT SHEET
BS 1377:Part 2:1990:cl 4.4,5

SILT (M-SOIL), M plots below A-Line , CLAY,C, plots above A-Line, M and C may be combined as FINE SOIL, F.



BH	Sample Depth	Liquid limit	Plasticity index
TP105	1.00	28.0	10.0

UKAS TESTING
4514

APPROVED BY	DK

CLIENT: DAEAR GEO CONSULTING	SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469)

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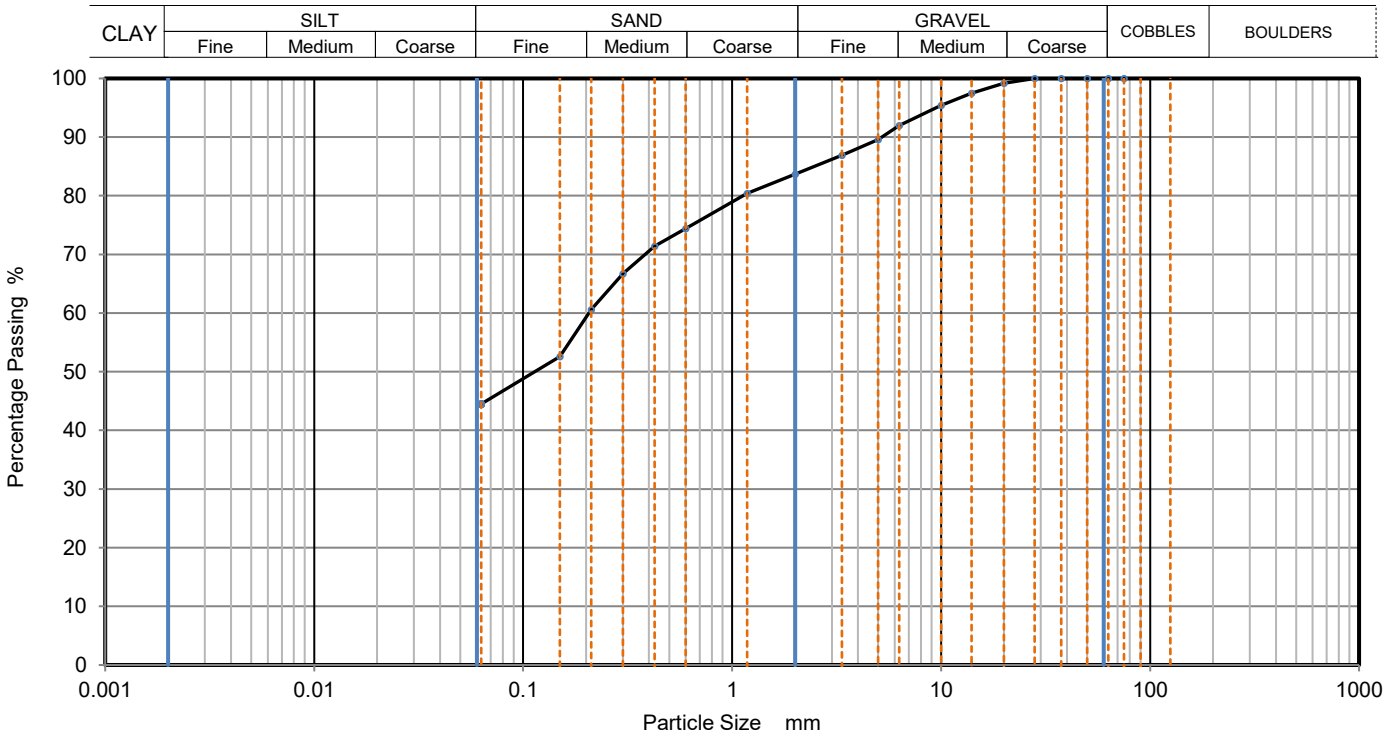
PARTICLE SIZE DISTRIBUTION

Job Ref	CCG-C-20-11469		
Borehole/Pit No.	TP105		
Site Name	COLOMENDY EXTENSION, DENBIGH	Sample No.	1
Specimen Description	Brown sandy slightly gravelly silty CLAY	Depth, m	1.00
Specimen Reference	Specimen Depth: m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2	KeyLAB ID	CCGL202002250



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	99		
14	98		
10	95		
6.3	92		
5	90		
3.35	87		
2	84		
1.18	80		
0.6	74		
0.425	71		
0.3	67		
0.212	61		
0.15	53		
0.063	45		

Dry Mass of sample, g

Sample Proportions	% dry mass
Very coarse	0
Gravel	16
Sand	39
Fines <0.063mm	45

Grading Analysis		
D100	mm	
D60	mm	0.206
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	Fig 1
JE	DK	DK	25/02/2020 14:36	Sheet

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)	Shear Strength (kN/m²)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
TP106	B	1.00	1.00	17	-	-	-	31	16	15	71	CL	Y	Brown sandy slightly gravelly silty CLAY. Gravel is fine to coarse subangular sandstone. (BS1377Pt2:3.2,4.4,5)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 26.02.20

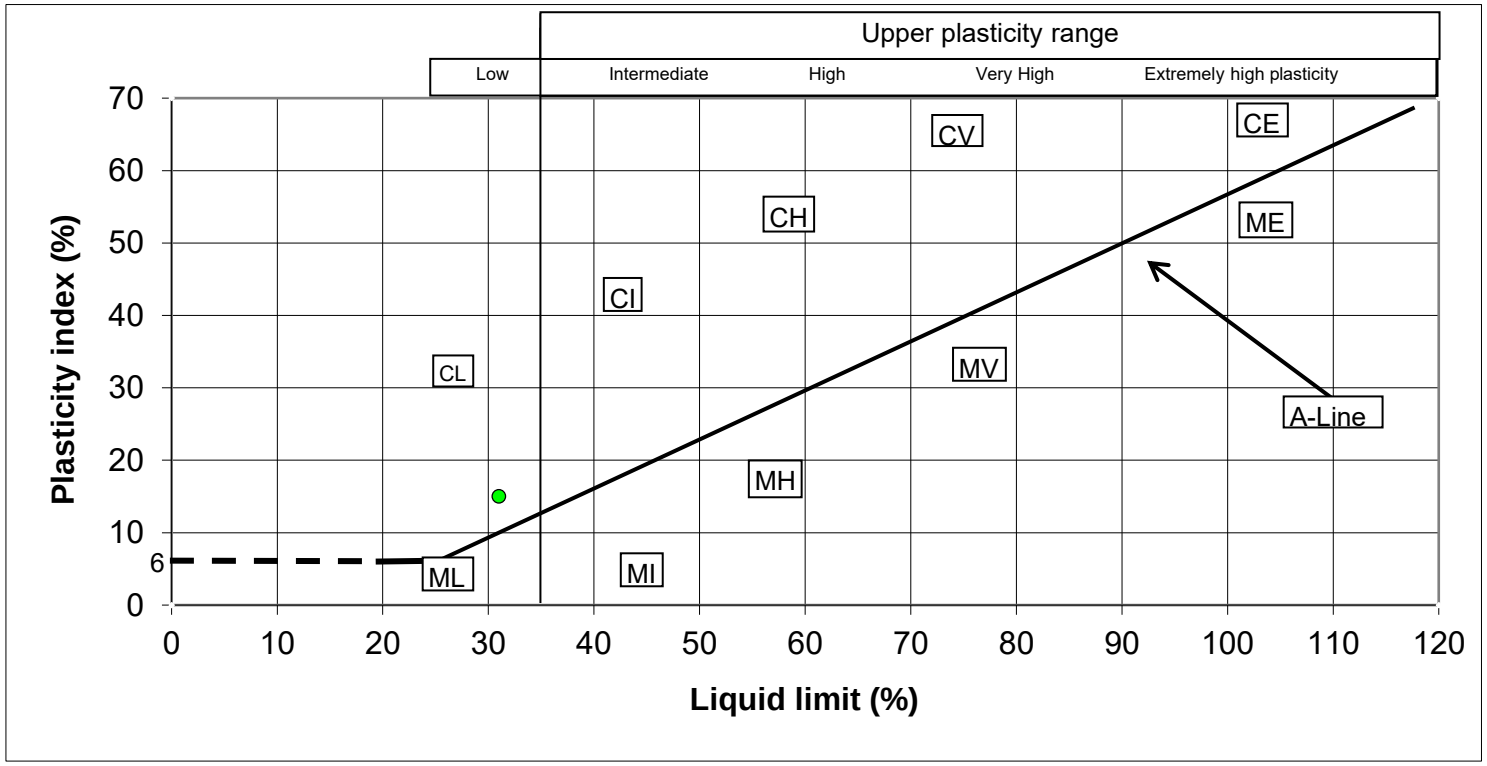
CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

ATTERBERG TEST RESULT SHEET
BS 1377:Part 2:1990:cl 4.4,5

SILT (M-SOIL), M plots below A-Line , CLAY,C, plots above A-Line, M and C may be combined as FINE SOIL, F.



BH	Sample Depth	Liquid limit	Plasticity index
TP106	1.00	31.0	15.0

UKAS TESTING
4514

APPROVED BY	DK

CLIENT: DAEAR GEO CONSULTING	SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469)

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Shear Strength (kN/m^2)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
TP107	ES	0.50	0.50	28	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse subangular sandstone. (BS1377Pt2:3.2)
TP107	B	1.00	1.00	16	-	-	-	35	17	18	78	CL / CI	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse subangular sandstone. (BS1377Pt2:3.2,4.4,5)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 26.02.20

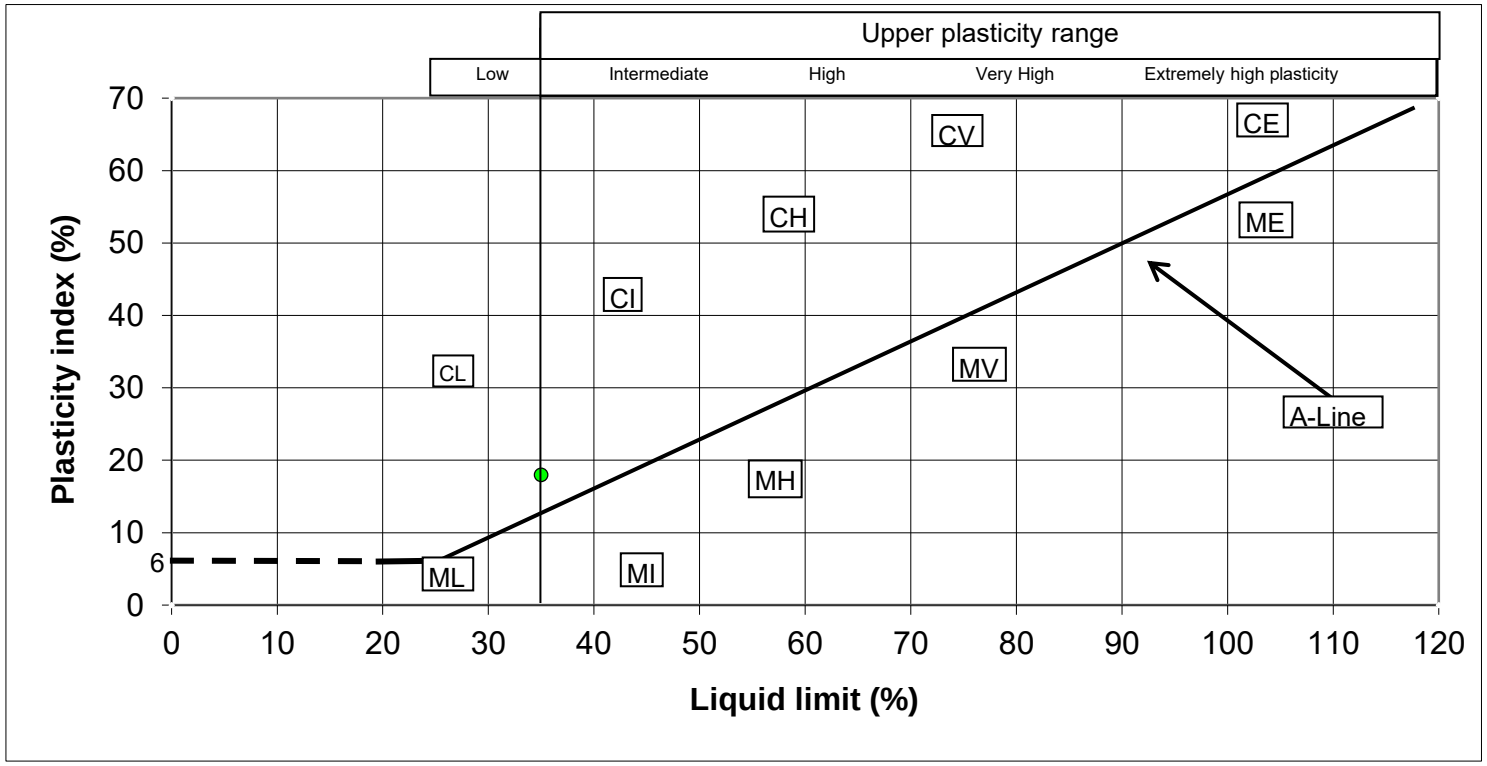
CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

ATTERBERG TEST RESULT SHEET
BS 1377:Part 2:1990:cl 4.4,5

SILT (M-SOIL), M plots below A-Line , CLAY,C, plots above A-Line, M and C may be combined as FINE SOIL, F.



BH	Sample Depth	Liquid limit	Plasticity index
TP107	1.00	35.0	18.0

UKAS TESTING
4514

APPROVED BY	DK

CLIENT: DAEAR GEO CONSULTING	SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469)

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Shear Strength (kN/m^2)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
TP108	ES	0.50	0.50	24	-	-	-	34	20	14	91	CL	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subangular sandstone. (BS1377Pt2:3.2,4.4,5)
TP108	B	1.00	1.00	19	-	-	-	38	17	21	88	CI	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse subangular sandstone. (BS1377Pt2:3.2,4.4,5)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 03.03.20

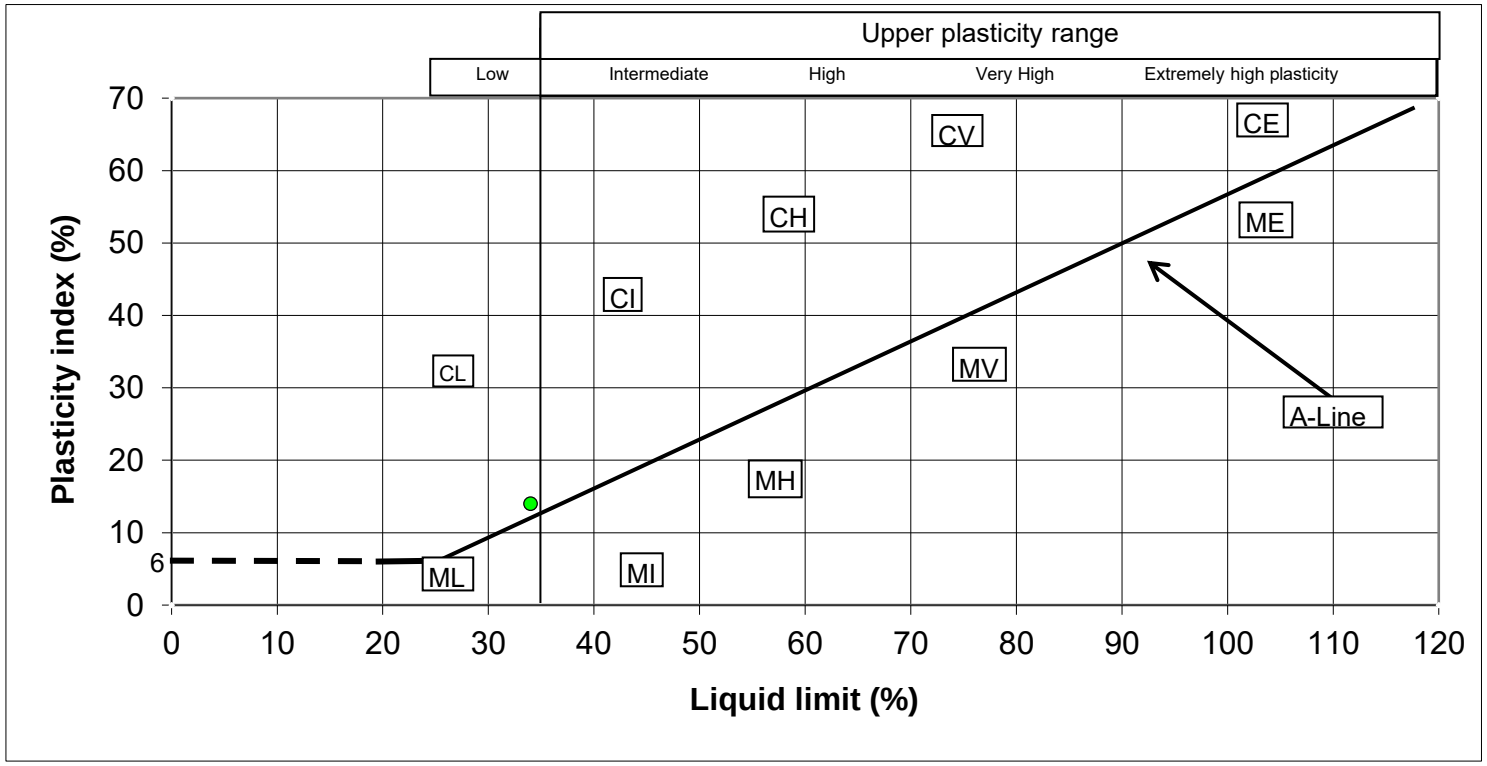
CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

ATTERBERG TEST RESULT SHEET
BS 1377:Part 2:1990:cl 4.4,5

SILT (M-SOIL), M plots below A-Line , CLAY,C, plots above A-Line, M and C may be combined as FINE SOIL, F.



BH	Sample Depth	Liquid limit	Plasticity index
TP108	0.50	34.0	14.0

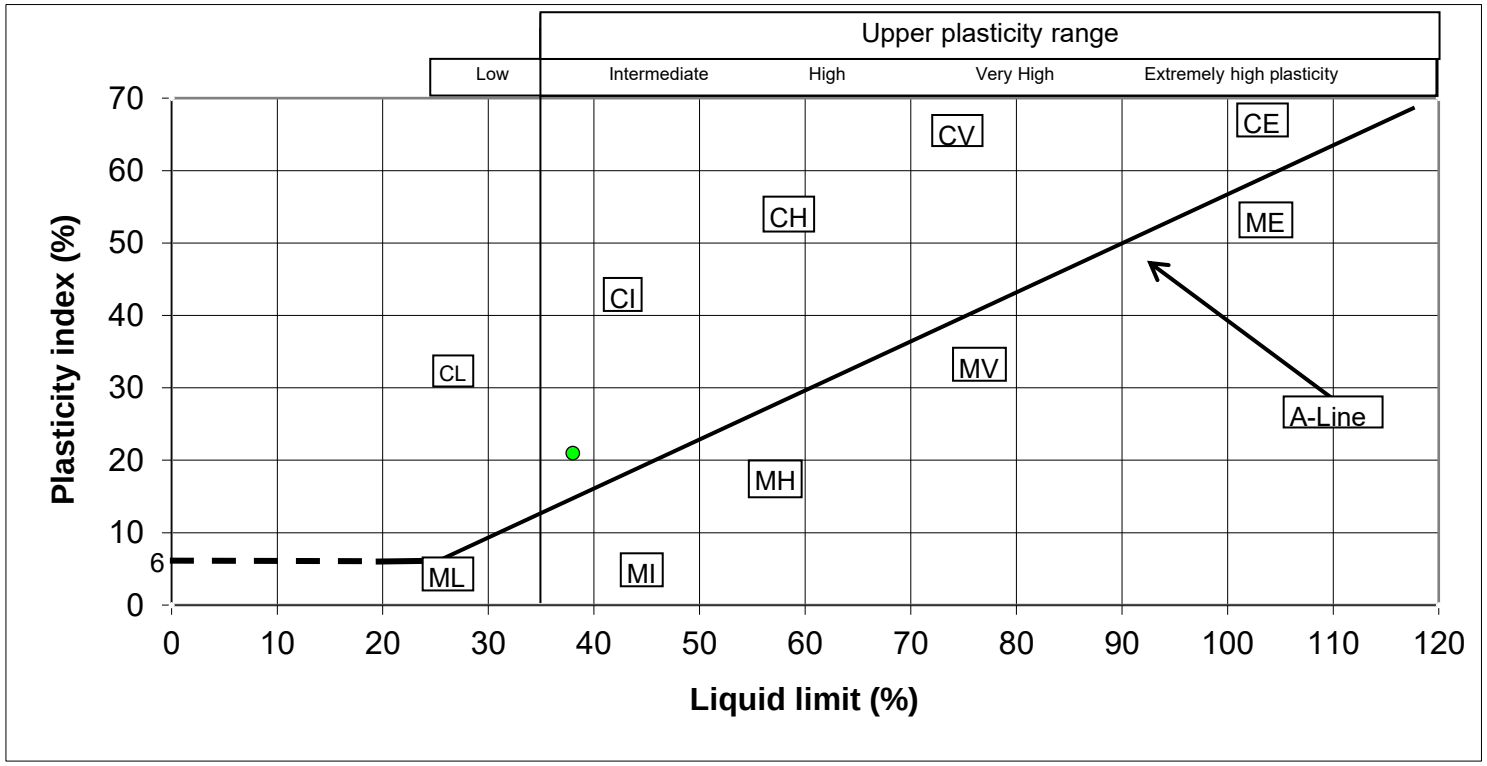
UKAS TESTING
4514

APPROVED BY	DK

CLIENT: DAEAR GEO CONSULTING	SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469)

ATTERBERG TEST RESULT SHEET
BS 1377:Part 2:1990:cl 4.4,5

SILT (M-SOIL), M plots below A-Line , CLAY,C, plots above A-Line, M and C may be combined as FINE SOIL, F.



BH	Sample Depth	Liquid limit	Plasticity index
TP108	1.00	38.0	21.0

UKAS TESTING
4514

APPROVED BY	DK

CLIENT: DAEAR GEO CONSULTING	SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469)

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Shear Strength (kN/m^2)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
TP110	ES	0.50	0.50	27	-	-	-	-	-	-	-	-	Y	Brown sandy slightly gravelly silty CLAY. Gravel is fine to coarse subangular sandstone. (BS1377Pt2:3.2)
TP110	B	1.00	1.00	17	-	-	-	29	16	13	71	CL	Y	Brown sandy slightly gravelly silty CLAY. Gravel is fine to coarse subangular sandstone. (BS1377Pt2:3.2,4.4,5)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 25.02.20

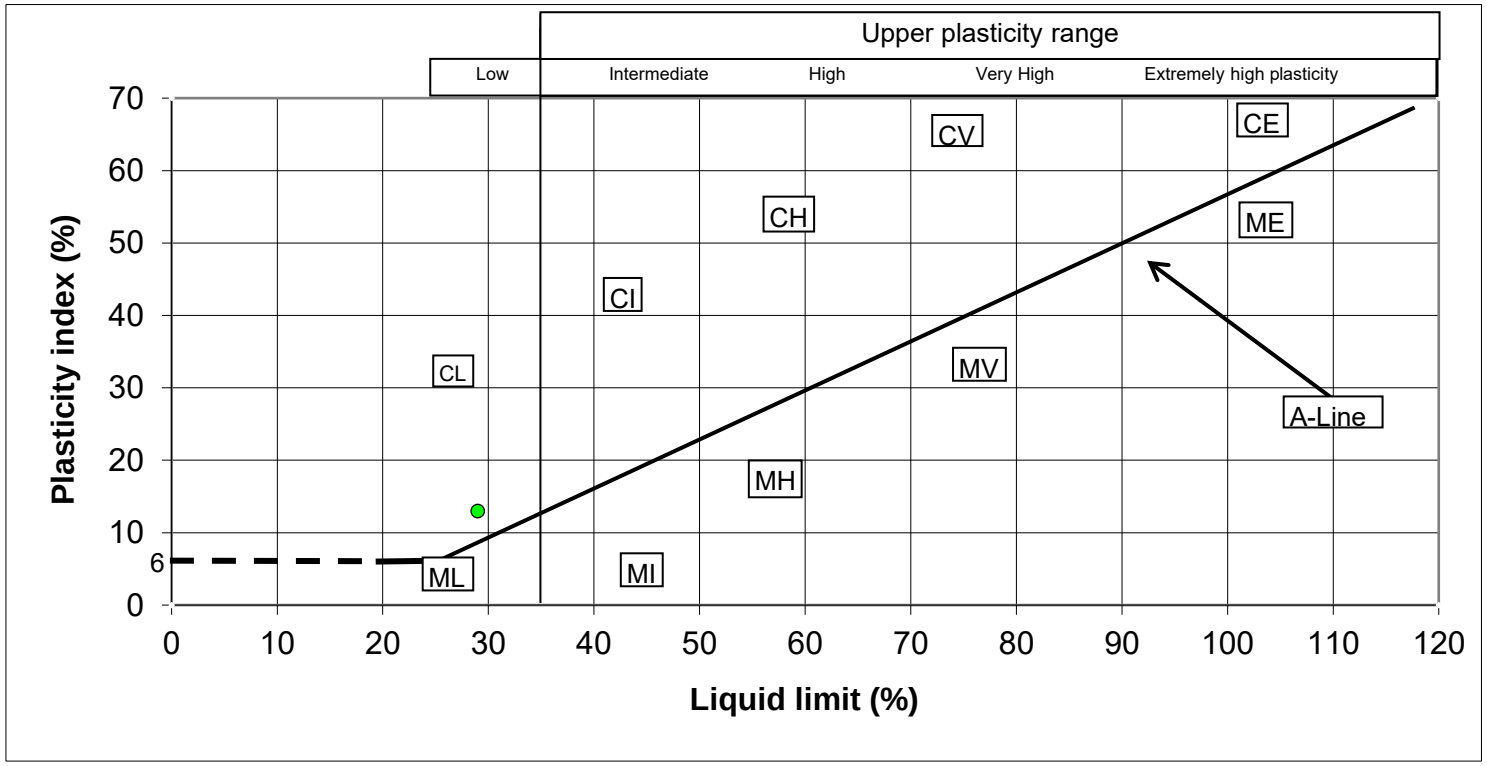
CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

ATTERBERG TEST RESULT SHEET
BS 1377:Part 2:1990:cl 4.4,5

SILT (M-SOIL), M plots below A-Line , CLAY,C, plots above A-Line, M and C may be combined as FINE SOIL, F.



BH	Sample Depth	Liquid limit	Plasticity index
TP110	1.00	29.0	13.0

UKAS TESTING
4514

APPROVED BY	DK

CLIENT: DAEAR GEO CONSULTING	SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469)

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)	Shear Strength (kN/m²)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
TP111	B	1.00	1.00	16	-	-	-	29	15	14	68	CL	Y	Greyish brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse subangular sandstone. (BS1377Pt2:3.2,4.4,5)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 25.02.20

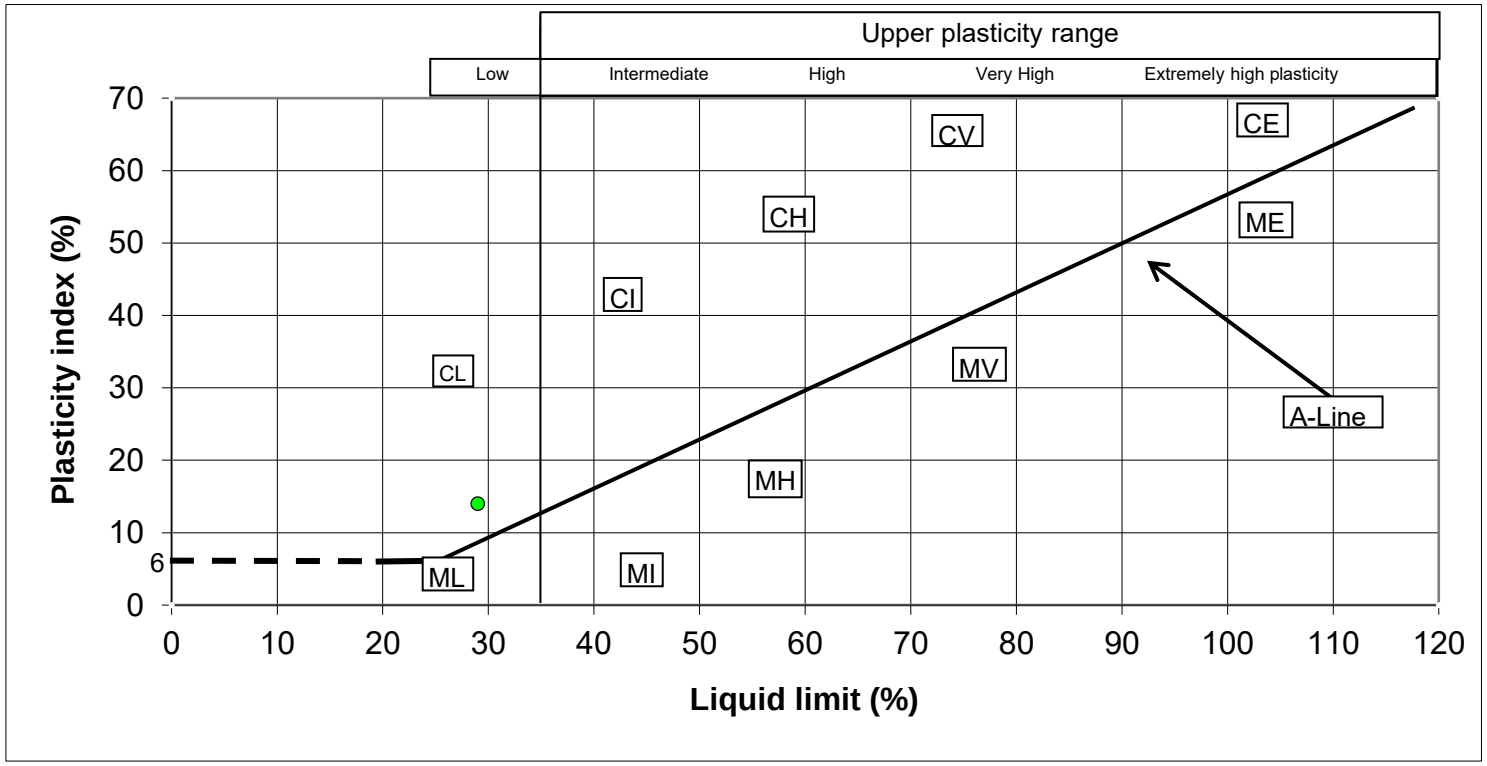
CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

ATTERBERG TEST RESULT SHEET
BS 1377:Part 2:1990:cl 4.4,5

SILT (M-SOIL), M plots below A-Line , CLAY,C, plots above A-Line, M and C may be combined as FINE SOIL, F.



BH	Sample Depth	Liquid limit	Plasticity index
TP111	1.00	29.0	14.0

UKAS TESTING
4514

APPROVED BY	DK

CLIENT: DAEAR GEO CONSULTING	SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469)

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Shear Strength (kN/m^2)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
TP113	B	0.50	0.50	33	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded sandstone. (BS1377Pt2:3.2)
TP113	B	1.00	1.00	20	-	-	-	29	18	11	78	CL	Y	Light brown sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded sandstone. (BS1377Pt2:3.2,4.4,5)
TP113	B	1.50	1.50	14	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded sandstone. (BS1377Pt2:3.2)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 26.02.20

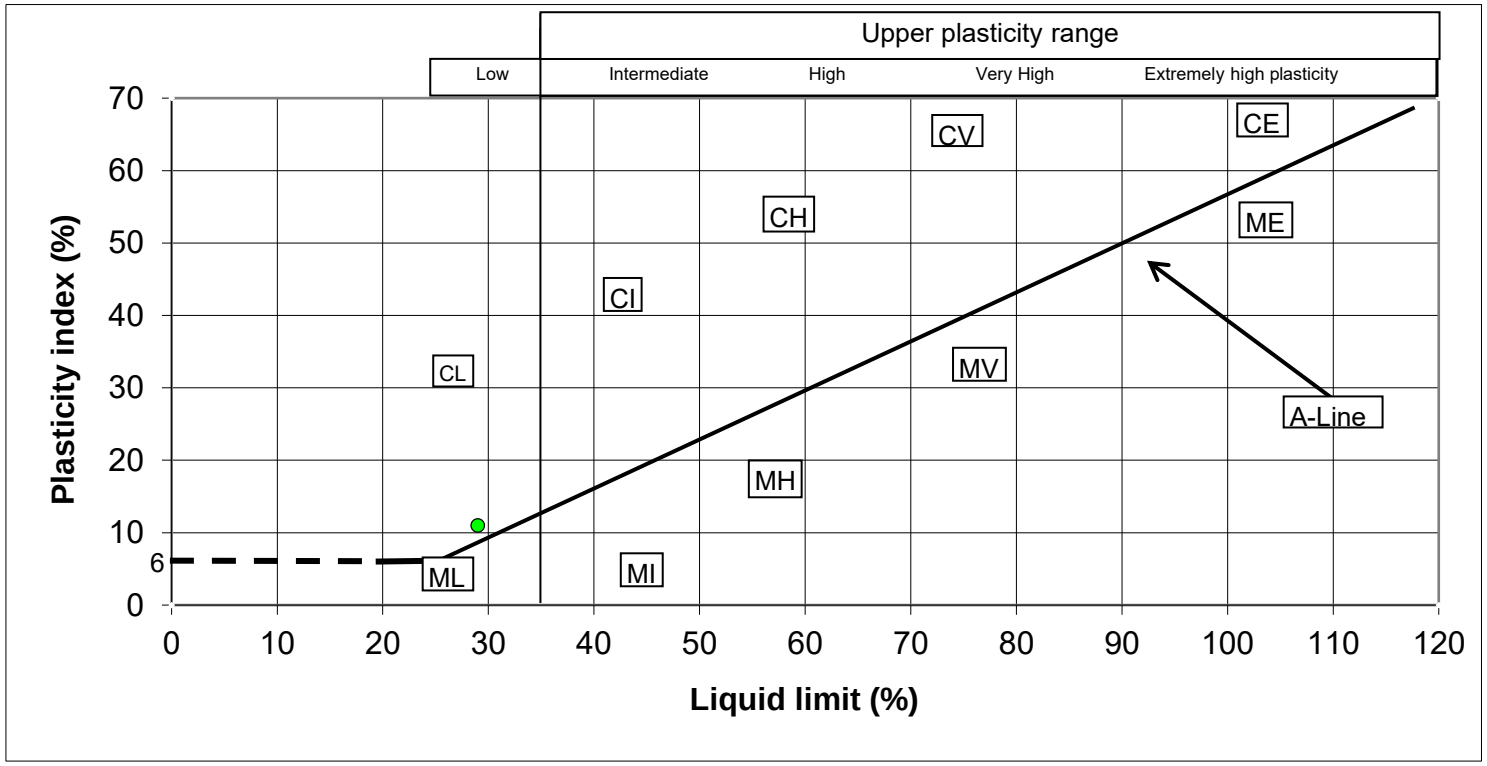
CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

ATTERBERG TEST RESULT SHEET
BS 1377:Part 2:1990:cl 4.4,5

SILT (M-SOIL), M plots below A-Line , CLAY,C, plots above A-Line, M and C may be combined as FINE SOIL, F.



BH	Sample Depth	Liquid limit	Plasticity index
TP113	1.00	29.0	11.0

UKAS TESTING
4514

APPROVED BY	DK

CLIENT: DAEAR GEO CONSULTING	SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469)

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Shear Strength (kN/m^2)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
TP201	ES	0.50	0.50	15	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular sandstone. (BS1377Pt2:3.2)
TP201	B	0.75	0.75	16	2.16	1.89	-	33	17	16	88	CL	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular sandstone. (BS1377Pt2:3.2,4.4,5,9.2,Pt4:3.3)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 26.02.20

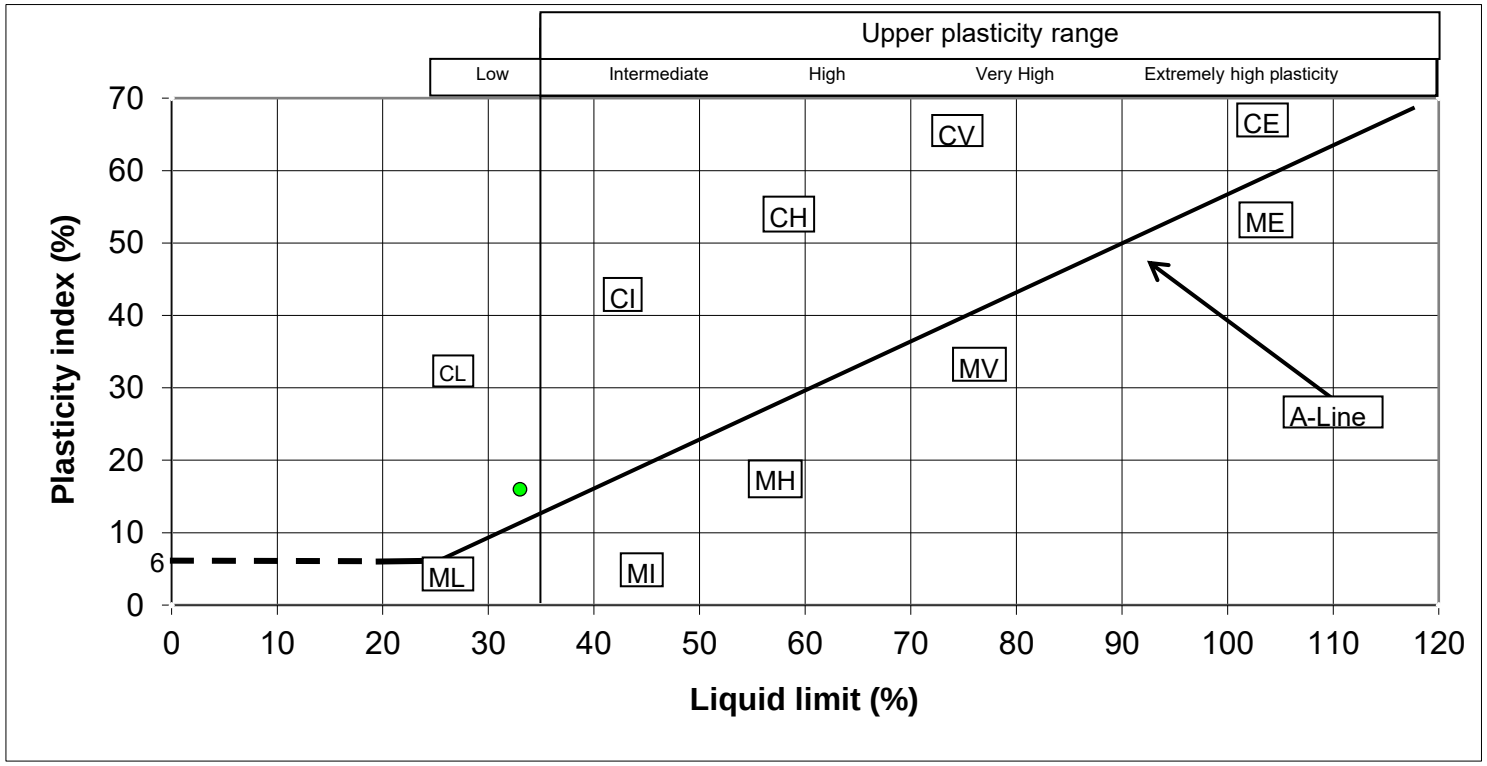
CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

ATTERBERG TEST RESULT SHEET
BS 1377:Part 2:1990:cl 4.4,5

SILT (M-SOIL), M plots below A-Line , CLAY,C, plots above A-Line, M and C may be combined as FINE SOIL, F.



BH	Sample Depth	Liquid limit	Plasticity index
TP201	0.75	33.0	16.0

UKAS TESTING
4514

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CLIENT: DAEAR GEO CONSULTING	SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469)

CC Geotechnical Ltd
Tel: 0151 545 2750
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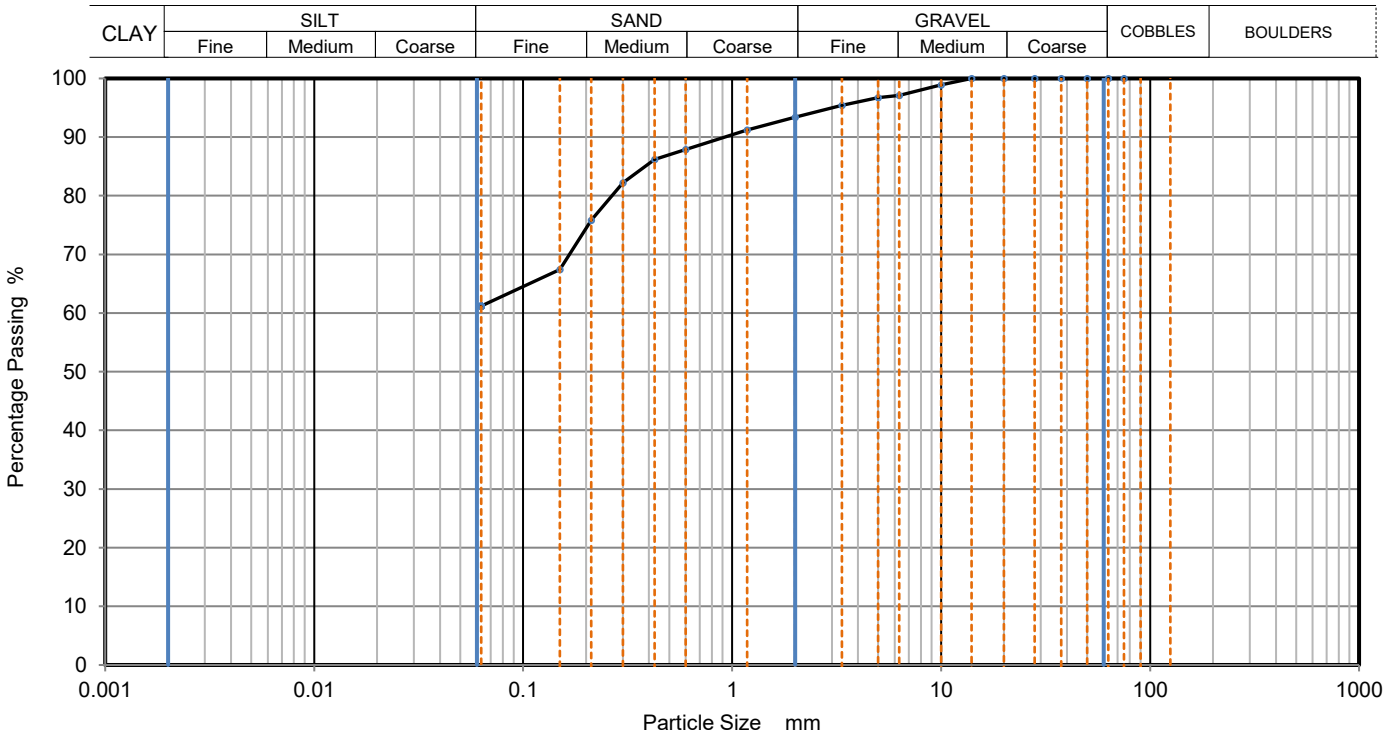
PARTICLE SIZE DISTRIBUTION

Job Ref	CCG-C-20-11469		
Borehole/Pit No.	TP201		
Site Name	COLOMENDY EXTENSION, DENBIGH	Sample No.	1
Specimen Description	Brown slightly sandy slightly gravelly silty CLAY	Depth, m	1.00
Specimen Reference	Specimen Depth: m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2	KeyLAB ID	CCGL202002260



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	99		
6.3	97		
5	97		
3.35	95		
2	93		
1.18	91		
0.6	88		
0.425	86		
0.3	82		
0.212	76		
0.15	67		
0.063	61		

Dry Mass of sample, g

Sample Proportions	% dry mass
Very coarse	0
Gravel	7
Sand	32
Fines <0.063mm	61

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

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	Fig 1
JE	DK	DK	26/02/2020 09:38	Sheet

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Shear Strength (kN/m^2)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
TP205	ES	0.50	0.50	16	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse subrounded to subangular mudstone. (BS1377Pt2:3.2)
TP205	B	0.75	0.75	20	-	-	-	48	20	28	94	CI	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular sandstone and mudstone. (BS1377Pt2:3.2,4.4,5,9.2)
TP205	ES	1.50	1.50	20	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular sandstone and mudstone. (BS1377Pt2:3.2)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 29.02.20

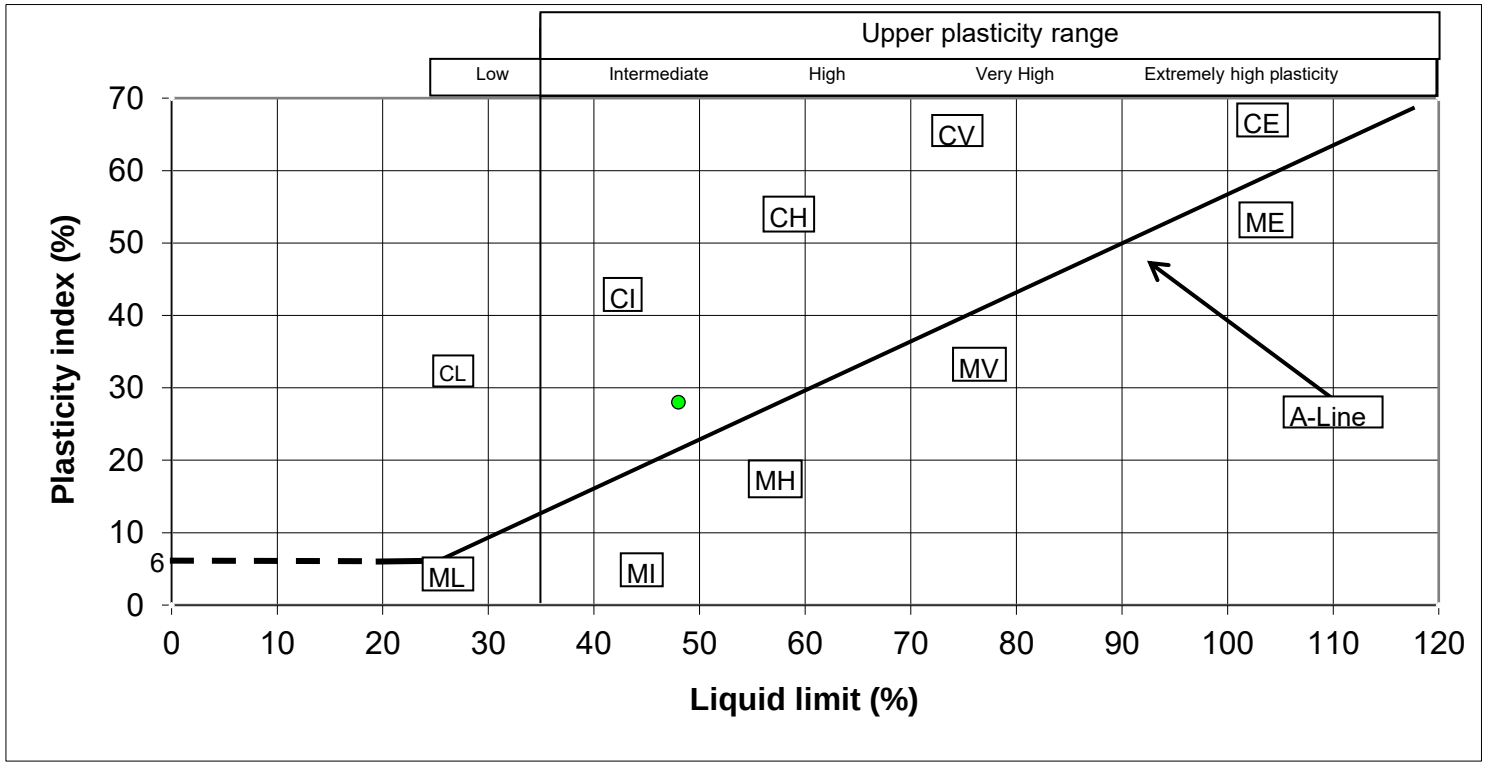
CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

ATTERBERG TEST RESULT SHEET
BS 1377:Part 2:1990:cl 4.4,5

SILT (M-SOIL), M plots below A-Line , CLAY,C, plots above A-Line, M and C may be combined as FINE SOIL, F.



BH	Sample Depth	Liquid limit	Plasticity index
TP205	0.75	48.0	28.0

UKAS TESTING
4514

APPROVED BY	DK

CLIENT: DAEAR GEO CONSULTING	SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469)

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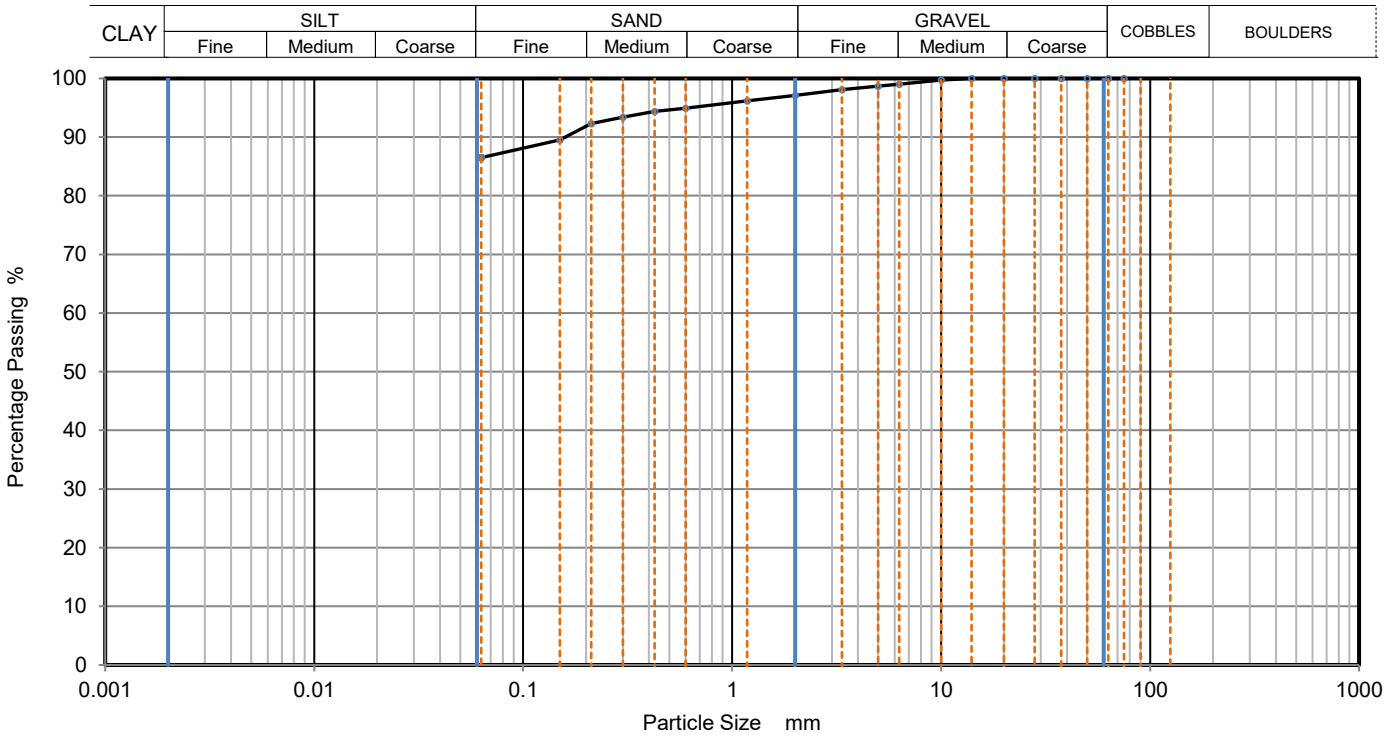
PARTICLE SIZE DISTRIBUTION

Job Ref	CCG-C-20-11469		
Borehole/Pit No.	TP205		
Site Name	COLOMENDY EXTENSION, DENBIGH	Sample No.	1
Specimen Description	Brown slightly sandy slightly gravelly silty CLAY	Depth, m	0.75
Specimen Reference	Specimen Depth: m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2	KeyLAB ID	CCGL202002261



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	99		
5	99		
3.35	98		
2	97		
1.18	96		
0.6	95		
0.425	94		
0.3	93		
0.212	92		
0.15	90		
0.063	87		

Dry Mass of sample, g

Sample Proportions	% dry mass
Very coarse	0
Gravel	3
Sand	11
Fines <0.063mm	87

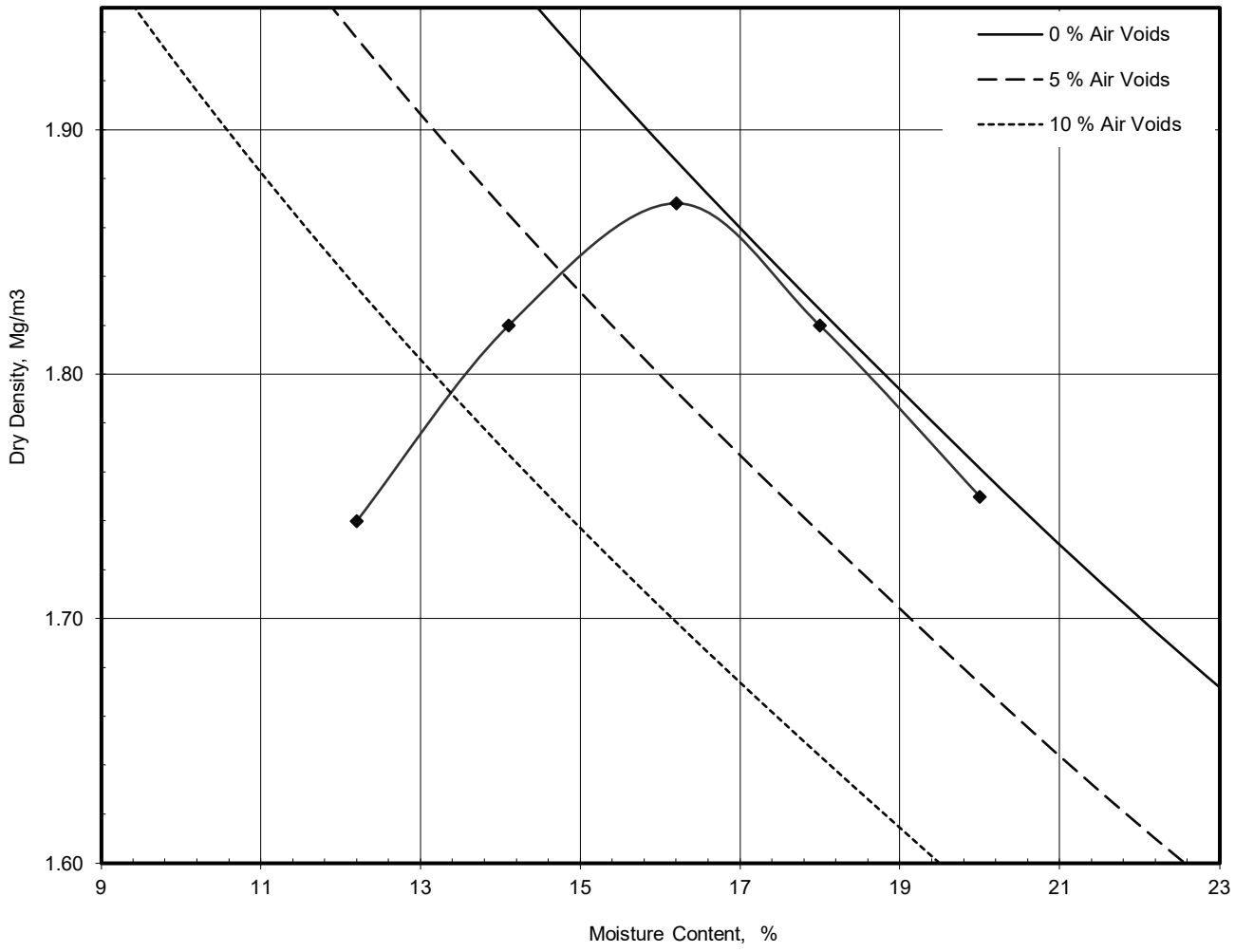
Grading Analysis		
D100	mm	
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	Fig 1
JE	DK	DK	26/02/2020 09:58	Sheet

	Dry Density / Moisture Content Relationship Light Compaction			Job Ref	CCG-C-20-11469
				Borehole / Pit No	TP205
Site Name	**COLOMENDY EXTENSION, DENBIGH**			Sample No	2
Soil Description	Brown slightly sandy slightly gravelly silty CLAY			Depth	0.75 m
Specimen Ref.		Specimen Depth	m	Sample Type	B
Test Method	BS1377:1990:Part 4 3.3			Keylab ID	
				Compaction Test Reference/No.	



Preparation		
Mould Type		1 litre
Samples Used		2
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	0
Particle Density -	Mg/m³	2.72

Maximum Dry Density	Mg/m³	**1.87**
Optimum Moisture Content	%	**16**

Operator	Checked	Approved	Remarks	Fig
MH	DK	DK		Sheet 1 of 1

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)	Shear Strength (kN/m²)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
TP207	ES	0.50	0.50	16	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse subrounded to subangular sandstone. (BS1377Pt2:3.2)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 26.02.20

CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)	Shear Strength (kN/m²)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
TP208	ES	0.50	0.50	19	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse subrounded to subangular sandstone and mudstone. (BS1377Pt2:3.2)
TP208	ES	0.75	0.75	20	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse subrounded to subangular sandstone and mudstone. (BS1377Pt2:3.2)
TP208	ES	1.00	1.00	16	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse subrounded to subangular sandstone and mudstone. (BS1377Pt2:3.2)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 29.02.20

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UKAS TESTING 4514

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CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Shear Strength (kN/m^2)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
TP210	ES	0.50	0.50	16	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse subrounded to subangular sandstone and mudstone. (BS1377Pt2:3.2)
TP210	B	0.75	0.75	19	2.10	1.77	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular sandstone and mudstone. (BS1377Pt2:3.2,9.2,Pt4:3.3)
TP210	ES	1.00	1.00	16	-	-	-	40	19	21	89	CI	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular sandstone and mudstone. (BS1377Pt2:3.2,4.4,5)
TP210	ES	1.50	1.50	15	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse subrounded to subangular sandstone and mudstone. (BS1377Pt2:3.2)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 29.02.20

CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

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CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

CC Geotechnical Ltd
Tel: 0151 545 2750
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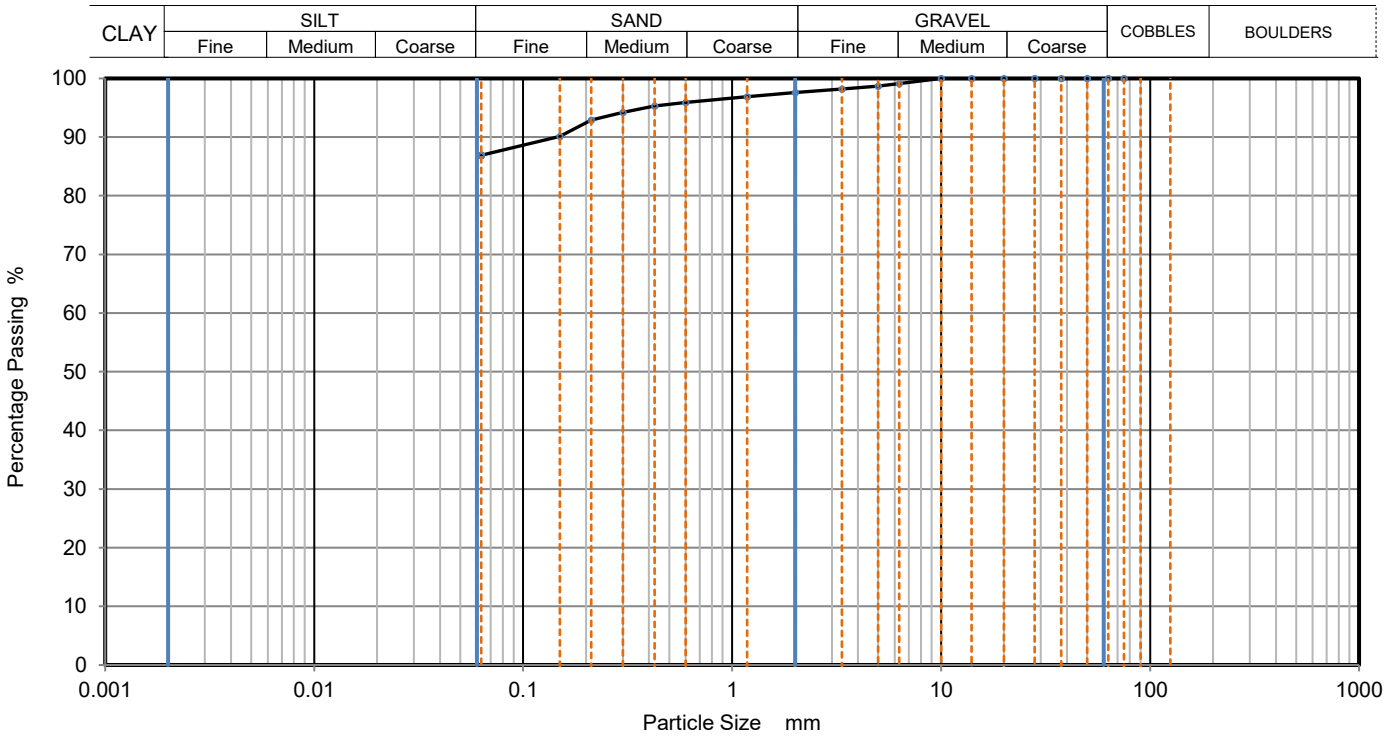
PARTICLE SIZE DISTRIBUTION

Job Ref	CCG-C-20-11469		
Borehole/Pit No.	TP210		
Site Name	COLOMENDY EXTENSION, DENBIGH	Sample No.	1
Specimen Description	Brown slightly sandy slightly gravelly silty CLAY	Depth, m	0.75
Specimen Reference	Specimen Depth: m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2	KeyLAB ID	CCGL202002262



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	99		
5	99		
3.35	98		
2	98		
1.18	97		
0.6	96		
0.425	95		
0.3	94		
0.212	93		
0.15	90		
0.063	87		

Dry Mass of sample, g

Sample Proportions	% dry mass
Very coarse	0
Gravel	2
Sand	11
Fines <0.063mm	87

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

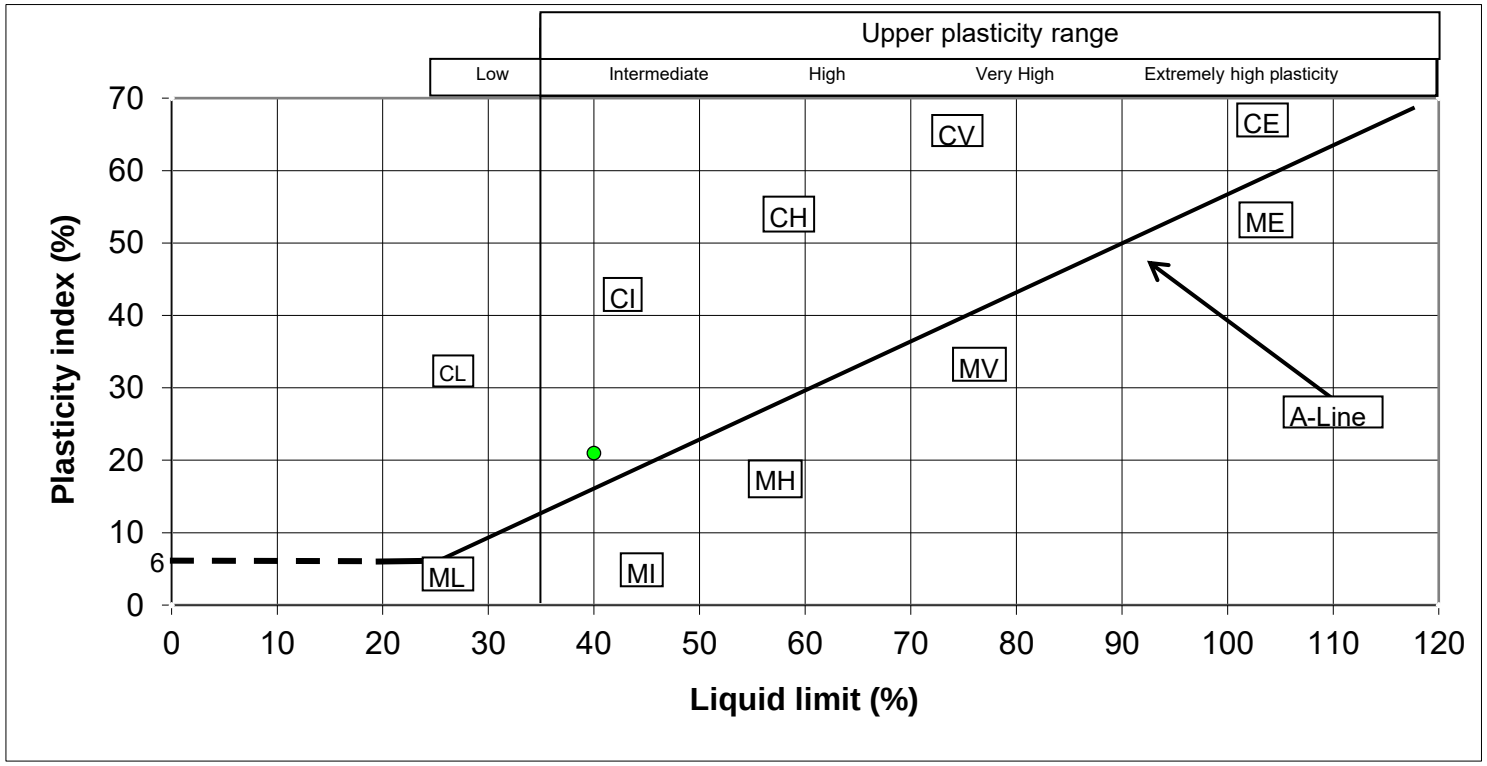
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	Fig 1
JE	DK	DK	26/02/2020 10:19	Sheet

ATTERBERG TEST RESULT SHEET
BS 1377:Part 2:1990:cl 4.4,5

SILT (M-SOIL), M plots below A-Line , CLAY,C, plots above A-Line, M and C may be combined as FINE SOIL, F.



BH	Sample Depth	Liquid limit	Plasticity index
TP210	1.00	40.0	21.0

UKAS TESTING
4514

APPROVED BY	DK

CLIENT: DAEAR GEO CONSULTING	SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469)

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)	Shear Strength (kN/m²)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
TP213	ES	0.50	0.50	17	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular sandstone. (BS1377Pt2:3.2)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 26.02.20

CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Shear Strength (kN/m^2)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
TP215	ES	0.50	0.50	16	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular sandstone and mudstone. (BS1377Pt2:3.2)
TP215	B	0.75	0.75	20	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular sandstone. (BS1377Pt2:3.2)
TP215	ES	1.00	1.00	18	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular sandstone and mudstone. (BS1377Pt2:3.2)
TP215	ES	1.50	1.50	13	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular sandstone. (BS1377Pt2:3.2)
TP215	ES	2.00	2.00	15	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular sandstone. (BS1377Pt2:3.2)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 29.02.20

CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)	Shear Strength (kN/m²)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
TP303	B	0.75	0.75	18	-	-	-	37	17	20	81	CI	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular sandstone and quartz. (BS1377Pt2:3.2,4.4,5,9.2)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 10.03.20

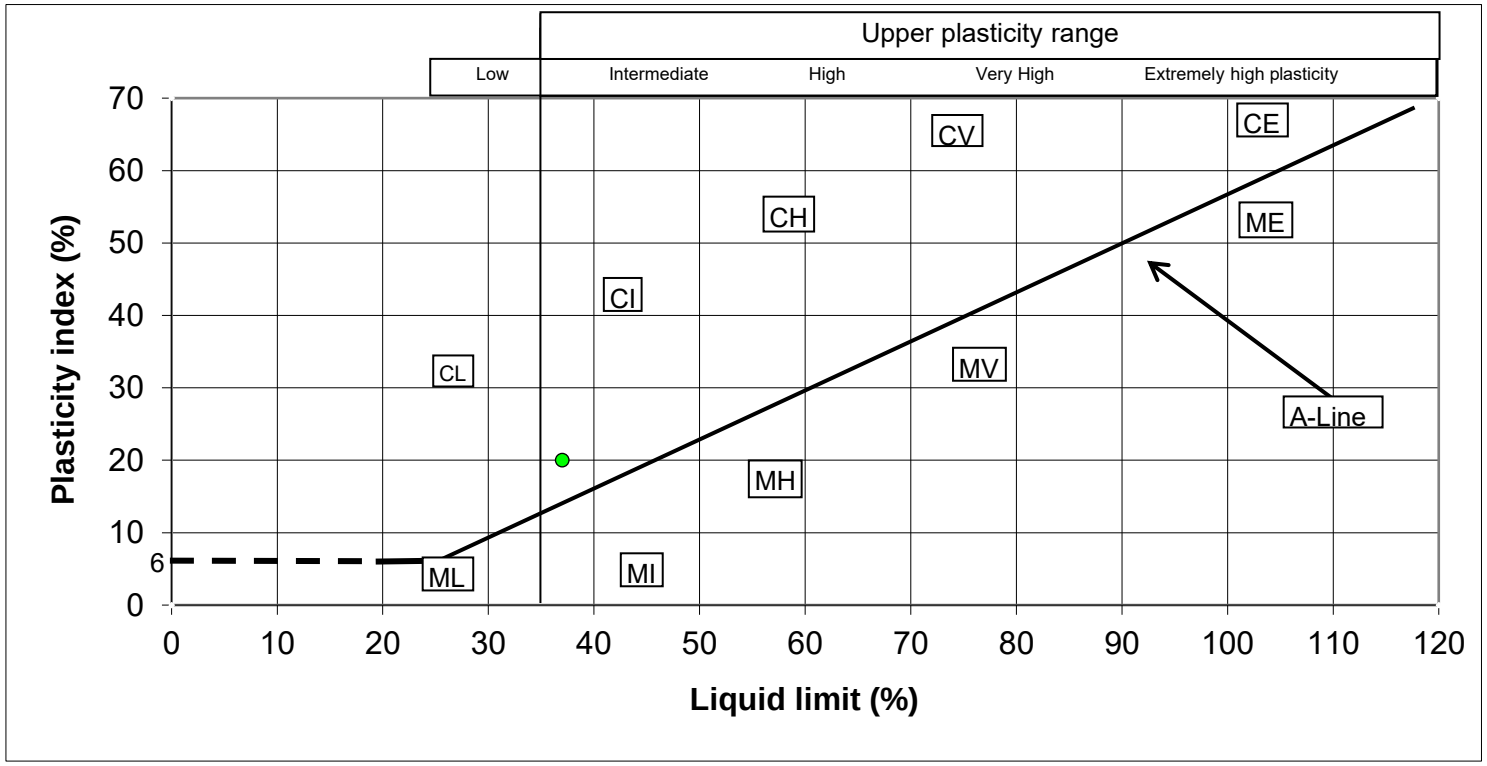
CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

ATTERBERG TEST RESULT SHEET
BS 1377:Part 2:1990:cl 4.4,5

SILT (M-SOIL), M plots below A-Line , CLAY,C, plots above A-Line, M and C may be combined as FINE SOIL, F.



BH	Sample Depth	Liquid limit	Plasticity index
TP303	0.75	37.0	20.0

UKAS TESTING
4514

APPROVED BY	DK

CLIENT: DAEAR GEO CONSULTING	SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469)

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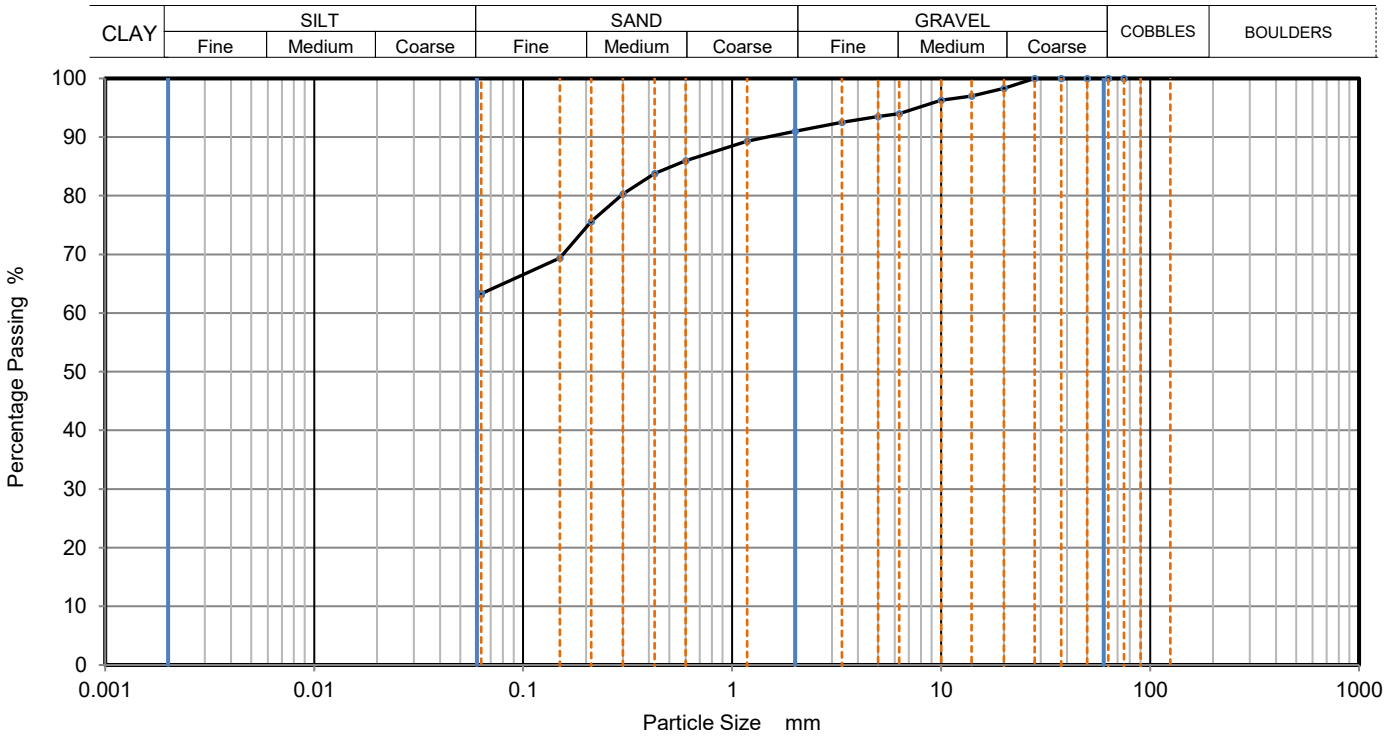
PARTICLE SIZE DISTRIBUTION

Job Ref	CCG-C-20-11469		
Borehole/Pit No.	TP303		
Site Name	COLOMENDY EXTENSION, DENBIGH	Sample No.	1
Specimen Description	Brown slightly sandy slightly gravelly silty CLAY	Depth, m	0.75
Specimen Reference	Specimen Depth: m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2	KeyLAB ID	CCGL202003101



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	98		
14	97		
10	96		
6.3	94		
5	94		
3.35	93		
2	91		
1.18	89		
0.6	86		
0.425	84		
0.3	80		
0.212	76		
0.15	69		
0.063	63		

Dry Mass of sample, g

Sample Proportions	% dry mass
Very coarse	0
Gravel	9
Sand	28
Fines <0.063mm	63

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

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	Fig 1
JE	DK	DK	10/03/2020 14:07	Sheet

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)	Shear Strength (kN/m²)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
TP304	ES	1.50	2.50	-	-	-	-	-	-	-	-	-	Y	Brown very clayey SAND & GRAVEL. Gravel is fine to coarse subangular to subrounded sandstone. (BS1377Pt2:9.2)
TP304	ES	2.50	2.50	13	-	-	-	-	-	-	-	-	Y	Brown very clayey SAND & GRAVEL. Gravel is fine to coarse subangular to subrounded sandstone. (BS1377Pt2:3.2)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 04.03.20

CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

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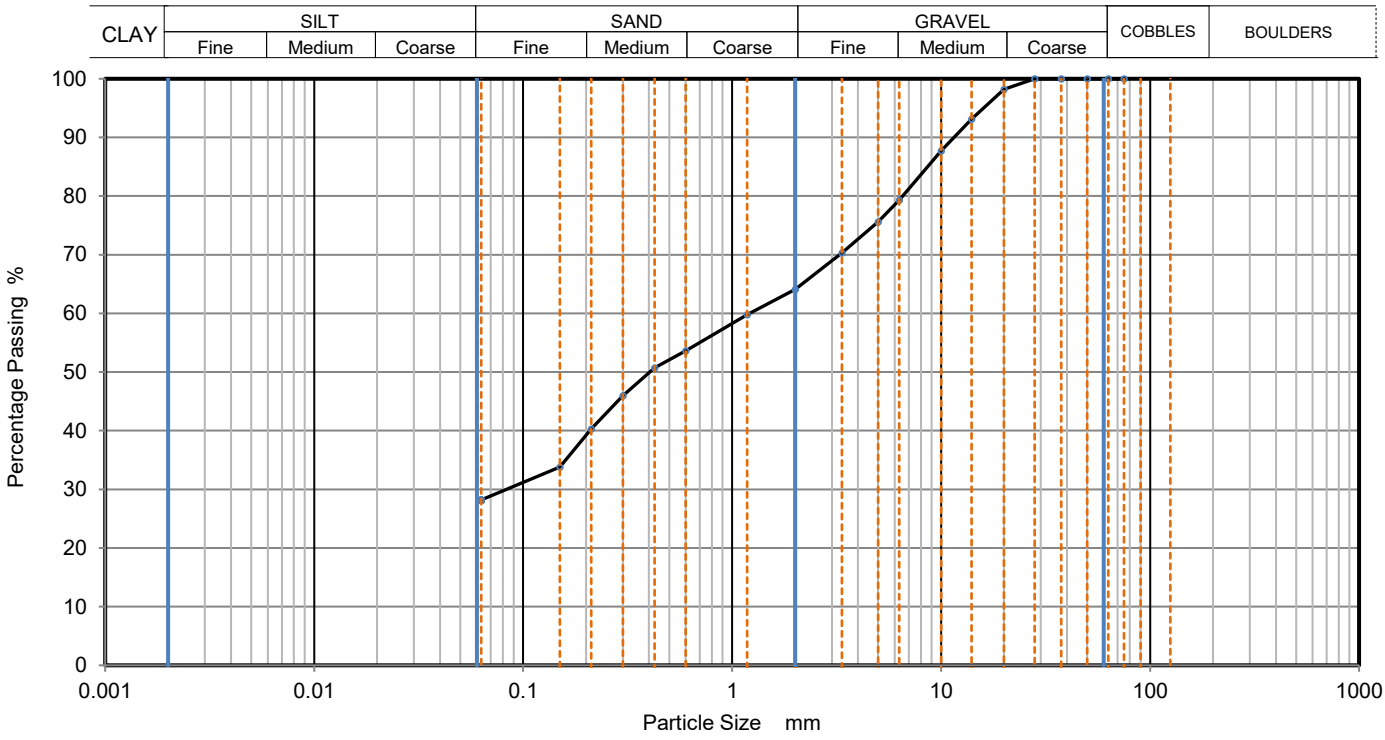
PARTICLE SIZE DISTRIBUTION

Job Ref	CCG-C-20-11469		
Borehole/Pit No.	TP304		
Site Name	COLOMENDY EXTENSION, DENBIGH	Sample No.	1
Specimen Description	Brown very clayey SAND & GRAVEL	Depth, m	1.50
Specimen Reference	Specimen Depth: m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2	KeyLAB ID	CCGL202003040



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	98		
14	93		
10	88		
6.3	79		
5	76		
3.35	70		
2	64		
1.18	60		
0.6	54		
0.425	51		
0.3	46		
0.212	40		
0.15	34		
0.063	28		

Dry Mass of sample, g

Sample Proportions	% dry mass
Very coarse	0
Gravel	36
Sand	36
Fines <0.063mm	28

Grading Analysis		
D100	mm	
D60	mm	1.21
D30	mm	0.0834
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	Fig 1
JE	DK	DK	04/03/2020 11:32	Sheet

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Shear Strength (kN/m^2)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
TP305	ES	0.50	0.50	18	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded sandstone. (BS1377Pt2:3.2)
TP305	ES	1.00	1.00	11	-	-	-	-	-	-	-	-	Y	Brown very clayey sandy GRAVEL. Gravel is fine to medium subrounded sandstone. (BS1377Pt2:3.2)
TP305	ES	1.50	1.50	9.4	-	-	-	28	17	11	24	CL	Y	Brown very clayey sandy GRAVEL. Gravel is fine to coarse subrounded sandstone. (BS1377Pt2:3.2,4.4,5)
TP305	ES	2.00	2.00	11	-	-	-	-	-	-	-	-	Y	Brown sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded sandstone. (BS1377Pt2:3.2)
TP305	ES	3.00	3.00	12	-	-	-	-	-	-	22	NP	Y	Brown very sandy silty GRAVEL. Gravel is fine to coarse subangular sandstone and limestone. (BS1377Pt2:3.2)
TP305	B	3.00	3.00	13	2.27	2.01	-	-	-	-	-	-	Y	Brown very sandy silty GRAVEL. Gravel is fine to coarse subangular sandstone and limestone. (BS1377Pt2:9.2,Pt4:3.4)
TP305	ES	3.50	3.50	16	-	-	-	-	-	-	-	-	Y	Brown very silty very gravelly fine to medium grained SAND. Gravel is fine to medium subrounded sandstone. (BS1377Pt2:3.2)
TP305	ES	4.00	4.00	18	-	-	-	32	21	11	93	CL	Y	Brown sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded sandstone. (BS1377Pt2:3.2,4.4,5)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 10.03.20

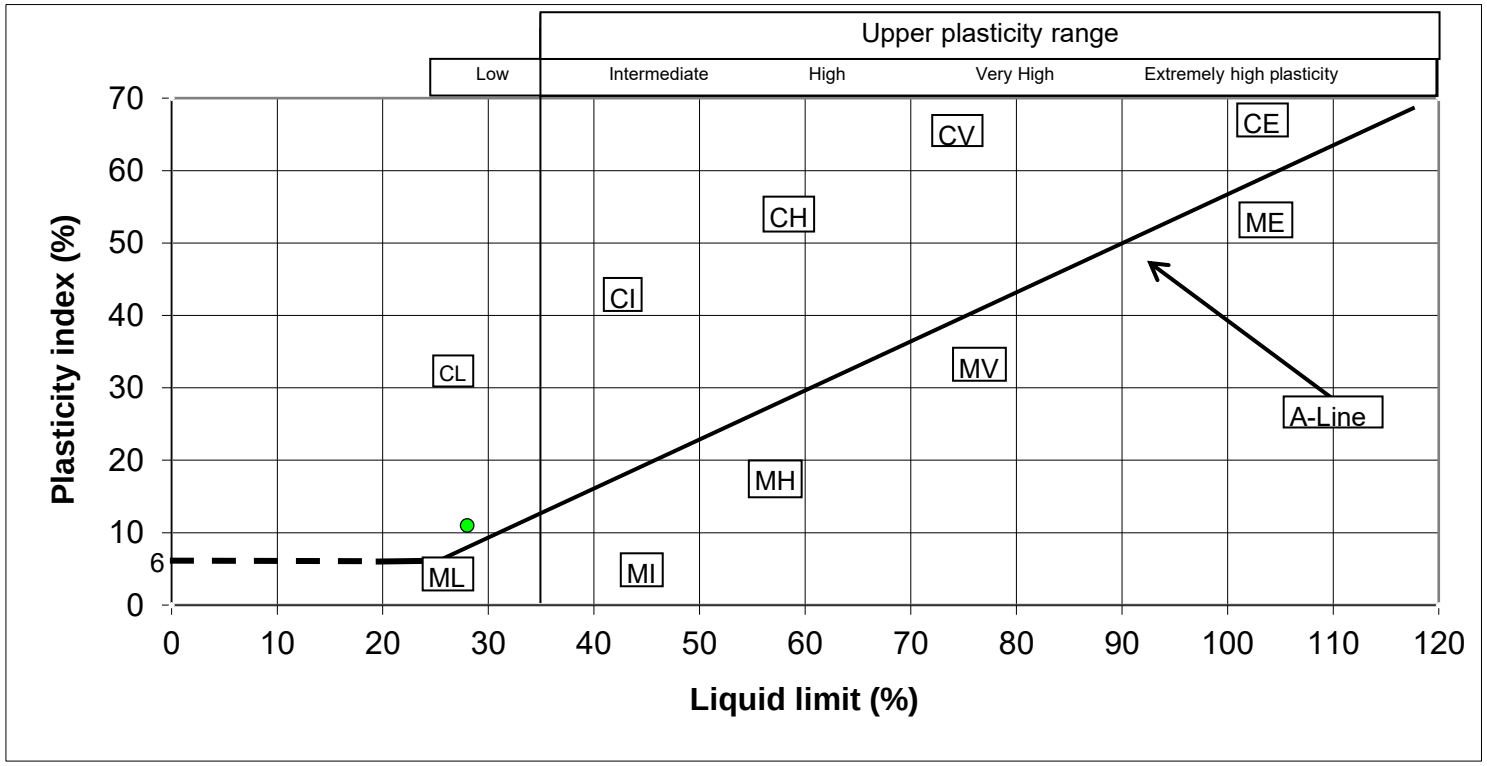
CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

ATTERBERG TEST RESULT SHEET
BS 1377:Part 2:1990:cl 4.4,5

SILT (M-SOIL), M plots below A-Line , CLAY,C, plots above A-Line, M and C may be combined as FINE SOIL, F.



BH	Sample Depth	Liquid limit	Plasticity index
TP305	1.50	28.0	11.0

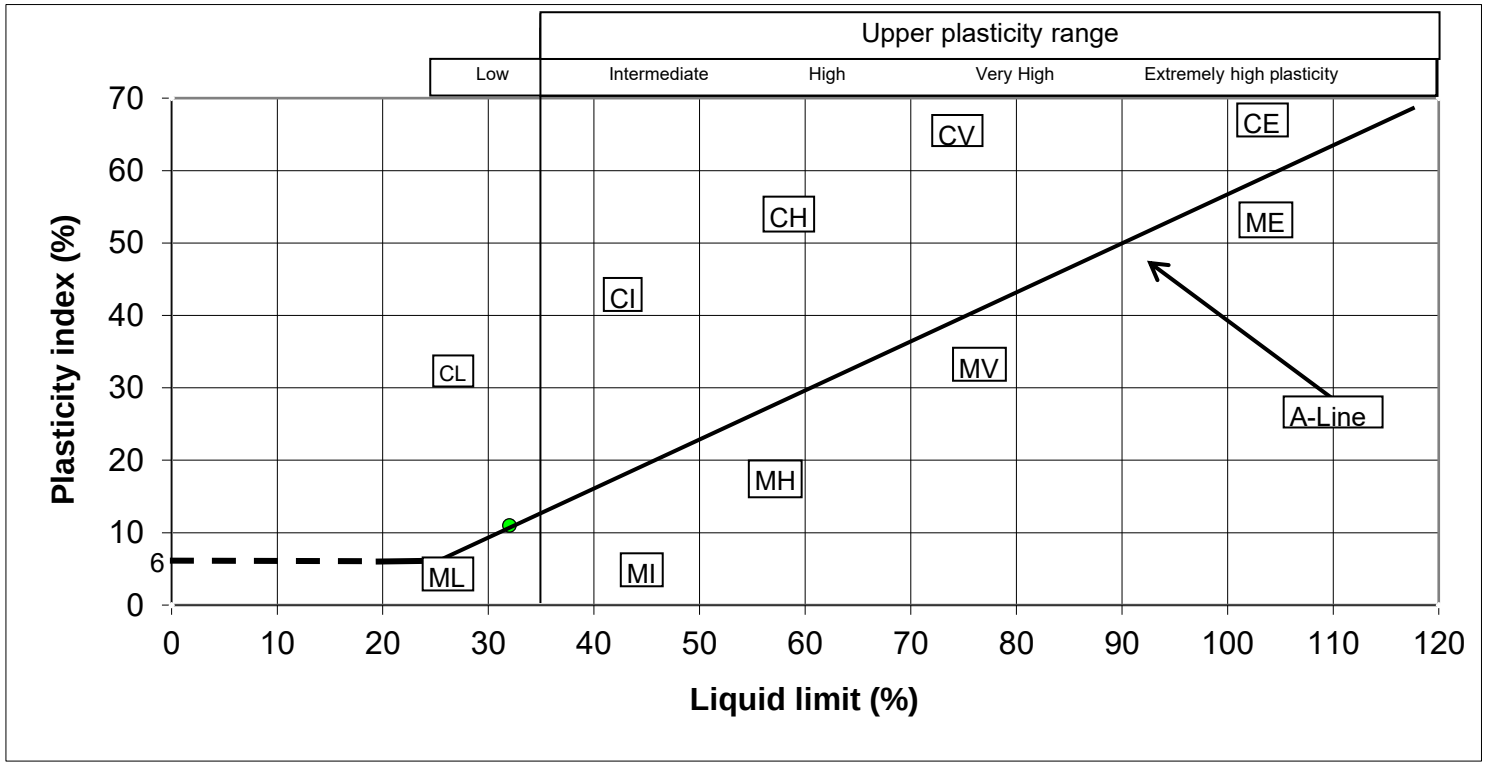
UKAS TESTING
4514

APPROVED BY	DK

CLIENT: DAEAR GEO CONSULTING	SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469)

ATTERBERG TEST RESULT SHEET
BS 1377:Part 2:1990:cl 4.4,5

SILT (M-SOIL), M plots below A-Line , CLAY,C, plots above A-Line, M and C may be combined as FINE SOIL, F.



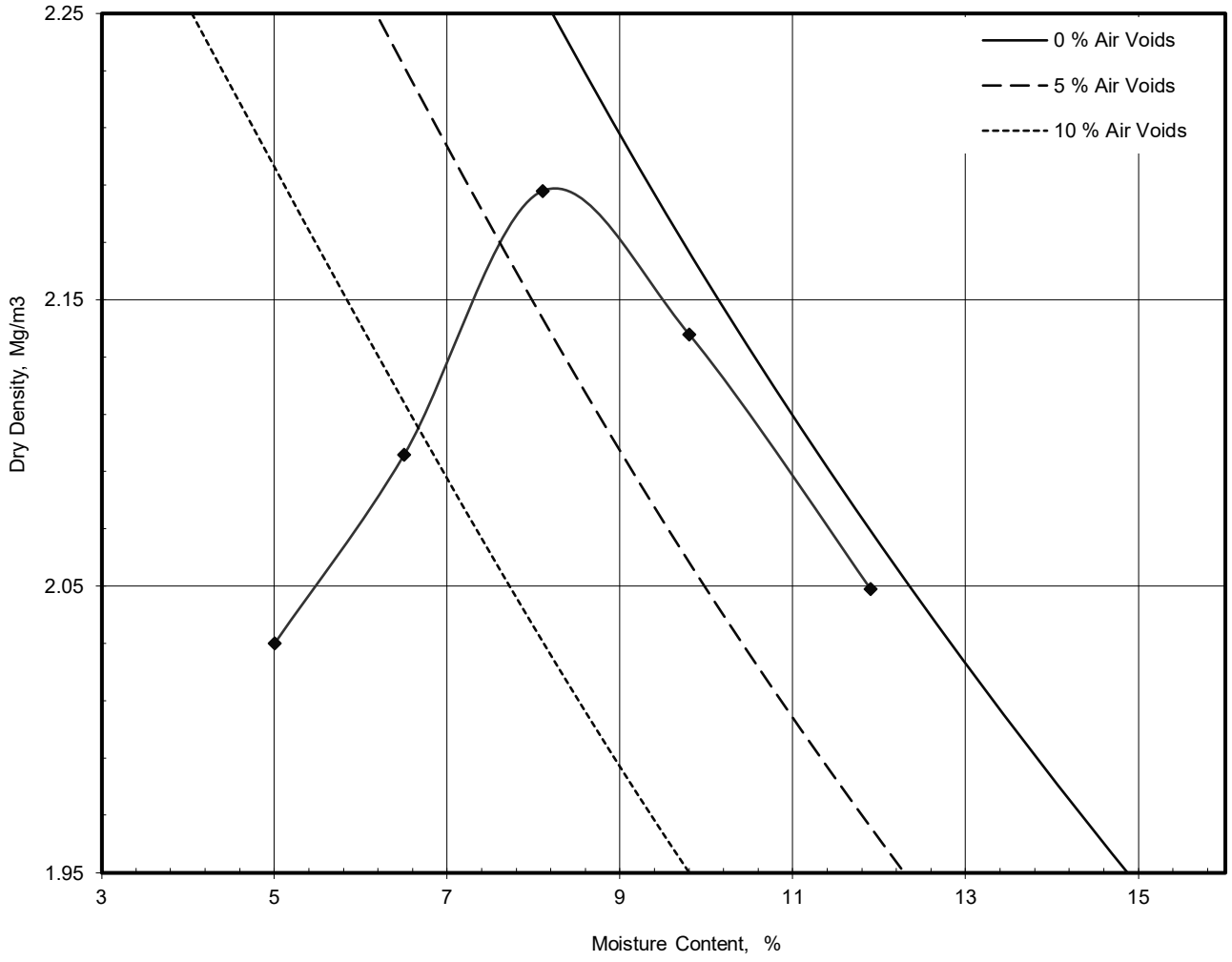
BH	Sample Depth	Liquid limit	Plasticity index
TP305	4.00	32.0	11.0

UKAS TESTING
4514

APPROVED BY	DK

CLIENT: DAEAR GEO CONSULTING	SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469)

	Dry Density / Moisture Content Relationship Light Compaction			Job Ref	CCG-C-20-11469
				Borehole / Pit No	TP305
Site Name	**COLOMENDY EXTENSION, DENBIGH**			Sample No	1
Soil Description	Brown very clayey sandy GRAVEL			Depth	1.50 m
Specimen Ref.		Specimen Depth	m	Sample Type	B
Test Method	BS1377:1990:Part 4 3.3			Keylab ID	
				Compaction Test Reference/No.	



Preparation		
Mould Type		1 litre
Samples Used		1
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	10
Particle Density -	Mg/m³	2.75

Maximum Dry Density	Mg/m³	**2.19**
Optimum Moisture Content	%	**8.1**

Operator	Checked	Approved	Remarks	Fig
MH	DK	DK		Sheet 1 of 1

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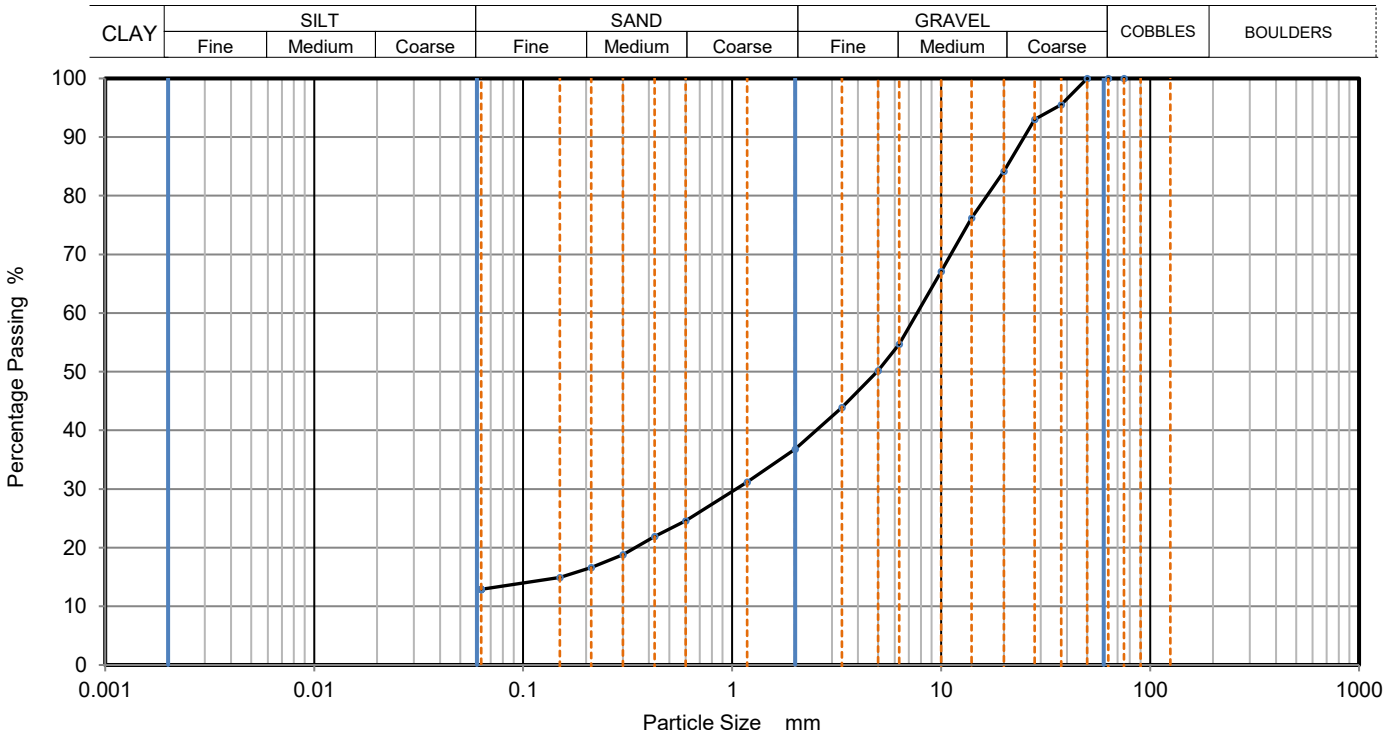
PARTICLE SIZE DISTRIBUTION

Job Ref	CCG-C-20-11469		
Borehole/Pit No.	TP305		
Site Name	COLOMENDY EXTENSION, DENBIGH	Sample No.	1
Specimen Description	Brown very sandy silty GRAVEL	Depth, m	3.00
Specimen Reference	Specimen Depth: m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2	KeyLAB ID	CCGL202003100



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	96		
28	93		
20	84		
14	76		
10	67		
6.3	55		
5	50		
3.35	44		
2	37		
1.18	31		
0.6	25		
0.425	22		
0.3	19		
0.212	17		
0.15	15		
0.063	13		

Dry Mass of sample, g

Sample Proportions	% dry mass
Very coarse	0
Gravel	63
Sand	24
Fines <0.063mm	13

Grading Analysis		
D100	mm	
D60	mm	7.68
D30	mm	1.04
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

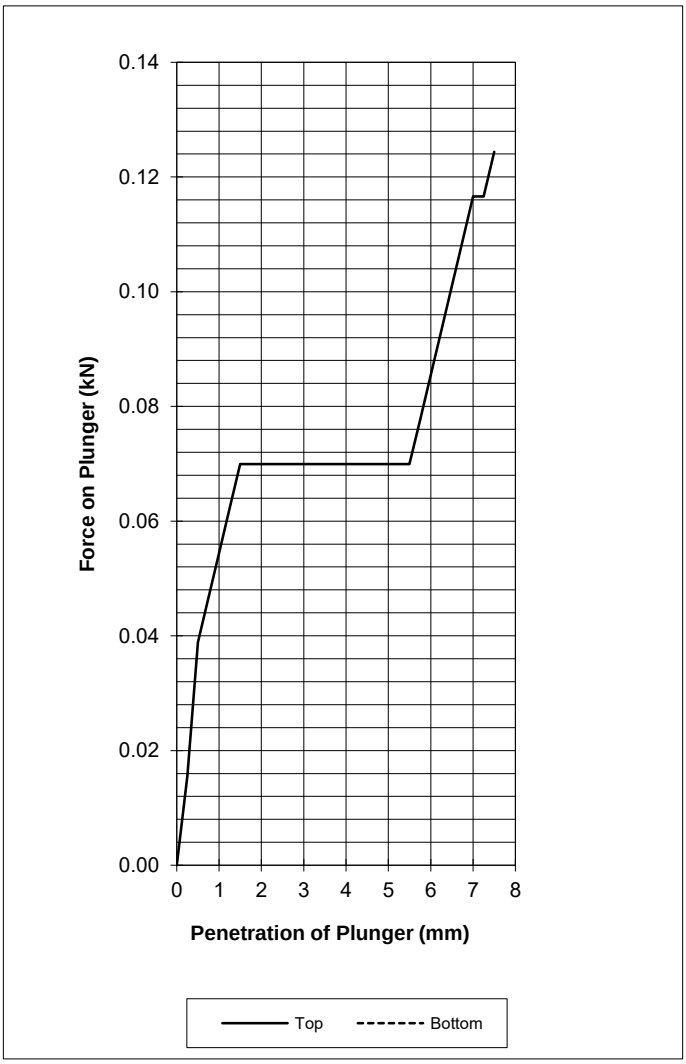
Operator	Checked	Approved	Sheet printed	Fig 1
JE	DK	DK	10/03/2020 11:19	Sheet

Laboratory Determination of California Bearing Ratio
B.S. 1377 (1990) : Part 4 : Clause 7

PROJECT No.:	CCG-C-20-11469	Proving ring No.	1155-8-1513
SITE:	COLOMENDY EXTENSION, DENBIGH	Division interval	0.0077736 kN/division
CLIENT:	DAEAR GEO CONSULTING	Surcharge	2 kg
BH / TP :	TP305 DEPTH: 3.00 m	Seating Load	10 N
MATERIAL DESCRIPTION	Brown very sandy silty GRAVEL		

Mass of mould	4934 g	Depth of mould	127 mm
Mass of mould & compacted soil	10159 g	Diameter of mould	152 mm

Penetration of plunger	TOP			
mm	kN	Load Gauge		
0.00	**0.00**	**0.00**		
0.25	0.02	2.00		
0.50	0.04	5.00		
0.75	0.05	6.00		
1.00	0.05	**7.00**		
1.25	0.06	8.00		
1.50	0.07	9.00		
1.75	0.07	9.00		
2.00	0.07	**9.00**		
2.25	0.07	9.00		
2.50	0.07	9.00		
2.75	0.07	9.00		
3.00	0.07	**9.00**		
3.25	0.07	9.00		
3.50	0.07	9.00		
3.75	0.07	9.00		
4.00	0.07	**9.00**		
4.25	0.07	9.00		
4.50	0.07	9.00		
4.75	0.07	9.00		
5.00	0.07	**9.00**		
5.25	0.07	9.00		
5.50	0.07	9.00		
5.75	0.08	10.00		
6.00	0.09	**11.00**		
6.25	0.09	12.00		
6.50	0.10	13.00		
6.75	0.11	14.00		
7.00	0.12	**15.00**		
7.25	0.12	15.00		
7.50	0.12	**16.00**		



RESULTS

Penetration	Force		Standard	CBR	
	Top	Bottom	Force	Top	
(mm)	(kN)	(kN)	(kN)	(%)	
2.50	0.07	0.00	13.2	0.5	
5.00	0.07	0.00	20	0.3	

CBR Values **0.5** %

CBR result **0.5** %

Mass of compacted soil	5225	g
Volume of mould	2305	cm^3
M/C of sample	12.7	%
Bulk density of compacted specimen	2.267	Mg/m^3
Dry density of compacted specimen	2.012	Mg/m^3

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Shear Strength (kN/m^2)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
TP306	ES	0.50	0.50	17	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded sandstone. (BS1377Pt2:3.2)
TP306	B	1.00	1.00	13	-	-	-	-	-	-	-	-	Y	Brown very clayey very sandy GRAVEL. Gravel is fine to coarse subangular to subrounded sandstone and quartz. (BS1377Pt2:3.2,9.2)
TP306	ES	1.00	1.00	13	-	-	-	-	-	-	33	NP	Y	Brown very clayey very sandy GRAVEL. Gravel is fine to coarse subangular to subrounded sandstone and quartz. (BS1377Pt2:3.2,4.4,5)
TP306	ES	1.50	1.50	12	-	-	-	-	-	-	-	-	Y	Brown silty gravelly SAND. Gravel is fine to medium subrounded sandstone. (BS1377Pt2:3.2)
TP306	B	2.50	2.50	10	-	-	-	-	-	-	-	-	Y	Brown very sandy silty GRAVEL. Gravel is fine to coarse subangular sandstone. (BS1377Pt2:3.2,9.2)
TP306	B	3.50	3.50	11	-	-	-	-	-	-	-	-	Y	Brown very sandy silty GRAVEL. Gravel is fine to coarse subangular to subrounded sandstone. (BS1377Pt2:3.2,9.2)
TP306	ES	3.50	3.50	12	-	-	-	-	-	-	-	-	Y	Brown very sandy silty GRAVEL. Gravel is fine to coarse subangular to subrounded sandstone. (BS1377Pt2:3.2)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 16.03.20

CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

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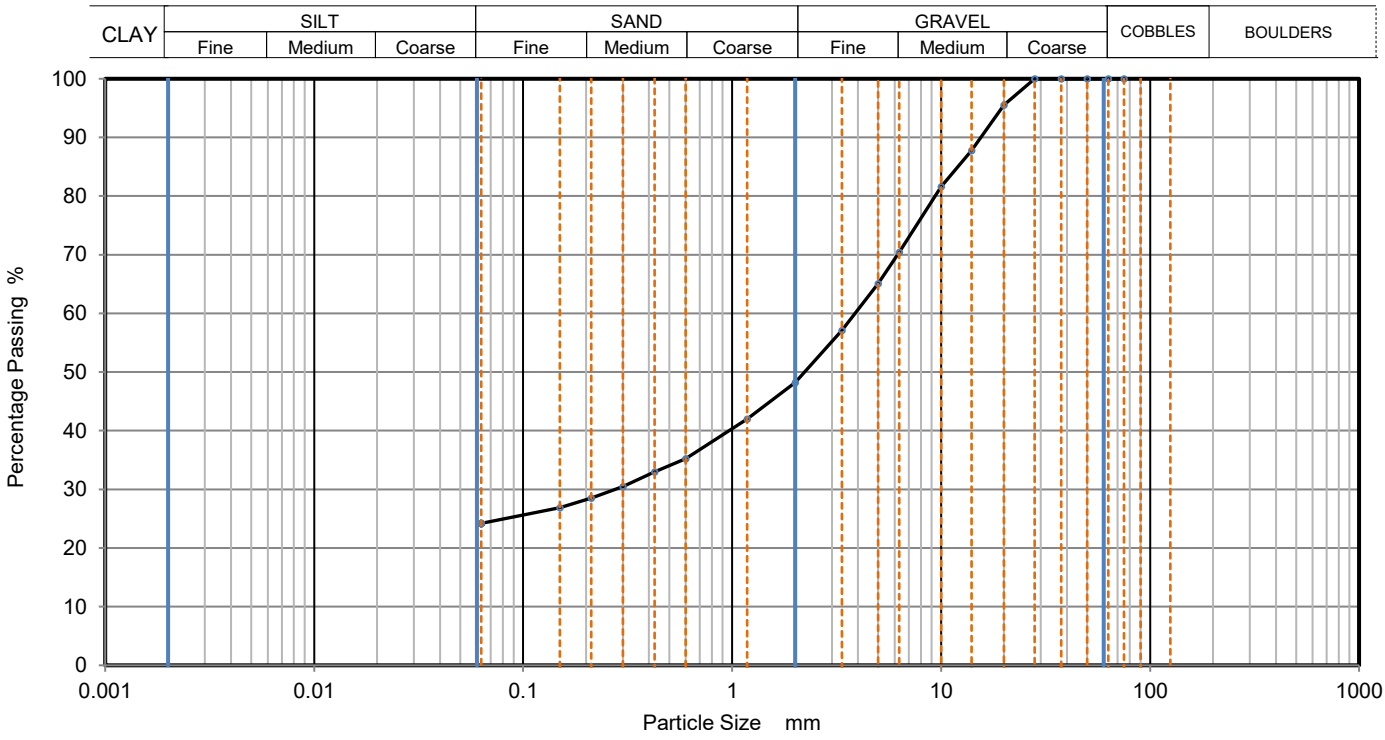
PARTICLE SIZE DISTRIBUTION

Job Ref	CCG-C-20-11469		
Borehole/Pit No.	TP306		
Site Name	COLOMENDY EXTENSION, DENBIGH	Sample No.	1
Specimen Description	Brown very clayey very sandy GRAVEL	Depth, m	1.00
Specimen Reference	Specimen Depth: m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2	KeyLAB ID	CCGL202003115



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	96		
14	88		
10	82		
6.3	70		
5	65		
3.35	57		
2	48		
1.18	42		
0.6	35		
0.425	33		
0.3	31		
0.212	29		
0.15	27		
0.063	24		

Dry Mass of sample, g

Sample Proportions	% dry mass
Very coarse	0
Gravel	52
Sand	24
Fines <0.063mm	24

Grading Analysis		
D100	mm	
D60	mm	3.87
D30	mm	0.276
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	Fig 1
JE	DK	DK	11/03/2020 11:10	Sheet

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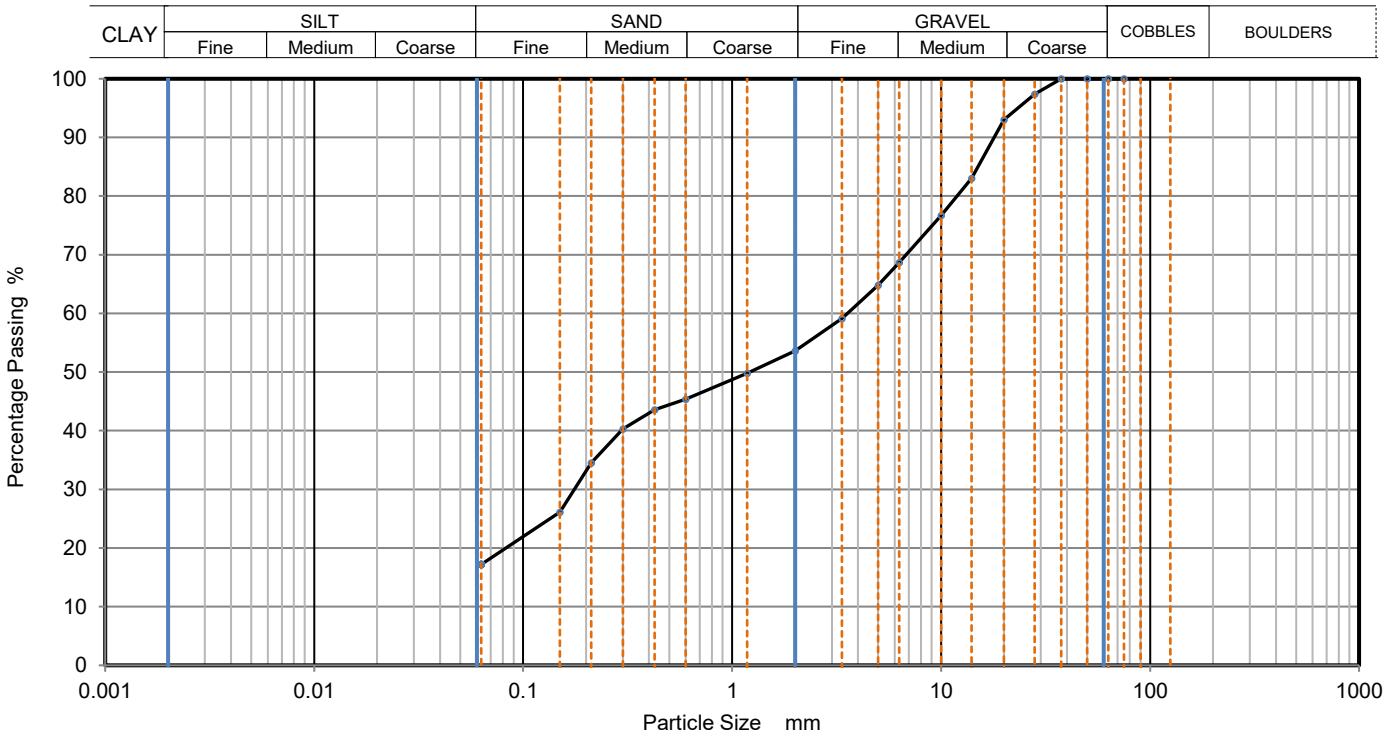
PARTICLE SIZE DISTRIBUTION

Job Ref	CCG-C-20-11469		
Borehole/Pit No.	TP306		
Site Name	COLOMENDY EXTENSION, DENBIGH	Sample No.	1
Specimen Description	Brown very sandy silty GRAVEL	Depth, m	2.50
Specimen Reference	Specimen Depth: m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2	KeyLAB ID	CCGL202003116



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	97		
20	93		
14	83		
10	77		
6.3	69		
5	65		
3.35	59		
2	54		
1.18	50		
0.6	45		
0.425	44		
0.3	40		
0.212	35		
0.15	26		
0.063	17		

Dry Mass of sample, g

Sample Proportions	% dry mass
Very coarse	0
Gravel	46
Sand	36
Fines <0.063mm	17

Grading Analysis		
D100	mm	
D60	mm	3.56
D30	mm	0.176
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	Fig 1
JE	DK	DK	11/03/2020 11:10	Sheet

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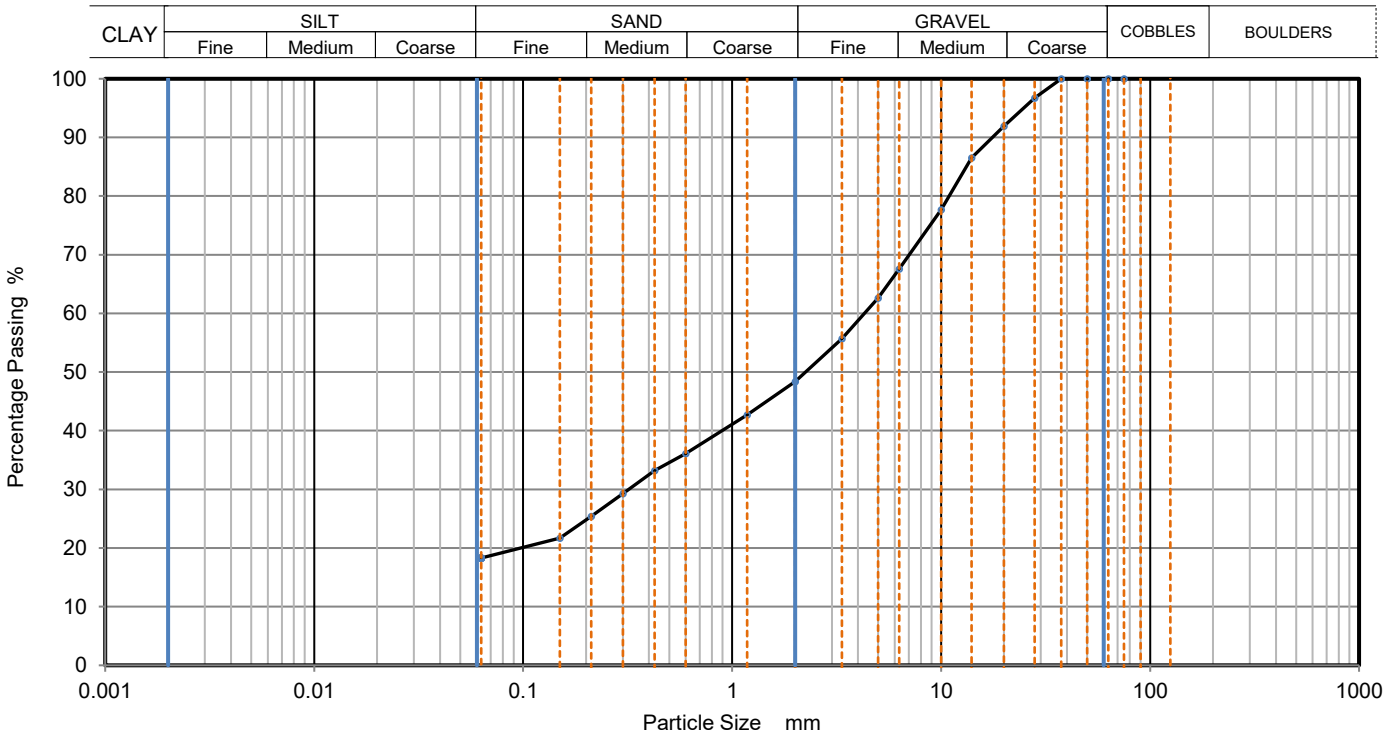
PARTICLE SIZE DISTRIBUTION

Job Ref	CCG-C-20-11469		
Borehole/Pit No.	TP306		
Site Name	COLOMENDY EXTENSION, DENBIGH	Sample No.	1
Specimen Description	Brown very sandy silty GRAVEL	Depth, m	3.50
Specimen Reference	Specimen Depth: m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2	KeyLAB ID	CCGL202003117



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	97		
20	92		
14	87		
10	78		
6.3	68		
5	63		
3.35	56		
2	48		
1.18	43		
0.6	36		
0.425	33		
0.3	29		
0.212	25		
0.15	22		
0.063	18		

Dry Mass of sample, g

Sample Proportions	% dry mass
Very coarse	0
Gravel	52
Sand	30
Fines <0.063mm	18

Grading Analysis		
D100	mm	
D60	mm	4.3
D30	mm	0.32
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	Fig 1
JE	DK	DK	11/03/2020 11:10	Sheet

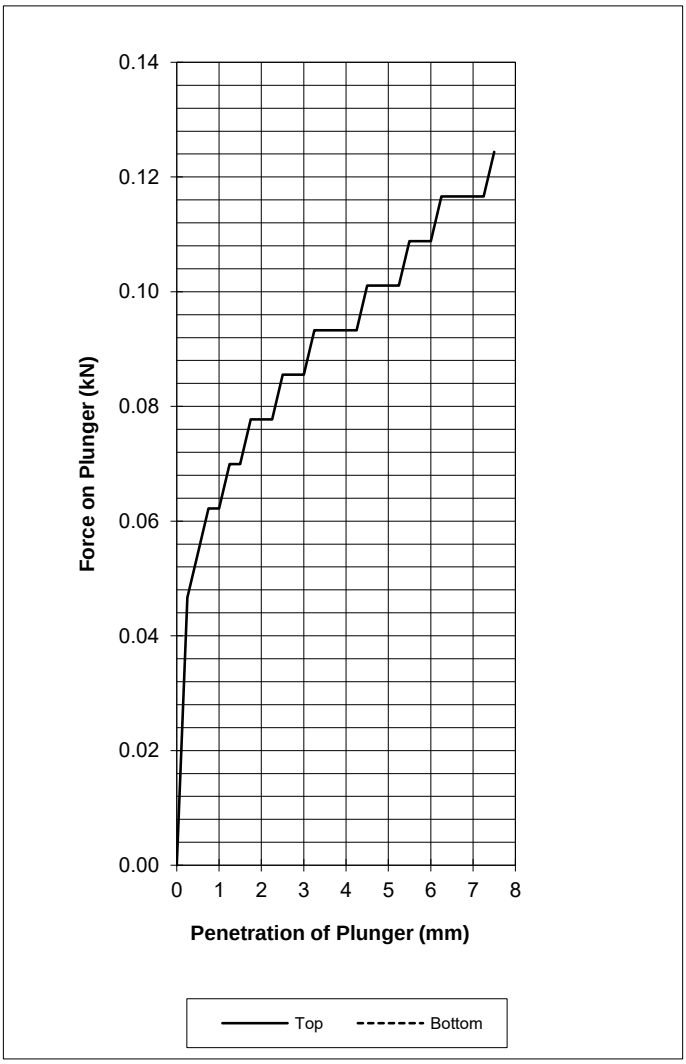
Laboratory Determination of California Bearing Ratio
B.S. 1377 (1990) : Part 4 : Clause 7

PROJECT No.:	CCG-C-20-11469			Proving ring No.	1155-8-1513
SITE:	COLOMENDY EXTENSION, DENBIGH			Division interval	0.0077736 kN/division
CLIENT:	DAEAR GEO CONSULTING			Surcharge	2 kg
BH / TP :	TP306	DEPTH:	1.00 m	Seating Load	10 N

MATERIAL DESCRIPTION: Brown very clayey very sandy GRAVEL

Mass of mould	4934 g	Depth of mould	127 mm
Mass of mould & compacted soil	9836 g	Diameter of mould	152 mm

Penetration of plunger	TOP			
mm	kN	Load Gauge		
0.00	**0.00**	**0.00**		
0.25	0.05	6.00		
0.50	0.05	7.00		
0.75	0.06	8.00		
1.00	0.06	**8.00**		
1.25	0.07	9.00		
1.50	0.07	9.00		
1.75	0.08	10.00		
2.00	0.08	**10.00**		
2.25	0.08	10.00		
2.50	0.09	11.00		
2.75	0.09	11.00		
3.00	0.09	**11.00**		
3.25	0.09	12.00		
3.50	0.09	12.00		
3.75	0.09	12.00		
4.00	0.09	**12.00**		
4.25	0.09	12.00		
4.50	0.10	13.00		
4.75	0.10	13.00		
5.00	0.10	**13.00**		
5.25	0.10	13.00		
5.50	0.11	14.00		
5.75	0.11	14.00		
6.00	0.11	**14.00**		
6.25	0.12	15.00		
6.50	0.12	15.00		
6.75	0.12	15.00		
7.00	0.12	**15.00**		
7.25	0.12	15.00		
7.50	0.12	**16.00**		



RESULTS

Penetration	Force		Standard	CBR	
	Top	Bottom	Force	Top	
(mm)	(kN)	(kN)	(kN)	(%)	
2.50	0.09	0.00	13.2	0.6	
5.00	0.10	0.00	20	0.5	

CBR Values: **0.6** %

CBR result: **0.6** %

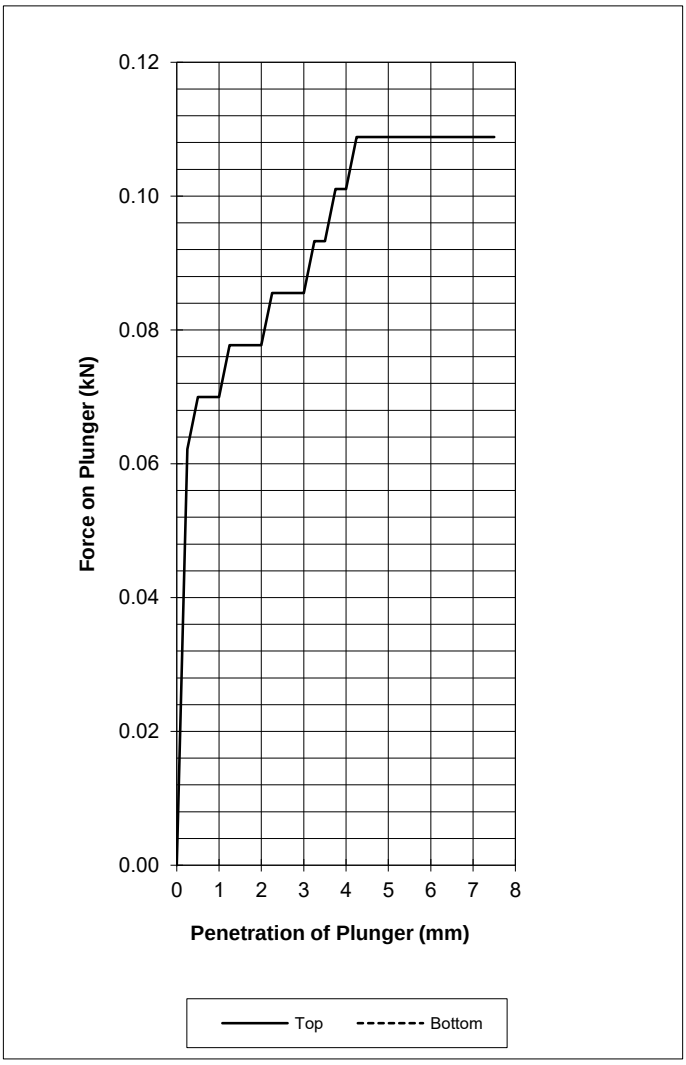
Mass of compacted soil	4902	g
Volume of mould	2305	cm^3
M/C of sample	13.4	%
Bulk density of compacted specimen	2.127	Mg/m^3
Dry density of compacted specimen	1.876	Mg/m^3

Laboratory Determination of California Bearing Ratio
B.S. 1377 (1990) : Part 4 : Clause 7

PROJECT No.:	CCG-C-20-11469	Proving ring No.	1155-8-1513
SITE:	COLOMENDY EXTENSION, DENBIGH	Division interval	0.0077736 kN/division
CLIENT:	DAEAR GEO CONSULTING	Surcharge	2 kg
BH / TP :	TP306 DEPTH: 2.50-3.50 m	Seating Load	10 N
MATERIAL DESCRIPTION	Brown very sandy silty GRAVEL		

Mass of mould	4934 g	Depth of mould	127 mm
Mass of mould & compacted soil	10097 g	Diameter of mould	152 mm

Penetration of plunger	TOP			
mm	kN	Load Gauge		
0.00	**0.00**	**0.00**		
0.25	0.06	8.00		
0.50	0.07	9.00		
0.75	0.07	9.00		
1.00	0.07	**9.00**		
1.25	0.08	10.00		
1.50	0.08	10.00		
1.75	0.08	10.00		
2.00	0.08	**10.00**		
2.25	0.09	11.00		
2.50	0.09	11.00		
2.75	0.09	11.00		
3.00	0.09	**11.00**		
3.25	0.09	12.00		
3.50	0.09	12.00		
3.75	0.10	13.00		
4.00	0.10	**13.00**		
4.25	0.11	14.00		
4.50	0.11	14.00		
4.75	0.11	14.00		
5.00	0.11	**14.00**		
5.25	0.11	14.00		
5.50	0.11	14.00		
5.75	0.11	14.00		
6.00	0.11	**14.00**		
6.25	0.11	14.00		
6.50	0.11	14.00		
6.75	0.11	14.00		
7.00	0.11	**14.00**		
7.25	0.11	14.00		
7.50	0.11	**14.00**		



RESULTS

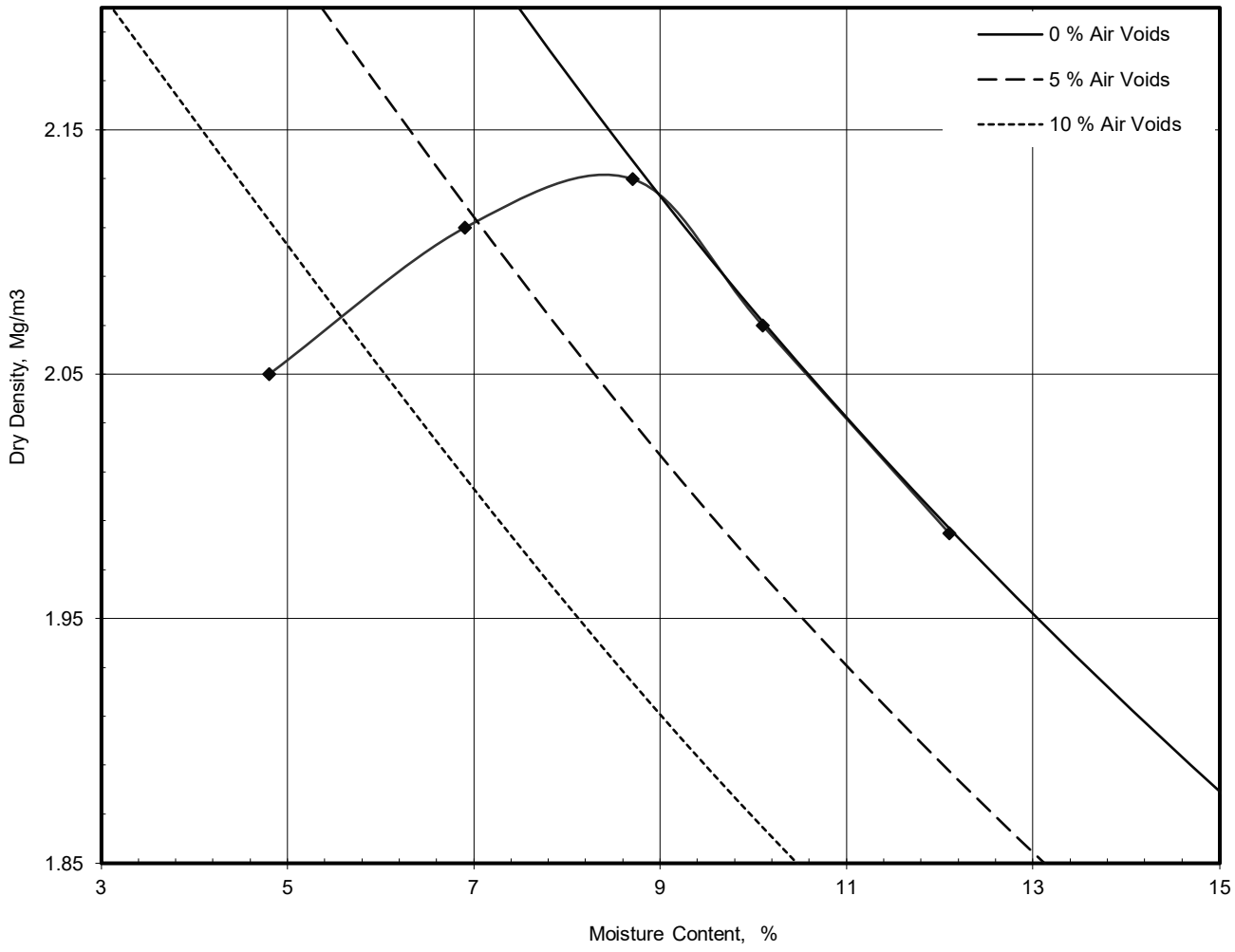
Penetration	Force		Standard	CBR	
	Top	Bottom	Force	Top	
(mm)	(kN)	(kN)	(kN)	(%)	
2.50	0.09	0.00	13.2	0.6	
5.00	0.11	0.00	20	0.5	

CBR Values **0.6** %

CBR result **0.6** %

Mass of compacted soil	5163	g
Volume of mould	2305	cm^3
M/C of sample	12.1	%
Bulk density of compacted specimen	2.240	Mg/m^3
Dry density of compacted specimen	1.999	Mg/m^3

	Dry Density / Moisture Content Relationship Light Compaction			Job Ref	CCG-C-20-11469
				Borehole / Pit No	TP306
Site Name	COLOMENDY EXTENSION, DENBIGH			Sample No	6
Soil Description	Brown very sandy silty GRAVEL			Depth	2.5-3.5 m
Specimen Ref.		Specimen Depth	m	Sample Type	B
Test Method	BS1377:1990:Part 4 3.3			Keylab ID	
				Compaction Test Reference/No.	



Preparation		
Mould Type		1 litre
Samples Used		1
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	8
Particle Density -	Mg/m³	2.62

Maximum Dry Density	Mg/m³	**2.13**
Optimum Moisture Content	%	**8.7**

Operator	Checked	Approved	Remarks	Fig
MH	DK	DK		Sheet 1 of 1

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Shear Strength (kN/m^2)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
TP307	ES	0.50	0.50	15	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular sandstone. (BS1377Pt2:3.2)
TP307	ES	1.00	1.00	11	-	-	-	-	-	-	-	-	Y	Brown sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular sandstone. (BS1377Pt2:3.2)
TP307	ES	1.50	1.50	21	-	-	-	29	16	13	72	CL	Y	Brown sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular sandstone. (BS1377Pt2:3.2,4.4,5)
TP307	B	1.50	1.50	20	-	-	-	-	-	-	-	-	Y	Brown sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular sandstone. (BS1377Pt2:3.2,9.2)
TP307	ES	2.00	2.00	13	-	-	-	-	-	-	-	-	Y	Brown very clayey gravelly SAND. Gravel is fine to coarse subangular to subrounded sandstone. (BS1377Pt2:3.2)
TP307	ES	2.50	2.50	12	-	-	-	-	-	-	-	-	Y	Brown very clayey gravelly SAND. Gravel is fine to coarse subangular to subrounded sandstone. (BS1377Pt2:3.2)
TP307	ES	3.00	3.00	12	-	-	-	-	-	-	-	-	Y	Brown clayey gravelly SAND. Gravel is fine to coarse subangular to subrounded sandstone. (BS1377Pt2:3.2)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 20.03.20

CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

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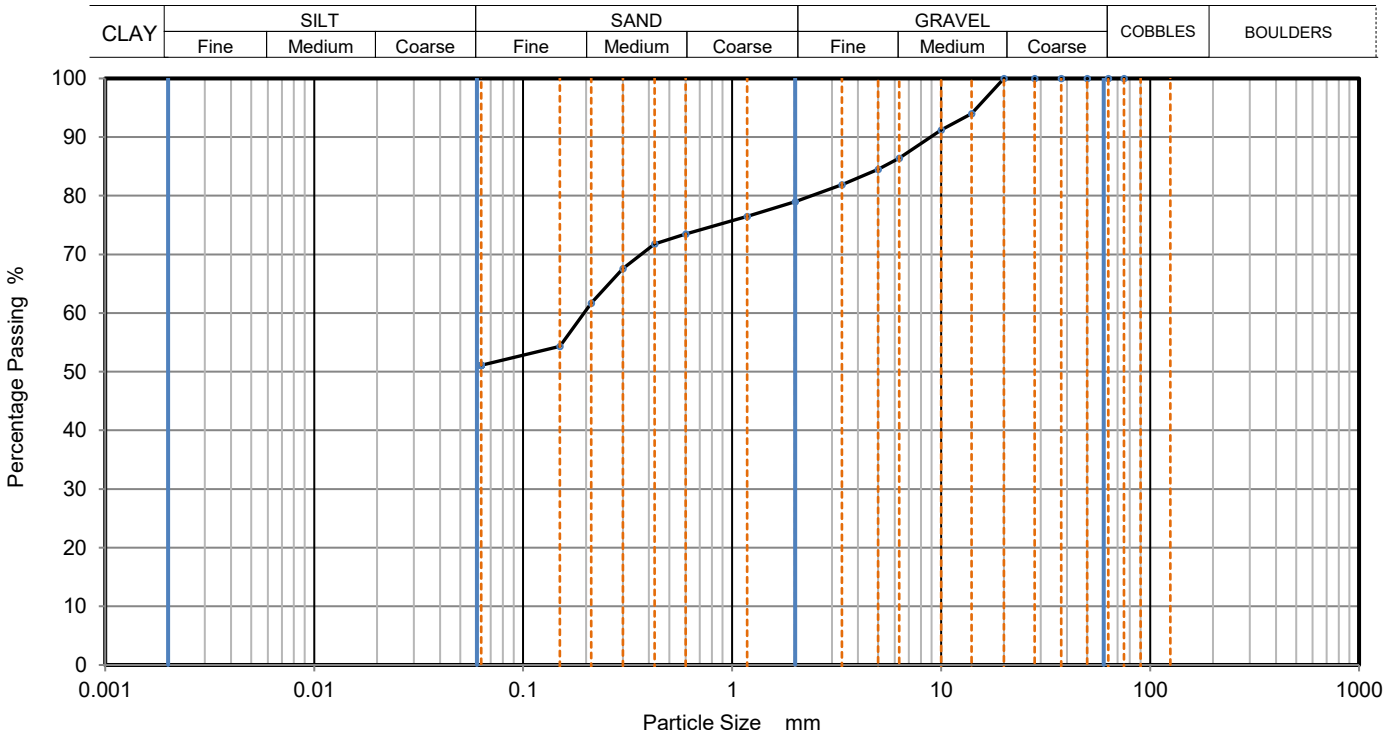
PARTICLE SIZE DISTRIBUTION

Job Ref	CCG-C-20-11469		
Borehole/Pit No.	TP307		
Site Name	COLOMENDY EXTENSION, DENBIGH	Sample No.	1
Specimen Description	Brown slightly sandy slightly gravelly silty CLAY	Depth, m	1.50
Specimen Reference	Specimen Depth: m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2	KeyLAB ID	CCGL202003102



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	94		
10	91		
6.3	86		
5	85		
3.35	82		
2	79		
1.18	77		
0.6	74		
0.425	72		
0.3	68		
0.212	62		
0.15	54		
0.063	51		

Dry Mass of sample, g

Sample Proportions	% dry mass
Very coarse	0
Gravel	21
Sand	28
Fines <0.063mm	51

Grading Analysis		
D100	mm	
D60	mm	0.196
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

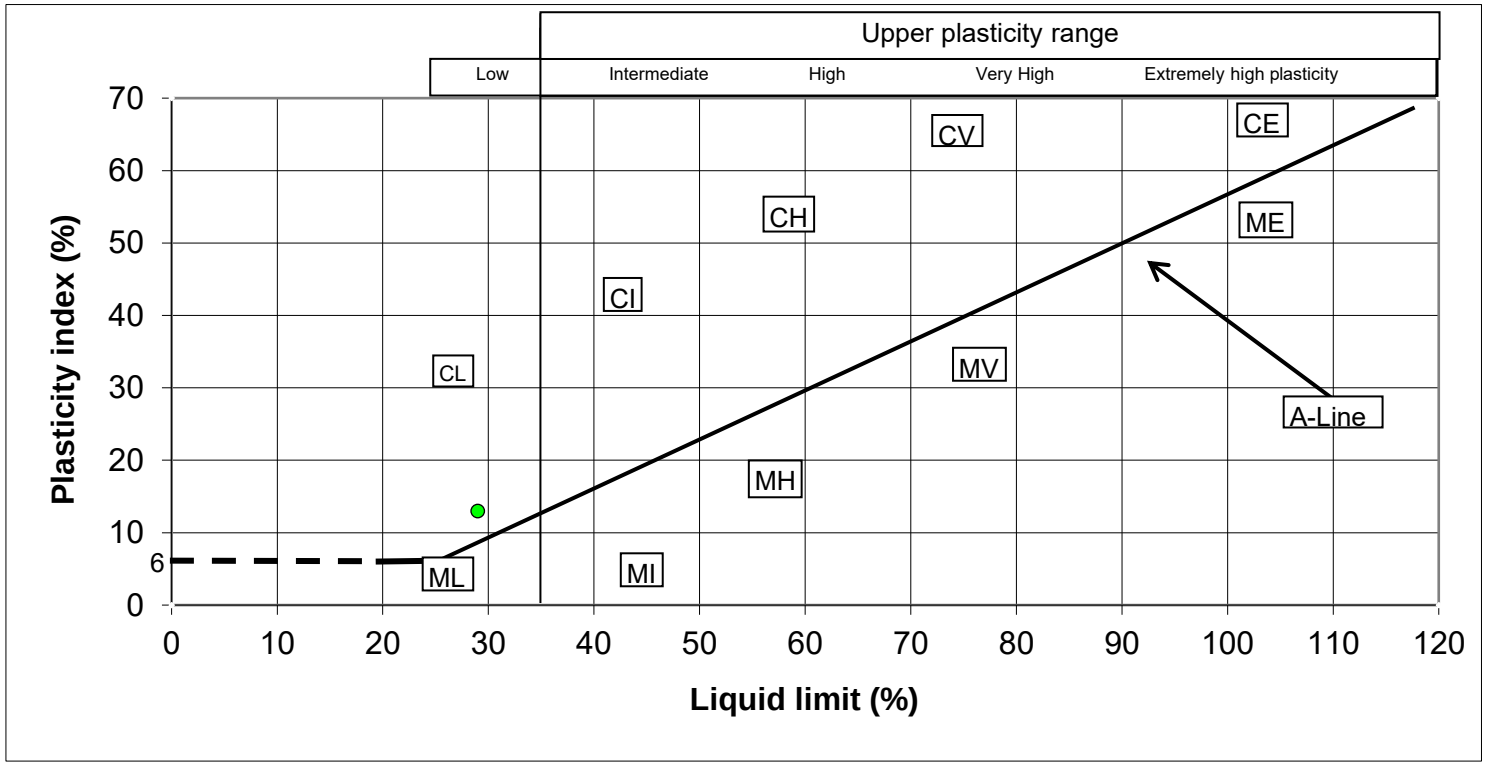
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	Fig 1
JE	DK	DK	10/03/2020 14:16	Sheet

ATTERBERG TEST RESULT SHEET
BS 1377:Part 2:1990:cl 4.4,5

SILT (M-SOIL), M plots below A-Line , CLAY,C, plots above A-Line, M and C may be combined as FINE SOIL, F.



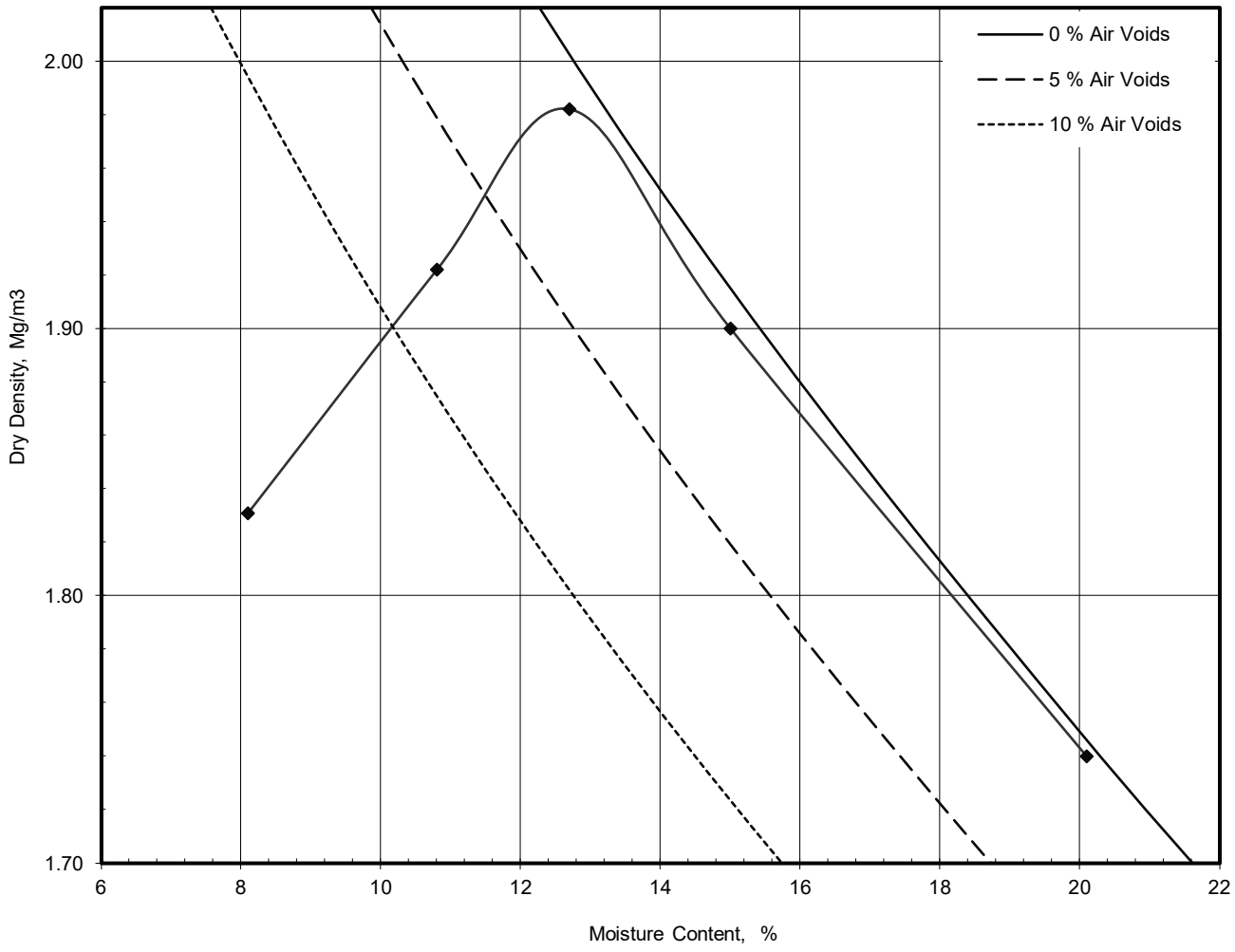
BH	Sample Depth	Liquid limit	Plasticity index
TP307	1.50	29.0	13.0

UKAS TESTING
4514

APPROVED BY	DK

CLIENT: DAEAR GEO CONSULTING	SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469)

	Dry Density / Moisture Content Relationship Light Compaction			Job Ref	CCG-C-20-11469
				Borehole / Pit No	TP307
Site Name	**COLOMENDY EXTENSION, DENBIGH**			Sample No	4
Soil Description	Brown slightly sandy slightly gravelly silty CLAY			Depth	1.50 m
Specimen Ref.		Specimen Depth	m	Sample Type	B
Test Method	BS1377:1990:Part 4 3.3			Keylab ID	
				Compaction Test Reference/No.	



Preparation		
Mould Type		1 litre
Samples Used		5
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	0
Particle Density -	Mg/m³	2.69

Maximum Dry Density	Mg/m³	**1.98**
Optimum Moisture Content	%	**12.7**

Operator	Checked	Approved	Remarks	Fig
MH	DK	DK		Sheet 1 of 1

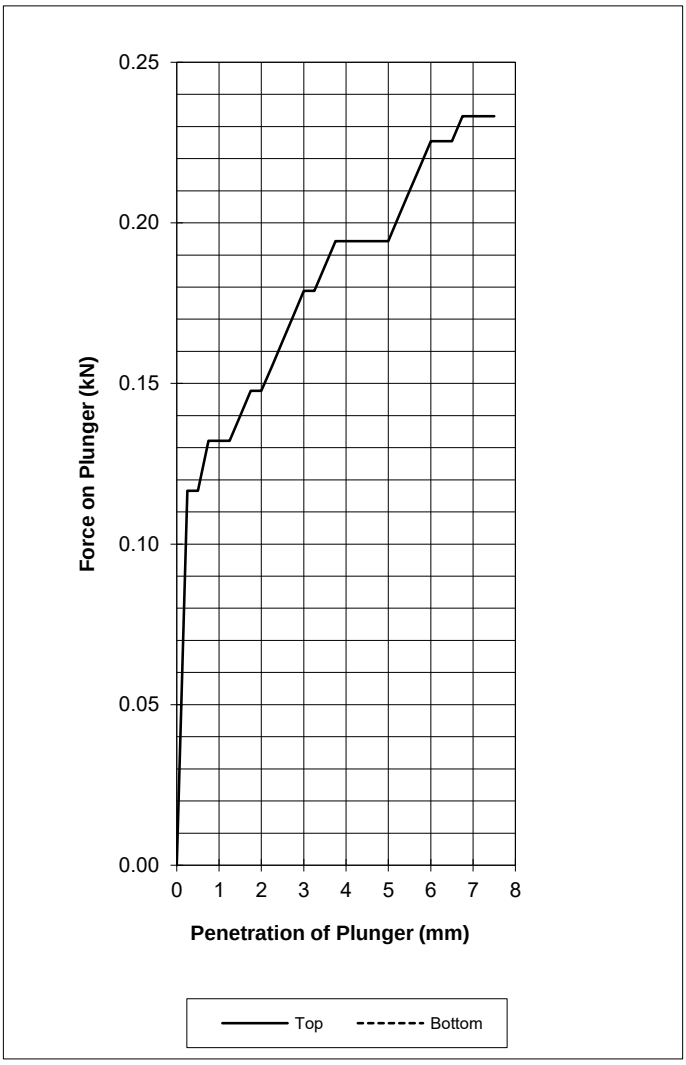
Laboratory Determination of California Bearing Ratio
B.S. 1377 (1990) : Part 4 : Clause 7

PROJECT No.:	CCG-C-20-11469			Proving ring No.	1155-8-1513
SITE:	COLOMENDY EXTENSION, DENBIGH			Division interval	0.0077736 kN/division
CLIENT:	DAEAR GEO CONSULTING			Surcharge	2 kg
BH / TP :	TP307	DEPTH:	1.50 m	Seating Load	10 N

MATERIAL DESCRIPTION: Brown slightly sandy slightly gravelly silty CLAY

Mass of mould	4934 g	Depth of mould	127 mm
Mass of mould & compacted soil	9761 g	Diameter of mould	152 mm

Penetration of plunger	TOP			
mm	kN	Load Gauge		
0.00	**0.00**	**0.00**		
0.25	0.12	15.00		
0.50	0.12	15.00		
0.75	0.13	17.00		
1.00	0.13	**17.00**		
1.25	0.13	17.00		
1.50	0.14	18.00		
1.75	0.15	19.00		
2.00	0.15	**19.00**		
2.25	0.16	20.00		
2.50	0.16	21.00		
2.75	0.17	22.00		
3.00	0.18	**23.00**		
3.25	0.18	23.00		
3.50	0.19	24.00		
3.75	0.19	25.00		
4.00	0.19	**25.00**		
4.25	0.19	25.00		
4.50	0.19	25.00		
4.75	0.19	25.00		
5.00	0.19	**25.00**		
5.25	0.20	26.00		
5.50	0.21	27.00		
5.75	0.22	28.00		
6.00	0.23	**29.00**		
6.25	0.23	29.00		
6.50	0.23	29.00		
6.75	0.23	30.00		
7.00	0.23	**30.00**		
7.25	0.23	30.00		
7.50	0.23	**30.00**		



RESULTS

Penetration	Force		Standard	CBR	
	Top	Bottom	Force	Top	
(mm)	(kN)	(kN)	(kN)	(%)	
2.50	0.16	0.00	13.2	1.2	
5.00	0.19	0.00	20	1.0	

CBR Values: **1.2** %

CBR result: **1.2** %

Mass of compacted soil	4827	g
Volume of mould	2305	cm^3
M/C of sample	20.1	%
Bulk density of compacted specimen	2.095	Mg/m^3
Dry density of compacted specimen	1.744	Mg/m^3

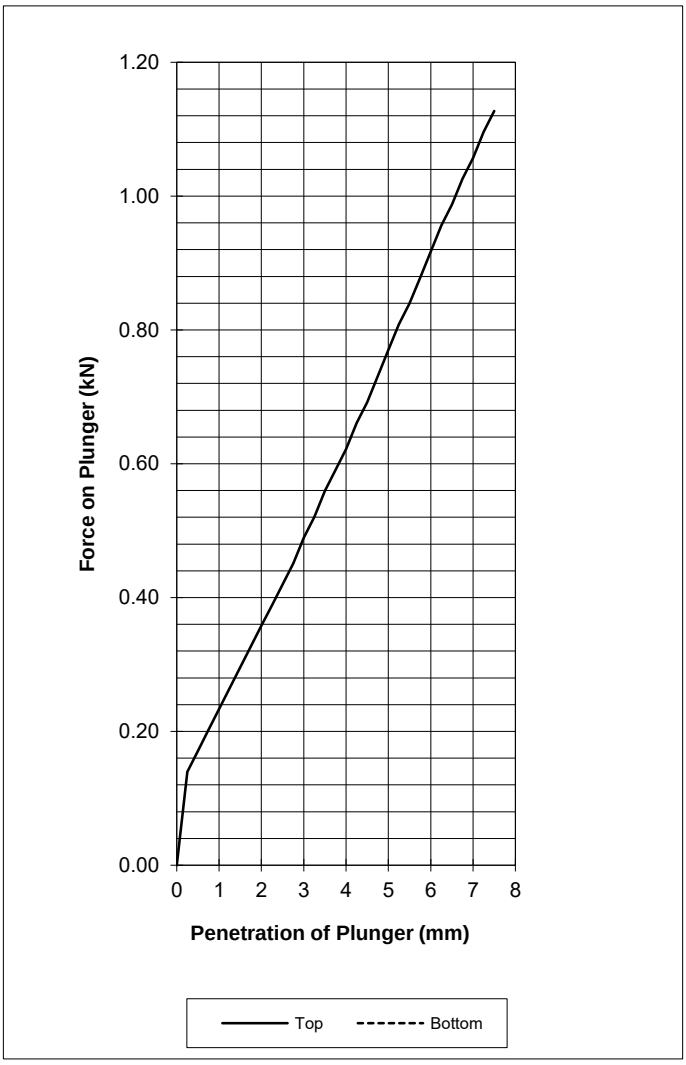
Laboratory Determination of California Bearing Ratio
B.S. 1377 (1990) : Part 4 : Clause 7

PROJECT No.:	CCG-C-20-11469			Proving ring No.	1155-8-1513
SITE:	COLOMENDY EXTENSION, DENBIGH			Division interval	0.0077736 kN/division
CLIENT:	DAEAR GEO CONSULTING			Surcharge	2 kg
BH / TP :	TP307	DEPTH:	1.50 m	Seating Load	10 N

MATERIAL DESCRIPTION: Brown slightly sandy slightly gravelly silty CLAY

Mass of mould	4934 g	Depth of mould	127 mm
Mass of mould & compacted soil	10071 g	Diameter of mould	152 mm

Penetration of plunger	TOP			
mm	kN	Load Gauge		
0.00	**0.00**	**0.00**		
0.25	0.14	18.00		
0.50	0.17	22.00		
0.75	0.20	26.00		
1.00	0.23	**30.00**		
1.25	0.26	34.00		
1.50	0.30	38.00		
1.75	0.33	42.00		
2.00	0.36	**46.00**		
2.25	0.39	50.00		
2.50	0.42	54.00		
2.75	0.45	58.00		
3.00	0.49	**63.00**		
3.25	0.52	67.00		
3.50	0.56	72.00		
3.75	0.59	76.00		
4.00	0.62	**80.00**		
4.25	0.66	85.00		
4.50	0.69	89.00		
4.75	0.73	94.00		
5.00	0.77	**99.00**		
5.25	0.81	104.00		
5.50	0.84	108.00		
5.75	0.88	113.00		
6.00	0.92	**118.00**		
6.25	0.96	123.00		
6.50	0.99	127.00		
6.75	1.03	132.00		
7.00	1.06	**136.00**		
7.25	1.10	141.00		
7.50	1.13	**145.00**		



RESULTS

Penetration	Force		Standard	CBR	
	Top	Bottom	Force	Top	
(mm)	(kN)	(kN)	(kN)	(%)	
2.50	0.42	0.00	13.2	3.2	
5.00	0.77	0.00	20	3.8	

CBR Values: **3.8** %

CBR result: **3.8** %

Mass of compacted soil	5137	g
Volume of mould	2305	cm^3
M/C of sample	12.7	%
Bulk density of compacted specimen	2.229	Mg/m^3
Dry density of compacted specimen	1.978	Mg/m^3

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Shear Strength (kN/m^2)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
TP401	ES	0.50	0.50	17	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subangular to subrounded sandstone. (BS1377Pt2:3.2)
TP401	B	1.00	1.00	24	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subangular to subrounded sandstone. (BS1377Pt2:3.2,9.2,Pt4:3.3)
TP401	ES	1.50	1.50	15	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subangular to subrounded sandstone. (BS1377Pt2:3.2)
TP401	B	2.00	2.00	19	-	-	-	37	19	18	89	CI	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subangular to subrounded sandstone. (BS1377Pt2:3.2,4.4,5)
TP401	ES	2.50	2.00	17	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subangular to subrounded sandstone. (BS1377Pt2:3.2)
TP401	ES	3.00	3.00	21	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subangular to subrounded sandstone. (BS1377Pt2:3.2)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 03.03.20

CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

CC Geotechnical Ltd
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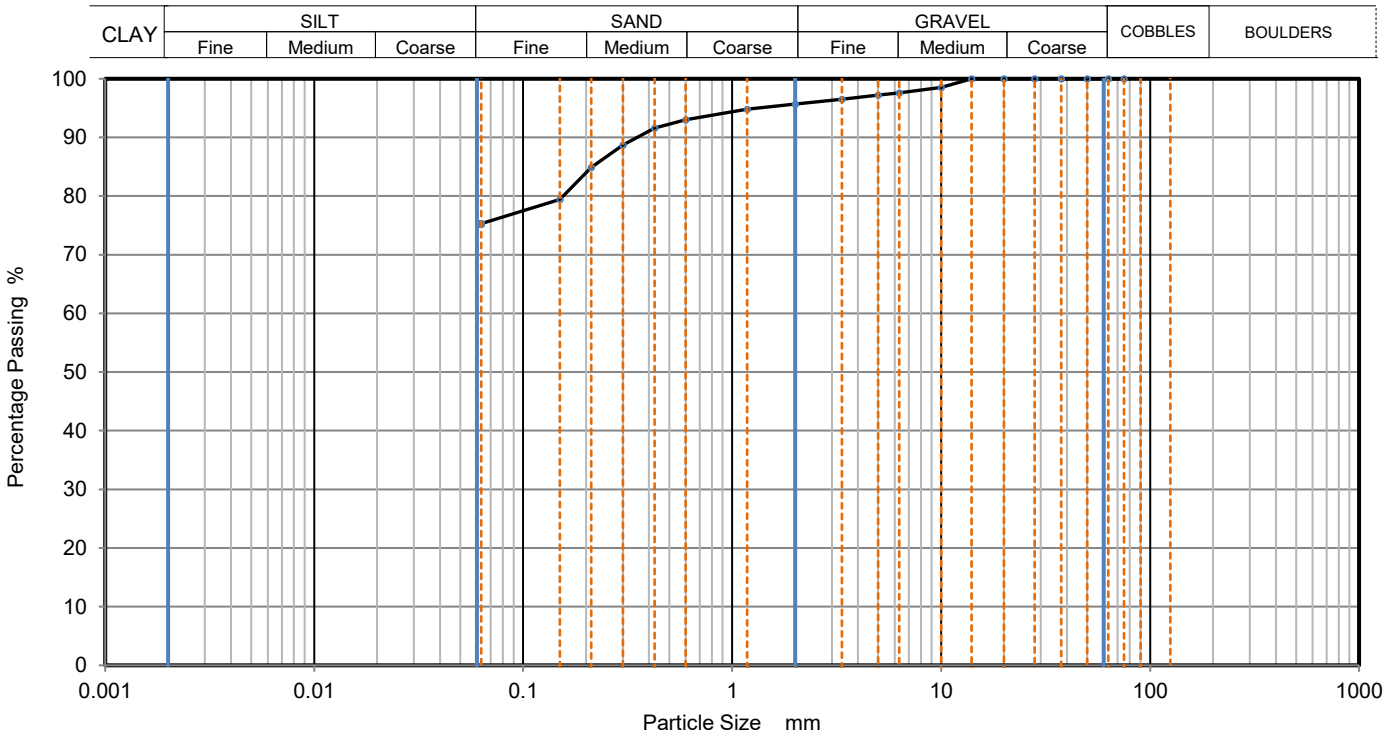
PARTICLE SIZE DISTRIBUTION

Job Ref	CCG-C-20-11469		
Borehole/Pit No.	TP401		
Site Name	COLOMENDY EXTENSION, DENBIGH	Sample No.	1
Specimen Description	Brown slightly sandy slightly gravelly silty CLAY	Depth, m	1.00
Specimen Reference	Specimen Depth: m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2	KeyLAB ID	CCGL202002266



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	99		
6.3	98		
5	97		
3.35	97		
2	96		
1.18	95		
0.6	93		
0.425	92		
0.3	89		
0.212	85		
0.15	79		
0.063	75		

Dry Mass of sample, g

Sample Proportions	% dry mass
Very coarse	0
Gravel	4
Sand	20
Fines <0.063mm	75

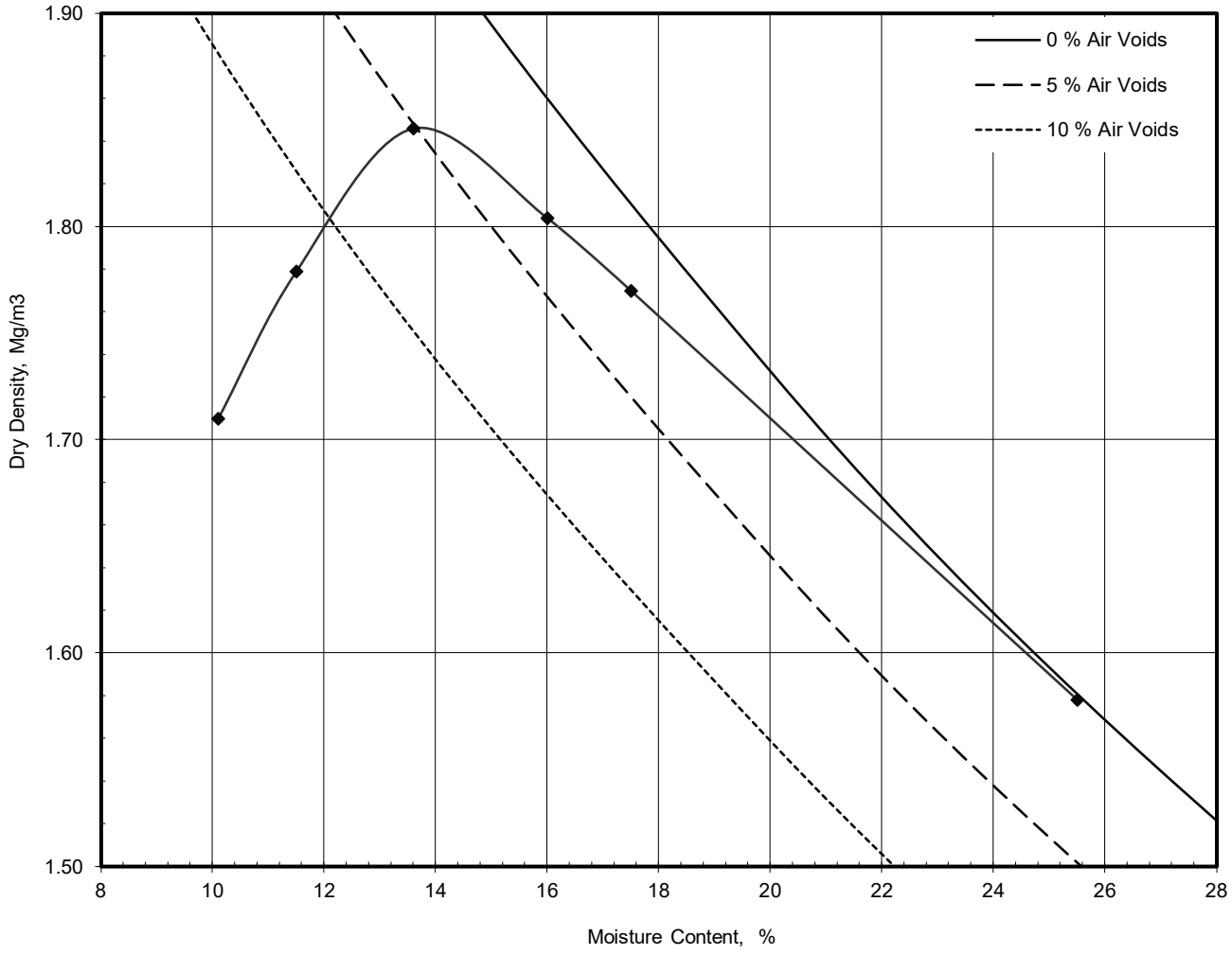
Grading Analysis		
D100	mm	
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	Fig 1
JE	DK	DK	26/02/2020 13:48	Sheet

	Dry Density / Moisture Content Relationship Light Compaction			Job Ref	CCG-C-20-11469
				Borehole / Pit No	TP401
Site Name	**COLOMENDY EXTENSION, DENBIGH**			Sample No	2
Soil Description	Brown slightly sandy slightly gravelly silty CLAY			Depth	1.00 m
Specimen Ref.		Specimen Depth	m	Sample Type	B
Test Method	BS1377:1990:Part 4 3.4.4.2			Keylab ID	
				Compaction Test Reference/No.	



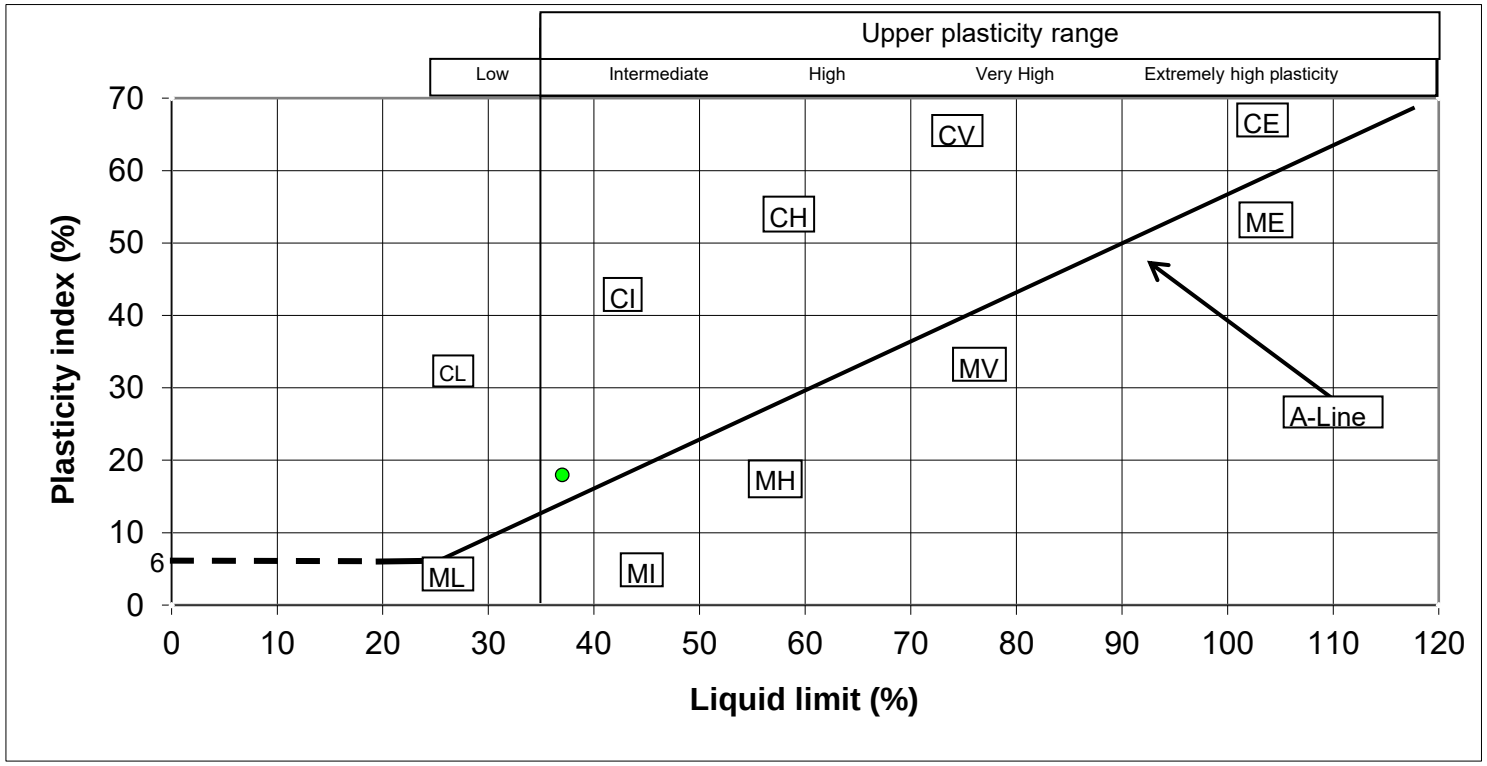
Preparation		
Mould Type		1 litre
Samples Used		6
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	0
Particle Density -	Mg/m³	2.65

Maximum Dry Density	Mg/m³	**1.85**
Optimum Moisture Content	%	**14**

Operator	Checked	Approved	Remarks	Fig
AS	DK	DK		Sheet 1 of 1

ATTERBERG TEST RESULT SHEET
BS 1377:Part 2:1990:cl 4.4,5

SILT (M-SOIL), M plots below A-Line , CLAY,C, plots above A-Line, M and C may be combined as FINE SOIL, F.



BH	Sample Depth	Liquid limit	Plasticity index
TP401	2.00	37.0	18.0

UKAS TESTING
4514

APPROVED BY	DK

CLIENT: DAEAR GEO CONSULTING	SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469)

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Shear Strength (kN/m^2)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
TP404	ES	0.50	0.50	18	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular sandstone. (BS1377Pt2:3.2)
TP404	B	0.75	0.75	21	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular sandstone. (BS1377Pt2:3.2)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 26.02.20

CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Shear Strength (kN/m^2)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
TP406	ES	0.50	0.50	18	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular sandstone. (BS1377Pt2:3.2)
TP406	B	0.75	0.75	19	2.17	1.82	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular sandstone. (BS1377Pt2:3.2,Pt4:3.3)
TP406	ES	1.00	1.00	15	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular sandstone. (BS1377Pt2:3.2,9.2)
TP406	ES	1.50	1.50	16	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular sandstone. (BS1377Pt2:3.2)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 26.02.20

CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

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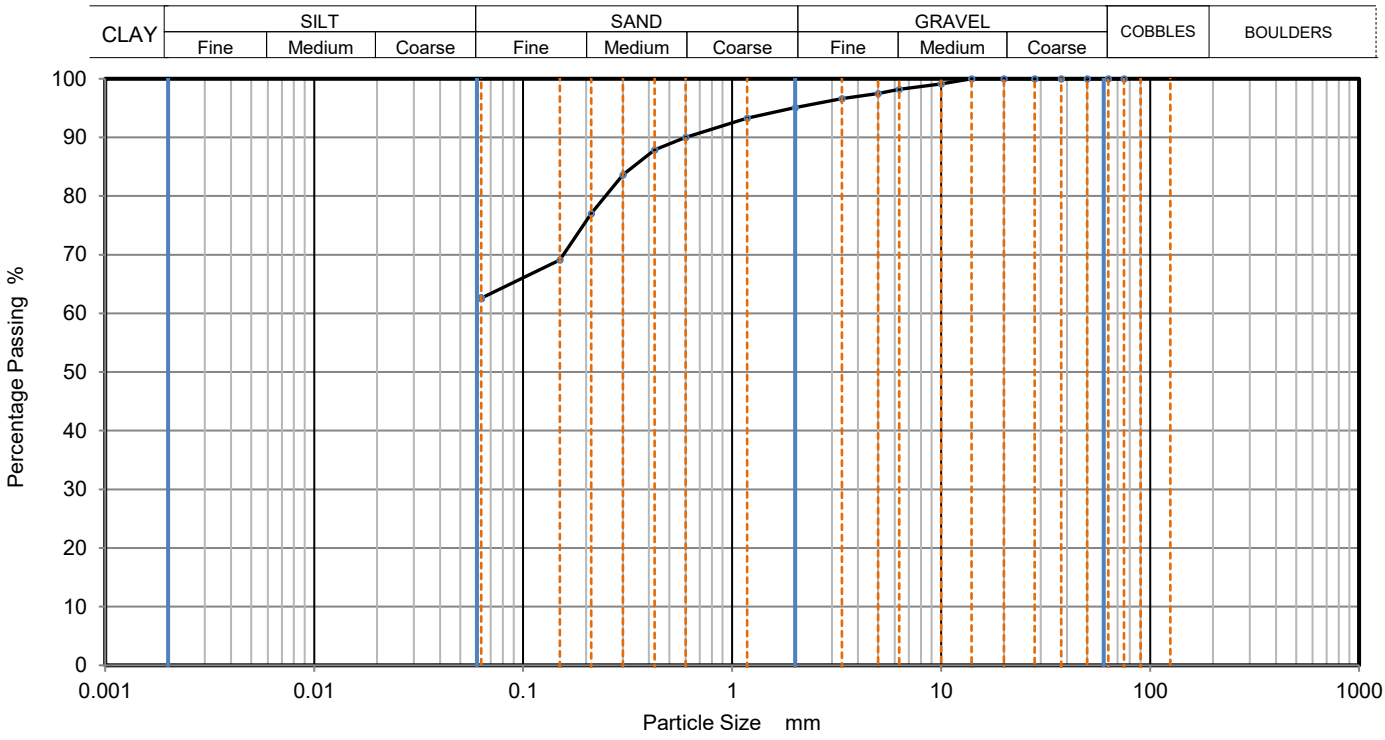
PARTICLE SIZE DISTRIBUTION

Job Ref	CCG-C-20-11469		
Borehole/Pit No.	TP406		
Site Name	COLOMENDY EXTENSION, DENBIGH	Sample No.	1
Specimen Description	Brown slightly sandy slightly gravelly silty CLAY	Depth, m	0.75
Specimen Reference	Specimen Depth: m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2	KeyLAB ID	CCGL202002267



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	99		
6.3	98		
5	98		
3.35	97		
2	95		
1.18	93		
0.6	90		
0.425	88		
0.3	84		
0.212	77		
0.15	69		
0.063	63		

Dry Mass of sample, g

Sample Proportions	% dry mass
Very coarse	0
Gravel	5
Sand	33
Fines <0.063mm	63

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

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	Fig 1
JE	DK	DK	26/02/2020 14:01	Sheet

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Shear Strength (kN/m^2)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
TP501	ES	0.50	0.50	19	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular sandstone and mudstone. (BS1377Pt2:3.2)
TP501	ES	1.50	1.50	17	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular sandstone and mudstone. (BS1377Pt2:3.2)
TP501	ES	2.50	2.50	13	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular mudstone and sandstone. (BS1377Pt2:3.2)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 29.02.20

CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Shear Strength (kN/m^2)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
TP502	ES	0.50	0.50	26	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular sandstone. (BS1377Pt2:3.2)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 29.02.20

CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Shear Strength (kN/m^2)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
TP503	ES	0.50	0.50	19	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular sandstone and mudstone. (BS1377Pt2:3.2)
TP503	ES	1.50	1.50	14	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse subrounded to subangular sandstone and mudstone. (BS1377Pt2:3.2)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 29.02.20

CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)	Shear Strength (kN/m²)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
TP505	ES	0.50	0.50	22	-	-	-	-	-	-	-	-	Y	Brown slightly sandy silty CLAY. (BS1377Pt2:3.2)
TP505	ES	1.50	1.50	18	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse subrounded mudstone. (BS1377Pt2:3.2)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 29.02.20

CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Shear Strength (kN/m^2)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
TP507	ES	0.50	0.50	29	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular mudstone and sandstone. (BS1377Pt2:3.2)
TP507	ES	1.50	1.50	14	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular mudstone, sandstone, quartz. (BS1377Pt2:3.2)
TP507	ES	2.00	2.00	14	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular mudstone and sandstone. (BS1377Pt2:3.2)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 29.02.20

CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Shear Strength (kN/m^2)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
TP509	ES	0.50	0.50	30	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular sandstone and mudstone. (BS1377Pt2:3.2)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 29.02.20

CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Shear Strength (kN/m^2)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
TP512	ES	0.50	0.50	18	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse subrounded to subangular sandstone and mudstone. (BS1377Pt2:3.2)
TP512	ES	1.50	1.50	17	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular sandstone and mudstone. (BS1377Pt2:3.2,9.2)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 03.03.20

CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

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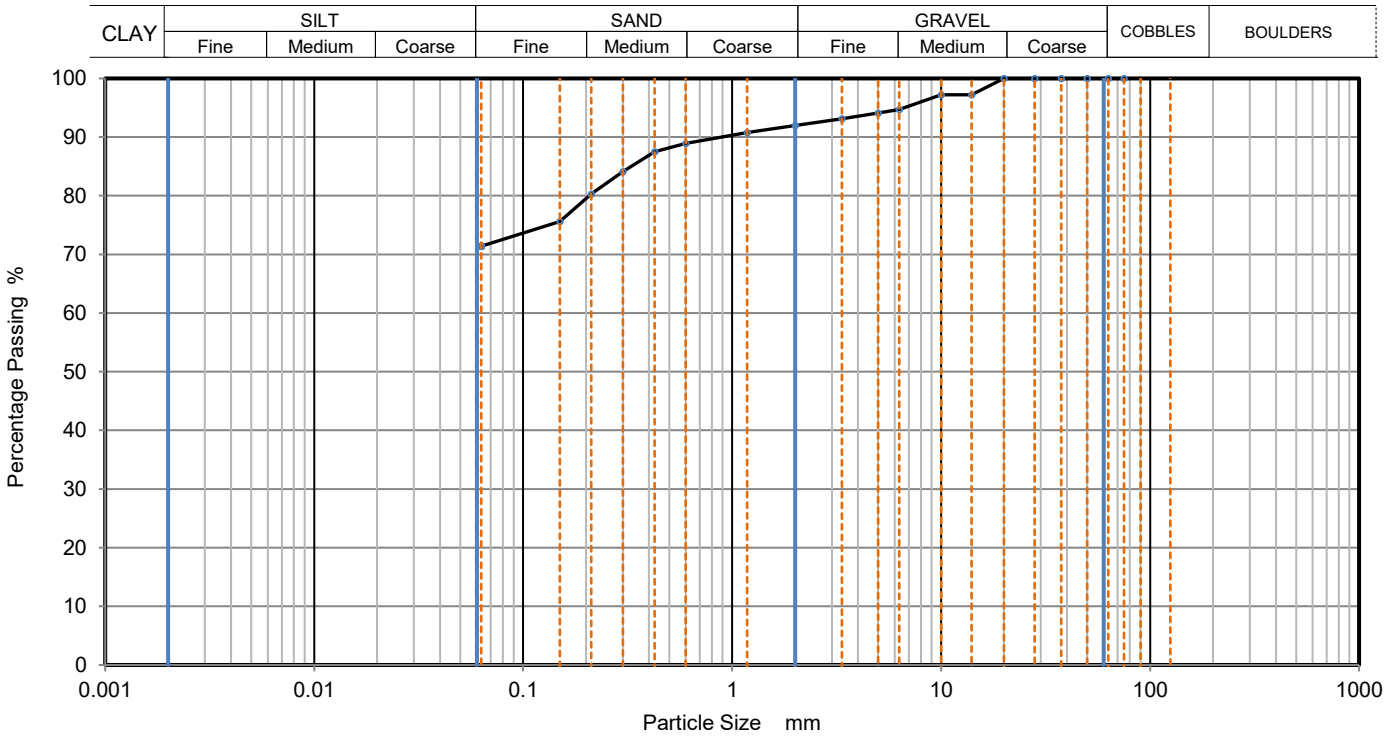
e: lab@ccgeotechnical.com

PARTICLE SIZE DISTRIBUTION

Job Ref	CCG-C-20-11469		
Borehole/Pit No.	TP512		
Site Name	COLOMENDY EXTENSION, DENBIGH	Sample No.	1
Specimen Description	Brown slightly sandy slightly gravelly silty CLAY	Depth, m	1.50
Specimen Reference	Specimen Depth: m	Sample Type	ES
Test Method	BS1377:Part 2:1990, clause 9.2	KeyLAB ID	CCGL202003032



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	97		
10	97		
6.3	95		
5	94		
3.35	93		
2	92		
1.18	91		
0.6	89		
0.425	88		
0.3	84		
0.212	80		
0.15	76		
0.063	71		

Dry Mass of sample, g

Sample Proportions	% dry mass
Very coarse	0
Gravel	8
Sand	21
Fines <0.063mm	71

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

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	Fig 1
JE	DK	DK	03/03/2020 12:24	Sheet

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)	Shear Strength (kN/m²)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
TP516	ES	0.50	0.50	15	-	-	-	-	-	-	-	-	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded to subangular sandstone and mudstone. (BS1377Pt2:3.2)

SITE: COLOMENDY EXTENSION, DENBIGH (CCG-C-20-11469) DATE: 29.02.20

CLIENT: DAEAR GEO CONSULTING

UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

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2683

THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number:	20-27080
Issue:	1
Date of Issue:	20/02/2020
Contact:	Tony Gerrard
Customer Details:	CC Geotechnical Ltd Unit 1 & 2 Deltic Place Deltic Way Liverpool MersevsideL33 7BA
Quotation No:	Q14-00045
Order No:	Not Supplied
Customer Reference:	CCG-C-20-11469
Date Received:	05/02/2020
Date Approved:	20/02/2020
Details:	Land at Colomendy
Approved by:	

Mike Varley, Technical Manager

Sample Summary

Report No.: 20-27080, issue number 1

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
197382	TP101 0.50	03/02/2020	14/02/2020		
197383	TP102 0.50	03/02/2020	14/02/2020		
197384	TP103 0.50	03/02/2020	14/02/2020		
197385	TP104 0.50	03/02/2020	14/02/2020	Silty loam	
197386	TP105 0.50	03/02/2020	14/02/2020		
197387	TP106 0.50	03/02/2020	14/02/2020		
197388	TP107 0.50	03/02/2020	14/02/2020	Silty loam	
197389	TP108 0.50	03/02/2020	14/02/2020	Silty loam	
197390	TP109 0.50	03/02/2020	14/02/2020		
197391	TP110 0.50	03/02/2020	14/02/2020	Silty loam	
197392	TP111 0.50	03/02/2020	14/02/2020		
197393	TP112 0.50	03/02/2020	14/02/2020		

Results Summary

Report No.: 20-27080, issue number 1

			ELAB Reference	197385	197386	197388	197389	197391
			Customer Reference					
			Sample ID					
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL
			Sample Location	TP104	TP105	TP107	TP108	TP110
			Sample Depth (m)	0.50	0.50	0.50	0.50	0.50
			Sampling Date	03/02/2020	03/02/2020	03/02/2020	03/02/2020	03/02/2020
Determinand	**Codes**	**Units**	**LOD**					
Soil sample preparation parameters								
Moisture Content	N	%	0.1	25.8	25.0	27.6	23.8	27.0
Material removed	N	%	0.1	< 0.1	n/t	< 0.1	< 0.1	< 0.1
Description of Inert material removed	N		0	None	n/t	None	None	None
Anions								
Water Soluble Sulphate	M	mg/l	20	< 20	n/t	< 20	< 20	< 20
Miscellaneous								
pH	M	pH units	0.1	8.0	n/t	8.2	8.3	7.3

Method Summary

Report No.: 20-27080, issue number 1

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
pH	M	Air dried sample	19/02/2020	113	Electromeric
Water soluble anions	M	Air dried sample	18/02/2020	172	Ion Chromatography

Report Information

Report No.: 20-27080, issue number 1

Key

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SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
NS	Subcontracted to approved laboratory. UKAS accreditation is not applicable.
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"

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2683

THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number:	20-27088
Issue:	1
Date of Issue:	20/02/2020
Contact:	Tony Gerrard
Customer Details:	CC Geotechnical Ltd Unit 1 & 2 Deltic Place Deltic Way Liverpool MersevsideL33 7BA
Quotation No:	Q14-00045
Order No:	Not Supplied
Customer Reference:	CCG-20-11469
Date Received:	17/02/2020
Date Approved:	20/02/2020
Details:	Land at Colomendy
Approved by:	

Mike Varley, Technical Manager

Sample Summary

Report No.: 20-27088, issue number 1

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
197454	TP113 0.50	12/02/2020	17/02/2020	Silty loam	

Results Summary

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Report No.: 20-27088, issue number 1

ELAB Reference	197454
Customer Reference	
Sample ID	
Sample Type	SOIL
Sample Location	TP113
Sample Depth (m)	0.50
Sampling Date	12/02/2020

Determinand	Codes	Units	LOD	
Soil sample preparation parameters				
Moisture Content	N	%	0.1	25.4
Material removed	N	%	0.1	< 0.1
Description of Inert material removed	N		0	None
Anions				
Water Soluble Sulphate	M	mg/l	20	< 20
Miscellaneous				
pH	M	pH units	0.1	8.0

Method Summary

Report No.: 20-27088, issue number 1

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
pH	M	Air dried sample	19/02/2020	113	Electromeric
Water soluble anions	M	Air dried sample	18/02/2020	172	Ion Chromatography

Report Information

Report No.: 20-27088, issue number 1

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THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number:	20-27144
Issue:	1
Date of Issue:	24/02/2020
Contact:	Tony Gerrard
Customer Details:	CC Geotechnical Ltd Unit 1 & 2 Deltic Place Deltic Way Liverpool MersevsideL33 7BA
Quotation No:	Q14-00045
Order No:	Not Supplied
Customer Reference:	CCG-20-11469
Date Received:	20/02/2020
Date Approved:	24/02/2020
Details:	Land at Colomendy
Approved by:	

Mike Varley, Technical Manager

Sample Summary

Report No.: 20-27144, issue number 1

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
197772	BH101 0.50	Not Provided	20/02/2020	Silty clayey loam	a
197773	BH102 0.50	Not Provided	20/02/2020	Silty loam	a
197774	TP201 0.50	04/02/2020	20/02/2020	Silty loam	
197775	TP207 0.50	04/02/2020	20/02/2020	Silty loam	
197776	TP213 0.50	05/02/2020	20/02/2020	Silty loam	
197777	TP215 0.50	04/02/2020	20/02/2020	Silty clayey loam	
197778	BH302 5.50	Not Provided	20/02/2020	Silty clayey loam	a
197779	BH303 5.80	05/02/2020	20/02/2020	Stones	
197780	TP401 3.00	06/02/2020	20/02/2020	Sandy silty loam	
197781	TP404 1.50	06/02/2020	20/02/2020	Silty loam	
197782	TP406 1.50	06/02/2020	20/02/2020	Silty clayey loam	

Results Summary

Report No.: 20-27144, issue number 1

				ELAB Reference	197772	197773	197774	197775	197776
				Customer Reference					
				Sample ID					
				Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL
				Sample Location	BH101	BH102	TP201	TP207	TP213
				Sample Depth (m)	0.50	0.50	0.50	0.50	0.50
				Sampling Date	Not Provided	Not Provided	04/02/2020	04/02/2020	05/02/2020
Determinand	**Codes**	**Units**	**LOD**						
Soil sample preparation parameters									
Moisture Content	N	%	0.1	n/t	n/t	15.2	15.9	17.3
Material removed	N	%	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Description of Inert material removed	N		0	None	None	None	None	None
Anions									
Water Soluble Sulphate	M	mg/l	20	< 20	< 20	23	< 20	< 20
Miscellaneous									
pH	M	pH units	0.1	8.2	8.2	8.5	8.6	8.3

Tests marked N are not UKAS accredited.

Results Summary

Report No.: 20-27144, issue number 1

				ELAB Reference	197777	197778	197779	197780	197781
				Customer Reference					
				Sample ID					
				Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL
				Sample Location	TP215	BH302	BH303	TP401	TP404
				Sample Depth (m)	0.50	5.50	5.80	3.00	1.50
				Sampling Date	04/02/2020	Not Provided	05/02/2020	06/02/2020	06/02/2020
Determinand	**Codes**	**Units**	**LOD**						
Soil sample preparation parameters									
Moisture Content	N	%	0.1		16.0	n/t	1.1	18.7	15.2
Material removed	N	%	0.1		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Description of Inert material removed	N		0		None	None	None	None	None
Anions									
Water Soluble Sulphate	M	mg/l	20		< 20	< 20	^ < 20	< 20	< 20
Miscellaneous									
pH	M	pH units	0.1		8.5	8.3	^ 8.6	8.4	8.3

Results Summary

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Report No.: 20-27144, issue number 1

ELAB Reference	197782
Customer Reference	
Sample ID	
Sample Type	SOIL
Sample Location	TP406
Sample Depth (m)	1.50
Sampling Date	06/02/2020

Determinand	Codes	Units	LOD	
Soil sample preparation parameters				
Moisture Content	N	%	0.1	16.2
Material removed	N	%	0.1	< 0.1
Description of Inert material removed	N		0	None
Anions				
Water Soluble Sulphate	M	mg/l	20	< 20
Miscellaneous				
pH	M	pH units	0.1	8.4

Method Summary

Report No.: 20-27144, issue number 1

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
pH	M	Air dried sample	21/02/2020	113	Electromeric
Water soluble anions	M	Air dried sample	21/02/2020	172	Ion Chromatography

Report Information

Report No.: 20-27144, issue number 1

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THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number:	20-27331
Issue:	1
Date of Issue:	09/03/2020
Contact:	Tony Gerrard
Customer Details:	CC Geotechnical Ltd Unit 1 & 2 Deltic Place Deltic Way Liverpool MersevsideL33 7BA
Quotation No:	Q14-00045
Order No:	Not Supplied
Customer Reference:	CCG-20-11469
Date Received:	03/03/2020
Date Approved:	09/03/2020
Details:	Land at Colomendy
Approved by:	

Tim Reeve, Quality Officer

Sample Summary

Report No.: 20-27331, issue number 1

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
198839	TP501 2.50	07/02/2020	03/03/2020	Silty clayey loam	
198840	TP503 1.50	07/02/2020	03/03/2020	Silty clayey loam	
198841	TP505 1.50	07/02/2020	03/03/2020	Silty clayey loam	
198842	TP507 2.00	07/02/2020	03/03/2020	Silty clayey loam	
198843	TP512 1.50	07/02/2020	03/03/2020	Silty clayey loam	
198844	TP516 0.50	07/02/2020	03/03/2020	Silty clayey loam	

Results Summary

Report No.: 20-27331, issue number 1

			ELAB Reference	198839	198840	198841
			Customer Reference			
			Sample ID			
			Sample Type	SOIL	SOIL	SOIL
			Sample Location	TP501	TP503	TP505
			Sample Depth (m)	2.50	1.50	1.50
			Sampling Date	07/02/2020	07/02/2020	07/02/2020
Determinand	**Codes**	**Units**	**LOD**			
Soil sample preparation parameters						
Material removed	N	%	0.1	< 0.1	< 0.1	< 0.1
Description of Inert material removed	N		0	None	None	None
Anions						
Water Soluble Sulphate	M	mg/l	20	< 20	< 20	< 20
Miscellaneous						
pH	M	pH units	0.1	8.6	8.4	8.5

Results Summary

Report No.: 20-27331, issue number 1

			ELAB Reference	198842	198843	198844
			Customer Reference			
			Sample ID			
			Sample Type	SOIL	SOIL	SOIL
			Sample Location	TP507	TP512	TP516
			Sample Depth (m)	2.00	1.50	0.50
			Sampling Date	07/02/2020	07/02/2020	07/02/2020
Determinand	**Codes**	**Units**	**LOD**			
Soil sample preparation parameters						
Material removed	N	%	0.1	< 0.1	< 0.1	< 0.1
Description of Inert material removed	N		0	None	None	None
Anions						
Water Soluble Sulphate	M	mg/l	20	< 20	< 20	< 20
Miscellaneous						
pH	M	pH units	0.1	8.6	8.5	8.3

Tests marked N are not UKAS accredited.

Method Summary

Report No.: 20-27331, issue number 1

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
pH	M	Air dried sample	05/03/2020	113	Electromeric
Water soluble anions	M	Air dried sample	04/03/2020	172	Ion Chromatography

Report Information

Report No.: 20-27331, issue number 1

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APPENDIX G: CURRENT GUIDEANCE & LEGISLATIONS

CURRENT CONTAMINATED LAND LEGISLATION / GUIDANCE & ENVIRONMENTAL RISK ASSESSMENT METHODOLOGY

LEGISLATION OVERVIEW

This report includes hazard identification and risk assessment in line with the risk-based methods referred to in relevant UK legislation and guidance. Government environmental policy is based upon a "suitable for use approach". When considering the current use of land, Part IIA of the Environment Protection Act 1990 (EPA 1990) provides the regulatory regime, which was introduced by Section 57 of the Environment Act 1995, which came into force in England on 1 April 2000. The main objective of introducing the Part IIA regime is to provide an improved system for the identification and remediation of land where contamination is causing unacceptable risks to human health or the wider environment given the current use and circumstances of the land.

Part IIA provides a statutory definition of contaminated land under Section 78A(2) as:

"any land which appears to the Local Authority in whose area it is situated to be in such a condition, by reason of substances in, on, or under the land, that:

(a) Significant harm is being caused or there is a significant possibility of such harm being caused;
or
(b) Pollution of controlled waters is being, or is likely to be, caused."

Part IIA provides a statutory definition of the pollution of controlled waters under Section 78A(9) as:

"the entry into controlled waters of any poisonous, noxious or polluting matter or any solid waste matter".

In order to assist in establishing if there is a "significant possibility of significant harm" there must be a "significant pollutant linkage" for potential harm to exist. That means there must be a source(s) of contamination, sensitive receptors present and a connection or pathway between the two. This combination of source-pathway-receptor is termed a "pollutant linkage or SPR linkage."

Part IIA of The Environmental Protection Act 1990 is supported by a substantial quantity of guidance and other Regulations, especially DEFRA Circular 01/2006 Contaminated Land (this replaces DETR Circular 02/2000). Part IIA defines the duties of Local Authorities in dealing with it. With the exception of situations of very high pollution risk, Part IIA places contaminated land responsibility on thee planning and redevelopment process. In situations where there is very high pollution risk direct action from the Local Authority is usually necessary. Planning Policy Statement 23 (PPS23) provides guidance on the planning process and requires that sites which have been developed shall not be capable of being determined "contaminated land" under Part IIA.

The criteria for assessing levels of pollutants and hence determining whether a site represents a hazard are based on a range of techniques, models and guidance. Within this context it is relevant to note that Government objectives are:

(a) to identify and remove unacceptable risks to human health and the environment;
(b) to seek to bring damaged land back into beneficial use;
(c) to seek to ensure that the cost burdens faced by individuals, companies and society as a whole are proportionate, manageable and economically sustainable.

These three objectives underlie the "suitable for use" approach to remediation of contaminated land. The "suitable for use" approach focuses on the risks caused by land contamination. The approach recognises that the risks presented by any given level of contamination will vary greatly according to the use of the land and a wide range of other factors, such as the underlying geology of the site. Risks therefore should be assessed on a site-by-site basis.

The "suitable for use" approach then consists of three elements:

(a) ensuring that land is suitable for its current use - in other words, identifying any land where contamination is causing unacceptable risks to human health and the environment, assessed on the basis of the current use and circumstances of the land, and returning such land to a condition where such risks no longer arise; the contaminated land regime provides the regulatory mechanisms to achieve this;

(b) ensuring that land is made suitable for any new use, as planning permission is given for that new use - in other words, assessing the potential risks from contamination, on the basis of the proposed future use and circumstances, before official permission is given for the development and, where necessary to avoid unacceptable risks to human health and the environment, remediating the land before the new use commences; this is the role of the town and country planning and building control regimes; and

(c) limiting requirements for remediation to the work necessary to prevent unacceptable risks to human health or the environment in relation to the current use or future use of the land for which planning permission is being sought - in other words, recognising that the risks from contaminated land can be satisfactory assessed only in the context of specific uses of the land (whether current or proposed), and that any attempt to guess what might be needed at some time in the future for other uses is likely to result either in premature work (thereby running the risk of distorting social, economic and environmental priorities) or in unnecessary work (thereby wasting resources).

The mere presence of pollutants does not therefore necessarily warrant action, and consideration must be given to the scale of risk involved for the current and proposed end use of the site.

RISK ASSESSMENT METHODOLOGY

Current practice recommends that the determination of potential liabilities that could arise from land contamination be carried out using the process of risk assessment, whereby "risk" is defined as:

"(a) The probability, or frequency, or occurrence of a defined hazard; and
(b) The magnitude (including the seriousness) of the consequences."

The UK's approach to the assessment of environmental risk is set out in by the Department of the Environment (2000) publication "A Guide to Risk Assessment and Risk Management for Environmental Protection." This established an iterative, systematic staged process which comprises:

(a) Hazard identification
(b) Hazard assessment
(c) Risk estimation
(d) Risk evaluation
(e) Risk Assessment

At each stage during the investigation process the above steps are repeated as more detailed information becomes available for the site.

CLR11- 'Model Procedures for the Management of Land Contamination', a document published by the Department for Environment, Food and Rural Affairs (DEFRA) and the Environment Agency (EA) outlines a tiered approach to the assessment of risks posed by contaminated land, as summarised hereunder:

Tier 1: Preliminary Risk Assessment

A Preliminary Risk Assessment is usually undertaken as part of a desk study, outlines potential risks posed by potential contamination to all receptors by defining plausible "pollution linkages" and developing a preliminary conceptual model (PCM). The purpose of this model is to define all possible complete pollution linkages, where the requisite source – pathway – target elements are present, and these elements being defined as:

- a contaminant (source) is a hazardous substance or agent, present at levels that have the potential to cause harm or damage a receptor
- a pathway is the means by or through which a contaminant comes into contact with, or otherwise affects, the receptor
- a receptor (target) is an entity (human being, aquatic environment, flora and fauna etc) that is vulnerable to the adverse effects of the contaminant

This relationship is termed a "pollution linkage". It should be recognised that for a health or environmental risk to exist, all three elements of the relationship or linkage must be present, i.e.

- if there is no contaminant, or contaminant present at levels below those considered to be harmful or damaging to a receptor, then there can be no adverse effect on a receptor
- if there is no receptor present that can be adversely affected by a contaminant, no harm or damage can arise
- even where both a contaminant and a receptor are present, no harm or damage will occur if there is no pathway by or through which a linkage between the two can be established

The absence of one or more of each component (source, pathway, receptor) would prevent a pollutant linkage being established and there would be no significant environmental risk.

The PCM is subject to continual refinement as additional data becomes available. As part of a Phase I Investigation (Desk Study and site walk over) a PCM is formed. Based on the PCM, potential pollutant linkages can be assessed. If the PCM and hazard assessment indicate that a pollution linkage is not of significance then no further assessment or action is required due to this linkage. For each significant and possible linkage a risk assessment is carried out. The linkages which potentially pose significant risks may require a variety of responses ranging from immediate remedial action or risk management or, more commonly, further investigation and risk assessment. This next stage is usually termed a Phase II Main Site Investigation and should provide additional data to allow refinement of the PCM and assess the level of risk from each pollutant linkage. Risk assessment will usually include Tier 2 Generic Quantitative Risk Assessment and / or, if necessary, a Tier 3 Detailed Quantitative Risk Assessment.

Tier 2: Generic Quantitative Risk Assessment (GQRA)

GQRA requires an intrusive investigation in order to characterise the site assisting in the re-assessment of the source-pathway receptor linkage. The conceptual model should be refined accordingly.

Upon completion of an intrusive investigation a it must be decided whether Generic Assessment Criteria (GAC) are suitable for assessing the risk posed by potential contaminantion at the site. If GAC are deemed unacceptable for risk assessment purposes or cannot be developed a Tier 3 Detailed Quantitative Risk Assessment (DQRA) is required.

If GQRA reveals that unnacceptable risks are not present then no further action is required. If GQRA identifies a possibility of risk, a decision must be made whether further work is required or necessary for the purposes of risk assessment. If further risk assessment is is deemed not suitable not required an Options Appraisal should be undertaken. If further risk assessment is required, the scope nature of further risk assessment must be decided – it is possible that a Tier 3 DQRA will be undertaken in this scenario.

Where the Environment Agency have published an SGV for a contaminant, this will be used in lieu, if the SGV is suitable for the subject site, of the GAC derived by *CC GEOTECHNICAL LTD.* For contaminants where an SGV has not been published

and a GAC has been published by LQM, then this GAC will be used. In house derived GAC's will only be used for contaminants where there is no SGV or LQM GAC.

Tier 3: Detailed Quantitative Risk Assessment (DQRA)
DQRA is used when pollutant linkages require further assessment. DQRA is often undertaken for pollutant linkages where GAC are unavailable or inappropriate for or more conservative than the actual circumstances of the site. Site specific data is used to create Site Specific Assessment Criteria (SSAC) and enable a more accurate assessment of the risks. Further investigation may or may not be required to formulate SSAC depending on the site specific conditions and information alrerady obtained.

If DQRA reveals that unnacceptable risks are not present then no further action is required. If DQRA identifies a possibility of risk, a decision must be made whether further work is required or necessary for the purposes of risk assessment. If further risk assessment is is deemed not suitable not required an Options Appraisal should be undertaken. If further risk assessment is required, the scope and nature of further risk assessment must be decided at this point.

NOTE: A Tier 1 Preliminary Risk Assessment is undertaken as part of a Desk Study Report and a Preliminary Conceptual Model is devloped for all pollutant linkages. However, the methodologies for assessing the risks to human health, risks to controlled waters and risk posed by ground gas using quantative techniques vary considerably, therefore GQRA and DQRA for human health, controlled waters and ground gas must be undertaken seperately. The risk assessment methodologies where quantative assessment is used for risks to human health, risks to controlled waters and risks posed by ground gas, if relevant, are described hereunder.

BACKGROUND INFROMATION, CURRENT GUIDANCE AND RISK ASSESSMENT METHODOLOGY FOR RISKS POSED TO HUMAN HEALTH

Background
In March 2002, the Department for Environment, Food and Rural Affairs (DEFRA) and the EA published the Contaminated Land Exposure Assessment (CLEA) Model and a series of related reports. These were designed to provide a scientifically based framework for the assessment of chronic risks to human health from contaminated land. These reports (CLR7-10) together with associated "SGV" documents have since been withdrawn (August 2008) and the following documents have been published as revised guidance to the CLEA assessment:

- Environment Agency : 2008: Updated Technical Background to the CLEA model Science Report SC050021/SR3
- Environment Agency : 2008: Human Health Toxicological Assessment of Contaminants in Soil SC050021/SR2

Additional guidance on statistical assessment replacing CLR 7 is provided in:

- CL:AIRE :2008 Guidance on Comparing Data With a Critical Concentration

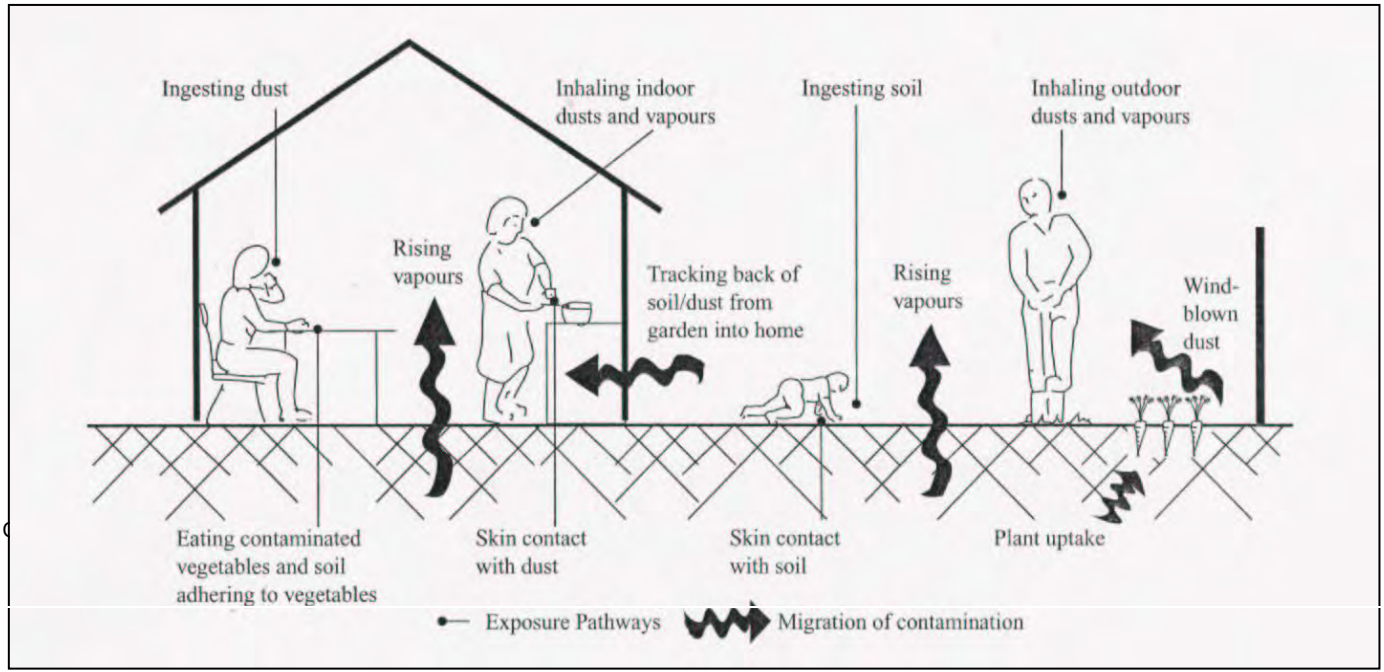
Other guidance/software used in spatial / statistical assessment is provided in:

- USEPA 2006: Data Quality Assessment: Statistical Methods for Practitioners
- Spatial Analysis and Decision Assistance (SADA) – The University of Tennessee

A different approach to the statistical appraisal of data is required depending on whether the assessment of risk is to assess whether land is Contaminated Land in accordance with regulations, or whether the assessment is to determine whether the site is suitable for new development in according with Planning guidance. This is discussed further in CL:AIRE :2008 "Guidance on Comparing Data With a Critical Concentration".

A program for the derivation of GAC`s based on the above guidance is provided by the Environment Agency and is entitled "CLEA Software Version 1.06".

The CLEA model has been developed to calculate an estimated tolerable daily soil intake (TDSI) for site users given a set 'default' exposure pathways. Ten human exposure pathways are covered in the CLEA model as presented below:



Ingestion
- ingestion of outdoor soil
- ingestion of indoor dust
- ingestion of home grown produce
- ingestion of soil attached to home grown produce

Dermal Contact
- dermal contact with outdoor soil
- dermal contact with indoor dust

Inhalation
- inhalation of outdoor dust
- inhalation of indoor dust
- inhalation of outdoor soil vapour
- inhalation of indoor soil vapour

It should be noted that there are other potential exposure pathways on some sites not included in the CLEA model e.g. certain organic compounds can pass through plastic water pipes into drinking water supply.

Where contaminated water is present at a depth less than 2.00mbgl and there is a potential risk of inhalation of vapours (only when volatile compounds are present) the risk from inhalation of vapours from soil water will be assessed using a UK compliant version of BP Risc v4.02.

The presence and/or significance of each of the above exposure pathways are dependent on the type of land use being considered and the nature of the contaminant under scrutiny. Accordingly, the CLEA model considers for principle 'default' land use types and makes a series of 'default' assumptions with regard to human exposure frequency, duration and critical human target groups for each land use considered:

- residential
- allotments
- commercial / industrial land use

The above land use categories defined in the CLEA are detailed below:

Residential: This generic scenario assumes a typical residential property consisting of a two-storey house built on a ground-bearing slab with a private garden consisting of lawn, flowerbeds, and a small fruit and vegetable patch. The occupants are assumed to be parents with young children, who make regular use of the garden area.

Allotments: This generic scenario assumes a plot of open space (about 250 m2), commonly made available by the local authority to tenants to grow fruit and vegetables for their own consumption. There are usually several plots to a site and the overall site area may cover more than a hectare. The tenants are assumed to be parents or grandparents and that young children make occasional accompanied visits to the plot.

Commercial/Industrial: There are many different kinds of workplace and work-related activities. This generic scenario assumes a typical commercial or light industrial property consisting of a threestorey building at which employees spend most time indoors and are involved in officebased or relatively light physical work.

Human Health Risk Assessment Methodolgy
Assessment of risk for the protection of human health is undertaken using the methodology as outlined previously, and summarised hereunder:

- Tier 1 Preliminary Risk Assessmnent
- Tier 2 Generic Quantitative Risk Assessment
- Tier 3 Detailed Quantitative Risk Assessment

The Tier 1 Preliminary Risk Assessment is undertaken as part of the desk study report and includes the development of a Preliminary Conceptuel Model. Tier 2 and Tier 3 Quantitative Risk Assessments are undertaken in order to develop and refine the Preliminary Conceptual Model aiding a more detailed assessment of the risk posed by contaminants revelaed by site investigation and soil / soil water chemical analyses.

The methods used by *CC GEOTECHNICAL LTD* to derive assessment criteria, to statistically analyse chemical data and to compare chemical data to the derived assessment criteria are discussed herunder.

Derivation of Generic Assessment Criteria (GAC) and Site Specific Assessment Criteria (SSAC)
GAC`s are derived on the basis of the proposed land use and the associated applicable exposure pathways. It should be noted that there are difficulties in establishing soil concentrations of contaminants beyond which risks from exposure to these contaminants would be 'unacceptable' and the GAC value does not necessarily equate to the level for "significant possibility of significant harm" as defined in Part IIA of The Environmental Protection Act (1990) to determine whether land is "contaminated." This ultimately requires detailed 'toxicological' information of the health effects of individual contaminants and also a scientific judgement on what constitutes an 'unacceptable' risk. The primary purpose of the CLEA derived GAC's are as 'minimal risk thresholds' for the assessment of human health risks in relation to land use.

Minimal risk thresholds calculated using generic input parameters for each of the above land uses are termed Generic Assessment Criteria (GAC) and are used for Generic Quanatative Risk Assessment (GQRA). However, further assessment may be required taking into consideration site specific factors such as the way the land is used, the soil type, the building

characteristics and the exact nature of the receptor, to determine whether there is a significant possibility of risk to human health to site users. Such an assessment is known as a Detailed Quantitative Risk Assessment (DQRA) and the resultant threshold concentrations are known as Site Specific Assessment Criteria (SSAC). Such assessments should be conducted with the agreement of the local authority (or the Environment Agency) since it is the authority that determines whether land is Contaminated Land or whether Planning Permission for a new development may be granted.

For the purposes of this report, assessment criteria have been derived in accordance with current guidance based on the conceptual model for the proposed land use using the CLEA v1.06 software. These criteria are not intended to indicate whether the site may be contaminated land nor do they replace any published soil guideline values. However, the values are intended to provide guidance for the local authority on whether the site may be considered uncontaminated. If, based on the site's proposed future use, the site would be considered by the local authority to be uncontaminated and therefore, on the basis of soil concentrations, fit for purpose, then no further risk assessment based on soil concentrations and the risk to human health would be necessary. However, should these criteria be exceeded or the conceptual site model vary from the model used in the risk assessment to derive these values then the risk assessment should be updated accordingly.

For contaminants routinely analysed where inhalation is a significant pathway (naphthalene, phenanthrene, Aromatic EC5-EC7, Aromatic EC7-EC8, Aromatic EC8-EC10, Aromatci EC10-EC12, Aromatic EC12-EC16, Aliphatic EC5-EC6, Aliphatic EC8_EC10, Aliphatic EC10-EC12, Aliphatic EC12-EC16), plots of the GAC as a function of Soil Organic Matter (SOM) are used to determine if they pose a potential risk to human health, which are presented hereunder. Where there is an exceedance further assessment may be undertaken.

Statistical Assessment of Soil Contamination Data & Comparison of Contamination Data to Threshold Values

In any site investigation only a small fraction of the soil on the site is analysed. Therefore the mean derived from the contamination data for a contaminant may not be the same as the true mean for the contaminant distribution on the site. To improve the reliability of any assessment a statistical analyses is undertaken in line with the CL:AIRE document "Guidance on Comparing Soil Contamination Data with a Critical Concentration".

Statistical assessment of soil data is undertaken using programs based on the guidance in the CL:AIRE document or the USEPA software ProUCL v4.0.

Where the number of results in a dataset is less than four, a statistical assessment is not undertaken, and the assessment is performed by comparison of the maximum value(s) with a Health Criteria Value (HCV), such as Generic Assessement Criteria value(s).

For the Planning situation, the regulator needs to check whether the concentration of contaminants is low compared to the HCV. This decision is based on whether there is at least a 95% confidence level that the true mean of the dataset is lower than the HCV.

For the Part IIA scenario the regulator needs to determine whether the concentration of contaminants is greater than the HCV. This decision is based on whether there is at least a 95% confidence level that the true mean of the dataset is higher than the HCV. However, the regulator may proceed with determination if there is just a 51% probability, "on the balance of probabilities".

The Outlier Test used in the statistical assessment may not be able identify separate populations if numerous populations are present. Inorder to ensure that this is not the case a spatial assessment of the data will be undertaken using SADA.

If the screening levels are exceeded then more sophisticated quantitative risk assessment or remedial action may be undertaken. The benefits of undertaking a quantitative risk assessment must be weighed against the likelihood that it will bring about cost savings in the proposed remediation.

BACKGROUND INFORMATION, CURRENT GUIDANCE AND RISK ASSESSMENT METHODOLOGY FOR RISKS POSED TO CONTROLLED WATER

Definition of Controlled Waters

The term 'controlled waters' is defined in Section 104 of the Water Resources Act 1991 as:

"*Territorial Waters…which extend seawards for three miles…, coastal waters…, inland freshwaters, waters in any relevant lake or pond or of so much of any relevant river or watercourse as is above the freshwater limit, and ground waters, that is to say, any waters contained in underground strata.*"

Note that the definition of groundwater under the Water Resources Act 1991 includes all water within underground strata (including soil / pore water in the unsaturated zone). The definition of groundwater under the Groundwater Directive however is limited to water in the saturated zone. For the purposes of Part IIA of the Environmental Protection Act 1990, the Environment Agency recommends that the groundwater within the saturated zone only is considered as the receptor (rather than soil / pore water).

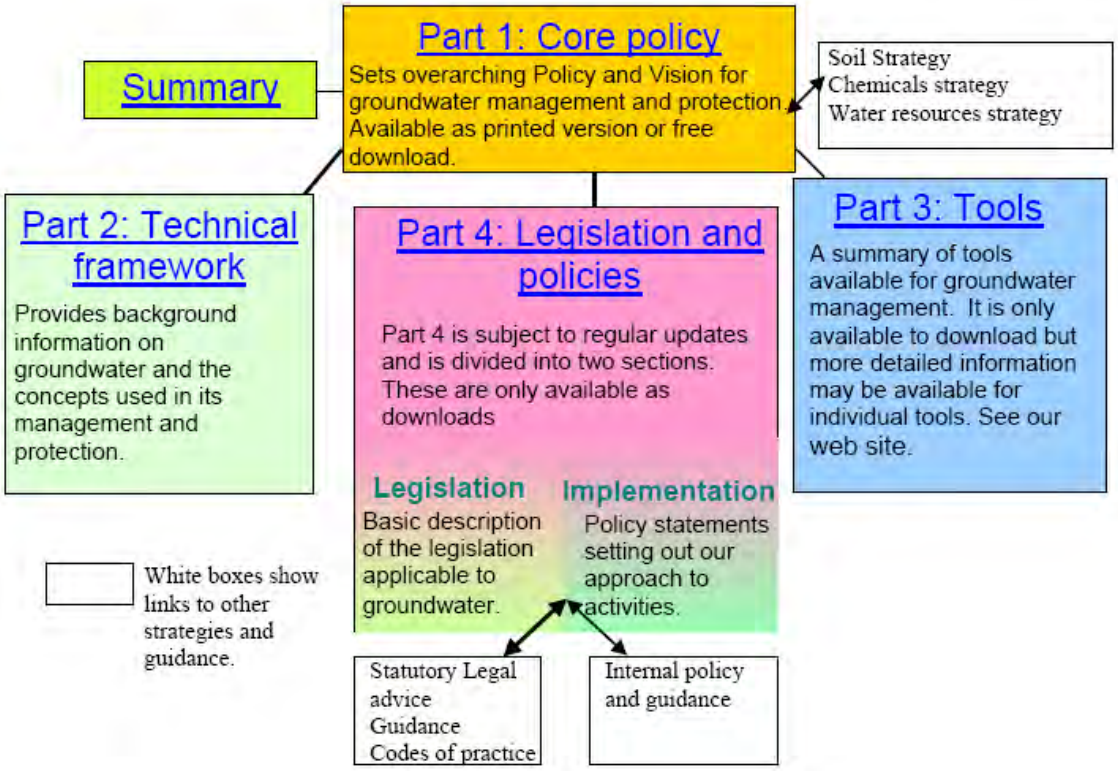
Environment Agency Guidance

Legislation and guidance surrounding the protection of controlled waters in the UK is abundant and can be complex. The Environment Agency's overall position on groundwater is "*To protect and manage groundwater resources for present and future generation in ways that are appropriate for the risks that we identify*" (Groundwater Protection : Policy and Practice GP3, 2006). In brief, the core objectives of the existing legislation serve to enforce this position.

In 1992, the National Rivers Authority published their Policy and Practice for the Protection of Groundwater (PPPG), this document was influential as it provided a focus for key developments such as Source Protection Zones (SPZs) and

Groundwater Vulnerability Maps. The Policy was then revised in 1998, since which there have been substantial changes in legislation, driven by Europe. Key European Directives relating to groundwater include the Groundwater Directive (80/68/EEC) and the Water Framework Directive (2000/60/EC). Aspects of these directives are controlled by primary UK legislation such as the Water Resources Act 1991. Further to legislative changes, gaps identified in the 1998 PPPG required addressing. These changes are reflected in the forthcoming Environment Agency Policy document entitled *Groundwater Protection : Policy and Practice (GP3)*, a draft version of which was available for public consultation (Parts 1 to 3) ending July 2006 with Part 4 issued in March 2008. Part 4 includes a section on key groundwater legislation and the Environment Agency's interpretation of it.

The following gives a breakdown of the structure of the document (taken from the Environment Agency GP3 draft consultation document, 2006)



Controlled Water Risk Assessment Methodology

The risk posed to controlled water is assessed by *CC GEOTECHNICAL* in accordance with current guidance as outlined hereunder.

In order for a developer of a potentially contaminated site to fulfil their obligations under the legislation, a site assessment would be required to be undertaken in order to identify any potential risks to controlled waters and to derive suitable clean-up criteria if necessary to ensure the protection of controlled waters. The general approach for Groundwater Protection is detailed further in Part 3 of GP3.

When assessing groundwater impact the Environment Agency advocate the application of their framework methodology "Remedial Targets Methodology – Hydrogeological Risk Assessment for Land Contamination" Environment Agency (2006). The methodology has four levels of assessment as described below:

- Level 1 considers whether contaminant concentrations in "pore water" in contaminated soil are sufficient to impact on the receptor, ignoring dilution, dispersion and attenuation along the pathway. The "pore water" concentration is determined from:

  i) measured "pore water" concentrations or perched water quality
  ii) soil leaching tests
  iii) theoretical calculations based on soil/water partitioning equations

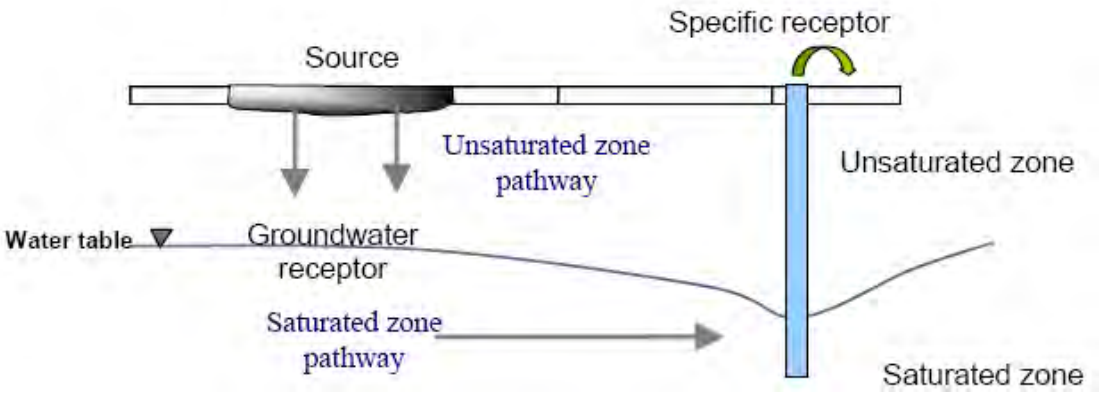
- Level 2 considers dilution by the receiving groundwater or surface water body and whether this is sufficient to reduce contaminant concentrations to acceptable levels. The remedial target is defined as the target concentration multiplied by a dilution factor (DF).

- Levels 3 and 4 consider whether natural attenuation (including dispersion, retardation and degradation) of the contaminant as it moves through the unsaturated and saturated zones to the receptor are sufficient to reduce contaminant concentrations to acceptable levels. The remedial target is defined as target concentration multiplied by a dilution factor (DF) and attenuation factor (AF). In Level 3 simple analytical models are used to calculate the significance of attenuation. The Environment Agency has released a "Remedial targets worksheet v3.1" to carry out basic calculations using a conservative approach up to Level 3 using basic principles assuming a simple migration of contaminants from the

source zone into the aquifer receptor. Level 4 assessment uses more sophisticated numerical models, and allows for the introduction of additional geological horizons and is used mainly to determine whether soil contaminants will reach their target within a specified timeframe. Use of such software should only be used once agreement has been obtained from the Environment Agency.

Three main stages apply to any risk assessment of controlled waters, these are:

1. Risk Screening (Tier 1 Preliminary Risk Assessment): The understanding of the Conceptual Site Model (CSM) is the key to assessing any site. Using a robust CSM, potential pathways or receptors may be screened out from any further assessment at an early stage. For example if the pathway through the unsaturated zone is blocked by the presence of a significant thickness of low permeability clay. A greater understanding of the CSM is achieved with each tier of risk assessment. An example of a basic CSM is given below (taken from the Environment Agency GP3 draft consultation document, 2006):



2. Generic Hydrogeological Risk Assessment (EA Remedial Targets Methodology Level 1): When undertaking the Generic Hydrogeological Risk Assessment (EA Remedial Targets Methodology Tier 1), comparison of chemical analytical results is made with screening criteria. Published values of screening criteria with which chemical test results can be compared are published in the following guidance:

   - Water Supply (Water Quality) Regulations 2000
   - The Private Water Supplies Regulations 1991
   - Environmental Quality Standards for surface waters based on The EC Dangerous Substnaces Directive (76/464/EEC and Daughter Directives)
   - The Surface Waters(Abstraction for Drinking Water Classification) Reguslations 1996
   - World Health Organisation Drinking Water Standards 2004

   Should the Level 1 assessment indicate threshold levels to be exceeded, then there are three alternative ways in which to proceed:

   - To devise suitable remedial solutions
   - To carry out more investigation, sampling and analysis
   - To conduct a site specific Detailed Quantitative Risk Assessment (DQRA) to determine determine if the materials are suitable for thair proposed use, or devise site specific clean-up level

3. Detailed Quantitative Risk Assessment (EA Remedial Targets Methodology Levels 2 to 4): The decision to carry out a DQRA will be dependant on the extent and implications of the initial qualitative and generic assessment. The scope of any such assessment will be accurately defined by the outcomes of the previous levels of assessment. The conceptual model will be sufficiently refined by this stage that only certain contaminants of concern, certain pathways and certain receptors will require further assessment, the remainder having been screened out.

   Additional site specific data is normally required for this stage of assessment, as explained above, more processes that are capable of affecting contaminant concentrations are considered (such as dilution and attenuation).

   Remediation criteria, if derived, will therefore be specific to each site and will be based on a detailed assessment of the potential impact at the identified receptor or *compliance point*. A greater level of confidence can be placed on the predicted impact on the compliance point following a DQRA.

BACKGROUND INFORMATION, CURRENT GUIDANCE AND RISK ASSESSMENT METHODOLOGY FOR RISKS POSED BY GROUND GAS

Background

Origin of Ground and Landfill Gases

When carrying out a ground gas risk assessment, the origin or source of the gases is important as potential risks will vary depending on the source. This Appendix relates to the risk of the two main ground gases of concern; methane and carbon dioxide, and does not apply to other ground gases (e.g. radon or vapours from hydrocarbon spills). Methane and carbon dioxide are major constituents of landfill gas but can also occur from a variety of anthropogenic and natural sources, as summarised in Table 5 below:

Gas	Source	Comments
Landfill Gas	Anaerobic decomposition of degradable waste within landfill sites. Typically 60% methane and 40% carbon dioxide during methanogenic phase.	Composition varies over time, particularly in early stages. Contains a range of minor constituents (particularly carbon monoxide and hydrogen sulphide).
Landfill Associated Gases	- Anaerobic degradation of leachate external to the site; - Degassing of dissolved gases in groundwater; - Evolution of gases following interaction between leachate and groundwater	Can result in secondary (external) production of methane or carbon dioxide.
Made Ground	Anaerobic degradation of organic components	Very variable depending on source
Sewer Gas, Cess Pits	Anaerobic degradation of organic components of sewage producing methane and carbon dioxide.	Often characterised by hydrogen sulphide odour.
Mains Gas	Leakage from underground pipework or storage tanks. Mainly methane but often contains higher alkanes.	An odouriser is added to permit detection of leaks. Typically 90% CH_4, but 1 to 27% C_2-C_4 alkanes, May also contain other trace gases e.g. CO, helium and CO_2 (from degradation of CH_4 in the ground).
Other Anthropogenic Sources	- Degradation of leaked or spilled hydrocarbons or other industrial chemicals; - Anaerobic degradation of organic contaminants in groundwaters (e.g. silage liquor); - Reactions between monitoring well construction components and environment; - Burial grounds/cemeteries.	Hydrocarbon spillages often have an 'oily' odour. Fuel spillages common – Petrol or Diesel and can contain a wide range of VOC's. Can degrade to produce methane / carbon dioxide.
Alluvium / Marsh / Peat Gas	Anaerobic microbial degradation of organic material (usually waterlogged vegetation / peat). Often associated with the presence of alluvial deposits or dredgings.	
Geogenic Gas	Natural seepages of carbon dioxide and hydrocarbon gases derived from geologic sources such as coal seams and deep oil / gas source formations. Can be present in solution in groundwaters.	Methane most common but can contain carbon dioxide and higher alkanes.
Mine Gases	Various types. Most common is "fire damp" with high methane, produced by the desorption of gas trapped in coal. "Black damp" (Stythe gas) with high carbon dioxide and denser than air. "White damp" is high in carbon monoxide.	Methane most common. Can contain higher alkanes, carbon dioxide and carbon monoxide. Often low in oxygen.
Natural Shallow Ground Gas	Various types - high carbon dioxide formed by subsurface aerobic activity leading to depleted oxygen and elevated carbon dioxide; - chemical degradation of rocks (e.g. carbonates) producing carbon dioxide; - carbon dioxide production in root zone of soils by plants.	Gases can be emitted from ground under falling barometric pressure conditions.

Table 5. Potential Sources of Ground Gases

This Appendix does not provide guidance for the assessment of risk when other gases are present due to 'Other Sources' from the above table (particularly organic compounds such as BTEX and VOC's or for the risk from radon or hydrogen sulphide).

To determine the origin of the gas a range of factors must be considered together, including;

1. Proximity of likely sources
2. Ground conditions (geology, hydrogeology, anthropogenic pathways etc)
3. Properties of gases present including:
   - Chemical composition
   - Physical properties
   - Ratios of components e.g. methane : carbon dioxide
4. Timeframe of activities such as infilling periods, capping works, installation of gas control systems etc

Identification of the originating source may be problematic given that there may be more than one source present and trace gas analysis may be required. Identification of the sources of the gases encountered during monitoring is usually carried out through a process of eliminating the most unlikely potential sources (given the site setting) and selecting those which are most likely.

Hazards Associated with Presence of Methane

Methane gas is combustible and potentially explosive. When the concentration of methane in air is between the limits of 5.0%v/v and 15.0%v/v an explosive mixture is formed. The Lower Explosive Limit (LEL) of methane is 5.0%v/v, which is equivalent to 100% LEL. The 15.0%v/v limit is known as the Upper Explosive Limit (UEL), but concentrations above this level cannot be assumed to represent safe concentrations. Further, the LEL and UEL will vary (up and down) depending upon the proportion of other gases (including oxygen). However, the fact that methane is a colourless, odourless gas means that there

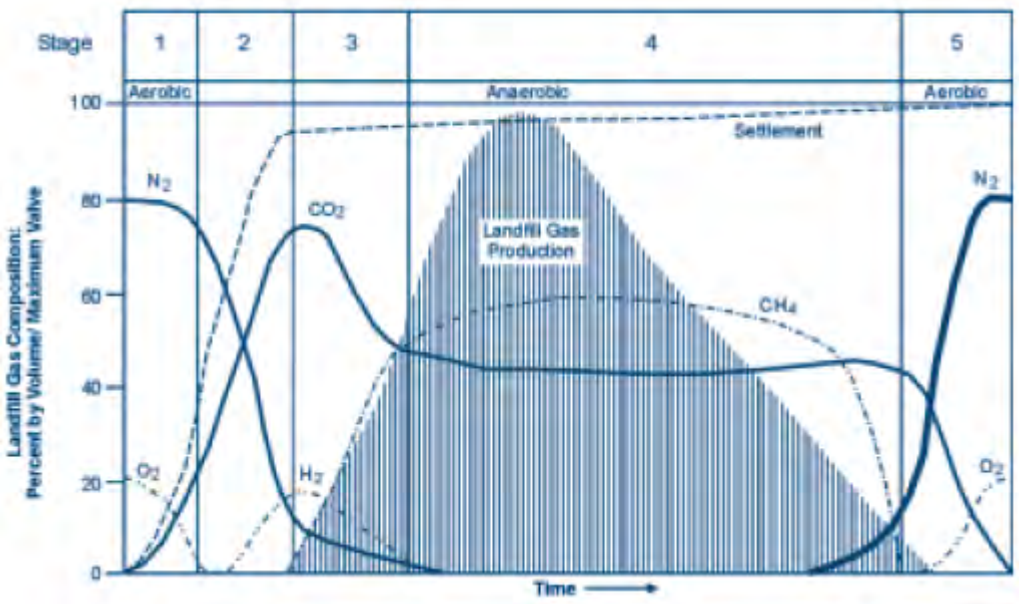
is no simple indicator of the presence of the gas until such a time as explosive limits are reached and an incident occurs. Methane is lighter than air and has a low toxicity. However, at high concentrations it can result in asphyxiation due to oxygen displacement.

Hazards Associated with Presence of Carbon Dioxide

Carbon dioxide is a colourless, odourless gas, which, although non-flammable, is both toxic and an asphyxiant. As carbon dioxide is denser than air, it will collect in low points and depressions. The UK Health & Safety Executive (HSE) has published information relating to concentrations of carbon dioxide that humans may be exposed to, which uses concentrations contained in the Control of Substances Hazardous to Health Regulations 2002 (as amended). These are the Long Term Occupational Exposure Limit (LTOEL, 8 hour period) and the Short Term Occupational Exposure Limit (STOEL, 15 minute period), which are 0.5% and 1.5% carbon dioxide, respectively.

Parameters Influencing the Rate of Ground Gas Production

The figure below is taken from EA guidance document LFTGN 03 illustrates typical ground gas generation curves from biodegradable materials:



The production of methane and carbon dioxide at a landfill site may be expected to be considerable and ongoing. Concentrations of methane will eventually decrease, followed by concentrations of carbon dioxide, but the duration and rate of gas production can vary markedly between sites. Five distinct phases of gas production occur during the process which are, in order of event as marked above, as follows:

1. An aerobic phase involving oxygen depletion and temperature increase through aerobic respiration;
2. The establishment of anaerobic conditions and the evolution of carbon dioxide and hydrogen through acidogenic activity;
3. Commencement of methanogenic activity; the establishment of populations of methanogenic bacteria;
4. A phase of stable methanogenic activity, which may go on for many tens of years;
5. A phase of decreasing methanogenic activity, representing depletion of the organic material and a return to aerobic conditions.

The time scale for the return to the normal ground gas concentrations will be highly variable, depending upon the types and quantities of materials present. In addition, the optimum parameters influencing the rate of decomposition and ground gas production within the ground at a site are as follows:

- High water content with adequate rainfall and water infiltration to provide moisture content between approximately 20 to 26%;
- Conditions that either are or are very close to anaerobic;
- High proportion of biodegradable materials;
- A pH between 6.5 and 8.5, ideally verging slightly on the acidic between pH 6 to 7;
- Temperature between 25°C and 55°C;
- The ratio of the biochemical and chemical oxygen demands (BOD:COD);
- High permeability;
- Small particle size, as finer subsurface materials possess a greater surface area to provide a growing 'face' for the micro-organisms but high fines levels reduces permeability and reduces decomposition rate.

For this reason, it is vital that sources of methane and carbon dioxide are identified prior to the commencement of any work on a construction site, and that the ground gas regime is characterised at the worst temporal conditions a site may experience. From this, a risk assessment is carried out to identify the risk at the site from ground gases so that suitable protection measures can be designed and incorporated into a development to prevent a dangerous build-up of gas occurring.

Factors Influencing the Migration and Behaviour of Ground Gases

CD37d

There are many factors that influence the migration of ground gases which can effect the risk from a gassing source:

- driving force – pressure differential along a pathway, diffusion and dissolved in solution;
- meteorological conditions – short term and seasonal conditions including atmospheric pressure changes (e.g. rapidly falling pressure causes gas to expand increasing emission rates), rainfall, frozen ground and thawing, temperature;
- geological and groundwater conditions – these can have the over riding influence on the direction/pathways and quantity of migrating gas;
- anthropogenic influences – man-made pathways include mine shafts, service runs/drains, foundation piles, underground voids/pits/basements, foundation/building design/construction

Current Guidance

Previous versions of Building Regulations Approved Document C provided statutory guidance stating that consideration should be given to appropriate action and / or specific solutions in situations where methane concentration exceeded 1%v/v or carbon dioxide concentrations exceeded 5%v/v. The latest Building Regulations Approved Document C (DoE 2004) no longer endorses this approach and recommends the use of a risk based approach to interpreting a gas monitoring survey. This is in line with current EA guidance for landfill gas (LFTGN 03, 2004) which recommends the use of a structured risk based approach similar to that outlined in CLR 11. On this basis, recent guidance has been produced in 2006 and 2007 with the aim of providing up to date advice in relation to residential and commercial development. The guidance does not address issues associated with gas derived from landfills, for this refer to *"Guidance on the Management of Landfill Gas"* (Environment Agency 2004) for an overview.

Recent guidance relevant to gas assessments for residential and commercial development includes;

- Wilson *et al.* (CIRIA C665, December 2007) ***"Assessing Risks Posed by Hazardous Ground Gases for Buildings."***
  This document provides up to date advice on all aspects of ground gas risk assessment such as investigation, monitoring programmes, data collection and interpretation. The guidance presents separate methodologies for the characterisation of:
  - All development types except low rise housing with gardens (Situation A)
  - Low rise housing with gardens (Situation B)

- Boyle and Witherington (NHBC / RSK Group, Report 10627-R01(04) January 2007) ***"Guidance on the Evaluation of Development Proposals on Sites where Methane and Carbon Dioxide are Present."***
  This document presents the "Traffic Lights System" detailed below and is relevant only for low rise properties (e.g. bungalows and town houses) that have a ventilated sub-floor void (i.e. Situation B as described in CIRIA C665).

- British Standard (BS 8485, December 2007) ***"Code of Practice for the Characterization and Remediation from Ground Gas in Affected Developments"***
  This document provides an overview of gas characterisation and assessment. The Standard is intended to be used by designers of gas protection measures and regulators involved in the assessment of design solutions.

Further guidance, Wilson and Card (CIEH) ***"Ground Gas Handbook for Designers and Regulators"*** providing practical guidance on ground gas assesments and the design and evaluation of protection measures, is expected to be published in March 2009.

Each of these documents continues to highlight the importance of, and give further guidance towards, carrying out a tiered risk-based decision-making process in accord with government policy on dealing with contamination from historic or natural sources and highlight the importance of the Conceptual Model in site characterisation.

Ground Gas Risk Assessment Methodology

Assessment of risk posed by ground gas is undertaken using the methodology as outlined previously, and summarised hereunder:

- Tier 1 Preliminary Risk Assessmnent
- Tier 2 Generic Quantitative Risk Assessment
- Tier 3 Detailed Quantitative Risk Assessment

The methodology used in each of the above assessments with concern to ground gas is discussed hereunder.

<u>Tier 1 Preliminary Risk Assessment</u>

All potential sources of methane and carbon dioxide are identified in the Preliminary Conceptual Model and the generation potential determined. The background information discussed earlier is referred to in order to determine the potential for a source to generate ground gas.

CIRIA C665 provides idealised monitoring frequency / period dependant upon generation potential of gas source and sensitivity of the proposed land use as below:

Idealised Frequency and Period of Monitoring (after Table 5.5a and 5.5b, CIRIA C665)

		Generation Potential of Source				
		Very Low	Low	Moderate	High	Very High
Sensitivity of Development	Low (Commercial)	4/1	6/2	6/3	12/6	12/12
	Moderate (Flats)	6/2	6/3	9/6	12/12	24/24
	High (Residential with Gardens)	6/3	9/6	12/6	24/12	24/24

Notes
1. First number is the number of readings and the second is the minimum period in months (e.g. 6/2 – six sets of readings over two months).
2. At least two sets of readings must be at low (preferably under 1,000 mb) and falling pressure.

The monitoring programme is decided using the above table prior to the intrusive site investigation. However, if the intrusive investigation reveals that a the potential source is better or worse than anticipated the monitoring programme should be modified accordingly. For example, if the made ground contains no evidence of organic material and comprises entirely granular brick fill, the potential for that made ground to generate ground gas is reduced considerably.

Tier 2 Generic Quantitative Risk Assessment
Generic Quantitiative Risk Assessment is undertaken upon completion of the required gas monitoring period.

All three current guidance documents propose that both ground gas concentrations and flow rates are used to calculate the limiting gas well gas volume flow rates for methane and carbon dioxide, based on the ground gas conditions monitored for during the worse-case temporal conditions. This limiting gas well volume flow rate is termed the Gas Screening Value (GSV, note that this was termed borehole gas volume flow), and is calculated as follows:

$$GSV\ (l/hr) = \frac{[\text{gas well gas concentration } (\%v/v)] \times [\text{gas well flow rate } (l/hr)]}{100}$$

GSV's are compared to typical max concentrations and limiting gas screening values derived for either Situation A - All development except low rise housing with gardens, or Situation B low rise housing with gardens (NHBC Traffic Light System). Table 8.5 from CIRIA C665 is used for comparison of gas screening values for "Situation A Developments" and is presented hereunder:

Characteristic Situation (CIRIA R149)	Comparable Partners in Technology gas Regime (see Box 8.2)	Risk Classification	Gas Screening Value (CH_4 or CO_2) $(l/hr)^1$	Additional Factors	Typical Source of Generation
1	A	Very low risk	<0.07	Typically methane ≤ 1% and/or carbon dioxide ≤ 5%. Otherwise consider increase to Situation 2	Natural soils with low organic content "Typical" made ground
2	B	Low risk	<0.7	Borehole air flow rate not to exceed 70l/hr. Otherwise consider increase to characteristic Situation 3	Natural soil, high peat/organic content. "Typical" made ground
3	C	Moderate risk	<3.5		Old landfill, inert waste, mineworking flooded
4	D	Moderate to high risk	<15	Quantitative risk assessment required to evaluate scope of protective measures.	Mineworking susceptible to flooding, completed landfill (WMP 26B criteria)
5	E	High risk	<70		Mineworking unflooded inactive with shallow workings near surface
6	F	Very high risk	>70		Recent landfill site

Table 8.5 from CIRIA C665 Modified Wilson and Card Classification

Table 8.7 is used for comparison of gas screening values for "Situation B Developments" and is presented herunder:

Traffic Light	Methane[1]		Carbon Dioxide[2]	
	Typical max concentration[3] (% by volume)	Gas screening value[2,4] (litres/hour)	Typical max concentration[3] (% by volume)	Gas screening value[2,4] (litres/hour)
Green				
Amber 1	1	0.13	5	0.78
Amber 2	5	0.63	10	1.60
Red	20	1.60	30	3.10

Notes:
1. The worst-case ground gas regime identified on the site, either methane or carbon dioxide, at the worst-case temporal conditions that the site may be expected to encounter will be the decoder as to what Traffic Light is allocated;
2. Borehole Gas Volume Flow Rate, in litres per hour as defined in Wilson and Card (1999), is the borehole flow rate multiplied by the concentration in the air stream of the particular gas being considered;
3. The Typical Maximum Concentration can be exceeded in certain circumstances should the Conceptual Site Model indicate it is safe to do so;
4. The Gas Screening Value thresholds should not generally be exceeded without the completion of a detailed ground gas risk assessment taking into account site-specific conditions.

Table 8.7 from CIRIA C665 - NHBC Traffic light system for 150 mm void

Dependant on the outcome of the assessment of risk posed by ground gas it is determined whether gas protection measures are required for the proposed development, and or whether a detailed quantitative risk assessment is required for the site.

Selection & Design of Protective Measures

Table 8.6 and Box 8.4 of CIRIA C665 contain information on the detailed design of protection measures and were initially intended for the purposes of determining then level of protection measures a development requires. These tables and related text include some useful information on the design of gas protection measures, however BS84845:2007, which supersedes the guidance included within CIRIA C665, is used for selection of gas protection measures.

BS8485: 2007 uses a scoring system dependant on the Characteristic Situation / NHBC Traffic Light and proposed end use of the site. The scoring system is summarised in BS8485:2015 Table 2 as presented hereunder:

Characteristic gas situation, CS	NHBC traffic light	Required gas protection			
		Non-managed property e.g. private housing	Public building (a)	Commercial buildings	Industrial buildings (b)
1	*Green*	0	0	0	0
2	*Amber 1*	3	3	2	1 (c)
3	*Amber 2*	4	3	2	2
4	*Red*	6 (d)	5(d)	4	3
5			6(e)	5	4
6				7	6

NOTE Traffic light indications are taken from NHBC Report no.:10627-RO1 (04) and are mainly applicable to low-rise residential housing[1]. These are for comparative purposes but the boundaries between the traffic light indications and CS values do not coincide.

a) Public buildings include, for example, managed apartments, schools and hospitals.
b) Industrial buildings are generally open and well ventilated. However, areas such as office pods might require a separate assessment and may be classified as commercial buildings and require a different scope of gas protection to the main building.
c) Maximum methane concentration 20% otherwise consider and increase to CS3.
d) Residential building on higher traffic light/CS sites is not recommended unless the type of construction or site circumstances allow additional levels of protection to be incorporated, e.g. high-performance ventilation or pathway intervention measures, and an associated sustainable system of management of maintenance of the gas control system, e.g. in institutional and/or fully serviced contractual situations.
e) Consideration of issues such as ease of evacuation and how false alarms will be handled are needed when completing the design specification of any gas protection scheme

[1] The NHBC guidance and CIRIA C665 guidance refers to low rise housing (which is up to three storeys without lifts) that is constructed with a 150mm ventilated sub-floor void.

BS8485:2007 Table 2 Required gas protection by characteristic gas situation and type of building

Once a score is assigned, a combination of protection systems / elements is chosen from BS8485:2007 Table 3 shown below:
CD37d

PROTECTION ELEMENT / SYSTEM		SCORE	COMMENTS
a) Venting / dilution (See Annex A BS8485)			
Passive sub floor ventilation (venting layer can be a clear void or formed using gravel, geocomposites, polystyrene void formers, etc.)[A]	Very good performance	2.5	*Ventilation performance in accordance with Annex A (BS8485)*
	Good performance	1	*If passive ventilation is poor this is generally unacceptable and some form of active system will be required.*
Subfloor ventilation with active abstraction/pressurization (venting layer can be a clear void or formed using gravel, geocomposites, polystyrene void formers, etc.)[A]		2.5	*There have to be robust management systems in place to ensure the continued maintenance of any ventilation system. Active ventilation can always be designed to meet good performance.*
Ventilated car park (basement or undercroft)		4	*Mechanically assisted systems come in two forms: extraction and positive pressurization.*
b) Barriers			
Floor slabs			
Block and beam floor slab		0	*It is good practice to install ventilation in all foundation systems to effect pressure relief as a minimum. Breaches in floor slabs such as joints have to be effectively sealed against gas ingress in order to maintain these performances.*
Reinforced concrete ground bearing slab		0.5	
Reinforced concrete ground bearing foundation raft with limited service penetrations that are cast into slab		1.5	
Reinforced concrete cast in situ suspended floor slab with minimal service penetrations and water bars around all slab penetrations and at joints		1.5	
Fully tanked basement		2	
c) Membranes			
Taped and sealed membrane to reasonable levels of workmanship/in line with current good practice with validation [B,C]		0.5	*The performance of membranes is heavily dependent on the quality of design of the installation, resistance to damage after installation, and the integrity of joints.*
Proprietary gas resistant membrane to reasonable levels of workmanship /in line with good practice under independent inspection (CQA)[B,C]		1	
Proprietary gas resistant membrane installed to reasonable levels of workmanship/in line with current good practice under CQA with integrity testing and independent validation		2	
d) Monitoring and detection (not applicable to non-managed property, or in isolation)			
Intermittent monitoring using hand held equipment		0.5	*Where fitted, permanent monitoring systems ought to be installed in the underfloor venting/dilution system in the first instance but can also be provided within the occupied space as a fail safe.*
Permanent monitoring and alarm system [A]	Installed in the underfloor venting/dilution system	2	
	Installed in the building	1	
e) Pathway Intervention			
Pathway intervention		-	*This can consist of site protection measures for off-site or on-site sources (see Annex A, BS8485)*
NOTE In practice the choice of materials might well rely on factors such as construction method and the risk of damage after installation. It is important to ensure that the chosen combination gives an appropriate level of protection			
A) It is possible to test ventilation systems by installing monitoring probes for post installation validation. *B) If a 1 200g DPM material is to function as a gas barrier it should be installed according to BRE 212 /BRE 414 being taped and sealed to all penetrations* *C) Polymeric Materials> 1200 g (proportional to thickness) but their physical properties mean that they are more robust and resistant to damage.*			

BS8485:2007 Table 3 Solution Scores

Where the gas situation is 4 or more (and for NHBC Red situations) the site requires a comprehensive risk assessment to confirm the scope of protection measures. These are higher risk sites and reliance on Table 2 and 3 alone is not sufficient.

For a site which is impacted by migratory gases from an off site source, the development may be protected by imposing pathway intervention methods, which if successfully validated, could also remove the need for further analysis. It is essential that the gas regime in these circumstances has been fully characterised and that the only source impacting the site is located off site and that the pathway is clearly defined and its interception equally proven before construction commences. Pathway intervention methods may include vertical membrane installations, venting trenches, rows of stone columns, activated trenches and various proprietary systems. These systems are particularly relevant to domestic housing where there is limited scope for foundation type solutions.

CURRENT GUIDANCE ON REMEDIATION

When risk assessment of the site has been completed and it indicates that remedial works are required, the main guidance in managing this process is set out in the DEFRA/EA publication CLR11 (2004) "Model Procedures for the Management of Land Contamination." The stages of managing remediation are as follows:

(a) Options Appraisal and develop Remediation Strategy;
(b) Develop Implementation Plan and Verification Plan;
(c) Remediation, Verification and Monitoring.

The Remediation Strategy sets out the remediation targets, identifies technically feasible remedial solutions and presents an evaluation of the options so that these can be assessed enabling that the most suitable solution is adopted. An outline of the proposed remedial method should be presented. Agreement should be sought of the appropriate statutory bodies for the Remediation Strategy before proceeding to the next stage.

The Implementation Plan is a detailed method statement setting out how the remediation is to be carried out including stating how the site will be managed, welfare procedures, health and safety considerations together with practical measures such as details of temporary works, programme of works, waste management licences and regulatory consents required. Agreement should again be sought of the appropriate statutory bodies for this Plan.

The Verification Plan sets out the requirements for gathering data to demonstrate that the remediation has met the required remediation objectives and criteria. The Verification Plan presents the requirements for a wide range of issues including the level of supervision, sampling and testing regimes for treated materials, waste and imported materials, required monitoring works during and post remediation, how compliance with all licenses and consents will be checked etc. Agreement should again be sought of the appropriate statutory bodies for the Verification Plan. On completion of the remediation a Verification Report should be produced to provide a complete record of all remediation activities on site and the data collected as required in the Verification Plan. The Verification Report should demonstrate that the remediation has met the remedial targets to show that the site is suitable for the proposed use.

APPENDIX H: NOTES ON LIMITATIONS

Standard Terms and Conditions of Engagement

Notes on Limitations For Geoenvironmental and Geotechnical Consultancy Services

General

CC GEOTECHNICAL LTD has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from CC GEOTECHNICAL LTD and a charge may be levied against such approval.

CC GEOTECHNICAL LTD accepts no responsibility or liability for:

the consequences of this document being used for any purpose or project other than for which it was commissioned

and/or

the consequences of use of this document by any party with whom an agreement has not been executed.

Phase I Environmental Audits / Desk Studies

The work undertaken to provide the basis of a Phase 1 Desk Study report comprises a study of available documented information from a variety of sources (including the client), together with (where appropriate) a walk over inspection of the site and meetings and discussions with relevant authorities and other interested parties. The opinions given in a Desk Study report have been dictated by finite data on which they are based and are relevant only to the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in the report, CC GEOTECHNICAL LTD reserves the right to review such information and to modify the opinions accordingly.

It should be noted that any risks identified in this report are perceived risks based on the information reviewed; actual risks can only be assessed following a physical investigation of the site.

Phase II Environmental Audits

The investigation of the site has been carried out with the intention of providing sufficient information concerning the type and degree of contamination, and ground and groundwater conditions to allow a reasonable risk assessment to be made. The objectives of the investigation have been limited to establishing the risks associated to potential human targets, building materials, the environment (including adjacent land), and surface and groundwater.

The amount of exploratory work and chemical testing undertaken may have been restricted by the timescale available, and the locations of the exploratory holes may have been restricted to areas unoccupied by the building(s) on the site, and further restricted by the existence of buried services. A more comprehensive investigation may be required if the site is to be redeveloped as, in addition to risk assessment, a number of important engineering and environmental issues may need to be resolved.

For those reasons, if costs have been included in relation to site remediation these must be considered as tentative only and must, in any event, be confirmed by a qualified quantity surveyor.

The exploratory holes undertaken, investigate only a small volume of the ground in relation to the size of the site, and can only provide a general indication of site conditions. The number of sampling points and the methods of sampling and testing do not preclude the existence of localised “hotspots” of contamination where concentrations may be significantly higher than those actually encountered.

Geoenvironmental Ground Investigations

The investigation of the site has been carried out to provide sufficient information within the agreed scope of the investigation, under the general headings of type and degree of contamination, geotechnical characteristics, and ground and groundwater conditions, to provide a reasonable assessment of the environmental risks together with engineering and development implications.

If costs have been included in relation to the site remediation, these must be confirmed by a qualified quantity surveyor.

The exploratory holes undertaken, investigate only a small volume of the ground in relation to the size of the site, and can only provide a general indication of the site conditions. The opinions provided and recommendations given in this report are based on the ground conditions apparent at the site of each of the exploratory holes. There may be ground conditions present on the site which have not been disclosed by this investigation, and which have therefore not been taken into account in this report.

The comments made on groundwater conditions are based on observations made at the time that site work was carried out. It should be noted that groundwater levels will vary owing to seasonal, tidal, weather, or other effects.

The risk assessment and opinions provided, inter alia, take into consideration currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values.

Appendix C

Plot 1 Retaining Wall Assessments

Colomendy Extension - Retaining Wall			Plot	1	Wall	1	Wall Ref.	1-1

Brief Description of wall			The wall is positioned in the west of Plot 1, it is a linear wall separating the car parking area in the west from the vehicle parking area. It is proposed to construct the wall using Redi Rock blocks on 1.64m wide MOT Type1 foundations with Class 6N granular backfill. The wall has not been detailed as yet however based on retained heights is likely to be of relative uniform height of approximately 1.2m. Two short lengths of retaining walls; Wall 1-1a and Wall 1-1b are positioned at the north end to form the edge of the sloping footpath, and the discussions below are also relevant to these walls.		
Wall Length (m)	**59**	**Wall Height (m)**	c. 1-2m	**Retained Height (m)**	c. 1-2m
Existing Ground Level (mAD)			88.2 - 88.3	**Top of Wall (mAD)**	c.89.2 - 89.5, reducing to grade each end
Proposed Ground Level Front (mAD)			c. 88.2	**Proposed Formation Level (mAD)**	TBC
Ground Gradient to Rear of Wall (degree)			level, footway	**Proposed Ground Level Rear**	as proposed levels
RELEVANT EXPLORATORY HOLES			**Trial pits (2019)**	TP04, 05 06	
			Trial pits (2020)	TP104, 105, 106	

SOIL/GEOLOGY

Strata	Typical Thickness (m)	Description / Comment	Potential Contam (y/n)
Topsoil	0.15 - 0.32		N
Glacial Deposits	varies	Shallow ground conditions are variable. 2019 GI recorded topsoil over firm to stiff cohesive soils, with granular soils below 0.9m in TP04 in the north. 2020 GI recorded granular soils in the centre of the wall with soft to firm cohesive soils to between 12m and 1.6m in the south and north with granular horizons beneath the topsoil and at the base of both the pits.	N
Rock	n/a	rock not encountered	n/a
Groundwater		Groundwater encountered in the granular horizons at the base of the pit	N

Lab Testing Summary	**See Geotech Report**
Anticipated Ground at Formation	Formation anticipated to be close to grade as retained ground is engineered fill. Variable ground conditions are anticipated ranging from soft, firm and stiff clay to granular soils. This will likely require some over excavation of the formation to provide uniform foundations, and potentially reinforcement of the foundation with geogrid. Any groundwater likely to be limited to granular horizons and controlled by pumping from sumps.
Presumed Bearing Capacity at Formation	Due to variability of ground conditions it is recommended that presumed bearing capacity for the wall is limited to 75kPa on cohesive material of minimum firm consistency (40kPa). Bearing capacity may be increased if required by removing firm clay to expose soils with a higher undrained shear strength and replacing with compacted granular fill; effectively deepening the MOT Type 1 formation.
Additional ground investigation / Inspections required?	Due to variability of ground conditions it is recommended that either further investigation is carried out, either pre-contract or alternatively it could be carried out once the contract is on site and in advance of the construction works to confirm any pre-treatment of the formation e.g. deepening of foundations or excavating and re-compacting the formation.
Temporary Works Considerations	No temporary excavations envisaged. Groundwater control by pumping from sumps is likely to be suitable.
Potential Value Engineering Opportunities	Mass retaining walls are generally the cheapest option for retaining walls. Other options to the Redi Rock system are available, such as crib walls, or gabions, which contractors may have a preference for. Crib walls are designed on a similar basis to the redi rock walls; timber crib walls are not recommended due to a relatively short design life, concrete cribs provide a much greater design life. Gabion walls generally require a greater land take at the base and are more labour intensive, however may be cost effective at low heights such as this wall. The design of any mass retaining wall system should consider bearing and sliding foundation as well as the individual members, and should also consider global slope stability to ensure that any slip circles do not pass beneath the wall. Since the wall is retaining engineered fill, the retaining wall could be replaced by reinforced earth, with either a vegetated surface (c.45deg) or 'hard' finish which would allow near vertical gradients. Consideration could also be given to replacing the retaining wall with a graded slope, the slope would encroach into Plot 2 or the landscape strip, and result in a reduction in available development area. The loss of development area would be relatively small due to the generally low retained height. Preliminary slope gradients of 1v:2h (c.26deg.) are considered suitable, steeper slopes could be justified with slope stability analysis, but maintenance would become an issue on steeper slopes.

Colomendy Extension - Retaining Wall	Plot	1	Wall	2	Wall Ref.	1-2

Brief Description of wall	The wall is positioned in the east of Plot 1, it is a linear wall separating the curtilage of the proposed sorting shed, which is constructed on engineered fill, from the landscape area to the north. It is proposed to construct the wall using Redi Rock blocks on MOT Type1 foundations with Class 6N granular backfill. The wall is 2 blocks (0.92m) high in the west raising to a maximum of 4 blocks (1.84) in the centre before reducing to 2 blocks in the east. Foundation width is indicated as The wall generally retains between 1m and 1.5m of engineered fill, with a stepped wall height . The ground to the rear slopes up to the footway around the building at a gradient of approximately 1v:3h. There is a change in angle at c. Ch.15 as the wall moves further away from the development platform towards the east as the fill level increases. The increased level difference is accommodated in the 1:3 slope rather than the wall height.

Wall Length (m)	**46**	**Wall Height (m)**	0.92 - 1.84	**Retained Height (m)**	c. 1 - 1.5m
Existing Ground Level (mAD)			83 (W) 81.5 (E)	**Top of Wall (mAD)**	82.4 (W) stepping up to 83.3 from Ch.14
Proposed Ground Level Front (mAD)			as existing	**Proposed Formation Level (mAD)**	81.2 (W) 81.7 (E)
Ground Gradient to Rear of Wall (degree)			1v:3h up to development area	**Proposed Ground Level Rear**	top of slope c.83.9
RELEVANT EXPLORATORY HOLES			**Boreholes**	WS01 (2019), BH101	
			Trial pits	TP10 (2019) TP107	

SOIL/GEOLOGY

Strata	Typical Thickness (m)	Description / Comment	Potential Contam (y/n)
Topsoil	0.2 - 0.3		N
Glacial Deposits	varies	Dominant strata along this RW, comprises cohesive glacial deposits, firm, becoming stiff below approx. 600mm, likely to have thin granular horizons, particularly with depth.	N
Rock	n/a	rock not encountered	n/a
Groundwater		Groundwater strike at 2.7m in granular horizon in WS1. Groundwater monitoring recorded water at 0.6m depth	N

Lab Testing Summary	**See Geotech Report**
Anticipated Ground at Formation	Typically, firm or stiff, cohesive glacial soils with slight possibility of localised firm horizons and local granular horizons. Any groundwater likely to be limited to granular horizons and controlled by pumping from sumps.
Presumed Bearing Capacity at Formation	A presumed bearing capacity of 125kPa is considered reasonable for design of the entire structure, may be requirement to remove soft clay from formation.
Additional ground investigation / Inspections required?	Not considered necessary based on proposed retaining wall. Formation inspection required, particularly as it is at shallow depth, and there is variability in suitability of shallow soils across the site.
Temporary Works Considerations	No temporary excavations envisaged. Groundwater control by pumping from sumps is likely to be suitable, if required.
Potential Value Engineering Opportunities	Mass retaining walls are generally the cheapest option for retaining walls. Other options to the Redi Rock system are available, such as crib walls, or gabions, which contractors may have a preference for. Crib walls are designed on a similar basis to the redi rock walls; timber crib walls are not recommended due to a relatively short design life, concrete cribs provide a much greater design life. Gabion walls generally require a greater land take at the base (approx. 2/3 height) and are more labour intensive. The design of any mass retaining wall system should consider bearing and sliding foundation as well as the individual members, and should also consider global slope stability to ensure that any slip circles do not pass beneath the wall. Since the wall is retaining engineered fill, the retaining wall could be replaced by reinforced earth, with either a vegetated surface (c.45deg) or 'hard' finish which would allow near vertical gradients. Consideration could ales be given to replacing the retaining wall with a graded slope, the slope would encroach into Plot 2 or the landscape strip, and result in a reduction in available development area. The loss of development area would be relatively small due to the generally low retained height. Preliminary slope gradients of 1v:2h (c.26deg.) are considered suitable, steeper slopes could be justified with slope stability analysis, but maintenance would become an issue on steeper slopes.

Colomendy Extension - Retaining Wall			Plot	1	Wall	3	Wall Ref.	1-3
Brief Description of wall			This linear retaining wall is positioned along the southern half of the eastern boundary of Plot 1. It retains the elevated development platform constructed of engineered fill from the land to the east which is retained at existing ground levels and comprises a corridor for the diverted HV electricity cables, with plot 2 beyond. It is proposed to construct the wall using Redi Rock blocks on MOT Type1 foundations with Class 6N granular backfill. The wall is 3 blocks (1.38m) high in the south rising to a maximum of 4 blocks (1.84) in the centre before reducing to 2 blocks in the north Foundation width is indicated as a maximum of 2.12m The wall generally retains between 0.5m and 1.5m of engineered fill, with a stepped wall height . The ground to the rear of the wall slopes up to the storage yard to the east of the building at a gradient of approximately 1v:3h, which is c. 1.6m above the top of wall.					
Wall Length (m)	**40**	**Wall Height (m)**	0.92 - 1.84		**Retained Height (m)**		c. 0.5- 1.5m	
Existing Ground Level (mAD)			80.3 - 80.9		**Top of Wall (mAD)**		81.4 - 81.9	
Proposed Ground Level Front (mAD)			as existing		**Proposed Formation Level (mAD)**		79.7 - 80.2	
Ground Gradient to Rear of Wall (degree)			1v:3h up to development area, c. 1.6m above wall		**Proposed Ground Level Rear**		top of slope c.83.5	
RELEVANT EXPLORATORY HOLES			**Boreholes**	n/a				
			Trial pits	TP15 & 16 (2019) TP111, 112 (2020)				

SOIL/GEOLOGY

Strata	Typical Thickness (m)	Description / Comment	Potential Contam (y/n)
Topsoil	0.2		N
Glacial Deposits	varies	Dominant strata along this RW, comprises cohesive glacial deposits, TP 15 & 16 encountered firm clay to c. 0.5m overlying stiff clay. TP111 and 112 encountered reworked ground above a 50mm plastic pipe at 0.7m and 0.8m, which was underlain by stiff clay.	N
Rock	n/a	rock not encountered	n/a
Groundwater		No groundwater encountered	N

Lab Testing Summary	**See Geotech Report**
Anticipated Ground at Formation	Stiff, cohesive glacial soils with slight possibility of localised firm horizons and local granular horizons. Any groundwater likely to be limited to granular horizons and controlled by pumping from sumps.
Presumed Bearing Capacity at Formation	A presumed bearing capacity of 125kPa is considered reasonable for design of the entire structure, may be requirement to remove soft clay from formation.
Additional ground investigation / Inspections required?	Not considered necessary based on proposed retaining wall. Formation inspection required, particularly as it is at shallow depth, and there is variability ion suitability of shallow soils across the site, although consistent conditions in area of wall 1-3.
Temporary Works Considerations	No temporary excavations envisaged. Groundwater control by pumping from sumps is likely to be suitable, if required.
Potential Value Engineering Opportunities	Mass retaining walls are generally the cheapest option for retaining walls. Other options to the Redi Rock system are available, such as crib walls, or gabions, which contractors may have a preference for. Crib walls are designed on a similar basis to the redi rock walls; timber crib walls are not recommended due to a relatively short design life, concrete cribs provide a much greater design life. Gabion walls generally require a greater land take at the base (approx. 2/3 height) and are more labour intensive. The design of any mass retaining wall system should consider bearing and sliding foundation as well as the individual members, and should also consider global slope stability to ensure that any slip circles do not pass beneath the wall. Since the wall is retaining engineered fill, the retaining wall could be replaced by reinforced earth, with either a vegetated surface (c.45deg) or 'hard' finish which would allow near vertical gradients. Consideration could ales be given to replacing the retaining wall with a graded slope, the slope would encroach into the HV corridor. Preliminary slope gradients of 1v:2h (c.26deg.) are considered suitable, steeper slopes could be justified with slope stability analysis, but maintenance would become an issue on steeper slopes.

Appendix D

BGS Radon Report

British Geological Survey
Expert | Impartial | Innovative

GeoReports

Alan Parry Jones
Daear Geo Consulting
Llanidan Lodge
Brynsiencyn
Llanfairpwll
Ynys Mon
LL61 6HJ

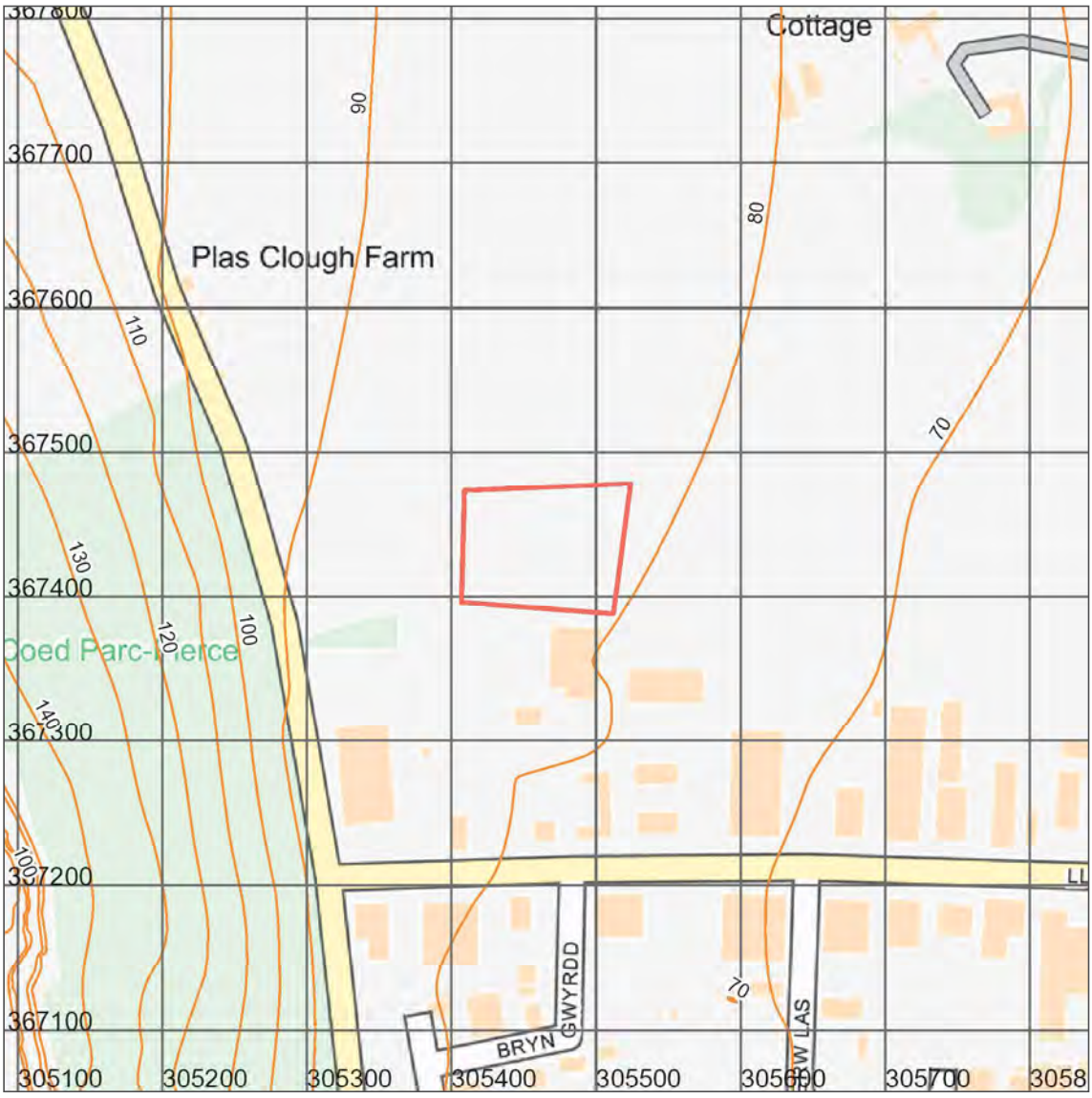
Radon Report

Advisory report on the requirement for radon protective measures in new buildings, conversions and extensions to existing buildings. The report also indicates whether a site is located within a radon Affected Area

Report Id: ***BGS_310683/13944***

Client reference: Email Alan Parry Jones

Search location



Contains OS data © Crown Copyright and database right 2020. OS OpenMap Local: Scale: 1:5 000 (1cm = 50 m)
Search location indicated in red

This report describes a site located at National Grid Reference 305466, 367433. Note that for sites of irregular shape, this point may lie outside the site boundary. Where the client has submitted a site plan the assessment will be based on the area given.

Radon Report: UK

When extensions are made to existing buildings in high radon areas, or new buildings are constructed in these areas, the Building Regulations for England, Wales, Scotland and Northern Ireland require that protective measures are taken against radon entering the building.

This report provides information on whether radon protective measures are required. Depending on the probability of buildings having high radon levels, the Regulations may require either:

1. No protective measures
2. Basic protective measures
3. Full protective measures

This is an advisory report on the requirement for radon protective measures in new buildings, conversions and extensions. The report also indicates whether a site is located within a radon Affected Area

Requirement for radon protective measures

The determination below follows advice in *BR211 Radon: Guidance on protective measures for new buildings (2015 edition), which also provides guidance on what to do if the* result *indicates that protective measures are required.*

Is the property in an area where radon protective measures are required for new buildings or extensions to existing ones as described in publication BR211 (2015 edition) Radon: Guidance on protective measures for new buildings?

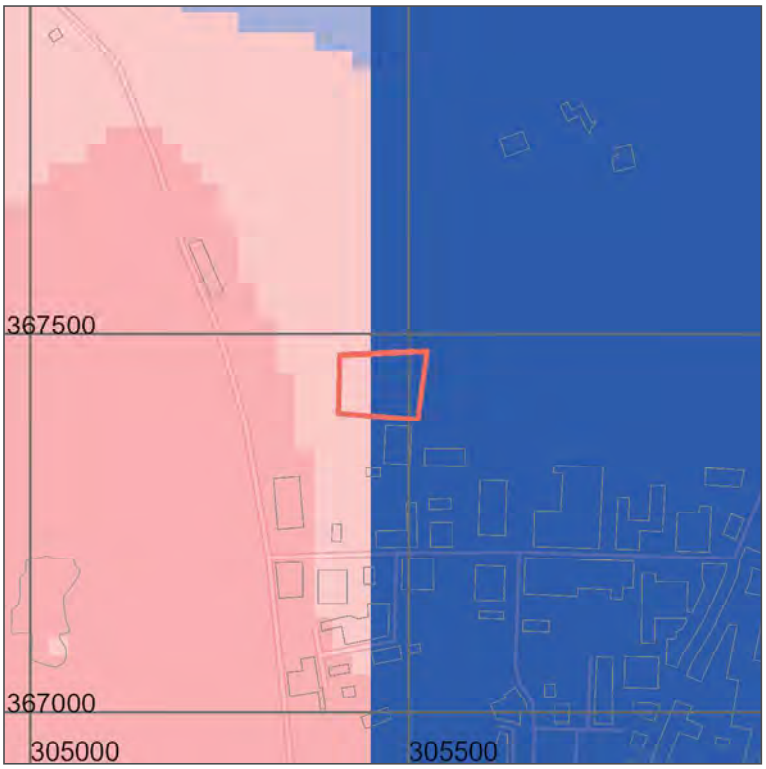
BASIC RADON PROTECTIVE MEASURES ARE REQUIRED FOR THE REPORT AREA.

More details of the protective measures required are available in *BR211 Radon: Guidance on protective measures for new buildings (2015 Edition)*. Additional information and guidance is available from the Building Research Establishment website (http://www.bre.co.uk/radon/).

Whether or not the radon level in a building is above or below the radon Action Level can only be established by having the building tested. The PHE provides a radon testing service which can be accessed at www.ukradon.org or by telephone (01235 822622).

If you require further information or guidance, you should contact your local authority building control officer or approved inspector.

Radon Affected Area



	% Homes estimated to be at or above the action level
	0-1%
	1-3%
	3-5%
	5-10%
	10-30%
	30-100%

Scale: 1:10 000 (1cm = 100 m)
Search area indicated in red

Is the property in a radon Affected Area as defined by Public Health England (PHE) and if so what percentage of homes are estimated to be above the Action Level? YES

Additional Information

THE PROPERTY IS IN A RADON AFFECTED AREA WHERE 5 TO 10% OF HOMES ARE ESTIMATED TO BE AT OR ABOVE THE ACTION LEVEL.

PHE recommends a radon 'Action Level' of 200 Becquerels per cubic metre of air (Bq m^{-3}) for the annual average of the radon gas concentration in a home. Where 1% or more of homes are estimated to exceed the Action Level the area should be regarded as a radon Affected Area.

This report informs you whether the property is in a radon Affected Area and the percentage of homes that are estimated to be at or above the radon Action Level at this location. Being in an Affected Area does not necessarily mean there is a radon problem in the property; the only way to find out whether the radon level is above or below the Action Level is to carry out a radon measurement.

PHE advises that radon gas should be measured in all properties within radon Affected Areas and that homes with radon levels above the Action Level (200 Bq m^{-3}) should be remediated. Householders with levels between the Target Level (100 Bq m^{-3}) and Action Level should seriously consider reducing their radon level, especially if they are at greater risk, such as if they are current or ex smokers. Whether or not a home is in fact above or below the Action Level or Target Level can only be established by having the building tested. PHE provides a validated radon testing service which can be accessed at www.ukradon.org.

The information in this report provides an answer to one of the standard legal enquiries on house purchase in England and Wales, known as Law Society CON29 Enquiries of the Local Authority (2016); 3.14 Radon Gas: Do records indicate that the property is in a “Radon Affected Area” as identified by PHE. The data can also be used to advise house buyers and sellers in Scotland and Northern Ireland.

If you are buying a new build property in a Radon Affected Area, you should ask the builder whether radon protective measures were incorporated in the construction of the property.

If you are buying a currently occupied property in a radon Affected Area, you should ask the present owner whether radon levels have been measured in the property. If they have, ask whether the results were above the radon Action Level and if so, whether remedial measures were installed, radon levels were re-tested, and if the results of re-testing confirmed the effectiveness of the measures.

Further information on radon is available from PHE at www.ukradon.org.

What is radon?

Radon is a naturally occurring radioactive gas, which is produced by the radioactive decay of radium which, in turn, is derived from the radioactive decay of uranium. Uranium is found in small quantities in all soils and rocks, although the amount varies from place to place. Radon released from rocks and soils is quickly diluted in the atmosphere. Concentrations in the open air are normally very low and do not present a hazard. Radon that enters enclosed spaces such as some buildings (particularly basements), caves, mines, and tunnels may reach high concentrations in some circumstances. The construction method and degree of ventilation will influence radon levels in individual buildings. A person's exposure to radon will also vary according to how particular buildings and spaces are used.

Inhalation of the radioactive decay products of radon gas increases the chance of developing lung cancer. If individuals are exposed to high concentrations for significant periods of time, there may be cause for concern. In order to limit the risk to individuals, the Government has adopted an Action Level for radon in homes of 200 becquerels per cubic metre (Bq m^{-3}). The Government advises householders that, where the radon level exceeds the Action Level, measures should be taken to reduce the concentration.

Radon in workplaces

The Ionising Radiation Regulations, 1999, require employers to take action when radon is present above a defined level in the workplace. Advice may be obtained from your local Health and Safety Executive Area Office or the Environmental Health Department of your local authority. The BRE publishes a guide (BR293)**: Radon in the workplace.** BRE publications may be obtained from the BRE Bookshop, Tel: 01923 664262, email: bookshop@bre.co.ukwebsite: www.brebookshop.com

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- Although samples and records are maintained with all reasonable care, there may be some deterioration in the long term.
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- Note that for some sites, the latest available records may be historical in nature, and while every effort is made to place the analysis in a modern geological context, it is possible in some cases that the detailed geology at a site may differ from that described.

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