Appendix 10.2: GEOLOGICAL GROUND INVESTIGATION REPORT

Project No. e0756
Report No. E0756.GGI.R1
Date. February 2016

The following report was commissioned by Jones Bros (Ruthin) Ltd from egeo solutions to undertake an intrusive ground investigation on land adjacent to the Seiont Brickworks Quarry. The objective was to determine geological conditions at the site to establish geotechnical properties of the ground strata and evaluate the potential for slope instability, signs of which were visible in the adjacent quarry slopes. The report presents the findings of a borehole ground investigation with laboratory geotechnical testing of soil samples.

Most of the report addresses the potential for mineral extraction in the area covered by the survey. Following consideration of the ground conditions the Applicant decided not to extend mineral extraction into the area, but instead to limit excavation to the formation of a haul road from the Seiont Quarry to the proposed A487 Bypass scheme.

JONES BROS (RUTHIN) LTD

BORROW PIT AREA AT THE FORMER SEIONT BRICKWORKS AND QUARRY, CAERNARFON, GWYNEDD, LL55 2YL

GEOLOGICAL GROUND INVESTIGATION REPORT

REPORT No. E0756.GGI.R1

FEBRUARY 2016

Client :	**JONES BROS (RUTHIN) LTD**
Project Title :	**BORROW PIT AREA AT THE FORMER SEIONT BRICKWORKS AND QUARRY, CAERNARFON, GWYNEDD, LL55 2YL**
Document Title:	**GEOLOGICAL GROUND INVESTIGATION REPORT**
Project No. **Report No.** **Date.**	**e0756** **E0756.GGI.R1** **FEBRUARY 2016**

Distribution: **JONES BROS (RUTHIN) LTD**

Version: **Date:**	FINAL 06/02/16		
Prepared by:	Huw Littler-Jones		
Checked by:			
Report Ref:	**E0756.GGI.R1**		
Signed:			

1. INTRODUCTION

1.1 Terms of Reference

1.1.1 In November 2015 e-geo Solutions Ltd were commissioned by Jones Bros (Ruthin) Ltd. to undertake an intrusive ground investigation on land identified as a borrow pit on fields adjacent to the former quarry and brickworks known as Seiont Quarry in Caernarfon, Gwynedd. The objective of the investigation was to determine the geological conditions at the site establish the geotechnical properties of the ground strata and evaluate the potential for slope instability.

1.1.2 This report presents the findings of a borehole ground investigation with the laboratory geotechnical testing of soil samples. The report provides the findings of the intrusive investigation and details of the ground conditions encountered and the results of geotechnical tests on soil samples.

1.1.3 The report has been prepared by e-geo Solutions Ltd for the sole use of the Client, for the purposes described and no extended duty of care applies to other parties. Any other party using this report for any purpose whatsoever do so at their own risk and any duty of care to that party is specifically excluded.

1.1.4 The comments given, and opinions expressed, in this report are based on the information available at the time the report was compiled, however there may be additional information and data which becomes available at a later date which has an impact on the report content. Where data supplied by others has been used it has been assumed that the information is correct. No responsibility can be accepted by e-geo Solutions Ltd for inaccuracies within the data supplied by others.

1.2 Report Contents

1.3.1 The report includes sections on:-

- Description of site area
- The scope of the ground investigation works and laboratory testing
- The geological and hydro-geological conditions encountered on site
- The geotechnical properties of the ground strata below the site
- Observations on slope instability

2. SITE LOCATION AND DESCRIPTION

2.1 Site Location

2.1.1 The area of investigation is situated on land to the northeast of the former Seiont Quarry in Caernarfon, Gwynedd, North Wales. The site location is shown on Figure 1 and the area of investigation on Figure 2 and is centred at Grid Reference SH49146168.

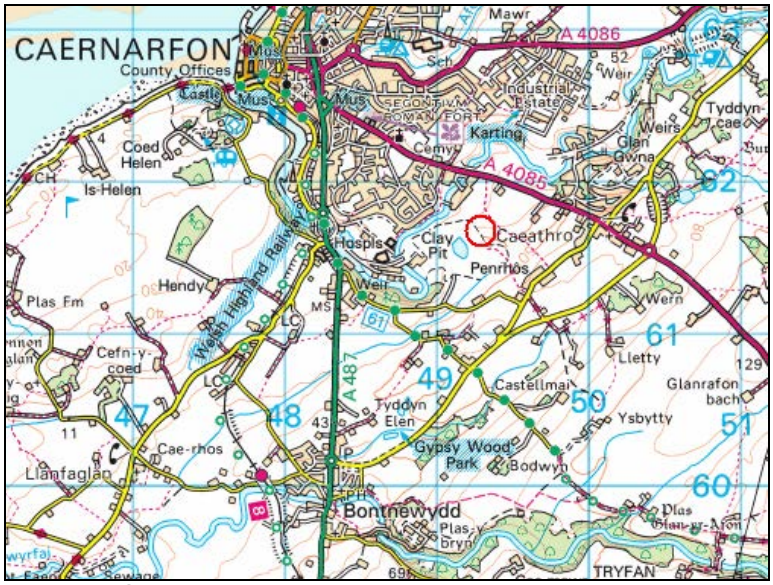

Figure 1 – Site Location

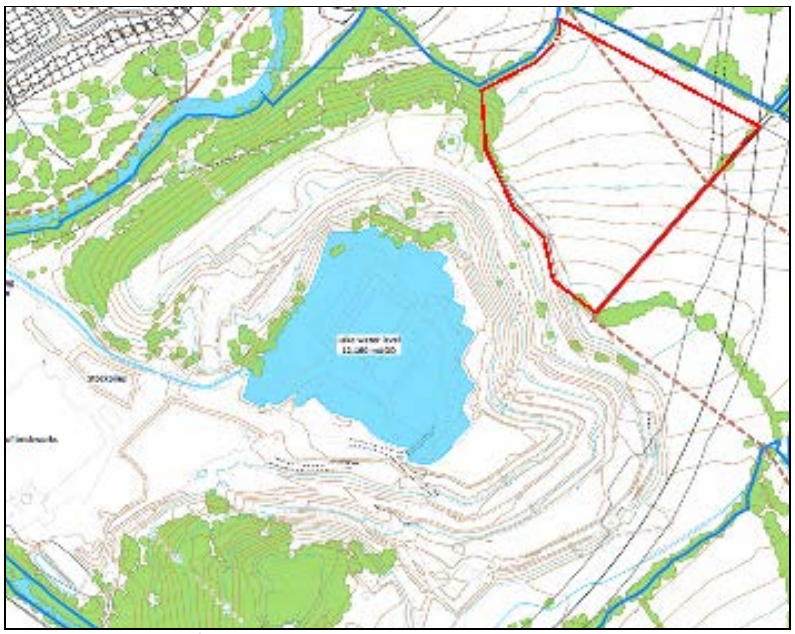
Figure 2 – Area of Investigation

2.2 Site Description and Topography

2.2.1 The investigation area comprises north facing grassed agricultural land. The land slopes relatively steeply towards the north from approximately 50.00m aOD to 30.00m aOD flattening towards the northern edge. An aerial photograph is presented as Plate 1.

Plate 1 – Area of investigation aerial photograph

2.2.2 In the upper southern portion of the field the ground is undulating and shows relict slump features that may be indicative of past slope instability. Slope photographs showing the slumping are presented below:

Plate 2 – Undulating slope showing geomorphologic features of slope movement

Plate 3 – Undulating slope showing geomorphologic features of slope movement

3. GEOLOGY, HYDROGEOLOGY AND EXISTING SLOPE INSTABILITY

3.1 Published Geology

3.1.1 Information from the British Geological Survey Map No. 118 indicates that the geological sequence glacial deposits overlying sedimentary rocks of mudstone. The glacial deposits will comprise a coarse sand and gravel with cobbles underlain by a gravely sandy silty clay with cobbles and occasional boulders of locally derived rock. The bedrock below the site will comprise fine grained sedimentary rocks of siltstone and mudstone.

3.1.1 There is no record of made up ground or fills being present at the site however from the topography there may be disturbed or slumped ground.

3.1.2 There are no faults within 100m of the site.

3.1.3 There is a high risk of landslides associated with the former clay pit and quarry immediately to the south of the area of investigation.

3.2 Hydrogeology

3.2.1 There is no information on the aquifer in the superficial deposits but it is likely to be an unproductive or secondary aquifer. These are deposits that have been defined as minor or non-aquifers. The bedrock below the site is classed as a secondary (B) aquifer. This is defined as geology of lower permeability layers, which yield limited amounts of groundwater and were formerly the water bearing parts of non-aquifers.

3.2.2 There is likely to be perched water within the granular drift deposits that may be present in the upper ground strata horizons above the lower permeability glacial clay deposits. There may also be pockets of trapped water within the more granular horizons in the glacial clay.

3.3 Mining, Mineral Extraction and Ground Workings

3.3.1 The site is not within a coal mining area and there is no evidence of underground workings or shallow mining hazard within 1000m of the site. The area of investigation is however immediately adjacent to an area where quarrying has been carried out.

3.4 Slope Instability

3.4.1 In addition to the existing geomorphologic features that were observed in the area of investigation evidence of past instability of the slopes within and above the former quarry immediately south of the investigation area can be seen on aerial photographs below:

Plate 4 – Arial photograph of quarry face slope in1999

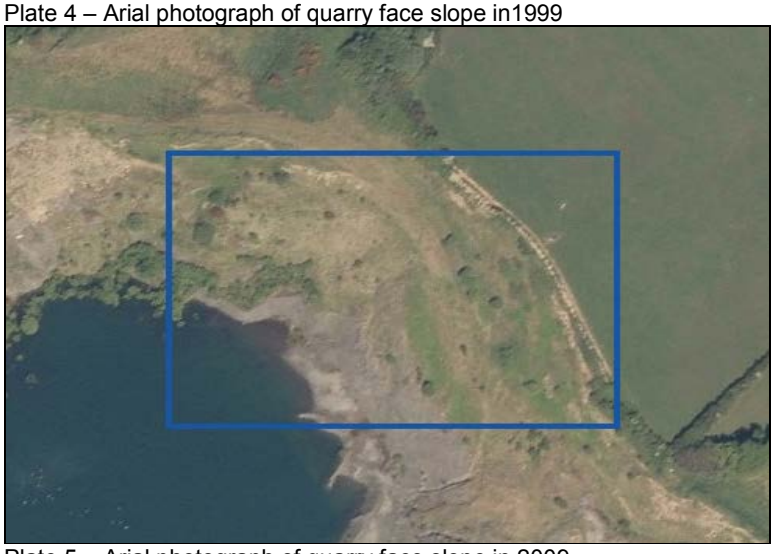

Plate 5 – Arial photograph of quarry face slope in 2009

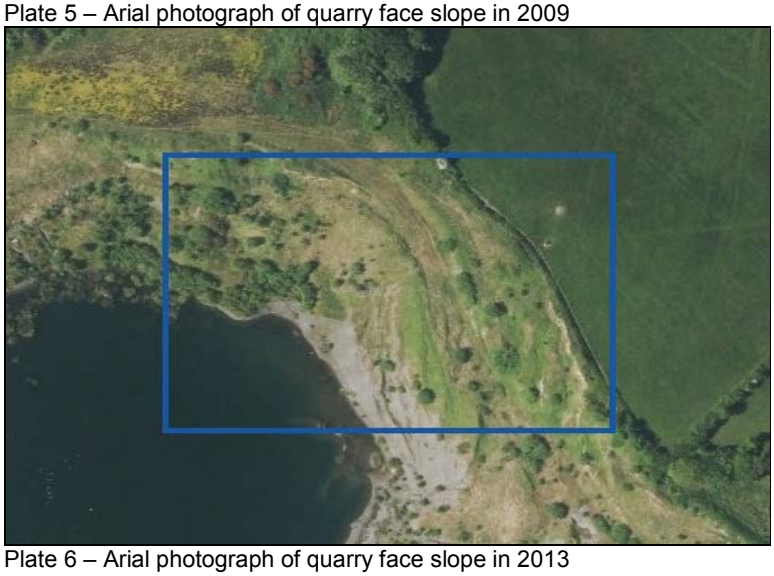

Plate 6 – Arial photograph of quarry face slope in 2013

3.4.2 An inspection of the slopes within the former quarry showed significant evidence of recent and ongoing slope instability with slumped soils, tension cracks and scarp faces extending down the slope.

Plate 7 – Numerous slips and scarps in the slope face

Plate 8 – Recently exposed gravel in scarp face of slipped slope

Plate 9 – Large tension crack behind slipped slope

Plate 10 – Evidence of slumped soils from multiple slope failures down slope

4. GROUND INVESTIGATION

4.1 Previous Investigations

4.1.1 There have been no known previous ground investigations directly within the present area of investigation.

4.2 Scope of Work – Borehole Investigation

4.2.1 The ground investigation was undertaken to determine the ground conditions, the hydrogeological conditions and the geotechnical properties of the ground strata. The works were carried out by e-geo Solutions Ltd with the field work element undertaken on 23rd to 26th November 2015. The investigation was designed, supervised and administered by e-geo Solutions Ltd and undertaken in accordance with BS5930 (1999) – code of Practice for Site Investigations (Amendment 1).

4.2.2 The scope of investigation work included the following tasks:

- Borehole Investigation – construction of 2 Nr. boreholes with a cable percussion rig to depths of 15.00m, undertaking in-situ tests (SPT), and collection of representative undisturbed and disturbed samples in each borehole. Full details and borehole records are presented in Appendix 1.

4.2.3 Borehole locations are indicated on Figure 3.

4.3 Scope of Work – Geotechnical Testing

4.3.1 Selected ground samples were collected from the boreholes and submitted for geotechnical testing as shown on the table below. The results are presented in Appendix 2.1 to 2.5

BH No	Depth	Geotechnical Testing
BH 1	1.50	MC, Atterberg limits, compaction, shear strength
BH 1	3.00	MC, Atterberg limits,
BH 2	2.00	MC, Atterberg limits,
BH 2	4.00	MC, Atterberg limits, compaction, shear strength
BH 3	2.80	MC, Atterberg limits,
BH 3	6.00	MC, Atterberg limits, compaction, shear strength
BH 3	10.00	MC, compaction, shear strength
BH 4	2.00	MC, Atterberg limits,
BH 4	6.00	MC, Atterberg limits, compaction, shear strength

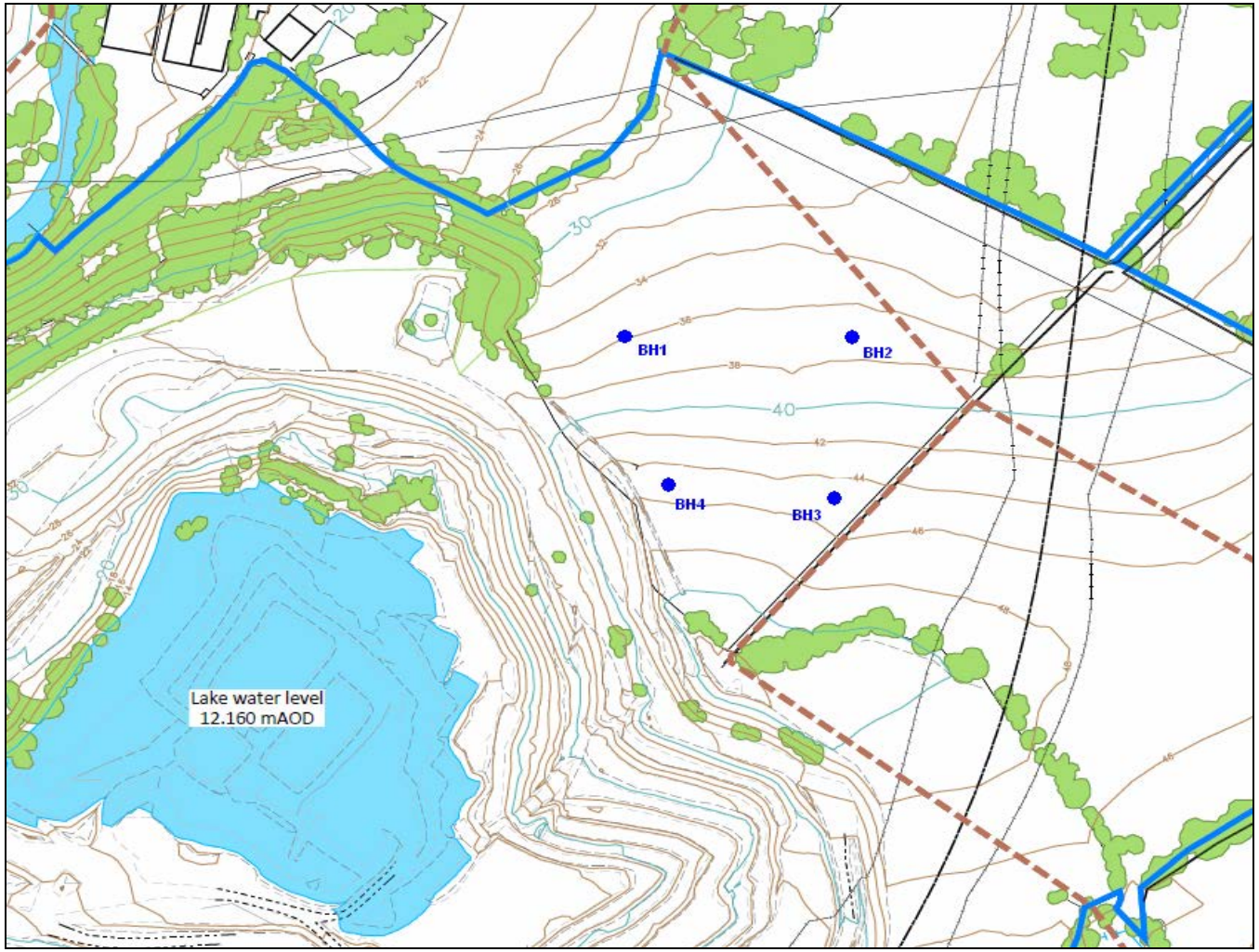

Figure 3 – Borehole Location Plan

5. GROUND CONDITIONS, GEOLOGY AND GEOTECHNICAL ASSESSMENT

5.1 General

5.1.1 Details of the ground strata and depths are presented on the borehole records in Appendix 1. A summary of the findings are presented below.

5.2 Stratigraphy

5.2.1 The general stratigraphic sequence at the site is:

Made Ground (part only) – brown gravely sandy silty clay with some cobbles and brick gravel
Clay – grey brown and orange brown slightly gravely sandy silty CLAY
Silt – grey brown gravely sandy SILT
Glacial Till – Clay – dark brown gravely sandy silty CLAY
Glacial Till – Sand and Gravel – grey brown and reddish brown silty clayey fine to coarse SAND and GRAVEL

5.2.2 The strata and depths encountered during the investigation were:

Stratum	Description	Depth to base m range (average)
Topsoil	Soft dark brown slightly gravely sandy silty CLAY Gravel is fine to coarse subangular quartz	0.30
CLAY 1	Firm becoming stiff dark brown to dark reddish brown gravely sandy silty CLAY. Low cobble content. Gravel is fine to coarse subangular to subrounded of quartz quartzite, rhyolite and siltstone. Occasional boulders	1.80 – 3.80
CLAY 2	Stiff dark brown slightly mottled dark grey brown and grey gravely sandy silty CLAY. Low cobble content. Gravel is fine to coarse subangular to subrounded of quartz quartzite, rhyolite and siltstone	4.00 - 8.00+
SILTSTONE (weathered)	Completely weathered dark grey with some light grey mottling SILTSTONE, Very weak. (recovered as silty fine to coarse gravel)	15.00 (BH3, BH4)

5.3 Groundwater

5.3.1 Groundwater was encountered in BH3 and BH4 at a higher elevation on the slope. Groundwater was encountered at 6.00m in both boreholes rising to 5.25m in 20 minutes in BH4 and rising to 2.00m overnight in BH3.

5.4 Geotechnical Properties

5.4.1 The following SPT 'N' values were obtained in the various strata.

Stratum	Description	Depth (m)	SPT 'N' value
CLAY 1	Firm becoming stiff dark brown to dark reddish brown gravely sandy silty CLAY. Low cobble content. Gravel is fine to coarse subangular to subrounded of quartz quartzite, rhyolite and siltstone. Occasional boulders	1.50	3,
CLAY 2	Stiff dark brown slightly mottled dark grey brown and grey gravely sandy silty CLAY. Low cobble content. Gravel is	1.50 4.00 6.00	14 14,13, 13,

	fine to coarse subangular to subrounded of quartz quartzite, rhyolite and siltstone	7.50	23,
SILTSTONE (weathered)	Completely weathered dark grey with some light grey mottling SILTSTONE, Very weak. (recovered as silty fine to coarse gravel)	4.00 6.00 8.00 10.00 14.00	27, 25 48,27 50+, 50+, 50+ 50+, 50+

5.4.2 The results of undrained triaxial tests on undisturbed samples of clay (Appendix 2) gave the following shear strength values:

BH1 – 1.50 – 33 Kn/m2 (CLAY 1)

BH3 – 6.00 - 53 kN/m2 (CLAY 2)

BH4 – 6.00 - 229 kN/m2 (SILTSTONE)

5.4.3 Atterberg limit test results indicates the following plasticity

CLAY 1	-	Low to medium plasticity
CLAY 2	-	Low to medium plasticity
SILTSTONE	-	Low plasticity

Appendix 1 - Borehole Records

E-GEO SOLUTIONS LTD, OAK HOUSE GROES LWYD, ABERGELE
Tel: 01745 828494. Mob: 07899980958

CABLE PERCUSSION BOREHOLE RECORD

SITE: BORROW PIT AREA, SEIONT BRICKWORKS, CAERNARFON	BOREHOLE No:
LOCN: BORROW PIT AREA, SEIONT BRICKWORKS, CAERNARFON	**BH 1**
CLIENT: JONES BROS (RUTHIN) LTD	Sheet 1 of 1
Dates : 23/11/2015 — Elev (maOD) : 36.00	Project Ref: e0756
Casing dia :150mm to 8.00m — Engineer: HLJ	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Description	Casing Depth(m)	Water Depth(m)	Elevation maOD
			((0.30))	TOPSOIL. Soft dark brown slightly gravely sandy silty CLAY. Gravel is fine to coarse subangular quartz			36.00
			0.30				35.70
0.50	D			Firm becoming stiff dark brown to dark reddish brown gravely sandy silty CLAY. Low cobble content.Gravel is fine to coarse subangular to subrounded of quartz quartzite, rhyolite and siltstone			
1.00	D						
1.50 - 1.95	SPT N = 3	1,1,0,1,1,1			1.50		
1.50	B						
			((3.50))				
2.50	D						
3.00	D						
3.45	D						
			3.80				32.20
4.00 - 4.50	SPT N = 14	4,2,2,4,4,4		Stiff dark brown slightly mottled dark grey brown and grey gravely sandy silty CLAY. Low cobble content.Gravel is fine to coarse subangular to subrounded of quartz quartzite, rhyolite and siltstone			
4.50	D		((1.70))				
5.00	D						
			5.50				30.50
				Large cobble or boulder			
5.50	D		5.70				30.30
6.00	B			Stiff dark brown slightly mottled dark grey brown and grey gravely sandy silty CLAY. Low cobble content.Gravel is fine to coarse subangular to subrounded of quartz quartzite, rhyolite and siltstone			
6.50	D						
			((2.30))				
7.00	D						
7.50 - 7.95	SPT N = 23	2,4,3,7,6,7					
				Base of borehole BH 1 at 8.00			

Remarks
No groundwater.
Chiseling from 5.50-5.70 - 1 hr

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CABLE PERCUSSION BOREHOLE RECORD

SITE: BORROW PIT AREA, SEIONT BRICKWORKS, CAERNARFON
LOCN: BORROW PIT AREA, SEIONT BRICKWORKS, CAERNARFON
CLIENT: JONES BROS (RUTHIN) LTD

BOREHOLE No: **BH 2**
Sheet 1 of 1

Dates : 24/11/2015 | Elev (maOD) : 37.00 | Project Ref: e0756
Casing dia :150mm to 8.00m | Engineer: HLJ

Depth (m)	Sample/ Test	Field Record	Depth (m)	Description	Casing Depth(m)	Water Depth(m)	Elevation maOD
			((0.30))	TOPSOIL. Soft dark brown slightly gravely sandy silty CLAY. Gravel is fine to coarse subangular quartz			37.00
			0.30				36.70
0.50	D			Firm becoming stiff dark brown to dark reddish brown gravely sandy silty CLAY. Low cobble content.Gravel is fine to coarse subangular to subrounded of quartz quartzite, rhyolite and siltstone			
			((1.50))	Boulder at 0.80m			
1.00	D						
1.50 - 1.95	SPT N = 14	2,3,3,5,3,3					
			1.80				35.20
				Stiff dark brown slightly mottled dark grey brown and grey gravely sandy silty CLAY. Low cobble content.Gravel is fine to coarse subangular to subrounded of quartz quartzite, rhyolite and siltstone	1.70		
2.50	D						
3.00	D						
3.45	D						
4.00 - 4.45	SPT N = 13	4,5,3,3,4,3			3.80		
			((6.20))				
4.50	D						
5.00	D						
5.50	D						
6.00 - 6.45	SPT N = 13	4,5,3,3,4,3			5.70		
6.50	D						
7.00	D						
7.50	D						
				Base of borehole BH 2 at 8.00			

Remarks
No groundwater.
Chisel large boulder 0.80m for 0.50hr - No penetration. Re set-up rig

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CABLE PERCUSSION BOREHOLE RECORD

SITE: BORROW PIT AREA, SEIONT BRICKWORKS, CAERNARFON
LOCN: BORROW PIT AREA, SEIONT BRICKWORKS, CAERNARFON
CLIENT: JONES BROS (RUTHIN) LTD

BOREHOLE No: **BH 3**
Sheet 1 of 2

Dates : 24/11/2015 to25/11/2015 | Elev (maOD) : 44.50 | Project Ref: e0756
Casing dia :200mm to 8.00m.150mm to 15.00m | Engineer: HLJ

Depth (m)	Sample/ Test	Field Record	Depth (m)	Description	Casing Depth(m)	Water Depth(m)	Elevation maOD
			((0.30))	TOPSOIL. Soft dark brown slightly gravely sandy silty CLAY. Gravel is fine to coarse subangular quartz			44.50
			0.30				44.20
0.50	D			Firm (with some soft patches) light brown mediur brown and grey brown slightly gravely slightly sandy silty CLAY with pockets and lenses of silty fine medium sand. Low cobble content.			
1.00	D						
			((3.70))				
2.00	B			Boulder at 2.00	1.70		
3.00	D						
			4.00				40.50
4.00 - 4.45	SPT N = 27	3,5,8,6,7,6		Completely weathered dark grey with some ligh grey mottling SILTSTONE, Very weak. (recovered as silty fine to coarse gravel)	3.70		
4.00	B						
5.00	D						
6.00 - 6.45	SPT N = 48	5,10,9,12,18,9			5.80		
7.00	D						
			((11.00+))				
8.00 - 8.45	SPT N = 50+	7,12,10,14,11,19			6.70		
9.00	D						

Remarks
No groundwater durig drilling. Borehole at 6.50m and water at 2.00m overnight
Chisel large boulder 2.00 - 2.30m for 1.00hr - No penetration. Re set-up rig

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CABLE PERCUSSION BOREHOLE RECORD

SITE: BORROW PIT AREA, SEIONT BRICKWORKS, CAERNARFON	BOREHOLE No:
LOCN: BORROW PIT AREA, SEIONT BRICKWORKS, CAERNARFON	**BH 3**
CLIENT: JONES BROS (RUTHIN) LTD	Sheet 2 of 2
Dates : 24/11/2015 to25/11/2015 — Elev (maOD) : 44.50	Project Ref: e0756
Casing dia :200mm to 8.00m.150mm to 15.00m — Engineer: HLJ	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Description	Casing Depth(m)	Water Depth(m)	Elevation maOD
10.00 10.00	SPT N = 50+ D	18,7,34, 16/10mm			8.7		
10.00 - 10.50	B						
11.00	D						
12.00	B						
			((11.00+))				
13.00	D						
14.00 - 14.45 B	SPT N = 50+	15,10,21,29/10mm			8.70		
14.50	D						
			15.00				29.50
				Base of borehole BH 3 at 15.00			

Remarks
No groundwater.
50mm dia standpipe installed from 5.00m. Bentonite 15.00 - 5.00. Gravel/slotted pipe 5.00 - 3.00. Bentonite/plain pipe 3.00 - 0.0

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CABLE PERCUSSION BOREHOLE RECORD

SITE: BORROW PIT AREA, SEIONT BRICKWORKS, CAERNARFON
LOCN: BORROW PIT AREA, SEIONT BRICKWORKS, CAERNARFON
CLIENT: JONES BROS (RUTHIN) LTD

BOREHOLE No: **BH 4**
Sheet 1 of 2

Dates : 26/11/2015 | Elev (maOD) : 45.00 | Project Ref: e0756
Casing dia :200mm to 8.00m.150mm to 15.00m | Engineer: HLJ

Depth (m)	Sample/ Test	Field Record	Depth (m)	Description	Casing Depth(m)	Water Depth(m)	Elevation maOD
			((0.30))	TOPSOIL. Soft dark brown slightly gravely sandy silty CLAY. Gravel is fine to coarse subangular quartz			45.00
			0.30				44.70
0.50	D			Firm (with some soft patches) light brown mediur brown and grey brown slightly gravely slightly sandy silty CLAY with pockets and lenses of silty fine medium sand. Low cobble content.			
1.00	D						
2.00 - 2.45	SPT N = 4	1,1,1,0,1,2	((3.60))				
2.00	B				1.70		
3.00	D						
			3.90				41.10
4.00 - 4.45	SPT N = 25	4,8,6,5,7,7		Completely weathered dark grey with some ligh grey mottling SILTSTONE, Very weak. (recovered as silty fine to coarse gravel)	3.70		
4.00	B						
5.00	D						
6.00 - 6.45	SPT N = 27	6,7,6,6,8,7			5.90	Slow inflow at 6.00. Rising to 5.25 (20min)	
6.00	B						
7.00	D						
			((11.10+))				
8.00	D						
9.00	D						

Remarks
Groundwater at 6.00 rising to 5.25 in 20 mir

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CABLE PERCUSSION BOREHOLE RECORD

SITE: BORROW PIT AREA, SEIONT BRICKWORKS, CAERNARFON
LOCN: BORROW PIT AREA, SEIONT BRICKWORKS, CAERNARFON
CLIENT: JONES BROS (RUTHIN) LTD

BOREHOLE No: **BH 4**
Sheet 2 of 2

Dates : 26/11/2015 | Elev (maOD) : 45.00 | Project Ref: e0756
Casing dia :200mm to 8.00m.150mm to 15.00m | Engineer: HLJ

Depth (m)	Sample/ Test	Field Record	Depth (m)	Description	Casing Depth(m)	Water Depth(m)	Elevation maOD
10.00 - 10.45	SPT N = 50+	11,9,21,23,6/10mm			6.70		
10.00	B						
10.00 - 10.50	B						
11.00	D						
12.00	B						
			((11.10+))				
13.00	D						
14.00 - 14.45	SPT N = 50+	17,12,27,22/10mm			6.70		
B							
14.50	D						
			15.00				30.00
				Base of borehole BH 4 at 15.00			

Remarks
Groundwater at 6.00 rising to 5.25 in 20 mir
50mm dia standpipe installed from 6.00m. Bentonite 15.00 - 6.00. Gravel/slotted pipe 6.00 - 3.00. Bentonite/plain pipe 3.00 - 0.0

E-geo Solutions Ltd.
Oak House
Groes Lwyd
Abergele
LL22 7SU

Date: 08 January 2016
Test Report Ref: STR 442533

Contract: Seiont, Caernarfon

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Moisture Content of a soil sample (definitive oven-drying method) in accordance with **BS 1377 : Part 2 : 1990 : clause 3.2**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56040**
Client Ref. No:	**BH1 @ 1.5 - 2.0m**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**30/11/2015**
Date of Start of Test:	**03/12/2015**
Sampling Location:	**BH1 @ 1.5 - 2.0m**
Name of Source:	**Seiont, Caernarfon**
Method of Sampling:	**Disturbed Bulk Sample**
Sampled By:	**Client**
Material Description:	**Brown slightly gravelly sandy silty CLAY**
Target Specification:	**N/A**

RESULTS:

Moisture Content (%) = **21**

Comments
None

Certificate Prepared by:-
Euros Jones
Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

E-geo Solutions Ltd.
Oak House
Groes Lwyd
Abergele
LL22 7SU

Date: 08 January 2016
Test Report Ref: STR 442537

Contract: Seiont, Caernarfon

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Moisture Content of a soil sample (definitive oven-drying method) in accordance with **BS 1377 : Part 2 : 1990 : clause 3.2**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56040**
Client Ref. No:	**BH1 @ 3.0m**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**30/11/2015**
Date of Start of Test:	**03/12/2015**
Sampling Location:	**BH1 @ 3.0m**
Name of Source:	**Seiont, Caernarfon**
Method of Sampling:	**Disturbed Bulk Sample**
Sampled By:	**Client**
Material Description:	**Brown slightly gravelly sandy silty CLAY**
Target Specification:	**N/A**

RESULTS:

Moisture Content (%) = **14**

Comments
None

Certificate Prepared by:-
Euros Jones
Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

E-geo Solutions Ltd.
Oak House
Groes Lwyd
Abergele
LL22 7SU

Date: 08 January 2016
Test Report Ref: STR 442539

Contract: Seiont, Caernarfon

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Moisture Content of a soil sample (definitive oven-drying method) in accordance with **BS 1377 : Part 2 : 1990 : clause 3.2**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56040**
Client Ref. No:	**BH2 @ 2.0m**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**30/11/2015**
Date of Start of Test:	**03/12/2015**
Sampling Location:	**BH2 @ 2.0m**
Name of Source:	**Seiont, Caernarfon**
Method of Sampling:	**Disturbed Bulk Sample**
Sampled By:	**Client**
Material Description:	**Brown slightly gravelly sandy silty CLAY**
Target Specification:	**N/A**

RESULTS:

Moisture Content (%) = **17**

Comments
None

Certificate Prepared by:-
Euros Jones
Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

E-geo Solutions Ltd.
Oak House
Groes Lwyd
Abergele
LL22 7SU

Date: 08 January 2016
Test Report Ref: STR 442545

Contract: Seiont, Caernarfon

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Moisture Content of a soil sample (definitive oven-drying method) in accordance with **BS 1377 : Part 2 : 1990 : clause 3.2**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56040**
Client Ref. No:	**BH3 @ 2.8m**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**30/11/2015**
Date of Start of Test:	**03/12/2015**
Sampling Location:	**BH3 @ 2.8m**
Name of Source:	**Seiont, Caernarfon**
Method of Sampling:	**Disturbed Bulk Sample**
Sampled By:	**Client**
Material Description:	**Grey gravelly sandy silty CLAY**
Target Specification:	**N/A**

RESULTS:

Moisture Content (%) = 22

Comments
None

Certificate Prepared by:-
Euros Jones
Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

E-geo Solutions Ltd.
Oak House
Groes Lwyd
Abergele
LL22 7SU

Date: 08 January 2016
Test Report Ref: STR 442547

Contract: Seiont, Caernarfon

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Moisture Content of a soil sample (definitive oven-drying method) in accordance with **BS 1377 : Part 2 : 1990 : clause 3.2**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56040**
Client Ref. No:	**BH3 @ 6.0 - 6.45**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**30/11/2015**
Date of Start of Test:	**03/12/2015**
Sampling Location:	**BH3 @ 6.0 - 6.45**
Name of Source:	**Seiont, Caernarfon**
Method of Sampling:	**Disturbed Bulk Sample**
Sampled By:	**Client**
Material Description:	**Grey slightly gravelly sandy silty CLAY**
Target Specification:	**N/A**

RESULTS:

Moisture Content (%) = 16

Comments
None

Certificate Prepared by:-
Euros Jones
Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

E-geo Solutions Ltd.
Oak House
Groes Lwyd
Abergele
LL22 7SU

Date: 08 January 2016
Test Report Ref: STR 442553

Contract: Seiont, Caernarfon

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Moisture Content of a soil sample (definitive oven-drying method) in accordance with **BS 1377 : Part 2 : 1990 : clause 3.2**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56040**
Client Ref. No:	**BH4 @ 2.0 - 2.5m**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**30/11/2015**
Date of Start of Test:	**03/12/2015**
Sampling Location:	**BH4 @ 2.0 - 2.5m**
Name of Source:	**Seiont, Caernarfon**
Method of Sampling:	**Disturbed Bulk Sample**
Sampled By:	**Client**
Material Description:	**Brown slightly gravelly sandy silty CLAY**
Target Specification:	**N/A**

RESULTS:

Moisture Content (%) = 33

Comments
None

Certificate Prepared by:-
Euros Jones
Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

E-geo Solutions Ltd.
Oak House
Groes Lwyd
Abergele
LL22 7SU

Date: 08 January 2016
Test Report Ref: STR 442555

Contract: Seiont, Caernarfon

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Moisture Content of a soil sample (definitive oven-drying method) in accordance with **BS 1377 : Part 2 : 1990 : clause 3.2**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56040**
Client Ref. No:	**BH4 @ 6.0 - 6.45m**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**30/11/2015**
Date of Start of Test:	**03/12/2015**
Sampling Location:	**BH4 @ 6.0 - 6.45m**
Name of Source:	**Seiont, Caernarfon**
Method of Sampling:	**Disturbed Bulk Sample**
Sampled By:	**Client**
Material Description:	**Grey slightly gravelly sandy silty CLAY**
Target Specification:	**N/A**

RESULTS:

Moisture Content (%) = 8.1

Comments
None

Certificate Prepared by:-
Euros Jones
Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

E-geo Solutions Ltd.
Oak House
Groes Lwyd
Abergele
LL22 7SU

Date: 08 January 2016
Test Report Ref: STR 442541

Contract: Seiont, Caernarfon

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Moisture Content of a soil sample (definitive oven-drying method) in accordance with **BS 1377 : Part 2 : 1990 : clause 3.2**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56040**
Client Ref. No:	**BH2 @ 4.0 - 4.5m**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**30/11/2015**
Date of Start of Test:	**03/12/2015**
Sampling Location:	**BH2 @ 4.0 - 4.5m**
Name of Source:	**Seiont, Caernarfon**
Method of Sampling:	**Disturbed Bulk Sample**
Sampled By:	**Client**
Material Description:	**Brown slightly gravelly sandy silty CLAY**
Target Specification:	**N/A**

RESULTS:

Moisture Content (%) = 18

Comments
None

Certificate Prepared by:-
Euros Jones
Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

E-geo Solutions Ltd.
Oak House
Groes Lwyd
Abergele
LL22 7SU

Date: 08 January 2016
Test Report Ref: STR 442535

Contract: Seiont, Caernarfon

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Dry Density and Moisture Content Relationship of soil passing 20mm sieve 4.5kg Rammer Method in accordance with BS 1377: 4: 1990 Clause 3.5

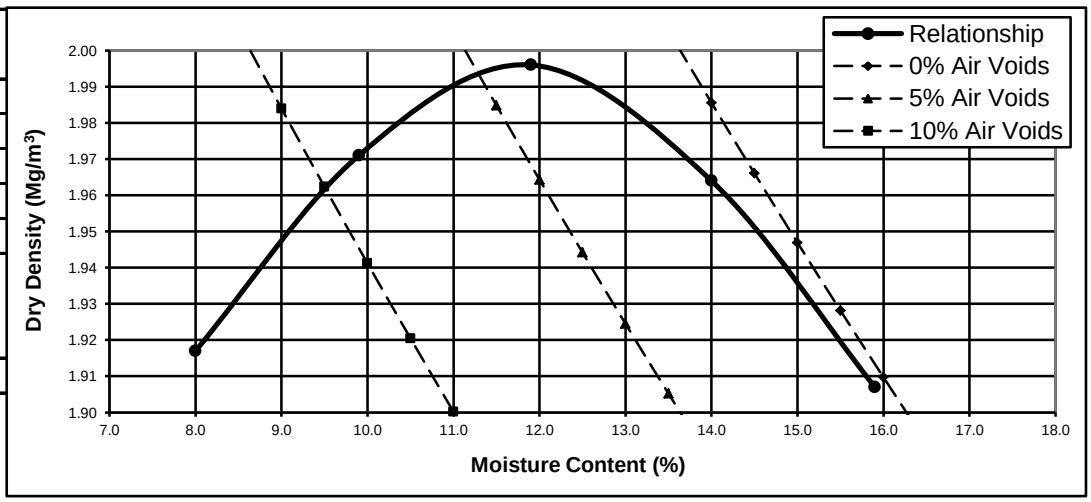
SAMPLE DETAILS:

Certificate of sampling received:	**No**	Name of Source:	**Seiont, Caernarfon**
Laboratory Ref. No:	**S56040**	Method of Sampling:	**Disturbed Bulk Sample**
Client Ref. :	**BH1 @ 1.5 - 2.0m**	Sampled By:	**Client**
Date and Time of Sampling:	**Unknown**		
Date of Receipt at Lab:	**30/11/2015**		
Date of Start of Test:	**04/01/2016**		
Sampling Location:	**BH1 @ 1.5 - 2.0m**		
Soil Description:	**Brown slightly gravelly sandy silty CLAY**		

RESULTS:

Were any unrepresentative lumps present?	**No**
Sample Preparation Procedure:	**3.2.4.1**
Sample Preparation Method:	**Single**
Particle Density:	**2.75Mg/m3 (Assumed)**
Amount of sample retained on 37.5mm test sieve:	**0 %**
Amount of sample retained on 20mm test sieve:	**0 %**

Moisture Content (%)	Dry Density Mg/m^3
8.0	1.92
9.9	1.97
11.9	2.00
14.0	1.96
15.9	1.91
Optimum Moisture Content (%)	**Maximum Dry Density Mg/m^3**
12	2.00



Comments
None

Certificate Prepared by:-
Euros Jones
Laboratory Manager

Approved by:
Eric Goulden
Technical Manager

E-geo Solutions Ltd.
Oak House
Groes Lwyd
Abergele
LL22 7SU

Date: 08 January 2016
Test Report Ref: STR 442543

Contract: Seiont, Caernarfon

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Dry Density and Moisture Content Relationship of soil passing 20mm sieve 4.5kg Rammer Method in accordance with BS 1377: 4: 1990 Clause 3.5

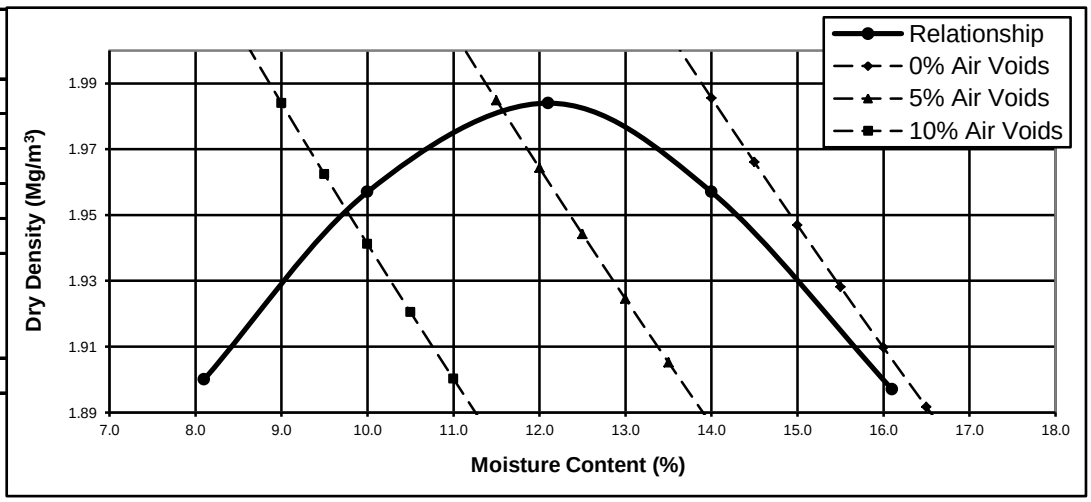
SAMPLE DETAILS:

Certificate of sampling received:	**No**	Name of Source:	**Seiont, Caernarfon**
Laboratory Ref. No:	**S56040**	Method of Sampling:	**Disturbed Bulk Sample**
Client Ref. :	**BH2 @ 4.0 - 4.5m**	Sampled By:	**Client**
Date and Time of Sampling:	**Unknown**		
Date of Receipt at Lab:	**30/11/2015**		
Date of Start of Test:	**04/01/2016**		
Sampling Location:	**BH2 @ 4.0 - 4.5m**		
Soil Description:	**Brown slightly gravelly sandy silty CLAY**		

RESULTS:

Were any unrepresentative lumps present?	**No**
Sample Preparation Procedure:	**3.2.4.1**
Sample Preparation Method:	**Single**
Particle Density:	**2.75Mg/m3 (Assumed)**
Amount of sample retained on 37.5mm test sieve:	**0 %**
Amount of sample retained on 20mm test sieve:	**0 %**

Moisture Content (%)	Dry Density Mg/m^3
8.1	1.90
10.0	1.96
12.1	1.98
14.0	1.96
16.1	1.90
Optimum Moisture Content (%)	**Maximum Dry Density Mg/m^3**
12	1.98



Comments
None

Certificate Prepared by:-
Euros Jones
Laboratory Manager

Approved by:
Eric Goulden
Technical Manager

E-geo Solutions Ltd.
Oak House
Groes Lwyd
Abergele
LL22 7SU

Date: 08 January 2016
Test Report Ref: STR 442549

Contract: Seiont, Caernarfon

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Dry Density and Moisture Content Relationship of soil passing 20mm sieve 4.5kg Rammer Method in accordance with BS 1377: 4: 1990 Clause 3.5

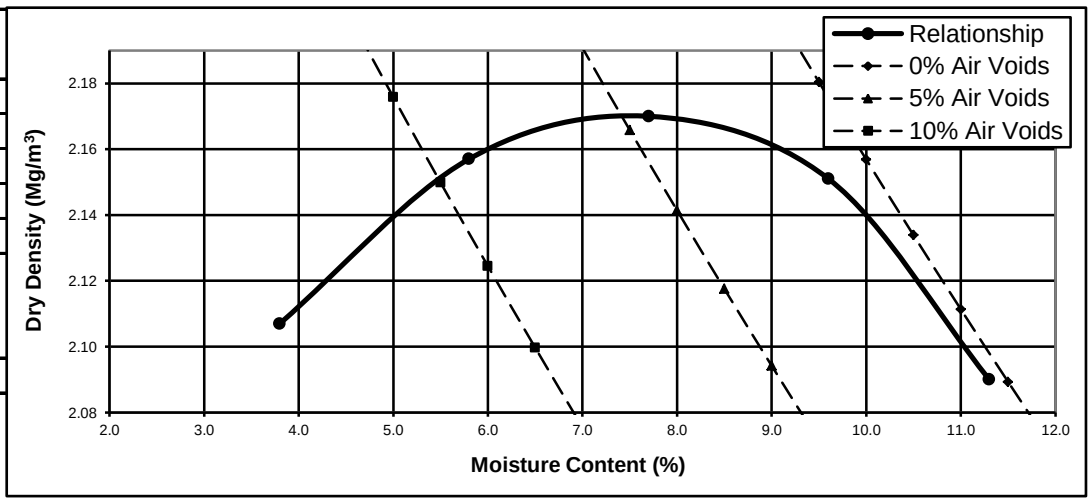
SAMPLE DETAILS:

Certificate of sampling received:	**No**	Name of Source:	**Seiont, Caernarfon**
Laboratory Ref. No:	**S56040**	Method of Sampling:	**Disturbed Bulk Sample**
Client Ref. :	**BH3 @ 6.0 - 6.45**	Sampled By:	**Client**
Date and Time of Sampling:	**Unknown**		
Date of Receipt at Lab:	**30/11/2015**		
Date of Start of Test:	**04/01/2016**		
Sampling Location:	**BH3 @ 6.0 - 6.45**		
Soil Description:	**Grey slightly gravelly sandy silty CLAY**		

RESULTS:

Were any unrepresentative lumps present?	**No**
Sample Preparation Procedure:	**3.2.4.1**
Sample Preparation Method:	**Single**
Particle Density:	**2.75Mg/m3 (Assumed)**
Amount of sample retained on 37.5mm test sieve:	**0 %**
Amount of sample retained on 20mm test sieve:	**0 %**

Moisture Content (%)	Dry Density Mg/m^3
3.8	2.11
5.8	2.16
7.7	2.17
9.6	2.15
11.3	2.09
Optimum Moisture Content (%)	**Maximum Dry Density Mg/m^3**
7.5	2.17



Comments
None

Certificate Prepared by:-
Euros Jones
Laboratory Manager

Approved by:
Eric Goulden
Technical Manager

E-geo Solutions Ltd.
Oak House
Groes Lwyd
Abergele
LL22 7SU

Date: 08 January 2016
Test Report Ref: STR 442551

Contract: Seiont, Caernarfon

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Dry Density and Moisture Content Relationship of soil passing 20mm sieve 4.5kg Rammer Method in accordance with BS 1377: 4: 1990 Clause 3.5

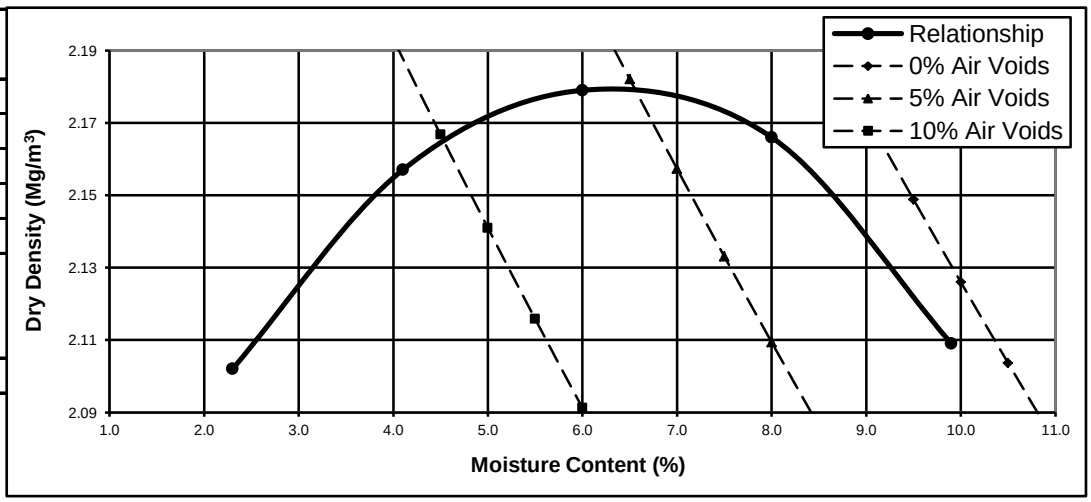
SAMPLE DETAILS:

Certificate of sampling received:	**No**	Name of Source:	**Seiont, Caernarfon**
Laboratory Ref. No:	**S56040**	Method of Sampling:	**Disturbed Bulk Sample**
Client Ref. :	**BH3 @ 10.0 - 10.45m**	Sampled By:	**Client**
Date and Time of Sampling:	**Unknown**		
Date of Receipt at Lab:	**30/11/2015**		
Date of Start of Test:	**04/01/2016**		
Sampling Location:	**BH3 @ 10.0 - 10.45m**		
Soil Description:	**Grey slightly gravelly sandy silty CLAY**		

RESULTS:

Were any unrepresentative lumps present?	**No**
Sample Preparation Procedure:	**3.2.4.1**
Sample Preparation Method:	**Single**
Particle Density:	**2.7Mg/m3 (Assumed)**
Amount of sample retained on 37.5mm test sieve:	**0 %**
Amount of sample retained on 20mm test sieve:	**0 %**

Moisture Content (%)	Dry Density Mg/m^3
2.3	2.10
4.1	2.16
6.0	2.18
8.0	2.17
9.9	2.11
Optimum Moisture Content (%)	**Maximum Dry Density Mg/m^3**
6.3	2.18



Comments
None

Certificate Prepared by:-
Euros Jones
Laboratory Manager

Approved by:
Eric Goulden
Technical Manager

E-geo Solutions Ltd.
Oak House
Groes Lwyd
Abergele
LL22 7SU

Date: 08 January 2016
Test Report Ref: STR 442557

Contract: Seiont, Caernarfon

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Dry Density and Moisture Content Relationship of soil passing 20mm sieve 4.5kg Rammer Method in accordance with BS 1377: 4: 1990 Clause 3.5

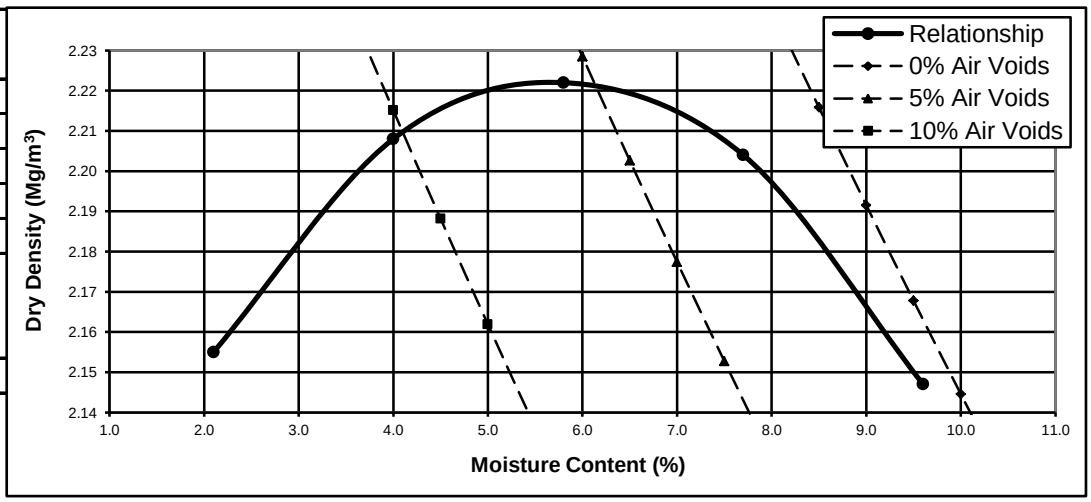
SAMPLE DETAILS:

Certificate of sampling received:	**No**	Name of Source:	**Seiont, Caernarfon**
Laboratory Ref. No:	**S56040**	Method of Sampling:	**Disturbed Bulk Sample**
Client Ref. :	**BH4 @ 6.0 - 6.45m**	Sampled By:	**Client**
Date and Time of Sampling:	**Unknown**		
Date of Receipt at Lab:	**30/11/2015**		
Date of Start of Test:	**04/01/2016**		
Sampling Location:	**BH4 @ 6.0 - 6.45m**		
Soil Description:	**Grey slightly gravelly sandy silty CLAY**		

RESULTS:

Were any unrepresentative lumps present?	**No**
Sample Preparation Procedure:	**3.2.4.1**
Sample Preparation Method:	**Single**
Particle Density:	**2.73Mg/m3 (Assumed)**
Amount of sample retained on 37.5mm test sieve:	**0 %**
Amount of sample retained on 20mm test sieve:	**0 %**

Moisture Content (%)	Dry Density Mg/m^3
2.1	2.16
4.0	2.21
5.8	2.22
7.7	2.20
9.6	2.15
Optimum Moisture Content (%)	**Maximum Dry Density Mg/m^3**
5.7	2.22



Comments
None

Certificate Prepared by:-
Euros Jones
Laboratory Manager

Approved by:
Eric Goulden
Technical Manager

E-geo Solutions Ltd.
Oak House
Groes Lwyd
Abergele
LL22 7SU

Date: 08 January 2016
Test Report Ref: STR 442534

Contract: Seiont, Caernarfon

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Plastic Limit, Liquid Limit, and Plasticity Index of sample in accordance with **BS 1377:Part 2:1990 Clause 5.3, Clause 4.3, and Clause 5.4.**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56040**
Client Ref. :	**BH1 @ 1.5 - 2.0m**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**30/11/2015**
Date of Start of Test:	**16/12/2015**
Sampling Location:	**BH1 @ 1.5 - 2.0m**
Name of Source:	**Seiont, Caernarfon**
Method of Sampling:	**Disturbed Bulk Sample**
Sampled By:	**Client**
Soil Description:	**Brown slightly gravelly sandy silty CLAY**
Target Specification:	**N/A**

RESULTS:

History of sample:	**:**	**~~Natural state~~/After wet sieving**
% Materials passing 425µm	**=**	**65**
Plastic Limit	**=**	**18**
Liquid Limit	**=**	**40**
Plasticity Index	**=**	**22**

Comments
None

Certificate Prepared by:-
Euros Jones
Laboratory Manager

Approved by:
Eric Goulden
Technical Manager

E-geo Solutions Ltd.
Oak House
Groes Lwyd
Abergele
LL22 7SU

Date: 08 January 2016
Test Report Ref: STR 442538

Contract: Seiont, Caernarfon

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Plastic Limit, Liquid Limit, and Plasticity Index of sample in accordance with **BS 1377:Part 2:1990 Clause 5.3, Clause 4.3, and Clause 5.4.**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56040**
Client Ref. :	**BH1 @ 3.0m**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**30/11/2015**
Date of Start of Test:	**16/12/2015**
Sampling Location:	**BH1 @ 3.0m**
Name of Source:	**Seiont, Caernarfon**
Method of Sampling:	**Disturbed Bulk Sample**
Sampled By:	**Client**
Soil Description:	**Brown slightly gravelly sandy silty CLAY**
Target Specification:	**N/A**

RESULTS:

History of sample:	**:**	**~~Natural state~~/After wet sieving**
% Materials passing 425µm	**=**	**70**
Plastic Limit	**=**	**17**
Liquid Limit	**=**	**36**
Plasticity Index	**=**	**19**

Comments
None

Certificate Prepared by:-
Euros Jones
Laboratory Manager

Approved by:
Eric Goulden
Technical Manager

E-geo Solutions Ltd.
Oak House
Groes Lwyd
Abergele
LL22 7SU

Date: 08 January 2016
Test Report Ref: STR 442540

Contract: Seiont, Caernarfon

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Plastic Limit, Liquid Limit, and Plasticity Index of sample in accordance with **BS 1377:Part 2:1990 Clause 5.3, Clause 4.3, and Clause 5.4.**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56040**
Client Ref. :	**BH2 @ 2.0m**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**30/11/2015**
Date of Start of Test:	**16/12/2015**
Sampling Location:	**BH2 @ 2.0m**
Name of Source:	**Seiont, Caernarfon**
Method of Sampling:	**Disturbed Bulk Sample**
Sampled By:	**Client**
Soil Description:	**Brown slightly gravelly sandy silty CLAY**
Target Specification:	**N/A**

RESULTS:

History of sample:	**:**	**~~Natural state~~/After wet sieving**
% Materials passing 425µm	**=**	**71**
Plastic Limit	**=**	**18**
Liquid Limit	**=**	**32**
Plasticity Index	**=**	**14**

Comments
None

Certificate Prepared by:-
Euros Jones
Laboratory Manager

Approved by:
Eric Goulden
Technical Manager

E-geo Solutions Ltd.
Oak House
Groes Lwyd
Abergele
LL22 7SU

Date: 08 January 2016
Test Report Ref: STR 442542

Contract: Seiont, Caernarfon

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Plastic Limit, Liquid Limit, and Plasticity Index of sample in accordance with **BS 1377:Part 2:1990 Clause 5.3, Clause 4.3, and Clause 5.4.**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56040**
Client Ref. :	**BH2 @ 4.0 - 4.5m**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**30/11/2015**
Date of Start of Test:	**16/12/2015**
Sampling Location:	**BH2 @ 4.0 - 4.5m**
Name of Source:	**Seiont, Caernarfon**
Method of Sampling:	**Disturbed Bulk Sample**
Sampled By:	**Client**
Soil Description:	**Brown slightly gravelly sandy silty CLAY**
Target Specification:	**N/A**

RESULTS:

History of sample:	**:**	**~~Natural state~~/After wet sieving**
% Materials passing 425µm	**=**	**71**
Plastic Limit	**=**	**17**
Liquid Limit	**=**	**34**
Plasticity Index	**=**	**17**

Comments
None

Certificate Prepared by:-
Euros Jones
Laboratory Manager

Approved by:
Eric Goulden
Technical Manager

E-geo Solutions Ltd.
Oak House
Groes Lwyd
Abergele
LL22 7SU

Date: 08 January 2016
Test Report Ref: STR 442546

Contract: Seiont, Caernarfon

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Plastic Limit, Liquid Limit, and Plasticity Index of sample in accordance with **BS 1377:Part 2:1990 Clause 5.3, Clause 4.3, and Clause 5.4.**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56040**
Client Ref. :	**BH3 @ 2.8m**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**30/11/2015**
Date of Start of Test:	**03/12/2015**
Sampling Location:	**BH3 @ 2.8m**
Name of Source:	**Seiont, Caernarfon**
Method of Sampling:	**Disturbed Bulk Sample**
Sampled By:	**Client**
Soil Description:	**Grey gravelly sandy silty CLAY**
Target Specification:	**N/A**

RESULTS:

History of sample:	**:**	**~~Natural state~~/After wet sieving**
% Materials passing 425µm	**=**	**28**
Plastic Limit	**=**	**17**
Liquid Limit	**=**	**26**
Plasticity Index	**=**	**9**

Comments
None

Certificate Prepared by:-
Euros Jones
Laboratory Manager

Approved by:
Eric Goulden
Technical Manager

E-geo Solutions Ltd.
Oak House
Groes Lwyd
Abergele
LL22 7SU

Date: 08 January 2016
Test Report Ref: STR 442554

Contract: Seiont, Caernarfon

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Plastic Limit, Liquid Limit, and Plasticity Index of sample in accordance with **BS 1377:Part 2:1990 Clause 5.3, Clause 4.3, and Clause 5.4.**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56040**
Client Ref. :	**BH4 @ 2.0 - 2.5m**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**30/11/2015**
Date of Start of Test:	**16/12/2015**
Sampling Location:	**BH4 @ 2.0 - 2.5m**
Name of Source:	**Seiont, Caernarfon**
Method of Sampling:	**Disturbed Bulk Sample**
Sampled By:	**Client**
Soil Description:	**Brown slightly gravelly sandy silty CLAY**
Target Specification:	**N/A**

RESULTS:

History of sample:	**:**	**~~Natural state~~/After wet sieving**
% Materials passing 425µm	**=**	**50**
Plastic Limit	**=**	**19**
Liquid Limit	**=**	**33**
Plasticity Index	**=**	**14**

Comments
None

Certificate Prepared by:-
Euros Jones
Laboratory Manager

Approved by:
Eric Goulden
Technical Manager

E-geo Solutions Ltd.
Oak House
Groes Lwyd
Abergele
LL22 7SU

Date: 08 January 2016
Test Report Ref: STR 442556

Contract: Seiont, Caernarfon

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Plastic Limit, Liquid Limit, and Plasticity Index of sample in accordance with **BS 1377:Part 2:1990 Clause 5.3, Clause 4.3, and Clause 5.4.**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56040**
Client Ref. :	**BH4 @ 6.0 - 6.45m**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**30/11/2015**
Date of Start of Test:	**16/12/2015**
Sampling Location:	**BH4 @ 6.0 - 6.45m**
Name of Source:	**Seiont, Caernarfon**
Method of Sampling:	**Disturbed Bulk Sample**
Sampled By:	**Client**
Soil Description:	**Grey slightly gravelly sandy silty CLAY**
Target Specification:	**N/A**

RESULTS:

History of sample:	**:**	**~~Natural state~~/After wet sieving**
% Materials passing 425µm	**=**	**52**
Plastic Limit	**=**	**18**
Liquid Limit	**=**	**32**
Plasticity Index	**=**	**14**

Comments
None

Certificate Prepared by:-
Euros Jones
Laboratory Manager

Approved by:
Eric Goulden
Technical Manager

E-geo Solutions Ltd.
Oak House
Groes Lwyd
Abergele
LL22 7SU

Date: 08 January 2016
Test Report Ref: STR 442548

Contract: Seiont, Caernarfon

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Plastic Limit, Liquid Limit, and Plasticity Index of sample in accordance with **BS 1377:Part 2:1990 Clause 5.3, Clause 4.3, and Clause 5.4.**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56040**
Client Ref. :	**BH3 @ 6.0 - 6.45**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**30/11/2015**
Date of Start of Test:	**16/12/2015**
Sampling Location:	**BH3 @ 6.0 - 6.45**
Name of Source:	**Seiont, Caernarfon**
Method of Sampling:	**Disturbed Bulk Sample**
Sampled By:	**Client**
Soil Description:	**Grey slightly gravelly sandy silty CLAY**
Target Specification:	**N/A**

RESULTS:

History of sample:	**:**	**~~Natural state~~/After wet sieving**
% Materials passing 425µm	**=**	**56**
Plastic Limit	**=**	**18**
Liquid Limit	**=**	**29**
Plasticity Index	**=**	**11**

Comments
None

Certificate Prepared by:-
Euros Jones
Laboratory Manager

Approved by:
Eric Goulden
Technical Manager

E-geo Solutions Ltd.
Oak House
Groes Lwyd
Abergele
LL22 7SU

Date: 08 January 2016
Test Report Ref: STR 442544

Contract: Seiont, Caernarfon

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the in-situ vane strength of weak intact cohesive soils in **accordance with BS 1377 : Part 9 : 1990 : clause 4.4**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56040**
Client Ref. No:	**BH2 @ 4.0 - 4.5m**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**30/11/2015**
Date of Start of Test:	**03/12/2015**
Sampling Location:	**BH2 @ 4.0 - 4.5m**
Name of Source:	**Seiont, Caernarfon**
Method of Sampling:	**Disturbed Bulk Sample**
Sampled By:	**Client**
Material Description:	**Brown slightly gravelly sandy silty CLAY**
Target Specification:	**N/A**

RESULTS:

Test 1 =	74 kPa
Test 2 =	80 kPa
Test 3 =	82 kPa
Mean Vane Shear Strength =	**79 kPa**

Comments

Test carried out on natural moisture content of 18.4%
Remoulded with a 4.5kg rammer

Certificate Prepared by:-

Euros Jones
Laboratory Manager

Approved by: -

Eric Goulden
Technical Manager

E-geo Solutions Ltd.
Oak House
Groes Lwyd
Abergele
LL22 7SU

Date: 08 January 2016
Test Report Ref: STR 442552

Contract: Seiont, Caernarfon

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the in-situ vane strength of weak intact cohesive soils in **accordance with BS 1377 : Part 9 : 1990 : clause 4.4**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56040**
Client Ref. No:	**BH3 @ 10.0 - 10.45m**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**30/11/2015**
Date of Start of Test:	**03/12/2015**
Sampling Location:	**BH3 @ 10.0 - 10.45m**
Name of Source:	**Seiont, Caernarfon**
Method of Sampling:	**Disturbed Bulk Sample**
Sampled By:	**Client**
Material Description:	**Grey slightly gravelly sandy silty CLAY**
Target Specification:	**N/A**

RESULTS:

Test 1 =	36 kPa
Test 2 =	40 kPa
Test 3 =	38 kPa
Mean Vane Shear Strength =	**38 kPa**

Comments

Test carried out on natural moisture content of 17.0%
Remoulded with a 4.5kg rammer

Certificate Prepared by:-

Euros Jones
Laboratory Manager

Approved by: -

Eric Goulden
Technical Manager

E-geo Solutions Ltd.
Oak House
Groes Lwyd
Abergele
LL22 7SU

Date: 08 January 2016
Test Report Ref: STR 442536

Contract: Seiont, Caernarfon

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Undrained Shear Strength in Triaxial Compression Without Measurement of Pore Pressure in accordance with **BS 1377-7: 1990 Clause 8**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56040**
Client Ref. No:	**BH1 @ 1.5 - 2.0m**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**30/11/2015**
Date of Start of Test:	**09/12/2015**
Sampling Location:	**BH1 @ 1.5 - 2.0m**
Name of Source:	**Seiont, Caernarfon**
Method of Sampling:	**Disturbed Bulk Sample**
Sampled By:	**Client**
Material Description:	**Brown slightly gravelly sandy silty CLAY**
Target Specification:	**N/A**

RESULTS:

See attached

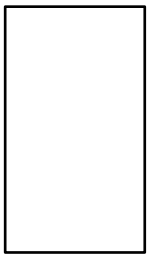
Comments
None

Certificate Prepared by:-
Euros Jones
Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

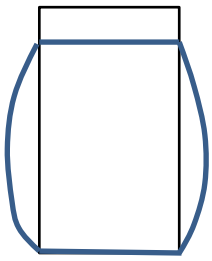
Sample Condition: REMOULDED
If remoulded state method of compaction: 4.5kg rammer

ORIENTATION AND POSITION OF UNDISTURBED SAMPLE WITHIN SAMPLING CONTAINER



Initial Specimen Length	202 mm
Initial Specimen Diameter	101 mm
Initial Moisture Content	20.2 %
Bulk Density	2.082 Mg/m³
Dry Density	1.732 Mg/m³
Rate of Strain	1.5 %/min
Latex Membrane Thickness	0.6 mm
Membrane Correction	2.3 kPa
Cell Pressure	200 kPa
Corrected Maximum Deviator Stress at failure	66 kPa
Strain at Failure	20.0 %
Shear Strength C_u	**33 kPa**

Mode of Failure: Plastic Failure-(Barrelling) *
~~Brittle Failure (Shear Plane)~~ *
~~Intermediate Type~~ *
* Delete as appropriate.



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Groes Lwyd
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LL22 7SU

Date: 08 January 2016
Test Report Ref: STR 442550

Contract: Seiont, Caernarfon

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Undrained Shear Strength in Triaxial Compression Without Measurement of Pore Pressure in accordance with **BS 1377-7: 1990 Clause 8**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56040**
Client Ref. No:	**BH3 @ 6.0 - 6.45**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**30/11/2015**
Date of Start of Test:	**09/12/2015**
Sampling Location:	**BH3 @ 6.0 - 6.45**
Name of Source:	**Seiont, Caernarfon**
Method of Sampling:	**Disturbed Bulk Sample**
Sampled By:	**Client**
Material Description:	**Grey slightly gravelly sandy silty CLAY**
Target Specification:	**N/A**

RESULTS:

See attached

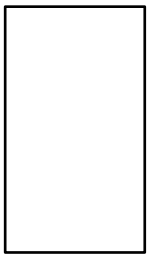
Comments
None

Certificate Prepared by:-
Euros Jones
Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

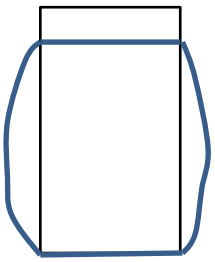
Sample Condition: REMOULDED
If remoulded state method of compaction: 4.5kg rammer

ORIENTATION AND POSITION OF UNDISTURBED SAMPLE WITHIN SAMPLING CONTAINER



Initial Specimen Length	202 mm
Initial Specimen Diameter	101 mm
Initial Moisture Content	16.6 %
Bulk Density	2.195 Mg/m³
Dry Density	1.882 Mg/m³
Rate of Strain	1.5 %/min
Latex Membrane Thickness	0.6 mm
Membrane Correction	2.3 kPa
Cell Pressure	200 kPa
Corrected Maximum Deviator Stress at failure	106 kPa
Strain at Failure	20.0 %
Shear Strength C_u	**53 kPa**

Mode of Failure: Plastic Failure-(Barrelling) *
~~Brittle Failure (Shear Plane)~~ *
~~Intermediate Type~~ *
* Delete as appropriate.



E-geo Solutions Ltd.
Oak House
Groes Lwyd
Abergele
LL22 7SU

Date: 08 January 2016
Test Report Ref: STR 442558

Contract: Seiont, Caernarfon

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Undrained Shear Strength in Triaxial Compression Without Measurement of Pore Pressure in accordance with **BS 1377-7: 1990 Clause 8**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56040**
Client Ref. No:	**BH4 @ 6.0 - 6.45m**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**30/11/2015**
Date of Start of Test:	**09/12/2016**
Sampling Location:	**BH4 @ 6.0 - 6.45m**
Name of Source:	**Seiont, Caernarfon**
Method of Sampling:	**Disturbed Bulk Sample**
Sampled By:	**Client**
Material Description:	**Grey slightly gravelly sandy silty CLAY**
Target Specification:	**N/A**

RESULTS:

See attached

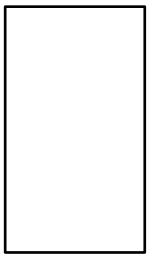
Comments
None

Certificate Prepared by:-
Euros Jones
Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

Sample Condition: REMOULDED
If remoulded state method of compaction: 4.5kg rammer

ORIENTATION AND POSITION OF UNDISTURBED SAMPLE WITHIN SAMPLING CONTAINER



Initial Specimen Length	202 mm
Initial Specimen Diameter	101 mm
Initial Moisture Content	8.9 %
Bulk Density	2.309 Mg/m³
Dry Density	2.120 Mg/m³
Rate of Strain	1.5 %/min
Latex Membrane Thickness	0.6 mm
Membrane Correction	1.6 kPa
Cell Pressure	200 kPa
Corrected Maximum Deviator Stress at failure	458 kPa
Strain at Failure	12.5 %
Shear Strength C_u	**229 kPa**

Mode of Failure: Plastic Failure-(Barrelling) *
~~Brittle Failure (Shear Plane)~~ *
~~Intermediate Type~~ *
* Delete as appropriate.