Appendix A.9.1 - Part 3

Ground Investigation Reports

Appendix A.9.1.5

Phase 3 Contract 2, N6 Galway City Transport Project Phase 3 Ground Investigation Contract 2, October 2015 to January 2016

R15-16

N6 Galway City Transport Project

Phase 3 Ground Investigation

Contract No. 2 - Factual Report

Galway County Council

Prepared by BRG Ltd. on behalf of Priority Drilling Ltd.

Dave Blaney

Project Number: **R15/16**
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R15/16
N6 Galway City Transport Project - Phase 3 Ground Investigation
Contract No. 2 - Factual Report
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Contents

List of Figures

Appendices

1. Purpose and Scope of Works

Galway County Council, on its own behalf and on behalf of Galway City Council, are committed to developing a solution to the existing transportation issues in Galway City and its environs, which are having a negative impact upon the local, regional and national road network. As part of this work it is necessary to undertake ground investigation works prior to the commencement of detailed design work.

The Menlo region, within and to the immediate west of Lackagh Quarry, has been selected as a possible route for the N6 road development (Figure 1).

Figure 1: Lackagh Quarry Ground Investigation Site - Yellow Polygon (Google 2015)

The site consists of a non-active quarry with associated derelict buildings, plant, structures and poor quality agricultural land used for the grazing of cattle (Figure 2).

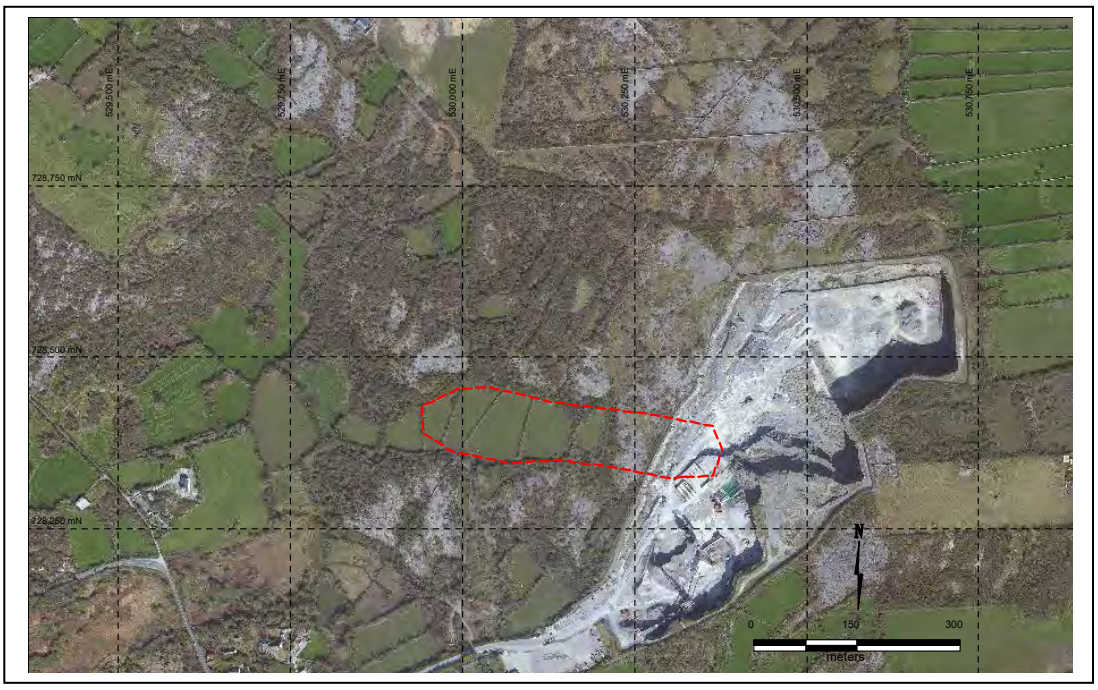

Figure 2: Site Area - Dashed Red Line

This area is in an environmentally sensitive region, with the Lough Corrib cSAC Annex 1 habitat (candidate Special Area of Conservation) located immediately west and north of the Lackagh Quarry site (Figure 3).

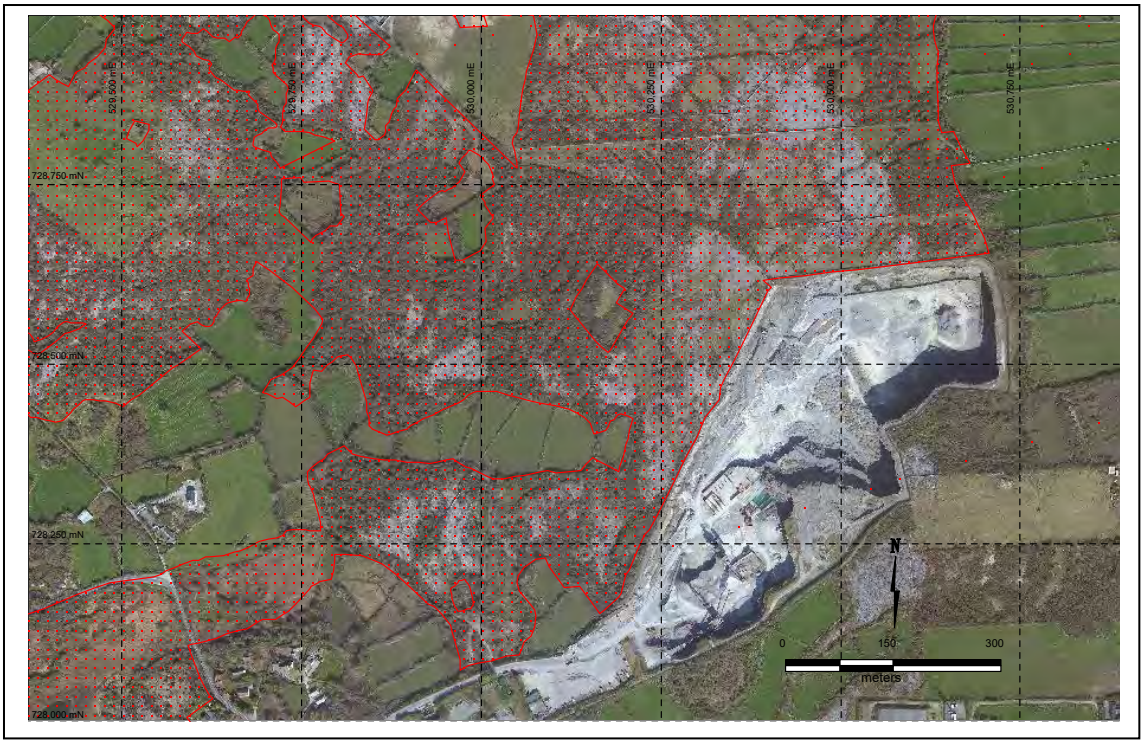

Figure 3: SAC Location (Red Hashed Area) (NPWS 2015)

The objective of the ground investigation is as follows:

- Characterise the nature of the rockmass for tunnel design;
- Characterise the hydrogeology for tunnel design and the existing groundwater conditions;
- Indentify any existing karst features and potential for karstic conditions with the rockmass
- Carryout in-situ and laboratory testing to provide geotechnical and hydrogeological parameters for tunnel design

In order to accomplish the stated objectives the following ground investigation was proposed:

- 1 No. Sub-horizontal rotary core drillhole along the proposed tunnel alignment for a length of approximately 300m
- 3 No. Vertical Rotary core drillholes to depths of 32.5m, 35.0m and 40.0m
- 3 No. Monitoring Installations (piezometers) with raised steel covers
- Geotechnical Laboratory Testing

- Downhole Geophysics
- Surface Geophysics
- Factual Reporting

2. Geological Setting and Ground Conditions

The site is underlain by Lower Carboniferous (Visean) Limestone located approximately 2km to the northeast of the contact with the Galway granitic intrusive complex (Figure 4). There is little published data for this region and Geological Survey of Ireland (GSI) 1:100,000 scale Bedrock Map series record this area as Undifferentiated Visean Shelf Limestones.

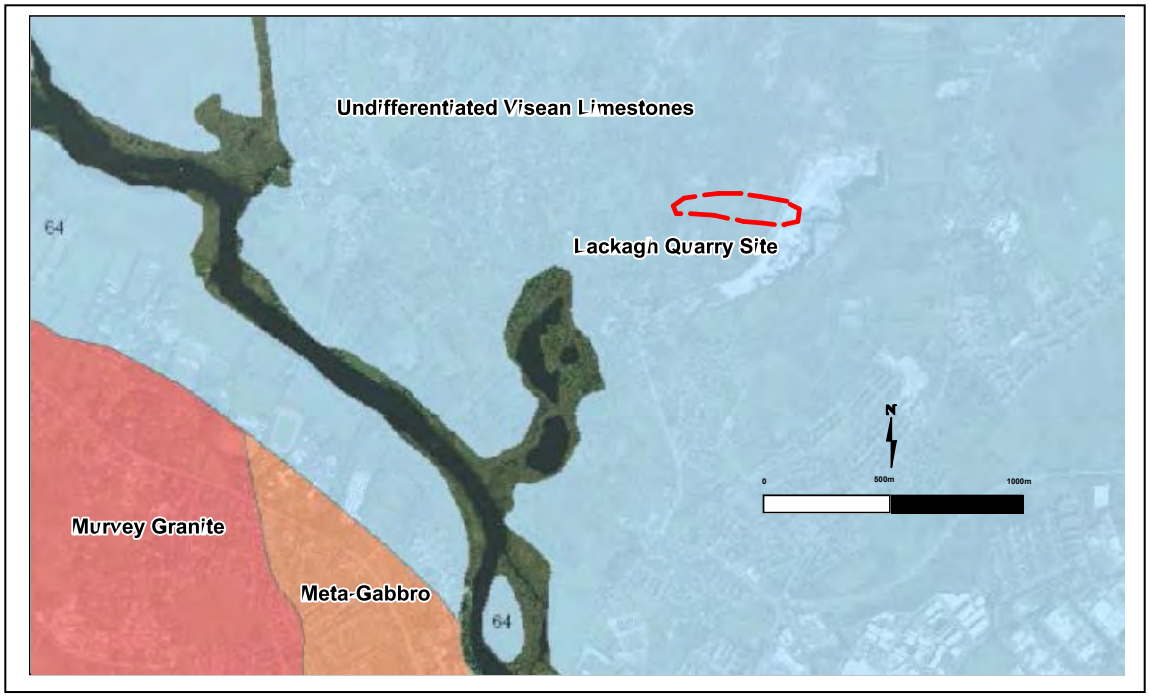

Figure 4: Simplified Geology Map of the Menlo Region (GSI 1:100,000 series)

The bedrock geology is dominated by light grey / grey, massively bedded, fine to medium grained pellety to weakly oolitic grainstones. Discrete, metric scale, beds of dark grey / black limestones are developed within the sequence. The black limestone beds are dominated by synsedimentary breccias with intraclastic clasts of grainstone supported in a black fine grained micritic matrix, this was only intersected by one of the ground investigation boreholes. There is evidence of burrowing and the brecciation may have been caused by bioturbation. Minor bioclastic debris is disseminated throughout, dominated by unrecognisable small shell fragments. Locally occurring coarse bioclastic fragments consist of thick shelled brachiopods and solitary corals. The fauna and well sorted nature of the rock are indicative of a shallow water, relatively high energy depositional environment. Thin (centimetric scale), horizons of grey / green to black mudstone form semi-continuous marker horizons within the geological sequence. The mudstone horizons (often known as clay wayboards) can be weakly tuffaceous, often containing a significant proportion of finely disseminated pyrite. The pyrite in these thin bands oxidises strongly and is responsible for the surficial iron staining present on parts of the lower benches at Lackagh Quarry.

The unconsolidated Quaternary geology of this region has been proven by the recent drilling to be much more complex than originally anticipated. A deep buried channel / trough is located to the west orientated along an east-west axis. Unconsolidated material deposited within this feature ranges from lacustrine, laminated (possibly varved) dark brown, organic clays to sands / gravels of a possibly fluviatile origin, all overlain by very stiff, glacial boulder clays.

Extensive areas of limestone pavement are developed to the north and west of the quarry site and there are numerous glacial erratics scattered throughout, many of which are granitic.

3. Ground Investigations

3.1 Setting Out / Surveying

Drawings and coordinates were provided by ARUP and were used to locate and position each borehole and geophysical station. The drillhole collar locations were positioned using a Trimble GeoExplorer 6000 RTK GPS system corrected to a differential base station through a phone modem link. Locations were measured relative to Irish Transverse Mercator.

The low angle borehole, BH01, was set out using the Trimble GeoExplorer 6000 RTK GPS system. The hole / working platform was orientated using a prismatic compass, accurate to +/- 0.5°. The rig was then set up using a Reflex TN14 Gyrocompass to measure the exact dip and azimuth of the hole before coring commenced.

Downhole surveying of drillhole BH01 was carried out at 3m intervals using a Reflex EZ-TRAC digital downhole survey instrument. Owing to ground conditions (cavities and localised broken ground from 186m) the hole could only be surveyed from 175m back to surface. A core orientation tool had been used throughout the drilling that provided information about the dip of the hole, the driller noted no significant variation in dip from 175m. Refer to Appendix I for all surveying data.

3.2 Ground Geophysical Surveying

Ground geophysical surveying was specified for the Lackagh Quarry Ground Investigation. BRG Ltd were sub-contracted by Priority Drilling Ltd. to carry out the surveying. The geophysical surveys consisted of 2D Electrical Resistivity Tomography (ERT) and Microgravity across an initial area of roughly 300x30m, this area was subsequently extended to define the lateral and depth extent of a zone of deep overburden. The surveys were designed to test for subsurface heterogeneity and bedrock depths in advance of follow up rotary core drilling. Information on potential karst features were of particular interest to the client.

Microgravity data was acquired with measured sites along the centre line and 15m either side of the proposed tunnel section. These lines were measured with nominal station spacing of 10m, with gaps where scrub hawthorn was too thick. Extra stations were measured within the quarry on the first bench at 5-10m intervals. Measurements were taken using a Lacoste & Romberg model G gravity meter. Instrument drift was monitored by returning to a locally established base station at hourly intervals.

Stations were topographically surveyed using a Trimble GeoExplorer 6000 RTK GPS system corrected through phone modem link for both the ERT and the gravity surveys. The drift corrected gravity data was corrected for elevation, latitude, and reduced to Bouguer 2.67g/cm^3 to allow for local average rock densities. It was then gridded and exported for display and interpretation in the MapInfo GIS system (Figure 5).

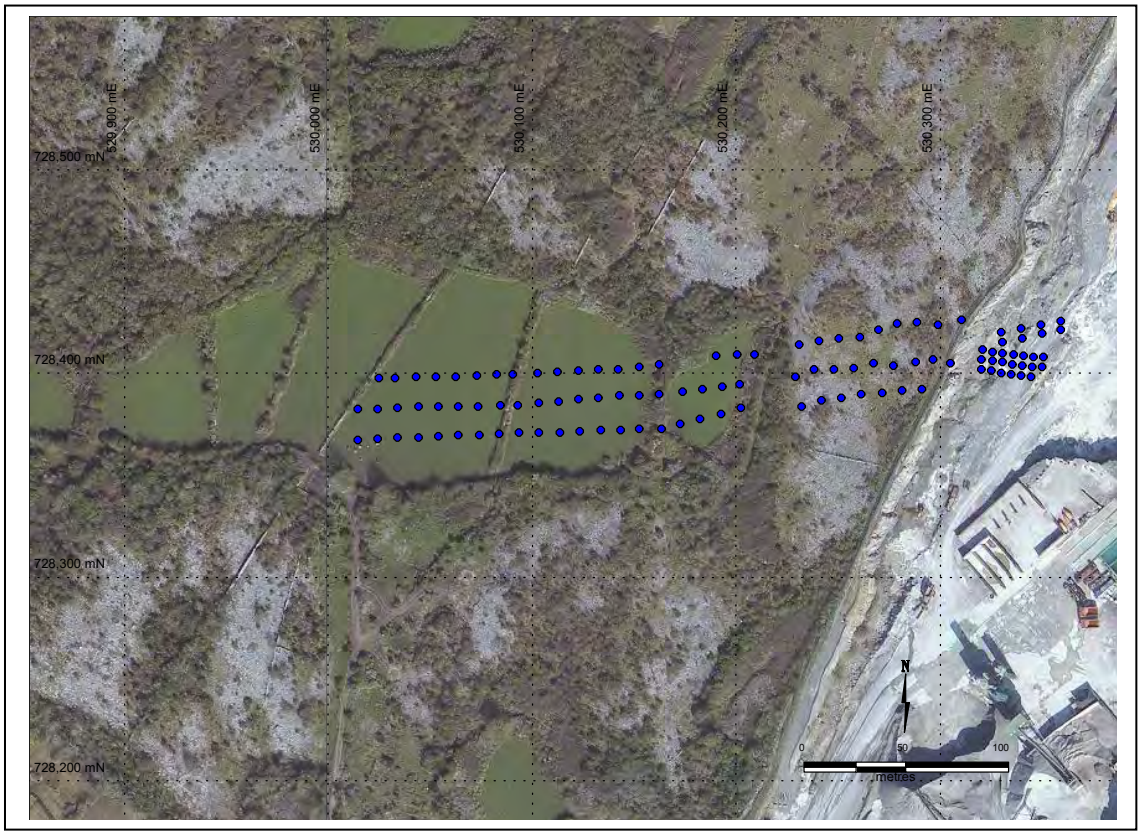

Figure 5: Microgravity Station Locations

Figure 6: 2D Electrical Resistivity Tomography (ERT) Line / Station Locations

The depth mapping potential with the ERT is limited by the length of each spread. The variability of line lengths meant that the ERT surveying was capable of surveying to a minimum depth of 22m bgl on Line 5 to a maximum depth of 60m bgl on Line 6. Equipment used was an Allied Associates Tigre system which has the potential for up to 128 electrode takeouts. 2m station spacing was initially used to get the required detail along the chosen lines, with 3m intervals on the long lines (6, 7 & 8). Data was measured using a Wenner array, controlled by an Imager2006 programme with a laptop computer. Saved data was inverted using the Geotomo Res2Dinv programme and exported as an image file displaying a cross section of the inverted Resistivities with elevation data. The resultant resistivity sections were subsequently interpreted and an interpreted geological model developed.

Resistivity sections from the 2D ERT and the microgravity data show a marked contrast from high resistivity bedrock in the east with a sharp contact into very low resistivity zones to the west. The western region has a low gravity response coincident with the low resistivity. The base of the initial ERT lines did not penetrate below 30m, however, the low resistivity zone developed to the west suggests that this area was dominated by a significant deep overburden feature. Subsequent 2D ERT surveying, particularly line 6 defined a channel / basin shaped feature developed along a roughly east - west axis with sharp contacts to the north and south. The northern side of the feature seems to be step down into the core of the channel, which is roughly coincident with BH03. The surface geophysical report is appended as Appendix V.

3.3 Rotary Borehole Investigation

Five rotary boreholes were drilled during this phase of the investigation. Four vertical and one low angle borehole drilled from the quarry floor (Figures 5 & 6).

DHID	East	North	Elevation	Dip	Azimuth	Length (m)
BH01	530370.592	728426.557	16.712	-11.5°	268.3°	276.7
BH03	530023.824	728382.566	26.256	-90°	360°	109.9
BH04	530150.783	728400.125	32.167	-90°	360°	35
BH05	530186.649	728378.105	34.138	-90°	360°	40.3
BH06	530125.143	728383.081	30.799	-90°	360°	45

Table 1: Borehole Collar Locations

3.3.1 Low Angle Drilling (HQ Core)

The low angle borehole, BH01, was drilled using a Dura Lite rig producing HQ diameter core (63.5mm). This borehole was drilled using a 3m hexagonal core barrel in order to minimise droop and deflection away from the planned section. The borehole was collared at an azimuth of 268.3° N_{mag} and a dip of -11.5° to the horizontal. BH01 was located within the boundary of the quarry and was designed to drill into the quarry face. The hole was located at the base of the lower bench and rig

was stepped back approximately 6m from the quarry face. The face was scaled back before the rig was moved onto site using an excavator to remove loose, unstable rock material that was at risk of collapse. A concrete plinth was constructed between the borehole collar and the quarry face to support the rods whilst drilling and accordingly the first 6m cored from BH01 consists of concrete.

BH01 was drilled to a final depth of 276.7m. It was scheduled to drill to approximately 300m. However, poor quality and unconsolidated / cavernous ground intersected from 272.4m to the end of hole at 276.7m meant that the hole could not be continued.

After drilling was completed borehole BH01 was sealed at a depth of 175m using a Vann Ruth plug and was then backfilled with a cement / bentonite grout from 175m back to surface. The cavities in the lower part of the hole (175.0 - 276.7m) contributed to localised unstable ground conditions and it was considered a significant possibility that they may act as conduits to draw the cement / bentonite grout away from the hole, therefore, a plug was installed at 175m to seal the lower part of the hole.

3.3.2 Vertical Drilling (PQ Core)

The vertical boreholes (BH03, BH04, BH05 & BH06) were all drilled using a top drive Hang Seng drilling rig producing PQ diameter drill core (85mm). The holes were collared along the line of the proposed tunnel route to the west of the quarry. BH03 was scheduled to drill to a depth of 32.5m, however, it drilled through a deep overburden feature with very challenging, poorly consolidated ground, intersecting rock at a depth of 104.95m and stopping at a depth of 109.9m. The hole was cored to 85.55m in PQ and subsequently cased to 85m with PW casing. It was then open hole drilled using a HQ tricone until competent ground was intersected at 104.95m and continued to the end of hole with HQ core. Due to the instability of hole BH03 the planned piezometer could not be installed or the downhole geophysical survey carried out. It was backfilled with a cement / bentonite grout upon completion.

BH04 and BH05 were drilled to scheduled depths and intersected the expected geological succession of shallow overburden overlying competent, massively bedded limestones. Piezometers were installed in both of these holes. BH06 was an additional hole added to the ground investigation to test a zone of transition from competent to poorly consolidated rock / overburden that had been detected by the ground geophysical survey. This hole was drilled to a final depth of 45m in unconsolidated clay, sand and gravel it was backfilled with a cement grout from the end of hole back to a depth of 11.0m. A stand pipe was installed in the top of the hole.

The core from the rotary drilling was logged in accordance with the BS5930:1999 specification. A detailed geological description of the rock was generated and a

quantitative description of the fracture state of the rock core was provided for each borehole, including:

- Total Core Recovery (TCR)
- Solid Core Recovery (SCR)
- Fracture Index (FI)
- Fracture Number (FNo.)
- Rock Quality Designation (RQD)

The logs were generated using HoleBase AGS software (Hard copies - Appendix II).

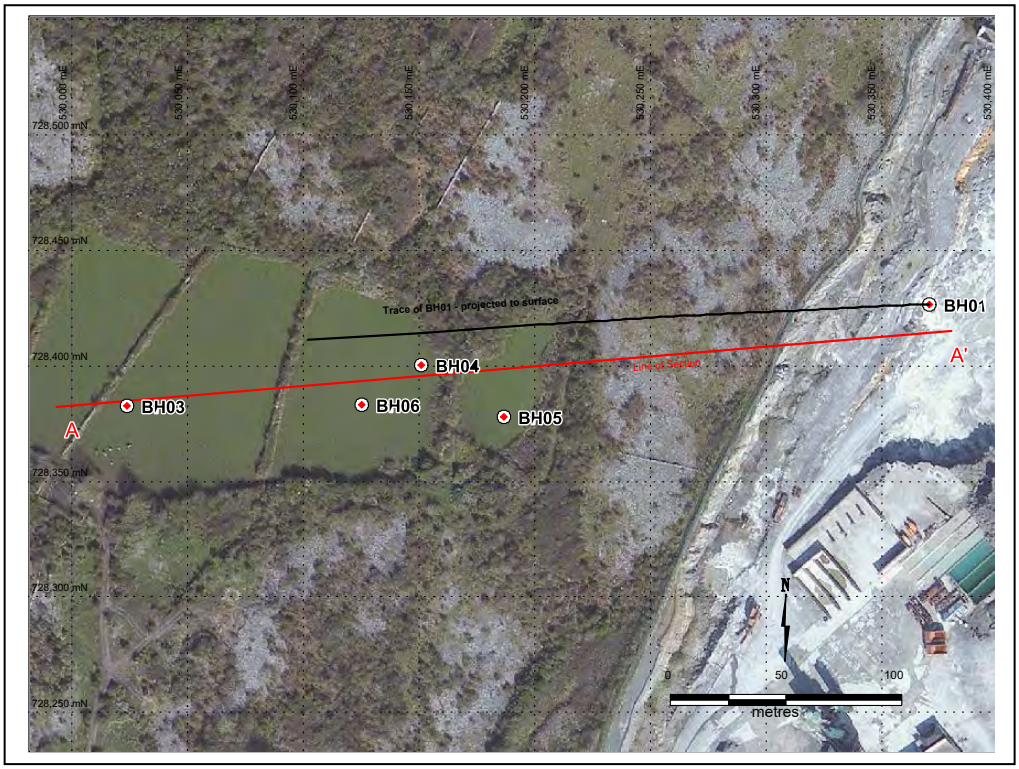

Figure 7: Borehole Collar Locations, Traces and Line of Section

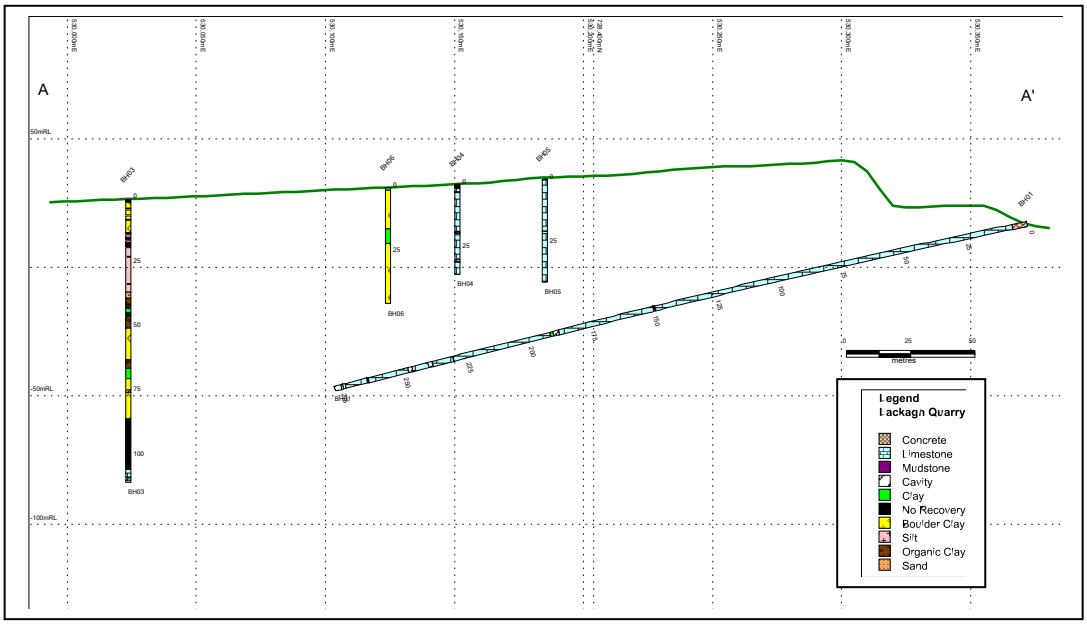

Figure 8: A - A' Drill Section (looking North) through the Lackagh Quarry GI Site

3.4 Discontinuity Logging

Discontinuity logging of rock cores was carried out using the ARUP "Rock Core Discontinuity Log" template for holes BH01, BH04 and BH05. The following headings were used:

- Orientation
- Spacing
- Roughness
- Weathering
- Infilling
- Number of Discontinuity Sets

The core from BH01 was orientated using a core orientation system mounted on the core barrel. and the discontinuities were measured relative to the invert of the core (NB: downhole direction is 180^{o} up hole is 0^{o}).

See Appendix III for the discontinuity logs.

3.5 Piezometer Installations

Three piezometers were installed in the vertical boreholes located to the west of the quarry. They were installed in boreholes BH04, BH05 and BH06. A summary of the installation design can be seen in Tables 2 - 4.

From (m)	To (m)	Installation
0.00	28.00	Blank 19mm PVC Pipe
28.00	34.00	Slotted 19mm PVC Pipe
34.00		End Cap
0.00	21.00	Cement Grout
21.00	23.00	Bentonite Pellets
23.00	24.00	Sand
24.00	34.00	Pea Gravel
34.00	35.00	Gravel Base

Table 2: BH04 Piezometer Installation Details

From (m)	To (m)	Installation
0.00	33.00	Blank 19mm PVC Pipe
33.00	39.00	Slotted 19mm PVC Pipe
39.00		End Cap
0.00	19.00	Cement Grout
19.00	23.00	Bentonite Pellets
23.00	24.00	Sand
24.00	39.00	Pea Gravel
39.00	40.30	Gravel Base

Table 3: BH05 Piezometer Installation Details

From (m)	To (m)	Installation
0.00	4.00	Blank 19mm PVC Pipe
4.00	10.00	Slotted 19mm PVC Pipe
10.00		End Cap
0.00	1.00	Cement Grout
1.00	2.00	Bentonite Pellets
2.00	3.00	Sand
3.00	11.00	Pea Gravel
11.00	45.00	Cement Grout

Table 4: BH06 Piezometer Installation Details

3.6 Borehole Geophysical Surveying

Ground geophysical surveying was specified for the Lackagh Quarry Ground Investigation. European Geophysical Services Ltd were sub-contracted by Priority Drilling Ltd. to carry out this surveying. It was originally intended to survey three boreholes, however, the poor ground conditions encountered in BH03 meant that only BH04 and BH05 were surveyed.

The geophysical surveys consisted of:

- Optical Televiewer
- Acoustic Televiewer
- Fluid Temperature and Conductivity, Natural Gamma Calliper
- Impeller Flowmeter
- Focused Resistivity
- Full Wave Sonic Velocity
- Pumped Temperature and Conductivity

Report attached as Appendix VI

3.7 Rock / Soil / Water - Laboratory Testing

Core samples were taken from the rock / soil recovered during the drilling operations and forwarded to two accredited laboratories for a testing. The Celtest Laboratory near Bangor in North Wales was selected to carry out the rock testing. The Priority Geotechnical Soil testing Laboratory was selected to carry out the soil testing.

Test	BH01 (No.)	BH04 (No.)	BH05 (No.)	Total Number of Tests
Deformability in Uniaxial Compression	10	5	5	20
Indirect Tensile Strength by Brazilian Test	3	1	1	5
Natural Water Content	40	10	9	59
Oxidisable Sulphate	5	1	1	7
pH Value	5	1	1	7
Point Load	58	25	25	108
Porosity / Density using Saturation & Buoyancy	15	2	3	20
Porosity / Density using Saturation & Calliper	15	2	3	20
Thin Section Petrography	2	1	1	4
Total Sulphur	6	1	1	8
Uniaxial Compressive Strength	36	10	10	56
Total	**195**	**59**	**60**	**314**

Table 5: Scheduled Rock Tests

Test	BH03 (No.)	BH06 (No.)	Total Number of Tests
Atterberg Limits	9	3	12
Moisture Content	19	3	22
Oedometer	4	3	7
Organic Matter Content	9	3	12
Particle Size Distribution	9	0	9
pH Value	5	0	5
Triaxial Test (Unconsolidated / Undrained)	5	3	8
Total	**60**	**15**	**75**

Table 6: Scheduled Soil Tests

A suite of aggregate tests had been scheduled in the Bill of Quantities, including:

- Slake Durability Index
- Los Angeles Coefficient
- Aggregate Crushing Value
- Ten Percent Fines
- Aggregate Impact Value
- Aggregate Abrasion Value
- Polished Stone Value
- Aggregate Frost Heave

The volume of material required to carry out these tests was excessive (e.g. the Aggregate Frost Heave test needs a minimum of 75kg of rock) and would have taken the bulk of the available drill core. Given the relatively homogenous nature of the limestone intersected it was agreed that a representative bulk sample would be acquired from the quarry and sent for the specified aggregate testing. Accordingly, a

composite, 275kg, representative sample was obtained from the quarry and sent to Celtest.

Water samples were obtained from the piezometers in boreholes BH04, BH05 and BH06 and sent to the IAS Laboratory in Bagenalstown, Co Carlow for testing for major cations and anions.

Test results are summarised in Tables 7 - 10 certificates are attached as Appendix VII

Location ID	Sample ID	Depth Top	Depth Base	Test	Result
BH01	**48861**	6.70	6.80	Moisture Content	**1.20%**
BH01	**48862**	10.36	10.46	Point Load	**79.3MPa**
BH01	**48863**	10.46	10.69	Uniaxial Compressive Strength	**97MPa**
BH01	**48864**	10.69	10.76	Point Load	**78MPa**
BH01	**48865**	10.89	10.97	Porosity / Density using Saturation and Buoyancy	**0.5 / 2.63**
BH01	**48866**	10.97	11.07	Porosity / Density using Saturation and Calliper	**0.47/2.69**
BH01	**48867**	11.57	11.94	Deformability in Uniaxial Compression	**99.8MPa**
BH01	**48868**	13.26	13.35	Moisture Content	**1.60%**
BH01	**48869**	13.35	13.45	Point Load	**82.9MPa**
BH01	**48870**	13.45	13.70	Uniaxial Compressive Strength	**59MPa**
BH01	**48871**	13.70	13.80	Point Load	**71.9MPa**
BH01	**48872**	16.30	16.40	Point Load	**67.7MPa**
BH01	**48873**	16.40	16.66	Uniaxial Compressive Strength	**73MPa**
BH01	**48874**	16.66	16.80	Point Load	**76.5MPa**
BH01	**48875**	22.40	22.50	Porosity / Density using Saturation and Calliper	**0.58/2.65**
BH01	**48876**	22.50	22.60	Porosity / Density using Saturation and Buoyancy	**1.2 / 2.70**
BH01	**48877**	26.20	26.36	Point Load	**47.1MPa**
BH01	**48878**	26.36	26.61	Uniaxial Compressive Strength	**100MPa**
BH01	**48879**	26.61	26.70	Point Load	**60.5MPa**
BH01	**48880**	27.85	28.15	Deformability in Uniaxial Compression	**112.4MPa**
BH01	**48881**	32.65	32.72	Moisture Content	**1.40%**
BH01	**48882**	34.44	34.48	Point Load	**88.8MPa**
BH01	**48883**	34.48	34.73	Uniaxial Compressive Strength	**69MPa**
BH01	**48884**	34.73	34.83	Point Load	**62.2MPa**
BH01	**48885**	44.35	44.40	Porosity / Density using Saturation and Calliper	**0.54/2.70**
BH01	**48886**	44.45	44.54	Point Load	**84.8MPa**
BH01	**48887**	44.54	44.79	Uniaxial Compressive Strength	**83MPa**
BH01	**48888**	44.79	44.90	Point Load	**53.0MPa**

BH01	**48889**	45.65	45.74	Porosity / Density using Saturation and Buoyancy	**0.5/2.68**
BH01	**48890**	48.90	49.16	Deformability in Uniaxial Compression	**187.5MPa**
BH01	**48891**	53.80	53.93	Total Sulphur	**<0.1%**
BH01	**48892**	55.30	55.40	Oxidisable Sulphate	**<0.01%**
BH01	**48893**	55.84	55.92	pH Value	**9.1**
BH01	**48894**	56.50	56.60	Point Load	**64.4MPa**
BH01	**48895**	56.60	56.85	Uniaxial Compressive Strength	**138MPa**
BH01	**48896**	56.85	56.93	Point Load	**63.9MPa**
BH01	**48897**	57.30	57.40	Moisture Content	**1.10%**
BH01	**48898**	61.65	61.75	Moisture Content	**1.20%**
BH01	**48899**	62.76	62.86	Point Load	**83.4MPa**
BH01	**48900**	62.86	63.05	Uniaxial Compressive Strength	**65MPa**
BH01	**50857**	63.05	63.16	Point Load	**49.6MPa**
BH01	**50858**	64.20	64.50	Indirect Tensile Strength by Brazilian Test	**7.8MPa**
BH01	**50859**	65.40	65.50	Total Sulphur	**<0.1%**
BH01	**50860**	65.66	65.75	Porosity / Density using Saturation and Buoyancy	**0.2/2.72**
BH01	**50861**	65.75	65.92	Porosity / Density using Saturation and Calliper	**0.64/2.69**
BH01	**50862**	66.00	66.10	Point Load	**69.6MPa**
BH01	**50863**	66.10	66.34	Uniaxial Compressive Strength	**104MPa**
BH01	**50864**	66.34	66.45	Point Load	**62.6MPa**
BH01	**50865**	67.07	67.20	Moisture Content	**1.10%**
BH01	**50866**	67.20	67.28	Porosity / Density using Saturation and Calliper	**0.57/2.71**
BH01	**50867**	68.50	68.59	Porosity / Density using Saturation and Buoyancy	**0.2/2.63**
BH01	**50868**	70.10	70.20	Moisture Content	**1.30%**
BH01	**50869**	72.10	72.30	Deformability in Uniaxial Compression	**136.3MPa**
BH01	**50870**	73.03	73.10	Moisture Content	**1.60%**
BH01	**50871**	76.00	76.09	Moisture Content	**1.20%**
BH01	**50872**	79.10	79.18	Point Load	**51.8MPa**
BH01	**50873**	79.18	79.40	Uniaxial Compressive Strength	**62MPa**
BH01	**50874**	79.40	79.52	Point Load	**48.0MPa**
BH01	**50875**	80.04	80.12	Moisture Content	**1.20%**
BH01	**50876**	81.70	81.78	Moisture Content	**1.60%**
BH01	**50877**	87.50	87.57	Moisture Content	**1.80%**
BH01	**50878**	39.70	39.80	Moisture Content	**1.30%**
BH01	**50879**	91.10	91.20	Total Sulphur	**<0.1%**
BH01	**50880**	91.34	91.42	Porosity / Density using Saturation and Calliper	**0.49/2.71**
BH01	**50881**	91.42	91.51	Porosity / Density using Saturation and Buoyancy	**1.0/2.70**
BH01	**50882**	91.63	91.71	Moisture Content	**1.80%**
BH01	**50883**	92.35	92.47	Point Load	**73.3MPa**
BH01	**50884**	92.47	92.70	Uniaxial Compressive Strength	**76MPa**

BH01	**50885**	92.70	92.79	Point Load	**71.1**
BH01	**50886**	93.00	93.10	Moisture Content	**1.50%**
BH01	**50887**	94.90	94.96	Oxidisable Sulphate	**<0.01%**
BH01	**50888**	94.96	95.05	pH Value	**9.2**
BH01	**50889**	97.34	97.43	Moisture Content	**1.30%**
BH01	**50890**	97.95	98.23	Deformability in Uniaxial Compression	**110.0MPa**
BH01	**50891**	101.36	101.45	Moisture Content	**1.60%**
BH01	**50892**	102.90	103.20	Indirect Tensile Strength by Brazilian Test	**12.6MPa**
BH01	**50893**	108.15	108.22	Point Load	**61.2MPa**
BH01	**50894**	108.22	108.51	Uniaxial Compressive Strength	**107MPa**
BH01	**50895**	108.51	108.62	Point Load	**70.2MPa**
BH01	**50896**	108.62	108.70	Moisture Content	**1.20%**
BH01	**50897**	110.27	110.37	Porosity / Density using Saturation and Calliper	**0.57/2.69**
BH01	**50898**	110.37	110.45	Porosity / Density using Saturation and Buoyancy	**0.7/2.59**
BH01	**50899**	113.00	113.08	Thin Section - Petrology	
BH01	**50900**	113.12	113.19	Moisture Content	**1.50%**
BH01	**50901**	115.89	116.05	Point Load	**52.5MPa**
BH01	**50902**	116.05	116.29	Uniaxial Compressive Strength	**104MPa**
BH01	**50903**	116.29	116.39	Point Load	**62.2MPa**
BH01	**50904**	118.82	118.88	Moisture Content	**1.90%**
BH01	**50905**	123.44	123.55	Moisture Content	**2.20%**
BH01	**50906**	125.90	126.00	Moisture Content	**1.30%**
BH01	**50907**	126.80	126.90	Moisture Content	**2.50%**
BH01	**50908**	128.80	128.89	Point Load	**80.8MPa**
BH01	**50909**	128.89	129.14	Uniaxial Compressive Strength	**79MPa**
BH01	**50910**	129.14	129.21	Point Load	**84.0MPa**
BH01	**50911**	131.12	131.17	Moisture Content	**2.60%**
BH01	**50912**	131.60	131.70	Moisture Content	**1.20%**
BH01	**50913**	132.65	132.62	Moisture Content	**1.80%**
BH01	**50914**	133.21	133.32	Point Load	**69.2MPa**
BH01	**50915**	133.32	133.54	Uniaxial Compressive Strength	**110MPa**
BH01	**50916**	133.54	133.63	Point Load	**61.8MPa**
BH01	**50917**	134.35	134.44	Moisture Content	**1.10%**
BH01	**50918**	137.06	137.20	Porosity / Density using Saturation and Calliper	**0.76/2.81**
BH01	**50919**	37.20	137.30	Porosity / Density using Saturation and Buoyancy	**0.3/2.63**
BH01	**50920**	138.60	138.72	pH Value	**9.2**
BH01	**50921**	140.00	140.20	Deformability in Uniaxial Compression	**58.7MPa**
BH01	**50922**	142.81	142.91	Moisture Content	**1.30%**
BH01	**50923**	146.20	146.30	Point Load	**55.0MPa**
BH01	**50924**	146.30	146.52	Uniaxial Compressive Strength	**100MPa**
BH01	**50925**	146.52	146.61	Point Load	**62.6MPa**
BH01	**50926**	148.97	149.05	Thin Section - Petrology	

BH01	**50927**	150.29	150.37	Porosity / Density using Saturation and Calliper	**0.61/2.75**
BH01	**50928**	151.67	151.75	Porosity / Density using Saturation and Buoyancy	**0.7/2.67**
BH01	**50929**	152.97	153.04	Total Sulphur	**<0.1%**
BH01	**50930**	153.20	153.30	Oxidisable Sulphate	**<0.01%**
BH01	**50931**	154.60	154.68	Moisture Content	**1.40%**
BH01	**50932**	155.20	155.28	Moisture Content	**1.70%**
BH01	**50933**	156.33	156.44	Point Load	**42.0MPa**
BH01	**50934**	156.44	156.68	Uniaxial Compressive Strength	**86MPa**
BH01	**50935**	156.68	156.76	Point Load	**47.3MPa**
BH01	**50936**	163.49	163.56	Moisture Content	**2.50%**
BH01	**50937**	165.17	165.25	Point Load	**77.7MPa**
BH01	**50938**	165.25	165.49	Uniaxial Compressive Strength	**83MPa**
BH01	**50939**	165.49	165.58	Point Load	**64.6MPa**
BH01	**50940**	166.00	166.10	Moisture Content	**1.30%**
BH01	**50941**	172.96	173.07	Porosity / Density using Saturation and Calliper	**0.49/2.68**
BH01	**50942**	173.07	173.20	Porosity / Density using Saturation and Buoyancy	**0.4/2.72**
BH01	**50943**	174.47	174.69	Uniaxial Compressive Strength	**76MPa**
BH01	**50944**	175.18	175.26	Point Load	**58.6MPa**
BH01	**50945**	175.26	175.50	Uniaxial Compressive Strength	**86MPa**
BH01	**50946**	175.50	175.59	Point Load	**58.6MPa**
BH01	**50947**	176.00	176.10	Moisture Content	**1.20%**
BH01	**50948**	180.24	180.50	Indirect Tensile Strength by Brazilian Test	**14.6MPa**
BH01	**50949**	182.12	182.20	pH Value	**9.3**
BH01	**50950**	183.17	183.40	Deformability in Uniaxial Compression	**118.6MPa**
BH01	**50951**	183.90	184.02	Point Load	**48.8MPa**
BH01	**50952**	184.02	184.25	Uniaxial Compressive Strength	**97MPa**
BH01	**50953**	184.25	184.34	Point Load	**70.1MPa**
BH01	**50954**	196.19	186.25	Moisture Content	**1.80%**
BH01	**50955**	193.60	193.68	Total Sulphur	**<0.1%**
BH01	**50956**	194.13	194.20	Porosity / Density using Saturation and Calliper	**0.54/2.69**
BH01	**50957**	194.60	194.67	Point Load	**48.0MPa**
BH01	**50958**	194.67	194.90	Uniaxial Compressive Strength	**114MPa**
BH01	**50959**	194.90	194.99	Point Load	**57.6MPa**
BH01	**50960**	195.77	195.86	Porosity / Density using Saturation and Buoyancy	**0.5/2.71**
BH01	**50961**	201.47	201.55	Oxidisable Sulphate	**<0.01%**
BH01	**50962**	204.62	204.70	Point Load	**83.6MPa**
BH01	**50963**	204.70	204.95	Uniaxial Compressive Strength	**132MPa**
BH01	**50964**	204.95	205.02	Point Load	**60.5**
BH01	**50965**	209.65	209.72	Moisture Content	**1.70%**
BH01	**50966**	210.18	210.30	Porosity / Density using Saturation and Calliper	**0.65/2.69**

BH01	**50967**	210.30	210.40	Porosity / Density using Saturation and Buoyancy	**0.3/2.85**
BH01	**50968**	210.57	210.82	Uniaxial Compressive Strength	**111MPa**
BH01	**50969**	211.10	211.20	Moisture Content	**1.40%**
BH01	**50970**	211.77	211.85	Point Load	**56.2MPa**
BH01	**50971**	211.85	212.10	Uniaxial Compressive Strength	**52MPa**
BH01	**50972**	212.10	212.20	Point Load	**68.7MPa**
BH01	**50973**	212.33	212.58	Deformability in Uniaxial Compression	**104.7MPa**
BH01	**50974**	213.80	213.90	pH Value	**9.1**
BH01	**50975**	218.20	218.28	Moisture Content	**1.50%**
BH01	**50976**	222.52	222.62	Moisture Content	**1.00%**
BH01	**50977**	223.70	223.80	Porosity / Density using Saturation and Calliper	**0.56/2.75**
BH01	**50978**	224.08	224.20	Porosity / Density using Saturation and Buoyancy	**0.3/2.63**
BH01	**50979**	225.65	225.74	Point Load	**80.3MPa**
BH01	**50980**	225.74	225.95	Uniaxial Compressive Strength	**77MPa**
BH01	**50981**	225.95	226.03	Point Load	**72.3MPa**
BH01	**50982**	228.16	228.24	Porosity / Density using Saturation and Calliper	**0.64/2.70**
BH01	**50983**	228.24	228.32	Porosity / Density using Saturation and Buoyancy	**0.4/2.65**
BH01	**50984**	230.13	230.20	Moisture Content	**2.00%**
BH01	**50985**	231.65	231.78	Point Load	**53.0MPa**
BH01	**50986**	231.78	232.00	Uniaxial Compressive Strength	**111MPa**
BH01	**50987**	232.00	232.10	Point Load	**74.6MPa**
BH01	**50988**	232.46	232.60	Deformability in Uniaxial Compression	**69.6MPa**
BH01	**50989**	235.04	235.10	Moisture Content	**1.30%**
BH01	**50990**	235.64	235.73	Total Sulphur	**<0.1%**
BH01	**50991**	236.73	237.03	Uniaxial Compressive Strength	**80MPa**
BH01	**50992**	237.17	237.43	Uniaxial Compressive Strength	**76MPa**
BH01	**50993**	242.82	242.92	Point Load	**53.8MPa**
BH01	**50994**	242.92	243.14	Uniaxial Compressive Strength	**118MPa**
BH01	**50995**	243.14	243.23	Point Load	**64.6MPa**
BH01	**50996**	250.30	250.56	Deformability in Uniaxial Compression	**56.4MPa**
BH01	**50997**	251.81	251.95	Point Load	**52.5MPa**
BH01	**50998**	251.95	252.22	Uniaxial Compressive Strength	**121MPa**
BH01	**50999**	252.22	252.32	Point Load	**61.4MPa**
BH01	**51000**	253.30	253.38	Oxidisable Sulphate	**<0.01%**
BH01	**51001**	259.72	259.82	Point Load	**64.1MPa**
BH01	**51002**	259.82	260.06	Uniaxial Compressive Strength	**143MPa**
BH01	**51003**	260.06	260.18	Point Load	**44.9MPa**
BH01	**51004**	262.43	262.63	Uniaxial Compressive Strength	**66MPa**
BH01	**51005**	262.63	262.73	Point Load	**67.7MPa**
BH01	**51006**	264.80	164.93	Point Load	**48.5MPa**
BH01	**51007**	264.93	264.15	Uniaxial Compressive Strength	**83MPa**
BH01	**51008**	265.15	265.25	Porosity / Density using Saturation and Calliper	**0.63/2.65**

BH01	**51009**	265.25	265.38	Porosity / Density using Saturation and Buoyancy	**0.5/2.64**
BH01	**51010**	268.30	268.40	Uniaxial Compressive Strength	**90MPa**
BH01	**51011**	271.70	271.90	Uniaxial Compressive Strength	**91MPa**

Table 7: Summary of Rock Test Results in BH01.

Location ID	Sample ID	Depth Top	Depth Base	Test	Certificate
BH03	**48801**	4.15	4.42	Triaxial - Unconsolidated / Undrained	x
BH03	**48802**	13.65	13.73	Moisture Content	x
BH03	**48803**	13.73	13.85	Atterberg Limits	x
BH03	**48804**	14.90	15.00	Particle Size Distribution	x
BH03	**48805**	19.00	19.10	Particle Size Distribution	x
BH03	**48806**	19.10	19.20	Atterberg Limits	x
BH03	**48807**	19.25	19.30	Moisture Content	x
BH03	**48808**	19.90	20.00	Moisture Content	x
BH03	**48809**	20.95	21.05	pH	x
BH03	**48810**	21.30	21.40	Moisture Content	x
BH03	**48811**	25.50	25.60	Particle Size Distribution	x
BH03	**48812**	25.80	25.90	Particle Size Distribution	x
BH03	**48813**	26.50	26.60	Particle Size Distribution	x
BH03	**48814**	26.70	26.80	Particle Size Distribution	x
BH03	**48815**	27.20	27.25	pH	x
BH03	**48816**	27.45	27.55	Atterberg Limits	x
BH03	**48817**	27.55	27.65	Particle Size Distribution	x
BH03	**48818**	30.25	30.33	Particle Size Distribution	x
BH03	**48819**	31.20	31.30	Moisture Content	x
BH03	**48822**	33.95	34.03	Moisture Content	x
BH03	**48824**	36.70	36.80	Particle Size Distribution	x
BH03	**48825**	38.60	38.70	Moisture Content	x
BH03	**48826**	38.95	39.05	Organic Matter Content	x
BH03	**48827**	39.25	39.30	Atterberg Limits	x
BH03	**48828**	39.45	39.55	Organic Matter Content	x
BH03	**48829**	39.80	39.83	Moisture Content	x
BH03	**48830**	40.65	40.77	Atterberg Limits	x
BH03	**48831**	41.20	41.25	pH	x
BH03	**48832**	41.30	41.50	Oedometer	x
BH03	**48833**	41.85	42.08	Triaxial - Unconsolidated / Undrained	x
BH03	**48834**	42.30	42.35	Moisture Content	x
BH03	**48835**	42.35	42.40	Organic Matter Content	x
BH03	**48836**	42.65	42.97	Triaxial - Unconsolidated / Undrained	x
BH03	**48837**	42.97	43.30	Oedometer	x
BH03	**48838**	44.05	44.20	Oedometer	x
BH03	**48839**	46.20	46.27	Organic Matter Content	x
BH03	**48840**	46.27	46.59	Triaxial - Unconsolidated / Undrained	x
BH03	**48841**	47.00	47.10	pH	x

BH03	**48842**	47.20	47.27	Moisture Content	x
BH03	**48843**	47.45	47.55	Organic Matter Content	x
BH03	**48844**	47.85	48.02	Oedometer	x
BH03	**48845**	48.20	48.30	Atterberg Limits	x
BH03	**48846**	48.45	48.70	Triaxial - Unconsolidated / Undrained	x
BH03	**48847**	49.00	49.10	Organic Matter Content	x
BH03	**48848**	49.30	49.40	Moisture Content	x
BH03	**48849**	63.15	63.22	Organic Matter Content	x
BH03	**48850**	63.38	63.43	pH	x
BH03	**48851**	63.50	63.55	Moisture Content	x
BH03	**48852**	63.90	63.95	Organic Matter Content	x
BH03	**48853**	64.30	64.35	Moisture Content	x
BH03	**48854**	64.90	64.95	Organic Matter Content	x
BH03	**48855**	65.50	65.60	Moisture Content	x
BH03	**48856**	66.95	67.05	Moisture Content	x
BH03	**48857**	68.40	68.45	Moisture Content	x
BH03	**48858**	70.40	70.50	Moisture Content	x
BH03	**48859**	70.75	70.85	Moisture Content	x
BH03	**48860**	71.60	71.70	Moisture Content	x
BH06	**50742**	5.25	5.50	Triaxial - Unconsolidated / Undrained	x
BH06	**50744**	16.20	16.50	Oedometer	x
BH06	**50745**	16.60	16.70	Moisture Content	x
BH06	**50746**	16.70	16.80	Atterberg Limits	x
BH06	**50747**	17.13	17.20	Organic Matter Content	x
BH06	**50748**	18.00	18.25	Triaxial - Unconsolidated / Undrained	x
BH06	**50749**	18.25	18.35	Moisture Content	x
BH06	**50750**	18.65	18.75	Atterberg Limits	x
BH06	**50851**	18.95	19.05	Organic Matter Content	x
BH06	**50852**	19.70	19.95	Oedometer	x
BH06	**50853**	20.00	20.25	Oedometer	x
BH06	**50854**	21.45	21.52	Moisture Content	x
BH06	**50855**	21.52	21.60	Atterberg Limits	x
BH06	**50856**	21.75	21.80	Organic Matter Content	x

Table 8: Summary of Soil Test Results in BH03 & BH06.

Location ID	Sample ID	Depth Top	Depth Base	Test	Result
BH04	**48901**	3.5	3.55	Moisture Content	**0.20%**
BH04	**48902**	5.4	5.48	Moisture Content	**0.60%**
BH04	**48903**	8.06	8.36	Deformability in Uniaxial Compression	**119.9MPa**
BH04	**48904**	9.3	9.36	Moisture Content	**0.30%**
BH04	**48905**	10.63	10.88	Deformability in Uniaxial Compression	**41.6MPa**
BH04	**48906**	11.77	11.83	Moisture Content	**0.20%**
BH04	**48907**	12.62	12.75	Point Load	**59.2MPa**
BH04	**48908**	12.85	13.1	Uniaxial Compressive Strength	**76MPa**
BH04	**48909**	13.1	13.25	Point Load	**52.7MPa**

BH04	**48910**	14.4	14.63	Deformability in Uniaxial Compression	**62.0MPa**
BH04	**48911**	14.63	14.74	Point Load	**49.2MPa**
BH04	**48912**	14.74	14.97	Uniaxial Compressive Strength	**86MPa**
BH04	**48913**	14.97	15.13	Point Load	**60.1MPa**
BH04	**48914**	11.77	11.83	Porosity / Density using Saturation and Calliper & Porosity / Density using Saturation and Buoyancy	**0.2/2.72**
BH04	**48915**	17.74	17.86	Point Load	**60.2MPa**
BH04	**48917**	18.12	18.2	Point Load	**56.5MPa**
BH04	**48918**	19.2	19.32	Point Load	**36.5MPa**
BH04	**48919**	20.05	20.12	Thin Section / Petrography	
BH04	**48920**	20.12	20.22	Point Load	**73.9MPa**
BH04	**48921**	20.22	20.5	Uniaxial Compressive Strength	**55MPa**
BH04	**48922**	20.8	20.85	Moisture Content	**0.40%**
BH04	**48923**	21.2	21.3	Point Load	**68.4MPa**
BH04	**48924**	21.8	21.9	Moisture Content	**1%**
BH04	**48925**	22.2	22.31	Point Load	**90.2MPa**
BH04	**48926**	22.6	22.78	Point Load	**60.1MPa**
BH04	**48927**	22.78	23.06	Uniaxial Compressive Strength	**53MPa**
BH04	**48928**	23.1	23.2	Point Load	**64.6MPa**
BH04	**48929**	21.8	21.9	Porosity / Density using Saturation and Calliper & Porosity / Density using Saturation and Buoyancy	**0.4/2.69**
BH04	**48930**	23.7	23.8	Point Load	**77.7MPa**
BH04	**48931**	23.8	24.1	Uniaxial Compressive Strength	**111MPa**
BH04	**48932**	24.17	24.28	Point Load	**74MPa**
BH04	**48933**	24.28	24.52	Uniaxial Compressive Strength	**91MPa**
BH04	**48934**	25.08	25.19	Point Load	**77.5MPa**
BH04	**48935**	25.19	25.41	Deformability in Uniaxial Compression	**64.1MPa**
BH04	**48936**	28.27	28.4	Porosity / Density using Saturation and Calliper	**0.5/2.65**
BH04	**48937**	27.91	28	Point Load	**89.4MPa**
BH04	**48938**	28.27	28.4	Moisture Content	**0.10%**
BH04	**48939**	28.4	28.44	Point Load	**68.3MPa**
BH04	**48941**	29.38	29.54	Indirect Tensile Strength by Brazilian Test	**5.97MPa**
BH04	**48943**	29.86	29.94	Point Load	**92MPa**
BH04	**48949**	30.93	30.03	Point Load	**76.6MPa**
BH04	**48950**	31.03	31.3	Uniaxial Compressive Strength	**76MPa**
BH04	**48951**	31.3	31.4	Point Load	**67.8MPa**
BH04	**48954**	31.66	31.7	Total Sulphur	**<0.1%**
BH04	**48955**	31.76	31.84	Point Load	**59.6MPa**
BH04	**48956**	31.84	31.93	Oxidisable Sulphur	**0.04**
BH04	**48957**	31.93	32.15	Uniaxial Compressive Strength	**78MPa**
BH04	**48958**	32.15	32.26	Point Load	**55.4MPa**
BH04	**48959**	32.26	32.35	pH	**9.3**
BH04	**48962**	32.5	32.57	Point Load	**78.8MPa**
BH04	**48963**	32.57	32.85	Uniaxial Compressive Strength	**92MPa**
BH04	**48964**	32.85	32.96	Point Load	**65.5MPa**

BH04	**48965**	33.12	33.16	Moisture Content	**0.10%**
BH04	**48966**	33.2	33.48	Deformability in Uniaxial Compression	**66.5MPa**
BH04	**48967**	33.48	33.6	Point Load	**49.9MPa**
BH04	**48968**	32.35	32.43	Porosity / Density using Saturation and Buoyancy	**0.4/2.69**
BH04	**48969**	34.56	34.59	Moisture Content	**0.30%**
BH04	**48970**	34.96	35	Moisture Content	**0.20%**
BH05	**48971**	0.65	0.73	Moisture Content	**0.30%**
BH05	**48972**	0.98	1.04	Moisture Content	**0.10%**
BH05	**48973**	1.41	1.5	Moisture Content	**0.10%**
BH05	**48974**	2.62	2.67	Porosity / Density using Saturation and Calliper	**0.4/2.68**
BH05	**48975**	2.8	2.96	Point Load	**27.8Mpa**
BH05	**48976**	1.41	1.5	Porosity / Density using Saturation and Buoyancy	**0.3/2.65**
BH05	**48977**	7.73	7.84	Point Load	**63MPa**
BH05	**48978**	8.1	8.25	Point Load	**43.8MPa**
BH05	**48979**	8.54	8.66	Point Load	**62MPa**
BH05	**48980**	8.9	8.96	Moisture Content	**0.10%**
BH05	**48981**	9.46	9.57	Point Load	**91.5MPa**
BH05	**48982**	9.57	9.77	Uniaxial Compressive Strength	**91MPa**
BH05	**48983**	9.77	9.92	Point Load	**55.4MPa**
BH05	**48984**	10.2	10.26	Point Load	**101.0MPa**
BH05	**48985**	11.3	11.45	Point Load	**43.1MPa**
BH05	**48986**	11.45	11.72	Uniaxial Compressive Strength	**86MPa**
BH05	**48987**	11.72	11.83	Point Load	**77.2MPa**
BH05	**48988**	12.92	13.07	Moisture Content	**0.30%**
BH05	**48989**	13.5	13.6	Point Load	**141.1MPa**
BH05	**48990**	13.7	13.81	Point Load	**67.3MPa**
BH05	**48991**	13.81	14.07	Uniaxial Compressive Strength	**94MPa**
BH05	**48992**	14.07	14.15	Point Load	**84.4MPa**
BH05	**48993**	14.27	14.4	Point Load	**74.0MPa**
BH05	**48994**	14.65	14.89	Uniaxial Compressive Strength	**72MPa**
BH05	**48995**	15.43	15.55	Point Load	**81.8MPa**
BH05	**48996**	15.95	16.22	Deformability in Uniaxial Compression	**57.0MPa**
BH05	**48997**	16.45	16.55	Point Load	**67.3MPa**
BH05	**48998**	16.87	17.19	Uniaxial Compressive Strength	**77MPa**
BH05	**48999**	17.97	18.06	Porosity / Density using Saturation and Buoyancy	**0.3/2.69**
BH05	**50701**	19.7	19.92	Indirect Tensile Strength by Brazilian Test	**3.39MPa**
BH05	**50702**	28.85	28.95	Porosity / Density using Saturation and Calliper	**0.4/2.69**
BH05	**50703**	22.07	22.21	Point Load	**54.3MPa**
BH05	**50704**	22.9	23	Point Load	**87.3MPa**
BH05	**50705**	23.94	24.05	Point Load	**67.2MPa**
BH05	**50706**	24.05	24.3	Deformability in Uniaxial Compression	**44.9MPa**
BH05	**50707**	24.73	24.85	Point Load	**66.4MPa**
BH05	**50708**	25.2	25.4	Deformability in Uniaxial Compression	**22.6MPa**

BH05	**50709**	26	26.12	Point Load	**76.4MPa**
BH05	**50710**	26.12	26.35	Deformability in Uniaxial Compression	**66.3MPa**
BH05	**50711**	27.68	27.88	Uniaxial Compressive Strength	**79MPa**
BH05	**50712**	28.75	28.85	Moisture Content	**0.10%**
BH05	**50715**	29.09	29.18	Total Sulphur	**<0.1**
BH05	**50716**	29.18	29.3	Oxidisable Sulphur	**<0.01**
BH05	**50717**	29.3	29.4	pH	**9.2**
BH05	**50718**	30.3	30.4	Moisture Content	**0.40%**
BH05	**50721**	30.88	30.92	Moisture Content	**0.30%**
BH05	**50725**	32.44	32.54	Point Load	**76.8MPa**
BH05	**50726**	32.54	32.6	Moisture Content	**0.20%**
BH05	**50727**	32.83	32.92	Point Load	**66.7MPa**
BH05	**50728**	32.92	33	Thin Section / Petrography	
BH05	**50729**	33	33.26	Uniaxial Compressive Strength	**116MPa**
BH05	**50730**	33.22	33.26	Porosity / Density using Saturation and Calliper	**0.6/2.69**
BH05	**50731**	33.5	33.7	Uniaxial Compressive Strength	**51MPa**
BH05	**50733**	33.92	33.16	Uniaxial Compressive Strength	**54MPa**
BH05	**50735**	34.5	34.7	Porosity / Density using Saturation and Buoyancy	**0.4/2.68**
BH05	**50736**	37.4	37.5	Point Load	**80.7MPa**
BH05	**50737**	37.5	37.82	Uniaxial Compressive Strength	**131MPa**
BH05	**50738**	37.82	37.92	Point Load	**77.2MPa**
BH05	**50740**	37.92	38.08	Point Load	**52.3MPa**

Table 9: Summary of Rock Test Results in BH04 & BH05

Sample	Test	Result
Bulk Sample	Aggregate Crushing Value	**23%**
Bulk Sample	Aggregate Impact Value	**17%**
Bulk Sample	Aggregate Abrasion Value	**12**
Bulk Sample	Polished Stone Value	**38**
Bulk Sample	Slake Durability	**99.40%**
Bulk Sample	Los Angeles Coefficient	**28**
Bulk Sample	Soundness by Magnesium Sulphate	**1**
Bulk Sample	10% Fines	**150kN**
Bulk Sample	Frost Heave	**3.3mm**

Table 10: Summary of Rock Test Results in Bulk Sample

3.8 In Situ Water Testing

Water samples were obtained from boreholes BH04, BH05 and BH06 and tested for pH, Temperature, Conductivity and Dissolved O_2. Three water samples were obtained and the pH, Temperature, Conductivity and dissolved O_2 data was acquired using a Watterra Pump with each borehole purged for at least 30 minutes. This work was carried out by Ronan Doyle of Ronan Doyle Monitoring Solutions, Ballinrobe County Mayo.

Borehole	pH	Temperature (°C)	Conductivity (µS)	Dissolved O_2 (mg/l)
BH04	7.47	10.5	295	0.21
BH05	7.77	10.5	420	0.8
BH06	12.53	9.8	6187	0.8

Table 11: In Situ Water Testing Results

3.9 Permeability Testing

Falling Head and Packer Testing was carried out on boreholes BH04 and BH05. The ground conditions intersected in boreholes BH03 and BH06 was considered too unstable for permeability testing.

A falling head test was carried out in BH04 on the 5th of January 2016. The rods were removed from the hole and the water level in the borehole was recorded at 17.88m bgl before the test commenced. Initially a volume of 130 litres was pumped into the hole, upon cessation of pumping the water level recovered almost immediately (i.e. faster than the dip meter could be lowered into the hole). A second test was subsequently carried out and 500 litres were pumped into the hole and same rapid recovery to 17.88m bgl was observed.

Falling head tests were carried out in BH05 on the 7th of January 2016. The rods were removed from the hole and the water level in this borehole was recorded at 19.45m bgl before commencement of the test. Initially a volume of 215 litres was pumped into the hole and the hole recovered back to 19.42m bgl and had stabilised after 40 minutes. A second test using a greater volume of water was carried out and 1000 litres of water was pumped into the hole. This test had proceeded almost to conclusion when the water level rose slightly (c.1.0cm) and a obstruction could be felt in the hole. The driller ran the rods back into the hole to assist with the piezometer installation and found that there was clay in the hole from 19.3 to 20.8m. The Falling Head test data is presented in Appendix XI.

Packer testing was carried out in boreholes BH04 and BH05 on the 18th of December 2015 and the 6th of January 2016 respectively. Set up details are presented in Table 12 and the results in Appendix X.

Borehole	Top (m)	Bottom (m)	Midpoint (m)
BH04	18	20	19
BH04	21	23	22
BH04	24	26	25
BH04	28	30	29
BH05	36	38	37
BH05	30	32	31
BH05	24	27	25.5
BH05	20	23	21.5

Table 12: Packer Test Installation Details

The Packer Tests carried out at 28-30m and 21-23m in BH04 suffered from loss of water pressure due to cavities / fractures. For both of these tests only one stage could be measured. All of the scheduled packer tests were carried out in BH05.

It was noted that the water pressure recovery once pumping had ceased was instantaneous in all of the test intervals.

3.10 Water level Measurements

Throughout the ground investigation water level measurements were taken from all of the vertical drillholes, both during and after drilling. It should be noted that owing to ground instability and the need to keep holes open for the ground geophysical surveying, the bulk of the readings from boreholes BH03 and BH04 were taken when the holes were cased with PW steel casing, which extended from surface to the base of the hole.

APPENDIX I

Hole	East	North	Elevation
BH1	530370.592	728426.557	16.712
BH3	530023.824	728382.566	26.256
BH4	530150.783	728400.125	32.167
BH5	530186.649	728378.105	34.138
BH6	530125.143	728383.081	30.799

Survey name	Station	East	North	Elevation	Dip	Azimuth	Tool–	Gravity	Mag.Str.	Mag.Dip	Mag.X	Mag.Y	Mag.Z	Roll Angle	Mag.T/face	DLS
*	Metres	Metres	Metres	Metres	Degrees	Degrees	Centigrade	G	nT	Degrees	nT	nT	nT	Degrees	Degrees	deg./30m
BH-1	1	0	0	0	-11.5	268.3	11	1.000147	48955	67.9	18396	0	45367	90	292.4	0
BH-1	4	-2.94	-0.09	-0.6	-11.5	268.1	11	1.00047	48954	67.9	18424	0	45355	90	292.4	1.9
BH-1	7	-5.88	-0.18	-1.2	-11.5	268.4	11	1.000677	48946	67.9	18415	0	45350	89.7	292.1	2.3
BH-1	10	-8.81	-0.28	-1.8	-11.7	267.9	11	1.00063	49023	67.9	18436	0	45424	89	291.5	5.4
BH-1	13	-11.75	-0.39	-2.41	-11.7	267.9	11	1.001172	49022	67.9	18468	0	45410	88.4	290.9	0.4
BH-1	16	-14.68	-0.5	-3.02	-11.8	267.6	11	1.000628	49027	67.9	18422	0	45434	88.4	290.8	3
BH-1	19	-17.62	-0.62	-3.63	-11.9	267.5	11	1.00041	49014	67.9	18451	0	45408	88.2	290.7	0.9
BH-1	22	-20.54	-0.81	-4.27	-12.6	265.4	11	1.002129	49028	68.5	17966	0	45618	89.2	291	22.5
BH-1	25	-23.47	-0.99	-4.91	-12.1	267.2	11	1.000351	49037	67.9	18457	0	45431	88.7	291.1	19
BH-1	28	-26.4	-1.13	-5.54	-12.2	267.3	11	1.000495	49044	67.9	18458	0	45438	88.4	290.8	1.2
BH-1	31	-29.33	-1.28	-6.18	-12.4	267.1	11	1.000687	49069	67.9	18452	0	45467	88.5	290.9	3.2
BH-1	34	-32.25	-1.43	-6.83	-12.6	266.9	11	1.000132	49044	67.9	18419	0	45454	88.4	290.8	2.8
BH-1	37	-35.18	-1.58	-7.48	-12.6	267.1	11	1.000742	49065	67.9	18458	0	45460	88.3	290.7	2.2
BH-1	40	-38.1	-1.73	-8.13	-12.6	267.1	11	1.000358	49075	67.9	18479	0	45463	88.3	290.8	0.4
BH-1	43	-41.02	-1.88	-8.79	-12.6	267.1	11	1.000171	49057	67.9	18429	0	45464	88.5	290.9	0.6
BH-1	46	-43.95	-2.02	-9.44	-12.5	267.3	11	1.000035	49054	67.9	18466	0	45446	88.8	291.3	2
BH-1	49	-46.87	-2.17	-10.09	-12.7	267	11	1.000317	49034	67.9	18438	0	45435	89.4	291.8	2.7
BH-1	52	-49.8	-2.32	-10.75	-12.7	267.1	11	1.000291	49062	68	18415	0	45475	89.7	292.1	0.4
BH-1	55	-52.72	-2.47	-11.41	-12.7	266.9	11	1.000127	49043	67.9	18450	0	45440	90.4	292.9	2
BH-1	58	-55.64	-2.61	-12.06	-12.5	267.8	11	0.99969	49044	67.6	18658	0	45356	90.8	293.6	9.5
BH-1	61	-58.57	-2.74	-12.72	-12.8	267.1	11	1.000477	49098	67.9	18474	0	45490	92.3	294.8	8
BH-1	64	-61.49	-2.89	-13.38	-12.8	267	11	1.00001	49037	67.9	18460	0	45430	93.1	295.6	0.4
BH-1	67	-64.41	-3.04	-14.05	-12.9	266.9	11	1.000212	49044	67.9	18458	0	45438	93.5	296	1.5
BH-1	70	-67.33	-3.2	-14.72	-12.9	267	11	1.0002	49029	67.9	18458	0	45422	94.5	297	1.4
BH-1	73	-70.25	-3.35	-15.39	-12.9	266.9	11	1.000355	49071	67.9	18437	0	45476	94.9	297.4	1.7
BH-1	76	-73.17	-3.51	-16.06	-12.9	267	11	1.000287	49068	67.8	18512	0	45442	95.4	297.9	1.8
BH-1	79	-76.11	-3.53	-16.68	-10.9	272	11	0.992033	49037	67.9	18432	0	45441	95.8	298.3	52.4

Survey name	Station	East	North	Elevation	Dip	Azimuth	Tool–	Gravity	Mag.Str.	Mag.Dip	Mag.X	Mag.Y	Mag.Z	Roll Angle	Mag.T/face	DLS
*	Metres	Metres	Metres	Metres	Degrees	Degrees	Centigrade	G	nT	Degrees	nT	nT	nT	Degrees	Degrees	deg./30m
BH-1	82	-79.04	-3.56	-17.3	-13	266.9	11	1.000459	49018	67.9	18469	0	45406	96.3	298.8	53.7
BH-1	85	-81.96	-3.72	-17.98	-13.2	266.6	11	1.000487	49052	67.9	18490	0	45434	96.5	299.1	3.2
BH-1	88	-84.87	-3.89	-18.66	-13.1	266.8	11	1.000296	49038	67.9	18437	0	45440	96.8	299.2	1.2
BH-1	91	-87.79	-4.06	-19.34	-13.1	266.8	11	1.000282	49031	67.9	18455	0	45426	96.8	299.3	0.7
BH-1	94	-90.71	-4.22	-20.03	-13.1	266.7	11	1.000122	49080	67.9	18447	0	45482	97.2	299.7	1
BH-1	97	-93.62	-4.39	-20.71	-13.2	266.7	11	1.000303	49066	67.9	18470	0	45457	97.6	300.1	0.6
BH-1	100	-96.54	-4.55	-21.4	-13.2	266.7	11	1.000268	49068	67.8	18503	0	45445	97.5	300.1	0.5
BH-1	103	-99.47	-4.63	-22.05	-11.8	270.2	11	0.995246	49056	68.6	17887	0	45678	98.2	300	37
BH-1	106	-102.39	-4.71	-22.7	-13.3	266.7	11	1.00031	49060	67.9	18480	0	45446	97.7	300.2	37.4
BH-1	109	-105.31	-4.88	-23.39	-13.3	266.6	11	1.000017	49021	67.9	18429	0	45425	97.8	300.3	0.7
BH-1	112	-108.22	-5.05	-24.08	-13.4	266.5	11	1.000223	49056	67.9	18482	0	45442	98	300.5	1.5
BH-1	115	-111.13	-5.22	-24.78	-13.4	266.7	11	1.000889	49063	67.9	18460	0	45457	98	300.5	1.4
BH-1	118	-114.05	-5.4	-25.48	-13.5	266.5	11	1.000317	49027	67.9	18468	0	45416	98.3	300.8	2.1
BH-1	121	-116.96	-5.58	-26.18	-13.4	266.6	11	1.000141	49042	67.9	18448	0	45440	98.3	300.8	1.2
BH-1	124	-119.87	-5.75	-26.88	-13.5	266.5	11	1.000272	49046	67.9	18477	0	45433	98.3	300.9	0.9
BH-1	127	-122.78	-5.93	-27.58	-13.5	266.5	11	0.99995	49034	67.9	18473	0	45422	98.3	300.8	0.6
BH-1	130	-125.69	-6.11	-28.28	-13.6	266.4	11	1.000699	49079	67.9	18430	0	45487	98.2	300.7	0.8
BH-1	133	-128.6	-6.29	-28.99	-13.6	266.6	11	1.00039	49055	67.9	18443	0	45456	98.2	300.8	1.6
BH-1	136	-131.51	-6.47	-29.7	-13.7	266.3	11	0.999701	49064	67.9	18444	0	45466	98	300.5	2.8
BH-1	139	-134.42	-6.65	-30.41	-13.7	266.4	11	1.000129	49052	67.9	18462	0	45445	98.2	300.7	0.9
BH-1	142	-137.33	-6.83	-31.12	-13.8	266.4	11	1.000614	49054	67.9	18477	0	45441	98.7	301.3	0.9
BH-1	145	-140.24	-7.02	-31.83	-13.8	266.3	11	1.000523	49075	67.9	18474	0	45465	98.7	301.2	0.7
BH-1	148	-143.14	-7.21	-32.55	-13.8	266.3	11	1.000394	49034	67.9	18471	0	45422	98.9	301.5	0.6

Survey name	Station	East	North	Elevation	Dip	Azimuth	Tool–	Gravity	Mag.Str.	Mag.Dip	Mag.X	Mag.Y	Mag.Z	Roll Angle	Mag.T/face	DLS
*	Metres	Metres	Metres	Metres	Degrees	Degrees	Centigrade	G	nT	Degrees	nT	nT	nT	Degrees	Degrees	deg./30m
BH-1	151	-146.05	-7.39	-33.26	-13.8	266.4	11	1.000164	49043	67.9	18474	0	45430	98.9	301.5	1.5
BH-1	154	-148.96	-7.57	-33.98	-13.9	266.4	11	1.000365	49066	67.9	18451	0	45464	99.1	301.6	1
BH-1	157	-151.87	-7.76	-34.7	-13.9	266.3	11	1.000252	49055	67.8	18506	0	45430	99.2	301.8	1
BH-1	160	-154.77	-7.95	-35.43	-14	266.2	11	0.999691	49068	67.9	18477	0	45456	99.2	301.7	0.6
BH-1	163	-157.68	-8.14	-36.15	-14	266.3	11	1.001008	49040	67.9	18411	0	45453	99.3	301.8	0.5
BH-1	166	-160.58	-8.33	-36.88	-14	266.2	11	0.999912	49061	67.9	18462	0	45455	100.3	302.8	0.6
BH-1	169	-163.48	-8.52	-37.6	-14	266.3	11	1.00026	49044	67.9	18480	0	45430	100.3	302.9	1.2
BH-1	172	-166.39	-8.71	-38.33	-14.1	266.4	11	1.000443	49080	67.9	18462	0	45476	100.3	302.8	0.4
BH-1	175	-169.29	-8.89	-39.06	-14.1	266.2	11	0.999983	49089	67.9	18458	0	45487	100.3	302.8	1.5

APPENDIX II

Rotary Core Log

Borehole No. **BH01**

Sheet 1 of 28

Project Name:	Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords:	530370.59 - 728426.56	Hole Type RC
Location:	Galway		Level:	16.71	Scale 1:50
Client:	Galway County Council		Dates:	13/11/2015 - 21/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
		0.00 - 5.60								Concrete Plinth
		5.60 - 6.30	14	100	60	41	5.60	11.11		Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. (Core invert not marked)
		6.30 - 7.52	3	100	100	100	6.30	10.41		Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. Sub-vertical stylolites, occasional coarse shelled bioclast (Brachiopod)
		7.52 - 10.15	6	100	89	81	7.52	9.19		Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. Occasional fine grained scattered bioclasts, minor stylolites

Continued on next sheet

Remarks

Rotary Core Log

Borehole No. **BH01**

Sheet 2 of 28

Project Name: Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords: 530370.59 - 728426.56	Hole Type RC
Location: Galway		Level: 16.71	Scale 1:50
Client: Galway County Council		Dates: 13/11/2015 - 21/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
							10.15	6.56		
		10.15 - 11.10	2	88	88	88				Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. Very occasional fine grained bioclast
							11.10	5.61		
		11.10 - 12.66	5	100	44	38				Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. pellety / slightly oolitic texture
							12.66	4.05		
		12.66 - 14.20	2	100	100	96				Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. pellety / slightly oolitic intervals with small rounded bioclasts
							14.20	2.51		
		14.20 - 14.58	18	100	29	29				Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. Intersecting conjugate joints
							14.58	2.13		
		14.58 - 15.46	2	100	100	100				Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. Minor white calcite fill along joint
							15.46	1.25		
		15.46 - 15.86	15	100	25	0				Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. White calcite fill and weak oxidation along steeply dipping joint surface
							15.86	0.85		
		15.86 - 17.04	2	100	100	100				Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. pellety / slightly oolitic texture, minor thick shelled brachiopods
							17.04	-0.33		
		17.04 - 21.07	3	97	87	86				Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. Slightly pellety scattered fine bioclastic debris with occasional coarse shelled brachiopod fragment

Continued on next sheet

Remarks

Rotary Core Log

Borehole No. **BH01**

Sheet 3 of 28

Project Name: Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords: 530370.59 - 728426.56	Hole Type RC
Location: Galway		Level: 16.71	Scale 1:50
Client: Galway County Council		Dates: 13/11/2015 - 21/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
							21.07	-4.36		
		21.07 - 21.60	23	100	53	40				Strong. fresh, grey / pale grey, fine to medium grained, massive LIMESTONE. minor bioclastic debris and white calcite veinlets, basal 10cm is rubble
		21.60 - 22.75	3	100	100	100	21.60	-4.89		Strong. fresh, grey / pale grey, fine to medium grained, massive LIMESTONE. Occasional coarse shelled brachiopod fragments
		22.75 - 24.34	4	100	78	65	22.75	-6.04		Strong. fresh, grey / pale grey, fine to medium grained, massive LIMESTONE. Thin, discontinuous white/pink dolomite veinlets dipping at 45'. Minor scattered fine grained bioclasts and very fine stylolites
		24.34 - 24.73	15	92	0	0	24.34	-7.63		Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. Cavity developed with weak oxidation and pitting / dissolution on contacts
		24.73 - 31.68	2	100	100	100	24.73	-8.02		Strong. fresh, grey, fine to medium grained, massive LIMESTONE. with hairline white calcite veinlets dipping at 50 - 70'. Minor scattered poorly sorted bioclastic debris. Fine sub-vertical stylolites

Continued on next sheet

Remarks

Rotary Core Log

Borehole No. **BH01**

Sheet 4 of 28

Project Name: Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords: 530370.59 - 728426.56	Hole Type RC
Location: Galway		Level: 16.71	Scale 1:50
Client: Galway County Council		Dates: 13/11/2015 - 21/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
		31.68 - 33.22	7	100	77	55	31.68	-14.97		Strong. fresh, grey, fine to medium grained, massive LIMESTONE. fine sub-vertical stylolites. 31.78m calcite filled vugs locally developed
		33.22 - 37.10	2	100	97	95	33.22	-16.51		Strong. fresh, grey, fine to medium grained, massive LIMESTONE. Small scattered bioclasts, very rare coarse shell and coral fragment. Minor fine stylolites
		37.10 - 38.70	6	100	59	51	37.10	-20.39		Strong. fresh, brownish pale grey, fine to medium grained, massive LIMESTONE. Fine grained scattered bioclastic debris, minor very fine stylolites
		38.70 - 40.45	2	100	100	100	38.70	-21.99		Strong. fresh, grey, fine to medium grained, massive LIMESTONE. Very minor scattered bioclastic debris, minor orange limonitic staining along a joint surface at 39.35m

Continued on next sheet

Remarks

Rotary Core Log

Borehole No. **BH01**

Sheet 5 of 28

Project Name: Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords: 530370.59 - 728426.56	Hole Type RC
Location: Galway		Level: 16.71	Scale 1:50
Client: Galway County Council		Dates: 13/11/2015 - 21/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
							40.45	-23.74		
		40.45 - 43.30	3	100	90	88				Strong. fresh, grey, fine to medium grained, massive LIMESTONE. Minor bioclastic debris, and fine stylolites
		43.30 - 44.30	6	90	9	0	43.30	-26.59		Strong. fresh, grey, fine to medium grained, massive LIMESTONE. Fine vuggy texture and faint stylolites
		44.30 - 52.98	6	100	96	91	44.30	-27.59		Strong. fresh, light grey, fine to medium grained, massive LIMESTONE. Scattered bioclastic debris, fragments of coarse shelled brachiopods or solitary corals. locally developed fine vuggy texture (49.1 - 49.55m). White calcite veinlets dip 90', azimuth 020' to core invert

41 42 43 44 45 46 47 48 49 50

Continued on next sheet

Remarks

Rotary Core Log

Borehole No. **BH01**

Sheet 6 of 28

Project Name:	Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords:	530370.59 - 728426.56	Hole Type RC
Location:	Galway		Level:	16.71	Scale 1:50
Client:	Galway County Council		Dates:	13/11/2015 - 21/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
		52.98 - 53.74	9	97	37	13	52.98	-36.27		Strong. fresh, light grey, fine to medium grained, massive LIMESTONE. Minor fine stylolites
		53.74 - 56.10	3	94	94	90	53.74	-37.03		Strong. fresh, light grey, fine to medium grained, massive LIMESTONE. Very rare small bioclastic fragments, fine stylolites
		56.10 - 58.60	3	100	96	92	56.10	-39.39		Strong. fresh, grey, medium grained, massive LIMESTONE. Pellety texture with scattered small bioclastic fragments and faint stylolites.
							58.60	-41.89		Strong. fresh, light grey, fine to medium grained, massive LIMESTONE. Minor bioclastic debris, and fine stylolites

Continued on next sheet

Remarks

Rotary Core Log

Borehole No. **BH01**

Sheet 7 of 28

Project Name: Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords: 530370.59 - 728426.56	Hole Type RC
Location: Galway		Level: 16.71	Scale 1:50
Client: Galway County Council		Dates: 13/11/2015 - 21/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
		58.60 - 61.47	3	100	99	99				
							61.47	-44.76		
		61.47 - 62.25	10	100	55	47				Strong. fresh, light grey, fine to medium grained, massive LIMESTONE. Fine vuggy texture, 61.94m a 1cm thick white calcite vein dipping at 80' azimuth 185' to core invert
							62.25	-45.54		
		62.25 - 63.73	1	100	100	100				Strong. fresh, grey, fine to medium grained, massive LIMESTONE. Occasional fine stylolite
							63.73	-47.02		
		63.73 - 64.22	10	94	69	61				Strong. fresh, grey/light grey, fine to medium grained, massive LIMESTONE. Minor bioclastic debris, and fine stylolites. Some coarse vugs (6mm wide) irregular shaped with orange/brown limonitic infill
							64.22	-47.51		
		64.22 - 67.85	3	100	100	100				Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. Incipient pellety texture , scatted bioclastic debris, and faint stylolites
							67.88	-51.17		
		67.85 - 68.78	9	92	77	60				Strong. fresh, grey, fine to medium grained, massive LIMESTONE. Minor bioclastic debris, and fine stylolites

Continued on next sheet

61 62 63 64 65 66 67 68 69 70

Remarks

AGS

Rotary Core Log

Borehole No. **BH01**

Sheet 8 of 28

Project Name: Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords: 530370.59 - 728426.56	Hole Type RC
Location: Galway		Level: 16.71	Scale 1:50
Client: Galway County Council		Dates: 13/11/2015 - 21/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
		68.78 - 72.31	3	98	96	96				
							72.31	-55.60		
		72.31 - 73.39	6	100	30	19				Strong. fresh, grey, fine to medium grained, massive LIMESTONE. Minor bioclastic debris, and fine stylolites. Axial parallel jointing
							73.39	-56.68		
		73.39 - 75.70	3	100	94	94				Strong. fresh, pale grey, fine grained, massive LIMESTONE. Minor fine stylolites
							75.70	-58.99		
		75.70 - 76.37	12	96	67	16				Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE.
							76.37	-59.66		
		76.37 - 77.60	2	100	100	95				Strong. fresh, grey, fine to medium grained, massive LIMESTONE. Fine stylolites
							77.60	-60.89		
		77.60 - 78.20	20	100	12	0				Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. 77.85m 1cm thick white calcite vein, 78.16m 1cm thick white orange calcite vein (Fe stains)
							78.20	-61.49		
										Strong. fresh, pale grey, fine grained, massive LIMESTONE. Numerous stylolites

71 72 73 74 75 76 77 78 79 80

Continued on next sheet

Remarks

AGS

Rotary Core Log

Borehole No. **BH01**

Sheet 9 of 28

Project Name:	Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords:	530370.59 - 728426.56	Hole Type RC
Location:	Galway		Level:	16.71	Scale 1:50
Client:	Galway County Council		Dates:	13/11/2015 - 21/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
		78.20 - 86.15	3	99	99	98				
							86.15	-69.44		Strong. fresh, grey, fine to medium grained, massive LIMESTONE. Occasional stylolites and fine grained bioclastic debris. 87.06m - 1cm thick white calcite vein
		86.15 - 88.77	2	100	96	96				
							88.77	-72.06		Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. 90.09m - 2cm thick white calcite vein. Locally developed fine vuggy texture
		88.77 - 90.30	7	100	49	23				

81 82 83 84 85 86 87 88 89 90

Continued on next sheet

Remarks

Rotary Core Log

Borehole No. **BH01**

Sheet 10 of 28

Project Name: Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords: 530370.59 - 728426.56	Hole Type RC
Location: Galway		Level: 16.71	Scale 1:50
Client: Galway County Council		Dates: 13/11/2015 - 21/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
							90.30	-73.59		
		90.30 - 95.95	2	100	99	98				Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. Minor faint stylolites
							95.95	-79.24		
		95.95 - 100.33	3	99	94	89				Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. small scattered bioclasts with some large (7cm dia.) coarse shelled brachiopods

91 92 93 94 95 96 97 98 99 100

Continued on next sheet

Remarks

AGS

Rotary Core Log

Borehole No. **BH01**

Sheet 11 of 28

Project Name: Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords: 530370.59 - 728426.56	Hole Type RC
Location: Galway		Level: 16.71	Scale 1:50
Client: Galway County Council		Dates: 13/11/2015 - 21/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
							100.33	-83.62		
		100.33 - 102.74	6	97	85	71				Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. Scattered small partially oxidised vugs. 101.4 & 101.43m 1cm thick white calcite veins dip 90' Azimuth 360'
							102.74	-86.03		
		102.74 - 105.90	3	100	99	99				Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. Fine bioclastic debris scattered throughout
							105.90	-89.19		
		105.90 - 108.60	2	100	100	99				Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. Thin (c.1mm), randomly orientated white / brown calcite veinlets over top 40cm. scattered fine bioclastic debris and fine stylolites
							108.60	-91.89		
										Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. Occasional scattered fine bioclastic debris and fine stylolites . Minor white calcite veining dipping at 85' to 180'

Continued on next sheet

Remarks

Rotary Core Log

Borehole No. **BH01**

Sheet 12 of 28

Project Name: Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords: 530370.59 - 728426.56	Hole Type RC
Location: Galway		Level: 16.71	Scale 1:50
Client: Galway County Council		Dates: 13/11/2015 - 21/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
		108.60 - 111.55	5	100	98	86				
							111.55	-94.84		Strong. fresh, grey, fine grained, massive LIMESTONE. Fine black stylolites
		111.55 - 113.73	1	100	100	100				
							113.73	-97.02		
		113.73 - 114.33	3	100	0	0				Strong. fresh, grey, fine grained, massive LIMESTONE. Fine grained bioclastic debris. Axial parallel jointing
							114.33	-97.62		Strong. fresh, grey, fine to medium grained, massive LIMESTONE. Disseminated very fine grained bioclastic debris
		114.33 - 119.52	1	100	100	98				
							119.52	-102.81		Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. Faint pellety texture, etched stylolites and scattered small vugs, often

Continued on next sheet

111 112 113 114 115 116 117 118 119 120

Remarks

Rotary Core Log

Borehole No. **BH01**

Sheet 13 of 28

Project Name:	Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords:	530370.59 - 728426.56	Hole Type RC
Location:	Galway		Level:	16.71	Scale 1:50
Client:	Galway County Council		Dates:	13/11/2015 - 21/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
		119.52 - 127.29	4	100	95	87				weakly oxidised. Disseminated fine grained bioclastic debris
		127.29 - 128.75	6	99	97	82	127.29	-110.58		Strong. fresh, grey, fine to medium grained, massive LIMESTONE. Incipient mottled texture and scattered fine bioclastic debris.
							128.75	-112.04		Strong. fresh, dark grey, fine to medium grained, massive LIMESTONE. Wispy black argillaceous partings. Scattered fine bioclastic debris with some coarse shelled brachiopods / gastropods. thick black stylolites with argillic infill. Occasional white calcite veinlet

121 122 123 124 125 126 127 128 129 130

Continued on next sheet

Remarks

AGS

Rotary Core Log

Borehole No. **BH01**

Sheet 14 of 28

Project Name:	Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords:	530370.59 - 728426.56	Hole Type RC
Location:	Galway		Level:	16.71	Scale 1:50
Client:	Galway County Council		Dates:	13/11/2015 - 21/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
		128.75 - 134.90	1	100	97	97				
		134.90 - 136.05	4	84	84	84	134.90	-118.19		Strong. fresh, dark grey, fine to medium grained, massive LIMESTONE. Wispy black argillaceous partings. Scattered fine bioclastic debris with some coarse shelled brachiopods.
		136.05 - 137.52	3	100	100	95	136.05	-119.34		Strong. fresh, dark grey, fine to medium grained, massive LIMESTONE. Weak intraclastic breccia texture minor stylolites and black argillic partings
		137.52 - 141.84	2	100	100	100	137.52	-120.81		Strong. fresh, grey, fine to medium grained, massive LIMESTONE. Small scattered bioclasts, incipient intraclastic breccia texture locally developed minor discontinuous white calcite veinlets

131 132 133 134 135 136 137 138 139 140

Continued on next sheet

Remarks

AGS

Rotary Core Log

Borehole No. **BH01**

Sheet 15 of 28

Project Name:	Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords:	530370.59 - 728426.56	Hole Type RC
Location:	Galway		Level:	16.71	Scale 1:50
Client:	Galway County Council		Dates:	13/11/2015 - 21/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
		141.84 - 142.93	3	100	100	100	141.84	-125.13		Strong. fresh, grey, fine to medium grained, massive LIMESTONE. Small scattered bioclasts, incipient bioturbated / burrowed texture
		142.93 - 143.70	0	100	100	100	142.93	-126.22		Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE.. Pellety / almost oolitic texture
		143.70 - 148.30	1	100	100	100	143.70	-126.99		Strong. fresh, grey, fine to medium grained, massive LIMESTONE. Intraclastic breccia texture sub-rounded clasts 0.5 - 2.0cm dia. possibly related to bioturbation / burrowing. Minor stylolites and a very rare bioclast
		148.30 - 148.90	10	100	0	0	148.30	-131.59		Core is crosscut by a 2cm thick band of weak / very weak, fresh, fine grained Black MUDSTONE. Soft / Friable texture, locally altered to clay dip 32' to 060'
							148.90	-132.19		Strong. fresh, dark grey / black, fine to medium grained, massive LIMESTONE. Intraclastic breccia texture poorly sorted, very irregular / angular clasts of fine grained limestone (micrite) in a black / dark grey locally argillaceous matrix. Intensity of brecciation decreasing with depth

Continued on next sheet

Remarks

AGS

Rotary Core Log

Borehole No. **BH01**

Sheet 16 of 28

Project Name:	Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords:	530370.59 - 728426.56	Hole Type RC
Location:	Galway		Level:	16.71	Scale 1:50
Client:	Galway County Council		Dates:	13/11/2015 - 21/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
		148.90 - 154.60	2	100	99	97				
		154.60 - 161.75	1	100	100	71	154.60	-137.89		Strong. fresh, grey, fine to medium grained, massive LIMESTONE. Stylolites locally up to 3mm thick. Minor bioclastic debris. Locally developed incipient intraclastic breccia / bioturbation textures

151 152 153 154 155 156 157 158 159 160

Continued on next sheet

Remarks

Rotary Core Log

Borehole No. **BH01**

Sheet 17 of 28

Project Name: Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords: 530370.59 - 728426.56	Hole Type RC
Location: Galway		Level: 16.71	Scale 1:50
Client: Galway County Council		Dates: 13/11/2015 - 21/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
							161.75	-145.04		
		161.75 - 166.30	1	100	100	98				Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. Locally developed pellety / oolitic texture. Scattered bioclastic debris
							166.30	-149.59		
		166.30 - 168.90	1	100	100	99				Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. Numerous coarse bioclasts and white calcite infilling small voids
							168.90	-152.19		
										Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. Slight pellety texture. Scattered fine to medium grained bioclasts

Continued on next sheet

Remarks

Rotary Core Log

Borehole No. **BH01**

Sheet 18 of 28

Project Name:	Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords:	530370.59 - 728426.56	Hole Type RC
Location:	Galway		Level:	16.71	Scale 1:50
Client:	Galway County Council		Dates:	13/11/2015 - 21/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
		168.90 - 172.00	1	100	100	100				
							172.00	-155.29		Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE.
		172.00 - 175.65	2	100	100	99				
							175.65	-158.94		Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. Scattered coarse shelled brachiopods
		175.65 - 177.00	1	100	100	100				
							177.00	-160.29		Strong. fresh, grey, fine to medium grained, massive LIMESTONE. Minor stylolites, some up to 2mm thick. Scattered fine bioclastic debris
		177.00 - 182.50	1	100	100	100				

171 172 173 174 175 176 177 178 179 180

Continued on next sheet

Remarks

AGS

Rotary Core Log

Borehole No. **BH01**

Sheet 19 of 28

Project Name: Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords: 530370.59 - 728426.56	Hole Type RC
Location: Galway		Level: 16.71	Scale 1:50
Client: Galway County Council		Dates: 13/11/2015 - 21/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
							182.50	-165.79		
		182.50 - 186.80	1	100	100	99				Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. Locally developed incipient intraclastic breccia texture. Fine stylolites and minor bioclasts
							186.80	-170.09		
		186.80 - 189.00	0	0	0	0				Cavity - No recovery. Pitting / dissolution textures and slight brown oxidation on contacts
							189.00	-172.29		
		189.00 - 190.30		100	0	0				Soft to firm, light brown, fine grained sandy CLAY. Some tabular / angular clasts of light brown oxidised mudstone within the clay

Continued on next sheet

Remarks

Rotary Core Log

Borehole No. **BH01**

Sheet 20 of 28

Project Name: Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords: 530370.59 - 728426.56	Hole Type RC
Location: Galway		Level: 16.71	Scale 1:50
Client: Galway County Council		Dates: 13/11/2015 - 21/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
			0				190.30	-173.59		
		190.30 - 191.20	0	100	100	100				Strong. fresh, grey, fine to medium grained, massive LIMESTONE.
		191.20 - 192.85	8	100	64	41	191.20	-174.49		Strong. fresh, grey / dark grey, fine to medium grained, massive LIMESTONE.
		192.85 - 195.70	1	100	100	100	192.85	-176.14		Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. Light brown sandy clay coating joint surfaces
		195.70 - 198.70	1	100	100	100	195.70	-178.99		Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. Scattered coarse shelled brachiopods
							198.70	-181.99		Strong. fresh, light grey / grey, fine to medium grained, massive LIMESTONE. Occasional coarse shelled brachiopod, locally developed incipient intraclastic breccia texture

Continued on next sheet

191 192 193 194 195 196 197 198 199 200

Remarks

Rotary Core Log

Borehole No. **BH01**

Sheet 21 of 28

Project Name: Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords: 530370.59 - 728426.56	Hole Type RC
Location: Galway		Level: 16.71	Scale 1:50
Client: Galway County Council		Dates: 13/11/2015 - 21/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
		198.70 - 203.00	2	91	91	91				
		203.00 - 203.90	9	94	94	56	203.00	-186.29		Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. Minor coarse shelled brachiopods. Joints coated with light brown fine sandy clay
		203.90 - 207.50	1	100	98	98	203.90	-187.19		Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. Scattered coarse shelled brachiopods
							207.50	-190.79		Strong. fresh, grey, fine to medium grained, massive LIMESTONE.

201 202 203 204 205 206 207 208 209 210

Continued on next sheet

Remarks

Rotary Core Log

Borehole No. **BH01**

Sheet 22 of 28

Project Name: Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords: 530370.59 - 728426.56	Hole Type RC
Location: Galway		Level: 16.71	Scale 1:50
Client: Galway County Council		Dates: 13/11/2015 - 21/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
		207.50 - 214.50	1	100	100	99				
							214.50	-197.79		Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. disseminated bioclastic debris
		214.50 - 216.90	2	100	90	90				
							216.90	-200.19		Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. Slightly vuggy with minor oxidation focused upon vugs
		216.90 - 217.60	3	100	100	100				
							217.60	-200.89		Strong. fresh, light grey / grey, fine to medium grained, massive LIMESTONE.
		217.60 - 221.55	4	97	87	78				

211 212 213 214 215 216 217 218 219 220

Continued on next sheet

Remarks

Rotary Core Log

Borehole No. **BH01**

Sheet 23 of 28

Project Name: Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords: 530370.59 - 728426.56	Hole Type RC
Location: Galway		Level: 16.71	Scale 1:50
Client: Galway County Council		Dates: 13/11/2015 - 21/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
		221.55 - 223.55	5	100	98	96	221.55	-204.84		Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. Minor oxidation and light brown clay localised along joints and along some stylolites
		223.55 - 226.55	3	97	84	81	223.55	-206.84		Strong. fresh, pale grey/ grey, medium grained, massive LIMESTONE. Distinct pellety texture, fine grained bioclastic debris. 226.4 - 226.5 evidence of oxidation, dissolution (pitting) along a shallowly dipping joint plane
		226.55 - 229.10	3	100	97	95	226.55	-209.84		Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. slight dissolution and oxidation focused on some joint surfaces
		229.10 - 229.20	0	0	0	0	229.10	-212.39		Cavity infilled with light brown soft / firm sticky clay
							229.20	-212.49		Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. Slight discolouration and oxidation along some joint surfaces

Continued on next sheet

Remarks

Rotary Core Log

Borehole No. **BH01**

Sheet 24 of 28

Project Name: Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords: 530370.59 - 728426.56	Hole Type RC
Location: Galway		Level: 16.71	Scale 1:50
Client: Galway County Council		Dates: 13/11/2015 - 21/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
		229.20 - 231.10	4	95	91	86	231.10	-214.39		
		231.10 - 233.20	1	100	98	95				Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE.
		233.20 - 234.15	11	91	79	45	233.20	-216.49		Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. Joints and fractures infilled with light brown fine / medium grained sand. 232.78 2cm white calcite vein
		234.15 - 237.55	6	99	80	70	234.15	-217.44		Strong. fresh, grey, fine to medium grained, massive LIMESTONE. Locally developed fine vuggy texture. 236.6m joint with intense bright orange Fe Staining.
		237.55 - 239.20	0	0	0	0	237.55	-220.84		CAVITY - coarse grained yellow sand and angular gravel with some light brown silt. Recover 30 - 35%
							239.20	-222.49		Strong. fresh, light grey / grey, fine to medium grained, massive LIMESTONE. Locally developed coarse vuggy texture - vugs up to 5mm dia.

231 232 233 234 235 236 237 238 239 240

Continued on next sheet

Remarks

Rotary Core Log

Borehole No. **BH01**

Sheet 25 of 28

Project Name: Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords: 530370.59 - 728426.56	Hole Type RC
Location: Galway		Level: 16.71	Scale 1:50
Client: Galway County Council		Dates: 13/11/2015 - 21/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
		239.20 - 241.40	6	50	19	13				
							241.40	-224.69		
		241.40 - 243.90	4	100	97	95				Strong. fresh, pale grey, fine to medium grained, massive LIMESTONE. Scattered poorly sorted bioclastic debris. Fine grained orange brown sand coating joint surfaces
		243.90 - 245.58	7	85	36	29				Strong. slightly weathered, pale grey, fine to medium grained, massive LIMESTONE. 243.9-244.35m axial parallel discontinuity with black argillaceous lamina. Orange brown clayey sand coating joint surfaces
							245.58	-228.87		
		245.58 - 247.25	0	0	0	0				CAVITY - 5% recovery of yellow brown fine to medium grained sand
							247.25	-230.54		
		247.25 - 248.37	4	100	61	38				Strong. fresh, pale grey / grey, mottled, fine to medium grained, massive LIMESTONE. Fine vuggy texture with minor oxidation / Fe staining localised within the vugs. Some axial parallel jointing
							248.37	-231.66		
		248.37 - 250.20	3	100	97	93				Strong. fresh, dark grey, medium grained, massive LIMESTONE. Poorly sorted bioclastic debris

241 242 243 244 245 246 247 248 249 250

Continued on next sheet

Remarks

AGS

Rotary Core Log

Borehole No. **BH01**

Sheet 26 of 28

Project Name: Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords: 530370.59 - 728426.56	Hole Type RC
Location: Galway		Level: 16.71	Scale 1:50
Client: Galway County Council		Dates: 13/11/2015 - 21/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
							250.20	-233.49		Strong. fresh, dark grey, medium grained, massive LIMESTONE. Poorly sorted bioclastic debris. Discontinuous randomly orientated white calcite veinlets
		250.20 - 253.00	2	100	98	98				
							253.00	-236.29		Strong. fresh, grey, medium grained, massive LIMESTONE. Scattered poorly sorted bioclastic debris. Incipient intraclastic breccia texture
		253.00 - 255.50	2	100	92	92				
		255.50 - 255.90	7	100	0	0	255.50	-238.79		Strong. grey LIMESTONE cross cut by cavity / dissolution zone bright orange staining and dissolution textures on cavity contact
		255.90 - 256.90	4	100	60	60	255.90	-239.19		Strong. fresh, grey, medium grained, massive LIMESTONE. Scattered bioclastic debris
		256.90 - 257.35	22	78	0	0	256.90	-240.19		Moderately strong, black, fine to medium grained LIMESTONE - black argillite rich zones - Rubble poorly sorted fragments with some polished surfaces.
		257.35 - 259.40	3	100	68	68	257.35	-240.64		Moderately strong. black / dark grey, fine to medium grained, massive LIMESTONE. Intraclastic breccia, irregular poorly sorted limestone clasts in a black argillite rich matrix
		259.40 - 259.50	0	100	0	0	259.40	-242.69		Strong. fresh, dark grey, medium grained, massive LIMESTONE.

Continued on next sheet

Remarks

Rotary Core Log

Borehole No. **BH01**

Sheet 27 of 28

Project Name: Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords: 530370.59 - 728426.56	Hole Type RC
Location: Galway		Level: 16.71	Scale 1:50
Client: Galway County Council		Dates: 13/11/2015 - 21/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
		259.50 - 263.10	3	100	90	87				
		263.10 - 263.70	3	58	0	0	263.10 263.70	-246.39 -246.99		Weak, black / grey MUDSTONE, running sub-parallel to core axis band is 2 - 3cm thick and partially altered to clay. The contact with the limestone shows evidence of oxidation / Fe staining
		263.70 - 266.40	2	100	100	100				Strong. fresh, grey / pale grey, medium grained, massive LIMESTONE. Mottled and evidence of bioturbation / burrowing. 265.4 - 265.46 fracture zone with rubble and coarse brown sand
		266.40 - 267.10	17	100	40	40	266.40	-249.69		Strong. fresh, grey / pale grey, medium grained, massive LIMESTONE. Mottled and evidence of bioturbation / burrowing. Core is coated with coarse brown sand
		267.10 - 267.70	2	100	100	100	267.10	-250.39		Strong. fresh, grey / pale grey, medium grained, massive LIMESTONE. Mottled and evidence of bioturbation / burrowing.
		267.70 - 270.30	6	100	55	52	267.70	-250.99		Strong. fresh, grey / dark grey, medium grained, massive LIMESTONE. Occasional stylolitic and axial parallel joint

261 262 263 264 265 266 267 268 269 270

Continued on next sheet

Remarks

AGS

Rotary Core Log

Borehole No. **BH01**

Sheet 28 of 28

Project Name: Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords: 530370.59 - 728426.56	Hole Type RC
Location: Galway		Level: 16.71	Scale 1:50
Client: Galway County Council		Dates: 13/11/2015 - 21/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
							270.30	-253.59		
		270.30 - 272.40	1	100	100	100				Strong. fresh, grey / dark grey, medium grained, massive LIMESTONE.
							272.40	-255.69		
		272.40 - 273.40	0	0	0	0				CAVITY no recovery
							273.40	-256.69		
		273.40 - 274.16	5	79	39	20				Strong. fresh, very pale grey, medium grained, massive LIMESTONE. Probably a boulder within cavity / unconsolidated sediments
							274.16	-257.45		
		274.16 - 276.70	0	8	0	0				CAVITY - unconsolidated ground only 10% medium to coarse limestone cobbles and some gravel recovered
							276.70	-259.99		End of borehole at 276.70 m

271 272 273 274 275 276 277 278 279 280

Remarks

AGS

Rotary Core Log

Borehole No. **BH03**

Sheet 1 of 11

Project Name:	Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords:	530023.82 - 728382.57	Hole Type RC
Location:	Galway		Level:	26.26	Scale 1:50
Client:	Galway County Council		Dates:	13/11/2015 - 09/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
										No Recovery
							1.20	25.06		Very soft, light brown, sandy CLAY with minor angular gravel
							1.45	24.81		Rubble of sub-angular to sub-rounded grey Limestone fragments and minor creamy coloured calcite. Lumps of soft light grey/brown clay. (Recovery 0.35m)
							2.70	23.56		Stiff, grey brown, sandy CLAY, occasional sub angular gravel and cobbles of dark grey limestone
							3.00	23.26		Coarse cobbles of dark grey limestone with firm / stiff grey brown sandy clay
							3.20	23.06		Coarse COBBLES with gravel. Sub-angular to sub-rounded grey / dark grey limestone with minor pink (tonalitic) granite
							3.55	22.71		Core loss
		4.15 - 4.42	C				4.00	22.26		Stiff / very stiff, light grey/brown sandy CLAY with minor (10 - 15%) scattered angular limestone gravel
							4.85	21.41		Stiff / very stiff, light grey/brown sandy CLAY with angular limestone gravel & cobbles
							6.00	20.26		Core loss
							6.55	19.71		Stiff / very stiff, light grey/brown sandy CLAY with angular limestone gravel, cobbles and occasional boulders
							6.85	19.41		Stiff / very stiff, grey / brown sandy CLAY with (12 - 20%) angular limestone gravel and occasional sub-rounded cobbles
							7.65	18.61		Core loss
							8.05	18.21		Loose angular GRAVEL with cobbles. Coated with stiff sandy clay
							8.25	18.01		Stiff / very stiff, light grey / brown, sandy CLAY, 205 sub-angular / sub-rounded gravel and occasional sub-rounded cobble and small boulder

Continued on next sheet

Remarks
All angles measured relative to core normal

Rotary Core Log

Borehole No. **BH03**

Sheet 2 of 11

Project Name:	Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords:	530023.82 - 728382.57	Hole Type RC
Location:	Galway		Level:	26.26	Scale 1:50
Client:	Galway County Council		Dates:	13/11/2015 - 09/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
							11.55	14.71		Stiff / very stiff, light grey / brown, sandy CLAY, 205 sub-angular / sub-rounded gravel and occasional sub-angular cobbles and small boulder
							12.94	13.32		Soft, dark chocolate brown CLAY
							12.98	13.28		Core Loss
		13.65 - 13.73	D				13.65	12.61		Soft / very soft, greenish grey, fine sandy SILT (recovery 0.5m)
		13.73 - 13.85	D							
		14.90 - 15.00	D				14.75	11.51		Core Loss
							16.15	10.11		Soft / firm, grey / green SILT
							16.45	9.81		Soft / very soft, grey brown SILT with very thin clay laminae (Mobilised and coating surface by drilling additive)
							16.85	9.41		Core loss
							18.60	7.66		Soft / very soft, grey SILT
		19.00 - 19.10	D							
		19.10 - 19.20	D							
		19.25 - 19.30	D				19.25	7.01		Soft / firm, grey SILT, locally developed faint brown laminae (smearing of clay surface)
		19.90 - 20.00	D							

Continued on next sheet

Remarks

All angles measured relative to core normal

Rotary Core Log

Borehole No. **BH03**

Sheet 3 of 11

Project Name:	Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords:	530023.82 - 728382.57	Hole Type RC
Location:	Galway		Level:	26.26	Scale 1:50
Client:	Galway County Council		Dates:	13/11/2015 - 09/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
		20.95 - 21.05	D							
		21.30 - 21.40	D							
							21.70	4.56		Very soft / soft, grey SILT (Recovery 50%)
							23.00	3.26		Soft / firm, grey SILT (Recovery 60%)
							25.20	1.06		Soft / very soft, grey SILT (Recovery 90%)
		25.50 - 25.60	D							
		25.80 - 25.90	D							
		26.50 - 26.60	D							
		26.70 - 26.80	D							
		27.20 - 27.25	D							
		27.45 - 27.55	D							
		27.55 - 27.65	D				27.50	-1.24		Firm grey SILT with centimetric scale horizontal banding
							28.45	-2.19		Soft, grey SILT (recovery 60%)
							30.00	-3.74		

Continued on next sheet

Remarks
All angles measured relative to core normal

Rotary Core Log

Borehole No. **BH03**

Sheet 4 of 11

Project Name:	Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords:	530023.82 - 728382.57	Hole Type RC
Location:	Galway		Level:	26.26	Scale 1:50
Client:	Galway County Council		Dates:	13/11/2015 - 09/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
		30.25 - 30.33	D							Soft / firm grey SILT
		31.20 - 31.30	D							
		31.35 - 31.45	D							
							31.73	-5.47		Firm, grey / brown SILT
							32.40	-6.14		Soft, grey SILT
		33.70 - 33.80	D							
		33.95 - 34.03	D							
							34.60	-8.34		Soft / Firm, light grey SILT. Minor fine grained sand
		36.05 - 36.15	D				36.05	-9.79		Loose / medium dense, light grey / brown, silty SAND (recovery 30%)
		36.70 - 36.80	D							
							38.38	-12.12		Firm, dark chocolate brown organic CLAY, Small fibres bottom 0.5m of core coated with fine grained grey sand
		38.60 - 38.70	D							
		38.95 - 39.05	D							
		39.25 - 39.30	D							
		39.45 - 39.55	D							
		39.80 - 39.83	D							

Continued on next sheet

31 32 33 34 35 36 37 38 39 40

Remarks
All angles measured relative to core normal

Rotary Core Log

Borehole No. **BH03**

Sheet 5 of 11

Project Name: Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords: 530023.82 - 728382.57	Hole Type RC
Location: Galway		Level: 26.26	Scale 1:50
Client: Galway County Council		Dates: 13/11/2015 - 09/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
		40.65 - 40.77	D				40.65	-14.39		Loose / medium dense, grey, fine to medium grained SAND (recovery 60%)
		41.20 - 41.25	D				41.00	-14.74		Firm grey / brown, organic CLAY, minor dark brown banding 0.5 - 1cm thick
		41.30 - 41.50	C							
		41.85 - 42.08	C				41.80	-15.54		Stiff / very stiff, dark brown, organic CLAY. Basal 4cm laminated - light / dark brown millimetric scale laminae
		42.30 - 42.35	D							
		42.35 - 42.40	D				42.40	-16.14		Firm / stiff, dark brown grey, CLAY
		42.65 - 42.97	C							
		42.97 - 43.30	C							
							43.25	-16.99		Soft to firm light grey CLAY
		44.05 - 44.20	C							
							44.20	-17.94		Core Loss
							44.85	-18.59		Firm, dark grey brown CLAY
							45.24	-18.98		Soft, grey SILT
							45.30	-19.04		Very Stiff, Dark brown / grey, organic CLAY
		46.20 - 46.27	D							
		46.27 - 46.59	C							
		47.00 - 47.10	D							
		47.20 - 47.27	D							
		47.45 - 47.55	D							
		47.85 - 48.02	C							
		48.20 - 48.30	D							
		48.45 - 48.70	C							
		49.00 - 49.10	D							
		49.30 - 49.40	D							
							50.00	-23.74		

Continued on next sheet

Remarks
All angles measured relative to core normal

Rotary Core Log

Borehole No. **BH03**

Sheet 6 of 11

Project Name:	Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords:	530023.82 - 728382.57	Hole Type RC
Location:	Galway		Level:	26.26	Scale 1:50
Client:	Galway County Council		Dates:	13/11/2015 - 09/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
							50.35	-24.09		Firm grey CLAY, with cobbles of strong pale grey limestone rounded to sub-angular
										Soft, light greyish brown, cobbly CLAY, cobbles of pale grey limestone, comprise 50% of material
							51.30	-25.04		Boulder of pale grey massive limestone, stylolitic with stylolites rotated to sub-vertical orientation
							52.56	-26.30		Soft / firm, brownish grey gravelly CLAY, angular gravel (10 - 20%), sub-rounded coarse cobbles / small boulders (30 - 40%) of light grey massive limestone. (recovery 80%)
							56.40	-30.14		Sub-rounded COBBLES with coarse gravel - coated by soft light grey clay
							57.15	-30.89		Soft / firm Pale grey CLAY with angular cobbles of grey limestone (recovery 40%)
							57.85	-31.59		Soft grey brown CLAY with angular gravel and cobbles (Recovery 40%)
										Continued on next sheet

51 52 53 54 55 56 57 58 59 60

Remarks
All angles measured relative to core normal

AGS

Rotary Core Log

Borehole No. **BH03**

Sheet 7 of 11

Project Name: Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords: 530023.82 - 728382.57	Hole Type RC
Location: Galway		Level: 26.26	Scale 1:50
Client: Galway County Council		Dates: 13/11/2015 - 09/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
							60.55	-34.29		BOULDER of strong, pale grey, fine to medium grained Limestone
							62.20	-35.94		Soft to firm grey brown cobbly CLAY - cobbles of angular limestone
							62.52	-36.26		Stiff brown, organic CLAY
		63.15 - 63.22	D							
		63.38 - 63.43	D							
		63.50 - 63.55	D							
		63.90 - 63.95	D							
		64.30 - 64.35	D				64.05	-37.79		Loose / medium dense, brown / grey, medium grained SAND
		64.90 - 64.95	D				64.11	-37.85		Firm / stiff, brown / dark brown, organic CLAY, Finely laminated (0.5 - 1.5mm laminae) light / dark brown. Occasional small white clay flecks / blebs. Millimetric to centimetric scale bands of fine to medium grained sand, locally developed grading - coarsening down
		65.50 - 65.60	D							
							65.78	-39.52		Stiff pale grey CLAY
							65.85	-39.59		Firm / stiff, brownish grey, finely laminated CLAY with sub-rounded cobbles of grey limestone, locally friable and broken up in situ
							66.48	-40.22		Firm grey, fine sandy CLAY, with 10% angular gravel
		66.95 - 67.05	D				66.85	-40.59		Firm, pale creamy grey, fine grained sandy CLAY (recovery 80%)
		68.40 - 68.45	D				67.65	-41.39		Firm, grey / creamy grey fine sandy CLAY laminated and banded texture with small clasts of creamy white, soft weather limestone
							69.15	-42.89		BOULDER of strong, fresh pale grey, fine grained Limestone
							69.89	-43.63		

Continued on next sheet

Remarks

All angles measured relative to core normal

Rotary Core Log

Borehole No. **BH03**

Sheet 8 of 11

Project Name:	Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords:	530023.82 - 728382.57	Hole Type RC
Location:	Galway		Level:	26.26	Scale 1:50
Client:	Galway County Council		Dates:	13/11/2015 - 09/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
		70.40 - 70.50	D							Firm, dark brown / grey, laminated CLAY, with boulders of light grey limestone
		70.75 - 70.85	D							
							72.98	-46.72		Soft / firm, grey / brown fine sandy CLAY with angular fine to medium grained limestone gravel and cobbles
							73.95	-47.69		Loose. light grey / brown medium grained SAND, with bands of soft brown clay (Recovery 50%)
							75.00	-48.74		BOULDER of strong, fresh, pale grey Limestone
							76.14	-49.88		Firm dark brown organic CLAY, minor coarse grained gravel
							76.35	-50.09		Soft dark brown organic CLAY - very light / low density
							76.42	-50.16		Soft light brown / grey, gravelly CLAY, 50 -60% coarse angular gravel and occasional cobbles, poor recovery of clay but all cobbles / gravel have a clay coating
							79.10	-52.84		BOULDER of strong light grey limestone
							79.54	-53.28		Soft / firm grey brown sandy CLAY, with sub-angular limestone gravel / cobbles
										Continued on next sheet

71 72 73 74 75 76 77 78 79 80

Remarks
All angles measured relative to core normal

Rotary Core Log

Borehole No. **BH03**

Sheet 9 of 11

Project Name:	Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords:	530023.82 - 728382.57	Hole Type RC
Location:	Galway		Level:	26.26	Scale 1:50
Client:	Galway County Council		Dates:	13/11/2015 - 09/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
							80.10	-53.84		Loose coarse gravelly COBBLES of light grey limestone. evidence of reworking by the bit
							85.55	-59.29		Tricone drilling - Open hole drilling - no recovery

81 82 83 84 85 86 87 88 89 90

Continued on next sheet

Remarks
All angles measured relative to core normal

Rotary Core Log

Borehole No.
BH03
Sheet 10 of 11

Project Name:	Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords:	530023.82 - 728382.57	Hole Type RC
Location:	Galway		Level:	26.26	Scale 1:50
Client:	Galway County Council		Dates:	13/11/2015 - 09/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description
				TCR	SCR	RQD				

91
92
93
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100

Continued on next sheet

Remarks
All angles measured relative to core normal

Rotary Core Log

Borehole No. **BH03**

Sheet 11 of 11

Project Name:	Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords:	530023.82 - 728382.57	Hole Type RC
Location:	Galway		Level:	26.26	Scale 1:50
Client:	Galway County Council		Dates:	13/11/2015 - 09/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
							104.95	-78.69		Strong, grey, fine to medium grained, massive LIMESTONE. Discontinuous white calcite veining dipping at 55 - 65' and up to 1cm thick., scatter bioclast debris.
							107.10	-80.84		Rubble of gravel sized pale grey Limestone fragments
		107.50 - 108.16	7	90	52	52	107.50	-81.24		Strong, fresh pale grey, fine grained, massive LIMESTONE. Scattered bioclastic debris, stylolitic thin argillite partings
							108.16	-81.90		Soft, dark brown CLAY, with cobbles of angular / sub-angular limestone
		108.60 - 109.90		100	100	100	108.60	-82.34		Strong, fresh, grey medium grained, massive LIMESTONE. Scattered fine bioclastic debris. 109.4m small calcite filled void with cubic crystals of purple fluorite
							109.90	-83.64		End of borehole at 109.90 m

101 102 103 104 105 106 107 108 109 110

Remarks
All angles measured relative to core normal

Rotary Core Log

Borehole No. **BH04**

Sheet 1 of 7

Project Name:	Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords:	530150.78 - 728400.13	Hole Type RC
Location:	Galway		Level:	32.17	Scale 1:25
Client:	Galway County Council		Dates:	11/11/2015 - 12/11/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
		0.00 - 1.20		0	0	0				No Recovery sandy gravelly soil
		1.20 - 1.35		100	0	0	1.20	30.97		Mid brown, soft CLAY, with fine to medium grained, angular, limestone gravel
		1.35 - 1.50		100	0	0	1.35	30.82		Light grey to pale brown soft CLAY
		1.50 - 2.84		37	0	0	1.50	30.67		Rubble comprising - Strong, Slightly weathered pale grey fine to medium grained LIMESTONE
		2.84 - 3.36		87	13	0	2.84	29.33		Strong, fresh, pale grey to brownish grey, fine to medium grained LIMESTONE
		3.36 - 4.00		100	0	0	3.36	28.81		Strong, fresh, pale grey / brown, fine to medium grained massive LIMESTONE. Broken in chaotic angular fragments clasts ranging in size from 0.5cm to 10cm across in a matrix of firm to stiff brown / grey clay between fragments and in bands up to 10cm thick.
		4.00 - 4.20	25	100	0	0	4.00	28.17		Strong, fresh, pale grey / brown, fine to medium grained massive LIMESTONE. two fracture sets, 1. dipping at 25' Planar / Rough, 2. Dipping at 85', Planar / Rough coated with grey / brown clay.
		4.20 - 4.45		100	0	0	4.20	27.97		A rubble of Strong, fresh, pale grey / brown, fine to medium grained massive LIMESTONE.
		4.45 - 4.90	9	100	24	24	4.45	27.72		Strong, fresh, pale grey / brown, fine to medium grained massive LIMESTONE. Two fracture sets, 1. dipping at 15 -30' Planar to slightly undulating / Rough, infilled with grey /brown grey stiff clay with fine grained sand, 2. Dipping at 65', Planar / Rough
							4.90	27.27		

Continued on next sheet

Remarks

All angles measured relative to short core axis

Rotary Core Log

Borehole No. **BH04**

Sheet 2 of 7

Project Name: Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords: 530150.78 - 728400.13	Hole Type RC
Location: Galway		Level: 32.17	Scale 1:25
Client: Galway County Council		Dates: 11/11/2015 - 12/11/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
		4.90 - 5.95	10	100	10	10				Strong, fresh, pale grey / brown, fine to medium grained massive LIMESTONE. Etched, sub-horizontal stylolites. Two fracture sets, 1. Closely spaced, dipping at 15-25' Planar to slightly undulating / Rough, coated with light brown / grey clay and fine sand, 2. Dipping at 70 - 90', Planar -undulating/ Rough coated with grey / brown clay and fine grained sand.
							5.95	26.22		
		5.95 - 6.20		88	0	0				Rubble of Strong, fresh, pale grey / brown, fine to medium grained massive LIMESTONE. Fragments angular and 1 - 7cm across.
							6.20	25.97		
		6.20 - 7.30	8	100	0	0				Strong, fresh, pale grey / brown, fine to medium grained massive LIMESTONE.. Slightly etched stylolites. two fracture sets, 1. dipping at 5 - 20' Planar / Rough,, grey clay infill 2. Dipping at 70 - 90', Planar - undulating / Rough coated with grey / brown clay.
							7.30	24.87		
		7.30 - 7.53	2	100	100	70				Strong, fresh, pale grey / brown, fine to medium grained massive LIMESTONE. One fracture set, dipping at 10' Planar / Rough,
							7.53	24.64		
		7.53 - 7.80	7	100	0	0				Strong, fresh, pale grey / brown, fine to medium grained massive LIMESTONE. Sub-horizontal stylolites. 3 - 10cm apart. One fracture set dipping at 70 - 90' Undulating / Rough, brown clay fill - aperture width up to 2mm..
							7.80	24.37		
		7.80 - 8.60	3	100	93	93				Strong, fresh, pale grey / brown, fine to medium grained massive LIMESTONE. Sub horizontal, well developed stylolites two fracture sets, 1. dipping at 5 - 10' Planar / Rough, 2. Dipping at 45', Planar / Rough no infill
							8.60	23.57		
		8.60 - 11.36	5	100	13	13				Strong, fresh, pale grey / brown, fine to medium grained massive LIMESTONE. Sub horizontal stylolites 10-20cm apart. Locally developed, sub -vertical white calcite veinlets at 9.7m. Three fracture sets, 1. dipping at 10 - 25' Undulating to Planar / Rough, locally developed light brown clay and fine grained sand, 2. Dipping at 70 - 90, Planar / Rough coated / infilled with with grey / brown clay. 3. Locally developed (between 9.4 - 97m), dipping at 85' Planar / Rough controlled by hairline white calcite veinlets

Continued on next sheet

Remarks
All angles measured relative to short core axis

Rotary Core Log

Borehole No. **BH04**

Sheet 3 of 7

Project Name:	Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords:	530150.78 - 728400.13	Hole Type RC
Location:	Galway		Level:	32.17	Scale 1:25
Client:	Galway County Council		Dates:	11/11/2015 - 12/11/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
							11.36	20.81		
		11.36 - 12.50	8	100	72	66				Strong, fresh, grey, fine to medium grained massive LIMESTONE. two fracture sets, 1. dipping at 5-15' Planar / Rough, locally developed thin clay light brown coating, 2. Dipping at 55', Planar / Rough coated with white grey calcite.
							12.50	19.67		
		12.50 - 15.86	1	100	100	100				Strong, fresh, grey / pale grey, fine to medium grained massive LIMESTONE. Sub horizontal stylolites., minor fine bioclastic debris. One fracture set dipping at 10' Planar / Rough.

11 12 13 14 15

Continued on next sheet

Remarks
All angles measured relative to short core axis

Rotary Core Log

Borehole No. **BH04**

Sheet 4 of 7

Project Name:	Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords:	530150.78 - 728400.13	Hole Type RC
Location:	Galway		Level:	32.17	Scale 1:25
Client:	Galway County Council		Dates:	11/11/2015 - 12/11/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
							15.86	16.31		
		15.86 - 17.74	6	100	41	41				Strong, fresh, grey, slightly mottled, fine to medium grained, massive LIMESTONE. Two fracture sets, 1. dipping at 10-25' undulating / Rough, Grey/brown to orange-brown clay coating fracture surfaces. and locally infilling fractures - aperture up to 2mm thick. 2. Dipping at 60 - 70', Planar / Rough very minor clay coating.
		17.74 - 18.40	0	100	100	100	17.74	14.43		Strong, fresh, pale grey / grey, slightly mottled, fine to medium grained, massive LIMESTONE. 5mm wide calcite vein dipping at 85'.
		18.40 - 18.50		100	0	0	18.40	13.77		Very soft, dark bluish grey CLAY
		18.50 - 18.60		100	0	0	18.50	13.67		
		18.60 - 19.36	1	100	100	100	18.60	13.57		Medium strength, fresh, faintly laminated, black MUDSTONE. Disseminated, sub mm to mm scale blebs of crystalline pyrite. Basal contact has a wavy / undulating nature. Strong, fresh, grey / dark grey, fine to medium grained, massive LIMESTONE. Faint brecciated intraclastic texture. - very irregular shaped angular, centimetric scale clasts in a dark grey fine grained matrix. Chaotic network of shaley stylolitic partings - incipient randomly orientated fracturing. One fracture set. dipping at 5' Planar / Rough, no infill
		19.36 - 19.55		79	0	0	19.36	12.81		Dark grey, soft CLAY with friable angular / tabular grey limestone fragments 2 - 5mm across
		19.55 - 19.95	18	100	58	40	19.55	12.62		Strong, fresh, grey / dark grey, slightly mottled, fine to medium grained, massive LIMESTONE. Brecciated texture, angular / irregularly shaped intraclasts 0.5 - 3cm across, in a dark grey fine grained matrix (micrite), clasts are matrix
							19.95	12.22		

Continued on next sheet

Remarks
All angles measured relative to short core axis

Rotary Core Log

Borehole No. **BH04**

Sheet 5 of 7

Project Name: Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords: 530150.78 - 728400.13	Hole Type RC
Location: Galway		Level: 32.17	Scale 1:25
Client: Galway County Council		Dates: 11/11/2015 - 12/11/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
		19.95 - 20.78	0	100	100	100				supported. One fracture set, dipping at 40-45' Planar / Rough, minor grey/brown clay. Strong, fresh, grey, slightly mottled, fine to medium grained, massive LIMESTONE. Brecciated texture, sub-angular, irregular shaped, intraclasts in a dark grey fine grained matrix. Minor bioclastic debris.
		20.78 - 21.64	2	100	100	100	20.78	11.39		Strong, fresh, grey, fine to medium grained, massive LIMESTONE. Incipient breccia texture. Sub-horizontal stylolites 10 - 15cm apart, minor scattered bioclasts. One fracture set dipping at 25' Planar / Rough, no infill (rubbly)
		21.64 - 22.60	9	96	57	57	21.64	10.53		Strong, fresh, grey / pale grey, slightly mottled, fine to medium grained, massive LIMESTONE. Sub-horizontal stylolites and very small discontinuous white calcite veins. Three fracture sets, 1. dipping at 5-10' Planar to slightly stepped / Rough,. 2. Dipping at 30 - 40', Planar / Rough, 3. Dipping at 70 - 75' Planar / Rough minor orange brown clay particulary over top 20cm. .
		22.60 - 26.50	2	100	100	99	22.60	9.57		Strong, fresh, pale grey / brownish grey, fine to medium grained, massive LIMESTONE. Scattered small bioclasts and an occasional larger (2- 3cm) coral fragment. Sub-horizontal stylolites 20 - 30cm apart. One fracture set dipping at 5-10' Planar / Rough, minor pale brown sandy clay coating.

Continued on next sheet

Remarks
All angles measured relative to short core axis

Rotary Core Log

Borehole No. **BH04**

Sheet 6 of 7

Project Name:	Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords:	530150.78 - 728400.13	Hole Type RC
Location:	Galway		Level:	32.17	Scale 1:25
Client:	Galway County Council		Dates:	11/11/2015 - 12/11/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
		26.50 - 27.20	9	100	46	20	26.50	5.67		Strong, fresh, pale grey / brownish grey, fine to medium grained, massive LIMESTONE. Two fracture sets, 1. dipping at 5-10 Planar / Rough, no infill. 2. Dipping at 55-60', Planar / Rough, very minor yellowish brown clay coating.
		27.20 - 28.95	4	100	87	78	27.20	4.97		Strong, fresh, pale grey, fine to medium grained, massive LIMESTONE. Two fracture sets, 1. closely / medium spaced, dipping at 5-10' Planar / Rough, Grey/brown to orange-brown clay coating fracture surfaces. and locally infilling fractures - aperture up to 2mm thick. 2. Dipping at 45", Planar / Rough
		28.95 - 29.32		0	0	0	28.95	3.22		CAVITY. Contacts display evidence of dissolution, pitting etc... thin coatings of yellowish brown clay
		29.32 - 30.20	3	100	100	100	29.32	2.85		Strong, fresh, pale grey, fine to medium grained, massive LIMESTONE. Sub-horizontal stylolites 10 - 20cm apart. One fracture set, 1. Closely spaced, dipping at 0-5' Planar / Rough,

Continued on next sheet

26 27 28 29 30

Remarks
All angles measured relative to short core axis

Rotary Core Log

Borehole No. **BH04**

Sheet 7 of 7

Project Name:	Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords:	530150.78 - 728400.13	Hole Type RC
Location:	Galway		Level:	32.17	Scale 1:25
Client:	Galway County Council		Dates:	11/11/2015 - 12/11/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
							30.20	1.97		
		30.20 - 30.40		100	0	0				Very soft light brown / grey CLAY with a band of pale brown sand 5cm thick at top. Cavity Fill?
							30.40	1.77		Strong, fresh, pale grey, fine to medium grained, massive LIMESTONE. Sub-horizontal stylolites. One fracture sets dipping at 5-20' Planar / Rough, Medium spaced.
		30.40 - 33.72	2	100	100	98				
							33.72	-1.55		Strong, fresh, pale grey, fine to medium grained, massive LIMESTONE. Sub-horizontal stylolites. Two fracture sets 1. dipping at 5-10' Planar / Rough, no infill. 2. dipping at 75-85', Planar / Rough.
		33.72 - 34.30	7	100	0	0				
							34.20	-2.03		Strong, fresh, pale grey, fine to medium grained, massive LIMESTONE. Minor sub-horizontal stylolites. One fracture sets dipping at 250' Planar to undulating / Rough, no infill.
		34.30 - 35.00	1	100	100	100				
							35.00	-2.83		End of borehole at 35.00 m

31 32 33 34 35

Remarks
All angles measured relative to short core axis

Rotary Core Log

Borehole No. **BH05**

Sheet 1 of 9

Project Name: Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords: 530186.65 - 728378.11	Hole Type RC
Location: Galway		Level: 34.14	Scale 1:25
Client: Galway County Council		Dates: 06/11/2015 - 10/11/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
										Overburden minor cobbles recovered
							0.40	33.74		
		0.40 - 0.95	13	100	0	0				Strong, pale grey, medium grained, massive LIMESTONE. Joint set dipping at 5 - 10' Planar / Rough, no infill. Joint set dipping at 85 - 90' Planar / Rough, grey calcite coating joint surface
							0.95	33.19		
		0.95 - 1.17	0	100	100	100				Strong, pale grey, medium grained, massive pelley LIMESTONE
							1.17	32.97		
		1.17 - 1.50	12	100	0	0				Strong, pale grey, medium grained, massive LIMESTONE. Joints dipping at 5 - 10' Planar - slightly undulating / Rough,, very close to closely spaced,
							1.50	32.64		
		1.50 - 2.30	11	100	0	0				Strong pale grey / grey, medium grained, massive LIMESTONE. Joints dipping at 5 - 10' Planar / Rough. Set of two conjugate joints dipping at 85 - 90' with strike angle between sets of 110 / 70' Planar to Slightly undulating / Rough
							2.30	31.84		
		2.30 - 3.27	11	100	32	32				Strong, pale grey, fine to medium grained, slightly bioclastic, massive LIMESTONE. Minor stylolites, Very closely to closely spaced fractures dipping at 5 - 15', Planar to slightly undulating / Rough.
							3.27	30.87		
		3.27 - 5.80	8	99	0	0				Strong, grey / pale grey, medium grained, pellety, massive LIMESTONE. closely spaced fracture dipping at 5 - 15', Planar to slightly undulating / Rough. Fracture set dipping at 85' planar / rough
										Continued on next sheet

1 2 3 4 5

Remarks
All angles measured relative to short core axis

AGS

Rotary Core Log

Borehole No. **BH05**

Sheet 2 of 9

Project Name:	Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords:	530186.65 - 728378.11	Hole Type RC
Location:	Galway		Level:	34.14	Scale 1:25
Client:	Galway County Council		Dates:	06/11/2015 - 10/11/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
							5.80	28.34		
		5.80 - 8.00	6	100	0	0				Strong, pale grey, medium grained, pellety, massive LIMESTONE. fine grained scattered bioclastic debris, Sub horizontal stylolites. Very closely to closely spaced fractures dipping at 5 - 20', Planar to slightly undulating / Rough, minor fine grained grey sand infill. Axial parallel conjugate jointing dipping at 85 - 90' striking 120 / 60 relative to each other. minor clay coating
		8.00 - 8.68	1	91	91	91	8.00	26.14		Strong, pale grey, medium grained, massive LIMESTONE. fine grained scattered bioclastic debris, Sub horizontal stylolites.
		8.68 - 9.50	11	100	88	37	8.68	25.46		Strong, pale grey, fine grained, massive LIMESTONE. Sub horizontal stylolites. Fractures dipping at 5 - 10', Planar / Rough, Fractures dipping at 45' Planar - slightly undulating / Rough
		9.50 - 10.25	0	100	100	100	9.50	24.64		Strong, pale grey, fine grained, massive LIMESTONE. fine, sub horizontal stylolites, spaced 5 - 10cm.

Continued on next sheet

6 7 8 9 10

Remarks
All angles measured relative to short core axis

AGS

Rotary Core Log

Borehole No. **BH05**

Sheet 3 of 9

Project Name: Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords: 530186.65 - 728378.11	Hole Type RC
Location: Galway		Level: 34.14	Scale 1:25
Client: Galway County Council		Dates: 06/11/2015 - 10/11/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
							10.25	23.89		
		10.25 - 11.34	13	100	0	0				Strong, pale grey, fine grained, massive LIMESTONE. Sub horizontal stylolites. Three fractures sets 1. dipping at 5 - 10', Planar / Rough, no infill; 2. dipping at 45 - 50' planar to slightly undulating / Rough, fine sand coating fracture surfaces. 3. dipping at 85 - 90', Planar to slightly undulating / Rough cross-cutting the other fracture sets.
							11.34	22.80		
		11.34 - 12.62	3	100	100	78				Strong, pale grey, fine to medium grained, massive LIMESTONE. Sub horizontal stylolites. Two fracture sets 1. dipping at 5 - 10', Planar to slightly undulating / Rough, 2. dipping at 85 - 90', Planar / Rough very minor iron staining.
							12.62	21.52		
		12.62 - 13.27	15	100	0	0				Strong, pale grey / grey, fine / medium grained, massive LIMESTONE. Two fractures sets 1. Close to very closely spaced dipping at 5 - 20', Planar / Rough; 2. dipping at 70 - 80', Planar / Rough
							13.27	20.87		
		13.27 - 15.04	4	100	100	96				Strong, grey, fine / medium grained, massive LIMESTONE. Very small scattered bioclasts, Occasional sub-horizontal stylolites. Small elongate calcite filled "Birdseyes", elongate sub vertical long axis 5 - 10mm long and 0.5mm wide. Two fracture sets 1. Medium spaced dipping at 5 - 15', Planar / Rough; 2. Widely spaced, dipping at 55', Planar / Rough

Continued on next sheet

Remarks
All angles measured relative to short core axis

Rotary Core Log

Borehole No. **BH05**

Sheet 4 of 9

Project Name: Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords: 530186.65 - 728378.11	Hole Type RC
Location: Galway		Level: 34.14	Scale 1:25
Client: Galway County Council		Dates: 06/11/2015 - 10/11/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
							15.04	19.10		
		15.04 - 15.44	18	100	100	0				Strong, grey, fine / medium grained, massive LIMESTONE. Very small scattered bioclasts and a large 1cm dia. gastropod , Occasional sub-horizontal stylolites. Two fracture sets 1. Closely to very closely spaced dipping at 5 - 15', Planar / Rough; 2. Dipping at 85', Planar to slightly undulating / Rough
							15.44	18.70		
		15.44 - 16.82	2		100	100				Strong, grey, fine / medium grained, massive LIMESTONE. Occasional sub-horizontal stylolites. Faint intraclasts centimetric scale. One fracture set dipping at 10', Planar / Rough;
							16.82	17.32		
		16.82 - 18.40	8	100	100	63				Strong, grey, fine / medium grained, massive LIMESTONE. Fine grained scattered bioclastic debris. Locally developed intraclasts, clasts are rounded to sub-rounded 1 - 2cm in dia. Two fracture sets 1. Medium spaced dipping at 10 - 15', Planar / Rough, minor associated rubble; 2. Sub-vertical - undulating dipping at 80 - 90', Planar / Rough
							18.40	15.74		
		18.40 - 19.26	7	100	95	60				Strong, grey, fine grained, massive LIMESTONE. Thin band of coarse brachiopod shells at 18.82m. Two fracture sets 1. Medium spaced, dipping at 10', Planar / Rough, minor light brown clay coating the fracture surfaces; 2. Dipping at 80-85', Planar / Rough associated with thin white calcite veinlets
							19.26	14.88		
		19.26 - 19.95	3	100	100	100				Strong, pale grey, fine / medium grained, massive, pellety LIMESTONE. Fine scattered bioclasts, Occasional sub-horizontal stylolites. Fracture set dipping at 5 - 10', Planar / Rough, no infill.
							19.95	14.19		

Continued on next sheet

16 17 18 19 20

Remarks
All angles measured relative to short core axis

Rotary Core Log

Borehole No. **BH05**

Sheet 5 of 9

Project Name: Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords: 530186.65 - 728378.11	Hole Type RC
Location: Galway		Level: 34.14	Scale 1:25
Client: Galway County Council		Dates: 06/11/2015 - 10/11/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
		19.95 - 20.20	24	100	60	0				Strong, grey, fine / medium grained, massive LIMESTONE. Two fracture sets 1. Closely spaced dipping at 5 - 10', Planar / Rough; 2. Dipping at 45', Planar / Rough light brown clay infill, up to 2mm thick.
		20.20 - 20.30	0	0	0	0	20.20	13.94		Core loss
		20.30 - 20.45	0	100	100	100	20.30	13.84		Very stiff, light brown / orange brown CLAY. Finely laminated.
		20.45 - 20.75	20	100	0	0	20.45	13.69		Strong, grey, fine / medium grained, massive LIMESTONE. Small black millimetric scale blebs- burrowing? Three fracture sets 1. Very closely spaced, dipping at 5', Planar / Rough; 2. Dipping at 80', Planar / Rough with white calcite coating fracture surfaces. 3. dipping at 70', undulating / rough crosscut by set 2.
		20.75 - 21.50	9	100	35	24	20.75	13.39		Strong, grey pale grey mottled, fine / medium grained, massive, pellety LIMESTONE. Intraclastic texture sub-angular to sub-rounded clasts 1 - 2cm dia. in a darker grey fine grained matrix. Two fracture sets 1. Dipping at 10 - 15', Planar / Rough; 2. Dipping at 60', Planar to undulating / Rough, fracture surfaces coated with light brown clay
		21.50 - 22.40	4	100	94	94	21.50	12.64		Strong, grey, medium grained, massive LIMESTONE. Very small scattered bioclasts with occasional coarse brachiopods. Minor sub-horizontal stylolites. Two fracture sets 1. Medium spaced dipping at 10', Planar / Rough; 2. Medium spaced, dipping at 35', Planar / Rough
		22.40 - 23.73	5	100	16	16	22.40	11.74		Strong, pale grey, fine / medium grained, massive LIMESTONE. Occasional sub-horizontal stylolites with minor oxidation. Thin hairline, steeply dipping white calcite veinlets. Two fracture sets 1. Medium spaced dipping at 5 - 10', Planar / Rough; 2. Dipping at 80-85', Planar / Rough, light brown clay coating fracture surfaces, locally developed fracture infill up to 1mm thick
		23.73 - 25.55	2	100	93	93	23.73	10.41		Strong, grey / grey brown, fine / medium grained, massive LIMESTONE. Occasional faint, sub-horizontal stylolites. Minor scatter fine bioclastic debris. Two fracture sets 1. Medium spaced dipping at 5 - 10', Planar / Rough; 2. Dipping at 60', Planar / Rough

21 22 23 24 25

Continued on next sheet

Remarks
All angles measured relative to short core axis

Rotary Core Log

Borehole No. **BH05**

Sheet 6 of 9

Project Name:	Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords:	530186.65 - 728378.11	Hole Type RC
Location:	Galway		Level:	34.14	Scale 1:25
Client:	Galway County Council		Dates:	06/11/2015 - 10/11/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
		25.55 - 25.85	13	100	80	80	25.55	8.59		Strong, grey / brownish grey, fine / medium grained, massive LIMESTONE. Very small scattered bioclasts, Two fracture sets 1. dipping at 10 - 20', Planar / Rough; 2. Dipping at 50', Planar / Rough no infill
		25.85 - 26.60	3	100	91	91	25.85	8.29		Strong, grey, fine / medium grained, massive LIMESTONE. Slightly oxidised sub-horizontal stylolites. Fracture set dipping at 5 - 10', Planar / Rough; no infill
		26.60 - 27.65	9	100	37	37	26.60	7.54		Strong, pale grey / brownish grey, fine / medium grained, massive LIMESTONE. Occasional thick shelled bioclasts - brachiopod, Three fracture sets 1. Dipping at 10 - 20', Planar / Rough; 2. Close spaced, dipping at 55 - 60', Planar / Rough; 3. Dipping at 85', Planar / Rough minor white calcite coating fracture surfaces
		27.65 - 28.03	3	100	100	100	27.65	6.49		Strong, pale grey / brownish grey, fine / medium grained, massive LIMESTONE. Occasional sub-horizontal stylolites. Fracture set dipping at 5 ', Planar / Rough, no infill
							28.03	6.11		Strong, pale grey / brownish grey, fine / medium grained, massive LIMESTONE. Three fracture sets 1. Close spaced dipping at 5 - 20', Planar / Rough; 2. Widely spaced, dipping at 40-50', Planar / Rough, at 31.7m light brown clay infill 1mm thick; 3. Axial parallel - 90', crosscuts all the other fracture sets. Planar / rough with a thin coating of white calcite.

Continued on next sheet

Remarks

All angles measured relative to short core axis

Rotary Core Log

Borehole No. **BH05**

Sheet 7 of 9

Project Name:	Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords:	530186.65 - 728378.11	Hole Type RC
Location:	Galway		Level:	34.14	Scale 1:25
Client:	Galway County Council		Dates:	06/11/2015 - 10/11/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
		28.03 - 32.03	3	100	0	0				
							32.03	2.11		Strong, pale grey / brownish grey, fine / medium grained, massive LIMESTONE. Occasional sub-horizontal stylolites. One fracture set, close to Medium spaced, dipping at 5 - 20', Planar / Rough, no infill.
		32.03 - 34.72	4	100	100	97				
							34.72	-0.58		Strong, grey . brownish grey, fine / medium grained, massive LIMESTONE. Very small scattered bioclasts, and a rare thick shelled

Continued on next sheet

31 32 33 34 35

Remarks
All angles measured relative to short core axis

Rotary Core Log

Borehole No. **BH05**

Sheet 8 of 9

Project Name:	Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords:	530186.65 - 728378.11	Hole Type RC
Location:	Galway		Level:	34.14	Scale 1:25
Client:	Galway County Council		Dates:	06/11/2015 - 10/11/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
		34.72 - 37.20	6	100	4	4				brachiopod . Occasional sub-horizontal stylolites. Three fracture sets 1. Close spaced dipping at 10 - 20', Planar / Rough; 2. Very widely spaced, dipping at 35-40', Planar / Rough; 3. 75 - 85' Undulating / rough, fracture surface coated with light brown clay. Crosscuts other fracture sets
		37.20 - 38.00	0	100	100	100	37.20	-3.06		Strong, grey / pale grey, fine / medium grained, massive LIMESTONE.
		38.00 - 40.00		100	0	0	38.00	-3.86		Strong, pale grey, fine to medium grained, massive LIMESTONE. Occasional stylolites, two fracture sets. 1. dipping at 5', planar / rough , 2. dipping at 85-90' Planar / rough coated and partially infilled by light brown clay

36 37 38 39 40

Continued on next sheet

Remarks
All angles measured relative to short core axis

Rotary Core Log

Borehole No.
BH05
Sheet 9 of 9

Project Name:	Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords:	530186.65 - 728378.11	Hole Type RC
Location:	Galway		Level:	34.14	Scale 1:25
Client:	Galway County Council		Dates:	06/11/2015 - 10/11/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
							40.30	-6.16		End of borehole at 40.30 m

41
42
43
44
45

Remarks
All angles measured relative to short core axis

Rotary Core Log

Borehole No. **BH06**

Sheet 1 of 5

Project Name:	Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords:	530125.14 - 728383.08	Hole Type RC
Location:	Galway		Level:	30.80	Scale 1:50
Client:	Galway County Council		Dates:	10/12/2015 - 18/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
							0.10	30.70		TOPSOIL Soft, pale grey, sandy CLAY (Recovery 35%)
							1.05	29.75		Loose grey to dark grey cobbly BOULDERS of bioclastic limestone, minor pale grey sandy clay
							1.50	29.30		Firm, light yellowish brown, sandy CLAY, coarse grained sub-angular cobbles of dark grey limestone and occasional granite cobble (recovery 45%)
							3.10	27.70		Very stiff , light yellowish brown sandy CLAY with coarse gravel / cobbles and occasional boulders of sub-rounded to sub-angular limestone with minor granite
		5.25 - 5.50	C							
							7.91	22.89		Firm / stiff light grey CLAY
							7.96	22.84		Very stiff, light brown sandy CLAY with minor light orange oxidation spots / patches. Coarse gravel / cobbles and occasional boulders of sub-rounded to sub-angular limestone with minor granite
		9.95 - 10.20	C							

Continued on next sheet

Remarks

All angles measured relative to short core axis

AGS

Rotary Core Log

Borehole No. **BH06**

Sheet 2 of 5

Project Name:	Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords:	530125.14 - 728383.08	Hole Type RC
Location:	Galway		Level:	30.80	Scale 1:50
Client:	Galway County Council		Dates:	10/12/2015 - 18/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
							15.20	15.60		Loose, medium grained angular clayey GRAVEL with small cobbles all coarse fragments coated with sticky, soft, dark grey clay
							15.93	14.87		Very Stiff dark grey / brown CLAY
		16.20 - 16.50	C							
		16.60 - 16.70	D							
		16.70 - 16.80	D							
		17.13 - 17.20	D							
		18.00 - 18.25	C				18.00	12.80		Very Stiff grey CLAY
		18.25 - 18.35	D							
		18.65 - 18.75	D							
		18.95 - 19.05	D							
		19.70 - 19.95	C							
		20.00 - 20.25	C							

Continued on next sheet

Remarks
All angles measured relative to short core axis

Rotary Core Log

Borehole No. **BH06**

Sheet 3 of 5

Project Name:	Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords:	530125.14 - 728383.08	Hole Type RC
Location:	Galway		Level:	30.80	Scale 1:50
Client:	Galway County Council		Dates:	10/12/2015 - 18/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
							21.20	9.60		Firm grey CLAY
		21.45 - 21.52	D				21.48	9.32		Firm / Stiff finely laminated dark brown / brown CLAY
		21.52 - 21.60	D				21.82	8.98		Firm, dark brown CLAY with 60% tabular angular gravel
							21.92	8.88		Firm grey fine sandy CLAY with angular limestone gravel and some coarse cobbles and small boulders
							22.60	8.20		Very soft, light grey sandy CLAY with rounded gravel
							22.84	7.96		Soft, grey sandy CLAY angular gravel / cobbles
							23.30	7.50		Firm / Stiff grey sandy CLAY with sub-angular / angular matrix supported coarse gravel and cobbles
							23.60	7.20		Soft, grey, sandy CLAY with medium / coarse grained, angular gravel and an occasional boulder (25cm dia.
							25.50	5.30		Soft / firm grey / green sandy CLAY with sub angular cobbles and boulders. Some of the clay is washed out and is just coated the cobbles and boulders
							26.65	4.15		Stiff / very stiff, light grey CLAY occasional boulder of pale grey limestone
							27.30	3.50		Loose, grey / dark grey cobbly GRAVEL with occasional boulders of limestone coated with very soft brownish grey clay

Continued on next sheet

Remarks
All angles measured relative to short core axis

Rotary Core Log

Borehole No. **BH06**

Sheet 4 of 5

Project Name:	Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords:	530125.14 - 728383.08	Hole Type RC
Location:	Galway		Level:	30.80	Scale 1:50
Client:	Galway County Council		Dates:	10/12/2015 - 18/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
							30.85	-0.05		Soft / very soft, pale grey / greenish grey bouldery CLAY, cobbles and coarse gravel, clay washed out and just left coating fragments in some areas.
							33.20	-2.40		Firm greenish grey (Khaki) CLAY with angular coarse cobbles of pale grey limestone
							33.50	-2.70		Firm, greenish grey gravelly CLAY, gavel composed of dark grey limestone
							33.70	-2.90		Pale grey, medium grained, fresh, massively bedded limestone BOULDER Broken up along a series of fractures - undulating rough dipping at 70-80' and planar rough dipping at 50-60'. Minor grey clay coating joint surfaces.
							34.70	-3.90		Loose sub-angular COBBLES coated with soft pale grey clay
							35.10	-4.30		Soft greenish grey sandy, gravelly CLAY with angular cobbles and small boulders of pale grey / occasionally black limestone
							39.10	-8.30		Loose sub-angular COBBLES of very dark grey limestone (Recovery 30%)

31 32 33 34 35 36 37 38 39 40

Continued on next sheet

Remarks
All angles measured relative to short core axis

Rotary Core Log

Borehole No. **BH06**

Sheet 5 of 5

Project Name:	Lackagh Quarry Preliminary Ground Investigation	Project No. Lackagh Quarry	Co-ords:	530125.14 - 728383.08	Hole Type RC
Location:	Galway		Level:	30.80	Scale 1:50
Client:	Galway County Council		Dates:	10/12/2015 - 18/12/2015	Logged By Dave Blaney

Well	Water Strikes	Depth (m)	Type / FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description
							40.60	-9.80		Loose, coarse gravelly COBBLES, angular to sub-angular with some coated by greenish grey clay occasional small boulder
							44.40	-13.60		BOULDER of strong, fresh, fine / medium grained, massively bedded Limestone. 44.8m a joint filled with soft, dark grey clay, 2cm thick (Possibly bedrock)
							45.00	-14.20		End of borehole at 45.00 m

41 42 43 44 45 46 47 48 49 50

Remarks
All angles measured relative to short core axis

APPENDIX III

			PROJECT NAM Lackagh Quarry																							REPORT NO:					
			CLIENT: Galway County Council																							HOLE NO:	BH-01				
			ENGINEER: ARUP																							LOGGED BY:	Dave Blaney				
				Roughness									Aperture					Filling					Weathering									
Depth of Discontinuity (m BGL)	Azimuth	Dip	Non Intact? (NI)	Stepped			Undulating			Planar			Other	V Open	Open	Mod Open	Tight	V Tight	Clean	Staining	% Soil	% Mineral	Clay	No	Sl	Mod	High	Comp		Hole Azimuth	Hole Dip	True Azimuth	True Dip
				R	Sm	St	R	Sm	St	R	Sm	St		>10 mm	2.5-10	0.5-2.5	0.1-0.5	<0.1														
5.80		45					X									X													No Invert marked	268	-11.5		
5.95		10								X						X													No Invert marked	268	-11.5		
6.10		20								X						X													No Invert marked	268	-11.5		
6.18		25	X							X						X													No Invert marked	268	-11.5		
6.30		65	X							X						X													No Invert marked	268	-11.5		
6.90	180	85								X						X														268	-11.5		
7.08	190	60								X						X														268	-11.5		
7.52	165	65								X						X														268	-11.5		
7.58	165	65								X						X														268	-11.5		
7.66	230	70								X						X														268	-11.5		
7.90	180	55					X									X														268	-11.5		
8.35	285	90								X						X														268	-11.5		
8.55	210	75								X						X														268	-11.5		
8.72	135	72								X						X														268	-11.5		
8.83	60	82								X						X														268	-11.5		
8.85	150	90					X									X														268	-11.5		
9.35	195	78								X						X														268	-11.5		
9.67	215	90								X						X														268	-11.5		
9.81	130	62								X						X														268	-11.5		
9.90	335	82								X						X														268	-11.5		
10.17	330	90								X						X														268	-11.7		
10.20	180	90					X									X														268	-11.7		
10.71	10	90								X						X														268	-11.7		
10.90	5	82								X						X														268	-11.7		
11.42	0	75								X						X														268	-11.7		
11.44	115	74								X						X								X					Slight Fe Staining	268	-11.7		
11.54	200	40	X							X						X								X						268	-11.7		
11.92	145	45								X						X								X						268	-11.7		
11.97	180	85								X						X								X						268	-11.7		
12.20	285	45					X									X								X						268	-11.7		
12.35	350	50	X							X						X								X						268	-11.7		
12.47	100	65								X						X								X						268	-11.7		
13.02	150	60								X						X								X						268	-11.7		
13.33	220	60								X						X						x		X					Partial coating of white calcite	268	-11.7		
13.43	350	75								X						X								X						268	-11.7		
14.32	25	72								X						X								X						268	-11.7		
14.36	120	85								X						X								X						268	-11.7		
14.39	185	62								X						X								X						268	-11.7		
14.42	30	80								X						X								X						268	-11.7		
14.45	120	80								X						X								X						268	-11.7		
14.52	140	65								X						X						X	X	X					Minor white calcite and smears of pale brown clay	268	-11.7		
14.56	50	80								X						X			X					X						268	-11.7		
14.70	170	80								X						X						X			X				White clacite and small patches of Fe Staining	268	-11.7		
15.27	165	80								X						X						X		X					Very Minor white calcite	268	-11.7		
15.47	170	80								X						X						X		X						268	-11.7		
15.58	130	72								X						X						X	X	X					White clacite and minor clay smears	268	-11.7		
15.63	355	50								X						X			X					X						268	-11.7		
15.68	75	90								X						X			X					X						268	-11.7		
15.76	135	85								X						X			X					X						268	-11.7		
15.83	195	60								X						X							X	X					Minor light brown clay	268	-11.7		
16.33	170	85								X						X			X					X						268	-11.8		
17.05	180	85								X						X			X					X						268	-11.8		

17.64	25	84	X							X						X			X					X					268	-11.8		
17.76	30	80								X						X							X	X					268	-11.8		
18.06	270	20								X						X			X					X					268	-11.8		
18.12	185	85	X							X						X			X					X					268	-11.8		
18.59	35	75								X						X						X		X					268	-11.8		
19.48	145	80								X						X			X					X					268	-11.9		
20.07	40	70								X						X			X					X					268	-11.9		
20.26	135	90								X						X			X					X					268	-11.9		
20.57	225	65								X						X			X					X					268	-11.9		
21.10	120	90	X							X						X			X					X					268	-11.9		
21.14	220	60								X						X			X					X					268	-11.9		
21.20	170	90								X						X							X	X					268	-11.9		
21.33	310	70								X						X			X					X					268	-11.9		
21.38	315	70								X						X			X					X					268	-11.9		
21.41	230	75	X							X						X			X					X					268	-11.9		
21.58	230	70								X						X			X					X					268	-11.9		
22.34	5	90								X						X			X					X					268	-11.9		
22.48	30	60								X						X			X					X					268	-11.9		
22.73	170	48								X						X			X					X					268	-11.9		
22.96	290	52		X												X			X					X					268	-11.9		
23.03	20	60								X						X						X		X					268	-11.9		
23.56	220	65								X						X			X					X					268	-11.9		
23.86	320	65					X									X						X			X				268	-11.9		
24.26	20	80								X						X			X					X					268	-11.9		
24.35	140	70								X						X						X			X				268	-11.9		
24.73	125	90								X						X						X							268	-11.9		
24.94	130	90								X						X			X					X					268	-11.9		
26.18	185	85								X						X			X					X					267	-12.1		
27.35	0	85								X						X			X					X					267	-12.1		
27.48	30	80								X						X			X					X					267	-12.1		
27.84	195	80								X						X			X					X					267	-12.1		
28.16	175	85								X						X			X					X					267	-12.2		
28.74	5	80		X												X			X					X					267	-12.2		
31.02	15	90								X						X						X		X					267	-12.4		
31.25	320	85		X												X			X					X					267	-12.4		
31.34	0	50								X						X			X					X					267	-12.4		
31.66	195	75								X						X			X					X					267	-12.4		
31.73	10	60	X							X						X			X					X					267	-12.4		
31.76	10	85										X			X							X		X					267	-12.4		
31.82	20	70		X											X				X					X					267	-12.4		
32.01	50	90								X						X			X					X					267	-12.4		
32.08	330	50								X						X			X					X					267	-12.4		
32.64	145	65								X						X			X					X					267	-12.4		
32.90	20	90								X						X			X					X					267	-12.4		
32.97	315	62								X						X			X					X					267	-12.4		
33.11	30	35								X						X			X					X					267	-12.4		
33.20	310	80								X						X			X					X					267	-12.4		
33.70	310	70	X							X						X			X					X					267	-12.4		
34.05	60	75								X						X			X					X					267	-12.6		
35.04	0	90								X						X			X					X					267	-12.6		
35.35	10	72		X												X			X					X					267	-12.6		
35.48	335	78								X						X			X					X					267	-12.6		
36.43	175	85								X						X			X					X					267	-12.6		
36.88	235	90								X						X			X					X					267	-12.6		
36.95	235	90								X						X			X					X					267	-12.6		
37.23	195	15					X									X			X					X					267	-12.6		
37.31	225	65								X						X			X					X					267	-12.6		
37.51	215	70								X						X			X					X					267	-12.6		
38.13	175	88								X						X			X					X					267	-12.6		
38.20	230	22		X												X			X					X					267	-12.6		
38.30	305	75								X						X			X					X					267	-12.6		
38.50	5	15								X						X			X					X					267	-12.6		

39.35	180	45							X						X				X					X				Minor orange Fe staining	267	-12.6		
40.53	160	40							X						X			X					X						267	-12.6		
40.80	0	90							X						X			X					X						267	-12.6		
41.03	50	88							X						X			X					X						267	-12.6		
41.20	315	90							X						X								X						267	-12.6		
41.67	180	10					X								X			X			X		X					Traces of white calcite	267	-12.6		
41.97	30	30							X						X			X					X						267	-12.6		
42.52	0	90							X						X			X					X						267	-12.6		
43.28	225	62							X						X			X					X						267	-12.5		
43.40	170	10							X						X			X					X						267	-12.5		
43.70	75	60							X						X			X					X						267	-12.5		
43.90	285	80							X						X			X					X						267	-12.5		
44.02	15	48							X						X			X					X						267	-12.5		
44.22	170	40							X						X			X					X						267	-12.5		
44.47	30	50							X						X			X					X						267	-12.5		
44.52	30	50							X						X			X					X						267	-12.5		
45.16	15	50							X						X			X					X						267	-12.5		
45.30	180	75							X				X						X		X			X				White calcite, minor Fe staining	267	-12.5		
45.47	30	55							X						X			X					X						267	-12.5		
45.62	30	70							X						X			X					X						267	-12.5		
45.70	25	55							X						X				X					X				Slight Fe staining	267	-12.5		
45.88	175	42							X						X						X			X				Discontinuous coating of white calcite	267	-12.5		
46.06	0	75							X						X			X					X						267	-12.7		
46.88	310	75							X						X			X					X						267	-12.7		
47.20	120	80							X						X							X	X					Minor brown clay	267	-12.7		
47.50	15	80							X						X			X					X						267	-12.7		
47.75	320	80					X								X						X		X					Partial coating of white calcite	267	-12.7		
47.88	310	75							X						X						X		X					Partial coating of white calcite	267	-12.7		
48.34	240	80							X						X			X					X						267	-12.7		
49.08	175	75							X						X			X					X						267	-12.7		
49.54	45	84							X						X			X					X						267	-12.7		
49.70	225	58							X						X			X					X						267	-12.7		
50.28	0	90							X						X			X					X						267	-12.7		
50.77	160	45							X						X			X					X						267	-12.7		
51.04	175	90							X						X			X					X						267	-12.7		
51.52	140	50							X						X			X					X						267	-12.7		
51.60	120	65							X						X			X					X						267	-12.7		
51.65	120	70							X						X			X					X						267	-12.7		
51.75	125	65							X						X			X					X						267	-12.7		
51.84	145	80							X						X			X					X						267	-12.7		
52.14	140	62							X						X			X					X						267	-12.7		
25.23	140	60							X						X			X					X						267	-12.7		
52.70	45	85							X						X			X					X						267	-12.7		
53.07	310	65	X						X						X			X					X						267	-12.7		
53.27	345	30							X						X			X					X						267	-12.7		
53.35	0	90							X						X			X					X						267	-12.7		
53.43	0	90							X						X			X					X						267	-12.7		
53.48	80	85	X				X								X			X					X						267	-12.7		
52.52	355	85							X						X			X					X						267	-12.7		
53.56	285	75	X				X								X			X					X						267	-12.7		
53.80	5	90							X						X			X					X						267	-12.7		
53.94	0	90							X						X			X					X						267	-12.7		
54.70	170	85							X						X			X					X						267	-12.7		
55.34	20	85							X						X			X					X						267	-12.7		
55.44	20	85							X						X			X					X						267	-12.7		
55.73	355	90							X						X			X					X						267	-12.7		
56.14	30	44					X								X			X					X						267	-12.7		
56.61	320	85							X						X			X					X						267	-12.7		
57.28	320	85							X						X			X					X						267	-12.7		
57.75	55	80	X						X						X			X					X						267	-12.7		
58.20	175	50					X								X			X					X					Curved / Arcuate joint surface	267	-12.7		
58.31	345	50							X						X			X					X						267	-12.7		

58.48	0	80							X						X			X					X					Possible drillers break	267	-12.7		
58.80	5	90									X				X			X					X					Triae due to intersecting stylolite	267	-12.7		
59.47	355	90							X						X			X					X						267	-12.7		
59.63	160	85							X						X			X					X						267	-12.7		
59.83	170	80					X								X			X					X					Curved / Arcuate joint surface	267	-12.7		
60.00	5	90							X						X			X					X						267	-12.7		
61.02	180	80							X						X			X					X						267	-12.8		
61.47	140	70							X						X						X		X					Trace grey calcite	267	-12.8		
61.80	90	85	X				X								X			X					X						267	-12.8		
61.85	200	65					X								X				X					X				Partial orange / brown Fe staining	267	-12.8		
62.02	20	80					X								X			X					X					Very Rough joint surface	267	-12.8		
62.17	50	60							X						X			X					X						267	-12.8		
62.58	145	60							X						X						X		X					Light grey calcite coating	267	-12.8		
63.77	40	50							X						X			X					X						267	-12.8		
63.97	200	42							X						X			X					X						267	-12.8		
64.06	30	65							X						X			X					X						267	-12.8		
64.20	210	50							X						X			X					X						267	-12.8		
64.50	345	50							X						X			X					X						267	-12.8		
64.98	180	85							X						X			X					X						267	-12.8		
65.72	130	75							X						X			X					X						267	-12.8		
65.88	130	80							X						X			X					X						267	-12.8		
66.97	50	80							X						X			X					X						267	-12.8		
66.99	50	78							X						X			X					X						267	-12.8		
67.20	175	78							X						X			X					X						267	-12.9		
67.60	220	80							X						X			X					X						267	-12.9		
67.70	45	90							X						X			X					X						267	-12.9		
67.90	60	72	X						X						X			X					X						267	-12.9		
68.38	350	90							X						X			X					X						267	-12.9		
68.60	355	90							X						X			X					X						267	-12.9		
68.66	350	90							X						X			X					X						267	-12.9		
68.73	0	90							X						X						X		X					Calcite vein 1mm thick	267	-12.9		
68.78	0	80							X						X						X		X					Calcite vein	267	-12.9		
68.90	170	75							X						X			X					X					Very irregular	267	-12.9		
69.25	355	90							X						X			X					X						267	-12.9		
69.66	20	75							X						X			X					X						267	-12.9		
69.93	325	85	X						X						X			X					X						267	-12.9		
69.98	140	75							X						X			X					X						267	-12.9		
70.13	10	80							X						X			X					X						267	-12.9		
70.27	15	80							X						X			X					X						267	-12.9		
70.60	5	80									X				X			X					X					Slickensides, plunging at 25' to 270'	267	-12.9		
71.43	355	80					X								X			X					X					Curved Arcuate Joint	267	-12.9		
71.90	50	82							X						X			X					X						267	-12.9		
72.34	310	80							X						X			X					X						267	-12.9		
72.45	50	30							X						X				X					X				Slight pale orange Fe staining	267	-12.9		
72.50	135	45	X						X						X			X					X						267	-12.9		
72.80	0	90							X						X			X					X						267	-12.9		
73.20	295	30							X						X			X					X						267	-12.9		
73.74	35	72							X						X			X					X						267	-12.9		
73.98	75	65		X											X			X					X					very small mm scale steps	267	-12.9		
74.50	350	78									X				X						X		X					White grey calcite vein, sub-horizontal striae	267	-12.9		
74.60	80	75					X										X	X					X						267	-12.9		
74.73	195	72							X						X			X					X					Very rough texture - almost stepped	267	-12.9		
75.14	5	80							X						X			X					X						267	-12.9		
75.27	150	55							X						X			X					X						267	-12.9		
75.50	170	85									X				X			X					X					Faint stating	267	-12.9		
75.80	20	75	X						X						X			X					X						267	-12.9		
75.92	30	65							X						X			X					X						267	-12.9		
76.09	25	70							X						X			X					X						267	-12.9		
76.19	165	60							X						X			X					X						267	-12.9		
76.39	50	50	X				X								X			X					X						267	-12.9		
76.72	200	70							X						X			X					X						267	-12.9		
77.10	325	70							X						X			X					X						267	-12.9		

77.17	205	85							X						X			X					X						267	-12.9		
77.63	305	55	X						X						X			X					X						267	-12.9		
77.67	65	80	X						X						X			X					X						267	-12.9		
77.80	110	85	X						X						X			X					X						267	-12.9		
77.86	20	75							X						X			X					X						267	-12.9		
77.93	335	90					X								X				X					X					urved / Arcuate fracture, Minor Fe staining	267	-12.9		
78.02	50	90							X						X			X					X						267	-12.9		
78.06	155	90	X						X						X			X					X						267	-12.9		
78.13	180	90	X						X						X			X					X						267	-12.9		
78.18	160	85	X						X						X			X					X						267	-12.9		
78.37	180	90	X						X						X			X					X						267	-12.9		
79.93	140	90	X				X								X			X					X						267	-12.9		
80.07	140	70		X											X			X					X						267	-12.9		
80.16	180	90							X						X			X					X						267	-12.9		
80.65	45	65							X						X						X		X					Thin coating of grey calcite	267	-12.9		
80.94	310	85							X						X			X					X						267	-12.9		
81.15	40	74							X						X			X					X						267	-12.9		
81.20	300	90							X						X			X					X						267	-12.9		
81.66	5	78									X				X				X					X					weak, sub-horizontal striae - Minor Fe staining	267	-12.9		
81.85	340	38							X						X			X					X						267	-12.9		
82.26	320	60					X								X			X					X						267	-13.1		
82.36	145	72									X				X			X					X					Striae formed by intersection offracture with stylolite	267	-13.1		
82.59	220	68									X				X			X					X						267	-13.1		
82.80	220	64					X								X			X					X					Curved / arcuate	267	-13.1		
83.12	320	58							X						X			X					X						267	-13.1		
83.40	355	44							X						X			X					X						267	-13.1		
83.53	335	84					X								X			X					X						267	-13.1		
84.00	0	90							X						X			X					X						267	-13.1		
84.25	10	88									X				X			X					X					Striae from intersection of stylolites	267	-13.1		
85.05	170	80							X						X			X					X					Curved / Arcuate joint surface	267	-13.1		
85.32	170	82							X						X				X		X			X				White / orange Fe stained clacite	267	-13.1		
86.10	310	54							X						X			X					X						267	-13.1		
86.38	220	50							X						X			X					X						267	-13.1		
86.62	350	38							X						X			X					X						267	-13.1		
86.96	350	52							X						X			X					X						267	-13.1		
87.47	205	58							X						X			X					X						267	-13.1		
87.53	285	70	X						X						X			X					X						267	-13.1		
88.14	10	88							X						X			X					X						267	-13.1		
88.77	0	90							X						X			X					X						267	-13.1		
88.82	90	78					X								X			X					X					Curved / Arcuate	267	-13.1		
88.99	0	42				X									X			X					X					Partially striated	267	-13.1		
89.13	340	42							X						X			X					X						267	-13.1		
89.35	210	52							X						X			X					X						267	-13.1		
89.44	70	82					X								X			X					X					Curved / Arcuate	267	-13.1		
89.64	10	78							X						X			X					X						267	-13.1		
89.75	100	86	X				X								X			X					X					Curved / Arcuate	267	-13.1		
90.00	80	84					X								X			X					X						267	-13.1		
90.30	100	84					X										X				X		X					Grey calcite	267	-13.1		
90.85	330	82								X					X			X					X					smooth	267	-13.1		
91.18	350	90							X						X			X					X						267	-13.1		
91.48	220	82							X						X			X					X						267	-13.1		
91.58	0	90							X						X			X					X						267	-13.1		
91.83	355	90							X						X			X					X						267	-13.1		
91.96	160	84							X						X			X					X						267	-13.1		
92.71	345	78							X						X			X					X						267	-13.1		
93.14	165	88							X						X						X		X					Partially coated with white calcite	267	-13.1		
93.97	320	82							X						X			X					X						267	-13.1		
94.75	350	70							X						X			X					X						267	-13.2		
95.00	10	78							X						X						X		X					Partially coated with white calcite	267	-13.2		
95.32	355	80							X						X			X					X						267	-13.2		
95.98	340	76	X	X											X			X					X						267	-13.2		
96.02	350	78							X						X			X					X						267	-13.2		

96.13	15	90		X											X			X					X						267	-13.2		
96.84	5	90					X								X			X					X					Curved / Arcuate	267	-13.2		
97.44	180	48								X					X			X					X						267	-13.2		
97.53	195	86								X					X							X			X				Joint infilled with 5mm white calcite veinlet minor Fe stain	267	-13.2		
98.92	225	74								X						X			X					X						267	-13.2		
98.37	320	48								X						X			X					X						267	-13.2		
98.92	5	90								X						X			X					X						267	-13.2		
99.35	225	58								X						X						X		X					Partially coated with grey calcite	267	-13.2		
99.40	185	80								X						X			X					X						267	-13.2		
99.70	185	36								X						X				X					X				Trace Fe staining	267	-13.2		
100.08	355	40								X						X			X					X						267	-13.2		
100.45	340	46								X						X			X					X						267	-13.2		
100.60	320	70		X												X			X					X					Very rough / irregular - pitted surface	267	-13.2		
100.65	195	56								X						X			X					X						267	-13.2		
100.74	215	62								X						X			X					X						267	-13.2		
100.85	140	62		X												X				X				X					Minor Fe Staining	267	-13.2		
100.91	210	70								X						X			X					X						267	-13.2		
101.16	345	36								X						X						X		X					Trace grey calcite	267	-13.2		
101.70	310	42								X						X			X					X					Very rough - almost stepped	267	-13.2		
101.43	350	90								X				X								X			X				Coarsely crystalline white calcite vein - Fe staining	267	-13.2		
101.65	170	72								X						X			X						X				Minor Fe staining	267	-13.2		
102.27	0	38								X						X			X					X						267	-13.2		
102.50	0	90	X						X							X				X					X				Stiae with locallised Fe Staining	267	-13.2		
102.55	180	18	X							X						X			X					X						267	-13.2		
103.48	340	80	X							X						X			X					X						267	-13.2		
103.87	355	86								X						X			X					X						267	-13.2		
103.92	330	76	X							X						X			X					X						267	-13.2		
103.95	210	62	X							X						X			X					X						267	-13.2		
104.15	150	38								X						X			X					X						267	-13.2		
104.78	350	74								X						X			X					X						267	-13.2		
105.42	350	88								X						X			X					X						267	-13.2		
105.54	345	85								X						X			X					X						267	-13.2		
105.70	0	90								X						X			X					X						267	-13.2		
106.13	185	50								X						X			X					X						267	-13.3		
106.30	150	62								X						X			X					X						267	-13.3		
107.10	5	50								X						X			X					X						267	-13.3		
107.35	10	48								X						X						X		X					Trace Fe staining -minor light brown clay	267	-13.3		
107.84	180	88								X						X			X					X						267	-13.3		
108.61	180	44								X						X			X					X						267	-13.3		
108.80	40	70								X						X								X						267	-13.3		
108.92	305	84								X						X						X		X					Slightly oxidised calcite	267	-13.3		
108.98	320	90								X						X			X					X						267	-13.3		
109.40	320	90								X						X			X					X						267	-13.3		
109.17	140	84								X						X			X					X						267	-13.3		
108.36	150	70								X						X			X					X						267	-13.3		
109.42	140	88								X						X			X					X						267	-13.3		
109.54	115	86	X	X												X			X					X						267	-13.3		
109.60	320	78								X						X			X					X						267	-13.3		
109.91	310	90								X						X						X		X						267	-13.3		
110.25	300	74								X						X			X					X						267	-13.3		
110.95	315	52								X						X						X		X						267	-13.3		
111.09	325	78								X						X			X					X						267	-13.3		
111.30	60	86								X						X						X		X						267	-13.3		
112.40	325	82		X												X			X					X						267	-13.4		
113.52	30	54		X												X						X		X						267	-13.4		
114.00	0	8	X				X									X			X					X						267	-13.4		
115.30	335	84								X						X			X					X						267	-13.4		
117.92	215	88								X						X			X					X						267	-13.4		
118.32	330	82								X						X			X					X						267	-13.5		
118.74	330	80								X						X			X					X						267	-13.5		
119.15	20	55	X				X									X			X					X						267	-13.5		
119.38	5	90								X						X			X					X						267	-13.5		

119.52	230	56							X						X			X					X						267	-13.5		
119.66	235	70							X						X								X						267	-13.5		
120.15	50	24					X								X			X			X		X						267	-13.5		
120.68	10	90					X								X			X					X						267	-13.5		
120.95	5	84								X					X			X					X						267	-13.5		
121.40	135	90								X					X			X					X						267	-13.5		
121.58	140	62	X							X					X				X					X						267	-13.5		
122.10	135	70		X											X				X					X						267	-13.5		
122.40	340	84								X				X							X			X						267	-13.5		
122.58	150	70					X								X			X					X						267	-13.5		
122.64	140	70		X											X			X					X						267	-13.5		
122.80	50	70					X								X						X		X						267	-13.5		
123.00	115	78					X								X			X					X						267	-13.5		
123.05	115	74					X								X			x						X					267	-13.5		
123.28	140	74					X								X			X					X						Very rough joint surface	267	-13.5		
123.38	20	68								X					X						X		X						Minor white grey calcite	267	-13.5		
123.44	320	80					X								X			X					X						Crystalline white calcite vein	267	-13.5		
123.52	160	60		X											X			X						X					Pitted surface - Dissolution	267	-13.5		
123.60	325	40								X					X			X					X							267	-13.5		
124.12	15	76								X					X						X		X						Minor light grey calcite	267	-13.5		
124.42	130	78								X					X						X		X						Minor white calcite	267	-13.5		
125.05	50	90					X								X			X					X						Curved / arcuate	267	-13.5		
125.28	25	64					X								X			X					X							267	-13.5		
125.62	320	90								X					X			X					X							267	-13.5		
126.10	240	80	X							X					X			X						X					Very weak Fe staining	267	-13.5		
126.25	150	58					X								X			X					X							267	-13.5		
126.72	235	72								X					X			X					X							267	-13.5		
126.83	325	64								X					X			X					X						Very irreglaur jointing	267	-13.5		
126.87	325	64								X					X			X					X							267	-13.5		
126.93	325	76								X							X	X					X							267	-13.5		
127.05	200	80					X								X			X					X							267	-13.5		
127.54	150	68					X								X			X					X						Slight undulation	267	-13.5		
127.61	320	70					X								X			X					X							267	-13.5		
127.67	315	82					X								X			X					X							267	-13.5		
127.80	220	74								X					X			X					X						Sub-parallel white calcite veinlets	267	-13.5		
127.91			X							X					X			X					X						Non Intact / broken core - pocssibly drilling related	267	-13.5		
128.36	195	52								X					X			X					X							267	-13.5		
128.41	165	62								X					X			X					X							267	-13.5		
128.48	150	62								X					X			X					X							267	-13.5		
129.60	195	62					X								X			X					X							267	-13.5		
129.83	20	60		X											X			X					X							267	-13.5		
130.25	205	42									X				X						X		X						Slightly polished - black argillite coating surface	266	-13.6		
130.30	80	80						X							X						X		X						Slightly polished - black argillite coating surface	266	-13.6		
130.62	170	84								X					X			X					X							266	-13.6		
131.47	160	48								X					X			X					X							266	-13.6		
131.60	80	80	X				X								X						X		X						Black argilite - stylolitic contact	266	-13.6		
131.71	350	70								X					X			X					X							266	-13.6		
132.14	340	86								X						X					X		X						White calcite vein	266	-13.6		
133.45	210	48								X					X			X					X							266	-13.6		
134.73	160	62					X								X			X					X							266	-13.6		
134.90	340	80								X				X							X		X						Infilled with 20mm thick white calcite vein	266	-13.6		
135.38	185	40								X					X			X					X							266	-13.6		
135.57	180	90					X								X			X					X						Strongly undulating	266	-13.6		
136.47	180	32								X					X			X					X							266	-13.7		
136.72	175	32								X					X			X					X							266	-13.7		
137.10	340	86								X					X			X					X							266	-13.7		
137.70	10	82								X					X			X					X							266	-13.7		
138.39	320	90								X					X			X					X							266	-13.7		
139.60	25	86								X					X			X					X							266	-13.7		
140.65	150	62					X								X			X					X							266	-13.7		
140.90	190	54								X					X			X					X							266	-13.7		
141.02	190	68								X					X			X					X							266	-13.7		

141.40	5	86							X						X			X					X						266	-13.7		
142.05	10	90							X						X			X					X						266	-13.7		
142.60	40	46		X											X			X					X						266	-13.8		
142.79	150	72							X							X		X					X						266	-13.8		
142.86	130	80							X						X			X					X						266	-13.8		
144.36	150	68							X						X			X					X						266	-13.8		
145.45	155	62							X						X			X					X						266	-13.8		
145.57	140	58							X						X			X					X						266	-13.8		
145.80	130	66							X						X			X					X						266	-13.8		
148.30			X																									148.3 148.5m NI / Broken & Friable core	266	-13.8		
149.10	350	86							X						X			X					X						266	-13.8		
149.77	155	70	X	X											X			X					X						266	-13.8		
150.44	160	76							X						X			X					X						266	-13.8		
150.84	30	70		X											X			X					X						266	-13.8		
150.88	140	90							X						X			X					X						266	-13.8		
150.93	320	80		X											X			X					X						266	-13.8		
151.20	310	72		X											X			X					X						266	-13.8		
151.60	150	82							X						X			X					X						266	-13.8		
152.09	10	90							X						X			X					X						266	-13.8		
152.56	165	60		X											X							X	X					Very rough / pitted / evidence of dissolution, Black argillite	266	-13.8		
152.94	20	84		X											X			X					X					Very rough / pitted / evidence of dissolution, Black argillite	266	-13.8		
153.35	15	90							X						X			X					X						266	-13.8		
153.70	140	74		X											X			X					X					Very rough / pitted / evidence of dissolution, Black argillite	266	-13.8		
154.30	350	90							X						X			X					X						266	-13.9		
154.80	355	60							X						X			X					X						266	-13.9		
154.90	355	60							X						X			X					X						266	-13.9		
155.12	340	60							X						X			X					X						266	-13.9		
155.90	340	82		X											X			X					X					Very Rough	266	-13.9		
156.30	350	90							X						X			X					X						266	-13.9		
157.15	5	86							X						X			X					X						266	-13.9		
159.45	5	90							X						X			X					X						266	-13.9		
159.60	120	86							X						X			X					X						266	-13.9		
162.05	5	82							X						X			X					X						266	-14		
163.48	325	88							X						X			X					X						266	-14		
163.57	330	86							X						X			X					X						266	-14		
163.97	15	90					X								X			X					X						266	-14		
164.08	5	90					X								X			X					X						266	-14		
164.55	180	44							X						X			X					X						266	-14		
165.00	325	86							X						X			X					X						266	-14		
167.00	60	74							X						X			X					X						266	-14		
167.68	135	90							X						X			X					X						266	-14		
168.64	140	80							X						X			X					X						266	-14		
168.69	140	82							X						X			X					X						266	-14		
171.07	60	78							X						X						X		X					Minor grey calcite	266	-14		
171.30	310	80							X						X			X					X						266	-14		
171.66	315	80							X						X			X					X						266	-14		
172.15	60	90							X						X						X		X					Minor grey calcite	266	-14.1		
172.56	315	90							X						X			X					X						266	-14.1		
173.00	320	74							X						X			X					X						266	-14.1		
173.40	325	76		X											X			X					X						266	-14.1		
173.44	330	76							X						X			X					X						266	-14.1		
174.05	320	76							X						X			X					X						266	-14.1		
174.86	330	82							X						X			X					X						266	-14.1		
176.52	310	70							X						X			X					X						266	-14.1		
177.10	180	18					X								X			X					X						266	-14.1		
179.77	0	90							X						X			X					X						266	-14.1		
180.17	350	84							X						X			X					X						266	-14.1		
180.75	330	86							X						X			X					X						266	-14.1		
182.53	45	86							X						X			X					X						266	-14.1		
182.97	115	76							X						X			X					X						266	-14.1		
183.95	230	76							X						X			X					X						266	-14.1		
185.83	50	68							X						X			X					X						266	-14.1		

186.17	180	88							X						X			X					X						266	-14.1		
186.24	180	85							X						X			X					X						266	-14.1		
186.53	40	80							X						X			X					X						266	-14.1		
191.20	335	90	X						X						X							X	X					Light brown sandy clay coating joints	266	-14.1		
191.64	40	72	X						X						X							X	X					Light brown sandy clay coating joints	266	-14.1		
191.72	40	72	X						X						X							X	X					Light brown sandy clay coating joints	266	-14.1		
191.90	340	52							X						X							X	X					Light brown sandy clay coating joints	266	-14.1		
192.21	350	38	X						X						X							X	X					Light brown sandy clay coating joints	266	-14.1		
192.50	140	48							X						X			X					X						266	-14.1		
192.70	330	80	X						X						X						X	X	X					White calcite & Light brown sandy clay	266	-14.1		
192.82	5	78							X						X			X					X						266	-14.1		
193.50	5	78							X						X			X					X						266	-14.1		
194.80	20	70							X						X			X					X						266	-14.1		
196.30	5	78							X						X			X					X						266	-14.1		
196.74	340	70							X						X			X					X						266	-14.1		
199.10	180	90							X						X			X					X						266	-14.1		
199.45	20	50							X						X						X		X					Wjite grey calcite	266	-14.1		
199.52	140	68							X						X			X					X						266	-14.1		
199.97	5	90							X						X			X					X						266	-14.1		
200.95	250	42	X					X							X				X					X				Slight Fe staining	266	-14.1		
203.00	345	38							X						X							X	X					Light brown, fine grained sand infill	266	-14.1		
203.21	340	54							X						X			X					X						266	-14.1		
203.24	340	56							X						X			X					X						266	-14.1		
203.32	345	50							X						X			X					X						266	-14.1		
203.64	340	70							X						X			X					X						266	-14.1		
203.69	345	62							X						X						X	X	X						266	-14.1		
203.87	145	54							X						X							X		X				Light brown grey clay coating, minor Fe staining	266	-14.1		
205.40	5	90							X						X			X					X						266	-14.1		
205.68	140	42							X						X			X					X						266	-14.1		
205.93	130	68							X						X			X					X						266	-14.1		
206.68	195	62		X											X				X					X				Slight Fe Staining	266	-14.1		
207.02	10	90							X						X			X					X						266	-14.1		
207.25	345	40		X											X			X					X						266	-14.1		
207.60	350	90							X						X			X					X						266	-14.1		
209.30	0	90							X						X			X					X						266	-14.1		
210.15	170	76							X						X			X					X						266	-14.1		
210.94	0	90							X						X			X					X						266	-14.1		
212.94	20	78							X						X			X					X						266	-14.1		
213.00	145	90							X						X							X		X				Brown grey clay coating, minor Fe staining	266	-14.1		
213.80	20	72							X						X			X					X						266	-14.1		
214.65	215	38							X						X			X					X						266	-14.1		
215.00	210	36							X						X			X					X						266	-14.1		
216.05	15	62		X											X						X		X					White calcite	266	-14.1		
216.80	30	70							X						X						X		X					Minor white calcite	266	-14.1		
216.90	135	74							X						X			X					X						266	-14.1		
217.10	340	88		X											X			X					X						266	-14.1		
217.33	330	90		X											X			X					X						266	-14.1		
217.92	330	82	X						X						X			X					X						266	-14.1		
217.94	40	78	X						X						X			X					X						266	-14.1		
218.04	330	82		X											X				X					X				slight oxidation	266	-14.1		
218.36	310	78							X						X				X					X				slight oxidation	266	-14.1		
218.37	310	76							X						X			X						X				slight oxidation	266	-14.1		
218.56	210	82							X						X			X					X						266	-14.1		
218.92	310	90							X						X			X						X				slight oxidation	266	-14.1		
219.70	320	86							X						X			X						X				slight oxidation	266	-14.1		
219.74	330	90							X						X			X						X				slight oxidation	266	-14.1		
219.77	330	90	X						X						X			X					X						266	-14.1		
220.44	240	42					X								X			X					X						266	-14.1		
220.58	310	90							X						X			X					X						266	-14.1		
220.74	45	78	X						X						X						X		X					Trace white calcite	266	-14.1		
221.61	120	46		X											X				X					X				Leached / pitted - slight Fe staining	266	-14.1		
221.90	20	60							X						X				X					X				Very light Fe staining	266	-14.1		

222.05	25	52							X					X							X		X					White calcite veining	266	-14.1		
223.34	15	58							X						X			X					X						266	-14.1		
222.55	160	70							X						X							X	X					Trace light brown clay smearing	266	-14.1		
222.65	20	58							X						X						X		X					White calcite	266	-14.1		
223.00	135	76							X						X							X	X					Minor yellow brown clay coating	266	-14.1		
223.05	140	78							X						X							X	X					Minor yellow brown clay coating	266	-14.1		
223.65	120	42							X						X			X					X						266	-14.1		
224.00	30	82							X						X						X		X					Coarse crystalline calcite	266	-14.1		
224.50	60	52							X						X			X					X						266	-14.1		
224.71	145	62							X						X			X					X						266	-14.1		
225.00	120	58							X						X							X	X					Trace light brown clay	266	-14.1		
225.45	170	36							X						X			X					X						266	-14.1		
226.35	220	40					X								X							X			X			Intensely oxidised, pitted - dissolution	266	-14.1		
226.62	140	62							X				X					X						X				Fe staining / minor clay	266	-14.1		
226.74	150	70							X						X				X					X				Slightly leached / dissolution	266	-14.1		
227.84	150	72							X						X				X					X				Slightly leached / dissolution	266	-14.1		
227.92	140	80							X						X				X					X				Slightly leached / dissolution	266	-14.1		
227.95	210	60	X	X											X			X					X						266	-14.1		
228.55	45	86							X						X			X					X						266	-14.1		
228.75	30	90							X						X			X					X						266	-14.1		
229.00	50	80							X				X									X		X				Clay filled cavity 10cm wide	266	-14.1		
229.10	50	80							X				X									X		X				Clay filled cavity 10cm wide	266	-14.1		
229.90	145	42							X						X							X	X					Minor grey brown clay	266	-14.1		
230.20	310	82							X						X							X		X				Slightly leached with grey / brown clay	266	-14.1		
230.36	310	90							X						X							X		X				Slightly leached with grey / brown clay	266	-14.1		
230.60	230	76	X												X									X				Axial parallel / broken int angular elongate fragments	266	-14.1		
230.93	310	90							X						X							X		X				Slightly leached grey sandy clay coating	266	-14.1		
231.10	35	72							X						X							X		X				Slightly leached grey clay coating	266	-14.1		
232.10	160	82							X						X			X					X						266	-14.1		
232.17	145	66							X						X			X					X						266	-14.1		
232.22	170	53							X						X			X					X						266	-14.1		
232.80	345	88								X					X						X		X					White calcite vein, vertical striae	266	-14.1		
233.20	55	68	X						X						X							X	X					Coarse brown grey sand	266	-14.1		
233.34	210	70							X						X			X					X						266	-14.1		
233.40	340	58	X						X					X								X	X					fine grained briwn / grey sand	266	-14.1		
233.56	50	82							X						X							X	X					Minor sand coating	266	-14.1		
233.70	310	82					X								X							X	X					Minor sand coating	266	-14.1		
233.90	180	88	X				X								X							X	X					Minor sand coating	266	-14.1		
134.10	180	86	X				X								X							X	X					Minor sand coating	266	-14.1		
234.36	160	70							X						X							X	X					Minor clayey sand	266	-14.1		
234.48	345	42					X								X			X					X					Curved / arcuate joint plane	266	-14.1		
234.96	160	64	X				X								X							X	X					Trace clay	266	-14.1		
235.03	350	78	X						X						X			X					X						266	-14.1		
235.08	0	60	X						X						X			X					X						266	-14.1		
235.19	150	72	X						X						X			X					X						266	-14.1		
235.26	180	50	X	X											X			X					X						266	-14.1		
235.31	155	48		X											X							X	X					Light brown clay coating	266	-14.1		
235.65	230	32							X						X			X					X						266	-14.1		
235.80	175	64							X						X							X	X					Soft grey brown clay	266	-14.1		
235.87	140	75					X								X							X	X					Soft grey brown clay	266	-14.1		
236.20	70	64	X						X						X							X	X					Minor grey clay	266	-14.1		
236.30	50	78	X						X						X							X	X					Minor grey clay	266	-14.1		
236.37	320	54	X						X						X							X	X					Minor grey clay	266	-14.1		
236.48	60	78		X											X			X					X						266	-14.1		
236.60	20	38							X					X								X					X	Fine sand infill & bright orange Fe staining	266	-14.1		
237.18	20	36							X						X			X					X						266	-14.1		
237.55	110	64							X						X							X						Upper contact of a cavity	266	-14.1		
239.25		45	X						X						X						X	X	X					No Invert marked	266	-14.1		
239.86		90		X											X			X					X					No Invert marked	266	-14.1		
240.00			X																			X						240.0 - 240.2m Rubble recovered	266	-14.1		
241.20		15							X						X				X					X				No Invert marked - Slight oxidation	266	-14.1		
241.55	220	42							X						X				X					X				Slight Oxidation	266	-14.1		

242.15	150	90							X						X				X					X				Slight Oxidation, fine sand	266	-14.1		
242.45	35	52							X						X				X					X				Slight Oxidation	266	-14.1		
242.70	320	88							X						X							X	X					Yellow brown clay coating joint surface	266	-14.1		
242.80	330	90							X						X							X	X					Yellow brown clay coating joint surface	266	-14.1		
243.50	20	90							X						X			X					X						266	-14.1		
243.53	20	84							X						X							X		X				Slightly oxidised with brown clay coating	266	-14.1		
243.55	20	86							X						X							X		X				Slightly oxidised with brown clay coating	266	-14.1		
243.74	175	44							X						X							X		X				Slightly oxidised with brown clay and fine sand coating	266	-14.1		
244.30	0	10					X								X						X			X				Black argillite caoting , undulating and axial paraleel	266	-14.1		
244.76	50	66							X						X			X							X			Bright orange oxidation	266	-14.1		
245.35	10	10							X						X							X		X				Orange brown sand coating surface, leached contact	266	-14.1		
247.70	0	28							X						X			X					X						266	-14.1		
247.90	95	78					X								X				X					X				Slight oxidation	266	-14.1		
248.05	310	30							X						X				X					X				Slight oxidation	266	-14.1		
249.00	315	90							X						X							X		X				Orange brown sandy clay coating	266	-14.1		
249.05	320	90	X						X						X			X					X						266	-14.1		
249.54	355	70							X						X							X	X						266	-14.1		
250.90	25	78					X								X							X	X					Orange brown fine grained sand	266	-14.1		
252.60	345	52	X						X						X							X	X					coarse yellow brown sand infill	266	-14.1		
253.15	145	82							X						X			X					X						266	-14.1		
254.11	0	90							X						X			X					X						266	-14.1		
254.70	140	48							X						X			X					X						266	-14.1		
254.94	160	78							X						X				X					X				Weak Fe staining	266	-14.1		
255.30	40	72	X	X											X				X					X				Weak Fe staining	266	-14.1		
255.33	230	80							X						X							X	X					Minor Orange brown clay	266	-14.1		
255.93		60	X						X						X			X						X				No Invert Marked	266	-14.1		
256.10		75					X								X							X	X					No Invert Marked - Curved / Arcuate	266	-14.1		
256.57		45							X						X			X					X					No Invert Marked	266	-14.1		
256.60		45							X						X			X					X					No Invert Marked	266	-14.1		
256.70		45							X						X			X					X					No Invert Marked	266	-14.1		
257.00		20	X					X							X			X					X					No Invert Marked - Polished	266	-14.1		
257.60		90	X					X							X			X					X					No Invert Marked - Polished and undulating	266	-14.1		
257.90		90	X					X							X			X					X					No Invert Marked	266	-14.1		
258.50		45							X						X			X					X					No Invert Marked	266	-14.1		
258.70		30							X						X							X	X					No Invert Marked - minor sand	266	-14.1		
259.05		85						X							X			X					X					No Invert Marked - slightly polished	266	-14.1		
260.23	155	78							X						X			X					X						266	-14.1		
260.51	150	70							X						X			X					X						266	-14.1		
260.70	40	90							X						X							X	X					Minor clay	266	-14.1		
260.80	280	38	X				X								X			X					X						266	-14.1		
260.84	150	78							X						X			X					X						266	-14.1		
261.30	170	62							X						X					X			X					Coarse sand	266	-14.1		
261.42	170	56							X						X			X					X						266	-14.1		
262.94	340	86							X						X			X					X						266	-14.1		
263.15	195	80							X						X			X					X						266	-14.1		
263.45	165	18					X								X				X						X				266	-14.1		
263.95	340	84							X						X			X					X						266	-14.1		
264.20	340	74							X						X			X					X						266	-14.1		
265.07	310	84	X						X						X				X					X				Slightly oxidsed	266	-14.1		
265.48	210	66							X				X							X				X				Coarse sand infill / ribble	266	-14.1		
266.09	210	70							X						X			X					X						266	-14.1		
266.35	305	72							X						X			X					X						266	-14.1		
266.44		55							X						X					X			X					No Invert Marked - Coarse sand	266	-14.1		
266.62		75							X						X					X			X					No Invert Marked - Coarse brown sand	266	-14.1		
267.05	50	72							X						X			X					X						266	-14.1		
267.15	40	662							X						X					X	X		X					Grey calcite & coarse brown sand	266	-14.1		
267.75	250	18							X						X					X			X					Minor Sand	266	-14.1		
267.96		60							X						X			X					X					No Invert Marked	266	-14.1		
268.04		65							X						X			X					X					No Invert Marked	266	-14.1		
268.50			X												X								X					268.5 - 268.65m Coarse Rubble	266	-14.1		
268.65		45							X						X			X					X					No Invert Marked	266	-14.1		
268.79		45							X						X			X					X					No Invert Marked	266	-14.1		

269.00		85	X						X						X			X					X					No Invert Marked - Conjugate Jointing	266	-14.1		
269.00		75					X								X			X					X					No Invert Marked - Conjugate Jointing	266	-14.1		
269.52	140	76							X						X			X					X						266	-14.1		
269.75	90	48							X						X			X					X						266	-14.1		
270.15	310	30							X						X			X					X						266	-14.1		
271.54	180	82							X						X			X					X						266	-14.1		

		PROJECT NAME Lackagh Quarry																									REPORT NO:	
		CLIENT: Glaway County Council																									HOLE NO:	BH-04
		ENGINEER: ARUP																									LOGGED BY:	Dave Blaney
Depth of Discontinuity (m BGL)	Orient.to Short Core Axis	Non Intact? (NI)	Roughness										Aperture					Filling					Weathering					Comments
			Stepped			Undulating			Planar			Other	V Open	Open	Mod Open	Tight	V Tight	Clean	Staining	% Soil	% Mineral	Clay	No	Sl	Mod	High	Comp	
			R	Sm	St	R	Sm	St	R	Sm	St		>10mm	2.5-10	0.5-2.5	0.1-0.5	<0.1											
5.30	20								x						x							x	x					Grey brown soft clay
5.40	20								x						x							x	x					Grey brown soft clay
5.60	50								x						x							x	x					Grey brown soft clay
5.70	80					x									x							x	x					Grey brown soft clay
6.35	10					x									x							x	x					Grey brown soft clay
6.40	90								x							x						x	x					Minor clay smeared on fracture surface
6.70	90								x							x						x	x					Minor clay smeared on fracture surface
6.50	15					x									x			x					x					
6.68	35					x									x			x					x					
6.95	85								x						x							x	x					Minor br/gy clay smeared on fracture surface
7.02	5								x						x			x					x					
7.37	15								x						x			x					x					
7.54	15								x						x			x					x					
7.73	75					x									x			x					x					
7.75	80					x									x							x	x					Stiff / Firm br/gy clay 1mm aperture
7.86	10								x						x			x					x					
8.20	10					x									x			x					x					
8.70	70					x									x			x					x					
8.90	80					x									x							x	x					Firm gy/br clay 2mm aperture
8.95	5					x									x							x	x					Minor gy/br clay smearing fract. Surface
9.05	80					x									x							x	x					Firm gy/br clay 1mm aperture
9.10	10					x									x							x	x					
9.16	80					x									x							x	x					
9.24	55					x									x			x					x					
9.72	85					x									x							x	x					
9.33	85					x									x							x	x					
9.40	50					x									x			x					x					
9.50	85								x						x							x	x					Minor light grey clay smearing
10.00	80					x									x							x	x					Minor light grey clay smearing
10.50	80					x									x							x	x					Locallised small smears of light grey clay
10.87	5								x						x			x					x					
11.06	80					x									x			x					x					
11.30	60					x									x			x					x					
11.60	45								x						x			x					x					

		PROJECT NAME Lackagh Quarry																								REPORT NO:	
		CLIENT: Glaway County Council																								HOLE NO:	BH-04
		ENGINEER: ARUP																								LOGGED BY:	Dave Blaney
Depth of Discontinuity (m BGL)	Orient.to Short Core Axis	Non Intact? (NI)	Roughness										Aperture					Filling					Weathering					Comments
			Stepped			Undulating			Planar			Other	V Open	Open	Mod Open	Tight	V Tight	Clean	Staining	% Soil	% Mineral	Clay	No	Sl	Mod	High	Comp	
			R	Sm	St	R	Sm	St	R	Sm	St		>10mm	2.5-10	0.5-2.5	0.1-0.5	<0.1											
11.63	5	x							x						x			x					x					
11.79	45								x						x			x					x					
11.80	5	x							x						x			x					x					
11.97	15					x									x			x					x					
12.50	60								x						x						x		x					White / grey calcite coating
12.51	15								x						x			x					x					
12.92	15					x									x			x					x					
14.40	10					x									x			x					x					
15.14	10					x									x			x					x					
15.90	70								x						x							x	x					Minor light grey clay smearing fract. Surface
16.38	10					x								x				x						x				Minor etching / pitting on fract. Surface
16.55	70					x									x			x					x					
16.77	5					x									x			x					x					
17.05	10					x									x			x					x					Strongly undulating - 30mm amplitude
17.40	10					x								x								x	x					Orange / brown clay infill
17.50	80					x									x							x		x				Minor clay and locallised Fe. staining
17.60	45	x							x						x			x					x					
17.65	70	x							x						x			x					x					
18.77	10								x						x			x					x					
19.93	25					x							x					x					x					
20.98	10								x						x			x					x					
21.85	60					x									x			x					x					
22.05	20					x								x				x					x					
22.15	40								x						x			x					x					
22.35	10								x						x			x					x					
23.10	10								x						x			x						x				Slight Fe Staining
23.13	0								x						x			x					x					
23.62	5								x						x			x					x					
24.17	20								x						x			x					x					
24.98	5					x									x			x					x					
25.16	10					x								x				x						x				Slight Fe Staining
25.58	10								x						x			x					x					
25.80	10								x						x			x					x					

		PROJECT NAME Lackagh Quarry																									REPORT NO:	
		CLIENT: Glaway County Council																									HOLE NO:	BH-04
		ENGINEER: ARUP																									LOGGED BY:	Dave Blaney
Depth of Discontinuity (m BGL)	Orient.to Short Core Axis	Non Intact? (NI)	Roughness										Aperture					Filling					Weathering					Comments
			Stepped			Undulating			Planar			Other	V Open	Open	Mod Open	Tight	V Tight	Clean	Staining	% Soil	% Mineral	Clay	No	Sl	Mod	High	Comp	
			R	Sm	St	R	Sm	St	R	Sm	St		>10mm	2.5-10	0.5-2.5	0.1-0.5	<0.1											
26.52	5					x									x			x					x					
26.70	75								x						x							x	x					Fine smear of light brown clay
26.72	20	x							x						x			x					x					
26.96	5					x									x			x					x					
27.06	60	x							x						x			x					x					
27.09	15	x							x						x			x					x					
27.13	10	x							x						x			x					x					
27.18	60	x							x						x			x					x					
27.53	5								x						x			x					x					
27.84	5					x									x			x					x					
27.87	5								x						x			x					x					
27.98	5								x						x			x					x					
28.25	5								x						x							x	x					Trace light grey clay coating
28.55	50								x						x			x					x					
28.90						x							x									x		x				37cm wide void - minor clay / slight oxidat.
29.77	5								x						x			x					x					
29.94	5								x						x			x					x					
30.10	5								x						x			x					x					
30.63	15					x									x							x	x					Minor light brown clay smearing
30.69	5								x						x							x	x					Minor light brown clay smearing
30.92	10					x									x			x					x					
31.43	10					x									x							x	x					Minor light brown clay smearing
31.60	5					x									x							x	x					Minor light brown clay smearing
32.47	20								x						x			x					x					
32.90	5								x						x			x					x					
33.94	10	x							x						x			x					x					
34.00	85								x						x			x					x					
34.04	10	x							x						x			x					x					
34.30	10	x							x						x			x					x					
34.52	75								x						x			x					x					
34.57	15	x							x						x			x					x					
34.96	15								x						x			x					x					

		PROJECT NAME Lackagh Quarry																									REPORT NO:	
		CLIENT: Galway County Council																									HOLE NO:	BH-05
		ENGINEER: ARUP																									LOGGED BY:	Dave Blaney
Depth of Discontinuity (m BGL)	Orient.to Short Core Axis	Non Intact? (NI)	Roughness										Aperture					Filling					Weathering					Comments
			Stepped			Undulating			Planar			Other	V Open	Open	Mod Open	Tight	V Tight	Clean	Staining	% Soil	% Mineral	Clay	X	Sl	Mod	High	Comp	
			R	Sm	St	R	Sm	St	R	Sm	St		>10mm	2.5-10	0.5-2.5	0.1-0.5	<0.1											
0.52	5	X				X									X			X					X					
0.60	5					X									X			X					X					
0.63	85								X						X						X		X					White / brown crystalline calcite
0.63	85								X						X			X					X					
0.68	5					X									X			X					X					
0.75	5	X							X						X			X					X					
0.84	5	X							X						X			X					X					
0.90	5								X						X			X					X					
1.31	15								X						X							X	X					Pale brown clay smearing fract. Surface
1.37	10	X				X									X							X	X					Pale brown clay smearing fract. Surface
1.40	10	X				X									X							X	X					Pale brown clay smearing fract. Surface
1.50	85	X							X						X							X	X					Pale brown clay smearing fract. Surface
1.66	5					X									X							X	X					Pale brown clay smearing fract. Surface
1.83	85	X							X						X			X					X					
2.13	10								X						X			X					X					
2.22	20		X												X			X					X					
2.42	5								X						X			X					X					
2.47	10								X						X			X					X					
2.57	10								X						X			X					X					
2.64	5								X						X			X					X					
2.70	10								X						X			X					X					
2.77	20					X									X			X					X					
2.82	5								X						X			X					X					
2.99	15								X						X			X					X					
3.07	10					X									X			X					X					
3.20	10								X						X			X					X					
3.27	20								X						X			X					X					
3.50	85					X									X			X					X					Minor fine gr. Sand coating fract. Surface
3.45	15	X				X									X			X					X					
3.62	20	X				X			X						X			X					X					
4.02	15								X						X			X					X					
4.10	85								X						X							X			X			Fine sandy clay coating & weak Fe staining
4.10	85								X						X							X			X			Joints are sub-parallel c.2-3cm apart
4.16	5								X						X			X					X					

		PROJECT NAME Lackagh Quarry																									REPORT NO:	
		CLIENT: Galway County Council																									HOLE NO:	BH-05
		ENGINEER: ARUP																									LOGGED BY:	Dave Blaney
Depth of Discontinuity (m BGL)	Orient.to Short Core Axis	Non Intact? (NI)	Roughness										Aperture					Filling					Weathering					Comments
			Stepped			Undulating			Planar			Other	V Open	Open	Mod Open	Tight	V Tight	Clean	Staining	% Soil	% Mineral	Clay	X	Sl	Mod	High	Comp	
			R	Sm	St	R	Sm	St	R	Sm	St		>10mm	2.5-10	0.5-2.5	0.1-0.5	<0.1											
4.25	5	X							X						X			X					X					
4.50	5	X							X						X			X					X					
4.73	5	X							X						X			X					X					
4.60	85								X						X							X			X			Fine sandy clay coating & weak Fe staining
4.60	85								X						X							X			X			Fine sandy clay coating & weak Fe staining. Joints are parallel and 2cm apart
4.74	5	X							X						X			X					X					
4.83	5	X							X						X			X					X					
3.85-8.0	85-90								X						X						X	X			X			Fine sandy clay coating & Fe staining. Fracture is are axial parallel and continue for 4.15m. From 6.5m white calcite deposited on fracture surface. 7.0-7.65m firm brown/grey clay infill - aparture up to 4mm wide
4.97	5	X							X						X			X					X					
5.07	10	X							X						X							X	X					Minor clay coating fracture surface
5.13	20	X							X						X							X	X					Minor clay coating fracture surface
5.20	75	X							X						X			X					X					Conjugate with vertical joint
5.16	10	X							X						X			X					X					
5.61	20	X				X									X			X					X					
5.73	10	X							X						X			X					X					
5.80	5	X							X						X			X					X					
5.97	5	X							X						X			X					X					
6.10	85	X	X												X							X	X					Conjugate with vertical fracture strike 120 / 60'
6.26	5	X							X						X			X					X					
6.38	10	X							X						X							X	X					Light brown clay
6.48	5	X							X						X			X					X					
6.60	5	X							X						X			X					X					
6.74	5	X							X						X			X					X					
6.78	5	X							X						X			X					X					
6.88	15	X				X									X			X					X					
6.91	10	X				X									X			X					X					
7.13	5	X							X						X			X					X					
7.37	5	X							X						X			X					X					
7.57	10	X							X						X			X					X					
7.74	15								X						X			X					X					
8.64	0								X						X				X					X				Orange brown Fe staining
8.68	50								X						X				X					X				Orange brown Fe staining
8.73	50								X						X				X					X				Orange brown Fe staining

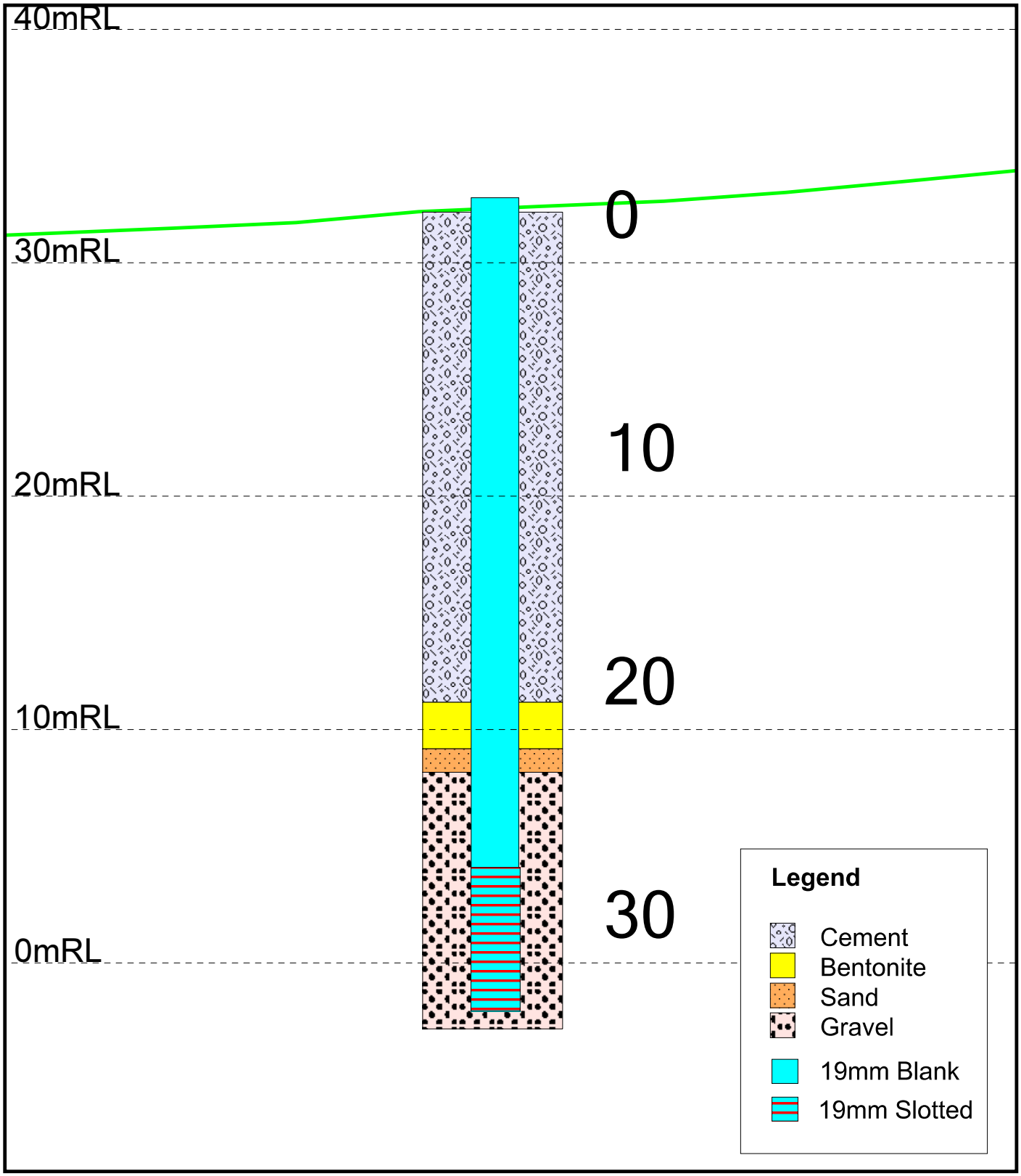
		PROJECT NAME Lackagh Quarry																									REPORT NO:	
		CLIENT: Galway County Council																									HOLE NO:	BH-05
		ENGINEER: ARUP																									LOGGED BY:	Dave Blaney
Depth of Discontinuity (m BGL)	Orient.to Short Core Axis	Non Intact? (NI)	Roughness										Aperture					Filling					Weathering					Comments
			Stepped			Undulating			Planar			Other	V Open	Open	Mod Open	Tight	V Tight	Clean	Staining	% Soil	% Mineral	Clay	X	Sl	Mod	High	Comp	
			R	Sm	St	R	Sm	St	R	Sm	St		>10mm	2.5-10	0.5-2.5	0.1-0.5	<0.1											
8.92	45		X												X				X					X				Orange brown Fe staining
9.20	45								X						X							X		X				Orange brown Fe staining
9.35	60		X												X				X					X				Orange brown Fe staining, light brown clay smearing
10.25	5								X						X			X					X					
10.4 - 11.3	85								X						X						X	X		X				Axial parallel fracture, minor calcite and orange brown clay coating fracture surface
10.50	5								X						X			X					X					
11.20	50					X									X						X	X	X					Light grey calcite and minor brown clay coating fracture surface
11.30	5								X						X			X					X					
11.90	5		X												X						X		X					Fracture devoped along stylolite, black argillite lining
11.95	80	X							X						X			X						X				Minor Fe staining
12.05	15					X									X			X					X					
12.42	10		X												X						X		X					Fracture devoped along stylolite, black argillite lining
12.60	55								X						X			X					X					
12.6 - 13.4	85								X						X				X					X				Minor Fe staining
12.78	0	X							X						X							X	X					Minor light brown clay
12.84	5	X							X						X							X	X					Minor light brown clay
13.02	5	X							X						X			X					X					
13.26	5	X							X						X			X					X					
13.52	20								X						X			X					X					
13.82	5								X						X			X					X					
14.39	30								X						X							X	X					Sand/clay coating, minor Fe staining
14.72	55								X						X			X					X					
15.00	30								X						X			X					X					
15.15	15		X												X						X		X					Fracture devoped along stylolite, black argillite lining
15.20	85	X				X									X			X					X					
15.33	85	X				X									X			X					X					
15.40	20					X									X							X	X					Minor brown clay
15.55	10		X												X						X		X					Fracture devoped along stylolite, black argillite lining
16.59	10					X									X			X					X					
16.86	10								X						X							X		X				Minor light brown clay, some pitting & weak oxidation of fracture surface
16.90	30								X						X							X		X				Minor light brown clay, some pitting & weak oxidation of fracture surface

		PROJECT NAME Lackagh Quarry																									REPORT NO:	
		CLIENT: Galway County Council																									HOLE NO:	BH-05
		ENGINEER: ARUP																									LOGGED BY:	Dave Blaney
Depth of Discontinuity (m BGL)	Orient.to Short Core Axis	Non Intact? (NI)	Roughness										Aperture					Filling					Weathering					Comments
			Stepped			Undulating			Planar			Other	V Open	Open	Mod Open	Tight	V Tight	Clean	Staining	% Soil	% Mineral	Clay	X	Sl	Mod	High	Comp	
			R	Sm	St	R	Sm	St	R	Sm	St		>10mm	2.5-10	0.5-2.5	0.1-0.5	<0.1											
17.20	10								X						X							X	X					Grey/brown clay coating fract. Surface
17.25	85	X				X									X							X	X					Minor grey / brown clay
17.40	45					X									X							X	X					Minor grey/brown clay coating fract. Surface
17.78	5					X									X							X	X					Undulating - amplitude 2cm, brown clay infill
18.03	15		X												X							X	X					Minor clay
18.30	15					X									X			X					X					
18.50	85	X							X						X						X		X					Minor white calcite
18.60	20								X						X							X	X					Orange/brown clay smeared on fract surface
18.80	10								X						X							X	X					Orange/brown clay smeared on fract surface
18.90	85								X						X						X		X					Minor white calcite
18.97	10					X									X			X					X					
19.20	20					X									X							X	X					Orange/brown clay infill
19.60	5								X						X			X					X					
19.98	45	X							X						X							X	X					Orange/brown clay infill, aperture up to 2mm thick
20.00	45	X							X						X							X	X					Orange/brown clay infill, aperture up to 2mm thick
20.04	45								X						X			X					X					
20.12	10								X						X			X					X					
20.60	85								X						X			X					X					
20.60	75					X									X							X	X					Orange/brown clay coating fract. Surface
20.52	10								X						X			X					X					
20.73	20	X	X												X							X	X					Very rough - Orange/brown clay coating fract. Surface
20.87	35	X	X												X							X	X					Very rough - Orange/brown clay coating fract. Surface
20.97	50					X									X							X	X					Orange/brown clay coating fract. Surface
21.23	55					X									X							X	X					Brown sandy clay coating
21.35	55					X									X							X	X					Brown sandy clay coating
21.42	55					X							X									X	X					Joint aperture is >10mm infilled with orange brown clay
21.86	30	X							X						X			X					X					
21.90	20								X						X			X					X					
22.05	45								X						X			X					X					

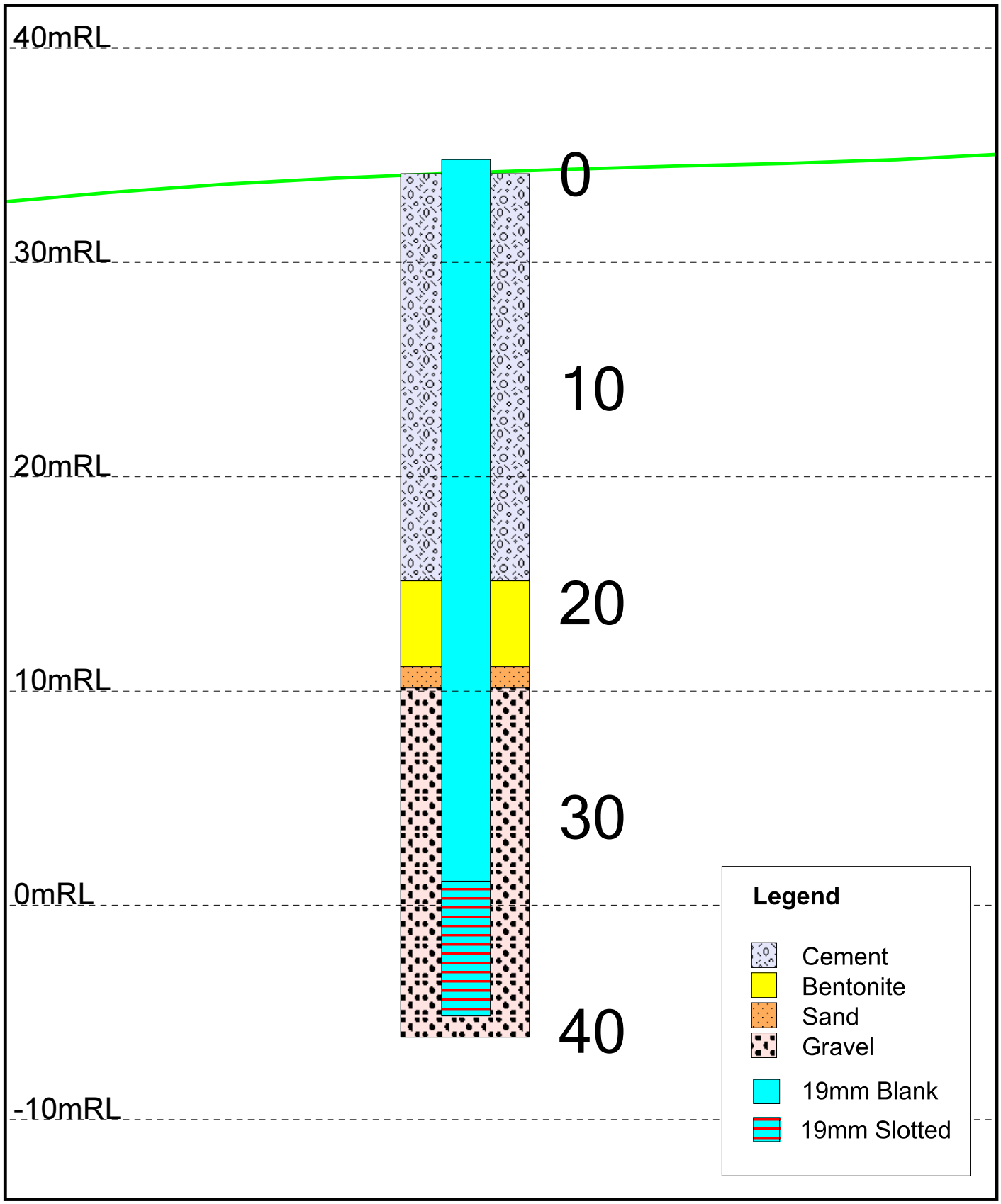
		PROJECT NAME Lackagh Quarry																							REPORT NO:	
		CLIENT: Galway County Council																							HOLE NO:	BH-05
		ENGINEER: ARUP																							LOGGED BY:	Dave Blaney
			Roughness										Aperture					Filling					Weathering					
Depth of Discontinuity (m BGL)	Orient.to Short Core Axis	Non Intact? (NI)	Stepped			Undulating			Planar			Other	V Open	Open	Mod Open	Tight	V Tight	Clean	Staining	% Soil	% Mineral	Clay	X	SI	Mod	High	Comp	Comments
			R	Sm	St	R	Sm	St	R	Sm	St		>10mm	2.5-10	0.5-2.5	0.1-0.5	<0.1										
22.10	5								X						X			X					X					
22.45	85	X							X						X							X		X			Clay coating fract surface minor Fe staining
22.92	10	X							X						X							X	X					Clay coating fract surface
23.40	70								X						X							X	X					Light brown clay over basal 30cm
23.60	5	X							X						X			X					X					
23.72	10								X						X						X		X					Minor light grey calcite
24.40	60								X						X			X					X					
24.50	0								X						X			X					X					
25.04	0								X						X			X					X					
25.52	45								X						X						X		X					Minor light grey calcite
25.82	25					X									X			X					X					
26.37	5								X						X			X					X					
26.61	5								X						X			X					X					
26.70	80	X							X						X				X				X					Minor Fe staining
27.10	85								X						X						X		X					Minor white calcite
27.14	20	X	X												X			X					X					
27.27	55								X						X			X					X					
27.62	55		X												X			X					X					
27.88	0								X						X			X					X					
28.05	5	X							X						X			X					X					
28.12	60	X							X						X			X					X					
28.16	5	X				X									X			X					X					
28.25	90								X						X						X		X					Minor white calcite veining
28.40	55	X							X						X			X					X					
28.1 - 32.35	85-90								X						X						X		X					Axial parallel fracture, surfaces partially coated with white calcite
28.81	15	X							X						X			X					X					
28.90	20	X							X						X			X					X					
29.05	30	X							X						X			X					X					
29.35	10	X							X						X			X					X					
29.40	60	X							X						X			X					X					
30.00	5	X							X						X			X					X					
30.30	40	X							X						X			X					X					
30.38	10	X				X									X			X					X					
30.50	10	X							X						X			X					X					

		PROJECT NAME Lackagh Quarry																								REPORT NO:	
		CLIENT: Galway County Council																								HOLE NO:	BH-05
		ENGINEER: ARUP																								LOGGED BY:	Dave Blaney
Depth of Discontinuity (m BGL)	Orient.to Short Core Axis	Non Intact? (NI)	Roughness										Aperture					Filling					Weathering					Comments
			Stepped			Undulating			Planar			Other	V Open	Open	Mod Open	Tight	V Tight	Clean	Staining	% Soil	% Mineral	Clay	X	Sl	Mod	High	Comp	
			R	Sm	St	R	Sm	St	R	Sm	St		>10mm	2.5-10	0.5-2.5	0.1-0.5	<0.1											
30.78	10	X							X						X			X					X					
30.90	35	X							X						X			X					X					
31.30	50	X							X						X				X					X				
31.60	70	X							X						X				X					X				
31.90	45	X							X						X			X					X					
32.07	35								X						X			X					X					
32.24	5								X						X			X					X					
32.85	15								X						X			X					X					
32.91	20								X						X			X					X					
33.30	5								X						X			X					X					
33.55	5								X						X			X					X					
33.80	5								X						X			X					X					
33.94	10					X									X			X					X					
34.55	10								X						X			X					X					
34.73	45								X						X			X					X					
34.9 - 37.2	85					X									X				X			X		X				Locally stepped aspect, trace clay coating surfaces, slight Fe staining over top 1.5m
34.90	20								X						X			X					X					
35.00	45	X							X						X			X					X					
35.23	20	X		X											X			X					X					
35.37	10	X							X						X			X					X					
35.54	15	X							X						X			X					X					
35.63	10								X						X			X					X					
35.73	10								X						X			X					X					
36.10	5	X							X						X							X		X				Minor clay, slight Fe Staining
36.40	20	X							X						X			X					X					
36.47	10								X						X			X					X					
36.88	45	X							X						X			X					X					
37.20	30					X									X							X	X					Traces of orange brown clay
38.05	10								X						X			X					X					
37.95 - 40.0	85					X									X							X		X				Minor clay smearing surfaces and locallised Fe staining
38.64	10	X							X						X			X					X					
39.64	10	X							X						X			X					X					
39.75	55	X							X						X			X					X					
39.90	65	X							X						X			X					X					

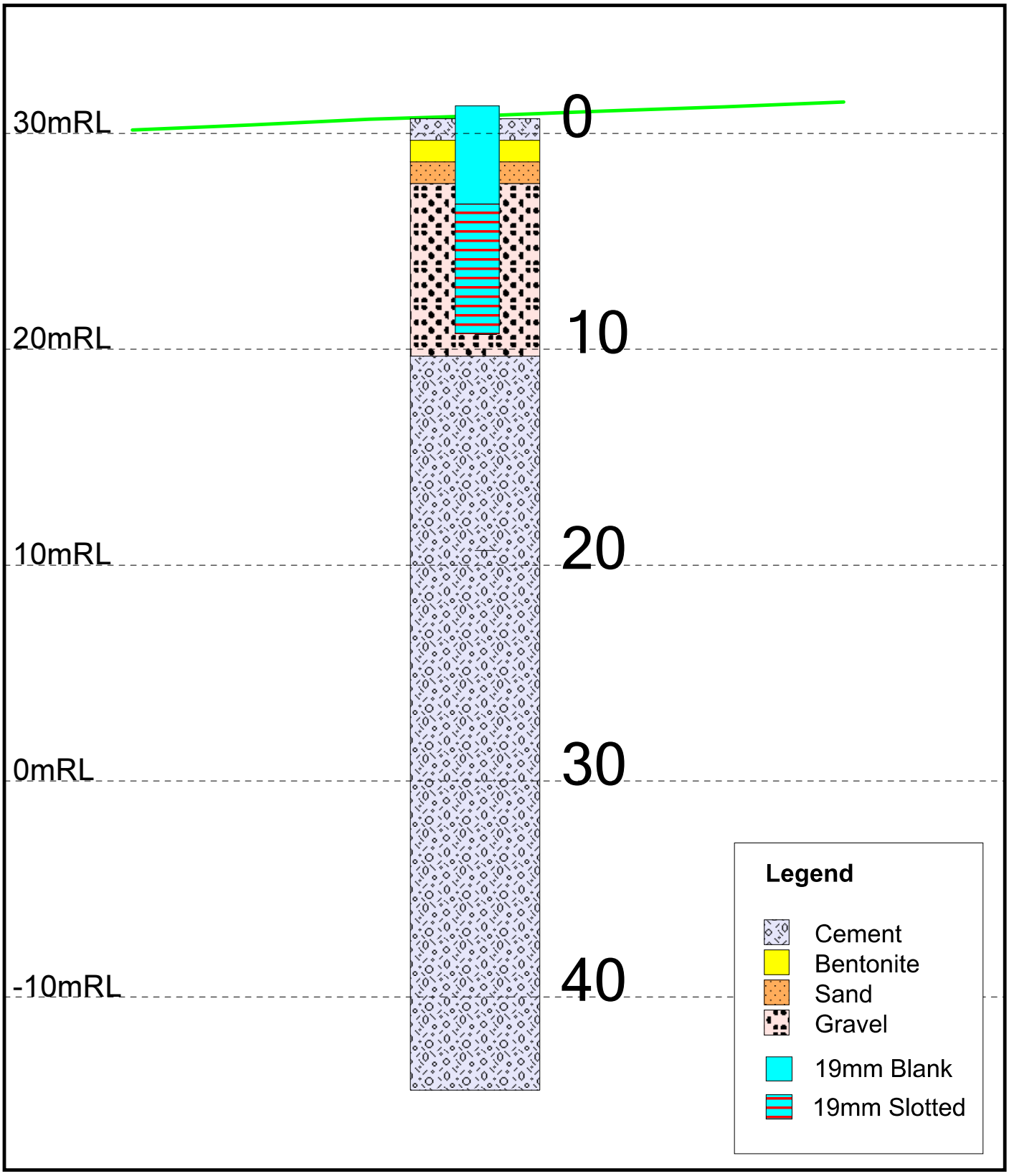
APPENDIX IV



Piezometer Installation BH04



Piezometer Installation BH05



Piezometer Installation BH06

APPENDIX V

R13/16

Report on Geophysical Surveys completed at Lackagh Quarry Co. Galway for Arup

Graham Reid P.Geo.

Project Number: **R13/16**
Author(s): Graham Reid P.Geo,
BRG Ltd. Arup
Date of Report: January 2016

Private & Confidential

THE DATA PRESENTED IN THIS REPORT WAS ACQUIRED FROM GEOPHYSICAL NON-INVASIVE TECHNIQUES CARRIED OUT AT SURFACE. INTERPRETATIONS ARE DERIVED FROM A COMBINATION OF GROUND CONDITIONS, TYPICAL GEOPHYSICAL RESPONSES AND THE KNOWLEDGE/EXPERIENCE OF THE AUTHOR. BRG LTD HAS COMPILED AND INTERPRETED THE DATA TO BEST INDUSTRY STANDARDS AND WITH ALL REASONABLE SKILL AND DILIGENCE IN RELATION TO THE TECHNIQUES AND RESOURCES APPLIED IN AGREEMENT WITH THE CLIENT. ANY FUTURE USE OF THIS REPORT SHOULD TAKE ITS INTERPRETIVE NATURE INTO CONSIDERATION.

Report Number	Author	Checked By	Version	Date
R13/16	Graham Reid P. Geo	Dave Blaney P. Geo	V1	18/01/2016
Signed				

R13/16

Report on Geophysical Surveys at Lackagh, Co. Galway

Graham Reid, January 2016

Contents

List of Figures

1. Executive Summary

BRG Ltd completed geophysical surveys in an area to the west of the abandoned Lackagh Quarry, Menlo, Co. Galway as part of the Priority Drilling Ltd preliminary site investigation for the proposed new road alignment through this area. The geophysical surveys consisted of 2D Electrical Resistivity Tomography (ERT) and Microgravity across an initial area of roughly 300*30m, subsequently extended to better define the extent of a deep weathering/karst zone.

The surveys were designed to test for subsurface details and bedrock depths in advance of follow up rotary core drilling. Information on potential karst features were of particular interest to the client. The bedrock exposed in the quarry and outcropping to the west consists of strong, thickly bedded Visean limestones dipping gently to the south-west. A thin Tuff band is reputed to control a local aquifer, with more thinly bedded limestones and thin shaley bands developed beneath.

Outcrop to the west of the quarry consists of well-developed limestone pavement extending c,80-100m to the west, which gives way to grass fields across the remainder of the survey area.

Resistivity sections from the 2D ERT and gravity data show a marked contrast from high resistivity bedrock in the east with a sharp contact into very low resistivity zones to the west. The western region has a low gravity response coincident with the low resistivity. The base of the initial ERT lines did not penetrate below 30m in the west suggesting that this area could be a deep overburden/weathered zone, possibly a karst filled sinkhole or more shaley unit.

The work was completed over three separate periods:

- 6 day period from 27th October to 3rd November 2015.
- 1 day, 25th November
- 3 days, 13-15th January

2. Introduction

BRG was hired by Priority drilling Ltd. to acquire 2D ERT and microgravity data along a planned potential route for the new Galway ring road located to the west of Lackagh Quarry.

The Quarry is located to the north of Galway city with easy access off the Coolagh Road. The quarry is abandoned and fenced off and site access was organised through Sean Ross of Arup. The work was completed mainly across fields and limestone pavement to the west of the quarry and outside the quarry footprint. A rough track running from inside the quarry bounds allowing access into the fields. Loose cattle including a bull were running free within the fields and surrounding scrub, however these were fenced out of the fields when ERT lines were being acquired. A minor microgravity grid was also added on the first bench within the quarry over the area where the proposed horizontal borehole was drilled.

Figure 1: Aerial Photograph Site Location Map

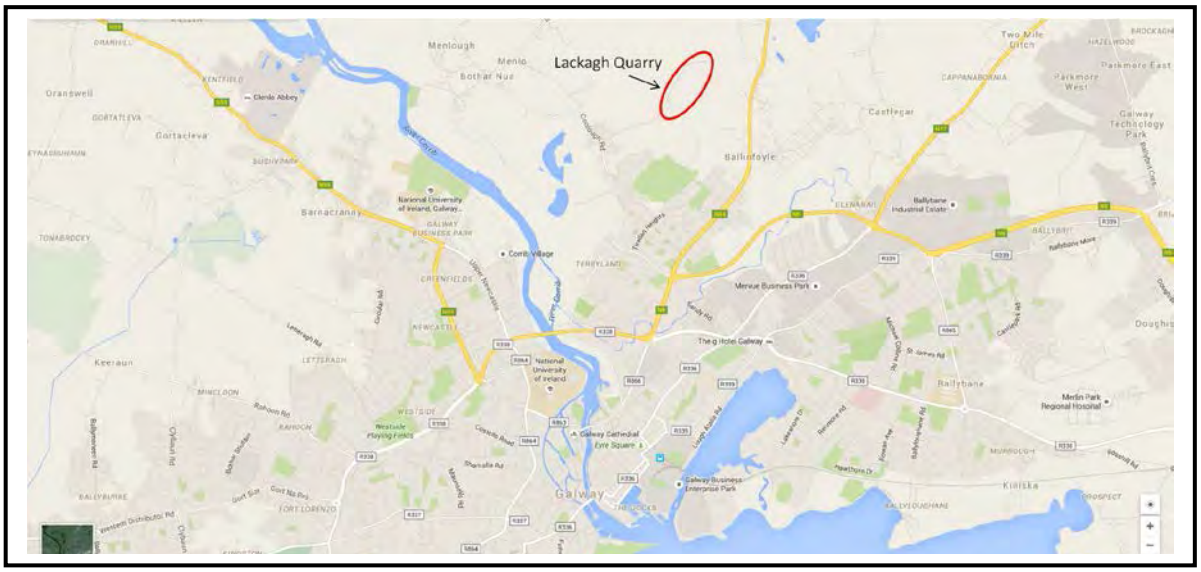


Figure 2: Location Map

2.1 Survey Objectives

1) Acquire 2D Resistivity and Microgravity data across the specified region within and proximal to the Lackagh Quarry site.

2) Generate Maps and sections showing the geophysical characteristics of the site and generate interpretative maps and sections of the overburden/bedrock model over the chosen areas.

3) Outline potential areas for future intrusive investigations (in particular to assist with locating follow up rotary drilling)

3. Geological setting

The mapped geology from the Geological Survey of Ireland (1:100,000) shows the site to be underlain by undifferentiated Visean limestones / shaley limestones. The rocks are well exposed within the quarry and to the west as outcropping weathered limestone pavement. These limestones are massive, thickly bedded micritic / grainstone units, generally strong and dipping to the southwest. Overburden appears to be mostly clay and gravels and most likely glacially derived soils (the site walk over noted rounded granite boulders scattered across the limestone pavement, these are probably glacial erratics). A pronounced Tuff band clearly exposed in the quarry underlies the massive limestones and is thought to control a local aquifer. It also appears to host minor sulphides (pyrite) with iron staining developed on the surface of the underlying, slightly argillaceous, limestones.

4. Survey Equipment and methodology

The geophysical surveys were chosen to provide detailed overburden/bedrock profiles along the chosen lines (ERT) and to identify any significant anomalous zones that could be a result of faults/fractures or karst development (ERT and Microgravity).

The depth mapping potential with the ERT is limited by the length of each spread so that individual spreads were capable of surveying to from 22m b.g.l. in Line 5 to a maximum of 60m b.g.l. with Line 6. Equipment consisted of an Allied Associates Tigre system which has the potential for up to 128 electrode takeouts. 2m station spacing was initially used to get the required detail along the chosen lines, with 3m intervals on the long lines (6, 7 & 8). Data was measured using a Wenner array, controlled by an Imager2006 programme with a laptop computer. Saved data was inverted using the Geotomo Res2Dinv programme and exported as an image file displaying a cross section of the inverted Resistivities with elevation data. The resultant resistivity sections were subsequently interpreted and an interpreted geological model developed.

Microgravity data was acquired with measured sites along the centre line and 15m either side of the proposed tunnel section. These lines were measured with nominal station spacing of 10m, with gaps where scrub hawthorn was too thick. Extra stations were measured within the quarry on the first bench at 5-10m intervals. Measurement was taken using a Lacoste & Romberg model G gravity meter. Instrument drift was monitored by returning to a locally established base station at hourly intervals.

Stations were topographically surveyed using a Trimble GeoExplorer 6000 RTK GPS system corrected through phone modem link for both the ERT and the gravity surveys. The drift corrected gravity data was corrected for elevation, latitude, and reduced to Bouguer 2.67g/cm^3 to allow for local average rock densities. It was then gridded and exported for display and interpretation in the MapInfo GIS system.

All points were surveyed in Irish Transverse Mercator (ITM) projection.

5. Discussion of Results (Figures 3-16)

The 2D ERT data defines a marked contrast between the resistive massive limestones to the east and exposed within the quarry and a narrow, deep, conductive response that was detected to the west. This contact is clearly seen on lines 1 (at station 114) & 2 (station 134) where it is shown as steep westerly dipping feature. Lines 3 & 4 are almost entirely mapping the lower resistivity unit which is greater than 14m deep. This conductive zone could represent a combination of thicker overburden and underlying weathered bedrock. Line 5 was surveyed entirely on the edge of the

outcropping limestone pavement and displays a thin conductive overburden layer over resistive bedrock.

Line 6 was extended N-S perpendicular to the long axis of the fields with the aim of mapping the edges of the deep overburden feature – this line was surveyed while BH3 was still in progress, with the inversion model shows the hole located within a significant deep overburden (low resistivity) feature. The southern contact of the deep overburden feature is mapped as being sub-vertical with the overburden depth increasing from <1.0m to >55.0m within a few meters. The northern side of the deep overburden feature exhibits a steeped nature with a rapid shallowing at station 210 to a depth of c.35m bgl, and the northern edge seen at station 275 where the overburden depth shallows rapidly.

Lines 7 & 8 were surveyed along similar locations to 2 & 1 respectively; however they were surveyed at 3m electrode spacing and extended to the west. Line 7 exhibits a strange higher resistivity shallow zone to the west of station 96 with lower resistivity below – this most likely reflects the line location proximal to the southern contact of the deep overburden feature resulting in the inversion model displaying some “edge” effects.

Lines 9 & 10 were also designed to map the edges of the deep overburden feature, and this has been successfully achieved along the southern contact and only partially successful in the north (where thick hawthorn bush in an environmentally sensitive area restricted access to extend the lines). These lines were surveyed using a 2m electrode spacing.

The microgravity data shows the same general scenario as the resistivity data. Higher density and more coherent limestones in the east give way to a lower density zone to the west with an irregular sinuous contact between the two. Measurements on the bench within the quarry give the same relatively high density limestone situation as seen at the area underlain by limestone pavement. However, the lower gravity readings located in zones along the edges of the quarry faces are interpreted as the effect of terrain factors

The geophysical interpretation (Figure 16) is derived from a combination of both the Microgravity and 2D ERT methods. This outlines the contact zone at about 530,130E between shallow limestones to the east and deeper overburden/weathered zone to the west. The original ERT lines and microgravity provided limited definition of the contact zones and these have been refined by the extended 3m interval lines. The rotary drilling has shown that the ERT models correlate well with the underlying geology. The mapped low resistivity zone closely follows the field outline. Completed drillholes have been located on the model sections, with those annotated as “offset”

projected from up to 10m away onto the sections (N.B. there is some slight discrepancy between the plotted holes and the modelled section inversion as the holes have been extrapolated from up to 10m off line)

The unusual nature of these grass fields and where they sit within the surrounding limestone pavement would also support the possibility that they reflect the surface expression of an infilled topographic feature such as a slot canyon.

ERT Line Locations

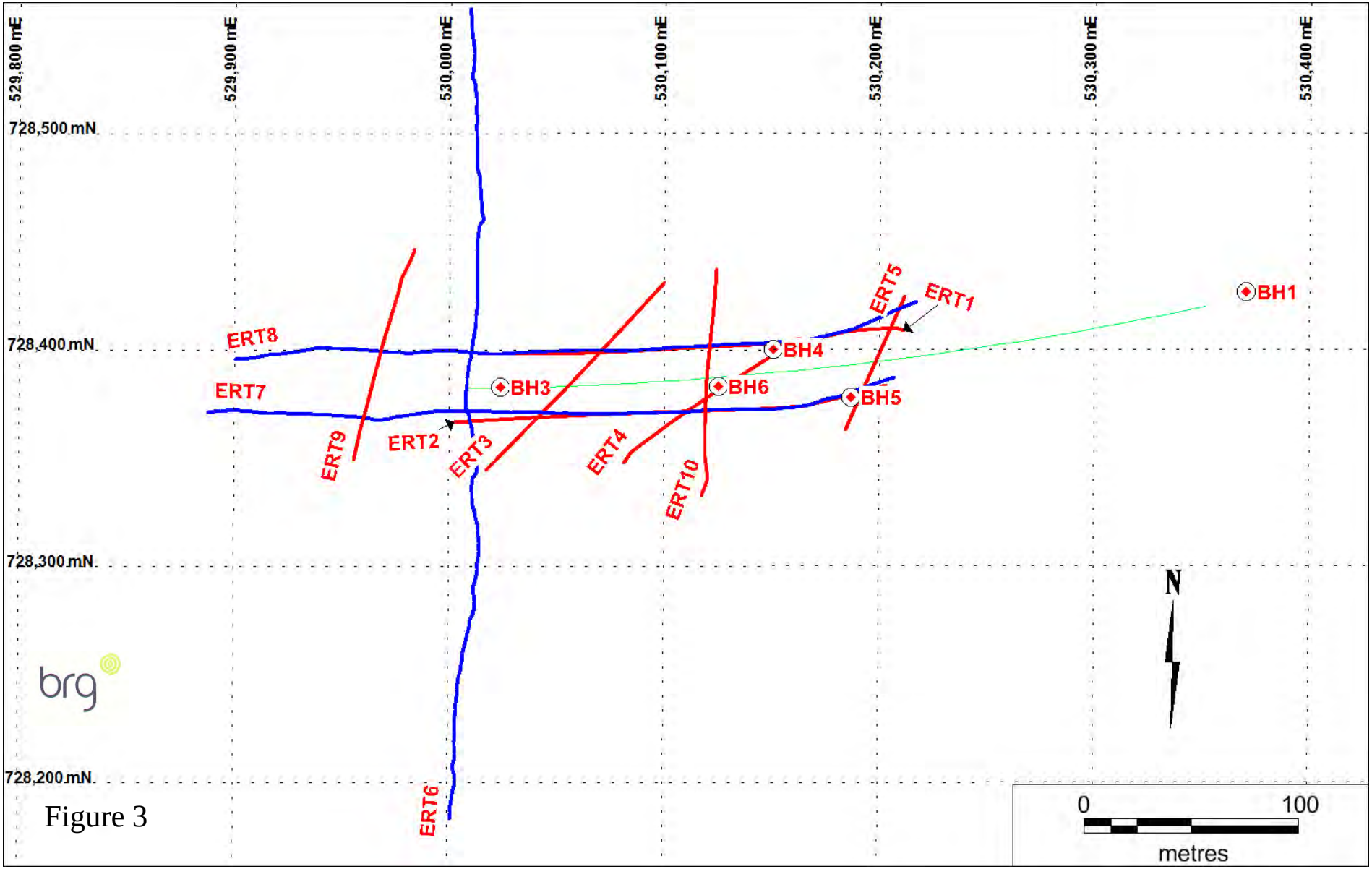


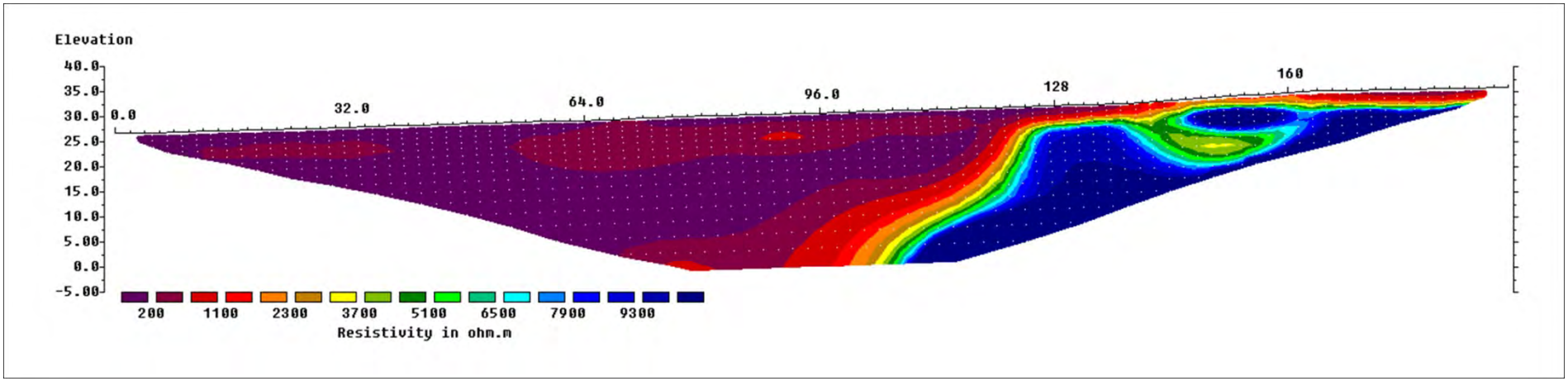
Figure 3

Resistivity – ERT Line 1

2m Electrode Takeouts

West

East



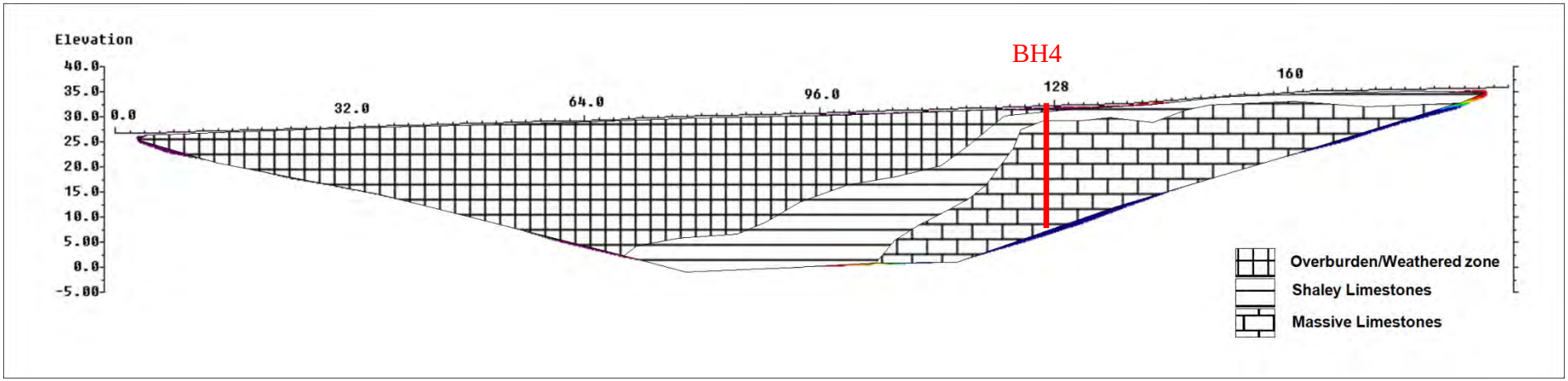


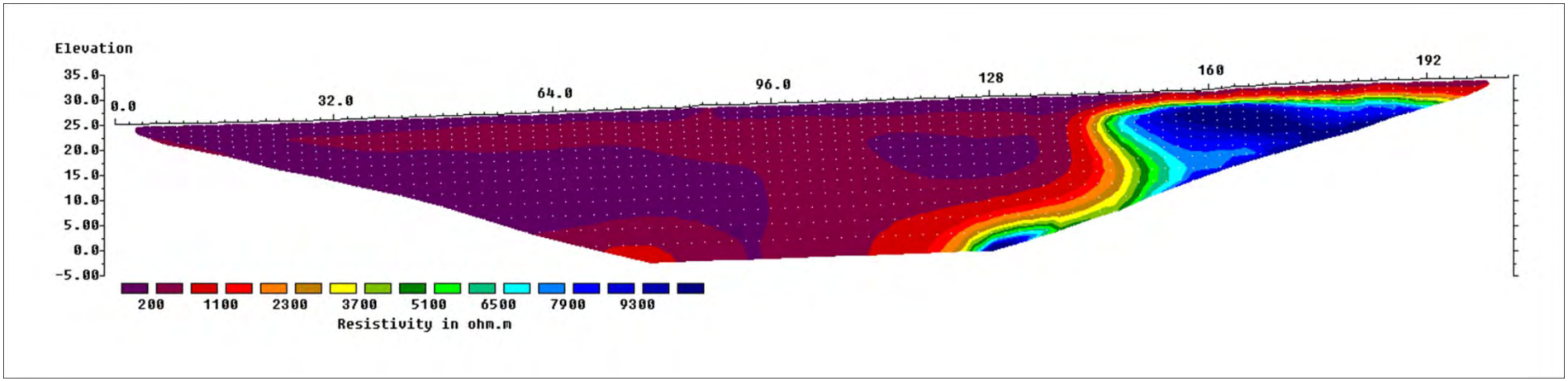
Figure 4

Resistivity – ERT Line 2

West

2m Electrode Takeouts

East



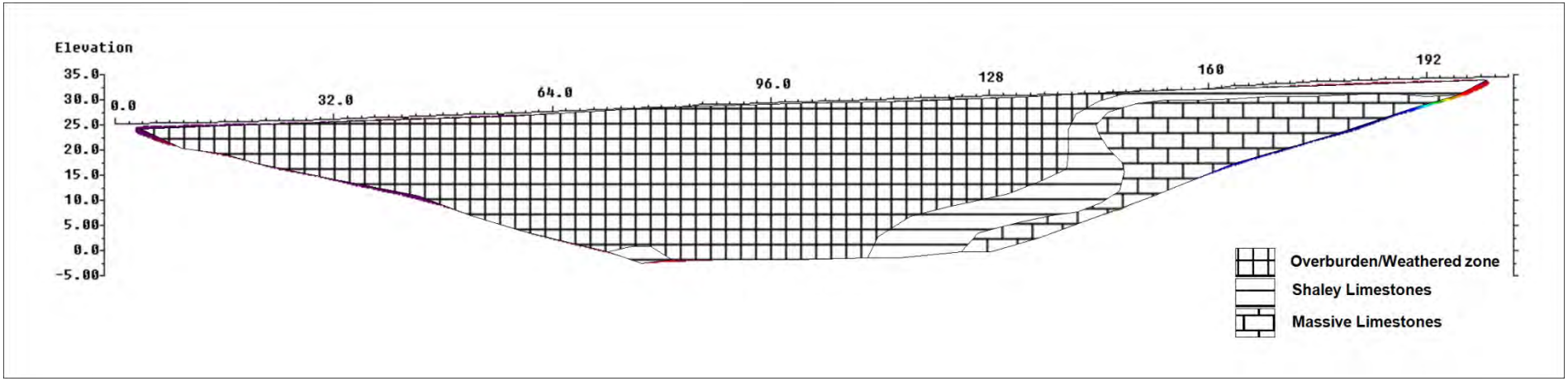


Figure 5

Resistivity – ERT Line 3

SW

2m Electrode Takeouts

NE

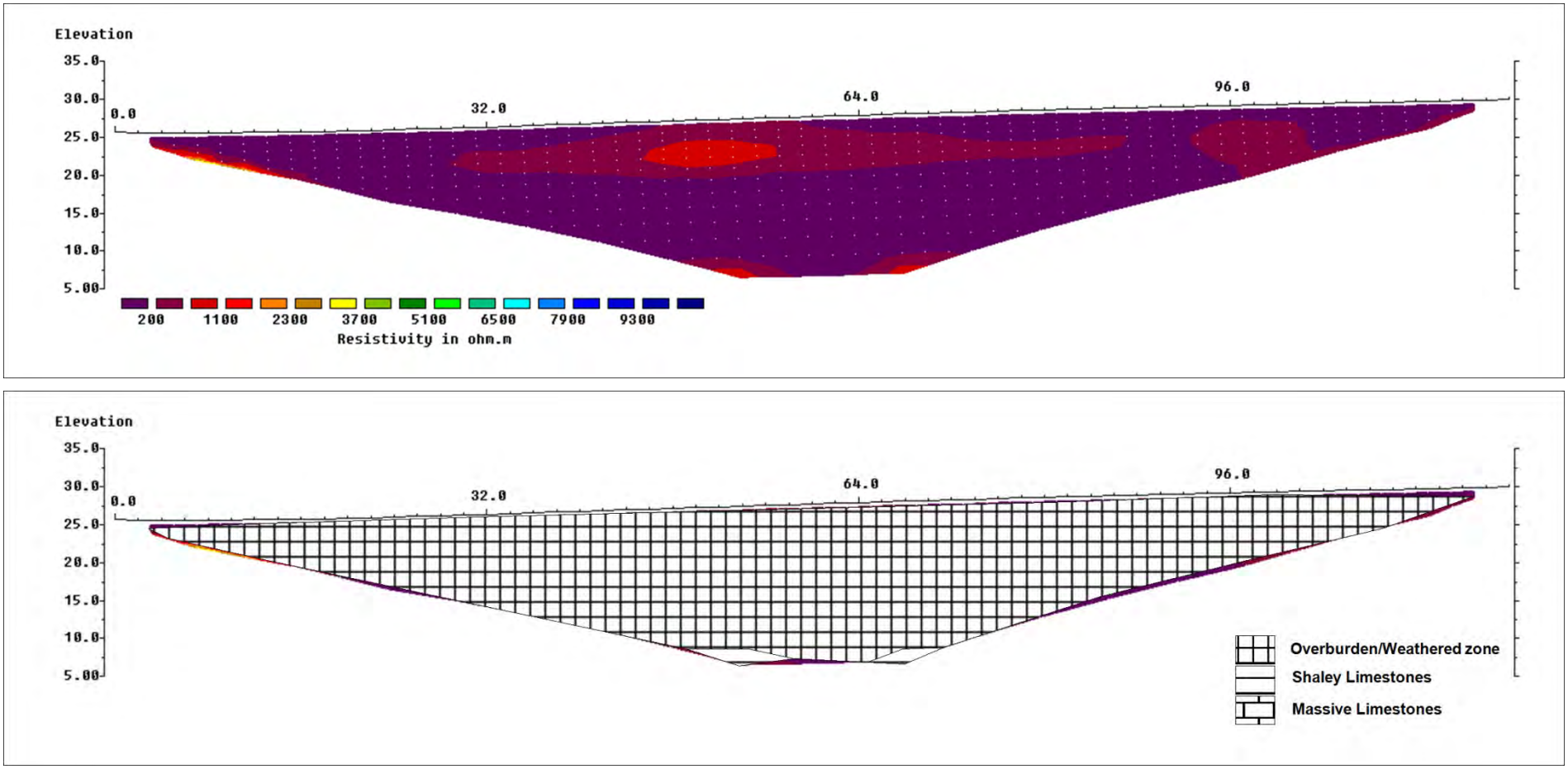


Figure 6

Resistivity – ERT Line 4

SW

2m Electrode Takeouts

NE

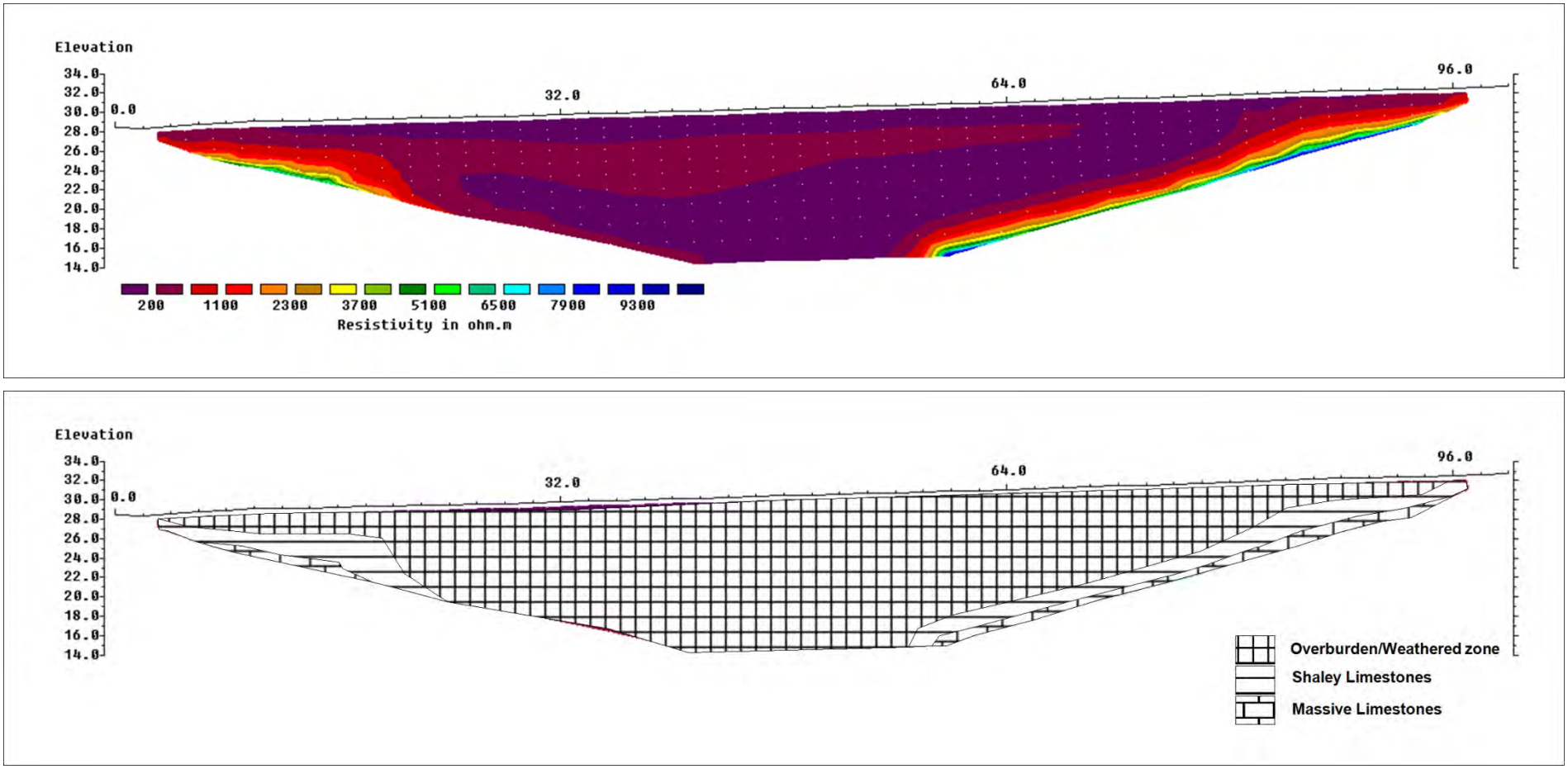


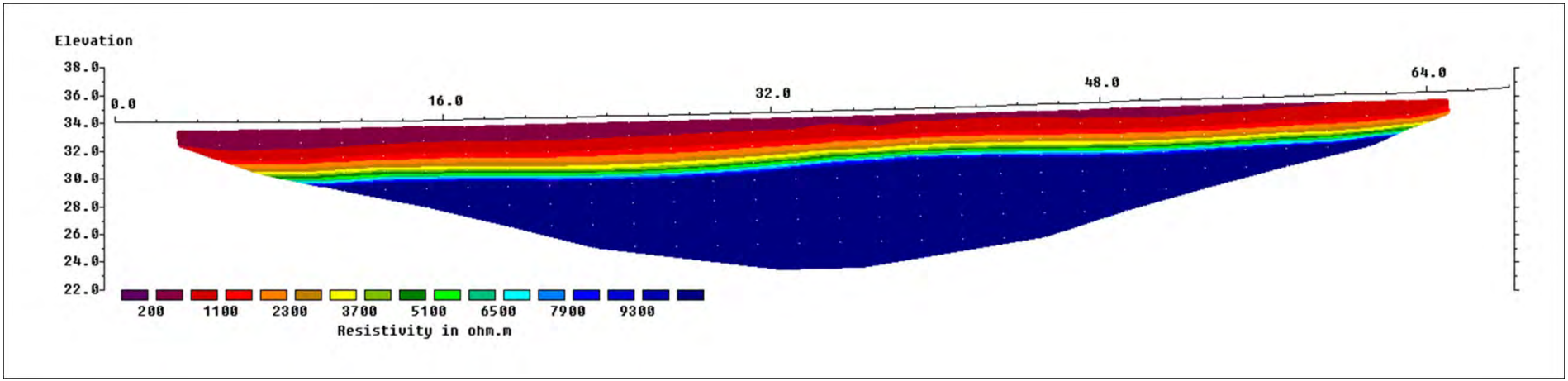
Figure 7

Resistivity – ERT Line 5

SW

2m Electrode Takeouts

NE



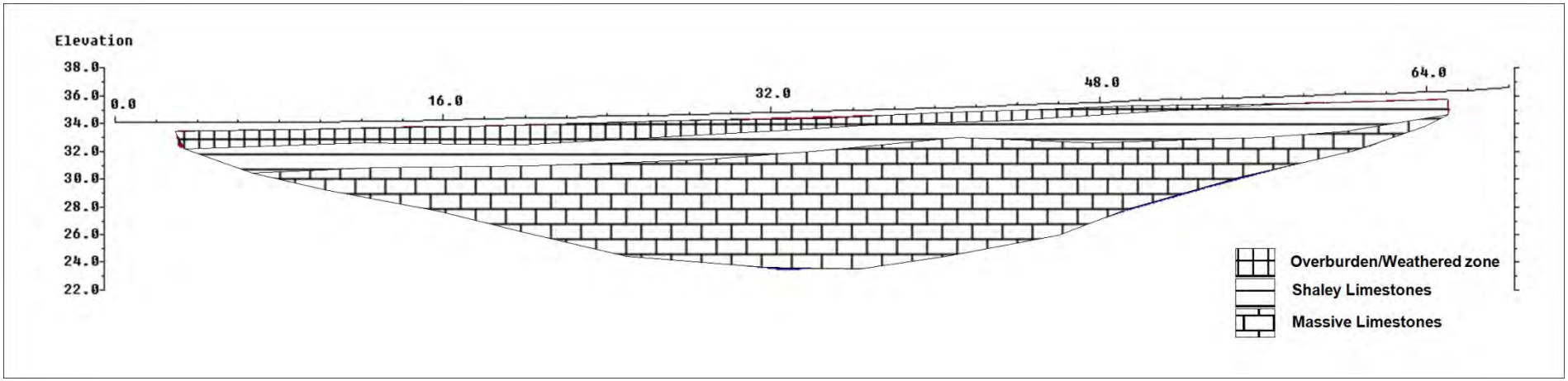


Figure 8

Resistivity – ERT Line 6

S

3m Electrode Takeouts

N

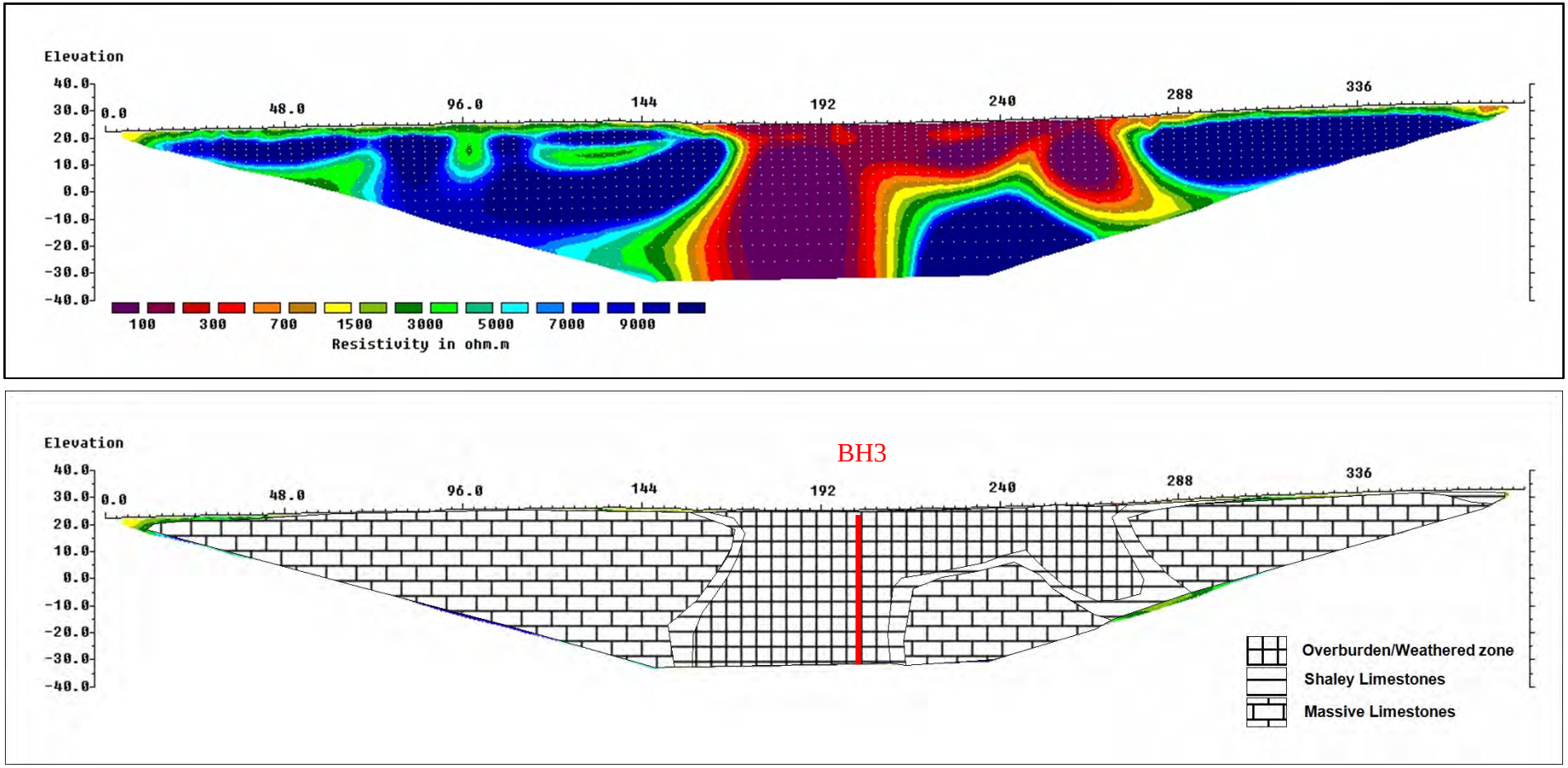


Figure 9

Resistivity – ERT Line 7

W

3m Electrode Takeouts

E

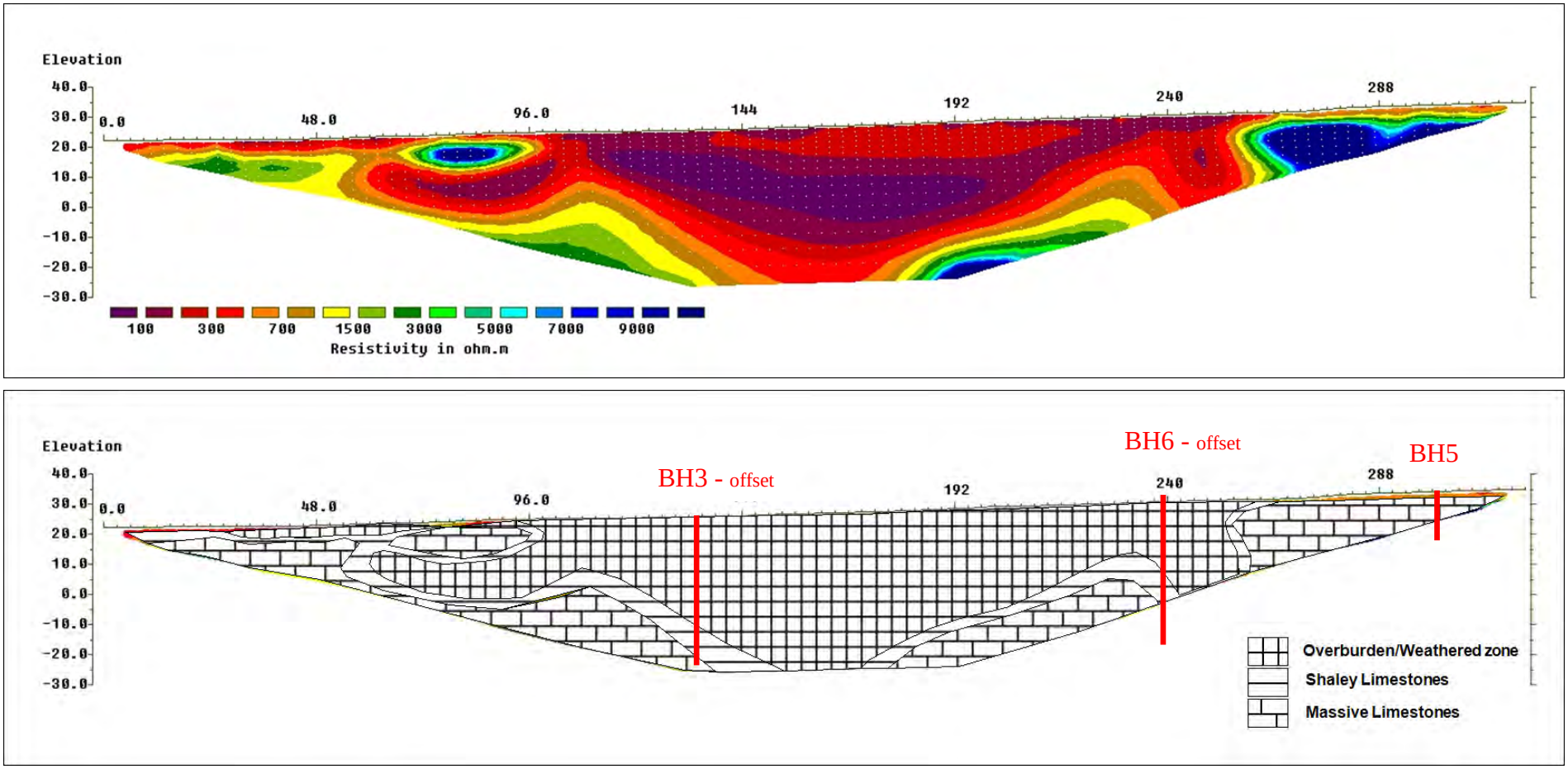


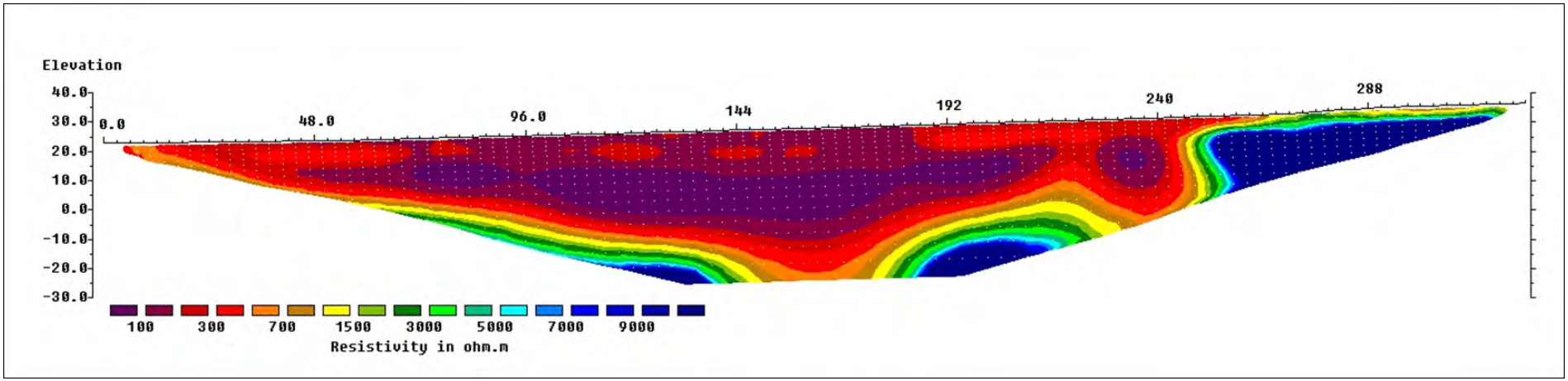
Figure 10

Resistivity – ERT Line 8

W

3m Electrode Takeouts

E



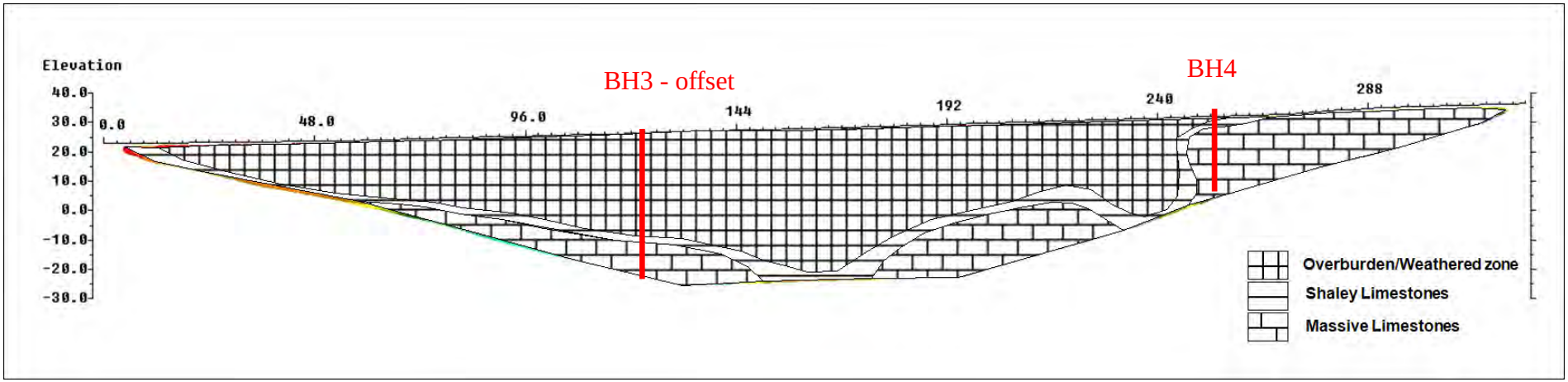


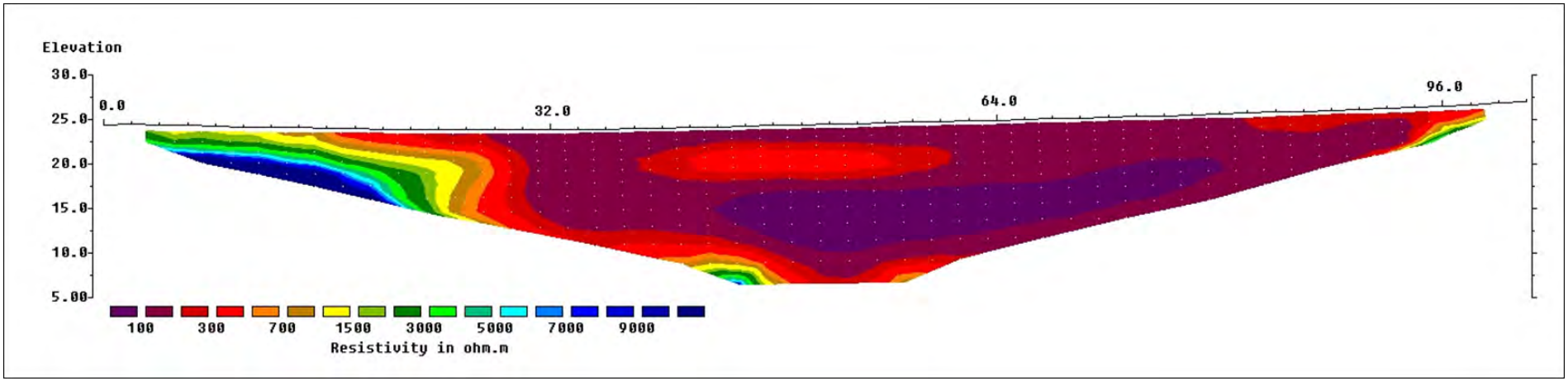
Figure 11

Resistivity – ERT Line 9

S

2m Electrode Takeouts

N



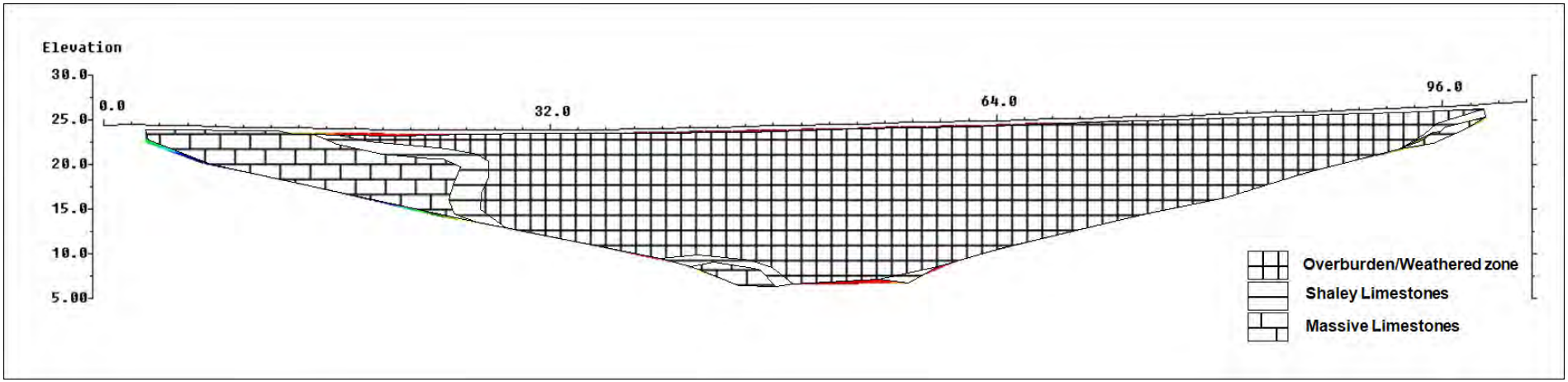


Figure 12

Resistivity – ERT Line 10

2m Electrode Takeouts

S N

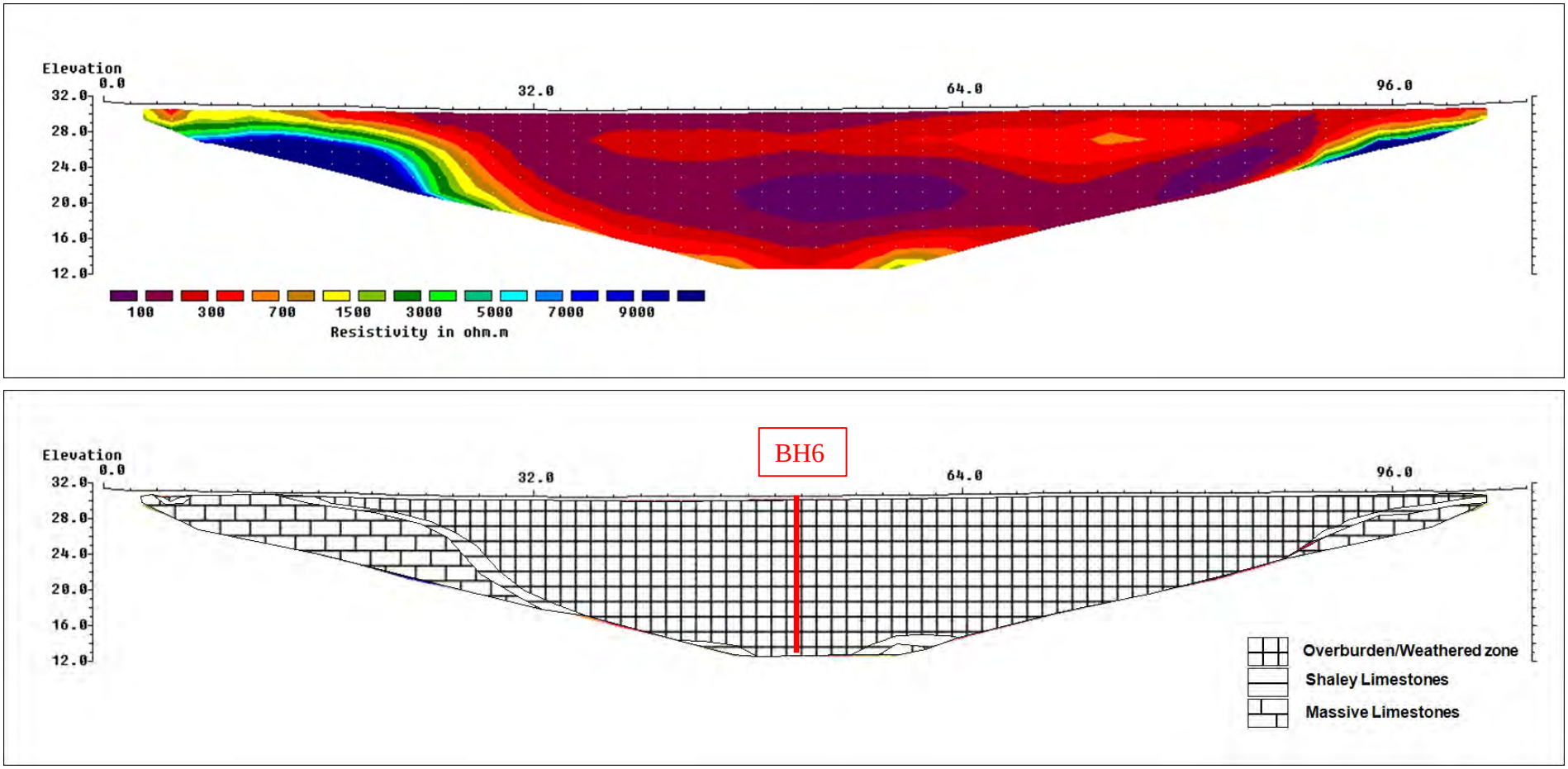


Figure 13

Microgravity Station Location Map

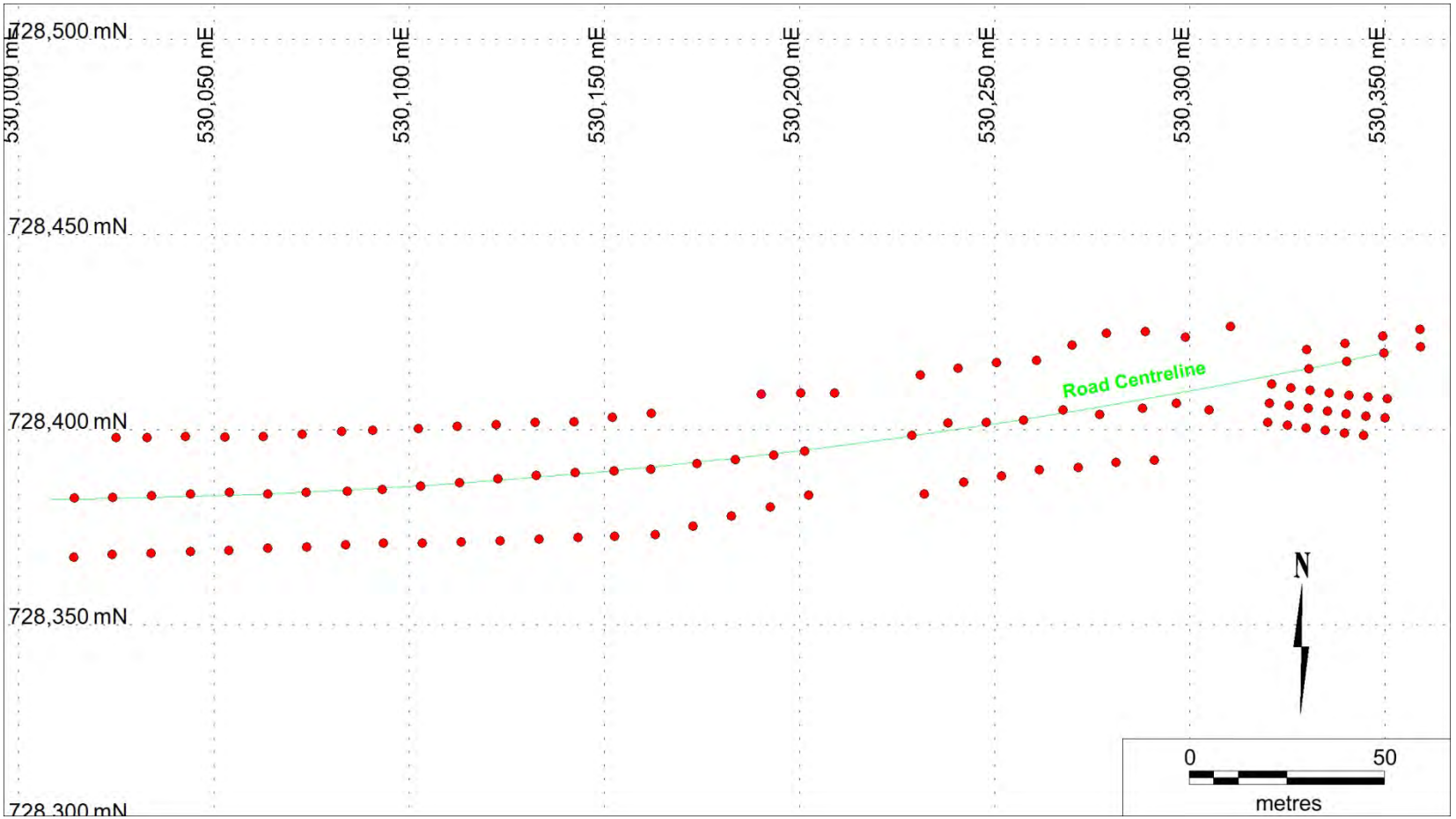


Figure 14

Microgravity Bouguer Gravity Map

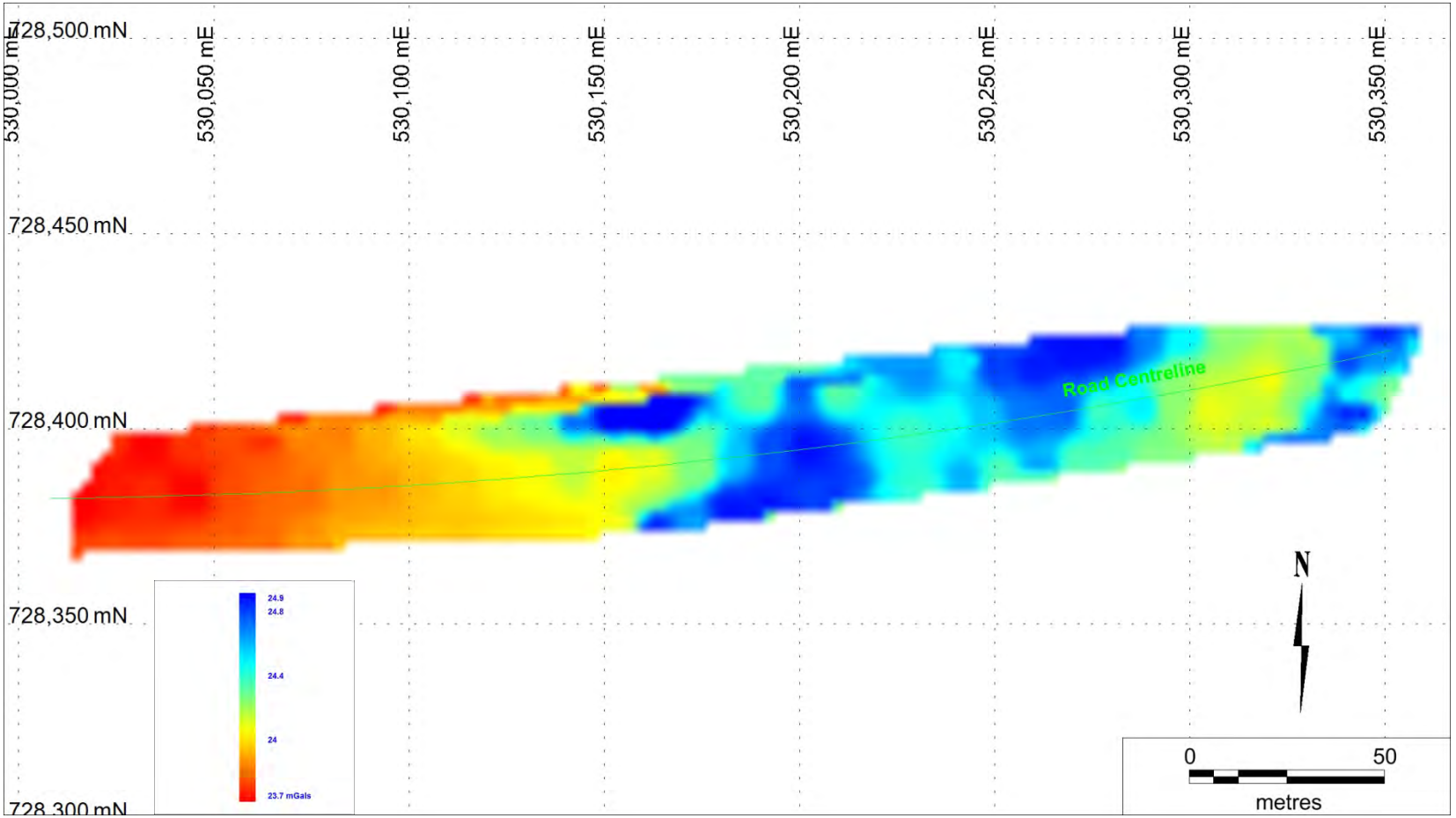


Figure 15

Geophysical Interpretation Map

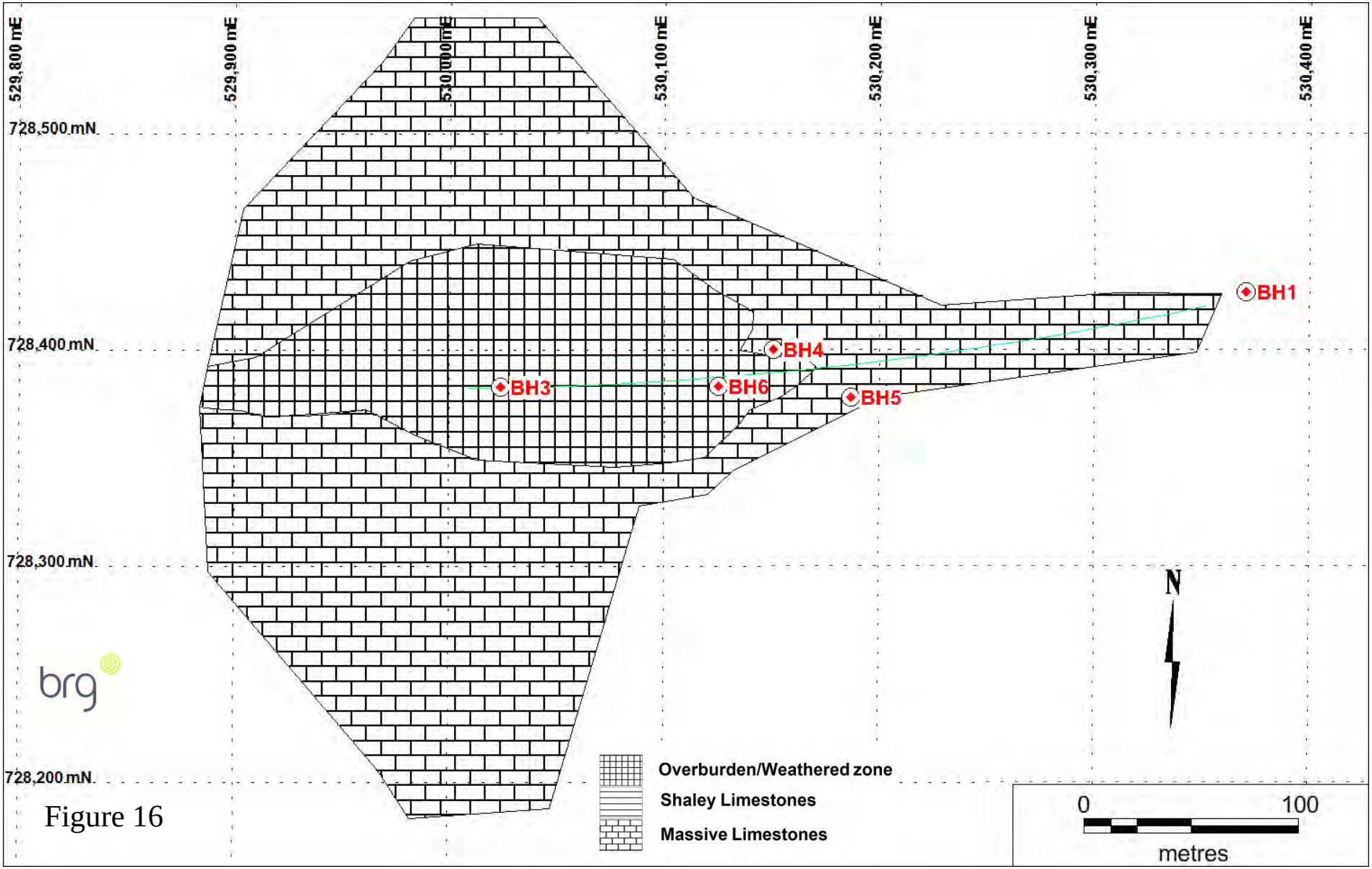


Figure 16

APPENDIX VI

EUROPEAN GEOPHYSICAL SERVICES

REPORT ON THE

GEOPHYSICAL LOGGING

OF TWO BOREHOLES

AT

LACKAGH QUARRY

Prepared For:

Priority Drilling Ltd.
Killimor, Ballinasloe,
Co. Galway, Ireland

PRIORITY DRILLING

JAN 2016/PRIO1502_ rpt/IRL

	Name	Date
Logged by:	Rhys Powell	8/9.12.15
Report by:	Rhys Powell	4.1.16
Checked by:	James Whitford	6.1.15

European Geophysical Services Ltd
22 The Stables, Sansaw Business Park, Hadnall, Shrewsbury. SY4 4AS
Tel: 01939 210710 | Fax: 01939 210532 E-mail: *eurogeophys@europeangeophysical.com* |
www.europeangeophysical.com

Registered in England and Wales No. 2962962 | VAT No. GB 648 4148 18

CONTENTS

LIST OF FIGURES

1.0 INTRODUCTION

At the request of Priority Drilling Ltd., borehole imaging and geophysical logging was carried out in two boreholes at Lackagh Quarry, Co. Galway, Ireland.

The work was carried out by European Geophysical Services on the 8th and 9th of December 2015.

The following logs were run:-

BH	Logs	From (m)	To (m)
4	Optical Imager, Acoustic Imager	3.1	34.0
4	Fluid Temperature and Conductivity, Natural Gamma, Caliper	3.1	34.2
4	Impeller Flowmeter	16.0	33.7
4	Focused Resistivity	15.5	34.0
4	Full Wave Sonic	15.5	34.0
4	Pumped Temperature and Conductivity	18.8	34.2

BH	Logs	From (m)	To (m)
5	Optical Imager, Acoustic Imager	1.0	39.9
5	Fluid Temperature and Conductivity, Natural Gamma, Caliper	1.0	40.0
5	Impeller Flowmeter	17.6	40.0
5	Focused Resistivity	17.6	40.0
5	Full Wave Sonic	17.6	40.0
5	Pumped Temperature and Conductivity	24.1	40.0

2.0 THE GEOPHYSICAL LOGGING METHODS

The Equipment and Field Procedure

A fully digital logging system with a 600m capacity motorised winch mounted in a Land Rover was used.

All logging data was recorded digitally for reprocessing and archiving purposes.

With the exception of the fluid logs, all logs were run from the bottom of the boreholes upward.

The optical imager survey was carried out first to avoid the disturbance of the fluid by the geophysical logs which may affect water clarity.

Fluid Temperature (T)

There is a natural geothermal gradient of increasing temperature with depth. This gradient varies with the thermal conductivity of the geological formation and is modified by water flowing in, out or vertically though the borehole.

This log is used to determine any flow pattern within the borehole and to identify flow zones.

Differential logs are produced over a one metre spacing, these are an interpretative aid to detect gradient changes.

Fluid Conductivity (EC or EC25)

The electrical conductivity (EC) of the water is related to its salinity and dissolved solids and is therefore a measure of the quality of the borehole water. The shape of the log trace can indicate zones of inflow.

Using data from the temperature log the electrical conductivity is corrected to 25°C (EC25).

This log is used to identify different zones of water quality.

Differential logs are produced over a one metre spacing, these are an interpretative aid to detect gradient changes.

2.0 THE GEOPHYSICAL LOGGING METHODS

Optical Borehole Imager (Optical)

A precision-machined prism and CCD camera assembly permits a high definition video image of the borehole wall to be captured in a variety of horizontal and vertical resolutions. The resulting image is digitised in the sonde for transmission to the surface acquisition system.

The image is then orientated to Magnetic North and displayed as an unwrapped image log. This enables a detailed structural interpretation to be made if required.

For the best results the optical imager should be run above the water level or in clean, clear fluid. The logging tool is centralised during data acquisition by two sets of bow springs. The bow springs are adjusted to a variety of borehole diameters prior to acquisition. The image is recorded on the way down the borehole to limit disturbance to the clarity of the water in the borehole by the logging tool.

Images and associated data are viewed in real time during the data acquisition.

The orientation system employs a flux gate magnetometer and therefore the recorded data within approximately one metre of magnetic steel casing is un-orientated. This is corrected manually during the post-processing stage

Acoustic Borehole Imager (Amplitude and Travel Time)

This tool scans the borehole wall through 360 degrees and records the acoustic reflection of the resulting signal in terms of amplitude and transit time (the travel time from the tool to the borehole wall). This technique requires a fluid filled borehole with a minimum of suspended solids, polymers or muds within the fluid column.

This sensitive technique responds to small diameter changes, rugosity and the acoustic nature of the borehole wall. It is primarily used for detecting fractures and other discontinuities. The resultant images are orientated (to magnetic North) 0° through 90°, 180° and 270° back to 0°.
The logging tool is centralised during data acquisition by two sets of bow springs. The bow springs are adjusted to a variety of borehole diameters prior to acquisition. The image is viewed on the way down the borehole to allow fine tuning of the acquisition parameters. The settings are then adjusted and the image recorded on the way up the borehole which ensures a constant line speed during acquisition.

Images and associated data are viewed in real time during the data acquisition.

The orientation system employs a flux gate magnetometer and therefore the recorded data within approximately one metre of magnetic steel casing is un-orientated. This is corrected manually during the post-processing stage

2.0 THE GEOPHYSICAL LOGGING METHODS

Impeller Flowmeter (FV)

This log is used to determine any flow pattern within the borehole and identify flow zones. The tool uses an impeller and is normally run at a constant logging speed against the anticipated flow for the best response. The data is corrected for logging speed and a fluid velocity (FV) log is produced.

Caliper (Cal)

This tool measures the mean diameter of the borehole. It is used to check the integrity of the borehole lining, and where the borehole is unlined to identify zones of washout, breakout or fissures.

Natural Gamma (Gam)

The tool measures the naturally occurring gamma radiation found in rocks and sediments. It is mainly used to detect the clays that contain potassium K^{40}, though the U^{238} series of elements and the Th^{232} series of elements also emit gamma radiation.

The higher the concentration of these clay minerals the greater the responses on the natural gamma log.

Focused Resistivity Log (Res Deep and Res Shallow)

The Focused Resistivity tool uses Guard Electrodes to focus the current into the formation. This gives excellent vertical resolution and good penetration, especially in highly conductive borehole fluids where a Normal Resistivity Sonde would not be as effective.

The tool has two electrode spacing's to allow a deep and shallow depth of investigation.

The response of this log is a function of porosity, type of formation / mineralogy and its pore water quality. These logs aid in the identification of strata and quality of the pore water.

2.0 THE GEOPHYSICAL LOGGING METHODS

Full Wave Sonic (VDL)

This tool has been specially designed to provide a full wave form recording of sonic signals and uses fixed spaced transmitter – receivers.
The received signals are digitised at a fast sampling rate with high resolution. Data may be sampled at typically 5cm or 10cm intervals dependant upon resolution required.

The data is processed for P wave velocity (or transit time) and amplitude.

This tool can only be used in fluid filled unlined boreholes.

3.0 SITE DETAILS

Site:
Lackagh Quarry

Irish Grid Ref: M 30240 28372

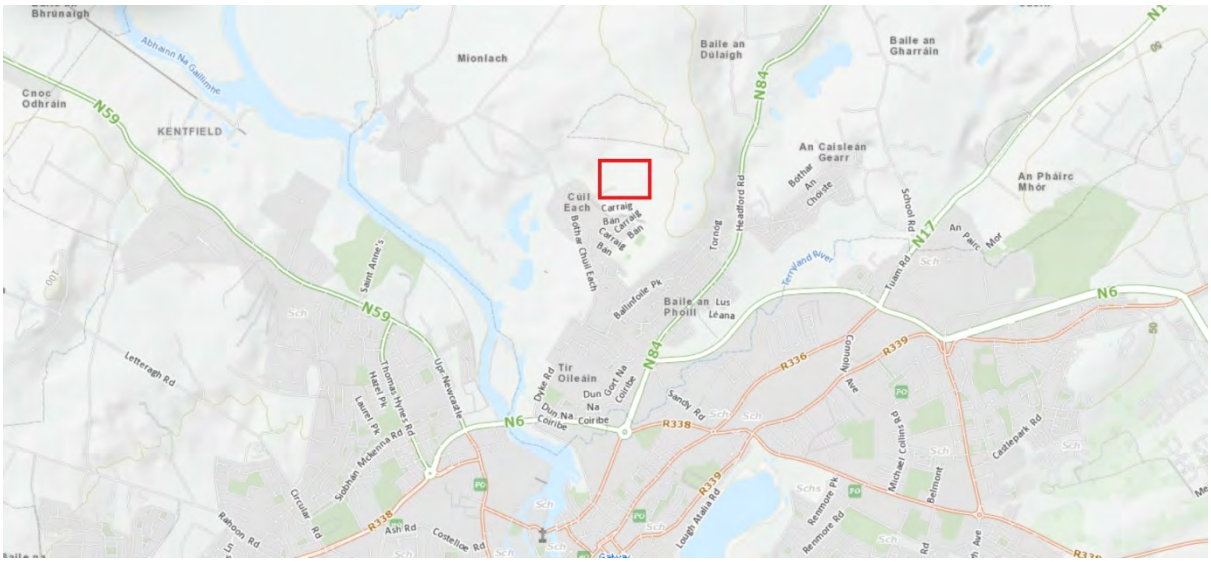


Figure 3.1 Location map showing location highlighted by red circle.
© 2014 Ordnance Survey Ireland.

Figure 3.2 Aerial image showing approximate borehole locations. © Google 2016.

4.0 PROCESSING AND PRESENTATION OF RESULTS

Detailed logs of the imager data have been produced at a vertical scale of 1:10. Composite geophysical logs have been produced at 1:50. Full Wave Sonic results are presented separately at 1:50 with Imager, Natural Gamma and Caliper data to aid interpretation.

Constructional details and information on each borehole are given in the headers of each log.

All images have been referenced to Magnetic North.

The borehole's azimuth and tilt are plotted alongside the images.

The image of the borehole wall is presented in an unwrapped form with a horizontal scale marked 0° - North, through 90° - East, 180° - South, 270° - West, back to North.

Structural features and discontinuities have been picked from the images in the form of colour coded sinusoidal projections - see Appendix 1 for details. This 'Discontinuities' log is also presented with a horizontal scale marked 0° - North, through 90° - East, 180° - South, 270° - West, back to North.

Structure picking is not a definitive analysis of all the features within a borehole. Only the discontinuities that have a linear dip and direction are 'picked' and used in the analysis of the discontinuities. Features that do not have a regular sinusoidal shape do not have a linear dip and direction, 'best fit' picking of these features is done if approximately 80% coverage of the sinusoid can be achieved. Below this percentage the inaccuracy of the picking is too great and if included in any structural analysis may adversely skew the results. Vughs, solution holes, and angular break outs are examples of features not picked.

The apparent azimuth and apparent dip (i.e. relative to the borehole's azimuth and tilt) of the discontinuities are calculated using the diameter of the borehole and the geometric parameters of the sinusoids overlaid on the discontinuities. The final processing stage is to correct these apparent values to true azimuth (in relation to Magnetic North) and true dip (from horizontal) by correcting for the borehole's azimuth and tilt.

The final results are presented as a 'tadpole' plot (Discontinuities - True°). The horizontal position of the tadpole's head gives the defect's true dip angle and its tail points in the direction of the defect's azimuth. These logs are presented with a horizontal scale in degrees. By convention the top of the page is North (Magnetic) and the right hand edge of the paper is East.

The true structural data has been presented in digital format as an excel file (xls).

5.0 BOREHOLE LOGGING CONSTRAINTS

- **Vehicle access restrictions**
  Poor ground conditions, soft ground access to borehole locations

- **Tool access restrictions**
  None

- **Borehole conditions / risk to equipment**
  Drill rods left in boreholes prior to logging to prevent collapse. Highly fractured rock below casing in BH4.

- **Lack of fluid filled column / cloudy fluid**
  Optical and Acoustic run in both boreholes due to cloudy water. Boreholes pumped dry during pumped TC logging, not possible to run pumped flowmeter.

- **Time constraint**
  None

- **Borehole construction / casing**
  BH4 not cased deep enough – loose rock below casing. No casing in BH5.

Appendix 1

Discontinuity Classification.

Discontinuity	Colour	Classification Parameters
Major Fracture or Fissure	Blue	An open break in the formation, that is **continuous** across the entire image.
Minor Fracture or Fissure	Turquoise	A thin or closed break in the formation, that is **continuous or discontinuous** across the image.
Vein	Green	That may be **continuous or discontinuous** across the entire image.
Fabric	Red	Defines a feature generally metamorphic, igneous or sedimentary in origin that may be **continuous or discontinuous** across the image, such as bedding and cross-bedding, schistosity or gneissosity.
Intrusions	Purple	Intrusive features such as dykes and sills, generally **continuous** across the image
Unknown	Black	Faint features which **can not** be classified.

Appendix 2

Geophysical Logs

EUROPEAN GEOPHYSICAL SERVICES LTD

Client: **Priority Drilling**

Borehole: **BH4**

Log Type: ***Composite***

Location: **Lackagh Quarry** Area: **Co. Galway** Grid Ref: Elevation:

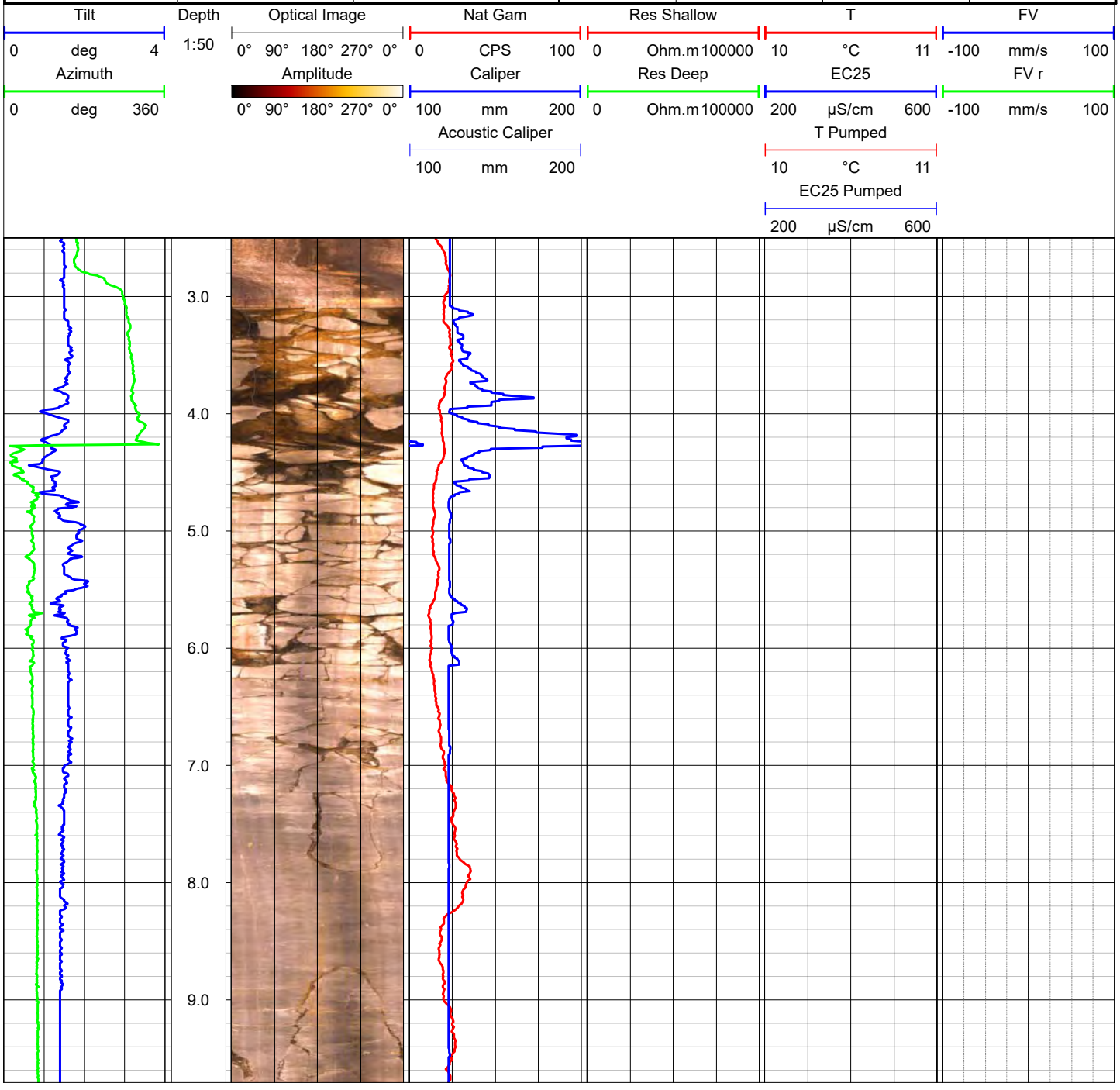
Drilled Depth: (m)	**35**	Date:	**8.12.15 / 9.12.15**
Logged Depth: (m)	**34.1**	Recorded By:	**Rhys Powell**
Logging Datum:	**Ground Level**	Remarks:	Rods pulled immediately before logging.
Logged Interval: (m)	**3.1 - 34.1**		
Fluid Level: (m)	**14.6 / 15.5**	**Ref:**	

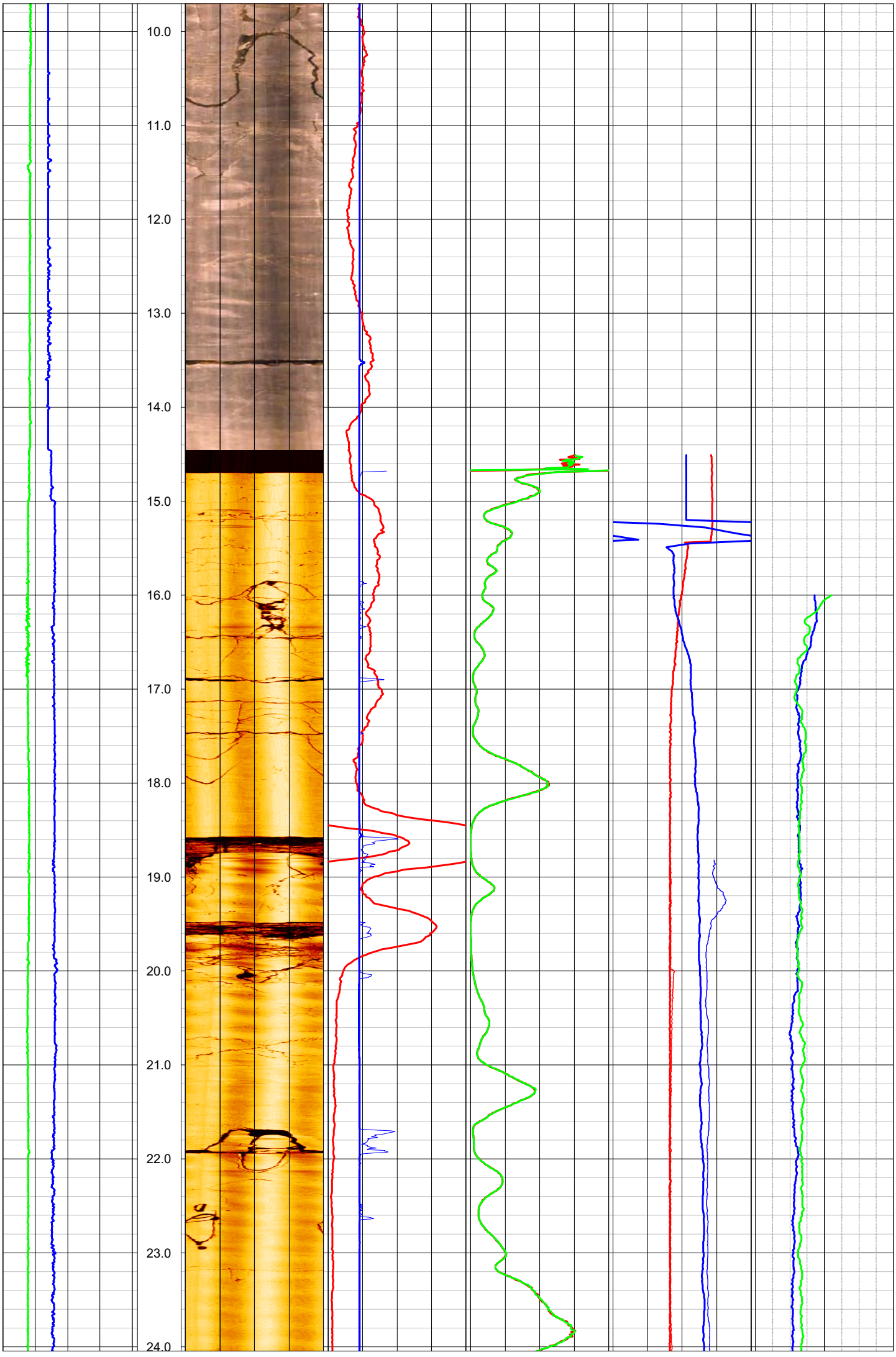
BOREHOLE RECORD

Bit: (mm)	From: (m)	To: (m)
122	**0.1**	**35**

CASING RECORD

Type	Size: (mm)	From: (m)	To: (m)
Steel	**130**	**0.0**	**3.1**

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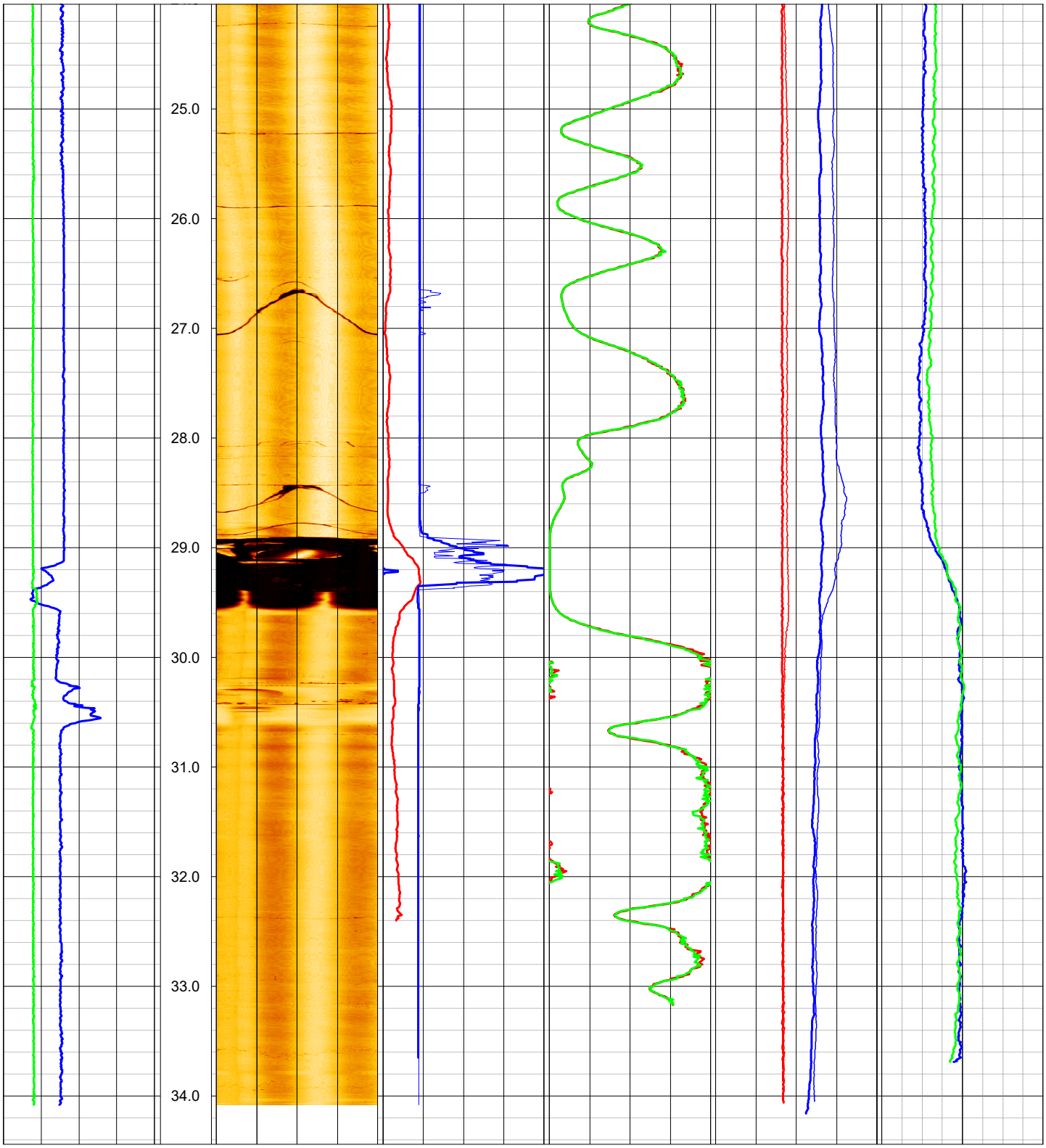
24.0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31.0
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33.0
34.0

EUROPEAN GEOPHYSICAL SERVICES LTD

Client: **Priority Drilling**

Borehole: **BH4**

Log Type: ***Image***

Location: **Lackagh Quarry** Area: **Co. Galway** Grid Ref: Elevation:

Drilled Depth: (m)	**35**	Date:	**8.12.15**
Logged Depth: (m)	**34.0**	Recorded By:	**Rhys Powell**
Logging Datum:	**Ground Level**	Remarks:	Rods pulled immediately before logging.
Logged Interval: (m)	**3.1 - 34.0**		
Fluid Level: (m)	**14.6**	**Ref:**	

BOREHOLE RECORD

Bit: (mm)	From: (m)	To: (m)
PQ	**0.1**	**35**

CASING RECORD

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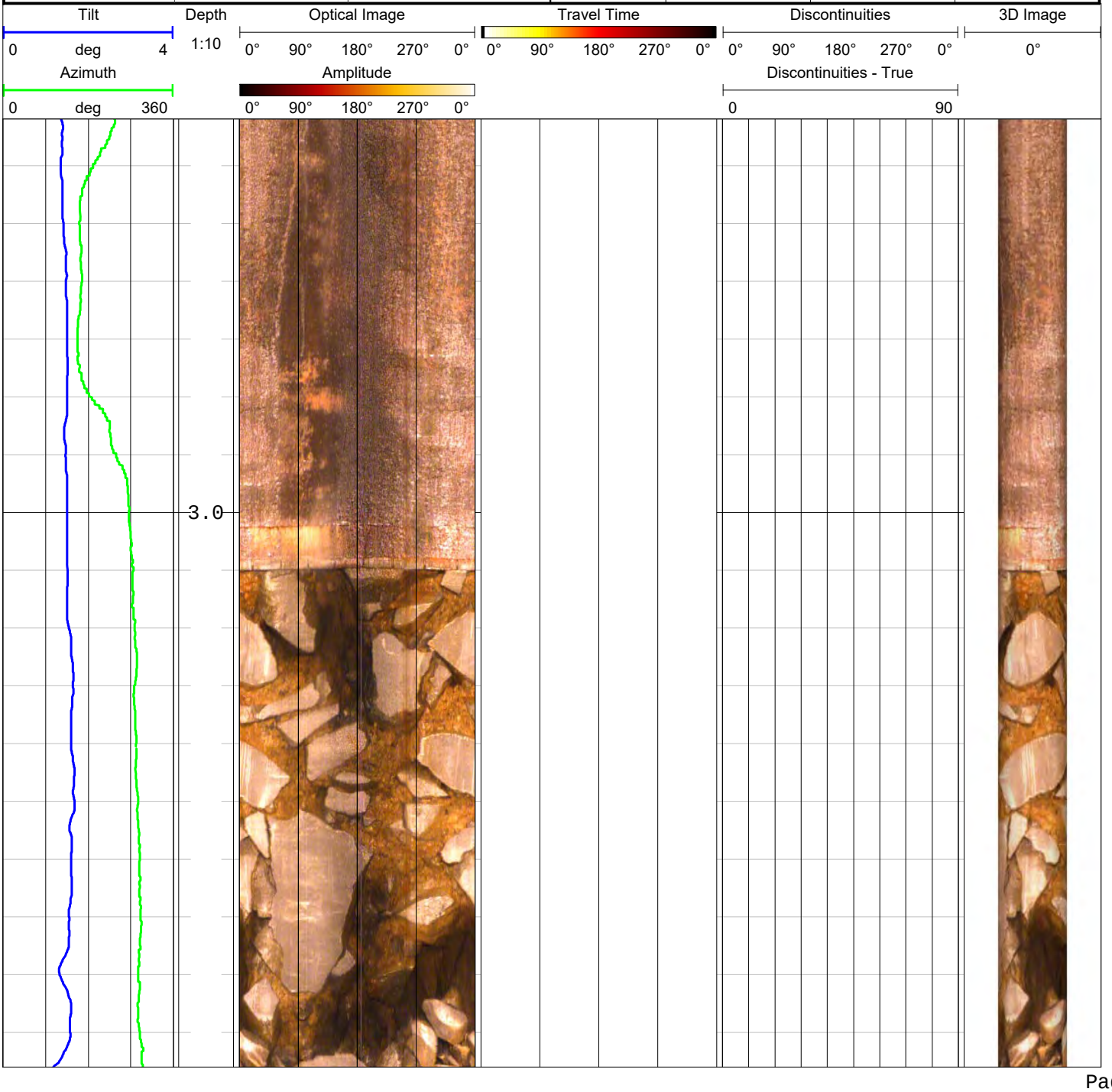
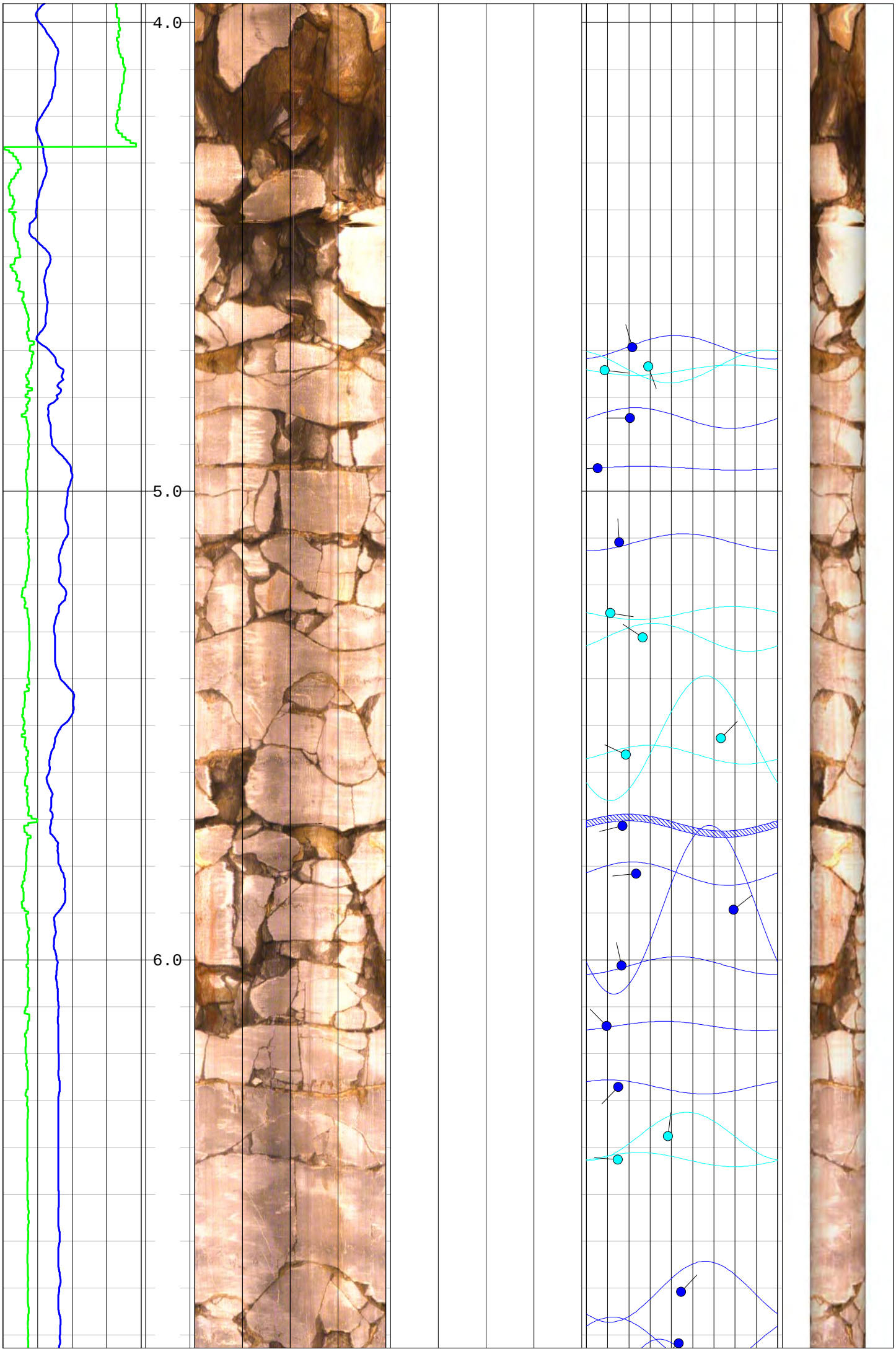
Steel	**130**	**0.0**	**3.1**

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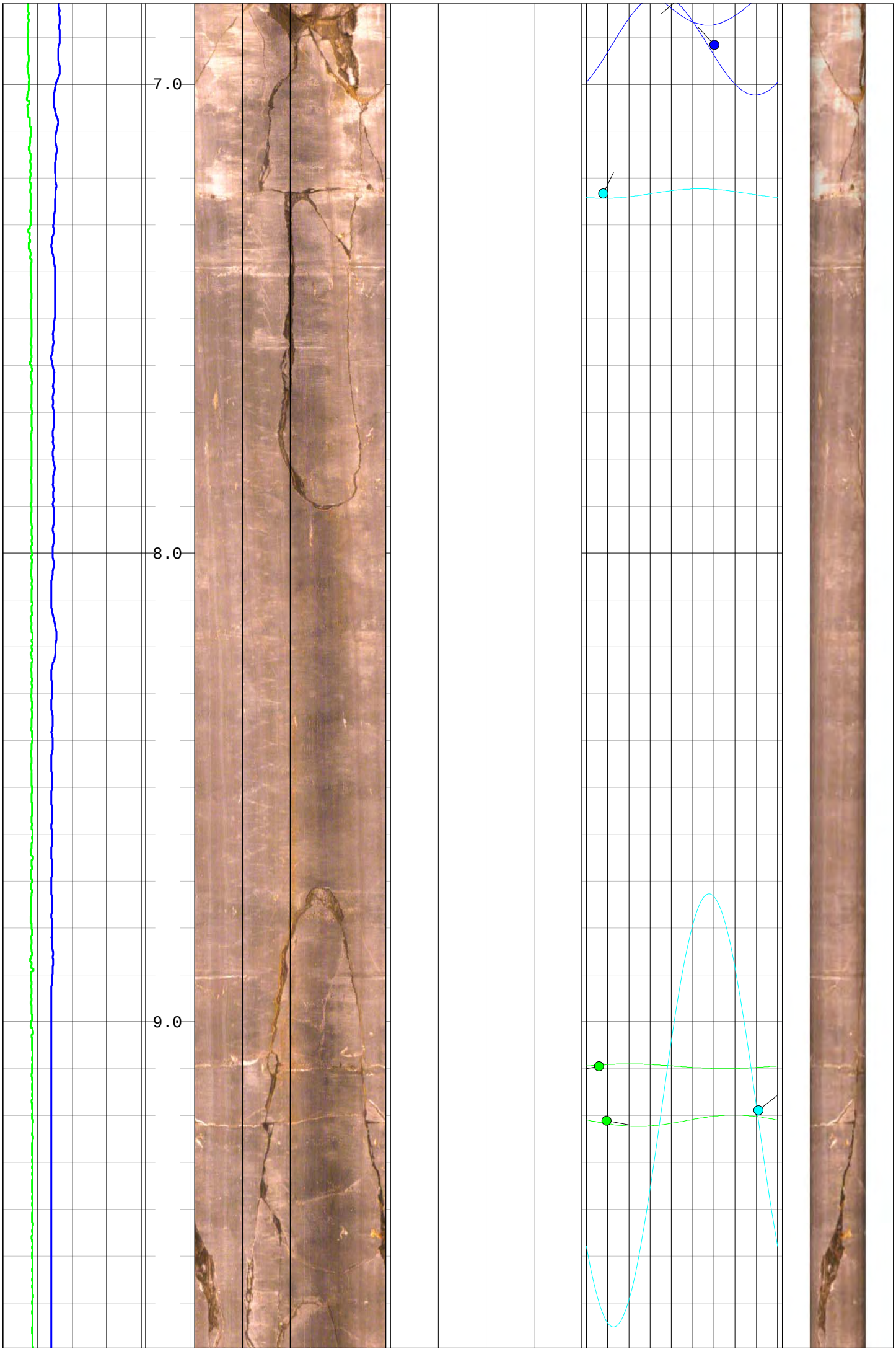
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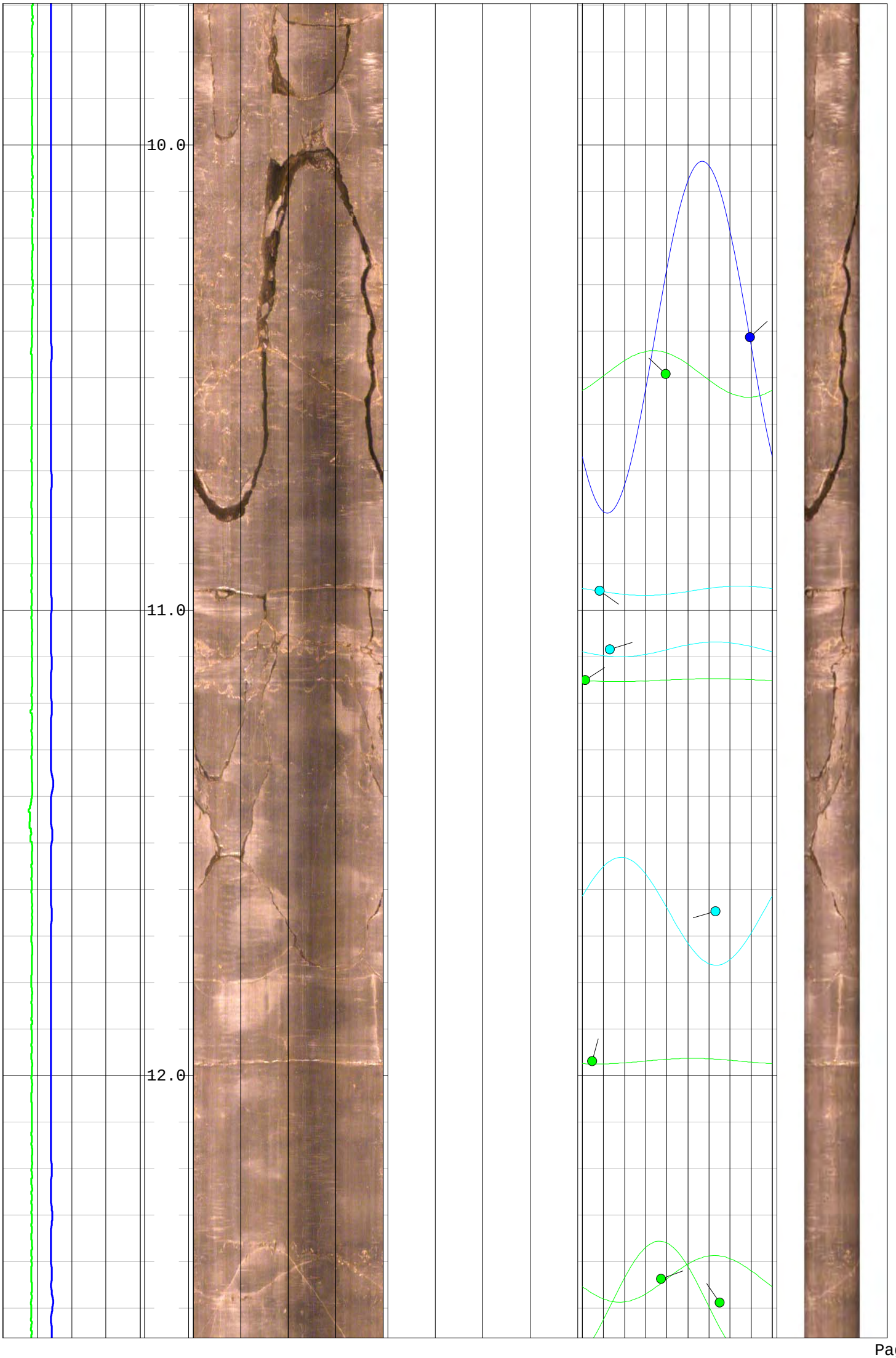
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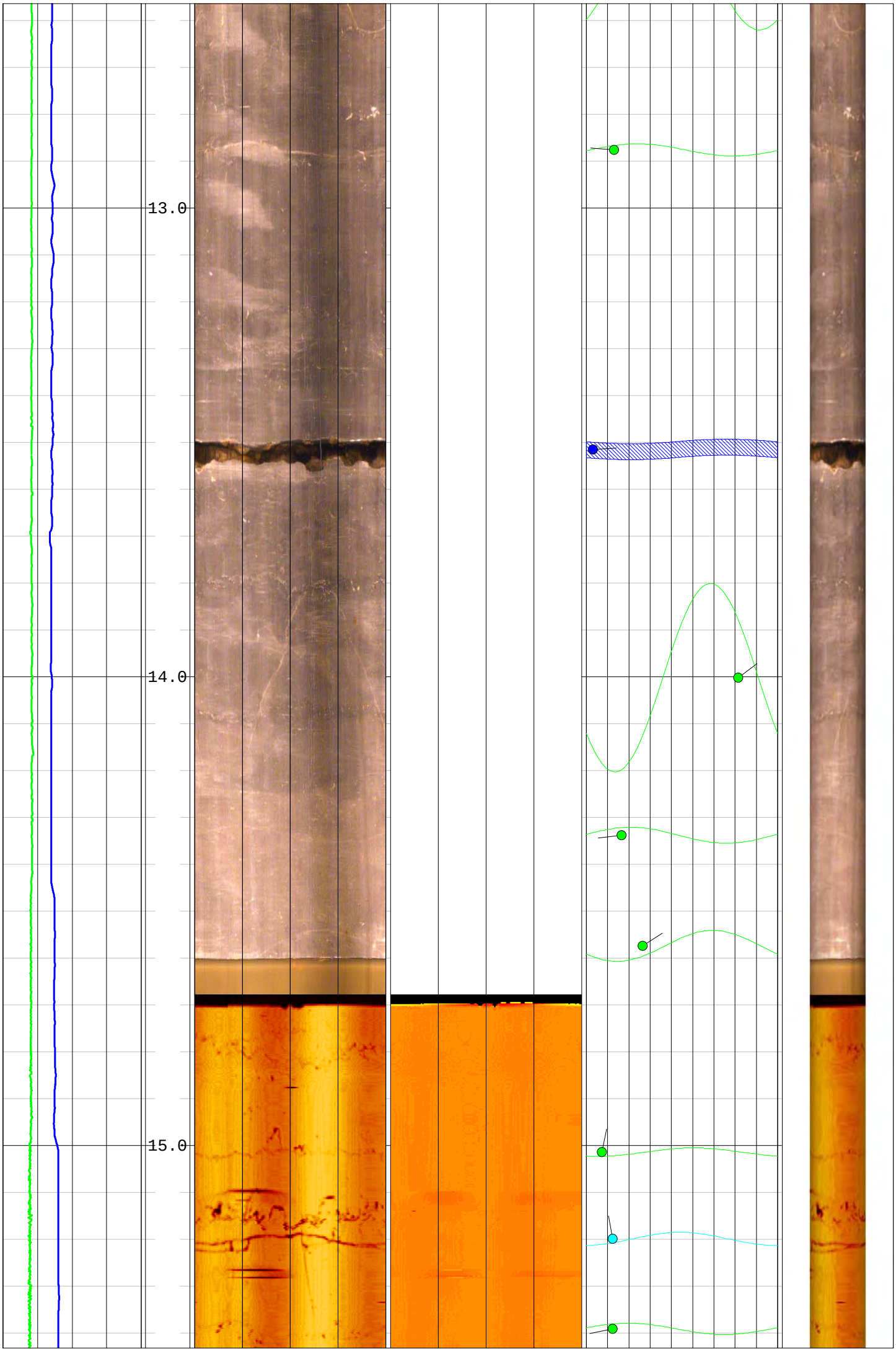
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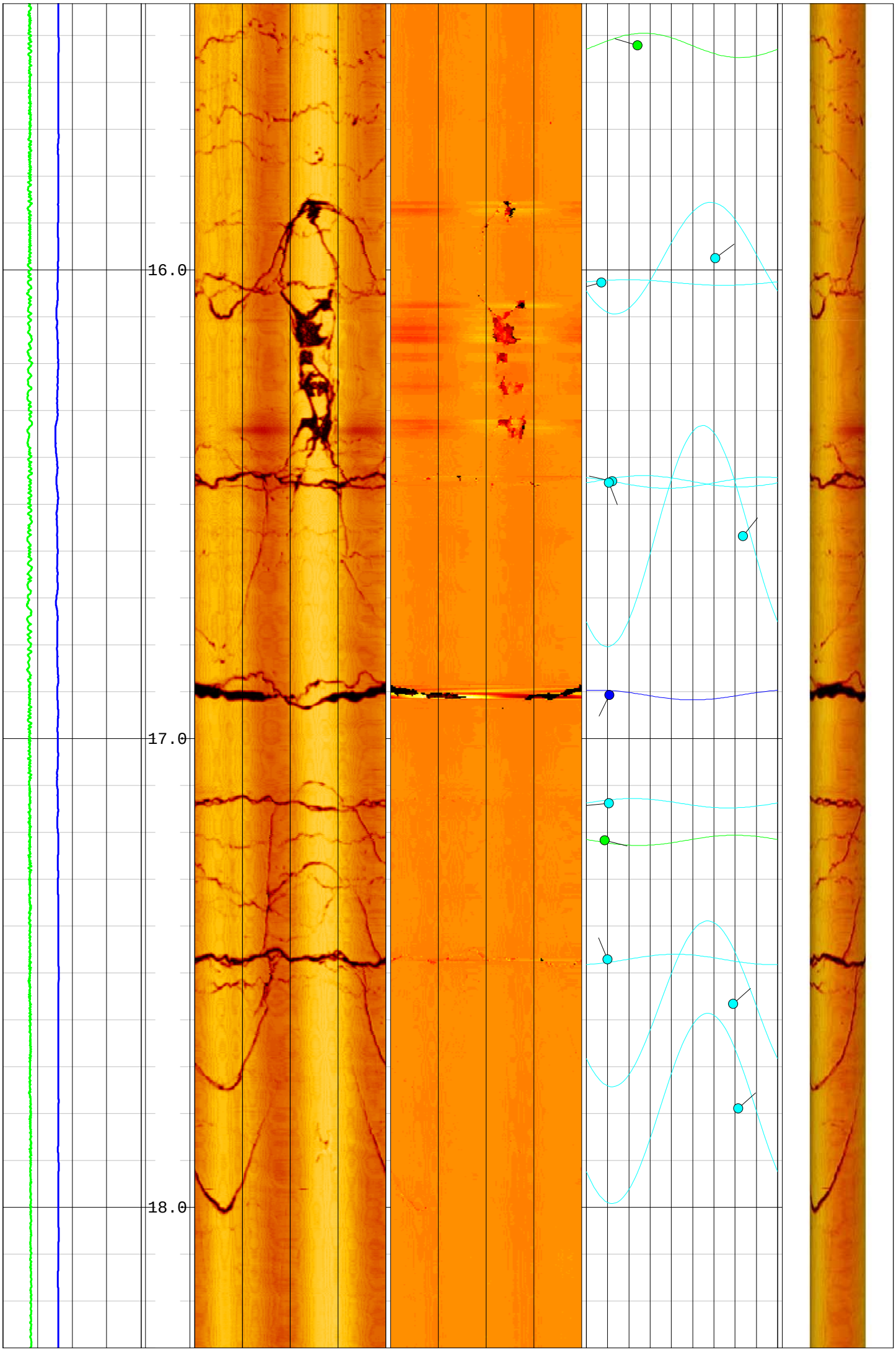
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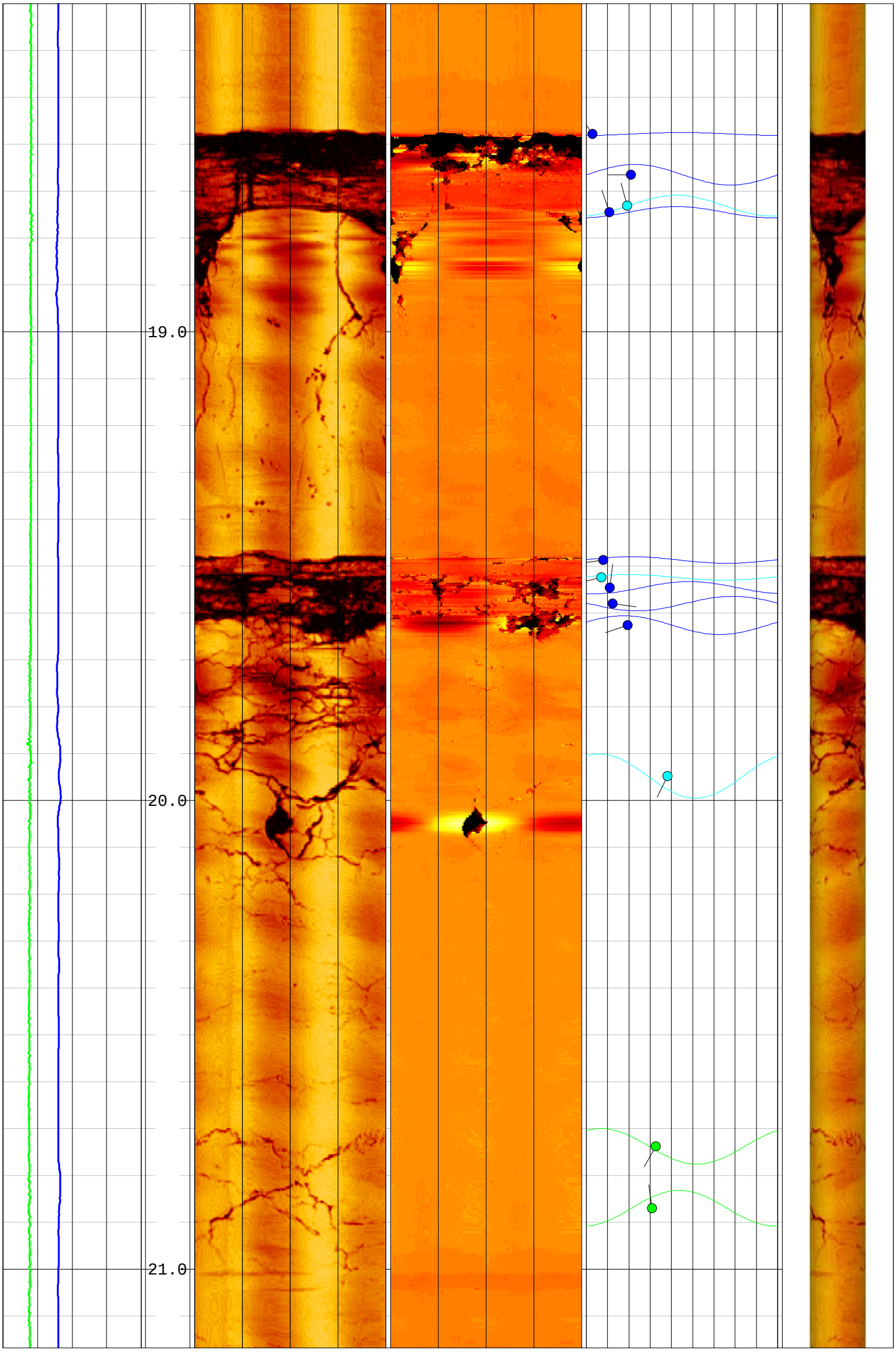
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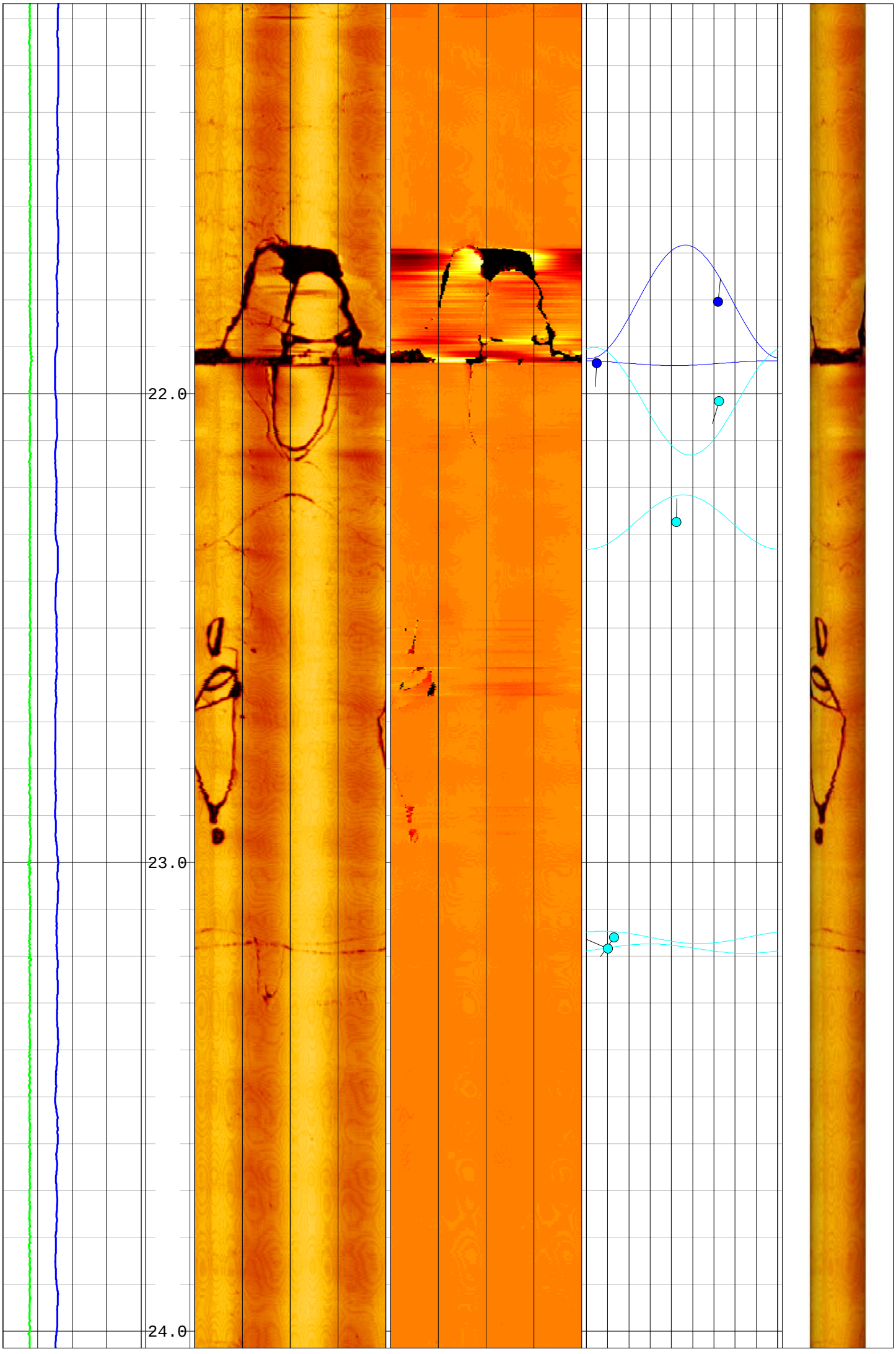
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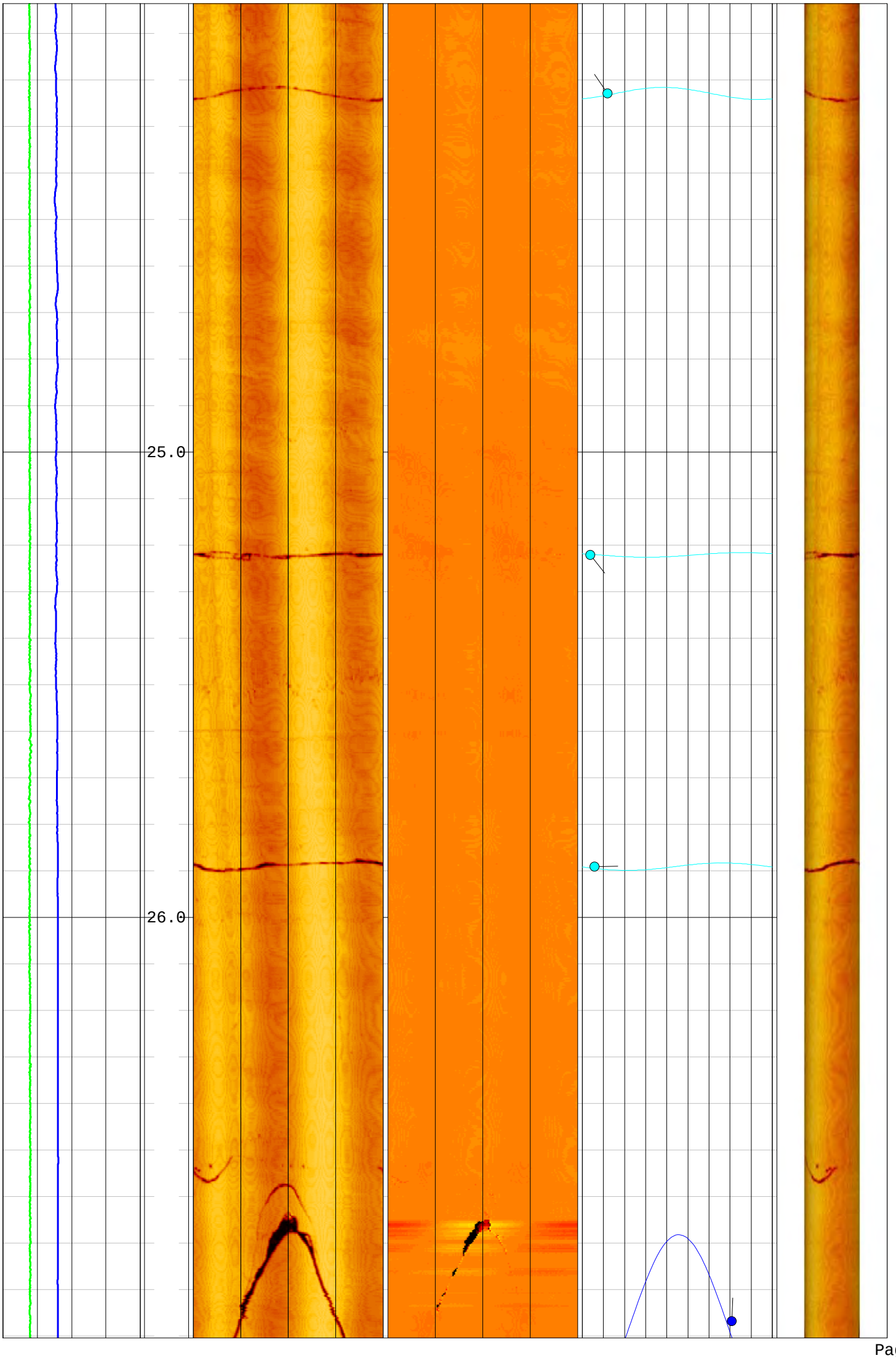
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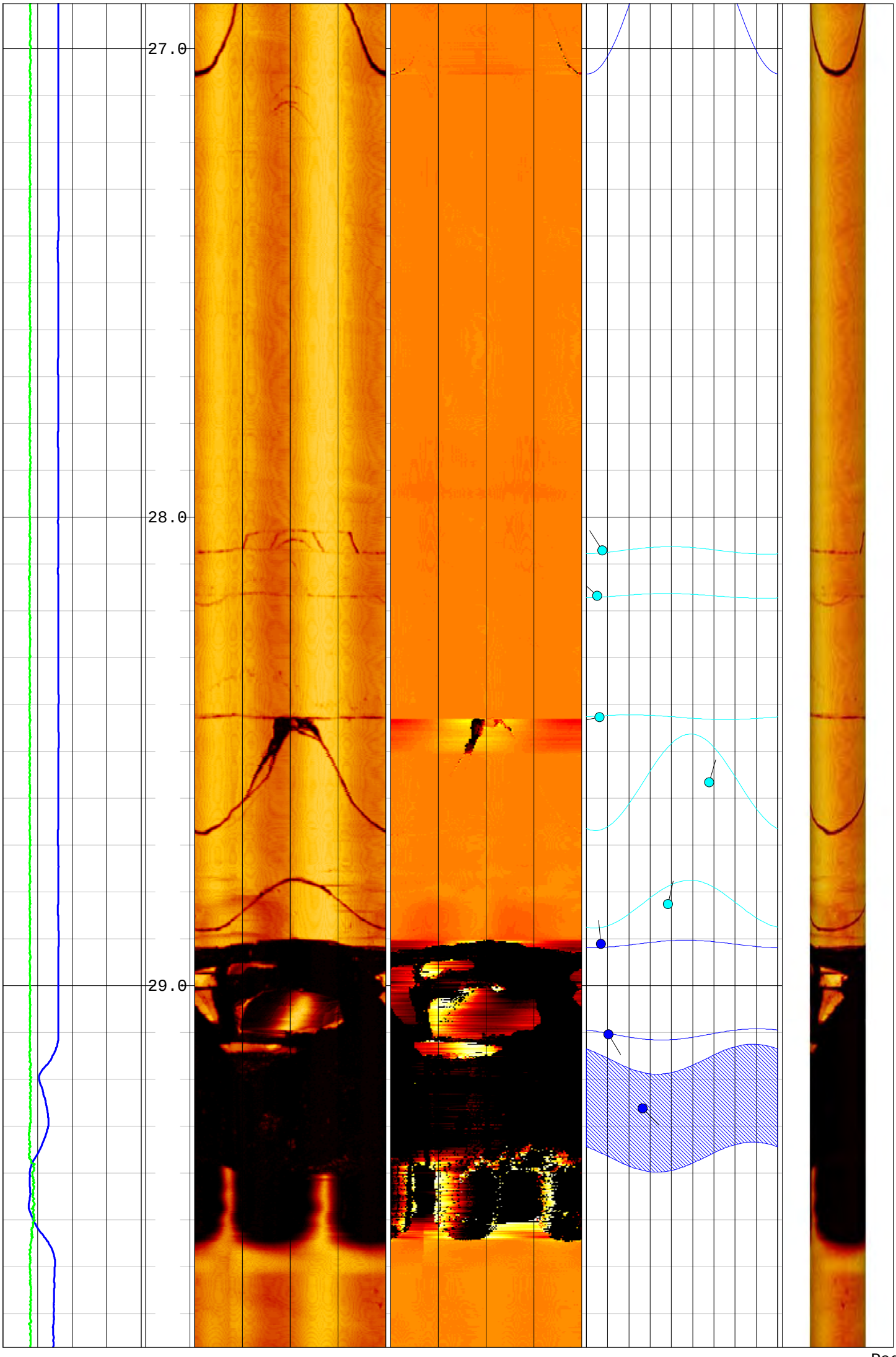
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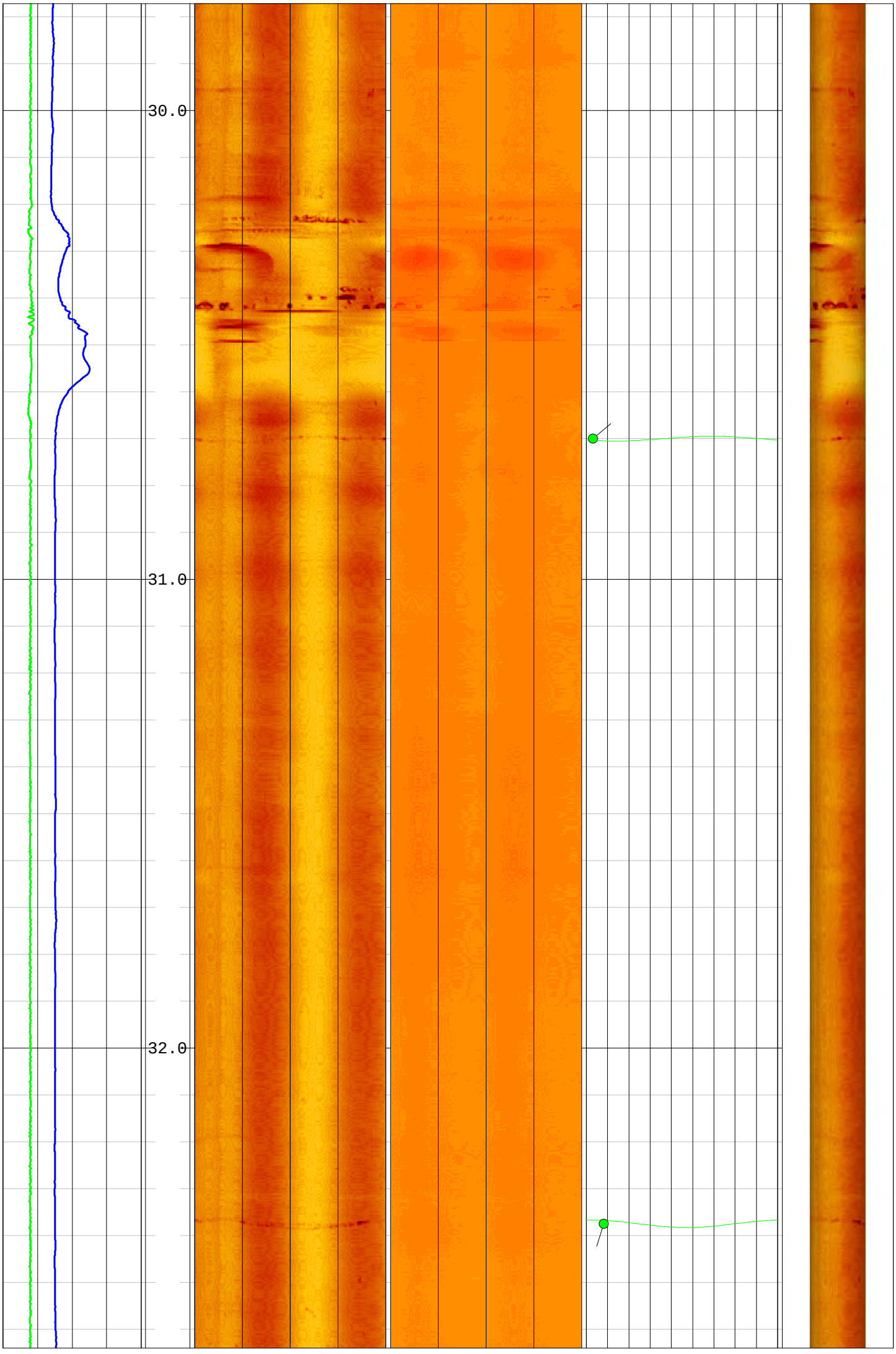
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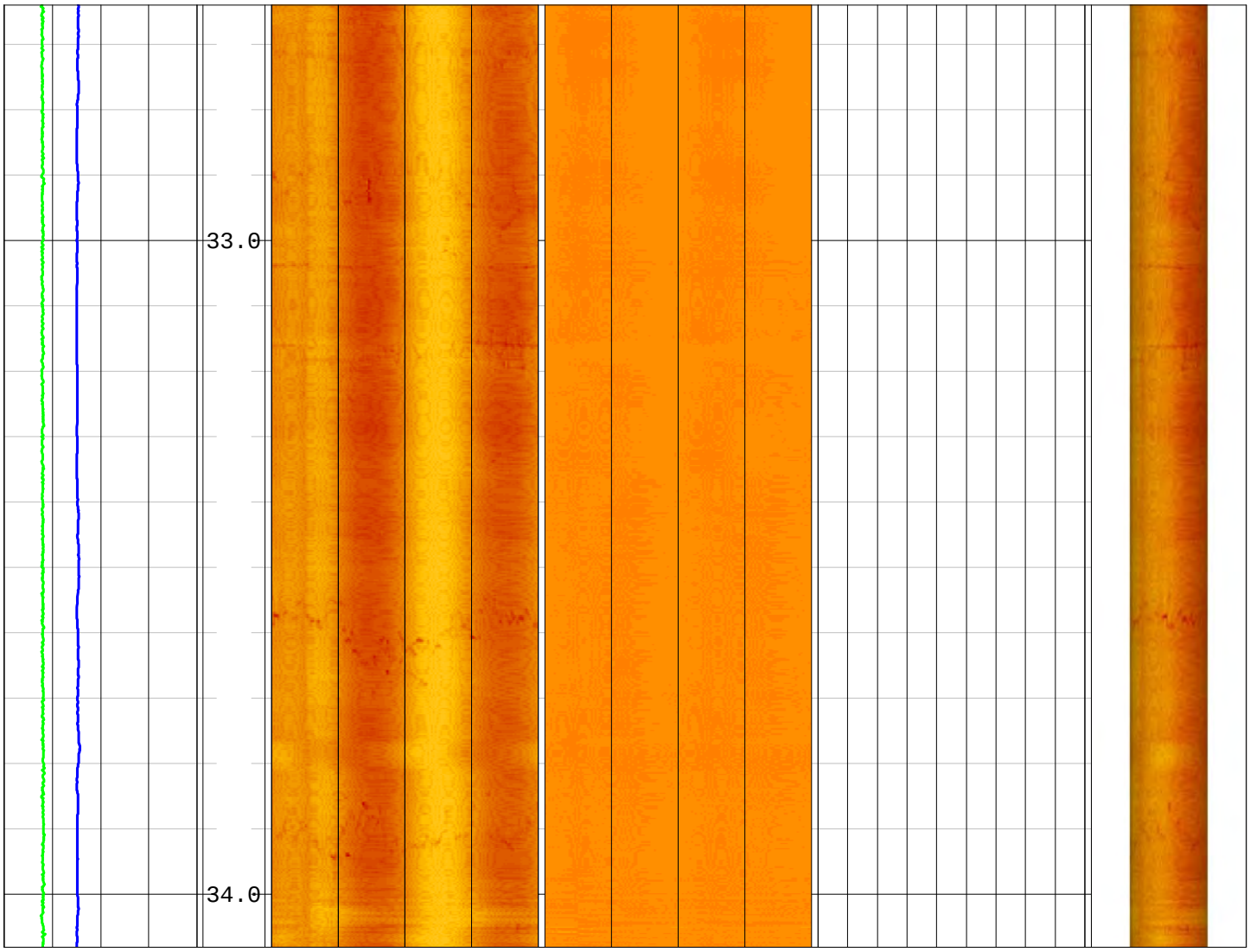

33.0
34.0

EUROPEAN GEOPHYSICAL SERVICES LTD

Client: **Priority Drilling**

Borehole: **BH4**

Log Type: ***Full Wave Sonic***

Location: **Lackagh Quarry** Area: **Co. Galway** Grid Ref: Elevation:

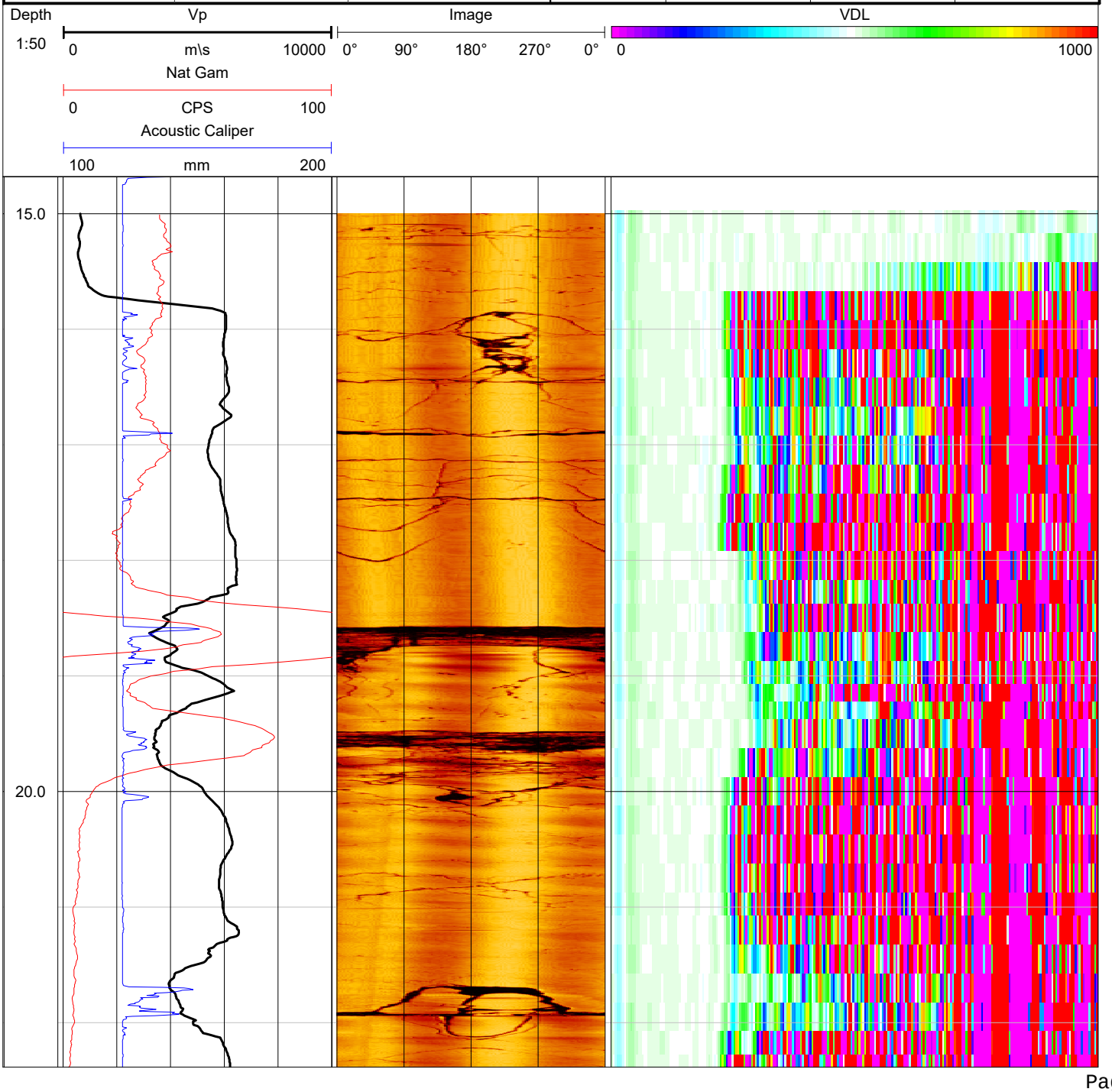
Drilled Depth: (m)	**35**	Date:	**9.12.15**
Logged Depth: (m)	**33.5**	Recorded By:	**Rhys Powell**
Logging Datum:	**Ground Level**	Remarks:	
Logged Interval: (m)	**16.0 - 33.5**		
Fluid Level: (m)	**16.0**	**Ref:**	

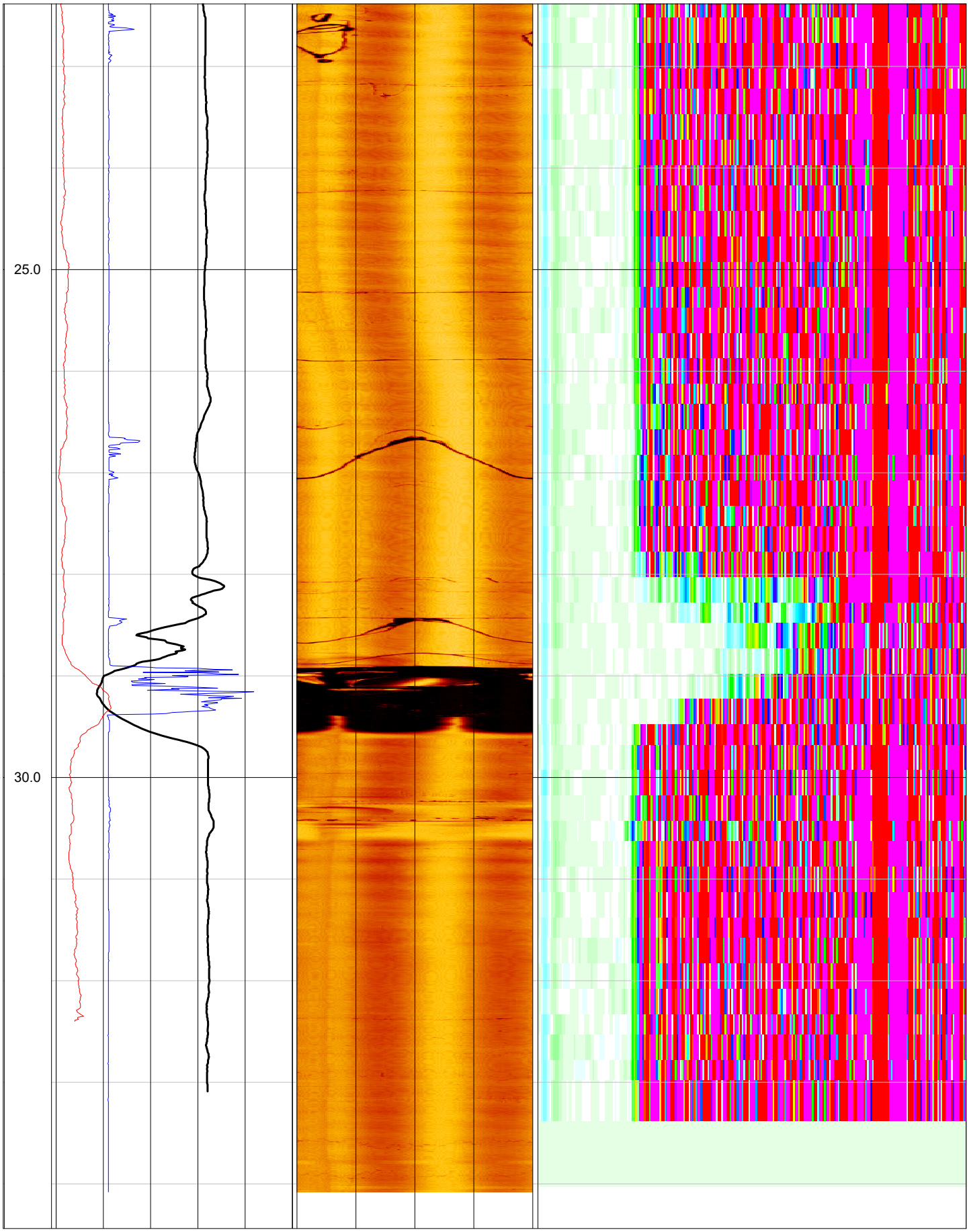
BOREHOLE RECORD

Bit: (mm)	From: (m)	To: (m)
122	**0.0**	**35**

CASING RECORD

Type	Size: (mm)	From: (m)	To: (m)
Steel	**130**	**0.0**	**3.1**

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EUROPEAN GEOPHYSICAL SERVICES LTD

Client: **Priority Drilling**

Borehole: **BH5**

Log Type: ***Composite***

Location: **Lackagh Quarry** Area: **Co. Galway** Grid Ref: Elevation:

Drilled Depth: (m)	**40.3**	Date:	**8.12.15**
Logged Depth: (m)	**40.1**	Recorded By:	**Rhys Powell**
Logging Datum:	**Ground Level**	Remarks:	
Logged Interval: (m)	**1.0 - 40.1**		
Fluid Level: (m)	**17.6**	**Ref:**	

BOREHOLE RECORD

Bit: (mm)	From: (m)	To: (m)
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CASING RECORD

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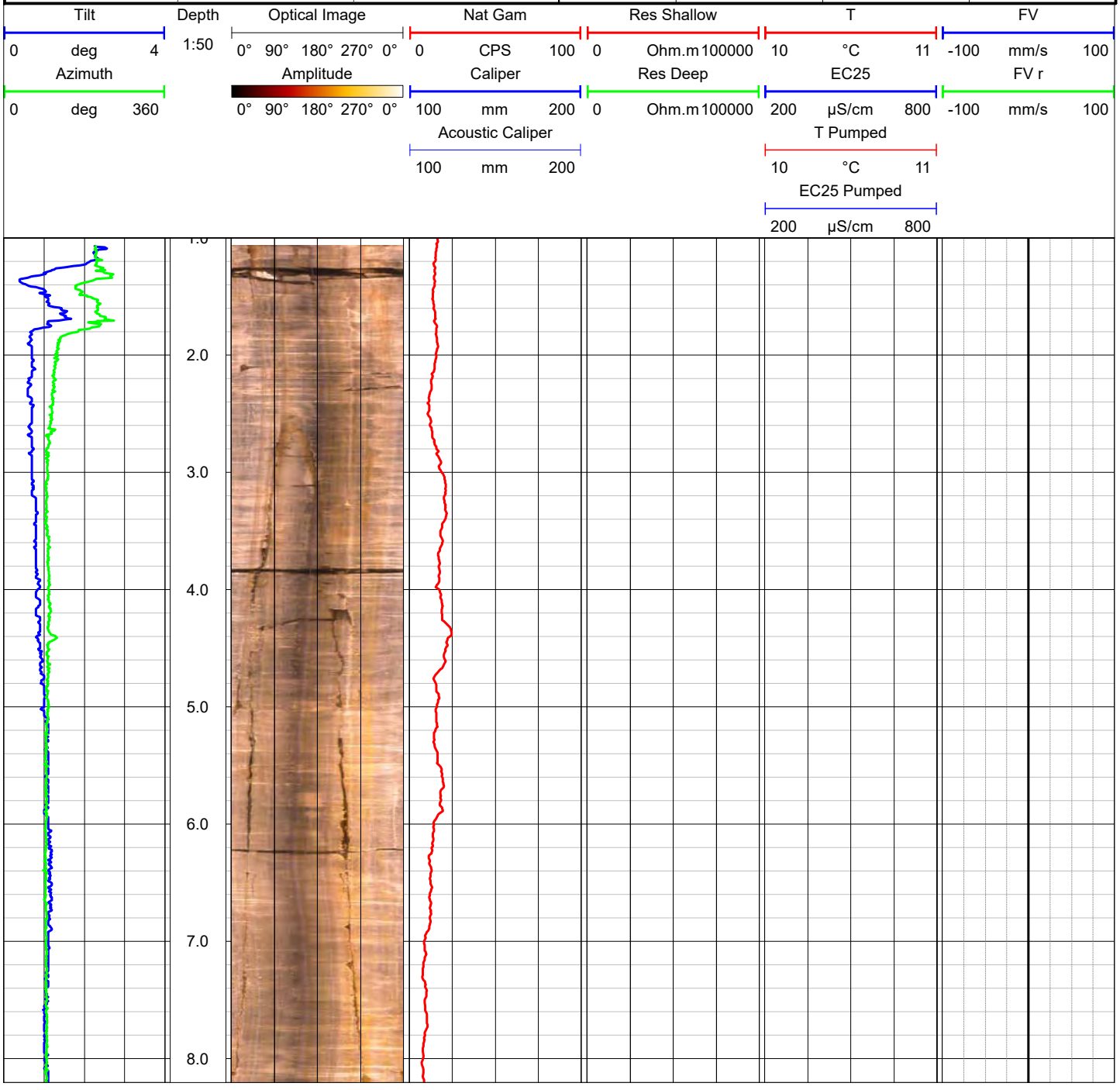

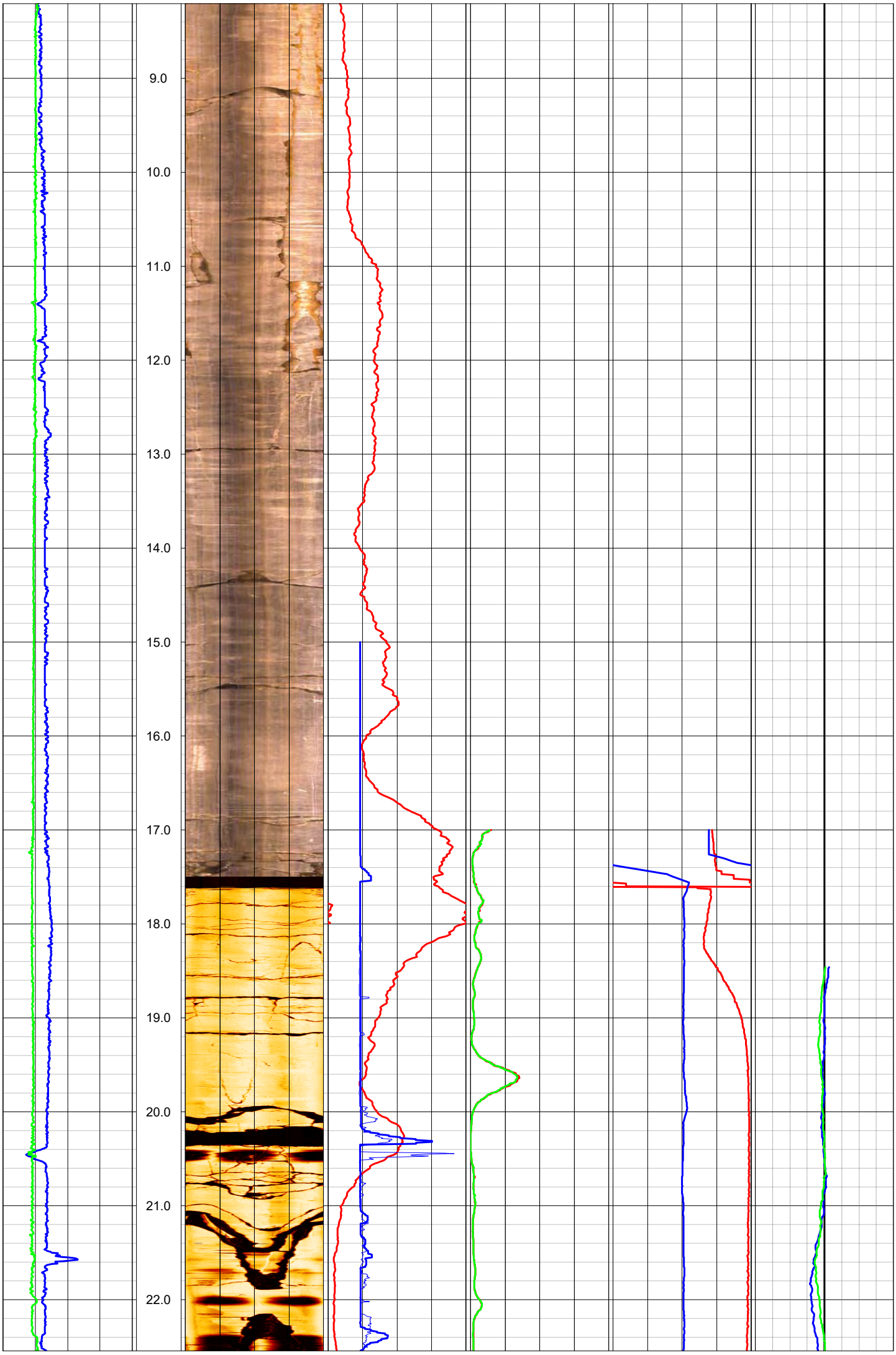
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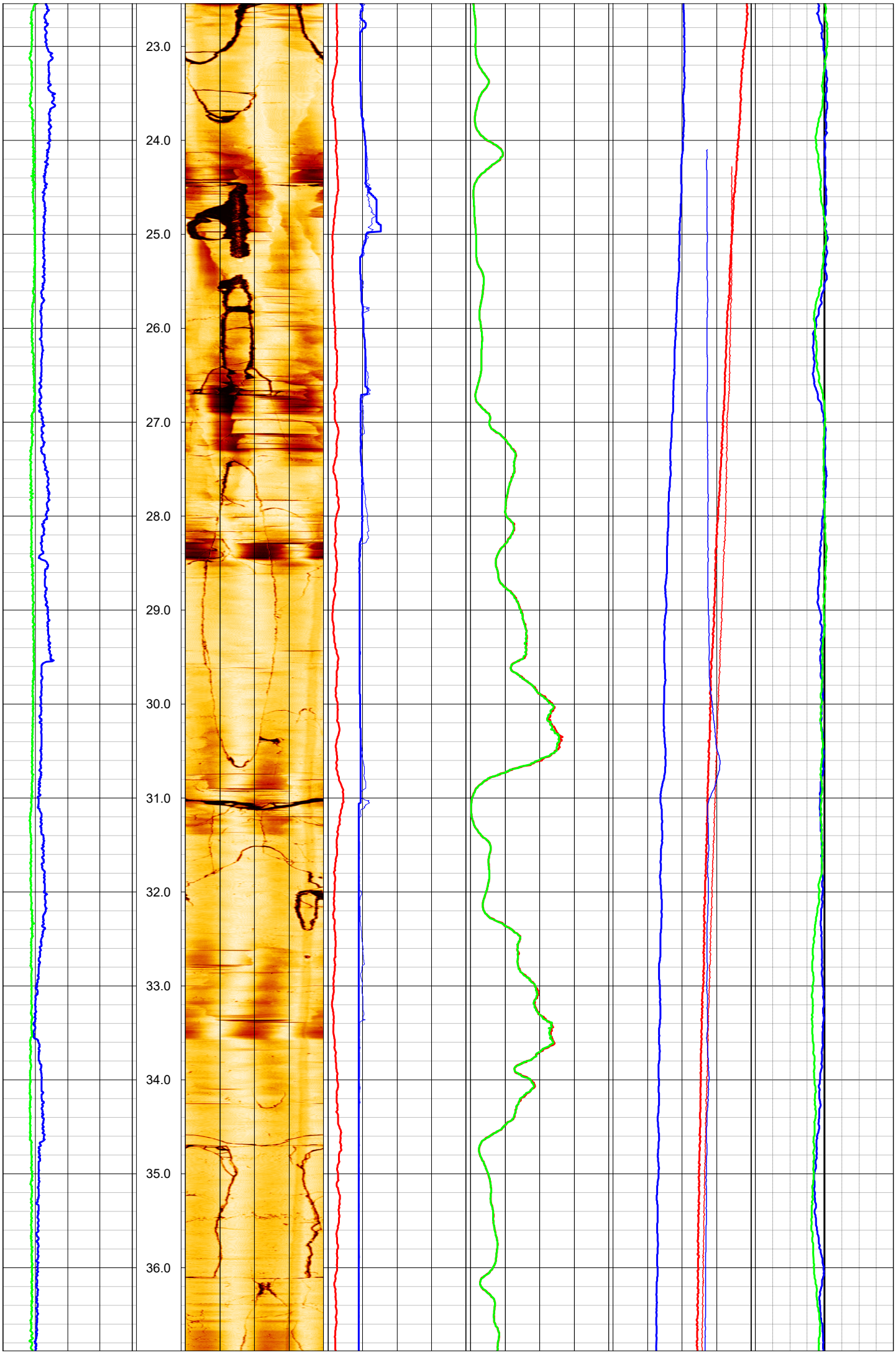
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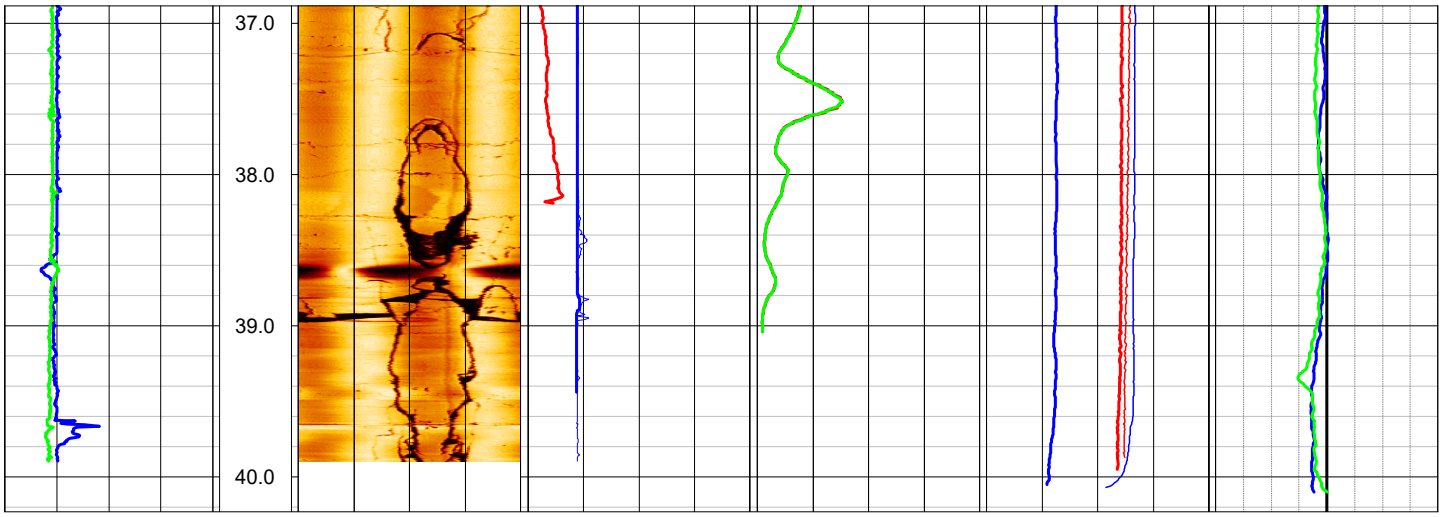
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EUROPEAN GEOPHYSICAL SERVICES LTD

Client: **Priority Drilling**

Borehole: **BH5**

Log Type: ***Image***

Location: **Lackagh Quarry** Area: **Co. Galway** Grid Ref: Elevation:

Drilled Depth: (m)	**40.3**	Date:	**8.12.15**
Logged Depth: (m)	**39.9**	Recorded By:	**Rhys Powell**
Logging Datum:	**Ground Level**	Remarks:	Rods pulled immediately before logging.
Logged Interval: (m)	**1.0 - 39.9**		
Fluid Level: (m)	**17.9**	**Ref:**	

BOREHOLE RECORD

Bit: (mm)	From: (m)	To: (m)
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CASING RECORD

Type	Size: (mm)	From: (m)	To: (m)
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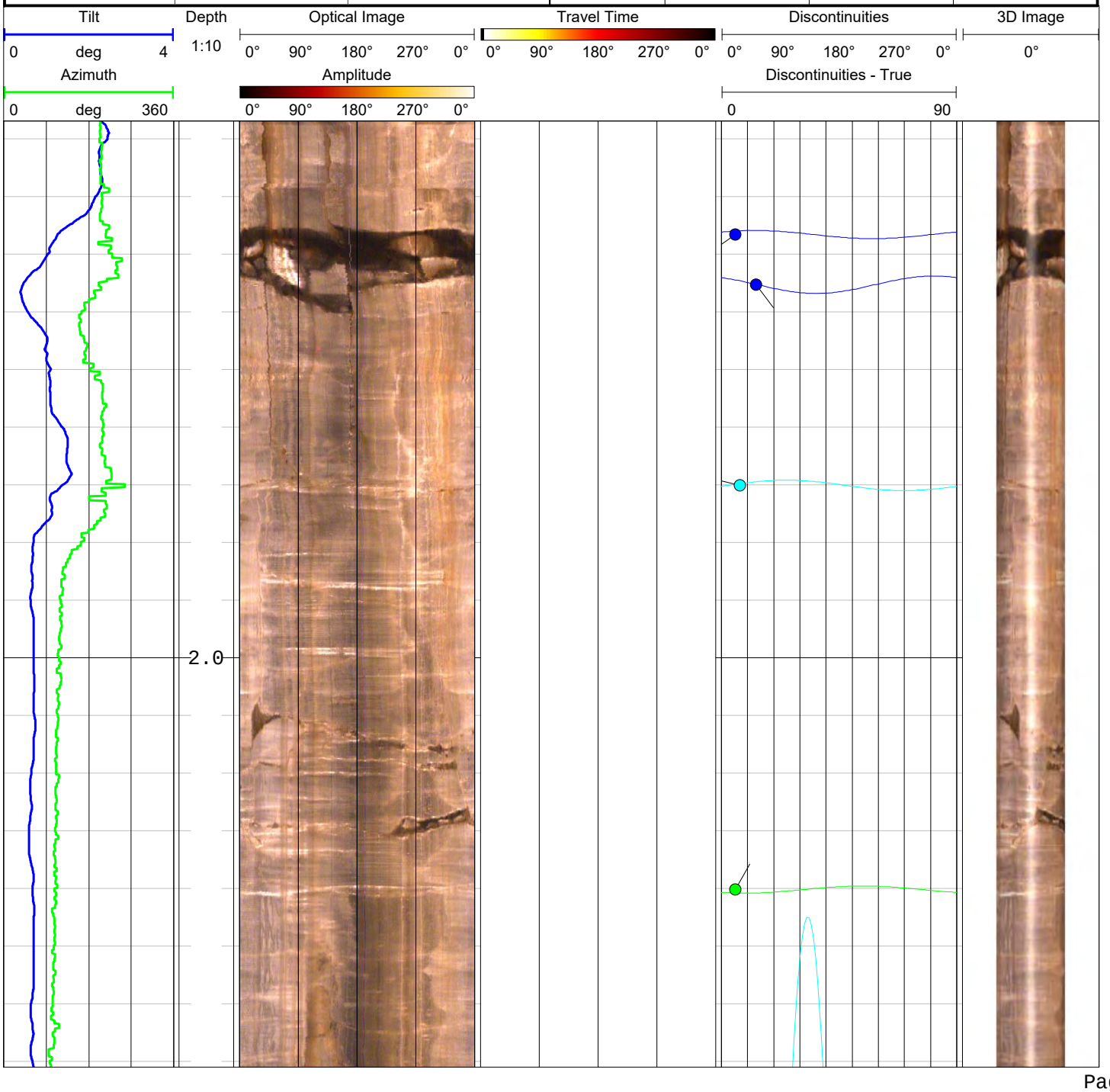

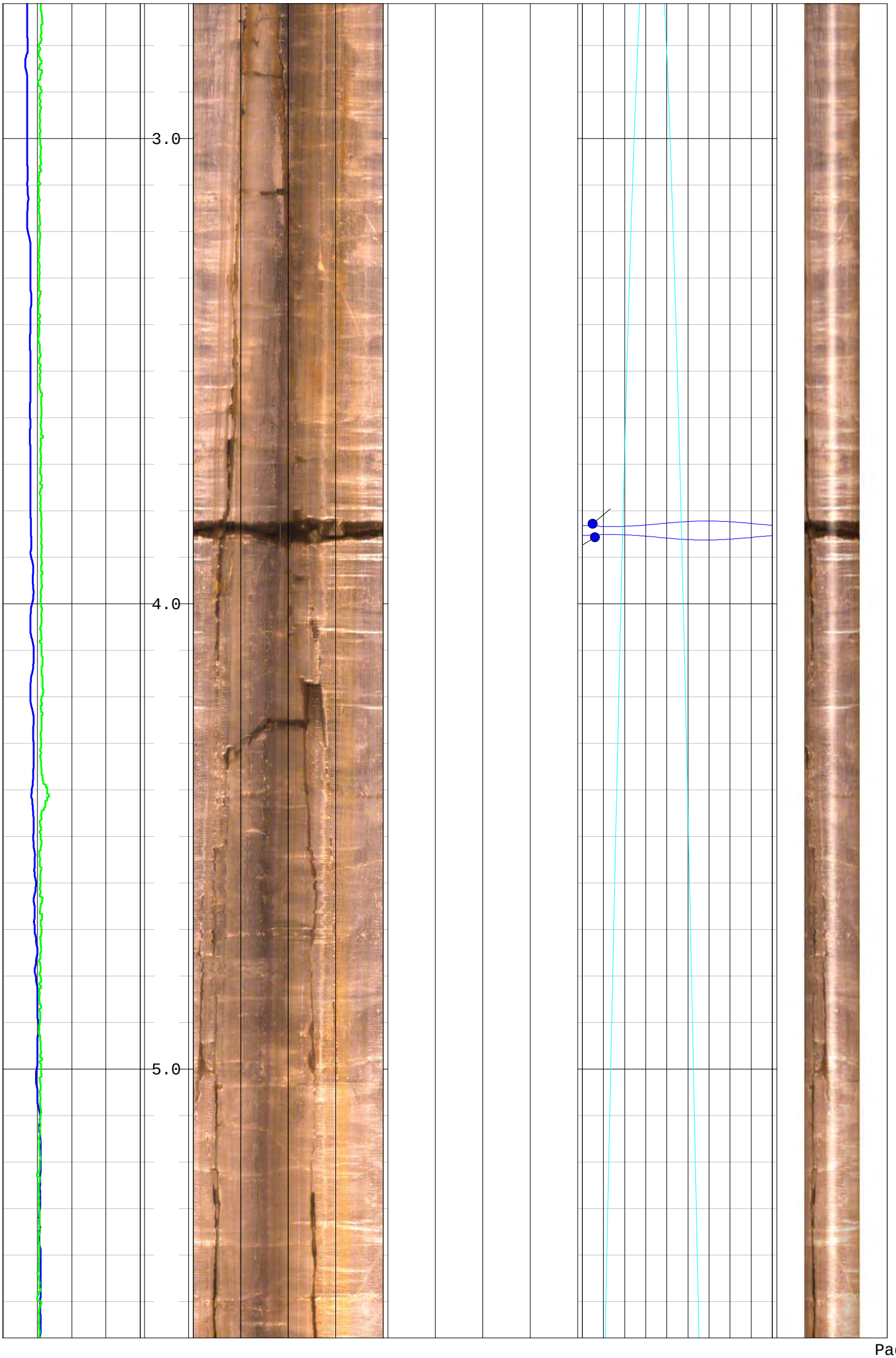
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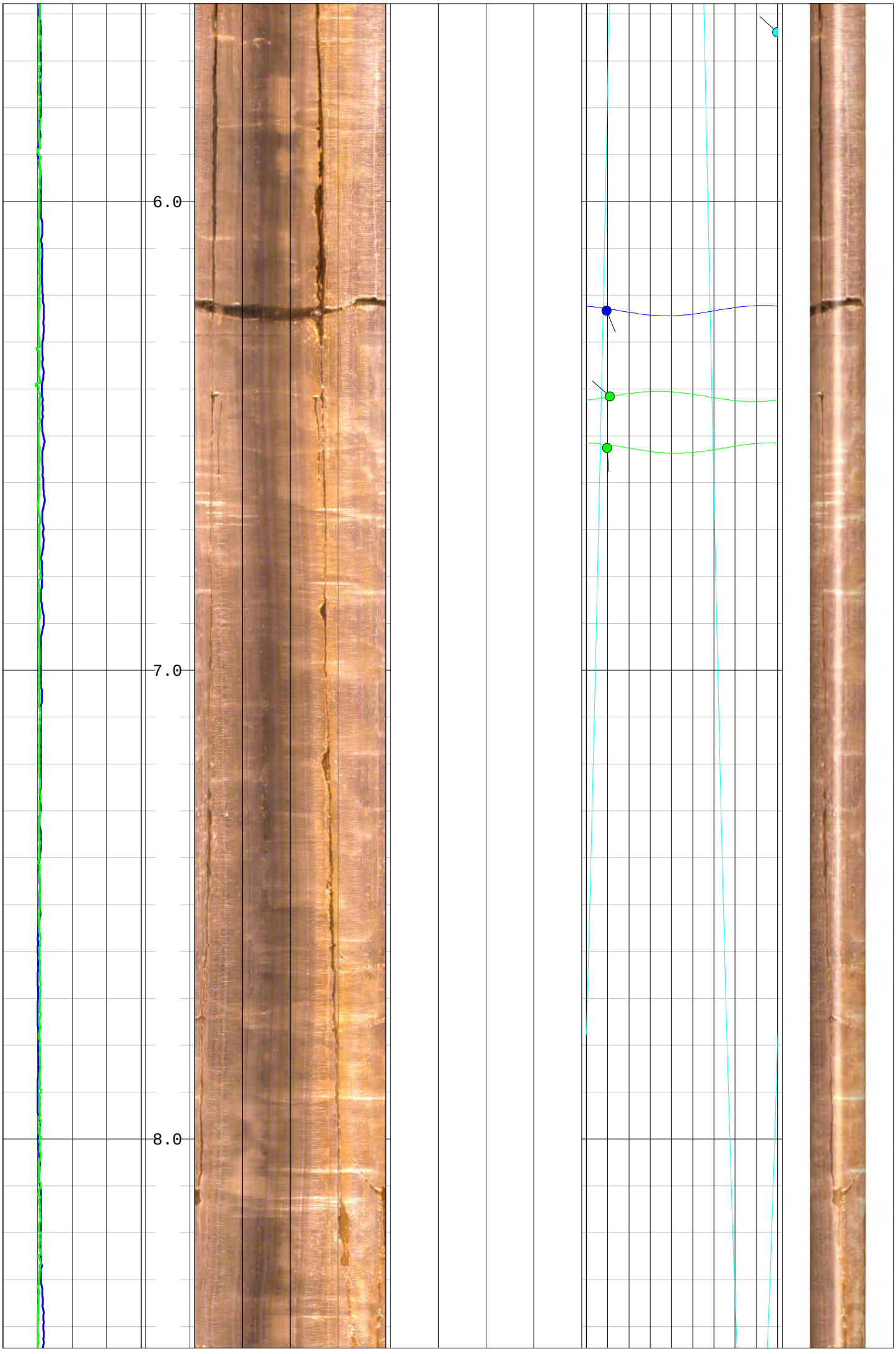
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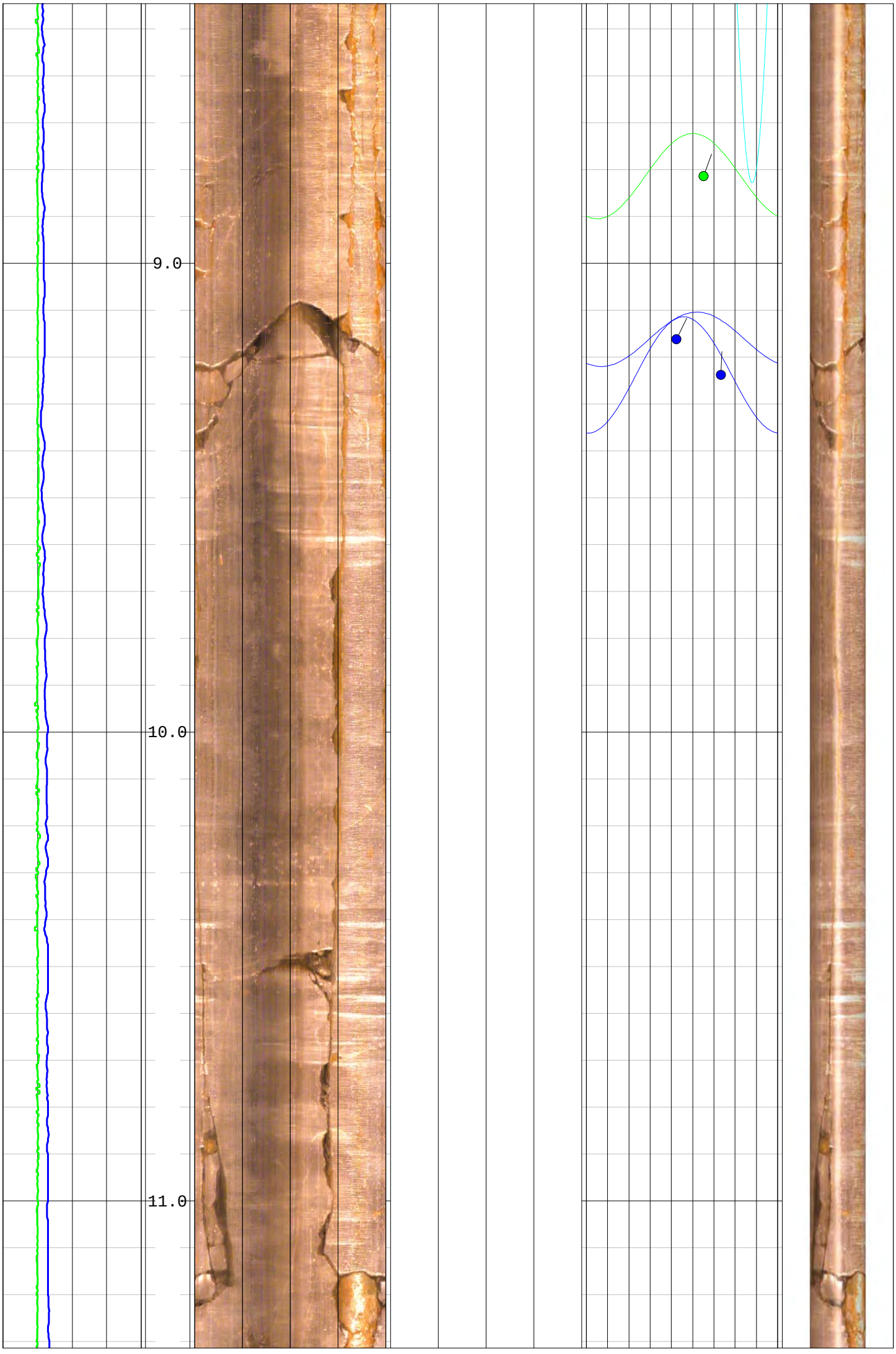
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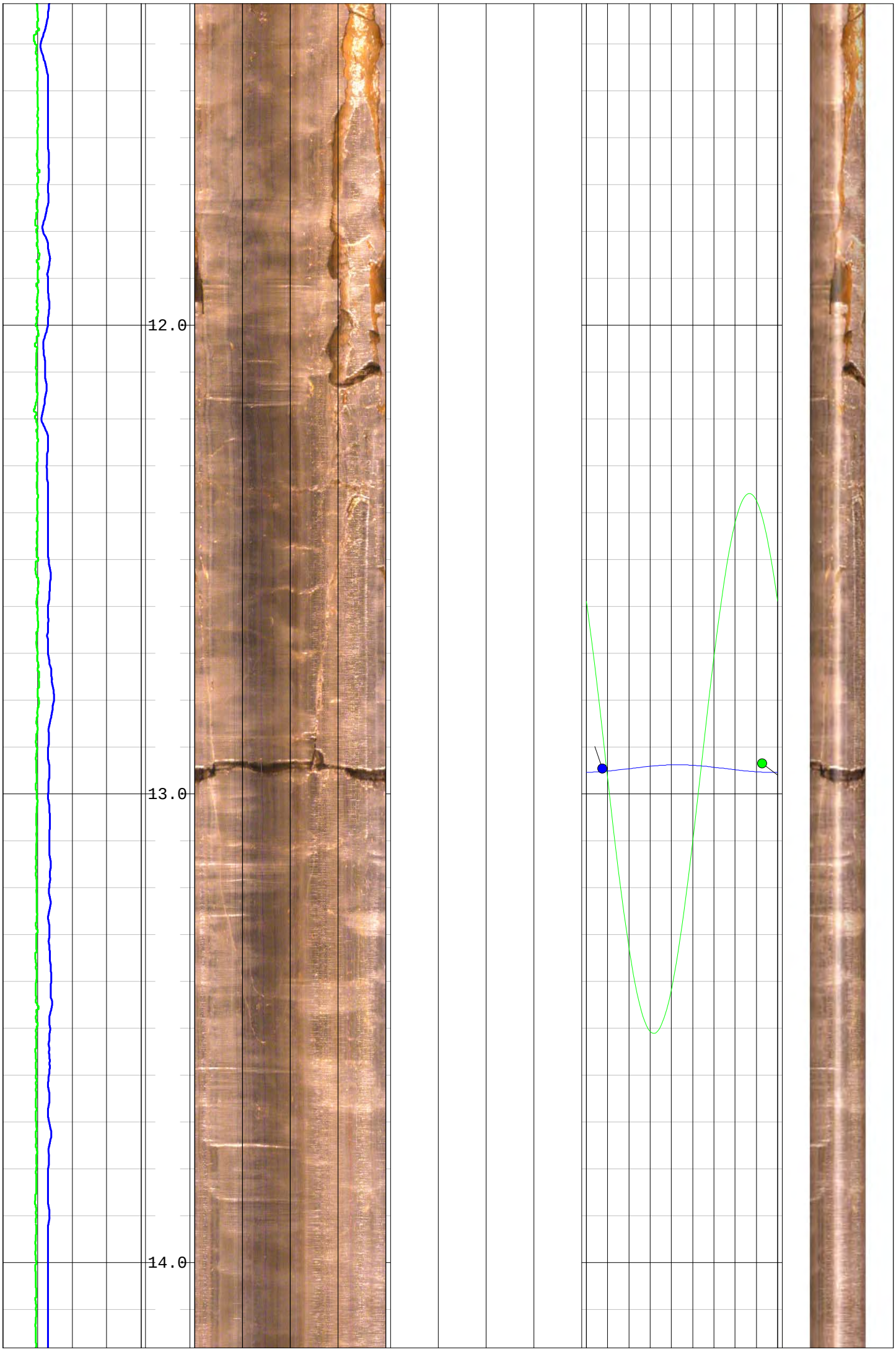
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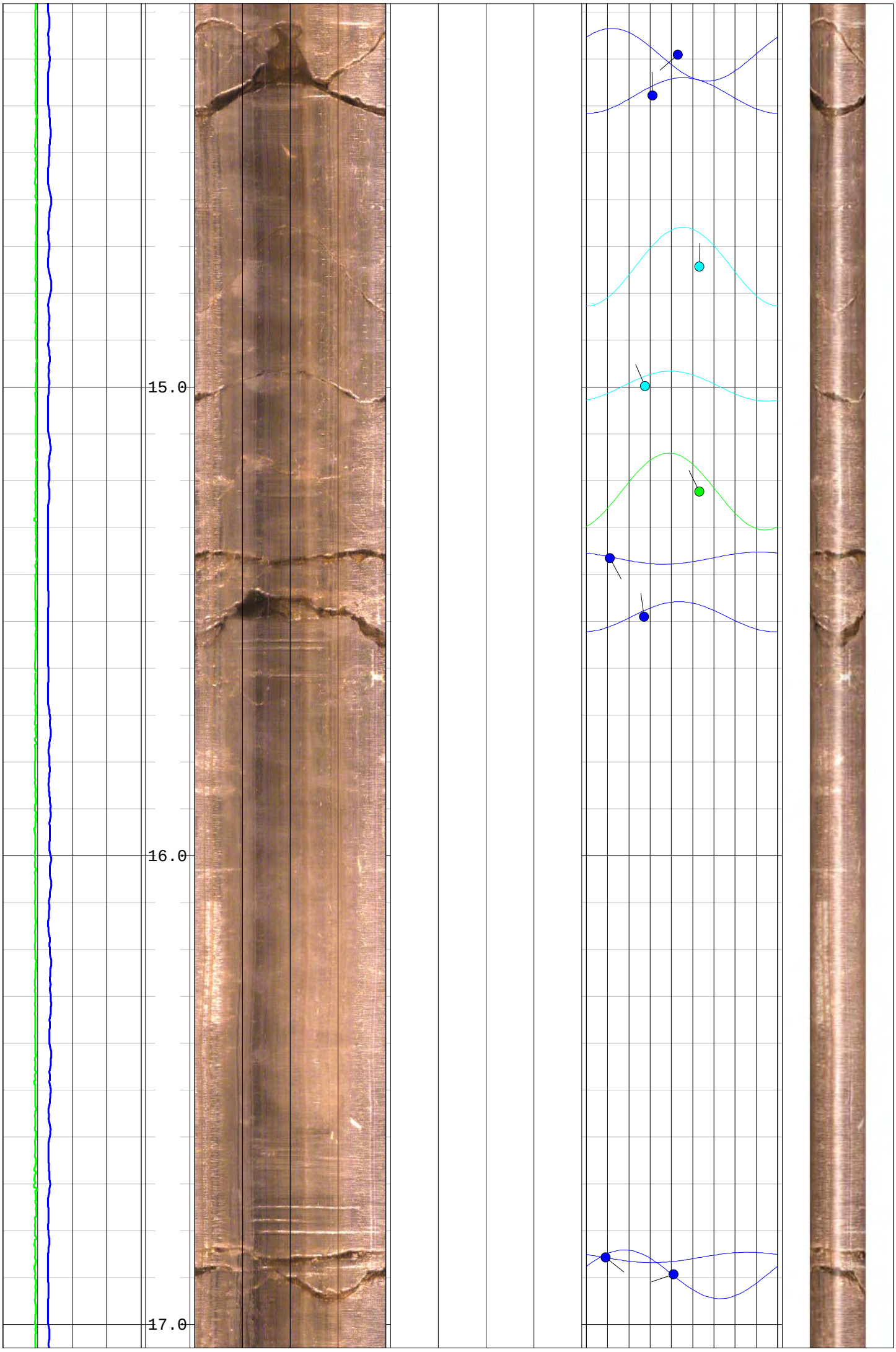
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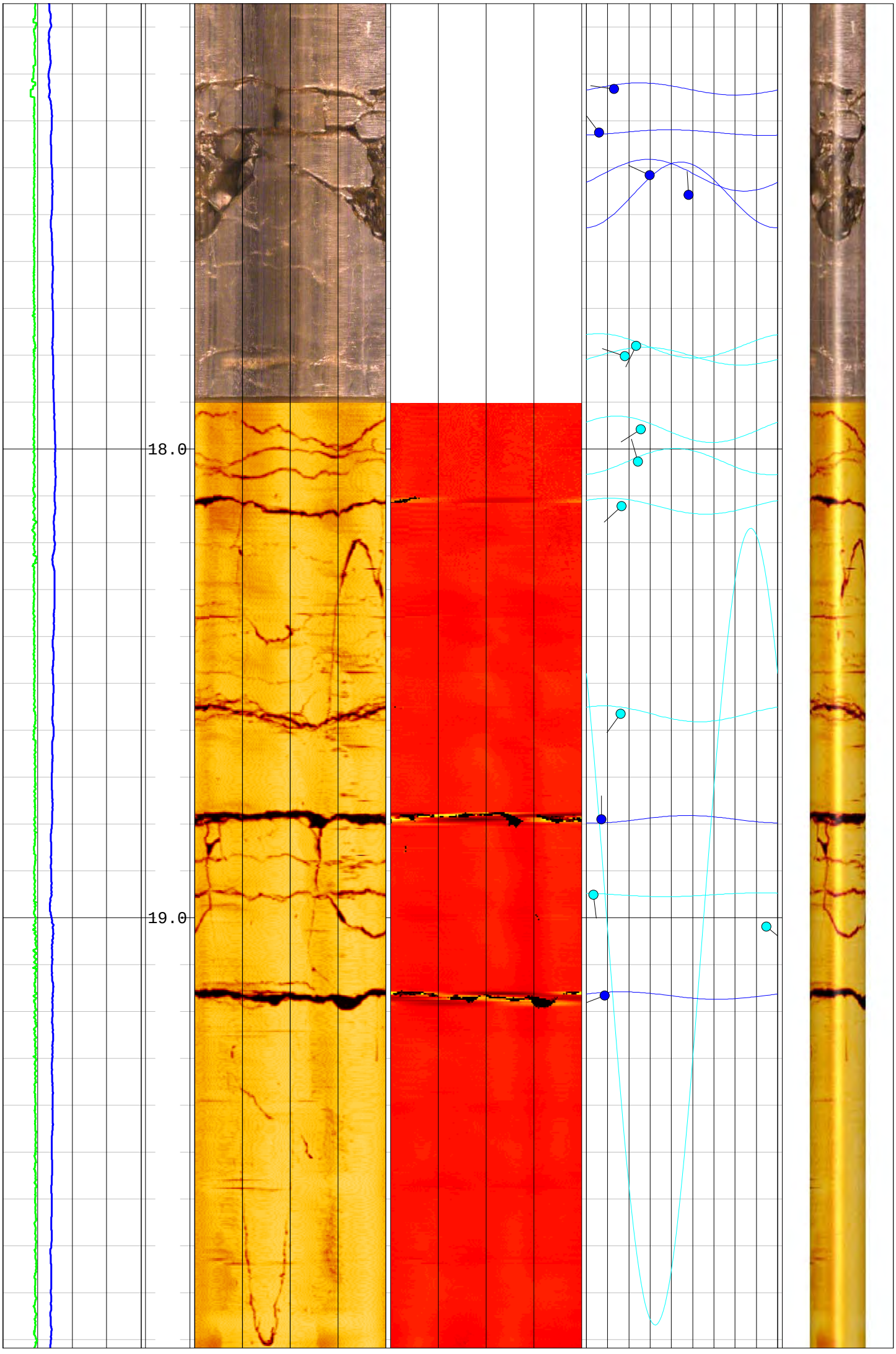
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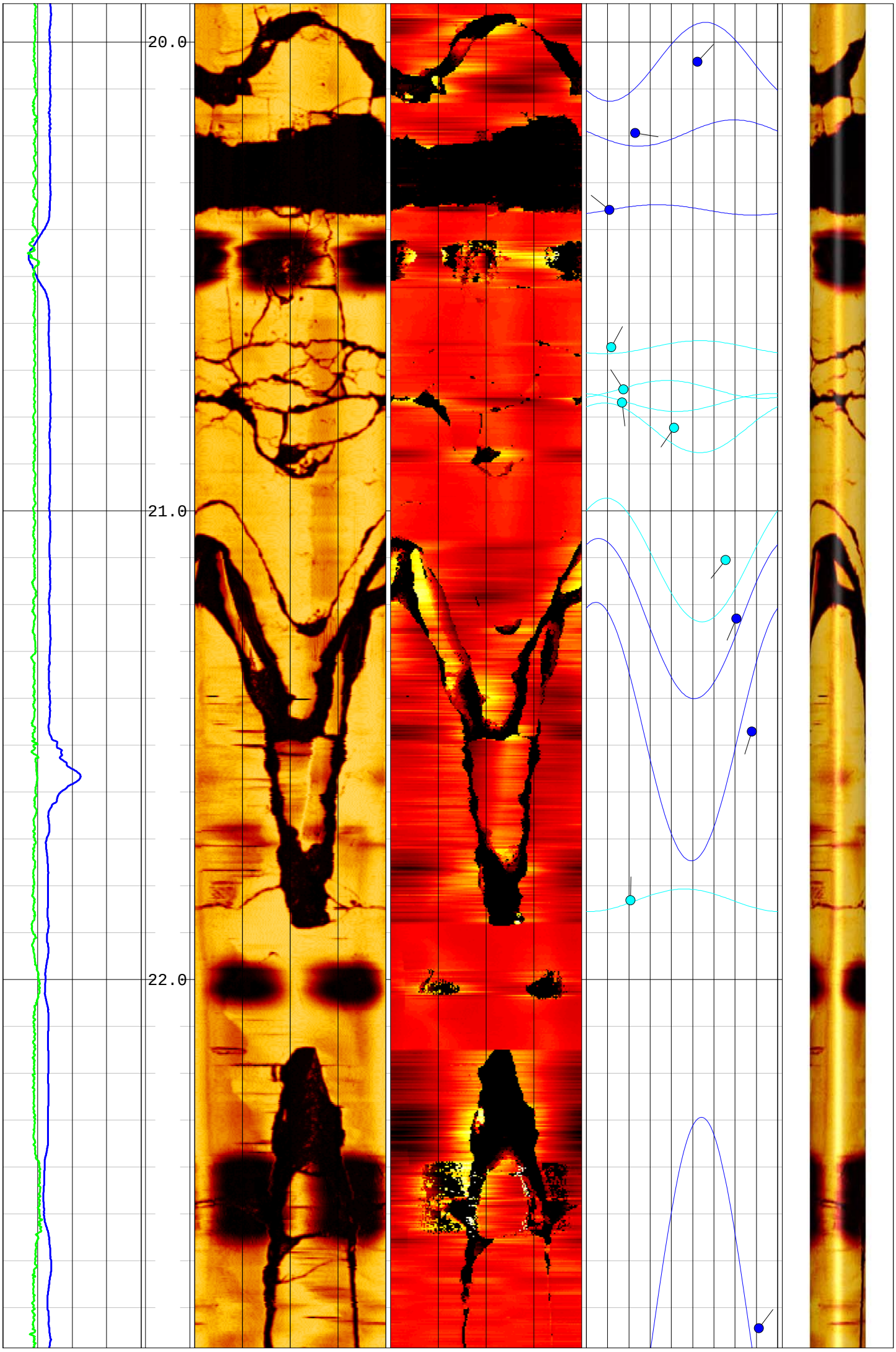
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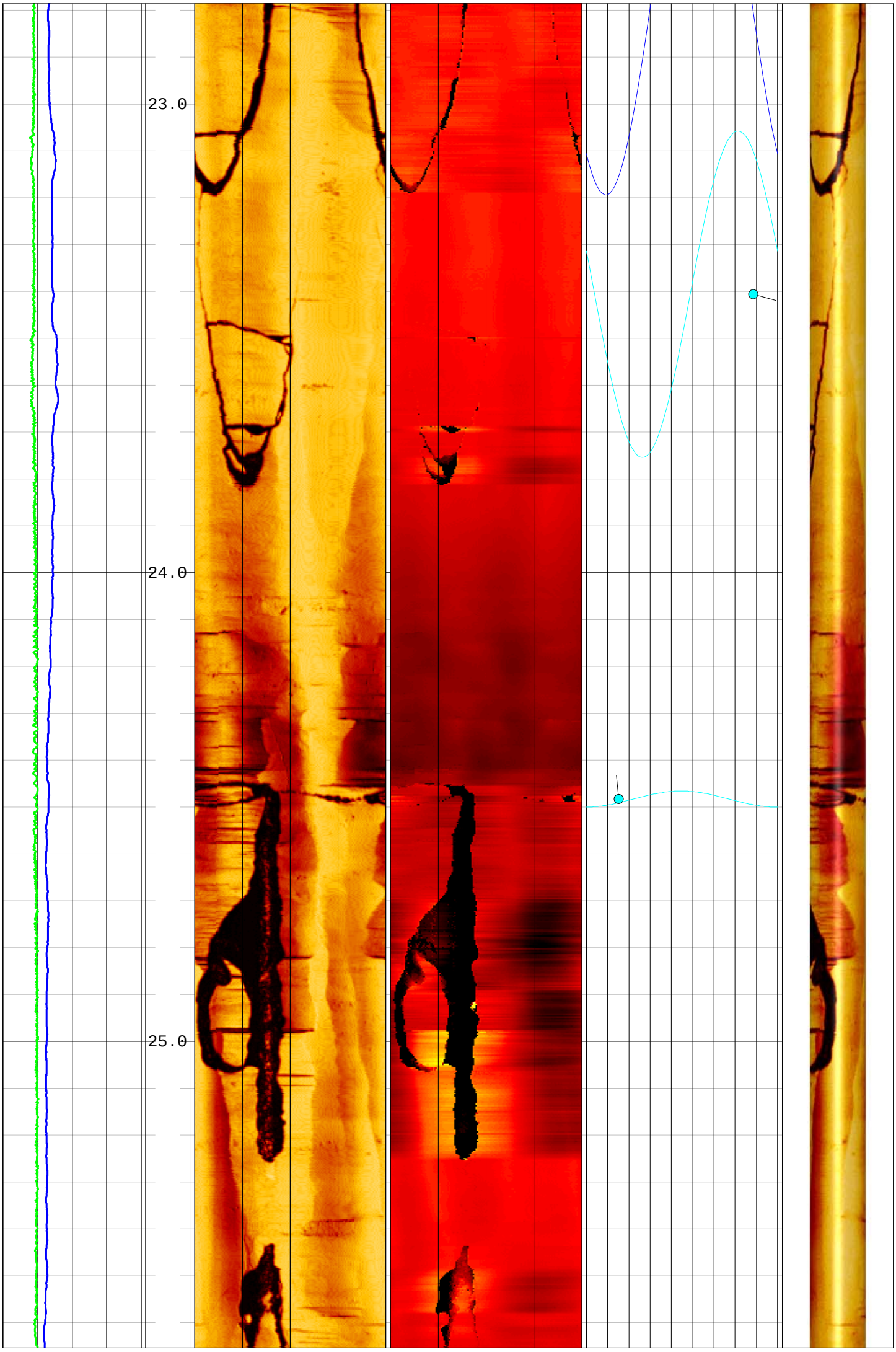
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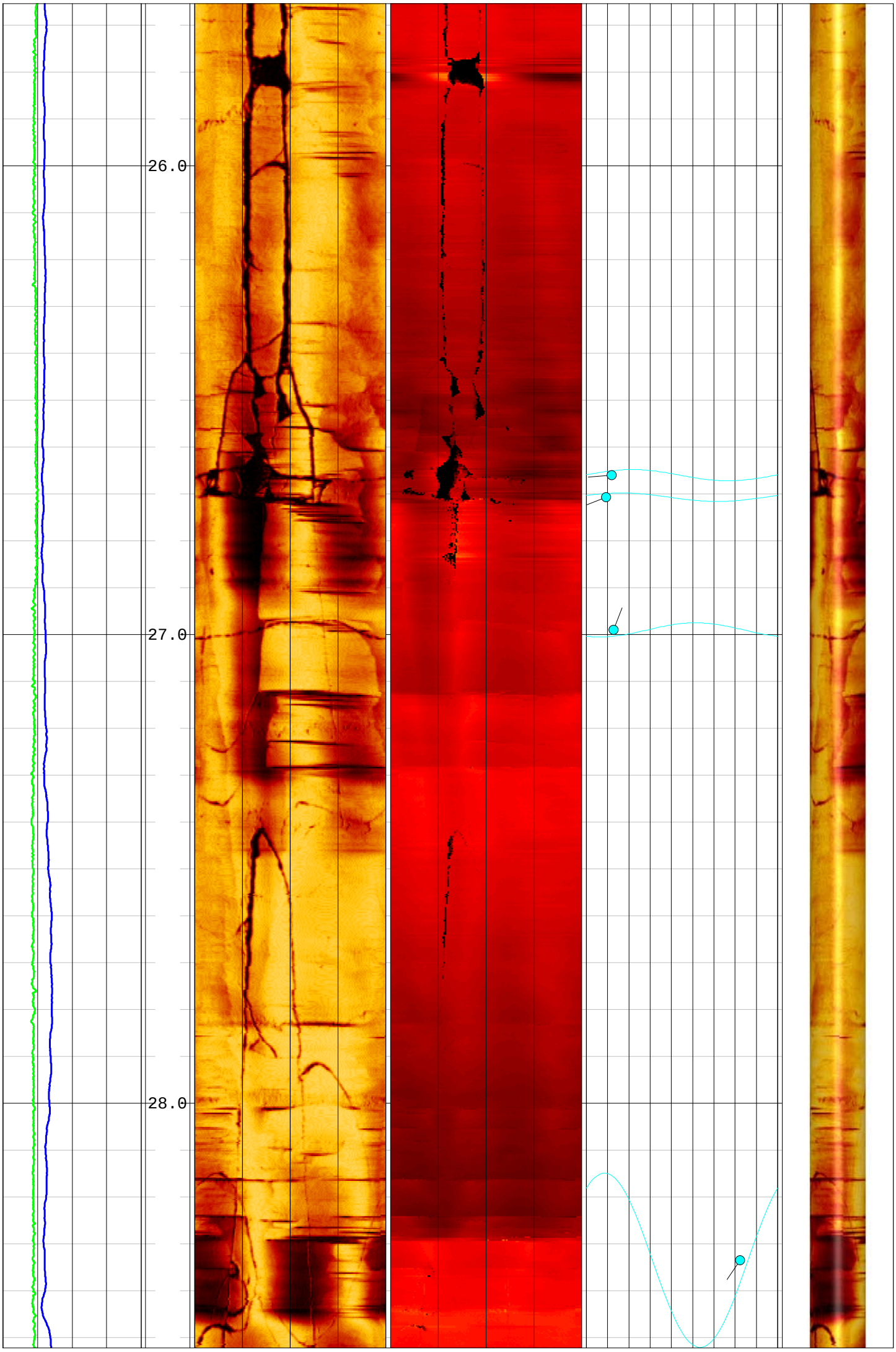
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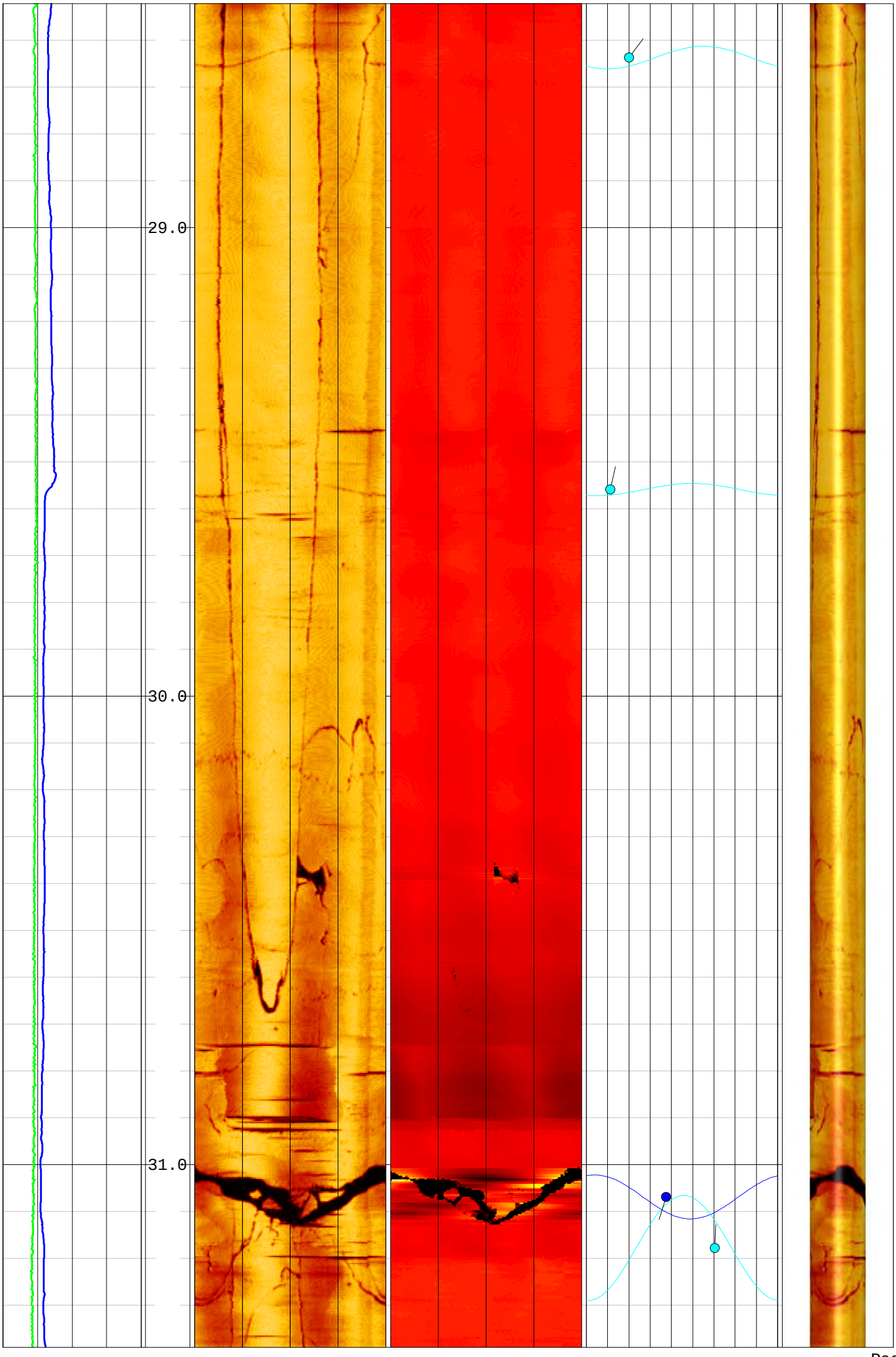
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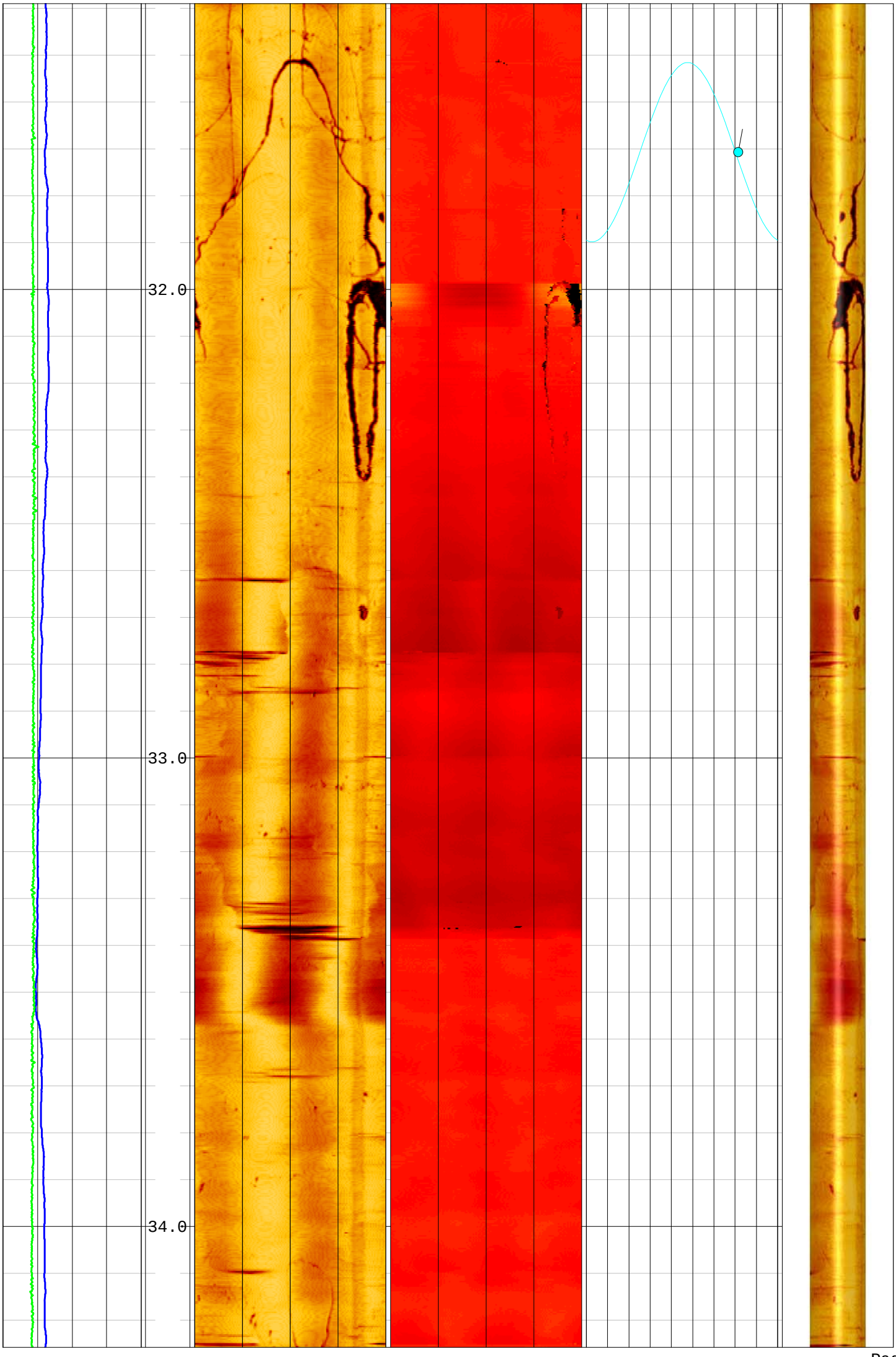
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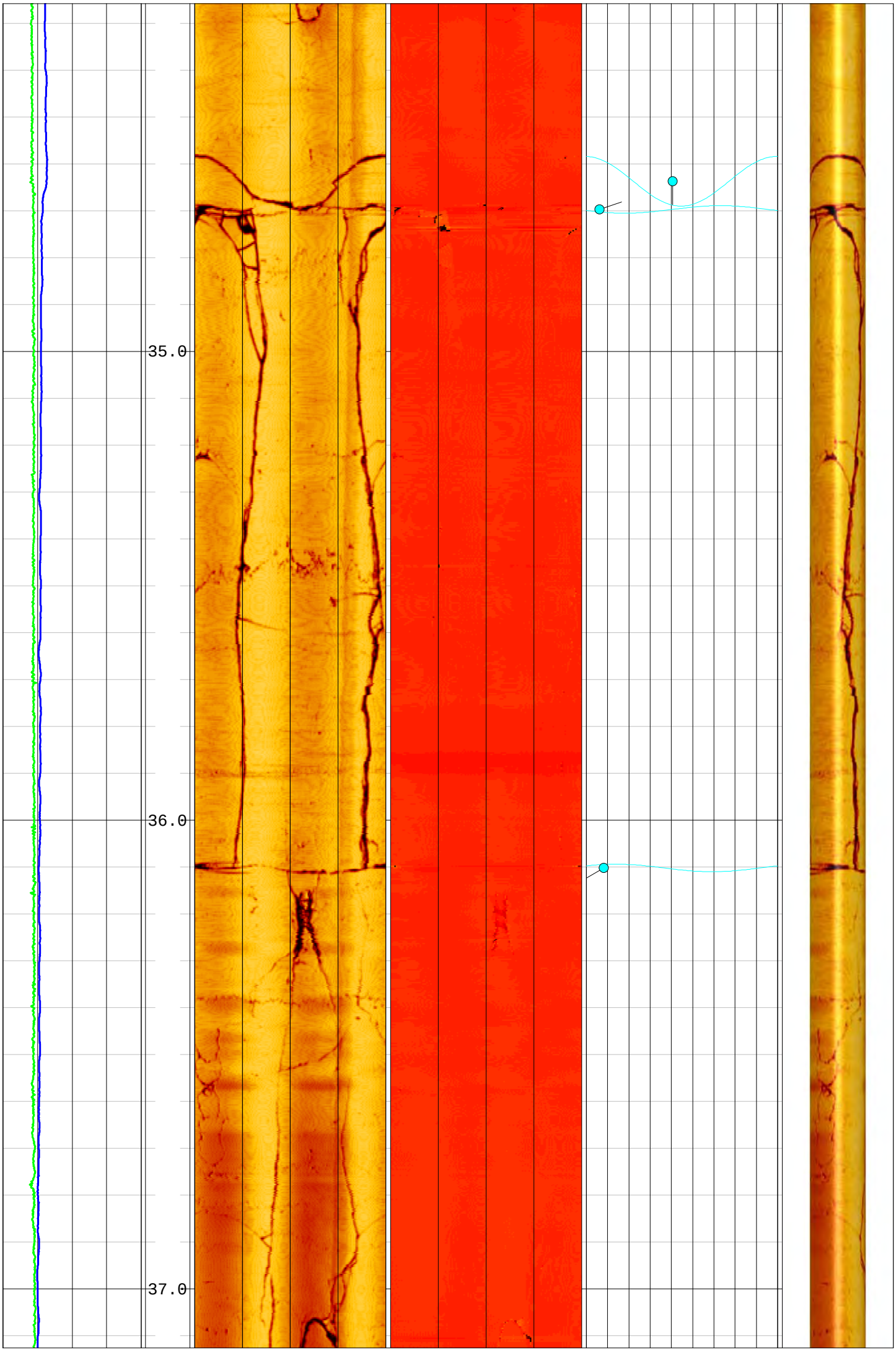
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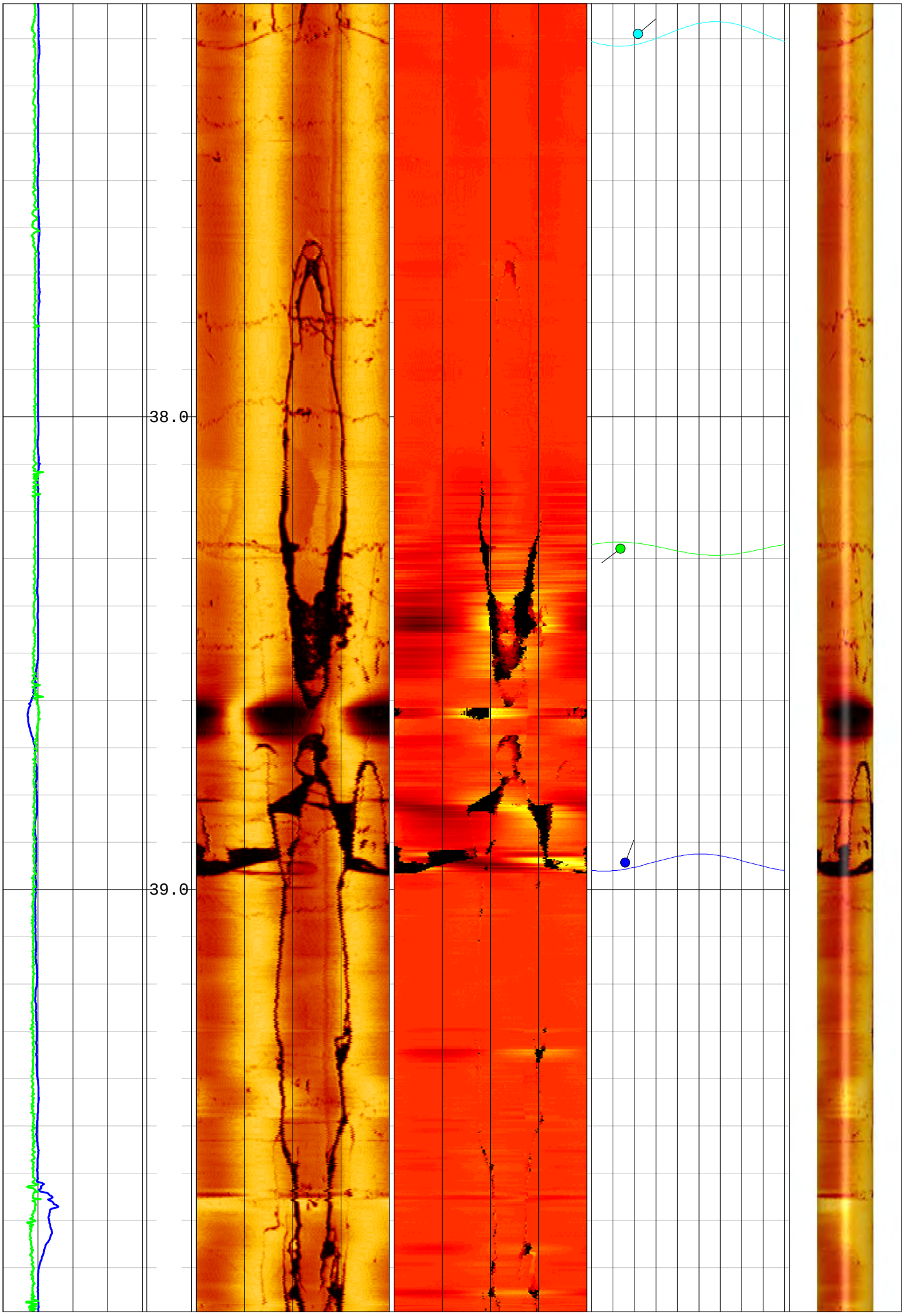
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EUROPEAN GEOPHYSICAL SERVICES LTD

Client: **Priority Drilling**

Borehole: **BH5**

Log Type: ***Full Wave Sonic***

Location: **Lackagh Quarry** Area: **Co. Galway** Grid Ref: Elevation:

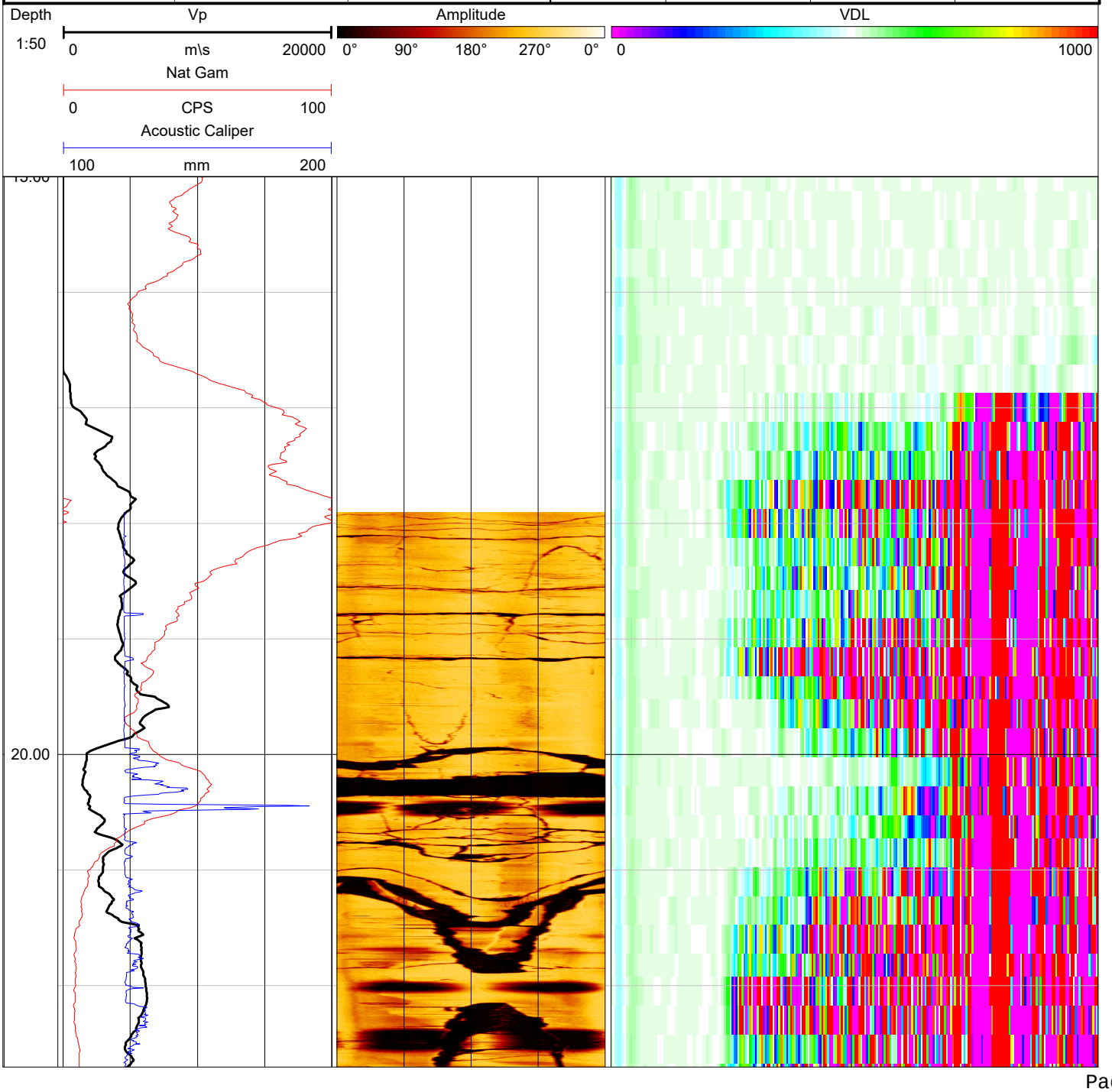
Drilled Depth: (m)	**40.3**	Date:	**8.12.15**
Logged Depth: (m)	**39.2**	Recorded By:	**Rhys Powell**
Logging Datum:	**Ground Level**	Remarks:	
Logged Interval: (m)	**16.9 - 39.2**		
Fluid Level: (m)	**16.9**	**Ref:**	

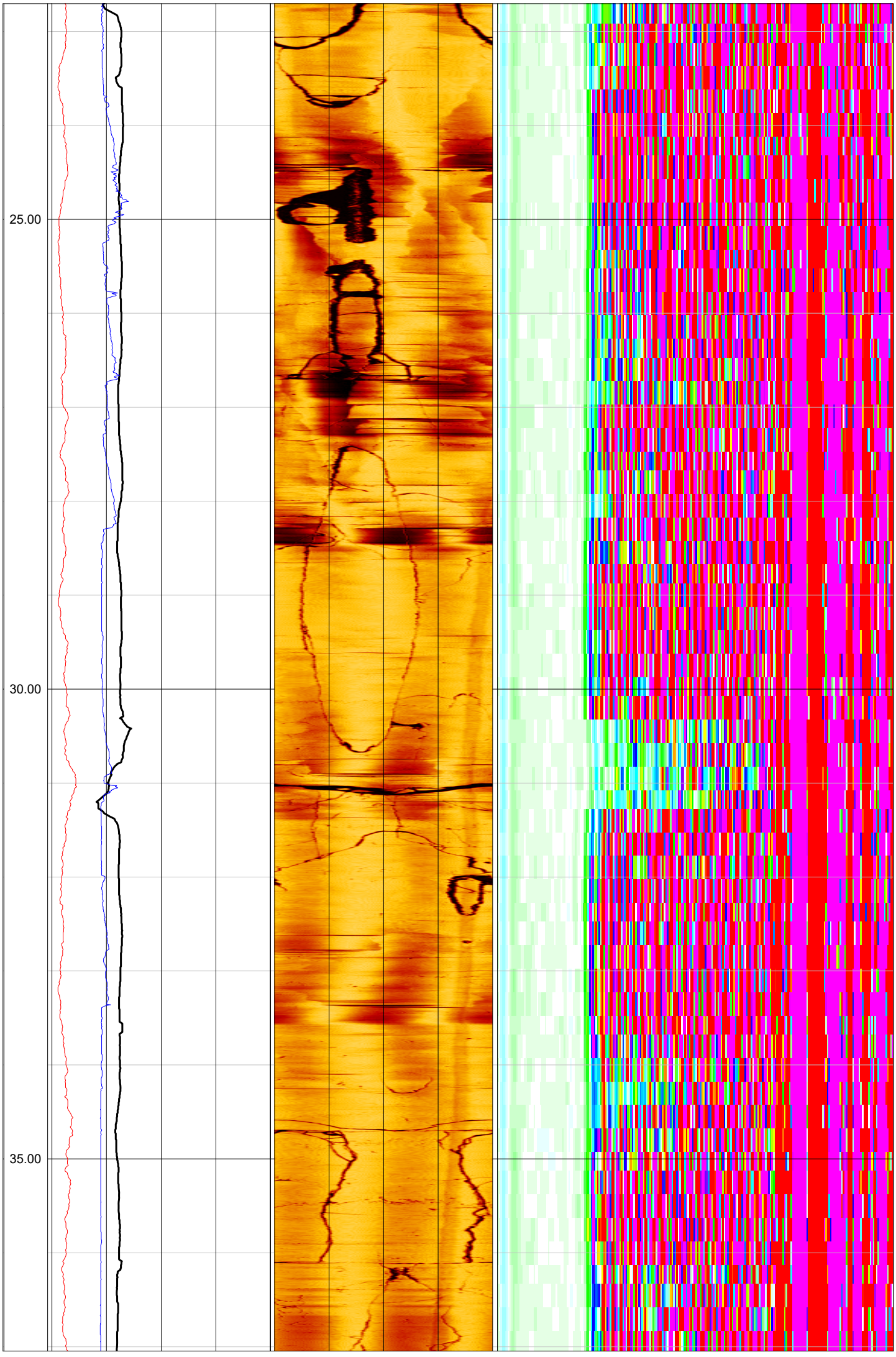
BOREHOLE RECORD

Bit: (mm)	From: (m)	To: (m)
122	**0.0**	**40.3**

CASING RECORD

Type	Size: (mm)	From: (m)	To: (m)
None			

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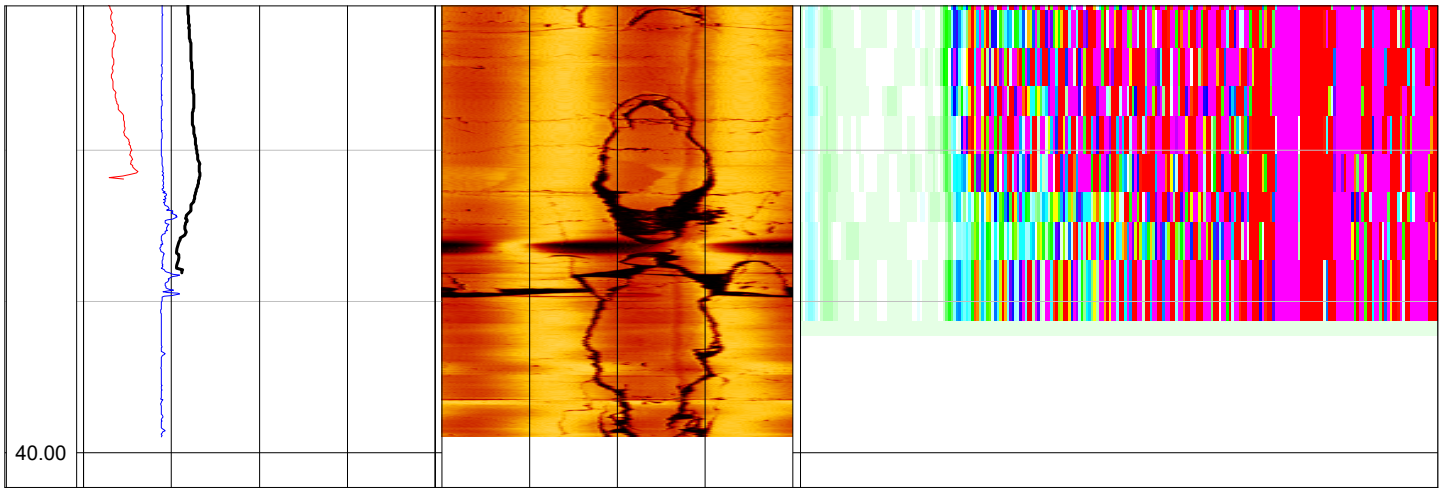
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APPENDIX VII

10% Fines

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Date: 29 February 2016
Test Report Ref: STR 448031

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Ten Per Cent Fines Value (TFV) of aggregate sample 10mm and greater in accordance with **BS 812: Part 111: 1990.**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**Bulk Sample**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**21/02/2016**
Sampling Location:	**Unknown**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Aggregate**
Target Specification	**N/A**

RESULTS:

Ten per cent fines value (DRY) = 150 kN

Comments

Has the "as received material" been altered by crushing in the laboratory: **Yes**

Report to nearest 10kN for forces of 100kN or more report to nearest 5kN for forces less than 100kN.

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

Aggregate Abrasion Value

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Contract: Lackagh Quarry

Date: 29 February 2016
Test Report Ref: STR 448026

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Aggregate Abrasion Value (AAV) of aggregate sample, in accordance with **BS EN 1097-8 : 2009 Annex A**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**Bulk Sample**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**23/02/2016**
Sampling Location:	**Unknown**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Aggregate**
Target Specification:	**N/A**

RESULTS:

Aggregate Abrasion Value (Test 1) = 12.1 (three significant figures)
Aggregate Abrasion Value (Test 2) = 12.4 (three significant figures)

Mean Aggregate Abrasion Value = 12 (two significant figures)

Comments
None

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

Aggregate Crushing Value

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Date: 29 February 2016
Test Report Ref: STR 448024

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Aggregate Crushing Value (ACV) of aggregate sample, in accordance with **BS 812: Part 110: 1990.**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**Bulk Sample**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**20/02/2016**
Sampling Location:	**Unknown**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Aggregate**
Target Specification:	**N/A**

RESULTS:

Aggregate Crushing Value (%) = 23 (nearest whole number)

Comments
None

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

Aggregate Impact Value

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Contract: Lackagh Quarry

Date: 29 February 2016
Test Report Ref: STR 448025

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Aggregate Impact Value (AIV) of aggregate sample – DRY, in accordance with **BS 812: Part 112: 1990.**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**Bulk Sample**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**21/02/2016**
Sampling Location:	**Unknown**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Aggregate**
Target Specification:	**N/A**

RESULTS:

Aggregate Impact Value (DRY) (%) = 17 (nearest whole number)

Comments
If the AIV is greater than 30 then, the results should be treated with caution.
No departure from specified procedure.

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

Deformability in Uniaxial Compression and Brazil Tests

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
REP. Of Ireland.
VAT No: 9D53971I

Date: 15th February 2016
Test Report Ref. STR: 443020

LABORATORY TEST REPORT

TEST REQUIREMENTS: Unconfined compressive strength, elastic moduli & indiect tensile strength by Brazil.

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref. No:	**Various**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**8/12/2016**
Date of Start of Test.:	**15/12/2015**
Sampling Location:	**Various**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Aggregate Type and Nominal Size:	**Core**
Target Specification:	**N/A**

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The work was carried out by our competent, sub contracted laboratory.

RESULTS

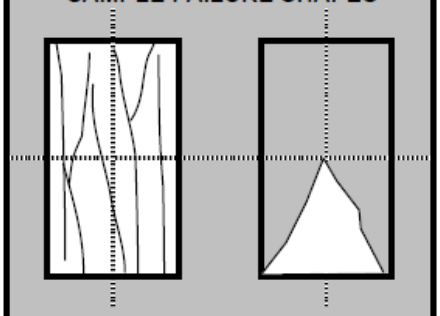
( ) E. R. Goulden
Technical Manager
Approved Signatories

( ) E. N. Jones
Soils Laboratory Manager

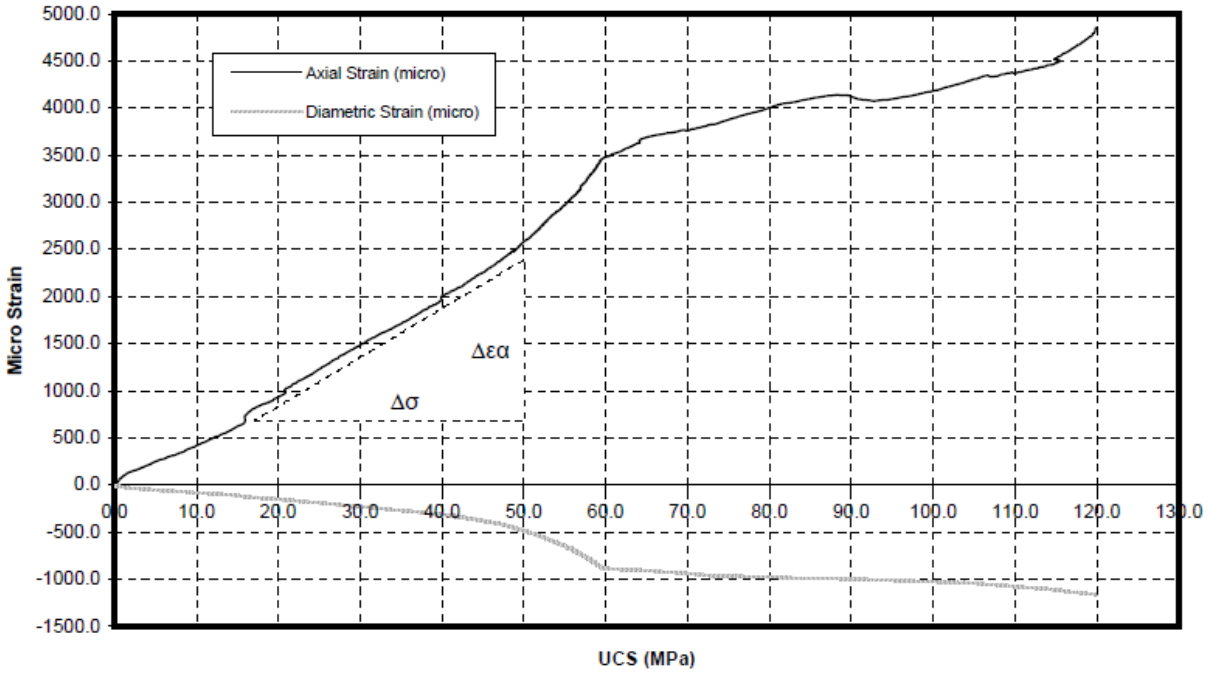
(✓) N Dumbarton
Assistant Laboratory Manager

BOREHOLE		BH04
CORE RUN		48903
DEPTH		8.06-8.36
SAMPLE DIAMETER	mm	82.22
SAMPLE HEIGHT	mm	186.15
WATER CONTENT	%	0.0
TEST CONDITION		As Received
RATE OF LOADING	kN/s	0.7
TEST DURATION	mm.sec	14.21
DATE OF TESTING		24/01/2016
LOAD FRAME USED		2000kN
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Perpendicular
YOUNG'S MODULUS *E* (AVERAGE)	GPa	18.60
POISSON'S RATIO *v*		0.20
UNCONFINED COMPRESSIVE STRENGTH	MPa	119.9

SAMPLE FAILURE SHAPES



Axial & Diametric Stress / Strain Curves

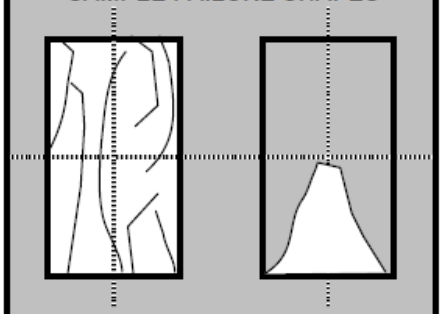


Test Notes:

Method of Young's modulus determination - Average Modulus of Linear Portion of Axial Stress-Strain Curve
Method of Poisson's ratio determination - slope of axial curve / slope of lateral curve
Young's modulus and poisson's ratio calculated between stress levels of 16.6MPa and 50.1MPa

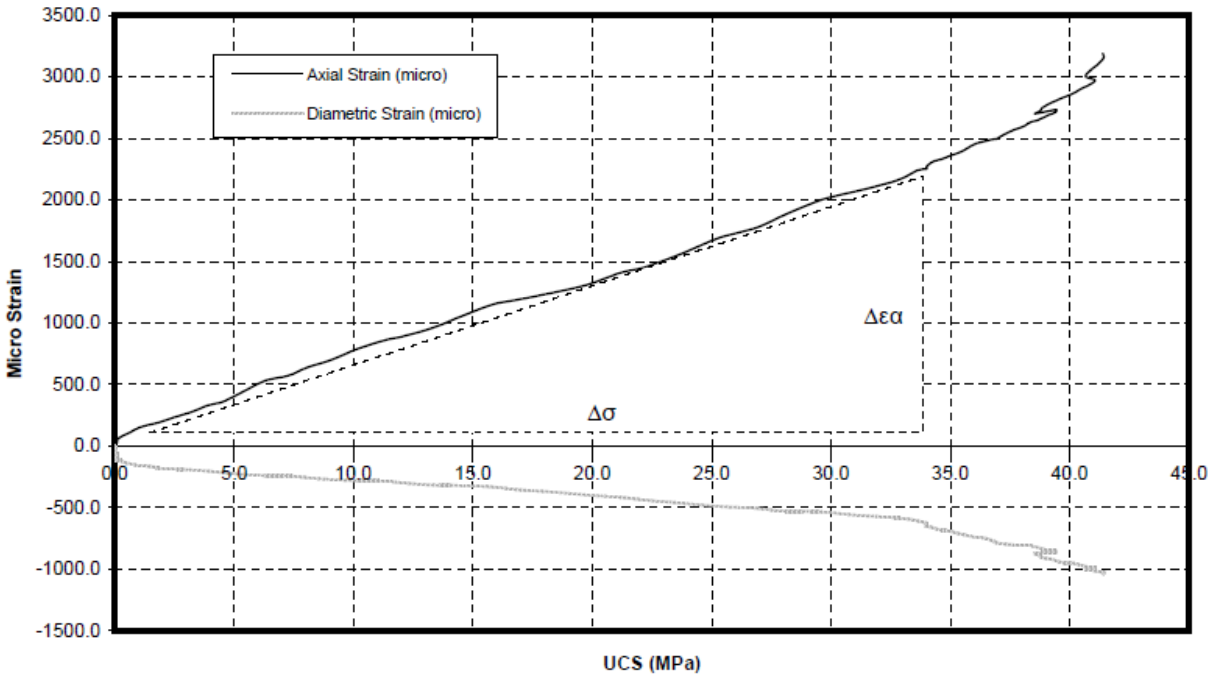
BOREHOLE		BH04
CORE RUN		48905
DEPTH		10.63-10.88
SAMPLE DIAMETER	mm	82.11
SAMPLE HEIGHT	mm	197.38
WATER CONTENT	%	0.1
TEST CONDITION		As Received
RATE OF LOADING	kN/s	0.6
TEST DURATION	mm.sec	6.4
DATE OF TESTING		25/01/2016
LOAD FRAME USED		2000kN
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Perpendicular
YOUNG'S MODULUS *E* (AVERAGE)	GPa	15.57
POISSON'S RATIO *v*		0.22
UNCONFINED COMPRESSIVE STRENGTH	MPa	41.6

SAMPLE FAILURE SHAPES



External Internal

Axial & Diametric Stress / Strain Curves

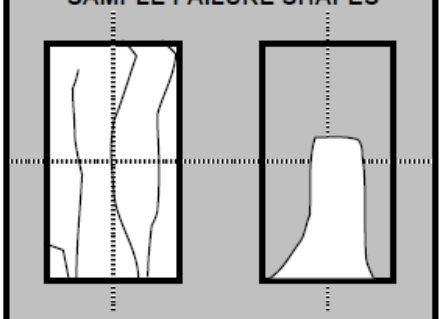


Test Notes:

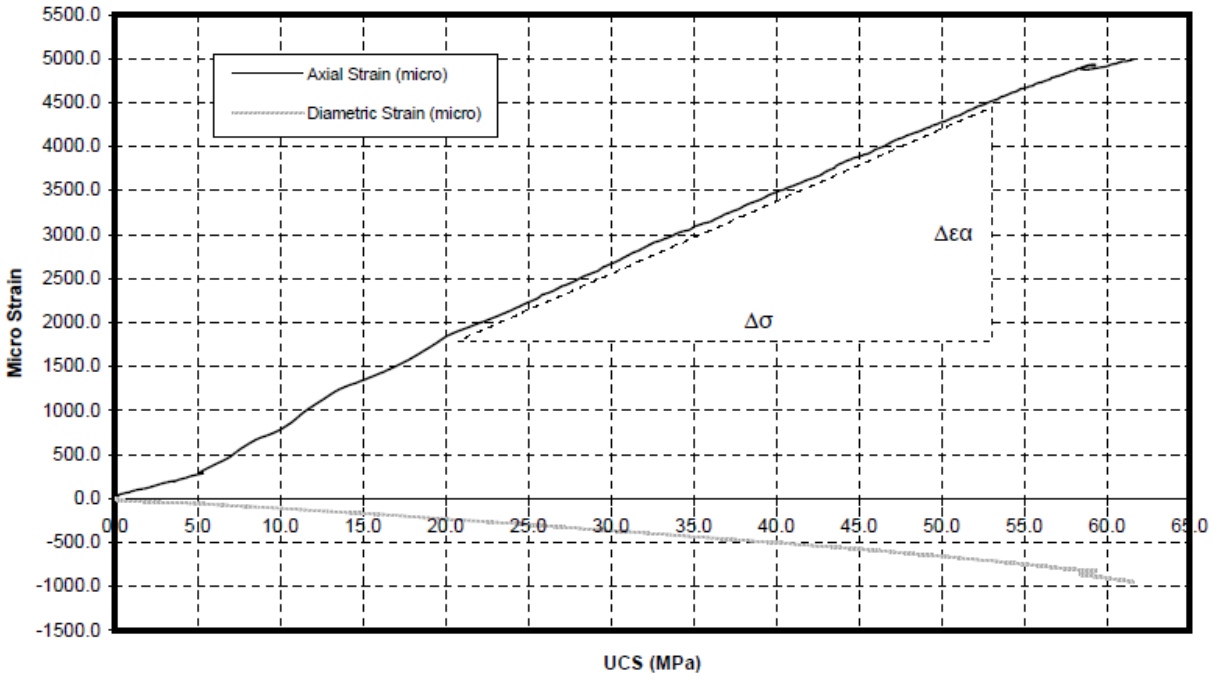
Method of Young's modulus determination - Average Modulus of Linear Portion of Axial Stress-Strain Curve
Method of Poisson's ratio determination - slope of axial curve / slope of lateral curve
Young's modulus and poisson's ratio calculated between stress levels of 1MPa and 34MPa

BOREHOLE		BH04
CORE RUN		48910
DEPTH		14.40-14.63
SAMPLE DIAMETER	mm	82.43
SAMPLE HEIGHT	mm	186.76
WATER CONTENT	%	0.2
TEST CONDITION		As Received
RATE OF LOADING	kN/s	0.8
TEST DURATION	mm.sec	6.52
DATE OF TESTING		25/01/2016
LOAD FRAME USED		2000kN
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Perpendicular
YOUNG'S MODULUS *E* (AVERAGE)	GPa	12.33
POISSON'S RATIO *v*		0.18
UNCONFINED COMPRESSIVE STRENGTH	MPa	62.0

SAMPLE FAILURE SHAPES



Axial & Diametric Stress / Strain Curves

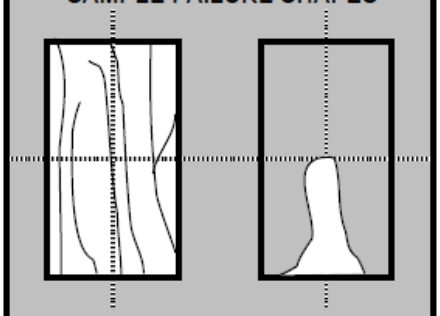


Test Notes:

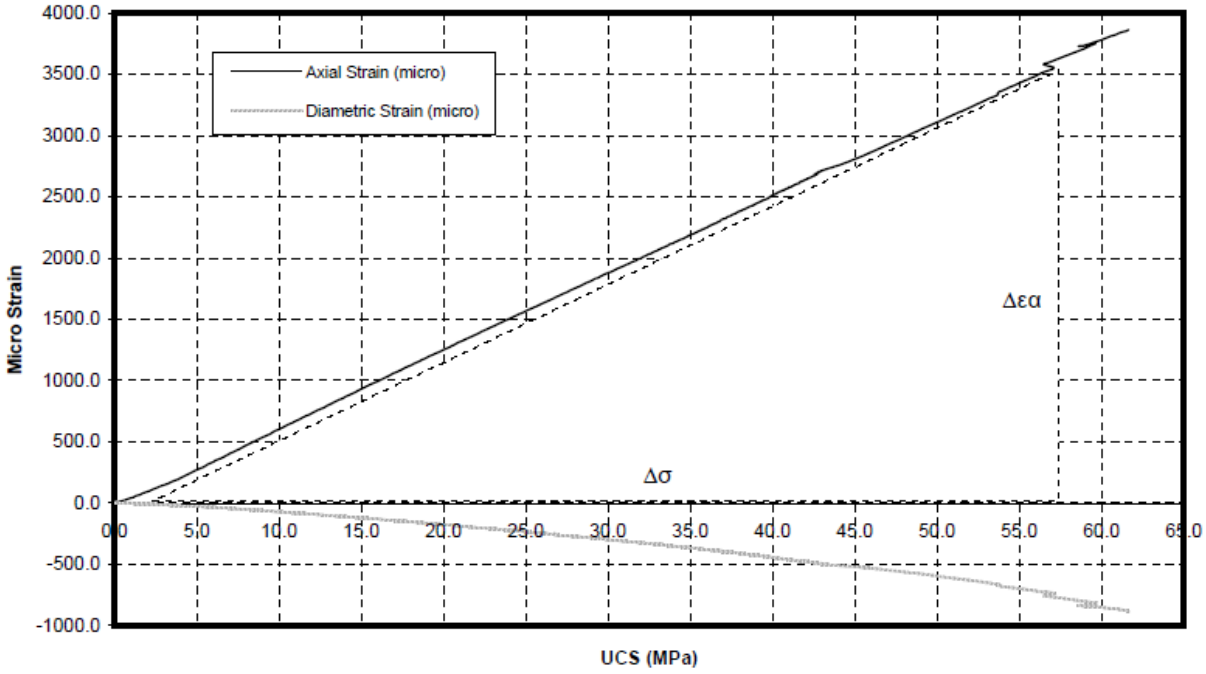
Method of Young's modulus determination - Average Modulus of Linear Portion of Axial Stress-Strain Curve
Method of Poisson's ratio determination - slope of axial curve / slope of lateral curve
Young's modulus and poisson's ratio calculated between stress levels of 20.2MPa and 52.9MPa

BOREHOLE		BH04
CORE RUN		48935
DEPTH		25.19-25.41
SAMPLE DIAMETER	mm	81.94
SAMPLE HEIGHT	mm	186.81
WATER CONTENT	%	0.1
TEST CONDITION		As Received
RATE OF LOADING	kN/s	0.7
TEST DURATION	mm.sec	8.34
DATE OF TESTING		25/01/2016
LOAD FRAME USED		2000kN
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Perpendicular
YOUNG'S MODULUS *E* (AVERAGE)	GPa	15.68
POISSON'S RATIO *v*		0.20
UNCONFINED COMPRESSIVE STRENGTH	MPa	64.1

SAMPLE FAILURE SHAPES



Axial & Diametric Stress / Strain Curves

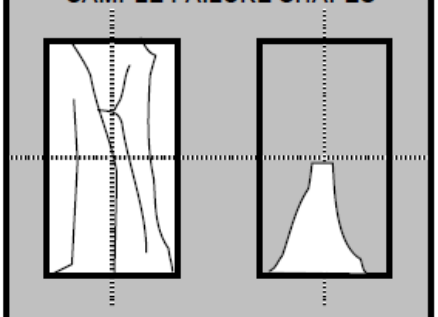


Test Notes:

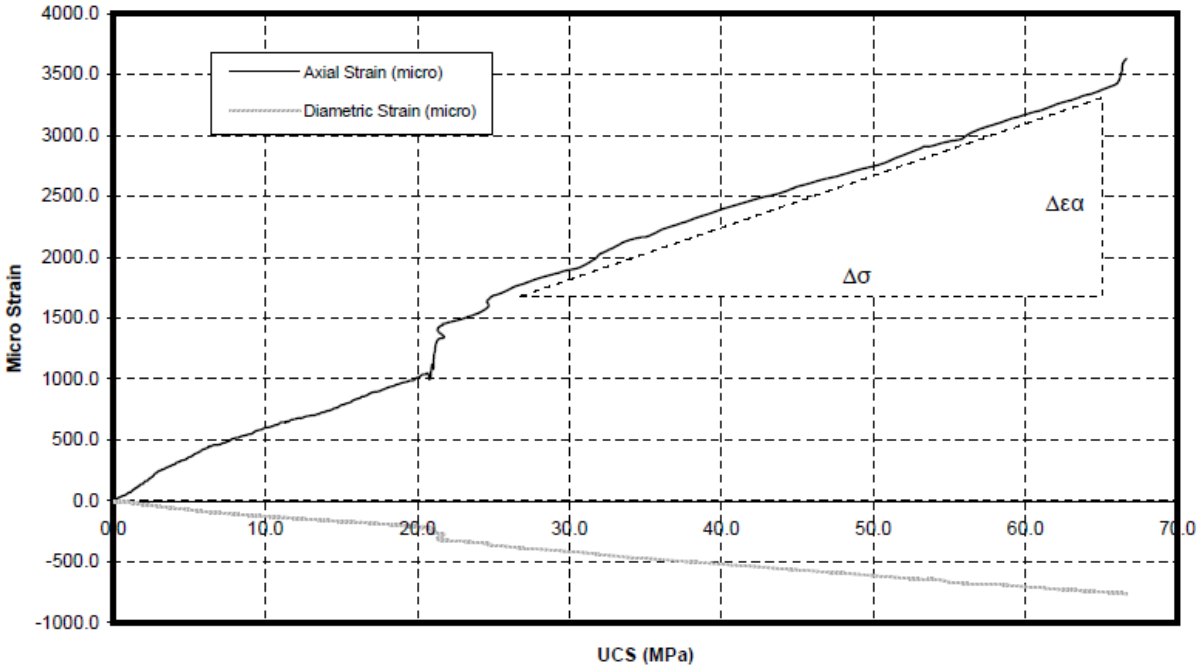
Method of Young's modulus determination - Average Modulus of Linear Portion of Axial Stress-Strain Curve
Method of Poisson's ratio determination - slope of axial curve / slope of lateral curve
Young's modulus and poisson's ratio calculated between stress levels of 2MPa and 57.5MPa

BOREHOLE		BH04
CORE RUN		48966
DEPTH		33.20-33.48
SAMPLE DIAMETER	mm	82.14
SAMPLE HEIGHT	mm	184.83
WATER CONTENT	%	0.1
TEST CONDITION		As Received
RATE OF LOADING	kN/s	1.1
TEST DURATION	mm.sec	5.11
DATE OF TESTING		25/01/2016
LOAD FRAME USED		2000kN
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Perpendicular
YOUNG'S MODULUS *E* (AVERAGE)	GPa	23.77
POISSON'S RATIO *v*		0.23
UNCONFINED COMPRESSIVE STRENGTH	MPa	66.5

SAMPLE FAILURE SHAPES



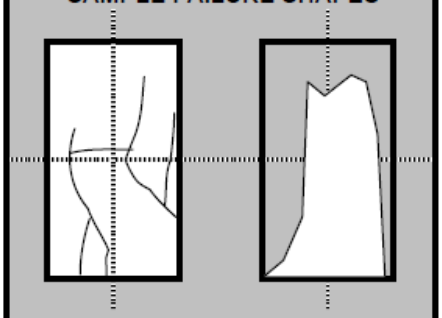
Axial & Diametric Stress / Strain Curves



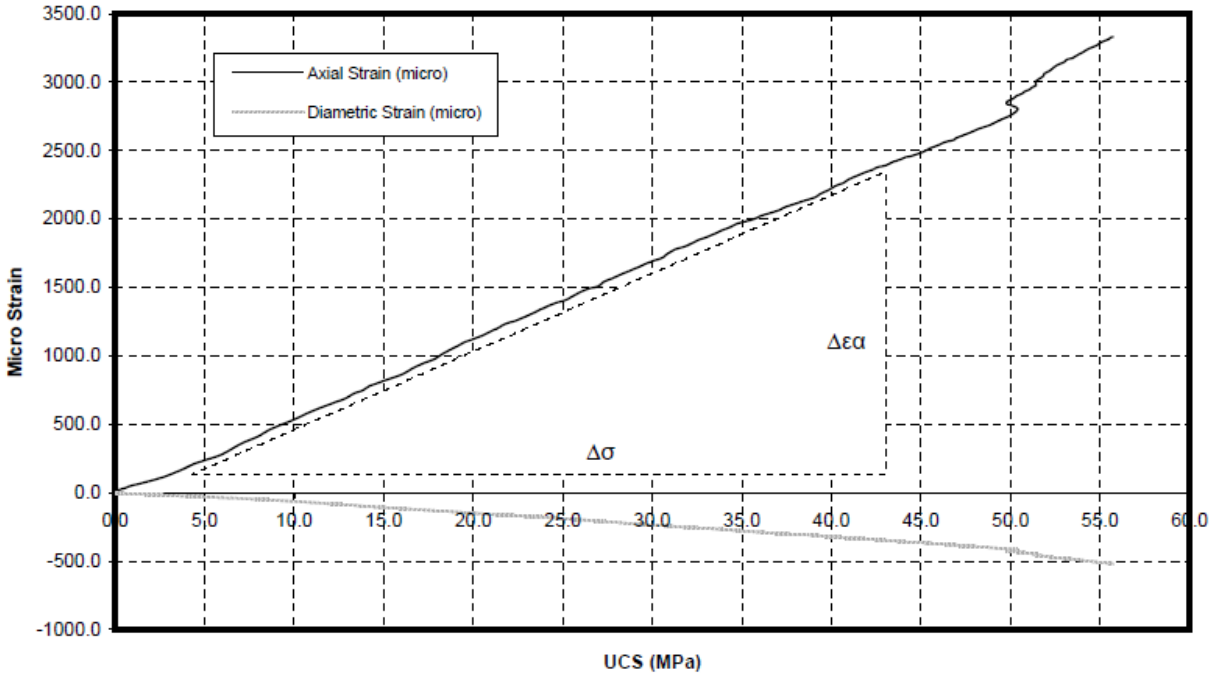
Test Notes:
Method of Young's modulus determination - Average Modulus of Linear Portion of Axial Stress-Strain Curve
Method of Poisson's ratio determination - slope of axial curve / slope of lateral curve
Young's modulus and poisson's ratio calculated between stress levels of 25.9MPa and 65.1MPa

BOREHOLE		BH05
CORE RUN		48996
DEPTH		15.95-16.22
SAMPLE DIAMETER	mm	82.33
SAMPLE HEIGHT	mm	187.90
WATER CONTENT	%	0.2
TEST CONDITION		As Received
RATE OF LOADING	kN/s	0.5
TEST DURATION	mm.sec	9.58
DATE OF TESTING		21/01/2016
LOAD FRAME USED		2000kN
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Perpendicular
YOUNG'S MODULUS *E* (AVERAGE)	GPa	17.68
POISSON'S RATIO *v*		0.15
UNCONFINED COMPRESSIVE STRENGTH	MPa	57.0

SAMPLE FAILURE SHAPES



Axial & Diametric Stress / Strain Curves



Test Notes:

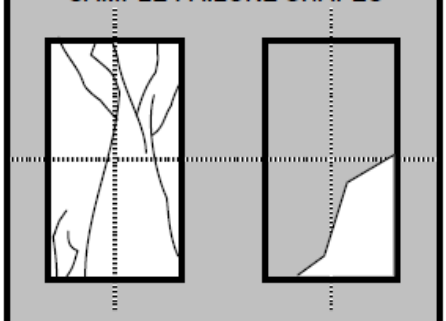
Method of Young's modulus determination - Average Modulus of Linear Portion of Axial Stress-Strain Curve

Method of Poisson's ratio determination - slope of axial curve / slope of lateral curve

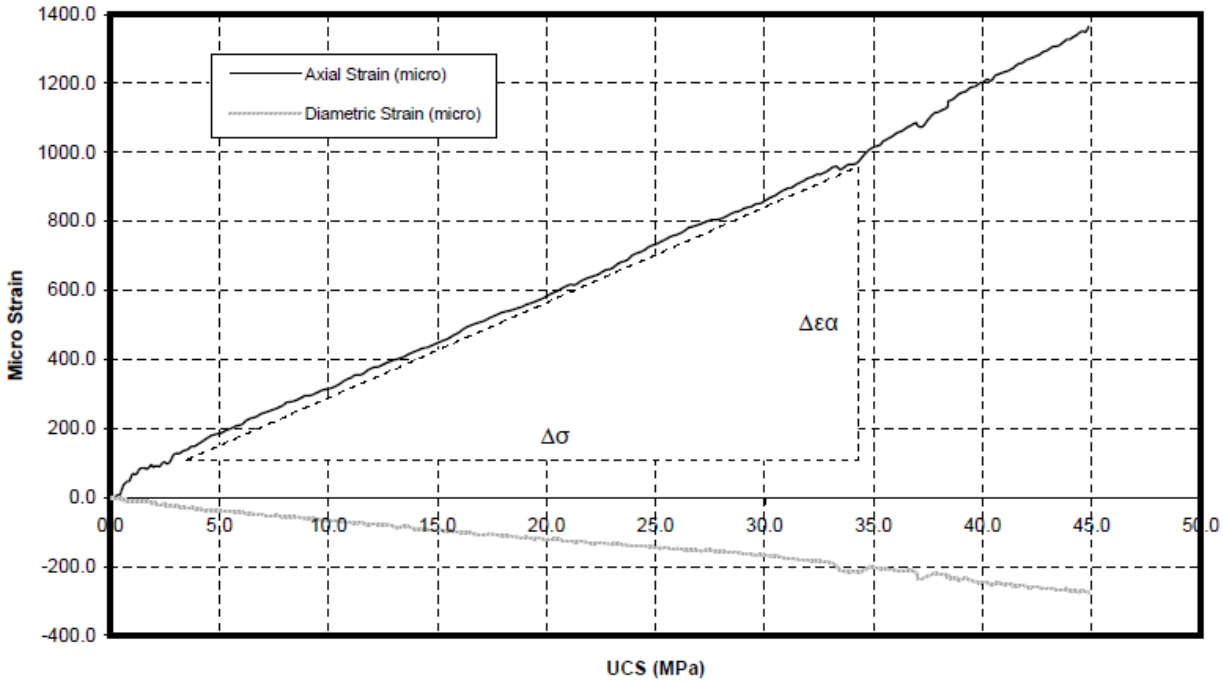
Young's modulus and poisson's ratio calculated between stress levels of 3.6MPa and 43MPa

BOREHOLE		BH05
CORE RUN		50706
DEPTH		24.05-24.30
SAMPLE DIAMETER	mm	81.06
SAMPLE HEIGHT	mm	187.95
WATER CONTENT	%	0.1
TEST CONDITION		As Received
RATE OF LOADING	kN/s	0.7
TEST DURATION	mm.sec	5.38
DATE OF TESTING		24/01/2016
LOAD FRAME USED		2000kN
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Perpendicular
YOUNG'S MODULUS *E* (AVERAGE)	GPa	36.97
POISSON'S RATIO *v*		0.20
UNCONFINED COMPRESSIVE STRENGTH	MPa	44.9

SAMPLE FAILURE SHAPES



Axial & Diametric Stress / Strain Curves

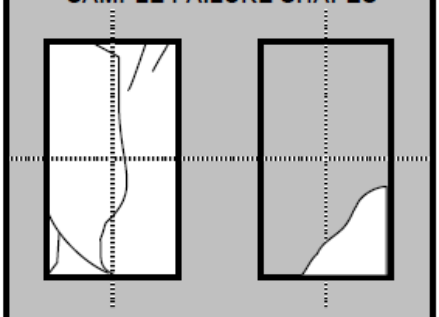


Test Notes:

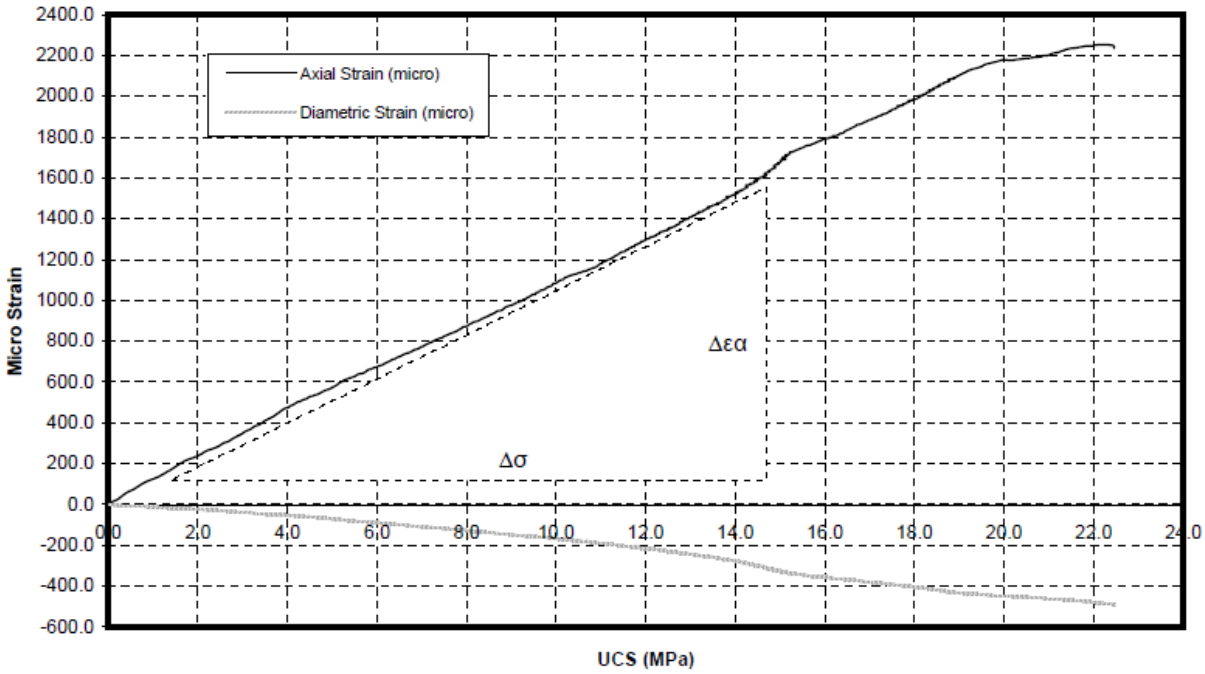
Method of Young's modulus determination - Average Modulus of Linear Portion of Axial Stress-Strain Curve
Method of Poisson's ratio determination - slope of axial curve / slope of lateral curve
Young's modulus and poisson's ratio calculated between stress levels of 3.1MPa and 34.3MPa

BOREHOLE		BH05
CORE RUN		50708
DEPTH		25.20-25.40
SAMPLE DIAMETER	mm	82.08
SAMPLE HEIGHT	mm	190.12
WATER CONTENT	%	0.1
TEST CONDITION		As Received
RATE OF LOADING	kN/s	0.6
TEST DURATION	mm.sec	3.21
DATE OF TESTING		25/01/2016
LOAD FRAME USED		2000kN
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Perpendicular
YOUNG'S MODULUS *E* (AVERAGE)	GPa	9.10
POISSON'S RATIO *v*		0.21
UNCONFINED COMPRESSIVE STRENGTH	MPa	22.6

SAMPLE FAILURE SHAPES



Axial & Diametric Stress / Strain Curves



Test Notes:

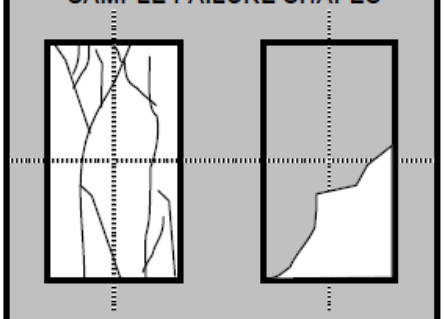
Method of Young's modulus determination - Average Modulus of Linear Portion of Axial Stress-Strain Curve

Method of Poisson's ratio determination - slope of axial curve / slope of lateral curve

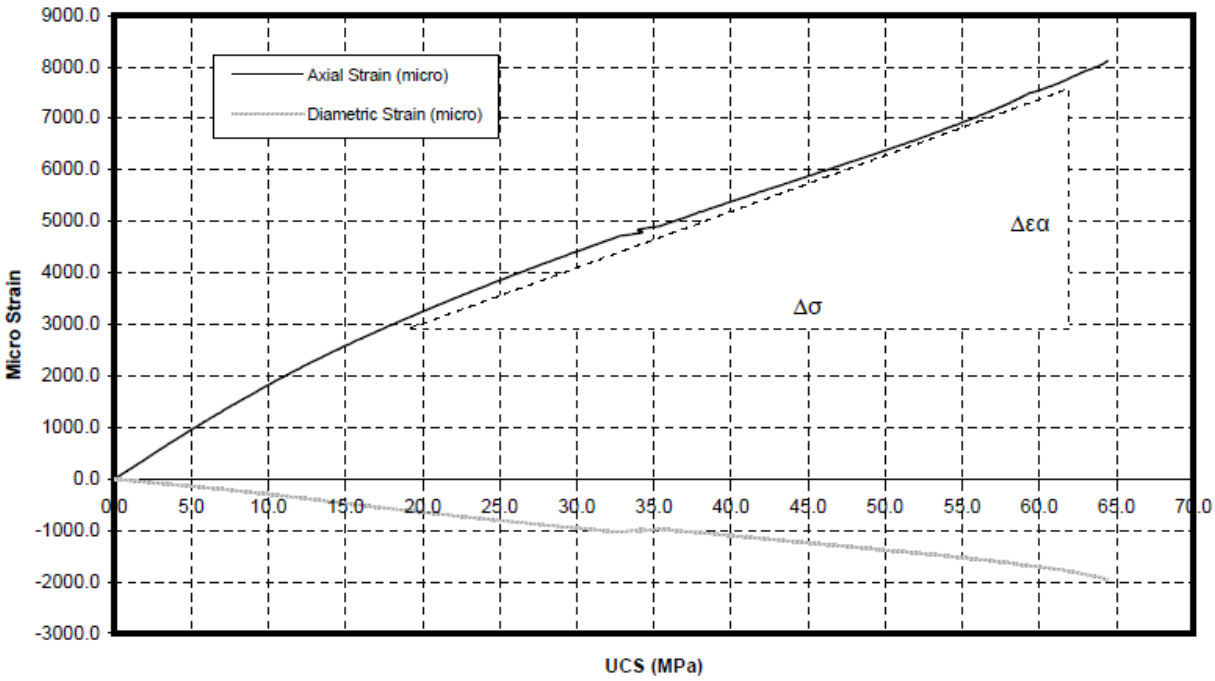
Young's modulus and poisson's ratio calculated between stress levels of 1.2MPa and 14.8MPa

BOREHOLE		BH05
CORE RUN		50710
DEPTH		26.12-26.35
SAMPLE DIAMETER	mm	79.70
SAMPLE HEIGHT	mm	181.09
WATER CONTENT	%	0.1
TEST CONDITION		As Received
RATE OF LOADING	kN/s	0.8
TEST DURATION	mm.sec	7.14
DATE OF TESTING		24/01/2016
LOAD FRAME USED		2000kN
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Perpendicular
YOUNG'S MODULUS *E* (AVERAGE)	GPa	9.18
POISSON'S RATIO *v*		0.24
UNCONFINED COMPRESSIVE STRENGTH	MPa	66.3

SAMPLE FAILURE SHAPES



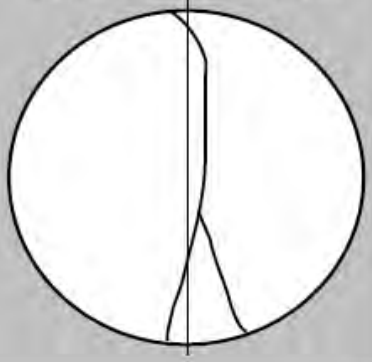
Axial & Diametric Stress / Strain Curves



Test Notes:
Method of Young's modulus determination - Average Modulus of Linear Portion of Axial Stress-Strain Curve
Method of Poisson's ratio determination - slope of axial curve / slope of lateral curve
Young's modulus and poisson's ratio calculated between stress levels of 18.8MPa and 62.4MPa

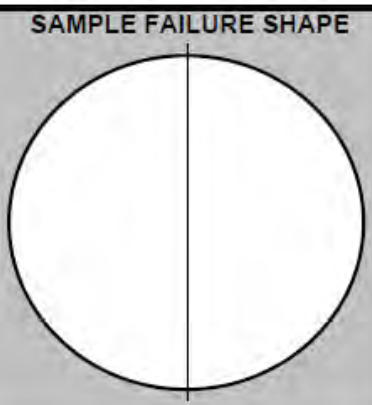
BOREHOLE		BH04
CORE RUN		48941
DEPTH		29.38-29.54
SAMPLE DIAMETER	mm	82.10
SAMPLE THICKNESS	mm	38.53
WATER CONTENT	%	0.1
DEGREE OF SATURATION	%	N/A
STRESS RATE	kN/s	1.90
TEST DURATION	secs	16
DATE OF TESTING		21-Jan-16
LOAD FRAME USED		Impact
ORIENTATION OF LOADING		Diam
TENSILE STRENGTH	MPa	5.97

SAMPLE FAILURE SHAPE



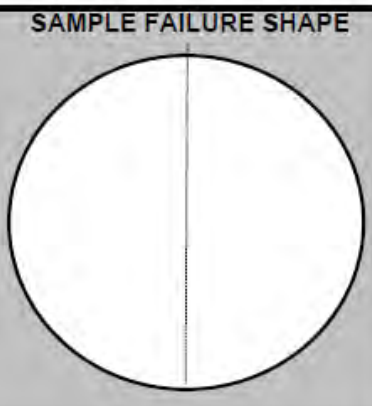
BOREHOLE		
CORE RUN		
DEPTH		
SAMPLE DIAMETER	mm	
SAMPLE THICKNESS	mm	
WATER CONTENT	%	
DEGREE OF SATURATION	%	
STRESS RATE	kN/s	
TEST DURATION	secs	
DATE OF TESTING		
LOAD FRAME USED		
ORIENTATION OF LOADING		
TENSILE STRENGTH	MPa	

SAMPLE FAILURE SHAPE



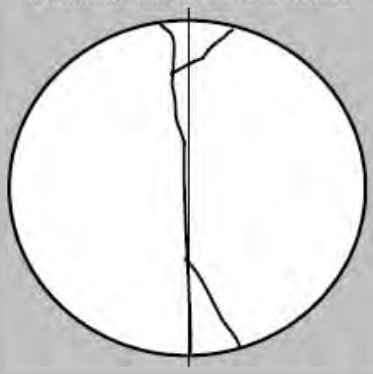
BOREHOLE		
CORE RUN		
DEPTH		
SAMPLE DIAMETER	mm	
SAMPLE THICKNESS	mm	
WATER CONTENT	%	
DEGREE OF SATURATION	%	
STRESS RATE	kN/s	
TEST DURATION	secs	
DATE OF TESTING		
LOAD FRAME USED		
ORIENTATION OF LOADING		
TENSILE STRENGTH	MPa	

SAMPLE FAILURE SHAPE



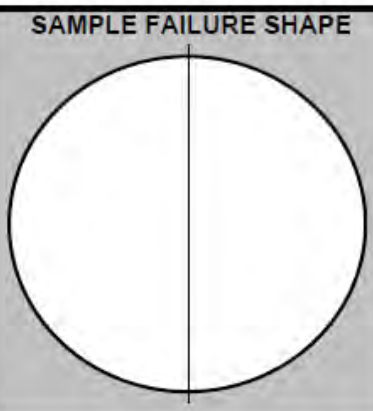
BOREHOLE		BH05
CORE RUN		50701
DEPTH		19.70-19.92
SAMPLE DIAMETER	mm	82.24
SAMPLE THICKNESS	mm	41.12
WATER CONTENT	%	0.2
DEGREE OF SATURATION	%	N/A
STRESS RATE	kN/s	0.80
TEST DURATION	secs	22
DATE OF TESTING		21-Jan-16
LOAD FRAME USED		Impact
ORIENTATION OF LOADING		Diam
TENSILE STRENGTH	MPa	3.39

SAMPLE FAILURE SHAPE



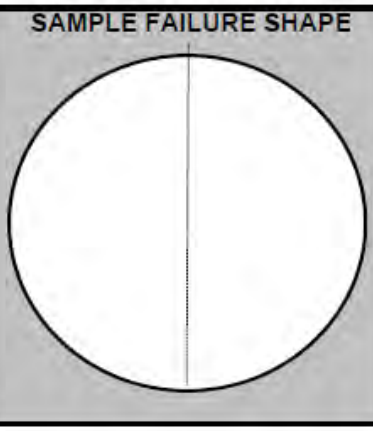
BOREHOLE		
CORE RUN		
DEPTH		
SAMPLE DIAMETER	mm	
SAMPLE THICKNESS	mm	
WATER CONTENT	%	
DEGREE OF SATURATION	%	
STRESS RATE	kN/s	
TEST DURATION	secs	
DATE OF TESTING		
LOAD FRAME USED		
ORIENTATION OF LOADING		
TENSILE STRENGTH	MPa	

SAMPLE FAILURE SHAPE



BOREHOLE		
CORE RUN		
DEPTH		
SAMPLE DIAMETER	mm	
SAMPLE THICKNESS	mm	
WATER CONTENT	%	
DEGREE OF SATURATION	%	
STRESS RATE	kN/s	
TEST DURATION	secs	
DATE OF TESTING		
LOAD FRAME USED		
ORIENTATION OF LOADING		
TENSILE STRENGTH	MPa	

SAMPLE FAILURE SHAPE



Priority Drilling Ltd.
Killimor
Ballinasloe
Co Galway
Ireland
8D23036i

Date: 29th March 2016
Test Report Ref. STR: 447866

LABORATORY TEST REPORT

TEST REQUIREMENTS: Unconfined compressive strength, elastic moduli & indirect tensile strength by Brazil.

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**Various**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test.:	**18/03/2016**
Sampling Location:	**Various**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Aggregate Type and Nominal Size:	**Rock Testing**
Target Specification:	**N/A**

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The work was carried out by our competent, sub contracted laboratory.

RESULTS

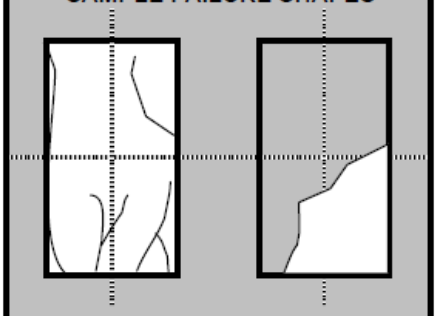
( ) E. R. Goulden
Technical Manager
Approved Signatories

( ) E. N. Jones
Soils Laboratory Manager

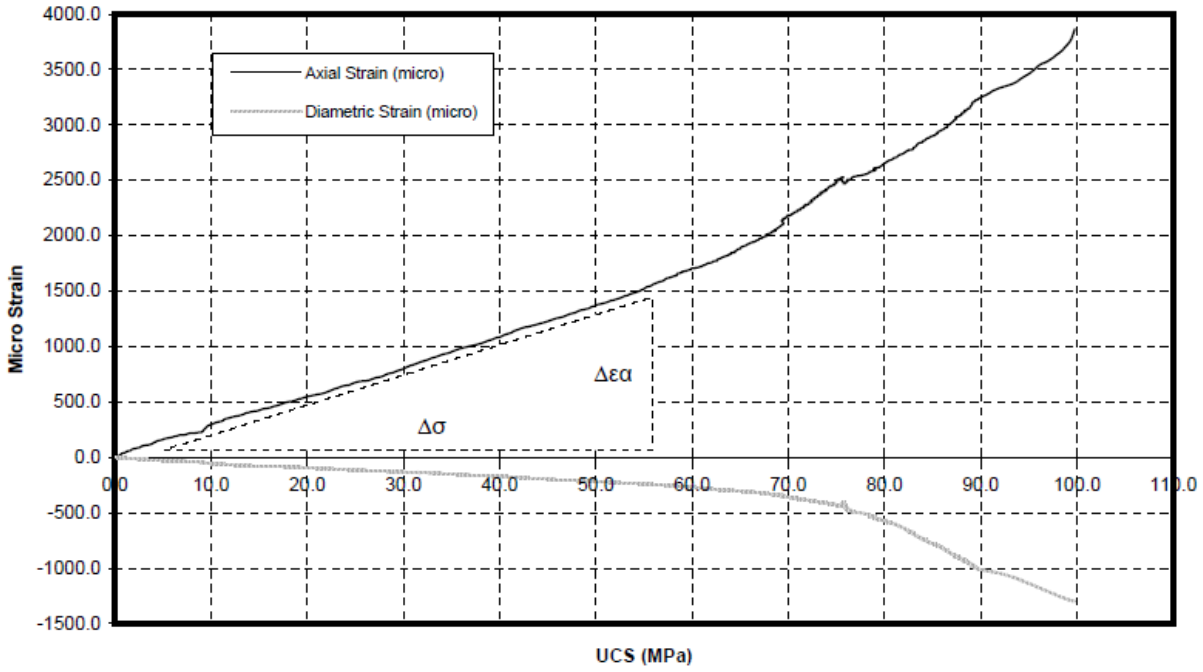
(✓) N Dumbarton
Assistant Laboratory Manager

BOREHOLE		BH01
CORE RUN		48867
DEPTH		11.57-11.94
SAMPLE DIAMETER	mm	61.08
SAMPLE HEIGHT	mm	137.42
WATER CONTENT	%	0.2
TEST CONDITION		As Received
RATE OF LOADING	kN/s	0.6
TEST DURATION	mm.sec	8.18
DATE OF TESTING		22/03/2016
LOAD FRAME USED		2000kN
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Perpendicular
YOUNG'S MODULUS *E* (AVERAGE)	GPa	36.46
POISSON'S RATIO *v*		0.15
UNCONFINED COMPRESSIVE STRENGTH	MPa	99.8

SAMPLE FAILURE SHAPES



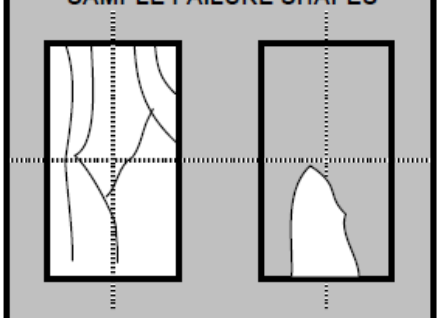
Axial & Diametric Stress / Strain Curves



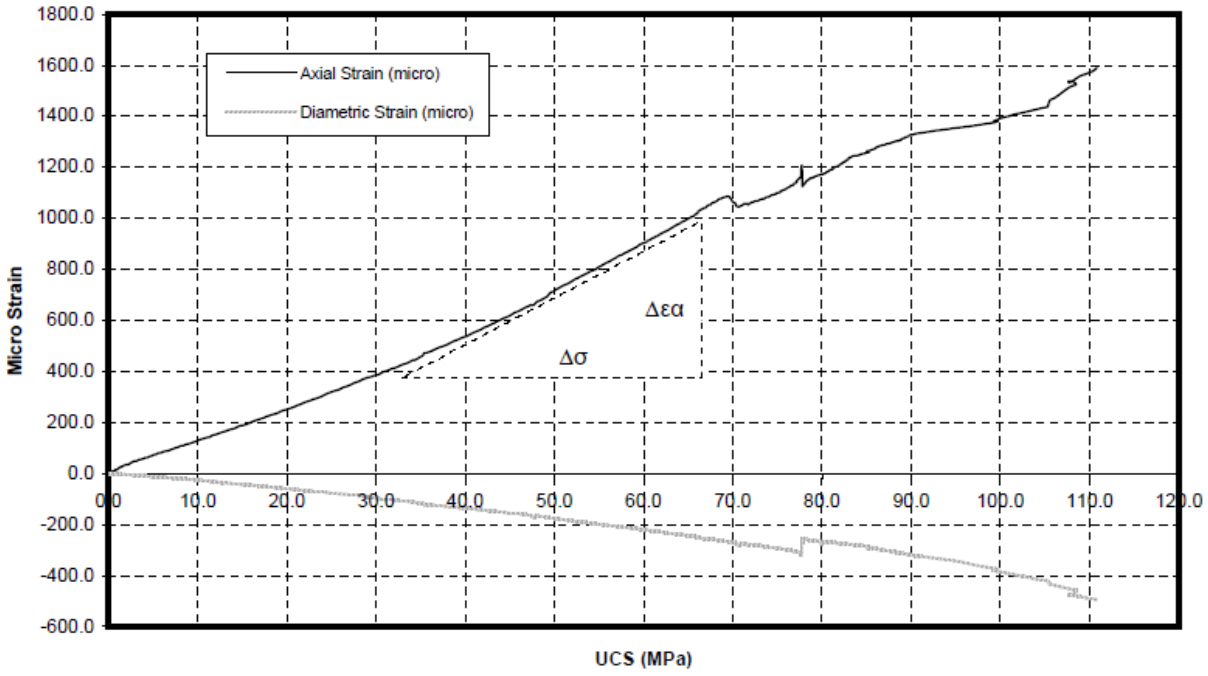
Test Notes:
Method of Young's modulus determination - Average Modulus of Linear Portion of Axial Stress-Strain Curve
Method of Poisson's ratio determination - slope of axial curve / slope of lateral curve
Young's modulus and poisson's ratio calculated between stress levels of 4.4MPa and 56MPa

BOREHOLE		BH01
CORE RUN		48880
DEPTH		27.85-28.15
SAMPLE DIAMETER	mm	61.32
SAMPLE HEIGHT	mm	135.90
WATER CONTENT	%	0.1
TEST CONDITION		As Received
RATE OF LOADING	kN/s	0.7
TEST DURATION	mm.sec	8.18
DATE OF TESTING		22/03/2016
LOAD FRAME USED		2000kN
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Perpendicular
YOUNG'S MODULUS *E* (AVERAGE)	GPa	55.37
POISSON'S RATIO *v*		0.23
UNCONFINED COMPRESSIVE STRENGTH	MPa	112.4

SAMPLE FAILURE SHAPES



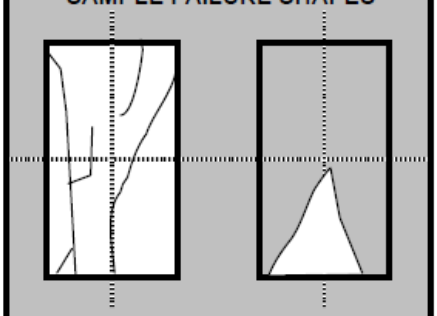
Axial & Diametric Stress / Strain Curves



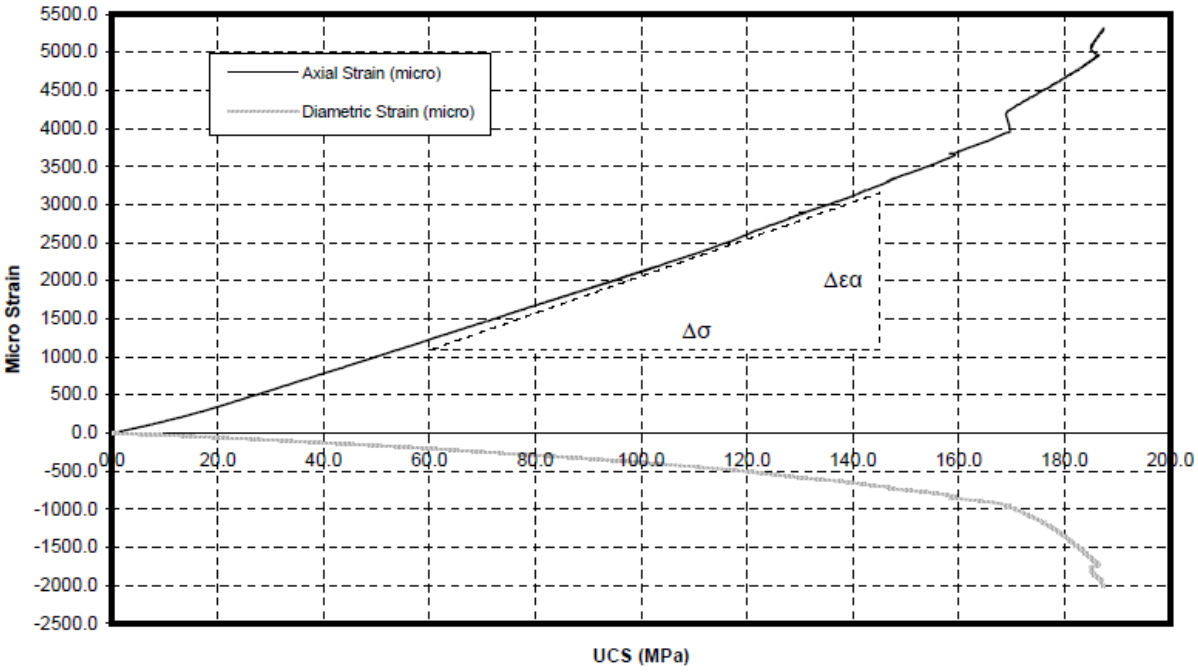
Test Notes:
Method of Young's modulus determination - Average Modulus of Linear Portion of Axial Stress-Strain Curve
Method of Poisson's ratio determination - slope of axial curve / slope of lateral curve
Young's modulus and poisson's ratio calculated between stress levels of 32MPa and 66.7MPa

BOREHOLE		BH01
CORE RUN		48890
DEPTH		48.90-49.16
SAMPLE DIAMETER	mm	61.11
SAMPLE HEIGHT	mm	136.32
WATER CONTENT	%	0.1
TEST CONDITION		As Received
RATE OF LOADING	kN/s	0.7
TEST DURATION	mm.sec	12.58
DATE OF TESTING		22/03/2016
LOAD FRAME USED		2000kN
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Perpendicular
YOUNG'S MODULUS *E* (AVERAGE)	GPa	42.01
POISSON'S RATIO *v*		0.24
UNCONFINED COMPRESSIVE STRENGTH	MPa	187.5

SAMPLE FAILURE SHAPES



Axial & Diametric Stress / Strain Curves

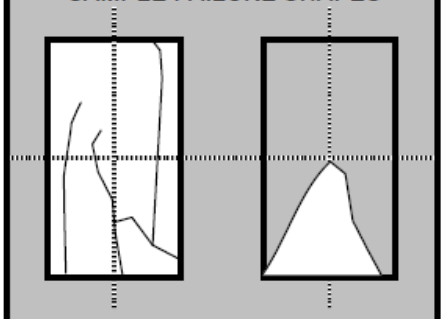


Test Notes:

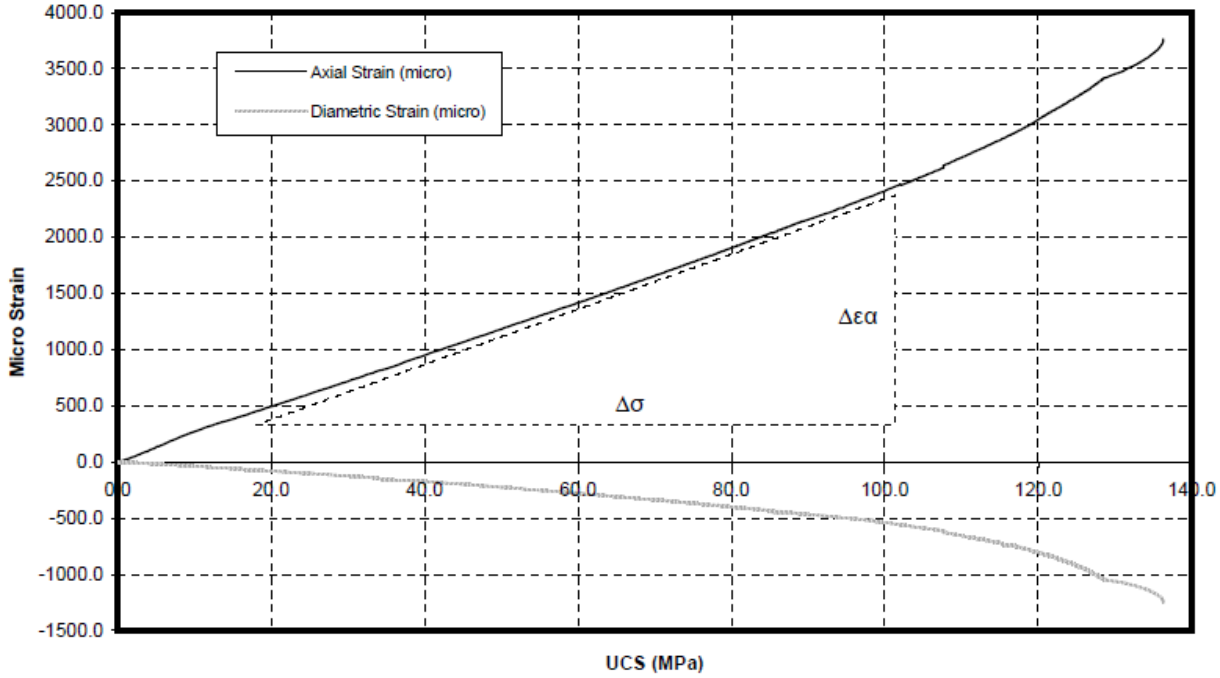
Method of Young's modulus determination - Average Modulus of Linear Portion of Axial Stress-Strain Curve
Method of Poisson's ratio determination - slope of axial curve / slope of lateral curve
Young's modulus and poisson's ratio calculated between stress levels of 58.6MPa and 145.9MPa

BOREHOLE		BH01
CORE RUN		50869
DEPTH		72.10-72.30
SAMPLE DIAMETER	mm	60.91
SAMPLE HEIGHT	mm	134.09
WATER CONTENT	%	0.1
TEST CONDITION		As Received
RATE OF LOADING	kN/s	0.6
TEST DURATION	mm.sec	10.36
DATE OF TESTING		22/03/2016
LOAD FRAME USED		2000kN
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Perpendicular
YOUNG'S MODULUS *E* (AVERAGE)	GPa	41.60
POISSON'S RATIO *v*		0.24
UNCONFINED COMPRESSIVE STRENGTH	MPa	136.3

SAMPLE FAILURE SHAPES



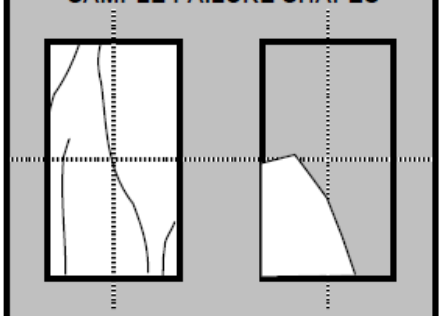
Axial & Diametric Stress / Strain Curves



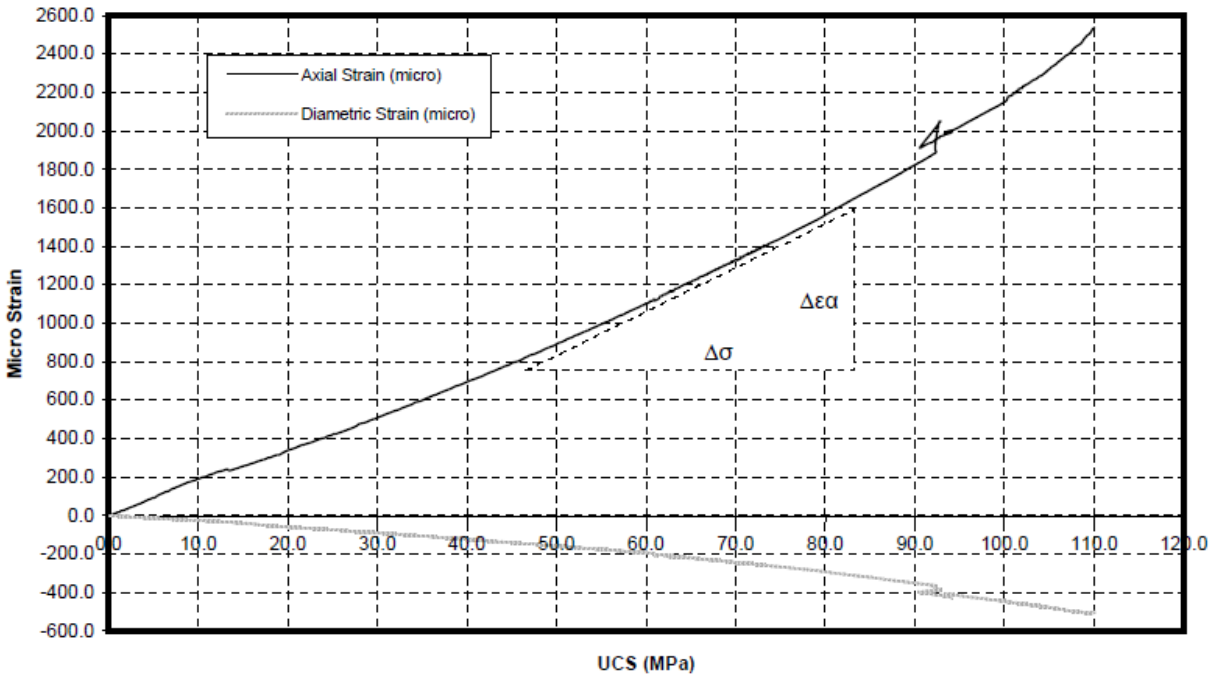
Test Notes:
Method of Young's modulus determination - Average Modulus of Linear Portion of Axial Stress-Strain Curve
Method of Poisson's ratio determination - slope of axial curve / slope of lateral curve
Young's modulus and poisson's ratio calculated between stress levels of 16.8MPa and 102.1MPa

BOREHOLE		BH01
CORE RUN		50890
DEPTH		97.95-98.23
SAMPLE DIAMETER	mm	61.07
SAMPLE HEIGHT	mm	135.52
WATER CONTENT	%	0.1
TEST CONDITION		As Received
RATE OF LOADING	kN/s	0.7
TEST DURATION	mm.sec	7.5
DATE OF TESTING		22/03/2016
LOAD FRAME USED		2000kN
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Perpendicular
YOUNG'S MODULUS *E* (AVERAGE)	GPa	44.43
POISSON'S RATIO *v*		0.20
UNCONFINED COMPRESSIVE STRENGTH	MPa	110.0

SAMPLE FAILURE SHAPES



Axial & Diametric Stress / Strain Curves

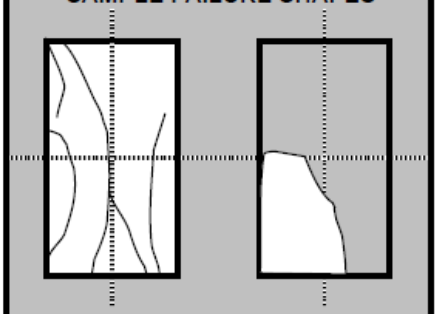


Test Notes:

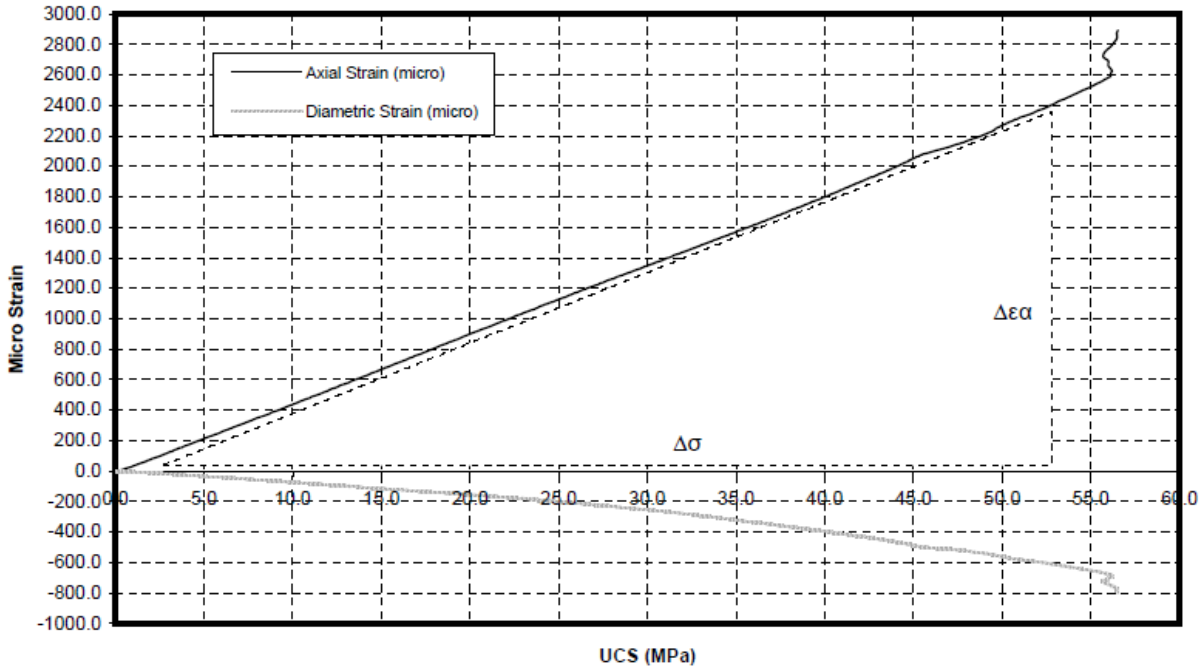
Method of Young's modulus determination - Average Modulus of Linear Portion of Axial Stress-Strain Curve
Method of Poisson's ratio determination - slope of axial curve / slope of lateral curve
Young's modulus and poisson's ratio calculated between stress levels of 45.6MPa and 83.4MPa

BOREHOLE		BH01
CORE RUN		50921
DEPTH		140.00-140.20
SAMPLE DIAMETER	mm	61.10
SAMPLE HEIGHT	mm	135.31
WATER CONTENT	%	0.1
TEST CONDITION		As Received
RATE OF LOADING	kN/s	0.7
TEST DURATION	mm.sec	4.05
DATE OF TESTING		22/03/2016
LOAD FRAME USED		2000kN
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Perpendicular
YOUNG'S MODULUS *E* (AVERAGE)	GPa	21.81
POISSON'S RATIO *v*		0.25
UNCONFINED COMPRESSIVE STRENGTH	MPa	58.7

SAMPLE FAILURE SHAPES



Axial & Diametric Stress / Strain Curves

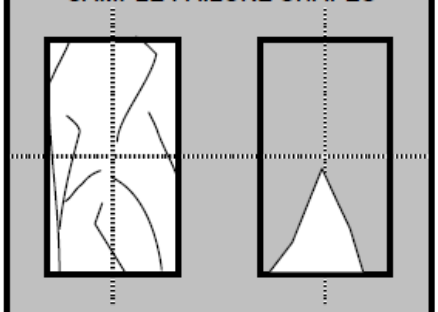


Test Notes:

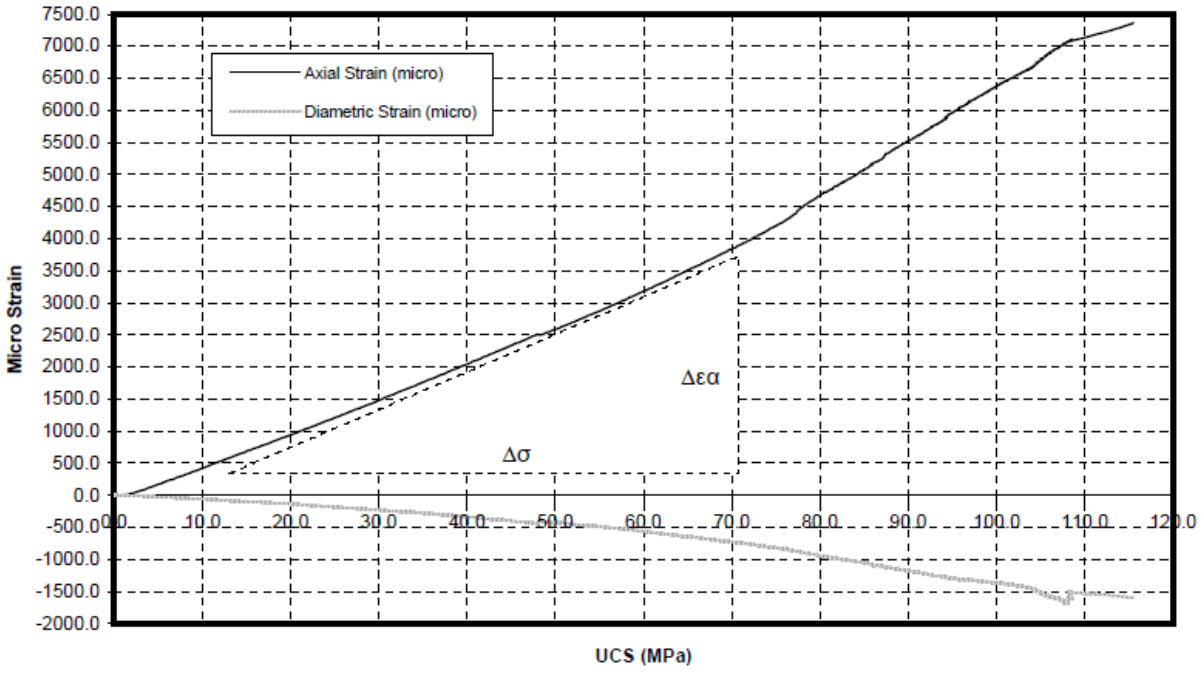
Method of Young's modulus determination - Average Modulus of Linear Portion of Axial Stress-Strain Curve
Method of Poisson's ratio determination - slope of axial curve / slope of lateral curve
Young's modulus and poisson's ratio calculated between stress levels of 2.3MPa and 53MPa

BOREHOLE		BH01
CORE RUN		50950
DEPTH		183.17-183.40
SAMPLE DIAMETER	mm	61.20
SAMPLE HEIGHT	mm	136.93
WATER CONTENT	%	0.1
TEST CONDITION		As Received
RATE OF LOADING	kN/s	0.9
TEST DURATION	mm.sec	6.55
DATE OF TESTING		22/03/2016
LOAD FRAME USED		2000kN
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Perpendicular
YOUNG'S MODULUS *E* (AVERAGE)	GPa	17.44
POISSON'S RATIO *v*		0.20
UNCONFINED COMPRESSIVE STRENGTH	MPa	118.6

SAMPLE FAILURE SHAPES



Axial & Diametric Stress / Strain Curves

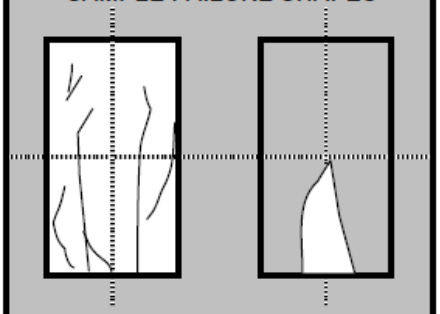


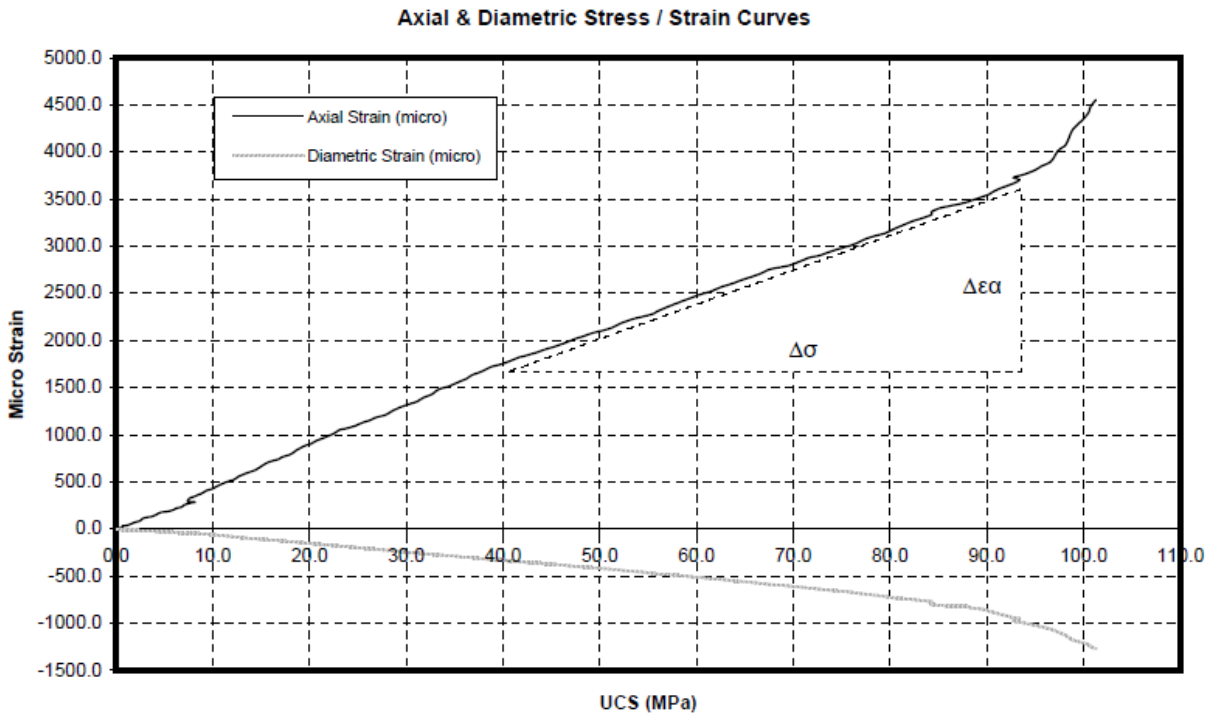
Test Notes:

Method of Young's modulus determination - Average Modulus of Linear Portion of Axial Stress-Strain Curve
Method of Poisson's ratio determination - slope of axial curve / slope of lateral curve
Young's modulus and poisson's ratio calculated between stress levels of 12.4MPa and 70.7MPa

BOREHOLE		BH01
CORE RUN		50973
DEPTH		212.33-212.58
SAMPLE DIAMETER	mm	61.08
SAMPLE HEIGHT	mm	136.48
WATER CONTENT	%	0.1
TEST CONDITION		As Received
RATE OF LOADING	kN/s	0.7
TEST DURATION	mm.sec	7.33
DATE OF TESTING		22/03/2016
LOAD FRAME USED		2000kN
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Perpendicular
YOUNG'S MODULUS *E* (AVERAGE)	GPa	26.89
POISSON'S RATIO *v*		0.31
UNCONFINED COMPRESSIVE STRENGTH	MPa	104.7

SAMPLE FAILURE SHAPES



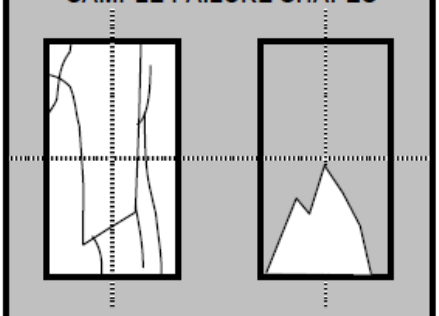


Test Notes:

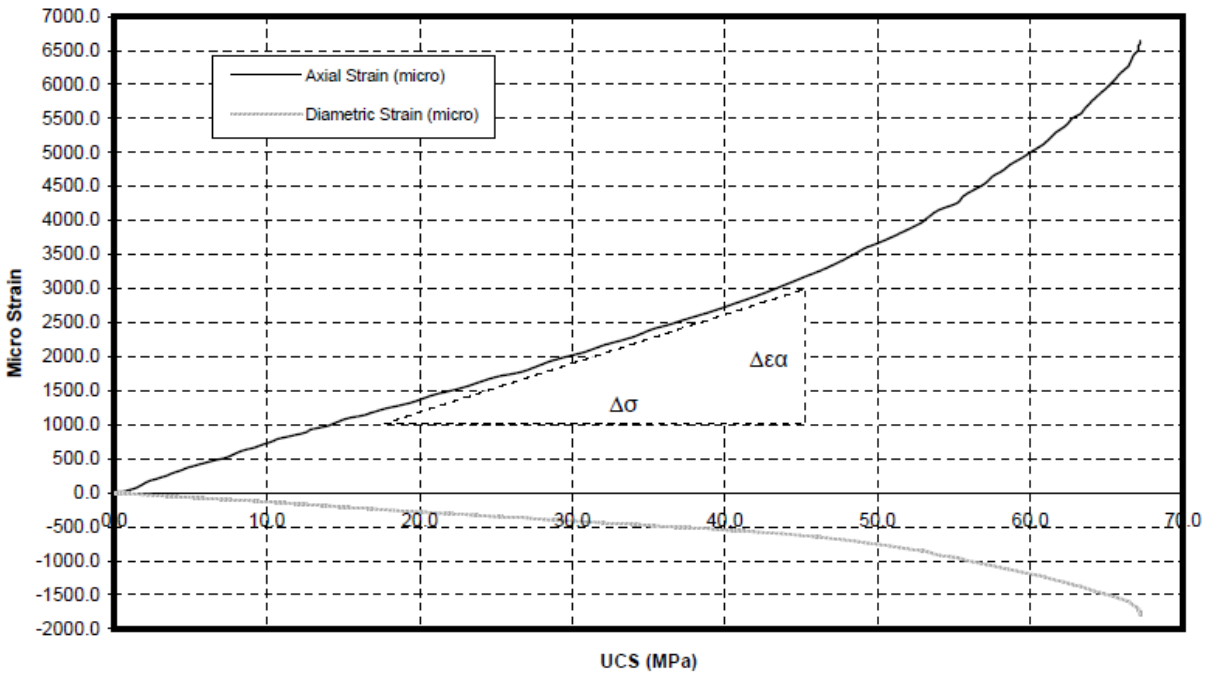
Method of Young's modulus determination - Average Modulus of Linear Portion of Axial Stress-Strain Curve
Method of Poisson's ratio determination - slope of axial curve / slope of lateral curve
Young's modulus and poisson's ratio calculated between stress levels of 39.7MPa and 93.4MPa

BOREHOLE		BH01
CORE RUN		50988
DEPTH		232.46-232.60
SAMPLE DIAMETER	mm	60.90
SAMPLE HEIGHT	mm	125.20
WATER CONTENT	%	0.2
TEST CONDITION		As Received
RATE OF LOADING	kN/s	0.4
TEST DURATION	mm.sec	8.19
DATE OF TESTING		22/03/2016
LOAD FRAME USED		2000kN
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Perpendicular
YOUNG'S MODULUS *E* (AVERAGE)	GPa	14.17
POISSON'S RATIO *v*		0.19
UNCONFINED COMPRESSIVE STRENGTH	MPa	69.6

SAMPLE FAILURE SHAPES



Axial & Diametric Stress / Strain Curves

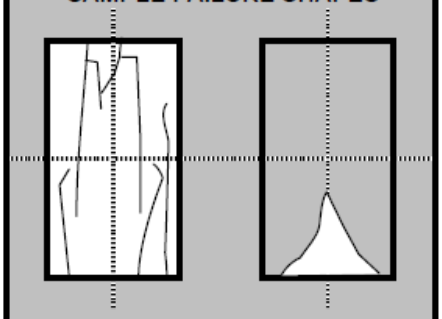


Test Notes:

Method of Young's modulus determination - Average Modulus of Linear Portion of Axial Stress-Strain Curve
Method of Poisson's ratio determination - slope of axial curve / slope of lateral curve
Young's modulus and poisson's ratio calculated between stress levels of 16.8MPa and 45.4MPa

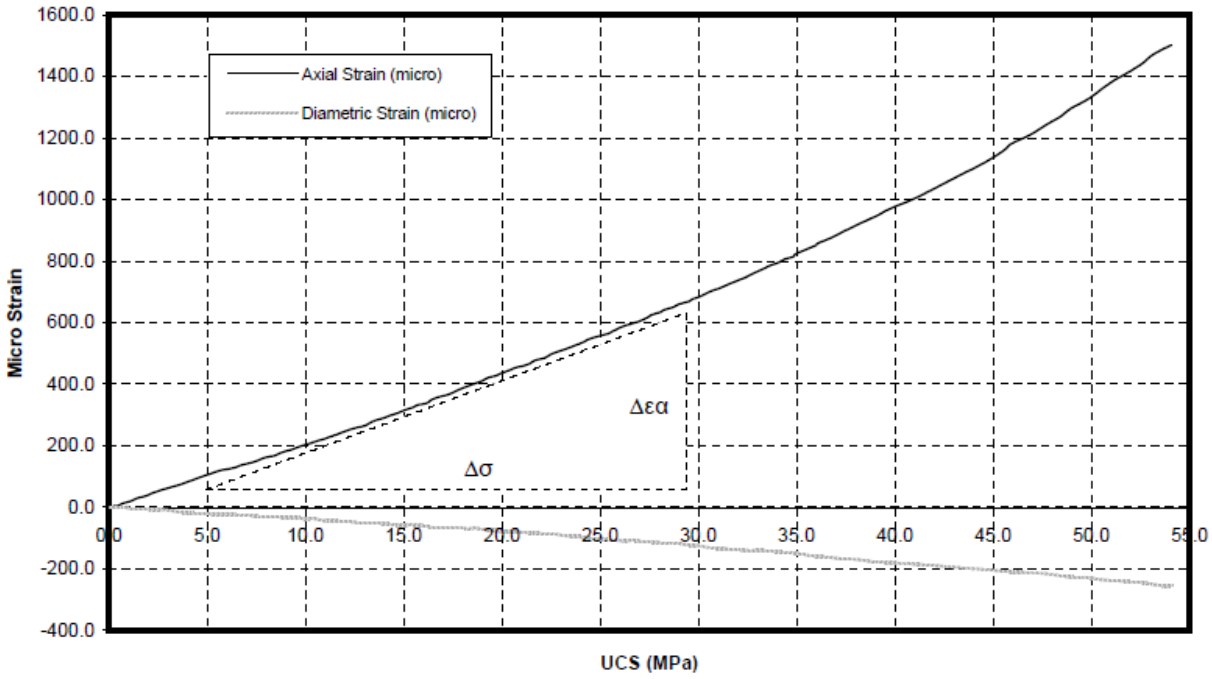
BOREHOLE		BH01
CORE RUN		50996
DEPTH		250.30-250.56
SAMPLE DIAMETER	mm	60.88
SAMPLE HEIGHT	mm	126.80
WATER CONTENT	%	0.1
TEST CONDITION		As Received
RATE OF LOADING	kN/s	0.7
TEST DURATION	mm.sec	4.17
DATE OF TESTING		22/03/2016
LOAD FRAME USED		2000kN
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		Perpendicular
YOUNG'S MODULUS *E* (AVERAGE)	GPa	43.34
POISSON'S RATIO *v*		0.18
UNCONFINED COMPRESSIVE STRENGTH	MPa	56.4

SAMPLE FAILURE SHAPES



External Internal

Axial & Diametric Stress / Strain Curves



Test Notes:

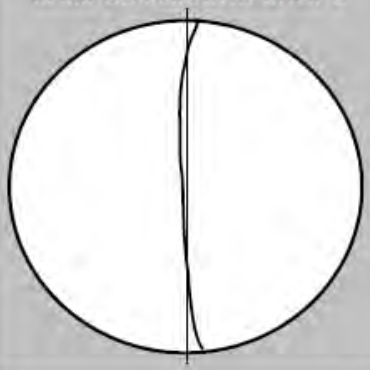
Method of Young's modulus determination - Average Modulus of Linear Portion of Axial Stress-Strain Curve

Method of Poisson's ratio determination - slope of axial curve / slope of lateral curve

Young's modulus and poisson's ratio calculated between stress levels of 5MPa and 29MPa

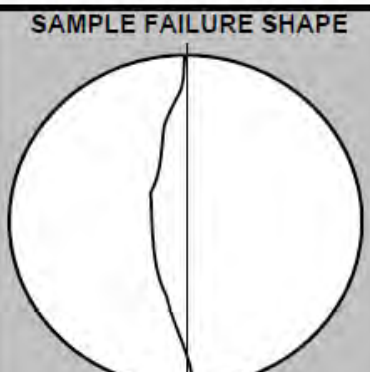
BOREHOLE		BH01
CORE RUN		50858
DEPTH		64.20-64.50
SAMPLE DIAMETER	mm	60.97
SAMPLE THICKNESS	mm	30.76
WATER CONTENT	%	0.3
DEGREE OF SATURATION	%	N/A
STRESS RATE	kN/s	1.10
TEST DURATION	secs	20
DATE OF TESTING		21-Mar-16
LOAD FRAME USED		2000kN
ORIENTATION OF LOADING		Diam
TENSILE STRENGTH	MPa	7.80

SAMPLE FAILURE SHAPE



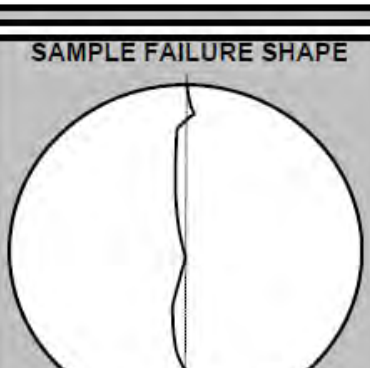
BOREHOLE		BH01
CORE RUN		50892
DEPTH		102.90-103.20
SAMPLE DIAMETER	mm	61.19
SAMPLE THICKNESS	mm	30.52
WATER CONTENT	%	0.1
DEGREE OF SATURATION	%	N/A
STRESS RATE	kN/s	1.50
TEST DURATION	secs	24
DATE OF TESTING		21-Mar-16
LOAD FRAME USED		2000kN
ORIENTATION OF LOADING		Diam
TENSILE STRENGTH	MPa	12.60

SAMPLE FAILURE SHAPE



BOREHOLE		BH01
CORE RUN		50948
DEPTH		180.24-180.50
SAMPLE DIAMETER	mm	61.51
SAMPLE THICKNESS	mm	30.46
WATER CONTENT	%	3.9
DEGREE OF SATURATION	%	N/A
STRESS RATE	kN/s	1.7
TEST DURATION	secs	26
DATE OF TESTING		21-Mar-16
LOAD FRAME USED		2000kN
ORIENTATION OF LOADING		Diam
TENSILE STRENGTH	MPa	14.60

SAMPLE FAILURE SHAPE



Frost Heave

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Date: 16 March 2016
Test Report Ref: STR 448032

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Frost Heave of Unbound Aggregate in accordance with **BS 812: Part 124: 2009 - Annex B (Use of Comparator Specimens)**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**Bulk Samples**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**24/02/2016**
Sampling Location:	**Unknown**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Aggregate**
Target Specification	**SHW Series 800: clause 801.8**

RESULTS:

Were any unrepresentative lumps present? No

Frost Heave Test Result:

Maximum Heave Observed in 96 hours (mm)		
Comparator Specimen 1	11.5	(nearest 0.5mm)
Comparator Specimen 2	12.0	(nearest 0.5mm)
Comparator Specimen 3	12.0	(nearest 0.5mm)
Mean	**11.8**	(nearest 0.1mm)
Test Specimen 1	3.5	(nearest 0.5mm)
Test Specimen 2	2.0	(nearest 0.5mm)
Test Specimen 3	4.5	(nearest 0.5mm)
Mean Frost Heave	**3.3**	**(nearest 0.1mm)**

In accordance with SHW Series 800: clause 801.8 the sample is classified as being
Non Frost Susceptible (mean frost heave ≤ 15mm)

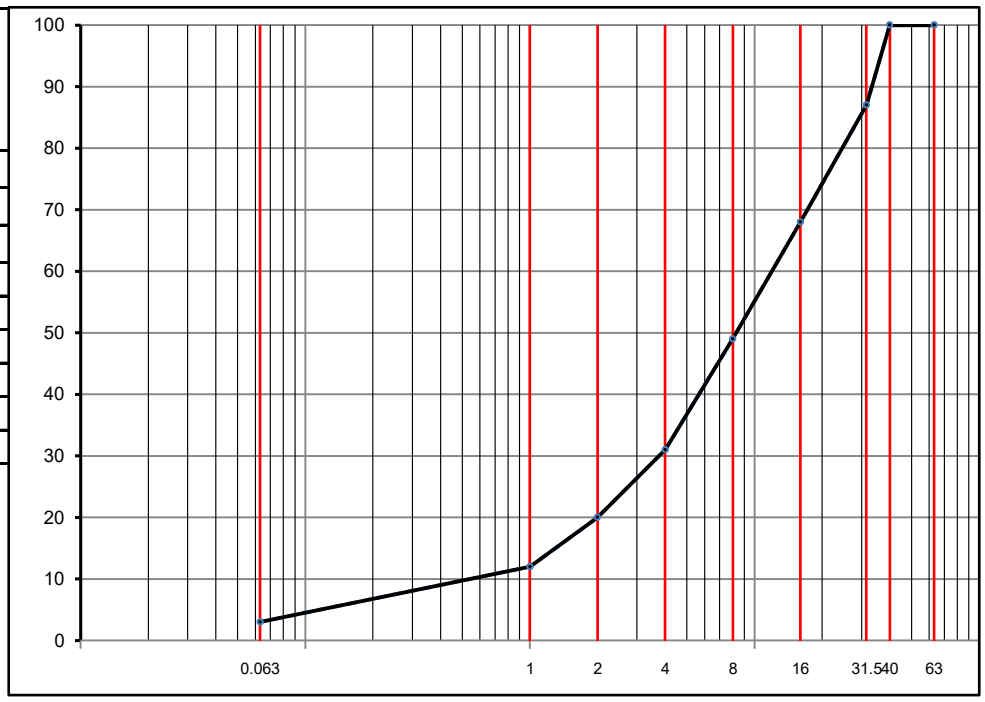
RESULTS CONTINUED:

Laboratory Dry Density & Water Content Test Result

Maximum Dry Density	2.18 Mg/m3
Optimum Water Content	6.5 %
Actual Dry Density	2.18 Mg/m3
Actual Water Content	6.5 %

Particle Size Distribution Test Result

BS Test Sieve Nominal Apperature	As Received Test Portion % Passing	Stable Test Portion % Passing
63.0 mm	100	100
40.0 mm	100	100
31.5 mm	87	87
16.0 mm	68	68
8.0 mm	49	49
4.0 mm	31	31
2.0 mm	20	20
1.0 mm	12	12
0.063 mm	3	3



Comments
None

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

Los Angeles Coefficient

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INDEPENDENT MATERIALS TESTING I DIAMOND DRILLING & SAWING

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Contract: Lackagh Quarry

Date: 29 February 2016
Test Report Ref: STR 448029

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Fragmentation of Aggregate - Los Angeles Test Method in accordance with **BS EN 1097-2: 2010**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**Bulk Sample**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**21/02/2016**
Sampling Location:	**Unknown**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Aggregate**
Target Specification:	**N/A**

RESULTS:

Size fraction from which the test portion was obtained: **14mm to 12.5mm**
12.5mm to 10.0mm

Los Angeles Coefficient (LA) = **28**

Comments
None

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

Magnesium Sulphate Soundness

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INDEPENDENT MATERIALS TESTING I DIAMOND DRILLING & SAWING

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Contract: Lackagh Quarry

Date: 29 February 2016
Test Report Ref: STR 448030

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Magnesium Sulfate Value of aggregate sample within the size range 10mm to 14mm in accordance with **BS EN 1367-2 : 2009**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**Bulk Sample**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**26/02/2016**
Sampling Location:	**Unknown**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Aggregate**
Target Specification:	**N/A**

RESULTS:

Magnesium Sulfate Value Portion 1 (MS_1) = 0.6
Magnesium Sulfate Value Portion 2 (MS_2) = 0.3

Mean Magnesium Sulfate Value (MS) = 1

Comments
Proportion by mass of laboratory sample used for the test portion = 5% (nearest 5%)

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

Moisture Content

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447817

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 48861**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:6.70 Depth Base:6.80**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = 1.2

Comments
None

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447830

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 48868**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:13.26 Depth Base:13.35**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **1.6**

Comments
None

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

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INDEPENDENT MATERIALS TESTING I DIAMOND DRILLING & SAWING

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447843

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 48881**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:32.65 Depth Base:32.72**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = 1.4

Comments
None

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

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INDEPENDENT MATERIALS TESTING I DIAMOND DRILLING & SAWING

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447861

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 48897**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:57.30 Depth Base:57.40**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **1.1**

Comments
None

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447862

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 48898**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:61.65 Depth Base:61.75**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **1.2**

Comments
None

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

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INDEPENDENT MATERIALS TESTING I DIAMOND DRILLING & SAWING

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447873

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50865**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:67.07 Depth Base:67.20**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **1.1**

Comments
None

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447876

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50868**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:70.10 Depth Base:70.20**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **1.3**

Comments
None

Certificate Prepared by:- Mathew Sayer
Assistant Laboratory Manager

Approved by: - Eric Goulden
Technical Manager

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447878

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50870**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:73.03 Depth Base:73.10**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **1.6**

Comments
None

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

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INDEPENDENT MATERIALS TESTING I DIAMOND DRILLING & SAWING

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447879

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50871**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:76.00 Depth Base:76.09**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **1.2**

Comments
None

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

celtest
INDEPENDENT MATERIALS TESTING I DIAMOND DRILLING & SAWING

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447883

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50875**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:80.04 Depth Base:80.12**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **1.2**

Comments
None

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447884

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50876**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:81.70 Depth Base:81.78**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **1.6**

Comments
None

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447885

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50877**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:87.50 Depth Base:87.57**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **1.8**

Comments
None

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

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Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447886

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50878**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:39.70 Depth Base:39.80**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **1.3**

Comments
None

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

celtest
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Priority Construction Ltd
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Dublin 3
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VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447890

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50882**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:91.63 Depth Base:91.71**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **1.8**

Comments
None

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

celtest
INDEPENDENT MATERIALS TESTING I DIAMOND DRILLING & SAWING

Priority Construction Ltd
162 Clontarf Road

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VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447894

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50886**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:93.00 Depth Base:93.10**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **1.5**

Comments
None

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

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Priority Construction Ltd
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VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447897

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50889**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:94.96 Depth Base:95.05**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **1.3**

Comments
None

Certificate Prepared by:-
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Approved by: -
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Technical Manager

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VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447899

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50891**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:101.36 Depth Base:101.45**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = 1.6

Comments
None

Certificate Prepared by:-
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Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

Priority Construction Ltd
162 Clontarf Road

Dublin 3
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VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447904

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50896**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:108.62 Depth Base:108.70**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **1.2**

Comments
None

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

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Priority Construction Ltd
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Dublin 3
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VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447908

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50900**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:113.12 Depth Base:113.19**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **1.5**

Comments
None

Certificate Prepared by:-
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Approved by: -
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Technical Manager

Priority Construction Ltd
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Dublin 3
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VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447912

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50904**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:118.82 Depth Base:118.88**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **1.9**

Comments
None

Certificate Prepared by:-
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Approved by: -
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Technical Manager

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VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447908

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50900**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:113.12 Depth Base:113.19**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **1.5**

Comments
None

Certificate Prepared by:-
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Assistant Laboratory Manager

Approved by: -
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Dublin 3
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VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447912

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50904**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:118.82 Depth Base:118.88**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **1.9**

Comments
None

Certificate Prepared by:-
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Approved by: -
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Technical Manager

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VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447913

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50905**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:123.44 Depth Base:123.55**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **2.2**

Comments
None

Certificate Prepared by:-
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Assistant Laboratory Manager

Approved by: -
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Technical Manager

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Dublin 3
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VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447914

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50906**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:125.90 Depth Base:126.00**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **1.3**

Comments
None

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
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Technical Manager

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VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447915

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50907**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:126.80 Depth Base:126.90**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **2.5**

Comments
None

Certificate Prepared by:-
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Assistant Laboratory Manager

Approved by: -
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Technical Manager

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INDEPENDENT MATERIALS TESTING I DIAMOND DRILLING & SAWING

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447919

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50911**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:131.12 Depth Base:131.17**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = 2.6

Comments
None

Certificate Prepared by:-
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Approved by: -
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Technical Manager

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Priority Construction Ltd
162 Clontarf Road

Dublin 3
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VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447920

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50912**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:131.60 Depth Base:131.70**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **1.2**

Comments
None

Certificate Prepared by:-
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Assistant Laboratory Manager

Approved by: -
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Technical Manager

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Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447921

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50913**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:132.65 Depth Base:132.62**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **1.8**

Comments
None

Certificate Prepared by:-
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Assistant Laboratory Manager

Approved by: -
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Technical Manager

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Priority Construction Ltd
162 Clontarf Road

Dublin 3
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VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447925

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50917**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:134.35 Depth Base:134.44**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = 1.1

Comments
None

Certificate Prepared by:-
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Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

Priority Construction Ltd
162 Clontarf Road

Dublin 3
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VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447930

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50922**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:142.81 Depth Base:142.91**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **1.3**

Comments
None

Certificate Prepared by:-
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Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

Priority Construction Ltd
162 Clontarf Road

Dublin 3
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VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447940

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50931**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:154.60 Depth Base:154.68**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **1.4**

Comments
None

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
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Technical Manager

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162 Clontarf Road

Dublin 3
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VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447941

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50932**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:155.20 Depth Base:155.28**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **1.7**

Comments
None

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
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Technical Manager

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INDEPENDENT MATERIALS TESTING I DIAMOND DRILLING & SAWING

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VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447945

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50936**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:163.49 Depth Base:163.56**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = 2.5

Comments
None

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
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Technical Manager

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Dublin 3
Ireland
VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447949

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50940**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:172.96 Depth Base:173.07**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **1.3**

Comments
None

Certificate Prepared by:-
Mathew Sayer
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Approved by: -
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VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447949

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50940**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:172.96 Depth Base:173.07**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **1.3**

Comments
None

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

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Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447957

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50947**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:176.00 Depth Base:176.10**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **1.2**

Comments
None

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447964

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50954**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:196.19 Depth Base:186.25**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **1.8**

Comments
None

Certificate Prepared by:-
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Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

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Ireland
VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447975

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50965**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:209.65 Depth Base:209.72**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **1.7**

Comments
None

Certificate Prepared by:-
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Approved by: -
Eric Goulden
Technical Manager

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Dublin 3
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VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447979

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50969**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:211.10 Depth Base:211.20**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **1.4**

Comments
None

Certificate Prepared by:-
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Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

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Ireland
VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447985

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50975**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:218.20 Depth Base:218.28**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **1.5**

Comments
None

Certificate Prepared by:-
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Approved by: -
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Technical Manager

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VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447986

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50976**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:222.52 Depth Base:222.62**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **1.0**

Comments
None

Certificate Prepared by:-
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Approved by: -
Eric Goulden
Technical Manager

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447994

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50984**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:230.13 Depth Base:230.20**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **2.0**

Comments
None

Certificate Prepared by:-
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VAT No: 9D53971I

Date: 24 February 2016
Test Report Ref: STR 447999

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50989**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:235.04 Depth Base:235.10**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **1.3**

Comments
None

Certificate Prepared by:-
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Dublin 3
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VAT No: 9D53971I

Date: 16 February 2016
Test Report Ref: STR 443012

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref. No:	**BH04 - 48901**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**08/12/2015**
Date of Start of Test:	**15/12/2015**
Sampling Location:	**Depth Top: 3.5 Depth Base: 3.55**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **0.2**

Comments
None

Certificate Prepared by:-
Mathew Sayer
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Approved by: -
Eric Goulden
Technical Manager

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VAT No: 9D53971I

Date: 15 February 2016
Test Report Ref: STR 443013

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref. No:	**BH04 - 48902**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**08/12/2015**
Date of Start of Test:	**15/12/2015**
Sampling Location:	**Depth Top: 5.4 Depth Base: 5.48**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **0.6**

Comments
None

Certificate Prepared by:-
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VAT No: 9D53971I

Date: 15 February 2016
Test Report Ref: STR 443016

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref. No:	**BH04 - 48904**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**08/12/2015**
Date of Start of Test:	**15/12/2015**
Sampling Location:	**Depth Top: 9.3 Depth Base: 9.36**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **0.3**

Comments
None

Certificate Prepared by:-
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Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

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VAT No: 9D53971I

Date: 15 February 2016
Test Report Ref: STR 443018

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref. No:	**BH04 - 48906**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**08/12/2015**
Date of Start of Test:	**15/12/2015**
Sampling Location:	**Depth Top: 11.77 Depth Base: 11.83**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **0.2**

Comments
None

Certificate Prepared by:-
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Approved by: -
Eric Goulden
Technical Manager

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162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Date: 21 December 2015
Test Report Ref: STR 443020

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Uniaxial Compressive Strength in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref. :	**Various**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**08/12/2015**
Date of Start of Test:	**08/12/2015**
Sampling Location:	**Various**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See attached

Certificate Prepared by:-
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Approved by: -
Eric Goulden
Technical Manager

BH	Core Diameter (mm)	Height/ Diameter Ratio	Uniaxial compressive strength (MPa)	Mode of Failure	EN ISO 14689-1 Term	Water content (%)
BH04 48908	82	2.6:1	**76**	N	Strong	0.1
BH04 48912	82.3	1.9:1	**86**	N	Strong	0.3
BH04 48921	82.3	1.5:1	**55**	N	Strong	0.1
BH04 48927	82.1	1.6:1	**53**	N	Strong	0.2
BH04 48931	82.2	2.6:1	**111**	N	Very Strong	0.1
BH04 48933	82	2.1:1	**91**	N	Strong	0.2
BH04 48950	82	2.5:1	**76**	N	Strong	0.2
BH04 48957	82	2:1	**78**	N	Strong	0.3
BH04 48963	82.2	2.4:1	**92**	N	Strong	0.1
BH05 48982	82	1.8:1	**91**	N	Strong	0.2
BH05 48986	81.5	2.6:1	**86**	N	Strong	0.4
BH05 48991	81.4	2.5:1	**94**	N	Strong	0.1
BH05 48994	82	1.9:1	**72**	N	Strong	0.2
BH05 48998	82.2	2.6:1	**77**	N	Strong	0.2
BH05 50711	78.5	1.8:1	**79**	N	Strong	0.2
BH05 50729	79	2.5:1	**116**	N	Very Strong	0.3
BH05 50731	81.4	2.6:1	**51**	N	Strong	0.1
BH05 50733	81.6	2.1:1	**54**	N	Strong	0.2
BH05 50737	82	1.5:1	**131**	N	Very Strong	0.2

Comments

1) The uniaxial compressive strength was carried out in accordance with ISRM guidelines.
2) Stress Rate: 0.7Mpa/s.

3)

EN ISO 14689-1 : 2003 Rock Strength Terms	
Compressive Strength mpa	Term
<1.0	Extremely Weak
1 to 5	Very Weak
5 to 25	Weak
25 to 50	Meduim Strong
50 to 100	Strong
100 to 250	Very Strong
> 250	Extremely Strong

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VAT No: 9D53971I

Date: 15 February 2016
Test Report Ref: STR 443034

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref. No:	**BH04 - 48922**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**08/12/2015**
Date of Start of Test:	**15/12/2015**
Sampling Location:	**Depth Top: 20.8 Depth Base: 20.85**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **0.4**

Comments
None

Certificate Prepared by:-
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Approved by: -
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Technical Manager

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VAT No: 9D53971I

Date: 15 February 2016
Test Report Ref: STR 443036

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref. No:	**BH04 - 48924**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**08/12/2015**
Date of Start of Test:	**15/12/2015**
Sampling Location:	**Depth Top: 21.8 Depth Base: 21.9**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **1.0**

Comments
None

Certificate Prepared by:-
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Assistant Laboratory Manager

Approved by: -
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VAT No: 9D53971I

Date: 15 February 2016
Test Report Ref: STR 443050

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref. No:	**BH04 - 48938**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**08/12/2015**
Date of Start of Test:	**15/12/2015**
Sampling Location:	**Depth Top: 28.27 Depth Base: 38.4**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **0.1**

Comments
None

Certificate Prepared by:-
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VAT No: 9D53971I

Contract: Lackagh Quarry

Date: 15 February 2016
Test Report Ref: STR 443067

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Total Sulfur Content of an Aggregate Sample in accordance with **BS EN 1744-1 : 2009 : Clause 11**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref. No:	**BH04 - 48954**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**08/12/2015**
Date of Start of Test:	**21/12/2015**
Sampling Location:	**Depth Top: 31.66 Depth Base: 31.7**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

Total Sulfur Content as S (%) =	**<0.1**
*95% Confidence limit**	*<0.06% - <0.14%*

Comments / Departure from specified Procedure

*95% Confidence limit is the expanded uncertainty which is the combined uncertainty standard multiplied by a factor (k) of 2

Certificate Prepared by:-
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Approved by: -
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Contract: Lackagh Quarry

Date: 15 February 2016
Test Report Ref: STR 443069

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Oxidisable sulphides (OS) content of an Sample by calculation of **TRL Report 447 Test No. 2 and Test No. 4**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref. :	**BH04 - 48956**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**08/12/2015**
Date of Start of Test:	**24/12/2015**
Sampling Location:	**Depth Top: 31.84 Depth Base: 31.93**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**<0.5 % SO_4 - If deposited within 500mm of Cementitious Materials** **<0.06 % SO_4 - If deposited within 500mm of Metallic Structural Elements**

RESULTS:

Oxidisable Sulphides (OS) (%) = 0.04 SO_4

Comments
The work was carried out by our accredited, competent, sub contracted laboratory.

Certificate Prepared by:-
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Approved by: -
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Technical Manager

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162 Clontarf Road

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VAT No: 9D53971I

Contract: Lackagh Quarry

Date: 15 February 2016
Test Report Ref: STR 443072

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the pH Value of Soils in accordance with **BS 1377:Part 3:1990 - Clause 9, Electrometric Method.**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref. No:	**BH04 - 48959**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**08/12/2015**
Date of Start of Test:	**22/12/2015**
Sampling Location:	**Depth Top: 32.26 Depth Base: 32.35**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

pH Value =	**9.3**
*95% Confidence limit**	*9.06% - 9.54%*

Comments

*95% Confidence limit is the expanded uncertainty which is the combined uncertainty standard multiplied by a factor (k) of 2

Certificate Prepared by:-
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Date: 15 February 2016
Test Report Ref: STR 443081

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref. No:	**BH04 - 48965**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**08/12/2015**
Date of Start of Test:	**15/12/2015**
Sampling Location:	**Depth Top: 33.12 Depth Base: 33.16**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **0.1**

Comments
None

Certificate Prepared by:-
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VAT No: 9D53971I

Date: 15 February 2016
Test Report Ref: STR 443085

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref. No:	**BH04 - 48969**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**08/12/2015**
Date of Start of Test:	**15/12/2015**
Sampling Location:	**Depth Top: 34.56 Depth Base: 34.59**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **0.3**

Comments
None

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Date: 15 February 2016
Test Report Ref: STR 443086

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref. No:	**BH04 - 48970**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**08/12/2015**
Date of Start of Test:	**15/12/2015**
Sampling Location:	**Depth Top: 34.96 Depth Base: 35**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **0.2**

Comments
None

Certificate Prepared by:-
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Approved by: -
Eric Goulden
Technical Manager

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Priority Construction Ltd
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VAT No: 9D53971I

Date: 15 February 2016
Test Report Ref: STR 443087

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref. No:	**BH05 - 48971**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**08/12/2015**
Date of Start of Test:	**15/12/2015**
Sampling Location:	**Depth Top: 0.65 Depth Base: 0.73**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **0.3**

Comments
None

Certificate Prepared by:-
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Approved by: -
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Technical Manager

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VAT No: 9D53971I

Date: 15 February 2016
Test Report Ref: STR 443088

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref. No:	**BH05 - 48972**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**08/12/2015**
Date of Start of Test:	**15/12/2015**
Sampling Location:	**Depth Top: 0.98 Depth Base: 1.04**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **0.1**

Comments
None

Certificate Prepared by:-
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VAT No: 9D53971I

Date: 15 February 2016
Test Report Ref: STR 443089

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref. No:	**BH05 - 48973**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**08/12/2015**
Date of Start of Test:	**15/12/2015**
Sampling Location:	**Depth Top: 1.41 Depth Base: 1.5**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **0.1**

Comments
None

Certificate Prepared by:-
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VAT No: 9D53971I

Date: 15 February 2016
Test Report Ref: STR 443096

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref. No:	**BH05 - 48980**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**08/12/2015**
Date of Start of Test:	**15/12/2015**
Sampling Location:	**Depth Top: 8.9 Depth Base: 8.96**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **0.1**

Comments
None

Certificate Prepared by:-
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Approved by: -
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VAT No: 9D53971I

Date: 15 February 2016
Test Report Ref: STR 443104

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref. No:	**BH05 - 48988**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**08/12/2015**
Date of Start of Test:	**15/12/2015**
Sampling Location:	**Depth Top: 12.92 Depth Base: 13.07**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **0.3**

Comments
None

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

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Priority Construction Ltd
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Dublin 3
Ireland
VAT No: 9D53971I

Date: 15 February 2016
Test Report Ref: STR 443128

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref. No:	**BH05 - 50712**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**08/12/2015**
Date of Start of Test:	**15/12/2015**
Sampling Location:	**Depth Top: 28.75 Depth Base: 28.85**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **0.1**

Comments
None

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
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Technical Manager

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Priority Construction Ltd
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Ireland
VAT No: 9D53971I

Contract: Lackagh Quarry

Date: 15 February 2016
Test Report Ref: STR 443132

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Oxidisable sulphides (OS) content of an Sample by calculation of **TRL Report 447 Test No. 2 and Test No. 4**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref. :	**BH05 - 50716**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**08/12/2015**
Date of Start of Test:	**24/12/2015**
Sampling Location:	**Depth Top: 29.18 Depth Base: 29.3**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**<0.5 % SO_4 - If deposited within 500mm of Cementitious Materials** **<0.06 % SO_4 - If deposited within 500mm of Metallic Structural Elements**

RESULTS:

Oxidisable Sulphides (OS) (%) = <0.01 SO_4

Comments
The work was carried out by our accredited, competent, sub contracted laboratory.

Certificate Prepared by:-
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Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

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VAT No: 9D53971I

Date: 15 February 2016
Test Report Ref: STR 443133

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the pH Value of Soils in accordance with **BS 1377:Part 3:1990 - Clause 9, Electrometric Method.**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref. No:	**BH05 - 50717**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**08/12/2015**
Date of Start of Test:	**22/12/2015**
Sampling Location:	**Depth Top: 29.3 Depth Base: 29.4**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

pH Value =	**9.2**
*95% Confidence limit**	*8.96% - 9.44%*

Comments

*95% Confidence limit is the expanded uncertainty which is the combined uncertainty standard multiplied by a factor (k) of 2

Certificate Prepared by:-
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Technical Manager

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Ireland
VAT No: 9D53971I

Date: 15 February 2016
Test Report Ref: STR 443134

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref. No:	**BH05 - 50718**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**08/12/2015**
Date of Start of Test:	**15/12/2015**
Sampling Location:	**Depth Top: 30.3 Depth Base: 30.4**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **0.4**

Comments
None

Certificate Prepared by:-
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Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

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VAT No: 9D53971I

Date: 15 February 2016
Test Report Ref: STR 443137

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref. No:	**BH05 - 50721**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**08/12/2015**
Date of Start of Test:	**15/12/2015**
Sampling Location:	**Depth Top: 30.88 Depth Base: 30.92**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **0.3**

Comments
None

Certificate Prepared by:-
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Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

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Ireland
VAT No: 9D53971I

Date: 15 February 2016
Test Report Ref: STR 443142

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS To determine the Water Content of aggregates by – drying in a ventilated oven according to **BS EN 1097-5: 2008**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref. No:	**BH05 - 50726**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**08/12/2015**
Date of Start of Test:	**15/12/2015**
Sampling Location:	**Depth Top: 32.54 Depth Base: 32.6**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

Water Content (%) = **0.2**

Comments
None

Certificate Prepared by:-
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Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

Oxidisable Sulphur

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INDEPENDENT MATERIALS TESTING I DIAMOND DRILLING & SAWING

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Contract: Lackagh Quarry

Date: 16 March 2016
Test Report Ref: STR 447856

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Oxidisable sulphides (OS) content of an Sample by calculation of **TRL Report 447 Test No. 2 and Test No. 4**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. :	**BH01 - 48892**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:55.30 Depth Base:55.40**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**<0.5 % SO_4 - If deposited within 500mm of Cementitious Materials** **<0.06 % SO_4 - If deposited within 500mm of Metallic Structural Elements**

RESULTS:

Oxidisable Sulphides (OS) (%) = <0.01 SO_4

Comments
The work was carried out by our accredited, competent, sub contracted laboratory.

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

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INDEPENDENT MATERIALS TESTING I DIAMOND DRILLING & SAWING

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Contract: Lackagh Quarry

Date: 16 March 2016
Test Report Ref: STR 447895

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Oxidisable sulphides (OS) content of an Sample by calculation of **TRL Report 447 Test No. 2 and Test No. 4**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. :	**BH01 - 50887**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:94.90 Depth Base:94.96**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**<0.5 % SO_4 - If deposited within 500mm of Cementitious Materials** **<0.06 % SO_4 - If deposited within 500mm of Metallic Structural Elements**

RESULTS:

Oxidisable Sulphides (OS) (%) = <0.01 SO_4

Comments
The work was carried out by our accredited, competent, sub contracted laboratory.

Certificate Prepared by:-
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Assistant Laboratory Manager

Approved by: -
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Dublin 3
Ireland
VAT No: 9D53971I

Contract: Lackagh Quarry

Date: 16 March 2016
Test Report Ref: STR 447938

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Oxidisable sulphides (OS) content of an Sample by calculation of **TRL Report 447 Test No. 2 and Test No. 4**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. :	**BH01 - 50930**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:153.20 Depth Base:153.30**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**<0.5 % SO_4 - If deposited within 500mm of Cementitious Materials** **<0.06 % SO_4 - If deposited within 500mm of Metallic Structural Elements**

RESULTS:

Oxidisable Sulphides (OS) (%) = <0.01 SO_4

Comments
The work was carried out by our accredited, competent, sub contracted laboratory.

Certificate Prepared by:-
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VAT No: 9D53971I

Contract: Lackagh Quarry

Date: 16 March 2016
Test Report Ref: STR 447971

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Oxidisable sulphides (OS) content of an Sample by calculation of **TRL Report 447 Test No. 2 and Test No. 4**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. :	**BH01 - 50961**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:201.47 Depth Base:201.55**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**<0.5 % SO_4 - If deposited within 500mm of Cementitious Materials** **<0.06 % SO_4 - If deposited within 500mm of Metallic Structural Elements**

RESULTS:

Oxidisable Sulphides (OS) (%) = <0.01 SO_4

Comments
The work was carried out by our accredited, competent, sub contracted laboratory.

Certificate Prepared by:-
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Assistant Laboratory Manager

Approved by: -
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Technical Manager

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INDEPENDENT MATERIALS TESTING I DIAMOND DRILLING & SAWING

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Contract: Lackagh Quarry

Date: 16 March 2016
Test Report Ref: STR 448010

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Oxidisable sulphides (OS) content of an Sample by calculation of **TRL Report 447 Test No. 2 and Test No. 4**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. :	**BH01 - 51000**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:253.30 Depth Base:253.38**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**<0.5 % SO_4 - If deposited within 500mm of Cementitious Materials** **<0.06 % SO_4 - If deposited within 500mm of Metallic Structural Elements**

RESULTS:

Oxidisable Sulphides (OS) (%) = <0.01 SO_4

Comments
The work was carried out by our accredited, competent, sub contracted laboratory.

Certificate Prepared by:-
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Assistant Laboratory Manager

Approved by: -
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Priority Construction Ltd
162 Clontarf Road

Dublin 3
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VAT No: 9D53971I

Contract: Lackagh Quarry

Date: 15 February 2016
Test Report Ref: STR 443069

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Oxidisable sulphides (OS) content of an Sample by calculation of **TRL Report 447 Test No. 2 and Test No. 4**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref. :	**BH04 - 48956**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**08/12/2015**
Date of Start of Test:	**24/12/2015**
Sampling Location:	**Depth Top: 31.84 Depth Base: 31.93**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**<0.5 % SO_4 - If deposited within 500mm of Cementitious Materials** **<0.06 % SO_4 - If deposited within 500mm of Metallic Structural Elements**

RESULTS:

Oxidisable Sulphides (OS) (%) = 0.04 SO_4

Comments
The work was carried out by our accredited, competent, sub contracted laboratory.

Certificate Prepared by:-
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Approved by: -
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INDEPENDENT MATERIALS TESTING I DIAMOND DRILLING & SAWING

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VAT No: 9D53971I

Contract: Lackagh Quarry

Date: 15 February 2016
Test Report Ref: STR 443132

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Oxidisable sulphides (OS) content of an Sample by calculation of **TRL Report 447 Test No. 2 and Test No. 4**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref. :	**BH05 - 50716**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**08/12/2015**
Date of Start of Test:	**24/12/2015**
Sampling Location:	**Depth Top: 29.18 Depth Base: 29.3**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**<0.5 % SO_4 - If deposited within 500mm of Cementitious Materials** **<0.06 % SO_4 - If deposited within 500mm of Metallic Structural Elements**

RESULTS:

Oxidisable Sulphides (OS) (%) = <0.01 SO_4

Comments
The work was carried out by our accredited, competent, sub contracted laboratory.

Certificate Prepared by:-
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Approved by: -
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pH Value

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VAT No: 9D53971I

Contract: Lackagh Quarry

Date: 16 March 2016
Test Report Ref: STR 447857

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the pH Value of Soils in accordance with **BS 1377:Part 3:1990 - Clause 9, Electrometric Method.**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 48893**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**09/02/2016**
Sampling Location:	**Depth Top:55.84 Depth Base:55.92**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

pH Value =	**9.1**
*95% Confidence limit**	*8.86% - 9.34%*

Comments

*95% Confidence limit is the expanded uncertainty which is the combined uncertainty standard multiplied by a factor (k) of 2

Certificate Prepared by:-
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Approved by: -
Eric Goulden
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162 Clontarf Road

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VAT No: 9D53971I

Date: 16 March 2016
Test Report Ref: STR 447896

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the pH Value of Soils in accordance with **BS 1377:Part 3:1990 - Clause 9, Electrometric Method.**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50888**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**09/02/2016**
Sampling Location:	**Depth Top:94.96 Depth Base:95.05**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

pH Value =	**9.2**
*95% Confidence limit**	*8.96% - 9.44%*

Comments

*95% Confidence limit is the expanded uncertainty which is the combined uncertainty standard multiplied by a factor (k) of 2

Certificate Prepared by:-
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VAT No: 9D53971I

Date: 16 March 2016
Test Report Ref: STR 447928

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the pH Value of Soils in accordance with **BS 1377:Part 3:1990 - Clause 9, Electrometric Method.**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50920**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**09/02/2016**
Sampling Location:	**Depth Top:138.60 Depth Base:138.72**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

pH Value =	**9.2**
*95% Confidence limit**	*8.96% - 9.44%*

Comments

*95% Confidence limit is the expanded uncertainty which is the combined uncertainty standard multiplied by a factor (k) of 2

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Date: 16 March 2016
Test Report Ref: STR 447959

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the pH Value of Soils in accordance with **BS 1377:Part 3:1990 - Clause 9, Electrometric Method.**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50949**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**09/02/2016**
Sampling Location:	**Depth Top:182.12 Depth Base:182.20**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

pH Value =	**9.3**
*95% Confidence limit**	*9.06% - 9.54%*

Comments

*95% Confidence limit is the expanded uncertainty which is the combined uncertainty standard multiplied by a factor (k) of 2

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Date: 16 March 2016
Test Report Ref: STR 447984

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the pH Value of Soils in accordance with **BS 1377:Part 3:1990 - Clause 9, Electrometric Method.**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50974**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**09/02/2016**
Sampling Location:	**Depth Top:213.80 Depth Base:213.90**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

pH Value =	**9.1**
*95% Confidence limit**	*8.86% - 9.34%*

Comments

*95% Confidence limit is the expanded uncertainty which is the combined uncertainty standard multiplied by a factor (k) of 2

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Contract: Lackagh Quarry

Date: 15 February 2016
Test Report Ref: STR 443072

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the pH Value of Soils in accordance with **BS 1377:Part 3:1990 - Clause 9, Electrometric Method.**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref. No:	**BH04 - 48959**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**08/12/2015**
Date of Start of Test:	**22/12/2015**
Sampling Location:	**Depth Top: 32.26 Depth Base: 32.35**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

pH Value =	**9.3**
*95% Confidence limit**	*9.06% - 9.54%*

Comments

*95% Confidence limit is the expanded uncertainty which is the combined uncertainty standard multiplied by a factor (k) of 2

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Date: 15 February 2016
Test Report Ref: STR 443133

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the pH Value of Soils in accordance with **BS 1377:Part 3:1990 - Clause 9, Electrometric Method.**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref. No:	**BH05 - 50717**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**08/12/2015**
Date of Start of Test:	**22/12/2015**
Sampling Location:	**Depth Top: 29.3 Depth Base: 29.4**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

pH Value =	**9.2**
*95% Confidence limit**	*8.96% - 9.44%*

Comments

*95% Confidence limit is the expanded uncertainty which is the combined uncertainty standard multiplied by a factor (k) of 2

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

Point Load Testing

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443019

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH04 - 48907**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 12.62 Depth Base: 12.75**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH04 48907											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	112	20.0	8960	11408	1.75	1.41	2.47	59.2
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**59.2**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443021

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH04 - 48909**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 13.1 Depth Base: 13.25**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443021 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH04 48909											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	130	20.0	10400	13242	1.51	1.46	2.20	52.7
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**52.7**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443023

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH04 - 48911**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 14.63 Depth Base: 14.74**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443023 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH04 48911											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	105	15.8	8400	10695	1.48	1.39	2.05	49.2
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**49.2**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443025

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH04 - 48913**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 14.97 Depth Base: 15.13**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443025 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH04 48913											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	125	22.1	10000	12732	1.74	1.44	2.50	60.1
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**60.1**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443027

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH04 - 48915**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 17.74 Depth Base: 17.86**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443027 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH04 48915											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	135	23.5	10800	13751	1.71	1.47	2.51	60.2
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**60.2**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443029

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH04 - 48917**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 18.12 Depth Base: 18.2**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443029 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH04 48917											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	85	15.4	6800	8658	1.78	1.32	2.35	56.5
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**56.5**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443030

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH04 - 48918**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 19.2 Depth Base: 19.32**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443030 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH04 48918											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	120	13.0	9600	12223	1.06	1.43	1.52	36.5
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**36.5**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443032

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH04 - 48920**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 20.12 Depth Base: 20.22**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443032 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH04 48920											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	98	22.5	7840	9982	2.25	1.37	3.08	73.9
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**73.9**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443035

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH04 - 48923**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 21.2 Depth Base: 21.3**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443035 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH04 48923											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	87	19.0	6960	8862	2.14	1.33	2.85	68.4
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**68.4**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443037

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH04 - 48925**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 22.2 Depth Base: 22.31**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443037 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH04 48925											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	100	27.9	8000	10186	2.74	1.37	3.76	90.2
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**90.2**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443038

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH04 - 48926**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 22.6 Depth Base: 22.78**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443038 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH04 48926											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	142	24.4	11360	14464	1.69	1.48	2.50	60.1
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**60.1**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443040

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH04 - 48928**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 23.1 Depth Base: 23.2**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443040 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH04 48928											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	100	20.0	8000	10186	1.96	1.37	2.69	64.6
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**64.6**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443042

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH04 - 48930**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 23.7 Depth Base: 23.8**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443042 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH04 48930											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	95	23.1	7600	9677	2.39	1.36	3.24	77.7
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**77.7**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443044

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH04 - 48932**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 24.17 Depth Base: 24.28**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443044 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH04 48932											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	100	22.9	8000	10186	2.25	1.37	3.08	74.0
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**74.0**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443047

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH04 - 48934**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 25.08 Depth Base: 25.19**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443047 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH04 48934											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	111	26.0	8880	11306	2.30	1.40	3.23	77.5
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**77.5**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443049

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH04 - 48937**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 27.91 Depth Base: 28**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443049 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH04 48937											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	86	24.6	6880	8760	2.81	1.33	3.72	89.4
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**89.4**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443051

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH04 - 48939**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 28.4 Depth Base: 28.44**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443051 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH04 48939											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	104	21.8	8320	10593	2.06	1.38	2.85	68.3
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**68.3**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443051

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH04 - 48939**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 28.4 Depth Base: 28.44**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443051 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH04 48939											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	104	21.8	8320	10593	2.06	1.38	2.85	68.3
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**68.3**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443054

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH04 - 48943**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 29.86 Depth Base: 29.94**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443054 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH04 48943											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Lump	b		80	40	14.0	3200	4074	3.44	1.12	3.84	92.0
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**92.0**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443062

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH04 - 48949**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 30.93 Depth Base: 30.03**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results

STR : 443062 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH04 48949											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	85	20.9	6800	8658	2.41	1.32	3.19	76.6
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**76.6**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443064

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH04 - 48951**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 31.3 Depth Base: 31.4**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443064 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH04 48951											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	112	22.9	8960	11408	2.01	1.41	2.82	67.8
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**67.8**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443068

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH04 - 48955**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 31.76 Depth Base: 31.84**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443068 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH04 48955											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	90	17.0	7200	9167	1.85	1.34	2.48	59.6
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**59.6**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443071

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH04 - 48958**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 32.15 Depth Base: 32.26**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443071 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH04 48958											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Lump	b		59	125	16.1	7375	9390	1.71	1.35	2.31	55.4
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**55.4**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443075

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH04 - 48962**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 32.5 Depth Base: 32.57**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443075 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH04 48962											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Lump	b		68	75	17.2	5100	6494	2.65	1.24	3.28	78.8
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**78.8**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443077

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH04 - 48964**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 32.85 Depth Base: 32.96**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443077 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH04 48964											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Lump	b		65	90	15.9	5850	7448	2.13	1.28	2.73	65.5
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**65.5**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443083

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH04 - 48967**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 33.48 Depth Base: 33.6**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443083 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH04 48967											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	115	17.2	9200	11714	1.47	1.42	2.08	49.9
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**49.9**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443091

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH05 - 48975**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 2.8 Depth Base: 2.96**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443091 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH05 48975											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	170	13.0	13600	17316	0.75	1.55	1.16	27.8
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**27.8**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443093

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH05 - 48977**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 7.73 Depth Base: 7.84**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH05 48977											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	110	21.0	8800	11205	1.87	1.40	2.63	63.0
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**63.0**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443094

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH05 - 48978**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 8.1 Depth Base: 8.25**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results

STR : 443094 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH05 48978											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	160	19.5	12800	16297	1.20	1.52	1.82	43.8
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**43.8**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443095

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH05 - 48979**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 8.54 Depth Base: 8.66**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443095 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH05 48979											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	120	22.1	9600	12223	1.81	1.43	2.58	62.0
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**62.0**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443097

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH05 - 48981**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 9.46 Depth Base: 9.57**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443097 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH05 48981											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	100	28.3	8000	10186	2.78	1.37	3.81	91.5
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**91.5**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443099

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH05 - 48983**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 9.77 Depth Base: 9.92**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443099 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH05 48983											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	126	20.5	10080	12834	1.60	1.44	2.31	55.4
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**55.4**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443100

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH05 - 48984**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 10.2 Depth Base: 10.26**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443100 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH05 48984											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Lump	b		80	48	17.7	3840	4889	3.62	1.16	4.21	101.0
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**101.0**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443101

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH05 - 48985**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 11.3 Depth Base: 11.45**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443101 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH05 48985											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	146	17.9	11680	14871	1.20	1.49	1.80	43.1
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**43.1**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443103

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH05 - 48987**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 11.72 Depth Base: 11.83**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443103 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH05 48987											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	100	23.9	8000	10186	2.35	1.37	3.22	77.2
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**77.2**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443105

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH05 - 48989**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 13.5 Depth Base: 13.6**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443105 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH05 48989											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Lump	b		80	43	22.7	3440	4380	5.18	1.13	5.88	141.1
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**141.1**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443106

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH05 - 48990**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 13.7 Depth Base: 13.81**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443106 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH05 48990											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	108	22.1	8640	11001	2.01	1.40	2.80	67.3
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**67.3**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443108

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH05 - 48992**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 14.07 Depth Base: 14.15**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443108 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH05 48992											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Lump	b		80	70	19.8	5600	7130	2.78	1.27	3.52	84.4
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**84.4**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443109

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH05 - 48993**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 14.27 Depth Base: 14.4**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443109 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH05 48993											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	95	22.0	7600	9677	2.27	1.36	3.08	74.0
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**74.0**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443111

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH05 - 48995**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 15.43 Depth Base: 15.55**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443111 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH05 48995											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	80	21.3	6400	8149	2.61	1.30	3.41	81.8
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**81.8**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443113

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH05 - 48997**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 16.45 Depth Base: 16.55**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443113 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH05 48997											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	95	20.0	7600	9677	2.07	1.36	2.80	67.3
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**67.3**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443119

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH05 - 50703**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 22.07 Depth Base: 22.21**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443119 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH05 50703											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	150	23.0	12000	15279	1.51	1.50	2.26	54.3
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**54.3**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443120

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH05 - 50704**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 22.9 Depth Base: 23**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443120 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH05 50704											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Lump	b		80	55	17.0	4400	5602	3.03	1.20	3.64	87.3
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**87.3**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443121

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH05 - 50705**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 23.94 Depth Base: 24.05**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443121 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH05 50705											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	100	20.8	8000	10186	2.04	1.37	2.80	67.2
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**67.2**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443123

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH05 - 50707**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 24.73 Depth Base: 24.85**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443123 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH05 50707											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		75	90	18.0	6750	8594	2.09	1.32	2.77	66.4
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**66.4**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443125

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH05 - 50709**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 26 Depth Base: 26.12**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443125 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH05 50709											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		75	103	23.0	7725	9836	2.34	1.36	3.18	76.4
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**76.4**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443141

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH05 - 50725**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 32.44 Depth Base: 32.54**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443141 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH05 50725											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	80	20.0	6400	8149	2.45	1.30	3.20	76.8
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**76.8**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443143

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH05 - 50727**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 32.83 Depth Base: 32.92**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443143 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH05 50727											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Lump	b		80	72	16.0	5760	7334	2.18	1.27	2.78	66.7
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**66.7**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443154

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH05 - 50736**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 37.4 Depth Base: 37.5**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443154 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH05 50736											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	95	24.0	7600	9677	2.48	1.36	3.36	80.7
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**80.7**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 21st December 2015
Test Report Ref:. STR: 443156

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH05 - 50738**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**8/12/2015**
Sampling Location:	**Depth Top: 37.82 Depth Base: 37.92**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 443156 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56158											
Date Recived	8.12.15											
Sample Ref	BH05 50738											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	100	23.9	8000	10186	2.35	1.37	3.22	77.2
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**77.2**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447819

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 48862**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:10.36 Depth Base:10.46**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 447819 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 48862											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	70	14.9	4200	5348	2.79	1.19	3.31	79.3
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**79.3**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447825

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 48864**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:10.69 Depth Base:10.76**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 447825 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 48864											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	60	13.0	3600	4584	2.84	1.15	3.25	78.0
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**78.0**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447831

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 48869**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:13.35 Depth Base:13.45**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 447831 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 48869											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	85	18.1	5100	6494	2.79	1.24	3.46	82.9
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**82.9**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447833

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 48871**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:13.70 Depth Base:13.80**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 447833 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 48871											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	90	16.4	5400	6875	2.39	1.26	3.00	71.9
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**71.9**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447834

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 48872**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:16.30 Depth Base:16.40**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 447834 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 48872											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	95	16.1	5700	7257	2.22	1.27	2.82	67.7
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**67.7**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447836

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 48874**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:16.66 Depth Base:16.80**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 447836- Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 48874											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	115	21.1	6900	8785	2.40	1.33	3.19	76.5
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**76.5**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447839

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 48877**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:26.20 Depth Base:26.36**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 447839 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 48877											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	165	17.2	9900	12605	1.36	1.44	1.96	47.1
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**47.1**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447841

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 48879**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:26.61 Depth Base:26.70**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 447841 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 48879											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	85	13.2	5100	6494	2.03	1.24	2.52	60.5
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**60.5**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447844

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 48882**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:34.44 Depth Base:34.48**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results

STR : 447844 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 48882											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample	Sample	Test		D	W	P	A	D*D	Is	F	Is (50)	Approx. Compressive
no	type	type		mm	mm	KN	=W*D					Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		39	60	10.6	2340	2979	3.56	1.04	3.70	88.8
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**88.8**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447846

Order No:

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 48884**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:34.73 Depth Base: 34.83**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 447846 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 48884											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	95	14.8	5700	7257	2.04	1.27	2.59	62.2
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**62.2**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447848

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 48886**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:44.45 Depth Base:44.54**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 48886											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	75	16.8	4500	5730	2.93	1.21	3.53	84.8
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**84.8**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447851

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 48888**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:44.79 Depth Base:44.90**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 447851- Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 48888											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	90	12.1	5400	6875	1.76	1.26	2.21	53.0
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**53.0**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447858

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 48894**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:56.50 Depth Base:56.60**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 447858 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 48894											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	70	12.1	4200	5348	2.26	1.19	2.68	64.4
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**64.4**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447860

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 48896**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:56.85 Depth Base:56.93**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR :447860 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 48896											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	70	12.0	4200	5348	2.24	1.19	2.66	63.9
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**63.9**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447863

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 48899**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:62.76 Depth Base:62.86**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR :447863- Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 48899											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample	Sample	Test		D	W	P	A	D*D	Is	F	Is (50)	Approx. Compressive
no	type	type		mm	mm	KN	=W*D					Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	85	18.2	5100	6494	2.80	1.24	3.47	83.4
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**83.4**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447865

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50857**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:63.05 Depth Base:63.16**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 447865 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50857											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	125	14.6	7500	9549	1.53	1.35	2.07	49.6
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**49.6**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447870

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50862**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:66.00 Depth Base:66.10**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 447870 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50862											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	80	14.5	4800	6112	2.37	1.22	2.90	69.6
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**69.6**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447872

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50864**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:66.34 Depth Base:66.45**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 447872- Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50864											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	105	16.1	6300	8021	2.01	1.30	2.61	62.6
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**62.6**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447880

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50872**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:79.10 Depth Base:79.18**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50872											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	85	11.3	5100	6494	1.74	1.24	2.16	51.8
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**51.8**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447882

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50874**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:79.40 Depth Base:79.52**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 447882 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50874											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	110	12.8	6600	8403	1.52	1.31	2.00	48.0
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**48.0**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447891

Order No:

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50883**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:92.35 Depth Base:92.47**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 447891- Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50883											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample	Sample	Test		D	W	P	A	D*D	Is	F	Is (50)	Approx. Compressive
no	type	type		mm	mm	KN	=W*D					Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	85	16.0	5100	6494	2.46	1.24	3.05	73.3
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**73.3**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447893

Order No:

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50885**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:92.70 Depth Base:92.79**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 447893- Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50885											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample	Sample	Test		D	W	P	A	D*D	Is	F	Is (50)	Approx. Compressive
no	type	type		mm	mm	KN	=W*D					Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	80	14.8	4800	6112	2.42	1.22	2.96	71.1
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**71.1**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447901

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50893**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:108.15 Depth Base:108.22**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 447901- Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50893											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	70	11.5	4200	5348	2.15	1.19	2.55	61.2
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**61.2**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447903

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50895**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:108.51 Depth Base:108.62**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 447903 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50895											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	75	13.9	4500	5730	2.43	1.21	2.92	70.2
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**70.2**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447909

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50901**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:115.89 Depth Base:116.05**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 447909- Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50901											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	110	14.0	6600	8403	1.67	1.31	2.19	52.5
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**52.5**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447911

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50903**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:116.29 Depth Base:116.39**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR :447911- Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50903											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample	Sample	Test		D	W	P	A	D*D	Is	F	Is (50)	Approx. Compressive
no	type	type		mm	mm	KN	=W*D					Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	95	14.8	5700	7257	2.04	1.27	2.59	62.2
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**62.2**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447916

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50908**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:128.80 Depth Base:128.89**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 447916- Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50908											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	75	16.0	4500	5730	2.79	1.21	3.37	80.8
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**80.8**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447918

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50910**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:129.14 Depth Base:129.21**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50910											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	60	14.0	3600	4584	3.05	1.15	3.50	84.0
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**84.0**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447922

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50914**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:133.21 Depth Base:133.32**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 447922 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50914											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	85	15.1	5100	6494	2.33	1.24	2.88	69.2
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**69.2**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447924

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50916**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:133.54 Depth Base:133.63**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50916											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	85	13.5	5100	6494	2.08	1.24	2.58	61.8
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**61.8**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447931

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50923**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:146.20 Depth BaseBase:146.30**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50923											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	85	12.0	5100	6494	1.85	1.24	2.29	55.0
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**55.0**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447933

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50925**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:146.52 Depth Base146.61**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 447933 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50925											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	95	14.9	5700	7257	2.05	1.27	2.61	62.6
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**62.6**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447942

Order No:

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50933**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:156.33 Depth Base:156.44**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 447942- Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50933											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample	Sample	Test		D	W	P	A	D*D	Is	F	Is (50)	Approx. Compressive
no	type	type		mm	mm	KN	=W*D					Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	110	11.2	6600	8403	1.33	1.31	1.75	42.0
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**42.0**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447944

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50935**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:156.68 Depth Base:156.76**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 447944- Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50935											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	90	10.8	5400	6875	1.57	1.26	1.97	47.3
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**47.3**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447946

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50937**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:165.17 Depth Base:165.25**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 447946 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50937											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	75	15.4	4500	5730	2.69	1.21	3.24	77.7
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**77.7**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447948

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50939**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:166.00 Depth Base:166.10**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50939											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	85	14.1	5100	6494	2.17	1.24	2.69	64.6
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**64.6**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447953

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50944**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:175.18 Depth Base:175.26**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 447953 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50944											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	85	12.8	5100	6494	1.97	1.24	2.44	58.6
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**58.6**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447956

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50946**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:175.50 Depth Base:175.59**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR :447956- Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50944											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	85	12.8	5100	6494	1.97	1.24	2.44	58.6
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**58.6**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447961

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50951**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:183.90 Depth Base:184.20**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 447961 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50951											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	110	13.0	6600	8403	1.55	1.31	2.03	48.8
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**48.8**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447963

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50953**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:184.25 Depth Base:184.34**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR :447963- Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50953											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	90	16.0	5400	6875	2.33	1.26	2.92	70.1
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**70.1**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447967

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50957**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:194.60 Depth Base:194.67**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50957											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	60	8.0	3600	4584	1.75	1.15	2.00	48.0
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**48.0**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447969

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50959**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:194.90 Depth Base:194.99**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50959											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample	Sample	Test		D	W	P	A	D*D	Is	F	Is (50)	Approx. Compressive
no	type	type		mm	mm	KN	=W*D					Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	80	12.0	4800	6112	1.96	1.22	2.40	57.6
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**57.6**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447972

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50962**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:204.62 Depth Base:204.70**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results

STR : 447972- Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50962											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	80	17.4	4800	6112	2.85	1.22	3.48	83.6
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**83.6**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 11th April 2016
Test Report Ref:. STR: 447974

Order No:

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50964**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:204.95 Depth Base:205.02**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 447974 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50964											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	85	13.2	5100	6494	2.03	1.24	2.52	60.5
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**60.5**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447980

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50970**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:211.77 Depth Base:211.85**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 447980- Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50970											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample	Sample	Test		D	W	P	A	D*D	Is	F	Is (50)	Approx. Compressive
no	type	type		mm	mm	KN	=W*D					Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	75	11.2	4500	5730	1.95	1.21	2.36	56.5
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**56.5**

Point load test results
STR : 447982- Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50972											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	100	17.0	6000	7639	2.23	1.29	2.86	68.7
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**68.7**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447982

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50972**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:212.10 Depth Base:212.20**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447989

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50979**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:225.65 Depth Base:225.74**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 447989- Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50979											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	95	19.1	5700	7257	2.63	1.27	3.34	80.3
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**80.3**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447991

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50981**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:225.95 Depth Base:226.03**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 447991 Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50981											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	95	17.2	5700	7257	2.37	1.27	3.01	72.3
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**72.3**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447995

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50985**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:231.65 Depth Base:231.78**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 447994- Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50985											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	120	15.1	7200	9167	1.65	1.34	2.21	53.0
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**53.0**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 447997

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50987**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:232.00 Depth Base:232.10**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 447997- Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50987											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample	Sample	Test		D	W	P	A	D*D	Is	F	Is (50)	Approx. Compressive
no	type	type		mm	mm	KN	=W*D					Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	70	14.0	4200	5348	2.62	1.19	3.11	74.6
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**74.6**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 448003

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50993**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:242.82 Depth Base:242.92**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 448003- Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50993											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	95	12.8	5700	7257	1.76	1.27	2.24	53.8
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**53.8**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 448005

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50995**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:243.14 Depth Base:243.23**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 448005 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50995											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	85	14.1	5100	6494	2.17	1.24	2.69	64.6
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**64.6**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 448007

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50997**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:251.81 Depth Base:251.95**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 448007 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50997											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	110	14.0	6600	8403	1.67	1.31	2.19	52.5
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**52.5**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 448009

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 50999**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:252.22 Depth Base:252.32**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 448009- Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 50999											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	90	14.0	5400	6875	2.04	1.26	2.56	61.4
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**61.4**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 448011

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 51001**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:259.72 Depth Base:259.82**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 448011- Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 51001											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	85	14.0	5100	6494	2.16	1.24	2.67	64.1
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**64.1**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 448013

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 51003**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:260.06 Depth Base:260.18**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR :448013- Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 51003											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample	Sample	Test		D	W	P	A	D*D	Is	F	Is (50)	Approx. Compressive
no	type	type		mm	mm	KN	=W*D					Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	120	12.8	7200	9167	1.40	1.34	1.87	44.9
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**44.9**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 448015

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 51005**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:262.63 Depth Base:262.73**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 448015 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 51005											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample	Sample	Test		D	W	P	A	D*D	Is	F	Is (50)	Approx. Compressive
no	type	type		mm	mm	KN	=W*D					Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	a		60	95	16.1	5700	7257	2.22	1.27	2.82	67.7
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**67.7**

Priority Construction Ltd
Killmor
Ballinasloe
Co. Galway
Ireland

Date: 24th February 2016
Test Report Ref:. STR: 448016

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56595**
Client Ref. No.:	**BH01 - 51006**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**18/1/2016**
Date of Start of Test.:	**18/1/2016**
Sampling Location:	**Depth Top:264.80 Depth Base:164.93**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR :448016 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S56595											
Date Recived	18.1.16											
Sample Ref	BH01 51006											
Key : -												
D	Always distance between platen contact points								D*D	= 4A/pi for axial (a) and irregular block (b) tests		
W	Smallest width perpendicular to loading direction								P	Load failure in KN		
	ie core diameter for axial tests.								Is	Uncorrected strength index		
	W =(W1 + W2)/2 for irregular blocks.								Is (50)	Point load strength index		
A	W*D minimum x-sectional area								F	Size correction factor		
	For axial or irregular block test 0.3W < D < W								#	Test perpendicular to fabric		
D*D	= D*D for diametral (d) tests								//	Test parallel to fabric		
Sample no *	Sample type *	Test type *	*	D mm *	W mm *	P KN *	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
Axial, Block or Lump Tests												
1	Core	a		60	100	12.0	6000	7639	1.57	1.29	2.02	48.5
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**48.5**

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 15th February 2016
Test Report Ref:. STR: 451474

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Point Load Index of Rock in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No.:	**S56158**
Client Ref. No.:	**BH05 - 50740**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab.:	**08/12/2015**
Date of Start of Test.:	**15/12/2015**
Sampling Location:	**Depth Top: 37.92 Depth Base: 38.08**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See Attached

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The specimens were perpendicular to the axis of loading with respect to the existing planes of anisotropy.

Nick Dumbarton – Assistant Laboratory Manager

Point load test results
STR : 451474 - Page 2 of 2

Client	Priority Construction Ltd											
Sample Number	S6158											
Date Recived	8.12.15											
Sample Ref	BH05 50740											
Key : -												
D	Always distance between platen contact points							D*D	= 4A/pi for axial (a) and irregular block (b) tests			
W	Smallest width perpendicular to loading direction							P	Load failure in KN			
	ie core diameter for axial tests.							Is	Uncorrected strength index			
	W =(W1 + W2)/2 for irregular blocks.							Is (50)	Point load strength index			
A	W*D minimum x-sectional area							F	Size correction factor			
	For axial or irregular block test 0.3W < D < W							#	Test perpendicular to fabric			
D*D	= D*D for diametral (d) tests							//	Test parallel to fabric			
Sample no	Sample type	Test type		D mm	W mm	P KN	A =W*D	D*D	Is	F	Is (50)	Approx. Compressive Strength (MPa)
*	*	*	*	*	*	*						
Axial, Block or Lump Tests												
1	Core	d		80	140	21.0	11200	14260	1.47	1.48	2.18	52.3
2												
3												
4												
5												
6												
7												
8												
9												
10												
											Mean	**52.3**

Porosity / Density Testing

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 22nd March 2016
Test Report No: STR: 443026

LABORATORY TEST REPORT

REQUIREMENTS: To determine the Porosity & Density using saturation and calliper in accordance with **ISRM Part 1: Test 2**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref.:	**Various**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**08/12/2015**
Date of Start of Test:	**11/02/2016**
Sampling Location:	**Various**
Name of Supplier:	**Lackagh Quarry**
Name and Location of Quarry	**Unknown**
Sampled By:	**Client**
Method of Sampling:	**Rock Testing**

Nick Dumbarton – Laboratory Manager

RESULTS:

Sample ref:	Porosity (%)	Dry Density of Rock (Kg/m^3)
BH4 - 48929	0.4	2.69
BH4 - 48936	0.5	2.65
BH5 - 48974	0.4	2.68
BH5 – 50702	0.4	2.69
BH5 – 50730	0.6	2.69

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 22nd March 2016
Test Report No: STR: 443115

LABORATORY TEST REPORT

REQUIREMENTS: To determine the Porosity & Density using saturation and buoyancy in accordance with **ISRM Part 1: Test 3**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref.:	**Various**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**08/12/2015**
Date of Start of Test:	**11/02/2016**
Sampling Location:	**Various**
Name of Supplier:	**Lackagh Quarry**
Name and Location of Quarry	**Unknown**
Sampled By:	**Client**
Method of Sampling:	**Rock Testing**

Nick Dumbarton – Laboratory Manager

RESULTS:

Sample ref:	Porosity (%)	Dry Density of Rock (Kg/m^3)
BH4 - 48914	0.2	2.72
BH4 - 48968	0.4	2.69
BH5 - 48976	0.3	2.65
BH5 - 48999	0.3	2.69
BH5 - 50735	0.4	2.68

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date:17th March 2016
Test Report No: STR: 447826

LABORATORY TEST REPORT

REQUIREMENTS: To determine the Porosity & Density using saturation and buoyancy in accordance with **ISRM Part 1: Test 3**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref.:	**Various**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/1/2016**
Date of Start of Test:	**21/2/2016**
Sampling Location:	**Various**
Name of Supplier:	**Lackagh Quarry**
Name and Location of Quarry	**Unknown**
Sampled By:	**Client**
Method of Sampling:	**Rock Testing**

Nick Dumbarton – Laboratory Manager

Test Report No: STR: 447826 Page 1 of 2

RESULTS:

Sample ref:	Porosity (%)	Dry Density of Rock (Kg/m^3)
BH01 - 48865	0.5	2.63
BH01 - 48876	1.2	2.70
BH01 - 48889	0.5	2.68
BH01 - 50860	0.2	2.72
BH01 - 50867	0.2	2.63
BH01 - 50881	1.0	2.70
BH01 - 50898	0.7	2.59
BH01 - 50919	0.3	2.63
BH01 - 50928	0.7	2.67
BH01 - 50942	0.4	2.72
BH01 - 50960	0.5	2.71
BH01 - 50967	0.3	2.85
BH01 - 50978	0.3	2.63
BH01 - 50983	0.4	2.65
BH01 - 51009	0.5	2.64

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 17th March 2016
Test Report No: STR: 447828

LABORATORY TEST REPORT

REQUIREMENTS: To determine the Porosity & Density using saturation and calliper in accordance with **ISRM Part 1: Test 2**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref.:	**Various**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**21/02/2016**
Sampling Location:	**Various**
Name of Supplier:	**Lackagh Quarry**
Name and Location of Quarry	**Unknown**
Sampled By:	**Client**
Method of Sampling:	**Rock Testing**

Nick Dumbarton – Laboratory Manager

Test Report No: STR: 447828 Page 1 of 2

RESULTS:

Sample ref:	Porosity (%)	Dry Density of Rock (Kg/m^3)
BH01 - 48866	0.47	2.69
BH01 - 48875	0.58	2.65
BH01 - 48885	0.54	2.70
BH01 - 50861	0.64	2.69
BH01 - 50866	0.57	2.71
BH01 - 50880	0.49	2.71
BH01 - 50897	0.57	2.69
BH01 - 50918	0.76	2.81
BH01 - 50927	0.61	2.75
BH01 - 50941	0.49	2.68
BH01 - 50956	0.54	2.69
BH01 - 50966	0.65	2.69
BH01 - 50977	0.56	2.75
BH01 - 50982	0.64	2.70
BH01 - 51008	0.63	2.65

Polish Stone Value

celtest
INDEPENDENT MATERIALS TESTING I DIAMOND DRILLING & SAWING

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Date: 01 March 2016
Test Report Ref: STR 448027

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Polished Stone Value (PSV) of aggregate sample in accordance with **BS EN 1097-8 : 2009**

SAMPLE DETAILS:

Certificate of sampling received:	**No**	Name of Source:	**Lackagh Quarry**
Laboratory Ref. No:	**S56595**	Method of Sampling:	**Unknown**
Client Ref. No:	**Bulk Sample**	Sampled By:	**Client**
Date and Time of Sampling:	**Unknown**		
Date of Receipt at Lab:	**18/01/2016**		
Date of Start of Test:	**23/02/2016**		
Sampling Location:	**Unknown**		
Material Description:	**Aggregate**		

RESULTS:

Recorded Polished Stone Value

Test Specimen	Test Run 1	(i)	35.3	Mean
		(ii)	35.7	Recorded
	Test Run 2	(iii)	35.0	Value (S)
		(iv)	37.0	= **35.8**
Control Stone	Test Run 1	(i)	47.7	Mean
		(ii)	47.3	Recorded
	Test Run 2	(iii)	47.0	Value (C)
		(iv)	46.7	= **47.2**

Corrected Polished Stone Value: S + 49* - C = **38**

Comments
*New Control Stone

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

Slake Durability

celtest
INDEPENDENT MATERIALS TESTING I DIAMOND DRILLING & SAWING

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Date: 29 February 2016
Test Report Ref: STR 448028

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Slake Durability Index of an aggregate sample in accordance with **ISRM guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. :	**Bulk Sample**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**18/02/2016**
Sampling Location:	**Unknown**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Aggregate**
Target Specification:	**N/A**

RESULTS:

Slake Durability Index = **99.4 %**

Comments
None

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

Soil Testing

PRIORITY GEOTECHNICAL	Natural Moisture Content/Atterberg Limits Summary BS 1377 : Part 2 : 1990 : Clause 3	Job Ref
Location	Galway PDL	P16005

Hole ID	Sample Ref	Depth (m)	Sample Type	Sample Description	MC	LL	PL	PI	% Pass 425
BH03		13.65	B		26				
BH03		13.73	B			34	NP	NP	100
BH03		19.1	B			29	NP	NP	100
BH03		19.25	B		30				
BH03		19.9	B		30				
BH03		21.3	B		30				
BH03		27.45	B			28	NP	NP	100
BH03		31.2	B		25				
BH03		33.95	B		27				
BH03		38.6	B		36				
BH03		39.25	B			56	44	12	100
BH03		39.8	B		38				
BH03		40.65	B			27	20	7	100
BH03		42.3	B		31				
BH03		47.2	B		32				
BH03		48.2	B			54	43	11	100
BH03		49.3	B		37				
BH03		63.5	B		20				
BH03		64.3	B		29				
BH03		65.5	B		24				
BH03		66.95	B		38				
BH03		68.4	B		37				

PRIORITY GEOTECHNICAL	Natural Moisture Content/Atterberg Limits Summary BS 1377 : Part 2 : 1990 : Clause 3	Job Ref
Location	Galway PDL	P16005

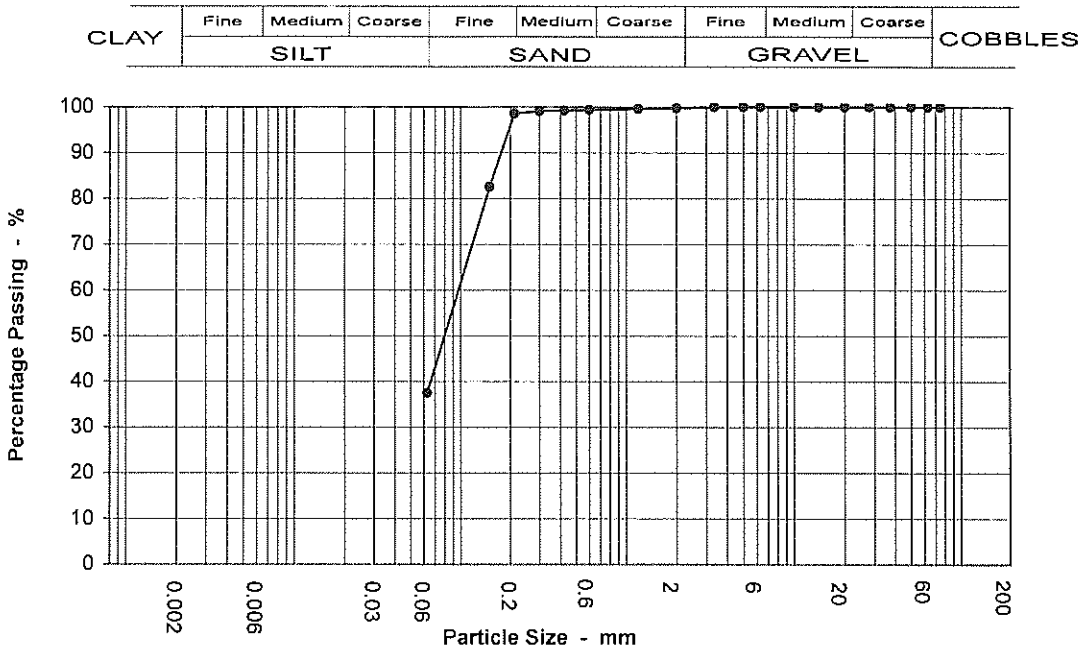
Hole ID	Sample Ref	Depth (m)	Sample Type	Sample Description	MC	LL	PL	PI	% Pass 425
BH03		70.4	B		21				
BH03		70.75	B		21				
BH03		71.6	B		25				
BH06		16.6	B		22				
BH06		16.7	B			38	27	11	100
BH06		18.25	B		28				
BH06		18.65	B			49	38	11	100
BH06		21.45	B		26				
BH06		21.52	B			39	30	9	100

PRIORITY GEOTECHNICAL

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

Job Ref	P16005
Borehole / Pit No	BH03
Location	Galway PDL
Sample No	0
Depth	14.90 m
Soil Description	
Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	99		
0.425	99		
0.3	99		
0.212	99		
0.15	82		
0.063	38		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	N/A

Sample Proportions	
Cobbles	0.0
Gravel	0.3
Sand	62.2
Silt & Clay	37.5

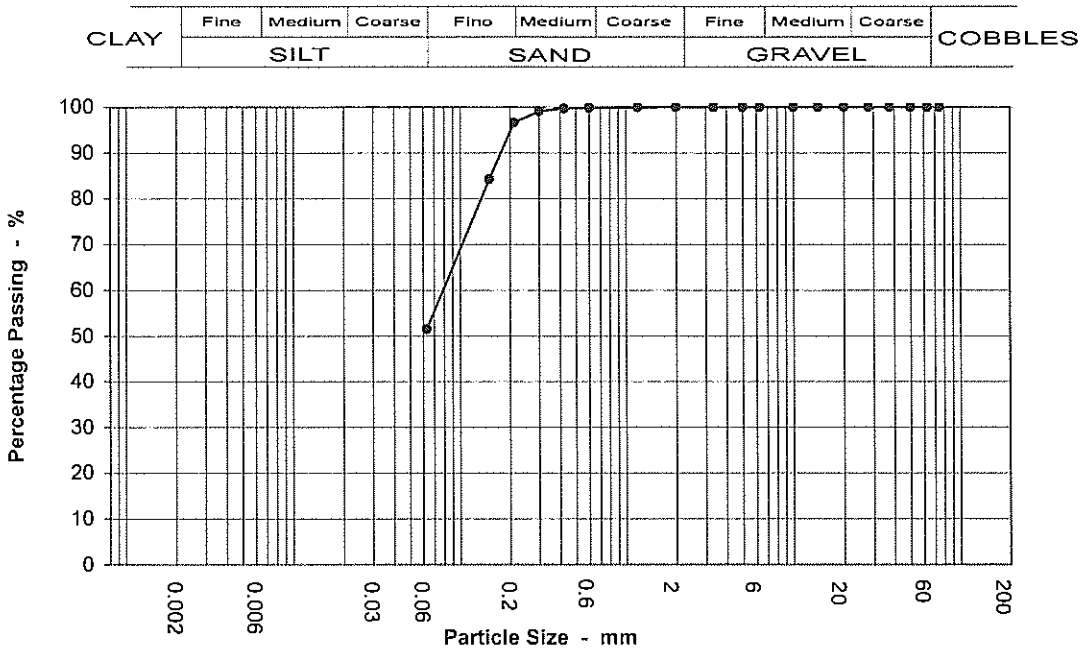
Grading Analysis	
D100	3.350
D60	0.106
D10	
Uniformity Coefficient	N/A

PRIORITY GEOTECHNICAL

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	P16005
		Borehole / Pit No	BH03
Location	Galway PDL	Sample No	0
		Depth	19.00 m
Soil Description		Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	99		
0.212	97		
0.15	84		
0.063	51		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	N/A

Sample Proportions	
Cobbles	0.0
Gravel	0.0
Sand	48.5
Silt & Clay	51.5

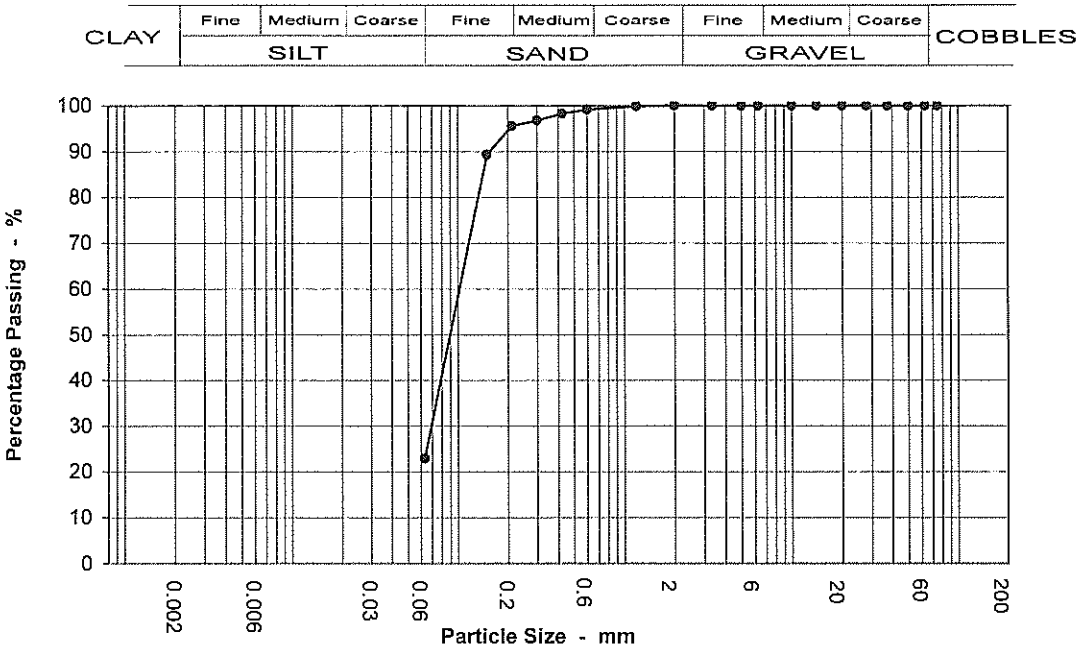
Grading Analysis	
D100	2.000
D60	0.086
D10	
Uniformity Coefficient	N/A

PRIORITY GEOTECHNICAL

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P16005**
		Borehole / Pit No	BH03
Location	Galway PDL	Sample No	0
		Depth	25.50 m
Soil Description		Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	99		
0.425	98		
0.3	97		
0.212	95		
0.15	89		
0.063	23		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	N/A

Sample Proportions	
Cobbles	0.0
Gravel	0.0
Sand	77.1
Silt & Clay	22.9

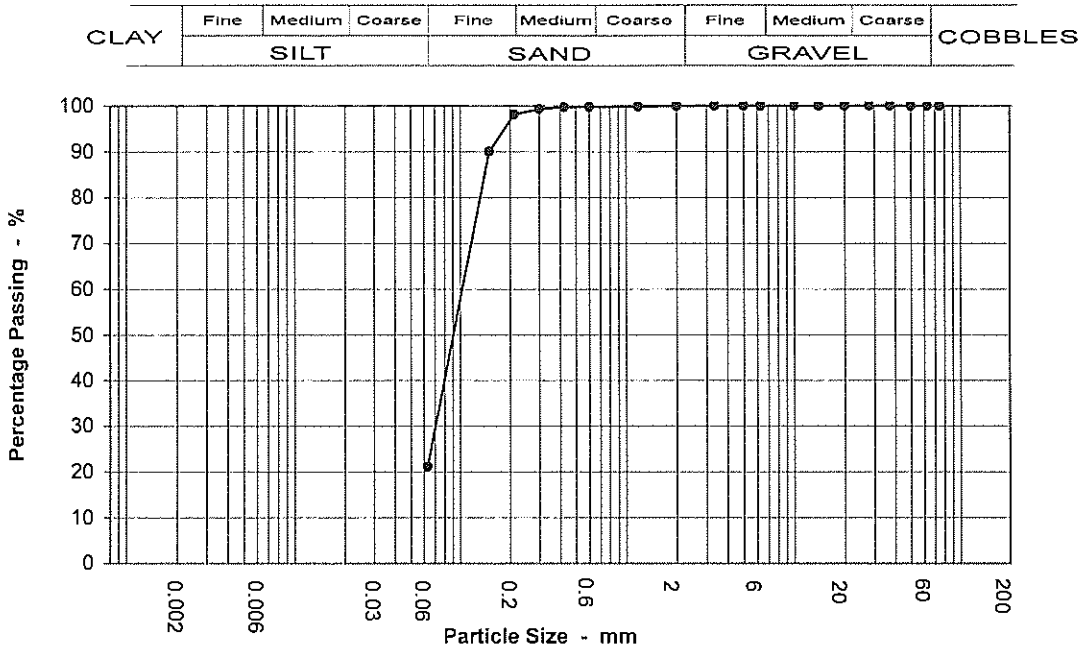
Grading Analysis	
D100	2.000
D60	0.112
D10	
Uniformity Coefficient	N/A

PRIORITY GEOTECHNICAL

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P16005**
		Borehole / Pit No	BH03
Location	**Galway PDL**	Sample No	0
		Depth	25.80 m
Soil Description		Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	99		
0.212	98		
0.15	90		
0.063	21		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	N/A

Sample Proportions	
Cobbles	0.0
Gravel	0.0
Sand	78.8
Silt & Clay	21.2

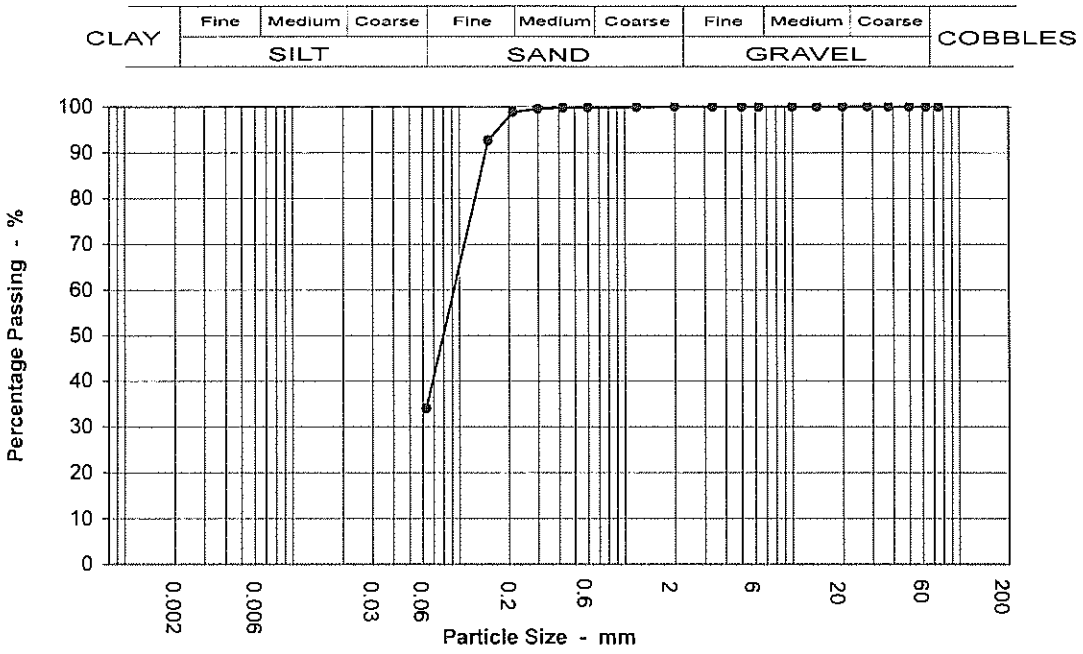
Grading Analysis	
D100	3.350
D60	0.112
D10	
Uniformity Coefficient	N/A

PRIORITY GEOTECHNICAL

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	P16005
		Borehole / Pit No	BH03
Location	Galway PDL	Sample No	0
		Depth	26.50 m
Soil Description		Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	99		
0.212	99		
0.15	93		
0.063	34		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	N/A

Sample Proportions	
Cobbles	0.0
Gravel	0.0
Sand	66.0
Silt & Clay	34.0

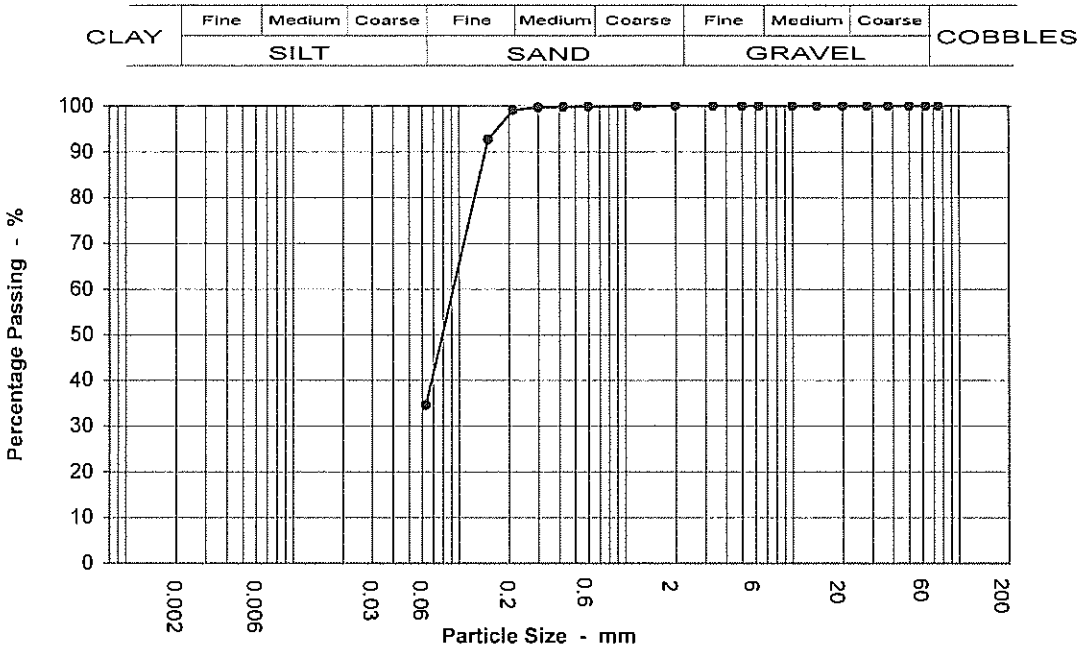
Grading Analysis	
D100	2.000
D60	0.102
D10	
Uniformity Coefficient	N/A

PRIORITY GEOTECHNICAL

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	P16005
		Borehole / Pit No	BH03
Location	Galway PDL	Sample No	0
		Depth	26.70 m
Soil Description		Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	100		
0.212	99		
0.15	93		
0.063	35		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	N/A

Sample Proportions	
Cobbles	0.0
Gravel	0.0
Sand	65.4
Silt & Clay	34.6

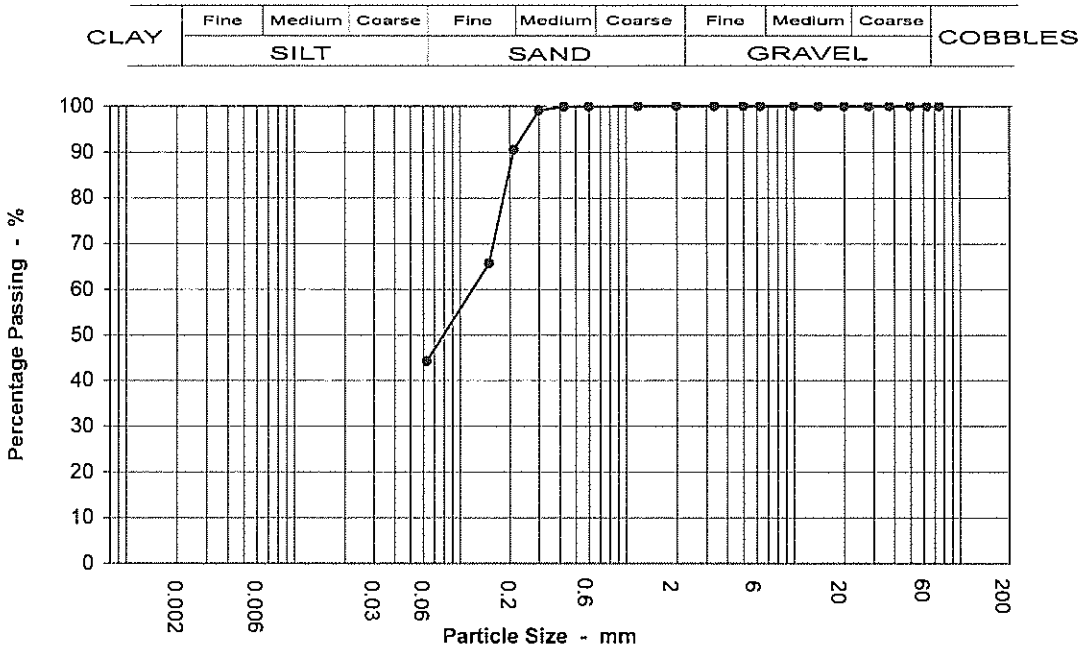
Grading Analysis	
D100	2.000
D60	0.101
D10	
Uniformity Coefficient	N/A

PRIORITY GEOTECHNICAL

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	**P16005**
		Borehole / Pit No	BH03
Location	**Galway PDL**	Sample No	0
		Depth	27.55 m
Soil Description		Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	99		
0.212	90		
0.15	66		
0.063	44		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	N/A

Sample Proportions	
Cobbles	0.0
Gravel	0.0
Sand	55.8
Silt & Clay	44.2

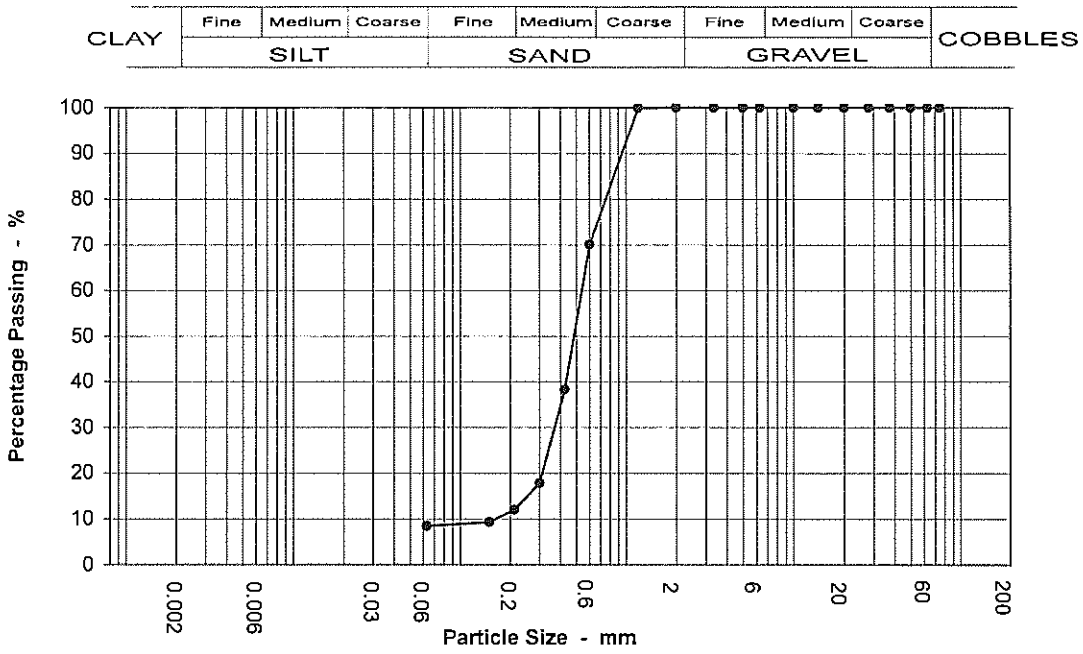
Grading Analysis	
D100	2.000
D60	0.127
D10	
Uniformity Coefficient	N/A

PRIORITY GEOTECHNICAL

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	P16005
		Borehole / Pit No	BH03
Location	Galway PDL	Sample No	0
		Depth	30.25 m
Soil Description		Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	70		
0.425	38		
0.3	18		
0.212	12		
0.15	9		
0.063	8		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	N/A

Sample Proportions	
Cobbles	0.0
Gravel	0.0
Sand	91.5
Silt & Clay	8.4

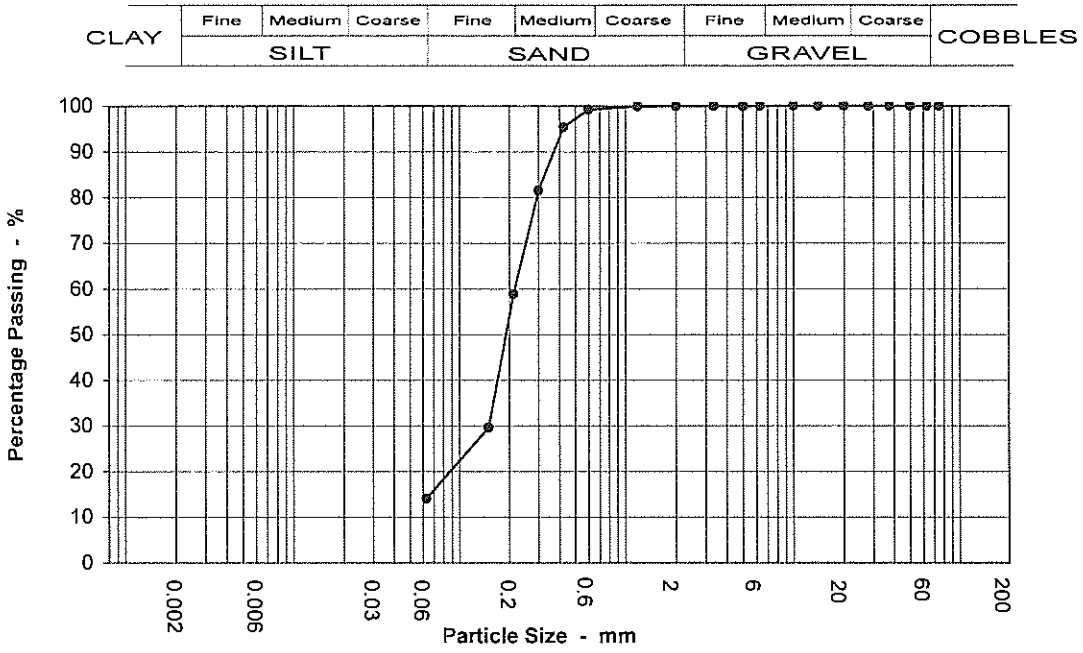
Grading Analysis	
D100	3.350
D60	0.545
D10	0.165
Uniformity Coefficient	3

PRIORITY GEOTECHNICAL

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	P16005
		Borehole / Pit No	BH03
Location	Galway PDL	Sample No	0
		Depth	36.70 m
Soil Description		Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	99		
0.425	95		
0.3	81		
0.212	59		
0.15	30		
0.063	14		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	N/A

Sample Proportions	
Cobbles	0.0
Gravel	0.1
Sand	85.8
Silt & Clay	14.1

Grading Analysis	
D100	6.300
D60	0.217
D10	
Uniformity Coefficient	N/A

PRIORITY GEOTECHNICAL

Sulphate Content & pH Value

BS 1377 : Part 3 : 1990 : Clause 5.5 & 9.5

Job Ref

Location: **Galway PDL**

P16005

Hole ID	Sample Ref	Depth (m)	Sample Type	Sample Description	% < 2.0 mm	pH Value	Sulphate Content as SO3			Sulphate Content as SO4		
							GW g/L	Total Sulphate %	Water Soluble g/L	GW g/L	Total Sulphate %	Water Soluble g/L
BH03		20.95	B			9.08						
BH03		27.20	B			8.93						
BH03		41.20	B			8.27						
BH03		47.00	B			7.77						
BH03		63.38	B			7.5						

PRIORITY GEOTECHNICAL

Organic Matter Content

BS 1377 : Part 3 : 1990 : Clause 3

Job Ref: P16005

Location: Galway PDL

Hole ID	Sample Ref	Depth (m)	Sample Type	Sample Description	% Mass < 2 mm	Organic Matter Content %
BH03		38.95	B		100	8.85
BH03		39.45	B		100	5.63
BH03		42.35	B		100	7.04
BH03		46.20	B		100	15.12
BH03		47.45	B		99.97	6.64
BH03		49.00	B		100	6.49
BH03		63.15	B		98.97	10.22
BH03		63.90	B		100	5.99
BH03		64.90	B		99.3	7.68
BH06		17.13	B		99.51	3.15
BH06		18.95	B		99.5	3.17
BH06		21.75	B		99.93	12.51

UNDRAINED TRIAXIAL COMPRESSION

BS 1377 : Part 7 : 1990 Clause 8

		Job Ref	P16005
		Borehole / Pit No	BH03
Location	Galway PDL	Sample No	
Soils Description		Depth	4.15 m
		Date	

Sample Details **Specimen** 1

Sample Condition		Undisturbed
Height	mm	185.0
Diameter	mm	82.0
Moisture Content	%	7.9
Bulk Density	Mg/m³	2.34
Dry Density	Mg/m³	2.17

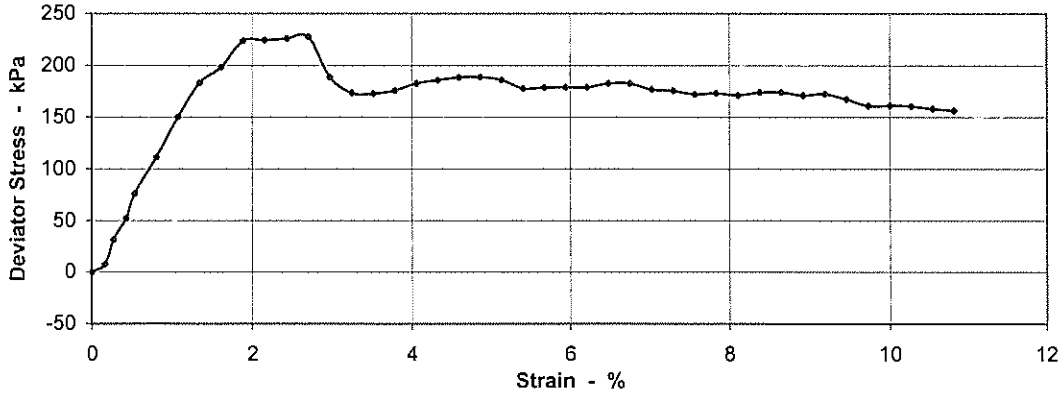
Position and orientation within the original sample

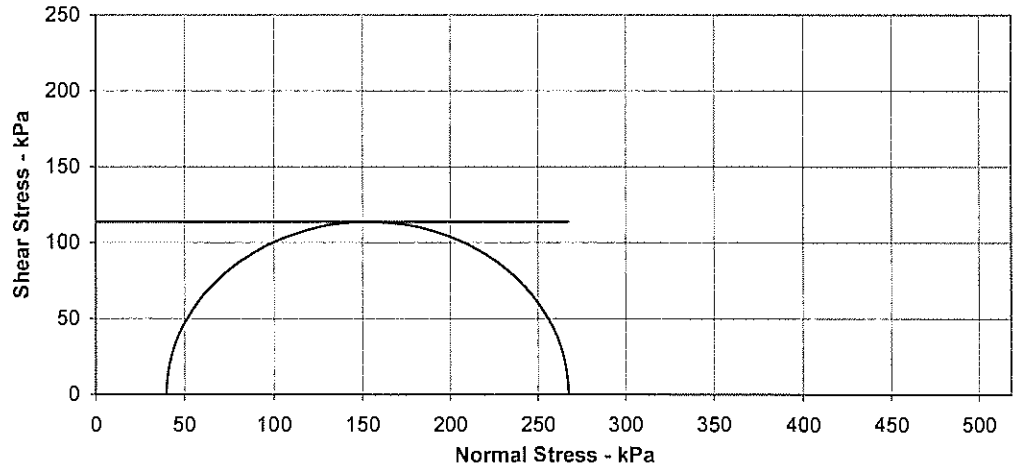
Test Details

Membrane Thickness	mm	0.36
Membrane Correction	kPa	0.33
Rate of Axial Displacement	%/min	1.62
Cell Pressure	kPa	40
Strain at Failure	%	2.7
Maximum Deviator Stress	kPa	227
Shear Strength	kPa	114
Mode of Failure		Brittle

Shear Strength Parameters	
C	114 kPa
Phi	0.0 °

Specimen 1





UNDRAINED TRIAXIAL COMPRESSION

BS 1377 : Part 7 : 1990 Clause 8

		Job Ref	P16005
		Borehole / Pit No	BH03
Location	Galway PDL	Sample No	
Soils Description		Depth	41.85 m
		Date	

Sample Details **Specimen 1**

Sample Condition		Undisturbed
Height	mm	208.0
Diameter	mm	83.0
Moisture Content	%	41
Bulk Density	Mg/m³	1.78
Dry Density	Mg/m³	1.26

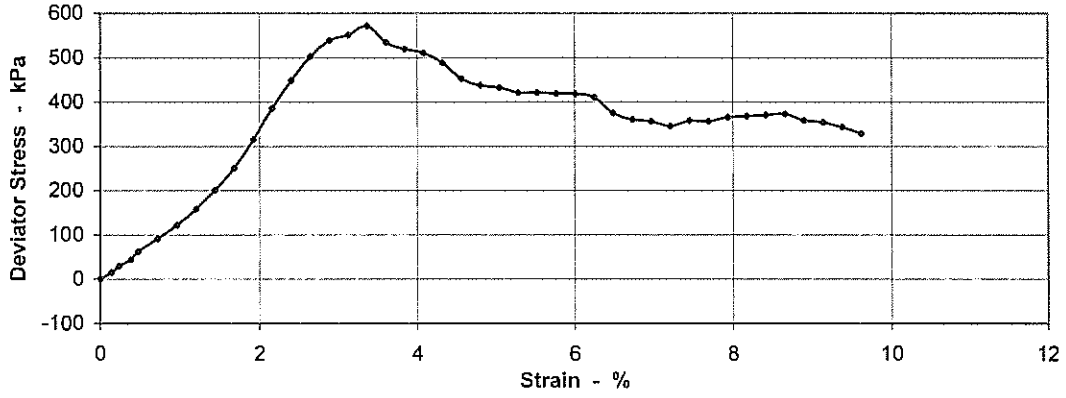
Test Details

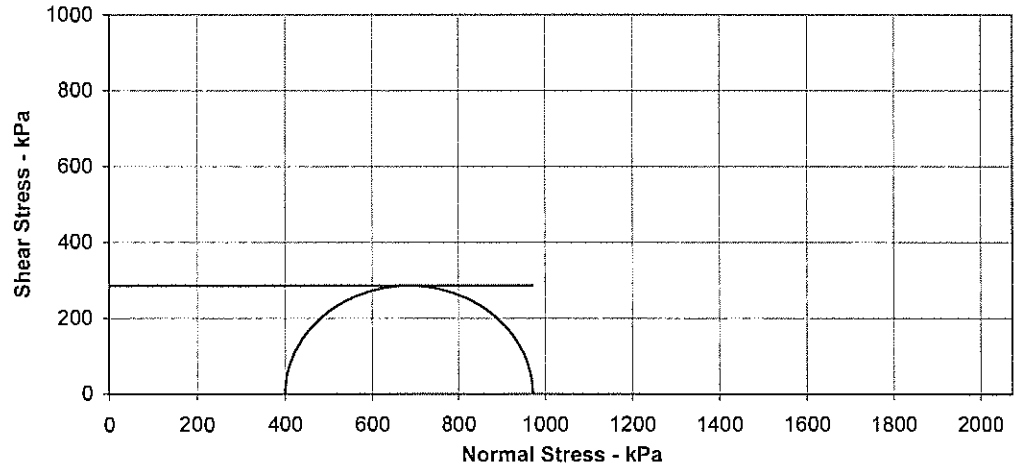
Membrane Thickness	mm	0.36
Membrane Correction	kPa	0.40
Rate of Axial Displacement	%/min	1.44
Cell Pressure	kPa	400
Strain at Failure	%	3.4
Maximum Deviator Stress	kPa	571
Shear Strength	kPa	286
Mode of Failure		Brittle

Position and orientation within the original sample

Shear Strength Parameters	
C	286 kPa
Phi	0.0 °

Specimen 1





UNDRAINED TRIAXIAL COMPRESSION

BS 1377 : Part 7 : 1990 Clause 8

Location	Galway PDL	Job Ref	P16005
		Borehole / Pit No	BH03
		Sample No	
Soils Description		Depth	42.81 m
		Date	

Sample Details **Specimen 1**

Sample Condition		Undisturbed
Height	mm	205.0
Diameter	mm	83.0
Moisture Content	%	43
Bulk Density	Mg/m³	1.95
Dry Density	Mg/m³	1.36

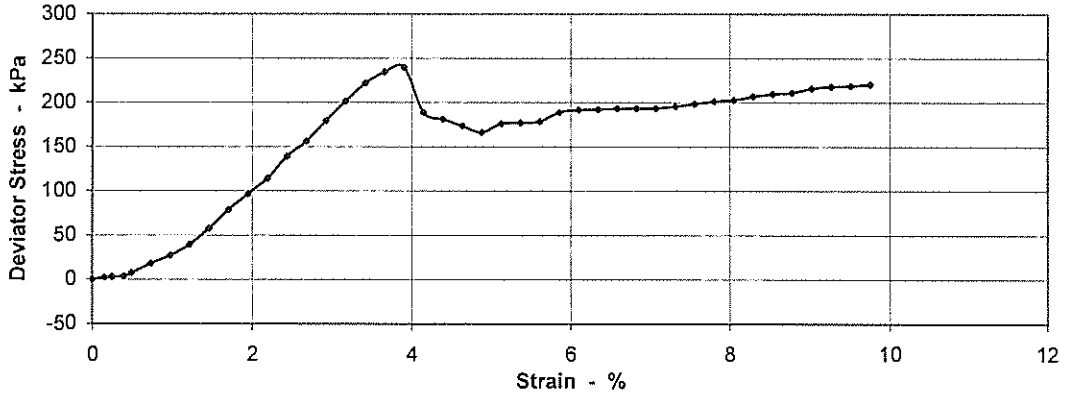
Test Details

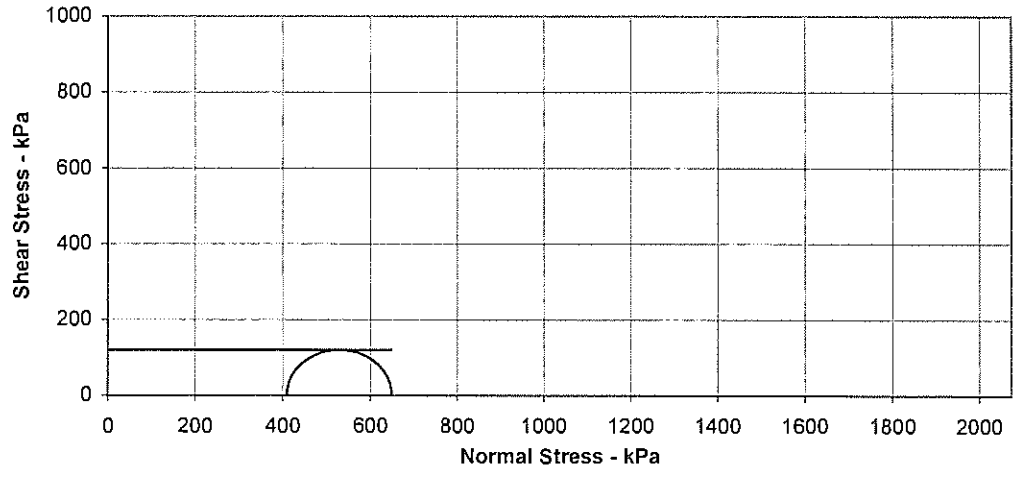
Membrane Thickness	mm	0.36
Membrane Correction	kPa	0.45
Rate of Axial Displacement	%/min	1.46
Cell Pressure	kPa	410
Strain at Failure	%	3.9
Maximum Deviator Stress	kPa	239
Shear Strength	kPa	120
Mode of Failure		Brittle

Position and orientation within the original sample

Shear Strength Parameters	
C	120 kPa
Phi	0.0 °

Specimen 1





UNDRAINED TRIAXIAL COMPRESSION

BS 1377 : Part 7 : 1990 Clause 8

		Job Ref	P16005
		Borehole / Pit No	BH03
Location	Galway PDL	Sample No	
Soils Description		Depth	46.43 m
		Date	

Sample Details **Specimen 1**

Sample Condition		Undisturbed
Height	mm	201.0
Diameter	mm	80.0
Moisture Content	%	38
Bulk Density	Mg/m³	1.73
Dry Density	Mg/m³	1.26

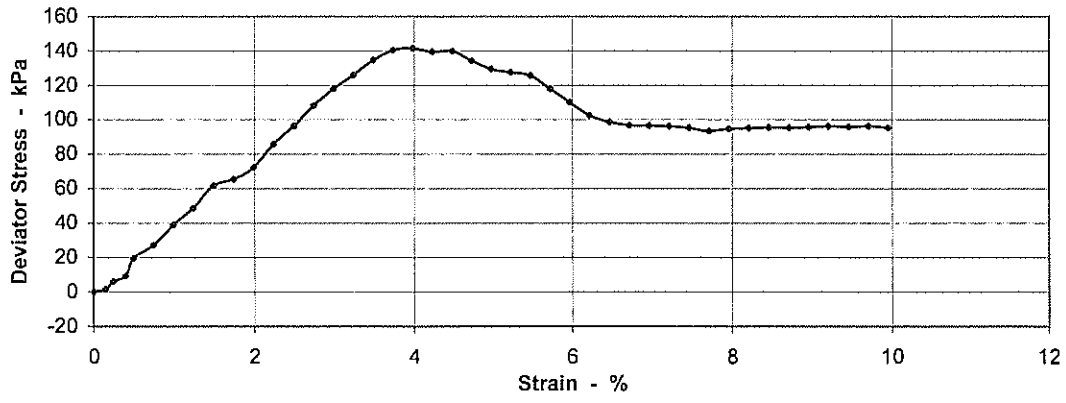
Test Details

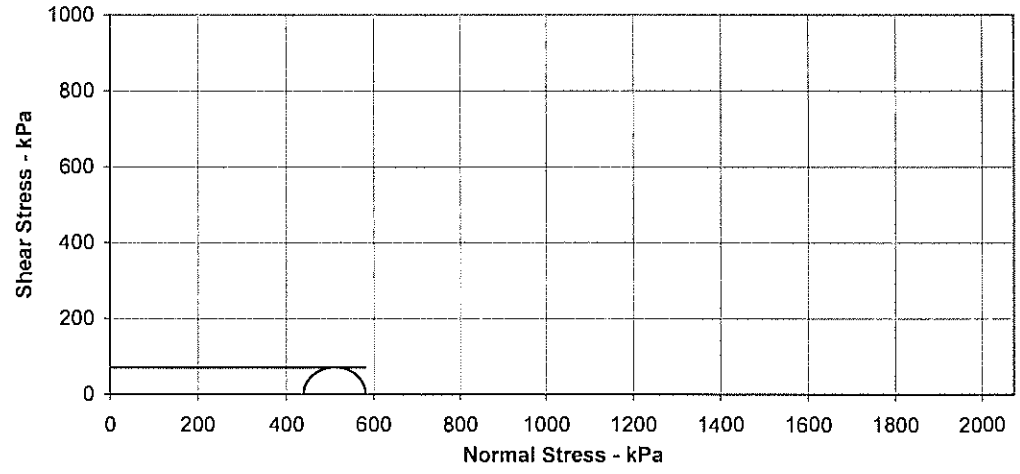
Membrane Thickness	mm	0.36
Membrane Correction	kPa	0.48
Rate of Axial Displacement	%/min	1.49
Cell Pressure	kPa	440
Strain at Failure	%	4.0
Maximum Deviator Stress	kPa	141
Shear Strength	kPa	71
Mode of Failure		Compound

Position and orientation within the original sample

Shear Strength Parameters	
C	71 kPa
Phi	0.0 °

Specimen 1





UNDRAINED TRIAXIAL COMPRESSION

BS 1377 : Part 7 : 1990 Clause 8

		Job Ref	P16005
		Borehole / Pit No	BH03
Location	Galway PDL	Sample No	
Soils Description		Depth	48.45 m
		Date	

Sample Details **Specimen** 1

Sample Condition		Undisturbed
Height	mm	210.0
Diameter	mm	83.0
Moisture Content	%	31
Bulk Density	Mg/m³	1.92
Dry Density	Mg/m³	1.47

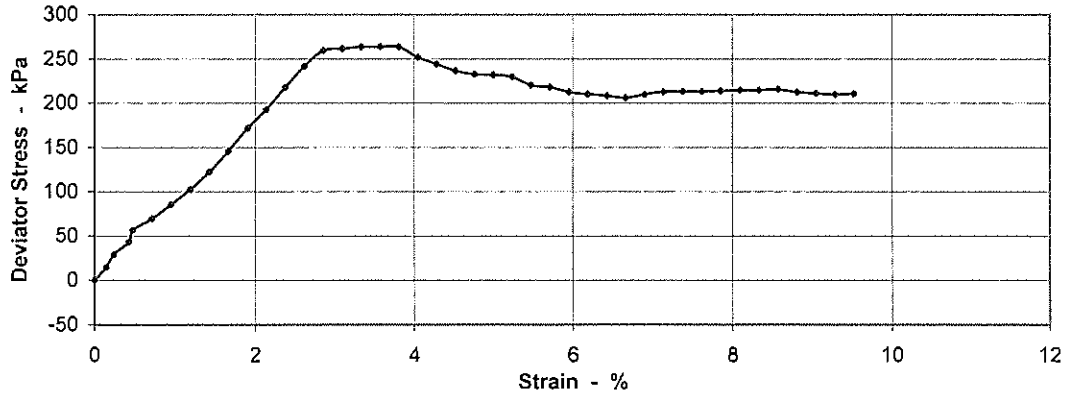
Test Details

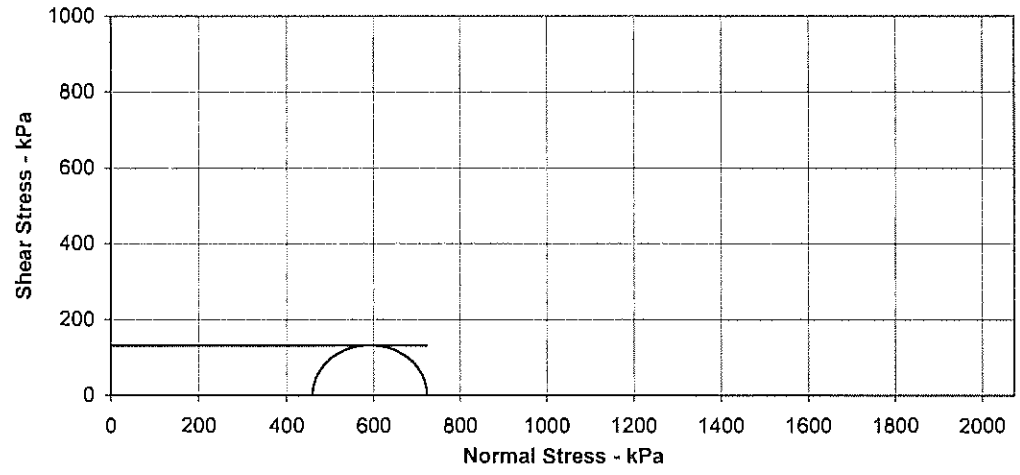
Membrane Thickness	mm	0.36
Membrane Correction	kPa	0.44
Rate of Axial Displacement	%/min	1.43
Cell Pressure	kPa	460
Strain at Failure	%	3.8
Maximum Deviator Stress	kPa	264
Shear Strength	kPa	132
Mode of Failure		Brittle

Position and orientation within the original sample

Shear Strength Parameters	
C	132 kPa
Phi	0.0 °

Specimen 1





UNDRAINED TRIAXIAL COMPRESSION

BS 1377 : Part 7 : 1990 Clause 8

Location	Galway PDL	Job Ref	P16005
		Borehole / Pit No	BH06
		Sample No	
Soils Description		Depth	5.25 m
		Date	

Sample Details **Specimen 1**

Sample Condition		Undisturbed
Height	mm	196.0
Diameter	mm	82.0
Moisture Content	%	6.1
Bulk Density	Mg/m³	2.39
Dry Density	Mg/m³	2.26

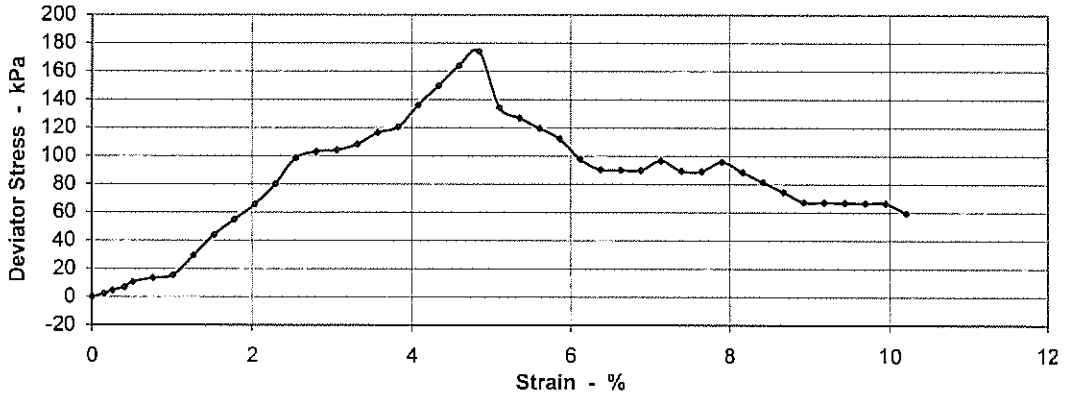
Test Details

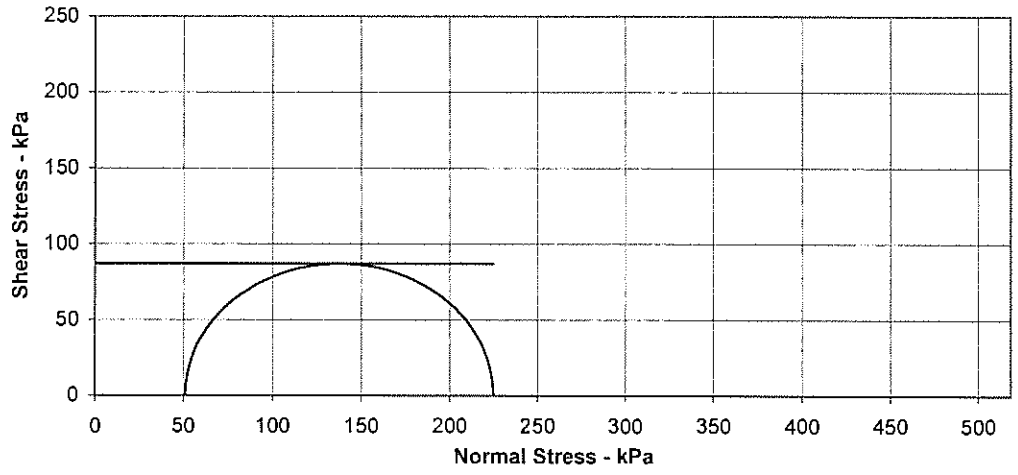
Membrane Thickness	mm	0.36
Membrane Correction	kPa	0.55
Rate of Axial Displacement	%/min	1.53
Cell Pressure	kPa	51
Strain at Failure	%	4.8
Maximum Deviator Stress	kPa	174
Shear Strength	kPa	87
Mode of Failure		Brittle

Position and orientation within the original sample

Shear Strength Parameters	
C	87 kPa
Phi	0.0 °

Specimen 1





UNDRAINED TRIAXIAL COMPRESSION

BS 1377 : Part 7 : 1990 Clause 8

		Job Ref	P16005
		Borehole / Pit No	BH06
Location	Galway PDL	Sample No	
Soils Description		Depth	18 m
		Date	

Sample Details **Specimen** 1

Sample Condition		Undisturbed
Height	mm	206.0
Diameter	mm	82.0
Moisture Content	%	30
Bulk Density	Mg/m³	2.09
Dry Density	Mg/m³	1.61

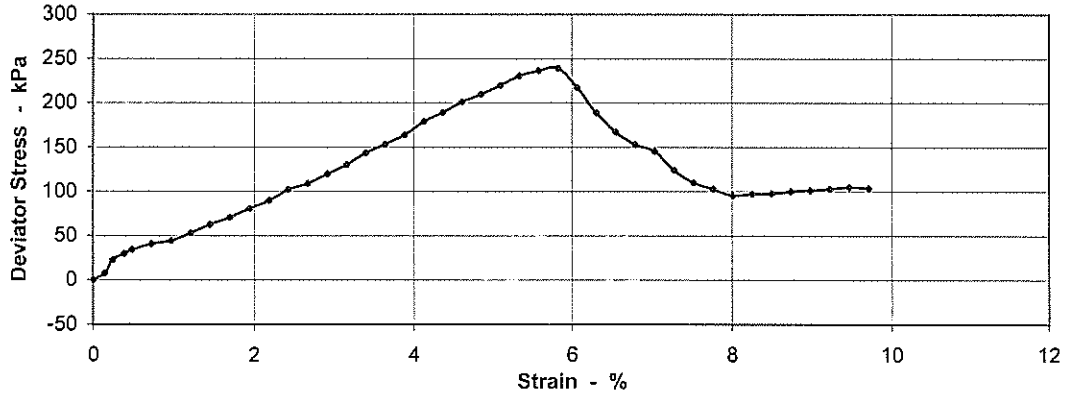
Test Details

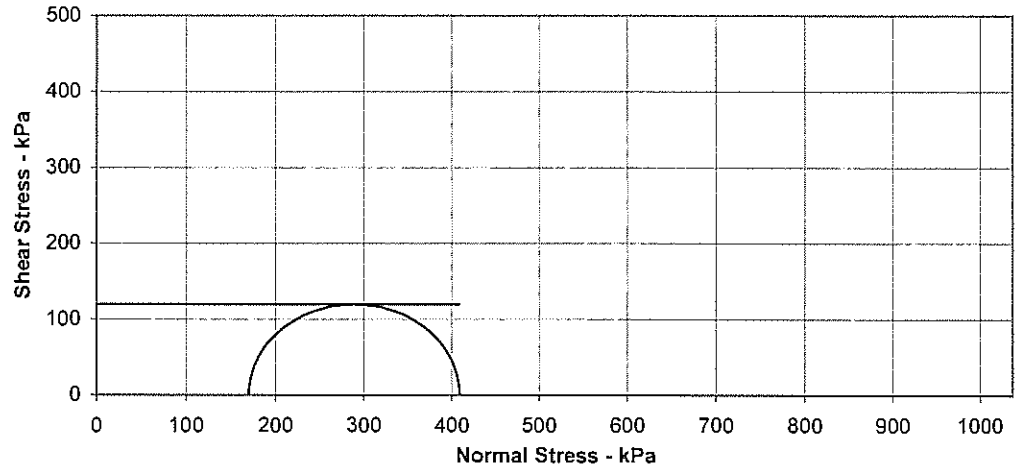
Membrane Thickness	mm	0.36
Membrane Correction	kPa	0.65
Rate of Axial Displacement	%/min	1.46
Cell Pressure	kPa	170
Strain at Failure	%	5.8
Maximum Deviator Stress	kPa	239
Shear Strength	kPa	119
Mode of Failure		Brittle

Position and orientation within the original sample

Shear Strength Parameters	
C	119 kPa
Phi	0.0 °

Specimen 1





Laboratory Report

GEO Site & Testing Services Ltd

Contract Number: 30522

Client's Reference: **P16005**

Report Date: **09-05-2016**

Client **Priority Geotechnical Limited**
Unit 12
Owenacurra Business Park
Midleton
Co. Cork.

Contract Title: **N6 Galway Bypass**

For the attention of: **Colette Kelly**

Date Received: **07-04-2016**

Date Commenced: **07-04-2016**

Date Completed: **09-05-2016**

Test Description	Qty
One-dimensional Consolidation 75mm or 50mm diameter specimens (5 days) 1377 : 1990 Part 5 : 3 - * UKAS	7
As 4.01 each additional day 1377 : 1990 Part 5 : 3	18
Disposal of Samples on Project	1

Notes: **Observations and Interpretations are outside the UKAS Accreditation**
*** - denotes test included in laboratory scope of accreditation**
 # - denotes test carried out by approved contractor
@ - denotes non accredited tests

Approved Signatories:
Alex Wynn (Associate Director) - Benjamin Sharp (Contracts Manager) - Emma Sharp (Office Manager)
Paul Evans (Quality/Technical Manager) - Vaughan Edwards (Managing Director)

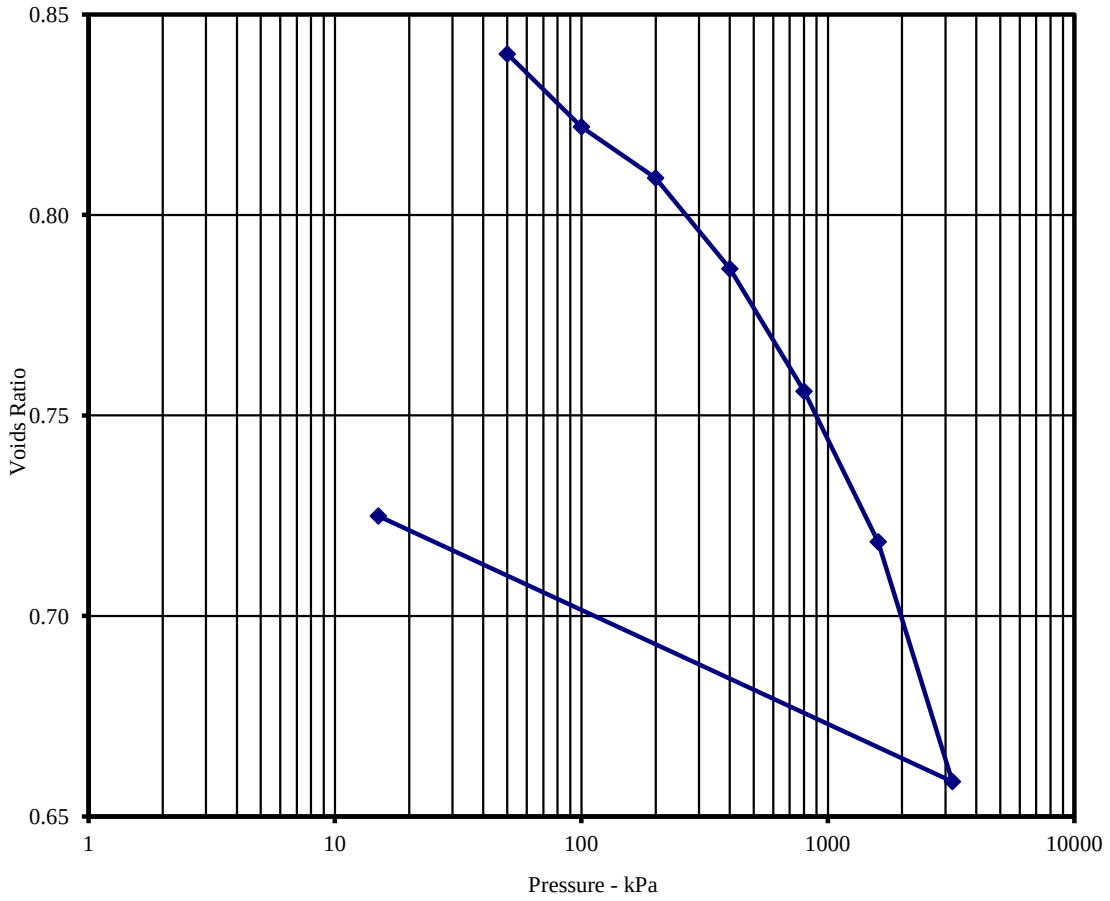
GEO Site & Testing Services Ltd
Unit 4, Heol Aur, Dafen Ind Estate, Dafen, Llanelli, Carmarthenshire SA14 8QN
Tel: 01554 784040 Fax: 01554 784041 info@gstl.co.uk gstl.co.uk

ONE DIMENSIONAL CONSOLIDATION

BS1377: Part 5: 1990

Client ref: **P16005**
Location: **N6 Galway Bypass**
Contract Number: **30522-070416**
Hole/Sample Number: **BH03**
Depth (m): **41.30 - 41.50**
Sample Type: **B**

Initial Conditions		Pressure Range			Mv	Cv	Method of time fitting used
Moisture Content (%):	33	kPa			m2/MN	m2/yr	Cv Calculated using t90
Bulk Density (Mg/m3):	1.89	0	-	50	0.20	23	Nominal Laboratory Temperature
Dry Density (Mg/m3):	1.43	50	-	100	0.20	15	20'C
Voids Ratio:	0.8590	100	-	200	0.070	24	Location of specimen with sample
Degree of saturation:	101.4	200	-	400	0.063	13	top
Height (mm):	19.96	400	-	800	0.043	7.4	Remarks:
Diameter (mm)	50.06	800	-	1600	0.027	9.8	
Particle Density (Mg/m3):	2.65	1600	-	3200	0.022	11	
Assumed		3200	-	15	0.013	20	



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GEO SITE & TESTING SERVICES LTD

Checked By **Date** 09/05/16

Approved By **Date** 09/05/16

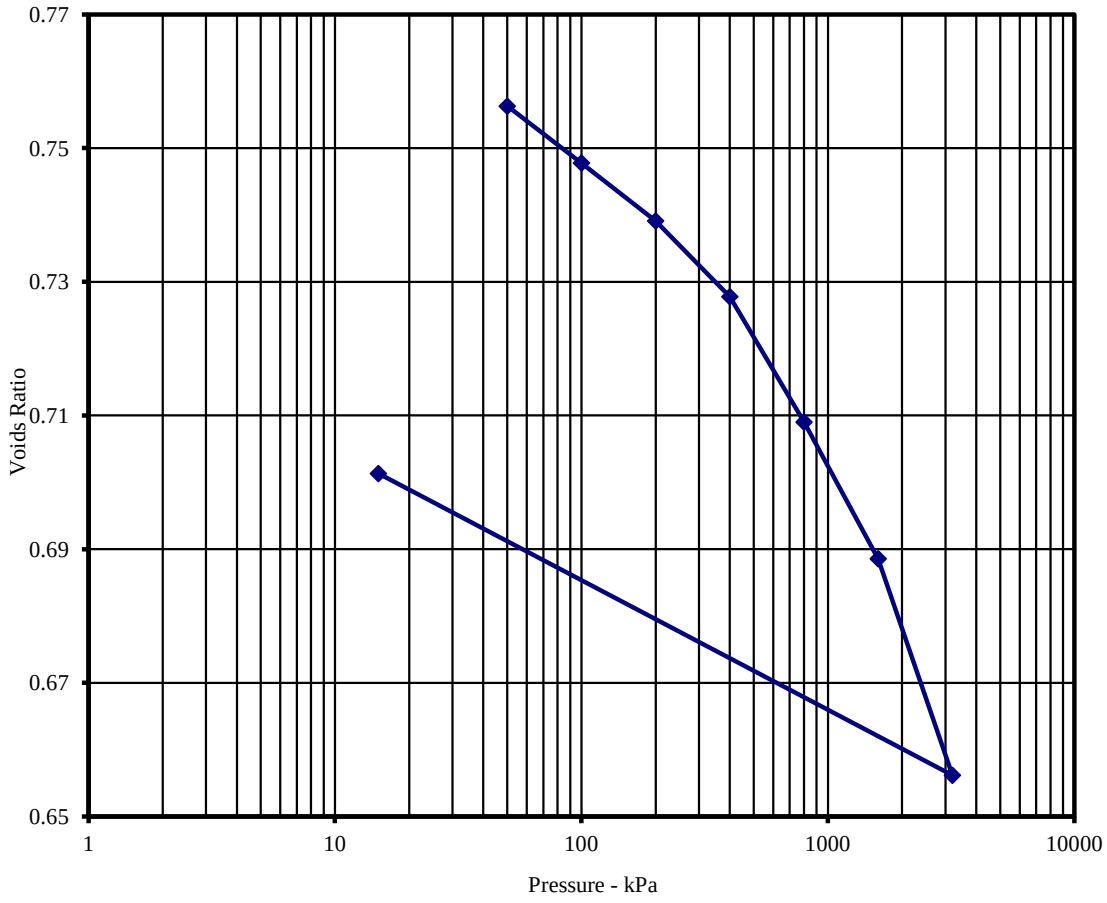
UKAS TESTING 2788

ONE DIMENSIONAL CONSOLIDATION

BS1377: Part 5: 1990

Client ref: **P16005**
Location: **N6 Galway Bypass**
Contract Number: **30522-070416**
Hole/Sample Number: **BH03**
Depth (m): **42.97 - 43.00**
Sample Type: **B**

Initial Conditions		Pressure Range			Mv	Cv	Method of time fitting used
Moisture Content (%):	29	kPa			m2/MN	m2/yr	Cv Calculated using t90
Bulk Density (Mg/m3):	1.93	0	-	50	0.18	31	Nominal Laboratory Temperature
Dry Density (Mg/m3):	1.50	50	-	100	0.10	11	20'C
Voids Ratio:	0.7721	100	-	200	0.050	36	Location of specimen with sample
Degree of saturation:	99.6	200	-	400	0.033	11	top
Height (mm):	20.02	400	-	800	0.027	12	Remarks:
Diameter (mm)	50.05	800	-	1600	0.015	25	
Particle Density (Mg/m3):	2.65	1600	-	3200	0.012	10	
Assumed		3200	-	15	0.0086	31	



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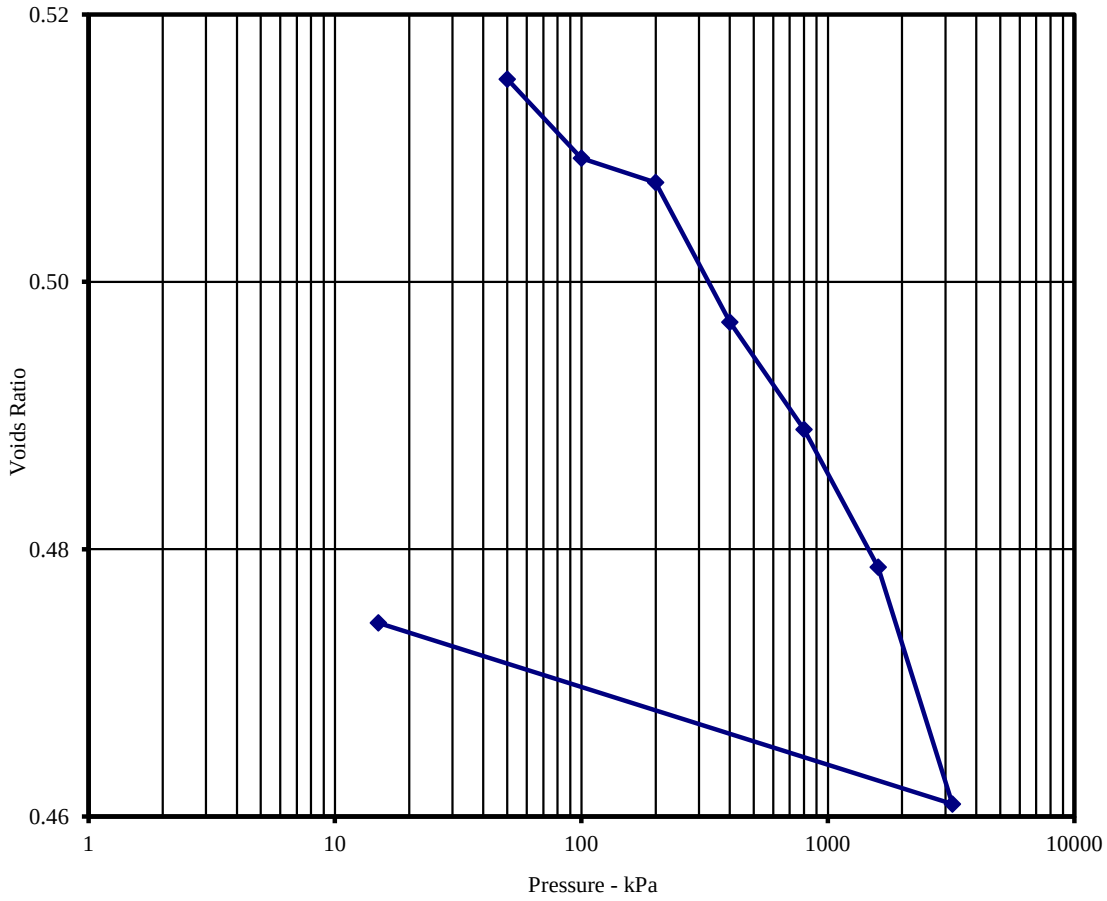
ONE DIMENSIONAL CONSOLIDATION

BS1377: Part 5: 1990

Client ref: **P16005**
Location: **N6 Galway Bypass**
Contract Number: **30522-070416**
Hole/Sample Number: **BH03**
Depth (m): **44.05 - 44.20**
Sample Type: **B**

Initial Conditions		Pressure Range			Mv	Cv	Method of time fitting used
Moisture Content (%):	21	kPa			m2/MN	m2/yr	Cv Calculated using t90
Bulk Density (Mg/m3):	2.11	0	-	50	0.025	19	Nominal Laboratory Temperature
Dry Density (Mg/m3):	1.75	50	-	100	0.078	0.53	20'C
Voids Ratio:	0.5171	100	-	200	0.012	19	Location of specimen with sample
Degree of saturation:	105.2	200	-	400	0.035	4.8	top
Height (mm):	20.03	400	-	800	0.013	6.2	Remarks:
Diameter (mm)	50	800	-	1600	0.0086	19	
Particle Density (Mg/m3):	2.65	1600	-	3200	0.0075	10	
Assumed		3200	-	15	0.0029	53	



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Checked By **Date** 09/05/16

Approved By **Date** 09/05/16

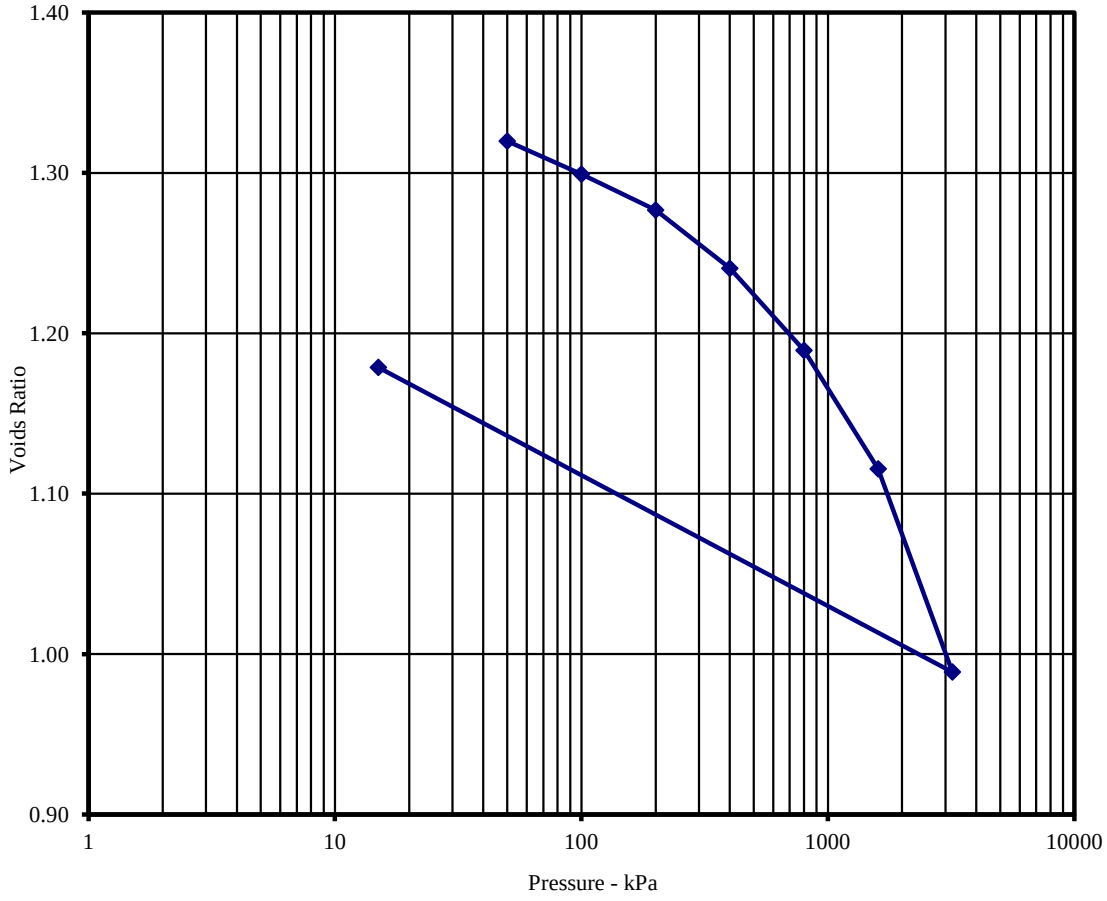
UKAS TESTING 2788

ONE DIMENSIONAL CONSOLIDATION

BS1377: Part 5: 1990

Client ref: **P16005**
Location: **N6 Galway Bypass**
Contract Number: **30522-070416**
Hole/Sample Number: **BH03**
Depth (m): **47.85 - 48.02**
Sample Type: **B**

Initial Conditions		Pressure Range			Mv	Cv	Method of time fitting used
Moisture Content (%):	40	kPa			m2/MN	m2/yr	Cv Calculated using t90
Bulk Density (Mg/m3):	1.59	0	-	50	0.13	18	Nominal Laboratory Temperature
Dry Density (Mg/m3):	1.14	50	-	100	0.18	5.6	20'C
Voids Ratio:	1.3346	100	-	200	0.097	18	Location of specimen with sample
Degree of saturation:	79.1	200	-	400	0.080	4.1	top
Height (mm):	20.04	400	-	800	0.057	0.63	Remarks:
Diameter (mm)	50.02	800	-	1600	0.042	15	
Particle Density (Mg/m3):	2.65	1600	-	3200	0.037	9.2	
Assumed		3200	-	15	0.030	2.8	



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Checked By — Date: 09/05/16

Approved By — Date: 09/05/16

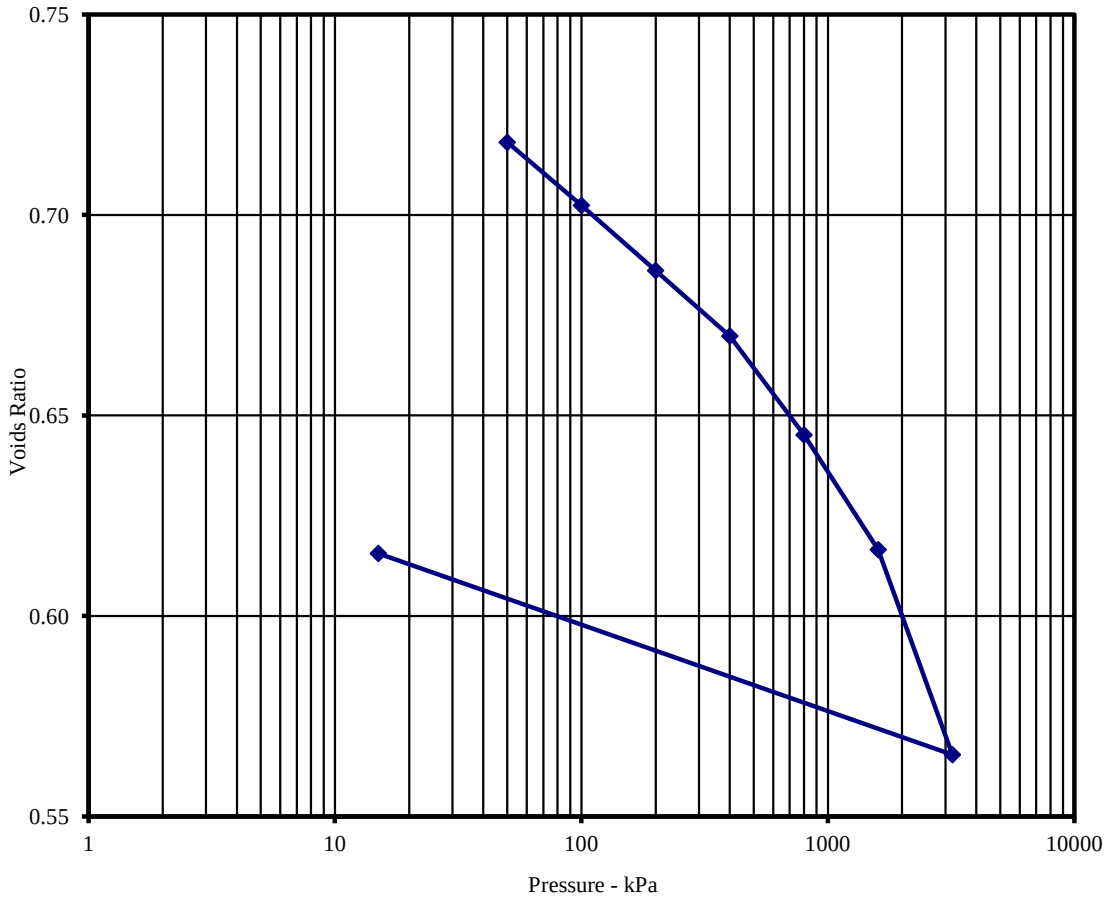
UKAS TESTING 2788

ONE DIMENSIONAL CONSOLIDATION

BS1377: Part 5: 1990

Client ref: P16005
Location: N6 Galway Bypass
Contract Number: 30522-070416
Hole/Sample Number: BH06
Depth (m): 16.20 - 16.50
Sample Type: B

Initial Conditions		Pressure Range			Mv	Cv	Method of time fitting used
Moisture Content (%):	26	kPa			m2/MN	m2/yr	Cv Calculated using t90
Bulk Density (Mg/m3):	1.95	0	-	50	0.046	17	Nominal Laboratory Temperature
Dry Density (Mg/m3):	1.54	50	-	100	0.18	12	20'C
Voids Ratio:	0.7221	100	-	200	0.10	10	Location of specimen with sample
Degree of saturation:	96.9	200	-	400	0.048	16	top
Height (mm):	20.04	400	-	800	0.037	6.2	Remarks:
Diameter (mm)	50.02	800	-	1600	0.022	11	
Particle Density (Mg/m3):	2.65	1600	-	3200	0.020	14	
Assumed		3200	-	15	0.010	10	



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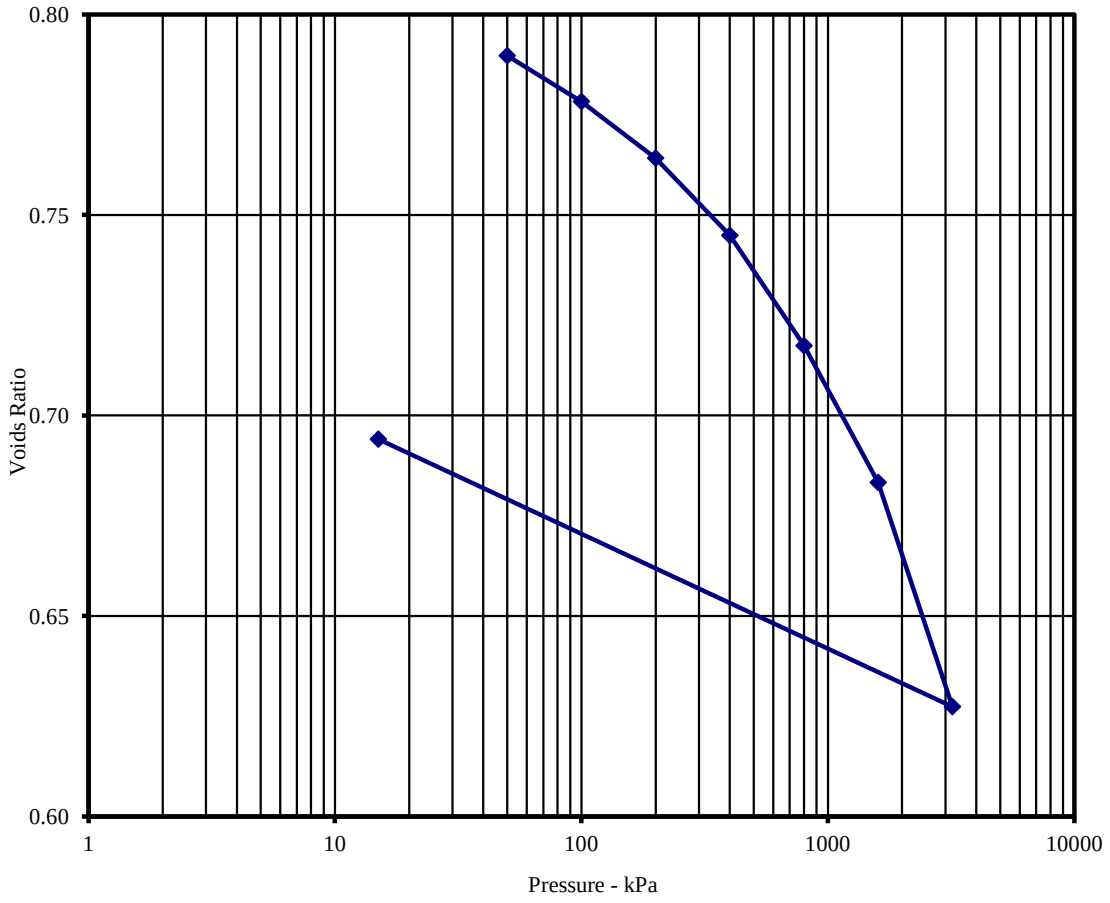
UKAS TESTING 2788

ONE DIMENSIONAL CONSOLIDATION

BS1377: Part 5: 1990

Client ref: **P16005**
Location: **N6 Galway Bypass**
Contract Number: **30522-070416**
Hole/Sample Number: **BH06**
Depth (m): **19.70 - 19.95**
Sample Type: **B**

Initial Conditions		Pressure Range			Mv	Cv	Method of time fitting used
Moisture Content (%):	27	kPa			m2/MN	m2/yr	Cv Calculated using t90
Bulk Density (Mg/m3):	1.87	0	-	50	0.084	12	Nominal Laboratory Temperature
Dry Density (Mg/m3):	1.47	50	-	100	0.13	12	20'C
Voids Ratio:	0.7973	100	-	200	0.079	27	Location of specimen with sample
Degree of saturation:	90.1	200	-	400	0.055	11	top
Height (mm):	20.13	400	-	800	0.039	4.3	Remarks:
Diameter (mm)	50.01	800	-	1600	0.025	16	
Particle Density (Mg/m3):	2.65	1600	-	3200	0.021	15	
Assumed		3200	-	15	0.013	16	



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Checked By **Date** 09/05/16

Approved By **Date** 09/05/16

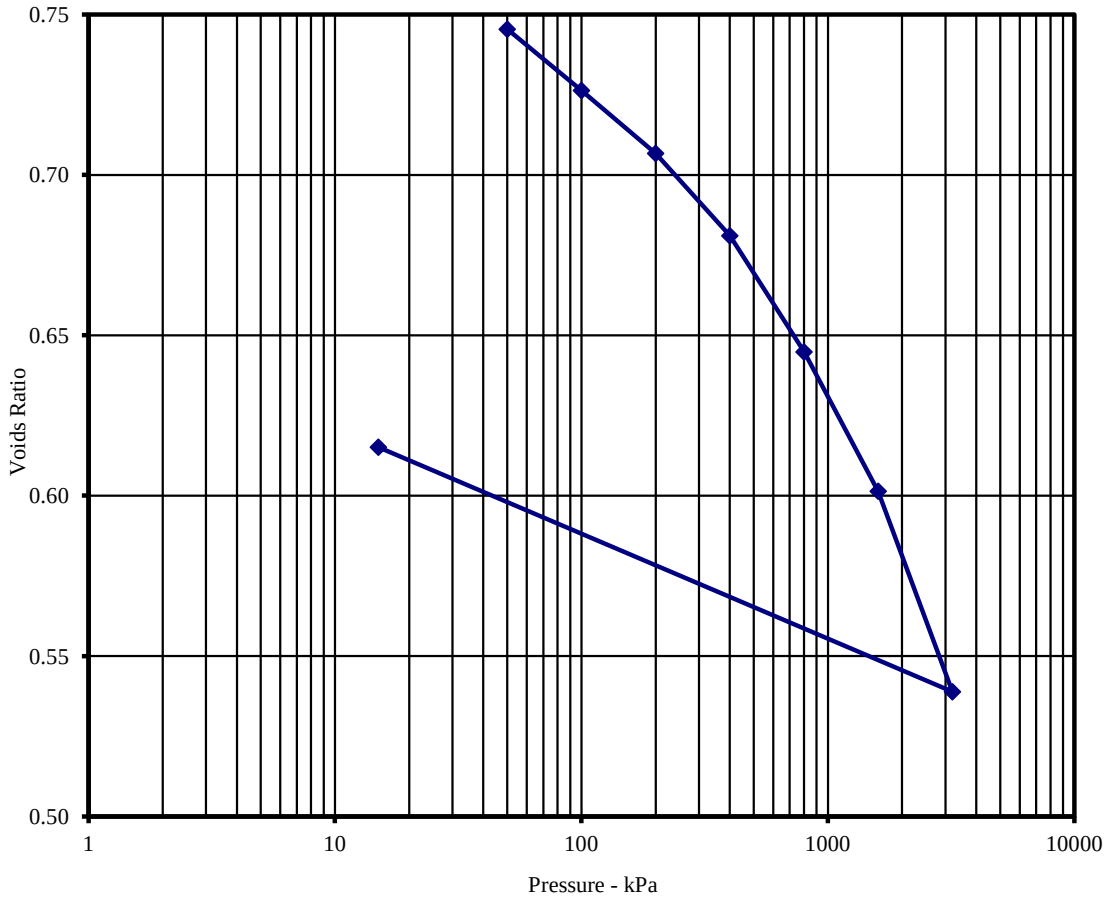
UKAS TESTING 2788

ONE DIMENSIONAL CONSOLIDATION

BS1377: Part 5: 1990

Client ref: **P16005**
Location: **N6 Galway Bypass**
Contract Number: **30522-070416**
Hole/Sample Number: **BH06**
Depth (m): **20.00 - 20.25**
Sample Type: **B**

Initial Conditions		Pressure Range			Mv	Cv	Method of time fitting used
Moisture Content (%):	30	kPa			m2/MN	m2/yr	Cv Calculated using t90
Bulk Density (Mg/m3):	1.94	0	-	50	0.35	18	Nominal Laboratory Temperature
Dry Density (Mg/m3):	1.49	50	-	100	0.22	15	20'C
Voids Ratio:	0.7762	100	-	200	0.11	27	Location of specimen with sample
Degree of saturation:	101.7	200	-	400	0.075	16	top
Height (mm):	19.92	400	-	800	0.054	7.0	Remarks:
Diameter (mm)	50.02	800	-	1600	0.033	21	
Particle Density (Mg/m3):	2.65	1600	-	3200	0.024	14	
Assumed		3200	-	15	0.016	7.1	



GSTL
GEO SITE & TESTING SERVICES LTD

Checked By **Date** 09/05/16

Approved By **Date** 09/05/16

UKAS TESTING 2788

Thin Section / Petrography

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 16th February 2016
Test Report Ref.: 443031

LABORATORY TEST REPORT

Test Requirements: Petrographic Examination of Natural Stone in accordance with BS EN 12047:2007

Sample details:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref. No:	**BH04 - 48919**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**29/1/2016**
Date of Start of Test.:	**21/1/2016**
Sampling Location:	**Depth Top: 20.05 Depth Base: 20.12**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The work was carried out by our accredited, competent, sub contracted laboratory.

RESULTS

See Attached

Nick Dumbarton – Assistant Laboratory Manager

Petrographic Examination Natural Stone– BS EN 12407:2007

HAND SPECIMEN DESCRIPTION

The sample was hard, fine to very coarse grained, anisotropic limestone breccia. The sample exhibited small to very large, medium grey limestone clasts (up to >70mm across), cemented or surrounded by dark grey materials comprising chiefly much smaller limestone and calcite grains, and including some clay materials. The sample did not appear macroporous.

MICROSCOPICAL DESCRIPTION

Constituents[1]	Visual Estimated Proportions[2] %	Range of Crystal/Grain Size	Petrographic Details	Origin
Calcite	94	Up to 4mm	Fresh, angular to well rounded calcium carbonate, including abundant bioclasts. The sample was partially stained in accordance with Dickson's method. This suggested that the calcite was non-ferroan.	Primary
Clay materials	2-3	<4µm	Very fine grained materials beyond the conclusive resolution of the petrographic microscope, which could be better investigated by scanning electron microscopy (SEM).	Primary
Opaque minerals	1-2	Up to 800µm	Irregular, anhedral to euhedral, fresh to partially oxidised isotropic minerals apparently comprising both framboidal and facetted, probably pyritic materials. Scanning electron microscopy should be used if necessary for better resolution and description of the opaque minerals.	Primary
Iron oxide compounds	<<1	N/A	Small amorphous by-products of the partial or complete oxidation of opaque minerals.	Secondary

The sample was a fine to very coarse grained LIMESTONE BRECCIA, comprising chiefly calcium carbonate (chiefly as limestone clasts), with a minor proportion of clay materials and trace to minor proportion of opaque minerals.

The individual limestone constituents were typically fine to medium grained. The dark grey areas of the sample comprised chiefly smaller calcium carbonate, with a minor proportion of clay materials. The opaque minerals were unevenly distributed and were frequently observed concentrated in thin, irregular and randomly orientated layers within the dark grey areas of the sample.

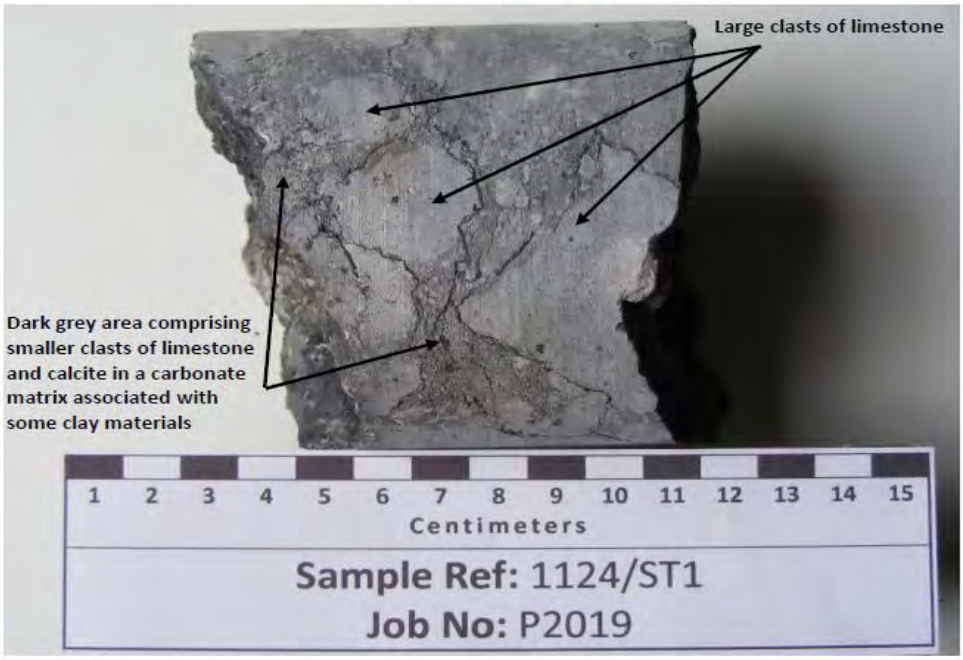
The sample fractured relatively easily along irregular and randomly distributed fracture surfaces within the dark grey areas of the sample during the cutting process to produce the thin section slice. This suggested that the dark grey areas of the sample exhibited frequent planes of weakness, which were probably associated with clay materials and the irregular layers of opaque minerals.

Only rare voids up to 0.4mm were observed. These voids appeared chiefly associated with loss of materials during the sampling process and did not appear interconnected. The void content was visually estimated as being well below 1%.

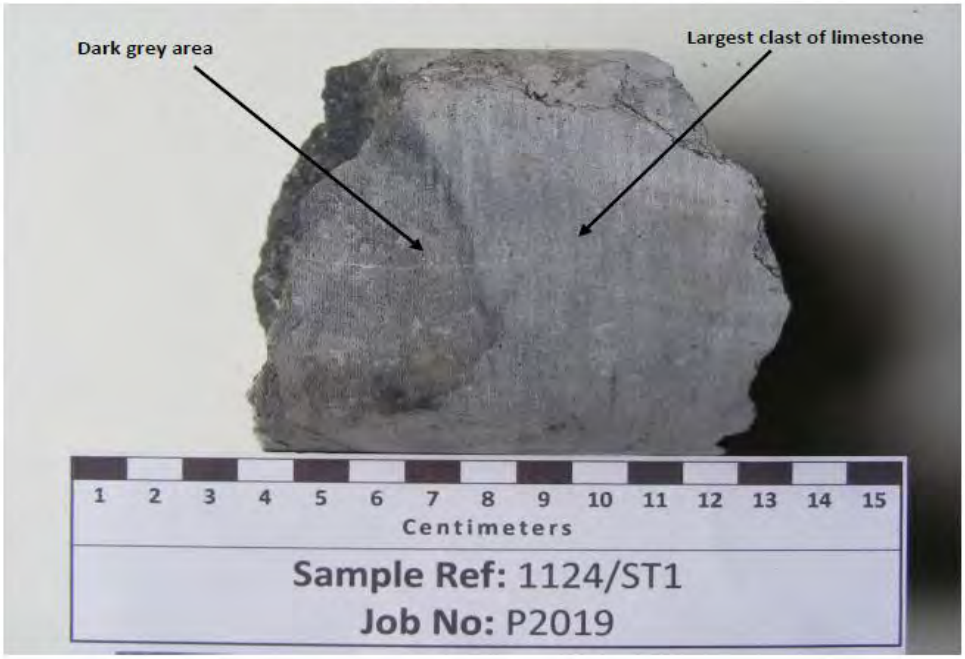
The sample was fresh and exhibited Grade I weathering.

Petrographic Examination Natural Stone– BS EN 12407:2007

Profile view of the sample as received

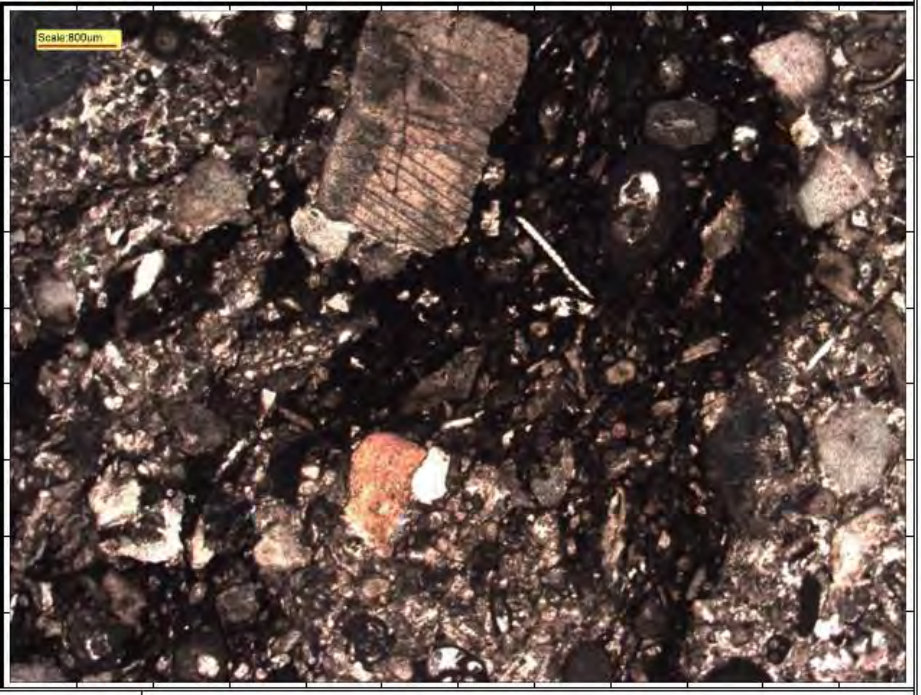


Another profile view of the sample as received



Petrographic Examination Natural Stone– BS EN 12407:2007

RECORD PHOTOMICROGRAPH



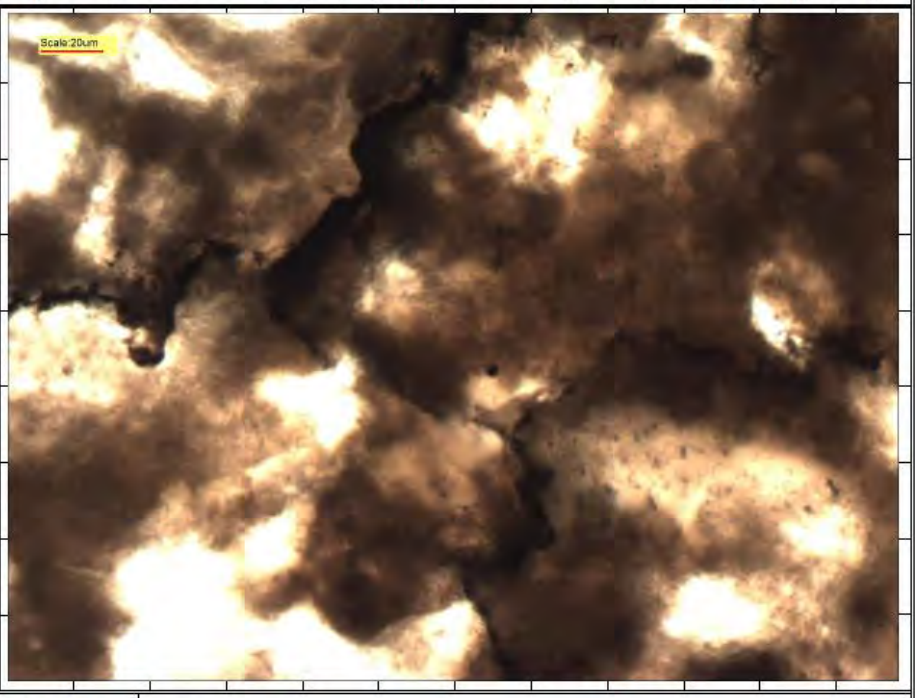
Viewing Light	Cross-polarised

Description

View of a section through the limestone, showing limestone and calcite clasts (grey/pale brown/white, pale pink/greyish brown: B2, B6, B9, B12, F2 and H6) and section of the dark grey areas (greyish black: A8, D3 and I2) comprising smaller limestone and calcite clasts/grains and some clay materials.

Petrographic Examination Natural Stone– BS EN 12407:2007

RECORD PHOTOMICROGRAPH



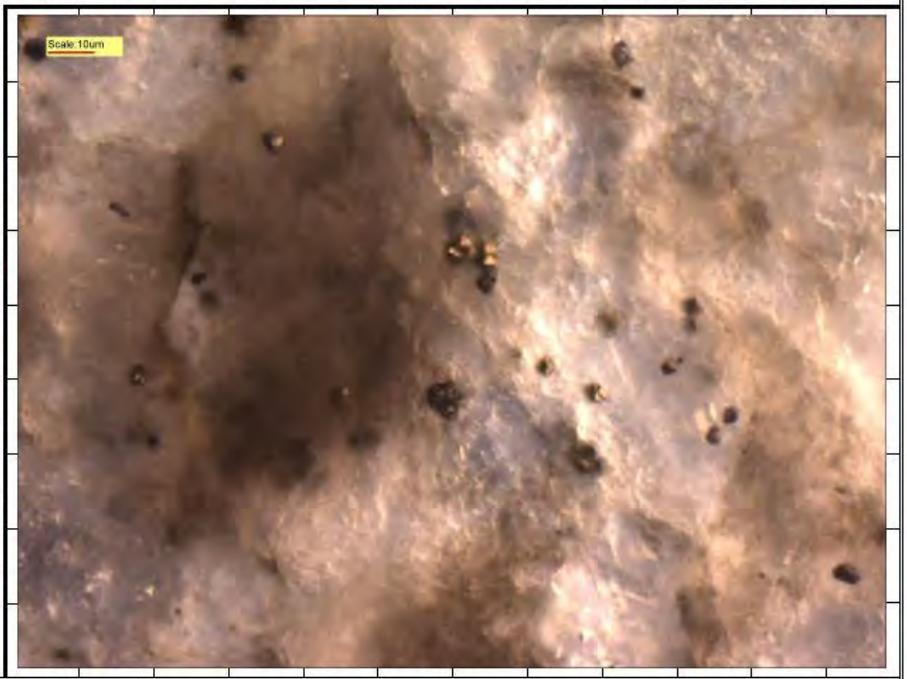
Viewing Light	Plane-polarised

Description

Closer view of a section through a dark grey area of the sample, showing clay materials (brown: A6, A11 and G1) and randomly distributed layers of opaque minerals (black: A7 to D1, D4 to F7 and E12 to I7).

Petrographic Examination Natural Stone– BS EN 12407:2007

RECORD PHOTOMICROGRAPH



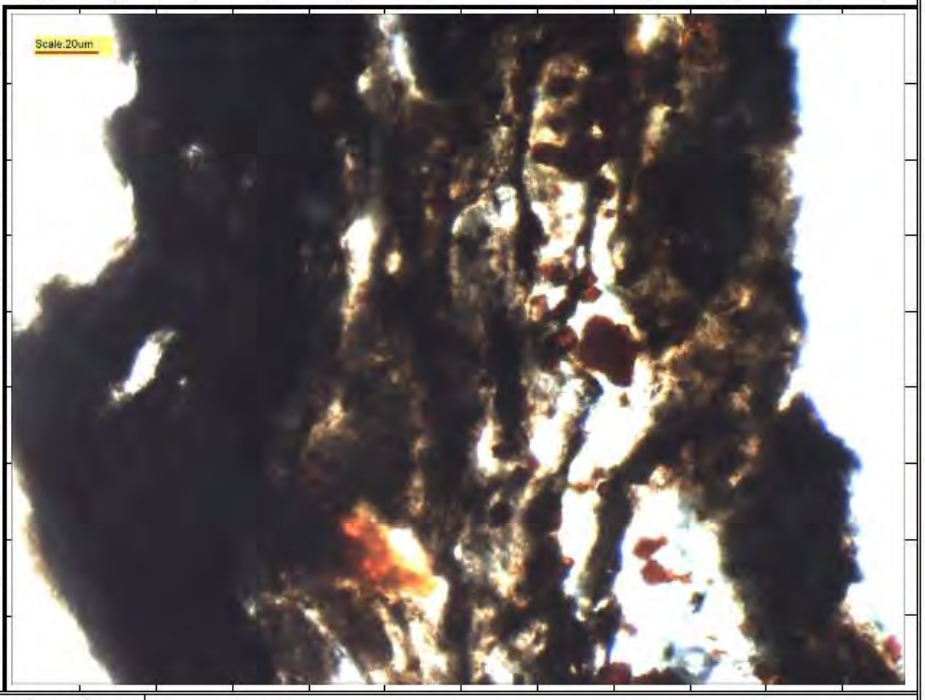
Viewing Light	Reflected light

Description

Closer view of a section through the sample, showing faceted opaque minerals (brass coloured: A9, B4, D7 and F8) and apparent framboidal opaque minerals (black/brass: A1, D7 and F6).

Petrographic Examination Natural Stone– BS EN 12407:2007

RECORD PHOTOMICROGRAPH



Viewing Light	Plane-polarised

Description

View of a section through the sample, showing opaque minerals (black: A3, A6 and C9) an oxidised opaque minerals (dusky red, reddish orange: A10, E8, H5/6 and H9irregular voids (yellow: B6, D6 and H9).

Petrographic Examination Natural Stone– BS EN 12407:2007

Glossary of Terms Used in the Descriptions

Proportions	**Major**: constituent present at a level ≥10%; **Minor**: constituent present at level ≥2% but <10; **Trace**: constituent present at <2% level
Frequency	• Rare – only found by thorough searching • Sporadic – only occasionally observed during normal examination • Common – easily observed during normal examination • Frequent – easily observed with minimal examination • Abundant – immediately apparent to initial examination
Hardness	• Very soft: can be penetrated easily by a finger • Soft: scores with a fingernail • Moderately soft: scores using a copper coin • Moderately hard: scores easily with a penknife • Hard: not easily scored with a penknife • Very hard: cannot be scored with a steel point or knife.
Weathering/ alteration	• Grade I (**Fresh**): Unchanged from original state • Grade II (**Slightly Weathered**): Slight discoloration, slight weakening; • Grade III (**Moderately Weathered**): Considerably weakened, penetrative discoloration, large pieces cannot be broken by hand • Grade IV (**Highly Weathered**): large pieces can be broken by hand, does not readily disaggregate (slake) when dry sample immersed in water • Grade V (**Completely Weathered**): considerably weakened, slakes, original texture apparent; Grade VI (**Residual Soil**) • Soil derived by in-situ weathering but retaining none of the original texture or fabric.
Origin	• **Primary constituents:** Constituents present within the rock at its formation. • **Secondary constituents:** Constituents formed by the alteration of pre-existing primary constituents or introduced from an external source after the rock was formed
Size	**Mega**: >60mm; **Macro**: 2-60mm; **Meso**: 60µm-2mm; **Micro**: 2-60µm; **Crypto**: <2µm; **Glassy**: without visible crystallinity
Bedding/Layering	**Thick**: >600mm; **Medium**: 200-600mm; **Thin**: 60-200mm; **Very thin**: 20-60mm
Lamination	**Thick**: 6-20mm; **Thin**: 2-6mm; **Very thin**: 600µm-2mm; **Extremely thin**: <600µm
Cleavage	**Extremely wide**: >2mm; **Very wide**: 600µm-2mm; **Wide**: 200-600µm; **Medium**: 60-200µm; **Close**: 20-60µm; **Very close**: 6-20µm; **Extremely close**: <6µm.
Cracks	• Fine microcracks (<1µm wide) • Microcracks (1-10µm wide) • Fine cracks (10-100µm wide) • Cracks (100µm-1mm wide) • Large cracks (>1mm wide).
Limestone Classification Schemes	**Folk**, R. L. 1959. Practical petrographic classification of limestones. *Bull. Am. Ass. Petro. Geol.* **43**, 1-38. **Dunham**, R. J. 1962. Classification of carbonate rocks according to depositional texture. In: Classification of Carbonate Rocks (Ed. By W. E. Ham), pp. 108-121. *Mem. Am. Ass. Petrol. Geol.* **1**, Tulsa.

Priority Construction Ltd
162 Clontarf Road
Dublin 3
Ireland
VAT No: 9D53971I

Date: 16th February 2016
Test Report Ref.: 443144

LABORATORY TEST REPORT

Test Requirements: Petrographic Examination of Natural Stone in accordance with BS EN 12047:2007

Sample details:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref. No:	**BH05 - 50728**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**29/1/2016**
Date of Start of Test.:	**21/1/2016**
Sampling Location:	**Depth Top: 32.92 Depth Base: 33**
Name of Source:	**Lackagh Quarry Sl**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The work was carried out by our accredited, competent, sub contracted laboratory.

RESULTS

See Attached

Nick Dumbarton – Assistant Laboratory Manager

Petrographic Examination Natural Stone– BS EN 12407:2007

HAND SPECIMEN DESCRIPTION

The sample was hard, fine grained, massive, not macroporous limestone. The sample was almost isotropic, except for the presence of a small stylolite (irregular suture) typically <200µm across, running more or less perpendicular to the coring direction. Sporadic small irregular voids up to approximately 1mm across were observed chiefly associated with apparent loss of materials along the stylolite.

MICROSCOPICAL DESCRIPTION

Constituents[1]	Visual Estimated Proportions[2] %	Range of Crystal/Grain Size	Petrographic Details	Origin
Calcite	99	Up to 800µm	Fresh, angular to well rounded calcium carbonate, including frequent bioclasts. The sample was partially stained in accordance with Dickson's method. This suggested that the calcite was non-ferroan.	Primary
Opaque minerals	<1	Up to 80µm	Fresh to partially altered, chiefly euhedral isotropic minerals apparently comprising facetted, probably pyritic materials. SEM should be used if necessary for better resolution and description of the opaque minerals.	Primary
Iron oxide compounds	<<1	N/A	Rare amorphous by-products of the partial or complete oxidation of opaque minerals.	Secondary

The sample was a fine grained LIMESTONE, comprising almost entirely calcium carbonate, with trace amounts of opaque minerals and associated iron oxide compounds.

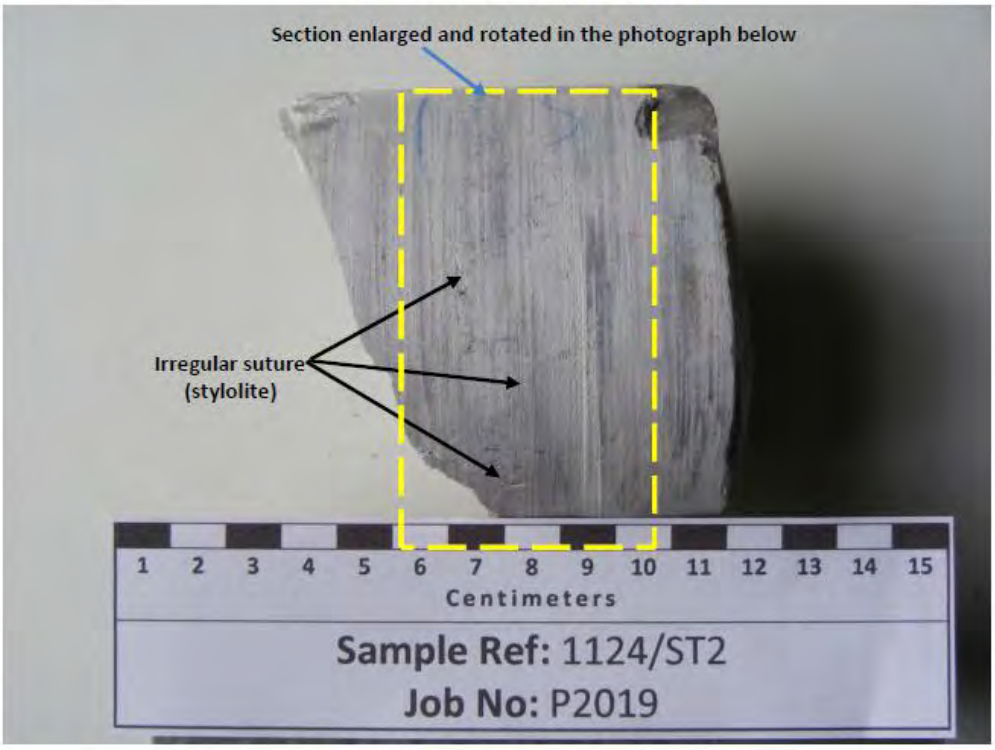
The sample exhibited stylolite comprising coarser crystals of calcite.

The sporadic voids observed associated with the stylolite did not appeared interconnected. The void content was visually estimated as being well below 1%.

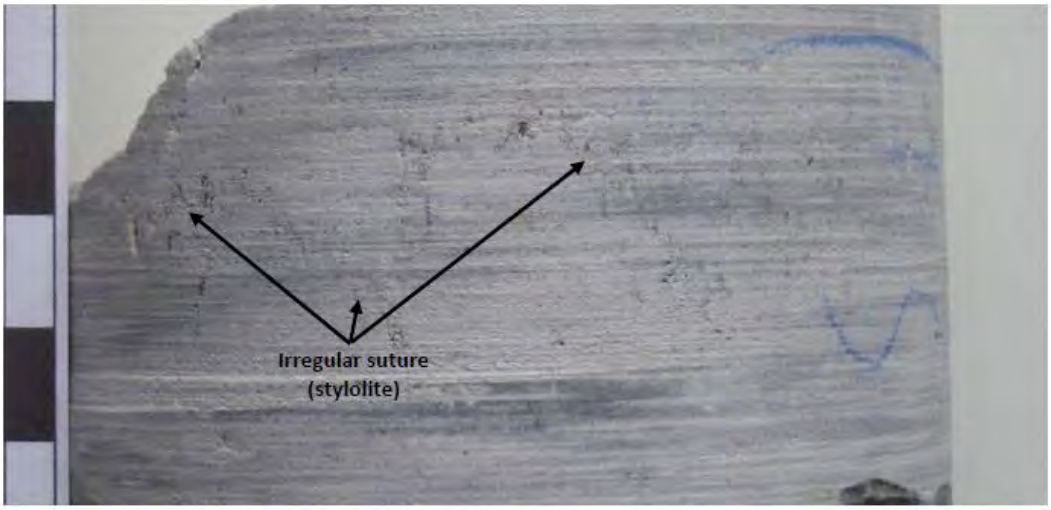
The sample was fresh and exhibited Grade I weathering.

Petrographic Examination Natural Stone– BS EN 12407:2007

Profile view of the sample as received

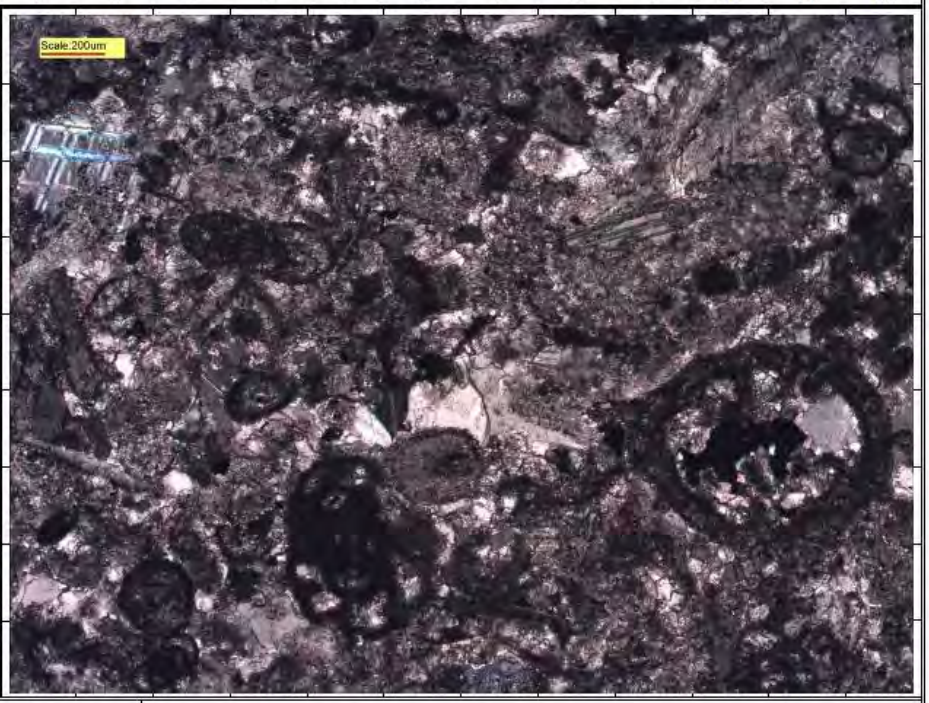


Closer view of the stylolite with 90 degrees rotation of the photograph



Petrographic Examination Natural Stone– BS EN 12407:2007

RECORD PHOTOMICROGRAPH



Viewing Light	Cross-polarised

Description

View of a section through the limestone particles showing almost entire calcium carbonate (brown, dusky brown, greyish brown, grey/blue/green, pale pink: A9, B/C1, C9, F7 and G5), including bioclasts (dusky brown/greyish black: A5, C/D4, F10 and G5).

Petrographic Examination Natural Stone– BS EN 12407:2007

RECORD PHOTOMICROGRAPH

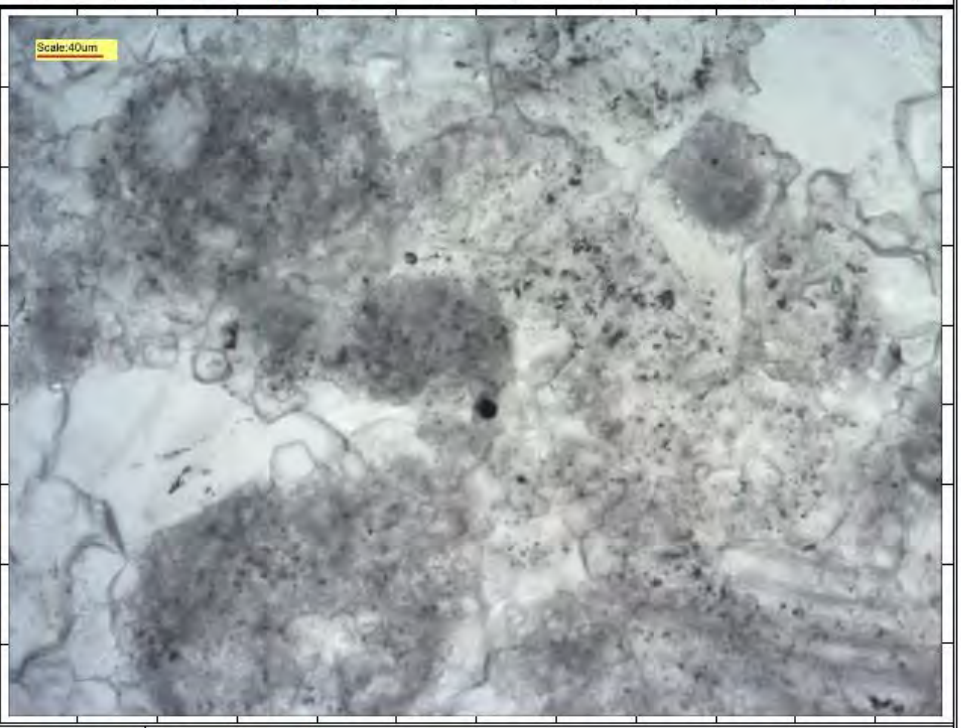
Viewing Light	Cross-polarised

Description

Closer view of a section through the limestone, showing sections of the stylolite (pale pink: A7, E5, E9, H4 and I9) and voids (yellow: B7/8, D8, F8 and I9) associated with the stylolite.

Petrographic Examination Natural Stone– BS EN 12407:2007

RECORD PHOTOMICROGRAPH



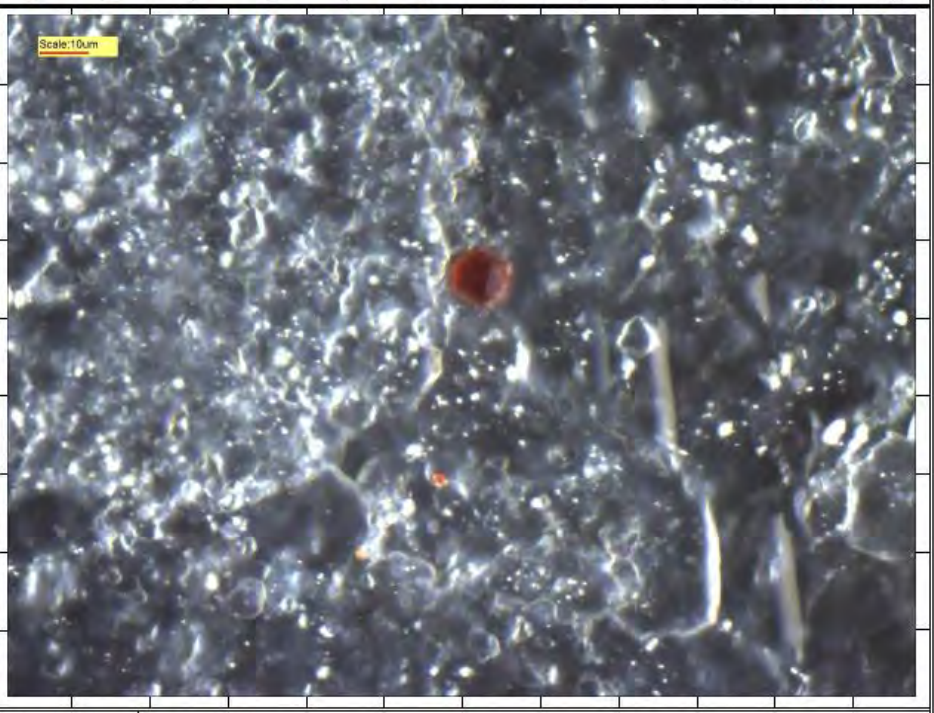
Viewing Light	Plane-polarised

Description

View of a section through the limestone, showing opaque minerals (black: E/F7).

Petrographic Examination Natural Stone– BS EN 12407:2007

RECORD PHOTOMICROGRAPH



Viewing Light	Reflected light

Description

View of a section through the limestone, showing partially oxidised opaque mineral (red: D7) and iron oxide compounds (reddish orange: G6 and G/H5).

Petrographic Examination Natural Stone– BS EN 12407:2007

Glossary of Terms Used in the Descriptions

Proportions	**Major**: constituent present at a level ≥10%; **Minor**: constituent present at level ≥2% but <10; **Trace**: constituent present at <2% level
Frequency	• Rare – only found by thorough searching • Sporadic – only occasionally observed during normal examination • Common – easily observed during normal examination • Frequent – easily observed with minimal examination • Abundant – immediately apparent to initial examination
Hardness	• Very soft: can be penetrated easily by a finger • Soft: scores with a fingernail • Moderately soft: scores using a copper coin • Moderately hard: scores easily with a penknife • Hard: not easily scored with a penknife • Very hard: cannot be scored with a steel point or knife.
Weathering/ alteration	• Grade I (**Fresh**): Unchanged from original state • Grade II (**Slightly Weathered**): Slight discoloration, slight weakening; • Grade III (**Moderately Weathered**): Considerably weakened, penetrative discoloration, large pieces cannot be broken by hand • Grade IV (**Highly Weathered**): large pieces can be broken by hand, does not readily disaggregate (slake) when dry sample immersed in water • Grade V (**Completely Weathered**): considerably weakened, slakes, original texture apparent; Grade VI (**Residual Soil**) • Soil derived by in-situ weathering but retaining none of the original texture or fabric.
Origin	• **Primary constituents:** Constituents present within the rock at its formation. • **Secondary constituents:** Constituents formed by the alteration of pre-existing primary constituents or introduced from an external source after the rock was formed
Size	**Mega**: >60mm; **Macro**: 2-60mm; **Meso**: 60µm-2mm; **Micro**: 2-60µm; **Crypto**: <2µm; **Glassy**: without visible crystallinity
Bedding/Layering	**Thick**: >600mm; **Medium**: 200-600mm; **Thin**: 60-200mm; **Very thin**: 20-60mm
Lamination	**Thick**: 6-20mm; **Thin**: 2-6mm; **Very thin**: 600µm-2mm; **Extremely thin**: <600µm
Cleavage	**Extremely wide**: >2mm; **Very wide**: 600µm-2mm; **Wide**: 200-600µm; **Medium**: 60-200µm; **Close**: 20-60µm; **Very close**: 6-20µm; **Extremely close**: <6µm.
Cracks	• Fine microcracks (<1µm wide) • Microcracks (1-10µm wide) • Fine cracks (10-100µm wide) • Cracks (100µm-1mm wide) • Large cracks (>1mm wide).
Limestone Classification Schemes	**Folk**, R. L. 1959. Practical petrographic classification of limestones. *Bull. Am. Ass. Petro. Geol.* **43**, 1-38. **Dunham**, R. J. 1962. Classification of carbonate rocks according to depositional texture. In: Classification of Carbonate Rocks (Ed. By W. E. Ham), pp. 108-121. *Mem. Am. Ass. Petrol. Geol.* **1**, Tulsa.

Priority Drilling Ltd.
Killimor
Ballinasloe
Co Galway
Ireland
8D23036i

Date: 6th April 2016
Test Report Ref.: 447907

LABORATORY TEST REPORT

Test Requirements: Petrographic Examination of Natural Stone in accordance with BS EN 12047:2007

Sample details:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50899**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test.:	**18/03/2016**
Sampling Location:	**Depth Top:113.00 Depth Base:113.08**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The work was carried out by our accredited, competent, sub contracted laboratory.

RESULTS

See Attached

Nick Dumbarton – Assistant Laboratory Manager

Petrographic Examination Natural Stone– BS EN 12407:2007

HAND SPECIMEN DESCRIPTION

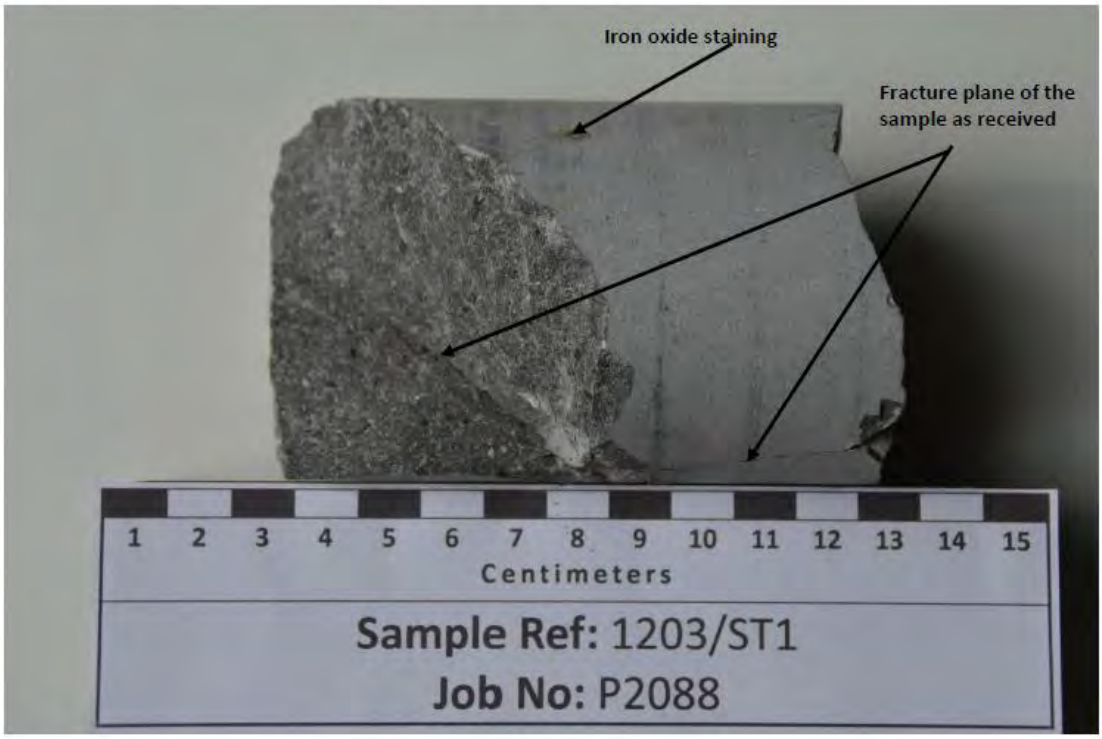
The sample was a moderately hard, fine to medium grained, massive, not macroporous limestone. The sample was chiefly medium dark grey, but exhibited common, randomly distributed, very light grey to medium grey grains that constituted the medium sized grains of the rock. The sample was almost isotropic, except for the presence of sporadic, randomly orientated small dark grey apparent stylolite (irregular suture) typically <500µm across and rare vein <400µm. Sporadic unevenly distributed patches of iron oxide compounds were observed.

MICROSCOPICAL DESCRIPTION

Constituents[1]	Visual Estimated Proportions[2] %	Range of Crystal/Grain Size	Petrographic Details	Origin
Calcite	99	Up to 2500µm	Fresh, anhedral to euhedral crystals comprising chiefly microcrystalline calcite (calcite crystals <4µm), with a lesser proportion of sparry calcite (calcite crystals >4µm) and large discrete calcium carbonate grains. The sparry calcite and larger discrete calcium carbonate grains were chiefly observed within randomly distributed, abundant bioclasts and rare calcite veins. The sample was partially stained in accordance with Dickson's method. This suggested that the calcite was predominantly non-ferroan, with a trace amount of possibly ferroan calcite.	Primary
Opaque minerals	<1	Up to 50µm	Fresh, chiefly anhedral isotropic minerals apparently comprising chiefly framboidal, probably pyritic grains. Scanning electron microscopy (SEM) should be used if necessary for better resolution and description of the opaque minerals.	Primary
Iron oxide compounds	<<1	N/A	Rare amorphous by-products of the oxidation of opaque minerals on the surface of the rock core.	Secondary
The sample was a fine to medium grained bioclastic LIMESTONE, comprising almost entirely calcium carbonate, with trace amounts of opaque minerals. No iron oxide compounds was observed in the thin section, suggesting that the patches observed on the hand specimen were superficial oxidation of the opaque minerals exposed to the element. The sample exhibited sporadic, unevenly distributed and randomly orientated stylolites comprising abundant opaque minerals. Rare irregular voids up to 100µm across were only observed associated with stylolites. The void content was visually estimated as being approximately 0%. The sample was fresh and exhibited Grade I weathering.				

Petrographic Examination Natural Stone– BS EN 12407:2007

Profile view of the sample as received



Petrographic Examination Natural Stone– BS EN 12407:2007

RECORD PHOTOMICROGRAPH

Viewing Light	Cross-polarised

Description

View of a section through the sample, showing bioclasts (brown, yellowish grey, pale green: A9, B3, C/D2, D6, G2, G6 and G10), discrete calcite (dark grey (I2/3) cemented by microcrystalline calcite matrix (brown/dusky brown: A8, E8 and H3).

Petrographic Examination Natural Stone– BS EN 12407:2007

RECORD PHOTOMICROGRAPH

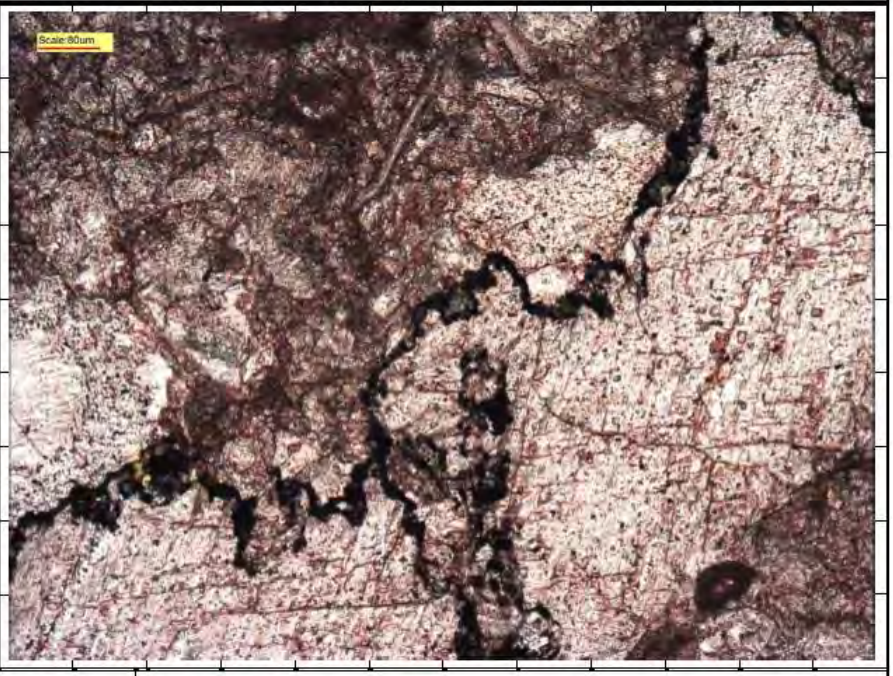
Viewing Light	Cross-polarised

Description

View of a section through the sample, showing calcite vein (C112 to H1)

Petrographic Examination Natural Stone– BS EN 12407:2007

RECORD PHOTOMICROGRAPH



Viewing Light	Plane-polarised

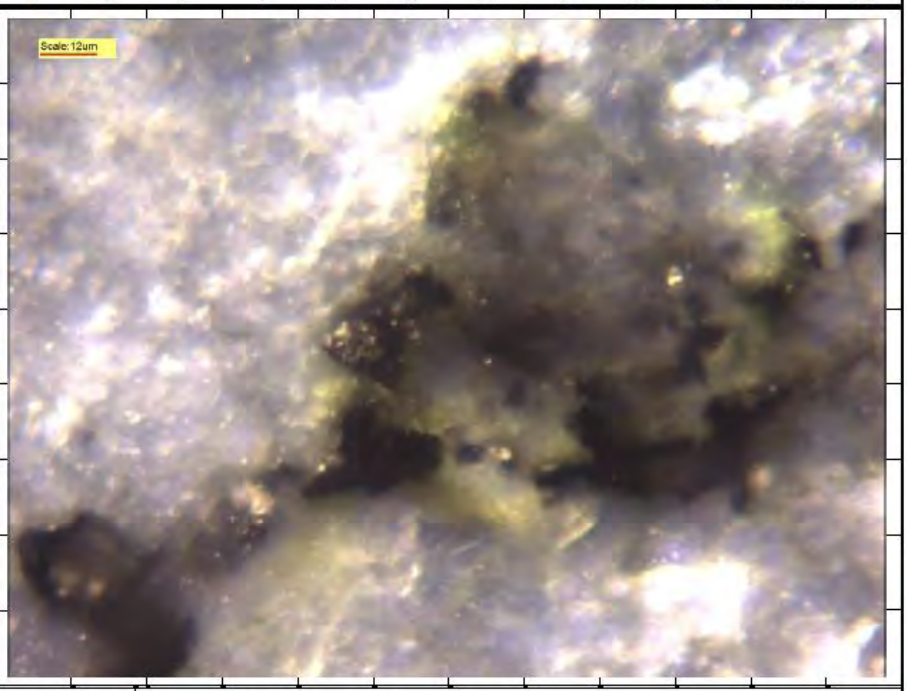
Description

View through the stained section of the sample, showing stylolite rich in opaque minerals (black: A10 to H1, A11 to B12 and G6 to I7).

The reddish brown colours (F3) observed throughout the field of view are due to the staining compound used and not due to oxidation.

Petrographic Examination Natural Stone– BS EN 12407:2007

RECORD PHOTOMICROGRAPH



Viewing Light	Reflected light

Description

Closer view of the section through a stylolite, showing apparent framboidal pyritic grains (black, bras coloured: E5, F6 and G4).

Petrographic Examination Natural Stone– BS EN 12407:2007

Glossary of Terms Used in the Descriptions

Proportions	**Major**: constituent present at a level ≥10%; **Minor**: constituent present at level ≥2% but <10; **Trace**: constituent present at <2% level
Frequency	• Rare – only found by thorough searching • Sporadic – only occasionally observed during normal examination • Common – easily observed during normal examination • Frequent – easily observed with minimal examination • Abundant – immediately apparent to initial examination
Hardness	• Very soft: can be penetrated easily by a finger • Soft: scores with a fingernail • Moderately soft: scores using a copper coin • Moderately hard: scores easily with a penknife • Hard: not easily scored with a penknife • Very hard: cannot be scored with a steel point or knife.
Weathering/ alteration	• Grade I **(Fresh)**: Unchanged from original state • Grade II **(Slightly Weathered)**: Slight discoloration, slight weakening; • Grade III **(Moderately Weathered)**: Considerably weakened, penetrative discoloration, large pieces cannot be broken by hand • Grade IV **(Highly Weathered)**: large pieces can be broken by hand, does not readily disaggregate (slake) when dry sample immersed in water • Grade V **(Completely Weathered)**: considerably weakened, slakes, original texture apparent; Grade VI **(Residual Soil)** • Soil derived by in-situ weathering but retaining none of the original texture or fabric.
Origin	• **Primary constituents:** Constituents present within the rock at its formation. • **Secondary constituents:** Constituents formed by the alteration of pre-existing primary constituents or introduced from an external source after the rock was formed
Size	**Mega**: >60mm; **Macro**: 2-60mm; **Meso**: 60µm-2mm; **Micro**: 2-60µm; **Crypto**: <2µm; **Glassy**: without visible crystallinity
Bedding/Layering	**Thick**: >600mm; **Medium**: 200-600mm; **Thin**: 60-200mm; **Very thin**: 20-60mm
Lamination	**Thick**: 6-20mm; **Thin**: 2-6mm; **Very thin**: 600µm-2mm; **Extremely thin**: <600µm
Cleavage	**Extremely wide**: >2mm; **Very wide**: 600µm-2mm; **Wide**: 200-600µm; **Medium**: 60-200µm; **Close**: 20-60µm; **Very close**: 6-20µm; **Extremely close**: <6µm.
Cracks	• Fine microcracks (<1µm wide) • Microcracks (1-10µm wide) • Fine cracks (10-100µm wide) • Cracks (100µm-1mm wide) • Large cracks (>1mm wide).
Colour	Description based on geological rock-color chart, produced by Munsell Color, 2009 Revised, 2011 Production.
Limestone Classification Schemes	**Folk**, R. L. 1959. Practical petrographic classification of limestones. *Bull. Am. Ass. Petro. Geol.* **43**, 1-38. **Dunham**, R. J. 1962. Classification of carbonate rocks according to depositional texture. In: Classification of Carbonate Rocks (Ed. By W. E. Ham), pp. 108-121. *Mem. Am. Ass. Petrol. Geol.* **1**, Tulsa.

Priority Drilling Ltd.
Killimor
Ballinasloe
Co Galway
Ireland
8D23036i

Date: 6th April 2016
Test Report Ref.: 447934

LABORATORY TEST REPORT

Test Requirements: Petrographic Examination of Natural Stone in accordance with BS EN 12047:2007

Sample details:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50926**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test.:	**18/03/2016**
Sampling Location:	**Depth Top:148.97 Depth Base:149.05**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The work was carried out by our accredited, competent, sub contracted laboratory.

RESULTS

See Attached

Nick Dumbarton – Assistant Laboratory Manager

Petrographic Examination Natural Stone– BS EN 12407:2007

HAND SPECIMEN DESCRIPTION

The sample was a moderately hard, fine to very coarse grained, not macroporous limestone. The sample was anisotropic. The sample exhibited medium grey to greyish black variously thick band/layers, unevenly distributed white bioclastic calcite materials up to 8mm across and a large irregular pyritic material up to approximated 2mm across. The sample also exhibited sporadic, randomly distributed and randomly orientated calcite veins up to <200µm across.

MICROSCOPICAL DESCRIPTION

Constituents[1]	Visual Estimated Proportions[2] %	Range of Crystal/Grain Size	Petrographic Details	Origin
Calcite	97	Up to 1600µm	Fresh, anhedral to euhedral crystals comprising significant amounts of both microcrystalline calcite (calcite crystals <4µm) and sparry calcite (calcite crystals >4µm), with minor proportion of discrete calcium carbonate grains that appeared to have replaced bioclasts. The bioclasts chiefly comprised both microcrystalline calcite and sparry calcite. The sample was partially stained in accordance with Dickson's method. The result of the staining process suggests that the calcite was chiefly non-ferroan	Primary
Opaque minerals	1-2	Up to 2000µm	Fresh, chiefly anhedral isotropic minerals apparently comprising almost entirely framboidal, probably pyritic grains. Scanning electron microscopy (SEM) should be used if necessary for better resolution and description of the opaque minerals.	Primary
Clay materials	1-2	<4µm	Very fine grained materials associated with abundant microcrystalline calcite, thus beyond the conclusive resolution of the petrographic microscope. This could be investigated further by scanning electron microscopy (SEM).	Primary

The sample was a fine to very coarse grained bioclastic LIMESTONE, comprising almost entirely calcium carbonate, with trace to minor proportions of opaque minerals, and trace to minor proportions of potentially clay minerals that were beyond the resolution of the petrographic microscope.

The limestone also exhibited abundant intraclasts (apparently reworked limestone fragments probably from nearby sediments).

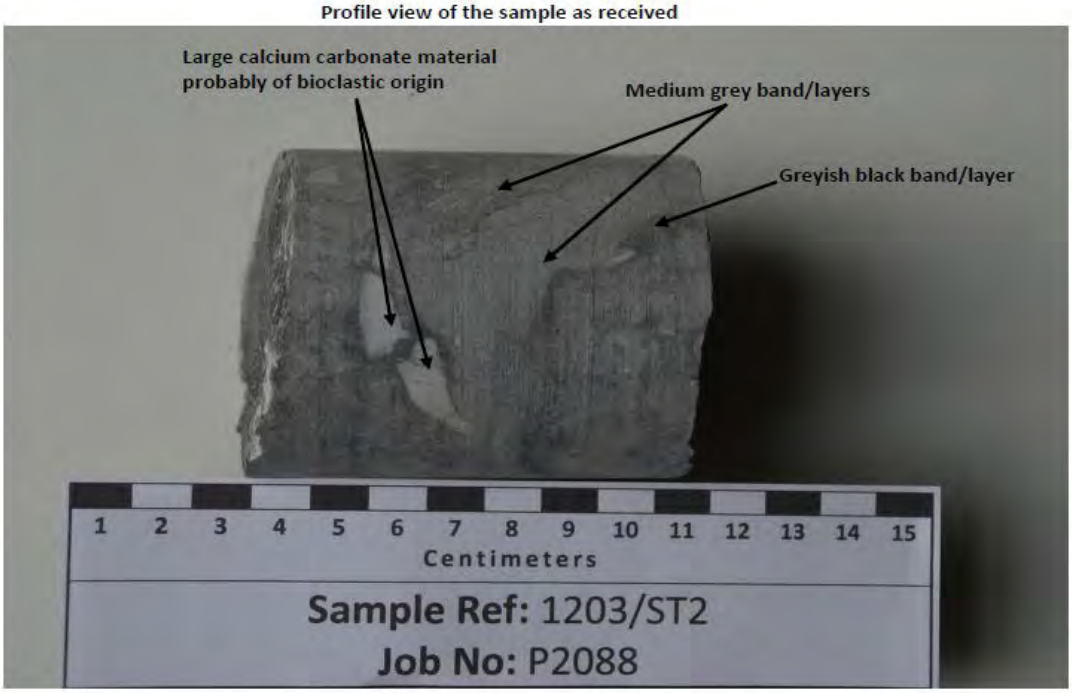
The greyish black bands/layers appeared brecciated as they comprised limestone fragments and discrete calcite grains cemented by very fine grained matrix comprising chiefly microcrystalline calcite, with trace to minor proportions of opaque minerals and possibly trace to minor proportions of clay materials.

No void was observed. The void content was visually estimated as being 0%.

The sample was fresh and exhibited Grade I weathering.

Petrographic Examination Natural Stone– BS EN 12407:2007

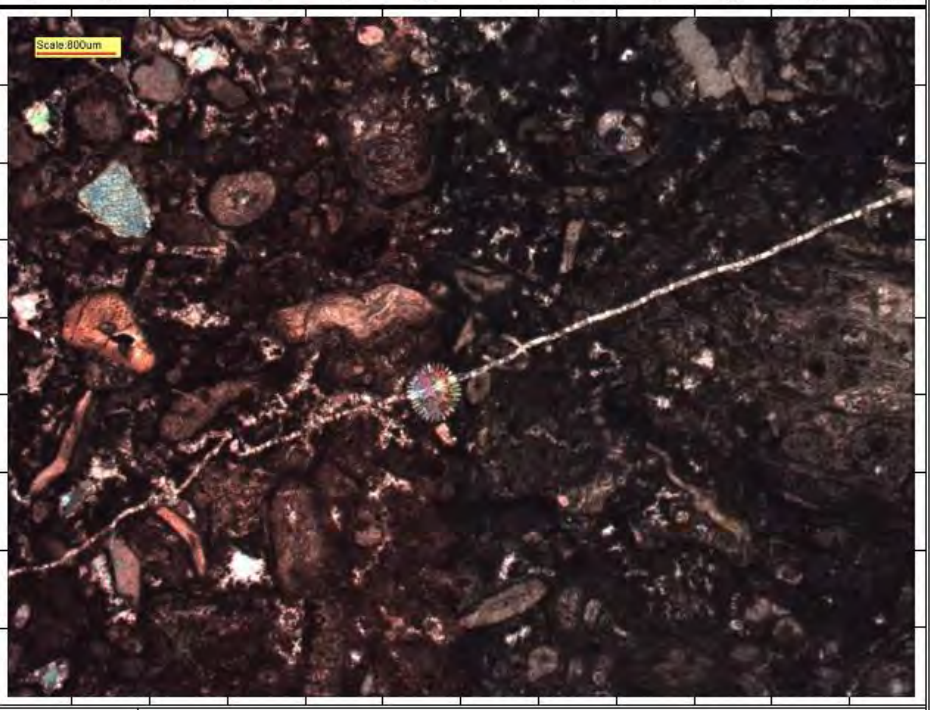
Profile view of the sample as received



Profile view of another side of the sample as received

Petrographic Examination Natural Stone– BS EN 12407:2007

RECORD PHOTOMICROGRAPH



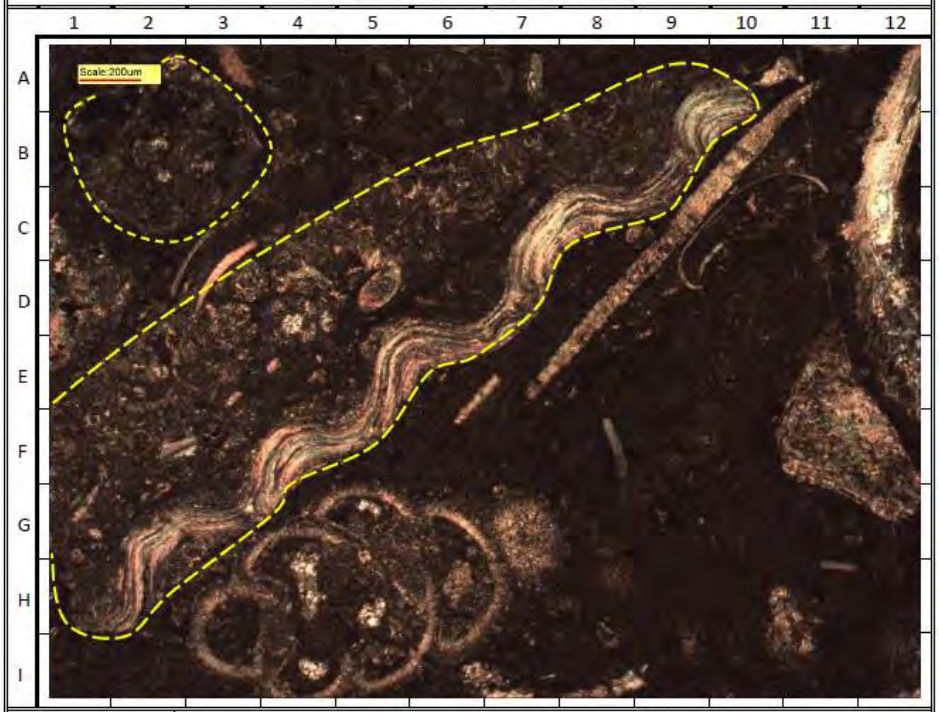
Viewing Light	Cross-polarised

Description

View of a section through a part-stained section of the sample, showing bioclasts (pink, pale ink, light brown, purple/green: A3, A11, B5, D5, E6 and E11) and calcite vein (light brown/pale pink/white: C12 to H1).

Petrographic Examination Natural Stone– BS EN 12407:2007

RECORD PHOTOMICROGRAPH



Viewing Light	Cross-polarised

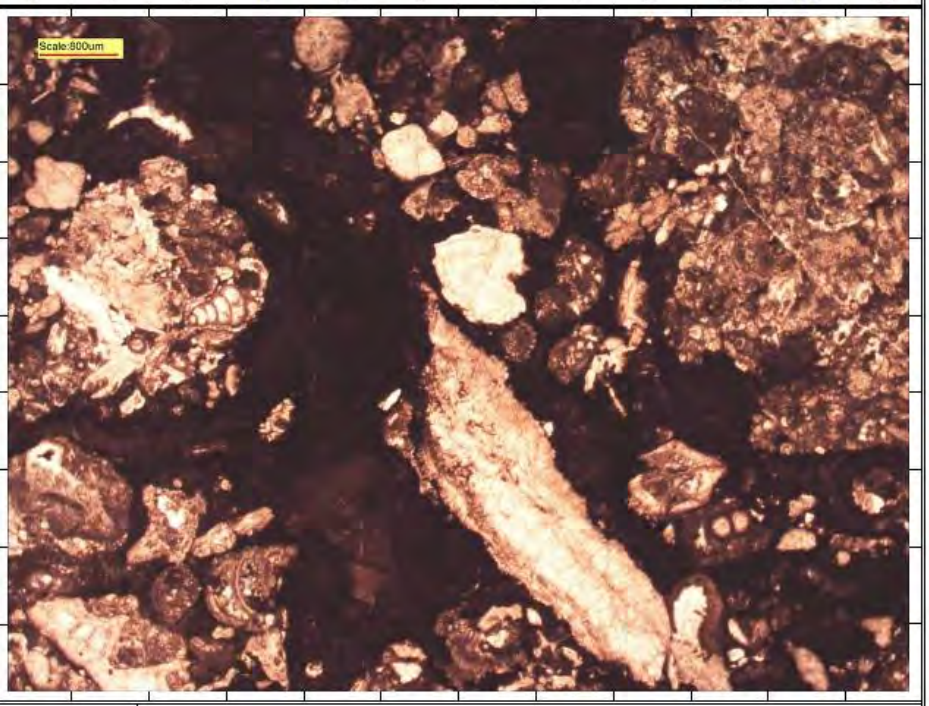
Description

View through a typical medium grey section of the sample, showing bioclasts (pale pink, light brown, pale yellow: D3, D5, D7, D8, D12 and H5) cemented by chiefly microcrystalline calcite (brownish grey: E9).

An apparent intraclasts are highlighted in yellow.

Petrographic Examination Natural Stone– BS EN 12407:2007

RECORD PHOTOMICROGRAPH



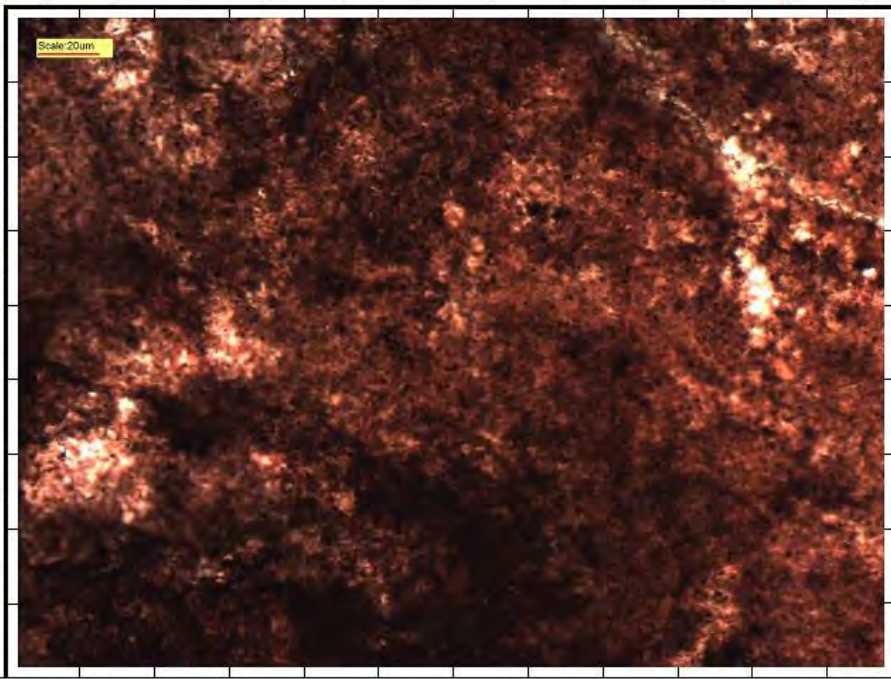
Viewing Light	Plane-polarised

Description

View of a section through a greyish black band/layer, showing apparent limestone fragments (pale pink, light brown, pale yellow: A5, C1, D2, D7, D11, G7 and G9), cemented by very fine grained matrix (dusky brown: A8, E5 and H12).

Petrographic Examination Natural Stone– BS EN 12407:2007

RECORD PHOTOMICROGRAPH



Viewing Light	Plane-polarised

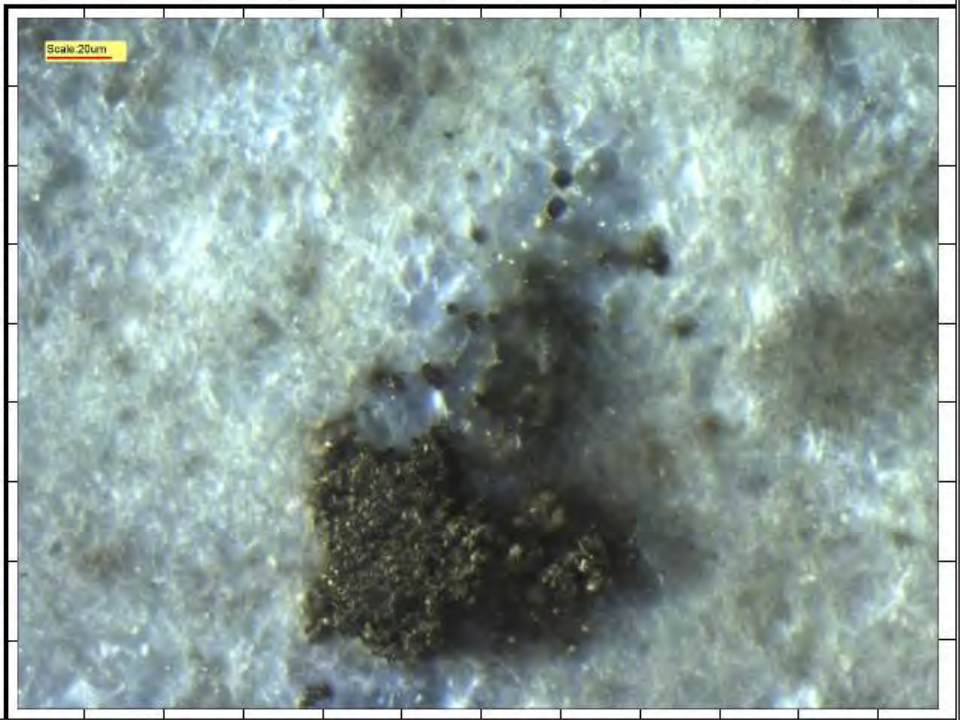
Description

Closer view through the matrix of the greyish black section of the sample, showing very fine grained materials beyond the conclusive resolution of the petrographic microscope. Opaque minerals appear black (A5 and E6). The remainder of the field of view appear to comprise both microcrystalline calcite and possibly some clay minerals.

The moderate red colour (D9) observed throughout the photomicrograph are due to the staining compound used and not due to oxidation.

Petrographic Examination Natural Stone– BS EN 12407:2007

RECORD PHOTOMICROGRAPH



Viewing Light	Reflected light

Description

Closer view of the section through the sample, showing framboidal pyritic grains (brass colour: C7 and G5).

Petrographic Examination Natural Stone– BS EN 12407:2007

Glossary of Terms Used in the Descriptions

Proportions	**Major**: constituent present at a level ≥10%; **Minor**: constituent present at level ≥2% but <10; **Trace**: constituent present at <2% level
Frequency	• Rare – only found by thorough searching • Sporadic – only occasionally observed during normal examination • Common – easily observed during normal examination • Frequent – easily observed with minimal examination • Abundant – immediately apparent to initial examination
Hardness	• Very soft: can be penetrated easily by a finger • Soft: scores with a fingernail • Moderately soft: scores using a copper coin • Moderately hard: scores easily with a penknife • Hard: not easily scored with a penknife • Very hard: cannot be scored with a steel point or knife.
Weathering/ alteration	• Grade I (**Fresh**): Unchanged from original state • Grade II (**Slightly Weathered**): Slight discoloration, slight weakening; • Grade III (**Moderately Weathered**): Considerably weakened, penetrative discoloration, large pieces cannot be broken by hand • Grade IV (**Highly Weathered**): large pieces can be broken by hand, does not readily disaggregate (slake) when dry sample immersed in water • Grade V (**Completely Weathered**): considerably weakened, slakes, original texture apparent; Grade VI (**Residual Soil**) • Soil derived by in-situ weathering but retaining none of the original texture or fabric.
Origin	• **Primary constituents:** Constituents present within the rock at its formation. • **Secondary constituents:** Constituents formed by the alteration of pre-existing primary constituents or introduced from an external source after the rock was formed
Size	**Mega**: >60mm; **Macro**: 2-60mm; **Meso**: 60µm-2mm; **Micro**: 2-60µm; **Crypto**: <2µm; **Glassy**: without visible crystallinity
Bedding/Layering	**Thick**: >600mm; **Medium**: 200-600mm; **Thin**: 60-200mm; **Very thin**: 20-60mm
Lamination	**Thick**: 6-20mm; **Thin**: 2-6mm; **Very thin**: 600µm-2mm; **Extremely thin**: <600µm
Cleavage	**Extremely wide**: >2mm; **Very wide**: 600µm-2mm; **Wide**: 200-600µm; **Medium**: 60-200µm; **Close**: 20-60µm; **Very close**: 6-20µm; **Extremely close**: <6µm.
Cracks	• Fine microcracks (<1µm wide) • Microcracks (1-10µm wide) • Fine cracks (10-100µm wide) • Cracks (100µm-1mm wide) • Large cracks (>1mm wide).
Colour	Description based on geological rock-color chart, produced by Munsell Color, 2009 Revised, 2011 Production.
Limestone Classification Schemes	**Folk**, R. L. 1959. Practical petrographic classification of limestones. *Bull. Am. Ass. Petro. Geol.* **43**, 1-38. **Dunham**, R. J. 1962. Classification of carbonate rocks according to depositional texture. In: Classification of Carbonate Rocks (Ed. By W. E. Ham), pp. 108-121. *Mem. Am. Ass. Petrol. Geol.* **1**, Tulsa.

Total Sulphur

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INDEPENDENT MATERIALS TESTING I DIAMOND DRILLING & SAWING

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Contract: Lackagh Quarry

Date: 16 March 2016
Test Report Ref: STR 447855

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Total Sulfur Content of an Aggregate Sample in accordance with **BS EN 1744-1 : 2009 : Clause 11**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 48891**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**19/02/2016**
Sampling Location:	**Depth Top:53.80 Depth Base:453.93**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

Total Sulfur Content as S (%) =	**<0.1**
*95% Confidence limit**	*<0.06% - <0.14%*

Comments / Departure from specified Procedure

*95% Confidence limit is the expanded uncertainty which is the combined uncertainty standard multiplied by a factor (k) of 2

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

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INDEPENDENT MATERIALS TESTING I DIAMOND DRILLING & SAWING

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Contract: Lackagh Quarry

Date: 16 March 2016
Test Report Ref: STR 447867

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Total Sulfur Content of an Aggregate Sample in accordance with **BS EN 1744-1 : 2009 : Clause 11**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50859**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:65.40 Depth Base:65.50**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

Total Sulfur Content as S (%) =	**<0.1**
*95% Confidence limit**	*<0.06% - <0.14%*

Comments / Departure from specified Procedure

*95% Confidence limit is the expanded uncertainty which is the combined uncertainty standard multiplied by a factor (k) of 2

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

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INDEPENDENT MATERIALS TESTING I DIAMOND DRILLING & SAWING

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Contract: Lackagh Quarry

Date: 16 March 2016
Test Report Ref: STR 447887

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Total Sulfur Content of an Aggregate Sample in accordance with **BS EN 1744-1 : 2009 : Clause 11**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50879**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**19/02/2016**
Sampling Location:	**Depth Top:91.10 Depth Base:91.20**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

Total Sulfur Content as S (%) =	**<0.1**
*95% Confidence limit**	*<0.06% - <0.14%*

Comments / Departure from specified Procedure

*95% Confidence limit is the expanded uncertainty which is the combined uncertainty standard multiplied by a factor (k) of 2

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

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INDEPENDENT MATERIALS TESTING I DIAMOND DRILLING & SAWING

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Contract: Lackagh Quarry

Date: 16 March 2016
Test Report Ref: STR 447937

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Total Sulfur Content of an Aggregate Sample in accordance with **BS EN 1744-1 : 2009 : Clause 11**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50929**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:152.97 Depth Base:153.04**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

Total Sulfur Content as S (%) =	**<0.1**
*95% Confidence limit**	*<0.06% - <0.14%*

Comments / Departure from specified Procedure

*95% Confidence limit is the expanded uncertainty which is the combined uncertainty standard multiplied by a factor (k) of 2

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

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INDEPENDENT MATERIALS TESTING I DIAMOND DRILLING & SAWING

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Contract: Lackagh Quarry

Date: 16 March 2016
Test Report Ref: STR 447965

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Total Sulfur Content of an Aggregate Sample in accordance with **BS EN 1744-1 : 2009 : Clause 11**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50955**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:193.60 Depth Base:193.68**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

Total Sulfur Content as S (%) =	**<0.1**
*95% Confidence limit**	*<0.06% - <0.14%*

Comments / Departure from specified Procedure

*95% Confidence limit is the expanded uncertainty which is the combined uncertainty standard multiplied by a factor (k) of 2

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

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INDEPENDENT MATERIALS TESTING I DIAMOND DRILLING & SAWING

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Contract: Lackagh Quarry

Date: 16 March 2016
Test Report Ref: STR 448000

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Total Sulfur Content of an Aggregate Sample in accordance with **BS EN 1744-1 : 2009 : Clause 11**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. No:	**BH01 - 50990**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**17/02/2016**
Sampling Location:	**Depth Top:235.64 Depth Base:235.73**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Testing**
Target Specification:	**N/A**

RESULTS:

Total Sulfur Content as S (%) =	**<0.1**
*95% Confidence limit**	*<0.06% - <0.14%*

Comments / Departure from specified Procedure

*95% Confidence limit is the expanded uncertainty which is the combined uncertainty standard multiplied by a factor (k) of 2

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Contract: Lackagh Quarry

Date: 15 February 2016
Test Report Ref: STR 443067

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Total Sulfur Content of an Aggregate Sample in accordance with **BS EN 1744-1 : 2009 : Clause 11**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref. No:	**BH04 - 48954**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**08/12/2015**
Date of Start of Test:	**21/12/2015**
Sampling Location:	**Depth Top: 31.66 Depth Base: 31.7**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

Total Sulfur Content as S (%) =	**<0.1**
*95% Confidence limit**	*<0.06% - <0.14%*

Comments / Departure from specified Procedure

*95% Confidence limit is the expanded uncertainty which is the combined uncertainty standard multiplied by a factor (k) of 2

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Contract: Lackagh Quarry

Date: 15 February 2016
Test Report Ref: STR 443131

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Total Sulfur Content of an Aggregate Sample in accordance with **BS EN 1744-1 : 2009 : Clause 11**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref. No:	**BH05 - 50715**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**08/12/2015**
Date of Start of Test:	**21/12/2015**
Sampling Location:	**Depth Top: 29.09 Depth Base: 29.18**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

Total Sulfur Content as S (%) =	**<0.1**
*95% Confidence limit**	*<0.06% - <0.14%*

Comments / Departure from specified Procedure

*95% Confidence limit is the expanded uncertainty which is the combined uncertainty standard multiplied by a factor (k) of 2

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

UCS

Priority Drilling Ltd,
Killimor,
Ballinasloe,
Co. Galway,
Ireland

Date: 10 March 2016
Test Report Ref: STR 447821a
Revision 1

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Uniaxial Compressive Strength in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56595**
Client Ref. :	**Various**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/01/2016**
Date of Start of Test:	**18/01/2016**
Sampling Location:	**Various**
Name of Source:	**Lackagh Quarry**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Rock Cores**
Target Specification:	**N/A**

RESULTS:

See attached

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

BH	Core Diameter (mm)	Height/ Diameter Ratio	Uniaxial compressive strength (MPa)	Mode of Failure	EN ISO 14689-1 Term	Water content (%)
BH01 48863	60.7	3.5:1	**97**	N	Strong	0.3
Bh01 48870	60.8	3.5:1	**59**	N	Strong	0.2
BH01 48873	60.7	3.5:1	**73**	N	Strong	0.1
BH01 48878	60.7	3:1	**100**	N	Strong	0.1
BH01 48883	60.7	3:1	**69**	N	Strong	0.3
BH01 48887	60.7	3:1	**83**	N	Strong	0.2
BH01 50943	60.8	3:1	**76**	N	Strong	0.1
BH01 48895	61	3.4:1	**138**	N	Very Strong	0.3
BH01 48900	60.8	2.5:1	**65**	N	Strong	0.1
BH01 50863	60.6	1.7:1	**104**	N	Very Strong	0.2
BH01 50873	60.7	3:1	**62**	N	Strong	0.2
BH01 50884	60.6	3:1	**76**	N	Strong	0.2
BH01 50894	60.7	3.4:1	**107**	N	Very Strong	0.2
BH01 50902	60.7	3:1	**104**	N	Very Strong	0.1
BH01 50909	60.8	2.1:1	**79**	N	Strong	0.2
Bh01 50915	60.8	3.1:1	**110**	N	Very Strong	0.3
Bh01 50924	60.7	1.4:1	**100**	N	Very Strong	0.2
BH01 50934	60.7	3.1:1	**86**	N	Strong	0.4
BH01 50938	60.6	3.4:1	**83**	N	Strong	0.2
BH01 50945	60.8	3.4:1	**86**	N	Strong	0.2
BH01 50952	60.6	3.2:1	**97**	N	Strong	0.5
BH01 50958	60.8	3.2:1	**114**	N	Very Strong	0.3
BH01 50963	60.6	3.1:	**132**	N	Very Strong	0.2
BH01 50968	60.6	3.3:1	**111**	N	Very Strong	0.1
BH01 50971	60.5	3.5:1	**52**	N	Strong	0.3
BH01 50980	60.5	2.8:1	**77**	N	Strong	0.2
BH01 50986	60.5	3:1	**111**	N	Very Strong	0.4
BH01 50991	60.6	3.5:1	**80**	N	Strong	0.2
BH01 50992	60.6	2.3:1	**76**	N	Strong	0.2
BH01 50994	60.6	3:1	**118**	N	Very Strong	0.2
BH01 50998	60.7	2.1:1	**121**	N	Very Strong	0.3
BH01 51002	60.4	3.3:1	**143**	N	Very Strong	0.2

BH01 51004	60.4	2.6:	**66**	N	Strong	0.2
BH01 51007	60.8	2.5:1	**83**	N	Strong	0.3
BH01 51010	60.6	2.5:1	**90**	N	Strong	0.3
BH01 51011	60.3	2.9:1	**91**	N	Strong	0.2

Comments

1) The uniaxial compressive strength was carried out in accordance with ISRM guidelines.
2) Stress Rate: 0.7Mpa/s.

3)

EN ISO 14689-1 : 2003 Rock Strength Terms	
Compressive Strength mpa	Term
<1.0	Extremely Weak
1 to 5	Very Weak
5 to 25	Weak
25 to 50	Meduim Strong
50 to 100	Strong
100 to 250	Very Strong
> 250	Extremely Strong

Priority Construction Ltd
162 Clontarf Road

Dublin 3
Ireland
VAT No: 9D53971I

Date: 21 December 2015
Test Report Ref: STR 443020

Contract: Lackagh Quarry

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Uniaxial Compressive Strength in accordance with **ISRM Guidelines**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S56158**
Client Ref. :	**Various**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**08/12/2015**
Date of Start of Test:	**08/12/2015**
Sampling Location:	**Various**
Name of Source:	**Lackagh Quarry SI**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

See attached

Certificate Prepared by:-
Mathew Sayer
Assistant Laboratory Manager

Approved by: -
Eric Goulden
Technical Manager

BH	Core Diameter (mm)	Height/ Diameter Ratio	Uniaxial compressive strength (MPa)	Mode of Failure	EN ISO 14689-1 Term	Water content (%)
BH04 48908	82	2.6:1	**76**	N	Strong	0.1
BH04 48912	82.3	1.9:1	**86**	N	Strong	0.3
BH04 48921	82.3	1.5:1	**55**	N	Strong	0.1
BH04 48927	82.1	1.6:1	**53**	N	Strong	0.2
BH04 48931	82.2	2.6:1	**111**	N	Very Strong	0.1
BH04 48933	82	2.1:1	**91**	N	Strong	0.2
BH04 48950	82	2.5:1	**76**	N	Strong	0.2
BH04 48957	82	2:1	**78**	N	Strong	0.3
BH04 48963	82.2	2.4:1	**92**	N	Strong	0.1
BH05 48982	82	1.8:1	**91**	N	Strong	0.2
BH05 48986	81.5	2.6:1	**86**	N	Strong	0.4
BH05 48991	81.4	2.5:1	**94**	N	Strong	0.1
BH05 48994	82	1.9:1	**72**	N	Strong	0.2
BH05 48998	82.2	2.6:1	**77**	N	Strong	0.2
BH05 50711	78.5	1.8:1	**79**	N	Strong	0.2
BH05 50729	79	2.5:1	**116**	N	Very Strong	0.3
BH05 50731	81.4	2.6:1	**51**	N	Strong	0.1
BH05 50733	81.6	2.1:1	**54**	N	Strong	0.2
BH05 50737	82	1.5:1	**131**	N	Very Strong	0.2

Comments

1) The uniaxial compressive strength was carried out in accordance with ISRM guidelines.
2) Stress Rate: 0.7Mpa/s.

3)

EN ISO 14689-1 : 2003 Rock Strength Terms	
Compressive Strength mpa	Term
<1.0	Extremely Weak
1 to 5	Very Weak
5 to 25	Weak
25 to 50	Meduim Strong
50 to 100	Strong
100 to 250	Very Strong
> 250	Extremely Strong

Water Tests

IAS LABORATORIES

Independent Analytical Supplies

Test Report

Lab Report Number:	**2165l01**	**Analysis Number:**	**99A/89470**

Customer ID:	BRG.L1	**Analysis Type:**	Misc. Tests (99A)
Contact Name:	DAVID BLANEY	**Delivery By:**	An Post
Company Name:	BRG LTD	**Sample Card Number:**	AAAQ1194/3
Address:	8B UNIT 3 ATHY BUSINESS CAMPUS ATHY CO KILDARE	**Sample Condition:**	Acceptable
Sample Type:	Ground Water	**Date Sample Received:**	15/03/2016
Sample Reference:	GROUND WATER	**Date Analysis Commenced:**	15/03/2016
Sample Description:	BH-04	**Date Certificate Issued:**	29/03/2016

Parameter	Method	Result	Unit
Calcium	ICP-MS	82.9	mg/l
Chloride	Konelab Aquakem SOP 2065	32.10	mg/l
Potassium	ICP-MS	0.94	mg/l
Magnesium	ICP-MS	2.50	mg/l
Sodium	ICP-MS	17.1	mg/l
Nitrite	Konelab Aquakem SOP 2059	<0.03	mg/l NO2
Sulphate	Konelab Aquakem SOP 2062	6.26	mg/l SO4

Signed: WD McCall Date: 29/03/2016

Wendy McCall - Laboratory Manager

*** = not INAB Accredited** **^ = Subcontracted**

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO.275T

IAS LABORATORIES, Unit 4 Bagenalstown Bus. Park, Bagenalstown, Co. Carlow,

Phone: 00353 59 9721022 Fax: 00353 59 9721897 Email: ias@iaslabs.ie Web: www.iaslabs.ie

IAS LABORATORIES

Independent Analytical Supplies

Test Report

Lab Report Number:	**2165I02**	**Analysis Number:**	**99A/89471**

Customer ID:	BRG.L1	**Analysis Type:**	Misc. Tests (99A)
Contact Name:	DAVID BLANEY	**Delivery By:**	An Post
Company Name:	BRG LTD	**Sample Card Number:**	AAAQ1194/3
Address:	8B UNIT 3 ATHY BUSINESS CAMPUS ATHY CO KILDARE	**Sample Condition:**	Acceptable
Sample Type:	Ground Water	**Date Sample Received:**	15/03/2016
Sample Reference:	GROUND WATER	**Date Analysis Commenced:**	15/03/2016
Sample Description:	BH-05	**Date Certificate Issued:**	29/03/2016

Parameter	Method	Result	Unit
Calcium	ICP-MS	92.6	mg/l
Chloride	Konelab Aquakem SOP 2065	25.38	mg/l
Potassium	ICP-MS	6.26	mg/l
Magnesium	ICP-MS	2.98	mg/l
Sodium	ICP-MS	14.4	mg/l
Nitrite	Konelab Aquakem SOP 2059	0.03	mg/l NO2
Sulphate	Konelab Aquakem SOP 2062	15.41	mg/l SO4

Signed: WD McCall Date: 29/03/2016

Wendy McCall - Laboratory Manager

*** = not INAB Accredited ^ = Subcontracted**

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO.2751

IAS LABORATORIES, Unit 4 Bagenalstown Bus. Park, Bagenalstown, Co. Carlow,

Phone: 00353 59 9721022 Fax: 00353 59 9721897 Email: ias@iaslabs.ie Web: www.iaslabs.ie

IAS LABORATORIES

Independent Analytical Supplies

Test Report

Lab Report Number:	**2165I03**	**Analysis Number:**	**99A/89472**

Customer ID:	BRG.L1	**Analysis Type:**	Misc. Tests (99A)
Contact Name:	DAVID BLANEY	**Delivery By:**	An Post
Company Name:	BRG LTD	**Sample Card Number:**	AAAQ1194/3
Address:	8B UNIT 3 ATHY BUSINESS CAMPUS ATHY CO KILDARE	**Sample Condition:**	Acceptable
Sample Type:	Ground Water	**Date Sample Received:**	15/03/2016
Sample Reference:	GROUND WATER	**Date Analysis Commenced:**	15/03/2016
Sample Description:	BH-06	**Date Certificate Issued:**	29/03/2016

Parameter	Method	Result	Unit
Calcium	ICP-MS	430.1	mg/l
Chloride	Konelab Aquakem SOP 2065	152.22	mg/l
Potassium	ICP-MS	39.3	mg/l
Magnesium	ICP-MS	<0.5	mg/l
Sodium	ICP-MS	306.1	mg/l
Nitrite	Konelab Aquakem SOP 2059	1.02	mg/l NO2
Sulphate	Konelab Aquakem SOP 2062	36.32	mg/l SO4

Signed: WD McCall Date: 29/03/2016

Wendy McCall - Laboratory Manager

*** = not INAB Accredited** **^ = Subcontracted**

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO.2751

IAS LABORATORIES, Unit 4 Bagenalstown Bus. Park, Bagenalstown, Co. Carlow,

Phone: 00353 59 9721022 Fax: 00353 59 9721897 Email: ias@iaslabs.ie Web: www.iaslabs.ie

APPENDIX VIII

Monitoring Well Sampling Log

Well Number:BH-04

Project Details

Project No.:	Lackagh	Location (GPS):	530150 728400
Date:	12-3-16	Sampler:	Ronan Doyle

Sample Details

Well No.:	BH-04	Measurement Point:	TOR
Stick Up:		T.O.C Elevation:	
Water Level:	19.65m	Well Depth:	33.06m
Head:	13.41m	Well Diameter:	
Volume in Well (L):		Volume Purged (L):	Pumped for 1 hr
Decon. Procedure:		Bailer Type:	Watterra Pump
Containers Used:			

Field Parameters

Observed Colour:	Brown Tint	Odour:	None
Temperature (°C):	10.5C	Conductivity (µS):	295
pH:	7.47	pHMV:	-58mv ORP=231mv

Comments

DO=0.21mg/l 1.8%

Ronan Doyle Monitoring Solutions,

Castlebar Road, Ballinrobe, County Mayo.

Monitoring Well Sampling Log

Well Number:BH-05

Project Details

Project No.:	Lackagh	Location (GPS):	530186 728378
Date:	12-3-16	Sampler:	Ronan Doyle

Sample Details

Well No.:	BH-05	Measurement Point:	TOR
Stick Up:		T.O.C Elevation:	
Water Level:	21.70m	Well Depth:	39.53m
Head:	17.83m	Well Diameter:	
Volume in Well (L):		Volume Purged (L):	Pumped for 1 hr
Decon. Procedure:		Bailer Type:	Watterra Pump
Containers Used:			

Field Parameters

Observed Colour:	Brown Tint	Odour:	None
Temperature (°C):	10.5C	Conductivity (µS):	420
pH:	7.77	pHMV:	-74.8mv ORP=216.9mv

Comments

DO=0.8mg/l 9.2%

Ronan Doyle Monitoring Solutions,

Castlebar Road, Ballinrobe, County Mayo.

Monitoring Well Sampling Log

Well Number:BH-06

Project Details

Project No.:	Lackagh	Location (GPS):	530125 728383
Date:	12-3-16	Sampler:	Ronan Doyle

Sample Details

Well No.:	BH-06	Measurement Point:	TOR
Stick Up:		T.O.C Elevation:	
Water Level:	4.02m	Well Depth:	7.48m
Head:	3.46m	Well Diameter:	
Volume in Well (L):		Volume Purged (L):	Pumped for 30min
Decon. Procedure:		Bailer Type:	Watterra Pump
Containers Used:			

Field Parameters

Observed Colour:	Milky brown	Odour:	None
Temperature (°C):	9.8C	Conductivity (µS):	6187
pH:	12.53	pHMV:	-333mv ORP=51.7mv

Comments

DO=0.8mg/l 9.4%

Ronan Doyle Monitoring Solutions,

Castlebar Road, Ballinrobe, County Mayo.

APPENDIX IX

Borehole ID	**BH5**
Water Level Start	**19.45m**
Water volume inserted	**215 ltrs**

Time (min)	Water Level (m)
1	18.1
1.5	18.52
2	18.82
2.5	19
3	19.14
3.5	19.22
4	19.26
4.5	19.29
5	19.31
5.5	19.32
6	19.33
8	19.35
11	19.38
14	19.39
18	19.4
22	19.405
26	19.41
30	19.41
34	19.415
40	19.42

Borehole ID **BH5**

Water Level Start **19.42m**

Water volume inserted **1000 ltrs**

Time (min)	Water Level (m)	Comments
1	17.62	
1.5	18.22	
2	18.51	
2.5	18.74	
3	18.93	
3.5	19.04	
4	19.11	
4.5	19.17	
5	19.21	
5.5	19.24	
6	19.26	
6.5	19.28	
7.5	19.29	
9	19.31	
12	19.33	
14	19.335	
17	19.34	
20	19.345	
24	19.345	
30	19.35	
40	19.34	Could feel material in the hole test stopped - driller reports clearing clay after test in oreder to install piezometer.

APPENDIX X

BH04 - Packer Test 18/12/15 **Water Depth** **Start** 16.8m **Finish** 16.8m

Depth Top	Bottom	Midpoint	Packer Pressure (psi)	Pressure (psi)	Flow (litres)	Time minutes 1	2	3	4	5	6	7	8	9	10		
28	30	29	175	49		59	113	168	225	282	343	399	456	518	579	**Total**	
						59	57	56	56	56	57	57	57	58	58	**l/m**	Unable to continue at
24	26	25	175	50		18.5	35	52	70	86	103	121	138	155.6	174	**Total**	
						19	18	17	18	17	17	17	17	17	17	**l/m**	
				65		29	58	87	117	147	176	207	236	267	297	**Total**	
						29	29	29	29	29	29	30	30	30	30	**l/m**	
				84		44	89	134	179	224	270	316	363	410	456	**Total**	
						44	45	45	45	45	45	45	45	46	46	**l/m**	
				65		32	73	113	152	193	232	273	313	354	395	**Total**	
						32	37	38	38	39	39	39	39	39	40	**l/m**	
				50		34	67	101	135	169	202	236	270	303	337	**Total**	
						34	34	34	34	34	34	34	34	34	34	**l/m**	
21	23	22	175	40		60	120	179	237	296	355	414	473	533	591	**Total**	
						60	60	60	59	59	59	59	59	59	59	**l/m**	
				50		67	134	200	266	331	397	464	530	576	662	**Total**	
						67	67	67	67	66	66	66	66	64	66	**l/m**	Unable to continue at
18	20	19	160	40		20	42	66	91	115	140	164	189	214	240	**Total**	
						20	21	22	23	23	23	23	24	24	24	**l/m**	
				60		31	64	96	128	160	192	225	257	289	322	**Total**	
						31	32	32	32	32	32	32	32	32	32	**l/m**	
				80		37	75	113	152	190	228	267	306	345	383	**Total**	
						37	38	38	38	38	38	38	38	38	38	**l/m**	
				60		33	66	99	132	165	198	231	264	297	328	**Total**	
						33	33	33	33	33	33	33	33	33	33	**l/m**	
				40		25	50	75	101	126	150	175	200	224	249	**Total**	
						25	25	25	25	25	25	25	25	25	25	**l/m**	

BH05 - Packer Test 6/1/16 **Water Depth Start** 19.26m **Finish** 19.2

Depth Top	Bottom	Midpoint	Packer Pressure (psi)	Pressure (psi)	Flow (litres)	Time minutes 1	2	3	4	5	6	7	8	9	10	
36	38	37	160	30		58.9	117.1	176.1	234.4	292.9	350.1	408.7	466.7	524.9	581.7	Total
						59	59	59	59	59	58	58	58	58	58	l/m
				45		70.1	139.9	209.1	279.1	348.7	417.9	485.1	554.6	620.5	686.1	Total
						70	70	70	70	70	70	69	69	69	69	l/m
				60		76.8	153.7	231.2	304.4	383.7	461.5	537.7	613.7	691.6	768.4	Total
						77	77	77	76	77	77	77	77	77	77	l/m
				45		73	145.7	212.8	278.1	351.5	421.4	493.3	564.4	634.6	705.9	Total
						73	73	71	70	70	70	70	71	71	71	l/m
				30		64.2	128.6	192.7	256.3	319.1	383.6	448.5	513.7	576.7	641.5	Total
						59	59	59	59	59	58	58	58	58	58	l/m
30	32	31	175	30		54.2	110.3	166.4	222.2	278.7	335.7	392.4	448.1	505.2	561.7	Total
						54	55	55	56	56	56	56	56	56	56	l/m
				45		67.3	135.1	204.1	273.5	342.4	411.7	481.2	530.4	619.3	688.1	Total
						67	68	68	68	68	69	69	66	69	69	l/m
				60		78.7	155.8	234.8	311.7	390.1	468.4	546.7	633.5	701.3	779.4	Total
						79	78	78	78	78	78	78	79	78	78	l/m
				45		69.7	139.7	209.6	286.5	346.5	414.5	481.7	550.7	621.8	693	Total
						70	70	70	72	69	69	69	69	69	69	l/m
				30		61.1	122.4	184.7	247.5	309.7	372.5	435.1	498.3	563.5	626.7	Total
						61	61	62	62	62	62	62	62	63	63	l/m
24	27	25.5	175	30		54.1	111.4	166.5	222.3	277	332.4	387.4	462.1	497.1	551.7	Total
						54	56	56	56	55	55	55	58	55	55	l/m
				45		67.1	135.4	200.4	268.2	335.3	402.1	468.3	535.3	602.7	667.1	Total
						67	68	67	67	67	67	67	67	67	67	l/m
				60		77.3	153.7	231.2	308.9	385.7	463.7	540.1	617.5	695	772.6	Total
						77	77	77	77	77	77	77	77	77	77	l/m
				45		65.6	130.5	196.3	261.1	326.7	391.6	457.5	512.9	587.2	652.5	Total
						66	65	65	65	65	65	65	64	65	65	l/m
				30		56.9	112.5	167.7	223.5	279.4	335.2	390.1	446	501.7	557.1	Total
						57	56	56	56	56	56	56	56	56	56	l/m
20	23	21.5	175	30		54.2	108.5	162	216.7	270.3	324.5	378	421.7	480	539	Total
						54	54	54	54	54	54	54	53	53	54	l/m
				45		65.6	131.8	197.3	262.5	328.3	394.5	459.8	524.7	590.3	655.7	Total
						66	66	66	66	66	66	66	66	66	66	l/m
				60		77.1	154.1	230.4	306.9	383.7	459.7	536.2	611.9	688.5	764.1	Total
						77	77	77	77	77	77	77	76	77	76	l/m
				45		67.7	135.2	203.1	271.4	337.9	403.3	468.2	530.7	592.8	656.7	Total
						68	68	68	68	68	67	67	66	66	66	l/m
				30		57.7	115.4	173.2	230.8	287.1	342.9	399.1	455.5	512.5	567.1	Total
						58	58	58	58	57	57	57	57	57	57	l/m

APPENDIX XI

	BH3	BH4	BH5	BH6
Elavation	26.256	32.167	34.138	30.799

Date	BH3 bgl	BH3 aod	BH4 bgl	BH4 aod	BH5 bgl	BH5 aod	BH6 bgl	BH6 aod	Comments
08/11/2015					1.31	32.83			Hole at deth of 3.15m
09/11/2015					Dry				Hole at deth of 7.4m
12/11/2015			5.34	26.827					Morning
12/11/2015			Dry						Evening
13/11/2015			17.46	14.707					Rods in hole
13/11/2015	0.65	25.606							Hole at 5.3m. Rods in Hole
16/11/2015	0.11	26.146							Hole at 5.3m. Rods in Hole
17/11/2015	7.51	18.746							Hole at 25.2m. Rods in Hole, Casing to 15m
18/11/2015	6.5	19.756							Hole at 25.2m. Rods in Hole, Casing to 15m
18/11/2015			15.76	16.407					Rods to EOH 35.0m
18/11/2015					17.69	16.45			Rods to EOH 40.3m
21/11/2015	7.5	18.756							Hole at 25.2m. Rods in Hole, Casing to 21m
21/11/2015			17.52	14.647					Rods to EOH 35.0m
21/11/2015					19.5	14.64			Rods to EOH 40.3m
23/11/2015	9	17.256							Hole at 50m. Rods in Hole, Casing to 21m
23/11/2015			18.79	13.377					Rods to EOH 35.0m
23/11/2015					20.56	13.58			Rods to EOH 40.3m
24/11/2015	8.5	17.756							Hole at 57.15m. Rods in Hole, Casing to 21m
24/11/2015			18.84	13.327					Rods to EOH 35.0m
24/11/2015					20.58	13.56			Rods to EOH 40.3m
25/11/2015	12	14.256							Hole at 65.78m. Rods in Hole, Casing to 21m
25/11/2015			18.92	13.247					Rods to EOH 35.0m
25/11/2015					20.72	13.42			Rods to EOH 40.3m
26/11/2015	13.21	13.046							Hole at 79.54m. Rods in Hole, Casing to 50m
26/11/2015			19.04	13.127					Rods to EOH 35.0m
26/11/2015					20.86	13.28			Rods to EOH 40.3m
02/12/2015	12.38	13.876							Hole at 104.95m. Rods in Hole, Casing to 50m
02/12/2015			16.02	16.147					Rods to EOH 35.0m
02/12/2015					17.77	16.37			Rods to EOH 40.3m

08/12/2015			16.14	16.027					Rods to EOH 35.0m
09/12/2015					17.33	16.81			Rods to EOH 40.3m
10/12/2015			15.47	16.697					Rods to EOH 35.0m
10/12/2015					16.98	17.16			Rods to EOH 40.3m
11/12/2015			17.56	14.607					Rods to EOH 35.0m
11/12/2015					16.99	17.15			Rods to EOH 40.3m
14/12/2015			15.65	16.517					Rods to EOH 35.0m
14/12/2015					15.49	18.65			Rods to EOH 40.3m
15/12/2015			16.48	15.687					Rods to EOH 35.0m
15/12/2015					15.51	18.63			Rods to EOH 40.3m
15/12/2015							15.6	15.199	Hole at deth of 45m Rods in hole
17/12/2015			16.87	15.297					Rods to EOH 35.0m
17/12/2015					15.58	18.56			Rods to EOH 40.3m
04/01/2016							2.81	27.989	Piezometer Installed
04/01/2016					14.46	19.68			Rods to EOH 40.3m
05/01/2016							2.83	27.969	Piezometer Installed
05/01/2016					14.68	19.46			Rods to EOH 40.3m
05/01/2016			17.88	14.287					Rods out of hole
06/01/2016					19.45	14.69			Rods out of hole
08/01/2016			16.46	15.707			3.39	27.409	Piezometer Installed
11/01/2016			16.43	15.737	17.48	16.658	3.05	27.749	Piezometer Installed
11/03/2016			18.96	13.207	20.86	13.278	3.59	27.209	Piezometer Installed

aod - Above Ordnance Datum (Sea Level)

Appendix A.9.1.6

Phase 3 Contract 3, N6 Galway City Transport Project Phase 3 Ground Investigation Contract 3, November to December 2016

Our Ref: JMS/Rp/P16185 + attachments (*.pdf)

09th May, 2017

Messrs. ARUP
Corporate House,
City East Business Park,
Ballybrit,
Galway,
H91K5YD.

Re: N6 Galway City Transport Project (GCTP) Phase 3 Contract 3 – Ground Investigation, Factual report.

Introduction

In November 2016, Priority Geotechnical were requested by Arup acting as Employer's Representative on behalf of Galway County Council, to undertake a ground investigation around the east of Galway City, with the majority in Ballybrit, Co. Galway, adjacent to the Galway Racecourse as part of the phase 3 contract 3 – ground investigation. The site works were carried out on private property. Invasive works were primarily in fields with two locations in a paved area.

Scope

The scope of the ground investigation, which was specified by Arup, comprised of:

- 1No. Cable percussion borehole;
- 3No. Rotary boreholes (5no. completed);
- 11No. Soakaway tests in accordance with BRE Digest 365 (17no. completed);
- 4No. Trial pits (5no. completed);
- 1No. 12m deep rotary pumping well;
- In situ testing, including Standard Penetration Tests;

- Surface geophysics survey (2D resistivity and seismic refraction);
- Crack monitoring;
- Groundwater monitoring;
- All associated sampling;
- Associated lab testing and
- Factual reporting.

Objectives

The purpose of the site investigation was to provide information on the soil and rock ground conditions, groundwater levels and karst activity along the proposed route alignment.

This factual report presents the fieldworks records and data obtained with regard to the ground investigation for the N6 GCTP phase 3 contract 3 - Ground Investigation and should be read in conjunction with the exploratory and photographic records and laboratory test data accompanying this report (attached).

Site Works

This investigation was carried out in accordance with Eurocode 7- Geotechnical Design Part 2, ground investigation and testing (BS EN 1997-2: 2007) and the relevant British Standards BS 5930 (2015) Code of Practice for Site Investigation and BS 1377, Method of Tests for Soil for Civil Engineering Purposes, *in situ* Tests Parts 1 to 9).

The fieldworks were undertaken between the 2th November and the 22nd December, 2017 under the supervision of PGL, Engineering Geologist(s). Details of the plant and equipment used are detailed on the relevant exploratory records, attached herein.

Cable Percussion Boreholes

A single (1) cable percussion borehole (BH03-62) was drilled to a depth of 1.90m below existing ground level (bgl) using PGL's Dando 2000 rig. The records are attached, herein.

Rotary boreholes

Five (5) rotary boreholes (RC03-60, RC03-61, RC03-62, RC03-63 and RC03-64) were drilled to depths between 8.0m bgl and 30.0m bgl using PGL's Deltabase 520, 6t rotary rig. The records are attached, herein.

A single (1) 200mm dia. pumping well (PW01) was drilled to a depth of 12.0m bgl by Dempsey Drilling on behalf of PGL.

Trial pits

A total of five (5) number trial pit excavations (TP03-19, TP03-50, TP03-51, TP03-52 and TP03-53) were excavated to depths of 0.8m below existing ground level (bgl) to 4.0m bgl using a 14t tracked excavator. Trial pits terminated above the scheduled depth of 4.5m bgl for a variety of reasons outlined on the relevant exploratory records attached, herein.

Soakaway Tests

A total of seventeen (17) number infiltration/ soakaway tests were carried out in in general accordance with BRE Digest 365, Soakaway Design (2003/ 2007). The data from the testing is presented accompanying the relevant exploratory records, SW03-03, SW03-04, SW03-05, SW03-06, SW03-07, SW03-08, SW03-09, SW03-10, SW03-11, SW03-12, SW03-13, SW03-14, SW03-15, SW03-16, SW03-17, SW03-18, and SW03-19.

Sampling

A total of fifty seven (57) bulk disturbed samples (B), thirty two (32) small disturbed samples (D) and rotary core were recovered from the exploratory holes in accordance with Geotechnical Investigation and Sampling – Sampling Methods and Groundwater Measurements (EN ISO 22475-1:2006).

Survey and Drawings

Upon completion of the fieldworks, the 'as built' exploration locations were surveyed using Trimble 5700/5800 GPS equipment to the Ordinance Survey Irish Transverse Mercator system of co-ordinates (ITM) and elevations to Malin Head datum. The

exploratory locations were shown on the Exploratory Location layout and Plan (P16185-SI-A) attached.

In-Situ Testing

Standard Penetration Test

Standard Penetration Tests, N values, were typically carried out in the boreholes using the 60º solid cone in place of the standard split barrel sampler. The Standard Penetration Test was carried out in accordance with Geotechnical Investigation and Testing, Part 3 Standard penetration test, BS EN ISO 22476-3:2005+A1:2011. The data is presented on the exploratory logs accompanying this factual report. Elevated SPT (SPT = >50) values are attributed to cobble and boulder inclusions.

A geophysical survey consisting of 2D-Resistivity and seismic refraction (p-wave) was carried out as part of the N6 GTCP Phase 3 Contract 3 - Ground Investigation. The reporting is issued separately.

An *In situ* variable head (falling and rising) permeability test was carried out in 200mm diameter standpipe well, BH-MW64. *In-situ* permeability tests were carried out in accordance with BS5930: 1999, Section 4: Cl. 25.4, within the superficial deposits over duration of one (1) hour. The processed test data is presented with this factual report. The shape or intake factor, f was derived from the condition at the base of the borehole at the test depth and test geometry as per Hvorslev (1951).

$$k = \frac{A}{fd} \frac{\log_e (H_0 / H_t)}{t}$$

Generally for all tests the specific depth range of the test was the slotted pipe of the standpipe. The ratio L/d was 20 to 60. A mean k measured ($k_H = k_V$), permeability in the soil was assumed equal in both horizontal and vertical direction, ($k_H / k_V = 1.$). The test geometry provided a shape factor, f of 20 for the tests undertaken.

SUMMARY OF IN-SITU TESTING

Type	Quantity	Remarks
Standard Penetration Test, N values	28No.	Nspt ranging from 8 to 91 including refusal >50. Nspt average = 36
Soakaway tests	17No.	See attached results
Rising head permeability test	01No.	1.20E-08ms^{-1}
Geophysical Survey	2D-Res 5671lin.m Seismic refraction,	See attached results

Laboratory Testing

Laboratory testing was scheduled by Arup and carried out by GSTL on behalf of PGL in accordance with BS1377 (1990), Methods of test for soils for civil engineering purposes and the ISRM suggested methods for rock characterisation, testing and monitoring. The laboratory data accompanies the report and was summarised as follows;

Type	GSTL No.	PGL No.	Remarks
Natural Moisture Content	40	2	4.4% to 48%
Atterberg limits	24	2	Liquid limit, LL 25% and 63% Plastic limit, PL14% to 46% incl. non plastic soils Plasticity index, PI 11 to 28
Particle size distribution analysis	32	2	Incl. 31 hydrometer on fines. Refer to attached results,
pH	4		7.5 to 7.91 units
Water soluble Sulphate, SO_4	4		<0.01g/l to 0.02g/l
Organic Content	5		0.9% to 11.4%
Consolidated Drained Shearbox	3		See attached results.
Consolidated Undrained Shearbox	2		See attached results.

Published Geology

The geology of the study area (GSI 1:100,000 mapping Sheet 14) is defined the Burren Formation (BU), described as pale grey clean skeletal Limestone. Karst features in the form of turloughs, enclosed depressions, caves and springs are common within the formation. Karst is a design risk. The national groundwater aquifer vulnerability mapping indicates high to extreme vulnerability. The extreme rating is likely due to bedrock at or near the surface. A review of geotechnical report ref: 1340 titled 'N6 Galway Eastern Approach Road' identified a series of historical rotary boreholes. Rock was encountered at depths between 0.05m bgl to 0.8m bgl.

Teagasc subsoil mapping indicates that the area is underlain glacial till derived chiefly from Limestone parent rock. Outcropping karstified Limestone bedrock was also indicated on the subsoil mapping.

Ground and groundwater conditions

The full details of the ground conditions encountered are provided for on the exploratory records accompanying this report. The records provide descriptions, in accordance with BS 5930 (2015) and Eurocode 7, Geotechnical Investigation and Testing, Identification and classification of soils, Part 1, Identification and description (EN ISO 14688-1: 2002),– Identification and Classification of Soil, Part 2: Classification Principles (EN ISO 14688-2:2004) and Identification and Classification of Rock, Part 1: Identification & Description (EN ISO 14689-1:2004) of the materials encountered, in situ testing and details of the samples taken, together with any observations made during the ground investigation.

Groundwater was recorded when encountered during boring and trial pit excavations over a period of 20 minutes, noting any changes that may occur. Groundwater levels were also monitored at start and end of drilling shifts. It should be noted that the normal rate of boring may not permit the recording of equilibrium groundwater levels for any one groundwater water strike where casing may exclude low volume flows as the borehole progresses. Groundwater conditions observed in the borings or pits are those appertaining to the period of the investigation. Groundwater levels may be subject to diurnal, seasonal and climatic variations and can also be affected by drainage

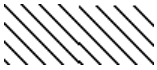
conditions, tidal variations etc. The groundwater regime should be assessed from standpipe well installations, where available.

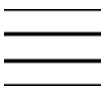
Groundwater was monitored using Rugged Troll 100 Leveloggers. Continuous, absolute pressure (hydrostatic and barometric pressure) was measured *in situ* to determine continual groundwater levels at three (3) number locations RC63, RC64 and PW01. Loggers were installed in standpipe well installations as specified by Arup. Levels were monitored during pumping tests on PW01 to determine drawdown, if any on groundwater levels in the area. Levels were obtained prior to the pump test, during pumping and during the recharge phase. Accuracy was within 0.05% in water depths up to 30m. The data loggers are presented as digital spreadsheet data (*.xls).

Five (5) 50mm diameter standpipes were constructed at locations RC03-60, RC03-61, RC03-62, RC03-63 and RC03-64 to allow for groundwater monitoring, else exploratory boreholes were backfilled with (pelletised) cement-bentonite grout. A summary of groundwater monitoring is shown below.


GRAVEL Backfill to installation/ borehole


GROUT Backfill to installation/ borehole


BENTONITE Backfill to installation/ borehole


uPVC slotted pipe

P16185 - N6 GTCP Phase 3 Contract 3	
Groundwater Readings	
Borehole No.	**24/01/2017**
RC03-60	14.02m
RC03-61	6.85m
RC03-62	6.15m
RC03-63	7.23m
RC03-64	5.15m
Pump Well	14.19m

Should you have any queries in relation to the data collected, please do not hesitate to contact our office.

Yours sincerely,
For **Priority Geotechnical,**

James McSweeney BSc
Engineering Geologist

No responsibility can be held by PGL for ground conditions between exploratory locations. The exploratory logs provide for ground profiles and configuration of strata relevant to the investigation depths achieved during the fieldworks. Caution shall be taken when extrapolating between such exploratory locations. No liability is accepted for ground conditions extraneous to the exploratory locations.

No account has been taken of potential subsidence or ground movement due to mineral extraction, mining works or karstification below or in proximity to the site, unless specifically addressed.

This report has been prepared for Employer and their Representative as outline, herein. The information should not be used without their prior written permission. PGL accepts no responsibility or liability for this document being used other than for the purposes for which it was intended.

KEY TO SYMBOLS ON EXPLORATORY HOLE RECORDS

All linear dimensions are in metres or millimetres

DESCRIPTIONS

**	Drillers Description
Friable	Easily crumbled

SAMPLES

U( )	Undisturbed 102mm diameter sample, ( ) denotes number of blows to drive sampler
U( )F, U( )P	F- not recovered, P-partially recovered
U38	Undisturbed 38mm diameter sample
P(F), (P)	Piston sample - disturbed
B	Bulk sample - disturbed
D	Jar Sample - disturbed
W	Water Sample
CBR	California Bearing Ratio mould sample
ES	Chemical Sample for Contamination Analysis
SPTLS	Standard Penetration Test S lump sample from split sampler

CORE RECOVERY AND ROCK QUALITY

TCR	Total Core Recovery (% of Core Run)
SCR	Solid Core Recovery (length of core having at least one full diameter as % of core run)
RQD	Rock Quality Designation (length of solid core greater than 100mm as % of core run)

Where there is insufficient space for the TCR, SCR and RQD, the results may be found in the remarks column

If	Fracture Spacing in mm (Minimum/Average/Maximum) NI - non intact, NR - no recovery
AZCL	Assumed Zone of Core Loss
NI	Non intact

GROUNDWATER

▽	Groundwater strike
▼	Groundwater level after standing period
Date/Water	Date of shift (day/month)/Depth to water at end of previous shift shown above the date and depth to water at beginning of shift given below the date

INSITU TESTING

S	Standard Penetration Test - split barrel sampler
C	Standard Penetration Test - solid 60^{o} cone
SW	Self Weight Penetration
Ivp, HVp (R)	In Situ Vane Test, Hand Vane Test (R) demonstrates remoulded strength
K(F), (C), (R), (P)	Permeability Test
HP	Hand Penetrometer Test

MEASURED PROPERTIES

N	Standard Penetration Test - blows required to drive 300mm after seating drive
x/y	Denotes x blows for y mm within the Standard Penetration Test
x*/y	Denotes x blows for y mm within the seating drive
c_u	Undrained Shear Strength (kN/m^2)
CBR	California Bearing Ratio

ROTARY DRILLING SIZES

Index Letter	Nominal Diameter (mm)	
	Borehole	Core
N	75	54
H	99	76
P	120	92
S	146	113

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Drilled By:	Borehole No.
PC	**BH03-62**
Logged By:	Sheet 1 of 1
AH	

Project Name:	N6 GCTP Phase 3	**Project No.** P16185	**Co-ords:**	532896E - 728291N	**Hole Type** CP
Location:	Galway City, Co. Galway		**Level:**	17.77m OD	**Scale** 1:50
Client:	Arup		**Date:**	05/12/2016 - 05/12/2016	

Well	Water Strike (m)	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (mOD)	Legend	Stratum Description
		0.00 - 0.50	B					Topsoil. CLAY.
		0.00 - 0.50	D		0.40	17.37		
		0.50	SPT (C)	N=8 (1,1/2,2,2,2)				Firm, brown, slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded. Cobbles are 200mm dia and sub-angular.
		1.00 - 1.80	B		1.00	16.77		Light brown, slightly sandy slightly gravelly CLAY with cobble content. Sand is fine to coarse. Gravel is fine to medium, sub-angular to sub-rounded.
		1.80	SPT (C)	50 (25 for 0mm/50 for 75mm)	1.90	15.87		
		1.90	SPT (C)	50 (25 for 0mm/50 for 75mm)				End of Borehole at 1.900m

Groundwater:

Struck (m)	Rose to	After (mins)	Sealed	Comment
				None encountered.

Hole Information:

Hole Depth (m)	Hole Dia (mm)	Casing Dia (mm)
1.90	200	200

Equipment: Dando 2000.

Chiselling:

Depth Top	Depth Base	Duration	Tool
1.80	1.90	01:00	Chisel.

Remarks:

Borehole terminated at 1.90m bgl due to obstruction, dense strata - refer to chiseling records.

Shift Data:

Groundwater	Shift	Hole Depth (m)	Remarks
	05/12/2016 08:00	0.00	Start of shift.
Dry	05/12/2016 18:00	1.90	End of borehole.

pgl priority geotechnical	**Priority Geotechnical Ltd.** **Tel: 021 4631600** **Fax: 021 4638690** **www.prioritygeotechnical.ie**		Borehole No. **RC03-60** Sheet 1 of 2
Project Name: N6 GCTP Phase 3	Project No. P16185	Co-ords: 533447.09 - 728232.31	Hole Type RC
Location: Galway City, Co. Galway		Level: 57.28m OD	Scale 1:50
Client: Arup		Dates: 02/12/2016	Logged By AH

Well	Water Strike (m)	Depth (m)	Type /Fs	Coring TCR	Coring SCR	Coring RQD	Depth (m) / Fl	Level (mOD)	Legend	Stratum Description
							0.40	56.88		Open hole boring. Driller described: Topsoil. Clay.
										Open hole boring. Driller described: Weathered rock. Assumed Limestone.
		50 (25 for 0mm/50 for 0mm) (C) 1.00 - 2.50	21mm 188mm	100	100	50	1.00 27/m	56.28		Lithology: Moderately strong to strong, grey, LIMESTONE. Weathering: Slightly weathered, slight orange oxidation, with clay smearing on fracture surfaces. Fractures: Main set oriented 10-25 degrees, close to widely spaced, with undulating rough fracture surfaces. Second set oriented 70-80 degrees, medium spaced, with undulating rough fracture surfaces.
		2.50 - 4.00		100	100	53				
		4.00 - 5.50		100	100	47				
		5.50 - 7.00	91mm 432mm	100	93	27	16/m			
		7.00 - 8.50		100	100	93				
			23mm 504mm				11/m			

1 2 3 4 5 6 7 8 9

Groundwater:

Struck, m	Rose to	After, min	Sealed	Comment
				None encountered.

Hole Information:

Hole Depth (m)	Hole Dia (mm)	Casing Dia (mm)
15.40	76	131

Equipment: Deltabase 520.

Chiselling:

Depth Top	Depth Base	Duration	Tool

Remarks:

Borehole terminated at 15.4m bgl. 50mm dia standpipe installed. Response zone from 6.4m to 15.4m bgl.

Shift Data:

Groundwater	Shift	Hole Depth (m)	Remarks
	02/12/2016 08:00	0.00	Start of shift.
Dry	02/12/2016 18:00	15.40	End of borehole.

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Borehole No.
RC03-60
Sheet 2 of 2

Project Name: N6 GCTP Phase 3	Project No. P16185	Co-ords: 533447.09 - 728232.31	Hole Type RC
Location: Galway City, Co. Galway		Level: 57.28m OD	Scale 1:50
Client: Arup		Dates: 02/12/2016	Logged By AH

Well	Water Strike (m)	Depth (m)	Type /Fs	Coring TCR	Coring SCR	Coring RQD	Depth (m) / Fl	Level (mOD)	Legend	Stratum Description
		8.50 - 10.00		100	100	93				
		10.00 - 11.50		100	87	50				*10.00m to 10.40m: Not Intact.*
		11.50 - 13.00	48mm 766mm	100	100	40	16/m			
		13.00 - 14.50		100	100	27				
		14.50 - 15.40	24mm 403mm	100	100	66	21/m			
							15.40	41.88		End of Borehole at 15.400m

10 11 12 13 14 15 16 17 18

Groundwater:

Struck, m	Rose to	After, min	Sealed	Comment
				None encountered.

Hole Information:

Hole Depth (m)	Hole Dia (mm)	Casing Dia (mm)
15.40	76	131

Equipment: Deltabase 520.

Chiselling:

Depth Top	Depth Base	Duration	Tool

Remarks:

Borehole terminated at 15.4m bgl. 50mm dia standpipe installed. Response zone from 6.4m to 15.4m bgl.

Shift Data:

Groundwater	Shift	Hole Depth (m)	Remarks
	02/12/2016 08:00	0.00	Start of shift.
Dry	02/12/2016 18:00	15.40	End of borehole.

Photographic Record

Number: RC03-60	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

Photographic Record

Number: RC03-60	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

Photographic Record

Number: RC03-60	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

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Borehole No.
RC03-61
Sheet 1 of 2

Project Name:	N6 GCTP Phase 3	Project No. P16185	Co-ords:	533623.69 - 728217.59	Hole Type RC
Location:	Galway City, Co. Galway		Level:	57.19m OD	Scale 1:50
Client:	Arup		Dates:	05/12/2016	Logged By AH

Well	Water Strike (m)	Depth (m)	Type /Fs	Coring TCR	Coring SCR	Coring RQD	Depth (m) / Fl	Level (mOD)	Legend	Stratum Description
							1.20	55.99		Open hole boring. Driller described: Topsoil, Clay.
		10 (25 for 90mm/10 for 0mm) (C) 1.70 - 3.20	124mm 422mm	87	28	0	1.70	55.49		Open hole boring. Driller described: Weathered rock. Assumed Limetsone.
		3.20 - 4.70		100	73	73	19/m			Lithology: Moderately strong to strong, grey, LIMESTONE. Weathering: Moderately weathered with clay smearing on fracture surfaces. Fractures: Main set oriented 10-25 degrees, close to widely spaced, with undulating rough fracture surfaces. *1.70m to 2.40m bgl not intact.*
		4.70 - 6.20		100	80	15				
		6.20 - 7.70	46mm 562mm	100	83	83	14/m			
	▼	7.70 - 9.20		100	100	80				

Groundwater:

Struck, m	Rose to	After, min	Sealed	Comment
8.30				See shift data.

Hole Information:

Hole Depth (m)	Hole Dia (mm)	Casing Dia (mm)
15.50	76	

Equipment: Deltabase 520

Chiselling:

Depth Top	Depth Base	Duration	Tool

Remarks:
Borehole terminated at 15.50m bgl.

Shift Data:

Groundwater	Shift	Hole Depth (m)	Remarks
	05/12/2016 08:00	0.00	Start of shift.
8.3	05/12/2016 18:00	15.50	End of borehole.

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Borehole No.
RC03-61
Sheet 2 of 2

Project Name: N6 GCTP Phase 3	Project No. P16185	Co-ords: 533623.69 - 728217.59	Hole Type RC
Location: Galway City, Co. Galway		Level: 57.19m OD	Scale 1:50
Client: Arup		Dates: 05/12/2016	Logged By AH

Well	Water Strike (m)	Depth (m)	Type /Fs	Coring TCR	Coring SCR	Coring RQD	Depth (m) / FI	Level (mOD)	Legend	Stratum Description
			108mm 454mm				11/m			Lithology: Moderately strong to strong, grey, LIMESTONE. Weathering: Moderately weathered with clay smearing on fracture surfaces. Fractures: Main set oriented 10-25 degrees, close to widely spaced, with undulating rough fracture surfaces.
		9.20 - 10.70		100	100	100				
		10.70 - 12.20		100	100	52				
			54mm 572mm				18/m			
		12.20 - 13.70		100	100	61				
		13.70 - 15.20		100	100	73	10/m			
			17mm 663mm							
		15.20 - 15.50		20	20	20				
							15.50	41.69		End of Borehole at 15.500m

10 11 12 13 14 15 16 17 18

Groundwater:

Struck, m	Rose to	After, min	Sealed	Comment
8.30				See shift data.

Hole Information:

Hole Depth (m)	Hole Dia (mm)	Casing Dia (mm)
15.50	76	

Equipment: Deltabase 520

Chiselling:

Depth Top	Depth Base	Duration	Tool

Remarks:
Borehole terminated at 15.50m bgl.

Shift Data:

Groundwater	Shift	Hole Depth (m)	Remarks
	05/12/2016 08:00	0.00	Start of shift.
8.3	05/12/2016 18:00	15.50	End of borehole.

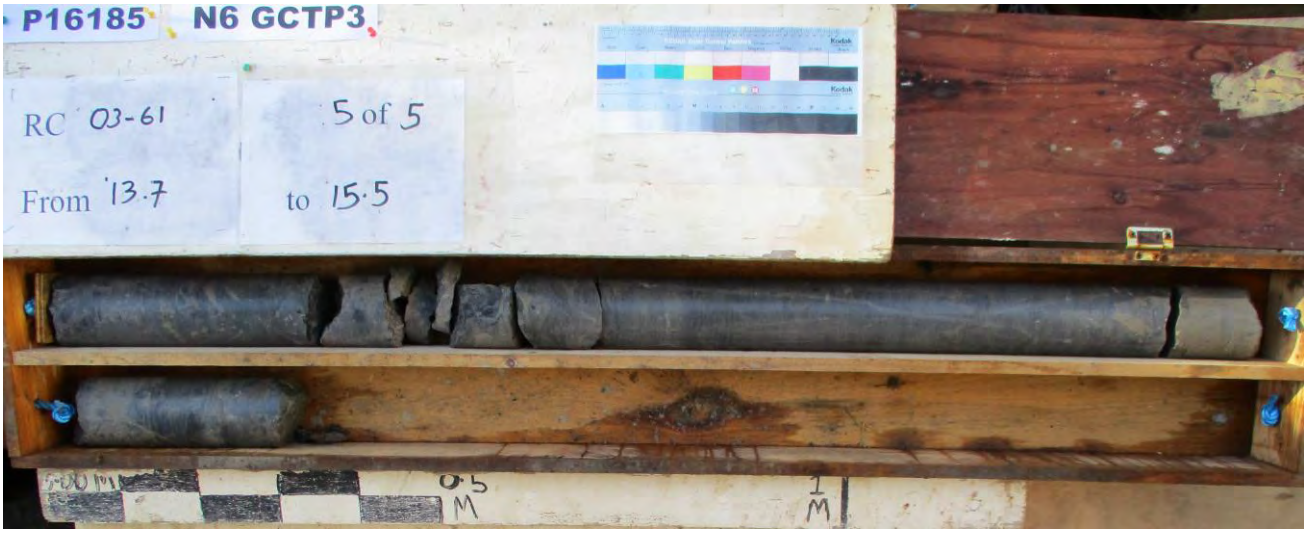
Photographic Record

Number: RC03-61	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

Photographic Record

Number: RC03-61	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

Photographic Record



Number: RC03-61	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

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Borehole No.
RC03-62
Sheet 1 of 4

Project Name: N6 GCTP Phase 3	Project No. P16185	Co-ords: 532895.64 - 728290.66	Hole Type RO
Location: Galway City, Co. Galway		Level: 17.77m OD	Scale 1:50
Client: Arup		Dates: 06/12/2016	Logged By

Well	Water Strike (m)	Depth (m)	Type /Fs	Coring TCR	Coring SCR	Coring RQD	Depth (m) / Fl	Level (mOD)	Legend	Stratum Description
		0.00 - 1.50	B							Open hole boring. Driller described: Sandy Clay.
		1.50 - 3.00 50 (3,4/50 for 0mm) (C)	B				1.70	16.07		Open hole boring. Driller described: Very dense Boulders.
							2.40	15.37		Open hole boring. Driller described: Firm becoming stiff, grey, sandy gravelly Clay.
		3.00 - 4.50 N=12 (3,4/4,3,2,3) (C)	B							
		4.50 - 6.00 44 (5,8/44 for 75mm) (C)	B							
		6.00 - 7.50 50 (25 for 10mm/50 for 10mm) (C)	B							
		7.50 - 9.00 N=35 (8,8/5,8,9,13) (C)	B				7.80	9.97		Open hole boring. Driller described: Medium dense, silty sandy Gravel.
		9.00 - 10.50	B							

Groundwater:

Struck, m	Rose to	After, min	Sealed	Comment
10.50				See shift data.

Hole Information:

Hole Depth (m)	Hole Dia (mm)	Casing Dia (mm)
30.00	131	131

Equipment: Deltabase 520

Chiselling:

Depth Top	Depth Base	Duration	Tool

Remarks:
Borehole terminated at 30.00m bgl.

Shift Data:

Groundwater	Shift	Hole Depth (m)	Remarks
	06/12/2016 08:00	0.00	Start of shift.
18.00	06/12/2016 18:00	30.00	End of borehole.

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Borehole No. **RC03-62**
Sheet 2 of 4

Project Name: N6 GCTP Phase 3	Project No. P16185	Co-ords: 532895.64 - 728290.66	Hole Type RO
Location: Galway City, Co. Galway		Level: 17.77m OD	Scale 1:50
Client: Arup		Dates: 06/12/2016	Logged By

Well	Water Strike (m)	Depth (m)	Type /Fs	Coring TCR	Coring SCR	Coring RQD	Depth (m) / Fl	Level (mOD)	Legend	Stratum Description
		N=24 (5,6/6,8,4,6) (C)								Open hole boring. Driller described: Medium dense, silty sandy Gravel.
	▼	10.50 - 12.00 N=13 (3,3/1,3,4,5) (C)	B				10.20	7.57		Open hole boring. Driller described: Medium dense becoming very dense, yellow brown, silty sandy Gravel with boulder content.
		12.00 - 13.50 33 (3,5/33 for 115mm) (C)	B							
		13.50 - 15.00 0 (25 for 50mm/0 for 0mm) (C)	B							
		15.00 - 16.50 35 (16,10/35 for 85mm) (C)	B							
		16.50 - 18.00 N=52 (11,9/5,10,18, 19) (C)	B							
		18.00 - 19.50	B							

Groundwater:

Struck, m	Rose to	After, min	Sealed	Comment
10.50				See shift data.

Hole Information:

Hole Depth (m)	Hole Dia (mm)	Casing Dia (mm)
30.00	131	131

Equipment: Deltabase 520

Chiselling:

Depth Top	Depth Base	Duration	Tool

Remarks:
Borehole terminated at 30.00m bgl.

Shift Data:

Groundwater	Shift	Hole Depth (m)	Remarks
	06/12/2016 08:00	0.00	Start of shift.
18.00	06/12/2016 18:00	30.00	End of borehole.

pgl priority geotechnical	**Priority Geotechnical Ltd.** **Tel: 021 4631600** **Fax: 021 4638690** **www.prioritygeotechnical.ie**		Borehole No. **RC03-62** Sheet 3 of 4
Project Name: N6 GCTP Phase 3	Project No. P16185	Co-ords: 532895.64 - 728290.66	Hole Type RO
Location: Galway City, Co. Galway		Level: 17.77m OD	Scale 1:50
Client: Arup		Dates: 06/12/2016	Logged By

Well	Water Strike (m)	Depth (m)	Type /Fs	Coring TCR	Coring SCR	Coring RQD	Depth (m) / Fl	Level (mOD)	Legend	Stratum Description
		N=21 (6,6/3,4,7,7) (C)								
		19.50 - 21.00 50 (25 for 0mm/50 for 0mm) (C)	B							
		21.00 - 22.50 N=65 (8,8/10,13,19, 23) (C)	B							
		22.50 - 24.00 25 (24 for 75mm/25 for 0mm) (C)	B							*22.50m: Locally medium dense.*
		24.00 - 25.50 N=91 (9,19/18,24,2 4,25) (C)	B							
		25.50 - 27.00 50 (25 for 30mm/50 for 10mm) (C)	B							
		27.00 - 28.50	B							

19 20 21 22 23 24 25 26 27

Groundwater:

Struck, m	Rose to	After, min	Sealed	Comment
10.50				See shift data.

Hole Information:

Hole Depth (m)	Hole Dia (mm)	Casing Dia (mm)
30.00	131	131

Equipment: Deltabase 520

Chiselling:

Depth Top	Depth Base	Duration	Tool

Remarks:

Borehole terminated at 30.00m bgl.

Shift Data:

Groundwater	Shift	Hole Depth (m)	Remarks
	06/12/2016 08:00	0.00	Start of shift.
18.00	06/12/2016 18:00	30.00	End of borehole.

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Borehole No.
RC03-62
Sheet 4 of 4

Project Name: N6 GCTP Phase 3	Project No. P16185	Co-ords: 532895.64 - 728290.66	Hole Type RO
Location: Galway City, Co. Galway		Level: 17.77m OD	Scale 1:50
Client: Arup		Dates: 06/12/2016	Logged By

Well	Water Strike (m)	Depth (m)	Type /Fs	Coring TCR	Coring SCR	Coring RQD	Depth (m) / Fl	Level (mOD)	Legend	Stratum Description
		50 (25 for 0mm/50 for 0mm) (C)								
		28.50 - 30.00 25 (10,16/25 for 10mm) (C)	B							*28.50 - 30.00m: Locally medium dense.*
		50 (25 for 50mm/50 for 10mm) (C)					30.00	-12.23		End of Borehole at 30.000m

28 29 30 31 32 33 34 35 36

Groundwater:

Struck, m	Rose to	After, min	Sealed	Comment
10.50				See shift data.

Hole Information:

Hole Depth (m)	Hole Dia (mm)	Casing Dia (mm)
30.00	131	131

Equipment: Deltabase 520

Chiselling:

Depth Top	Depth Base	Duration	Tool

Remarks:
Borehole terminated at 30.00m bgl.

Shift Data:

Groundwater	Shift	Hole Depth (m)	Remarks
	06/12/2016 08:00	0.00	Start of shift.
18.00	06/12/2016 18:00	30.00	End of borehole.

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Borehole No.
RC03-63
Sheet 1 of 2

Project Name: N6 GCTP Phase 3	Project No. P16185	Co-ords: 534688.05 - 726922.21	Hole Type RO
Location: Galway City, Co. Galway		Level: 36.20m OD	Scale 1:50
Client: Arup		Dates: 01/12/2016	Logged By

Well	Water Strike (m)	Depth (m)	Type /Fs	Coring TCR	Coring SCR	Coring RQD	Depth (m) / Fl	Level (mOD)	Legend	Stratum Description
		50 (25 for 10mm/50 for 10mm) (C)					0.30	35.90		Open hole boring. Driller described: Topsoil. Clay.
		50 (25 for 0mm/50 for 0mm) (C)					2.30	33.90		Open hole boring. Driller described: Weathered rock.
										Open hole boring. Driller described: Rock.

Groundwater:

Struck, m	Rose to	After, min	Sealed	Comment
				None encountered.

Hole Information:

Hole Depth (m)	Hole Dia (mm)	Casing Dia (mm)
10.00	131	131

Equipment: Deltabase 520.

Chiselling:

Depth Top	Depth Base	Duration	Tool

Remarks:

Borehole terminated at 10.00m bgl. 50mm dia standpipe installed. Response zone from 4.0m to 10.0m bgl.

Shift Data:

Groundwater	Shift	Hole Depth (m)	Remarks
	01/12/2016 08:00	0.00	Start of shift.
Dry	01/12/2016 18:00	10.00	End of borehole.

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Borehole No.
RC03-63
Sheet 2 of 2

Project Name: N6 GCTP Phase 3	Project No. P16185	Co-ords: 534688.05 - 726922.21	Hole Type RO
Location: Galway City, Co. Galway		Level: 36.20m OD	Scale 1:50
Client: Arup		Dates: 01/12/2016	Logged By

Well	Water Strike (m)	Depth (m)	Type /Fs	Coring TCR	Coring SCR	Coring RQD	Depth (m) / Fl	Level (mOD)	Legend	Stratum Description
										Open hole boring. Driller described: Rock.
							10.00	26.20		End of Borehole at 10.000m

Groundwater:

Struck, m	Rose to	After, min	Sealed	Comment
				None encountered.

Hole Information:

Hole Depth (m)	Hole Dia (mm)	Casing Dia (mm)
10.00	131	131

Equipment: Deltabase 520.

Chiselling:

Depth Top	Depth Base	Duration	Tool

Remarks:

Borehole terminated at 10.00m bgl. 50mm dia standpipe installed. Response zone from 4.0m to 10.0m bgl.

Shift Data:

Groundwater	Shift	Hole Depth (m)	Remarks
	01/12/2016 08:00	0.00	Start of shift.
Dry	01/12/2016 18:00	10.00	End of borehole.

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Borehole No.
RC03-64
Sheet 1 of 1

Project Name:	N6 GCTP Phase 3	Project No. P16185	Co-ords:	534688.51 - 726961.05	Hole Type RO
Location:	Galway City, Co. Galway		Level:	37.62m OD	Scale 1:50
Client:	Arup		Dates:	01/12/2016	Logged By

Well	Water Strike (m)	Depth (m)	Type /Fs	Coring TCR	Coring SCR	Coring RQD	Depth (m) / Fl	Level (mOD)	Legend	Stratum Description
							0.30	37.32		Open hole boring. Driller described: Topsoil. Clay.
										Open hole boring. Driller described: Weathered rock with clay bands.
							2.90	34.72		Open hole boring. Driller described: Rock.
							8.00	29.62		End of Borehole at 8.000m

Groundwater:

Struck, m	Rose to	After, min	Sealed	Comment
				None encountered.

Hole Information:

Hole Depth (m)	Hole Dia (mm)	Casing Dia (mm)
8.00	131	131

Equipment: Deltabase 520

Chiselling:

Depth Top	Depth Base	Duration	Tool

Remarks:

Borehole terminated at 8.00m bgl. 50mm dia standpipe installed. Response zone from 5.0m to 8.0m.

Shift Data:

Groundwater	Shift	Hole Depth (m)	Remarks
	01/12/2016 08:00	0.00	Start of shift.
Dry	01/12/2016 18:00	8.00	None encountered

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Trial Pit No
TP03-19
Sheet 1 of 1

Project Name: N6 GCTP Phase 3	**Project No.** P16185	**Co-ords:** 531192.33 - 728489.43 **Level:** 18.88	**Date** 12/12/2016
Location: Galway City, Co. Galway	**Dimensions (m):** 4.20 × 2.00 **Depth:** 0.25		**Scale** 1:25
Client: Arup			**Logged** VT

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.20	18.68		Topsoil. Soft, brown, slightly gravelly sandy SILT. Gravel is fine to coarse, angular to sub-angular, Limestone lithology. Sand is fine to coarse.
				0.25	18.63		Firm, light grey to light brown, slightly sandy gravelly SILT with high cobble content and medium boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-angular, Limestone lithology. Cobbles are angular to sub-rounded, 63-200mm dia. Limestone lithology. Boulders are angular to sub-angular, 200-700mm dia. Limestone lithology.
							End of Pit at 0.25m

1
2
3
4
5

Stability: Good.
Plant: 6t track machine.
Backfill: Arisings.

Groundwater: None encountered.

Remarks: Trial pit terminated at 0.25m bgl on bedrock.

Photographic Record

Number: TP03-19	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

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Trial Pit No
TP03-50
Sheet 1 of 1

Project Name: N6 GCTP Phase 3	**Project No.** P16185	**Co-ords:** 532910.81 - 728281.73 **Level:** 18.04	**Date** 01/12/2016
Location: Galway City, Co. Galway		**Dimensions (m):** 4.00 x 1.30 **Depth:** 4.00	**Scale** 1:25
Client: Arup			**Logged** AH

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							Topsoil.
				0.40	17.64		Soft to firm, grey, slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse and sub-angular.
	0.80 - 1.50 0.80 - 1.50	B D		0.80	17.24		Firm, grey, slightly sandy gravelly CLAY with high cobble content. Sand is fine to coarse. Gravel is fine to coarse, sub-rounded to rounded. Cobbles are 63mm to 200mm dia, sub-rounded to rounded.
	1.50 - 2.00 1.50 - 2.00	B D					
	2.00 - 3.00 2.00 - 3.00	B D		2.00	16.04		Very sandy very clayey GRAVEL.
	3.00 - 4.00 3.00 - 4.00	B D		3.00	15.04		Firm, grey, slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse..
				4.00	14.04		End of Pit at 4.00m

Stability: Good.
Plant: 14T track machine.
Backfill: Arisings.
Groundwater: None encountered.
Remarks: Trial pit terminated at 4.00m bgl, rock/ boulder obstruction.

Photographic Record

Number: TP03-50	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

Photographic Record

Number: TP03-50	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

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Trial Pit No
TP03-51
Sheet 1 of 1

Project Name: N6 GCTP Phase 3	**Project No.** P16185	**Co-ords:** 533409.80 - 728269.18 **Level:** 57.54	**Date** 06/12/2016
Location: Galway City, Co. Galway		**Dimensions (m):** 3.00 x 1.30 **Depth:** 0.80	**Scale** 1:25
Client: Arup			**Logged** DMC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.30	57.24		Topsoil. Soft, slightly sandy slightly gravelly SILT. Sand is fine to coarse. Gravel is fine to coarse and sub-angular.
				0.80	56.74		Weathered rock. Recovered as: BOULDERS. Boulders are sub-angular, Limestone lithology.
							End of Pit at 0.80m

Stability: Good.
Plant: 14T track machine.
Backfill: Arisings.
Groundwater: None encountered.
Remarks: Trial pit terminated at 0.80m bgl, on bedrock.

Photographic Record

Number: TP03-51	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

Photographic Record

Number: TP03-51	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

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Trial Pit No
TP03-52
Sheet 1 of 1

Project Name: N6 GCTP Phase 3	**Project No.** P16185	**Co-ords:** 533536.07 - 728203.64 **Level:** 56.79	**Date** 06/12/2016
Location: Galway City, Co. Galway		**Dimensions (m):** 2.20 x 1.30 **Depth:** 1.25	**Scale** 1:25
Client: Arup			**Logged** DMC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.15	56.64		Topsoil.
	0.20 - 0.50 0.20 - 0.50	B D					Soft, light brown, slightly sandy gravelly SILT. Sand is fine to coarse.
	0.50 - 1.20 0.50 - 1.20	B D		0.50	56.29		Soft to firm, slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded. Cobbles are sub-rounded.
				1.25	55.54		End of Pit at 1.25m

Stability: Moderate.
Plant: 14T track machine.
Backfill: Arisings.

Groundwater: None encountered.

Remarks: Trial pit terminated at 1.25m bgl, on bedrock.

Photographic Record

Number: TP03-52	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

Photographic Record

Number: TP03-52	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

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Trial Pit No
TP03-53
Sheet 1 of 1

Project Name: N6 GCTP Phase 3	**Project No.** P16185	**Co-ords:** 533686.85 - 728181.43 **Level:** 56.85	**Date** 06/12/2016
Location: Galway City, Co. Galway		**Dimensions (m):** 3.50 x 1.50 **Depth:** 4.00	**Scale** 1:25
Client: Arup			**Logged** DMC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							Topsoil.
	0.50 - 0.90 0.50 - 0.90	B D		0.40	56.45		Soft, brown, sightly gravelly slightly sandy CLAY. Sand is fine to coarse.
	1.00 - 1.50 1.00 - 1.50	B D		0.95	55.90		Soft to firm, light grey, slightly gravelly sandy CLAY with medium cobble content, low boulder content. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded. Cobbles are 63mm to 200mm dia and sub-rounded. Boulders are 200mm to 300mm dia , sub-rounded to rounded.
	2.00 - 2.50 2.00 - 2.50	B D					
	2.50 - 3.50 2.50 - 3.50	B D		2.50	54.35		Firm to stiff, light grey, slightly sandy gravelly SILT with medium cobble content. Cobbles are sub-rounded to rounded, Limestone lithology.
	3.50 - 4.00 3.50 - 4.00	B D		3.50	53.35		Sandy very silty very gravely COBBLES.
				4.00	52.85		End of Pit at 4.00m

Stability: Good.
Plant: 14T track machine.
Backfill: Arisings.

Groundwater: None encountered.

Remarks: Trial pit terminated at 4.00m bgl. Difficult to excavate very stiff strata.

Photographic Record

Number: TP03-53	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

Photographic Record

Number: TP03-53	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

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Trial Pit No
SW03-03
Sheet 1 of 1

Project Name: N6 GCTP Phase 3	**Project No.** P16185	**Co-ords:** 531747.15 - 728409.59 **Level:** 30.01	**Date** 13/12/2016
Location: Galway City, Co. Galway	**Dimensions (m):** 3.30 x 1.00		**Scale** 1:25
Client: Arup	**Depth:** 0.45		**Logged** VT

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.15 - 0.45 0.15 - 0.45	B D		0.15	29.86		Topsoil. Soft to firm, brown, slightly sandy SILT. Sand is fine to coarse.
				0.45	29.56		Brown, very gravelly very silty SAND with high cobble content and high boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-angular, Limestone lithology. Cobbles are angular to sub-angular, 63-200mm dia, Limestone lithology. Boulders are angular to sub-angular, 200-750mm dia, Limestone lithology.
							End of Pit at 0.45m

Stability: 0.45
Plant: 6t track machine.
Backfill: Arisings.

Groundwater: None encountered.

Remarks: Soakaway pit terminated at 0.45m bgl on bedrock. Soakaway test carried out (BRE 365)

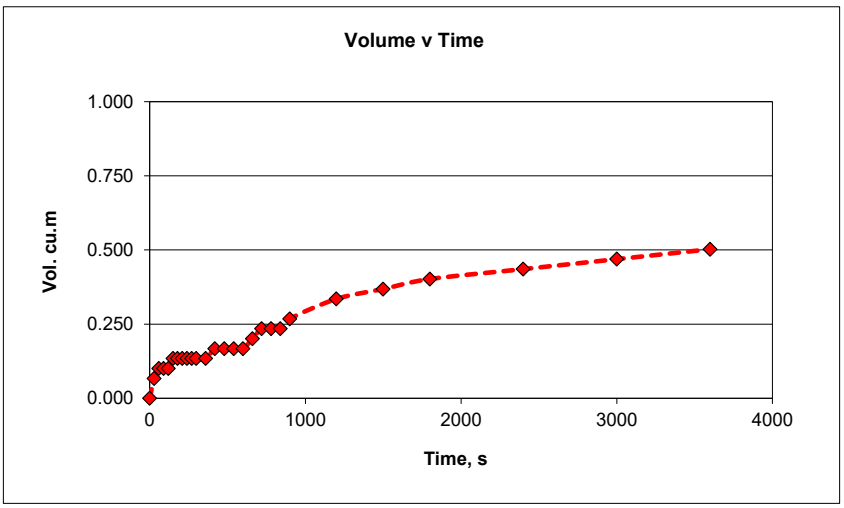
P16185 **N6 GCTP**

Test 1 **SW3/03** **13/12/2016**

				d, m	**0.47**
l, m	**3.35**	b, m	**1**	d_eff, m	**0.17**
l_base, m	**3.35**			d_act, m	**0.15**
l_eff, m	**3.35**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	0.3	0	0.17	0.00	0.000
0.5	0.32	30	0.15	0.02	0.067
1	0.33	60	0.14	0.03	0.101
1.5	0.33	90	0.14	0.03	0.101
2	0.33	120	0.14	0.03	0.101
2.5	0.34	150	0.13	0.04	0.134
3	0.34	180	0.13	0.04	0.134
3.5	0.34	210	0.13	0.04	0.134
4	0.34	240	0.13	0.04	0.134
4.5	0.34	270	0.13	0.04	0.134
5	0.34	300	0.13	0.04	0.134
6	0.34	360	0.13	0.04	0.134
7	0.35	420	0.12	0.05	0.168
8	0.35	480	0.12	0.05	0.168
9	0.35	540	0.12	0.05	0.168
10	0.35	600	0.12	0.05	0.168
11	0.36	660	0.11	0.06	0.201
12	0.37	720	0.10	0.07	0.235
13	0.37	780	0.10	0.07	0.235
14	0.37	840	0.10	0.07	0.235
15	0.38	900	0.09	0.08	0.268
20	0.4	1200	0.07	0.10	0.335
25	0.41	1500	0.06	0.11	0.369
30	0.42	1800	0.05	0.12	0.402
40	0.43	2400	0.04	0.13	0.436
50	0.44	3000	0.03	0.14	0.469
60	0.45	3600	0.02	0.15	0.503

Area	3.35 m^2				
50% Area_eff, a_{p50}	4.0895 m^2	$V_{p75\text{-}25\ theory}$	volume	0.28475	m^3
50% Area_act, a_{p50}	4.0025 m^2	$V_{p\ 75\ -\ 25\ actual}$	volume	0.25125	m^3
		$t_{p\ 75\text{-}\ 25\ actual}$	time	1440.00	s
		Infiltration Coefficient	*f*	4.359E-05	ms^-1



NOTES:

See SW3/03 log for detailed soil strata details: slightly sandy gravelly SILT

No groundwater was encountered, pit assumed unsaturated.

Infiltration rate calculated over actual fall.

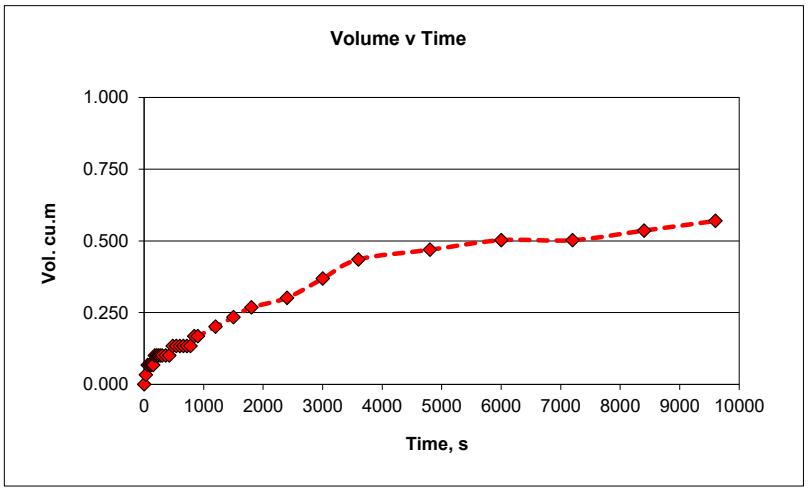
P16185 **N6 GCTP**

Test 2 **SW3/03** **13/12/2016**

				d, m	**0.47**
l, m	**3.35**	b, m	**1**	d_eff, m	**0.17**
l_base, m	**3.35**			d_act, m	**0.17**
l_eff, m	**3.35**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	0.3	0	0.17	0.00	0.000
0.5	0.31	30	0.16	0.01	0.034
1	0.32	60	0.15	0.02	0.067
1.5	0.32	90	0.15	0.02	0.067
2	0.32	120	0.15	0.02	0.067
2.5	0.32	150	0.15	0.02	0.067
3	0.33	180	0.14	0.03	0.101
3.5	0.33	210	0.14	0.03	0.101
4	0.33	240	0.14	0.03	0.101
4.5	0.33	270	0.14	0.03	0.101
5	0.33	300	0.14	0.03	0.101
6	0.33	360	0.14	0.03	0.101
7	0.33	420	0.14	0.03	0.101
8	0.34	480	0.13	0.04	0.134
9	0.34	540	0.13	0.04	0.134
10	0.34	600	0.13	0.04	0.134
11	0.34	660	0.13	0.04	0.134
12	0.34	720	0.13	0.04	0.134
13	0.34	780	0.13	0.04	0.134
14	0.35	840	0.12	0.05	0.168
15	0.35	900	0.12	0.05	0.168
20	0.36	1200	0.11	0.06	0.201
25	0.37	1500	0.10	0.07	0.235
30	0.38	1800	0.09	0.08	0.268
40	0.39	2400	0.08	0.09	0.302
50	0.41	3000	0.06	0.11	0.369
60	0.43	3600	0.04	0.13	0.436
80	0.44	4800	0.03	0.14	0.469
100	0.45	6000	0.02	0.15	0.503
120	0.45	7200	0.02	0.15	0.503
140	0.46	8400	0.01	0.16	0.536
160	0.47	9600	0.00	0.17	0.570

Area	3.35	m^2			
50% Area_eff, a_{p50}	4.0895	m^2	$V_{p75\text{-}25\ theory}$ volume	0.28475	m^3
50% Area_act, a_{p50}	4.0895	m^2	$V_{p\ 75\ -\ 25\ actu}$ volume	0.28475	m^3
			$t_{p\ 75\text{-}\ 25\ actual}$ time	2970.00	s
			Infiltration Coefficient *f*	2.34443E-05	ms^-1



NOTES:

See SW3/03 log for detailed soil strata details: slightly sandy gravelly SILT

No groundwater was encountered, pit assumed saturated for second test.

Infiltration rate calculated over actual fall.

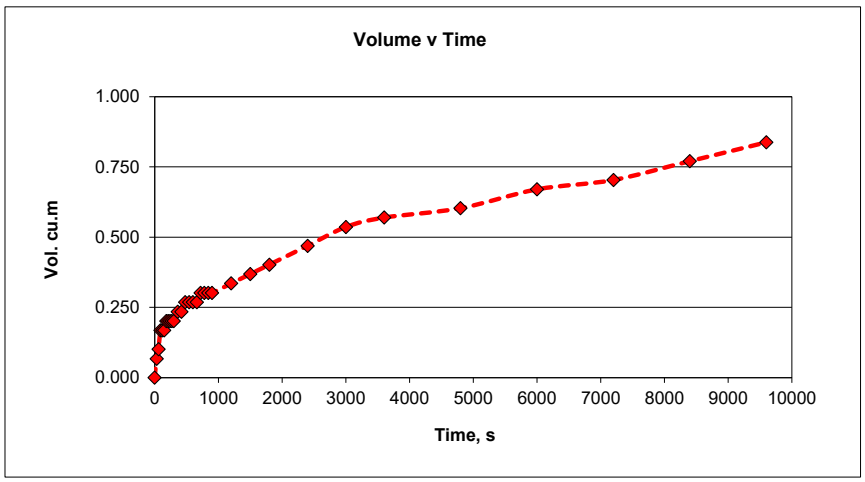
P16185 **N6 GCTP**

Test 3 **SW3/11** **13/12/2016**

				d, m	**0.47**
l, m	**3.35**	b, m	**1**	d_eff, m	**0.25**
l_base, m	**3.35**			d_act, m	**0.25**
l_eff, m	**3.35**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	0.22	0	0.25	0.00	0.000
0.5	0.24	30	0.23	0.02	0.067
1	0.25	60	0.22	0.03	0.101
1.5	0.27	90	0.20	0.05	0.168
2	0.27	120	0.20	0.05	0.168
2.5	0.27	150	0.20	0.05	0.168
3	0.28	180	0.19	0.06	0.201
3.5	0.28	210	0.19	0.06	0.201
4	0.28	240	0.19	0.06	0.201
4.5	0.28	270	0.19	0.06	0.201
5	0.28	300	0.19	0.06	0.201
6	0.29	360	0.18	0.07	0.235
7	0.29	420	0.18	0.07	0.235
8	0.3	480	0.17	0.08	0.268
9	0.3	540	0.17	0.08	0.268
10	0.3	600	0.17	0.08	0.268
11	0.3	660	0.17	0.08	0.268
12	0.31	720	0.16	0.09	0.302
13	0.31	780	0.16	0.09	0.302
14	0.31	840	0.16	0.09	0.302
15	0.31	900	0.16	0.09	0.302
20	0.32	1200	0.15	0.10	0.335
25	0.33	1500	0.14	0.11	0.369
30	0.34	1800	0.13	0.12	0.402
40	0.36	2400	0.11	0.14	0.469
50	0.38	3000	0.09	0.16	0.536
60	0.39	3600	0.08	0.17	0.570
80	0.40	4800	0.07	0.18	0.603
100	0.42	6000	0.05	0.20	0.670
120	0.43	7200	0.04	0.21	0.704
140	0.45	8400	0.02	0.23	0.771
160	0.47	9600	0.00	0.25	0.838

Area	3.35 m^2				
50% Area_eff, a_{p50}	4.4375 m^2	$V_{p75\text{-}25\ theory}$	volume	0.41875	m^3
50% Area_act, a_{p50}	4.4375 m^2	$V_{p\ 75\ -\ 25\ actual}$	volume	0.41875	m^3
		$t_{p\ 75\text{-}25\ actual}$	time	5500.00	s
		Infiltration Coefficient	*f*	1.71575E-05	ms^-1



NOTES:

See SW3/03 log for detailed soil strata details: slightly sandy gravelly SILT

No groundwater was encountered, pit assumed saturated for third test.

Infiltration rate calculated over actual fall.

Photographic Record

Number: SW03-03	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

Photographic Record

Number: SW03-03	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

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Trial Pit No
SW03-04
Sheet 1 of 1

Project Name: N6 GCTP Phase 3	**Project No.** P16185	**Co-ords:** 533188.89 - 728353.66 **Level:** 52.77	**Date** 01/12/2016
Location: Galway City, Co. Galway		**Dimensions (m):** 1.50 × 1.30 **Depth:** 0.35	**Scale** 1:25
Client: Arup			**Logged** DMC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.35	52.42		Topsoil. Soft, brown, slightly gravelly SILT. End of Pit at 0.35m

1
2
3
4
5

Stability: Good.
Plant: 14T track machine.
Backfill: Arisings.

Groundwater: None encountered.

Remarks: Soakaway pit terminated at 0.35m bgl, on bedrock. Soakaway test carried out (BRE 365).

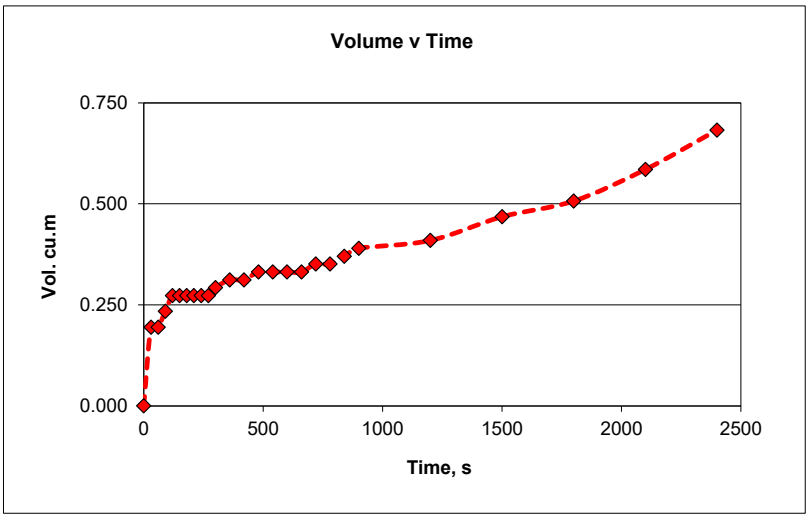
P16185 **N6 GCTP**

Test 1 **SW3/04** **01/12/2016**

				d, m	**0.35**
l, m	**1.5**	b, m	**1.3**	d_eff, m	**0.35**
l_base, m	**1.5**			d_act, m	**0.35**
l_eff, m	**1.5**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	0	0	0.35	0.00	0.000
0.5	0.1	30	0.25	0.10	0.195
1	0.1	60	0.25	0.10	0.195
1.5	0.12	90	0.23	0.12	0.234
2	0.14	120	0.21	0.14	0.273
2.5	0.14	150	0.21	0.14	0.273
3	0.14	180	0.21	0.14	0.273
3.5	0.14	210	0.21	0.14	0.273
4	0.14	240	0.21	0.14	0.273
4.5	0.14	270	0.21	0.14	0.273
5	0.15	300	0.20	0.15	0.293
6	0.16	360	0.19	0.16	0.312
7	0.16	420	0.19	0.16	0.312
8	0.17	480	0.18	0.17	0.332
9	0.17	540	0.18	0.17	0.332
10	0.17	600	0.18	0.17	0.332
11	0.17	660	0.18	0.17	0.332
12	0.18	720	0.17	0.18	0.351
13	0.18	780	0.17	0.18	0.351
14	0.19	840	0.16	0.19	0.371
15	0.2	900	0.15	0.20	0.390
20	0.21	1200	0.14	0.21	0.410
25	0.24	1500	0.11	0.24	0.468
30	0.26	1800	0.09	0.26	0.507
35	0.30	2100	0.05	0.30	0.585
40	0.35	2400	0.00	0.35	0.683

Area	1.95 m^2				
50% Area_eff, a_{p50}	2.93 m^2	$V_{p75\text{-}25\ theory}$	volume	0.34125	m^3
50% Area_act, a_{p50}	2.93 m^2	$V_{p\ 75\ -\ 25\ actual}$	volume	0.34125	m^3
		$t_{p\ 75\text{-}25\ actual}$	time	1818.00	s
		Infiltration Coefficient	*f*	6.406E-05	ms^-1



NOTES:

See SW3/04 log for detailed soil strata details: slightly gravelly SILT

No groundwater was encountered, pit assumed unsaturated.

Infiltration rate calculated over actual fall.

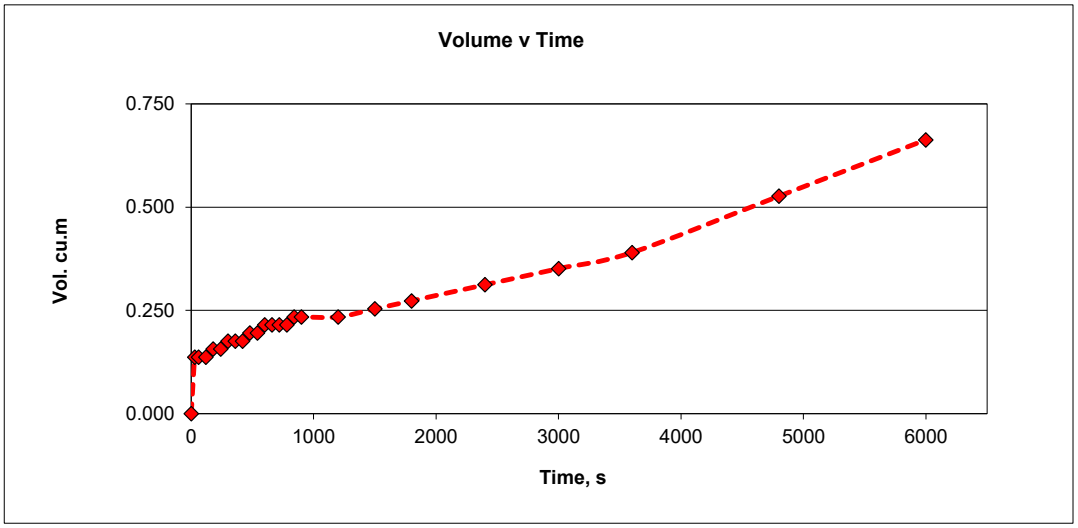
P16185 **N6 GCTP**

Test 2 **SW3/04** **01/12/2016**

				d, m	**0.35**
l, m	**1.5**	b, m	**1.3**	d_eff, m	**0.35**
l_base, m	**1.5**			d_act, m	**0.34**
l_eff, m	**1.5**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	0	0	0.35	0.00	0.000
0.5	0.07	30	0.28	0.07	0.137
1	0.07	60	0.28	0.07	0.137
2	0.07	120	0.28	0.07	0.137
3	0.08	180	0.27	0.08	0.156
4	0.08	240	0.27	0.08	0.156
5	0.09	300	0.26	0.09	0.176
6	0.09	360	0.26	0.09	0.176
7	0.09	420	0.26	0.09	0.176
8	0.1	480	0.25	0.10	0.195
9	0.1	540	0.25	0.10	0.195
10	0.11	600	0.24	0.11	0.215
11	0.11	660	0.24	0.11	0.215
12	0.11	720	0.24	0.11	0.215
13	0.11	780	0.24	0.11	0.215
14	0.12	840	0.23	0.12	0.234
15	0.12	900	0.23	0.12	0.234
20	0.12	1200	0.23	0.12	0.234
25	0.13	1500	0.22	0.13	0.254
30	0.14	1800	0.21	0.14	0.273
40	0.16	2400	0.19	0.16	0.312
50	0.18	3000	0.17	0.18	0.351
60	0.20	3600	0.15	0.20	0.390
80	0.27	4800	0.08	0.27	0.527
100	0.34	6000	0.01	0.34	0.663

Area	1.95				
50% Area_eff, a_{p50}	2.93	m^2	$V_{p75\text{-}25\ theory}$ volume	0.34125	m^3
50% Area_act, a_{p50}	2.902	m^2	$V_{p\ 75\ -\ 25\ actu}$ volume	0.3315	m^3
			$t_{p\ 75\text{-}\ 25\ actual}$ time	4620.00	s
			Infiltration Coefficient *f*	2.47254E-05	ms^-1



NOTES:

See SW3/04 log for detailed soil strata details: slightly gravelly SILT

No groundwater was encountered, pit assumed saturated for second test.

Infiltration rate calculated over actual fall.

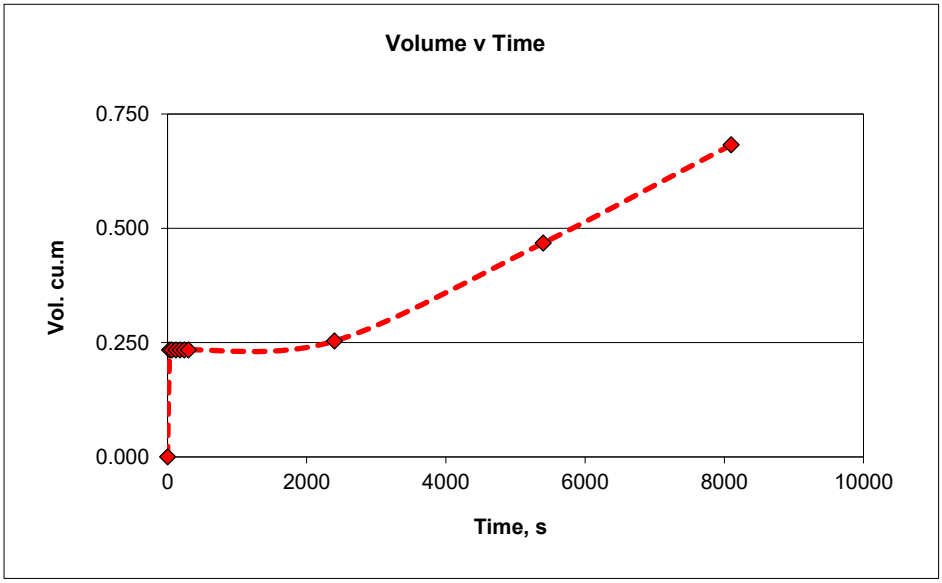
P16185 **N6 GCTP**

Test 3 **SW3/04** **01/12/2016**

				d, m	**0.35**
l, m	**1.5**	b, m	**1.3**	d_eff, m	**0.35**
l_base, m	**1.5**			d_act, m	**0.35**
l_eff, m	**1.5**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	0	0	0.35	0.00	0.000
0.5	0.12	30	0.23	0.12	0.234
1	0.12	60	0.23	0.12	0.234
2	0.12	120	0.23	0.12	0.234
3	0.12	180	0.23	0.12	0.234
4	0.12	240	0.23	0.12	0.234
5	0.12	300	0.23	0.12	0.234
40	0.13	2400	0.22	0.13	0.254
90	0.24	5400	0.11	0.24	0.468
135	0.35	8100	0.00	0.35	0.683

Area	1.95			
50% Area_eff, a_{p50}	2.93 m^2	$V_{p75\text{-}25\ theory}$ volume	0.34125	m^3
50% Area_act, a_{p50}	2.93 m^2	$V_{p\ 75\ -\ 25\ actu}$ volume	0.34125	m^3
		$t_{p\ 75\text{-}25\ actual}$ time	6066.00	s
		Infiltration Coefficient *f*	1.92001E-05	ms^-1



NOTES:

See SW3/04 log for detailed soil strata details: slightly gravelly SILT

No groundwater was encountered, pit assumed saturated for third test.

Infiltration rate calculated over actual fall.

Photographic Record

Number: SW03-04	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

Photographic Record

Number: SW03-04	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

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Trial Pit No
SW03-05
Sheet 1 of 1

Project Name: N6 GCTP Phase 3	**Project No.** P16185	**Co-ords:** 532788.59 - 727597.04 **Level:** 42.27	**Date** 30/11/2016
Location: Galway City, Co. Galway	**Dimensions (m):** 2.40 × 1.60		**Scale** 1:25
Client: Arup	**Depth:** 0.90		**Logged** VT

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.20	42.07		Topsoil. Firm, brown, slightly gravelly SILT with medium cobble content. Gravel is fine to coarse, angular to sub-rounded. Cobbles are 63mm to 200mm dia, angular to sub-rounded, Limestone lithology.
							Soft to firm, slightly gravelly sandy SILT with high cobble content, high boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-angular. Cobbles are 63mm to 200mm dia, sub-angular to sub-rounded. Boulders are 200mm to 500mm dia, sub-angular to sub-rounded.
				0.90	41.37		End of Pit at 0.90m

Stability: Good.
Plant: 12T track machine.
Backfill: Arisings.

Groundwater: None encountered.

Remarks: Soakaway pit terminated at 0.90m bgl, on bedrock. Soakaway test carried out (BRE 365).

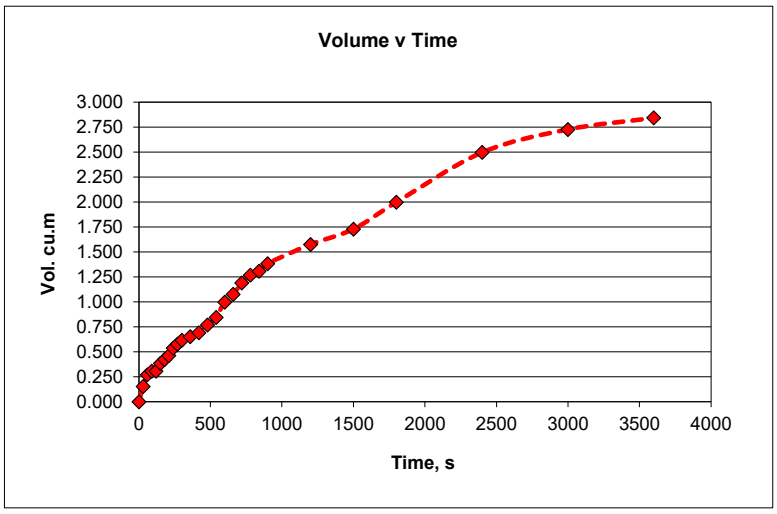
P16185 **N6 GCTP**

Test 1 **SW3/05** **30/11/2016**

				d, m	**0.9**
l, m	**2.4**	b, m	**1.6**	d_eff, m	**0.74**
l_base, m	**2.4**			d_act, m	**0.74**
l_eff, m	**2.4**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	0.16	0	0.74	0.00	0.000
0.5	0.2	30	0.70	0.04	0.154
1	0.23	60	0.67	0.07	0.269
1.5	0.24	90	0.66	0.08	0.307
2	0.24	120	0.66	0.08	0.307
2.5	0.26	150	0.64	0.10	0.384
3	0.27	180	0.63	0.11	0.422
3.5	0.28	210	0.62	0.12	0.461
4	0.3	240	0.60	0.14	0.538
4.5	0.31	270	0.59	0.15	0.576
5	0.32	300	0.58	0.16	0.614
6	0.33	360	0.57	0.17	0.653
7	0.34	420	0.56	0.18	0.691
8	0.36	480	0.54	0.20	0.768
9	0.38	540	0.52	0.22	0.845
10	0.42	600	0.48	0.26	0.998
11	0.44	660	0.46	0.28	1.075
12	0.47	720	0.43	0.31	1.190
13	0.49	780	0.41	0.33	1.267
14	0.5	840	0.40	0.34	1.306
15	0.52	900	0.38	0.36	1.382
20	0.57	1200	0.33	0.41	1.574
25	0.61	1500	0.29	0.45	1.728
30	0.68	1800	0.22	0.52	1.997
40	0.81	2400	0.09	0.65	2.496
50	0.87	3000	0.03	0.71	2.726
60	0.90	3600	0.00	0.74	2.842

Area	3.84 m^2				
50% Area_eff, a_{p50}	6.8 m^2	$V_{p75\text{-}25\ theory}$	volume	1.4208	m^3
50% Area_act, a_{p50}	6.8 m^2	$V_{p\ 75\ -\ 25\ actual}$	volume	1.4208	m^3
		$t_{p\ 75\text{-}\ 25\ actual}$	time	1800.00	s
		Infiltration Coefficient	*f*	0.000116	ms^-1



NOTES:

See SW3/05 log for detailed soil strata details: slightly gravelly sandy SILT

No groundwater was encountered, pit assumed unsaturated.

Infiltration rate calculated over actual fall.

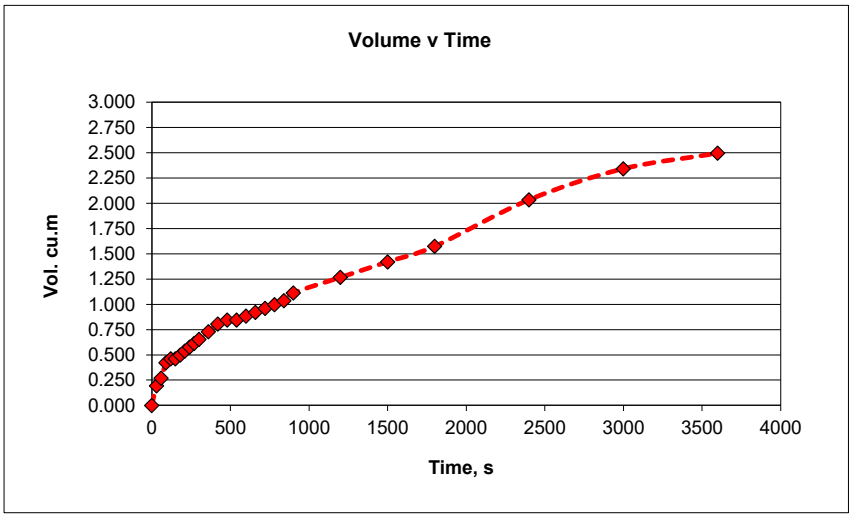
P16185 **N6 GCTP**

Test 2 **SW3/05** **30/11/2016**

				d, m	**0.9**
l, m	**2.4**	b, m	**1.6**	d_eff, m	**0.65**
l_base, m	**2.4**			d_act, m	**0.65**
l_eff, m	**2.4**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	0.25	0	0.65	0.00	0.000
0.5	0.3	30	0.60	0.05	0.192
1	0.32	60	0.58	0.07	0.269
1.5	0.36	90	0.54	0.11	0.422
2	0.37	120	0.53	0.12	0.461
2.5	0.37	150	0.53	0.12	0.461
3	0.38	180	0.52	0.13	0.499
3.5	0.39	210	0.51	0.14	0.538
4	0.4	240	0.50	0.15	0.576
4.5	0.41	270	0.49	0.16	0.614
5	0.42	300	0.48	0.17	0.653
6	0.44	360	0.46	0.19	0.730
7	0.46	420	0.44	0.21	0.806
8	0.47	480	0.43	0.22	0.845
9	0.47	540	0.43	0.22	0.845
10	0.48	600	0.42	0.23	0.883
11	0.49	660	0.41	0.24	0.922
12	0.5	720	0.40	0.25	0.960
13	0.51	780	0.39	0.26	0.998
14	0.52	840	0.38	0.27	1.037
15	0.54	900	0.36	0.29	1.114
20	0.58	1200	0.32	0.33	1.267
25	0.62	1500	0.28	0.37	1.421
30	0.66	1800	0.24	0.41	1.574
40	0.78	2400	0.12	0.53	2.035
50	0.86	3000	0.04	0.61	2.342
60	0.90	3600	0.00	0.65	2.496

Area	3.84	m^2			
50% Area_eff, a_{p50}	6.44	m^2	$V_{p75\text{-}25\ theory}$ volume	1.248	m^3
50% Area_act, a_{p50}	6.44	m^2	$V_{p\ 75\ -\ 25\ actu}$ volume	1.248	m^3
			$t_{p\ 75\text{-}\ 25\ actual}$ time	1630.00	s
			Infiltration Coefficient *f*	0.000118889	ms^-1



NOTES:

See SW3/05 log for detailed soil strata details: slightly gravelly sandy SILT

Second test pit assumed saturated.

Infiltration rate calculated over actual fall.

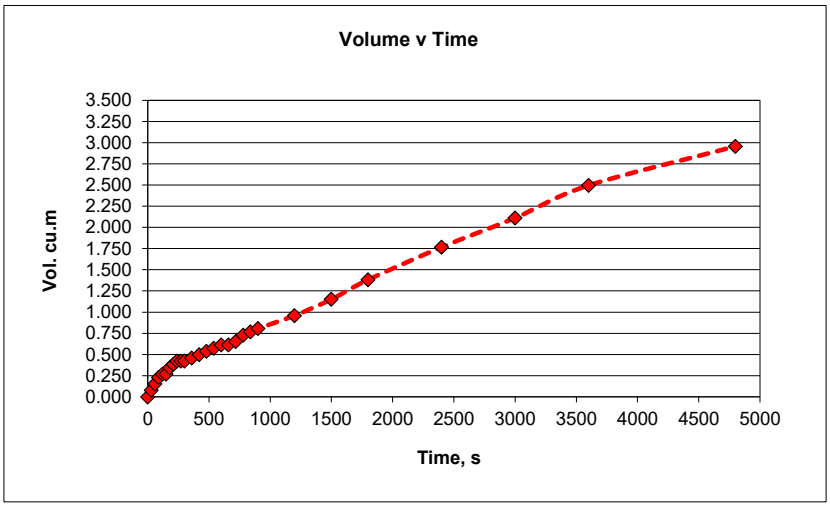
P16185 **N6 GCTP**

Test 3 **SW3/05** **30/11/2016**

				d, m	**0.9**
l, m	**2.4**	b, m	**1.6**	d_eff, m	**0.77**
l_base, m	**2.4**			d_act, m	**0.77**
l_eff, m	**2.4**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	0.13	0	0.77	0.00	0.000
0.5	0.15	30	0.75	0.02	0.077
1	0.17	60	0.73	0.04	0.154
1.5	0.19	90	0.71	0.06	0.230
2	0.2	120	0.70	0.07	0.269
2.5	0.2	150	0.70	0.07	0.269
3	0.22	180	0.68	0.09	0.346
3.5	0.23	210	0.67	0.10	0.384
4	0.24	240	0.66	0.11	0.422
4.5	0.24	270	0.66	0.11	0.422
5	0.24	300	0.66	0.11	0.422
6	0.25	360	0.65	0.12	0.461
7	0.26	420	0.64	0.13	0.499
8	0.27	480	0.63	0.14	0.538
9	0.28	540	0.62	0.15	0.576
10	0.29	600	0.61	0.16	0.614
11	0.29	660	0.61	0.16	0.614
12	0.3	720	0.60	0.17	0.653
13	0.32	780	0.58	0.19	0.730
14	0.33	840	0.57	0.20	0.768
15	0.34	900	0.56	0.21	0.806
20	0.38	1200	0.52	0.25	0.960
25	0.43	1500	0.47	0.30	1.152
30	0.49	1800	0.41	0.36	1.382
40	0.59	2400	0.31	0.46	1.766
50	0.68	3000	0.22	0.55	2.112
60	0.78	3600	0.12	0.65	2.496
80	0.90	4800	0.00	0.77	2.957

Area	3.84	m^2			
50% Area_eff, a_{p50}	6.92	m^2	$V_{p75\text{-}25\ theory}$ volume	1.4784	m^3
50% Area_act, a_{p50}	6.92	m^2	$V_{p\ 75\ -\ 25\ actual}$ volume	1.4784	m^3
			$t_{p\ 75\text{-}\ 25\ actual}$ time	2280.00	s
			Infiltration Coefficient *f*	9.37025E-05	ms^-1



NOTES:

See SW3/05 log for detailed soil strata details: slightly gravelly sandy SILT

Third test pit assumed saturated.

Infiltration rate calculated over actual fall.

Photographic Record

Number: SW03-05	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

Photographic Record

Number: SW03-05	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

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Trial Pit No
SW03-06
Sheet 1 of 1

Project Name: N6 GCTP Phase 3	**Project No.** P16185	**Co-ords:** 534038.37 - 727783.11 **Level:** 48.56	**Date** 05/12/2016
Location: Galway City, Co. Galway		**Dimensions (m):** 2.50 x 1.20 **Depth:** 1.50	**Scale** 1:25
Client: Arup			**Logged** DMC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							Topsoil.
				0.40	48.16		Soft, brown, slightly sandy slightly gravelly SILT.
				0.80	47.76		Light grey, slightly sandy gravelly SILT.
				1.50	47.06		End of Pit at 1.50m

Stability: Moderate.
Plant: 14T track machine.
Backfill: Arisings.

Groundwater: None encountered.

Remarks: Soakaway pit terminated at required depth of 1.50m bgl.

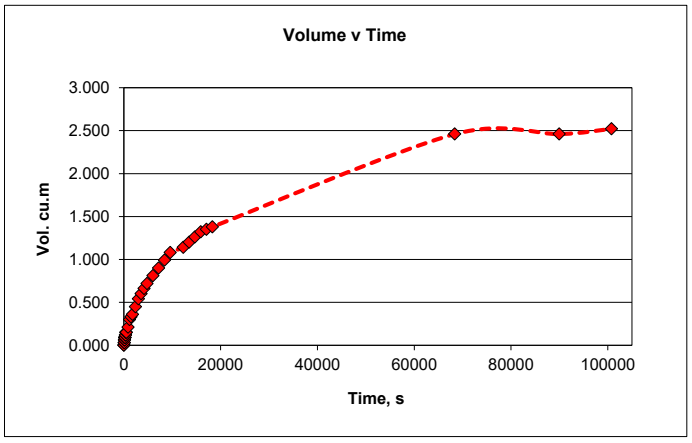
P16185 **N6 GCTP**

Test 3 **SW3/06** **05/12/2016**

				d, m	**1.5**
l, m	**2.5**	b, m	**1.2**	d_eff, m	**1.42**
l_base, m	**2.5**			d_act, m	**0.84**
l_eff, m	**2.5**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	0.08	0	1.42	0.00	0.000
0.5	0.08	30	1.42	0.00	0.000
1	0.09	60	1.41	0.01	0.030
1.5	0.09	90	1.41	0.01	0.030
2	0.1	120	1.40	0.02	0.060
2.5	0.1	150	1.40	0.02	0.060
3	0.11	180	1.39	0.03	0.090
3.5	0.11	210	1.39	0.03	0.090
4	0.11	240	1.39	0.03	0.090
4.5	0.11	270	1.39	0.03	0.090
5	0.12	300	1.38	0.04	0.120
6	0.12	360	1.38	0.04	0.120
7	0.13	420	1.37	0.05	0.150
8	0.13	480	1.37	0.05	0.150
9	0.13	540	1.37	0.05	0.150
15	0.15	900	1.35	0.07	0.210
20	0.18	1200	1.32	0.10	0.300
25	0.19	1500	1.31	0.11	0.330
30	0.20	1800	1.30	0.12	0.360
40	0.23	2400	1.27	0.15	0.450
50	0.26	3000	1.24	0.18	0.540
60	0.28	3600	1.22	0.20	0.600
70	0.30	4200	1.20	0.22	0.660
80	0.32	4800	1.18	0.24	0.720
100	0.35	6000	1.15	0.27	0.810
120	0.38	7200	1.12	0.30	0.900
140	0.41	8400	1.09	0.33	0.990
160	0.44	9600	1.06	0.36	1.080
205	0.46	12300	1.04	0.38	1.140
225	0.48	13500	1.02	0.40	1.200
245	0.50	14700	1.00	0.42	1.260
265	0.52	15900	0.98	0.44	1.320
285	0.53	17100	0.97	0.45	1.350
305	0.54	18300	0.96	0.46	1.380
1140	0.90	68400	0.60	0.82	2.460
1500	0.90	90000	0.60	0.82	2.460
1680	0.92	100800	0.58	0.84	2.520

Area	3	m^2			
50% Area_eff, a_{p50}	8.254	m^2	$V_{p75\text{-}25\ theory}$ volume	2.13	m^3
50% Area_act, a_{p50}	6.108	m^2	$V_{p\ 75\ -\ 25\ actual}$ volume	1.26	m^3
			$t_{p\ 75\text{-}25\ actual}$ time	38087.40	s
			Infiltration Coefficient *f*	5.42E-06	ms^-1



NOTES:

See SW3/06 log for detailed soil strata details: slightly sandy gravelly SILT

No groundwater was encountered, pit assumed unsaturated.

Infiltration rate calculated over actual fall.

Photographic Record

Number: SW03-06	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

Photographic Record

Number: SW03-06	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

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Trial Pit No
SW03-07
Sheet 1 of 1

Project Name: N6 GCTP Phase 3	**Project No.** P16185	**Co-ords:** 534619.39 - 726923.63 **Level:** 37.08	**Date** 29/11/2016
Location: Galway City, Co. Galway		**Dimensions (m):** 3.00 x 1.60 **Depth:** 1.10	**Scale** 1:25
Client: Arup			**Logged** VT

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				1.10	35.98		Firm, brown, slightly sandy slightly gravelly SILT with high cobble content, high boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-angular. Cobbles are 63mm to 200mm dia, angular to sub-angular, Limestone lithology. Boulders are 200mm to 500mm dia, angular to sub-angular, Limestone lithology.
							End of Pit at 1.10m

1
2
3
4
5

Stability: Moderate to good.
Plant: 12T track machine.
Backfill: Arisings.

Groundwater: None encountered.

Remarks: Soakaway pit terminated at 1.10m bgl on bedrock. Soakaway test carried out (BRE 365).

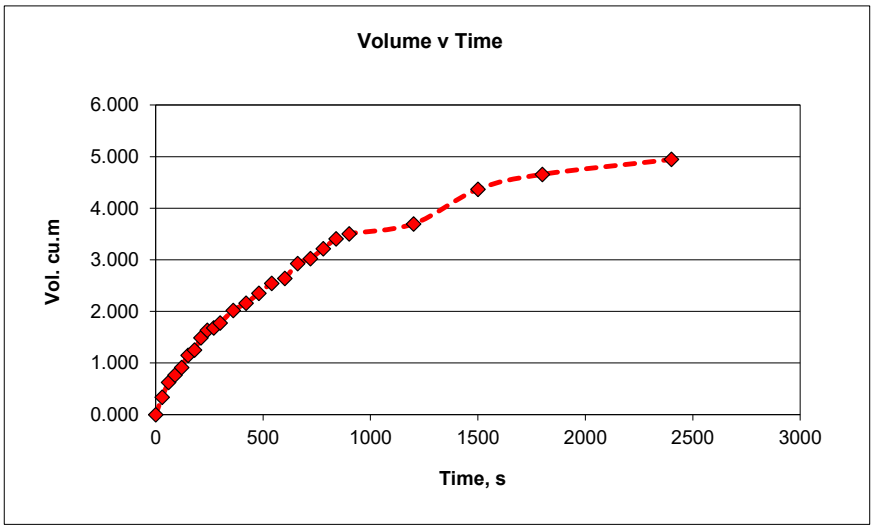
P16185 **N6 GCTP**

Test 1 **SW3/07** **29/11/2016**

				d, m	**1.1**
l, m	**3**	b, m	**1.6**	d_eff, m	**1.03**
l_base, m	**3**			d_act, m	**1.03**
l_eff, m	**3**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	0.07	0	1.03	0.00	0.000
0.5	0.14	30	0.96	0.07	0.336
1	0.2	60	0.90	0.13	0.624
1.5	0.23	90	0.87	0.16	0.768
2	0.26	120	0.84	0.19	0.912
2.5	0.31	150	0.79	0.24	1.152
3	0.33	180	0.77	0.26	1.248
3.5	0.38	210	0.72	0.31	1.488
4	0.41	240	0.69	0.34	1.632
4.5	0.42	270	0.68	0.35	1.680
5	0.44	300	0.66	0.37	1.776
6	0.49	360	0.61	0.42	2.016
7	0.52	420	0.58	0.45	2.160
8	0.56	480	0.54	0.49	2.352
9	0.6	540	0.50	0.53	2.544
10	0.62	600	0.48	0.55	2.640
11	0.68	660	0.42	0.61	2.928
12	0.7	720	0.40	0.63	3.024
13	0.74	780	0.36	0.67	3.216
14	0.78	840	0.32	0.71	3.408
15	0.8	900	0.30	0.73	3.504
20	0.84	1200	0.26	0.77	3.696
25	0.98	1500	0.12	0.91	4.368
30	1.04	1800	0.06	0.97	4.656
40	1.10	2400	0.00	1.03	4.944

Area	4.8	m^2			
50% Area_eff, a_{p50}	9.538	m^2	$V_{p75\text{-}25\ theory}$	volume	2.472 m^3
50% Area_act, a_{p50}	9.538	m^2	$V_{p\ 75\ -\ 25\ actual}$	volume	2.472 m^3
			$t_{p\ 75-\ 25\ actual}$	time	1029.00 s
			Infiltration Coefficient	*f*	0.0002519 ms^-1



NOTES:

See SW3/07 log for detailed soil strata details: slightly gravelly slightly sandy SILT

No groundwater was encountered, pit assumed unsaturated.

Infiltration rate calculated over actual fall.

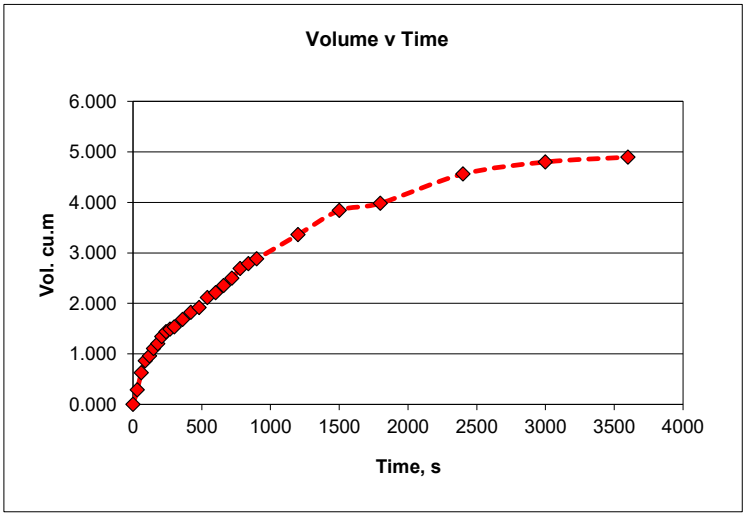
P16185 **N6 GCTP**

Test 2 **SW3/07** **29/11/2016**

				d, m	**1.1**
l, m	**3**	b, m	**1.6**	d_eff, m	**1.02**
l_base, m	**3**			d_act, m	**1.02**
l_eff, m	**3**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	0.08	0	1.02	0.00	0.000
0.5	0.14	30	0.96	0.06	0.288
1	0.21	60	0.89	0.13	0.624
1.5	0.26	90	0.84	0.18	0.864
2	0.28	120	0.82	0.20	0.960
2.5	0.31	150	0.79	0.23	1.104
3	0.33	180	0.77	0.25	1.200
3.5	0.36	210	0.74	0.28	1.344
4	0.38	240	0.72	0.30	1.440
4.5	0.39	270	0.71	0.31	1.488
5	0.4	300	0.70	0.32	1.536
6	0.43	360	0.67	0.35	1.680
7	0.46	420	0.64	0.38	1.824
8	0.48	480	0.62	0.40	1.920
9	0.52	540	0.58	0.44	2.112
10	0.54	600	0.56	0.46	2.208
11	0.57	660	0.53	0.49	2.352
12	0.6	720	0.50	0.52	2.496
13	0.64	780	0.46	0.56	2.688
14	0.66	840	0.44	0.58	2.784
15	0.68	900	0.42	0.60	2.880
20	0.78	1200	0.32	0.70	3.360
25	0.88	1500	0.22	0.80	3.840
30	0.91	1800	0.19	0.83	3.984
40	1.03	2400	0.07	0.95	4.560
50	1.08	3000	0.02	1.00	4.800
60	1.10	3600	0.00	1.02	4.896

Area	4.8	m^2			
50% Area_eff, a	9.492	m^2	$V_{p75\text{-}25\ theory}$ volume	2.448	m^3
50% Area_act, a	9.492	m^2	$V_{p\ 75\ -\ 25\ actu}$ volume	2.448	m^3
			$t_{p\ 75\text{-}25\ actual}$ time	1211.00	s
			Infiltration Coefficient *f*	0.000213	ms^-1



NOTES:

See SW3/07 log for detailed soil strata details: slightly gravelly slightly sandy SILT

No groundwater was encountered, pit assumed saturated on second test.

Infiltration rate calculated over actual fall.

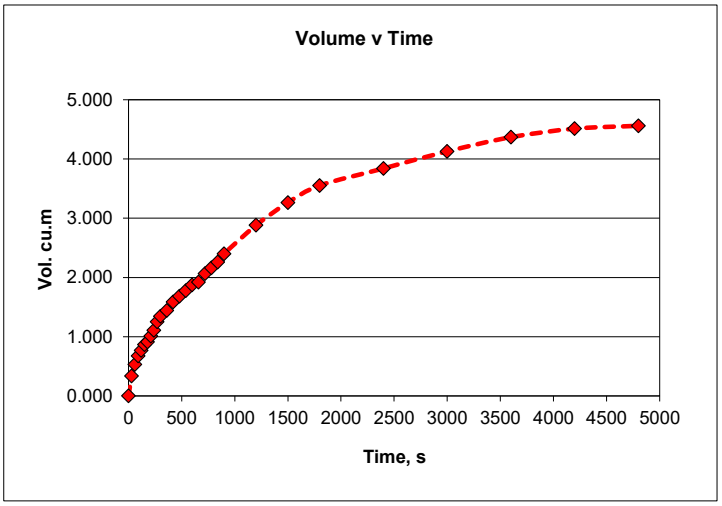
P16185 **N6 GCTP**

Test 3 **SW3/07** **29/11/2016**

				d, m	**1.1**
l, m	**3**	b, m	**1.6**	d_eff, m	**0.95**
l_base, m	**3**			d_act, m	**0.95**
l_eff, m	**3**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	0.15	0	0.95	0.00	0.000
0.5	0.22	30	0.88	0.07	0.336
1	0.26	60	0.84	0.11	0.528
1.5	0.29	90	0.81	0.14	0.672
2	0.31	120	0.79	0.16	0.768
2.5	0.33	150	0.77	0.18	0.864
3	0.34	180	0.76	0.19	0.912
3.5	0.36	210	0.74	0.21	1.008
4	0.38	240	0.72	0.23	1.104
4.5	0.41	270	0.69	0.26	1.248
5	0.43	300	0.67	0.28	1.344
6	0.45	360	0.65	0.30	1.440
7	0.48	420	0.62	0.33	1.584
8	0.5	480	0.60	0.35	1.680
9	0.52	540	0.58	0.37	1.776
10	0.54	600	0.56	0.39	1.872
11	0.55	660	0.55	0.40	1.920
12	0.58	720	0.52	0.43	2.064
13	0.6	780	0.50	0.45	2.160
14	0.62	840	0.48	0.47	2.256
15	0.65	900	0.45	0.50	2.400
20	0.75	1200	0.35	0.60	2.880
25	0.83	1500	0.27	0.68	3.264
30	0.89	1800	0.21	0.74	3.552
40	0.95	2400	0.15	0.80	3.840
50	1.01	3000	0.09	0.86	4.128
60	1.06	3600	0.04	0.91	4.368
70	1.09	4200	0.01	0.94	4.512
80	1.10	4800	0.00	0.95	4.560

Area	4.8	m^2			
50% Area_eff, a_{p50}	9.17	m^2	$V_{p75\text{-}25\ theory}$ volume	2.28	m^3
50% Area_act, a_{p50}	9.17	m^2	$V_{p\ 75\ -\ 25\ actual}$ volume	2.28	m^3
			$t_{p\ 75\text{-}\ 25\ actual}$ time	1492.00	s
			Infiltration Coefficient *f*	0.000167	ms^-1



NOTES:

See SW3/07 log for detailed soil strata details: slightly gravelly slightly sandy SILT

No groundwater was encountered, pit assumed saturated on third test.

Infiltration rate calculated over actual fall.

Photographic Record

Number: SW03-07	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

Photographic Record

Number: SW03-07	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

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Trial Pit No
SW03-08
Sheet 1 of 1

Project Name: N6 GCTP Phase 3	**Project No.** P16185	**Co-ords:** 534660.70 - 726868.16 **Level:** 34.45	**Date** 29/11/2016
Location: Galway City, Co. Galway		**Dimensions (m):** 3.20 × 1.50 **Depth:** 1.60	**Scale** 1:25
Client: Arup			**Logged** VT

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.35	34.10		Topsoil. Soft to firm, brown, slightly sandy slightly gravelly SILT with high cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-rounded. Cobbles are 63mm to 200mm dia, angular to sub-rounded, Limestone lithology.
				1.60	32.85		Firm, brown grey, slightly gravelly sandy SILT with high cobble content, high boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-rounded. Cobbles are 63mm to 200mm dia, angular to sub-angular. Boulders are 200mm to 500mm dia, angular to sub-angular, LImestone lithology.
							End of Pit at 1.60m

Stability: Good to moderate.
Plant: 12T track machine.
Backfill: Arisings.

Groundwater: None encountered.

Remarks: Soakaway pit terminated at 1.60m bgl on bedrock. Soakaway test carried out (BRE 365).

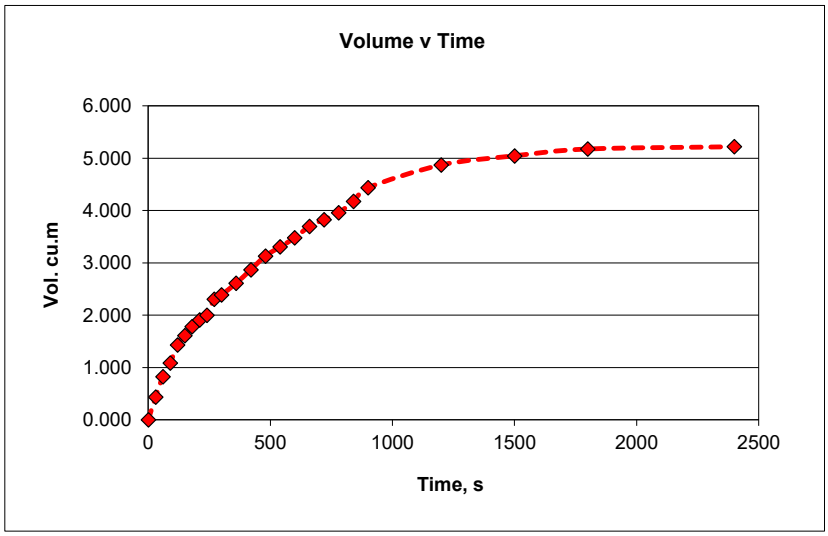
P16185 **N6 GCTP**

Test 1 **SW3/08** **29/01/2016**

				d, m	**1.65**
l, m	**2.9**	b, m	**1.5**	d_eff, m	**1.20**
l_base, m	**2.9**			d_act, m	**1.20**
l_eff, m	**2.9**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	0.45	0	1.20	0.00	0.000
0.5	0.55	30	1.10	0.10	0.435
1	0.64	60	1.01	0.19	0.827
1.5	0.7	90	0.95	0.25	1.088
2	0.78	120	0.87	0.33	1.436
2.5	0.82	150	0.83	0.37	1.610
3	0.86	180	0.79	0.41	1.784
3.5	0.89	210	0.76	0.44	1.914
4	0.91	240	0.74	0.46	2.001
4.5	0.98	270	0.67	0.53	2.306
5	1	300	0.65	0.55	2.393
6	1.05	360	0.60	0.60	2.610
7	1.11	420	0.54	0.66	2.871
8	1.17	480	0.48	0.72	3.132
9	1.21	540	0.44	0.76	3.306
10	1.25	600	0.40	0.80	3.480
11	1.3	660	0.35	0.85	3.698
12	1.33	720	0.32	0.88	3.828
13	1.36	780	0.29	0.91	3.959
14	1.41	840	0.24	0.96	4.176
15	1.47	900	0.18	1.02	4.437
20	1.57	1200	0.08	1.12	4.872
25	1.61	1500	0.04	1.16	5.046
30	1.64	1800	0.01	1.19	5.177
40	1.65	2400	0.00	1.20	5.220

Area	4.35 m^2				
50% Area_eff, a_{p50}	9.63 m^2	$V_{p75\text{-}25\ theory}$	volume	2.61	m^3
50% Area_act, a_{p50}	9.63 m^2	$V_{p\ 75\ -\ 25\ actual}$	volume	2.61	m^3
		$t_{p\ 75\text{-}25\ actual}$	time	651.00	s
		Infiltration Coefficient	*f*	0.0004163	ms^-1



NOTES:

See SW3/08 log for detailed soil strata details: slightly gravelly sandy SILT

No groundwater was encountered, pit assumed unsaturated.

Infiltration rate calculated over actual fall.

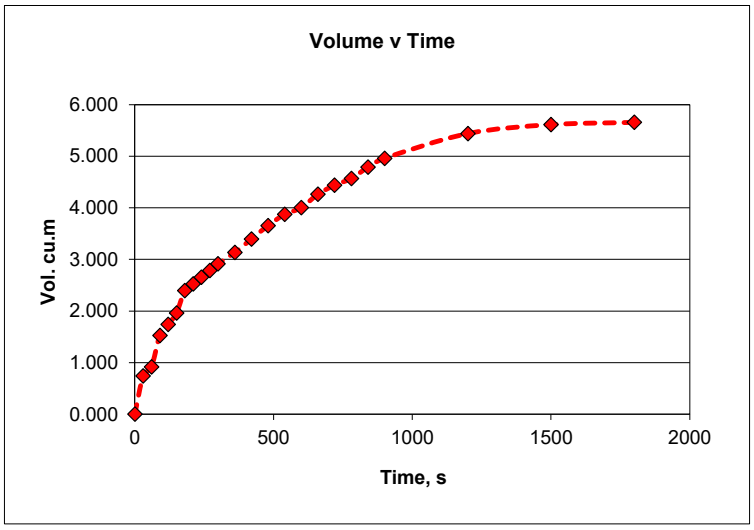
P16185 **N6 GCTP**

Test 2 **SW3/08** **29/01/2016**

				d, m	**1.65**
l, m	**2.9**	b, m	**1.5**	d_eff, m	**1.30**
l_base, m	**2.9**			d_act, m	**1.30**
l_eff, m	**2.9**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	0.35	0	1.30	0.00	0.000
0.5	0.52	30	1.13	0.17	0.740
1	0.56	60	1.09	0.21	0.914
1.5	0.7	90	0.95	0.35	1.523
2	0.75	120	0.90	0.40	1.740
2.5	0.8	150	0.85	0.45	1.958
3	0.9	180	0.75	0.55	2.393
3.5	0.93	210	0.72	0.58	2.523
4	0.96	240	0.69	0.61	2.654
4.5	0.99	270	0.66	0.64	2.784
5	1.02	300	0.63	0.67	2.915
6	1.07	360	0.58	0.72	3.132
7	1.13	420	0.52	0.78	3.393
8	1.19	480	0.46	0.84	3.654
9	1.24	540	0.41	0.89	3.872
10	1.27	600	0.38	0.92	4.002
11	1.33	660	0.32	0.98	4.263
12	1.37	720	0.28	1.02	4.437
13	1.4	780	0.25	1.05	4.568
14	1.45	840	0.20	1.10	4.785
15	1.49	900	0.16	1.14	4.959
20	1.6	1200	0.05	1.25	5.438
25	1.64	1500	0.01	1.29	5.612
30	1.65	1800	0.00	1.30	5.655
40	1.65	2400	0.00	1.30	5.655

Area	4.35	m^2			
50% Area_eff, a_{p50}	10.07	m^2	$V_{p75\text{-}25\ theory}$ volume	2.8275	m^3
50% Area_act, a_{p50}	10.07	m^2	$V_{p\ 75\ -\ 25\ actu}$ volume	2.8275	m^3
			$t_{p\ 75\text{-}25\ actual}$ time	571.00	s
			Infiltration Coefficient *f*	0.000492	ms^-1



NOTES:

See SW3/08 log for detailed soil strata details: slightly gravelly sandy SILT

No groundwater was encountered, pit assumed saturated for second test.

Infiltration rate calculated over actual fall.

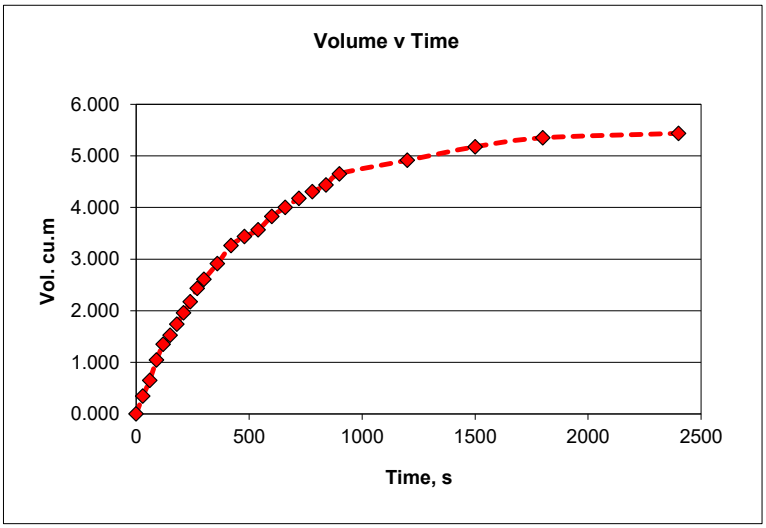
P16185 **N6 GCTP**

Test 2 **SW3/08** **29/01/2016**

				d, m	**1.65**
l, m	**2.9**	b, m	**1.5**	d_eff, m	**1.25**
l_base, m	**2.9**			d_act, m	**1.25**
l_eff, m	**2.9**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	0.4	0	1.25	0.00	0.000
0.5	0.48	30	1.17	0.08	0.348
1	0.55	60	1.10	0.15	0.653
1.5	0.64	90	1.01	0.24	1.044
2	0.71	120	0.94	0.31	1.349
2.5	0.75	150	0.90	0.35	1.523
3	0.8	180	0.85	0.40	1.740
3.5	0.85	210	0.80	0.45	1.958
4	0.9	240	0.75	0.50	2.175
4.5	0.96	270	0.69	0.56	2.436
5	1	300	0.65	0.60	2.610
6	1.07	360	0.58	0.67	2.915
7	1.15	420	0.50	0.75	3.263
8	1.19	480	0.46	0.79	3.437
9	1.22	540	0.43	0.82	3.567
10	1.28	600	0.37	0.88	3.828
11	1.32	660	0.33	0.92	4.002
12	1.36	720	0.29	0.96	4.176
13	1.39	780	0.26	0.99	4.307
14	1.42	840	0.23	1.02	4.437
15	1.47	900	0.18	1.07	4.655
20	1.53	1200	0.12	1.13	4.916
25	1.59	1500	0.06	1.19	5.177
30	1.63	1800	0.02	1.23	5.351
40	1.65	2400	0.00	1.25	5.438

Area	4.35 m^2			
50% Area_eff, a_{p50}	9.85 m^2	$V_{p75\text{-}25\ theory}$ volume	2.71875	m^3
50% Area_act, a_{p5}	9.85 m^2	$V_{p\ 75\ -\ 25\ actu}$ volume	2.71875	m^3
		$t_{p\ 75\text{-}25\ actual}$ time	623.00	s
		Infiltration Coefficient *f*	0.000443	ms^-1



NOTES:

See SW3/08 log for detailed soil strata details: slightly gravelly sandy SILT

No groundwater was encountered, pit assumed saturated on third test.

Infiltration rate calculated over actual fall.

Photographic Record

Number: SW03-08	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

Photographic Record

Number: SW03-08	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

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Trial Pit No
SW03-09
Sheet 1 of 1

Project Name: N6 GCTP Phase 3	**Project No.** P16185	**Co-ords:** - **Level:**	**Date** 29/11/2016
Location: Galway City, Co. Galway	**Dimensions (m):** 2.80 × 1.55		**Scale** 1:25
Client: Arup	**Depth:** 0.80		**Logged** VT

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.20			Topsoil. Firm, brown, slightly sandy SILT.
				0.80			Soft to firm, brown grey, slightly gravelly very sandy SILT with high cobble content, medium boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-rounded. Cobbles are 63mm to 200mm dia, angular to sub-rounded, Limestone lithology. Boulders are 200mm to 400mm dia, angular to sub-rounded, Limestone lithology.
							End of Pit at 0.80m

Stability: Good.
Plant: 12T track machine.
Backfill: Arisings.

Groundwater: None encountered.

Remarks: Soakaway pit terminated at 0.80m bgl due to obstruction.

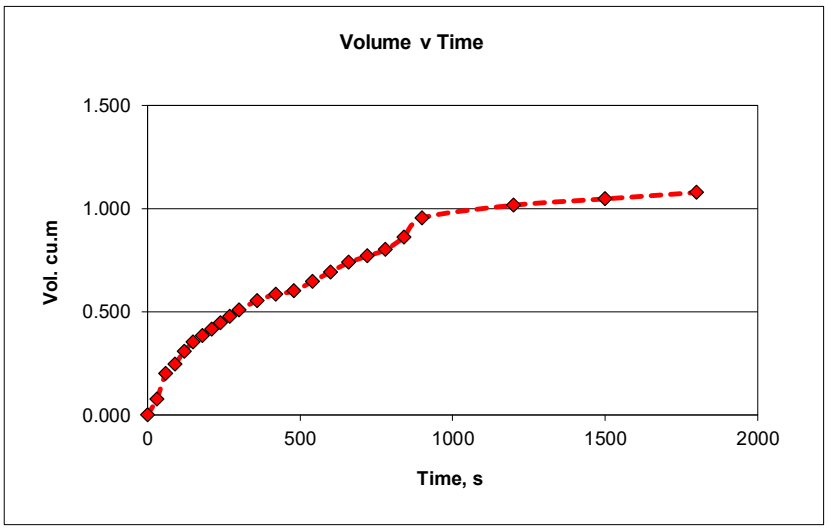
P16185 **N6 GCTP**

Test 1 **SW3/09** **30/11/2016**

				d, m	**0.8**
l, m	**2.8**	b, m	**0.55**	d_eff, m	**0.70**
l_base, m	**2.8**			d_act, m	**0.70**
l_eff, m	**2.8**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	0.1	0	0.70	0.00	0.000
0.5	0.15	30	0.65	0.05	0.077
1	0.23	60	0.57	0.13	0.200
1.5	0.26	90	0.54	0.16	0.246
2	0.3	120	0.50	0.20	0.308
2.5	0.33	150	0.47	0.23	0.354
3	0.35	180	0.45	0.25	0.385
3.5	0.37	210	0.43	0.27	0.416
4	0.39	240	0.41	0.29	0.447
4.5	0.41	270	0.39	0.31	0.477
5	0.43	300	0.37	0.33	0.508
6	0.46	360	0.34	0.36	0.554
7	0.48	420	0.32	0.38	0.585
8	0.49	480	0.31	0.39	0.601
9	0.52	540	0.28	0.42	0.647
10	0.55	600	0.25	0.45	0.693
11	0.58	660	0.22	0.48	0.739
12	0.6	720	0.20	0.50	0.770
13	0.62	780	0.18	0.52	0.801
14	0.66	840	0.14	0.56	0.862
15	0.72	900	0.08	0.62	0.955
20	0.76	1200	0.04	0.66	1.016
25	0.78	1500	0.02	0.68	1.047
30	0.80	1800	0.00	0.70	1.078

Area	1.54 m^2				
50% Area_eff, a_{p50}	3.885 m^2	$V_{p75\text{-}25\ theory}$	volume	0.539	m^3
50% Area_act, a_{p50}	3.885 m^2	$V_{p\ 75\ -\ 25\ actual}$	volume	0.539	m^3
		$t_{p\ 75\text{-}\ 25\ actual}$	time	690.00	s
		Infiltration Coefficient	*f*	0.0002011	ms^-1



NOTES:

See SW3/09 log for detailed soil strata details: slightly gravelly slightly sandy SILT

No groundwater was encountered, pit assumed unsaturated.

Infiltration rate calculated over actual fall.

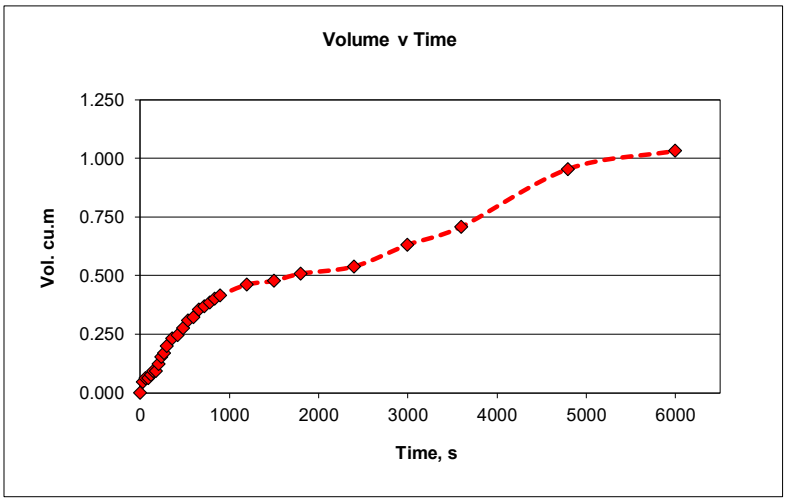
P16185 **N6 GCTP**

Test 2 **SW3/09** **30/11/2016**

				d, m	**0.8**
l, m	**2.8**	b, m	**0.55**	d_eff, m	**0.67**
l_base, m	**2.8**			d_act, m	**0.67**
l_eff, m	**2.8**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	0.13	0	0.67	0.00	0.000
0.5	0.16	30	0.64	0.03	0.046
1	0.17	60	0.63	0.04	0.062
1.5	0.17	90	0.63	0.04	0.062
2	0.18	120	0.62	0.05	0.077
2.5	0.19	150	0.61	0.06	0.092
3	0.19	180	0.61	0.06	0.092
3.5	0.21	210	0.59	0.08	0.123
4	0.23	240	0.57	0.10	0.154
4.5	0.24	270	0.56	0.11	0.169
5	0.26	300	0.54	0.13	0.200
6	0.28	360	0.52	0.15	0.231
7	0.29	420	0.51	0.16	0.246
8	0.31	480	0.49	0.18	0.277
9	0.33	540	0.47	0.20	0.308
10	0.34	600	0.46	0.21	0.323
11	0.36	660	0.44	0.23	0.354
12	0.37	720	0.43	0.24	0.370
13	0.38	780	0.42	0.25	0.385
14	0.39	840	0.41	0.26	0.400
15	0.4	900	0.40	0.27	0.416
20	0.43	1200	0.37	0.30	0.462
25	0.44	1500	0.36	0.31	0.477
30	0.46	1800	0.34	0.33	0.508
40	0.48	2400	0.32	0.35	0.539
50	0.54	3000	0.26	0.41	0.631
60	0.59	3600	0.21	0.46	0.708
80	0.75	4800	0.05	0.62	0.955
100	0.8	6000	0.00	0.67	1.032

Area	1.54	m^2			
50% Area_	3.7845	m^2	$V_{p75\text{-}25\ theory}$	volume	0.5159 m^3
50% Area_	3.7845	m^2	$V_{p\ 75\ -\ 25\ actu}$	volume	0.5159 m^3
			$t_{p\ 75\text{-}\ 25\ actual}$	time	3667.00 s
			Infiltration Coefficient	*f*	3.71746E-05 ms^-1



NOTES:

See SW3/09 log for detailed soil strata details: slightly gravelly sandy SILT

No groundwater was encountered, pit assumed saturated for second test.

Infiltration rate calculated over actual fall.

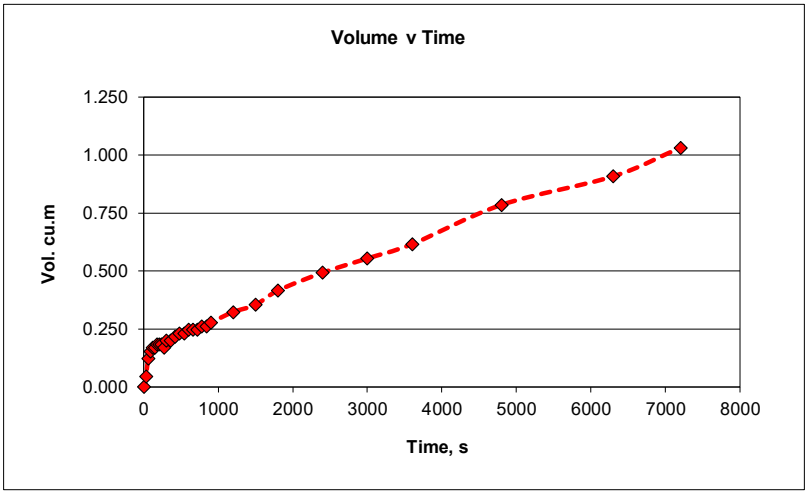
P16185 **N6 GCTP**

Test 3 **SW3/09** **30/11/2016**

				d, m	**0.8**
l, m	**2.8**	b, m	**0.55**	d_eff, m	**0.67**
l_base, m	**2.8**			d_act, m	**0.67**
l_eff, m	**2.8**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	0.13	0	0.67	0.00	0.000
0.5	0.16	30	0.64	0.03	0.046
1	0.21	60	0.59	0.08	0.123
1.5	0.23	90	0.57	0.10	0.154
2	0.24	120	0.56	0.11	0.169
2.5	0.24	150	0.56	0.11	0.169
3	0.25	180	0.55	0.12	0.185
3.5	0.25	210	0.55	0.12	0.185
4	0.25	240	0.55	0.12	0.185
4.5	0.24	270	0.56	0.11	0.169
5	0.26	300	0.54	0.13	0.200
6	0.26	360	0.54	0.13	0.200
7	0.27	420	0.53	0.14	0.216
8	0.28	480	0.52	0.15	0.231
9	0.28	540	0.52	0.15	0.231
10	0.29	600	0.51	0.16	0.246
11	0.29	660	0.51	0.16	0.246
12	0.29	720	0.51	0.16	0.246
13	0.3	780	0.50	0.17	0.262
14	0.3	840	0.50	0.17	0.262
15	0.31	900	0.49	0.18	0.277
20	0.34	1200	0.46	0.21	0.323
25	0.36	1500	0.44	0.23	0.354
30	0.4	1800	0.40	0.27	0.416
40	0.45	2400	0.35	0.32	0.493
50	0.49	3000	0.31	0.36	0.554
60	0.53	3600	0.27	0.40	0.616
80	0.64	4800	0.16	0.51	0.785
105	0.72	6300	0.08	0.59	0.909
120	0.80	7200	0.00	0.67	1.032

Area	1.54	m^2			
50% Area_eff, a_{p50}	3.7845	m^2	$V_{p75\text{-}25\ theory}$	volume	0.5159 m^3
50% Area_act, a_{p50}	3.7845	m^2	$V_{p\ 75\ -\ 25\ actua}$	volume	0.5159 m^3
			$t_{p\ 75\text{-}\ 25\ actual}$	time	3947.00 s
			Infiltration Coefficient	*f*	3.45374E-05 ms^-1



NOTES:

See SW3/09 log for detailed soil strata details: slightly gravelly sandy SILT

No groundwater was encountered, pit assumed saturated for third test.

Infiltration rate calculated over actual fall.

Photographic Record

Number: SW03-09	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

Photographic Record

Number: SW03-09	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

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Trial Pit No
SW03-10
Sheet 1 of 1

Project Name: N6 GCTP Phase 3	**Project No.** P16185	**Co-ords:** 535336.71 - 726865.32 **Level:** 39.57	**Date** 02/12/2016
Location: Galway City, Co. Galway	**Dimensions (m):** 1.90 × 1.50		**Scale** 1:25
Client: Arup	**Depth:** 0.70		**Logged** DMC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							Topsoil. Soft, brown, slightly gravelly SILT.
	0.30 - 0.50	B		0.30	39.27		Firm, grey, gravelly SILT with high cobble content. Cobbles are 63mm to 200mm dia, sub-angular to rounded, Limestone lithology.
				0.50	39.07		Weathered rock. Recovered as: BOULDERS. Boulders are 200mm to 400mm dia, angular, Limestone lithology.
				0.70	38.87		End of Pit at 0.70m

Stability: Moderate.
Plant: 14T track machine.
Backfill: Arisings.

Groundwater: None encountered.

Remarks: Soakaway pit terminated at 0.70m bgl, on bedrock. Soakaway test carried out (BRE 365).

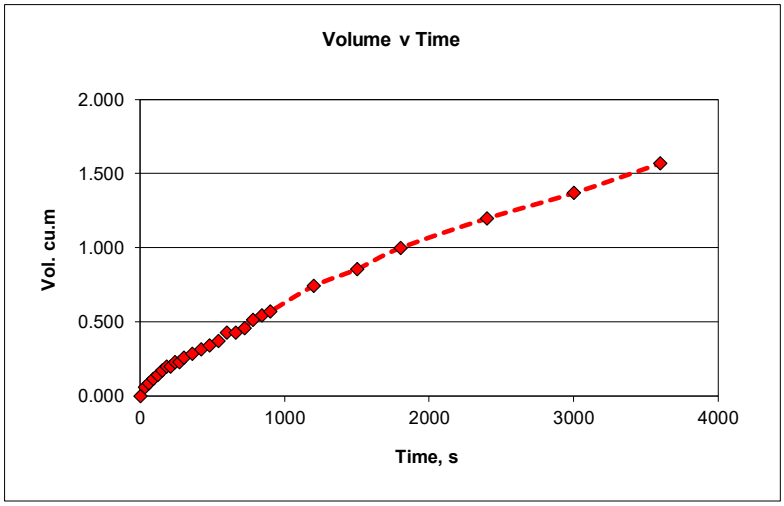
P16185 **N6 GCTP**

Test 1 **SW3/10** **02/12/2016**

				d, m	**0.7**
l, m	**1.9**	b, m	**1.5**	d_eff, m	**0.55**
l_base, m	**1.9**			d_act, m	**0.55**
l_eff, m	**1.9**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	0.15	0	0.55	0.00	0.000
0.5	0.17	30	0.53	0.02	0.057
1	0.18	60	0.52	0.03	0.085
1.5	0.19	90	0.51	0.04	0.114
2	0.2	120	0.50	0.05	0.143
2.5	0.21	150	0.49	0.06	0.171
3	0.22	180	0.48	0.07	0.200
3.5	0.22	210	0.48	0.07	0.200
4	0.23	240	0.47	0.08	0.228
4.5	0.23	270	0.47	0.08	0.228
5	0.24	300	0.46	0.09	0.257
6	0.25	360	0.45	0.10	0.285
7	0.26	420	0.44	0.11	0.314
8	0.27	480	0.43	0.12	0.342
9	0.28	540	0.42	0.13	0.371
10	0.3	600	0.40	0.15	0.428
11	0.3	660	0.40	0.15	0.428
12	0.31	720	0.39	0.16	0.456
13	0.33	780	0.37	0.18	0.513
14	0.34	840	0.36	0.19	0.542
15	0.35	900	0.35	0.20	0.570
20	0.41	1200	0.29	0.26	0.741
25	0.45	1500	0.25	0.30	0.855
30	0.50	1800	0.20	0.35	0.998
40	0.57	2400	0.13	0.42	1.197
50	0.63	3000	0.07	0.48	1.368
60	0.70	3600	0.00	0.55	1.568

Area	2.85 m^2				
50% Area_eff,	4.72 m^2	$V_{p75\text{-}25\ theory}$	volume	0.78375	m^3
50% Area_act,	4.72 m^2	$V_{p\ 75\ -\ 25\ actual}$	volume	0.78375	m^3
		$t_{p\ 75\text{-}\ 25\ actual}$	time	1759.00	s
		Infiltration Coefficient	*f*	9.44E-05	ms^-1



NOTES:

See SW3/10 log for detailed soil strata details: slightly sandy gravelly SILT

No groundwater was encountered, pit assumed unsaturated.

Infiltration rate calculated over actual fall.

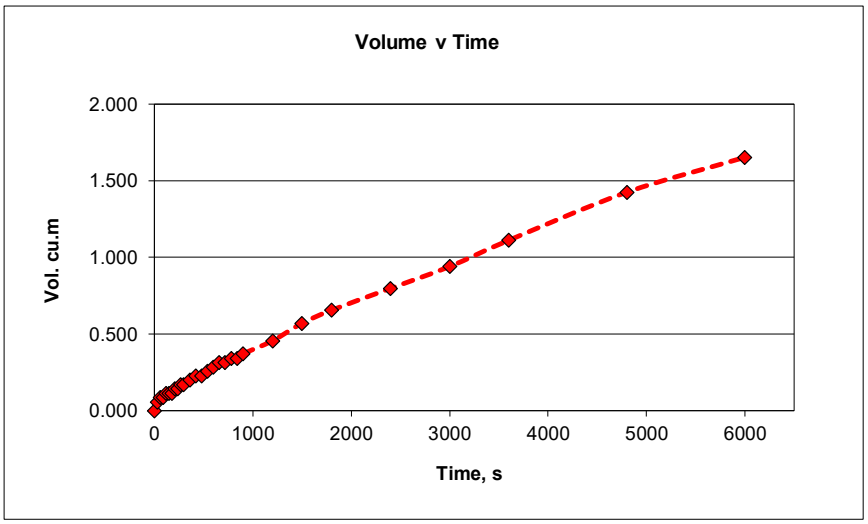
P16185 N6 GCTP

Test 2 **SW3/10** **02/12/2016**

				d, m	**0.7**
l, m	**1.9**	b, m	**1.5**	d_eff, m	**0.58**
l_base, m	**1.9**			d_act, m	**0.58**
l_eff, m	**1.9**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	0.12	0	0.58	0.00	0.000
0.5	0.14	30	0.56	0.02	0.057
1	0.15	60	0.55	0.03	0.086
1.5	0.15	90	0.55	0.03	0.086
2	0.16	120	0.54	0.04	0.114
2.5	0.16	150	0.54	0.04	0.114
3	0.16	180	0.54	0.04	0.114
3.5	0.17	210	0.53	0.05	0.143
4	0.17	240	0.53	0.05	0.143
4.5	0.18	270	0.52	0.06	0.171
5	0.18	300	0.52	0.06	0.171
6	0.19	360	0.51	0.07	0.200
7	0.2	420	0.50	0.08	0.228
8	0.2	480	0.50	0.08	0.228
9	0.21	540	0.49	0.09	0.257
10	0.22	600	0.48	0.10	0.285
11	0.23	660	0.47	0.11	0.314
12	0.23	720	0.47	0.11	0.314
13	0.24	780	0.46	0.12	0.342
14	0.24	840	0.46	0.12	0.342
15	0.25	900	0.45	0.13	0.371
20	0.28	1200	0.42	0.16	0.456
25	0.32	1500	0.38	0.20	0.570
30	0.35	1800	0.35	0.23	0.656
40	0.40	2400	0.30	0.28	0.798
50	0.45	3000	0.25	0.33	0.941
60	0.51	3600	0.19	0.39	1.112
80	0.62	4800	0.08	0.50	1.425
100	0.70	6000	0.00	0.58	1.653

Area	2.85	m^2			
50% Area_	4.822	m^2	$V_{p75\text{-}25\ theory}$ volume	0.8265	m^3
50% Area_	2.85	m^2	$V_{p\ 75\ -\ 25\ actu}$ volume	0.8265	m^3
			$t_{p\ 75\text{-}25\ actual}$ time	4464.00	s
			Infiltration Coefficient *f*	6.49642E-05	ms^-1



NOTES:

See SW3/10 log for detailed soil strata details: slightly sandy gravelly SILT

No groundwater was encountered, pit assumed unsaturated.

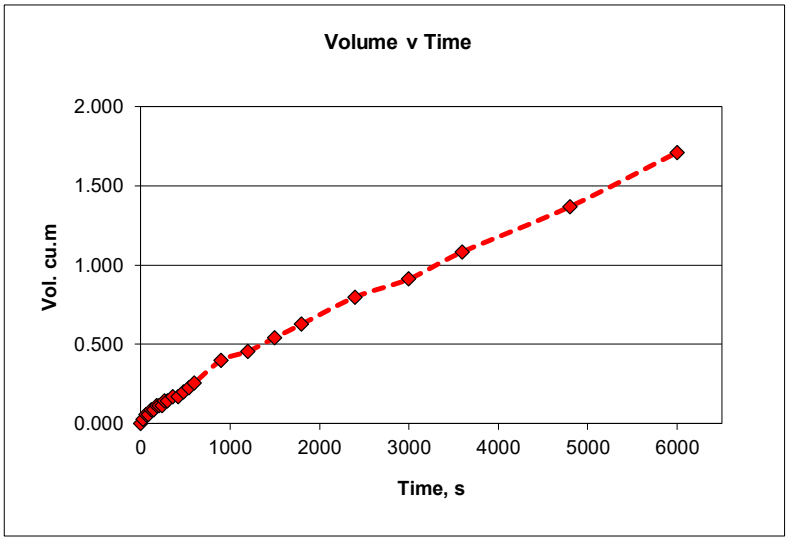
Infiltration rate calculated over actual fall.

P16185 **N6 GCTP**

Test 3		**SW3/10**			**02/12/2016**
				d, m	**0.7**
l, m	**1.9**	b, m	**1.5**	d_eff, m	**0.60**
l_base, m	**1.9**			d_act, m	**0.60**
l_eff, m	**1.9**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	0.1	0	0.60	0.00	0.000
0.5	0.11	30	0.59	0.01	0.029
1	0.12	60	0.58	0.02	0.057
1.5	0.12	90	0.58	0.02	0.057
2	0.13	120	0.57	0.03	0.086
2.5	0.13	150	0.57	0.03	0.086
3	0.14	180	0.56	0.04	0.114
3.5	0.14	210	0.56	0.04	0.114
4	0.14	240	0.56	0.04	0.114
4.5	0.15	270	0.55	0.05	0.143
5	0.15	300	0.55	0.05	0.143
6	0.16	360	0.54	0.06	0.171
7	0.16	420	0.54	0.06	0.171
8	0.17	480	0.53	0.07	0.200
9	0.18	540	0.52	0.08	0.228
10	0.19	600	0.51	0.09	0.257
15	0.24	900	0.46	0.14	0.399
20	0.26	1200	0.44	0.16	0.456
25	0.29	1500	0.41	0.19	0.542
30	0.32	1800	0.38	0.22	0.627
40	0.38	2400	0.32	0.28	0.798
50	0.42	3000	0.28	0.32	0.912
60	0.48	3600	0.22	0.38	1.083
80	0.58	4800	0.12	0.48	1.368
100	0.71	6000	-0.01	0.60	1.710

Area	2.85	m^2			
50% Area_	4.89	m^2	$V_{p75\text{-}25\ theory}$ volume	0.855	m^3
50% Area_	4.89	m^2	$V_{p\ 75\ -\ 25\ actu}$ volume	0.855	m^3
			$t_{p\ 75\text{-}\ 25\ actual}$ time	3090.00	s
			Infiltration Coefficient *f*	5.66E-05	ms^-1



NOTES:

See SW3/10 log for detailed soil strata details: slightly sandy gravelly SILT

No groundwater was encountered, pit assumed unsaturated.

Infiltration rate calculated over actual fall.

Photographic Record

Number: SW03-10	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

Photographic Record

Number: SW03-10	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

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Trial Pit No
SW03-11
Sheet 1 of 1

Project Name: N6 GCTP Phase 3	**Project No.** P16185	**Co-ords:** 535486.56 - 726929.33 **Level:** 37.68	**Date** 02/12/2016
Location: Galway City, Co. Galway		**Dimensions (m):** 1.60 x 1.30 **Depth:** 1.00	**Scale** 1:25
Client: Arup			**Logged** DMC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.30	37.38		Topsoil.
				0.70	36.98		Soft to firm, light grey, slightly sandy gravelly SILT with low cobble content. Sand is fine to coarse. Gravel is fine to coarse and sub-angular. Cobbles are sub-rounded to rounded, Limestone lithology.
				1.00	36.68		Weathered rock. Recovered as: BOULDERS. Boulders are angular, Limestone lithology.
							End of Pit at 1.00m

Stability: Good.
Plant: 14T track machine.
Backfill: Arisings.

Groundwater: None encountered.

Remarks: Soakaway pit terminated at 1.00m bgl, on bedrock. Soakaway test carried out (BRE 365).

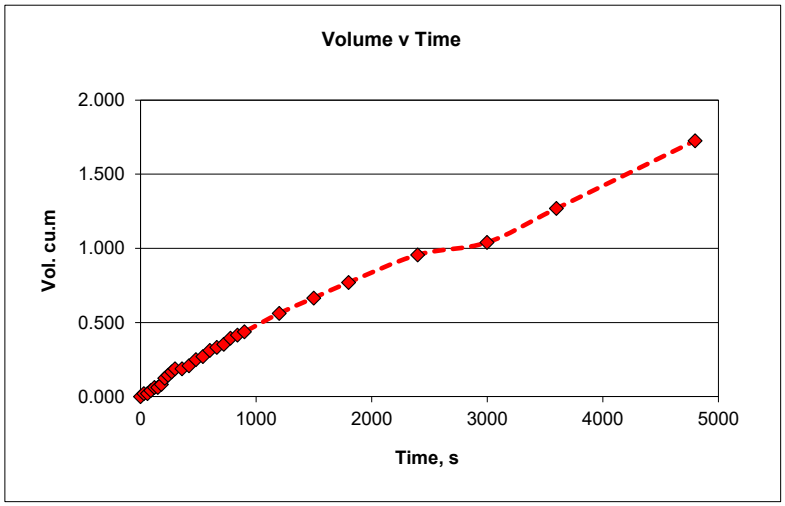
P16185 **N6 GCTP**

Test 1 **SW3/11** **########**

				d, m	**1**
l, m	**1.6**	b, m	**1.3**	d_eff, m	**0.90**
l_base, m	**1.6**			d_act, m	**0.83**
l_eff, m	**1.6**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	0.1	0	0.90	0.00	0.000
0.5	0.11	30	0.89	0.01	0.021
1	0.11	60	0.89	0.01	0.021
1.5	0.12	90	0.88	0.02	0.042
2	0.13	120	0.87	0.03	0.062
2.5	0.13	150	0.87	0.03	0.062
3	0.14	180	0.86	0.04	0.083
3.5	0.16	210	0.84	0.06	0.125
4	0.17	240	0.83	0.07	0.146
4.5	0.18	270	0.82	0.08	0.166
5	0.19	300	0.81	0.09	0.187
6	0.19	360	0.81	0.09	0.187
7	0.2	420	0.80	0.10	0.208
8	0.22	480	0.78	0.12	0.250
9	0.23	540	0.77	0.13	0.270
10	0.25	600	0.75	0.15	0.312
11	0.26	660	0.74	0.16	0.333
12	0.27	720	0.73	0.17	0.354
13	0.29	780	0.71	0.19	0.395
14	0.3	840	0.70	0.20	0.416
15	0.31	900	0.69	0.21	0.437
20	0.37	1200	0.63	0.27	0.562
25	0.42	1500	0.58	0.32	0.666
30	0.47	1800	0.53	0.37	0.770
40	0.56	2400	0.44	0.46	0.957
50	0.60	3000	0.40	0.50	1.040
60	0.71	3600	0.29	0.61	1.269
80	0.93	4800	0.07	0.83	1.726

Area	2.08 m^2				
50% Area_eff,	4.69 m^2	$V_{p75\text{-}25\ theory}$	volume	0.936	m^3
50% Area_act	4.487 m^2	$V_{p\ 75\ -\ 25\ actual}$	volume	0.8632	m^3
		$t_{p\ 75\text{-}25\ actual}$	time	2755.00	s
		Infiltration Coefficient	*f*	6.983E-05	ms^-1



NOTES:

See SW3/11 log for detailed soil strata details: slightly sandy gravelly SILT

No groundwater was encountered, pit assumed unsaturated.

Infiltration rate calculated over actual fall.

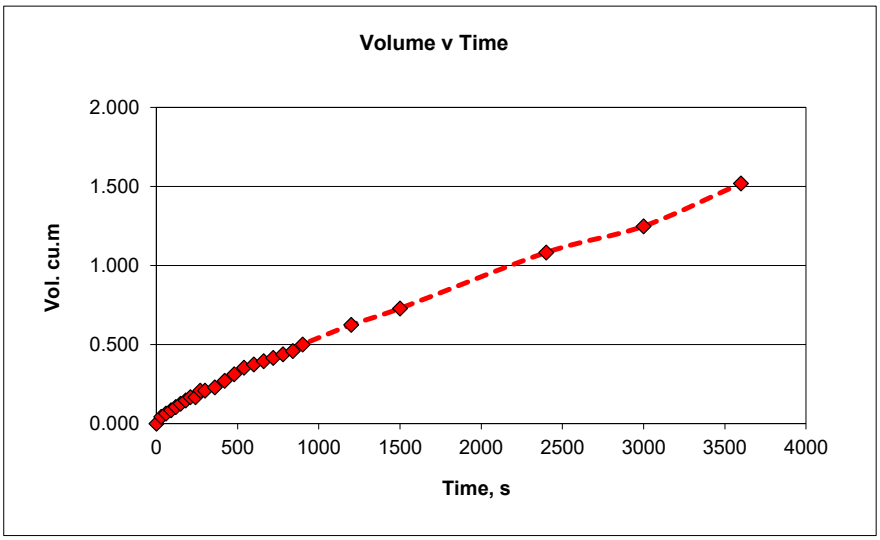
P16185 N6 GCTP

Test 2 **SW3/11** **02/12/2016**

				d, m	**1**
l, m	**1.6**	b, m	**1.3**	d_eff, m	**0.80**
l_base, m	**1.6**			d_act, m	**0.73**
l_eff, m	**1.6**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	0.2	0	0.80	0.00	0.000
0.5	0.22	30	0.78	0.02	0.042
1	0.23	60	0.77	0.03	0.062
1.5	0.24	90	0.76	0.04	0.083
2	0.25	120	0.75	0.05	0.104
2.5	0.26	150	0.74	0.06	0.125
3	0.27	180	0.73	0.07	0.146
3.5	0.28	210	0.72	0.08	0.166
4	0.28	240	0.72	0.08	0.166
4.5	0.3	270	0.70	0.10	0.208
5	0.3	300	0.70	0.10	0.208
6	0.31	360	0.69	0.11	0.229
7	0.33	420	0.67	0.13	0.270
8	0.35	480	0.65	0.15	0.312
9	0.37	540	0.63	0.17	0.354
10	0.38	600	0.62	0.18	0.374
11	0.39	660	0.61	0.19	0.395
12	0.4	720	0.60	0.20	0.416
13	0.41	780	0.59	0.21	0.437
14	0.42	840	0.58	0.22	0.458
15	0.44	900	0.56	0.24	0.499
20	0.5	1200	0.50	0.30	0.624
25	0.55	1500	0.45	0.35	0.728
40	0.72	2400	0.28	0.52	1.082
50	0.80	3000	0.20	0.60	1.248
60	0.93	3600	0.07	0.73	1.518

Area	2.08 m^2			
50% Area_	4.4 m^2	$V_{p75\text{-}25\ theory}$ volume	0.832	m^3
50% Area_	4.197 m^2	$V_{p\ 75\ -\ 25\ actu}$ volume	0.7592	m^3
		$t_{p\ 75\text{-}\ 25\ actual}$ time	1794.00	s
		Infiltration Coefficient *f*	0.000100831	ms^-1



NOTES:

See SW3/11 log for detailed soil strata details: slightly sandy gravelly SILT

No groundwater was encountered, pit assumed unsaturated.

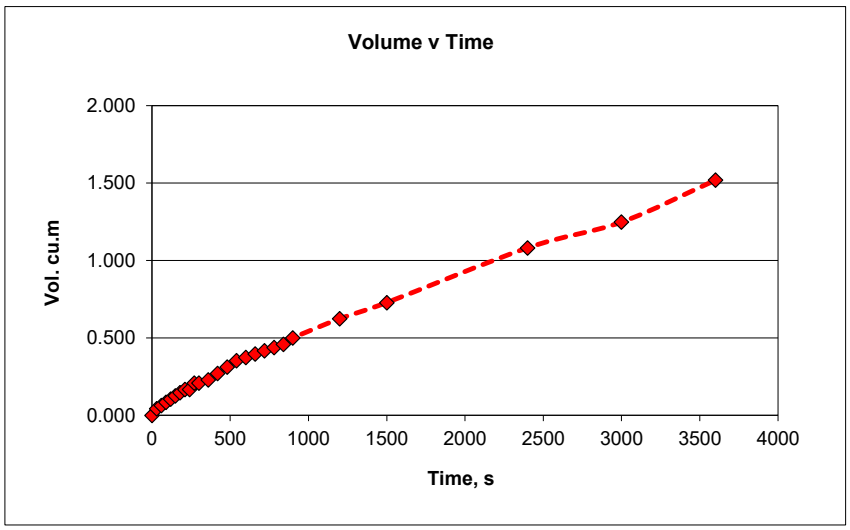
Infiltration rate calculated over actual fall.

P16185 N6 GCTP

Test 3		**SW3/11**			**02/12/2016**
				d, m	**1**
l, m	**1.6**	b, m	**1.3**	d_eff, m	**0.80**
l_base, m	**1.6**			d_act, m	**0.73**
l_eff, m	**1.6**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	0.2	0	0.80	0.00	0.000
0.5	0.22	30	0.78	0.02	0.042
1	0.23	60	0.77	0.03	0.062
1.5	0.24	90	0.76	0.04	0.083
2	0.25	120	0.75	0.05	0.104
2.5	0.26	150	0.74	0.06	0.125
3	0.27	180	0.73	0.07	0.146
3.5	0.28	210	0.72	0.08	0.166
4	0.28	240	0.72	0.08	0.166
4.5	0.3	270	0.70	0.10	0.208
5	0.3	300	0.70	0.10	0.208
6	0.31	360	0.69	0.11	0.229
7	0.33	420	0.67	0.13	0.270
8	0.35	480	0.65	0.15	0.312
9	0.37	540	0.63	0.17	0.354
10	0.38	600	0.62	0.18	0.374
11	0.39	660	0.61	0.19	0.395
12	0.4	720	0.60	0.20	0.416
13	0.41	780	0.59	0.21	0.437
14	0.42	840	0.58	0.22	0.458
15	0.44	900	0.56	0.24	0.499
20	0.5	1200	0.50	0.30	0.624
25	0.55	1500	0.45	0.35	0.728
40	0.72	2400	0.28	0.52	1.082
50	0.80	3000	0.20	0.60	1.248
60	0.93	3600	0.07	0.73	1.518

Area	2.08 m^2			
50% Area_	4.4 m^2	$V_{p75\text{-}25\ theory}$ volume	0.832	m^3
50% Area_	4.197 m^2	$V_{p\ 75\ -\ 25\ actu}$ volume	0.7592	m^3
		$t_{p\ 75\text{-}\ 25\ actual}$ time	2384.00	s
		Infiltration Coefficient *f*	7.58771E-05	ms^-1



NOTES:

See SW3/11 log for detailed soil strata details: slightly sandy gravelly SILT

No groundwater was encountered, pit assumed unsaturated.

Infiltration rate calculated over actual fall.

Photographic Record

Number: SW03-11	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

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Trial Pit No
SW03-12
Sheet 1 of 1

Project Name: N6 GCTP Phase 3	**Project No.** P16185	**Co-ords:** 532982.03 - 728221.91 **Level:** 30.50	**Date** 01/12/2016
Location: Galway City, Co. Galway		**Dimensions (m):** 1.90 × 1.30	**Scale** 1:25
Client: Arup		**Depth:** 3.50	**Logged** DMC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.40	30.10		Topsoil.
				0.80	29.70		Soft, brown, slightly gravelly CLAY. Gravel fine to coarse.
	1.00 - 2.00	B					Firm, grey, slightly sandy gravelly SILT with high cobble content. Sand is fine to coarse. Gravel is fine to coarse. Cobbles are sub-angular, Limestone lithology.
	2.00 - 3.00	B					*2.00 - 3.00m: Decreasing gravel content.*
				3.50	27.00		End of Pit at 3.50m

Stability: Good.
Plant: 14T track machine.
Backfill: Arisings.

Groundwater: None encounterted.

Remarks: Trial pit terminated at 3.50m bgl, on bedrock. Soakaway test carried out (BRE 365).

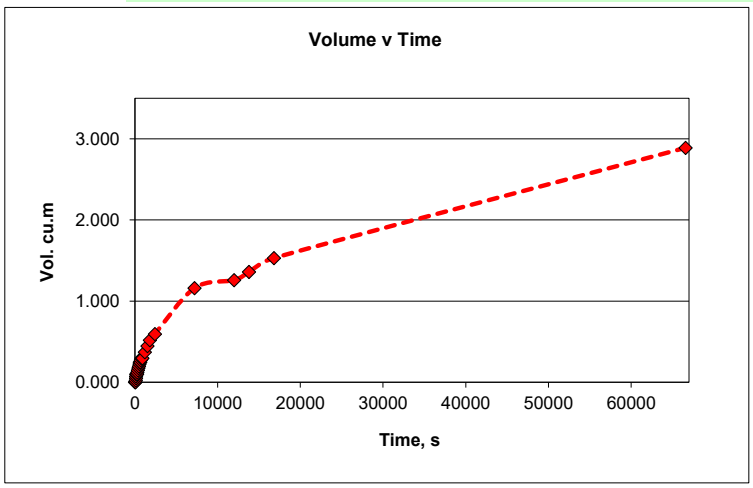
P16185 **N6 GCTP**

Test 1 **SW3/12** **01/12/2016**

				d, m	**3.5**
l, m	**1.9**	b, m	**1.3**	d_eff, m	**3.15**
l_base, m	**1.9**			d_act, m	**1.17**
l_eff, m	**1.9**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	0.35	0	3.15	0.00	0.000
0.5	0.35	30	3.15	0.00	0.000
1	0.35	60	3.15	0.00	0.000
1.5	0.36	90	3.14	0.01	0.025
2	0.37	120	3.13	0.02	0.049
2.5	0.38	150	3.12	0.03	0.074
3	0.39	180	3.11	0.04	0.099
3.5	0.39	210	3.11	0.04	0.099
4	0.39	240	3.11	0.04	0.099
4.5	0.39	270	3.11	0.04	0.099
5	0.4	300	3.10	0.05	0.124
6	0.41	360	3.09	0.06	0.148
7	0.42	420	3.08	0.07	0.173
8	0.43	480	3.07	0.08	0.198
9	0.44	540	3.06	0.09	0.222
10	0.45	600	3.05	0.10	0.247
11	0.45	660	3.05	0.10	0.247
12	0.46	720	3.04	0.11	0.272
13	0.47	780	3.03	0.12	0.296
14	0.47	840	3.03	0.12	0.296
15	0.47	900	3.03	0.12	0.296
20	0.5	1200	3.00	0.15	0.371
25	0.53	1500	2.97	0.18	0.445
30	0.56	1800	2.94	0.21	0.519
40	0.59	2400	2.91	0.24	0.593
120	0.82	7200	2.68	0.47	1.161
200	0.86	12000	2.64	0.51	1.260
230	0.90	13800	2.60	0.55	1.359
280	0.97	16800	2.53	0.62	1.531
1110	1.52	66600	1.98	1.17	2.890

Area	2.47 m^2				
50% Area_eff, a_{p50}	12.55 m^2	$V_{p75\text{-}25\ theory}$	volume	3.89025	m^3
50% Area_act, a_{p50}	6.214 m^2	$V_{p\ 75\ -\ 25\ actual}$	volume	1.44495	m^3
		$t_{p\ 75\text{-}25\ actual}$	time	36702.00	s
		Infiltration Coefficient	*f*	6.336E-06	ms^-1



NOTES:

See SW3/12 log for detailed soil strata details: slightly sandy gravelly SILT

No groundwater was encountered, pit assumed unsaturated.

Infiltration rate calculated over actual fall.

Photographic Record

Number: SW03-12	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

Photographic Record

Number: SW03-12	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

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Trial Pit No
SW03-13
Sheet 1 of 1

Project Name: N6 GCTP Phase 3	**Project No.** P16185	**Co-ords:** 533661.00 - 728105.09 **Level:** 56.48	**Date** 06/12/2016
Location: Galway City, Co. Galway		**Dimensions (m):** 2.30 x 1.20 **Depth:** 3.80	**Scale** 1:25
Client: Arup			**Logged** DMC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.00			Topsoil.
				0.60	55.88		Firm, grey, sandy gravelly SILT with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to rounded. Cobbles are angular to sub-rounded, Limestone lithology.
	1.50 - 2.50	B		1.20	55.28		Firm to stiff, slightly sandy gravelly SILT with high cobble content, low boulder content. Sand is fine to coarse. Cobbles are sub-rounded to rounded, Limestone lithology. Boulders are 200mm to 300mm dia, sub-rounded, Limestone lithology.
				3.80	52.68		End of Pit at 3.80m

Stability: Good.
Plant: 14T track machine.
Backfill: Arisings.

Groundwater: None encountered.

Remarks: Soakaway pit terminated at 3.80m bgl. Soakaway test carried out (BRE 365).

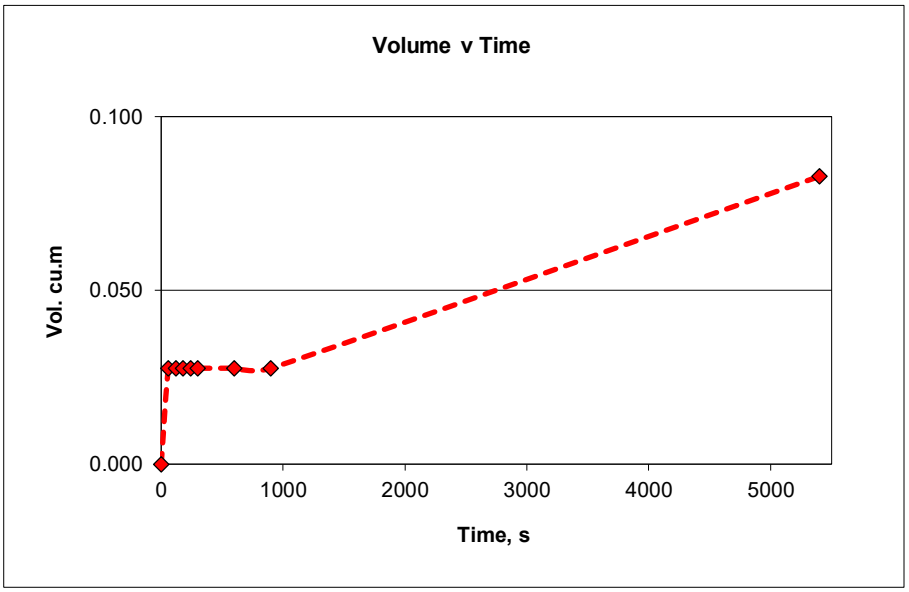
P16185 **N6 GCTP**

Test 1 **SW3/13** **06/12/2016**

				d, m	**3.8**
l, m	**2.3**	b, m	**1.2**	d_eff, m	**2.50**
l_base, m	**2.3**			d_act, m	**0.03**
l_eff, m	**2.3**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	1.3	0	2.50	0.00	0.000
1	1.31	60	2.49	0.01	0.028
2	1.31	120	2.49	0.01	0.028
3	1.31	180	2.49	0.01	0.028
4	1.31	240	2.49	0.01	0.028
5	1.31	300	2.49	0.01	0.028
10	1.31	600	2.49	0.01	0.028
15	1.31	900	2.49	0.01	0.028
90	1.33	5400	2.47	0.03	0.083

Area	2.76 m^2				
50% Area_eff, a_{p50}	11.51 m^2	$V_{p75\text{-}25\ theory}$	volume	3.45	m^3
50% Area_act, a_{p50}	2.865 m^2	$V_{p\ 75\ -\ 25\ actual}$	volume	0.0414	m^3
		$t_{p\ 75\text{-}\ 25\ actual}$	time	3600.00	s
		Infiltration Coefficient	*f*	4.014E-06	ms^-1



NOTES:

See SW3/13 log for detailed soil strata details: slightly sandy gravelly SILT

No groundwater was encountered, pit assumed unsaturated.

Infiltration rate calculated over actual fall.

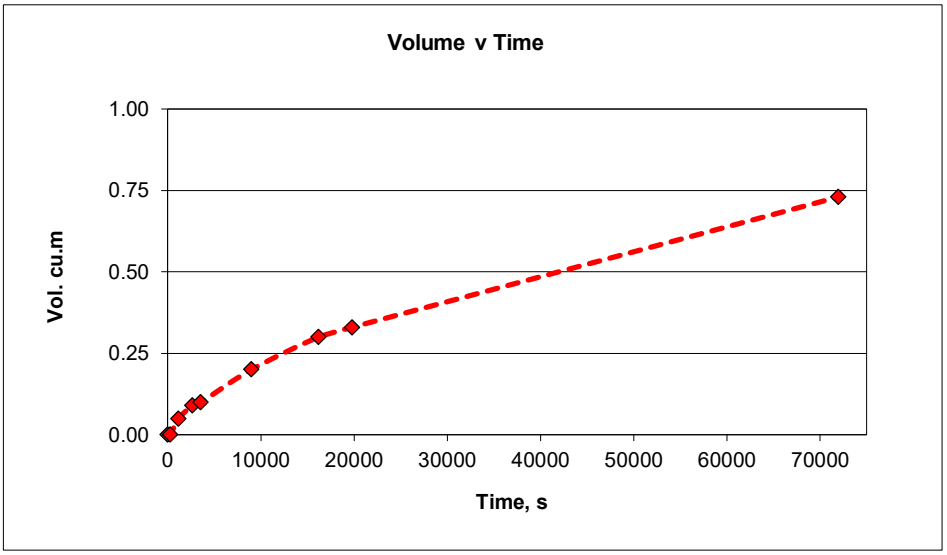
P16185 **N6 GCTP**

Test 2 **SW3/13** **06/12/2016**

				d, m	**3.8**
l, m	**2.3**	b, m	**1.2**	d_eff, m	**3.33**
l_base, m	**2.3**			d_act, m	**0.73**
l_eff, m	**2.3**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	0.47	0	3.33	0.00	0.000
5	0.47	300	3.33	0.00	0.000
20	0.52	1200	3.28	0.05	0.138
45	0.56	2700	3.24	0.09	0.248
60	0.57	3600	3.23	0.10	0.276
150	0.67	9000	3.13	0.20	0.552
270	0.77	16200	3.03	0.30	0.828
330	0.8	19800	3.00	0.33	0.911
1200	1.2	72000	2.60	0.73	2.015

Area	2.76	m^2			
50% Area_ef	14.415	m^2	$V_{p75\text{-}25\ theory}$ volume	4.5954	m^3
50% Area_ac	5.315	m^2	$V_{p\ 75\ -\ 25\ actu}$ volume	1.0074	m^3
			$t_{p\ 75\text{-}\ 25\ actual}$ time	39960.00	s
			Infiltration Coefficient *f*	4.74322E-06	ms^-1



NOTES:

See SW3/13 log for detailed soil strata details: slightly sandy gravelly SILT

No groundwater was encountered, pit assumed unsaturated.

Infiltration rate calculated over actual fall.

Photographic Record

Number: SW03-13	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

Photographic Record

Number: SW03-13	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

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Trial Pit No
SW03-14
Sheet 1 of 1

Project Name: N6 GCTP Phase 3	**Project No.** P16185	**Co-ords:** 533110.49 - 728555.83 **Level:** 21.68	**Date** 08/12/2016
Location: Galway City, Co. Galway		**Dimensions (m):** 3.50 x 1.20 **Depth:** 4.50	**Scale** 1:25
Client: Arup			**Logged** DMC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.20	21.48		Topsoil.
				0.40	21.28		Soft, grey, slightly sandy SILT.
	0.50 - 1.50 0.50 - 1.50	B D					Soft, brown, slightly sandy slightly gravelly CLAY. Gravel is fine to coarse and angular.
				1.70	19.98		Soft to firm, light grey, slightly sandy CLAY. Sand is fine to medium.
	2.00 - 2.50 2.00 - 2.50	B D					
				2.90	18.78		Dark grey black, slightly gravelly slightly sandy peaty SILT.
	3.00 - 3.50 3.00 - 3.50	B D					
	4.00 - 4.50 4.00 - 4.50	B D					
				4.50	17.18		End of Pit at 4.50m

Stability: Good.
Plant: 14T track machine.
Backfill: Arisings.

Groundwater: None encountered.

Remarks: Soakaway pit terminated at required depth of 4.50m bgl. Soakaway test carried out (BRE 365).

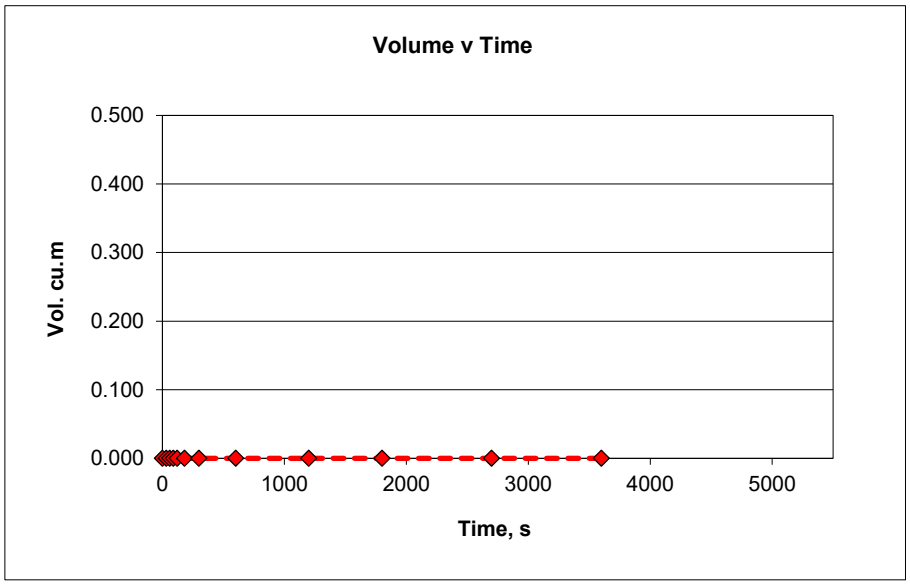
P16185 **N6 GCTP**

Test 1 **SW3/14** **08/12/2016**

				d, m	**4.5**
l, m	**3.5**	b, m	**1.2**	d_eff, m	**0.86**
l_base, m	**3.5**			d_act, m	**0.00**
l_eff, m	**3.5**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	3.64	0	0.86	0.00	0.000
0.5	3.64	30	0.86	0.00	0.000
1	3.64	60	0.86	0.00	0.000
1.5	3.64	90	0.86	0.00	0.000
2	3.64	120	0.86	0.00	0.000
3	3.64	180	0.86	0.00	0.000
5	3.64	300	0.86	0.00	0.000
10	3.64	600	0.86	0.00	0.000
20	3.64	1200	0.86	0.00	0.000
30	3.64	1800	0.86	0.00	0.000
45	3.64	2700	0.86	0.00	0.000
60	3.64	3600	0.86	0.00	0.000

Area	4.2	m^2				
50% Area_eff, a_{p50}	8.242	m^2	$V_{p75\text{-}25\ theory}$	volume	1.806	m^3
50% Area_act, a_{p50}		m^2	$V_{p\ 75\ -\ 25\ actual}$	volume		m^3
			$t_{p\ 75\text{-}\ 25\ actual}$	time		s
			Infiltration Coefficient	*f*		ms^-1



NOTES:

See SW3/15 log for detailed soil strata details: slightly gravelly sandy CLAY/SILT

No groundwater was encountered, pit assumed unsaturated.

Infiltration rate not applicable.

Pit wall collapsed overnight.Final reading disregarded.

Photographic Record

Number: SW03-14	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

Photographic Record

Number: SW03-14	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

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Trial Pit No
SW03-15
Sheet 1 of 1

Project Name: N6 GCTP Phase 3	**Project No.** P16185	**Co-ords:** 533069.52 - 728487.25 **Level:** 22.73	**Date** 08/12/2016
Location: Galway City, Co. Galway		**Dimensions (m):** 3.80 x 1.20 **Depth:** 4.50	**Scale** 1:25
Client: Arup			**Logged** DMC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.20	22.53		Topsoil.
	0.50 - 1.00 0.50 - 1.00	B D					Soft, brown, slightly gravelly slightly sandy SILT. Sand is fine to coarse.
				1.10	21.63		Stiff, light grey brown, slightly gravelly very sandy SILT with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded. Cobbles are 63mm to 200mm dia, sub-rounded, Limestone lithology.
	1.50 - 2.00 1.50 - 2.00	B D					*Cobble content increases with depth.*
	2.50 - 3.00 2.50 - 3.00	B D		2.50	20.23		Light grey brown, very sandy very silty GRAVEL with cobble content.
	3.50 - 4.50 3.50 - 4.50	B D		3.50	19.23		Light grey brown, slightly gravelly slightly sandy SILT with cobble content.
				4.50	18.23		End of Pit at 4.50m

Stability: Good.
Plant: 14T track machine.
Backfill: Arisings.

Groundwater: None encountered.

Remarks: Soakaway pit terminated at required depth of 4.50m bgl. Soakaway test carried out (BRE 365).

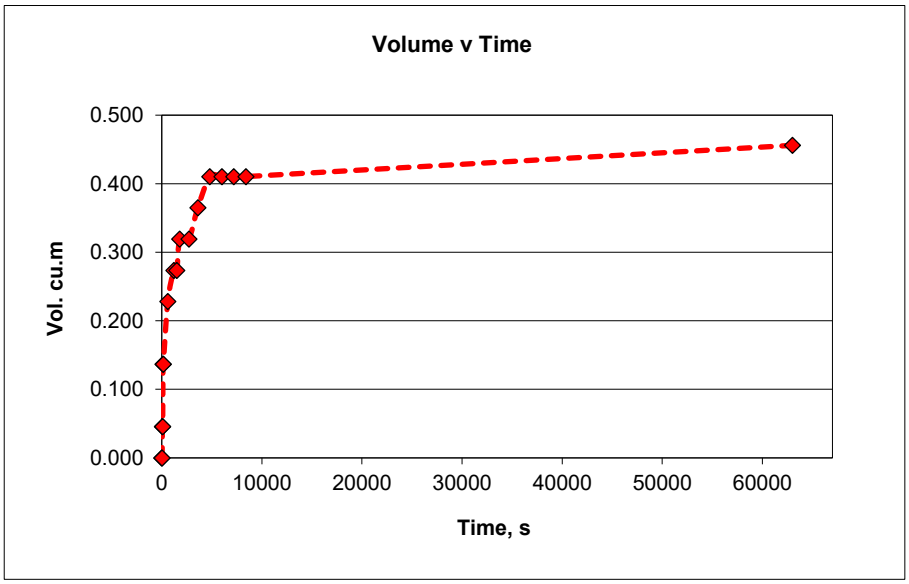
P16185 **N6 GCTP**

Test 1 **SW3/15** **08/12/2016**

				d, m	**4.5**
l, m	**3.8**	b, m	**1.2**	d_eff, m	**1.05**
l_base, m	**3.8**			d_act, m	**0.10**
l_eff, m	**3.8**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	3.45	0	1.05	0.00	0.000
0.5	3.45	30	1.05	0.00	0.000
1	3.46	60	1.04	0.01	0.046
1.5	3.46	90	1.04	0.01	0.046
2	3.48	120	1.02	0.03	0.137
2.5	3.48	150	1.02	0.03	0.137
10	3.5	600	1.00	0.05	0.228
20	3.51	1200	0.99	0.06	0.274
25	3.51	1500	0.99	0.06	0.274
30	3.52	1800	0.98	0.07	0.319
45	3.52	2700	0.98	0.07	0.319
60	3.53	3600	0.97	0.08	0.365
80	3.54	4800	0.96	0.09	0.410
100	3.54	6000	0.96	0.09	0.410
120	3.54	7200	0.96	0.09	0.410
140	3.54	8400	0.96	0.09	0.410
1050	3.55	63000	0.95	0.10	0.456

Area	4.56 m^2				
50% Area_eff, a_{p50}	9.81 m^2	$V_{p75\text{-}25\ theory}$	volume	2.394	m^3
50% Area_act, a_{p50}	5.06 m^2	$V_{p\ 75\ -\ 25\ actual}$	volume	0.228	m^3
		$t_{p\ 75\text{-}\ 25\ actual}$	time	3082.00	s
		Infiltration Coefficient	*f*	1.462E-05	ms^-1



NOTES:

See SW3/15 log for detailed soil strata details: slightly gravelly sandy SILT

No groundwater was encountered, pit assumed unsaturated.

Infiltration rate calculated over actual fall.

Photographic Record

Number: SW03-15	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

Photographic Record

Number: SW03-15	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

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Trial Pit No
SW03-16
Sheet 1 of 1

Project Name: N6 GCTP Phase 3	**Project No.** P16185	**Co-ords:** 533014.93 - 728441.91 **Level:** 19.56	**Date** 08/12/2016
Location: Galway City, Co. Galway		**Dimensions (m):** 3.20 x 1.60 **Depth:** 4.30	**Scale** 1:25
Client: Arup			**Logged** DMC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							Topsoil.
				0.30	19.26		Soft to firm, light grey cream, CLAY.
	0.50 - 1.50 0.50 - 1.50	B D					
	1.50 - 2.90 1.50 - 2.90	B D		1.50	18.06		Stiff, dark grey, slightly sandy gravelly CLAY with cobble content. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded.
	3.00 - 4.00 3.00 - 4.00	B D		2.90	16.66		Firm, yellowish brown, very sandy very silty GRAVEL with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded. Cobbles are 63mm to 200mm dia sub-rounded, Limestone lithology. *Cobble content increases with depth.*
				4.30	15.26		End of Pit at 4.30m

Stability: Good.
Plant: 14T track machine.
Backfill: Arisings.

Groundwater: None encountered.

Remarks: Soakaway pit terminated at 4.30m bgl. Soakaway test carried out (BRE 365).

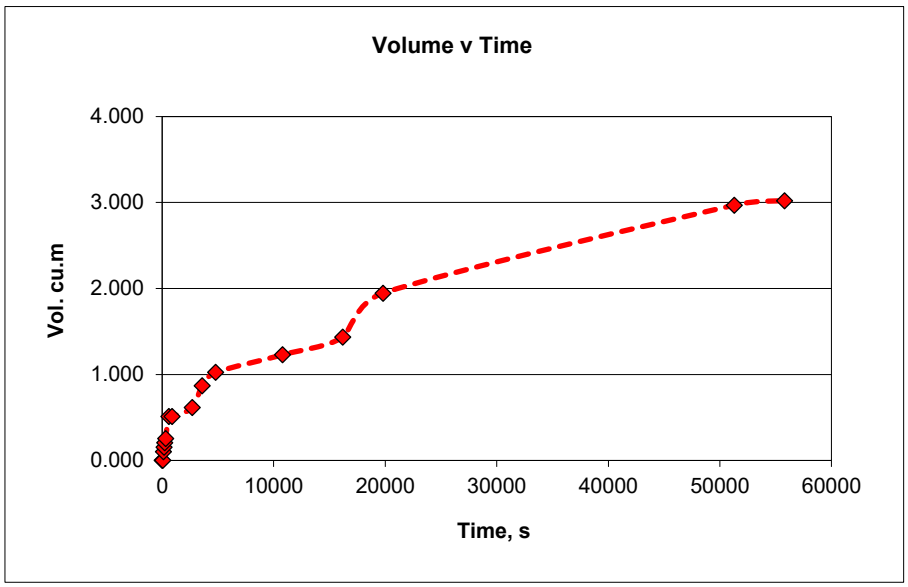
P16185 **N6 GCTP**

Test 1 **SW3/16** **08/12/2016**

				d, m	**4.3**
l, m	**3.2**	b, m	**1.6**	d_eff, m	**1.40**
l_base, m	**3.2**			d_act, m	**0.59**
l_eff, m	**3.2**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	2.9	0	1.40	0.00	0.000
1	2.9	60	1.40	0.00	0.000
2	2.92	120	1.38	0.02	0.102
3	2.93	180	1.37	0.03	0.154
4	2.94	240	1.36	0.04	0.205
5	2.95	300	1.35	0.05	0.256
10	3	600	1.30	0.10	0.512
15	3	900	1.30	0.10	0.512
45	3.02	2700	1.28	0.12	0.614
60	3.07	3600	1.23	0.17	0.870
80	3.1	4800	1.20	0.20	1.024
180	3.14	10800	1.16	0.24	1.229
270	3.18	16200	1.12	0.28	1.434
330	3.28	19800	1.02	0.38	1.946
855	3.48	51300	0.82	0.58	2.970
930	3.49	55800	0.81	0.59	3.021

Area	5.12 m^2				
50% Area_eff, a_{p50}	11.84 m^2	$V_{p75\text{-}25\ theory}$	volume	3.584	m^3
50% Area_act, a_{p50}	7.952 m^2	$V_{p\ 75\ -\ 25\ actual}$	volume	1.5104	m^3
		$t_{p\ 75\text{-}25\ actual}$	time	25767.00	s
		Infiltration Coefficient	*f*	7.371E-06	ms^-1



NOTES:

See SW3/16 log for detailed soil strata details: slightly gravelly slightly sandy SILT

No groundwater was encountered, pit assumed unsaturated.

Infiltration rate calculated over actual fall.

Photographic Record

Number: SW03-16	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

Photographic Record

Number: SW03-16	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

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Trial Pit No
SW03-17
Sheet 1 of 1

Project Name: N6 GCTP Phase 3	**Project No.** P16185	**Co-ords:** 532695.57 - 728363.07 **Level:** 16.35	**Date** 07/12/2016
Location: Galway City, Co. Galway		**Dimensions (m):** 1.70 x 1.25 **Depth:** 1.60	**Scale** 1:25
Client: Arup			**Logged** DMC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.15	16.20		Topsoil.
	0.20 - 0.40 0.20 - 0.40	B D					Soft, grey brown, slightly gravelly sandy CLAY. Gravel is fine and sub-angular.
				0.40	15.95		Soft to firm, brown, CLAY.
	0.50 - 1.50 0.50 - 1.50	B D					*1.50 - 1.60: Grey in colour.*
				1.60	14.75		End of Pit at 1.60m

Stability: Good.
Plant: 14T track machine.
Backfill: Arisings.

Groundwater: None encountered.

Remarks: Soakaway pit terminated at required depth of 1.60m bgl. Soakaway test carried out (BRE 365).

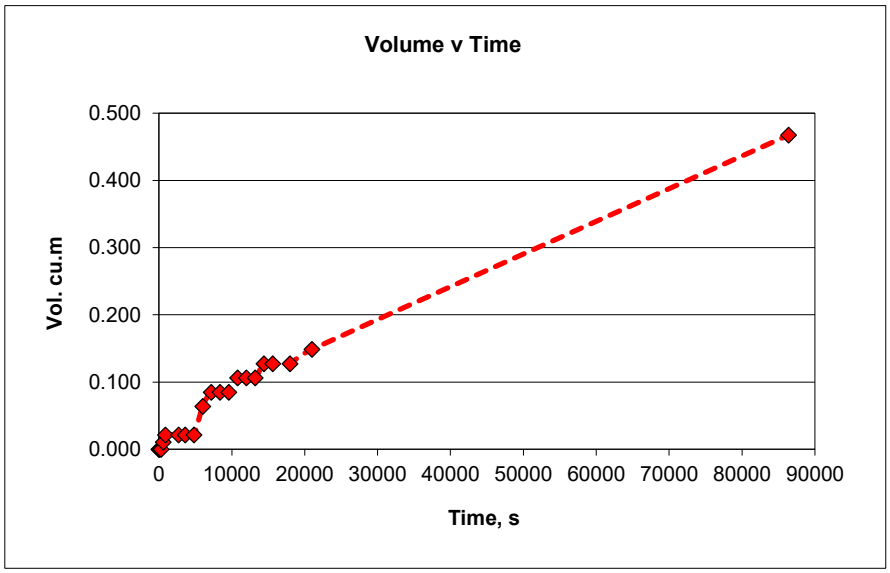
P16185 **N6 GCTP**

Test 1 **SW3/17** **07/12/2016**

				d, m	**1.6**
l, m	**1.7**	b, m	**1.25**	d_eff, m	**1.50**
l_base, m	**1.7**			d_act, m	**0.22**
l_eff, m	**1.7**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	0.1	0	1.50	0.00	0.000
1	0.1	60	1.50	0.00	0.000
5	0.1	300	1.50	0.00	0.000
10	0.105	600	1.50	0.00	0.011
15	0.11	900	1.49	0.01	0.021
45	0.11	2700	1.49	0.01	0.021
60	0.11	3600	1.49	0.01	0.021
80	0.11	4800	1.49	0.01	0.021
100	0.13	6000	1.47	0.03	0.064
120	0.14	7200	1.46	0.04	0.085
140	0.14	8400	1.46	0.04	0.085
160	0.14	9600	1.46	0.04	0.085
180	0.15	10800	1.45	0.05	0.106
200	0.15	12000	1.45	0.05	0.106
220	0.15	13200	1.45	0.05	0.106
240	0.16	14400	1.44	0.06	0.128
260	0.16	15600	1.44	0.06	0.128
300	0.16	18000	1.44	0.06	0.128
350	0.17	21000	1.43	0.07	0.149
1440	0.32	86400	1.28	0.22	0.468

Area	2.125 m^2				
50% Area_eff, a_{p50}	6.55 m^2	$V_{p75\text{-}25\ theory}$	volume	1.59375	m^3
50% Area_act, a_{p50}	2.774 m^2	$V_{p\ 75\ -\ 25\ actual}$	volume	0.23375	m^3
		$t_{p\ 75\text{-}\ 25\ actual}$	time	48342.00	s
		Infiltration Coefficient	*f*	1.743E-06	ms^-1



NOTES:

See SW3/17 log for detailed soil strata details: slightly gravelly SILT/CLAY

No groundwater was encountered, pit assumed unsaturated.

Infiltration rate calculated over actual fall.

Photographic Record

Number: SW03-17	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

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Trial Pit No
SW03-18
Sheet 1 of 1

Project Name: N6 GCTP Phase 3	**Project No.** P16185	**Co-ords:** 532711.15 - 728444.80 **Level:** 16.07	**Date** 07/12/2016
Location: Galway City, Co. Galway		**Dimensions (m):** 1.80 / 1.20	**Scale** 1:25
Client: Arup		**Depth:** 4.50	**Logged** DMC

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.20	15.87		Topsoil.
	0.50 - 1.00 0.50 - 1.00	B D					Soft to firm, slightly sandy slightly gravelly CLAY. Gravel is fine to medium and sub-angular.
				1.40	14.67		Soft, light grey, slightly sandy gravelly SILT. Sand is fine to coarse. Gravel is fine to coarse and sub-angular.
	1.50 - 2.00 1.50 - 2.00	B D					
	2.00 - 2.50 2.00 - 2.50	B D		2.00	14.07		Soft to firm, grey brown, slightly gravelly slightly sandy CLAY. *2.00 - 3.50m: Thin bands of fine sand (5mm).*
	3.00 - 3.50 3.00 - 3.50	B D					
	3.50 - 4.50 3.50 - 4.50	B D		3.50	12.57		Soft, blue, CLAY.
				4.50	11.57		End of Pit at 4.50m

Stability: Good.
Plant: 14T track machine.
Backfill: Arisings.

Groundwater: None encountered.

Remarks: Soakaway pit terminated at required depth of 4.50m bgl. Soakaway test carried out (BRE 365).

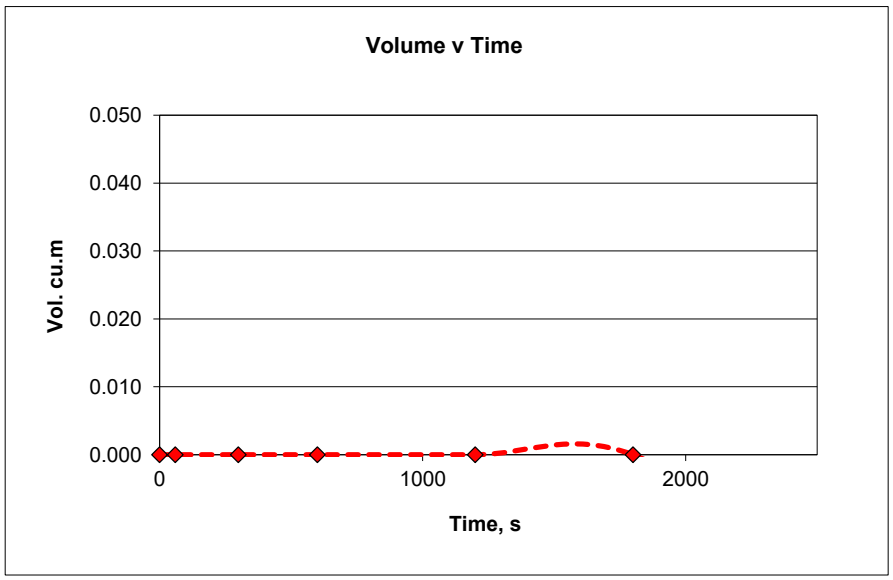
P16185 **N6 GCTP**

Test 1 **SW3/18** **07/12/2016**

				d, m	**4.5**
l, m	**1.8**	b, m	**1.2**	d_eff, m	**1.02**
l_base, m	**1.8**			d_act, m	
l_eff, m	**1.8**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	3.48	0	1.02	0.00	0.000
1	3.48	60	1.02	0.00	0.000
5	3.48	300	1.02	0.00	0.000
10	3.48	600	1.02	0.00	0.000
20	3.48	1200	1.02	0.00	0.000
30	3.48	1800	1.02	0.00	0.000
45	3.47	2700	1.03	-0.01	-0.022
60	3.47	3600	1.03	-0.01	-0.022
80	3.47	4800	1.03	-0.01	-0.022
100	3.47	6000	1.03	-0.01	-0.022
120	3.47	7200	1.03	-0.01	-0.022
140	3.47	8400	1.03	-0.01	-0.022
160	3.47	9600	1.03	-0.01	-0.022
180	3.47	10800	1.03	-0.01	-0.022
200	3.47	12000	1.03	-0.01	-0.022
220	3.47	13200	1.03	-0.01	-0.022
240	3.47	14400	1.03	-0.01	-0.022
1200	3.47	72000	1.03	-0.01	-0.022

Area	2.16 m^2				
50% Area_eff, a_{p50}	5.22 m^2	$V_{p75\text{-}25\ theory}$	volume	1.1016	m^3
50% Area_act, a_{p50}	m^2	$V_{p\ 75\ -\ 25\ actual}$	volume		m^3
		$t_{p\ 75\text{-}\ 25\ actual}$	time		s
		Infiltration Coefficient	*f*		ms^-1



NOTES:

See SW3/18 log for detailed soil strata details: slightly gravelly slightly sandy SILT

No groundwater was encountered, pit assumed unsaturated.

Infiltration rate not applicable.

Photographic Record

Number: SW03-18	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

Photographic Record

Number: SW03-18	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

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Trial Pit No
SW03-19
Sheet 1 of 1

Project Name: N6 GCTP Phase 3	**Project No.** P16185	**Co-ords:** 531215.03 - 728480.43 **Level:** 17.29	**Date** 22/12/2016
Location: Galway City, Co. Galway	**Dimensions (m):** 2.30 × 1.00 **Depth:** 0.35		**Scale** 1:25
Client: Arup			**Logged** VT

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20 - 0.35 0.20 - 0.35	B D		0.20 0.35	17.09 16.94		Topsoil. Soft, brown, slightly gravelly slightly sandy SILT. Light grey to light brown, very silty very sandy GRAVEL with high cobble content and medium boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-angular, Limestone lithology. Cobbles are angular to sub-rounded, 3-200mm dia. Limestone lithology. Boulders are angular to sub-angular, 200-400mm dia. Limestone lithology. End of Pit at 0.35m

Stability: Good.
Plant: 6t track machine.
Backfill: Arisings.
Groundwater: None encountered.
Remarks: Soakaway pit terminated at 0.35m bgl on bedrock. Soakaway test carried out (BRE 365).

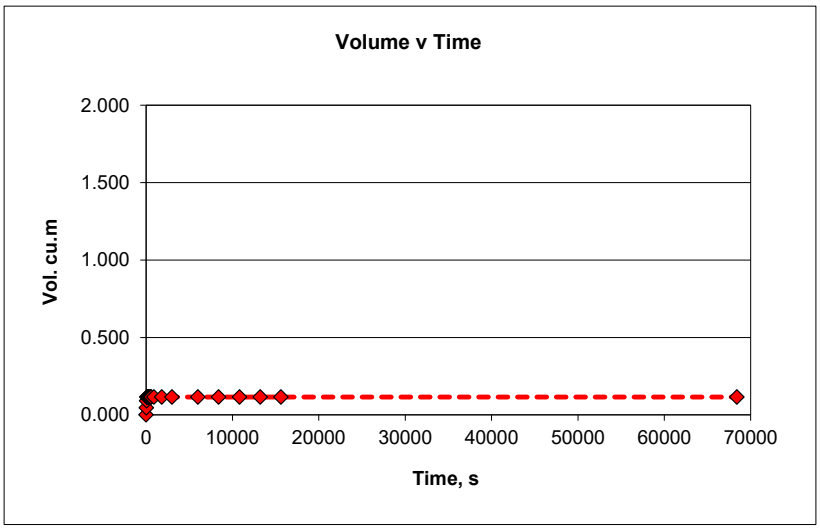
P16185 **N6 GCTP**

Test 1 **SW3/19** **12/12/2016**

				d, m	**0.35**
l, m	**2.3**	b, m	**1**	d_eff, m	**0.27**
l_base, m	**2.3**			d_act, m	**0.05**
l_eff, m	**2.3**				

Time, min	Measure, m bgl	Time, sec	Depth water, m	Fall, m	Volume
0	0.08	0	0.27	0.00	0.000
0.5	0.1	30	0.25	0.02	0.046
1	0.12	60	0.23	0.04	0.092
1.5	0.13	90	0.22	0.05	0.115
2	0.13	120	0.22	0.05	0.115
2.5	0.13	150	0.22	0.05	0.115
3	0.13	180	0.22	0.05	0.115
3.5	0.13	210	0.22	0.05	0.115
4	0.13	240	0.22	0.05	0.115
4.5	0.13	270	0.22	0.05	0.115
5	0.13	300	0.22	0.05	0.115
6	0.13	360	0.22	0.05	0.115
7	0.13	420	0.22	0.05	0.115
8	0.13	480	0.22	0.05	0.115
9	0.13	540	0.22	0.05	0.115
10	0.13	600	0.22	0.05	0.115
15	0.13	900	0.22	0.05	0.115
30	0.13	1800	0.22	0.05	0.115
50	0.13	3000	0.22	0.05	0.115
100	0.13	6000	0.22	0.05	0.115
140	0.13	8400	0.22	0.05	0.115
180	0.13	10800	0.22	0.05	0.115
220	0.13	13200	0.22	0.05	0.115
260	0.13	15600	0.22	0.05	0.115
1140	0.13	68400	0.22	0.05	0.115

Area	2.3	m^2			
50% Area_eff,	3.191	m^2	$V_{p75-25\ theory}$	volume	0.3105 m^3
50% Area_act,	2.465	m^2	$V_{p\ 75-25\ actual}$	volume	0.0575 m^3
			$t_{p\ 75-25\ actual}$	time	36.60 s
			Infiltration Coefficient	*f*	0.0006373 ms^-1



NOTES:

See SW3/19 log for detailed soil strata details: slightly sandy gravelly SILT

No groundwater was encountered, pit assumed unsaturated.

Infiltration rate calculated over actual fall.

Photographic Record

Number: SW03-19	**Project** N6 GCTP **Project No** P16185 **Engineer** Arup	

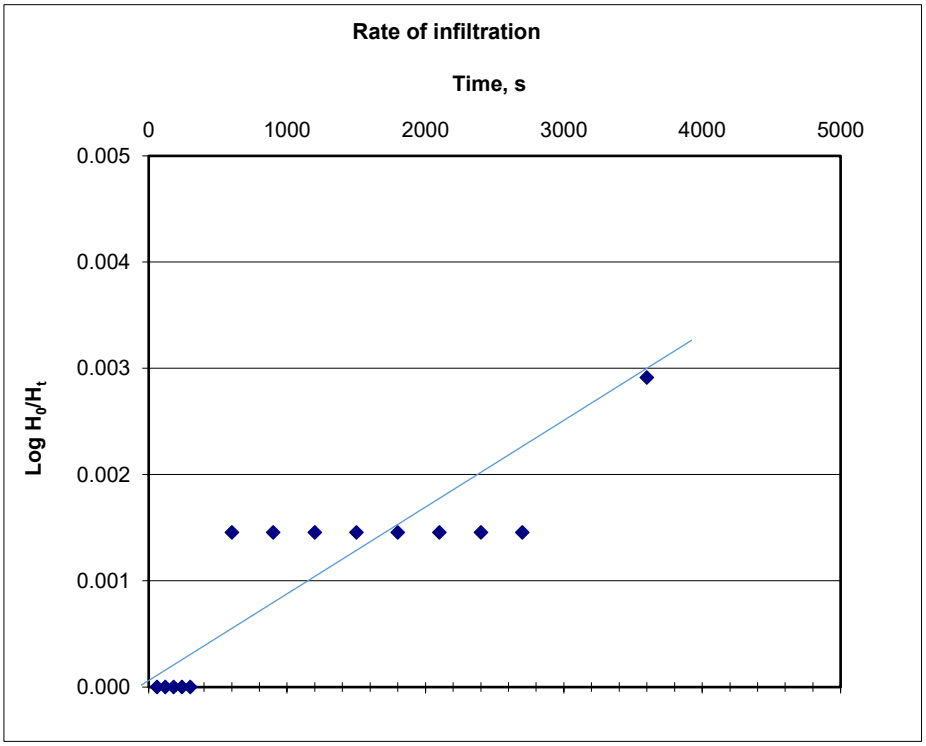
P16185 Rising head permeability test

Location	**Monitoring well**			
BH ID	**BH-MW64**		H_w / H_o	**2.99**
Casing diameter	**200**	mm		
Casing depth	**8.3**	m		
Borehole depth	**8.3**	m		
Groundwater level	**4.10**	mbgl		
Date	**28/03/2017**			

Min	Sec	depth, m bgl	vol, cu.m	H_t	log H_0/H_t
1	60	7.090	0.22263	2.990	0.000
2	120	7.090	0.22263	2.990	0.000
3	180	7.090	0.22263	2.990	0.000
4	240	7.090	0.22263	2.990	0.000
5	300	7.090	0.22263	2.990	0.000
10	600	7.080	0.22231	2.980	0.001
15	900	7.080	0.22231	2.980	0.001
20	1200	7.080	0.22231	2.980	0.001
25	1500	7.080	0.22231	2.980	0.001
30	1800	7.080	0.22231	2.980	0.001
35	2100	7.080	0.22231	2.980	0.001
40	2400	7.080	0.22231	2.980	0.001
45	2700	7.080	0.22231	2.980	0.001
60	3600	7.070	0.22200	2.970	0.003
90	5400	7.060	0.22168	2.960	0.004
120	7200	7.050	0.22137	2.950	0.006
150	9000	7.045	0.22121	2.945	0.007
180	10800	7.035	0.22090	2.935	0.008
210	12600	7.030	0.22074	2.930	0.009
240	14400	7.025	0.22059	2.925	0.010

k_{mean} **1.20E-08** ms^{-1}

$k_H = k_V$



N6 GWTP Stepped Pump Test

Flow Rate (L / min)	Time (min)	Pump Well	MW 3/63	MW 3/64	Note
0	0	4.52	7.22	5.09	15 mins spent getting accurate 1 L/min reading
1 L / min	0.5				
	1	4.57	7.22	5.09	
	1.5				
	2	4.57	7.22	5.09	
	2.5				
	3	4.5	7.22	5.09	
	3.5				
	4	4.65	7.22	5.09	
	4.5				
	5	4.75	7.22	5.09	
	5.5				
	6	4.77	7.22	5.09	
	6.5	4.79	7.22	5.09	
	7	4.81	7.22	5.09	
	7.5	4.83	7.22	5.09	
	8	4.85	7.22	5.09	
	8.5	4.87	7.22	5.09	
	9	4.88	7.22	5.09	
	9.5	4.89	7.22	5.09	
	10	4.9	7.22	5.09	
	12	4.96	7.22	5.09	
	14	5.03	7.22	5.09	
	16	5.1	7.22	5.09	Pump stopped pumping due to height of hose
	18	5.11	7.22	5.09	
	20	5.11	7.22	5.09	
	25		7.22	5.09	
	30	5.28	7.22	5.09	
	35	5.475	7.22	5.09	
	40	5.58	7.22	5.095	
	45	5.67	7.22	5.1	
	50	5.75	7.22	5.1	
	55	5.81	7.22	5.1	
	60	5.88	7.22	5.1	

Depth before data loggers removed-

PW	4.52 m
MW 3/63	7.22m
MW 3/64	5.09m

N.B all levels are from top of standpipe.

Top of standpipe to groundlevel, PW- 0.49m

MW 3/63- 0.85m
MW 3/64- 0.96m

Pump installed at 15m below top of standpipe on pump well (PW)

N6 GWTP Stepped Pump Test

Flow Rate (L / min)	Time (min)	Pump Well	MW 3/63	MW 3/64	Note
0	60 mins	5.88	7.22	5.1	2 mins spent getting accurate 2 L/min reading
2 L / min	0.5	5.87			
	1	5.89	7.22	5.1	
	1.5	5.93			
	2	5.99	7.22	5.1	
	2.5	6.02			
	3	6.08	7.22	5.1	
	3.5	6.08			
	4	6.1	7.22	5.1	
	4.5	6.11			
	5	6.12	7.22	5.1	
	5.5	6.16			
	6	6.19	7.22	5.1	
	6.5	6.215	7.22	5.1	
	7	6.24	7.22	5.1	
	7.5	6.27	7.22	5.1	
	8	6.29	7.22	5.1	
	8.5	6.32	7.22	5.1	
	9	6.345	7.22	5.1	
	9.5	6.37	7.22	5.1	
	10	6.4	7.22	5.1	
	12	6.49	7.22	5.1	
	14	6.58	7.22	5.1	
	16	6.665	7.22	5.1	
	18	6.77	7.22	5.1	
	20	6.85	7.22	5.1	
	25	7.045	7.22	5.1	
	30	7.23	7.22	5.1	
	35	7.32	7.22	5.1	
	40	7.455	7.22	5.1	
	45	7.69	7.22	5.1	
	50	7.915	7.22	5.1	
	55	8.1	7.22	5.1	
	60	8.26	7.22	5.1	

Depth before data loggers removed-

PW 4.52 m
MW 3/63 7.22m
MW 3/64 5.09m

N.B all levels are from top of standpipe.

Top of standpipe to groundlevel, PW- 0.49m

MW 3/63- 0.85m
MW 3/64- 0.96m

N6 GWTP Stepped Pump Test

Flow Rate (L / min)	Time (min)	Pump Well	MW 3/63	MW 3/64	Note
0	120 mins	8.26	7.22	5.1	5 mins spent getting accurate 3 L/min reading
3 L / min	0.5				
	1		7.22	5.1	
	1.5	8.42			
	2	8.45	7.22	5.1	
	2.5	8.5			
	3	8.55	7.22	5.1	
	3.5	8.59			
	4	8.635	7.22	5.1	
	4.5	8.73			
	5	8.735	7.22	5.1	
	5.5	8.76			
	6	8.8	7.22	5.1	
	6.5	8.84	7.22	5.1	
	7	8.89	7.22	5.1	
	7.5	8.93	7.22	5.1	
	8	8.97	7.22	5.1	
	8.5	9	7.22	5.1	
	9	9.05	7.22	5.1	
	9.5	9.09	7.22	5.1	
	10	9.12	7.22	5.1	
	12	9.295	7.22	5.1	
	14	9.47	7.22	5.1	
	16	9.63	7.22	5.1	
	18	9.76	7.22	5.1	
	20	9.91	7.22	5.1	
	25	10.09	7.22	5.1	
	30	10.31	7.22	5.1	
	35	10.67	7.225	5.1	
	40	10.94	7.225	5.1	
	45		7.225	5.1	
	50	11.51	7.225	5.1	
	55	11.785	7.225	5.1	
	60	12.06	7.225	5.1	

Depth before data loggers removed-

PW	4.52 m
MW 3/63	7.22m
MW 3/64	5.09m

N.B all levels are from top of standpipe.

Top of standpipe to groundlevel, PW- 0.49m

MW 3/63- 0.85m
MW 3/64- 0.96m

N6 GWTP Stepped Pump Test

Flow Rate (L / min)	Time (min)	Pump Well	MW 3/63	MW 3/64	Note
0	180 mins	12.06	7.225	5.1	5 mins spent getting accurate 3.5 L/min reading
3.5 L /min	0.5	12.15			
	1	12.18	7.225	5.1	
	1.5	12.22			
	2	12.27	7.225	5.1	
	2.5	12.31			
	3	12.35	7.225	5.1	
	3.5	12.39			
	4	12.44	7.225	5.1	
	4.5	12.51			
	5	12.57	7.225	5.1	
	5.5				
	6		7.225	5.1	
	6.5	12.75	7.225	5.1	
	7	12.82	7.225	5.1	
	7.5	12.86	7.225	5.1	
	8	12.91	7.225	5.1	
	8.5	12.97	7.225	5.1	
	9	13.04	7.225	5.1	
	9.5	13.08	7.225	5.1	
	10	13.13	7.225	5.1	
	12	13.36	7.225	5.1	
	14	13.58	7.225	5.1	
	16	13.74	7.225	5.1	
	18	13.87	7.225	5.1	
	20	14.07	7.225	5.1	
	25	14.57	7.225	5.1	
	30	15.01	7.225	5.1	
	35				
	40				
	45				
	50				
	55				
	60				

Depth before data loggers removed-

PW	4.52 m
MW 3/63	7.22m
MW 3/64	5.09m

N.B all levels are from top of standpipe.

Top of standpipe to groundlevel, PW- 0.49m

MW 3/63- 0.85m
MW 3/64- 0.96m

N6 GWTP Stepped Pump Test

RECHARGE

Flow Rate (L / min)	Time (min)	Pump Well	MW 3/63	MW 3/64	Note
0	0	15.01	7.225	5.1	
	0.5	14.94			
	1	14.94	7.225	5.1	
	1.5	14.94			
	2	14.94	7.225	5.1	
	2.5	14.94			
	3	14.94	7.225	5.1	
	3.5	14.94			
	4	14.94	7.225	5.1	
	4.5	14.93			
	5	14.93	7.225	5.1	
	5.5	14.93			
	6	14.93	7.225	5.1	
	6.5	14.93	7.225	5.1	
	7	14.93	7.225	5.1	
	7.5	14.93	7.225	5.1	
	8	14.93	7.225	5.1	
	8.5	14.93	7.225	5.1	
	9	14.92	7.225	5.1	
	9.5	14.92	7.225	5.1	
	10	14.92	7.225	5.1	
	12	14.92	7.225	5.1	
	14	14.92	7.225	5.1	
	16	14.92	7.225	5.1	
	18	14.92	7.225	5.1	
	20	14.92	7.225	5.1	
	25	14.915	7.225	5.1	
	30	14.915	7.225	5.1	
	35	14.915	7.225	5.1	
	40	14.91	7.225	5.1	
	45	14.91	7.225	5.1	
	50	14.91	7.225	5.1	
	55	14.9	7.225	5.1	
	60	14.9	7.225	5.1	
	70	14.89	7.225	5.1	
	80	14.885	7.225	5.1	
	90	14.88	7.225	5.1	

Depth before data loggers removed-

PW	4.52 m
MW 3/63	7.22m
MW 3/64	5.09m

N.B all levels are from top of standpipe.

Top of standpipe to groundlevel, PW- 0.49m

MW 3/63- 0.85m

MW 3/64- 0.96m

KEY TO SYMBOLS - LABORATORY TEST RESULT

U	Undisturbed Sample	
P	Piston Sample	
TWS	Thin Wall Sample	
B	Bulk Sample - Disturbed	
D	Jar Sample - Disturbed	
W	Water Sample	
pH	Acidity/Alkalinity Index	
SO_3	% - Total Sulphate Content (acid soluble)	
SO_3	g/ltr - Water Soluble Sulphate (Water or 2:1 Aqueous Soil Extract)	
+	Calcareous Reaction	
Cl	Chloride Content	
PI	Plasticity Index	
<425	% of material in sample passing 425 micron sieve	
LL	Liquid Limit	
PL	Plastic Limit	
MC	Water Content	
NP	Non Plastic	
Yb	Bulk Density	
Yd	Dry Density	
Ps	Particle Density	
U/D	Undrained/Drained Triaxial	
U/C	Unconsolidated/Consolidated Triaxial	
T/M	Single Stage/Multistage Triaxial	
100/38	Sample Diameter (mm)	
REM	Remoulded Triaxial Test Specimen	
TST	Triaxial Suction Test	
V	Vane Test	
DSB	Drained Shear Box	
RSB	Residual Shear Box	
RS	Ring Shear	
σ_3	Cell Pressure	
σ_1-σ_3	Deviator Stress	
c	Cohesion	
c_	Effective Cohesion Intercept	
ϕ	Angle of Shearing Resistance - Degrees	
ϕ_	Effective Angle of Shearing Resistance	
εf	Strain at Failure	
*	Failed under 1st Load	
**	Failed under 2nd Load	
#	Untestable	
##	Excessive Strain	
p_o	Effective Overburden Pressure	
m_v	Coefficient of Volume Decrease	
c_v	Coefficient of Consolidation	
Opt	Optimum	
Nat	Natural	
Std	Standard Compaction - 2.5kg Rammer	(¶ CBR)
Hvy	Heavy Compaction - 4.5kg Rammer	(§ CBR)
Vib	Vibratory Compaction	
CBR	California Bearing Ratio	
Sat m.c.	Saturation Moisture Content	
MCV	Moisture Condition Value	

PRIORITY GEOTECHNICAL	Natural Moisture Content/Atterberg Limits Summary BS 1377 : Part 2 : 1990 : Clause 3	Job Ref
Location	N6 GCTP Phase 3	P16185

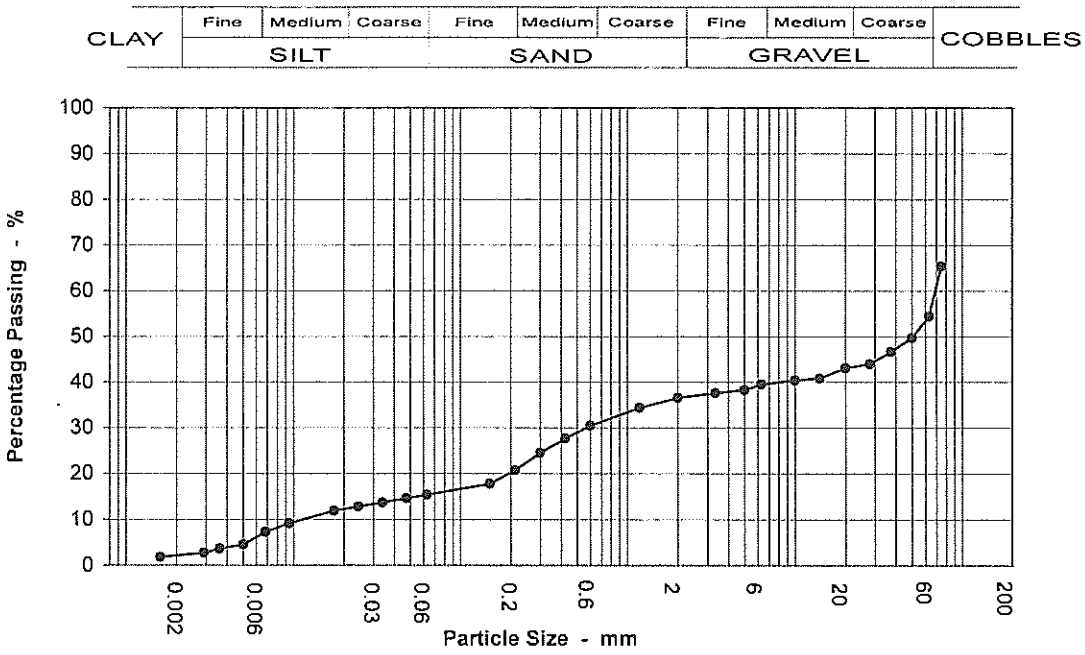
Hole ID	Sample Ref	Depth (m)	Sample Type	Sample Description	MC	LL	PL	PI	% Pass 425
SW03-03	2	0.15	D	Very silty very gravelly SAND	48	63	46	17	85.6
SW03-19	2	0.2	D	Very sandy very silty GRAVEL	19	42	28	14	59.1

PRIORITY GEOTECHNICAL

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	P16185
		Borehole / Pit No	SW03-03
Location	N6 GCTP Phase 3	Sample No	1
		Depth	0.15 m
Soil Description	Very silty very gravelly SAND with high cobble content	Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.063	15
90	70	0.048	15
75	65	0.034	14
63	54	0.024	13
50	50	0.018	12
37.5	47	0.009	9
28	44	0.007	7
20	43	0.005	5
14	41	0.004	4
10	40	0.003	3
6.3	39	0.002	2
5	38		
3.35	38		
2	37		
1.18	34		
0.6	30		
0.425	28		
0.3	24		
0.212	21		
0.15	18		
0.063	15		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	Clause 9.5

Sample Proportions	
Cobbles	46.7
Gravel	16.8
Sand	21.3
Silt	13.1
Clay	2.1

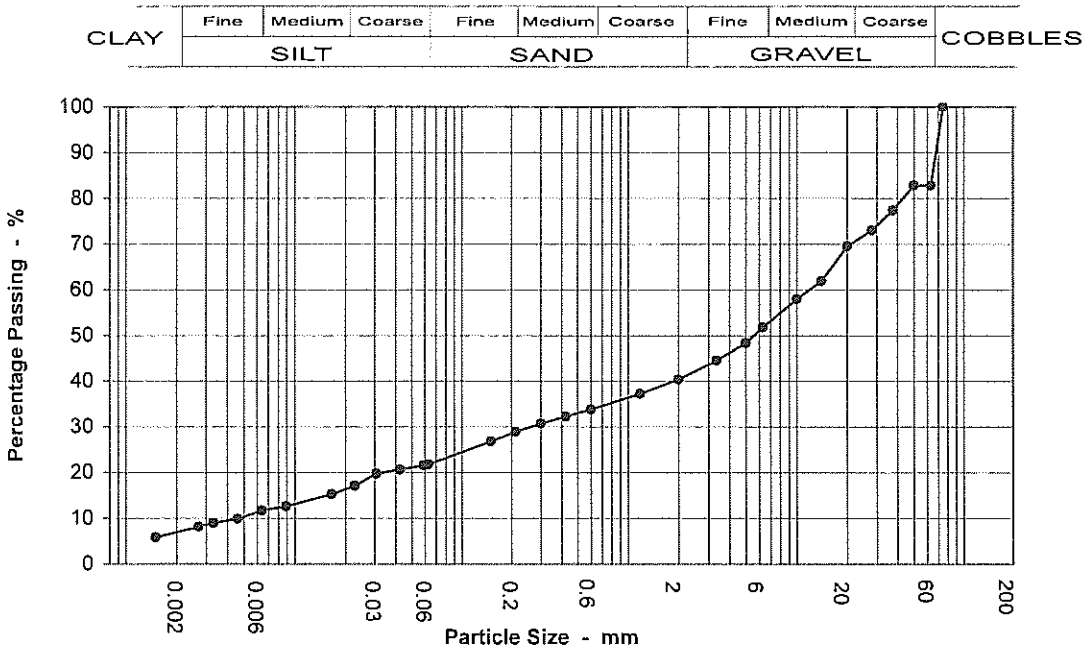
Grading Analysis	
D100	125.000
D60	69.153
D10	0.012
Uniformity Coefficient	5791

PRIORITY GEOTECHNICAL

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	P16185
		Borehole / Pit No	SW03-19
Location	N6 GCTP Phase 3	Sample No	1
		Depth	0.20 m
Soil Description	Very sandy very silty GRAVEL with medium cobble content	Sample type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.059	22
90	100	0.043	21
75	100	0.031	20
63	83	0.023	17
50	83	0.017	15
37.5	77	0.009	13
28	73	0.006	12
20	69	0.005	10
14	62	0.003	9
10	58	0.003	8
6.3	52	0.002	6
5	48		
3.35	45		
2	40		
1.18	37		
0.6	34		
0.425	32		
0.3	31		
0.212	29		
0.15	27		
0.063	22		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	Clause 9.5

Sample Proportions	
Cobbles	17.2
Gravel	42.4
Sand	18.7
Silt	14.8
Clay	6.8

Grading Analysis	
D100	75.000
D60	12.112
D10	0.005
Uniformity Coefficient	2566

Laboratory Report

GEO Site & Testing Services Ltd

Contract Number: 33812

Client's Reference: **P16185**

Report Date: **03-02-2017**

Client **Priority Geotechnical Limited**
Unit 12
Owenacurra Business Park
Midleton
Co. Cork.

Contract Title: **Galway GCT**

For the attention of: **Colette Kelly**

Date Received: **17-01-2017**

Date Commenced: **17-01-2017**

Date Completed: **03-02-2017**

Test Description	Qty
Moisture Content 1377 : 1990 Part 2 : 3.2 - * UKAS	40
4 Point Liquid & Plastic Limit (LL/PL) 1377 : 1990 Part 2 : 4.3 & 5.3 - * UKAS	24
PSD Wet Sieve method 1377 : 1990 Part 2 : 9.2 - * UKAS	32
PSD: Sedimentation by hydrometer 1377 : 1990 Part 2 : 9.5 - @ Non Accredited Test	31
Organic Matter Content-dichromate method 1377 : 1990 Part 3 : 3 - @ Non Accredited Test	5
Water Soluble Sulphate 2:1 extract 1377 : 1990 Part 3 : 5 - @ Non Accredited Test	4
pH Value of Soil... 1377 : 1990 Part 3 : 9 - @ Non Accredited Test	4

Notes: **Observations and Interpretations are outside the UKAS Accreditation**
*** - denotes test included in laboratory scope of accreditation**
 # - denotes test carried out by approved contractor
@ - denotes non accredited tests

Approved Signatories:
Alex Wynn (Associate Director) - Benjamin Sharp (Contracts Manager) - Emma Sharp (Office Manager)
Paul Evans (Quality/Technical Manager) - Vaughan Edwards (Managing Director)

GEO Site & Testing Services Ltd
Unit 3-4, Heol Aur, Dafen Ind Estate, Dafen, Llanelli, Carmarthenshire SA14 8QN
Tel: 01554 784040 Fax: 01554 784041 info@gstl.co.uk gstl.co.uk

Laboratory Report

GEO Site & Testing Services Ltd

Contract Number: 33812

Test Description	Qty
Consolidated Drained Peak Shear Strength - set of 3 - 60 x 60mm Shear Box Specimens by Direct Shearing (3 days) 1377 : 1990 Part 7 :4 - * UKAS	3
CUD 38mm Consolidated undrained triaxial compression test on a set of three x 38 mm diameter specimens with the measurement of pore water pressure including saturation and consolidation, test duration four days. 1377 : 1990 Part 8 : 7 - @ Non Accredited Test	2
Disposal of Samples on Project	1

Notes: **Observations and Interpretations are outside the UKAS Accreditation**
*** - denotes test included in laboratory scope of accreditation**
 # - denotes test carried out by approved contractor
@ - denotes non accredited tests

Approved Signatories:
Alex Wynn (Associate Director) - Benjamin Sharp (Contracts Manager) - Emma Sharp (Office Manager)
Paul Evans (Quality/Technical Manager) - Vaughan Edwards (Managing Director)

GEO Site & Testing Services Ltd
Unit 3-4, Heol Aur, Dafen Ind Estate, Dafen, Llanelli, Carmarthenshire SA14 8QN
Tel: 01554 784040 Fax: 01554 784041 info@gstl.co.uk gstl.co.uk

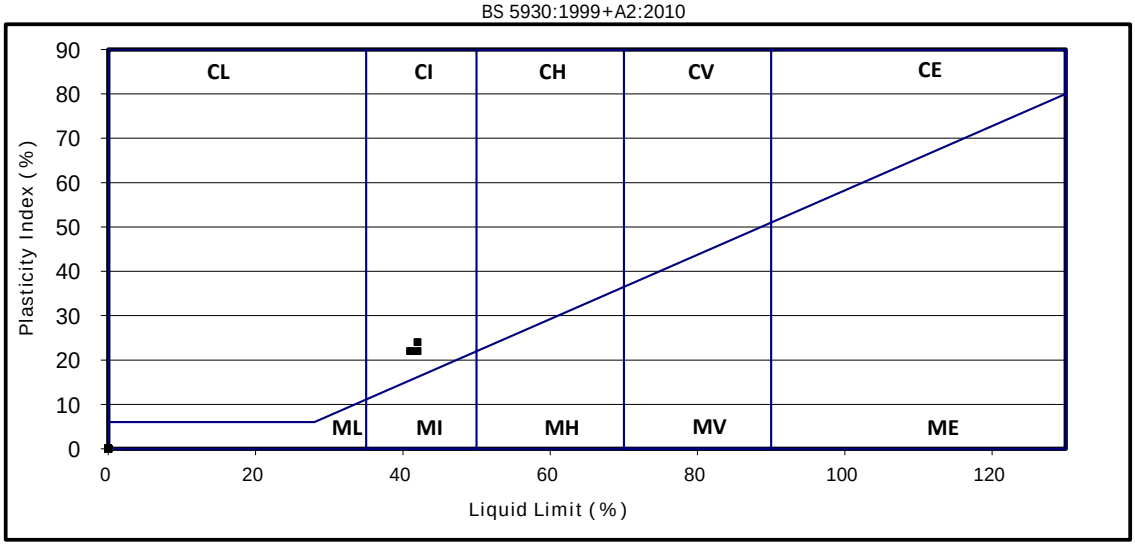
Test Report: Method of the Determination of the plastic limit and plasticity index
BS 1377 : Part 2 : 1990 Method 5

Client ref: P16185
Location: Galway GCT
Contract Number: 33812-

Hole/ Sample Number	Sample Type	Depth m	Moisture Content % Cl. 3.2	Liquid Limit % Cl. 4.3/4.4	Plastic Limit % Cl. 5.	Plasticity Index % Cl. 6.	% Passing .425mm	Remarks
SW03-12/1	B	1.00	11					
SW03-12/2	B	2.00	11					
SW03-13/1	B	1.50	12					
SW03-14/2	D	0.50	22	41	19	22	100	CI Intermediate Plasticity
SW03-14/4	D	2.00	21	42	20	22	100	CI Intermediate Plasticity
SW03-14/6	D	3.00	24		NP		100	
SW03-14/8	D	4.00	41		NP		100	
SW03-15/1	B	0.50	16		NP		70	
SW03-15/2	D	0.50	25					
SW03-15/4	D	1.50	7.8		NP		60	
SW03-15/5	B	2.50	6.9					
SW03-15/6	D	2.50	9.6					
SW03-15/8	D	3.50	4.4		NP		25	
SW03-16/1	B	0.50	24	42	18	24	100	CI Intermediate Plasticity
SW03-16/2	D	0.50	22					
SW03-16/4	D	1.50	4.5					
SW03-16/6	D	3.00	6.9					

Symbols: NP : Non Plastic # : Liquid Limit and Plastic Limit Wet Sieved

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.
BS 5930:1999+A2:2010



GSTL
GEO SITE & TESTING SERVICES LTD

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Emma Sharp (Office Manager)
Date: 31.1.17

UKAS TESTING 2788

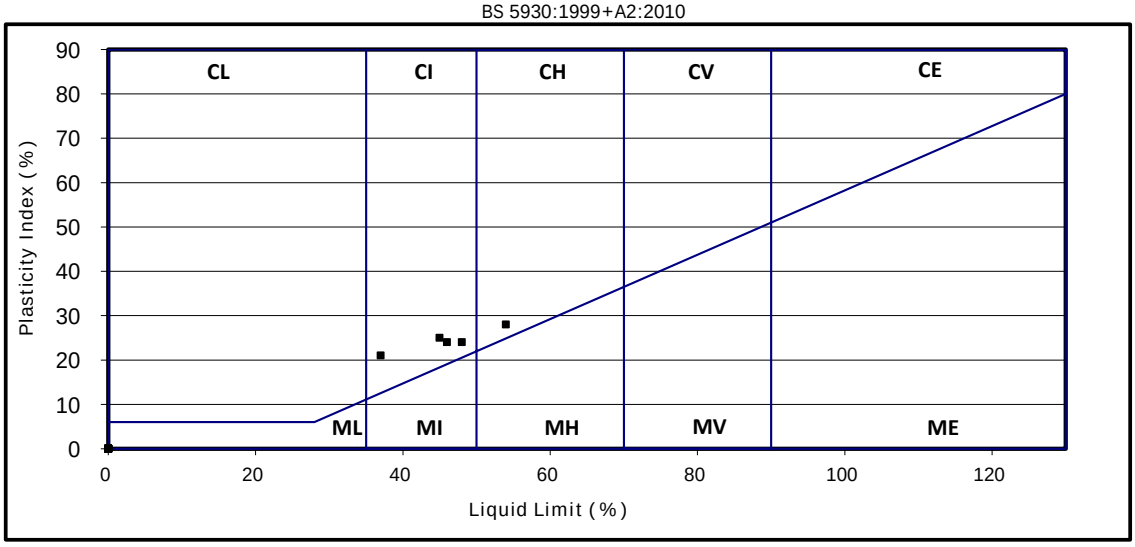
Test Report: Method of the Determination of the plastic limit and plasticity index
BS 1377 : Part 2 : 1990 Method 5

Client ref: P16185
Location: Galway GCT
Contract Number: 33812-

Hole/ Sample Number	Sample Type	Depth m	Moisture Content % Cl. 3.2	Liquid Limit % Cl. 4.3/4.4	Plastic Limit % Cl. 5.	Plasticity Index % Cl. 6.	% Passing .425mm	Remarks
SW03-17/2	D	0.20	25	48	24	24	88	CI Intermediate Plasticity
SW03-17/4	D	0.50	33					
SW03-18/2	D	0.50	30	54	26	28	100	CH High Plasticity
SW03-18/4	D	1.50	13	37	16	21	59	CI Intermediate Plasticity
SW03-18/6	D	2.00	26	45	20	25	100	CI Intermediate Plasticity
SW03-18/7	D	3.00	24	46	22	24	100	CI Intermediate Plasticity
SW03-18/8	B	3.00	23					
SW03-18/10	D	3.50	27					

Symbols: NP : Non Plastic # : Liquid Limit and Plastic Limit Wet Sieved

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.
BS 5930:1999+A2:2010



GSTL
GEO SITE & TESTING SERVICES LTD

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Emma Sharp (Office Manager)
Date: 31.1.17

UKAS TESTING 2788

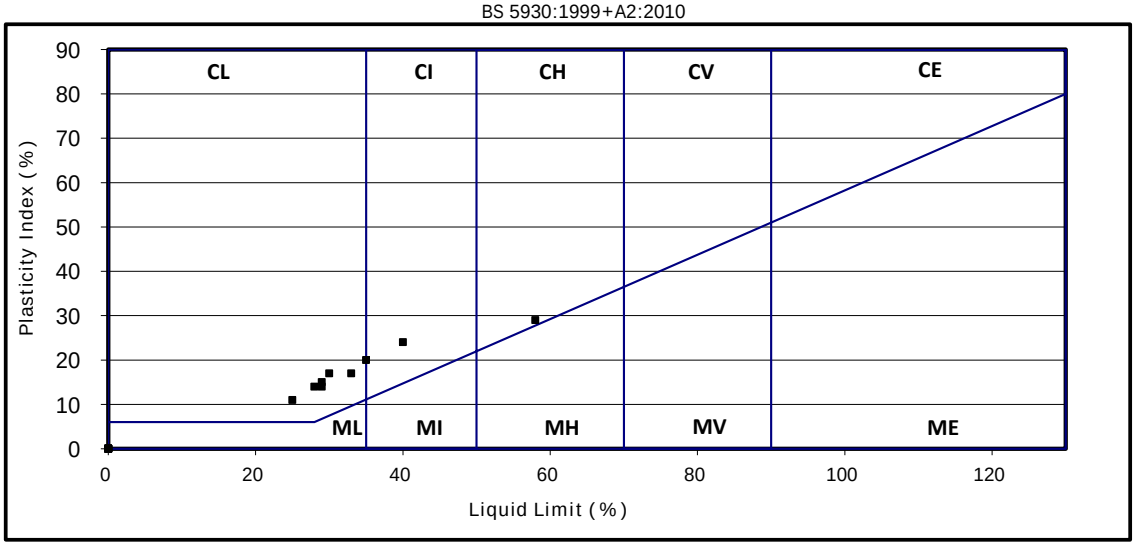
Test Report: Method of the Determination of the plastic limit and plasticity index
BS 1377 : Part 2 : 1990 Method 5

Client ref: P16185
Location: Galway GCT
Contract Number: 33812-

Hole/ Sample Number	Sample Type	Depth m	Moisture Content % Cl. 3.2	Liquid Limit % Cl. 4.3/4.4	Plastic Limit % Cl. 5.	Plasticity Index % Cl. 6.	% Passing .425mm	Remarks
TP03-50/1	B	0.80	8.9	25	14	11	70	CL Low Plasticity
TP03-50/2	D	0.80	9.1					
TP03-50/4	D	1.50	7.4		NP		56	
TP03-50/6	D	2.00	8.7	29	15	14	75	CL Low Plasticity
TP03-50/8	D	3.00	7.7	29	14	15	70	CL Low Plasticity
TP03-52/2	D	0.20	28					
TP03-52/3	B	0.50	10	30	13	17	70	CL Low Plasticity
TP03-52/4	D	0.50	23	40	16	24	80	CI Intermediate Plasticity
TP03-53/2	D	0.50	22					
TP03-53/3	B	1.00	11	35	15	20	82	CL/I Low/Inter. Plasticity
TP03-53/4	D	1.00	13					
TP03-53/5	B	2.00	9.1	33	16	17	80	CL Low Plasticity
TP03-53/6	D	2.00	10					
TP03-53/8	D	2.50	7.8		NP		60	
TP03-53/10	D	3.50	7.9	28	14	14	69	CL Low Plasticity
BH03-62/1	B	0.00	34	58	29	29	60	CH High Plasticity
BH03-62/2	B	1.00	37					

Symbols: NP : Non Plastic # : Liquid Limit and Plastic Limit Wet Sieved

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.
BS 5930:1999+A2:2010



GSTL
GEO SITE & TESTING SERVICES LTD

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Emma Sharp (Office Manager)
Date: 31.1.17

UKAS TESTING 2788

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Web: www.geo.uk.com

Certificate of Analysis

Date:	25-01-17
Client:	Priority
Our Reference:	33812
Client Reference:	P1S185
Contract Title:	Galway
Description: (Total Samples)	9
Date Received:	23-01-17
Date Started:	#REF!
Date Completed:	25-01-17
Test Procedures:	(BRE BR 279)
Notes:	

Solid samples will be disposed 1 month and liquids 2 weeks after the date of issue of this test certificate

Approved By:

Authorised Signatories:

Emma Sharp	Ben Sharp	Paul Evans
Laboratory Office Manager	Contracts Manager	Quality Manager

Contract No: 33812
Client Ref: P1S185
Location: Galway
Date: 25-01-2017

Summary of Chemical Analysis

(BRE BR 279)

Hole Number	Sample Number	Sample Type	Depth m	Sulphate Content as SO_4			Chloride Content		pH Value @ 25°C	Total Sulphur % S	Magnesium g/l	Organic Content
				Acid Soluble Sulphate as % SO_4	Aqueous Extract Sulphate as g/l SO_4	Ground-water g/l	Semi Quantative Test Strip mg Cl/l	Quantative g/l				
				BR 279	BR 279	BR 279	BR 279	BR 279	BR 279	BR 279	BR 279	BR 279
SW03-12		B	1.00									1.9
SW03-14		B	3.00									10.2
SW03-14		B	4.00									11.4
SW03-16		B	0.50									0.6
SW03-16		B	1.50		0.02				7.50			
SW03-17		B	0.50		0.02				7.66			
SW03-18		D	3.50									0.9
SW03-50		B	1.50		<.01				7.91			
SW03-53		B	0.50		0.02				7.34			

NCP - No Chloride present

Test Report:

Particle Size Distribution Test

BS 1377 Part 2:1990.

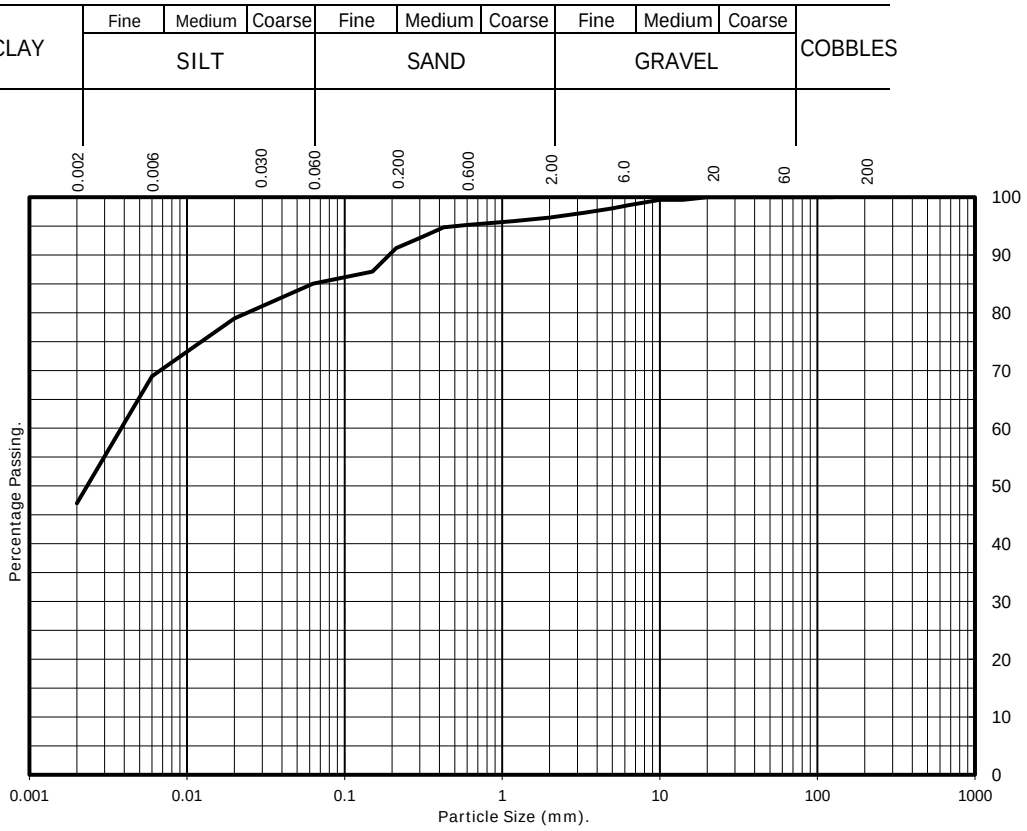
Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref:	P16185	Sample Number:	2
Contract Number:	33812-	Depth from (m):	1.00
Hole Number:	BH03-62	Depth to (m):	N/A
		Sample Type:	B

Location: Galway GCT

Description: Brown gravelly sandy fine to medium silty CLAY.

BS Test Sieve	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	100
10	100
6.3	99
5.0	98
3.35	97
2.00	96
1.18	96
0.60	95
0.425	95
0.300	93
0.212	91
0.150	87
0.063	85



Particle Diameter	% Passing
0.02	79
0.006	69
0.002	47

Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
47	38	11	4	0	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Emma Sharp (Office Manager)

Date: 31.1.17

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UKAS TESTING 2788

Test Report:

Particle Size Distribution Test

BS 1377 Part 2:1990.

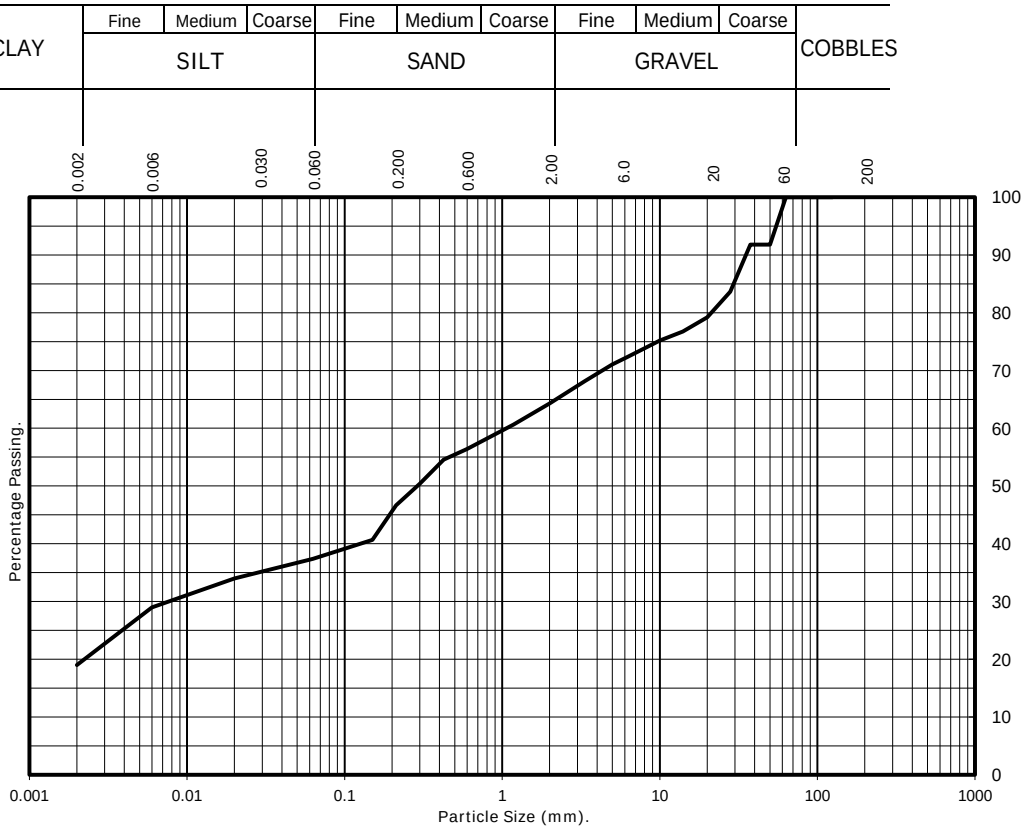
Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref:	P16185	Sample Number:	1
Contract Number:	33812-	Depth from (m):	1.00
Hole Number:	SW03-12	Depth to (m):	N/A
		Sample Type:	B

Location: Galway GCT

Description: Brown silty clayey sandy fine to coarse GRAVEL

BS Test Sieve	% Passing
125	100
90	100
75	100
63	100
50	92
37.5	92
28	84
20	79
14	77
10	75
6.3	72
5.0	71
3.35	68
2.00	64
1.18	61
0.60	56
0.425	55
0.300	50
0.212	47
0.150	41
0.063	37



Particle Diameter	% Passing
0.02	34
0.006	29
0.002	19

Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
19	18	27	36	0	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Emma Sharp (Office Manager)

Date: 30.1.17

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GEO SITE & TESTING SERVICES LTD

UKAS TESTING 2788

Test Report:

Particle Size Distribution Test

BS 1377 Part 2:1990.

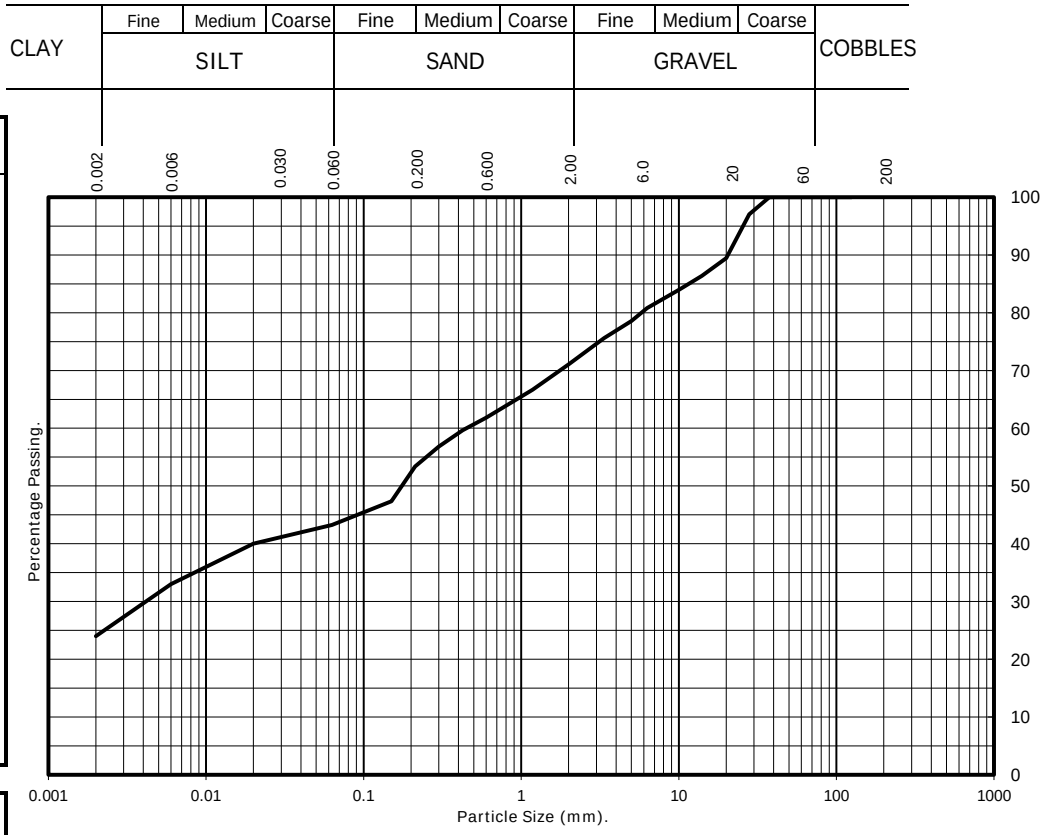
Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref:	P16185	Sample Number:	2
Contract Number:	33812-	Depth from (m):	2.00
Hole Number:	SW03-12	Depth to (m):	N/A
		Sample Type:	B

Location: Galway GCT

Description: Brown silty clayey sandy fine to coarse GRAVEL

BS Test Sieve	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	97
20	89
14	86
10	84
6.3	81
5.0	79
3.35	76
2.00	71
1.18	67
0.60	62
0.425	60
0.300	57
0.212	53
0.150	47
0.063	43



Particle Diameter	% Passing
0.02	40
0.006	33
0.002	24

Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
24	19	28	29	0	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Emma Sharp (Office Manager)

Date: 30.1.17

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Test Report:

Particle Size Distribution Test

BS 1377 Part 2:1990.

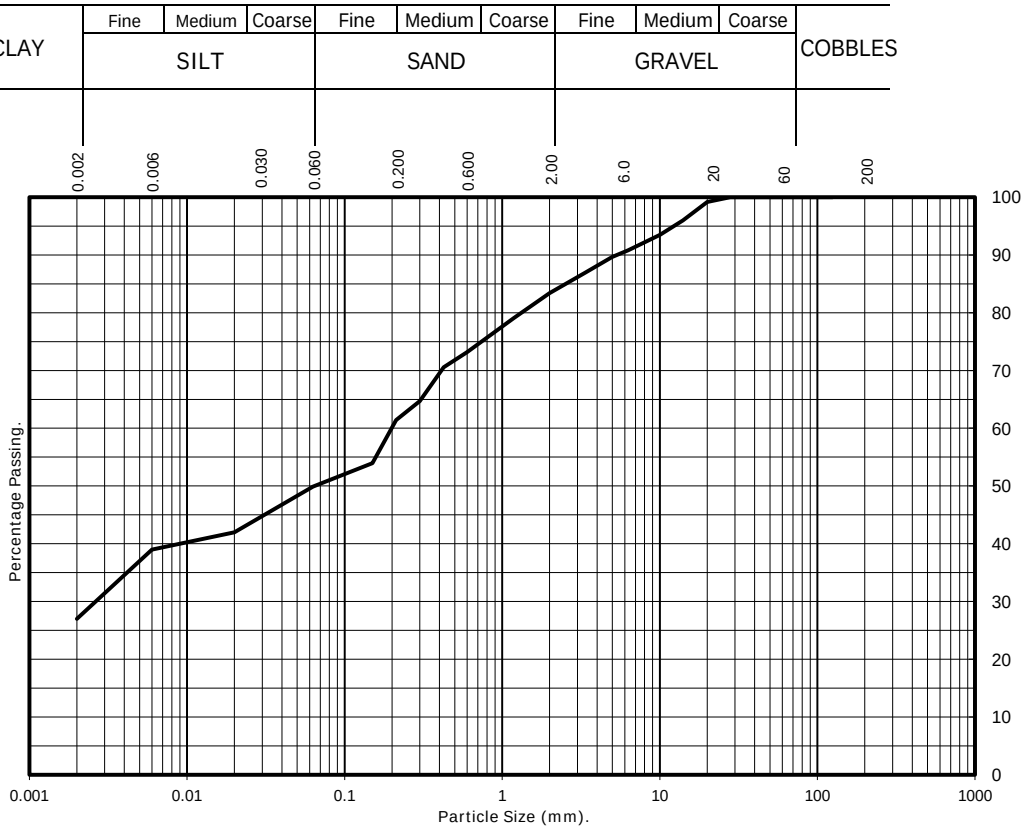
Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref:	P16185	Sample Number:	1
Contract Number:	33812-	Depth from (m):	1.50
Hole Number:	SW03-13	Depth to (m):	N/A
		Sample Type:	B

Location: Galway GCT

Description: Brown fine to coarse gravelly silty clayey SAND.

BS Test Sieve	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	99
14	96
10	93
6.3	91
5.0	90
3.35	87
2.00	83
1.18	79
0.60	73
0.425	71
0.300	65
0.212	61
0.150	54
0.063	50



Particle Diameter	% Passing
0.02	42
0.006	39
0.002	27

Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
27	23	33	17	0	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Emma Sharp (Office Manager)

Date: 30.1.17

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Test Report:

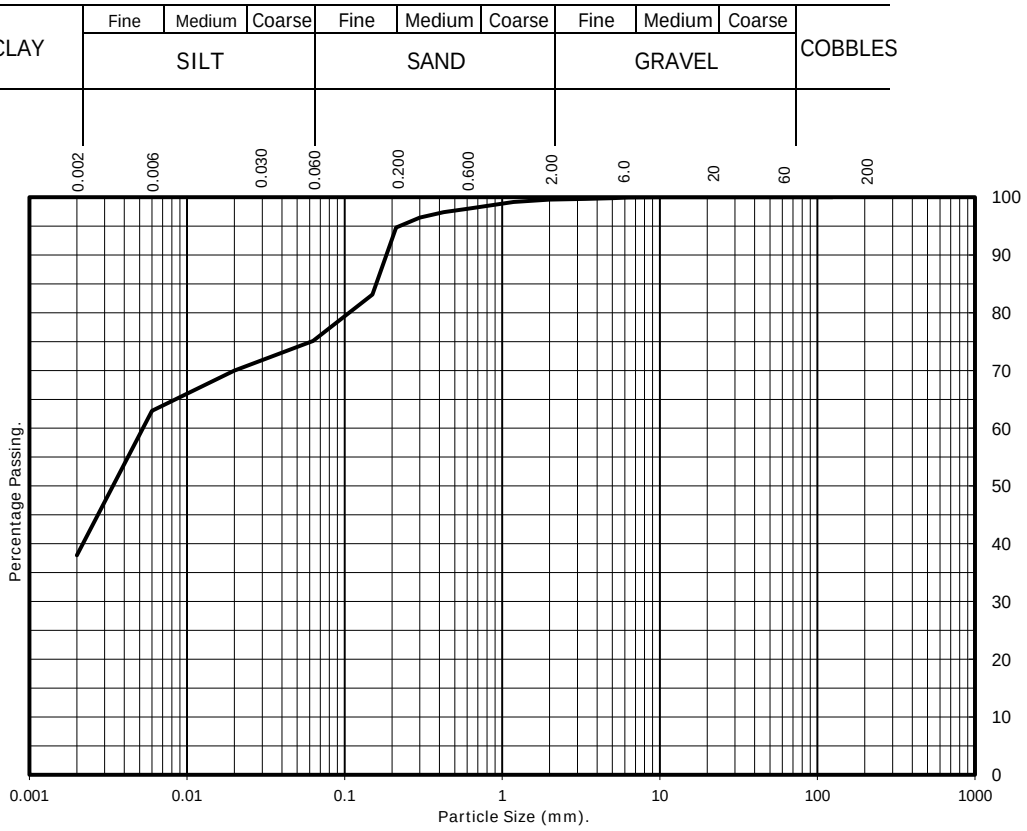
Particle Size Distribution Test

BS 1377 Part 2:1990.

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref:	P16185	Sample Number:	1
Contract Number:	33812-	Depth from (m):	0.50
Hole Number:	SW03-14	Depth to (m):	N/A
		Sample Type:	B
Location:	Galway GCT		
Description:	Brown fine to medium sandy silty CLAY.		

BS Test Sieve	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	100
10	100
6.3	100
5.0	100
3.35	100
2.00	100
1.18	99
0.60	98
0.425	97
0.300	96
0.212	95
0.150	83
0.063	75



Particle Diameter	% Passing
0.02	70
0.006	63
0.002	38

Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
38	37	25	0	0	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Emma Sharp (Office Manager)

Date: 30.1.17

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Test Report:

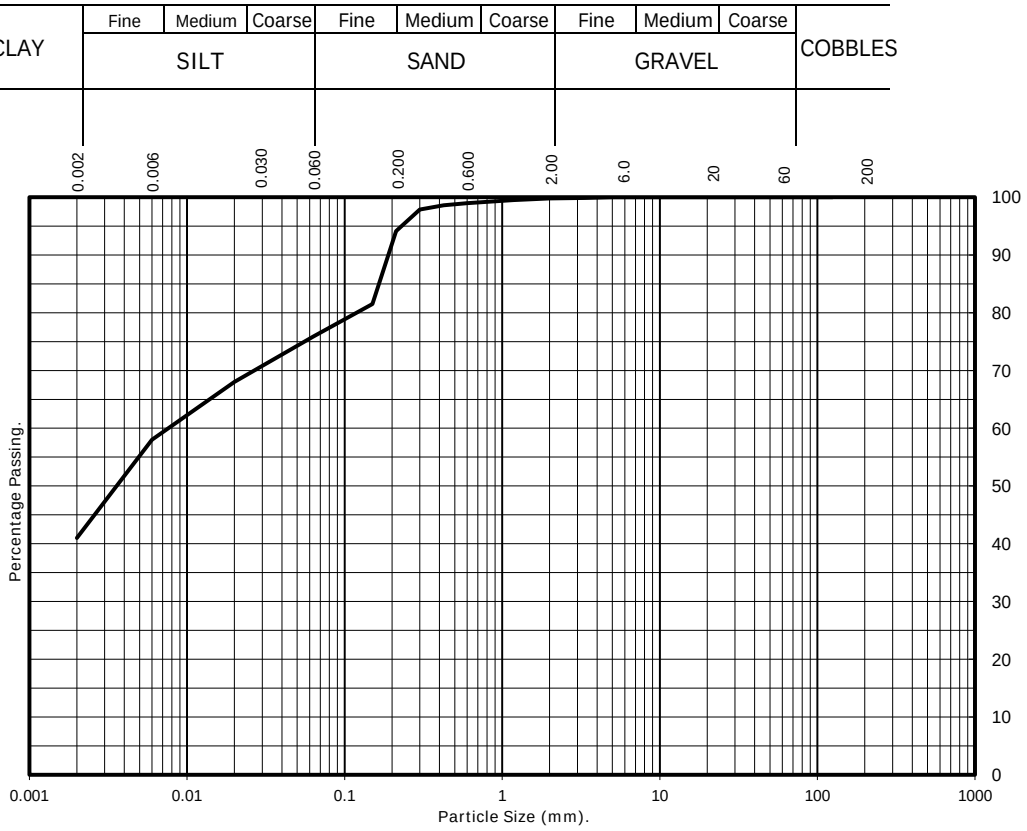
Particle Size Distribution Test

BS 1377 Part 2:1990.

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref:	P16185	Sample Number:	3
Contract Number:	33812-	Depth from (m):	2.00
Hole Number:	SW03-14	Depth to (m):	N/A
		Sample Type:	B
Location:	Galway GCT		
Description:	Brown fine to medium sandy silty CLAY.		

BS Test Sieve	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	100
10	100
6.3	100
5.0	100
3.35	100
2.00	100
1.18	99
0.60	99
0.425	99
0.300	98
0.212	94
0.150	82
0.063	76



Particle Diameter	% Passing
0.02	68
0.006	58
0.002	41

Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
41	35	24	0	0	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Emma Sharp (Office Manager)

Date: 30.1.17

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Test Report:

Particle Size Distribution Test

BS 1377 Part 2:1990.

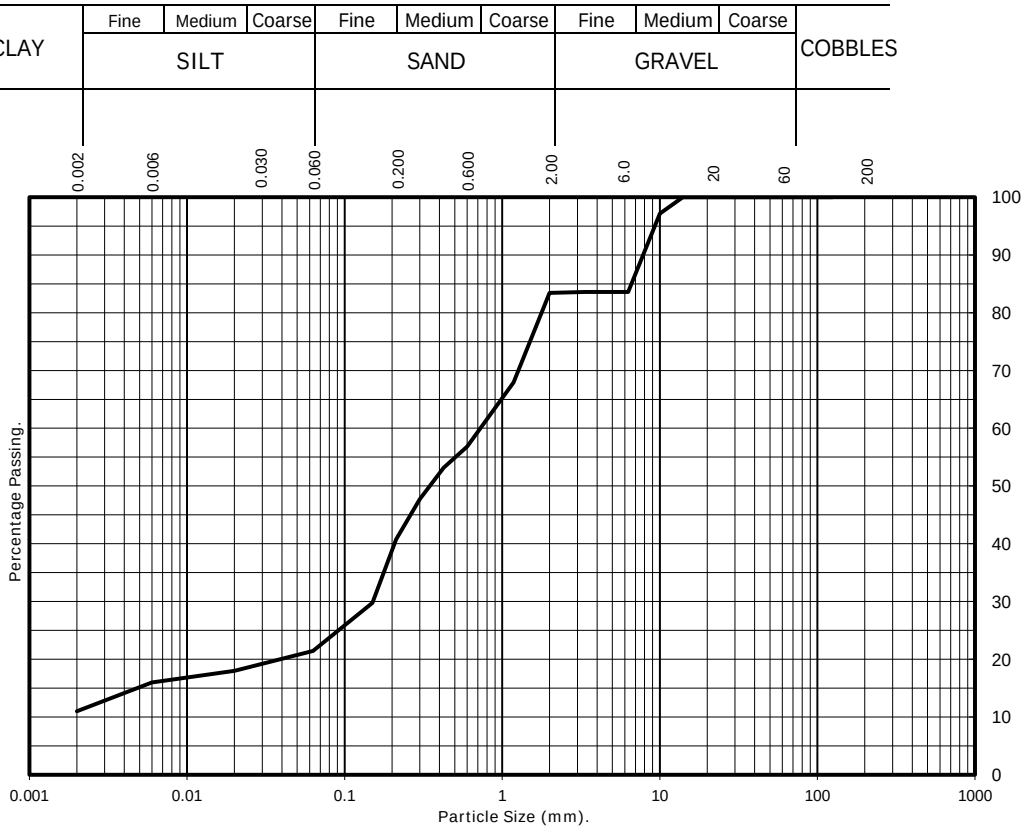
Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref:	P16185	Sample Number:	5
Contract Number:	33812-	Depth from (m):	3.00
Hole Number:	SW03-14	Depth to (m):	N/A
		Sample Type:	B

Location: Galway GCT

Description: Brown fine to medium silty clayey gravelly SAND containing organic material.

BS Test Sieve	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	100
10	97
6.3	84
5.0	84
3.35	84
2.00	83
1.18	68
0.60	57
0.425	53
0.300	48
0.212	41
0.150	30
0.063	21



Particle Diameter	% Passing
0.02	18
0.006	16
0.002	11

Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
11	10	62	17	0	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Emma Sharp (Office Manager)

Date: 30.1.17

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Test Report:

Particle Size Distribution Test

BS 1377 Part 2:1990.

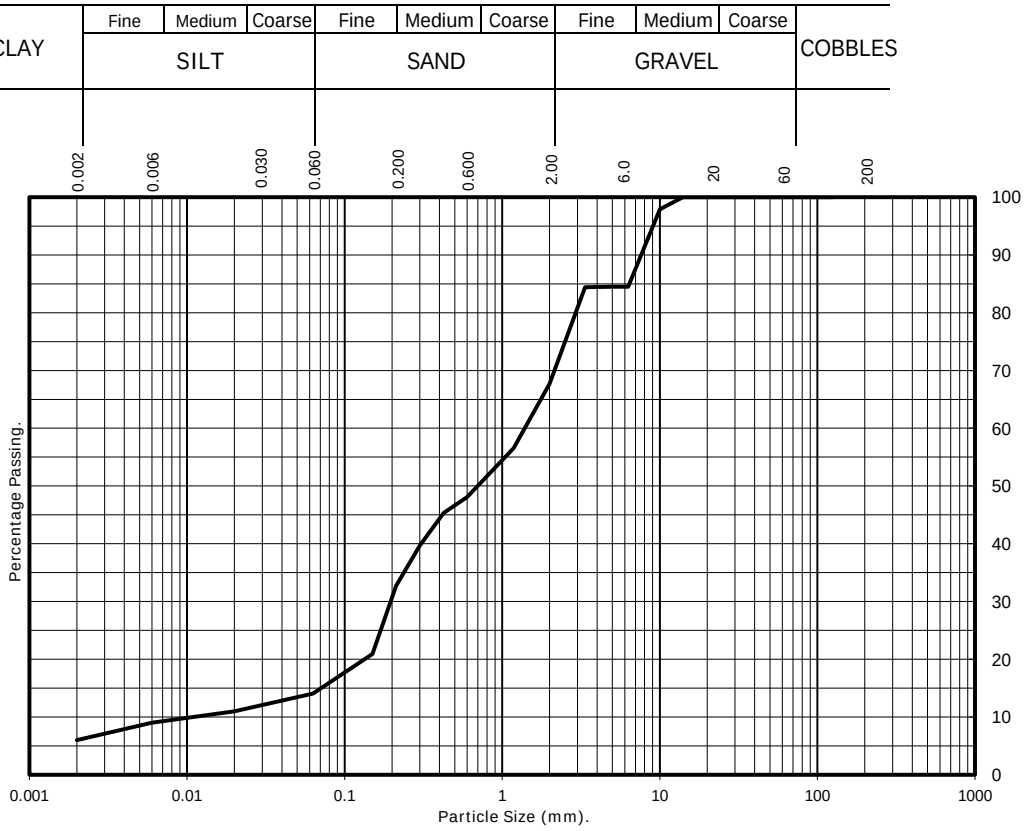
Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref:	P16185	Sample Number:	7
Contract Number:	33812-	Depth from (m):	4.00
Hole Number:	SW03-14	Depth to (m):	N/A
		Sample Type:	B

Location: Galway GCT

Description: Brown fine to medium clayey silty gravelly SAND containing organic material.

BS Test Sieve	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	100
10	98
6.3	84
5.0	84
3.35	84
2.00	68
1.18	57
0.60	48
0.425	45
0.300	40
0.212	33
0.150	21
0.063	14



Particle Diameter	% Passing
0.02	11
0.006	9
0.002	6

Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
6	8	54	32	0	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Emma Sharp (Office Manager)

Date: 30.1.17

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Test Report:

Particle Size Distribution Test

BS 1377 Part 2:1990.

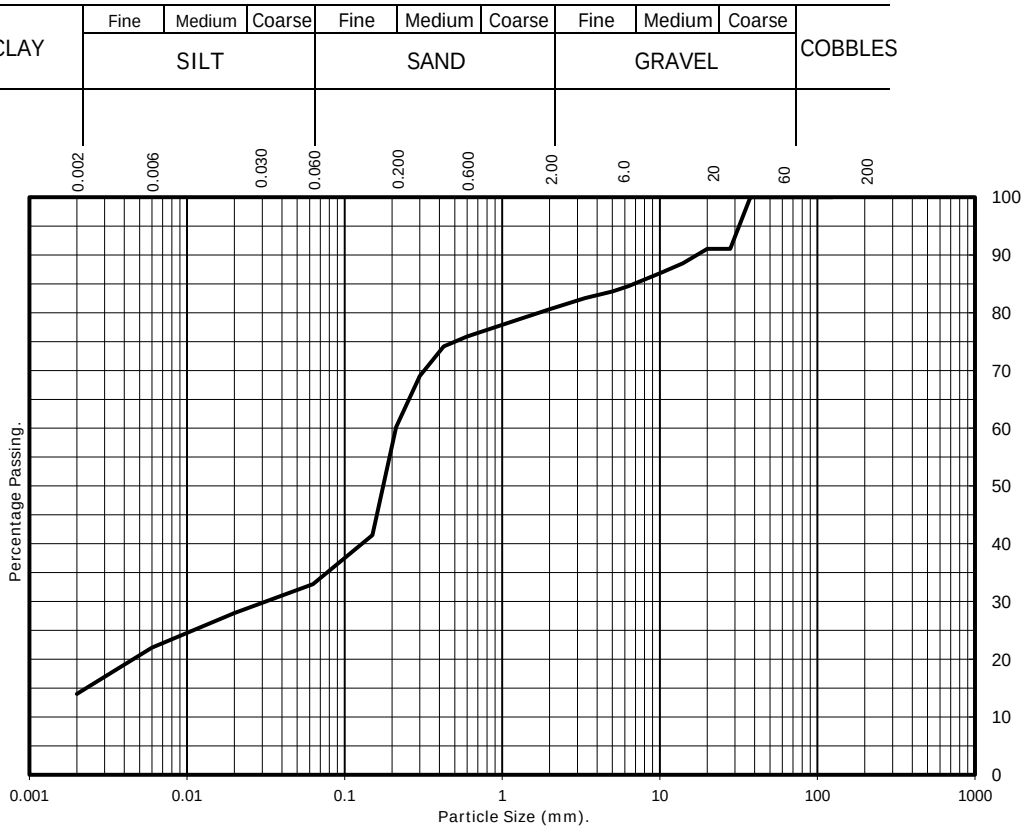
Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref:	P16185	Sample Number:	1
Contract Number:	33812-	Depth from (m):	0.50
Hole Number:	SW03-15	Depth to (m):	N/A
		Sample Type:	B

Location: Galway GCT

Description: Brown clayey silty fine to coarse gravelly SAND.

BS Test Sieve	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	91
20	91
14	89
10	87
6.3	85
5.0	84
3.35	83
2.00	81
1.18	79
0.60	76
0.425	74
0.300	69
0.212	60
0.150	42
0.063	33



Particle Diameter	% Passing
0.02	28
0.006	22
0.002	14

Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
14	19	48	19	0	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Emma Sharp (Office Manager)

Date: 30.1.17

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GEO SITE & TESTING SERVICES LTD

UKAS TESTING 2788

Test Report:

Particle Size Distribution Test

BS 1377 Part 2:1990.

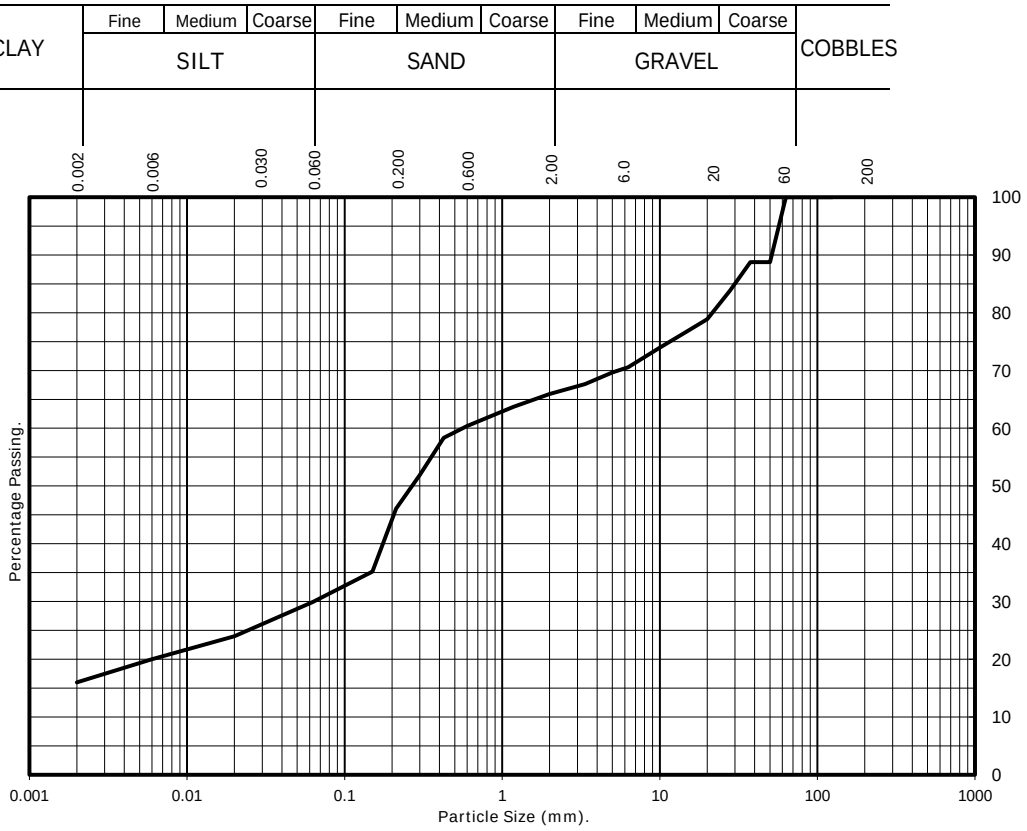
Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref:	P16185	Sample Number:	3
Contract Number:	33812-	Depth from (m):	1.50
Hole Number:	SW03-15	Depth to (m):	N/A
		Sample Type:	B

Location: Galway GCT

Description: Brown silty clayey fine to coarse gravelly SAND.

BS Test Sieve	% Passing
125	100
90	100
75	100
63	100
50	89
37.5	89
28	84
20	79
14	76
10	74
6.3	71
5.0	70
3.35	68
2.00	66
1.18	64
0.60	60
0.425	58
0.300	52
0.212	46
0.150	35
0.063	30



Particle Diameter	% Passing
0.02	24
0.006	20
0.002	16

Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
16	14	36	34	0	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Emma Sharp (Office Manager)

Date: 30.1.17

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UKAS TESTING 2788

Test Report:

Particle Size Distribution Test

BS 1377 Part 2:1990.

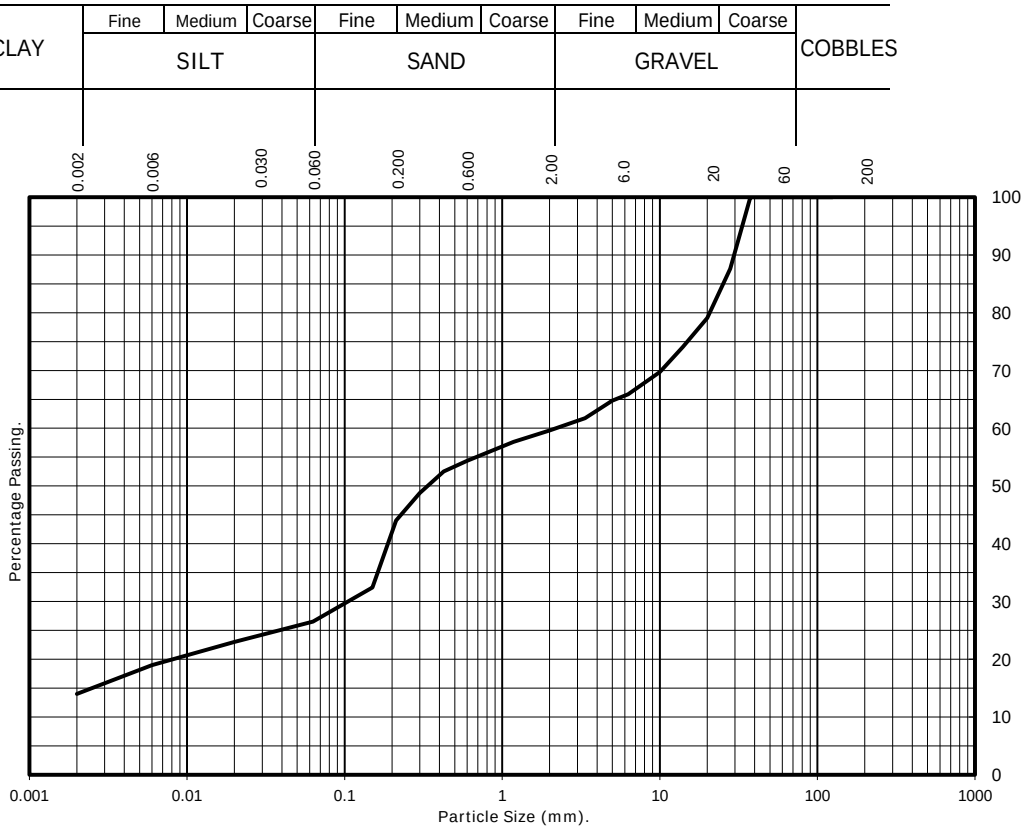
Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref:	P16185	Sample Number:	5
Contract Number:	33812-	Depth from (m):	2.50
Hole Number:	SW03-15	Depth to (m):	N/A
		Sample Type:	B

Location: Galway GCT

Description: Brown silty clayey sandy fine to coarse GRAVEL.

BS Test Sieve	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	88
20	79
14	74
10	70
6.3	66
5.0	65
3.35	62
2.00	60
1.18	58
0.60	54
0.425	53
0.300	49
0.212	44
0.150	32
0.063	27



Particle Diameter	% Passing
0.02	23
0.006	19
0.002	14

Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
14	13	33	40	0	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Emma Sharp (Office Manager)

Date: 30.1.17

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GEO SITE & TESTING SERVICES LTD

UKAS TESTING 2788

Test Report:

Particle Size Distribution Test

BS 1377 Part 2:1990.

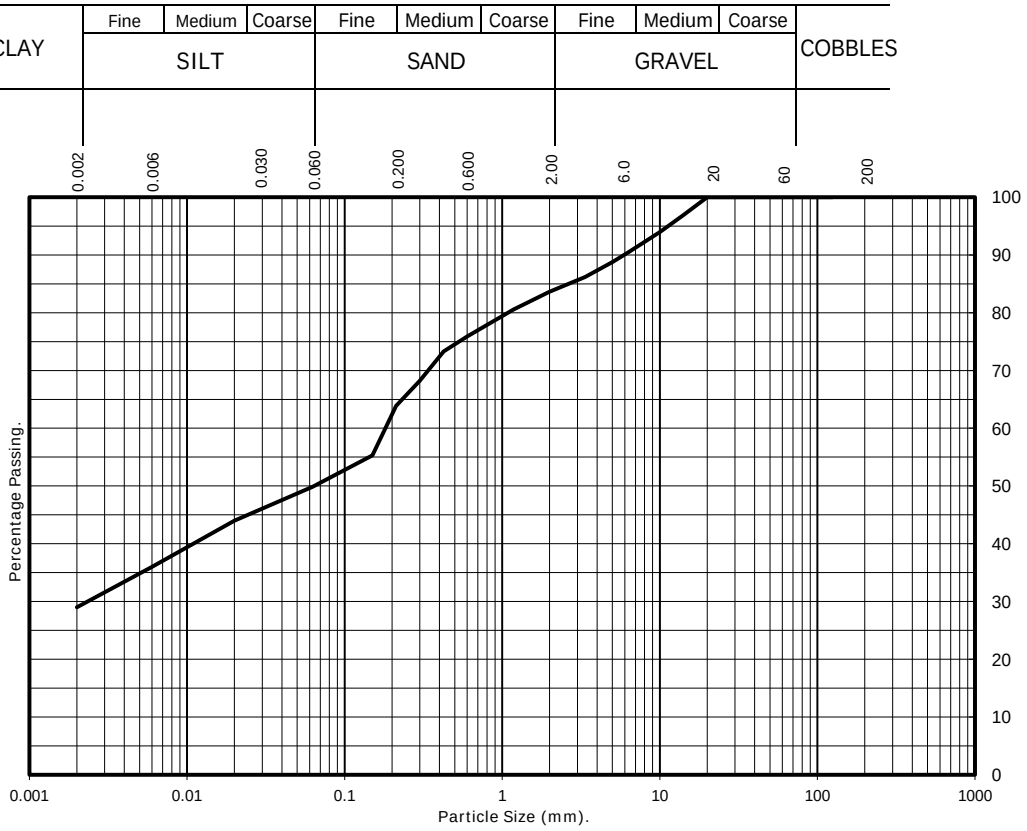
Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref:	P16185	Sample Number:	5
Contract Number:	33812-	Depth from (m):	3.50
Hole Number:	SW03-15	Depth to (m):	N/A
		Sample Type:	B

Location: Galway GCT

Description: Brown gravelly silty clayey sandy fine to coarse SAND.

BS Test Sieve	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	97
10	94
6.3	90
5.0	89
3.35	86
2.00	84
1.18	81
0.60	76
0.425	73
0.300	68
0.212	64
0.150	55
0.063	50



Particle Diameter	% Passing
0.02	44
0.006	36
0.002	29

Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
29	21	34	16	0	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Emma Sharp (Office Manager)

Date: 30.1.17

GSTL
GEO SITE & TESTING SERVICES LTD

UKAS TESTING 2788

Test Report:

Particle Size Distribution Test

BS 1377 Part 2:1990.

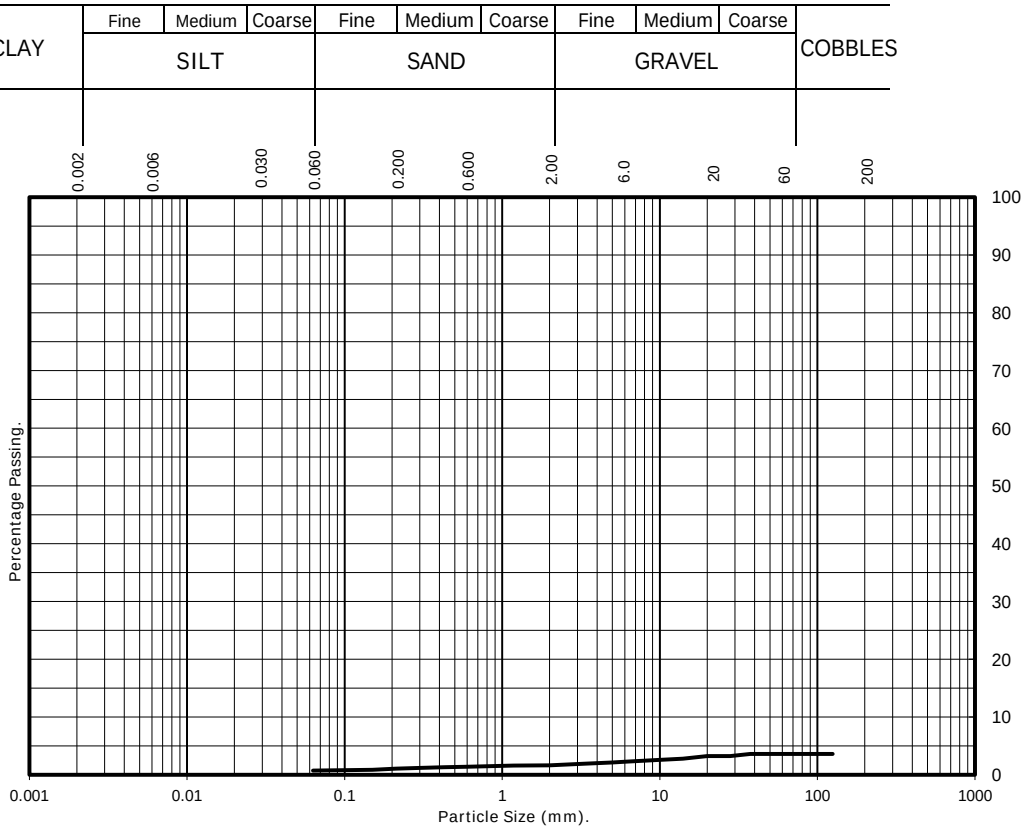
Wet Sieve, Clause 9.2

Client ref:	P16185	Sample Number:	3
Contract Number:	33812-	Depth from (m):	1.50
Hole Number:	SW03-16	Depth to (m):	N/A
		Sample Type:	B

Location: Galway GCT

Description: Brown silty clayey sandy fine to coarse GRAVEL with one large cobble.

BS Test Sieve	% Passing
125	4
90	4
75	4
63	4
50	4
37.5	4
28	3
20	3
14	3
10	3
6.3	2
5.0	2
3.35	2
2.00	2
1.18	2
0.60	1
0.425	1
0.300	1
0.212	1
0.150	1
0.063	1



Particle Diameter	% Passing
0.02	#
0.006	#
0.002	#

	Silt and Clay	Sand	Gravel	Cobbles	Soil Fraction
	1	1	2	96	Total Percentage

Remarks:

#- not determined

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Emma Sharp (Office Manager)

Date: 3.2.17

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GEO SITE & TESTING SERVICES LTD

UKAS TESTING 2788

Test Report:

Particle Size Distribution Test

BS 1377 Part 2:1990.

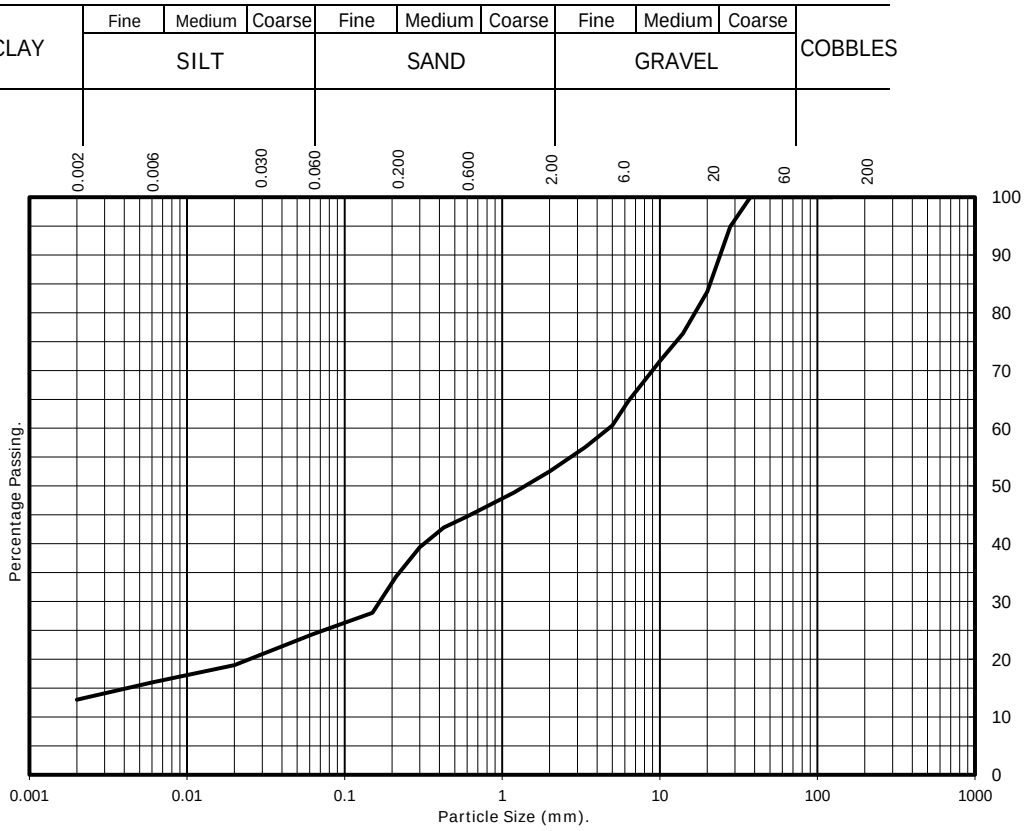
Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref:	P16185	Sample Number:	5
Contract Number:	33812-	Depth from (m):	3.00
Hole Number:	SW03-16	Depth to (m):	N/A
		Sample Type:	B

Location: Galway GCT

Description: Brown silty clayey sandy fine to coarse GRAVEL.

BS Test Sieve	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	95
20	84
14	76
10	72
6.3	65
5.0	60
3.35	57
2.00	53
1.18	49
0.60	45
0.425	43
0.300	39
0.212	34
0.150	28
0.063	24



Particle Diameter	% Passing
0.02	19
0.006	16
0.002	13

Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
13	11	29	47	0	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Emma Sharp (Office Manager)

Date: 30.1.17

GSTL
GEO SITE & TESTING SERVICES LTD

UKAS TESTING 2788

Test Report:

Particle Size Distribution Test

BS 1377 Part 2:1990.

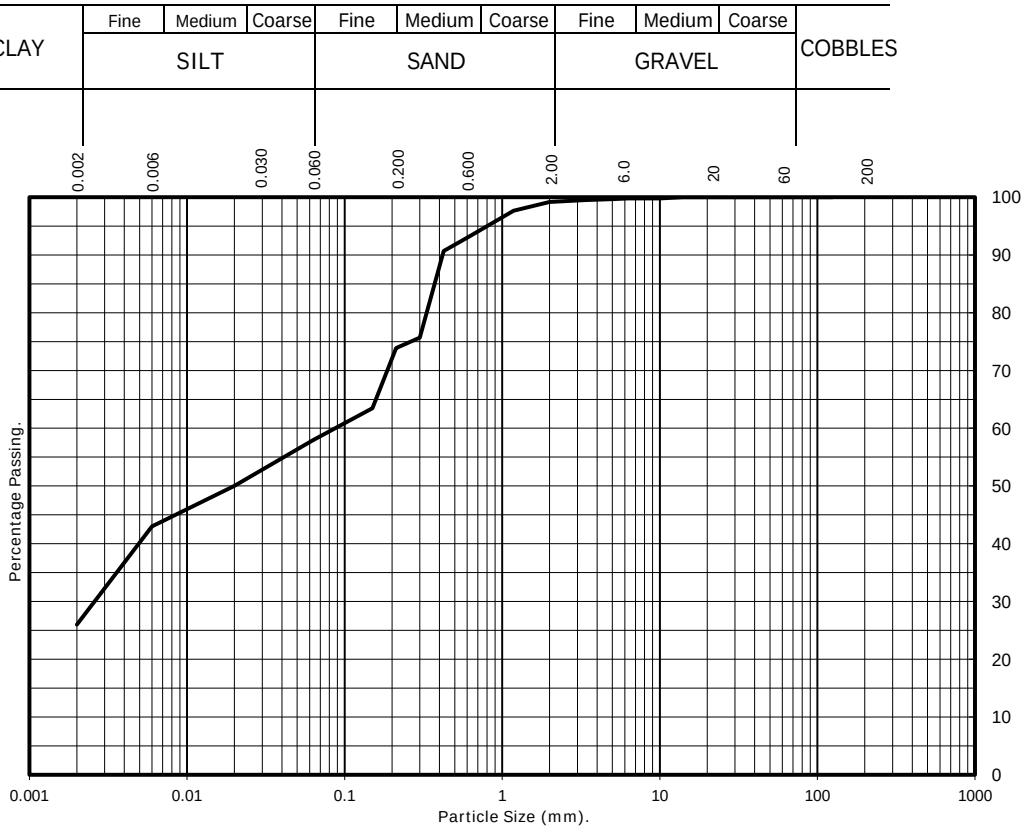
Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref:	P16185	Sample Number:	1
Contract Number:	33812-	Depth from (m):	0.20
Hole Number:	SW03-17	Depth to (m):	N/A
		Sample Type:	B

Location: Galway GCT

Description: Brown gravelly clayey silty fine to medium SAND.

BS Test Sieve	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	100
10	100
6.3	100
5.0	100
3.35	99
2.00	99
1.18	98
0.60	93
0.425	91
0.300	76
0.212	74
0.150	63
0.063	58



Particle Diameter	% Passing
0.02	50
0.006	43
0.002	26

Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
26	32	41	1	0	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Emma Sharp (Office Manager)

Date: 30.1.17

GSTL
GEO SITE & TESTING SERVICES LTD

UKAS TESTING 2788

Test Report:

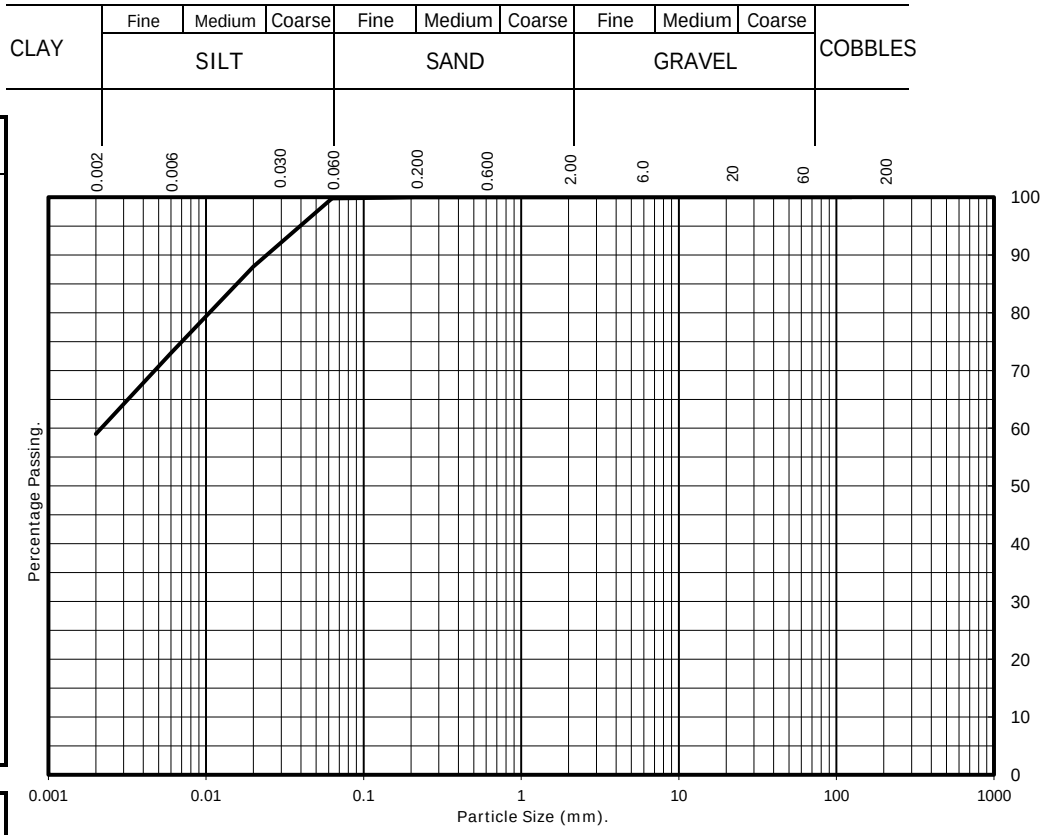
Particle Size Distribution Test

BS 1377 Part 2:1990.

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref:	P16185	Sample Number:	3
Contract Number:	33812-	Depth from (m):	0.50
Hole Number:	SW03-17	Depth to (m):	N/A
		Sample Type:	B
Location:	Galway GCT		
Description:	Brown silty CLAY.		

BS Test Sieve	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	100
10	100
6.3	100
5.0	100
3.35	100
2.00	100
1.18	100
0.60	100
0.425	100
0.300	100
0.212	100
0.150	100
0.063	100



Particle Diameter	% Passing
0.02	88
0.006	73
0.002	59

Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
59	41	0	0	0	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Emma Sharp (Office Manager)

Date: 30.1.17

GSTL
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2788

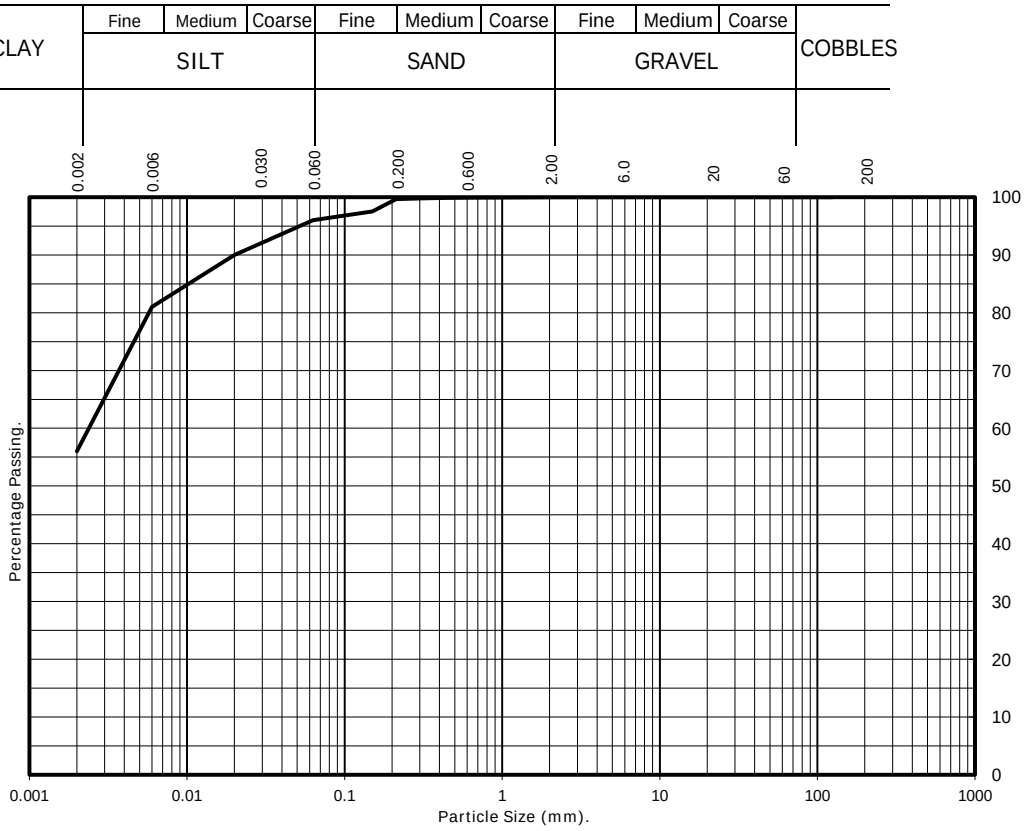
Test Report:

Particle Size Distribution Test

BS 1377 Part 2:1990.

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref:	P16185	Sample Number:	1
Contract Number:	33812-	Depth from (m):	0.50
Hole Number:	SW03-18	Depth to (m):	N/A
		Sample Type:	B
Location:	Galway GCT		
Description:	Brown slightly sandy silty CLAY.		



BS Test Sieve	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	100
10	100
6.3	100
5.0	100
3.35	100
2.00	100
1.18	100
0.60	100
0.425	100
0.300	100
0.212	100
0.150	98
0.063	96

Particle Diameter	% Passing
0.02	90
0.006	81
0.002	56

Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
56	40	4	0	0	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Emma Sharp (Office Manager)

Date: 30.1.17

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GEO SITE & TESTING SERVICES LTD

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Test Report:

Particle Size Distribution Test

BS 1377 Part 2:1990.

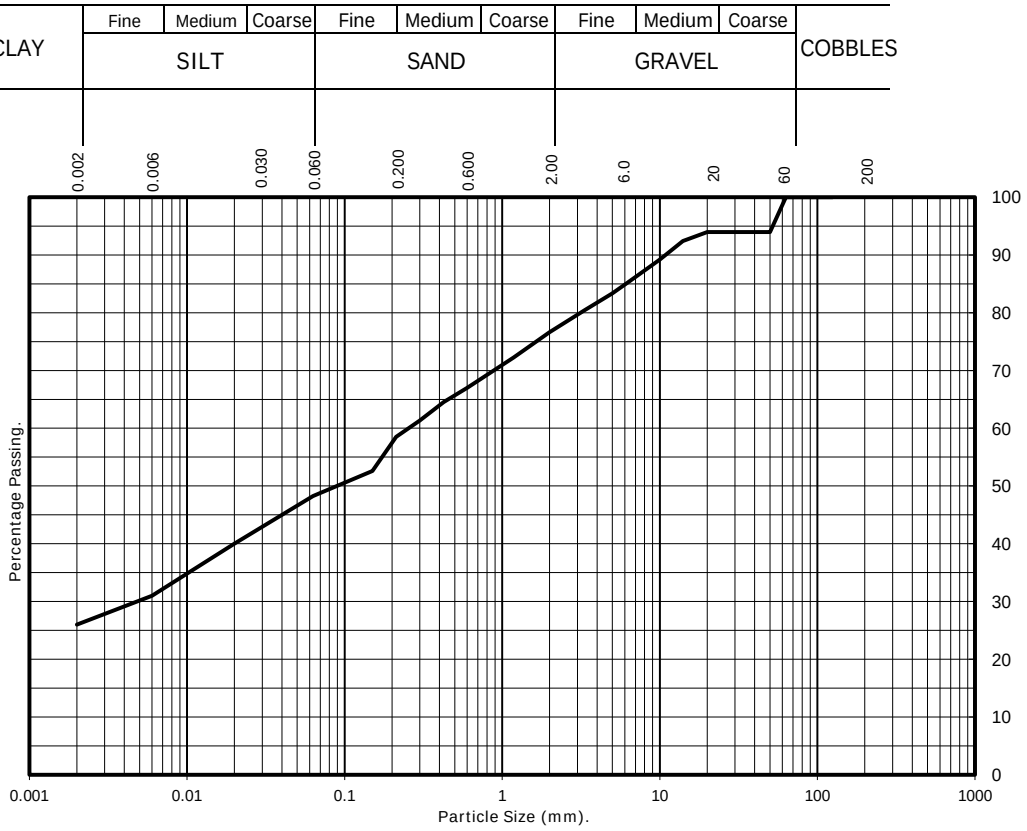
Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref:	P16185	Sample Number:	3
Contract Number:	33812-	Depth from (m):	1.50
Hole Number:	SW03-18	Depth to (m):	N/A
		Sample Type:	B

Location: Galway GCT

Description: Brown silty fine to coarse gravelly clayey SAND.

BS Test Sieve	% Passing
125	100
90	100
75	100
63	100
50	94
37.5	94
28	94
20	94
14	92
10	89
6.3	85
5.0	83
3.35	80
2.00	77
1.18	72
0.60	67
0.425	65
0.300	61
0.212	59
0.150	53
0.063	48



Particle Diameter	% Passing
0.02	40
0.006	31
0.002	26

Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
26	22	29	23	0	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
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Date: 31.1.17

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Test Report:

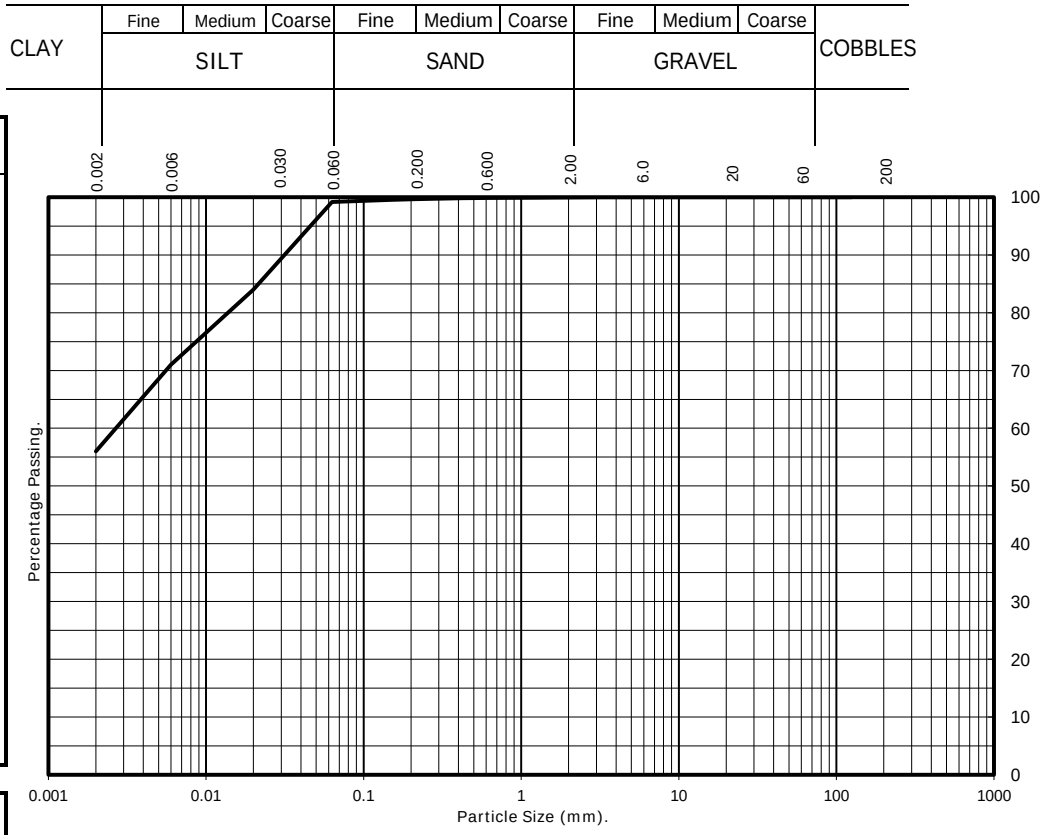
Particle Size Distribution Test

BS 1377 Part 2:1990.

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref:	P16185	Sample Number:	5
Contract Number:	33812-	Depth from (m):	2.00
Hole Number:	SW03-18	Depth to (m):	N/A
		Sample Type:	B
Location:	Galway GCT		
Description:	Brown fine sandy silty CLAY.		

BS Test Sieve	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	100
10	100
6.3	100
5.0	100
3.35	100
2.00	100
1.18	100
0.60	100
0.425	100
0.300	100
0.212	100
0.150	100
0.063	99



Particle Diameter	% Passing
0.02	84
0.006	71
0.002	56

Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
56	43	1	0	0	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
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Test Report:

Particle Size Distribution Test

BS 1377 Part 2:1990.

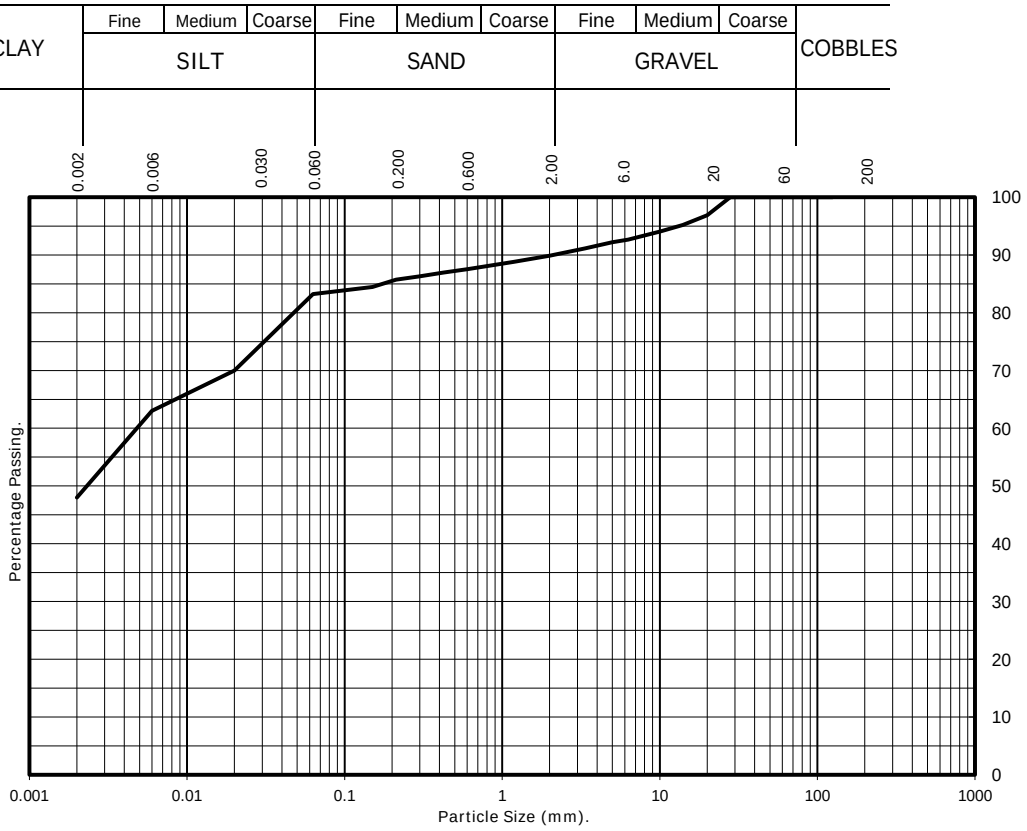
Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref:	P16185	Sample Number:	7
Contract Number:	33812-	Depth from (m):	3.00
Hole Number:	SW03-18	Depth to (m):	N/A
		Sample Type:	B

Location: Galway GCT

Description: Brown sandy fine to coarse gravelly silty CLAY.

BS Test Sieve	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	97
14	95
10	94
6.3	93
5.0	92
3.35	91
2.00	90
1.18	89
0.60	88
0.425	87
0.300	86
0.212	86
0.150	84
0.063	83



Particle Diameter	% Passing
0.02	70
0.006	63
0.002	48

Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
48	35	7	10	0	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Emma Sharp (Office Manager)

Date: 31.1.17

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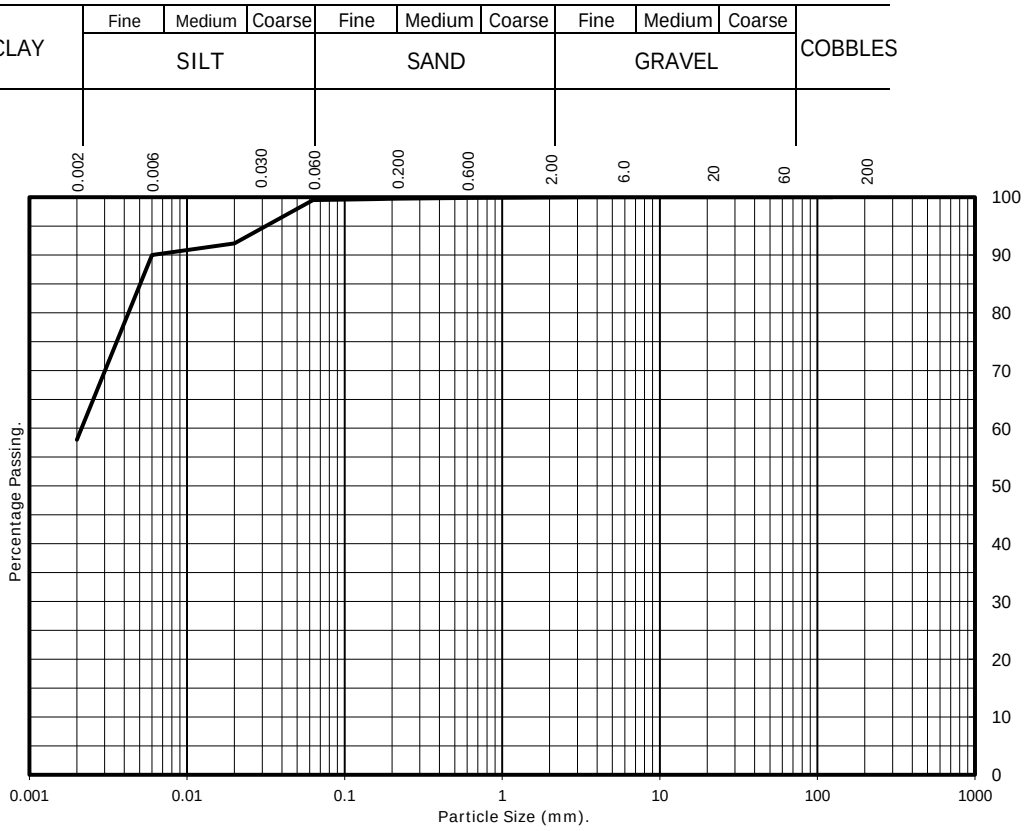
Test Report:

Particle Size Distribution Test

BS 1377 Part 2:1990.

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref:	P16185	Sample Number:	9
Contract Number:	33812-	Depth from (m):	3.50
Hole Number:	SW03-18	Depth to (m):	N/A
		Sample Type:	B
Location:	Galway GCT		
Description:	Greyish brown silty CLAY.		



BS Test Sieve	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	100
10	100
6.3	100
5.0	100
3.35	100
2.00	100
1.18	100
0.60	100
0.425	100
0.300	100
0.212	100
0.150	100
0.063	100

Particle Diameter	% Passing
0.02	92
0.006	90
0.002	58

Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
58	42	0	0	0	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Emma Sharp (Office Manager)

Date: 31.1.17

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Test Report:

Particle Size Distribution Test

BS 1377 Part 2:1990.

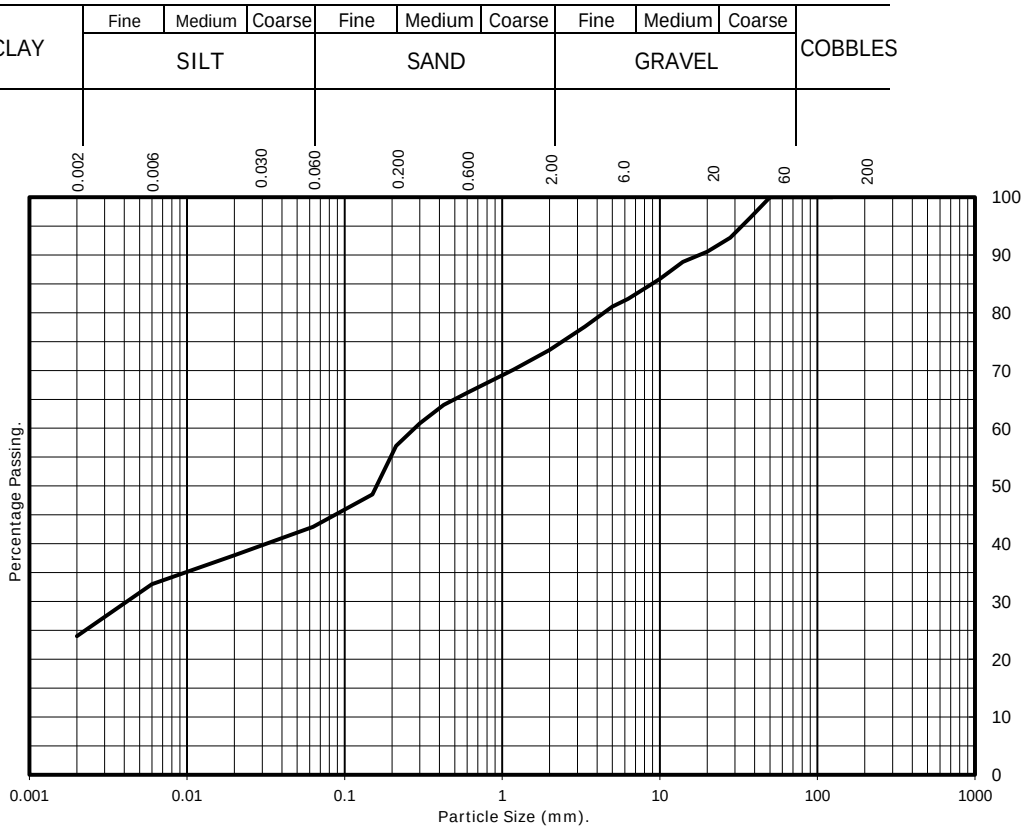
Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref:	P16185	Sample Number:	1
Contract Number:	33812-	Depth from (m):	0.80
Hole Number:	TP03	Depth to (m):	N/A
		Sample Type:	B

Location: Galway GCT

Description: Brown silty clayey fine to coarse gravelly SAND.

BS Test Sieve	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	96
28	93
20	91
14	89
10	86
6.3	82
5.0	81
3.35	78
2.00	74
1.18	70
0.60	66
0.425	64
0.300	61
0.212	57
0.150	49
0.063	43



Particle Diameter	% Passing
0.02	38
0.006	33
0.002	24

Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
24	19	31	26	0	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Emma Sharp (Office Manager)

Date: 31.1.17

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GEO SITE & TESTING SERVICES LTD

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Test Report:

Particle Size Distribution Test

BS 1377 Part 2:1990.

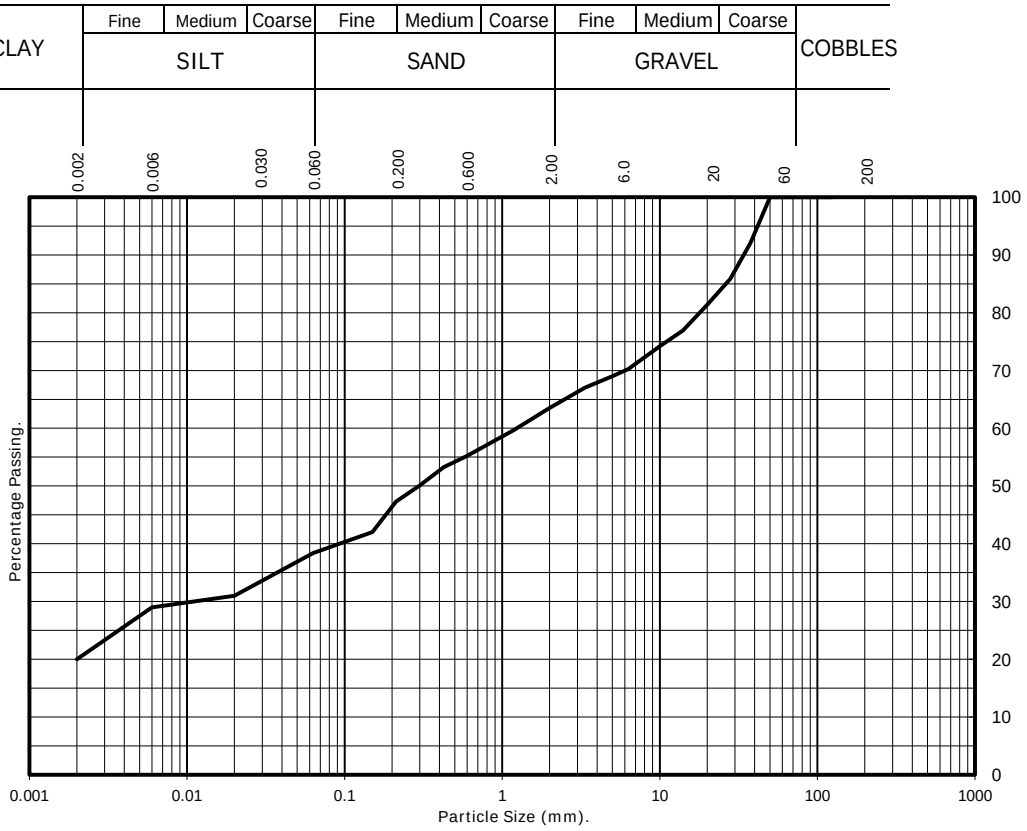
Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref:	P16185	Sample Number:	3
Contract Number:	33812-	Depth from (m):	1.50
Hole Number:	TP03-50	Depth to (m):	N/A
		Sample Type:	B

Location: Galway GCT

Description: Brown silty clayey fine to coarse sandy GRAVEL.

BS Test Sieve	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	92
28	86
20	81
14	77
10	74
6.3	70
5.0	69
3.35	67
2.00	64
1.18	60
0.60	55
0.425	53
0.300	50
0.212	47
0.150	42
0.063	38



Particle Diameter	% Passing
0.02	31
0.006	29
0.002	20

Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
20	18	26	36	0	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Emma Sharp (Office Manager)

Date: 31.1.17

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GEO SITE & TESTING SERVICES LTD

UKAS TESTING 2788

Test Report:

Particle Size Distribution Test

BS 1377 Part 2:1990.

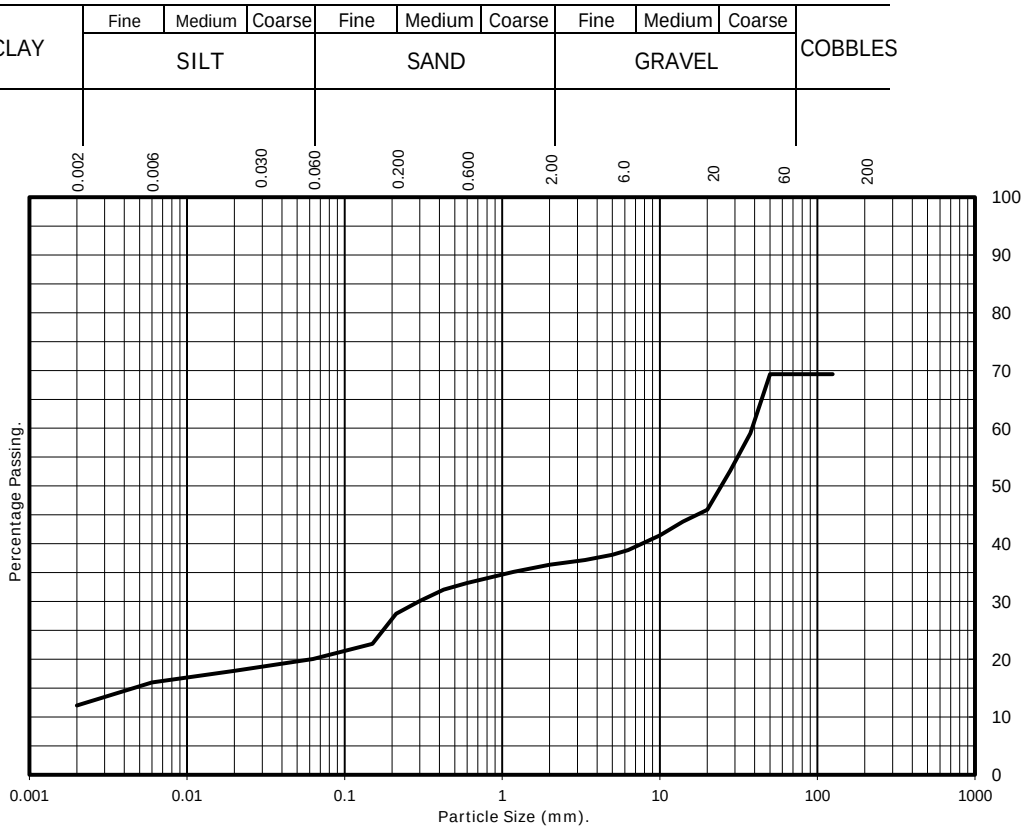
Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref:	P16185	Sample Number:	5
Contract Number:	33812-	Depth from (m):	2.00
Hole Number:	TP03-50	Depth to (m):	N/A
		Sample Type:	B

Location: Galway GCT

Description: Brown silty clayey fine to coarse sandy GRAVEL with many cobbles.

BS Test Sieve	% Passing
125	69
90	69
75	69
63	69
50	69
37.5	59
28	53
20	46
14	44
10	41
6.3	39
5.0	38
3.35	37
2.00	36
1.18	35
0.60	33
0.425	32
0.300	30
0.212	28
0.150	23
0.063	20



Particle Diameter	% Passing
0.02	18
0.006	16
0.002	12

Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
12	8	16	33	31	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Emma Sharp (Office Manager)

Date: 31.1.17

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GEO SITE & TESTING SERVICES LTD

UKAS TESTING 2788

Test Report:

Particle Size Distribution Test

BS 1377 Part 2:1990.

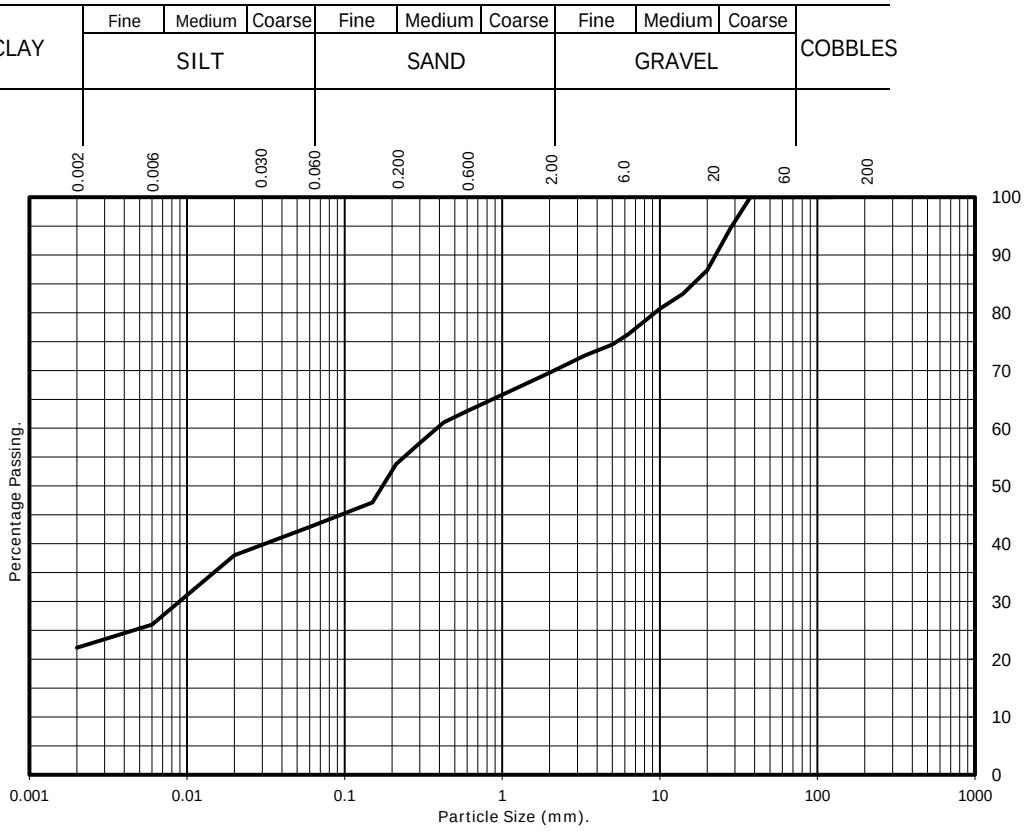
Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref:	P16185	Sample Number:	7
Contract Number:	33812-	Depth from (m):	3.00
Hole Number:	TP03-50	Depth to (m):	N/A
		Sample Type:	B

Location: Galway GCT

Description: Brown silty clayey fine to coarse sandy GRAVEL.

BS Test Sieve	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	95
20	87
14	83
10	81
6.3	76
5.0	75
3.35	73
2.00	70
1.18	67
0.60	63
0.425	61
0.300	57
0.212	54
0.150	47
0.063	43



Particle Diameter	% Passing
0.02	38
0.006	26
0.002	22

Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
22	21	27	30	0	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
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Date: 31.1.17

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Test Report:

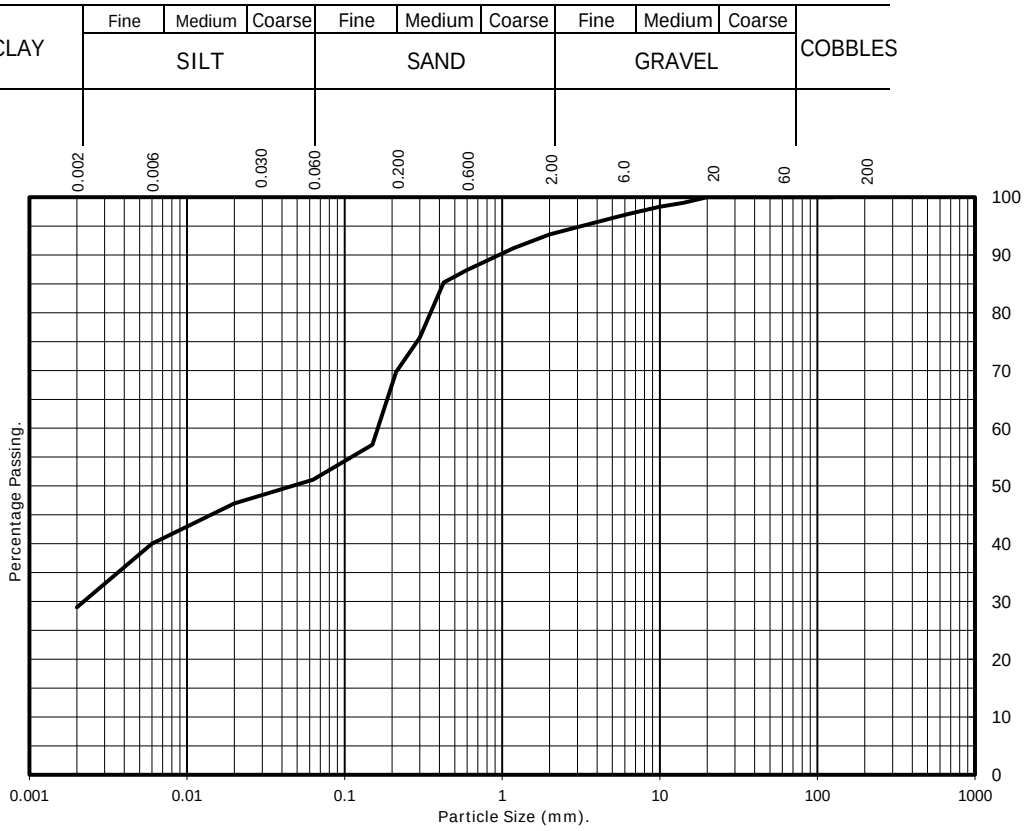
Particle Size Distribution Test

BS 1377 Part 2:1990.

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref:	P16185	Sample Number:	1
Contract Number:	33812-	Depth from (m):	0.20
Hole Number:	TP03-52	Depth to (m):	N/A
		Sample Type:	B
Location:	Galway GCT		
Description:	Brown gravelly silty clayey fine SAND.		

BS Test Sieve	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	99
10	98
6.3	97
5.0	96
3.35	95
2.00	94
1.18	91
0.60	87
0.425	85
0.300	76
0.212	70
0.150	57
0.063	51



Particle Diameter	% Passing
0.02	47
0.006	40
0.002	29

Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
29	22	43	6	0	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Emma Sharp (Office Manager)

Date: 31.1.17

GSTL
GEO SITE & TESTING SERVICES LTD

UKAS TESTING 2788

Test Report:

Particle Size Distribution Test

BS 1377 Part 2:1990.

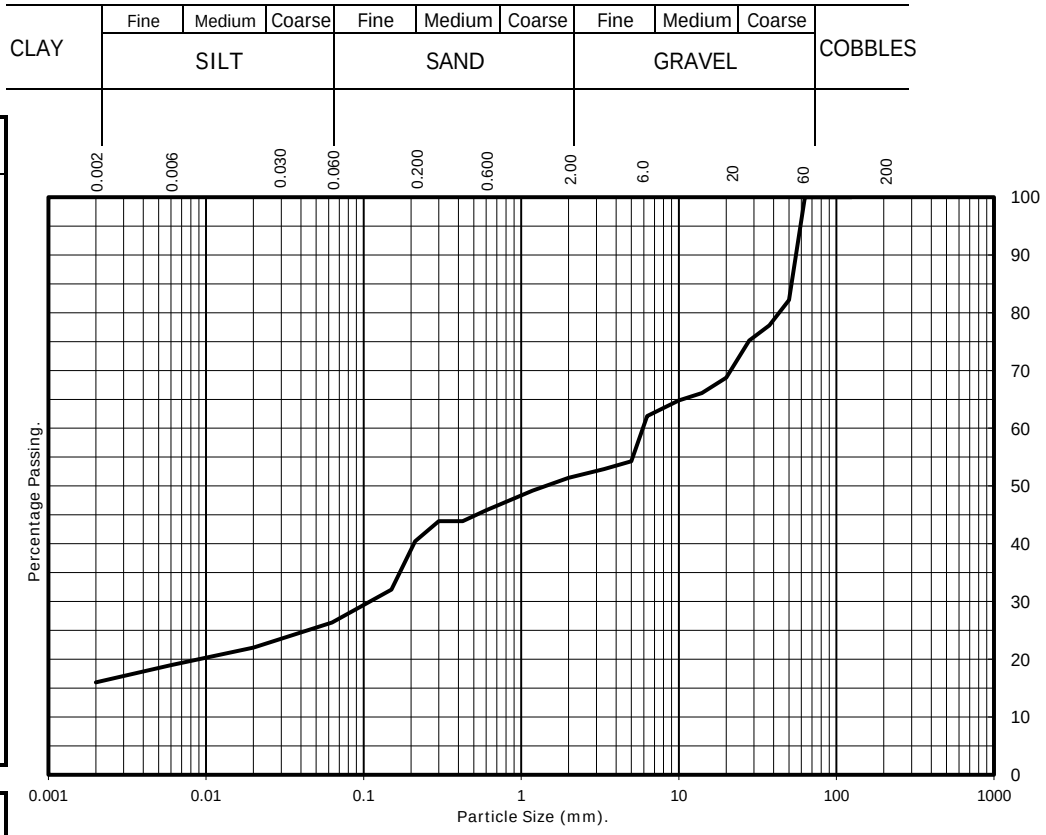
Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref:	P16185	Sample Number:	3
Contract Number:	33812-	Depth from (m):	0.50
Hole Number:	TP03-52	Depth to (m):	N/A
		Sample Type:	B

Location: Galway GCT

Description: Brown silty clayey sandy fine to coarse GRAVEL.

BS Test Sieve	% Passing
125	100
90	100
75	100
63	100
50	82
37.5	78
28	75
20	69
14	66
10	65
6.3	62
5.0	54
3.35	53
2.00	51
1.18	49
0.60	46
0.425	44
0.300	44
0.212	40
0.150	32
0.063	26



Particle Diameter	% Passing
0.02	22
0.006	19
0.002	16

Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
16	10	25	49	0	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Emma Sharp (Office Manager)

Date: 31.1.17

GSTL
GEO SITE & TESTING SERVICES LTD

UKAS TESTING 2788

Test Report:

Particle Size Distribution Test

BS 1377 Part 2:1990.

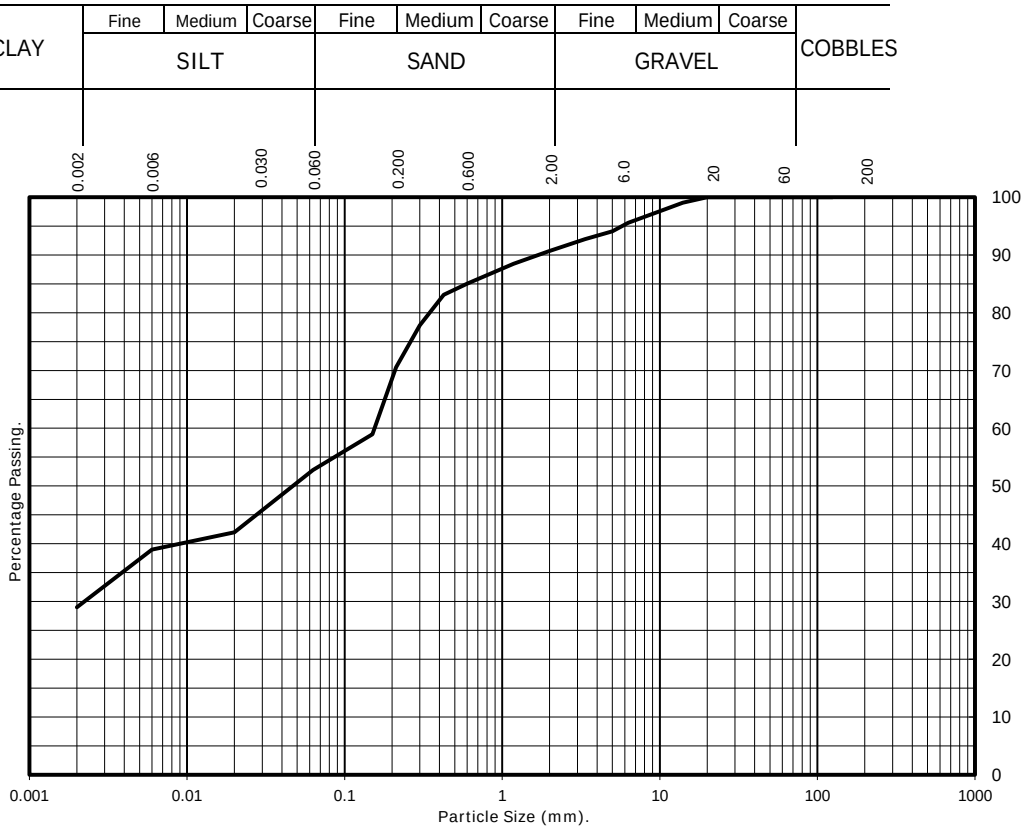
Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref:	P16185	Sample Number:	1
Contract Number:	33812-	Depth from (m):	0.50
Hole Number:	TP03-53	Depth to (m):	N/A
		Sample Type:	B

Location: Galway GCT

Description: Brown gravelly silty clayey fine to coarse SAND.

BS Test Sieve	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	99
10	98
6.3	96
5.0	94
3.35	93
2.00	91
1.18	88
0.60	85
0.425	83
0.300	78
0.212	71
0.150	59
0.063	53



Particle Diameter	% Passing
0.02	42
0.006	39
0.002	29

Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
29	24	38	9	0	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Emma Sharp (Office Manager)

Date: 31.1.17

GSTL
GEO SITE & TESTING SERVICES LTD

UKAS TESTING 2788

Test Report:

Particle Size Distribution Test

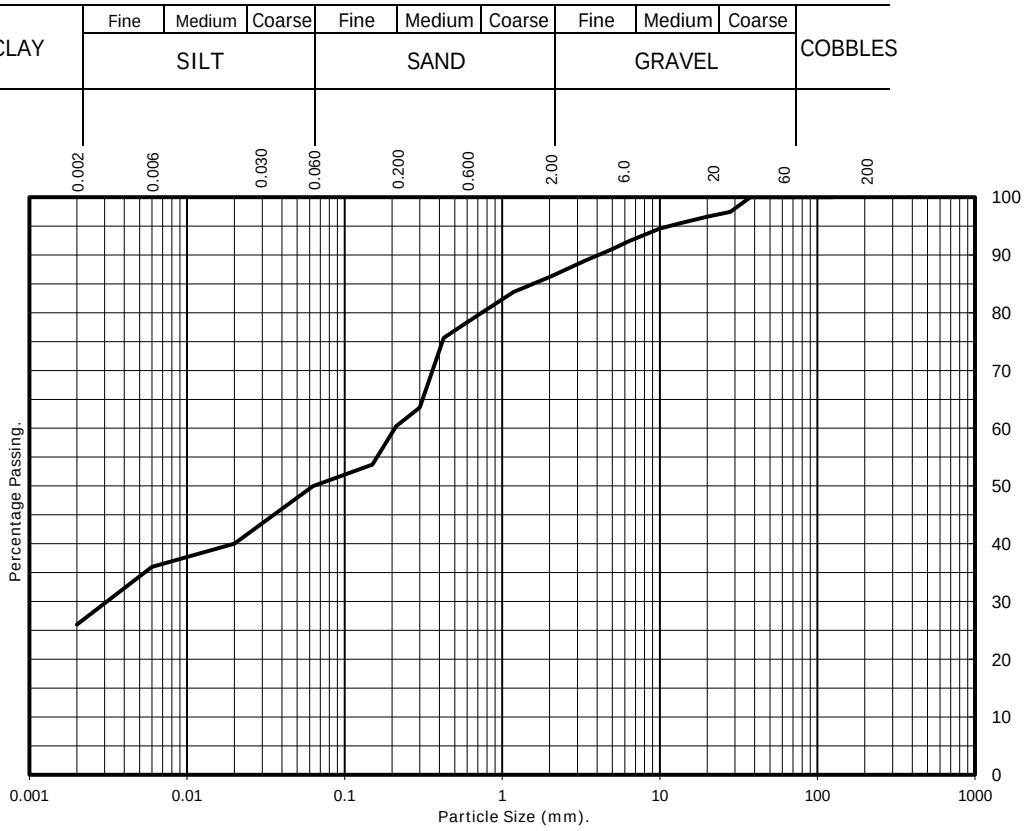
BS 1377 Part 2:1990.

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref:	P16185	Sample Number:	3
Contract Number:	33812-	Depth from (m):	1.00
Hole Number:	TP03-53	Depth to (m):	N/A
		Sample Type:	B

Location: Galway GCT

Description: Brown fine to coarse gravelly silty clayey SAND.



BS Test Sieve	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	97
20	97
14	96
10	95
6.3	92
5.0	91
3.35	89
2.00	86
1.18	84
0.60	78
0.425	76
0.300	64
0.212	60
0.150	54
0.063	50

Particle Diameter	% Passing
0.02	40
0.006	36
0.002	26

Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
26	24	36	14	0	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Emma Sharp (Office Manager)

Date: 31.1.17

GSTL
GEO SITE & TESTING SERVICES LTD

UKAS TESTING 2788

Test Report:

Particle Size Distribution Test

BS 1377 Part 2:1990.

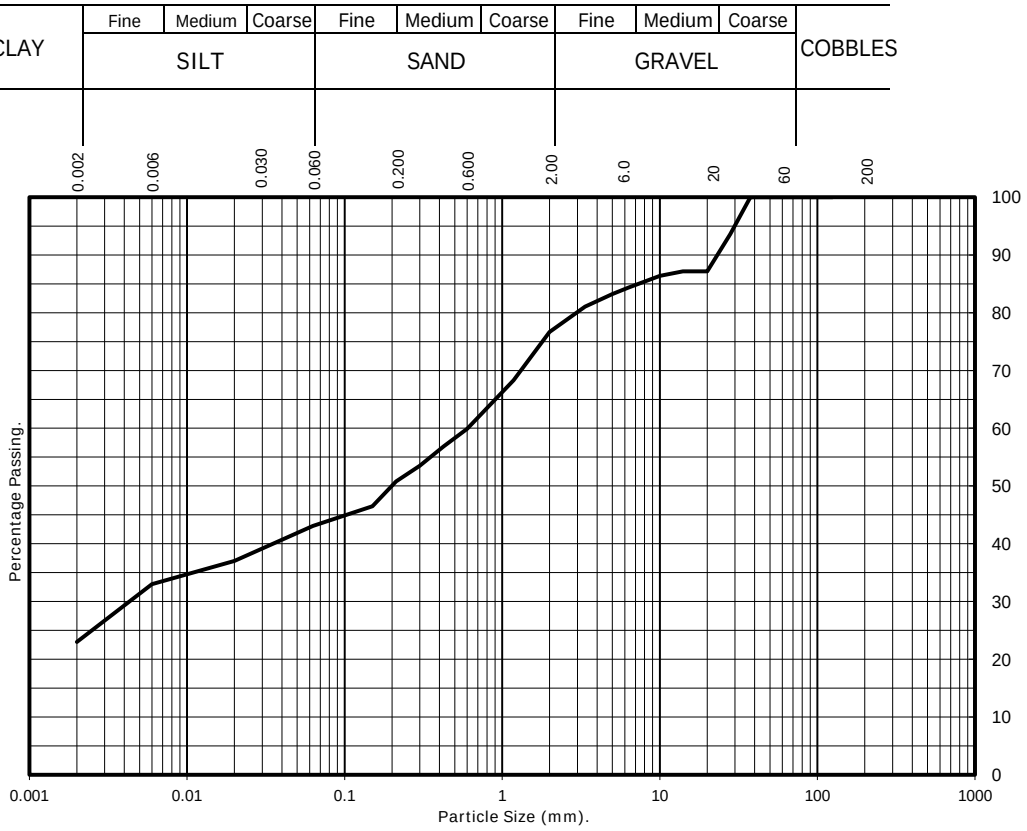
Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref:	P16185	Sample Number:	3
Contract Number:	33812-	Depth from (m):	2.00
Hole Number:	TP03-53	Depth to (m):	N/A
		Sample Type:	B

Location: Galway GCT

Description: Brown silty clayey fine to coarse gravelly SAND.

BS Test Sieve	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	94
20	87
14	87
10	86
6.3	84
5.0	83
3.35	81
2.00	77
1.18	68
0.60	60
0.425	57
0.300	53
0.212	51
0.150	46
0.063	43



Particle Diameter	% Passing
0.02	37
0.006	33
0.002	23

Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
23	20	34	23	0	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Emma Sharp (Office Manager)

Date: 31.1.17

GSTL
GEO SITE & TESTING SERVICES LTD

UKAS TESTING 2788

Test Report:

Particle Size Distribution Test

BS 1377 Part 2:1990.

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref:	P16185	Sample Number:	7
Contract Number:	33812-	Depth from (m):	2.50
Hole Number:	TP03-53	Depth to (m):	N/A
		Sample Type:	B

Location: Galway GCT

Description: Brown silty sandy clayey fine to coarse GRAVEL.

BS Test Sieve	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	80
20	73
14	72
10	70
6.3	68
5.0	67
3.35	65
2.00	64
1.18	61
0.60	57
0.425	56
0.300	53
0.212	50
0.150	45
0.063	42

Particle Diameter	% Passing
0.02	35
0.006	31
0.002	24

Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
24	18	22	36	0	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Emma Sharp (Office Manager)

Date: 31.1.17

GSTL
GEO SITE & TESTING SERVICES LTD

UKAS TESTING 2788

Test Report:

Particle Size Distribution Test

BS 1377 Part 2:1990.

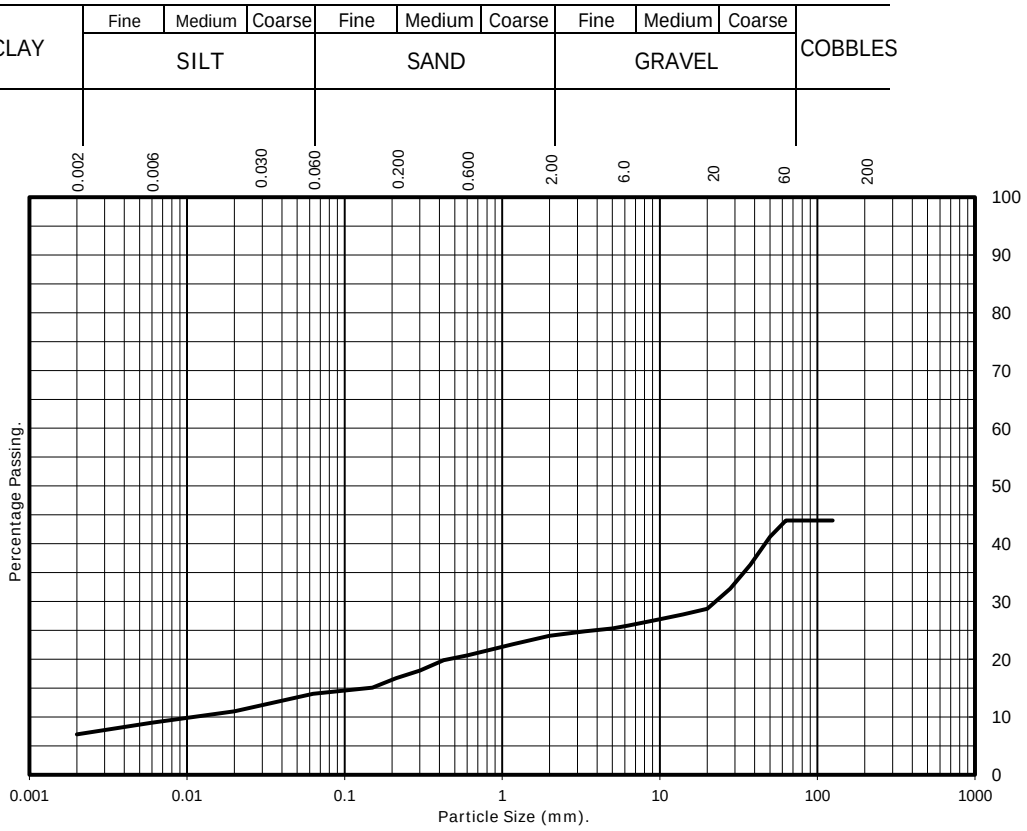
Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref:	P16185	Sample Number:	9
Contract Number:	33812-	Depth from (m):	3.50
Hole Number:	TP03-53	Depth to (m):	N/A
		Sample Type:	B

Location: Galway GCT

Description: Brown silty clayey sandy fine to coarse GRAVEL with many cobbles.

BS Test Sieve	% Passing
125	44
90	44
75	44
63	44
50	41
37.5	36
28	32
20	29
14	28
10	27
6.3	26
5.0	25
3.35	25
2.00	24
1.18	23
0.60	21
0.425	20
0.300	18
0.212	17
0.150	15
0.063	14



Particle Diameter	% Passing
0.02	11
0.006	9
0.002	7

Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
7	7	10	20	56	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Emma Sharp (Office Manager)

Date: 31.1.17

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GEO SITE & TESTING SERVICES LTD

UKAS TESTING 2788

Test Report: CONSOLIDATED DRAINED SHEARBOX TEST.

BS1377:Part 7:4.5 :1990.

Borehole Number:	TP03-52	Depth from (m):	0.50
Sample Number :		Depth to (m):	3.00

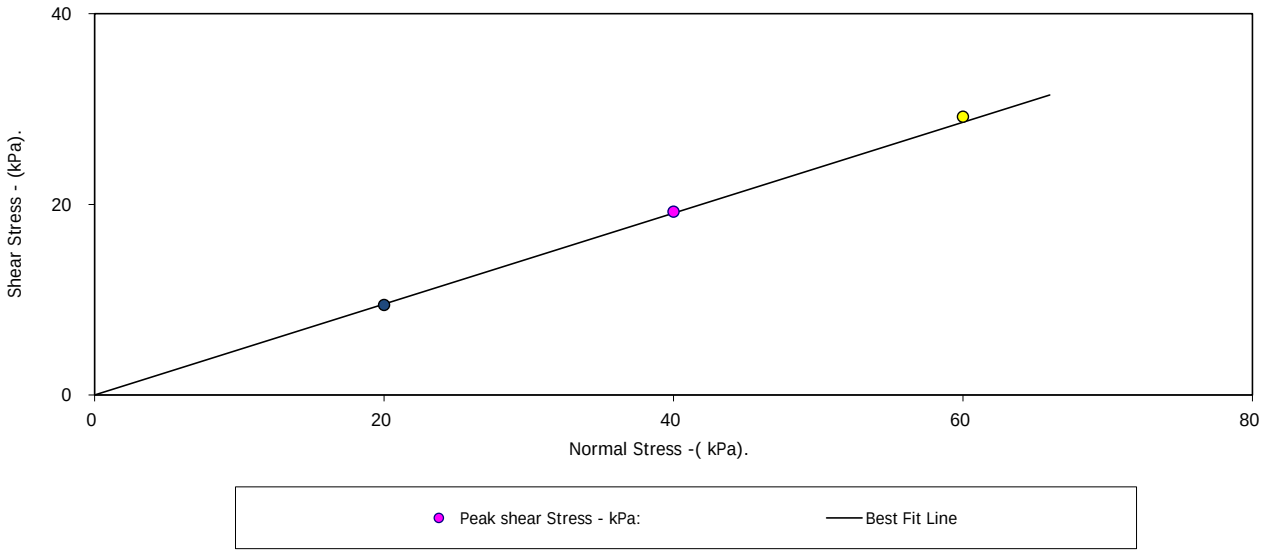
Sample Type:	B
Particle Density - Mg/m3:	2.65 (Assumed)
Specimen Tested:	Submerged, Remoulded (Light Tamping) Material above 2mm removed.

Sample Description:
Brown slightly silty gravelly (fine-coarse/angular-subrounded) sandy CLAY

STAGE	1	2	3
Initial Conditions			
Height - mm:	24.27	24.27	24.27
Length - mm:	59.97	59.97	59.97
Moisture Content - %:	9	9	9
Bulk Density - Mg/m3:	2.10	2.10	2.10
Dry Density - Mg/m3:	1.92	1.92	1.92
Voids Ratio:	0.3811	0.3827	0.3825
Normal Pressure- kPa	20	40	60
Consolidation			
Consolidated Height - mm:	24.21	24.03	23.85
Shear			
Rate of Strain (mm/min)	0.010	0.010	0.010
Strain at peak shear stress (mm)	8.38	7.34	7.33
Peak shear Stress - kPa:	9	19	29

PEAK	
Angle of Shearing Resistance: (~~θ~~)	25.5
Effective Cohesion - kPa:	0

FAILURE CONDITIONS



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Approved Pages 1-4 by: Date

Contract No.: 33812

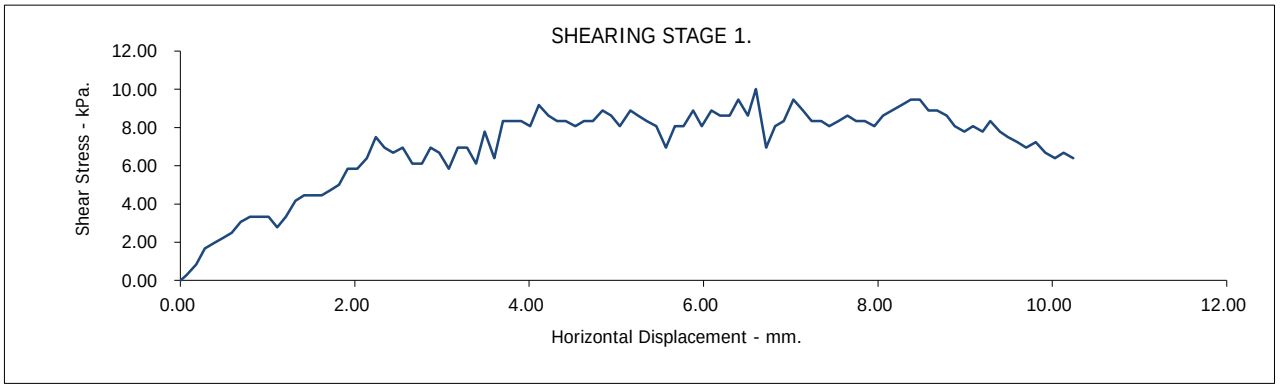
Galway GCT

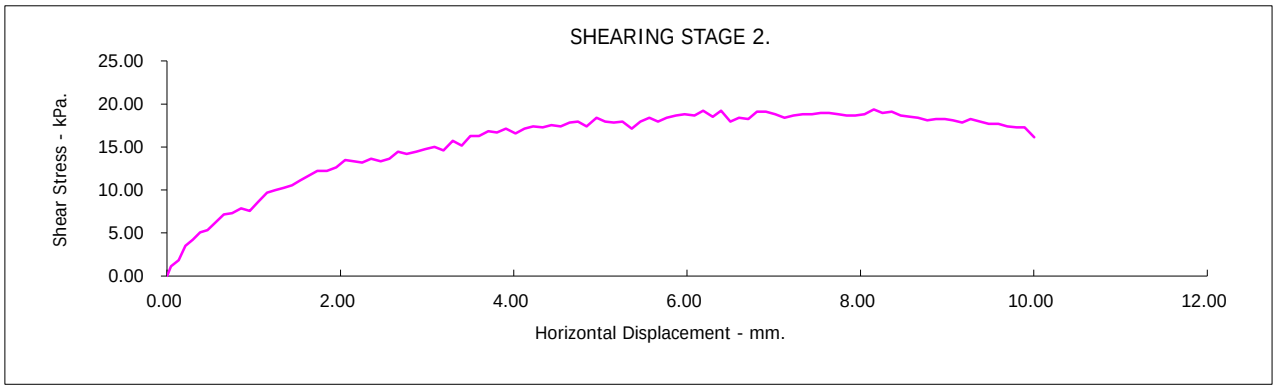
Client Ref Number: P16185

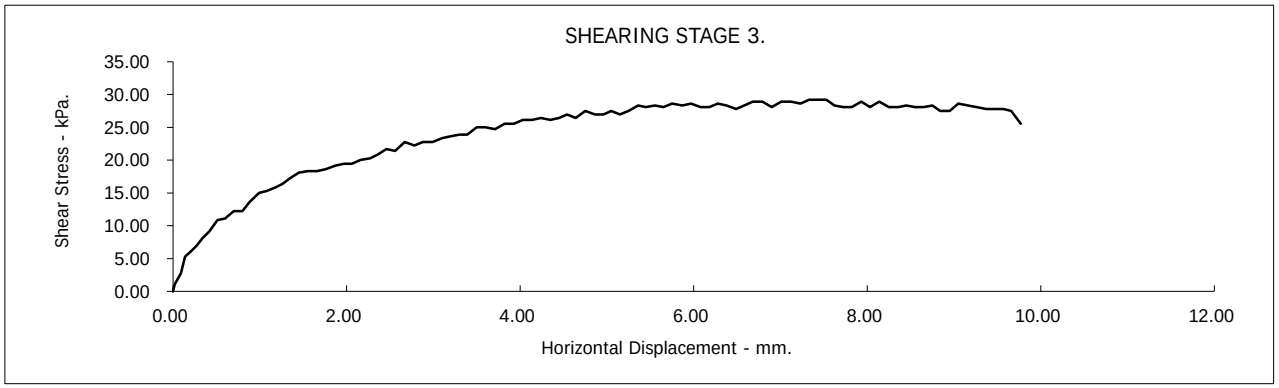
Test Report: CONSOLIDATED DRAINED SHEARBOX TEST.

BS1377:Part 7:4.5 :1990.

Borehole Number:	TP03-52	Depth from (m):	0.50
Sample Number :		Depth to (m):	3.00







Contract No.: 33812

Galway GCT

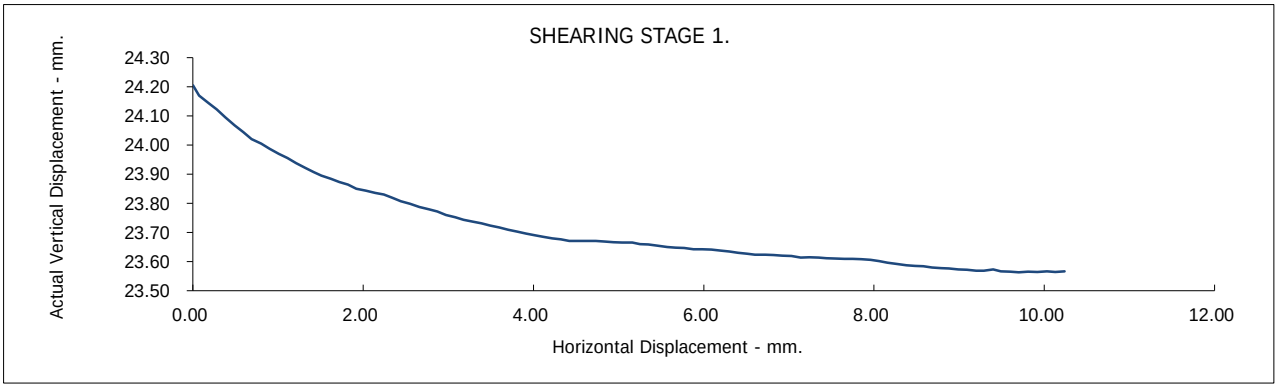
Client Ref Number: P16185

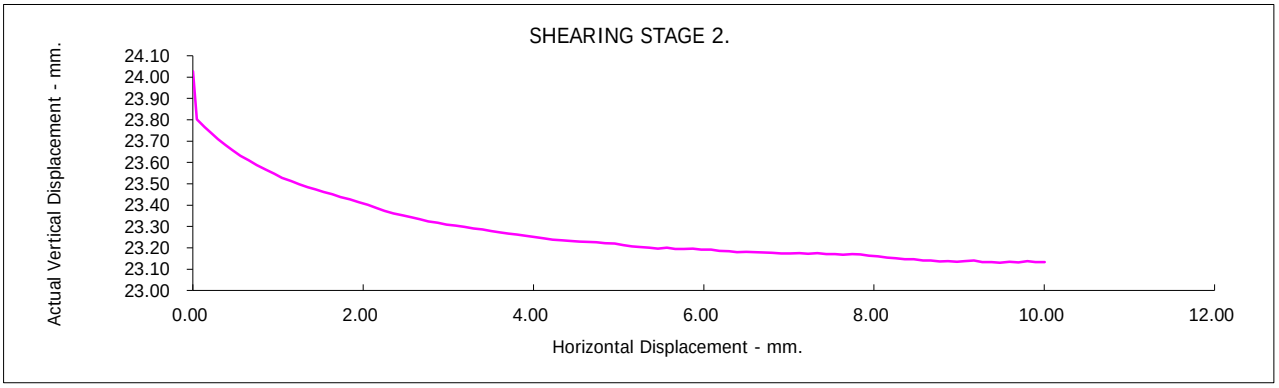
Figure.

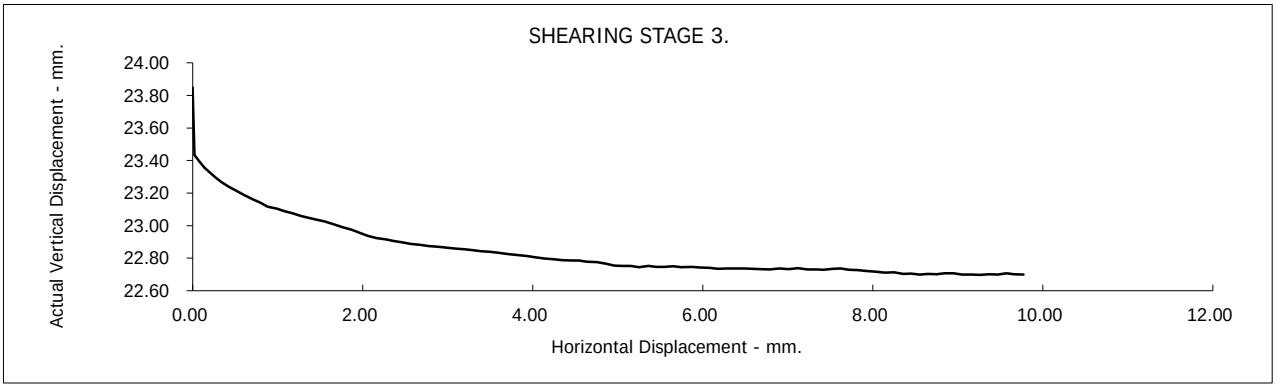
Test Report: CONSOLIDATED DRAINED SHEARBOX TEST.

BS1377:Part 7:4.5 :1990.

Borehole Number:	TP03-52	Depth from (m):	0.50
Sample Number :		Depth to (m):	3.00







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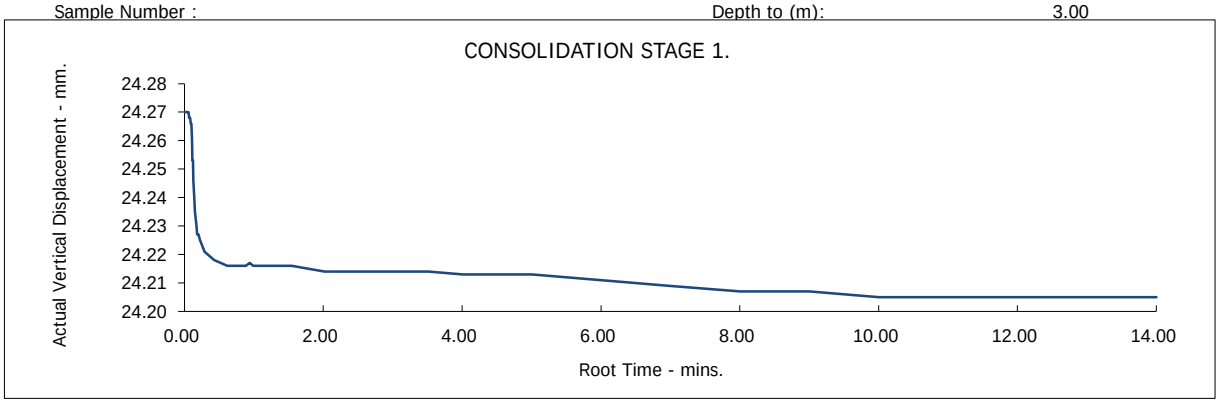
Galway GCT

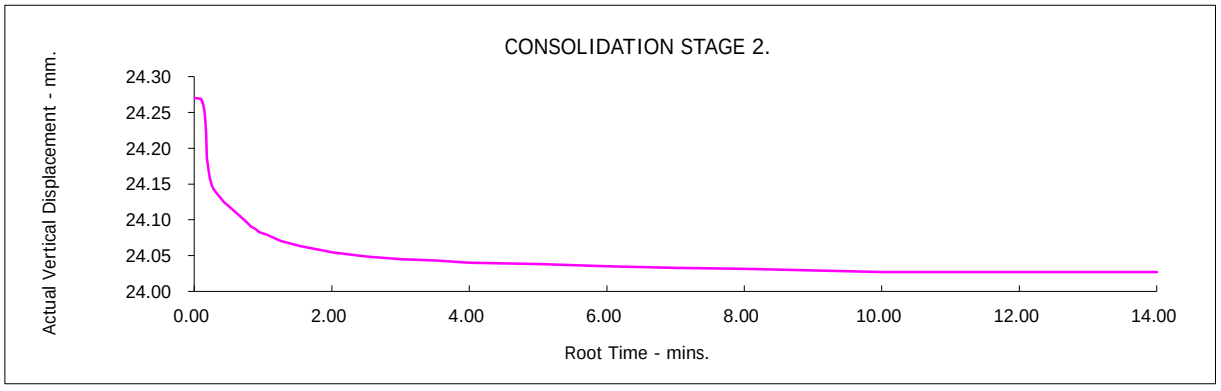
Client Ref Number:
P16185

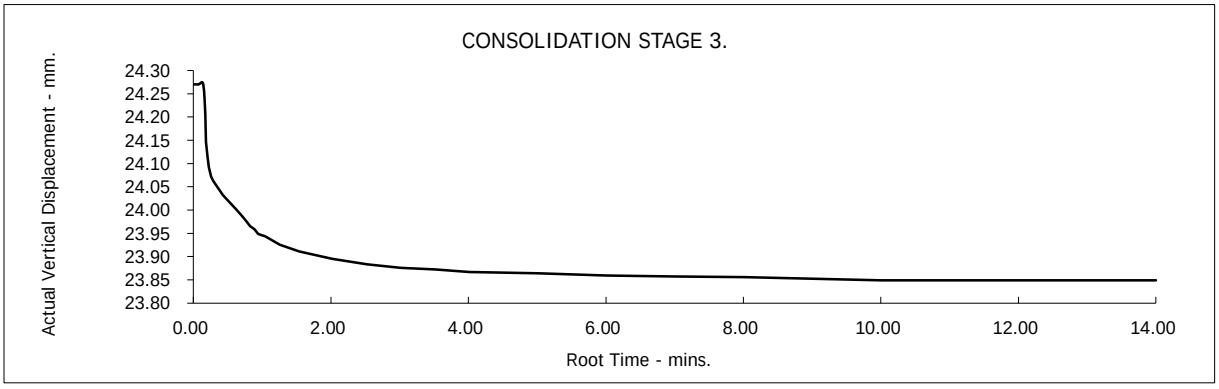
Test Report: CONSOLIDATED DRAINED SHEARBOX TEST.

BS1377:Part 7:4.5 :1990.

Borehole Number:	TP03-52	Depth from (m):	0.50
Sample Number :		Depth to (m):	3.00







Contract No.: 33812

Galway GCT

Client Ref Number: P16185

Test Report: CONSOLIDATED DRAINED SHEARBOX TEST.

BS1377:Part 7:4.5 :1990.

Borehole Number:	TP03-52	Depth from (m):	0.50
Sample Number :	B3	Depth to (m):	3.00

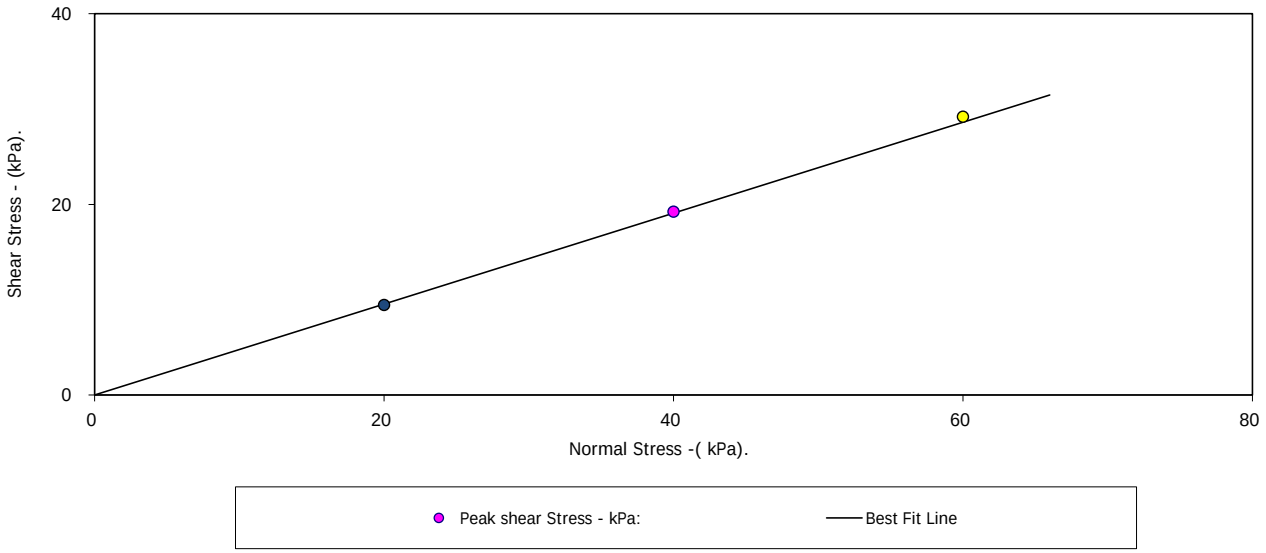
Sample Type:	B
Particle Density - Mg/m3:	2.65 (Assumed)
Specimen Tested:	Submerged, Remoulded (Light Tamping) Material above 2mm removed.

Sample Description:
Brown slightly silty gravelly (fine-coarse/angular-subrounded) sandy CLAY

STAGE	1	2	3
Initial Conditions			
Height - mm:	24.27	24.27	24.27
Length - mm:	59.97	59.97	59.97
Moisture Content - %:	9	9	9
Bulk Density - Mg/m3:	2.10	2.10	2.10
Dry Density - Mg/m3:	1.92	1.92	1.92
Voids Ratio:	0.3811	0.3827	0.3825
Normal Pressure- kPa	20	40	60
Consolidation			
Consolidated Height - mm:	24.21	24.03	23.85
Shear			
Rate of Strain (mm/min)	0.010	0.010	0.010
Strain at peak shear stress (mm)	8.38	7.34	7.33
Peak shear Stress - kPa:	9	19	29

PEAK	
Angle of Shearing Resistance: (~~θ~~)	25.5
Effective Cohesion - kPa:	0

FAILURE CONDITIONS



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Galway GCT

Client Ref Number: P16185

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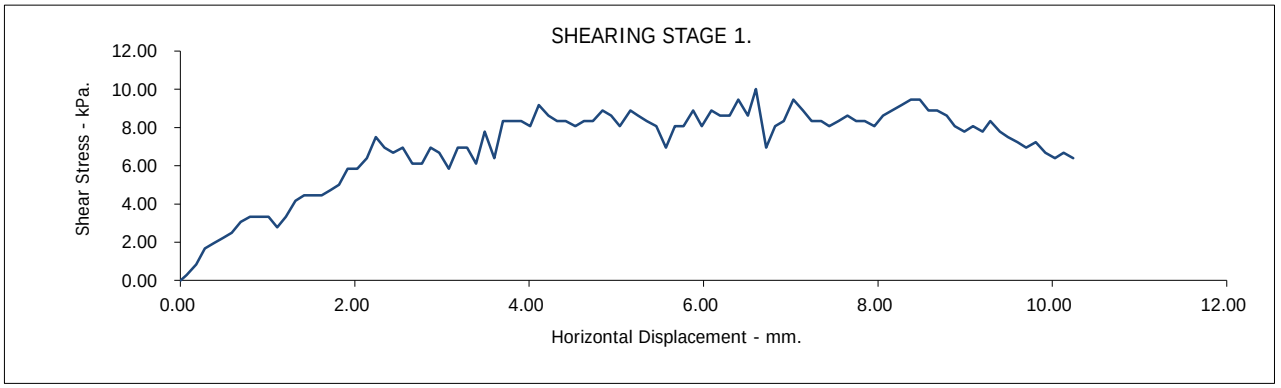
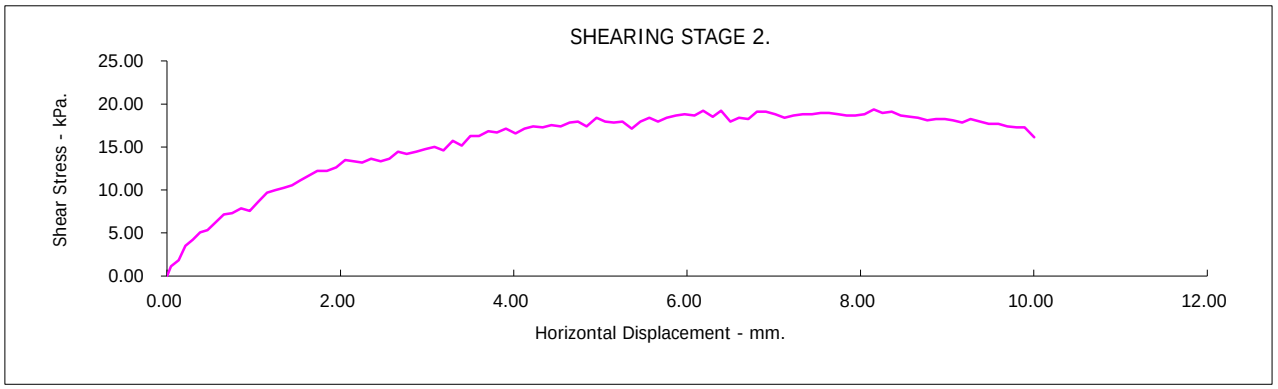
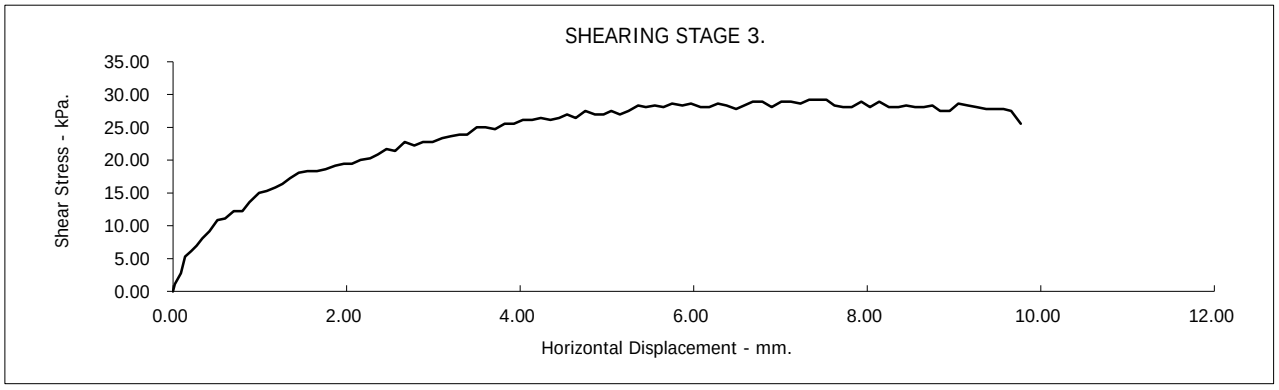
Test Report: CONSOLIDATED DRAINED SHEARBOX TEST.

BS1377:Part 7:4.5 :1990.

Borehole Number:	TP03-52	Depth from (m):	0.50
Sample Number :	B3	Depth to (m):	3.00







Contract No.: 33812

Galway GCT

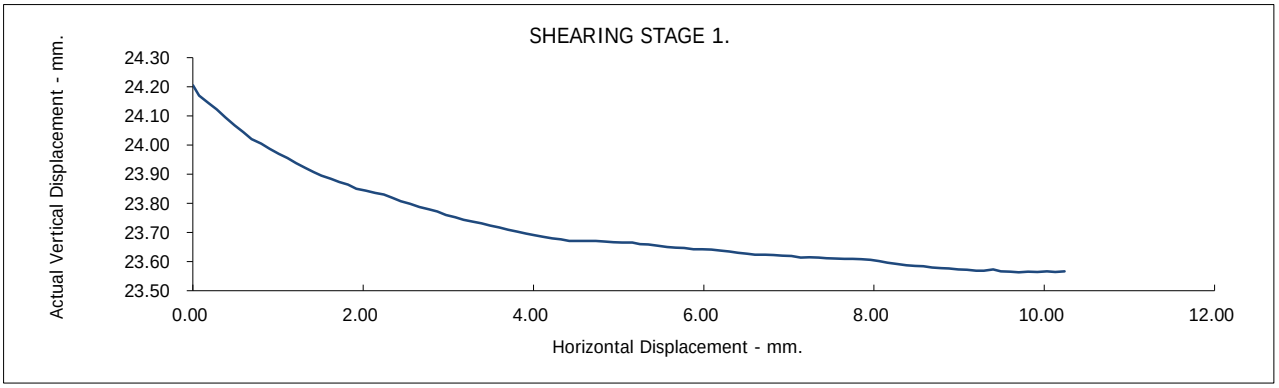
Client Ref Number: P16185

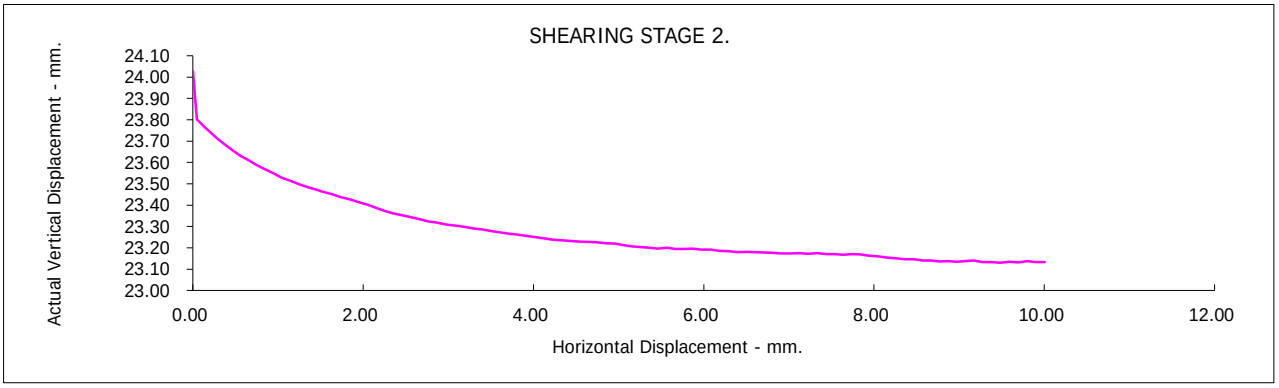
Figure.

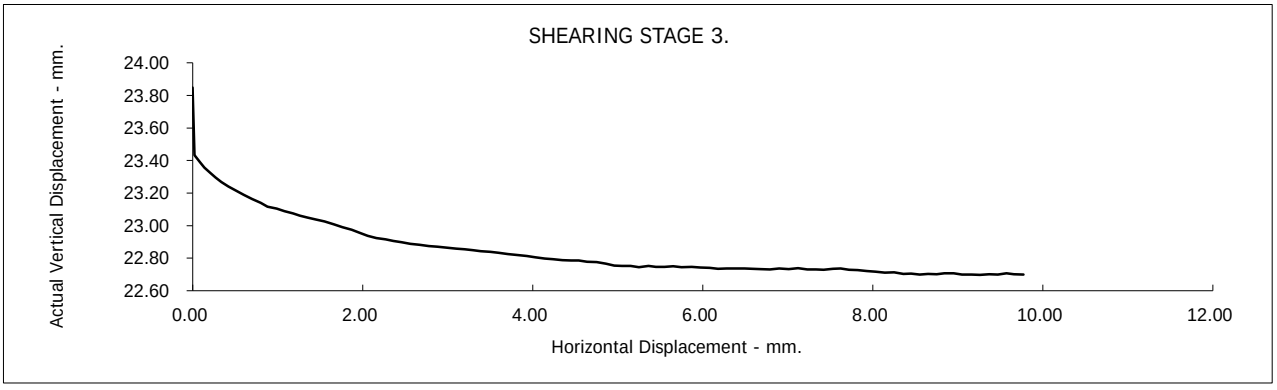
Test Report: CONSOLIDATED DRAINED SHEARBOX TEST.

BS1377:Part 7:4.5 :1990.

Borehole Number:	TP03-52	Depth from (m):	0.50
Sample Number :	B3	Depth to (m):	3.00







Contract No.:
33812

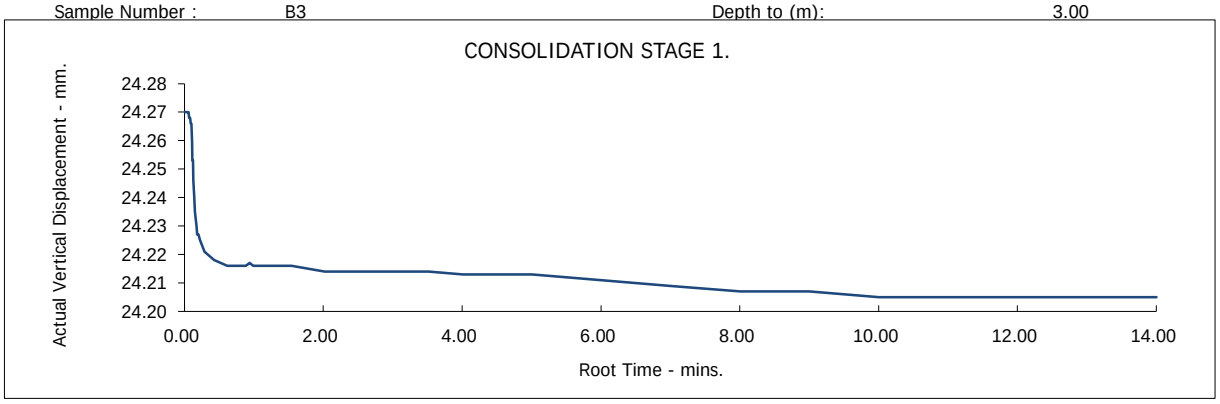
Galway GCT

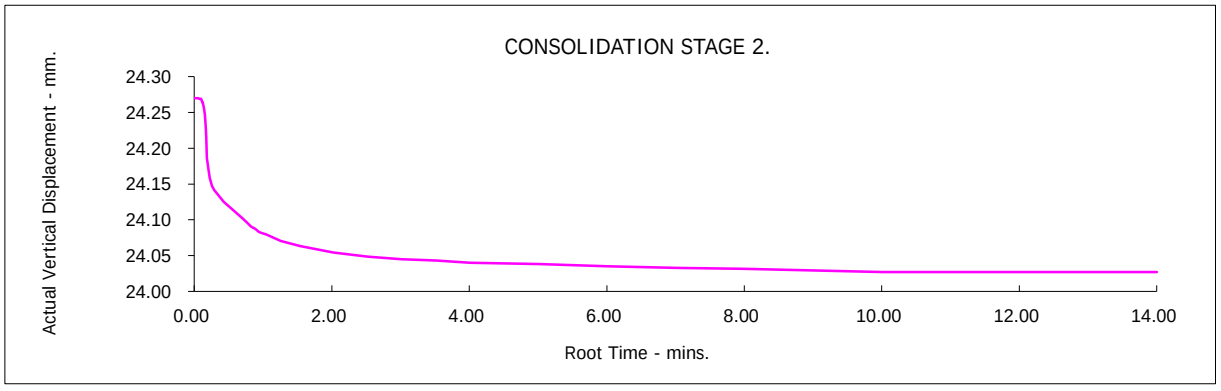
Client Ref Number:
P16185

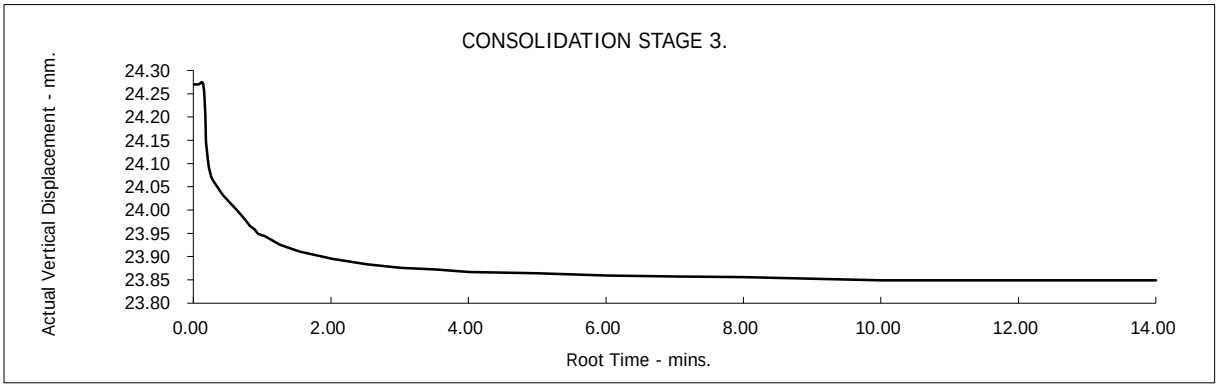
Test Report: CONSOLIDATED DRAINED SHEARBOX TEST.

BS1377:Part 7:4.5 :1990.

Borehole Number:	TP03-52	Depth from (m):	0.50
Sample Number :	B3	Depth to (m):	3.00







Contract No.:
33812

Galway GCT

Client Ref Number:
P16185

Test Report: CONSOLIDATED DRAINED SHEARBOX TEST.

BS1377:Part 7:4.5 :1990.

Borehole Number:	TP03-53	Depth from (m):	1.00
Sample Number :	B3	Depth to (m):	3.00

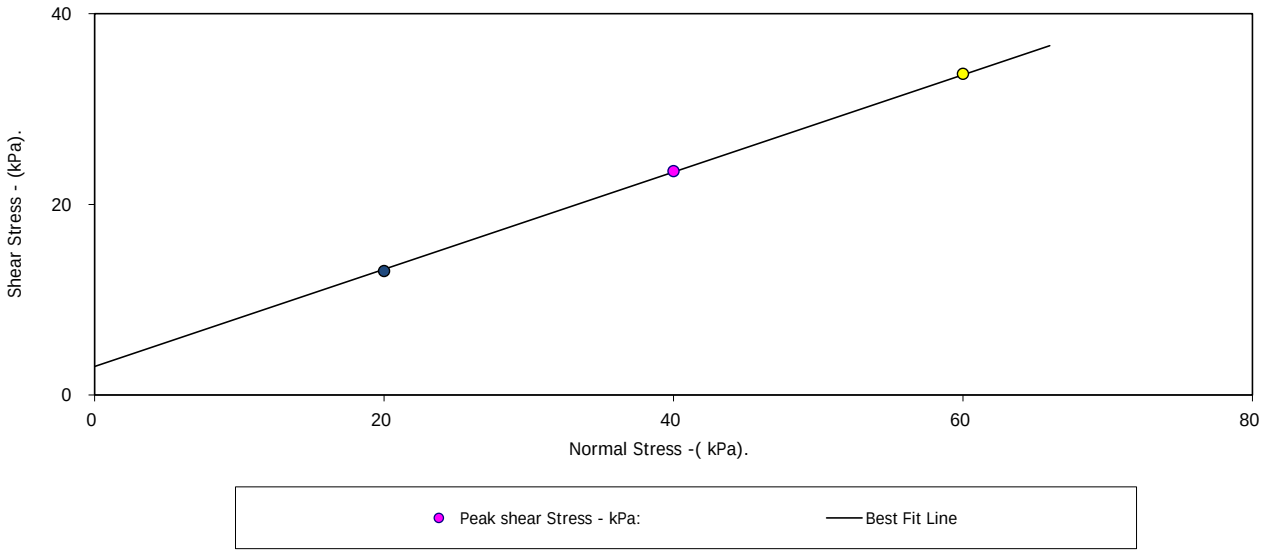
Sample Type:	B
Particle Density - Mg/m3:	2.65 (Assumed)
Specimen Tested:	Submerged, Remoulded (Light Tamping) Material above 2mm removed.

Sample Description:
Brown slightly silty sandy gravelly (fine-coarse/angular-subrounded) soft CLAY

STAGE	1	2	3
Initial Conditions			
Height - mm:	24.27	24.27	24.27
Length - mm:	59.97	59.97	59.97
Moisture Content - %:	10	10	10
Bulk Density - Mg/m3:	2.24	2.25	2.25
Dry Density - Mg/m3:	2.05	2.05	2.05
Voids Ratio:	0.2942	0.2931	0.2935
Normal Pressure- kPa	20	40	60
Consolidation			
Consolidated Height - mm:	24.04	23.79	23.54
Shear			
Rate of Strain (mm/min)	0.010	0.010	0.010
Strain at peak shear stress (mm)	9.52	8.44	6.35
Peak shear Stress - kPa:	13	23	34

PEAK	
Angle of Shearing Resistance: (~~θ~~)	27.0
Effective Cohesion - kPa:	3

FAILURE CONDITIONS



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Contract No.: 33812

Galway GCT

Client Ref Number: P16185

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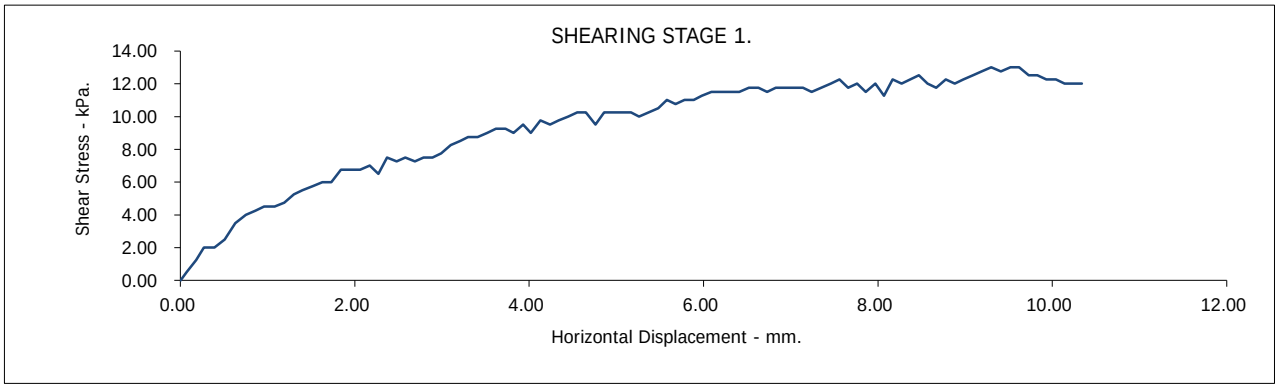
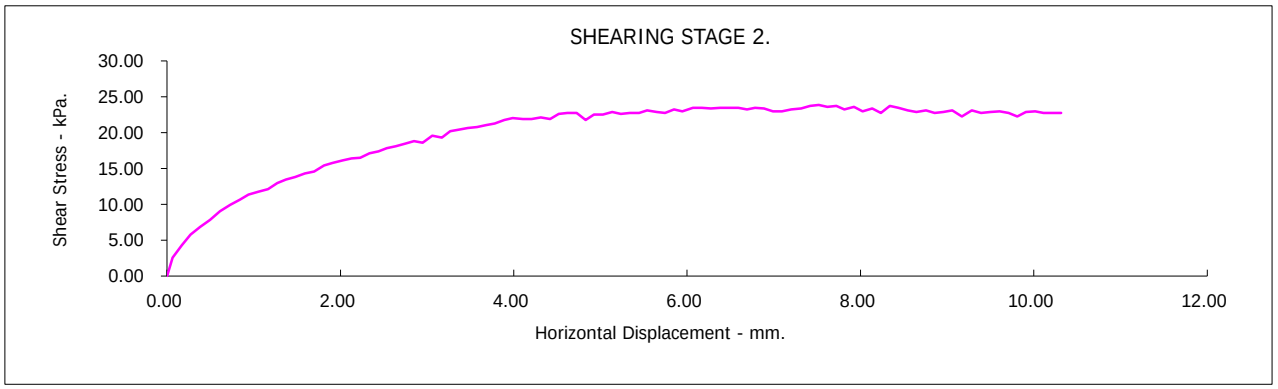
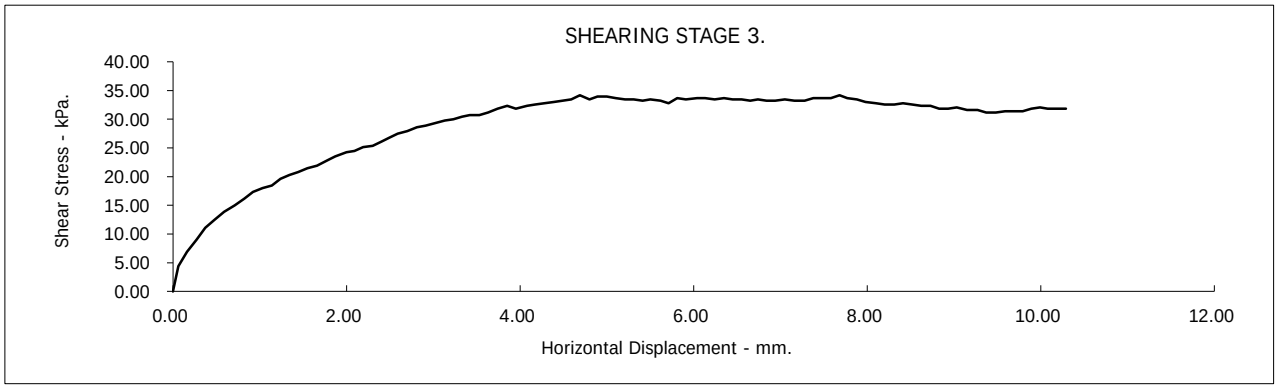
Test Report: CONSOLIDATED DRAINED SHEARBOX TEST.

BS1377:Part 7:4.5 :1990.

Borehole Number:	TP03-53	Depth from (m):	1.00
Sample Number :	B3	Depth to (m):	3.00







Contract No.: 33812

Galway GCT

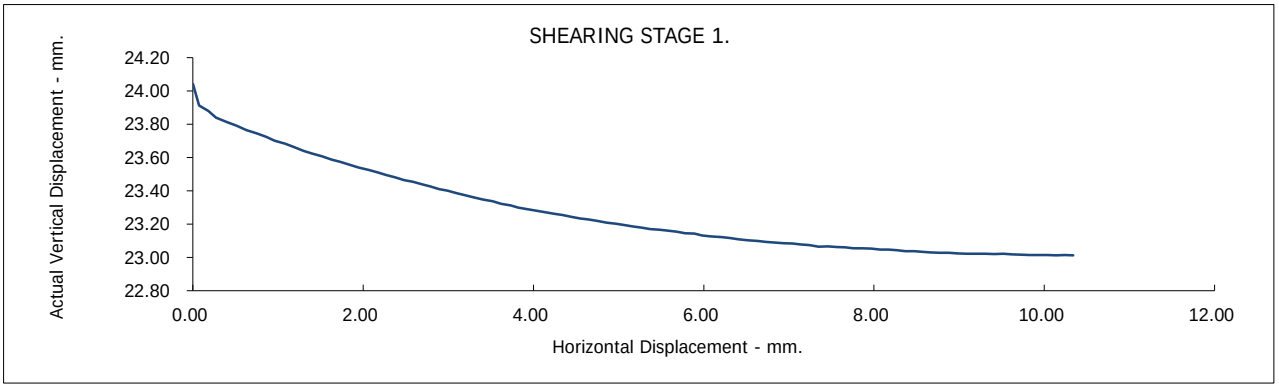
Client Ref Number: P16185

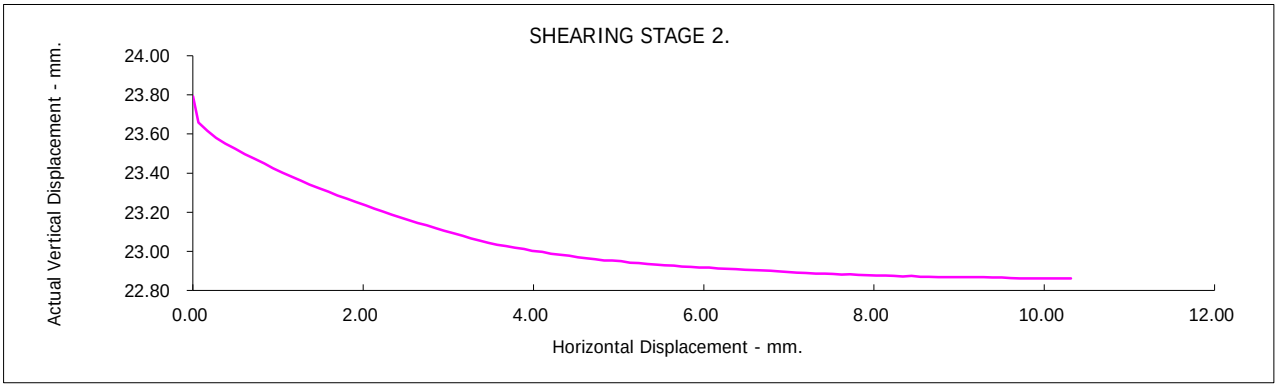
Figure.

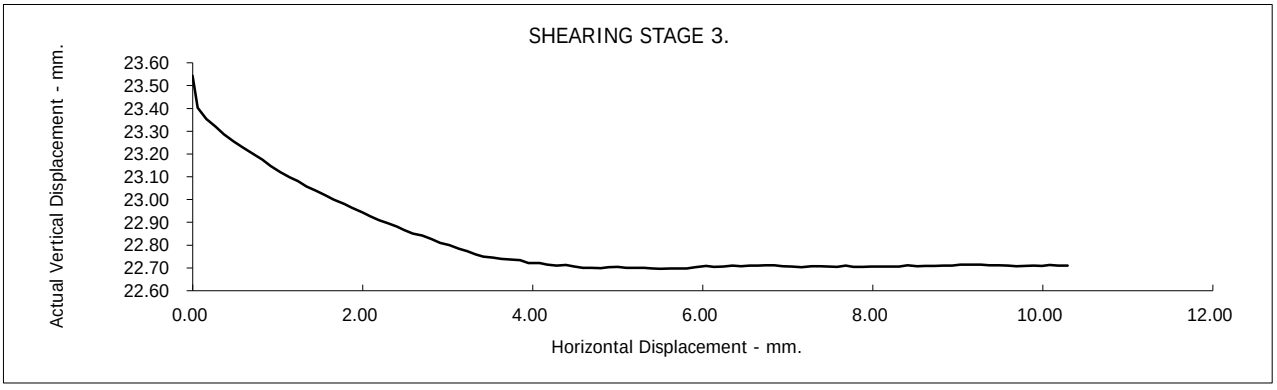
Test Report: CONSOLIDATED DRAINED SHEARBOX TEST.

BS1377:Part 7:4.5 :1990.

Borehole Number:	TP03-53	Depth from (m):	1.00
Sample Number :	B3	Depth to (m):	3.00







Contract No.:
33812

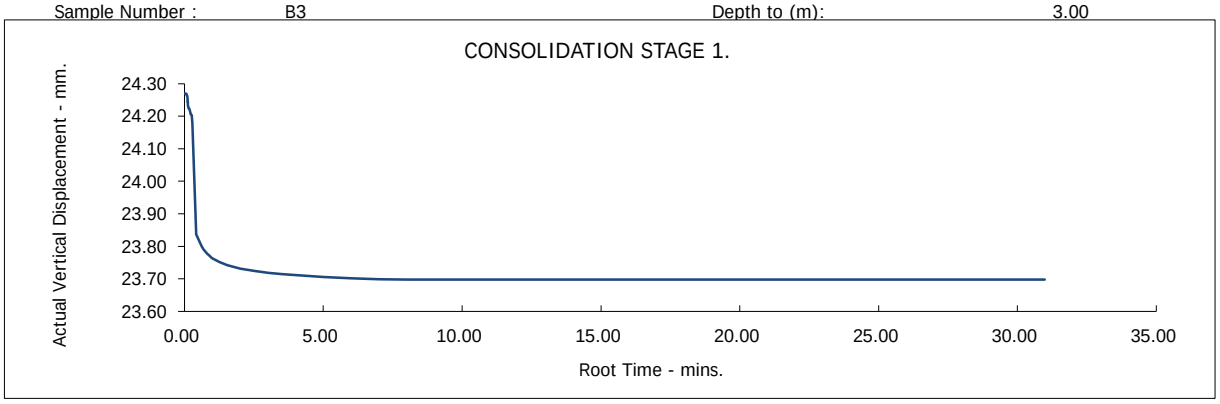
Galway GCT

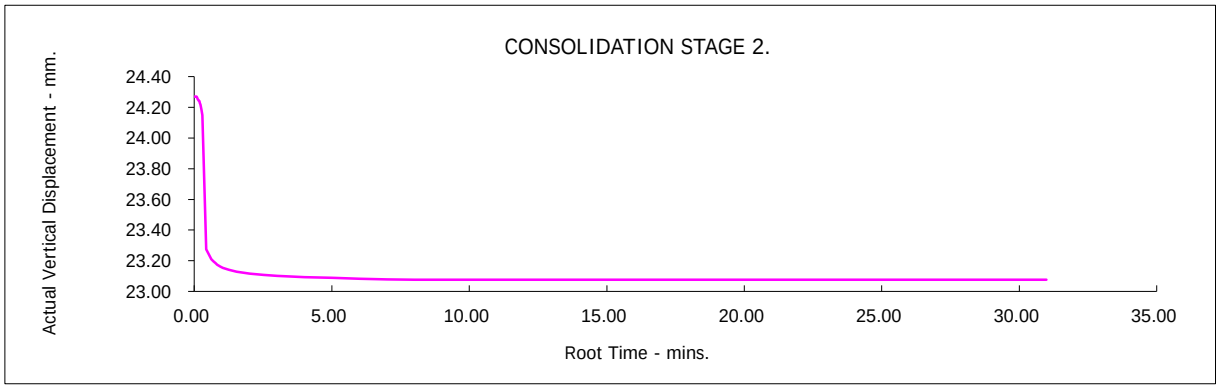
Client Ref Number:
P16185

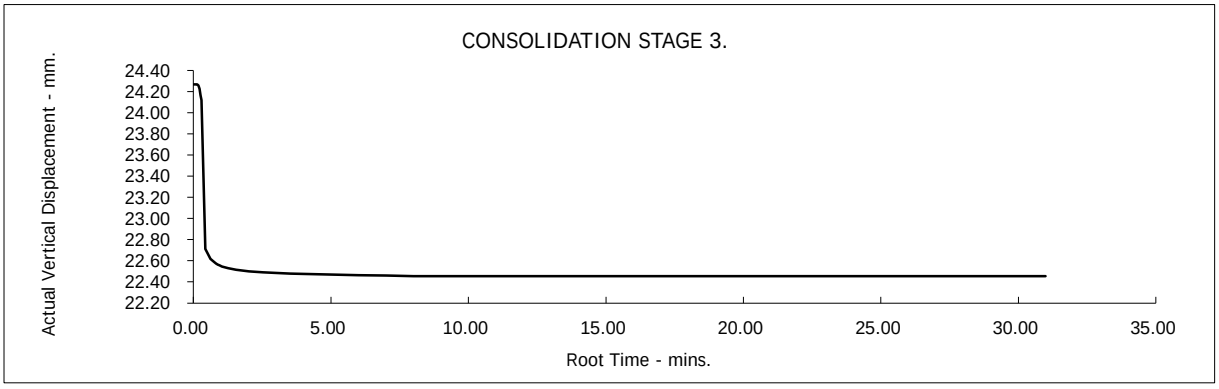
Test Report: CONSOLIDATED DRAINED SHEARBOX TEST.

BS1377:Part 7:4.5 :1990.

Borehole Number:	TP03-53	Depth from (m):	1.00
Sample Number :	B3	Depth to (m):	3.00







Contract No.: 33812

Galway GCT

Client Ref Number: P16185

Test Report: CONSOLIDATED DRAINED SHEARBOX TEST.

BS1377:Part 7:4.5 :1990.

Borehole Number:	TP03-53	Depth from (m):	2.00
Sample Number :	B5	Depth to (m):	5.00

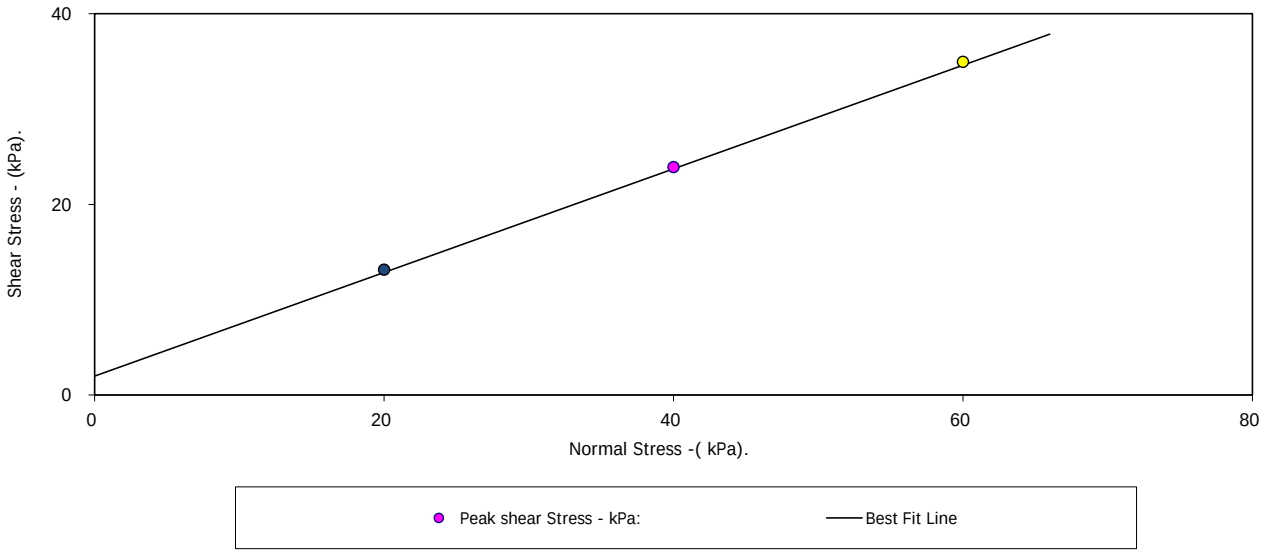
Sample Type:	B
Particle Density - Mg/m3:	2.65 (Assumed)
Specimen Tested:	Submerged, Remoulded (Light Tamping) Material above 2mm removed.

Sample Description:
Brown slightly silty sandy gravelly (fine-coarse/angular-subrounded) soft CLAY

STAGE	1	2	3
Initial Conditions			
Height - mm:	24.50	24.50	24.50
Length - mm:	59.90	59.90	59.90
Moisture Content - %:	11	11	11
Bulk Density - Mg/m3:	2.22	2.22	2.22
Dry Density - Mg/m3:	2.00	2.00	2.00
Voids Ratio:	0.3241	0.3236	0.3242
Normal Pressure- kPa	20	40	60
Consolidation			
Consolidated Height - mm:	24.28	23.97	23.66
Shear			
Rate of Strain (mm/min)	0.010	0.010	0.010
Strain at peak shear stress (mm)	9.74	8.17	7.15
Peak shear Stress - kPa:	13	24	35

PEAK	
Angle of Shearing Resistance: (~~θ~~)	28.5
Effective Cohesion - kPa:	2

FAILURE CONDITIONS



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Approved Pages 1-4 by: 01/02/17 Date

Contract No.: 33812

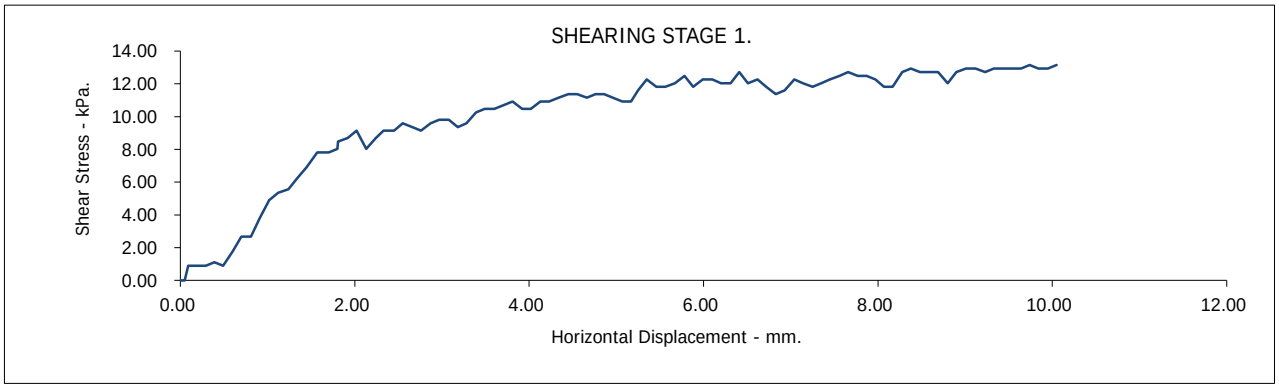
Galway GCT

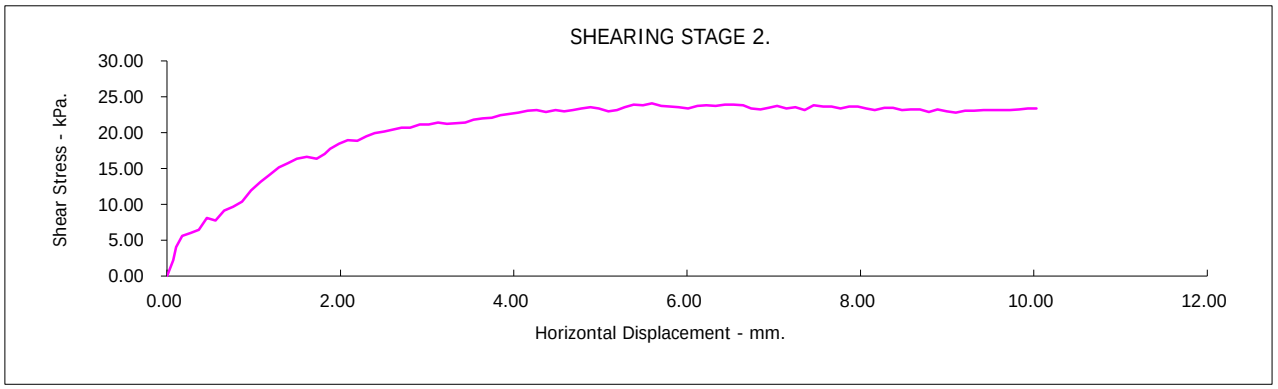
Client Ref Number: P16185

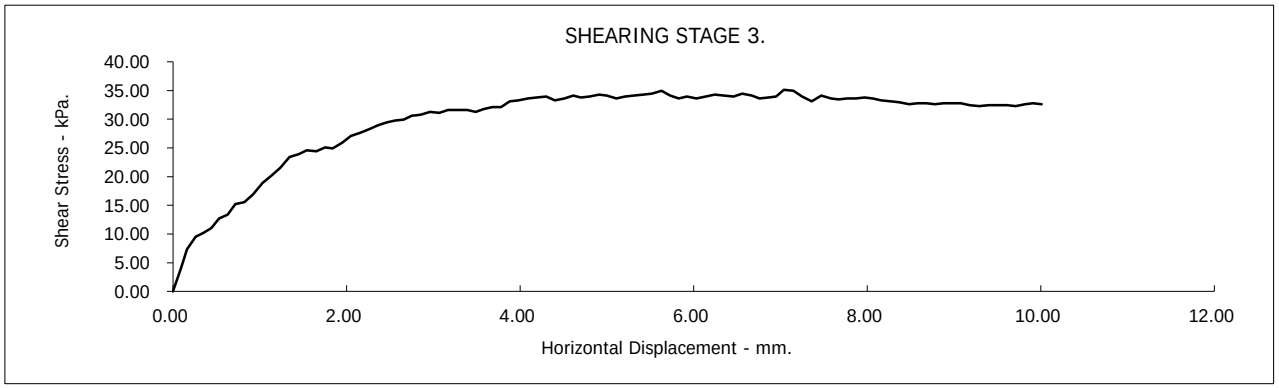
Test Report: CONSOLIDATED DRAINED SHEARBOX TEST.

BS1377:Part 7:4.5 :1990.

Borehole Number:	TP03-53	Depth from (m):	2.00
Sample Number :	B5	Depth to (m):	5.00







Galway GCT

Contract No.: 33812

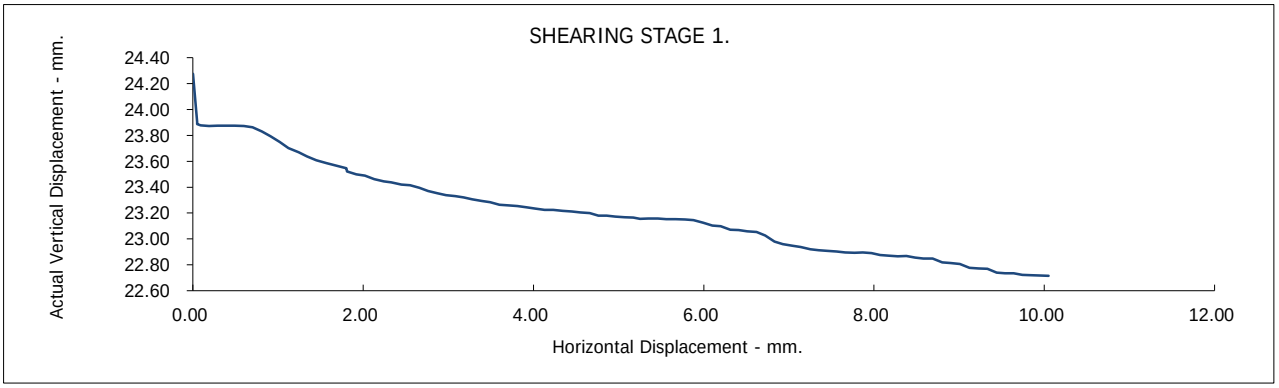
Client Ref Number: P16185

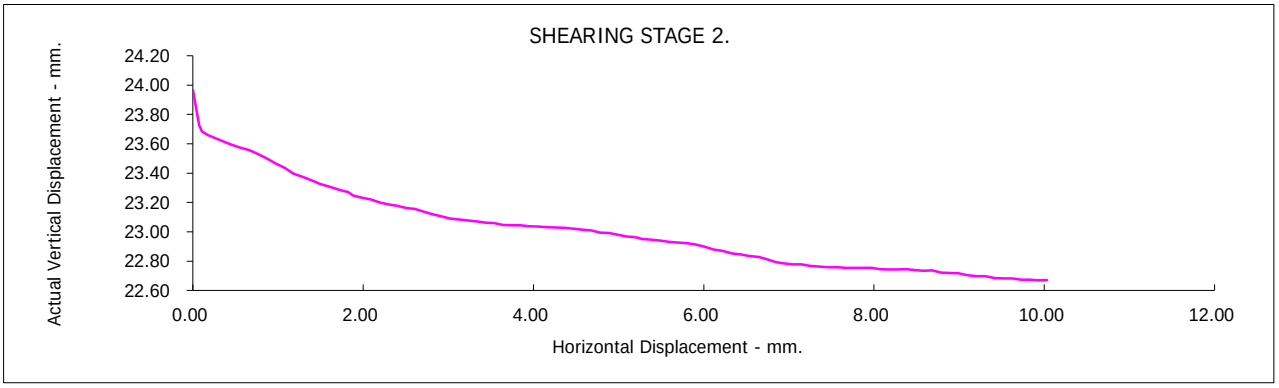
Figure.

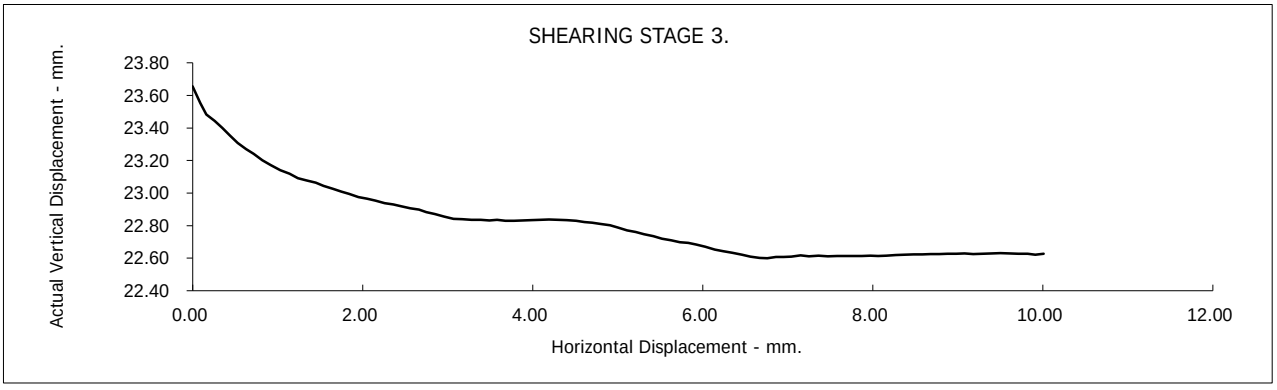
Test Report: CONSOLIDATED DRAINED SHEARBOX TEST.

BS1377:Part 7:4.5 :1990.

Borehole Number:	TP03-53	Depth from (m):	2.00
Sample Number :	B5	Depth to (m):	5.00







Contract No.:
33812

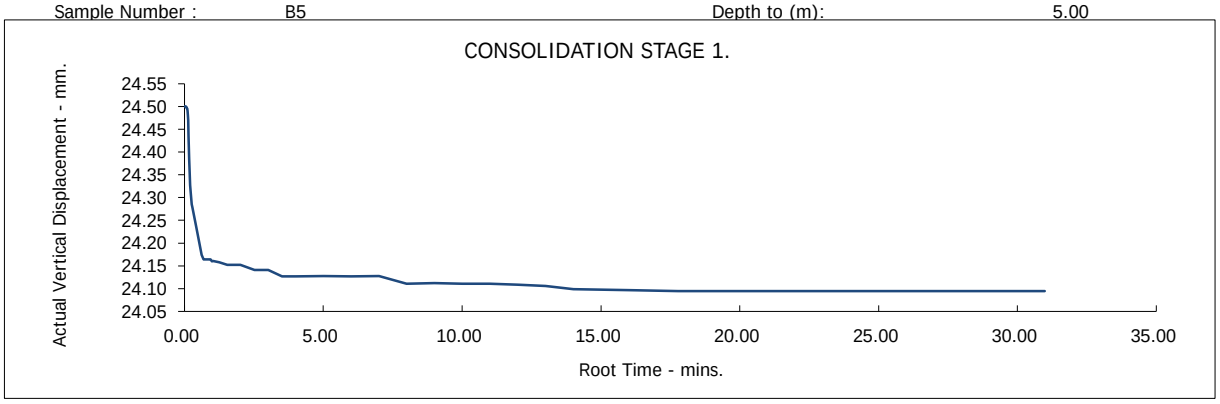
Galway GCT

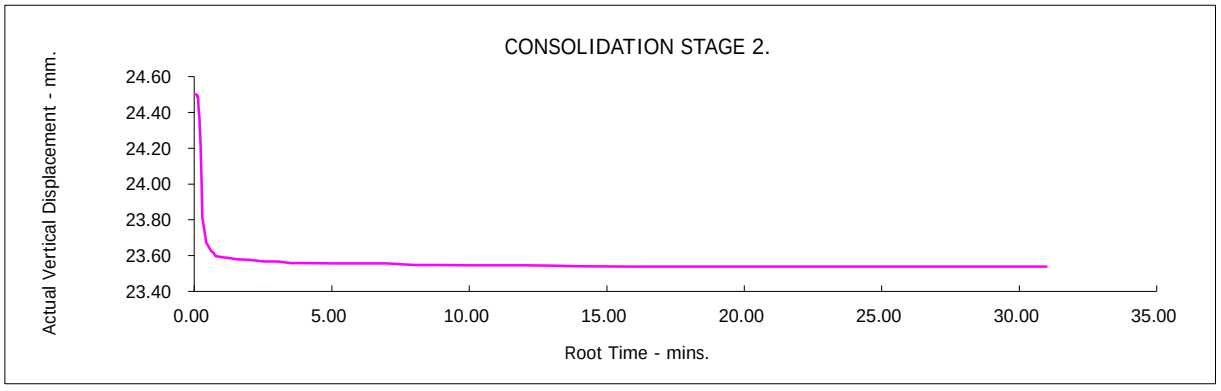
Client Ref Number:
P16185

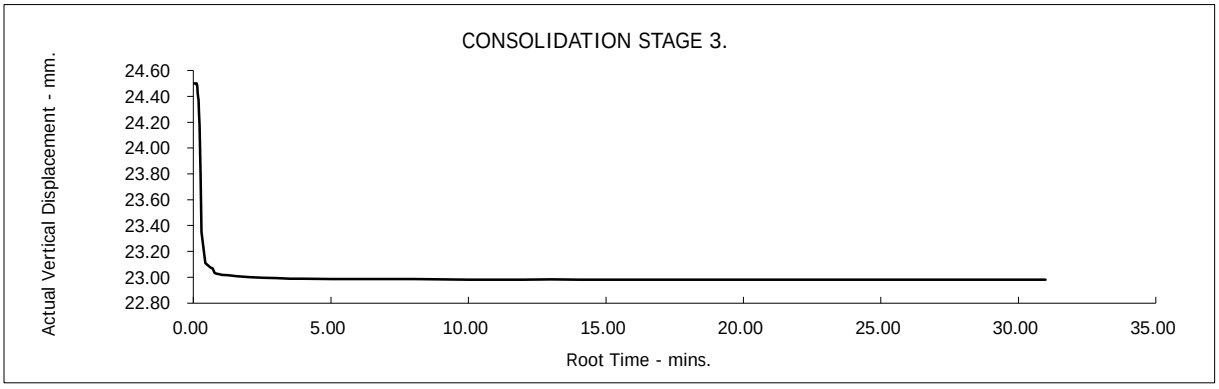
Test Report: CONSOLIDATED DRAINED SHEARBOX TEST.

BS1377:Part 7:4.5 :1990.

Borehole Number:	TP03-53	Depth from (m):	2.00
Sample Number :	B5	Depth to (m):	5.00







Contract No.:
33812

Galway GCT

Client Ref Number:
P16185

Consolidated Undrained Triaxial Compression Test
BS 1377 : Part 8 : 1990 : 38mm Set of Three

Specimen Details

Borehole		TP03-50
Sample No.		1
Depth	from(m)	0.50
Depth	to(m)	1.00
Date		02/02/2017
Disturbed / Undisturbed		Disturbed

Description of Specimen

Brown silty firm CLAY

Initial Specimen Conditions

Height	mm	76.00	76.00	76.00
Diameter	mm	38.00	38.00	38.00
Area	mm^2	1134.11	1134.11	1134.11
Volume	cm^3	86.19	86.19	86.19
Mass	g	192.80	171.00	170.00
Dry Mass	g	135.10	144.00	141.00
Density	Mg/m^3	2.24	1.98	1.97
Dry Density	Mg/m^3	1.57	1.67	1.64
Moisture Content	%	43	19	21
Specific Gravity	kN/m^3	2.65	2.65	2.65
(assumed/measured)		assumed	assumed	assumed

Final Specimen Conditions

Moisture Content	%	19	19	18
Density	Mg/m^3	2.40	2.41	2.70
Dry Density	Mg/m^3	2.01	2.03	2.28

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P16185

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GEO SITE & TESTING SERVICES LTD

Consolidated Undrained Triaxial Compression Test
BS 1377 : Part 8 : 1990 : 38mm Set of Three

Specimen Details

Borehole		TP03-50
Sample No.		1
Depth	from(m)	0.50
Depth	to(m)	1.00

Test Setup

Date started	31/01/2017	26/01/2017	26/01/2017
Date Finished	01/02/2017	00/01/1900	00/01/1900
Top Drain Used	y	y	y
Base Drain Used	y	y	y
Side Drains Used	y	y	y
Pressure System Number	P11	P10	P11
Cell Number	C11	C10	C11

Saturation

Cell Pressure Incr.	kPa	100.00	100.00	100.00
Back Pressure Incr.	kPa	95.00	95.00	95.00
Differential Pressure	kPa	5.00	5.00	5.00
Final Cell Pressure	kPa	300.00	500.00	500.00
Final Pore Pressure	kPa	296.00	395.50	495.00
Final B Value		0.97	0.95	0.97

Consolidation

Effective Pressure	kPa	200.00	300.00	400.00
Cell Pressure	kPa	300.00	500.00	500.00
Back Pressure	kPa	100.00	200.00	100.00
Excess Pore Pressure	kPa	196.00	296.00	395.00
Pore Pressure at End	kPa	100.00	200.00	100.00
Consolidated Volume	cm^3	67.19	70.94	61.89
Consolidated Height	mm	70.42	71.52	68.86
Consolidated Area	mm^2	967.45	1000.34	920.96
Vol. Compressibility	m^2/MN	2.20436	0.88465	2.81926
Consolidation Coef.	$m^2/yr.$	0.29190	0.02043	0.37693

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Client Ref
P16185
Contract No
33812

Galway GCT

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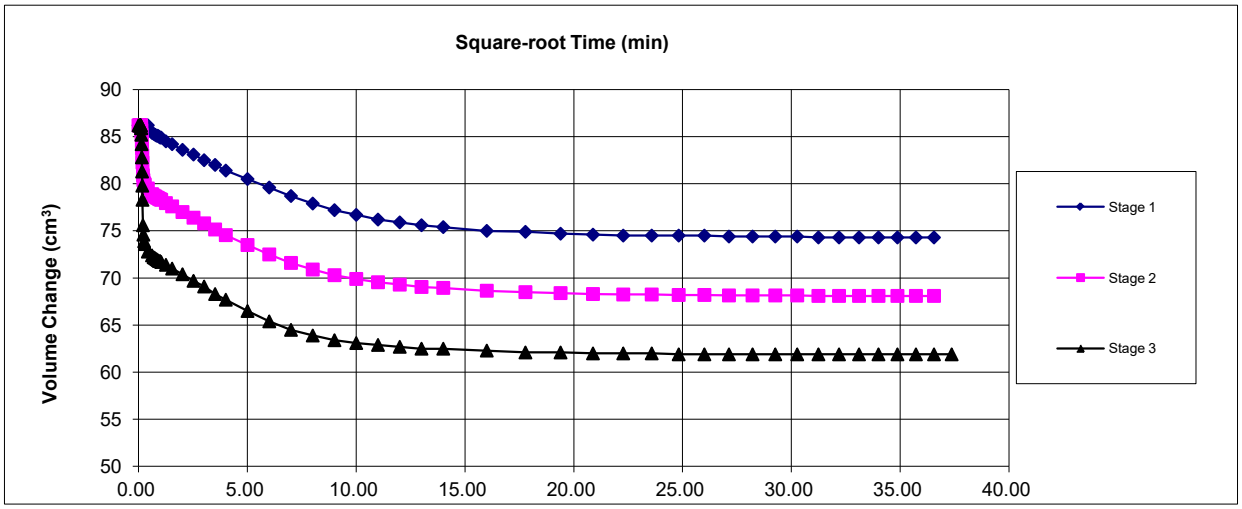
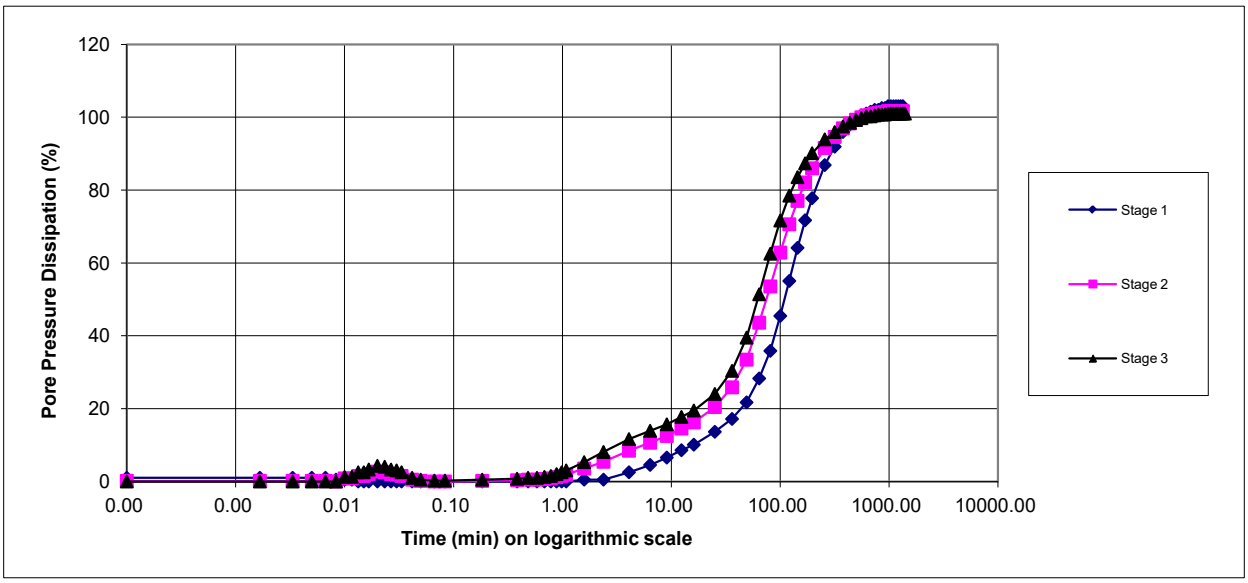
BS 1377 : Part 8 : 1990 : 38mm Set of Three

Specimen Details

Borehole		TP03-50
Sample No.		1
Depth	from(m)	0.50
Depth	to(m)	1.00

Consolidation Stage





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P16185
Contract No
33812

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Consolidated Undrained Triaxial Compression Test
BS 1377 : Part 8 : 1990 : 38mm Set of Three

Specimen Details

Borehole		TP03-50
Sample No.		1
Depth	from(m)	0.50
Depth	to(m)	1.00

Shearing

Initial Cell Pressure	kPa	300	500	500
Initial Pore Pressure	kPa	100	200	100
Rate of Strain	mm/min	0.0150	0.0011	0.0189
Max Deviator Stress				
Axial Strain		9.856	8.977	8.801
Axial Stress	kPa	383.891	562.01	689.23
Cor. Deviator stress	kPa	372.470	549.77	676.95
Effective Major Stress	kPa	516.470	770.27	951.95
Effective Minor Stress	kPa	145.000	220.50	275.00
Effective Stress Ratio		3.562	3.493	3.46
s'	kPa	330.735	495.39	613.47
t'	kPa	185.735	274.89	338.47
Max Effective Priciple Stress Ratio				
Axial Strain		8.592	8.355	8.801
Axial Stress	kPa	382.659	561.823	689.225
Cor. Deviator stress	kPa	370.498	549.710	676.947
Effective Major Stress	kPa	513.498	768.710	951.947
Effective Minor Stress	kPa	143.000	219.000	275.000
Effective Stress Ratio		3.591	3.510	3.462
s'	kPa	328.249	493.855	613.473
t'	kPa	185.249	274.855	338.473
Shear Resistance Angle	degs			33.0
Cohesion c'	kPa			5

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P16185

Galway GCT

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33812

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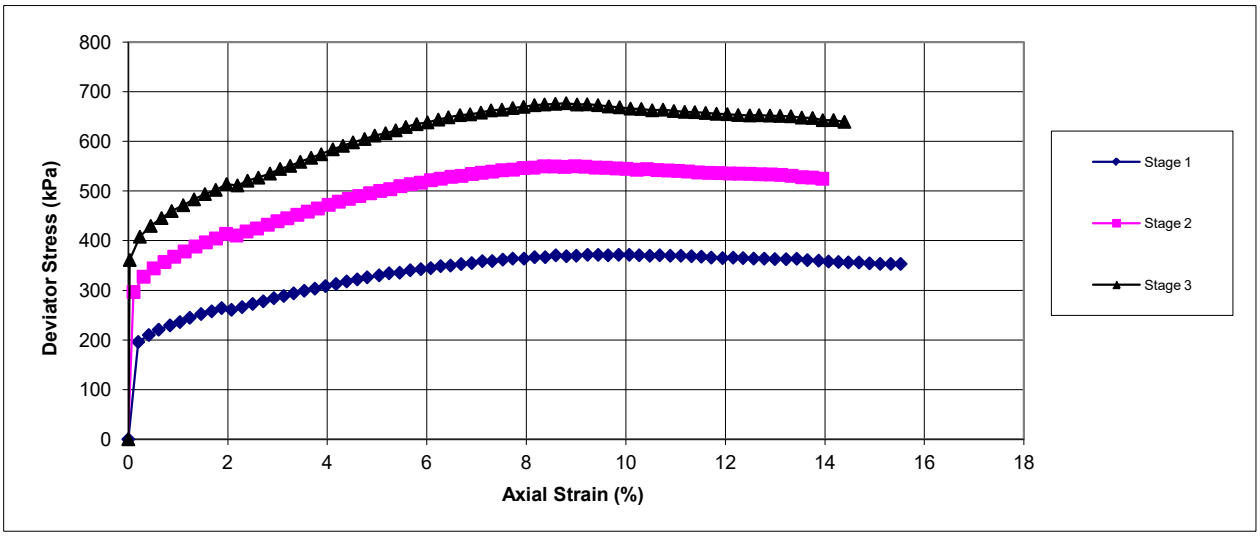
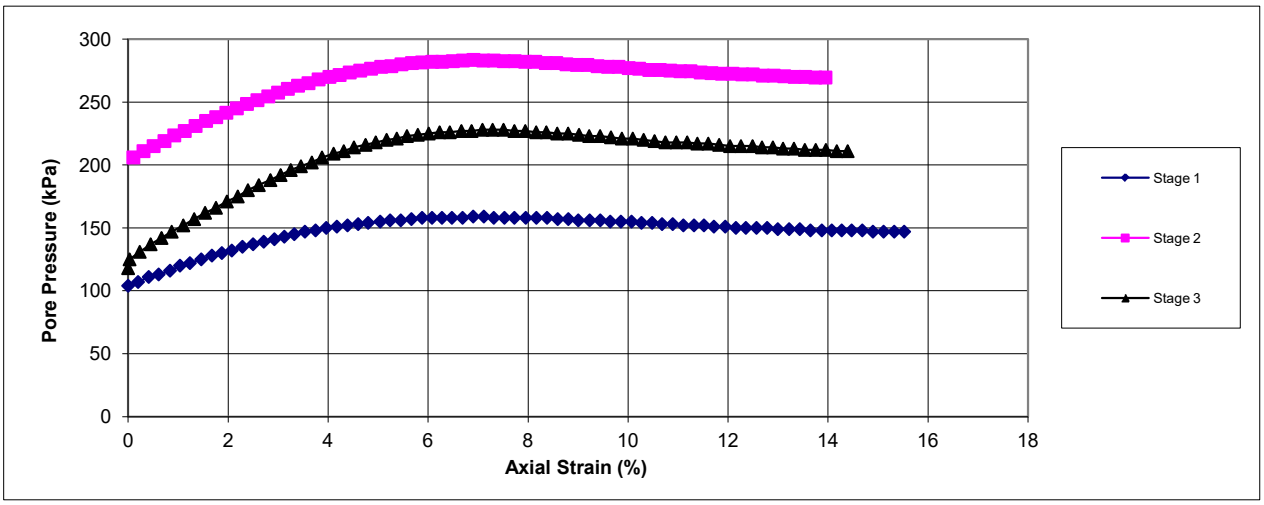
BS 1377 : Part 8 : 1990 : 38mm Set of Three

Specimen Details

Borehole		TP03-50
Sample No.		1
Depth	from(m)	0.50
Depth	to(m)	1.00

Shearing Stage





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P16185

Galway GCT

Contract No
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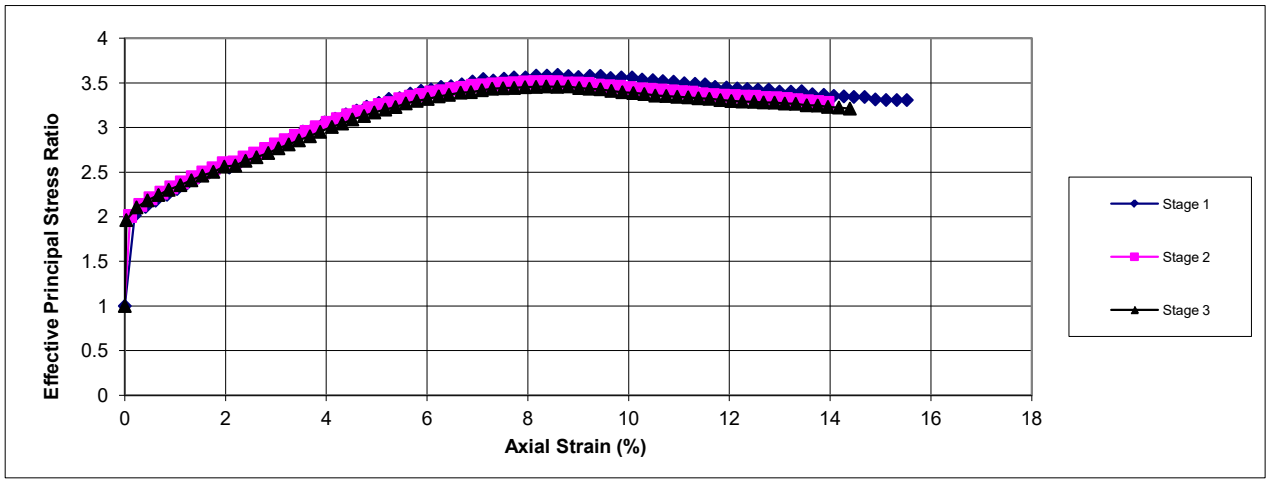
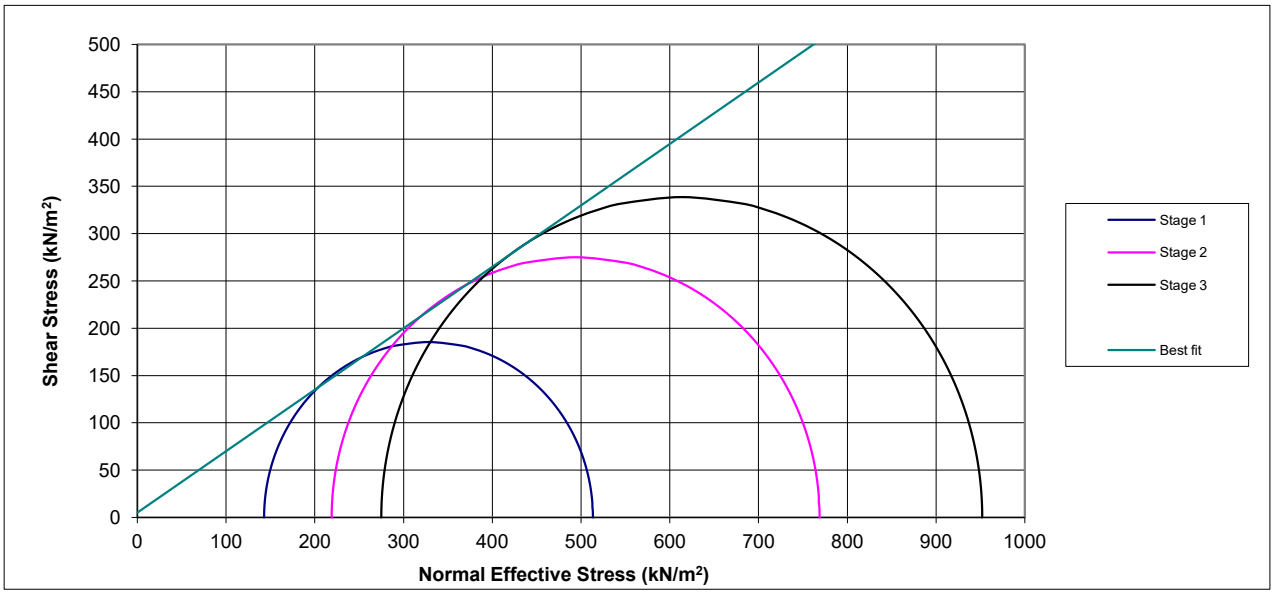
BS 1377 : Part 8 : 1990 : 38mm Set of Three

Specimen Details

Borehole		TP03-50
Sample No.		1
Depth	from(m)	0.50
Depth	to(m)	1.00

Shearing Stage





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P16185

Galway GCT

Contract No
33812

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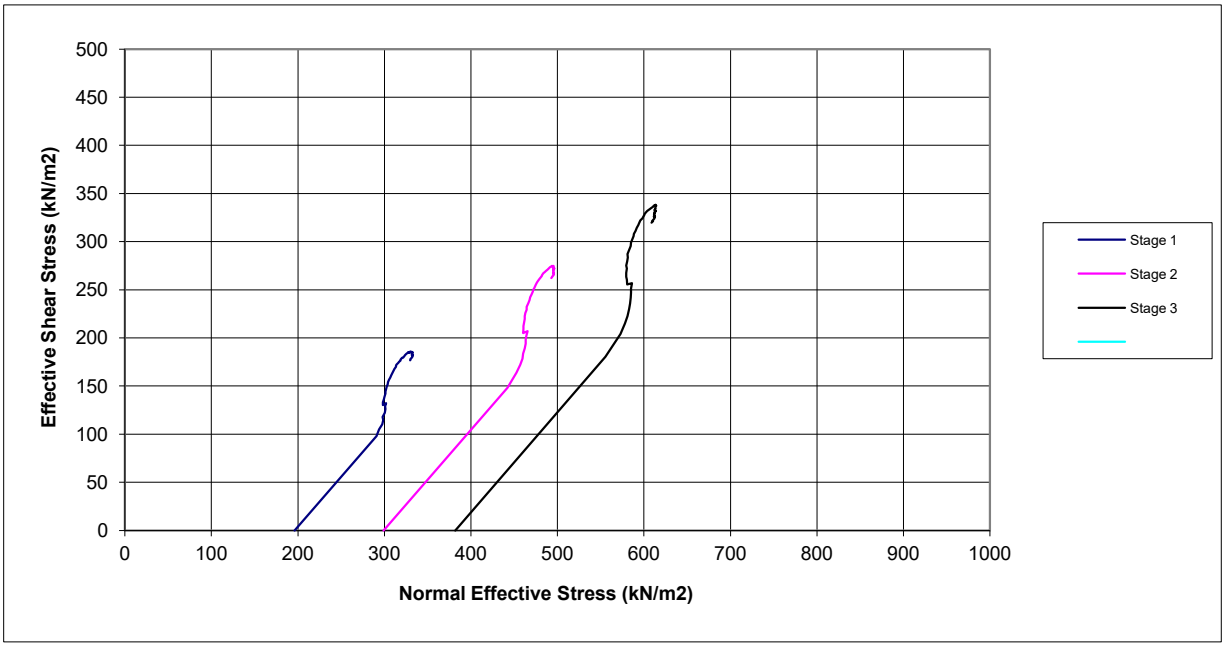
BS 1377 : Part 8 : 1990 : 38mm Set of Three

Specimen Details

Borehole		TP03-50
Sample No.		1
Depth	from(m)	0.50
Depth	to(m)	1.00

Shearing Stage



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Client Ref
P16185
Contract No
33812

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Consolidated Undrained Triaxial Compression Test
BS 1377 : Part 8 : 1990 : 38mm Set of Three

Specimen Details

Borehole		TP03-50
Sample No.		1
Depth	from(m)	0.50
Depth	to(m)	1.00

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Client Ref
P16185
Contract No
33812

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Consolidated Undrained Triaxial Compression Test

BS 1377 : Part 8 : 1990 : 38mm Set of Three

Specimen Details

Borehole		TP03-50
Sample No.		1
Depth	from(m)	0.50
Depth	to(m)	1.00
Date		02/02/2017
Disturbed / Undisturbed		Disturbed

Description of Specimen

Brown silty firm CLAY

Initial Specimen Conditions

Height	mm	76.00	74.00	76.00
Diameter	mm	38.00	37.00	38.00
Area	mm^2	1134.11	1075.21	1134.11
Volume	cm^3	86.19	79.57	86.19
Mass	g	197.80	196.20	192.80
Dry Mass	g	179.00	180.20	177.30
Density	Mg/m^3	2.29	2.47	2.24
Dry Density	Mg/m^3	2.08	2.26	2.06
Moisture Content	%	11	9	9
Specific Gravity	kN/m^3	2.65	2.65	2.65
(assumed/measured)		assumed	assumed	assumed

Final Specimen Conditions

Moisture Content	%	10	9	9
Density	Mg/m^3	2.52	2.54	2.63
Dry Density	Mg/m^3	2.30	2.34	2.42

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Client Ref

P16185

Contract No

33812

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Consolidated Undrained Triaxial Compression Test

BS 1377 : Part 8 : 1990 : 38mm Set of Three

Specimen Details

Borehole		TP03-50
Sample No.		1
Depth	from(m)	0.50
Depth	to(m)	1.00

Test Setup

Date started		31/01/2017	26/01/2017	26/01/2017
Date Finished		01/02/2017	00/01/1900	00/01/1900
Top Drain Used		y	y	y
Base Drain Used		y	y	y
Side Drains Used		y	y	y
Pressure System Number		P11	P10	P11
Cell Number		C11	C10	C11

Saturation

Cell Pressure Incr.	kPa	100.00	100.00	100.00
Back Pressure Incr.	kPa	95.00	95.00	95.00
Differential Pressure	kPa	5.00	5.00	5.00
Final Cell Pressure	kPa	300.00	500.00	500.00
Final Pore Pressure	kPa	296.00	396.50	497.00
Final B Value		0.97	0.95	0.97

Consolidation

Effective Pressure	kPa	200.00	300.00	400.00
Cell Pressure	kPa	300.00	500.00	500.00
Back Pressure	kPa	100.00	200.00	100.00
Excess Pore Pressure	kPa	196.00	297.00	397.00
Pore Pressure at End	kPa	100.00	200.00	100.00
Consolidated Volume	cm^3	77.99	77.12	73.19
Consolidated Height	mm	73.59	73.24	72.18
Consolidated Area	mm^2	1062.19	1053.14	1020.08
Vol. Compressibility	m^2/MN	0.95136	0.15396	1.50825
Consolidation Coef.	$m^2/yr.$	2.64027	0.02043	2.16131

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P16185

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33812

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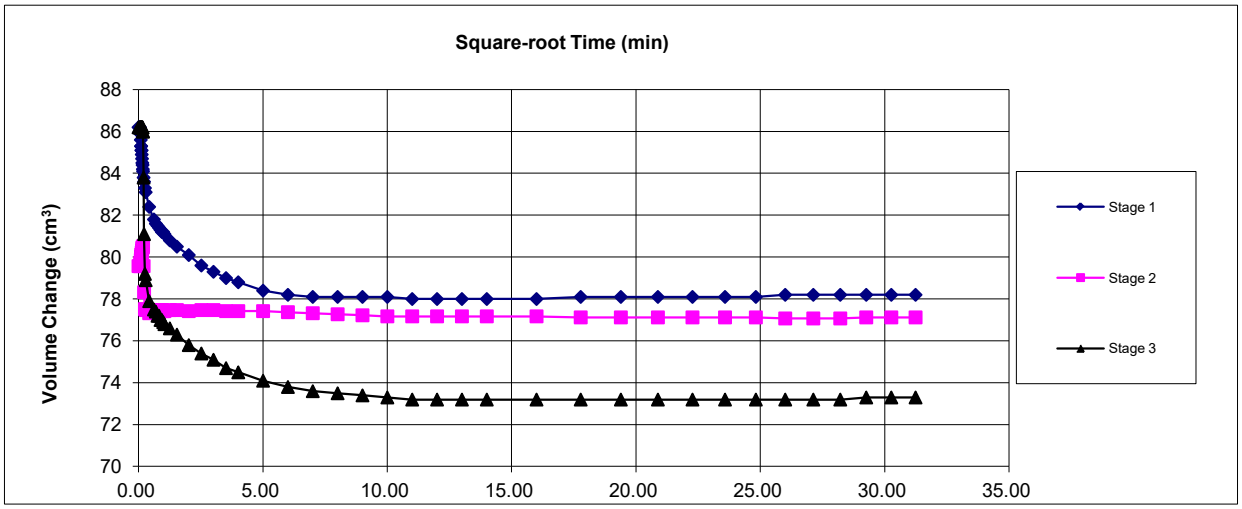
Consolidated Undrained Triaxial Compression Test

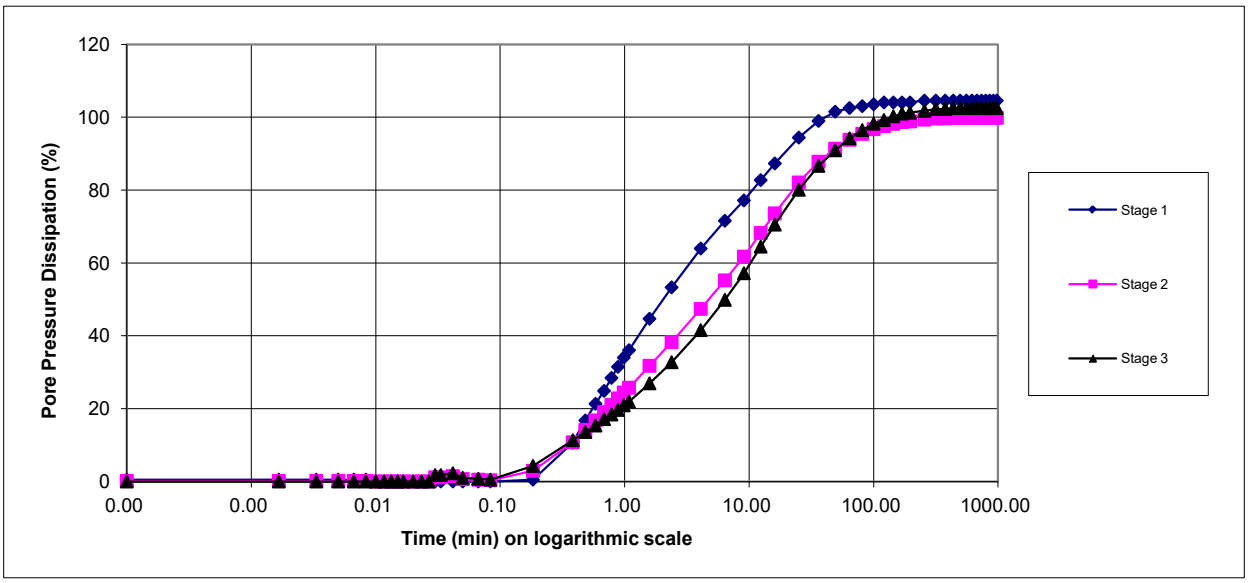
BS 1377 : Part 8 : 1990 : 38mm Set of Three

Specimen Details

Borehole		TP03-50
Sample No.		1
Depth	from(m)	0.50
Depth	to(m)	1.00

Consolidation Stage





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Consolidated Undrained Triaxial Compression Test

BS 1377 : Part 8 : 1990 : 38mm Set of Three

Specimen Details

Borehole		TP03-50
Sample No.		1
Depth	from(m)	0.50
Depth	to(m)	1.00

Shearing

Initial Cell Pressure	kPa	300	500	500
Initial Pore Pressure	kPa	100	200	100
Rate of Strain	mm/min	0.1418	0.0011	0.1139
Max Deviator Stress				
Axial Strain		6.713	6.704	7.398
Axial Stress	kPa	597.215	807.04	1037.60
Cor. Deviator stress	kPa	586.438	795.27	1025.55
Effective Major Stress	kPa	772.438	1063.27	1375.55
Effective Minor Stress	kPa	187.000	268.00	350.00
Effective Stress Ratio		4.131	3.967	3.93
s'	kPa	479.719	665.63	862.77
t'	kPa	292.719	397.63	512.77
Max Effective Priciple Stress Ratio				
Axial Strain		5.612	6.404	6.359
Axial Stress	kPa	586.489	804.753	1032.722
Cor. Deviator stress	kPa	574.937	793.039	1020.835
Effective Major Stress	kPa	757.937	1060.039	1368.835
Effective Minor Stress	kPa	183.000	267.000	348.000
Effective Stress Ratio		4.142	3.970	3.933
s'	kPa	470.469	663.520	858.418
t'	kPa	287.469	396.520	510.418
Shear Resistance Angle	degs			35.6
Cohesion c'	kPa			15

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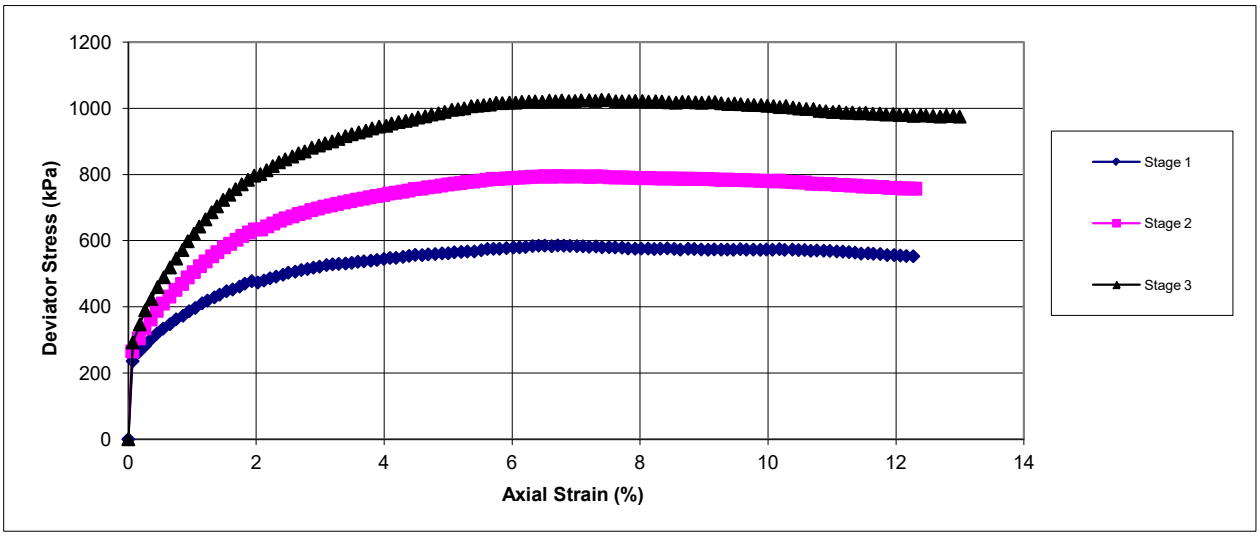
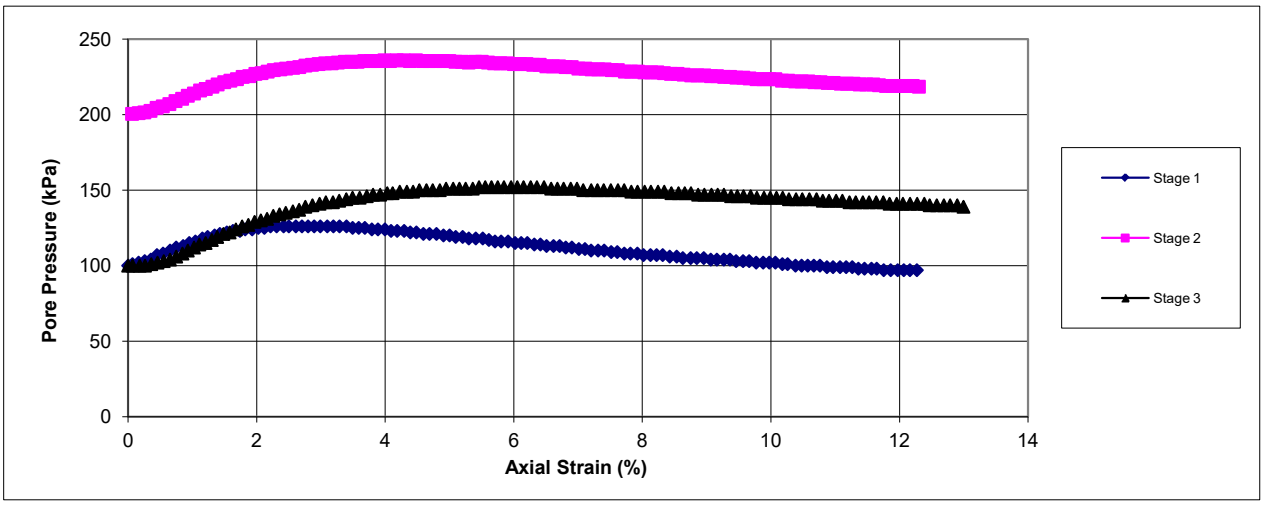
BS 1377 : Part 8 : 1990 : 38mm Set of Three

Specimen Details

Borehole		TP03-50
Sample No.		1
Depth	from(m)	0.50
Depth	to(m)	1.00

Shearing Stage





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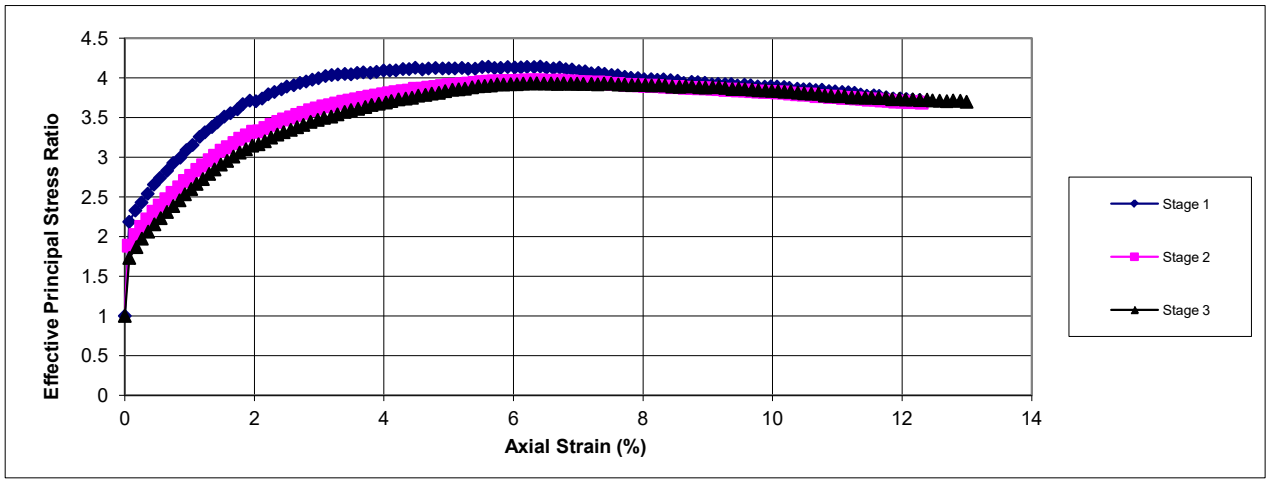
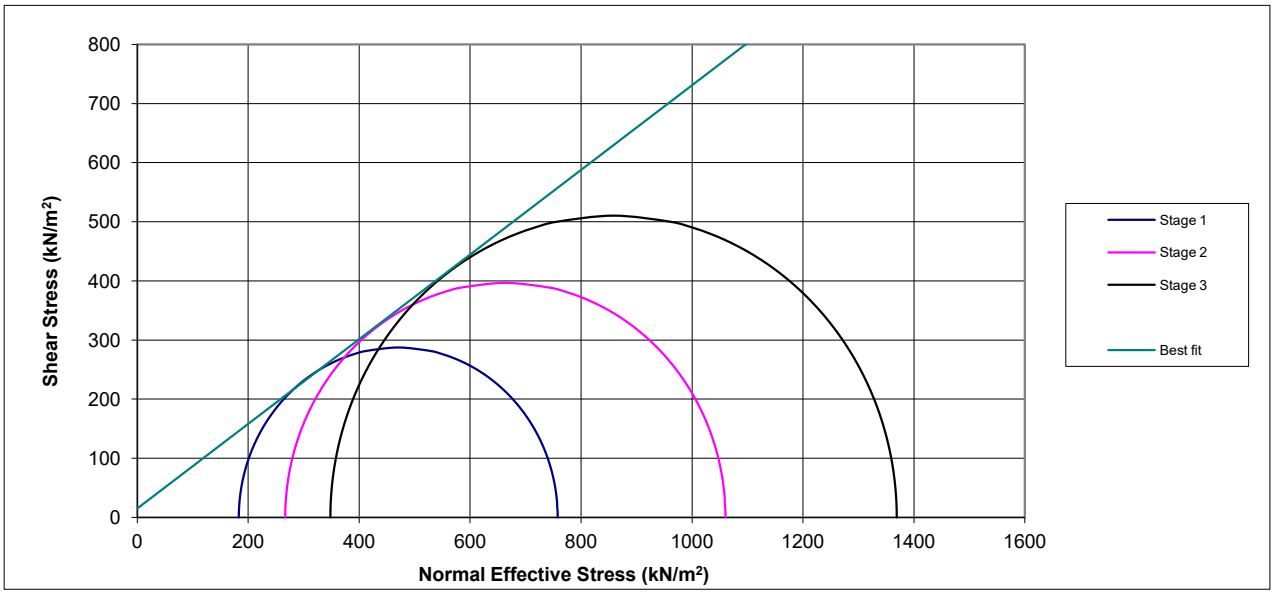
BS 1377 : Part 8 : 1990 : 38mm Set of Three

Specimen Details

Borehole		TP03-50
Sample No.		1
Depth	from(m)	0.50
Depth	to(m)	1.00

Shearing Stage





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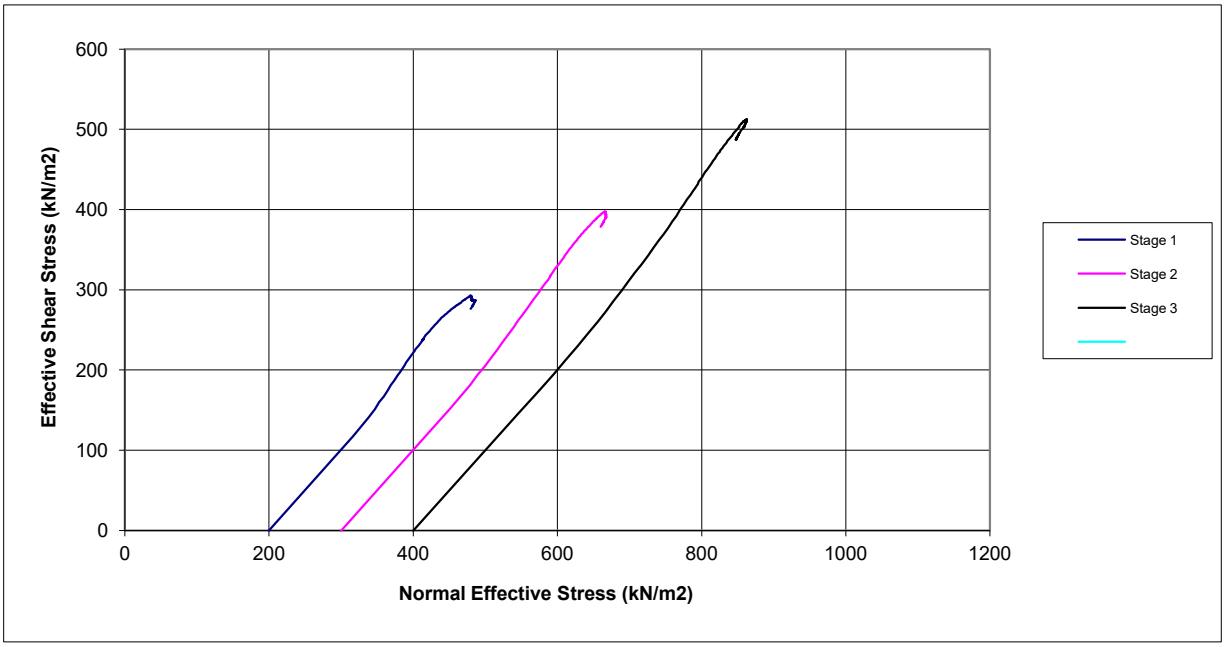
BS 1377 : Part 8 : 1990 : 38mm Set of Three

Specimen Details

Borehole		TP03-50
Sample No.		1
Depth	from(m)	0.50
Depth	to(m)	1.00

Shearing Stage



D P Evans

Checked and Approved By

02/02/17
Date

Client Ref
P16185
Contract No
33812

Galway GCT

GSTL
GEO SITE & TESTING SERVICES LTD

Consolidated Undrained Triaxial Compression Test

BS 1377 : Part 8 : 1990 : 38mm Set of Three

Specimen Details

Borehole		TP03-50
Sample No.		1
Depth	from(m)	0.50
Depth	to(m)	1.00

D P Evans

Checked and Approved By

02/02/17
Date

Client Ref
P16185
Contract No
33812

GSTL
GEO SITE & TESTING SERVICES LTD

Galway GCT

Priority Geotechnical Limited

Point Load Test Results

Project: **N6 GCTP Phase 3**

Project No: P16185

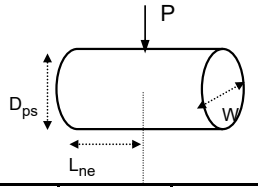
Carried out by: GH

06/01/2017

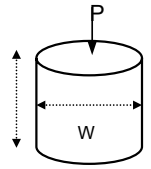
Test Type
D - Diametral, A - Axial, I - Irregular Lump
Direction (U = unknown or random)
Par - parallel to planes of weakness
Per - perpendicular to planes of weakness
Dimensions
Dps - Distance between platens (platen separation)
Dps' - at failure
Lne - Length from platens to nearest free end
W - Width of shortest dimension perpendicular to load, P

Machine Ram Area, cm^2

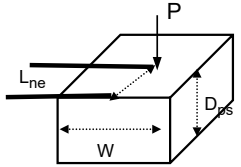
Diametral



Axial



Block/irregular lump



Borehole	Sample Top, m BGL	Sample Ref	Sample Type	Sample Base, m BGL	Specimen Ref	Specimen Depth, m BGL	Description	Test Type see ISRM Fig 5 and 8		Failure Valid (Y/N)	Dimensions			Gauge reading, kN	P Failure Load, kN	De equivalent diameter, mm	Is MPa	Is(50) point load index, MPa	Remarks
								Type (D, A, I)	Direction (Par/Per/U)		L mm	Dps, mm	W mm						
RC03-60	1.6						Limestone	D	Par	Y	80	86	86	10.21	10.21	86.0	1.38	1.76	Undulating Rough
RC03-60	2.7						Limestone	D	Par	Y	76	86	86	9.44	9.44	86.0	1.28	1.63	Undulating Rough
RC03-60	6.9						Limestone	D	Par	Y	101	86	86	19.95	19.95	86.0	2.70	3.44	Undulating Rough
RC03-60	7.8						Limestone	D	Par	Y	160	86	86	29.13	29.13	86.0	3.94	5.03	Undulating Smooth
RC03-60	12						Limestone	D	Par	Y	110	86	86	22.24	22.24	86.0	3.01	3.84	Undulating Rough
RC03-60	15.3						Limestone	D	Par	Y	82	86	86	16.12	16.12	86.0	2.18	2.78	Undulating Rough
RC03-61	5.0						Limestone	I	Par	Y	95	60	78	16.6	16.60	77.2	2.79	3.39	Undulating Rough
RC03-61	9.1						Limestone	D	Par	Y	68	86	86	27.93	27.93	86.0	3.78	4.82	Undulating Rough
RC03-61	11.3						Limestone	D	Par	Y	89	86	86	28.33	28.33	86.0	3.83	4.89	Undulating Rough
RC03-61	13.9						Limestone	D	Par	Y	126	86	86	23.96	23.96	86.0	3.24	4.14	Undulating Rough

Unconfined Compressive Strength, UCS

Job Name	**N6 GCTP Phase 3**
Job Number	**P16185**
Borehole:	**RC03-60**
Depth:	**3.5 m**
Rock Type	**Limestone**

Bulk Density	**2.69**	**Mg/m^3**
Load at Failure, P	**147.9**	**kN**
Stress at Failure	**25.41**	**MPa**

Failure mode

NOTES:

Operator	GH
Checked	CK

Unconfined Compressive Strength, UCS

Job Name	**N6 GCTP Phase 3**
Job Number	**P16185**

Borehole:	**RC03-60**	
Depth:	**4.3**	**m**
Rock Type	**Limestone**	

Bulk Density	**2.69**	**Mg/m^3**
Load at Failure, P	**455.6**	**kN**
Stress at Failure	**78.41**	**MPa**

Failure mode

NOTES:

Operator	GH
Checked	CK

Unconfined Compressive Strength, UCS

Job Name	**N6 GCTP Phase 3**
Job Number	**P16185**

Borehole:	**RC03-61**	
Depth:	**3.3**	**m**
Rock Type	**Limestone**	

Bulk Density	**2.69**	**Mg/m^3**
Load at Failure, P	**292.8**	**kN**
Stress at Failure	**50.41**	**MPa**

Failure mode

NOTES:

Operator	GH
Checked	CK

Unconfined Compressive Strength, UCS

Job Name	**N6 GCTP Phase 3**
Job Number	**P16185**
Borehole:	**RC03-61**
Depth:	**6.3 m**
Rock Type	**Limestone**

Bulk Density	**2.69**	**Mg/m^3**
Load at Failure, P	**455**	**kN**
Stress at Failure	**78.36**	**MPa**

Failure mode

NOTES:

Operator	GH
Checked	CK

Unconfined Compressive Strength, UCS

Job Name	**N6 GCTP Phase 3**
Job Number	**P16185**

Borehole:	**RC03-60**	
Depth:	**9.6**	**m**
Rock Type	**Limestone**	

Bulk Density	**2.68**	**Mg/m^3**
Load at Failure, P	**208.1**	**kN**
Stress at Failure	**35.1**	**MPa**

Failure mode

NOTES:

Operator	GH
Checked	CK

Unconfined Compressive Strength, UCS

Job Name	**N6 GCTP Phase 3**
Job Number	**P16185**
Borehole:	**RC03-61**
Depth:	**13.25 m**
Rock Type	**Limestone**

Bulk Density	**2.70**	**Mg/m^3**
Load at Failure, P	**560.4**	**kN**
Stress at Failure	**96.51**	**MPa**

Failure mode

NOTES:

Operator	GH
Checked	CK

SI-01

SI-02

SI-03

SI-04

SI-05

SI-06

Priority Geotechnical Site

JOB NAME:

Galway N6 GCTP Phase 3

Sheet Title:

EXPLORATORY LOCATION LAYOUT

JOB NUMBER:

P16185

DRAWING NUMBER:

P16185-SI-A

DRAWN BY:

Gary Curtin

DATE:

02/02/2017

SCALE:

1:20,000 ON A3

APPROVED:

GH

REVISION:

D01

pgl priority geotechnical

KEY:

- SW00 Denotes Slit Trench and Datum location
- TP00 Denotes Trial Pit location
- BH00 Denotes Borehole location
- RC00 Denotes Rotary Core location

JOB NAME:

Galway N6 GCTP Phase 3

Sheet Title:

EXPLORATION LOCATION PLAN

JOB NUMBER:

P16185

DRAWING NUMBER:

P16185-SI-01

DRAWN BY:

Gary Curtin

DATE:

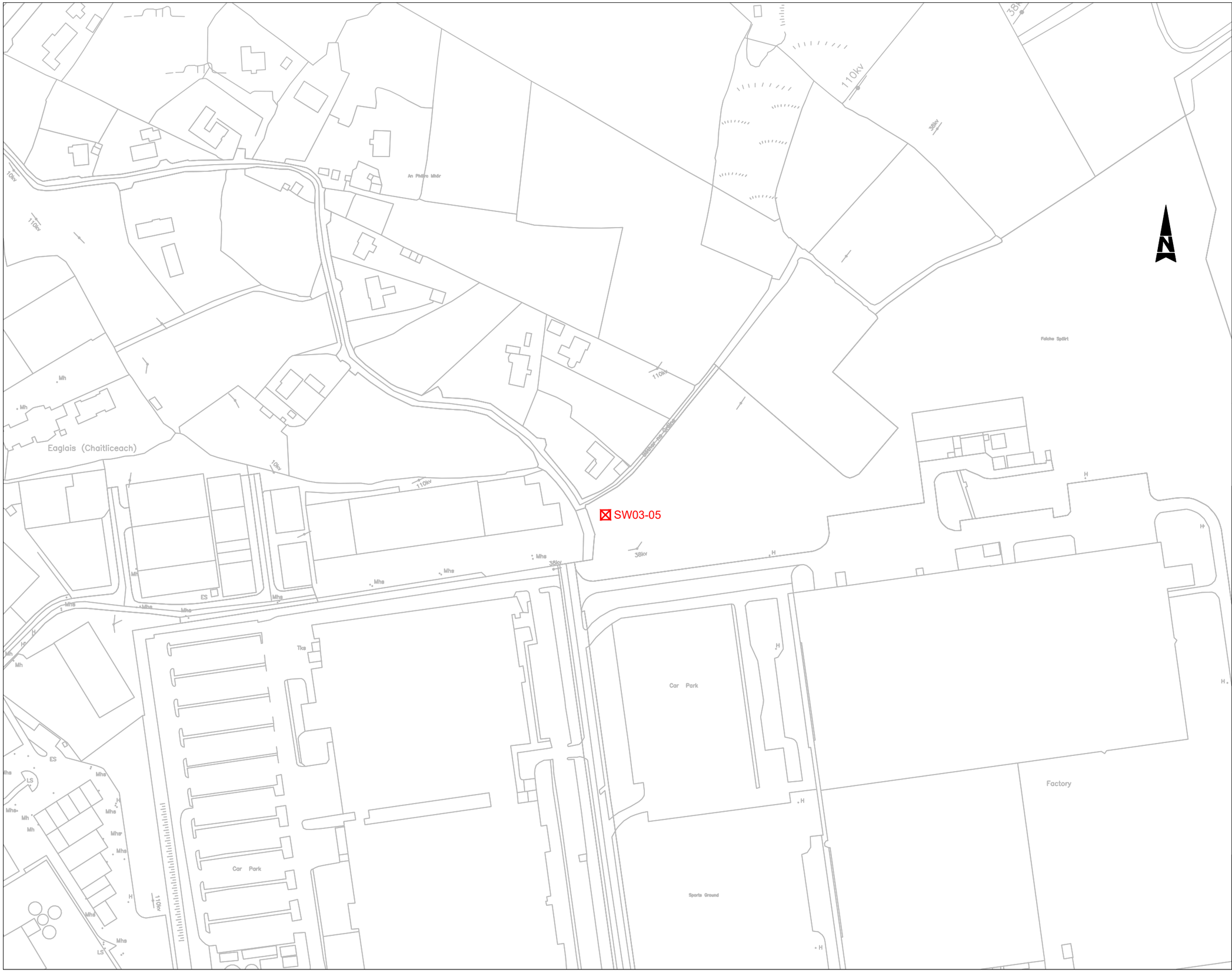
02/02/2017

SCALE:	APPROVED:
1:1,000 ON A3	GH

REVISION:

D01

pgl priority geotechnical



JOB NAME:

Galway N6 GCTP Phase 3

Sheet Title:

EXPLORATION LOCATION PLAN

JOB NUMBER:

P16185

DRAWING NUMBER:

P16185-SI-02

DRAWN BY:

Gary Curtin

DATE:

02/02/2017

SCALE:	APPROVED:
1:1,000 ON A3	GH

REVISION:

D01

pgl priority geotechnical

KEY:

SW00	Denotes Slit Trench and Datum location
TP00	Denotes Trial Pit location
BH00	Denotes Borehole location
RC00	Denotes Rotary Core location

JOB NAME:

Galway N6 GCTP Phase 3

Sheet Title:

EXPLORATION LOCATION PLAN

JOB NUMBER:

P16185

DRAWING NUMBER:

P16185-SI-03

DRAWN BY:

Gary Curtin

DATE:

02/02/2017

SCALE:	APPROVED:
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REVISION:

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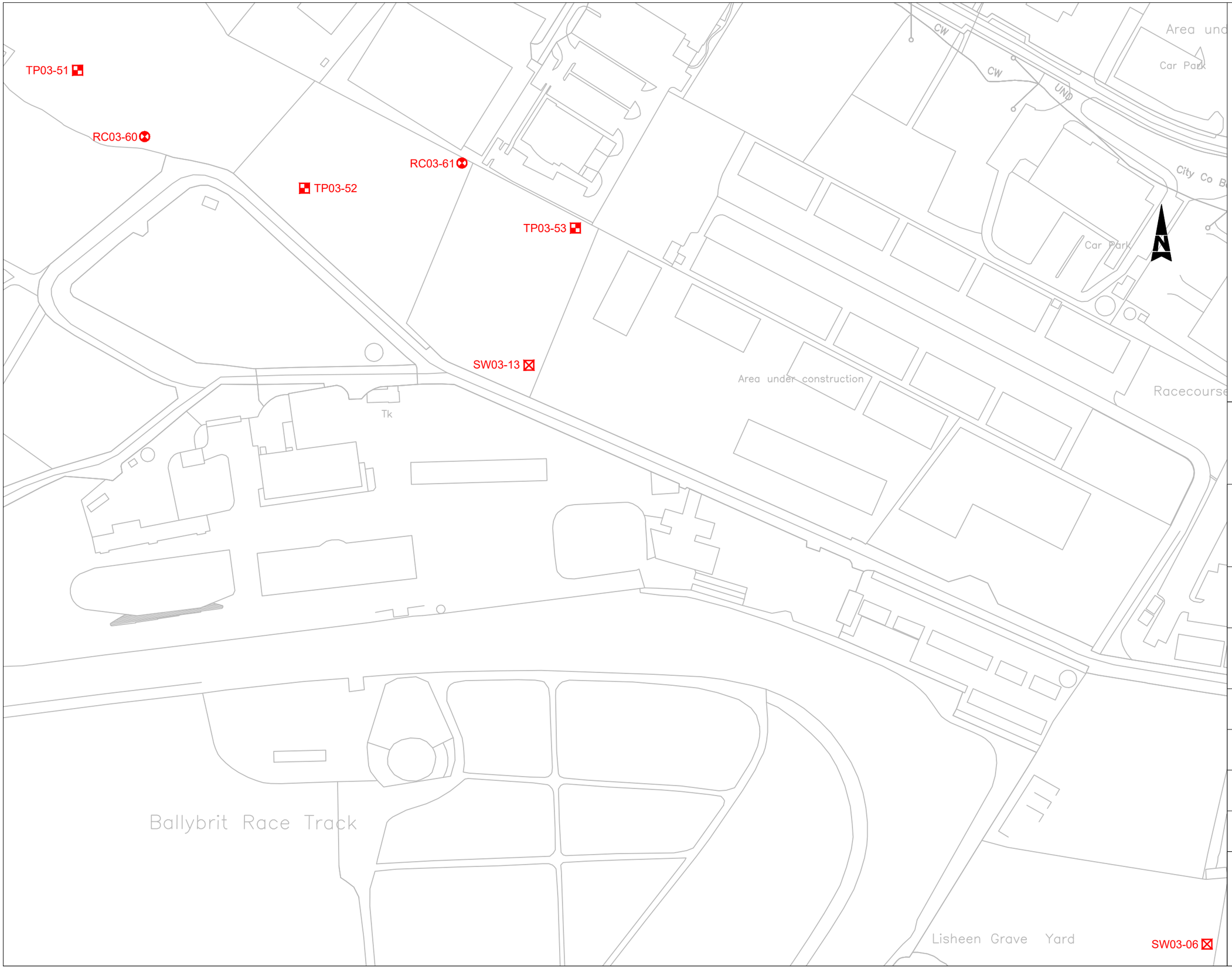
pgl priority geotechnical



KEY:

- SW00 Denotes Slit Trench and Datum location
- TP00 Denotes Trial Pit location
- BH00 Denotes Borehole location
- RC00 Denotes Rotary Core location

JOB NAME:

Galway N6 GCTP Phase 3

Sheet Title:

EXPLORATION LOCATION PLAN

JOB NUMBER:

P16185

DRAWING NUMBER:

P16185-SI-04

DRAWN BY:

Gary Curtin

DATE:

02/02/2017

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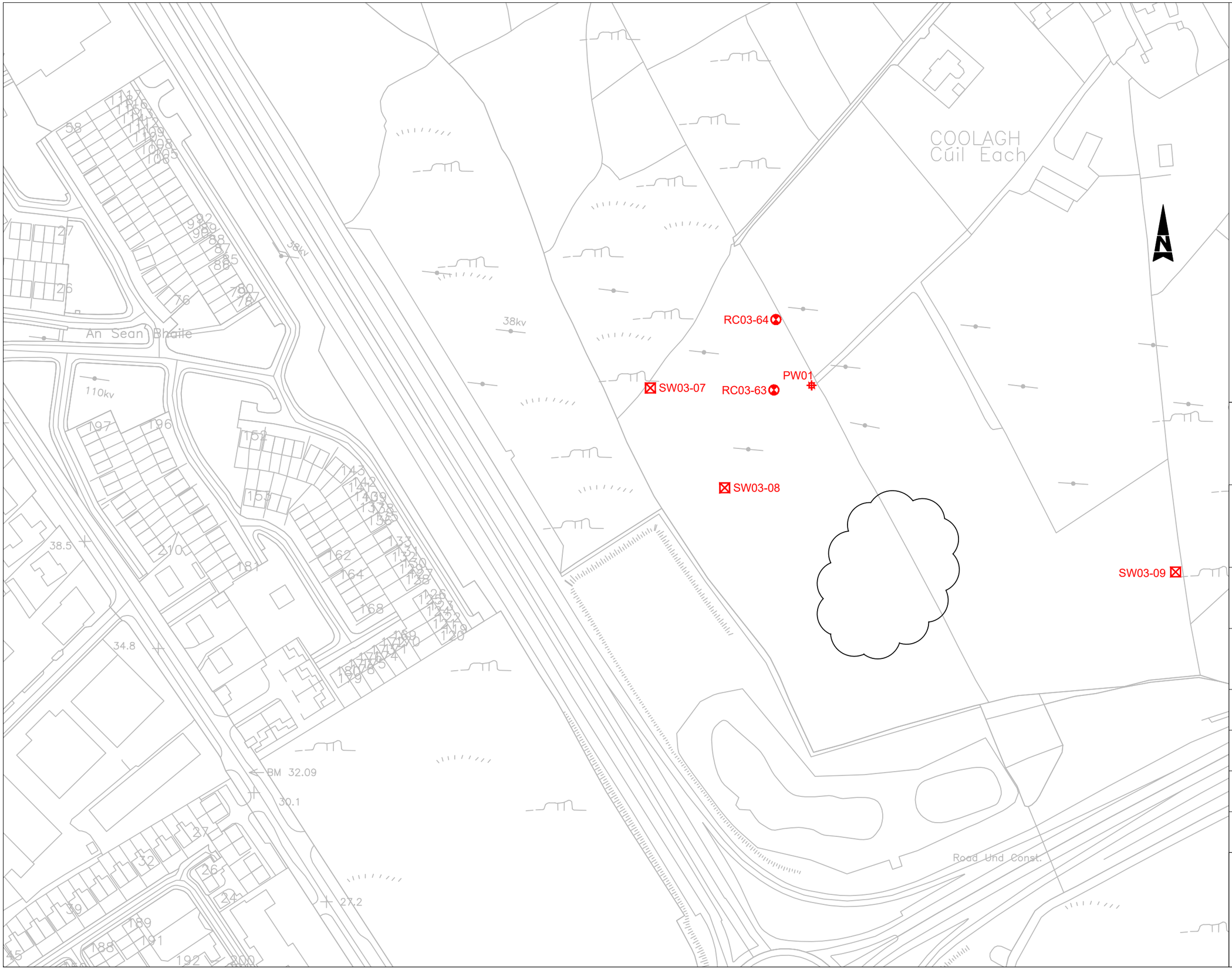
REVISION:

D01

pgl priority geotechnical



KEY:

- SW00 Denotes Slit Trench and Datum location
- TP00 Denotes Trial Pit location
- BH00 Denotes Borehole location
- RC00 Denotes Rotary Core location
- PW00 Denotes Pump Well location

JOB NAME:

Galway N6 GCTP Phase 3

Sheet Title:

EXPLORATION LOCATION PLAN

JOB NUMBER:

P16185

DRAWING NUMBER:

P16185-SI-05

DRAWN BY:

Gary Curtin

DATE:

02/02/2017

SCALE:	APPROVED:
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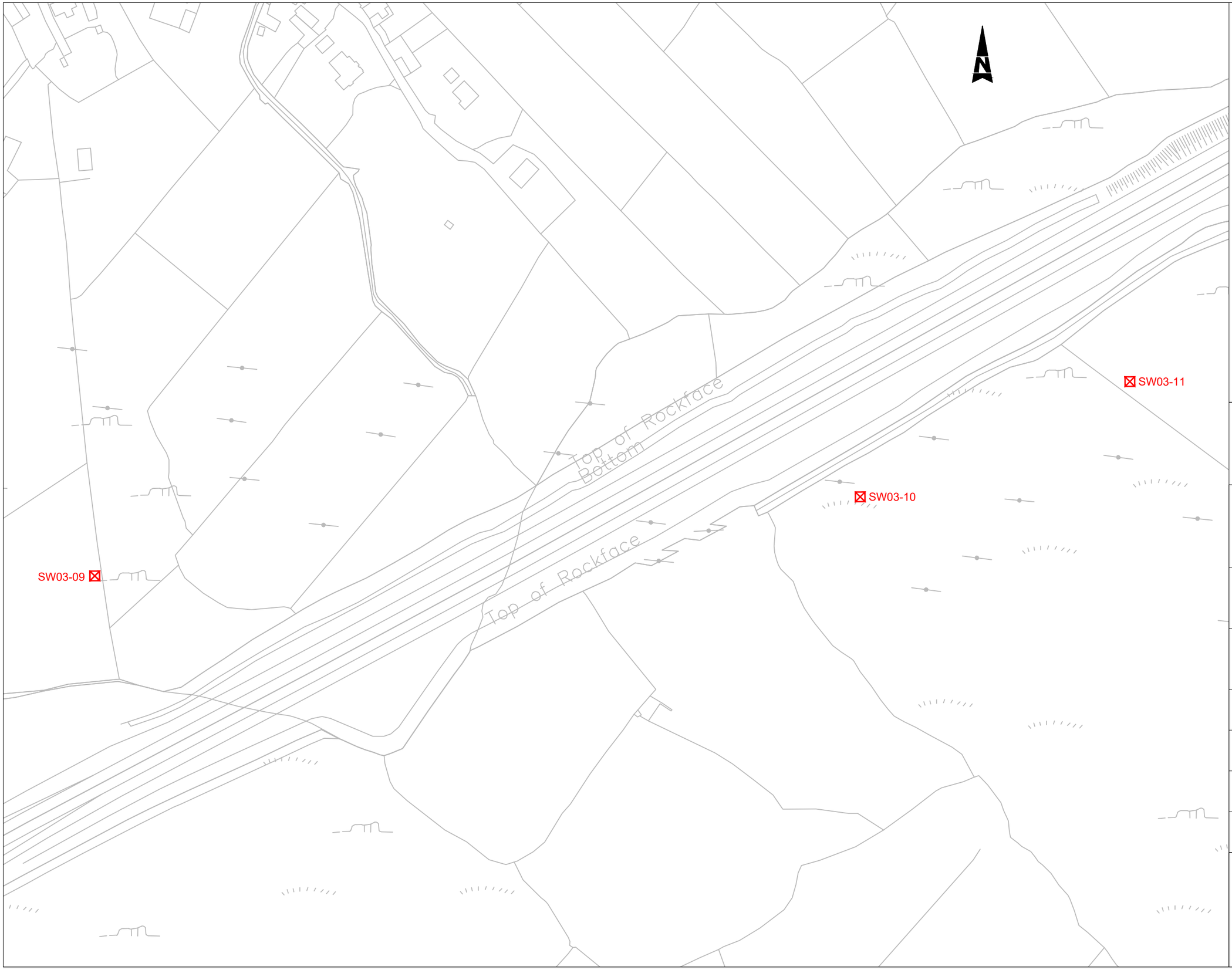
REVISION:

D01

pgl priority geotechnical



KEY:

- SW00 Denotes Slit Trench and Datum location
- TP00 Denotes Trial Pit location
- BH00 Denotes Borehole location
- RC00 Denotes Rotary Core location

JOB NAME:

Galway N6 GCTP Phase 3

Sheet Title:

EXPLORATION LOCATION PLAN

JOB NUMBER:

P16185

DRAWING NUMBER:

P16185-SI-06

DRAWN BY:

Gary Curtin

DATE:

02/02/2017

SCALE:	APPROVED:
1:1,000 ON A3	GH

REVISION:

D01

pgl priority geotechnical