

# North Irish Sea Array Landfall – Ground Investigation

Client:

Statkraft Limited

Client's Representative: Arup

Report No.:

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Status:

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21-1619A

Final Report

Causeway Geotech Ltd

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# **Document Control Sheet**

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The works were conducted in accordance with:

British Standards Institute (2015) BS 5930:2015+A1:2020, Code of practice for site investigations.

EN 1997-2: 2007: Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing.

Geotechnical Society of Ireland (2016), Specification & Related Documents for Ground Investigation in Ireland

Laboratory testing was conducted in accordance with:

British Standards Institute BS 1377:1990 parts 2, 4, 5, 7 and 9





# **METHODS OF DESCRIBING SOILS AND ROCKS**

Soil and rock descriptions are based on the guidance in BS5930:2015+A1:2020, The Code of Practice for Site Investigation.

U	Nominal 100mm diameter undisturbed open tube sample (thick walled sampler).
UT	Nominal 100mm diameter undisturbed open tube sample (thin walled sampler).
Р	Nominal 100mm diameter undisturbed piston sample.
В	Bulk disturbed sample.
LB	Large bulk disturbed sample.
D	Small disturbed sample.
С	Core sub-sample (displayed in the Field Records column on the logs).
L	Liner sample from dynamic sampled borehole.
W	Water sample.
ES / EW	Soil sample for environmental testing / Water sample for environmental testing.
SPT (s)	Standard penetration test using a split spoon sampler (small disturbed sample obtained).
SPT (c)	Standard penetration test using 60 degree solid cone.
(x,x/x,x,x,x)	Blows per increment during the standard penetration test. The initial two values relate to the seating drive (150mm and the remaining four to the 75mm increments of the test length.
(Y for Z/Y for Z)	Incomplete standard penetration test where the full test length was not achieved. The blows 'X' represent the total blows for the given seating or test length 'Z' (mm).
N=X	SPT blow count 'N' given by the summation of the blows 'X' required to drive the full test length (300mm).
HVP / HVR	In situ hand vane test result (HVP) and vane test residual result (HVR). Results presented in kPa.
V VR	Shear vane test (borehole). Shear strength stated in kPa.V: undisturbed vane shear strengthVR: remoulded vane shear strength
Soil consistency description	In cohesive soils, where samples are disturbed and there are no suitable laboratory tests, N values may be used to indicate consistency on borehole logs – a median relationship of Nx5=Cu is used (as set out in Stroud & Butler 1975).
dd-mm-yyyy	Date at the end and start of shifts, shown at the relevant borehole depth. Corresponding casing and water depths shown in the adjacent columns.
$\bigtriangledown$	Water strike: initial depth of strike.
▼	Water strike: depth water rose to.
Abbreviations relatin	g to rock core – reference Clause 36.4.4 of BS 5930: 2015
TCR (%)	Total Core Recovery: Ratio of rock/soil core recovered (both solid and non-intact) to the total length of core run.
SCR (%)	Solid Core Recovery: Ratio of solid core to the total length of core run. Solid core has a full diameter, uninterrupted by natural discontinuities, but not necessarily a full circumference and is measured along the core axis between natural fractures.
RQD (%)	Rock Quality Designation: Ratio of total length of solid core pieces greater than 100mm to the total length of core run
FI	Fracture Index: Number of natural discontinuities per metre over an indicated length of core of similar intensity of fracturing.
NI	Non Intact: Used where the rock material was recovered fragmented, for example as fine to coarse gravel size particles
AZCL	Assessed zone of core loss: The estimated depth range where core was not recovered.
DIF	Drilling induced fracture: A fracture of non-geological origin brought about by the rock coring.
(xxx/xxx/xxx)	Spacing between discontinuities (minimum/average/maximum) measured in millimetres.





# North Irish Sea Array

# **1 AUTHORITY**

On the instructions of Arup, ("the Client's Representative"), acting on the behalf of Statkraft Limted ("the Client"), a ground investigation was undertaken at the above location to provide geotechnical and environmental information for input to the design and construction of a proposed onshore cable route.

This report details the work carried out both on site and in the geotechnical and chemical testing laboratories; it contains a description of the site and the works undertaken, the exploratory hole logs and the laboratory test results. A discussion on the recommendations for construction is also provided.

All information given in this report is based upon the ground conditions encountered during the site investigation works, and on the results of the laboratory and field tests performed. However, there may be conditions at the site that have not been taken into account, such as unpredictable soil strata, contaminant concentrations, and water conditions between or below exploratory holes. It should be noted that groundwater levels usually vary due to seasonal and/or other effects and may at times differ to those recorded during the investigation. No responsibility can be taken for conditions not encountered through the scope of work commissioned, for example between exploratory hole points, or beneath the termination depths achieved.

This report was prepared by Causeway Geotech Ltd for the use of the Client and the Client's Representative in response to a particular set of instructions. Any other parties using the information contained in this report do so at their own risk and any duty of care to those parties is excluded.

# 2 SCOPE

The extent of the investigation, as instructed by the Client's Representative, included boreholes, trial pits, soil and rock core sampling, environmental sampling, groundwater monitoring, in-situ and laboratory testing, downhole geophysics and the preparation of a factual report on the findings.

# **3 DESCRIPTION OF SITE**

As shown on the site location plan in Appendix A, the works were conducted on the site of agricultural lands located north of Balbriggan. The landfall site is bordered to the east by the Irish Sea and to the north, south and west by agricultural lands. The R132 and main railway line connecting Dublin northwards also runs through the site.





# **4 SITE OPERATIONS**

#### 4.1 Summary of site works

Site operations, which were conducted between the 23<sup>rd</sup> of February and the 26<sup>th</sup> of April 2022, comprised:

- eleven boreholes:
  - seven boreholes by light cable percussion extended by rotary follow-on.
  - four boreholes by rotary drilling methods.
- a standpipe installation in five boreholes
- ten machine dug trial pits; and
- downhole geophysics

The exploratory holes and in-situ tests were located as instructed by the Client's Representative, as shown on the exploratory hole location plan in Appendix A.

#### 4.2 Boreholes

A total of eleven boreholes were put down in a minimum diameter of 150mm through soils and rock strata to their completion depths by a combination of methods, including light percussion boring using light cable percussion boring by Dando 2000 and 3000 rigs, and rotary drilling by Comacchio 205, Comacchio 405 and Comacchio 601 rotary drilling rigs.

The borehole logs state the methodology and plant used for each location, as well as the appropriate depth ranges.

A summary of the boreholes, subdivided by category in accordance with the methods employed for their completion, is presented in the following sub-sections.

#### 4.2.1 Boreholes by combined percussion boring and rotary follow-on drilling

Seven boreholes (BH03-BH07 and BH15-BH16) were put down by a combination of light cable percussion boring and rotary follow-on drilling techniques with core recovery in overburden and bedrock. Where the cable percussion borehole had not been advanced onto bedrock, rotary percussive methods were employed to advance the borehole to completion/bedrock. Symmetrix cased full-hole drilling was used, with SPTs carried out at standard intervals as required.

Hand dug inspection pits were carried out between ground level and 1.20m depth to ensure boreholes were put down at locations clear of services or subsurface obstructions.





Standard penetration tests were carried out in accordance with BS EN 22476-3:2005+A1:2011 at standard depth intervals throughout the overburden using the split spoon sampler (SPT<sub>(s)</sub>) or solid cone attachment (SPT<sub>(c)</sub>). The penetrations are stated for those tests for which the full 150mm seating drive or 300mm test drive was not possible. The N-values provided on the borehole logs are uncorrected and no allowance has been made for energy ratio corrections. The SPT hammer energy measurement report is provided in Appendix H.

Where coring was carried out within bedrock strata, Geobor S Coring was used. The core was extracted in up to 1.5m lengths using an SK6L core barrel, which produced core of nominal 102mm diameter, and was placed in single channel wooden core boxes.

The core was subsequently photographed and examined by a qualified and experienced Engineering Geologist, thus enabling the production of an engineering log in accordance with *BS 5930: 2015: Code of practice for ground investigations*.

Appendix B presents the borehole logs, with core photographs presented in Appendix C.

#### 4.2.2 Rotary drilled boreholes

Four boreholes (BH01, BH02, BH17, BH18) were put to their completion by rotary drilling techniques only. The boreholes were completed using tracked Comacchio 405 and Comacchio 601 rotary drilling rigs.

Symmetrix-cased full hole rotary percussive drilling techniques were employed to advance the boreholes to a specified depth, after which rotary coring was employed to recover core samples of the overburden and bedrock. SPTs were carried out at standard intervals throughout the overburden, with small and bulk disturbed samples obtained where possible through the soil strata.

Where coring was carried out within bedrock strata, Geobor S Coring was used. The core was extracted in up to 1.5m lengths using an SK6L core barrel, which produced core of nominal 102mm diameter, and was placed in single channel wooden core boxes.

The core was subsequently photographed and examined by a qualified and experienced Engineering Geologist, thus enabling the production of an engineering log in accordance with *BS 5930: 2015: Code of practice for ground investigations*.

Appendix B presents the borehole logs, with core photographs presented in Appendix C.

#### 4.3 Standpipe installations

A groundwater monitoring standpipe was installed in BH01, BH03, BH06, BH16 and BH17.





Details of the installations, including the depth range of the response zone, are provided in Appendix B on the individual borehole logs.

### 4.4 Trial Pits

Ten trial pits (TP01–TP05, TP07-TP09 and TP11-TP12) were excavated using a 6t tracked excavator fitted with a 600mm wide bucket, to a maximum depth of 3.0m.

Environmental samples were taken at various depths in each trial pit.

Disturbed (small jar and bulk bag) samples were taken at standard depth intervals and at change of strata.

Any water strikes encountered during excavation were recorded along with any changes in their levels as the excavation proceeded. The stability of the trial pit walls was noted on completion.

Appendix D presents the trial pit logs with photographs of the pits and arising provided in Appendix E.

#### 4.5 Surveying

The as-built exploratory hole positions were surveyed following completion of site operations by a Site Engineer from Causeway Geotech. Surveying was carried out using a Trimble R10 GPS system employing VRS and real time kinetic (RTK) techniques.

The plan coordinates (Irish Transverse Mercator) and ground elevation (mOD Malin) at each location are recorded on the individual exploratory hole logs. The exploratory hole plan presented in Appendix A shows these as-built positions.

#### 4.6 Groundwater monitoring

Following completion of site works, groundwater monitoring was conducted. Ground water monitoring was carried out using a water interface probe.

The monitoring records are presented in Table 2 of Section 6.3.

#### 5 LABORATORY WORK

Upon their receipt in the laboratory, all disturbed samples were carefully examined and accurately described, and their descriptions incorporated into the borehole logs.





# 5.1 Geotechnical laboratory testing of soils

Laboratory testing of soils comprised:

- **soil classification:** moisture content measurement, Atterberg Limit tests and particle size distribution analysis.
- **shear strength** (total stress): unconsolidated undrained triaxial tests(uu)
- **shear strength (effective stress):** consolidated undrained triaxial tests (cu)
- **compaction related:** dry density/moisture content relationship, Moisture Condition Value (MCV), MCV/moisture content relationship
- **soil chemistry:** BRE Suite B, thermal resistivity

Laboratory testing of soils samples was carried out in accordance with British Standards Institute: *BS 1377, Methods of test for soils for civil engineering purposes; Part 1 (2016), and Parts 2-9 (1990).* 

The test results are presented in Appendix F.

# 5.2 Geotechnical laboratory testing of rock

Laboratory testing of rock sub-samples comprised:

- point load index
- unconfined compressive strength (UCS) tests

Test	Test carried out in accordance with
Point load index	ISRM Suggested Methods (1985) Suggested method for determining point-load strength. Int. J. Rock Mech. Min. Sci. Geomech. Abstr. 22, pp. 53–60
Uniaxial	ISRM Suggested Methods (1981) Suggested method for determining
compression	deformability of rock materials in uniaxial compression, Part 2
strength tests	and
	ISRM (2007) Ulusay R, Hudson JA (eds) The complete ISRM suggested methods
	for rock characterization, testing and monitoring, 2007

The test results are presented in Appendix F.





# 5.3 Environmental laboratory testing of soils

Environmental testing was conducted on selected environmental soil samples by Chemtest at its laboratory in Newmarket, Suffolk.

Testing was carried out according to Arup Soil Suite E, with all testing scheduled by the client's representative.

Results of environmental laboratory testing are presented in Appendix G.

# **6 GROUND CONDITIONS**

#### 6.1 General geology of the area

Published geological mapping indicate the superficial deposits underlying the site comprise Glacial Till and Alluvium. These deposits are underlain by andesite, pillow breccia and tuff of the Belcamp Formation.

#### 6.2 Ground types encountered during investigation of the site

A summary of the ground types encountered in the exploratory holes is listed below, in approximate stratigraphic order:

- **Topsoil:** encountered a maximum thickness of 450mm across the site.
- **Possible Made Ground (fill):** sandy gravelly clay encountered in BH03, BH15 and BH16 extending to a maximum depth of 2.30m in BH16.
- **Fluvioglacial deposits:** typically medium dense sands interspersed with layers of sandy gravelly clay in BH05, BH06 and BH17.
- **Glacial Till:** sandy gravelly clay, frequently with low cobble content, typically firm or stiff in upper horizons, becoming very stiff with increasing depth.
- **Bedrock (Breccia, Andesite, Greywacke, Mudstone, Tuff, Limestone and Siltstone):** Rockhead was encountered at depths ranging from 3.0m in BH01 to 12.60m in BH05.

#### 6.3 Groundwater

Details of the individual groundwater strikes, along with any relative changes in levels as works proceeded, are presented on the exploratory hole logs for each location.





Groundwater was encountered during drilling and trial pit excavations as groundwater strikes as shown in Table 1.

Location	Depth (mbgl)
BH03	2.60/7.30
BH04	1.30/2.80/3.50
BH05	4.30
BH06	2.00
BH15	5.00
BH16	5.00/9.90
TP01	1.20
TP03	1.30
TP05	1.70
TP07	2.00
TP08	1.40
TP11	1.00
TP12	1.00

#### Table 1: Groundwater strikes encountered during ground investigation.

Groundwater was not noted during drilling at any of the other borehole locations. However, it should be noted that the casing used in supporting the borehole walls during drilling may have sealed out additional groundwater strikes and the possibility of encountering groundwater during excavation works should not be ruled out.

It should be noted that any groundwater strikes within bedrock may have been masked by the fluid used as the drilling flush medium.

Location	Round 1 (26/05/2022)	Round 2 (08/06/2022) -	Round 3(15/09/2022) -
	- mbgl	mbgl	mbgl
BH01	1.10	10.28	2.19
BH06	0.80	0.86	0.72
BH16	1.71	1.79	2.25
BH17	3.90	3.95	4.54

#### Table 2: Groundwater monitoring records.

Continued monitoring of the installations will give an indication of the seasonal variations on groundwater level which should be factored into design considerations.





# 7 **REFERENCES**

Geotechnical Society of Ireland (2016), Specification & Related Documents for Ground Investigation in Ireland.

IS EN 1997-2: 2007: Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing. National Standards Authority of Ireland.

BS 5930: 2015+A1:2020: Code of practice for ground investigations. British Standards Institution.

BS EN ISO 14688-1:2018: Geotechnical investigation and testing. Identification and classification of soil. Part 1 Identification and description.

BS EN ISO 14688-2:2018: Geotechnical investigation and testing. Identification and classification of soil. Part 2 Principles for a classification.

BS EN ISO 14689-1:2018: Geotechnical investigation and testing. Identification and classification of rock. Identification and description.

BS EN ISO 22476-3:2005+A1:2011: Geotechnical investigation and testing. Field testing. Standard penetration test.



# APPENDIX A SITE AND EXPLORATORY HOLE LOCATION PLANS









# APPENDIX B BOREHOLE LOGS

	C		<b>E</b> Geo			Y			-	ct No. 619A	Project Client: Client's		rish Sea Arra ft Limited	ay Landfall				ehole ID 3 <b>H01</b>
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Rotary C	oring	Comacch	110 40	15	2.	70	30.	.00		8.67 E 1.97 N	Elevatio	<b>n:</b> 3.53 mO	D End Date:	25/04/2022	Logger: [	DM	F	INAL
Depth (m)	Samples ,	Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend		Des	cription			Water	ackfill
										-		TOPSOIL- Brown	andy gravelly C	LAY.				-
1.20 1.20 - 1.65	D1 SPT(S) N (2,2/2,2, Hammer						1.20	Dry	3.33	- 0.20		Firm brown sandy	gravelly CLAY	Driller's descript	ion)			
								-								2.5 —		
2.70 2.70 - 3.00	D2 SPT(S) N	=6 (1,2/6							0.83	- 2.70		Firm dark brown		CLAY. Sand is fine	to coarse. G	ravel is	¥	-
2.70 5.00	for 150n	าm)							0.53	- 3.00		subangular fine to						3.0
3.70	Hammei	- SN = 0643	80	90	60 50							Medium strong g thick) at various c strength, slightly Discolouration: 1. 10-20 degree ju rough with orang 2. 30-40 degree ju rough with browr 3. 80-90 degree ju undulating, rough surfaces. <u>385-4.10m: Vesicular</u>	rientations. Pa closer fracture bints, medium s sh brown disco bints, widely sp discolouration bints, very wide with yellowish	rtially weathered spacing with disc spaced (40/300/7 louration on join aced (130/1950/v on joint surfaces ly spaced (3200/ brown discolour	: slightly red olouration o 740), undulat t surfaces. 6500), undul s. 6000/10000	uced n joint ting, lating, ),		
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6.70	Watar	Strikes	TCR	SCR	RQD	FI				-								6.5
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										71.97 N	Elevatio	Elevation: 3.53 mOD		End Date: 25/04/2022 Logger:		FINAL		
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8.20			100	100	90	-				<ul> <li>thick) at various orientations. Partially weathered: slightly reduced strength, slightly closer fracture spacing with discolouration on joint surfaces.</li> <li>Discolouration:         <ol> <li>1.0-20 degree joints, medium spaced (40/300/740), undulating, rough with orangish brown discolouration on joint surfaces.</li> <li>3.0-40 degree joints, widely spaced (130/1950/6500), undulating, rough with brown discolouration on joint surfaces.</li> <li>3.80-90 degree joints, very widely spaced (3200/6000/10000),</li> </ol> </li> </ul>								
			100	100	97					- - - - - - - - - - - - -		3. 80-90 degree join undulating, rough w surfaces.						
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27.70			100	95	90													28.0 — 28.5 —	
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	etails iam (mm)	Time (min)			n) н Ц	land o ocatio	dug ir on: La	andfal		cavated to	o 1.20m.								
2.70 30.00	200 150	Flush		e					eason neduled c	epth.						Last Upd	Updated 1 /12/2022 AGS		

	CA		E			Y			-	ct No. 619A	<b>19A</b> Client: Statkraft Limited								
Metho	d	Plant L	lsed		Top	(m)	Base	(m)	Coord	inates	Client's Rep Arup						Sheat E a	of ⊑	
Rotary Dri	illing	Comacch	io 40		0.0	00	2.	70			Final De	1W	Sheet 5 of Scale: 1:4						
Rotary Co	oring	Comacch	iio 40	)5	2.1	2.70		.00		8.67 E 1.97 N	Elevatio	<b>n:</b> 3.53 mOD	End Date:	25/04/2022	Logger: D	м	FINAL		
Depth (m)	Samples / Fie	eld Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend		Des	cription		Water	Backfill		
	Samples / Fie	eld Records	100			FI	Depth	Depth				Medium strong grey thick) at various orid strength, slightly clo surfaces. Discolouration: 1. 10-20 degree joir rough with orangish 2. 30-40 degree joir undulating, rough w surfaces.	y ANDESITE w entations. Par oser fracture s hts, medium s h brown disco nts, widely spa liscolouration nts, very widel with yellowish	ith white calcite tially weathered spacing with disc paced (40/300/7 louration on join accd (130/1950/ on joint surface ly spaced (3200/	I: slightly redu colouration on 740), undulatin nt surfaces. (6500), undula s. (6000/10000),	i0mm iced i joint ng, ating,	Backfill	29.5 - 30.0 - 31.0 - 31.5 - 32.0 - 32.5 - 33.0 - 33.5 - 34.0 - 34.5 - 34.5 - 35.5 - 35.5 - 36.0 -	
			TCR	SCR	RQD	FI				-									
Casing De To (m) Di		ime (min) Core I	Barre		n) H La	ocatio	dug in on: La	spect ndfall		cavated to	1.20m.								
2.70 30.00	200 150		6L					-											
50.00	130	<b>Flush</b> Wa		e					e <b>ason</b> Neduled de	epth.						Last Updat 02/12/202	Updated 12/2022 AGS		

Vertex Stube         Vertex Stube<	Borehole ID		ay Landfall	sh Sea Arra	Name: North Iri	Project	ct No.	Proje									2
Wethod         Plant Uset         Top (n)         See (n)         Plant (n)         Plan	BH02			Limited	Statkraft	Client:	619A	21-1			Y	A	W	SE	AUS	C	
Retary Coning         Connection 405         0.00         2.50         30.00         Turns 40         Perial Depth:         30.01 m         Start Date:         17.042/027         Definition           Perint         Sample / Instruction         Tot         Sample / Instruction         5.41 mC10         nd Date:         17.042/027         ogger:         Turn         Sample / Instruction         5.41 mC10         nd Date:         17.042/027         ogger:         Turn         Sample / Instruction         5.41 mC10         nd Date:         17.042/027         ogger:         Turn         Sample / Instruction         5.41 mC10         nd Date:         17.042/027         ogger:         Turn         Sample / Instruction         Sample / Instr					<b>Rep</b> Arup	Client's					Н	EC	DTI	GEC	(	8 -	
Number         Test Start Start         Elevention:         5.43 mOD         End Date:         21/04/2021         Logger:         End Star:         Comparison of the start Sta	Sheet 1 of 5 Scale: 1:40	Driller: RS	: 13/04/2022	Start Date:	<b>pth:</b> 30.00 m	Final De			.50	2.	.00	0.	05	nio 40	Comacch	Drilling	Rotary I
Image: Section of the sectio		Logger: EM	21/04/2022	End Date:	<b>n:</b> 5.43 mOD	Elevatio	0.35 N				.50			10 10	connacci		notary
4.00       4       4       4       4       4       5	ਸ਼ੇ ਡਿ Backfill					Legend			Water Depth (m)	Casing Depth (m)	FI	RQD	SCR	TCR	Field Records	Samples /	
5.50       90       76       13       NI       Weak (bcally very weak) brownish grey GkEYWACKE. Distinctly weak brown and closer fracture spacing with discolouration and clay deposits on fracture surfaces and brown clay deposits in the space of t	0.5 1.0 1.5 2.0 2.5	ogies.	se of mixed litholo y CLAY with low co ubangular fine to	r fine to coars	Gravel is subangular Soft brown slightly s Sand is fine to coars are subangular of v		- 2.50	2.93		_	AZCI			63			4.00
7.00       100       88       36       12       100       12       100       12       100       12       100       12       100       12       100       12       100       12       100       12       100       12       100       12       100       12       100       12       100       12       100       12       100       12       100       100       12       100	n ffil. 5.0 50), its 5.5	re spacing with ces and clay infill. ed (130/357/750), n and orangish wn clay deposits	uch closer fractur on fracture surfac es, medium space ark reddish brown surfaces and brow ure surfaces.	d strength, mu clay deposits o lding fracture ough, with dan nost fracture s n most fractu	weathered: reduced discolouration and d Discontinuities: 1. 20-30 degree bed planar, smooth to re brown staining on n (up to 3mm thick) o		4.65 - - - - - - - - - - - - - - - - - - -	0.78			NI	13	76	90			5.50
Water Strikes     Remarks       Struck at (m) Casing to (m)     Time (min)       Rose to (min)     Time (min)       Rose to (min) <td></td> <td></td> <td>ning and patchy br</td> <td>y brown stain</td> <td>to rough with patch</td> <td></td> <td>- - - - - - - - - - - - - - - -</td> <td></td> <td></td> <td></td> <td>12</td> <td>36</td> <td>88</td> <td>100</td> <td></td> <td></td> <td></td>			ning and patchy br	y brown stain	to rough with patch		- - - - - - - - - - - - - - - -				12	36	88	100			
Water Strikes     Remarks       Struck at (m) Casing to (m) Time (min)     Rose to (m)       Location: Landfall     Location: Landfall       Televiewer completed.     No noticeable groundwater strikes- water added during drilling.	7.0 -		silty clay infill	wn slightly sandy s	7.00-7.10m: Soft light bro		-										7.00
Water Strikes     Remarks       Struck at (m) Casing to (m)     Time (min)     Rose to (m)       Location:     Landfall       Televiewer completed.     No noticeable groundwater strikes- water added during drilling.						· · · · · ·	-			-		Por	807	105			
Struck at (m) Casing to (m)       Time (min)       Rose to (m)         Hand dug inspection pit excavated to 1.20m         Location: Landfall         Televiewer completed.         No noticeable groundwater strikes- water added during drilling.										arke		L	SCR		Strikes	W/ator	
					d during drilling.			eted.	andfall compl	dug ii on: La ewer	land .ocati elevi	n) ⊢ L T	e to (n	Rose			Struck at (m)
Casing Details Core Barrel													el	Barre	Core		
To (m)         Diam (mm)           2.50         200														<6L	SI	200	2.50
	ast Updated 02/12/2022						epth						e			150	30.00

	/ -		GEC	DTI	ECI	Н			21-1	ct No. 619A	roject Name: North Irish Sea Array Landfall lient: Statkraft Limited lient's Rep Arup	Borehole ID BH02
Metho Rotary Dri Rotary Co	illing	Plant U Comacch Comacch	nio 40	)5	0.0 2.1	00	Base 2.! 30.	50		linates 88.43 E	nal Depth: 30.00 m Start Date: 13/04/2022 Drille	er: RS Sheet 2 of 5 Scale: 1:40
			1	1			Casing	Water		0.35 N	evation: 5.43 mOD End Date: 21/04/2022 Logg	er: EM FINAL
Depth (m)	Samples /	Field Records	TCR	SCR	RQD	FI	Depth (m)	Depth (m)	Level mOD	Depth (m)	egend Description 	tinctly
8.50			98	65	30				-2.22	- 7.65 - - - - - -	<ul> <li>weathered: reduced strength, much closer fracture spac discolouration and clay deposits on fracture surfaces and Discontinuities:</li> <li>1. 20-30 degree bedding fractures, medium spaced (130 planar, smooth to rough, with dark reddish brown and o brown staining on most fracture surfaces and brown clay (up to 3mm thick) on most fracture surfaces.</li> <li>2. 50-60 degree joints at 5.90-6.00m and 6.10-6.20m, plat to rough with patchy brown staining and patchy brown clay</li> </ul>	ng with 7.5 I clay infill. /357/750), rangish 8.0 - deposits 8.0 -
			100	55	13	>20				- - - - - - - - - - -	[<1mm thick) on most joint surfaces.	9.0 - (375/700), dish brown ough with 9.5
10.00						NI 13				-		10.0 -
11.50			100	60	46				-5.37	- 10.80 	Medium strong grey ANDESITE with white calcite veins ( thick) at various orientations. Partially weathered: slight strength with discolouration and clay deposits on fractur Discontinuities: 1. 5-15 degree joints, medium spaced (150/428/960), sli undulating, rough with orangish brown and brown staini joint surfaces and patchy brown clay deposits (up to 5mm	y reduced 11.0 - e surfaces.
			100	53	46	NI				-	some joint surfaces 2. 50-60 degree joint at 11.05-11.16m, undulating, rough orangish brown and brown staining, patchy greyish brown deposits (<1mm thick) and white calcite mineralisation of surface 3. 70 degree joint at 13.00-13.30m, undulating, rough with patchy orangish brown staining and white calcite mineralised joint surface <u>12.40-12.80m: recovered as subangular medium to coarse gravel</u>	n vith n clay 12.0 - n joint 12.0 -
13.00						4				-		13.0 -
			100	96	96				-7.87	- 13.30 	Medium strong grey ANDESITE with white calcite veins ( thick) at various orientations. Largely unweathered: sligh fracture spacing. Discontinuities: 1. 20-30 degree joints, widely spaced (450/1300/1300), rough, clean	tly closer 13.5 planar, 14.0 -
14.50										-	<ul> <li>2. 50-60 degree joints at 16.70-16.85m and 17.15-17.30t rough, clean</li> <li>3. 5 degree joint at 14.33m, planar, rough, clean</li> </ul>	n, planar,
			TCR	SCR	RQD	FI						
Struck at (m) Ca	sing to (m)	Core	Barre		n) H La Te	ocatio elevie	dug in on: La ewer o	ndfal comp	eted.	cavated to r strikes- v	20m er added during drilling.	
2.50 30.00	200 150	Sk Flush	(6L	e	Т	ermi	natio	on Re	ason			Last Updated
		Wa	ater		Te	ermin	nated	at scł	neduled d	epth		02/12/2022 AGS

2									Proje	ct No.	Project	Name: North Iri	ish Sea Arra	y Landfall		В	orehole ID
	-}} C	AUS	E	M		Y			21-1	619A	Client:	Statkraft	Limited				BH02
		(	BEC		EC						Client's	Rep Arup					
Met Rotary		Plant I Comacch			-	( <b>m)</b> 00	Base (		Coord	dinates	Final De	<b>pth:</b> 30.00 m	Start Date:	13/04/2022	Driller: RS		heet 3 of 5 Scale: 1:40
Rotary		Comacch	nio 40	05	2.	50	30.0	)0		38.43 E 20.35 N	Elevatio	<b>n:</b> 5.43 mOD	End Date:	21/04/2022	Logger: EM		FINAL
Depth (m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Depth D	Water Depth (m)	Level mOD	Depth (m)	Legend		Desc	cription		Water	Backfill
(,							(m)	(m)		-		Medium strong gre thick) at various ori					-
			100	100	100					- - - - - - - - - - -		fracture spacing. Discontinuities: 1. 20-30 degree joir rough, clean 2. 50-60 degree joir rough, clean 3. 5 degree joint at	nts, widely spa nts at 16.70-16	aced (450/1300/	1300), planar,		15.0
16.00			100	100	100	2											16.0
17.50			100	100	100	-				-							17.5
			100	100	100				-14.17	- - - - - - - -		Medium strong gre thick) at various ori fracture spacing Discontinuities: 1. 5-10 degree joint clean	ientations. Larg ts at 24.25m, 2	gely unweathere 25.15m, and 25.4	d: slightly closer	_	
20.50			100	100	100					-		<ol> <li>2. 30-40 degree join white calcite miner</li> <li>3. 60-70 degree join</li> <li>4. 70-80 degree join orangish brown sta</li> </ol>	alisation on joi nt at 19.5-19.8 nt at 24.60-25.	int surfaces, oth 5m, undulating, 00m, undulating	erwise clean rough, clean , rough with		21.0
			TCR	SCR	RQD				L	[						1	
Struck at (m) Casing To (m) 2.50 30.00	Casing to (m)	Core S⊧ Flush	Barro	el	<u>т)</u> н ц т N	ocatio elevie lo no <b>ermi</b>	dug ins on: Lan ewer co ticeable <b>inatior</b>	ndfall omple e gro	l leted. oundwater			d during drilling.			Last U 02/1.	<b>pdate</b> 2/2022	

•	-		GEC	DT	EC	Η			21-1	ect No. 1 <b>619A</b>	Project Client: Client's	Name: North Iri Statkraft Rep Arup		ay Landfall			rehole ID BH02
Metho Rotary Dri Rotary Co	lling	Plant Comacch Comacch	nio 40	)5	0.	(m) 00 50		<b>e (m)</b> 50 .00		dinates 88.43 E	Final De	<b>pth:</b> 30.00 m	Start Date:	13/04/2022	Driller: RS		eet 4 of 5 cale: 1:40
									76552	20.35 N	Elevatio	<b>n:</b> 5.43 mOD	End Date:	21/04/2022	Logger: EM		FINAL
Depth (m) 22.00	Samples /	Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Medium strong gre		cription		3	Backfill
22.00			100	100	100							thick) at various ori fracture spacing Discontinuities: 1. 5-10 degree joint clean 2. 30-40 degree joint white calcite miner: 3. 60-70 degree join 4. 70-80 degree join orangish brown stai	entations. Lar ts at 24.25m, 2 nts at 21.55m alisation on jo nt at 19.5-19.8 nt at 24.60-25	gely unweathere 25.15m, and 25.4 and 27.35m, pla int surfaces, oth 35m, undulating, .00m, undulating	ed: slightly close 40m, planar, rou nar, rough with erwise clean rough, clean 3, rough with	er ugh,	22.0 22.5 - 23.0
23.50			100	100	100												23.5 - 24.0 24.5 -
25.00						2				- - - - - -							25.0 <del>-</del> 25.5 -
26.50			100	100	100					- - - - - - - - - - - - - - - - - - -							26.0 — 26.5 -
			96	96	96					- - - - - - - - - - - - - - - - - - -							27.0 — 27.5 -
28.00			100							- - - - -							28.0 — 28.5 -
	Water	Strikas	TCR	SCR	RQD		rks			-							29.0 —
	sing to (m) etails am (mm)	Time (min)			<b>п)</b> н Ц	ocatio elevie	dug in on: La ewer o	andfal comp	l leted.	cavated to		d during drilling.					
2.50 30.00	200 150	Flush		e					eason heduled c	lepth						ost Updated	AGS

	8 -		GEC	DT	EC	Η	<b>D</b>	o ()	21-1	ct No. 619A	Project Client: Client's	Name: North Iri Statkraft Rep Arup		y Landfall	1		BH02	2
Metl Rotary I Rotary	Drilling	Plant Comacch Comacch	hio 4	05	0.	(m) 00 50	2.	e (m) .50 .00	71978	<b>inates</b> 8.43 E	Final De			13/04/2022	Driller: RS	5	Sheet 5 o Scale: 1:	40
			-	1		1	Casing	Water		0.35 N	Elevatio	<b>n:</b> 5.43 mOD	End Date:	21/04/2022	Logger: EN		FINAL	-
Depth (m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Depth (m)	Level mOD	Depth (m)	Legend	Medium strong grey		cription	veins (un to 5	Mater Mater	Backfill	
9.50			100							-		thick) at various originature spacing Discontinuities: 1. 5-10 degree joint	entations. Lar	gely unweathere	ed: slightly clos	ser		29.5 ·
0.00			100			-			-24.57	- 		clean 2. 30-40 degree join white calcite minera	nts at 21.55m	and 27.35m, pla	nar, rough wit	-		30.0
										-		<ol> <li>60-70 degree joir</li> <li>70-80 degree joir</li> <li>orangish brown stai</li> </ol>	nt at 24.60-25 ining on joint	.00m, undulating	g, rough with			30.5 ·
										-								
										- - -								31.0 —
										-								31.5 -
										-								32.0 —
										-								32.5 -
										-								33.0
										-								33.5 -
										-								
										- - -								34.0 —
										-								34.5 -
										-								35.0 —
										-								35.5 -
										-								36.0 —
										-								
			TCR	SCR			1											1
ruck at (m)		• Strikes )  Time (min)	Rose	e to (r	<u>т)</u> н Ца Та	ocatio elevie	dug ir on: La ewer	andfal comp	leted.			d during drilling.						
	Diam (mm)	Core	Barr	el														
2.50 30.00	200 150	Flush		e	T	ermi	inati	on Re	eason						L	ast Update	ed	
		W	ater		Т	ermir	nated	at sc	neduled d	epth						02/12/2022	<sup>2</sup> A	GS

		1	GEC	DTI	EC	Η			21-1	ect No. L <b>619A</b>	Project Name:       North Irish Sea Array Landfall         Client:       Statkraft Limited         Client's Rep:       Arup	Borehold BH03	3
Met Cable Per Rotary	rcussion	Plant U Dando Comacch	2000	)	0.	(m) 00 50	5.	<b>e (m)</b> 50 .00	7194	dinates 14.12 E 19.80 N	Final Depth:         20.00 m         Start Date:         15/03/2022         Driller:         BM+RS           Elevation:         8.63 mOD         End Date:         12/03/2022         Logger:         CH+TH	Scale: 1	:50
Depth (m)	Sample / Tests	Fie	eld Re	cords			Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend Description	Backfill	1
(111)	iests						(m)	(m)	mob	(,	MADE GROUND: Soft brown sandy gravelly CLAY. Sand is fine to		
0.30 - 0.50 0.50	B1 ES								8.33	0.30	coarse. Gravel is subangular to subrounded fine to coarse.		0.5
										Ē	coarse. Gravel is subangular to subrounded fine to medium.		0.5
0.80 - 1.00										Ē	철상 위험 전 244 년		1.0
1.00 1.20	ES D7									Ē	<u>철수가</u> 에 1979년 1월		1.0
1.20 - 1.65		N=15 (2,3/3,	3,4,5)	) Han	nmer	SN =	1.00	Dry		Ē			
		0199							7.13	1.50	Firm brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is		1.5
1.80 - 2.00	В3									Ē	subangular to subrounded fine to coarse.		•
2.00	U13	Ublow=20 90	0%				1.50	Dry	6.63	2.00	교 생승 실 북자부분 Firm grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse.		2.0
										Ē	Gravel is subangular to subrounded fine to medium.		*
										Ē	고양소 것 같~~~~~~		° 2.5
		Slow seepage	e at 2	2.60m	ו					Ē			*
2.80 - 3.00										Ē			*
3.00 3.00 - 3.45	D8 SPT (S)	N=13 (2,3/3,	3,3,4]	) Han	nmer	SN =	3.00	Dry		Ē			3.0
		0199								Ē			
										Ē			* <sup>3.5</sup>
8.80 - 4.00	В5									Ē	<u>요구 한 것</u> 고양 2월 전		•
1.00	D9									Ē			4.0
1.00 - 4.45	SPT (S)	N=15 (3,3/3, 0199	3,4,5	) Han	nmer	SN =	3.00	Dry		Ē			* .*
		0155							4.13	4.50			° 4.5
											Very stiff brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse.		
	111.4	11blow-20.10	00%				2 00	Draw		Ē			5.0
5.00 - 5.45	U14	Ublow=30 10	00%				3.00	Dry		Ē			5.0
										È	요구수 있 <u>요구요 것</u>		
5.50	D10								3.13	5.50	Stiff becoming very stiff brownish grey slightly gravelly sandy CLAY		5.5
5.50 - 6.80	C1									Ē	with low cobble content. Sand is fine to coarse. Gravel is subrounded fine to medium of various lithologies.		
5.00	D11						3.00	Dry		Ē			6.0
5.00 - 7.00 5.00 - 6.45		N=43	80							Ē			
	(5,7/9,9	9,11,14)								(1.95)			6.5
	Hamme	er SN = 0199								Ē			
7.00										Ē			7.0
				1	1	AZCL				Ē			7.0
7.30 - 7.52	SPT(S) ( (15,25/				1		3.00	Dry	1.18	7.45	、1997年1997年 第二章 (1997年) 第二章 (1997年)	<b>_</b>	
	75mm)	Hammer SN			1				1.10	- 7.45	Very stiff greyish brown slightly gravelly sandy CLAY with low cobble		7.5
	= 0199 Slow se	epage at	73							Ē	mudstone and sandstone.		
	7.30m	כרימב מו			1					(1.05)			8.0
7.50	D12				1					Ē			
3.50					-	-			0.13	8.50	Very stiff dark grey slightly sandy gravelly SILT. Sand is fine to coarse.		8.5
8.50 - 9.15		N-E0			1					Ē	Very stiff dark grey slightly sandy gravelly SILI. Sand is fine to coarse.		
3.50 - 8.68		v=50 0 for 25mm)	100		1					(0.65)			9.0
	Hamme	er SN = 1376							-0.52	9.15	Dark grey subangular fine to coarse GRAVEL of mudstone and sandstone.		2.0
9.15 - 9.55	C3		TCR	SCR	RQD	FI	1			F			
		r Strikes						selling	g Detail		Remarks		
truck at (m) 2.60	Casing to (m 2.60	n) Time (min)	Rose	e to (r	m) F	rom (	m)	To (	m) Tin	ne (hh:mm)	Hand dug inspection pit excavated to 1.20m		
7.30	7.30										ocation: Landfall.		
-	Details	Water	-										
To (m) 3.00	Diam (mm 200	) From (m)	To	o (m)	-								
5.50	200				$\vdash$	Core	Bar	rel	Fluch	Туре	Fermination Reason	Updated	_
20.00	150												
						S	K6L		Wa	ater	Terminated at scheduled depth.     02/1	12/2022	(6

	97 -		ίΕC	DTI	EC	Н	De	2	roject   1-161	.9A	Project Client: Client's	Name: North Iri Statkraft Rep: Arup		y Landfall			Boreho BH(	03
Meth Cable Pero		Plant U Dando 2			· ·	<b>(m)</b> 00	Base 5.5		oordina	ates	Final De	<b>pth:</b> 20.00 m	Start Date:	15/03/2022	Driller: BN	И+RS	Sheet 2 Scale:	
Rotary C	oring	Comacch	io 40	)5	5.	50	20.0		19414.1 65319.8		Elevatio	<b>n:</b> 8.63 mOD	End Date:	12/03/2022	Logger: CH	I+TH	FIN	
Depth (m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Casing Depth (m)		vel I OD	Depth (m)	Legend		Des	cription			Backf	ill
9.55 - 10.00	C4							-0.		(0.40) 9.55		Dark grey subangula sandstone.	ar fine to coar	se GRAVEL of m	udstone and			9.5
									E	(0.45)		Very stiff brown slig content. Sand is fine						
10.00						-		-1.		10.00		Very stiff dark brow						10.0
.0.00 - 10.25 .0.00 - 10.16		<b>I</b> =50						-1.		(0.25) 10.25		coarse. Gravel is sub	bangular fine t	to coarse.				
	(12,13/5	50 for Hammer SN							Ē,			Grey slightly gravell fine to coarse.	ly clayey fine t	o coarse SAND.	Gravel is suban	guiar		10.5
	= 1376		100						= (	(0.80)								
.0.25 - 11.05 .1.05 - 11.50								-2.	.42	11.05		Very stiff dark brow	n slightly sand	ly gravelly CLAV	with low cobbl			11.0
										(0.70)		content. Sand is fine	0,	, 0 ,				
1.50					$\vdash$				E (	(0.70)								11.5
.1.50 - 11.63	90mm/!							-3.	.12 1	11.75	<u>a o o e</u>	Weak massive greyi	ish brown MU	DSTONE with m	edium spaced 1	thin		
	20mm) = 1376	Hammer SN							-			beds of weak yellow weathered: reduced						12.0
			100	55	33	12						discolouration and	0,		0,			
									-			Discontinuities: 1. 20 to 30 degree j	oints, closely	spaced (30/140/	'370) planar to			12.
												rough, dark brown s clay infill on most jo	• •		• •	yk		
3.00									-			2.~60 degree joint a	at 12.25m to 1			wn		13.
						>20			(	(3.15)		staining on joint sur 3. 70 to 80 degree j		m to 11.95m and	d 12.6m to 12.4	45m,		
									-			planar, rough, dark 490 degree joint a		• •		~		13.
			33	4	0							ornagish brown stai	ining on ioint :	surface.				
						AZCL			-			13.00m to 13.50m: Recov 13.50m to 14.50m: AZCL	due to disturbance	difficulties.	ONNEL			14.
													MUDGEO					
4.50												Weak massive dark reduced strength, c	• •		-	ly		14.
						10		-6	.27 1	14.90		discolouration on fr Discontinuities:	acture surface	es.				
								0.	Ē			1. 20 to 40 degree j			/43/60) planar,			15.
			87	42	27	>20			(	(0.65)		rough, orangish bro /Medium strong mas			are greyish whi	te		
								-6	.92 1	15.55		calcite veins of vario weathered: slightly		•		ark		15.
											· · · · · · · · · · · · · · · · · · ·	orangish brown disc		-				
.6.00									-		· · · · · ·	Discontinuities: 1. 20 to 40 degree j	oints, closely	spaced (50/180/	'500) planar, ro	ugh,		16.
											· · · · · ·	orangish brown stai 2. 50 to 60 degree j	-	•	0/600) slightly			
									-			undulating, rough, o	dark brown sta	aining on joint su	urfaces.			16.
			83	63	41	8			(	(2.35)		Weak thickly lamina mineralisation para				tite		
									-			weathered: slightly orangish brown disc		-		clav		17
												infill.						
7.50												Discontinuities: 1. 10 to 20 degree b	-		• • •			17
								۹_	.27 [ 1	17.90		planar rough, orang dark brown gravelly		-		,		
			60	37	15	14			Ē	(0.50)		2.~ 50 degree joint	at 18.00m to 2			brown		18.
								-9	Ē	18.40		staining on joint sur 18.10m to 18.16m: Firm of thick.	dark brown gravelly	clay infill- 20 degree b	edding fractures 45n	nm		
			TCP	SCP.	RQD	FI						No recovery						18.
	Water	Strikes	IUR	JUR	1.00	- FI	Chise	elling De	tails		Remarks					I		
	Casing to (m	) Time (min)	Rose	e to (r	n) F	rom (		To (m)	Time (hł		Hand dug	inspection pit excava	ted to 1.20m					
2.60 7.30	2.60 7.30										Location:	Landtall.						
Casing D To (m)	<b>Details</b> Diam (mm)	Water	_	<b>ed</b> o (m)	-													
3.00	200	,,		,														
5.50 20.00	200 150					Core	Barre	el Fl	lush Typ	pe	Terminat	tion Reason			L	ast Upda	ated	
						S	K6L		Water		Terminate	d at scheduled depth	I.			02/12/20	022	٨G

			SE Geo			Y				ct No. 619A	Project Client: Client's	Name: North Iri Statkraft		y Landfall			Bo	BH03	
Meti Cable Per		Plant Dando				<b>(m)</b> 00		e (m)	Coord	inates	Final De	<b>pth:</b> 20.00 m	Start Date:	15/03/2022	Driller:	BM+RS		neet 3 d	
Rotary (		Comacch				50		50 .00	71941 76531	4.12 E 9.80 N	Elevatio			12/03/2022			5	FINA	
Depth (m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend		Des	cription			Water	Backfill	
. ,						AZCL		.,				No recovery							
9.00																			19.0
										(1.60)									
			0	0	0	NR													19.5
0.00									-11.37	20.00			End of Bore	hole at 20.00m					20.0
													Lind of Bollo						
																			20.5
																			21.0
																			21.5
																			22.
																			22.
																			23.
																			23.
																			23.
																			24.0
																			24.5
																			25.0
																			25.
																			26.
																			26.
																			27.
																			27.
			TCR	SCR	RQD	FI				<u> </u>									1
	Casing to (m	r Strikes	Rose	e to (r	n) F	rom (		To (	g Details m) Tim	e (hh:mm)		inspection pit excavat	ted to 1.20m						
2.60 7.30	2.60 7.30										Location:								
Casing	Dataila	Water	ار اد ۸	04															
To (m)	Diam (mm			e <b>a</b> 5 (m)															
3.00 5.50	200 200	1				Core	Barı	rel	Flush	Туре	Terminat	ion Reason				Last Up	date	d	_
20.00	150	1					K6L		Wat			d at scheduled depth				02/12/			0

			SEC GEC			<b>Y</b> H				ct No. 619A	Project Client: Client's	Name: North Iris Statkraft Rep: Arup		ıy Landfall				rehole BH04	
Meth		Plant L						e (m)	Coord	linates	Final De	<b>pth:</b> 20.00 m	Start Date:	16/03/2022	Driller:	RS+BM	Sh	eet 1 of	<sup>:</sup> 3
Cable Pero Rotary D Rotary C	riling	Dando Comacch Comacch	nio 4	05	0.( 3.( 4.(	00	4.	00 00 .00		88.60 E 53.53 N	Elevatio	-		25/03/2022	Logger:			cale: 1:5 FINAL	
Depth (m)	Sample / Tests	Fie	eld Re	cords			Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend		Des	cription			Water	Backfill	
. ,												TOPSOIL- Soft brow	n sandy grave	lly CLAY.			-		
0.30 - 0.50	B1								12.74	0.30		Firm becoming stiff Gravel is subangular				lly CLAY.			0.5
0.80 - 1.00	В2										X X	Graver is Subariguia	to subround						
	52										X								1.0
1.20 1.20 - 1.65	D4 SPT (S)	N=9 (1,1/2,2	.2.3)	Hamr	mer Sl	N =	1.00	Drv			X X X						▾		
		0199 Slow seepage									× ····								1.5
L.80 - 2.00	B3	Siow Scepage									×								
2.00 2.00 - 2.45	D5 SPT (S)	N=26 (3,5/5,	6,7,8	) Ham	nmer	SN =	1.50	Dry			×>								2.0
		0199							10.74	2.30		Very stiff brown san			o coarse. Gra	avel is			2.5
		Slow seepage	0 0+ 7	0 00								subangular to subro	ounded fine to	coarse.			¥		 
3.00 - 3.12		1.0			for		2 00	2.70	10.04	3.00		Brown sandy gravel		r's description)					3.0
5.00 - 5.12	5PT (5)	N=50 (25 for 50mm) Ham					3.00	2.70	10.04			Brown sandy graven	iy clar (Drile	r's description)					
		Water strike	at 3.	50m													▼		3.5
.00 - 5.00	C								9.04	4.00		Stiff brown slightly s							4.0
												boulder content. Sa coarse of various lit			-				
			70									lithologies predomin	nantly limesto	one and mudstor	ne.				4.5
			73								0-0-								5.0
						AZCL													
5.50						AZCL				(3.00)									5.5
											0-0-0								
																			6.0
			73								0-0-0-								
																			6.5
7.00						AZCL			6.04	7.00									7.0
7.00 7.00 - 8.25	с								0.04	7.00	( * * * * * * * *	Stiff brown slightly s is fine to coarse. Gra				t. Sans			7.0
													-						7.5
			100	15	6					(1.25)	$\underset{\times\times\times\times}{\times\times\times}$	Maak (Issel)	uppl() +1: 1 1	minat-d- ov	TETONE	tioll:			
												Weak (locally very w weathered : much c	loser fracture	spacing, further	r weakened v	with			8.0
									4.79	8.25		clay deposits, clay ir Discontinuities:							
3.50			<u> </u>							1		1. 35 to 45 degree b planar, smooth with	orangish bro	wn staining and	light brown o	clay			8.5
			100	87	6					-	× × × × × × × × × × × × × × × × × × ×	deposits and clay in 2. 70 degree joint at							9.0
											× × × × × × × × × × × × × × × × × × ×	undulating, rough w surface.	vith brown cla	y infill (up to 90)	nm thick) on	joint			5.0
	14/	Strikes	TCR	SCR	RQD	FI	Ch.1	0.000	T Doto!!	<u>[</u>	Domasla								
	Casing to (m	Strikes	Rose	e to (n	n) Fr			To (	g Details m) Tim	e (hh:mm)	Remarks Hand dug	inspection pit excavat	ted to 1.20m						
1.30 2.80 3.50	1.30 2.80 3.50										Location: L Televiewer	Landfall. r completed.							
Casing D To (m)	<b>Details</b> Diam (mm	Water	-	ed 5 (m)	_														
3.00 4.00	200 200			. /		<u></u>				There	Torrest	ion Deeres			I	10-11	4.5.4		
20.00	150					Core		rel	Flush			ion Reason				Last Upc			Ī
						S	K6L		Wa	ter	Terminate	d at scheduled depth				02/12/2	2022	AU	5

	C									ct No. 619A	roject Name: North Irish Sea Array Landfall lient: Statkraft Limited lient's Rep: Arup	Borehole ID BH04
Meth Cable Per		<b>Plant U</b> Dando			-	<b>(m)</b> 00	Base 3.0	· ·	Coord	linates	nal Depth: 20.00 m Start Date: 16/03/2022 Driller: RS	Sheet 2 of 3
Rotary I Rotary (	Driling	Comacch Comacch	nio 40	05	3.	00 00	4.0 20.0	00		88.60 E	levation: 13.04 mOD End Date: 25/03/2022 Logger: EN	Scale: 1:50 A+CH FINAL
Depth (m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	egend Description	Backfill
9.65 - 9.75 10.00	с										<ul> <li>Weak (locally very weak) thinly laminated grey SILTSTONE. Partial weathered : much closer fracture spacing, further weakened with clay deposits, clay infill and discolouration in fracture surfaces.</li> <li>Discontinuities:</li> <li>1.35 to 45 degree bedding fractures, closely spaced (10/214/30)</li> </ul>	5.5 9.5
10.35 - 10.4	5 C		100	26	0						<ul> <li>planar, smooth with orangish brown staining and light brown claves of the point of the</li></ul>	aces.
11.50			100	10	0	>20				_ (6.35)		11.5 12.0 12.5
13.00			100	60	13						Medium strong indistinctly thinly laminated grey GREYWACKE. Partially weathered: discolouration and clay deposits on fracture surfaces, pyrite speckled throughout. Discontinuities:	13.0 13.5 14.0
14.50			100	98	90	4			-1.56	14.60	1. 45 degree bedding fractures medium spaced (150/280/800)         planar, rough with dark discolouration and patchy grey clay deputer         on fracture surfaces.         2. 60 to 70 degree joints at 15.20m to 15.50m, 15.85m to 16.00         with patchy brown staining and patchy grey clay deposits on fracture         Weak thinly laminated grey MUDSTONE. Partially weathered:	m 15.0
15.50 - 15.7	0 C										reduced strength, clsoer fracture spacing, with discolouration and clay deposits on fracture surfaces and occasional white mineralisation.	
16.00 16.70 - 16.8	0 C		100	65	0				-2.96	- 16.00	Discontinuities: 1. 5 to 15 degree bedding fractures closely spaced (50//210) pla smooth, with orangish brown staining and grey clay deposits on fracture surfaces. 16.00m to 16.20m: Soft greyish brown slightly sandy clay infill Medium strong indistinctly thickly laminated grey GREYWACKE withit quartz veins at 45 degree angles (up to 40mm thick). Part weathered: closer fracture spacing, with clay deposits and discolourship of fracture spacing.	most 16.5
17.50 18.15 - 18.5	0 C		100	99	80	5			-4.76	17.80	discolouration on fracture surfaces. Discontinuities: 1. 35 to 45 degree bedding fractures closely spaced (12//600) pl smooth with grey clay deposits (up to 4mm thick) and orangish brown staining on fracture surfaces. 2. 80- to 90 degree joint at 18.00m to 18.60m, slightly undulatin rough with strong dark brown and dark orangish brown staining joint surfaces, otherwise clean.	1 <b>g</b> , 18 0
											3. 60 to 70 degree joint at 19.85m to 20.00m, undulating, rough           patchy orangish brown staining on joint surface, otherwise clean	
	147	Chuilter	TCR	SCR	RQD	FI			Date "	<u> </u>	mania	
truck at (m) ( 1.30 2.80 3.50		r <b>Strikes</b> ) Time (min)	Rose	e to (r	n) F	rom (		To (m	Details	e (hh:mm)	marks nd dug inspection pit excavated to 1.20m cation: Landfall. eviewer completed.	
Casing I To (m) 3.00 4.00	Details Diam (mm) 200 200	Water	-	<b>ed</b> o (m)		<u> </u>						
20.00	150						Barre K6L	-1	Flush Wa		rmination Reason L rminated at scheduled depth	o2/12/2022

	/ -		ΞEC	DTI	EC	Н	<b>D</b> - 1	(	21-1	ect No. L619A	Project Client: Client's	Name: North Iri Statkraft Rep: Arup		ay Landfall				BH04
Metho Cable Percu	ussion	Plant L Dando	2000	)	0.	00	3.			dinates	Final De	epth: 20.00 m	Start Date:	16/03/2022	Driller:	RS+BM		neet 3 of 3 cale: 1:50
Rotary Dr Rotary Co		Comacch Comacch				00 00	4.0 20	00 .00		38.60 E 63.53 N	Elevatio	<b>n:</b> 13.04 mOD	End Date:	25/03/2022	Logger:	EM+CH		FINAL
Depth (m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend			cription			Water	Backfill
	Samples	/ Field Records	100		RQD						Legend	Medium strong indi white quartz veins a weathered: closer fi discolouration on fr Discontinuities: 1. 35 to 45 degree b smooth with grey cl brown staining on fi 2. 80- to 90 degree i rough with strong d joint surfaces, other 3. 60 to 70 degree ju patchy orangish bro	stinctly thickl at 45 degree a racture spacir acture surface bedding fractu ay deposits (u racture surface joint at 18.00 ark brown an rwise clean. oint at 19.85n wn staining o	y laminated grey ingles (up to 40n ig, with clay dep es. irres closely space up to 4mm thick) ies. m to 18.60m, slių d dark orangish n to 20.00m, uno	nm thick). F osits and ed (12//600 and orang ghtly undul brown stair dulating, ro	Partially D) planar, ish ating, hing on ugh, with	Wat	Backfill , 19.0 , 19.0 , 19.0 , 10.0 , 20.0 , 20
	Matar	Chrilion	TCR	SCR	RQD		Chie		a Deteil		Domorka							
1.30 2.80 3.50	sing to (m 1.30 2.80 3.50	Strikes Time (min)			n) F			To (	g Detail	S ne (hh:mm)	Location:	inspection pit excavat	ted to 1.20m					
Casing De To (m) Di	e <b>tails</b> am (mm)	Water From (m)		<b>ed</b> o (m)	-													
3.00 4.00 20.00	200 200 200 150			, (11)	┢	Core	Barr	rel	Flush	Туре	Termina	tion Reason				Last Up		
						S	K6L		Wa	ater	Terminate	d at scheduled depth				02/12/2	2022	AG

	97 -		ίΕC	DTI	EC	Н			21-1	ect No. L <b>619A</b>	Project Name: North Irish Sea Array Landfall         Client:       Statkraft Limited         Client's Rep:       Arup	Boreho BH	05
Meth Cable Pero Rotary C	cussion	Plant L Dando 2 Comacch	2000	)	0.	(m) 00 00	Base 6.0 20.	00		dinates	Final Depth:     20.00 m     Start Date:     22/03/2022     Driller:     BM+JG	Sheet Scale:	
	8			-			20			55.28 N	Elevation:       10.24 mOD       End Date:       30/03/2022       Logger:       CH+RC	FIN	AL
Depth (m)	Sample / Tests	Fie	ld Re	cords			Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend Description	Kater Back	fill
).30 - 0.50 ).50	B3 ES1										TOPSOIL-Soft brown sandy gravelly CLAY.		0.5
).80 - 1.10 00	B4 ES2								9.24	1.00			1.0
.20	D10								512 .	1.00	Firm brownish grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium.		
20 - 1.65 80 - 2.00		N=14 (2,2/3,3 0199	3,4,4	) Han	nmer	SN =	1.00	Dry					1.5
2.00	вэ D11									Ē			2.0
2.00 - 2.45		N=25 (4,4/4, 0199	7,7,7	) Han	nmer	SN =	1.50	Dry	8.04	2.20	Stiff grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium.		2.5
2.80 - 3.00	B6												
.00 - 3.45	U14	Ublow=25 10	0%				3.00	Dry	7.24	3.00	Stiff grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to medium.		3.0
													3.5
.80 - 4.00 .00	B7 D12												4.
.00 - 4.45	SPT (S)	N=22 (4,4/5,5 0199 Slow seepage			nmer	SN =	3.00	Dry				▾	4.
.80 - 5.00	B8												
.00 .00 - 5.45	D13	N=24 (4,5/5,5 0199	5,6,8	) Han	nmer	SN =	3.00						5.0
													5.5
5.00 - 6.45	U15 Ub	low=25 80%					3.00	Dry	4.24	6.00	Stiff greyish brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of mixed lithologies.		6.0
			57	0	0					(1.50)	6.85m to 7.50m: AZCL		7.0
7.30 - 7.50	В9					AZCL							
7.50 7.50 - 8.50	C			-	-		3.00	Dry	2.74	7.50	고 22 전		7.5
7.50 - 8.50 7.50 - 7.63	105mm	I=50 (31 for /50 for Hammer SN								(1.00)	subangular to subrounded fine to coarse of mixed lithologies.		8.
	= 0199		100	0	0				:				
3.50 - 9.00 3.50 - 8.76	C9 SPT(C) N (5,11/43 110mm								1.74	8.50 (0.60)	Stiff dark greyish brown slightly sandy gravelly CLAY. Sand is fine to medium. Gravel is subangular to subrounded of mixed lithologies.		8.5 9.0
9.00	SN = 02								1.14	9.10	Dark grey slightly sandy slightly clayey subangular fine to coarse GRAVEL of mixed lithologies. Sand is fine to coarse.		9.0
		o	TCR	SCR	RQD	FI				<u> </u>			
ruck at (m) C		Strikes	Rose	e to (r	n) F	rom (		elling To (	g Detail m) Tir	<b>S</b> ne (hh:mm)	Remarks Hand dug inspection pit excavated to 1.20m		
4.30	4.30										Location: Landfall		
Casing D		Water											
6.00	Diam (mm) 200	) From (m)		o (m)									
20.00	150					Core	Barr	rel	Flush	Туре	Termination Reason Last Up		
						S	K6L		Wa	ater	Terminated at scheduled depth. 02/12/	2022	AG

									oject No. 1619A	Client:	Project Name:       North Irish Sea Array Landfall         Client:       Statkraft Limited         Client's Rep:       Arup						
Metho Cable Perc		<b>Plant U</b> Dando				<b>(m)</b> 00	Base ( 6.00		ordinates	Final De	Final Depth: 20.00 m Start Date: 22/03/2022 Driller: BM+JG						
Rotary Co	oring	Comacch	nio 60	01	6.	00	20.0		9530.91 E 5155.28 N	Elevatio	on: 10.24 mOD	End Date: 30/03/2022 Logger: CH4			Scale: 1:50		
Depth (m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Casing V Depth D (m)	Vater Leve lepth (m) mO		Legend		Description			Water	Backfill	
10.00 - 10.45	(4,6/9,9		39	0	0	AZCL			(1.40)			ndy slightly clayey suba hologies. Sand is fine to		barse		9.5 10.0 -	
10.50 10.50 - 11.40	C10							-0.2	6 10.50			gravelly silty fine to coa ar of mixed lithologies.	arse SAND. Grave	el is		10.5	
			73	0	0				_ (0.90)	$\mathbf{x}^{\mathbf{x}}$						11.0 •	
11.50 - 11.95	(4,9/10,	I=50 13,12,15) r SN = 0209				AZCL		-1.1	.6 11.40 (0.60)		cobble content. San	own slightly sandy sligh d is fine to coarse. Grav «ed lithologies. Cobbles	el is angular to s	ubangular		11.5	
12.00								-1.7	6 12.00		Greyish brown sligh lithologies. Sand is f	tly sandy angular fine to ine to coarse.	o coarse GRAVEL	of mixed		12.0 -	
			77	0	0	>20		-2.3			significantly reduce	veak) greyish brown TU strength, much closer f olouration on fracture s	racture spacing f			12.5 13.0 -	
13.50											1. 45 to 55 degree jo	pints closely spaced (10 blackish brown staining		rough and		13.5	
15.00			100	24	0				(4.50)							14.0 -	
15.00			100	19	0	20						stinctly thinly laminated				15.0 · 15.5 16.0 ·	
16.50						-					frequent heavy blac Discontinuities:	: reduced strength, clos kish brown discolourati pints closely spaced (30	on on fracture s	urfaces.		16.5	
			100	36	0			-6.8	6 17.10		deep. 2.0 65 to 75 degree	sh brown staining on joi joint from 17.50m to 18 kish brown staining on	8.00m, planar, ro	ough and		17.0 -	
18.00						16		-7.7	(0.90) 6 – 18.00		weathered: reduced frequent pervasive	ally weak) dark brownis I strength, much closer blackish brown discolou	fracture spacing	and		17.5	
												pints closely spaced (10 sive blackish brown stai				18.5	
			TCR	SCR	RQD												
Struck at (m) Ca 4.30		Strikes ) Time (min)	Rose	e to (r	n) F			<b>lling Det</b> To (m)	ails Time (hh:mm)	Remarks Hand dug Location:	inspection pit excavat	ed to 1.20m					
6.00	iam (mm) 200	Water From (m)	-	<b>ed</b> 5 (m)													
20.00	150						Barre		i <b>sh Type</b> Water	Termination Reason         Last Up           Terminated at scheduled depth.         02/12/						AGS	

•	7 —		ΪEC	DTE	ECI	Н			21-1	ect No. .619A	Project Name:       North Irish Sea Array Landfall         Client:       Statkraft Limited         Client's Rep:       Arup						Borehole ID BH05			
Method Cable Percussion Rotary Coring		Dando 2000				<b>(m)</b> 00		<b>e (m)</b> 00	Coordinates		Final De	epth: 20.00 m	Start Date:	22/03/2022	Driller: B	N+JG	Sheet 3 Scale: 1			
					6.00		20.00		719530.91 E 765155.28 N		Elevation:         10.24 mOD         End Date:         30/03/2022         Log			Logger: CH	H+RC	FINAL				
Depth (m)	Samples /	Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend		Des	cription		Water	Backfil	1		
	C12	Field Records	93	SCR 27 100	0	FI >20	Casing Depth	Water Depth (m)				Medium strong (loc weathered: reduced frequent pervasive l surfaces. Discontinuities: 1. 45 to 55 degree jo and frequent pervas Medium strong light reduced strength an Discontinuities: 1. 25 to 45 degree jo rough, unstained. 2. 10.20m joint at 19	ally weak) dai d strength, mu blackish brow oints closely s sive blackish t t grey ANDESI d closer fract oints at 19.40 9.70m, planar	rk brownish grey Juch closer fractur n discolouration paced (10/65/10 prown staining of TE. Partially wea ure spacing. m to 19.45m and	re spacing and on fracture 10) planar, rouų n joint surface thered: slightl d 19.60m, plan	/ gh s/ У	Backfil	19.0         19.0         19.5         20.0         21.5         21.0         21.5         22.0         23.5         23.5         24.0         24.5         25.5         25.5         26.5		
																		27.0 -		
			TCR	SCR	RQD	FI												27.5		
	Water								g Detail		Remarks					I		1		
	4.30 etails fam (mm)	Time (min) Water From (m)	Add		n) F	<u>rom (</u>	<u>m)</u>	То (	<u>m) Tin</u>	ne (hh:mm)	Hand dug Location:	inspection pit excaval Landfall	ted to 1.20m							
6.00 20.00	200 150					Core	Barı	rel	Flush	Туре	Terminat	tion Reason			L	.ast Upda	ted			
						S	K6L			ter	Terminate	d at scheduled depth				02/12/202		GŚ		

	9 -		GEC	DTE	CI	-			<b>21</b> -1	ect No.	Project Name: North Irish Sea Array Landfall Client: Statkraft Limited Client's Rep: Arup	Borehole BH06			
Metho Cable Perc Rotary Co	ussion	Dando 200		Plant Used1Dando 2000Comacchio 205		<b>(m)</b> 00 00	Base 4.( 20.	00	719454.92 E		Final Depth:       20.00 m       Start Date:       21/03/2022       Driller:       BM+RS		Sheet 1 o Scale: 1		
									765155.97 N		Elevation: 11.95 mOD End Date: 29/03/2022 Logger: CH+EM	FINAL			
Depth Sample / Field Rec (m) Tests							Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend Description TOPSOIL-Soft brown slightly sandy slightly gravelly CLAY. Sand is fine	Water	Backf	fill	
0.30 - 0.50 0.50 0.80 - 1.00 1.00 1.20 1.20 - 1.65		N=16 (1,2/3, 0199	5,5,3)	Hamı	ammer SN = 1.00 Dr				10.95	- 1.00	Stiff brownish grey sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Gravel         Stiff brownish grey sandy gravelly CLAY. Sand is fine to coarse. Gravel	_	· • • • •	0.5	
1.80 - 2.00 2.00 - 2.45		Ublow=20 90 Slow seepage	1.50 1.90 t 2.00m				1.90	10.15	1.80	Stiff brownish slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium.	<b>•</b>		2.0 2.5		
2.80 - 3.00 3.00	B6 D9													•	
3.00 3.00 - 3.45	SPT (S)	N=16 (2,3/3, 0199	=16 (2,3/3,4,4,5) Hammer SN = 3.0 199			3.00	Dry						3.5		
3.80 - 4.00	В7														
4.00 4.00 - 4.45	l=21 ,6,6)				AZCL	3.00	Dry	7.95	4.00	Dark greyish brown very clayey fine to medium SAND. 4.00m to 4.93m: AZCL due to disturbance by SPT			4.0		
	паттте	r SN = 0199	37						6.00	(1.15)				5.0	
5.50 5.50 - 6.13	с								6.80	5.15	Very stiff dark greyish brown slightly sandy gravelly CLAY with high cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse of various lithologies. Cobbles are sub angular of various lithologies.			5.5	
5.75 - 5.90	с										္ ေလး က ေ 5.75m to 5.90m: Bed of clayey sandy gravel				
5.13 - 7.00	с		42			AZCL			5.82	6.13 (0.87)	Dark greyish brown very clayey fine to coarse SAND			6.5	
7.00 7.00 - 7.35	C12		25						4.95	7.00	Dark greyish brown sandy clayey sub angular fine to coarse GRAVEL of various lithologies with medium cobble content. Sand is fine to coarse. Cobbles are sub angular of various lithologies. 7.38m to 8.50m. AZCL possibly washed out due to flush	_		7.0	
8.50 8.50 - 9.50	с		65			AZCL			3.45	(1.50) 8.50 (1.00)	Very stiff brown slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse of various lithologies	_		8.0 8.0	
			05							L (1.00)			°.°⊢	• * 9.0	
			TCR	SCR	RQD	FI									
		Strikes							; Detail		Remarks	_			
2.00 Casing D	2.00	) Time (min)			<u>  </u>	<u>rom (</u>	<u>m)</u>	<u>    To (</u> 1	<u>11)   Tir</u>	ne (hh:mm)	Hand dug inspection pit excavated to 1.20m Location: Landfall.				
	Diam (mm) 200 150			(m)			Barr	el		t <b>ype</b>	Termination Reason     Last Up       Terminated at scheduled depth.     02/12			Ļ	

	—		GEC		EC	Н		21-1	ect No. 1 <b>619A</b>	Project Name:       North Irish Sea Array Landfall         Client:       Statkraft Limited         Client's Rep:       Arup	Borehole ID BH06
Method Cable Percu Rotary Cor	ssion	Plant L Dando Comacch	2000		0.	(m) 00 00	Base (1 4.00 20.00	) 7194	dinates 54.92 E 55.97 N	Final Depth:         20.00 m         Start Date:         21/03/2022         Driller:         BM+RS           Elevation:         11.95 mOD         End Date:         29/03/2022         Logger:         CH+EN	Scale: 1:50
Depth	Samples /	Field Records	TCR	SCR	RQD	FI	Casing Wa Depth De (m) (r		Depth	Legend Description	Backfill
(m)			-				(m) (r	mOD 2.45	(m) 9.50	Very stiff brown slightly sandy gravelly CLAY with low cobble content.	9.5
10.00						AZCL		2.1.5	(0.65)	Stiff brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is subangular line to coarse. Gravel is subangular fine to coarse.	
10.00 - 10.15	С		73					1.80	10.15	Very stiff brown slightly sandy gravelly CLAY with low cobble and boulder content. Sand is fine to coarse. Gravel is subangular fine to coarse of various lithologies.	
11.50						AZCL					11.5
			0			NR			(4.35)		12.0 -
13.00											13.0 -
			0			NR					13.5
L4.50 L4.50 - 14.90	с							-2.55	14.50	Very stiff greyish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse of various	14.5
14.50 - 14.90 14.90 - 15.45 14.90 - 15.45	С		96					-2.95	14.90 (0.55)	Greyish brown sandy slightly clayey subangular fine to coarse GRAVEI with low cobble content. Sand is fine to coarse. Cobbles are	15.0 -
15.45 - 15.90 15.45 - 15.90								-3.50	15.45	subangular of various lithologies. Very stiff brown slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse of various lithologies.	15.5
16.00											16.0 -
			73						(2.05)		16.5
17.50						AZCL		-5.55 -5.80	17.50 (0.25) 17.75	Brown slightly gravelly clayey fine to medium SAND. Gravely is sub angular fine to medium of various lithologies. No recovery.	17.5
			44	005	DOD	AZCL				18.17m to 19.00m: AZCL possibly washed out due to flush	18.0 -
	Water S		TCR		RQD			ing Detail	s	Remarks	
truck at (m) Cas 2.00 Casing De	2.00 tails	Water	Add	ed	n) F				ne (hh:mm)	Hand dug inspection pit excavated to 1.20m .ocation: Landfall.	
To (m) Dia 3.00 20.00	am (mm) 200 150	From (m)	Тс	<u>(m)</u>			Barrel		<b>Type</b> Iter		pdated

			SEC						21-:	ect No. 1619A	Client:	Name: North Iri Statkraft Rep: Arup						BH06	
Met Cable Pe		Plant U Dando				<b>(m)</b> 00	Base 4.	e <b>(m)</b> 00	Coor	dinates	Final De	<b>pth:</b> 20.00 m	Start Date:	21/03/2022	Driller:	BM+RS		neet 3 o	
Rotary		Comacch				00	20			54.92 E 55.97 N	Elevatio	<b>n:</b> 11.95 mOD	End Date:	29/03/2022	Logger	CH+EM		cale: 1: FINAL	
Depth (m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend		Des	cription			Water	Backfill	
.9.00										(2.25)		No recovery.							19.0 19.5
0.00									-8.05	20.00			End of Bore	hole at 20.00m					20.0
																			20.5
																			21.0
																			22.0
																			22.5
																			23.0
																			23.5
																			24.5
																			25.0
																			25.5
																			26.0
																			26.5
																			27.
			TCR	SCR	RQD					-									-
ruck at (m) 2.00		Strikes	Rose	e to (r	n) F	rom (	Chis m)	ellin <sub>i</sub> To (	g Detail m) Tir		Remarks Hand dug Location:	inspection pit excavat	ted to 1.20m						
-											Location.								
To (m) 3.00	Details Diam (mm) 200	Water From (m)		l <b>ed</b> o (m)															
20.00	150					Core	Barı	rel	Flush	п Туре	Terminat	ion Reason				Last Up	dated	d I	

	9/ -		ΕC	DTI	EC	Η			21-1	ect No. .619A	Project Name:       North Irish Sea Array Landfall         Client:       Statkraft Limited         Client's Rep:       Arup	Borehole II BH07
Methe Cable Perc Rotary C	cussion	Plant L Dando I Comacch	2000	)	0.	00 00 00	Base 4.( 15.	00		dinates	Final Depth: 15.50 m Start Date: 21/03/2022 Driller: JG+BM	Sheet 1 of 2 Scale: 1:50
-	_			-						79.09 N	Elevation: 19.70 mOD End Date: 28/03/2022 Logger: RC+CH	FINAL
Depth (m)	Sample / Tests	Fie	ld Re	cords			Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend Description	Backfill
0.30 - 0.50 0.50 0.80 - 1.00 1.00	B3 ES1 B4 ES2								18.80	0.90	MADE GROUND: Soft brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse.	0.9
1.20 - 1.65 1.80 - 2.00		Ublow=15 90	)%				1.00	Dry			Sand is fine to coarse. Gravel is subangular to subrounded fine to medium.	1.
2.00 2.00 - 2.45	D8 SPT (S)	N=11 (2,2/2, 0199	3,3,3	) Harr	nmer	SN =	1.50	Dry				2.0
2.80 - 3.00 3.00 3.00 - 3.45		N=16 (2,3/3,- 0199	nmer	SN =	3.00	Dry				3.(		
3.80 - 4.00	В7						16.30	3.40	Very stiff brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse.	3.		
1.00 1.00 - 4.45 1.00 - 4.05	SPT(S) N 25mm/5	I=50 (25 for 50 for	0		3.00 3.00		15.70	- 4.00 (1.70)	Stiff light brownish grey slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse of limestone and mudstone. Cobbles are angular of limestone and mudstone.	4.		
5.50 5.50 - 5.95	(3,4/6,6	U12 Ublow=50 0% SPT(S) N=50 (25 for 25mm/50 for 25mm) Hammer SN 92 0 6						Dry	14.00	5.70	Stiff brownish grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular fine to medium of limestone and mudstone.	5.
.70	Hamme C	r SN = 0209	100	0	0					(1.30)		6.
7.00 7.00 7.00 - 7.45	C SPT(C) N (4,4/7,8 Hamme					_	7.00	Dry	12.70	(0.80)	Stiff light greyish brown slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is angular fine to medium of sandstone, mudstone and limestone.	7.9
7.30 - 8.00	с		100	0	0				11.90	7.80	Extremely weak light greyish brown BRECCIA. Destructured: greatly           Image: Stress of the stress of	
8.50			100	0	0					(1.90)	Gravel is angular fine to coarse of breccia. Cobbles are angular of breccia.	8.
			TCR	SCR	RQD	FI						
ruck at (m) C		Strikes       Time (min)	Rose	e to (r	n) F	rom (		ellin; To (	g Details (m) Tim	<b>5</b> ne (hh:mm)	Remarks Hand dug inspection pit excavated to 1.20m Location: Landfall. No groundwater encountered- water added during drilling.	
4.00	Diam (mm) 200	Water From (m)	_	<b>ed</b> o (m)								
15.50	150					Core S	Barr	el		<b>Type</b> Iter	Termination Reason     Last Up       Terminated at scheduled depth     02/12/	

	8 -		GEC	DTI	ECI	Н		21	oject No. L-1619A	Client: Client'			ay Landfall			BF	iole ID 107
Metl Cable Per		Plant L Dando	2000	)	0.	00	Base ( 4.00	)	ordinates	Final D	epth: 15.50 m	Start Date:	21/03/2022	Driller: JG	6+BM		2 of 2 e: 1:50
Rotary	Coring	Comacch	nio 60	01	4.	00	15.5		9317.44 E 5079.09 N		on: 19.70 mOD	End Date:	28/03/2022	Logger: Ro	C+CH	FIN	NAL
Depth (m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Casing V Depth ( (m)	Vater Leve lepth (m) mO		Legend			cription			Mater Bac	kfill
10.00			83	0	0			10.0			Extremely weak ligh weakened, matrix v on fracture surface: sandy gravelly CLAY Gravel is angular fin breccia. Extremely weak ligh weakened, matrix v on fracture surface: sandy gravelly CLAY	veakened and s. Recovered a with low cob ne to coarse of nt brown BREC veakened and s Recovered	disturbed with s: (stiff light grey ble content. Sand f breccia. Cobble CCIA. Destructure disturbed with f as: (stiff light gre	frequent clay i yish brown slig d is fine to coa s are angular c ed: greatly frequent clay in yish brown slig	infill ghtly irse. of nfill ghtly		9.5 - 10.0 -
11.50									(2.30		Gravel is angular fir breccia.	ne to coarse of	f breccia. Cobble	s are angular c	of		11.0
			86	0	0	>20		7.7	0 - 12.0		Extremely weak dan reduced strength, n dark orangish brow surfaces. Discontinuities:	nuch closer fra	acture spacing w	ith frequent st	trong		12.0 — 12.5 —
13.00						- 20		6.3			1. 0-20 degree joint frequent heavy ora whole diameter of t	ngish brown s the core	taining on joint s	surface up to t			13.0 —
			100	0	0	18					Very weak dark bro reduced strength, c orangish brown diso Discontinuities: 1. 0 to 15 degree jo with frequent boom	loser fracture colouration or ints closely sp	spacing with fre fracture surface paced (50/150/40	quent heavy es. 00) planar, rou	-		13.5 -
14.50			100	100	0	11			(2.15	)) (1) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2	with frequent heavent entire diameter of t 2. 55 to 75 degree j 14.10m to 14.20m a frequent heavy darl diameter of core.	the core. oints from 13 and 14.50m to	.50m to 13.70m, o 14.60m, planar,	13.70m to 13 , rough and	.80m,		14.5 - 15.0 -
15.25								4.2	0 15.5	0		End of Bore	hole at 15.50m				15.5 -
																	16.0 -
																	17.0 -
																	17.5 -
																	18.0 -
	14/	Chuilter	TCR	SCR	RQD		CI-11			Den and de	-						
Struck at (m)		Strikes Time (min)	Rose	e to (r	n) F			<b>lling Det</b> To (m)	ails Time (hh:mm	Location:	inspection pit excava		during drilling.				
Casing		Water	-														
To (m) 4.00 15.50	Diam (mm) 200 150	From (m)	Тс	o (m)		Core	Barre	сі.	ish Type	Termina	tion Reason			I	last Upda	ated	
							K6L		Water		ed at scheduled depth				02/12/20		AGS

	C	G	EW	ECH			21-1	ct No. 619A	Project Client: Client's			y Landfall				ehole ID 8H15
Methe Cable Perc		Plant Us Dando 2		<b>Top (m)</b> 0.00	Base 8.0		Coord	dinates	Final De	epth: 14.50 m	Start Date:	24/03/2022	Driller:	RS+BM		et 1 of 2
Rotary Di Rotary C	rilling	Comacchie Comacchie	o 405	8.00 8.50	8.! 14.	50		L5.01 E L3.01 N	Elevatio	<b>n:</b> 32.12 mOD	End Date:	28/04/2022	Logger: 1	EM+CH		INAL
Depth (m)	Sample / Tests	Field	d Records		Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend		Desc	ription	- <b>I</b>		Water	ackfill
0.30 - 0.50	В3									MADE GROUND: So coarse. Gravel is sub				0		
0.50 - 0.50 0.50	ES1						31.72	0.40		Firm brownish grey				s fine to		0.5
0.80 - 1.00	В4									medium. Gravel is s	ubangulai to s	ubrounded nne	to coarse.			
1.00 1.20 - 1.65	ES2 U17	Ublow=15 100	0%		1.00	Drv										1.0
						,										1.5
1.80 - 2.00	В5															
2.00 2.00 - 2.45	D11	N-10 /2 2 /4 4	5 6) பு	mer CN -	1 50	Dret	30.12	2.00		Stiff brown slightly s	sandy slightly g	gravelly CLAY. Sa	ind is fine to	coarse.		2.0
2.00 - 2.45		N=19 (3,3/4,4 0199	,ə,o) Ham	mer SN =	1.50	Ury				Gravel is subangular						
																2.5
2.80 - 3.00 3.00	B6 D12															3.0
3.00 - 3.45	SPT (S)	N=24 (5,6/6,6, 0199	,5,7) Ham	nmer SN =	3.00	Dry										
																3.5
8.80 - 4.00	B7															
4.00 4.00 - 4.45	D13 SPT (S)	N=23 (4,5/5,6	,6,6) Ham	nmer SN =	3.00	Dry										4.0
		0199														4.5
	DO															4.5
4.80 - 5.00 5.00	B8 D14													(	$\mathbf{\Sigma}$	5.0
5.00 - 5.45		N=26 (5,5/6,6) 0199	,6,8) Harr	nmer SN =	3.00	Dry										
		Slow seepage	at 5.00m													5.5
5.80 - 6.00	В9															
5.00 - 6.45	U18	Ublow=30 100	0%		3.00	Dry										6.0
																6.5
																7.0
7.30 - 7.50	B10															
7.50 7.50 - 7.95		N=31 (6,6/7,8	,8,8) Harr	nmer SN =	3.00	Dry										7.5
		0199														8.0
3.00 3.00 - 8.12		N=50 (25 for 2			3.00	Dry										
		100mm) Hami	mer SN =	0199			23.62	8.50		Weathered rock rec	overed as: bro	wn slightly sand	dy very claye	y		8.5
			100 73	16			23.22	(0.40) 8.90		angular fine to coars Weak (locally very w	se GRAVEL of s veak) thinly lar	iltstone. ninated grey SII	LTSONE. Disti	inctly		
										weathered: reduced discolouration, clay	d strength, mu	ch closer fractu	re spacing wi	ith		9.0
			TCR SCR	RQD FI			<u> </u>	<u> </u>								
	asing to (m	• Strikes ) Time (min) F		n) From (		elling To (	g Details m) Tim	ie (hh:mm)	Remarks Hand dug	inspection pit excavat	ted to 1.20m					
5.00	5.00	20	4.90						Location:							
Casing D	etails	Water A	Added													
To (m) D 3.00	Diam (mm) 200	From (m)	To (m)	_												
8.50 14.50	200 150			Core	Barr	el	Flush	Туре	Terminat	tion Reason				Last Upo	lated	
				S	K6L		Wa	ter	Terminate	d at scheduled depth				02/12/2	022	AG

	/ -		GEC	DTI	EC	Η			21-1	ct No. 619A	Project Name: North Irish Sea Array Landfall         Client:       Statkraft Limited         Client's Rep:       Arup	Borehole ID BH15
Metho Cable Perci	ussion	Plant L Dando	2000	)	0.	00	8.			linates	Final Depth:         14.50 m         Start Date:         24/03/2022         Driller:         RS+BM	Sheet 2 of 2 Scale: 1:50
Rotary Dr Rotary Cc	-	Comacch Comacch			1	00 50	8. 14	50 .50		.5.01 E .3.01 N	Elevation: 32.12 mOD End Date: 28/04/2022 Logger: EM+CH	FINAL
Depth (m)	Samples /	Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend Description	Backfill
10.00			100	70	14	16				(3.20)	Veak (locally very weak) thinly laminated grey SILTSONE. Distinctly         weathered: reduced strength, much closer fracture spacing with         discolouration, clay deposits and clay infill on fracture surfaces.         Discontinuities:         1. 30-40 degree bedding fractures, medium spaced (150/210/210),         planar, smooth with strong orangish brown staining on most fracture         surfaces and grey clay deposits and infill (up to 100mm thick) on         most fracture surfaces.         2. 80-90 degree joint at 10.50-10.60mm, planar, smooth with strong         orangish brown staining and grey clay deposits (up to 2mm thick) on         joint surface.         3. 70-80 degree joint at 11.10-11.50m, undulating, rough with dark	9.5 · 10.0 - 10.5 · 11.0 -
11.50						>20					<pre>&gt;</pre>	11.5 - 12.0 –
13.00			100	78	0				20.02	12.10	XXXXXX       Weak thickly laminated grey SILTSTONE with white quartz veins (up         XXXXXX       to 10mm thick) at various orientations. Partially weathered: slightly         XXXXXX       reduced strength, closer fracture spacing with clay deposits, clay infill         and discolouration on fracture surfaces.       Discontinuities:         XXXXXX       1. 20-30 degree bedding fractures, medium spaced (200/266/600),	12.5 •
13.00			80	60	13	10				(2.40)	>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>	13.0 13.5 - 14.0 -
14.50									17.62	14.50	Ison receiption of the provided in the provid	14.5
												15.0 - 15.5 - 16.0 -
												16.5 · 17.0 –
												17.5
			TCR	SCR	RQD	FI						18.5
Struck at (m) Ca	Water		Rose	to (r	n) F	rom /		<b>ellin</b> To (	g Details	e (hh:mm)	Remarks	
5.00 Casing D	5.00	Water From (m)	Add	1.90	<u></u>	.0111 (		10 (		<u>(((((((((((((((((((((((((((((((((((((</u>	Hand dug inspection pit excavated to 1.20m Location: Landfall.	
8.50 14.50	200 200 150					<b>Core</b>	Barı K6L	rel	Flush Wa		Termination Reason     Last Upc       Terminated at scheduled depth.     02/12/2	

		GE		AY CH				ect No. .619A	Project Client: Client's	Name: North Iri: Statkraft <b>Rep:</b> Arup		y Landtall				nole ID 116
Meth Cable Pero Rotary C	cussion	Plant Used Dando 200 Comacchio 4	00	<b>Top (m)</b> 0.00 10.00	Base 10. 15.	.00		dinates 96.53 E	Final De	<b>pth:</b> 15.00 m	Start Date:	23/02/2022	Driller: B	3M+RS		: 1 of 2 e: 1:50
KOLATYC	Johng	Comaccino 2	405	10.00	15.	.00		22.39 N	Elevatio	<b>n:</b> 31.97 mOD	End Date:	26/04/2022	Logger: (	CH+EM	FIN	IAL
Depth (m)	Sample / Tests	Field R	lecords		Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend			ription			Mater Bac	kfill
).30 - 0.50 ).50	B3 ES1									MADE GROUND: So CLAY. Sand is fine to to medium.						0.5
0.80 - 1.00	B4						31.27	0.70		Firm brownish grey				fine to		
00	ES2									coarse. Gravel is sub	Jangular to su		o medium.			1.0
20 20 - 1.65	D9 SPT (S)	N=14 (2,3/3,3,4,- 0199	4) Hamm	ner SN =	1.00	Dry										1.5
.80 - 2.00	B5															
2.00 2.00 - 2.45	D10 SPT (S)	N=20 (4,4/4,5,5, 0199	6) Hamm	ner SN =	1.50	Dry	20.67	- 2.20								2.0
		0133					29.67	2.30		Stiff becoming very Sand is fine to coars medium.						2.5
2.80 - 3.00 3.00 - 3.45	B6 U13	Ublow=25 80%			3.00	Dry										3.0
,45	013	00/0		3.00	ыy											
																3.5
8.80 - 4.00	B7															
.00 .00 - 4.45	D11 SPT (S)	N=20 (4,4/5,5,5,	5) Hamm	ner SN =	3.00	Dry								ļ	•	4.0
		0199														4.5
100 F																4.5
1.80 - 5.00 5.00	B8 D12														¥	5.0
5.00 - 5.45		N=21 (5,7/5,5,5, 0199	6) Hamm	ner SN =	3.00	Dry										
		Slow seepage at	5.00m												• * _ 1	° • 5.5
															°	
5.00 - 6.45	U14	Ublow=25 100%			3.00	Dry		-								6.0
																6.5
																7.0
								Ē								
7.50 - 7.95	SPT (S)	N=36 (5,5/6,7,8, = 0199	15) Ham	mer SN	3.00											7.
																8.0
9.00 - 9.45	U15	Ublow=30 90%			3.00		22.97	9.00		Very stiff brown slig coarse. Gravel is sub				e to		<b>_</b>   <sub>9.0</sub>
								Ē		coarse. Graver is suc	Jangular to SU	orounded fine to	o meaium.		• •	<u>, , , , , , , , , , , , , , , , , , , </u>
ruck at (m)		r <b>Strikes</b> )  Time (min)  Ros	se to (m)	From (		elling To (	g Detail	5 ne (hh:mm)	Remarks		tod to 1 20					
5.00 9.90	5.00 9.90	20	4.90 4.20		,	(		, ()	Hand dug Location: I	inspection pit excavat Landfall	ιευ ιυ 1.20M					
Casing D	Details	Water Add	ded													
	Diam (mm		To (m)	1												
				Core	Barr	el	Flush	Туре	Terminat	tion Reason				Last Upd	ated	
				5	K6L		Wa	tor	Terminate	d at scheduled depth				02/12/2	022	

		CAUS		<b>W</b> DTE						ect No. .619A	Project Client: Client's	Name: North Iri Statkraft		ay Landfall			Boreh BH	ole ID 16
Meti	hod	Plant U	Jsed		Тор	(m)	Base	(m)	Coord	dinates				/ /			Sheet	2 of 2
Cable Per Rotary (		Dando Comacch			0.0 10	00 .00	10. 15.		71879	96.53 E	Final De	<b>pth:</b> 15.00 m	Start Date:	23/02/2022	Driller: BN	VI+RS	Scale	: 1:50
,	8								76482	22.39 N	Elevatio	<b>n:</b> 31.97 mOD	End Date:	26/04/2022	Logger: CH	H+EM	FIN	IAL
Depth (m)	Sample / Tests	Fie	eld Re	cords			Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend		Des	cription		Water	Bacl	cfill
(m)	(m)         Tests         Heid Ref           00 - 10.45         SPT(S) N=50 (15,18/15,15,9,11) Hammer SN = 0199         100           50         80         80           00         100         100           50         100         100           50         100         100           50         100         100		90m 56 40 80	0 13 13 40	16 2 AZCL 14	Caling (m)					Brown slightly sand various lithologies. 1 Medium strong to v Partially weathered strength with clay d Discontinuities: 1. 30-40 degree bec planar, smooth with on most fracture su (up to 5mm thick) o 2. 80-90 degree joir with dark brown sta 2. 80-90 degree bec planar, smooth to ro deposits (up to 3mm orangish brown stai 2. 70-80 degree joir with localised brow orangish brown stai 3. 60-70 degree joir patchy orangish brown	y very clayey Sand is fine to veak thinly lai : much closer eposits and d dding fracture patchy orang rfaces and br in some fracture patchy orang rfaces and br in some fracture ta t 12.10-12 stinctly thickl : closer fracture suffiction fracture ough with brc in thick) on soo ning on most it at 13.35-13 n clay deposil ning on joint its at 14.00-1 win staining o	subangular fine to o coarse. minated brownis fracture spacing liscolouration on s, closely spaced gish brown and d own slightly grav ure surfaces. .30m, slightly un surface. y laminated grey ire spacing with o es. s, medium space wish grey and g me fracture surface: .90m, undulating ts (up to 4mm thi surface. 4.50m, undulatin	h grey MUDST , slightly reduc fracture surfar (100/159/180 lark brown stai velly clay deposit dulating, smoot SILTSTONE. clay deposits a ed (150/260/28 grey sandy clay aces and dark s. g, smooth to ro cick) and patchy	/EL of ONE. ced ces. )), ining sits oth nd 30), , '		dill         9.5           10.0         10.5           11.0         11.5           12.0         13.5           14.0         14.5           15.0         15.5	
5.00 9.90 <b>Casing</b>	Casing to (m 5.00 9.90	r Strikes ) Time (min) 20 20 Water ) From (m)	Rose 4 4 Add	I.90 I.20		FI rom (		elling To (	<b>3 Details</b> m) Tim	ne (hh:mm)	Remarks Hand dug Location: I	inspection pit excavat	ted to 1.20m					16.0 16.5 17.0 17.5 18.0 18.5
	Core Barrel								Flush	Туре	Terminat	ion Reason			L	ast Upda	ted	
						S	K6L		Wa	iter	Terminate	d at scheduled depth				02/12/202	22	AG

	C		GEC			<b>Y</b> H			-	ct No. 619A	Project Name:       North Irish Sea Array Landfall         Client:       Statkraft Limited         Client's Rep       Arup	Borehole ID BH17
Meth Rotary D Rotary C	rilling	Plant Comacch Comacch Comacch	nio 60	01	<b>Top</b> 0. 7.	00		<b>e (m)</b> 00 .50	71979	<b>dinates</b> 00.17 E 52.88 N	Final Depth:         29.50 m         Start Date:         01/04/2022         Driller:         JG           Fluenting:         5.95 m OD         Sad Date:         04/04/2022         Description:         DG	Sheet 1 of 5 Scale: 1:40
Depth							Casing	Water	Level	Depth	Elevation: 5.85 mOD End Date: 04/04/2022 Logger: RC	FINAL
(m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Depth (m)	Depth (m)	mOD	(m)	Legend Description TOPSOIL - Brown sandy gravelly CLAY.	Backfill
									5.55	- - 0.30 -	Firm brown sandy CLAY (Driller's description)	- 0.5
1.00 - 1.45	SPT(C) N (3,5/5,5 Hamme								4.65	- 1.20	Stiff dark sandy gravelly CLAY (Driller's description)	1.0 -
2.50 - 2.95		l=50 11,13,15) r SN = 1387										2.0 - 2.5 3.0 -
4.00 - 4.45	SPT(C) N (4,5/7,1 Hamme								1.85	- 4.00	Dense gravelly SAND (Driller's description)	- 4.0 - 4.5 5.0 -
5.50 - 5.95	SPT(C) N (4,4/6,5 Hamme								-0.15	- - - - - - - - - - - - - - - - - -	Greenish grey angular weathered ROCK (Driller's description)           Weak light greenish grey GREYWACKE with occasional randomly           oriented 160mm thick veins of greyish white calcite. Partially           weathered: reduced strength, much closer fracture spacing and           occasional clay infill on fracture surfaces.           Discontinuities:           1. 10 to 30 degree joints closely spaced (50/130/350) planar, rough           and occasional greyish brown gravelly clay infill on joint surfaces up           to 5mm thick.           2. 30 to 45 degree joints medium spaced (100/310/700) planar,           rough and occasional greyish brown gravelly clay infill on joint	5.5 6.0 - 6.5
			TCR	SCR			-		-1.15	- 7.00	surfaces up to 20mm thick.         3. 55 to 75 degree joints from 7.20m to 7.80m, 8.40m to 8.80m,         8.80m to 9.10m and 10.00m to 10.50m, undulating, rough and         frequent light grey gravelly clay infill on joint surfaces up to 50mm         thick.	7.0 -
	Casing to (m) Details Diam (mm)	Core	Barre		<u>n)</u> н	ocatio	dug ir on: La	nspect andfall compl		cavated to	1.20m.	
7.00 29.50	200 150	- Sł Flusł	<6L	e	Т	ermi	inatio	on Re	ason		Last U	odated
			ater		Т	ermir	nated	at sch	neduled d	epth.		/2022 AGS

	9 -		GEC		ECI	Η		2:	1-1(	ct No. 619A	Project Client: Client's	Name: North Iris Statkraft		ıy Landfall	1		Borehole ID BH17
Metho Rotary Di Rotary Co	rilling	Plant U Comacch Comacch	nio 60		<b>Top</b> 0.0 7.0	00	Base ( 7.00 29.5	) 0 71	1979	inates 0.17 E 2.88 N	Final De			01/04/2022	Driller:		Sheet 2 of 5 Scale: 1:40 FINAL
Depth	Garrenter	Field Records	TOD		RQD	FI	Casing W Depth De	ater Lev		Depth	Legend	<b>11.</b> 5.85 IIIOD		cription	Logger:	NC .	Backfill
(m) 8.50			100		0	>20	(m) (	m) m(	DD	(m) 		Weak light greenish oriented 160mm thi weathered: reduced occasional clay infill Discontinuities: 1. 10 to 30 degree jc and occasional greyi to 5mm thick. 2. 30 to 45 degree jc rough and occasiona	grey GREYW. ck veins of gr I strength, mi on fracture s pints closely s ish brown gra pints medium al greyish bro	ACKE with occasi eyish white calci uch closer fractur urfaces. spaced (50/130/3 welly clay infill or spaced (100/31)	te. Partially re spacing a 350) planar, n joint surfa 0/700) plan	rough aces up aar,	≥ Column 7.5 8.0 8.5
9.40 - 9.65	C1		100	19	0	6						surfaces up to 20mn 3. 55 to 75 degree jc 8.80m to 9.10m and frequent light grey g thick.	oints from 7.2 I 10.00m to 1	0.50m, undulatir	ng, rough ar	nd	9.0 9.5
10.00			100	7	0	>20		-4.	85	- - - - - - - - - - - - - - - - - - -		Medium strong indis with occasional ranc calcite veins. Partiall fracture spacing, occ	domly oriente ly weathered	ed 1 to 7mm thicl : slightly reduced	k greyish wi strength, c	hite	
11.50			100	10	0	>20				-		discolouration on fra fracture surfaces. Discontinuities: 1. 10 to 25 degree jc clean, unstained. 2. 45 to 65 degree b planar, smooth, occa to 5mm deep and oc surfaces up to 5mm 3. 65 to 75 degree jc and 12.80m to 13.00 dark grey gravelly cla	oints closely s edding fractu asional heavy ccasional dar thick. pints from 10 Om, undulatir	paced (50/150/4 res medium spar r light brownish o k grey gravelly in .70m to 11.30m, ng, rough, unstain	100) planar, ced (10/250 prange stain fill on fractu 11.90m to ned and occ	rough, 0/500)m ing up ure 12.50m casional	
13.00										- - - - -							
13.80 - 14.00	0 C2		100	45	15	11				- - - - -							
14.50	Water	Strikes	TCR	SCR	RQD	FI	rks			-							**************************************
truck at (m) C	asing to (m)				<u>n)</u> н Lo	and d ocatio	lug insp on: Lanc			cavated to	1.20m.						
Casing D           To (m)         D           7.00         29.50	<b>Details</b> Diam (mm) 200 150	Sk Flush	(6L					<b>Reason</b> schedul		onth						Last Upd	

	C		SE Geo						ect No. .619A	Client:	Name: North Irish Sea Array Landfall Statkraft Limited	Borehole ID BH17
					1					Client's	Rep Arup	
Metho Rotary Dr	rilling	Plant I Comacch	nio 60	01	0.	00	Base (m 7.00		dinates	Final De	pth: 29.50 m Start Date: 01/04/2022 Driller: JG	Sheet 3 of 5 Scale: 1:40
Rotary Co	oring	Comacch	nio 60	01	7.	00	29.50		90.17 E 52.88 N	Elevatio	n: 5.85 mOD End Date: 04/04/2022 Logger: RC	FINAL
Depth (m)	Samples /	Field Records	TCR	SCR	RQD	FI	Casing Wate Depth Dept (m) (m)	h Level	Depth (m)	Legend	Description	Backfill
			100	74	30	8		-8.95	- 14.80 		Medium strong indistinctly thinly laminated dark grey MUDSTONE with occasional randomly oriented 1 to 7mm thick greyish white calcite veins. Partially weathered: slightly reduced strength, closer fracture spacing, occasional heavy light brownish orange discolouration on fracture surfaces ad occasional clay infill on fracture surfaces. Discontinuities: 1. 10 to 25 degree joints closely spaced (50/150/400) planar, rough, clean, unstained. 2. 45 to 65 degree bedding fractures medium spaced (10/250/500)m planar, smooth, occasional heavy light brownish orange staining up to 5 mediate the statement with the fracture fracture for the	15.0 –
16.00 16.40 - 16.70 16.95 - 17.05			100	60	50	0		-11.25		× × × × × × × × × × × × × × × × × × ×	to 5mm deep and occasional dark grey gravelly infill on fracture surfaces up to 5mm thick. 3. 65 to 75 degree joints from 10.70m to 11.30m, 11.90m to 12.50m and 12.80m to 13.00m, undulating, rough, unstained and occasional dark grey gravelly clay infill on joint surfaces up to 8mm thick. Medium strong indistinctly thinly laminated light grey SILTSTONE with randomly oriented 1 to 6mm thick greyish white calcite veins. Partially weathered: reduced strength, closer fracture spacing, occasional heavy brownish orange discolouration on fracture surfaces and occasional clay infill on fracture surfaces.	16.0 - 16.5 - 17.0 -
17.50								-11.25	-		Discontinuities: 1. 15 to 25 degree joints medium spaced (50/270/550) planar, rough, occasional heavy brownish orange staining on joint surfaces up to 5mm deep and occasional light grey gravelly lay infill on joint	17.5 -
			100	30	0	>20			- - - - - - - - -		surfaces up to 2mm thick. 2. 55 to 75 degree joints from 14.80m to 15.20m and 1.520m to 15.40m, undulating, rough and occasional heavy brownish orange staining on joint surfaces up to 20mm deep. Medium strong (locally weak) indistinctly thinly laminated dark grey SILTSTONE. Partially weathered: reduced strength, much closer fracture spacing and occasional clay infill on fracture spacing. Discontinuities: 1. 10 to 25 degree joints closely spaced (50/110/300) planar, rough	18.0 <del>-</del> 18.5 -
18.70 - 18.90 19.00	) C6							-13.15	- - - 19.00	*****	and occasional dark grey gravelly clay infill on joint surfaces up to 50mm thick. 2. 35 to 45 degree joints at 18.10m, 18.40m to 18.60m, undulating,	19.0 -
19.20 - 19.40	0 C7		100	83	67	5			-		rough, unstained, clean. 3. 65 to 75 degree joints from 18.90m to 19.00m, undulating, rough, <u>unstained and clean</u> . Strong indistinctly thinly laminated fine grained well cemented light greenish grey SANDSTONE. partially weathered: slightly reduced strength and closer fracture spacing. Discontinuities: 1. 55 to 65 degree joints at 19.80m to 20.00m, planar, rough, unstained and clean.	19.5 20.0 -
20.50								-14.45	- 20.30		Medium strong (locally weak) indistinctly thinly laminated light greenish grey SILTSTONE. Partially weathered: reduced strength, much closer fracture spacing and occasional clay infill on fracture	20.5
			100	10	0	>20			-	× ×	surfaces. Discontinuities: 1. 10 to 25 degree joints closely spaced (50/40/300) slightly undulating, rough, unstained and occasional grey gravelly clay infill on joint surfaces up to 2mm thick. 2. 25 to 45 degree joints medium spaced (200/500/1000) undulating, rough and occasional light grey gravelly clay infill on joint surfaces up to 2mm thick.	21.0 - 21.5
									-	× ×		
	\ <u>\</u>	Chuilter	TCR	SCR	RQD							
Struck at (m) Ci		Strikes Time (min)	Rose	e to (r	<u>п)</u> н	ocatio			cavated to	9 1.20m.		
7.00	Diam (mm) 200	<b>Core</b>	Barre	el								
29.50	150	Flush Wa	<b>Typ</b> ater	e			nation F	<b>Reason</b> cheduled d	epth.		Last Upd 02/12/2	

	c		<b>E</b> GEC		A EC	<b>Y</b> H			-	ct No. 619A	Project Client: Client's	Name: North Iri Statkraft		ay Landfall			Borehole BH17	
Metho	d	Plant l	Jsed		Тор	(m)	Base	e (m)	Coord	linates		-					Sheet 4 c	of 5
Rotary Dri	-	Comacch			0.	00	7.	00			Final De	<b>pth:</b> 29.50 m	Start Date:	01/04/2022	Driller: JG	i	Scale: 1	
Rotary Co	aring	Comacch	110 60	J1	7.	00		.50		0.17 E 2.88 N	Elevatio	<b>n:</b> 5.85 mOD	End Date:	04/04/2022	Logger: RC		FINA	L
Depth (m)	Samples /	Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend			scription		Water	Backfill	
22.00			100	38	0	5	-			-	X X X X X X X X X X X X X X X X X X X	Medium strong (loc greenish grey SILTS) much closer fractur surfaces. Discontinuities: 1. 10 to 25 degree j undulating, rough, u on joint surfaces up 2. 25 to 45 degree j rough and occasion to 2mm thick. 22.70m to 23.30m: Stiff lij	TONE. Partiall e spacing and oints closely unstained and to 2mm thic oints medium al light grey g	ly weathered: red d occasional clay spaced (50/40/3) d occasional grey k. n spaced (200/50 rravelly clay infill	duced strength infill on fractur 00) slightly gravelly clay in 0/1000) undul	n, re nfill lating,		22.0 — - - - - - - - - - - - - - - - - - - -
23.35 - 23.50	C9								-17.45	- 23.30		Medium strong dar	k grey TUFF. F	Partially weather	ed: slightly red	luced		
23.50						1				-		strength and closer Discontinuities:		-				23.5 -
23.80 - 24.00	C10									[		1. 10 to 25 degree j rough, unstained ar	nd clean.					
										-		2. 25 to 45 degree j rough, unstained, cl		n spaced (100/43	0/800)plaanr,			24.0 — ·
			100	68	35													
						10				-								24.5 <del>-</del>
										-								
25.00	C11																	25.0 —
25.10 - 25.25										-								
										-								25.5 –
			100	35	7					-								
						-												26.0 —
						>20				-								
26.50										-								
26.50																		26.5 -
										-								
										-								27.0 —
			100	64	41	10				-								
										-								27.5 -
										-								
28.00					-		-			_								28.0 —
										-								
										-	KAAA							28.5 –
			100							-								
										_								29.0 —
					<u> </u>					-								
	Water	Strikes	TCR	SCR	RQD	FI Rema	rks				1							
Struck at (m) Ca			Rose	e to (r	n) ⊦	land o	dug ir		tion pit ex	cavated to	1.20m.							
						ocatio elevie			l leted.									
Casing De To (m) Di	e <b>tails</b> am (mm)	Core		el														
7.00 29.50	200 150	56	(6L														• • • · •	
23.50	130	Flush		e					eason	onth						ast Upda		
		Wa	ater		T	ermir	iated	at sc	heduled d	eptn.						02/12/202	~  A	υŊ

Method		GEOTE	СН		Project No.       Project Name: North Irish Sea Array Landfall         21-1619A       Client:       Statkraft Limited         Client's Rep       Arup         m)       Coordinates							BH17 BH17 Sheet 5 of 5	
Rotary Drillin Rotary Corin		nio 601	0.00 7.00	Base (m) 7.00 29.50	719790.1	Final De		pth: 29.50 m Start Date: 01/04/2022 Drille		Driller: JG		Scale: 1:40	
Denth				Casing Water	765252.8	Conth	evatio	n: 5.85 mOD		04/04/2022	Logger: RC	er	FINAL
Depth (m)         Si           29.50         -	amples / Field Records	TCR SCR	RQD FI	Casing Water Depth Depth (m) (m)	mOD - -		rgend	Medium strong dark strength and closer Discontinuities: 1. 10 to 25 degree jc rough, unstained an 2. 25 to 45 degree jc rough, unstained, ch	s grey TUFF. P. fracture spaci bints medium d clean. bints medium ean.	ng. spaced (50/260/	(700) undulating,	t l	Backfill 29.5 30.0 30.1 30.1 31.0 31.0 32.0 32.0 32.0 32.0 32.0 32.0 32.0 32.0 32.0 32.0 32.0 32.0 32.0 33.0 33.0 33.0 34.0 34.0 34.0 35.5
	Vater Strikes g to (m) Time (min)	TCR SCR Rose to (m	Rem	arks	tion pit excava	ted to 1.20	0m.						36.0
7.00 20	(mm) 00 Sk	Barrel GL	_	ewer comp							Last	Updat	ed

									ct No.	Project Name: North In		Borehole IE		
		AUS	<b>E</b> GEC			Y H								
										Client's Rep Arup				
Metho Rotary Dr	rilling	Plant U Comacch	nio 40		0.0	00	Base (m) 2.70	<b>Coordinates</b> 719790.13 E		Final Depth: 30.00 m	Start Date: 11/04/2022 Driller: N	MW Scale: 1:4		
Rotary Co	oring	Comacch	110 40	5	2.7	70	30.00		34.97 N	Elevation: 8.09 mOE	on: 8.09 mOD End Date: 13/04/2022 Logger: TH			
Depth (m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Casing Water Depth Depth (m) (m)	Level mOD	Depth (m)	Legend	Description	S Backfill		
								7.89	0.20	TOPSOIL- Brown sa				
20 20 - 1.65	D1 SPT(S) N (2,3/3,3, Hammer						1.20 Dry			Firm brown sandy	gravelly CLAY (Driller's description)	0. 1. 2.		
70 70 - 3.15	D2 SPT(S) N (1,3/4,4, Hammel		90				2.70 Dry	5.39	- 2.70		y stiff greyish brown slightly sandy slightly g o coarse. Gravel is subrounded fine to coars			
70 70 - 5.20 70 - 4.15 70	D3 C SPT(S) N (2,4/4,4, Hammel		47			AZCL	3.70 Dry	4.39	- - - - - - - - - - - - - - - - - - -	Gravel is subangul	a slightly sandy gravelly CLAY. Sand is fine to ar fine to coarse. <del>Jue to disturbances fro</del> m SPT	coarse. 4.		
.20 - 6.70 .20 - 5.65 .20	C SPT(S) N (3,6/6,7, Hamme		50			AZCL	5.20		-	Medium strong (lo frequent greyish w 30mm thick) and c Partially weathere	tue to disturbances from SPT cally weak) massive grey GREYWACKE with /hite calcite veins of various orientation (up occasional pyrite crystals (1 to 2mm in diame d: slightly reduced strength, closer fracture brown discolouration on some fracture surf	eter.		
.70 - 6.84 .70	105mm/	l=50 (42 for /50 for Hammer SN	TCR	SCR	RQD	FI		1.09	- - - - - 7.00	1. 20 to 40 degree rough, orangish br 2. 65 to 70 degree white calcite mine 3. 80 to 90 degree to 8.83m and 8.42 brown staining and	joints, medium spaced (120/360/1000) plan own staining on some joint surfaces. joint, at 7.10m to 7.30m, planar, smooth, gr ralisation on joint surface (up to 2mm thick) joints, at 7.58m to 7.70m, 8.20m to 9.00m, m to 8.60m, planar, rough, patchy dark orar d gravelly clay infill on most joint surfaces (u ish white calcite mineralisation on some joir mm thick).	reyish a. 8.45m igish p to 7.1		
	Water	Strikes				ema	rks		1					
ruck at (m) Ca	asing to (m)	Time (min)	Rose	to (r	n) H Lo Te	and o ocatio elevie	lug inspec on: Landfa wer comp	l. leted.		o 1.20m r added during drilling.				
	Diam (mm)	Core	Barre	el										
2.70	200 150	Flush				ormi	nation R	ason				Last Updated		
30.00	130													

	C				A EC				ect No. .619A	Project Name: North Irish Sea Array Landfall Client: Statkraft Limited Client's Rep Arup	Borehole ID BH18	
Metho		Plant U		25			Base (m)	Coordinates		inal Depth: 30.00 m Start Date: 11/04/2022 Driller: MV	Sheet 2 of 5	
Rotary Dr Rotary Co	0	Comacch Comacch			2.	00 70	2.70 30.00		90.13 E 34.97 N	Elevation: 8.09 mOD End Date: 13/04/2022 Logger: TH	Scale: 1:40	
Depth (m)	Samples /	Field Records	TCR	SCR	RQD	FI	Casing Water Depth Depth (m) (m)	Level mOD	Depth (m)	Legend Description	ਸ਼ੇ ਇ Backfill	
8.20 9.00 - 9.15	с		83	50		5	(m) (m)			Medium strong (locally weak) massive grey GREYWACKE with         frequent greyish white calcite veins of various orientation (up to         30mm thick) and occasional pyrite crystals (1 to 2mm in diamete         Partially weathered: slightly reduced strength, closer fracture         spacing, orangish brown discolouration on some fracture surface         Discontinuities:         1. 20 to 40 degree joints, medium spaced (120/360/1000) planar,         rough, orangish brown staining on some joint surfaces.         2. 65 to 70 degree joint, at 7.10m to 7.30m, planar, smooth, grey         white calcite mineralisation on joint surface (up to 2mm thick).         3. 80 to 90 degree joints, at 7.58m to 7.70m, 8.20m to 9.00m, 8.4         to 8.83m and 8.42m to 8.60m, planar, rough, patchy dark orangis         brown staining and gravelly clay infill on most joint surfaces (up to 10mm thick), surfaces (up to 10mm thick).	5m 8.5	
9.15 - 9.40	С								- - -			
9.45 - 9.55 9.55 9.70	c							-1.71	- - - 9.80	Medium strong massive greyish black MUDSTONE with frequent greyish white calcite veins (up to 20mm thick) occasional pyrite crystals (up to 2mm in diameter). Partially weathered: slightly	9.5	
			97	71	60	6			- - - - -	reduced strength, slightly closer fracture spacing. Discontinuities: 1. 20 to 30 degree joints at 1.20m and 10.47m, planar, smooth. 2. 40 to 60 degree joints, at 9.80m, 10.00m, 10.35m and 10.55m, steeped, rough, grey calcite mineralisation on most joint surfaces 3. 70 to 90 degree joints, at 9.80m to 10.00m, 10.25m to 10.34m 10.65m to 10.80m, undulating, rough, patchy dark orangish brow	and 10.5	
11.20						3		-2.71	- 10.80 - - -	staining on some joint surfaces. Medium strong (locally weak) massive grey calcareous GREYWAC with occasional greyish white calcite veins of predominantly subvertical orientation. Partially weathered: slightly reduced strength, slightly closer fracture spacing, patchy brown discolouration on some fracture surfaces.	KE 11.0 -	
			100	72	63			-3.61	- - - 11.70 -	Discontinuities: 1. 20 to 30 degree joints, at 11.57m, planar, rough, patchy brown staining on joint surface. 2. 60 to 90 degree joints, at 10.82m to 11.10m, 11.20m to 11.30m and 11.40m to 11.50m, undulating, rough. Weak massive dark grey MUDSTONE with frequent calcite veins of		
12.70						3			-	predominantly subvertical orientation (up to 60mm thick). Partia weathered: reduced strength, slightly closer fracture spacing, infi on most fracture surfaces. Discontinuities: 1. 70 to 90 degree joints, at 11.70m to 12.00m, 11.90m to 12.90r 12.10m to 12.45m, 12.60m to 13.25m and 12.30m to 12.40m,	12.5	
			100	82	82			-5.16	- - 13.25	undulating, rough, grey clayey gravelly infill on most joint surface (up to 35mm thick). /Medium strong massive grey GREYWACKE with occasional greyisl white calcite veins of various orientations (2 to 6mm thick). Partia weathered: slightly reduced strength, slightly closer fracture space patchy calcite mineralisation on some fracture surfaces.	13.0 - Ily	
14.20						4				<ul> <li>Discontinuities:</li> <li>1. 30 to 50 degree joints, medium, spaced (130/355/650) planar, rough, patchy grey calcite mineralisation on some joint surfaces.</li> <li>2. 60 to 70 degree joints, at 16.365m to 16.75m and 16.75m to 16.80m, planar, rough, grey claicte mineralisation and blackish g staining on joint surfaces.</li> </ul>	14.0 -	
0									-	3. 70 to 90 degree joints, at 13.70m to 14.04m, 14.00m to 14.20r           14.47 to 14.80m and 15.60m to 16.20m, 16.60m to 16.70m,           undulating, rough, grey calcite mineralisation on most joint surfa	14.5	
	Water	Strikes		JOCK	RQD	FI ema	rks					
Struck at (m) Ca			Rose	e to (r	<u>n)</u> н Ца Те	and c ocatio elevie	lug inspec on: Landfa wer comp	ll. oleted.	cavated to red- water	.20m dded during drilling.		
Casing D           To (m)         D           2.70         D	etails <sup>liam</sup> (mm) 200	Core I	 Barre	el								
30.00	150	<b>Flush</b> Wa	<b>Typ</b>	e			nation R	<b>eason</b> heduled d	epth.		t Updated	

	CAUSEWAY GEOTECH								Proje 21-1	Borehole ID BH18		
Metho Rotary Dr		Plant L Comacch				( <b>m)</b> 00	Base (m) 2.70		Coordinates		inal Depth: 30.00 m Start Date: 11/04/2022 Driller: MV	Sheet 3 of 5
Rotary Co	•	Comacch				70	30.			90.13 E 84.97 N	ilevation: 8.09 mOD End Date: 13/04/2022 Logger: TH	Scale: 1:40 FINAL
Depth (m)	Samples /	/ Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend Description	Backfill
14.85 - 14.95 15.40 - 15.50			100	89	83					-	Medium strong massive grey GREYWACKE with occasional greyis white calcite veins of various orientations (2 to 6mm thick). Parti weathered: slightly reduced strength, slightly closer fracture spar patchy calcite mineralisation on some fracture surfaces. Discontinuities: 1. 30 to 50 degree joints, medium, spaced (130/355/650) planar, rough, patchy grey calcite mineralisation on some joint surfaces. 2. 60 to 70 degree joints, at 16.365m to 16.75m and 16.75m to 16.80m, planar, rough, grey claicte mineralisation and blackish g	ally ing, 15.0 •
15.70			100	77	61	5			0.74	-	<ul> <li>Staining on joint surfaces.</li> <li>3. 70 to 90 degree joints, at 13.70m to 14.04m, 14.00m to 14.20i</li> <li>14.47 to 14.80m and 15.60m to 16.20m, 16.60m to 16.70m, undulating, rough, grey calcite mineralisation on most joint surfaces</li> </ul>	n,
17.20						-			-8.71	- 16.80 	Medium strong light grey TUFF with rare greyish white calcite ve           Partially weathered: slightly reduced strength, greyish black stair           on most fracture surfaces.           Discontinuities:           1. 20 to 35 degree joints, widely spaced (430/975/1200) planar t	ing 17.0 -
			100	96	82					- - - - - - - - - - - - - - - - - - -	<ul> <li>undulating, rough.</li> <li>2. 40 to 60 degree joints, medium spaced (110/490/980) planar,</li> <li>rough, patchy grey calcite mineralisation and greyish black stainii</li> <li>on most joint surfaces, greenish grey clayey gravelly infill on som</li> <li>joints (up to 45mm thick).</li> <li>3. 70 to 80 degree joints at 17.10m to 17.40m, 18.70m to 19.00n</li> <li>19.25m to 19.40m, 20.55m to 20.75m and 21.30m to 22.00m,</li> <li>undulating, rough, greyish white and greenish grey staining calcit</li> <li>mineralisation on most joint surfaces.</li> </ul>	17.5 e 18.0
18.70			100	78	68	4				-		19.0 - 19.5 20.0 -
20.20			90	65	42	-				-		20.5 21.0 -
21.70						9				-		21.5
		<b>.</b>	TCR	SCR	RQD							
struck at (m) Ca		Strikes Time (min)	Rose	e to (r	<b>n)</b> н Г	ocatio elevie	dug in on: La ewer c	ndfall compl	eted.	cavated to red- water	20m dded during drilling.	
2.70	0iam (mm) 200	Core SK	Barre	el								
30.00	150	Flush	<b>Typ</b> ater	e					e <b>ason</b> Neduled d	enth		st Updated

	C		SEC GEC		EC	<b>Y</b> H			Project No.       Project Name: North Irish Sea Array Landfall         21-1619A       Client:       Statkraft Limited         Client's Rep       Arup						
Meth Rotary D		Plant U				<b>(m)</b> 00	Base 2.7		) Coordinates		inal Depth: 30.00 m Start Date: 11/04/2022 Driller: M	Sheet 4 of 5			
Rotary (		Comacch				70	30.0			90.13 E 34.97 N	levation: 8.09 mOD End Date: 13/04/2022 Logger: TH	Scale: 1:40			
Depth (m)	Samples ,	Field Records	TCR	SCR	RQD	FI	Depth [	Vater Depth (m)	Level mOD	Depth (m)	Legend Description	평 Backfill			
22.30 - 22.4 22.90 - 23.1			100	77	61						<ul> <li>Medium strong light grey TUFF with rare greyish white calcite very Partially weathered: slightly reduced strength, greyish black stain on most fracture surfaces.</li> <li>Discontinuities:         <ol> <li>20 to 35 degree joints, widely spaced (430/975/1200) planar undulating, rough.</li> <li>40 to 60 degree joints, medium spaced (110/490/980) planar rough, patchy grey calcite mineralisation and greyish black stain on most joint surfaces, greenish grey clayey gravelly infill on sor joints (up to 45mm thick).</li> </ol></li></ul>	ning 22.5 - ing 23.0 -			
23.20			100	64	53	5				- - - - - - - - -	3. 70 to 80 degree joints at 17.10m to 17.40m, 18.70m to 19.00     19.25m to 19.40m, 20.55m to 20.75m and 21.30m to 22.00m,     undulating, rough, greyish white and greenish grey staining calc     mineralisation on most joint surfaces.				
24.70									-16.51	- 24.60 -	Medium strong grey TUFF with frequent greyish white calcite ve of various orientations (2 to 25mm thick). Partially weathered: slightly reduced strength, slightly fracture spacing, infill and ora				
26.20			100	72	72	4					<ul> <li>brown discolouration on some fracture surfaces.</li> <li>Discontinuities:</li> <li>1. 20 to 30 degree joints, widely spaced (500/770/1500) planar</li> <li>undulating, rough.</li> <li>2. 60 to 70 degree joints, at 25.56m to 25.70m, 25.80m to 25.90</li> <li>25.87m to 26.00m, 28.00m to 28.15m, 28.25m to 28.40m, 28.2</li> <li>28.45m and 29.20m to 29.40m, planar, rough, greyish white cal</li> <li>mineralisation on most joint surfaces, greenish grey gravelly cla</li> <li>on some joint surfaces 92 to 5mm thick).</li> <li>3. 80 to 90 degree joints, at 27.10m to 27.80m, 28.20m to 28.60m</li> </ul>	to m, 25.5 - Bm to cite infill 26.0 -			
26.20			97	64	64	NI				- - - - - - - - - - -	28.75m to 29.10m, and 29.80m to 30.00m, undulating, rough, greyish white calcite mineralisation and greyish black staining o joint surfaces, clayey gravelly infill on some joint surfaces.	26.5			
27.70			100	75	65	5						27.5 28.0 - 28.5			
29.20										- - - -		29.0 -			
	Water	Strikes		BCR	RQD	FI Rema	rke								
itruck at (m)		Time (min)	Rose	e to (r	n) н Ц	land o ocatio elevie	dug ins on: Lan ewer co	dfall. mplet	ted.	cavated to red- water	20m dded during drilling.				
Casing		Core	Barr	el	1										
To (m) 2.70 30.00	Diam (mm) 200 150	SK	(6L									···· · · · · · · · · · · · · · · · · ·			
30.00	120	Flush	<b>i Typ</b> ater	e			natio		<b>son</b> duled de	anth		02/12/2022			

•	GEOTECH								-	ct No. 619A	Project Name:       North Irish Sea Array Landfall         Client:       Statkraft Limited         Client's Rep       Arup						Borehole ID BH18	
Metho		Plant I			-			<b>se (m)</b> 2.70	Coord	linates	Final De	epth: 30.00 m	Start Date:	11/04/2022	Driller:	MM	Sheet 5 o	f 5
Rotary Dr Rotary Co		Comacch Comacch				00 70		.70 ).00		0.13 E 4.97 N	Elevation: 8.09 mOD End Date: 13/0				Logger:		Scale: 1:4	
Depth (m)	Samples /	Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Depth	Level mOD	Depth (m)	Legend		Des	cription			Backfill	
Depth (m)			100	SCR 75	75		Casing United States (m)	Water		Depth (m) 		Medium strong grey of various orientatic slightly reduced stro brown discolouratic Discontinuities: 1. 20 to 30 degree ju undulating, rough. 2. 60 to 70 degree ji 25.87m to 26.00m, 28.45m and 29.20m mineralisation on m on some joint surface 3. 80 to 90 degree ji 28.75m to 29.10m, greyish white calcite joint surfaces, clayer	y TUFF with fr ons (2 to 25m ength, slightly on on some fr oints, widely : oints, at 25.56 28.00m to 28 n to 29.40m, p nost joint suffices 92 to 5mr oints, at 27.10 and 29.80m t e mineralisati y gravelly infi	requent greyish v m thick). Partiali fracture spacing acture surfaces. spaced (500/770 5m to 25.70m, 2! .15m, 28.25m to olanar, rough, gre aces, greenish gr n thick). Om to 27.80m, 2! o 30.00m, undul on and greyish b	y weathere g, infill and /1500) plan 5.80m to 25 9 28.40m, 2 29 yish white ey gravelly 8.20m to 28 ating, roug lack stainin	d: orangish nar to 5.90m, 8.23m to calcite clay infill 8.60m, h,	Backfill	29.5 - 30.0 - 31.0 - 31.5 - 32.0 - 32.5 - 33.0 - 33.5 - 33.0 - 33.5 - - 35.5 - - 36.0 - - 37.0 - - 37.0 - - 37.0 - - 37.0 - - - - - - - - - - - - - -
	Water	Strikes			<u> </u>	Rema	rks	1										<u> </u>
truck at (m) Ca		Time (min)			n) ⊢ ∟ ⊤	land o ocatio	dug ii on: La ewer	andfal comp	leted.			ring drilling.						
Casing D		Core	Barr	el														
2.70	0iam (mm) 200	51	(6L															
30.00	150	Flush	<b>i Typ</b> ater	e					<b>eason</b> heduled de	epth.	_			_		Last Upc 02/12/2		ן רע

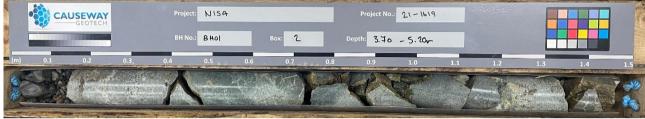


# APPENDIX C CORE PHOTOGRAPHS

#### North Irish Sea Array



BH01 (Box 1) 2.70-3.70m



BH01 (Box 2) 3.70-5.20m



# BH01 (Box 3) 5.20-6.70m



# BH01 (Box 4) 6.70-8.20m



BH01 (Box 5) 8.20-9.70m



# North Irish Sea ArrayRepresentation of the sea Arrayfright registing the sea ArrayImage: Sea Ar

 BH01 (Box 6) 9.70-11.20m

 Project
 N15A
 Project N0.
 21-1619

 m)
 0.3
 0.4
 0.5
 0.6
 0.7
 0.8
 0.9
 1.0
 1.1
 1.2
 1.3
 1.4
 1.3

BH01 (Box 7) 11.20-12.70m



BH01 (Box 8) 12.70-14.20m



# BH01 (Box 9) 14.20-15.70m



BH01 (Box 10) 15.70-17.20m



# North Irish Sea ArrayReport No.: 21 - 1619 $m \rightarrow 0.1$ $n \rightarrow 0.2$ $n \rightarrow 0.4$ $n \rightarrow 0.6$ $n \rightarrow 0.7$ $n \rightarrow 0.6$ $n \rightarrow 0.7$ $n \rightarrow 0.6$ $n \rightarrow 0.7$ $n \rightarrow 0.6$ $n \rightarrow 0.6$

BH01 (Box 11) 17.20-18.70m



#### BH01 (Box 12) 18.70-20.20m



# BH01 (Box 13) 20.20-21.70m



#### BH01 (Box 14) 21.70-23.20m



#### BH01 (Box 15) 23.20-24.70m

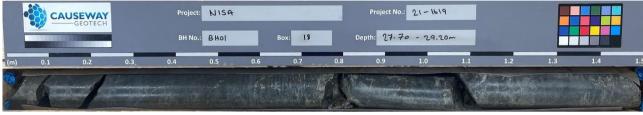


#### BH01 (Box 16) 24.70-26.20m



# North Irish Sea Array Report No.: 21-1619 Image: Contract project No: 21-1659 Image: Contract project Project No: 21-1659 Image: Contract project No: 21-1659 Image: Contract project Project No: 21-1659 Image: Contract project No: 21-1659 Image: Contract project Proje

# BH01 (Box 17) 26.20-27.70m

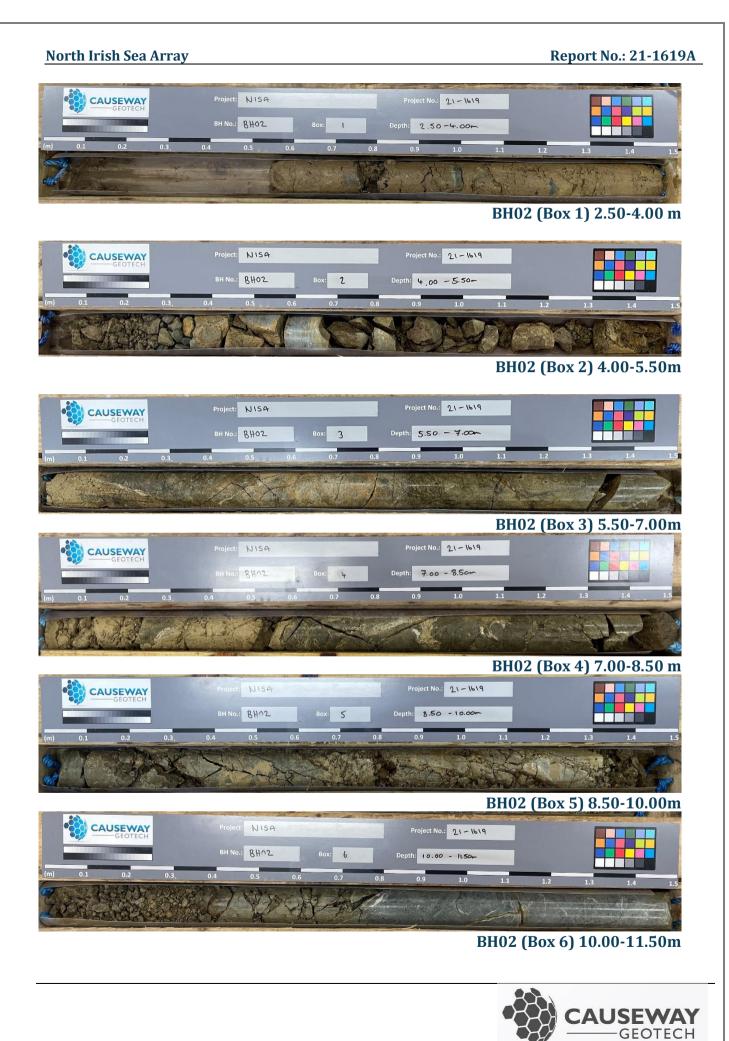


# BH01 (Box 18) 27.70-29.20m



# BH01 (Box 19) 29.20-30.00m



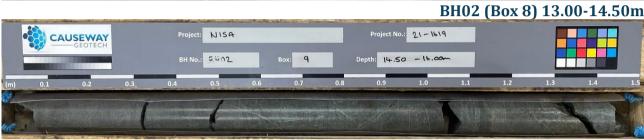


#### North Irish Sea Array



BH02 (Box 7) 11.50-13.00m

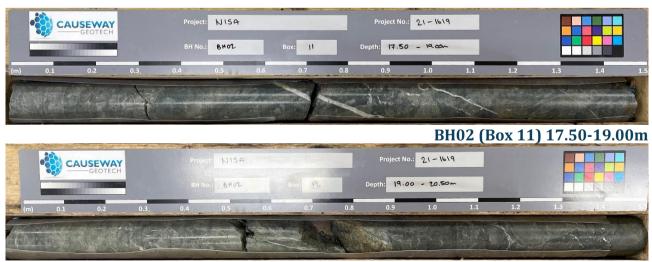




#### BH02 (Box 9) 14.50-16.00m



#### BH02 (Box 10) 16.00-17.50m



# BH02 (Box 12) 19.00-20.50m



# North Irish Sea Array Report No.: 21-1619 Image: Control of the state of the stat

#### BH02 (Box 13) 20.50-22.00 m



#### BH02 (Box 14) 22.00-23.50 m



#### BH02 (Box 15) 23.50-25.00 m



## BH02 (Box 16) 25.00-26.50m



BH02 (Box 17) 26.50-28.00m



#### North Irish Sea Array



# BH03 (Box 1) 5.50-7.00m



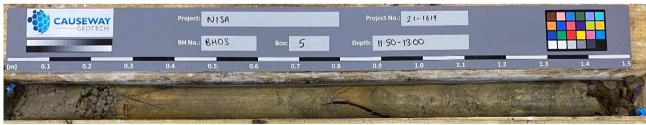
#### BH03 (Box 2) 7.00-8.50m



# BH03 (Box 3) 8.50-10.00m

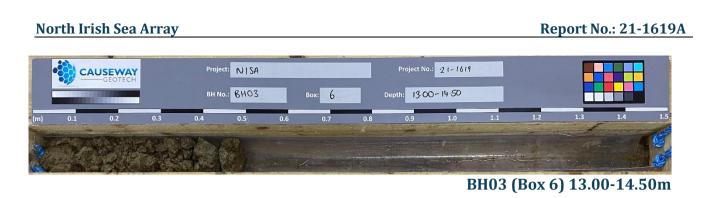


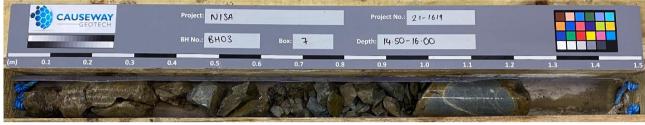
#### BH03 (Box 4) 10.00-11.50m



#### BH03 (Box 5) 11.50-13.00m







# BH03 (Box 7) 14.50-16.00m

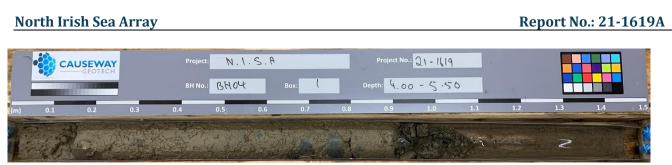


#### BH03 (Box 8) 16.00-17.50m



### BH03 (Box 9) 17.50-19.00m





BH04 (Box 1) 4.00-5.50m



## BH04 (Box 2) 5.50-7.00m



BH04 (Box 3) 7.00-8.50m



# BH04 (Box 4) 8.50-10.00m



BH04 (Box 5) 10.00-11.50m





## BH04 (Box 6) 11.50-13.00m



# BH04 (Box 7) 13.00-14.50m



# BH04 (Box 8) 14.50-16.00m

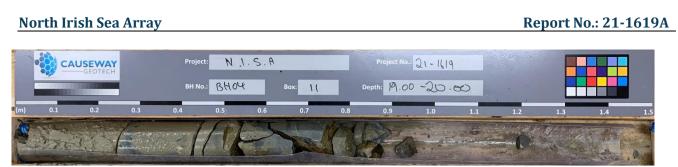


# BH04 (Box 9) 16.00-17.50m



#### BH04 (Box 10) 17.50-19.00m





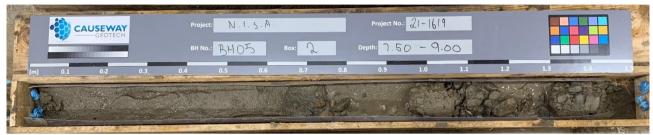
BH04 (Box 11) 19.00-20.00m



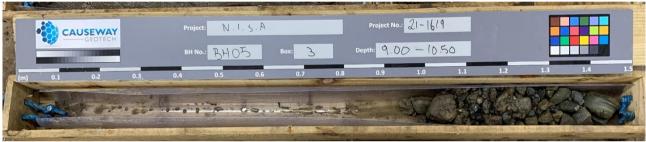
#### North Irish Sea Array

CAUSEWAY	Project: N. I. S. A	Project No.: 21 - 1619	
(m) 0.1 0.2 0.3.	BH No.: BH OF Box: 1 0.4 0.5 0.6 0.7	Depth: <u>6.の</u> -フ. <u>5</u> 0 0.8 0.9 1.0	1.1 1.2 1.3 1.4 1.5
Re Made	A Trans	VAR I	and the second

# BH05 (Box 1) 6.00-7.50m



# BH05 (Box 2) 7.50-9.00m



# BH05 (Box 3) 9.00-10.50m



# BH05 (Box 4) 10.50-12.00m



BH05 (Box 5) 12.00-13.50m



#### North Irish Sea Array



#### BH05 (Box 6) 13.50-15.00m



# BH05 (Box 7) 15.00-16.50 m



### BH05 (Box 8) 16.50-18.00m



## BH05 (Box 9) 18.00-19.50m



### BH05 (Box 10) 19.50-20.00m



#### North Irish Sea Array



BH06 (Box 1) 4.00-5.50m



BH06 (Box 2) 5.50-7.00m



BH06 (Box 3) 7.00-8.50m



BH06 (Box 4) 8.50-10.00m



BH06 (Box 5) 10.00-11.50m

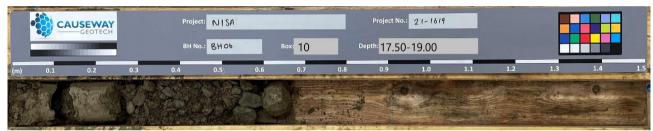




BH06 (Box 8) 14.50-16.00m



# BH06 (Box 9) 16.00-17.50m



BH06 (Box 10) 17.50-19.00m





# BH07 (Box 4) 8.50-10.00m



### BH07 (Box 5) 10.00-11.50m





BH07 (Box 6) 11.50-13.00m



BH07 (Box 7) 13.00-14.50m

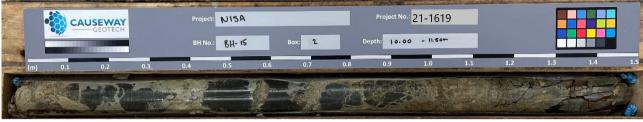


BH07 (Box 8) 14.50-15.25m





#### BH15 (Box 1) 8.50-10.00m



#### BH15 (Box 2) 10.00-11.50m



BH15 (Box 3) 11.50-13.00m



BH15 (Box 4) 13.00-14.50m



## North Irish Sea Array Report No.: 21-1619 Project N15A Project N15A BH No.: GH-16 Box: 1 Depth: 10.00 - 11.50m 10 0.1 0.1 0.2

#### BH16 (Box 1) 10.00-11.50m



#### BH16 (Box 2) 11.50-13.00m



#### BH16 (Box 3) 13.00-14.50m



BH16 (Box 4) 14.50-15.00m

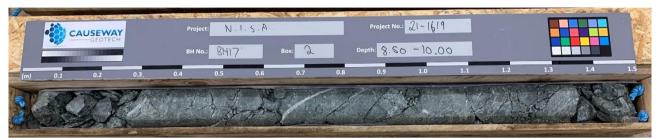


#### Report No.: 21-1619A

#### North Irish Sea Array



#### BH17 (Box 1) 7.00-8.50m



#### BH17 (Box 2) 8.50-10.00m



#### BH17 (Box 3) 10.00-11.50m



#### BH17 (Box 4) 11.50-13.00m



#### BH17 (Box 5) 13.00-14.50m



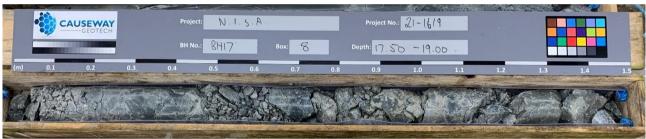
### North Irish Sea Array Report No.: 21-1619A



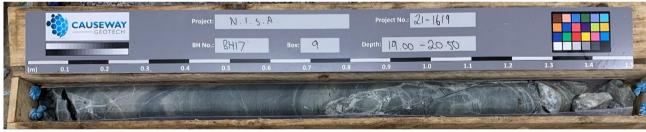
#### BH17 (Box 6) 14.50-16.00m



#### BH17 (Box 7) 16.00-17.50m



#### BH17 (Box 8) 17.50-19.00m



#### BH17 (Box 9) 19.00-20.50m



#### BH17 (Box 10) 20.50-22.00m

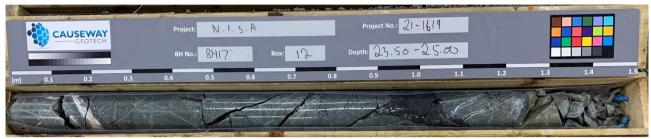


#### **Report No.: 21-1619A**

#### North Irish Sea Array



#### BH17 (Box 11) 22.00-23.50m



#### BH17 (Box 12) 23.50-25.00m



#### BH17 (Box 13) 25.00-26.50m



#### BH17 (Box 14) 26.50-28.00m

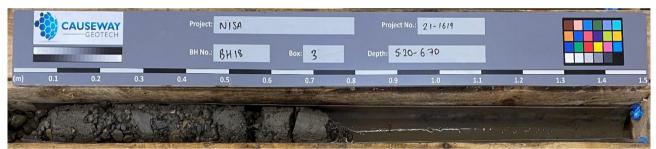


# North Irish Sea ArrayReport No.: 21-16/90.10.10.10.10.10.10.20.30.40.50.60.70.80.91.01.11.21.11.2<td cols

BH18 (Box 1) 2.70-3.70m



BH18 (Box 2) 3.70-5.20m



BH18 (Box 3) 5.20-6.70m



#### BH18 (Box 4) 6.70-8.20m



BH18 (Box 5) 8.20-9.70m



#### Report No.: 21-1619A

#### North Irish Sea Array



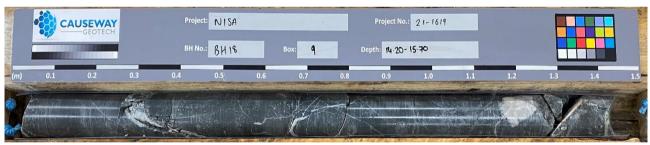
BH18 (Box 6) 9.70-11.20m



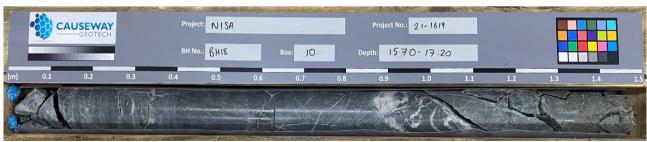
#### BH18 (Box 7) 11.20-12.70m



#### BH18 (Box 8) 12.70-14.20m



#### BH18 (Box 9) 14.20-15.70m



#### BH18 (Box 10) 15.70-17.20m



#### Report No.: 21-1619A

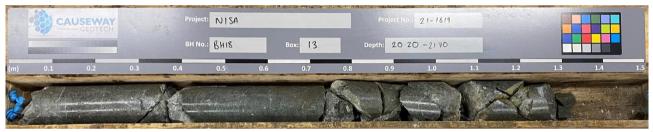
#### North Irish Sea Array



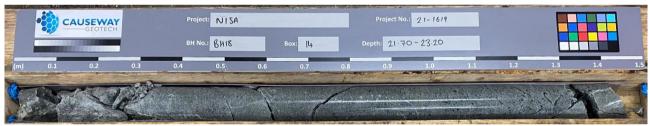
#### BH18 (Box 11) 17.20-18.70m



#### BH18 (Box 12) 18.70-20.20m



#### BH18 (Box 13) 20.20-21.70m



#### BH18 (Box 14) 21.70-23.20m



#### BH18 (Box 15) 23.20-24.70m





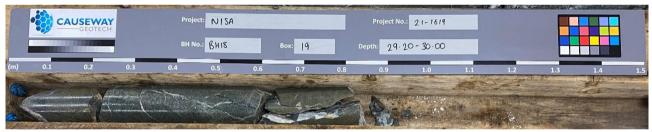
#### BH18 (Box 16) 24.70-26.20m



#### BH18 (Box 17) 26.20-27.70m



BH18 (Box 18) 27.70-29.20m



#### BH18 (Box 19) 29.20-30.00m







#### APPENDIX D TRIAL PIT LOGS

			Proje	ect No.	Project	Name:			Tri	al Pit ID
		EWAY	21-1	1619A	North I	rish Sea Array Landfall				
		EOTECH	Coor	dinates	Client:				-	TP01
	0	LOTLCTI	7106			ft Limited				
Method:					Client's	Representative:			She	et 1 of 1
Trial Pitting					Arup				Sca	ale: 1:25
Plant:					Date:		gger:		r	INAL
6T Tracked Exca	avator		6.28	3 mOD	15/03/2	2022 RS	5			INAL
Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description			Water	
(,			(			TOPSOIL - Brown sandy gravelly CLAY.			-	
				[						_
			5.98	- 0.30						_
				- }		Stiff yellowish brown slightly sandy slightly gravelly CLAY. coarse. Gravel is subrounded fine to coarse of mudstone.		ne to		_
	ES			[						0.5
0.50	ES1			Ē						_
				ŀ						_
				-						-
1.00	B3		5.38	- 0.90	2000 - 100 -	Stiff grey slightly sandy slightly gravelly CLAY with low cob	ble cont	ent.		10
	ES				000 000 00 10 00 0	Sand is fine to coarse. Gravel is subrounded fine to mediu lithologies predominantly mudstone. Cobbles are of mud		ed		1.0
	ES2 B4		5.08	- 1.20	0.0 0.0 0.0				▾	_
1.20		Slow seepage at 1.2		-		End of trial pit at 1.20m				_
				- E						_
				Ē						1.5
				ŀ						_
				-						_
				Ē						2.0
				-  -						_
				ŕ						_
				[						_
				ŀ						-
				- t						2.5
				Ē						_
				-  -						_
										3.0
				[						-
				ŀ						-
				- }						-
				Ē						3.5 —
				[						3.5
				ŀ						_
				- }						_
				Ē						_
				Ē						4.0
				- }						-
				-						_
				[						_
				- F						4.5
				ŕ						_
				[						_
				Ē						_
				Ē						-
Water		<b>Depth:</b> 1.20		<b>harks:</b> ation: Land	fall.					
Struck at (m) 1.20	Remarks Slow seepage	at Width: 1.00								
	1.2	Length: 3.00								
		Stability:	Tern	nination R	eason			Last Upo	lated	
		Stable	Slow	progress du	ue to macł	nine size.		02/12/2		AGS

Method: Trial Pitting		EWAY BEOTECH	21-2 <b>Coor</b> 71968	ect No. 1619A dinates 80.68 E 19.19 N	North I <b>Client:</b> Statkra	Name: rish Sea Array Landfall ft Limited s Representative:		Sł	rial Pit ID TPO2 neet 1 of 1 cale: 1:25
<b>Plant:</b> 6T Tracked Exc	avator			<b>vation</b> 3 mOD	Date: 15/03/		FINAL		
Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	RS	Water	
0.50 0.50 0.50	ES ES1	HVP=155, HVR=23	8.78	0.30		TOPSOIL- Brown sandy gravelly CLAY. Stiff brown slightly sandy slightly gravelly CLAY with I Sand is fine to coarse. Gravel is subrounded fine to n Cobbles are of limestone.	low cobble cor nedium of lime	ntent.	0.5
1.00 1.00 1.20	ES ES2 B4		7.18	1.90		End of trial pit at 1.90m			
									2.0
				- - - - - - - - - - - - - - - - - - -					
				- - - - - - - - - - - - - - - - - - -					
				- - - - - - - - - - - -					4.5 — 
Wate Struck at (m)	r Strikes Remarks	Depth:         1.90           Width:         1.00           Length:         2.50	No g Shea	<b>narks:</b> groundwat ar vane cor ation: Land	mpleted.	ntered.			
		<b>Stability:</b> Stable		nination R progress du		nine size.	1	Last Update	

	CALIC			<b>ect No.</b> 1619A		t <b>Name:</b> Irish Sea Array Landfall		Trial Pit ID
	G	EOTECH	Coor	dinates	Client:			TP03
Method:				24.72 E		s Representative:		Sheet 1 of 1
Trial Pitting				94.71 N	Arup			Scale: 1:25
<b>Plant:</b> 6T Tracked Exc	covator			vation 6 mOD	Date: 14/03/	2022 RS	er:	FINAL
Depth	Sample /	Field Records	Level	Depth	Legend	Description	active and the second se	
(m) 0.50 0.50	ES ES1		(mOD) 32.26	(m) - 0.30		TOPSOIL- Brown sandy gravelly CLAY. Brown very sandy very clayey subrounded to subangular fine GRAVEL of mixed lithologies with high cobble content. Sand coarse. Cobbles are of mixed lithologies.	e to coarse	•     0.5
1.00 1.00 1.00 1.20	B3 ES ES2 B4 SI	ow seepage at 1.3	31.56	1.00		Firm brown slightly sandy slightly gravelly CLAY. Sand is fine f Gravel is subangular fine to medium.	to coarse.	_
			30.36	2.20		End of trial pit at 2.20m		1.5 — — — 2.0 —
				- - - - - - -				2.5 —
				- - - - - - -				3.0
				- - - - -				
				-				-
				-				4.0
				-				-
				-				
				- - - -				4.5
				- - - -				-
				-				
Wate Struck at (m) 1.30	er Strikes Remarks Slow seepage a 1.3	Depth:         2.20           width:         1.00           Length:         2.50		n <b>arks:</b> ntion: Lanc	lfall	1		
		<b>Stability:</b> Unstable		nination R progress d		hine size.	Last Upda 02/12/20	

	CAUS	SEWAY GEOTECH		<b>ect No.</b> 1619A	North I	: <b>Name:</b> rish Sea Array Landfall		Т	rial Pit ID		
	(	GEOTECH		dinates	Client: Statkra	ft Limited			TP04		
Method:				52.35 E 38.10 N		s Representative:		Sł	neet 1 of 1		
Trial Pitting						Arup					
<b>Plant:</b> 6T Tracked Ex	covator			<b>vation</b> 7 mOD	Date: 14/03/	2022	Logger: RS		FINAL		
Depth	Sample /	Field Records	Level	Depth	Legend	Description	KS	Water			
<u>(m)</u>	Tests		(mOD) 30.37	(m)		TOPSOIL- Brown sandy gravelly CLAY. Stiff brown slightly sandy slightly gravelly CLAY with	low cobble cont	tent.	-		
0.50 0.50 0.50	ES ES1	HVP=138, HVR=20		- - - - - - - - -		Sand is fine to coarse. Gravel is subrounded fine to Cobbles are of limestone.	medium of limes	stone.	0.5 — - - -		
1.00 1.00 1.00 1.20	B3 ES ES2 B4								1.0 — - - 1.5 —		
				-					-		
			28.87	- 1.80		End of trial pit at 1.80m			-		
				-					2.0		
				-					-		
				-					-		
				-					- 2.5 —		
				-							
				-					-		
				-					-		
				-					3.0		
				-					-		
				- - - - - -					- 3.5 — -		
				- - - - - -					- - 4.0		
				- - - - -					- - 4.5 —		
				- - - - -							
Wate Struck at (m)	er Strikes Remarks	Depth: 1.80 Width: 1.00 Length: 3.00	No g Shea	<b>narks:</b> groundwat ar vane co ation: Lanc	mpleted.			I			
		Stability:		nination R progress d		nine size.		ast Update 02/12/2022			

	GAUSI	EWAY EOTECH	21-2	ect No. 1619A dinates	North I Client:	t <b>Name:</b> Irish Sea Array Landfall ft Limited		Trial Pit ID TP05
<b>Method:</b> Trial Pitting			76514	80.25 E 40.50 N	<b>Client'</b> Arup	s Representative:		Sheet 1 of 1 Scale: 1:25
<b>Plant:</b> 6T Tracked Exc	cavator			<b>vation</b> 6 mOD	Date: 14/03/	2022 RS	er:	FINAL
Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	Water	
0.50 0.50 0.50	B3 ES ES1		19.44	0.30		TOPSOIL- Brown sandy gravelly CLAY. Stiff yellowish brown slightly sandy slightly gravelly CLAY with content. Sand is fine to coarse. Gravel is subangular fine to me mixed lithologies. Cobbles are of mudstone.	low cobble	0.5 —
1.00 1.00 1.00 1.20	B4 ES ES2 B5			-				1.0 — — — — — — — — — —
2.00	B6	ow seepage at 1.7	18.05	1.70		Brown very gravelly very silty fine to coarse SAND. Gravel is su fine to medium of mixed lithologies.	bangular	2.0
			17.34	2.40		End of trial pit at 2.40m		2.5
				- - - - - - - -				3.0
				-				
				- - - - - - - -				4.0
				-				4.5
Wate Struck at (m) 1.70	r Strikes Remarks Slow seepage a 1.7	Length: 3.00		i <b>arks:</b> ition: Lanc	lfall.			
		<b>Stability:</b> Unstable		nination R		hine size.	Last Updat 02/12/202	

Method: Trial Pitting Plant: 6T Tracked Excavato Depth Sam	AUSE GEC	Field Records	71949 76523 Elev	dinates 00.98 E 33.68 N mOD Depth (m) 0.25		ft Limited s Representative: Logg	9	TP07 heet 1 of 1 Scale: 1:25 FINAL
Plant: 6T Tracked Excavato Depth Sam (m) Te 0.50 B3 0.50 ES	mple /	Field Records	Elev 9.22 Level (mOD)	wation mOD Depth (m)	<b>Date:</b> 15/03/	2022 RS Description	er:	
Depth         Sam           (m)         Te           0.50         B3           0.50         ES	mple /	Field Records	Level (mOD)	Depth (m)		Description	Water	FINAL
(m) Te		Field Records	(mOD)	(m)	Legend		Water	
0.50 ES			8.97	0.25		TOPSOIL- Brown sandy gravelly CLAY.		+
				- - - - -		Stiff brownish yellow slightly sandy slightly gravelly CLAY with content. Sand is fine to coarse. Gravel is subangular fine to m mixed lithologies predominantly limestone. Cobbles are of lir	edium of	
1.00 B4 1.00 ES 1.00 ES2 1.20 B5			7.72	1.50		Stiff dark grey slightly sandy slightly gravelly CLAY. Sand is fine Gravel is subrounded fine to medium of limestone.	e to coarse.	1.0 — — — — — — — — — —
2.00 Вб	Slow	seepage at 2.00	7.22	- 2.00		End of trial pit at 2.00m	<b>T</b>	2.0
				· · · ·				2.5 —
				· · · ·				3.5
				· 				4.0
				- - - - - - -				4.5 — — — —
	Remarks v seepage at	Depth: 2.00 Width: 1.00		arks: tion: Land	lfall			
		Length: 2.50 Stability:	Torm	nination R	eason		Last Update	
		Stablinty: Stable		progress di		hine size.	02/12/2022	

	CALIC			<b>ect No.</b> 1619A	-	t <b>Name:</b> rish Sea Array Landfall	1	rial Pit ID
		EVVAT	Coor	dinates	Client:			TP08
	0.		7193	82.81 E		ft Limited		
Method: Trial Pitting				36.56 N	Arup	s Representative:		heet 1 of 1
Plant:			Elev	/ation	Date:	Logger		Scale: 1:25
6T Tracked Exc	cavator			) mOD	14/03/			FINAL
Depth (m)	Sample /	Field Records	Level (mOD)	Depth (m)	Legend	Description	Nater	
Depth (m)	ES ES1 B3 ES ES2 B4	Field Records	Level (mOD) 11.60 11.30 10.20	Depth (m)		Description TOPSOIL- Brown sandy gravelly CLAY. Firm brownish yellow slightly sandy slightly gravelly CLAY. Sand i coarse. Gravel is subangular fine to coarse of mixed lithologies. Stiff grey slightly sandy slightly gravelly SILT with low cobble cor Sand is fine to coarse. Gravel is subrounded fine to coarse of mi lithologies predominantly limestone. End of trial pit at 1.70m	itent.	
				-				4.0
				-				4.5 — — — —
				-				
Wate Struck at (m) 1.40	r Strikes Remarks Slow seepage a 1.4	Depth: 1.70 at Width: 1.00 Length: 3.00		a <b>rks:</b> ition: Land	lfall	1		1
		Stability:	Tern	nination R	eason		Last Update	ed 🔳 🔳
		Stable	Slow	progress d	ue to mac	hine size.	02/12/2022	

	CAUS	<b>EWAY</b> EOTECH	21-2	<b>ect No.</b> 1619A	North I	: <b>Name:</b> rish Sea Array Landfall		Trial Pit ID
Method:	G	EOTECH		<b>dinates</b> 37.39 E		ft Limited <b>5 Representative:</b>		TP09
Trial Pitting			7653	68.70 N	Arup	o nepresentative.		Sheet 1 of 1 Scale: 1:25
Plant:			Elevation		Date:	Logg		
6T Tracked Exc				5 mOD	15/03/	2022 RS		FINAL
Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	Water	
0.50	ES		3.75	0.30		TOPSOIL- Brown sandy gravelly CLAY. Stiff grey slightly sandy slightly gravelly CLAY. Sand is fine to c Gravel is subangular fine of mixed lithologies.	oarse.	
0.50	ES1			- - - - - -				
1.00 1.00 1.20	ES ES2 B4							
			2.15	- 1.90 		End of trial pit at 1.90m		
				-				2.5 —
				- - - - - - -				3.0
				-				- - 3.5 —
				- - - - - -				4.0
				- - - - -				- - 4.5 —
				- - - - - -				
Wate Struck at (m)	r Strikes Remarks	Depth:         1.90           Width:         1.00           Length:         2.50	Nog	a <b>rks:</b> groundwat ation: Land		ntered .		
		<b>Stability:</b> Stable		nination R		nine size.	Last Updat 02/12/202	

	CALIC			ect No. 1619A		: <b>Name:</b> rish Sea Array Landfall		T	rial Pit ID
	G	EVVAI	Coord	dinates	Client:		1	TP11	
Method:			71924	45.88 E		ft Limited s Representative:		c	neet 1 of 1
Trial Pitting				96.74 N	Arup				icale: 1:25
<b>Plant:</b> 6T Tracked Ex	ovator			mOD	Date: 14/03/	FINAL			
Depth	Sample /	Field Records	Level	Depth	Legend	Description	S	Water	
<b>(m)</b> 0.50	ES		(mOD) 22.86	(m) 0.30		TOPSOIL- Brown sandy gravelly CLAY. Stiff brown slightly sandy gravelly CLAY with high cobble fine to coarse. Gravel is subrounded to subangular fine t mixed lithologies. Cobbles are of mixed lithologies.	content. Sand is o coarse of		
1.00	ES1 B3							T	
1.00 1.00 1.20	ES ES2 B4 SI	low seepage at 1.0		· · · ·					
2.00	85		21.16	- 2.00		End of trial pit at 2.00m			
				· · · · ·					- - 2.5
				· · · · ·					3.0
				· · · ·					4.0
				· - - - - - -					4.5 — - -
Wate Struck at (m) 1.00	er Strikes Remarks Slow seepage a 1.0	Depth:         2.00           width:         1.00           Length:         3.00           Stability:	Loca	arks: tion: Land			Last U	pdate	
		Unstable		progress di		hine size.		2/2022	

	CALIC			<b>ect No.</b> 1619A		: <b>Name:</b> rish Sea Array Landfall		Trial Pit ID
	CAUS	EWAY EOTECH		dinates	Client:			TP12
		JEOTECH	7196	39.96 E		ft Limited		
Method:				70.89 N		s Representative:		Sheet 1 of 1
Trial Pitting <b>Plant:</b>				vation	Arup Date:	Logger:		Scale: 1:25
6T Tracked Ex	cavator			mOD	14/03/			FINAL
Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description		Water
0.50 0.50 1.00 1.00 1.00 1.20	ES ES1 B3 ES ES2	Seepage at 1.	5.89	0.30		TOPSOIL- Brown sandy gravelly CLAY. Firm yellowish brown slightly sandy slightly gravelly CLAY. Sand i coarse. Gravel is subangular fine to medium of mixed lithologies Stiff grey slightly sandy slightly gravelly CLAY. Sand is fine to coar Gravel is subangular fine of mixed lithologies.	is fine to 5.	- - - - - - - - - - - - - - - - - - -
			210					
			3.19	- 3.00	<u></u>	End of trial pit at 3.00m		
Wate Struck at (m)	er Strikes Remarks	— Depth: 3.00		narks:	lfall			
1.00	Seepage at	Width:         1.00           Length:         3.00						
		Stability:	Tern	nination F	Reason		Last Upda	ated
		Stable		inated at s		lepth	02/12/20	



#### APPENDIX E TRIAL PIT PHOTOGRAPHS





#### Report No.: 21-1619







#### Report No.: 21-1619







#### Report No.: 21-1619



TP01



May 2022

#### Report No.: 21-1619







#### Report No.: 21-1619







#### Report No.: 21-1619





#### Report No.: 21-1619



TP02





#### Report No.: 21-1619













#### Report No.: 21-1619







#### Report No.: 21-1619





#### Report No.: 21-1619





## Report No.: 21-1619





## Report No.: 21-1619



TP04





## Report No.: 21-1619







## Report No.: 21-1619





## Report No.: 21-1619





## Report No.: 21-1619





## Report No.: 21-1619





## Report No.: 21-1619



**TP05** 





## Report No.: 21-1619







## Report No.: 21-1619





## Report No.: 21-1619



**TP05** 



May 2022

## Report No.: 21-1619



**TP05** 



May 2022

## Report No.: 21-1619













## Report No.: 21-1619







## Report No.: 21-1619





## Report No.: 21-1619





## Report No.: 21-1619



**TP08** 





#### Report No.: 21-1619







## Report No.: 21-1619





## Report No.: 21-1619







## Report No.: 21-1619







## Report No.: 21-1619







## Report No.: 21-1619







## Report No.: 21-1619



TP09



May 2022

## Report No.: 21-1619



TP09



May 2022

## Report No.: 21-1619













## Report No.: 21-1619



TP11





May 2022

## Report No.: 21-1619





## Report No.: 21-1619





## Report No.: 21-1619







## Report No.: 21-1619







## Report No.: 21-1619







## Report No.: 21-1619



TP12



May 2022



# APPENDIX F GEOTECHNICAL LABORATORY TEST RESULTS





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#### REGIONAL OFFICE Causeway Geotech (IRL) Ltd Unit 1 Fingal House Stephenstown Industrial Estate Balbriggan, Co Dublin, Ireland, K32 VR66 ROI: +353 (0)1 526 7465 ROI: +3533 (0)1 526 7465 Company Number 633786

www.causewaygeotech.com

### 27 April 2022

# SOIL AND ROCK SAMPLE ANALYSIS LABORATORY TEST REPORT

Project Name:	North Irish Sea Array
Project No.:	21-1619
Client:	Statkraft
Engineer:	ARUP

We are pleased to attach the results of laboratory testing carried out for the above project. This memo and its attachments constitute a report of the results of tests as detailed in the Contents page(s). This testing was performed between 18/03/2022 and 11/04/2022.

The attached results complete the testing requested and we would therefore wish to confirm that samples will be retained without charge for a period of 28 days from the above date after which they will be appropriately disposed of unless we receive written instructions to the contrary prior to that date.

We trust our report meets with your approval but if you have any queries or require additional information, please do not hesitate to contact the undersigned.

Han Notin

Stephen Watson Laboratory Manager Signed for and on behalf of Causeway Geotech Ltd



Project Name: No	orth Irish Sea Array
------------------	----------------------

**Report Reference:** Schedule 4 - FINAL

The table below details the tests carried out, the specifications used, and the number of tests included in this report. The results contained in this report relate to the sample(s) as received

Tests marked with\* in this report are not United Kingdom Accreditation Service (UKAS) accredited and are not included in Causeway Geotech Limited's scope of UKAS Accreditation Schedule of Tests. Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Material tested	Type of test/Properties measured/Range of measurement	Standard specifications	No. of results included in the report
SOIL	Moisture Content of Soil	BS 1377-2: 1990: Cl 3.2	13
SOIL	Liquid and Plastic Limits of soil-4 point cone penetrometer method	BS 1377-2: 1990: Cl 4.4, 5.3 & 5.4	9
SOIL	Particle size distribution - wet sieving	BS 1377-2: 1990: Cl 9.2	7
SOIL	Particle size distribution - sedimentation hydrometer method	BS 1377-2: 1990: Cl 9.5	7
SOIL	Moisture Condition Value at natural moisture content	BS 1377-4: 1990: Cl 5.4	5

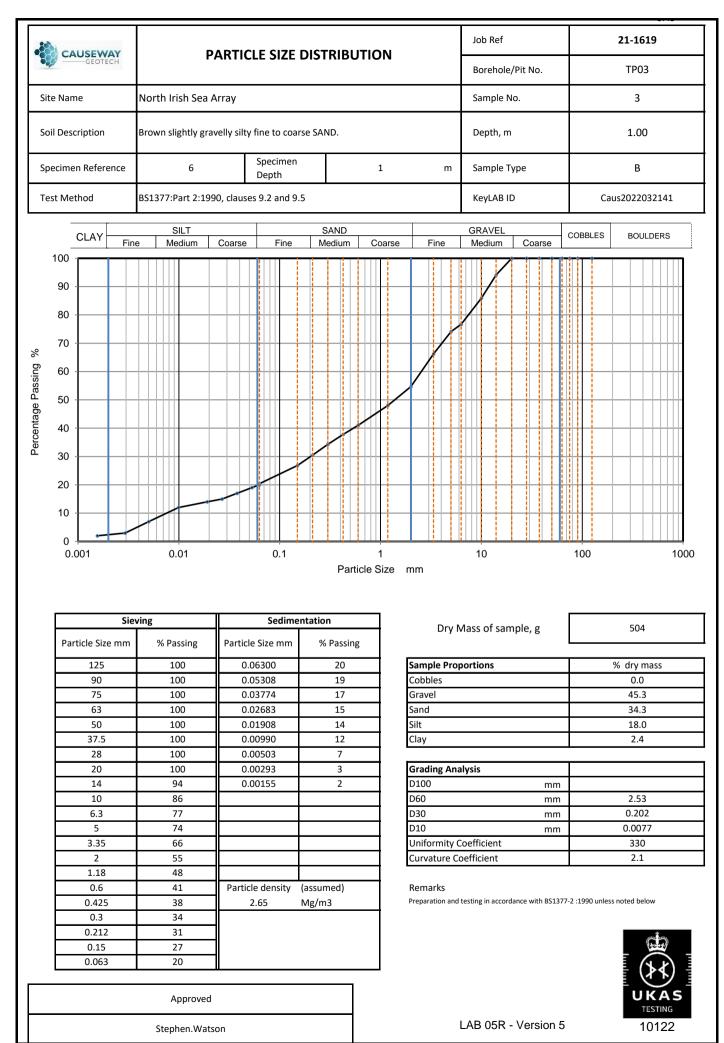
### SUB-CONTRACTED TESTS

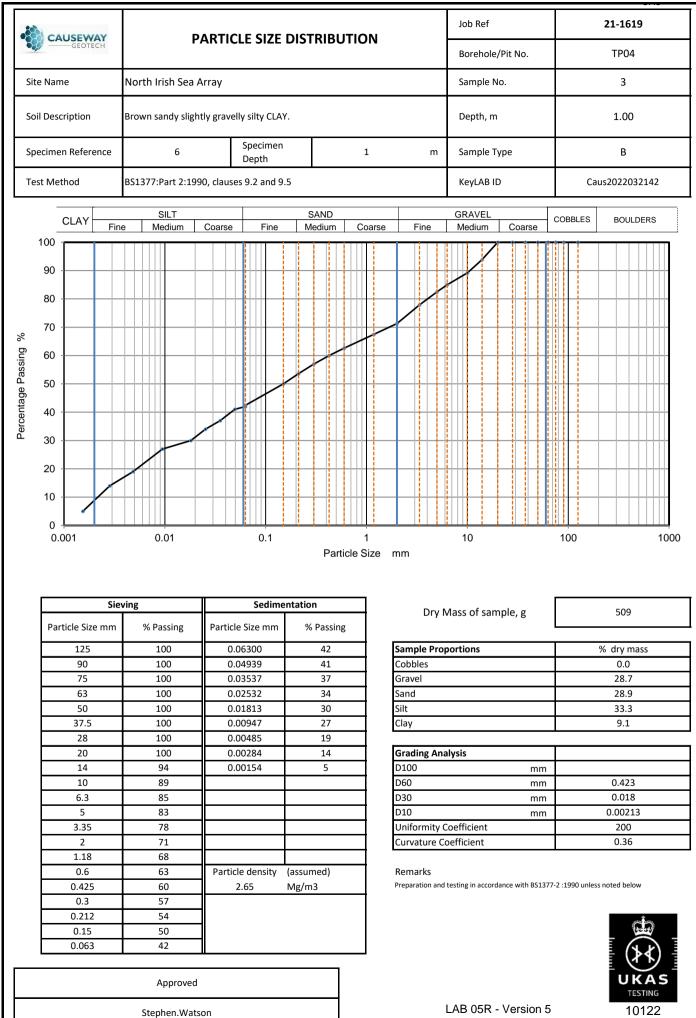
In agreement with Client, the following tests were conducted by an approved sub-contractor. All subcontracting laboratories used are UKAS accredited.

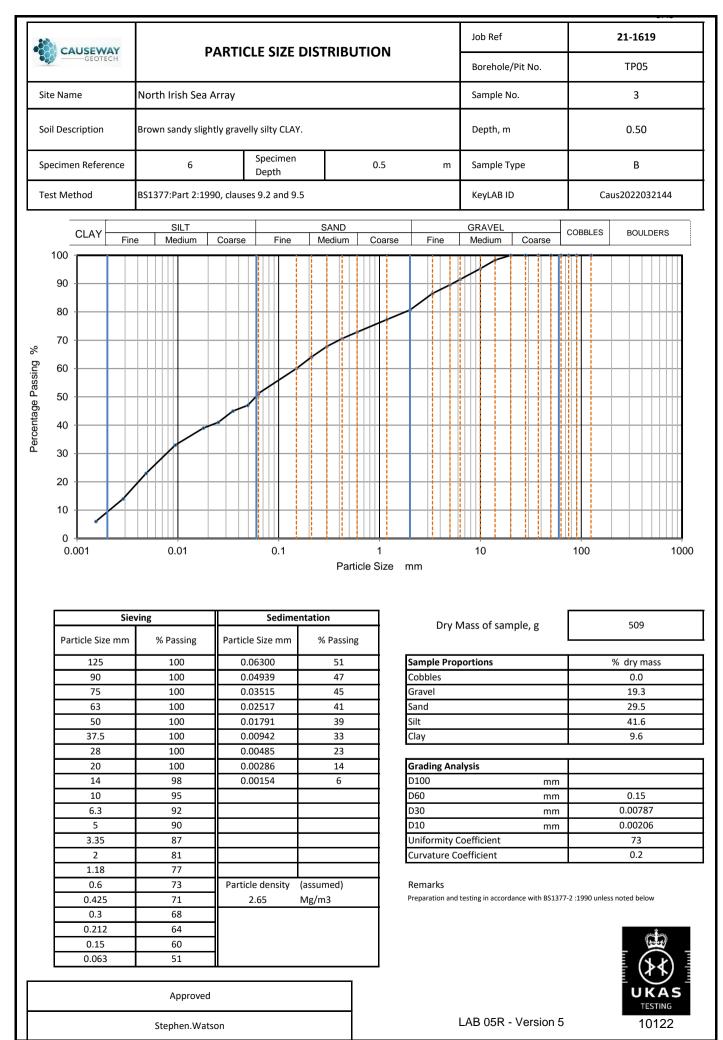
Material tested	Type of test/Properties measured/Range of measurement	Standard specifications	No. of results included in the report
SOIL – subcontracted to Pro Soils Limited (UKAS 4043)	Thermal Resistivity		6
SOIL – Subcontracted to Eurofins Chemtest Ltd (UKAS 2183)	BRE Test - Suite B		3

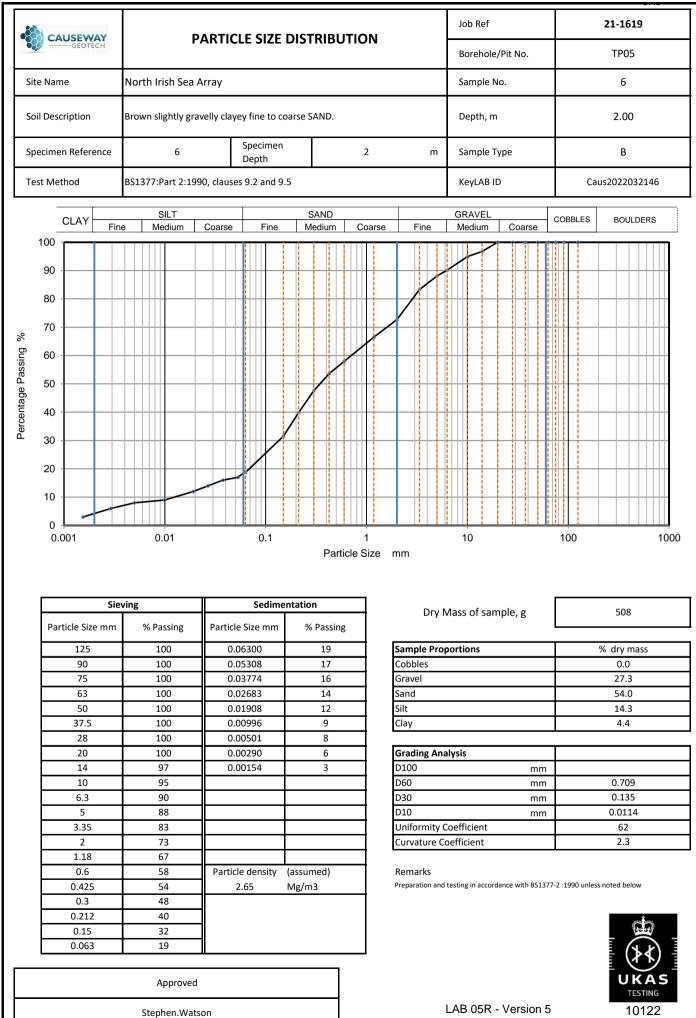
Summary of Class						sific	ation	Test	Res	sult	S			
Project No. Project Name														
21-1	619					Ν	lorth I	rish Se	ea Array		r —	1		
Hole No.	Ref	Sar Top	mple Base	Туре	Soil Description	Dens bulk Mg/m	dry	W %	Passing 425µm %	LL %	PL %	PI %	Particle density Mg/m3	Casagrande Classification
TP03	3	1.00		в	Brown slightly gravelly silty fine to coarse SAND.			14.0	51	23	17	6		ML/CL
TP04	3	1.00		В	Brown sandy slightly gravelly silty CLAY.			14.0	65	34	19	15		CL
TP04	4	1.20		в	Brown sandy slightly gravelly silty CLAY.			13.0						
TP05	3	0.50		В	Brown sandy slightly gravelly silty CLAY.			21.0	72	37	18	19		CI
TP05	4	1.00		В	Brown sandy slightly gravelly silty CLAY.			23.0	74	34	17	17		CL
TP05	6	2.00		В	Brown slightly gravelly clayey fine to coarse SAND.			18.0	62	35	20	15		CL/CI
TP08	3	1.00		В	Greyish brown sandy slightly gravelly silty CLAY.			14.0	62	41	20	21		CI
TP08	4	1.20		В	Greyish brown sandy slightly gravelly silty CLAY.			15.0						
TP11	3	1.00		В	Greyish brown sandy slightly gravelly silty CLAY.			20.0	74	36	18	18		CI
TP11	4	1.20		В	Greyish brown sandy slightly gravelly silty CLAY.			21.0						
TP11	5	2.00		В	Greyish brown sandy slightly gravelly silty CLAY.			14.0	60	28	15	13		CL
TP12	3	1.00		В	Greyish brown silty CLAY.			25.0	96	31	11	20		CL
All tests perfor	med i	n accord	lance wit	h BS1	377:1990 unless specified	otherwis	e						LAB	01R Version 5
	neasure ter displ	ment unles acement in water		cas - C		e density nall pyknom s jar 4	leter	Date F 04/1	Printed	00:00		oved	By Watson	UKAS TESTING 10122

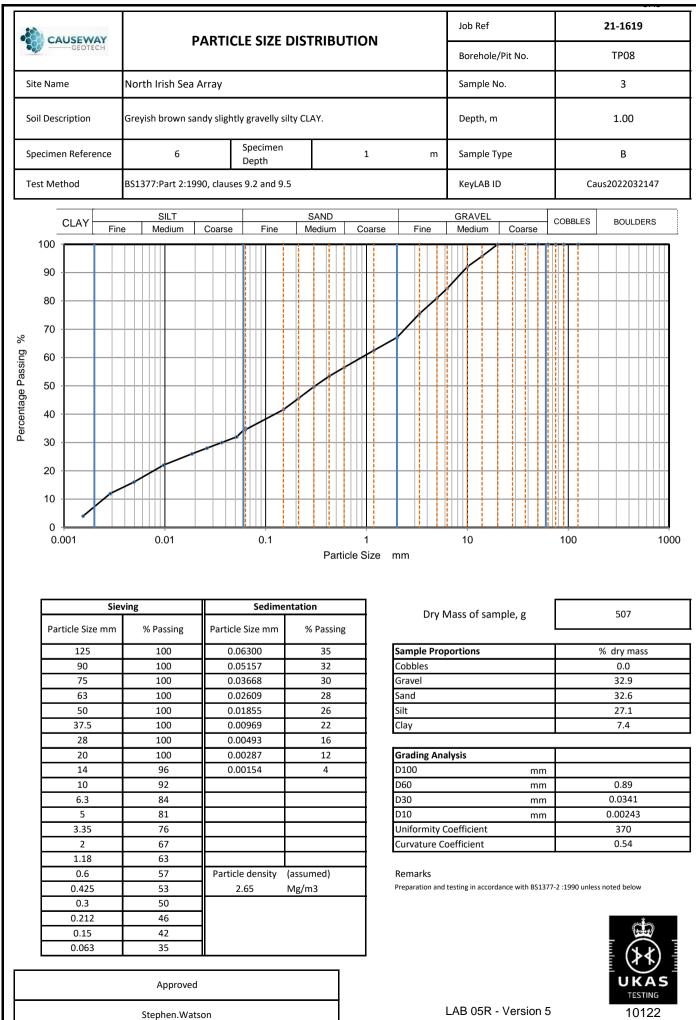
CAUSEWAY GEOTECH		Summary of Classification Test Results								Re	sult	S			
Project No. I 21-1619			Project Name North Irish Sea Array												
			Sar	nple			Dens		r	Passing	LL	PL	PI	Particle	
Hole I	No.	Ref	Тор	Base	Туре	Soil Description	bulk Mg/n	dry	W %	425µm	%	۲L %	РI %	density Mg/m3	Casagrande Classification
TP1	2	4	1.20		в	Greyish brown sandy slightly gravelly silty CLAY.			22.0						
All tests	perforr	ned ii	n accord	lance wit	th BS1	377:1990 unless specified	d otherwis	e						LAE	3 01R Version 5
		easure	ment unles acement			ie unless : sp - :	cle density small pyknom as iar	neter	Date F 04/ <sup>,</sup>	Printed	00:00	Appr	roved	Ву	
wd - water displacement     cas - Casagrande method     gj - gas jar       wi - immersion in water     1pt - single point test						Step	ohen.	Watson	10122						

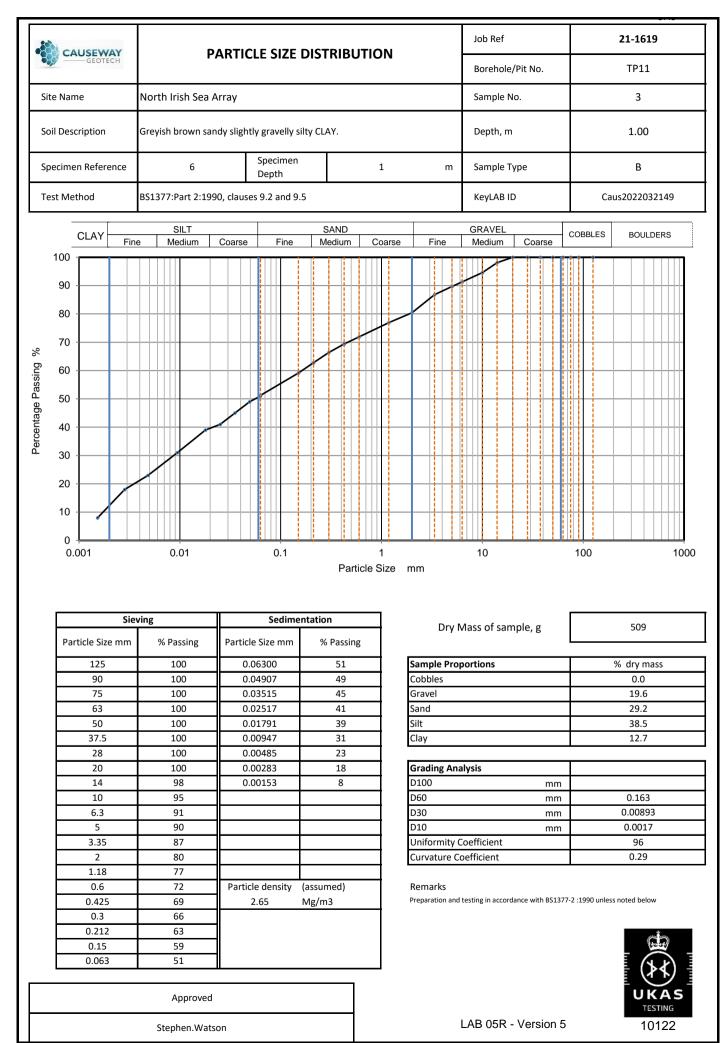


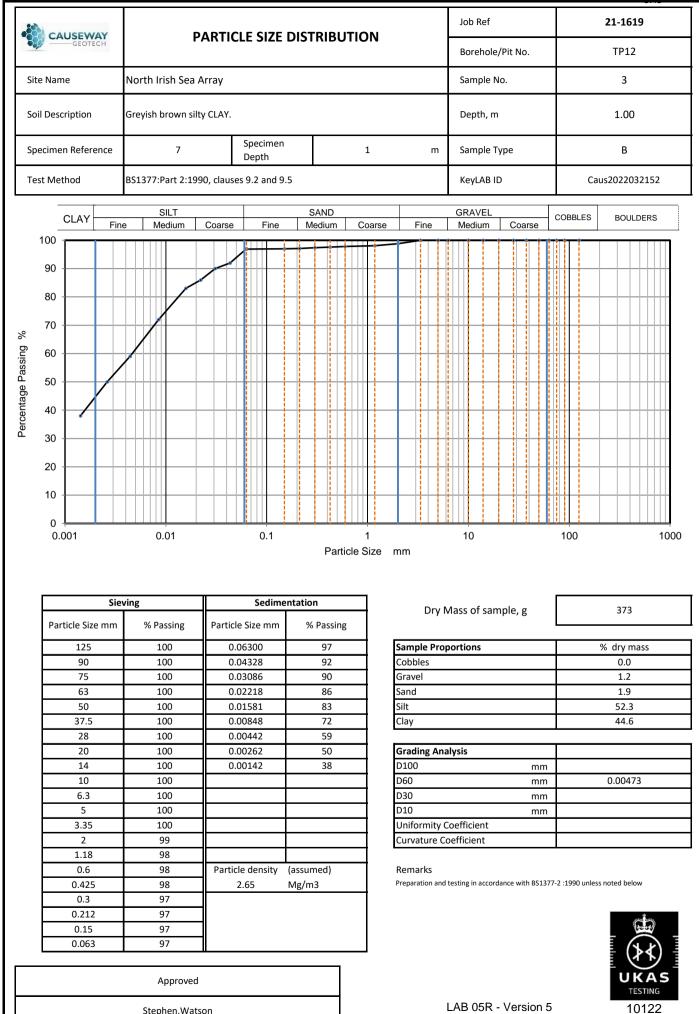












Stephen.Watson

	JSEN GEOT	AY ECH	Moisture Condition Value at Natural Moisture Content Summary of Results									
Project No.			Project Name									
21-1619				lanto		North I	rish Sea Arra	у				
Hole No.	Ref	Sar Top			nple		Soil Description	Retained on 20mm sieve	Moisture Content <20mm	Moisture Condition Value	Method of Interpretation	Remarks
	Rei	тор	Base	Туре		%	%					
TP04	4	1.20		в	Brown sandy slightly gravelly silty CLAY.	4	14	10.4	Best fit line			
TP05	4	1.00		В	Brown sandy slightly gravelly silty CLAY.	10	22	6.5	Best fit line			
TP08	4	1.20		В	Greyish brown sandy slightly gravelly silty CLAY.	15	13	8.2	Best fit line			
TP11	4	1.20		В	Greyish brown sandy slightly gravelly silty CLAY.	18	22	6.7	Best fit line			
TP12	3	1.00		В	Greyish brown silty CLAY.	0	23	13.1	Best fit line			
									LA	B 10R - Version 6		
Key Test performed in accordance with BS1377:Part4:1990, clause 5.4 unless annotated otherwise				Date Printed 04/12/20	22 00:00	Approved By Stephe	n.Watson					

## 🔅 eurofins

### Chemtest

Eurofins Chemtest Ltd Depot Road Newmarket CB8 0AL Tel: 01638 606070 Email: info@chemtest.com

Report No.:	22-11176-1		
Initial Date of Issue:	30-Mar-2022		
Client	Causeway Geotech Ltd		
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL		
Contact(s):	Carin Cornwall Colm Hurley Darren O'Mahony Gabriella Horan Joe Gervin John Cameron Lucy Newland Martin Gardiner Matthew Gilbert Neil Haggan Paul Dunlop Sean Ross Stephen Franey Stephen Watson Stuart Abraham Thomas McAllister		
Project	21-1619 North Irish Sea Array		
Quotation No.:		Date Received:	24-Mar-2022
Order No.:		Date Instructed:	24-Mar-2022
No. of Samples:	3		
Turnaround (Wkdays):	7	Results Due:	01-Apr-2022
Date Approved:	30-Mar-2022		
Approved By:			
Sont	-		

**Details:** 

Stuart Henderson, Technical Manager



# 🔅 eurofins

### Chemtest

Eurofins Chemtest Ltd Depot Road Newmarket CB8 0AL Tel: 01638 606070 Email: info@chemtest.com

## <u> Results - Soil</u>

#### Project: 21-1619 North Irish Sea Array

Client: Causeway Geotech Ltd		Cher	ntest J	ob No.:	22-11176	22-11176	22-11176
Quotation No.:	(	Chemte	st Sam	ple ID.:	1398031	1398032	1398033
Order No.:		Clier	nt Samp	le Ref.:	4	3	4
		Sa	ample Lo	ocation:	TP04	TP08	TP12
			Sampl	e Type:	SOIL	SOIL	SOIL
			Top De	oth (m):	1.2	1.0	1.2
			Date Sa	ampled:	23-Mar-2022	23-Mar-2022	23-Mar-2022
Determinand	Accred.	SOP	Units	LOD			
Moisture	N	2030	%	0.020	14	15	21
рН	U	2010		4.0	8.5	8.5	8.5
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.048	0.046	0.059
Sulphate (Total)	U 2430 % 0.010			0.011	0.010	0.014	
Sulphate (Acid Soluble)	U	2430	%	0.010	0.021	< 0.010	0.019

## Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	рН	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.

### **Report Information**

Key	
U	UKAS accredited
М	MCERTS and UKAS accredited
Ν	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
Т	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection
	Comments or interpretations are beyond the scope of LIKAS appreditation

Comments or interpretations are beyond the scope of UKAS accreditation The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request None of the results in this report have been recovery corrected All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis All Asbestos testing is performed at the indicated laboratory Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

#### **Sample Deviation Codes**

- A Date of sampling not supplied
- B Sample age exceeds stability time (sampling to extraction)
- C Sample not received in appropriate containers
- D Broken Container
- E Insufficient Sample (Applies to LOI in Trommel Fines Only)

#### Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt All water samples will be retained for 14 days from the date of receipt Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to: <u>customerservices@chemtest.com</u>



## LABORATORY REPORT



4043

### **Contract Number: PSL22/2277**

Report Date: 27 April 2022

Client's Reference: 21-1619

Client Name: Causeway Geotech 8 Drumahiskey Road Ballymoney Co.Antrim BT53 7QL

#### For the attention of: Stephen Watson

Contract Title:	North Irish Sea Array
Date Received:	28/3/2022
Date Commenced:	28/3/2022
Date Completed:	27/4/2022

### Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

A Watkins (Director) R Berriman (Quality Manager) S Royle (Laboratory Manager)

£##

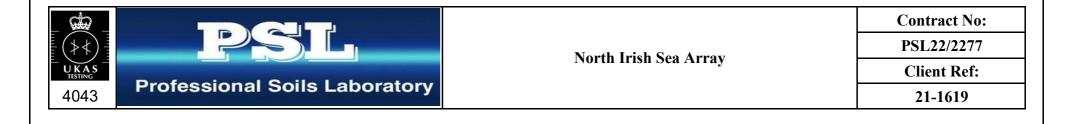
L Knight (Assistant Laboratory Manager) S Eyre (Senior Technician) T Watkins (Senior Technician)

Page 1 of

5 – 7 Hexthorpe Road, Hexthorpe, Doncaster DN4 0AR tel: +44 (0)844 815 6641 fax: +44 (0)844 815 6642 e-mail: rgunson@prosoils.co.uk awatkins@prosoils.co.uk

## SUMMARY OF LABORATORY SOIL DESCRIPTIONS

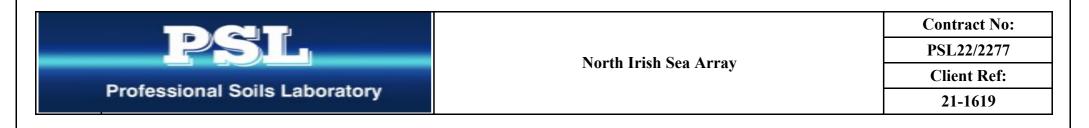
Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
TP03	3	В	1.00		Brown very gravelly very sandy CLAY.
<b>TP04</b>	3	В	1.00		Brown gravelly sandy CLAY.
<b>TP05</b>	6	В	2.00		Brown slightly gravelly sandy CLAY.
<b>TP08</b>	4	В	1.20		Brown gravelly sandy CLAY.
<b>TP11</b>	3	В	1.00		Brown gravelly sandy CLAY.
<b>TP12</b>	3	В	1.00		Brown slightly gravelly CLAY.



## SUMMARY OF THERMAL PROPERTY TESTS

#### In accordance with ASTM-D5334

					Moisture	Bulk	Dry	Thermal	Thermal	
Hole	Sample	Sample	Тор	Base	Content	Density	Density	Conductivity	Resistivity	Remarks
Number	Number	Туре	Depth	Depth	%	Mg/m <sup>3</sup>	Mg/m <sup>3</sup>			Kemai Ks
			m	m				W/m K	C.cm/W	
<b>TP03</b>	3	В	1.00		13			2.177	45.9	
<b>TP04</b>	3	В	1.00		13			1.957	51.1	
<b>TP05</b>	6	В	2.00		17			2.169	46.1	
<b>TP08</b>	4	В	1.20		15			2.231	44.8	
<b>TP11</b>	3	В	1.00		21			1.894	52.8	
<b>TP12</b>	3	В	1.00		24			1.507	66.3	





HEAD OFFICE Causeway Geotech Ltd NI: +44 (0)28 276 66640 Registered in Northern Ireland. Company Number: NI610766

#### **REGIONAL OFFICE** Causeway Geotech (IRL) Ltd Unit 1 Fingal House Stephenstown Industrial Estate Balbriggan, Co Dublin, Ireland, K32 VR66 ROI: +353 (0)1 526 7465 Registered in Ireland. Company Number: 633786

www.causewaygeotech.com

#### 28 April 2022

#### SOIL AND ROCK SAMPLE ANALYSIS LABORATORY TEST REPORT

Project Name:	North Irish Sea Array
Project No.:	21-1619
Client:	Statkraft
Engineer:	ARUP

We are pleased to attach the results of laboratory testing carried out for the above project. This memo and its attachments constitute a report of the results of tests as detailed in the Contents page(s). This testing was performed between 18/03/2022 and 28/04/2022.

The attached results complete the testing requested and we would therefore wish to confirm that samples will be retained without charge for a period of 28 days from the above date after which they will be appropriately disposed of unless we receive written instructions to the contrary prior to that date.

We trust our report meets with your approval but if you have any queries or require additional information, please do not hesitate to contact the undersigned.

Han Notin

Stephen Watson Laboratory Manager Signed for and on behalf of Causeway Geotech Ltd



Project Name:	North Irish Sea Array
---------------	-----------------------

**Report Reference:** Schedule 4 - FINAL

The table below details the tests carried out, the specifications used, and the number of tests included in this report. The results contained in this report relate to the sample(s) as received

Tests marked with\* in this report are not United Kingdom Accreditation Service (UKAS) accredited and are not included in Causeway Geotech Limited's scope of UKAS Accreditation Schedule of Tests. Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Material tested	Type of test/Properties measured/Range of measurement	Standard specifications	No. of results included in the report		
SOIL	Moisture Content of Soil	BS 1377-2: 1990: Cl 3.2	15		
SOIL	Liquid and Plastic Limits of soil-4 point cone penetrometer method	BS 1377-2: 1990: Cl 4.4, 5.3 & 5.4	11		
SOIL	Particle size distribution - wet sieving	BS 1377-2: 1990: Cl 9.2	11		
SOIL	Particle size distribution - sedimentation hydrometer method	BS 1377-2: 1990: Cl 9.5	11		
SOIL	Dry density/moisture content relationship (2.5 kg rammer)	BS 1377-4: 1990: Cl 3.3 & 3.4	1		
SOIL	Moisture Condition Value at natural moisture content	BS 1377-4: 1990: Cl 5.4	5		
SOIL	Undrained shear strength – triaxial compression without measurement of pore pressure (loads from 0.12 to 24 kN)	BS 1377-7: 1990: Cl 8	2		

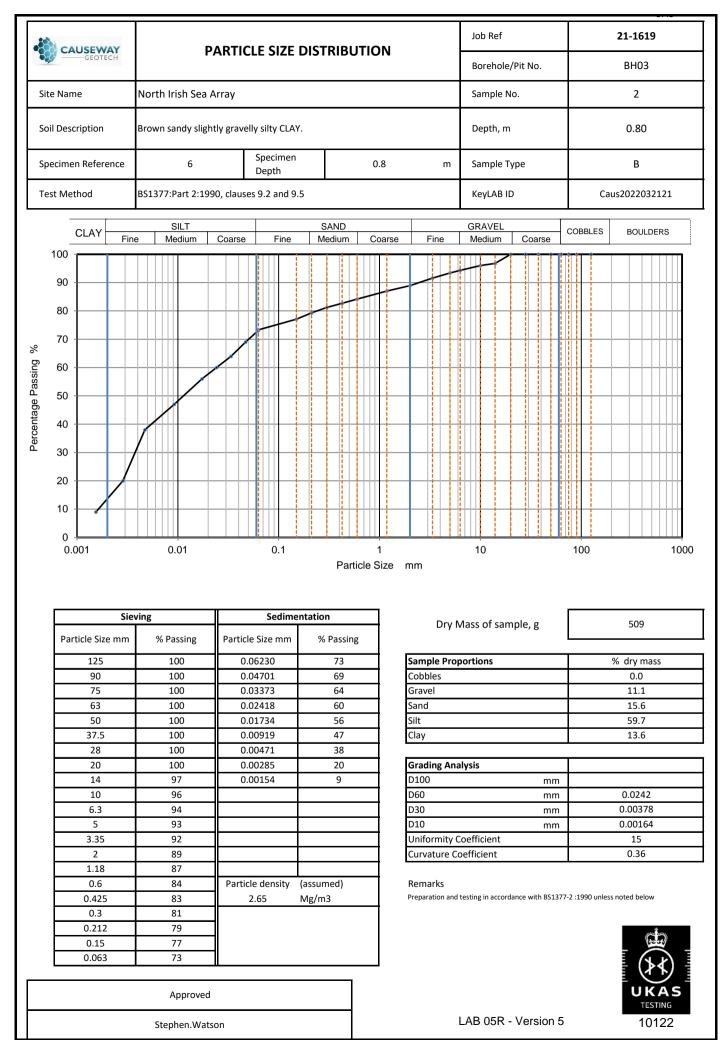
### SUB-CONTRACTED TESTS

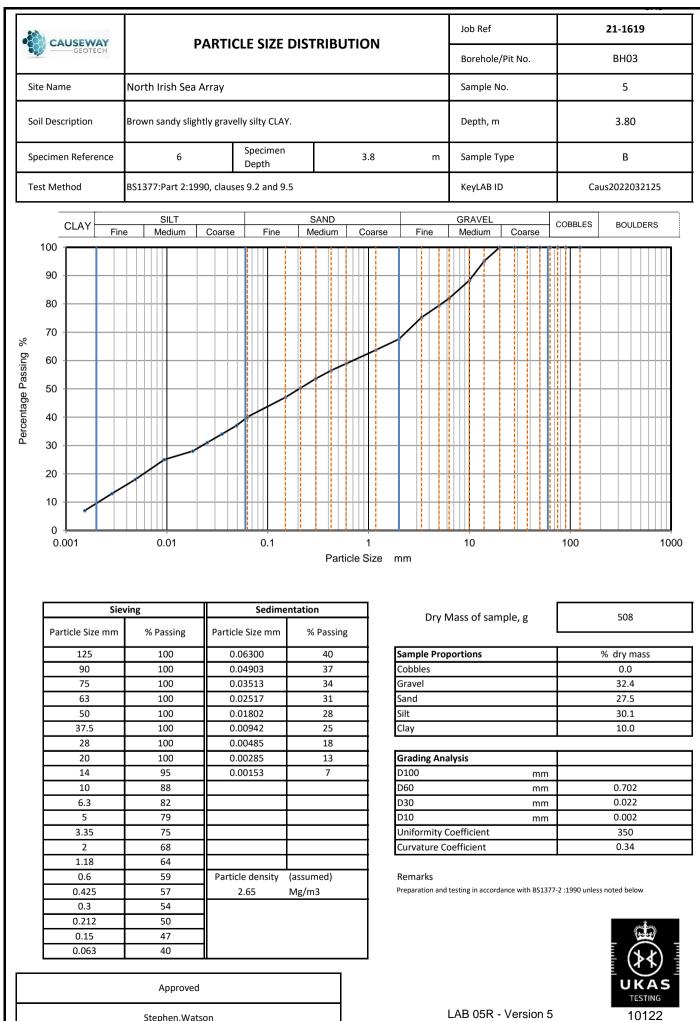
In agreement with Client, the following tests were conducted by an approved sub-contractor. All subcontracting laboratories used are UKAS accredited.

Material tested	Type of test/Properties measured/Range of measurement	Standard specifications	No. of results included in the report
SOIL – subcontracted to Pro Soils Limited (UKAS 4043)	Thermal Resistivity		6

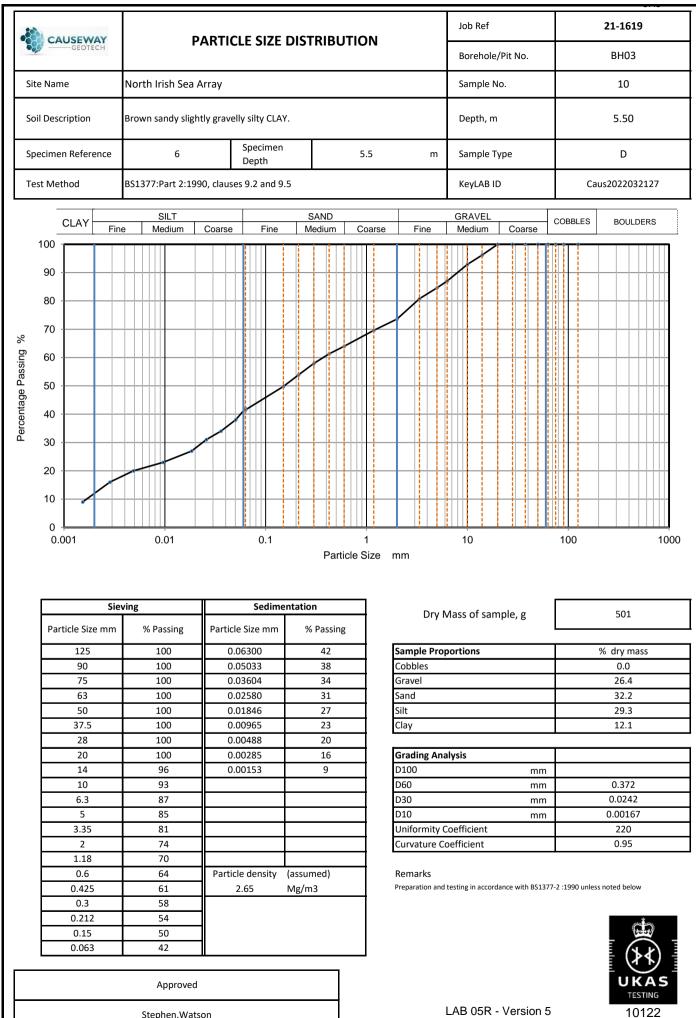
	<b>VAY</b> TECH	Summary of Classification Test Results													
Project No.			Project	Project Name North Irish Sea Array											
21-1	619	0							· ·		1				
Hole No.	Ref	Top	nple Base	Туре	Soil Description	Dens bulk Mg/m	dry	W %	Passing 425µm %	LL %	PL %	PI %	Particle density Mg/m3	Casagrande Classification	
BH03	2	0.80	1.00	В	Brown sandy slightly gravelly silty CLAY.			23.0	83	42	21	21		CI	
BH03	3	1.80	2.00	в	Brown sandy slightly gravelly silty CLAY.			14.0							
BH03	4	2.80	3.00	в	Brown sandy slightly gravelly silty CLAY.			13.0							
BH03	5	3.80	4.00	В	Brown sandy slightly gravelly silty CLAY.			13.0	65	30	16	14		CL	
BH03	14	5.00	5.45	U	Brown sandy slightly gravelly silty CLAY.			13.0							
BH03	10	5.50		D	Brown sandy slightly gravelly silty CLAY.			11.0	60	25	14	11		CL	
BH03	12	7.50		D	Brown sandy slightly gravelly silty CLAY.			22.0							
TP01	3	1.00		В	Greyish brown sandy slightly gravelly silty CLAY.			17.0	92	45	22	23		CI	
TP02	3	1.00		В	Greyish brown sandy slightly gravelly silty CLAY.			14.0	67	30	19	11		CL	
TP07	4	1.00		в	Greyish brown sandy slightly gravelly silty CLAY.			16.0	65	30	19	11		CL	
TP07	6	2.00		в	Greyish brown sandy slightly gravelly silty CLAY.			14.0	67	40	16	24		CI	
TP09	4	1.20		В	Greyish brown silty CLAY.			23.0	98	41	22	19		CI	
All tests perfor	med i	n accord	lance wit	h BS1	377:1990 unless specified	otherwis	e	-					LAE	01R Version 5	
Linear measurement unless : 4p wd - water displacement ca						e density nall pyknom s jar	sity / <sup>knometer</sup> 04/11/2022 00:00			Appr		UKAS TESTING 10122			

•	CAL	JSE GEO	<b>VAY</b> TECH	Summary of Classification Test Results												
Project				Project Name												
	21-1	619					-	North Irish Sea Array								
	No		Sai	mple	r –	Coll Departmention	Den: bulk	sity dry	w	Passing 425µm	LL	PL	ΡI	Particle density	Casagrande	
Hole	INO.	Ref	Тор	Base	Туре	Soil Description	Mg/r		%	%	%	%	%	Mg/m3	Classification	
TP	20	3	1.00		в	Greyish brown sandy slightly gravelly silty CLAY.		-	32.0	89	53	26	27		СН	
TP	20	4	1.20		в	Greyish brown clayey fine to coarse SAND.			37.0	93	40	22	18		CI	
TP	21	3	1.00		в	Greyish brown sandy slightly gravelly clayey SILT with occasional shell fragments.			58.0	96	53	35	18		МН	
All tests	perfor	med i	n accord	lance wi	th BS1	377:1990 unless specified	lotherwis	se						LAE	3 01R Version 5	
Key					Liquid 4pt cor cas - C	Limit Partic le unless : sp - s	sle density Small pyknor as jar		Date Printed 04/11/2022 00:00			Approved By Stephen.Watson			UKAS TESTING 10122	



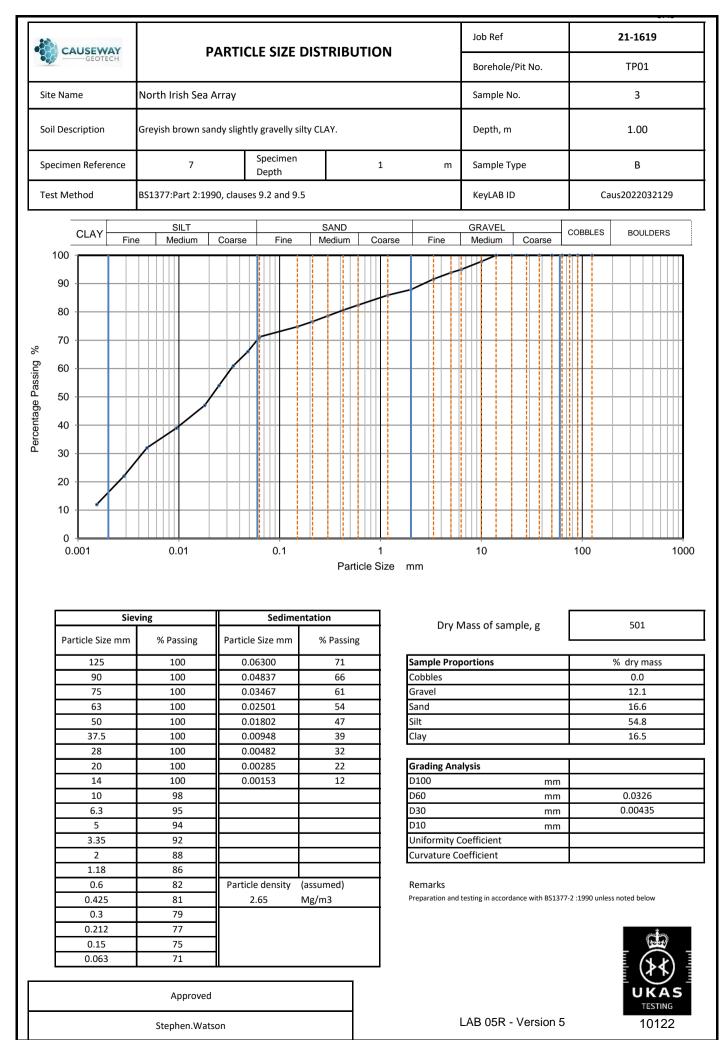


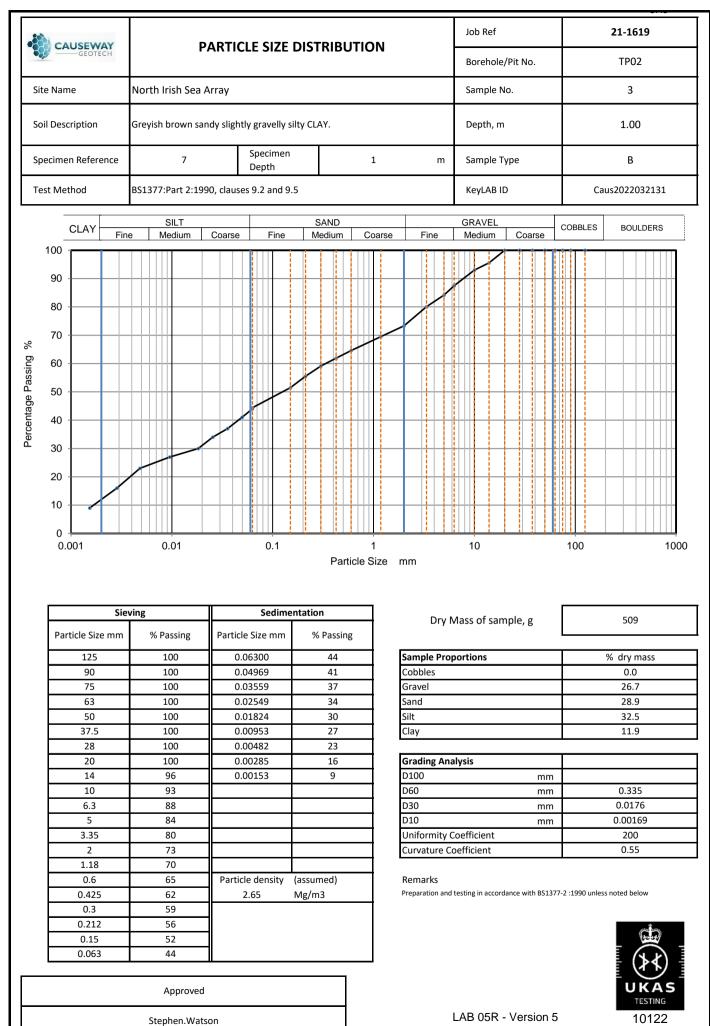
Stephen.Watson

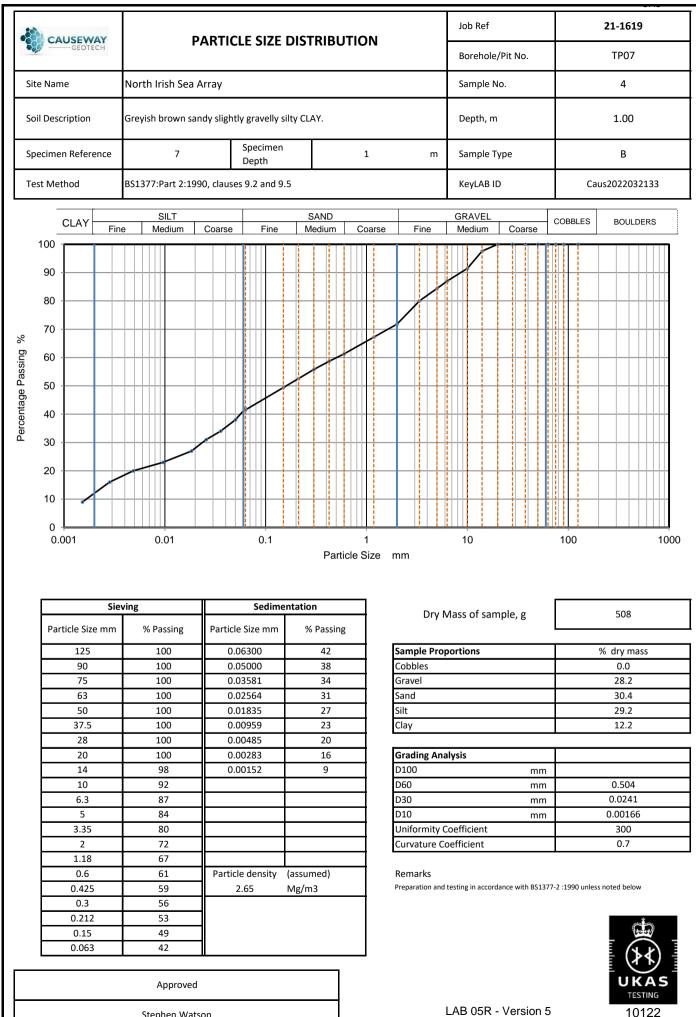


LAB 05R - Version 5

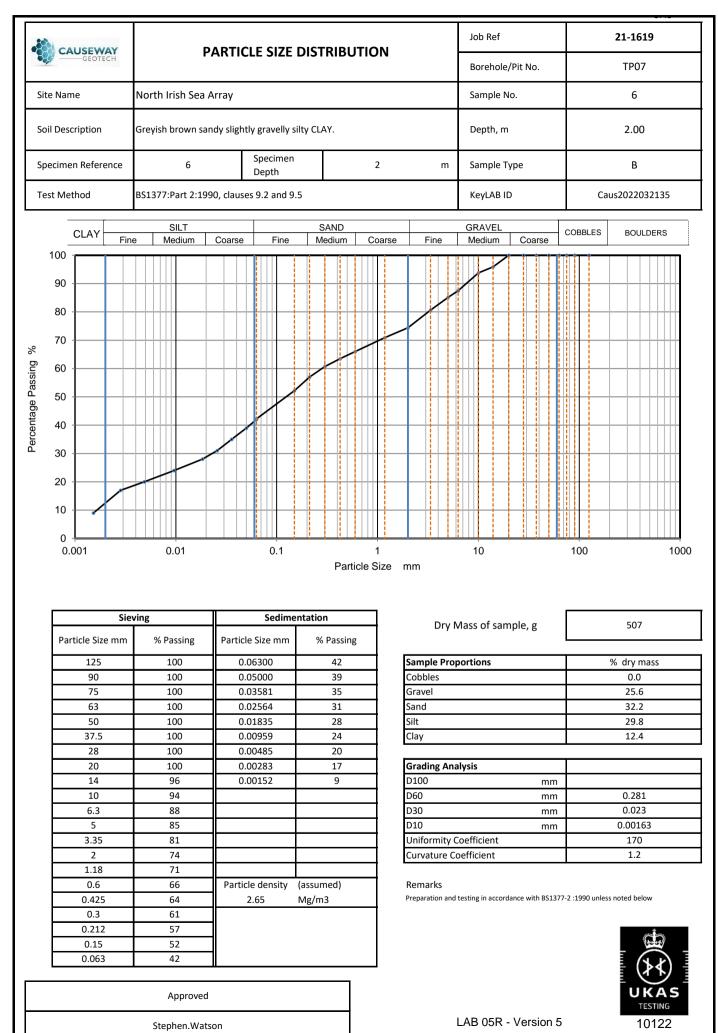
Stephen.Watson

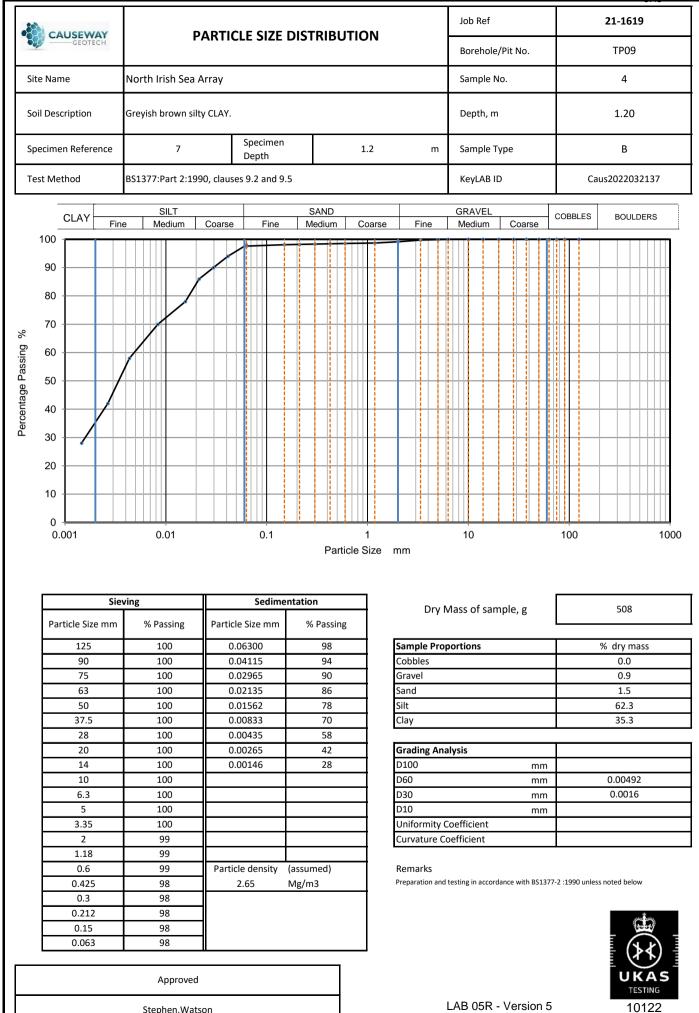




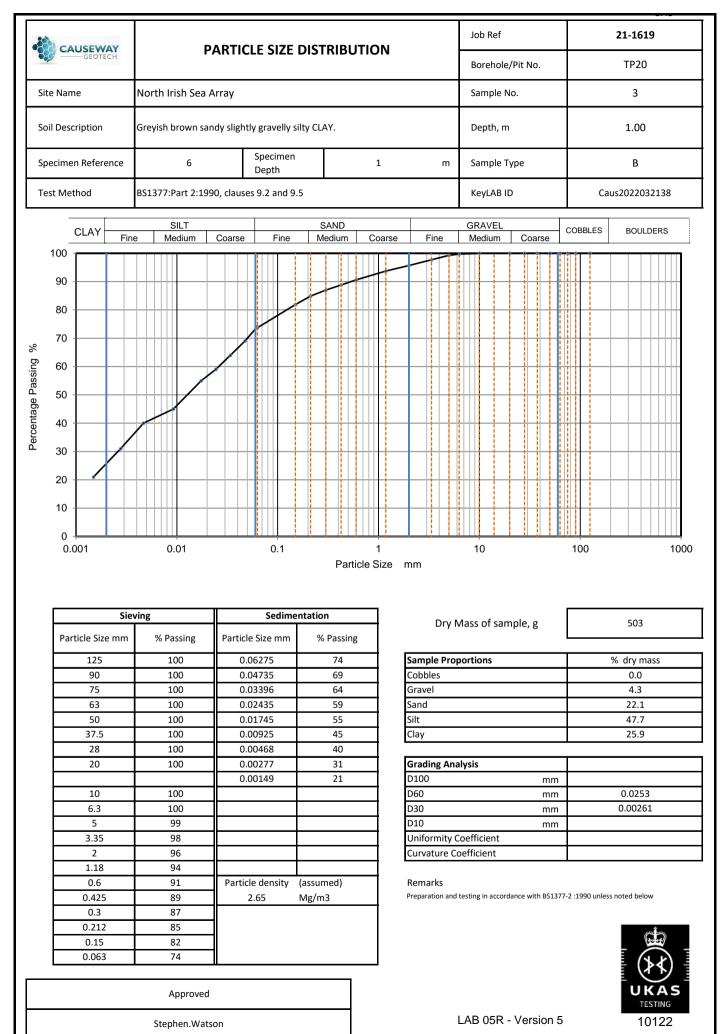


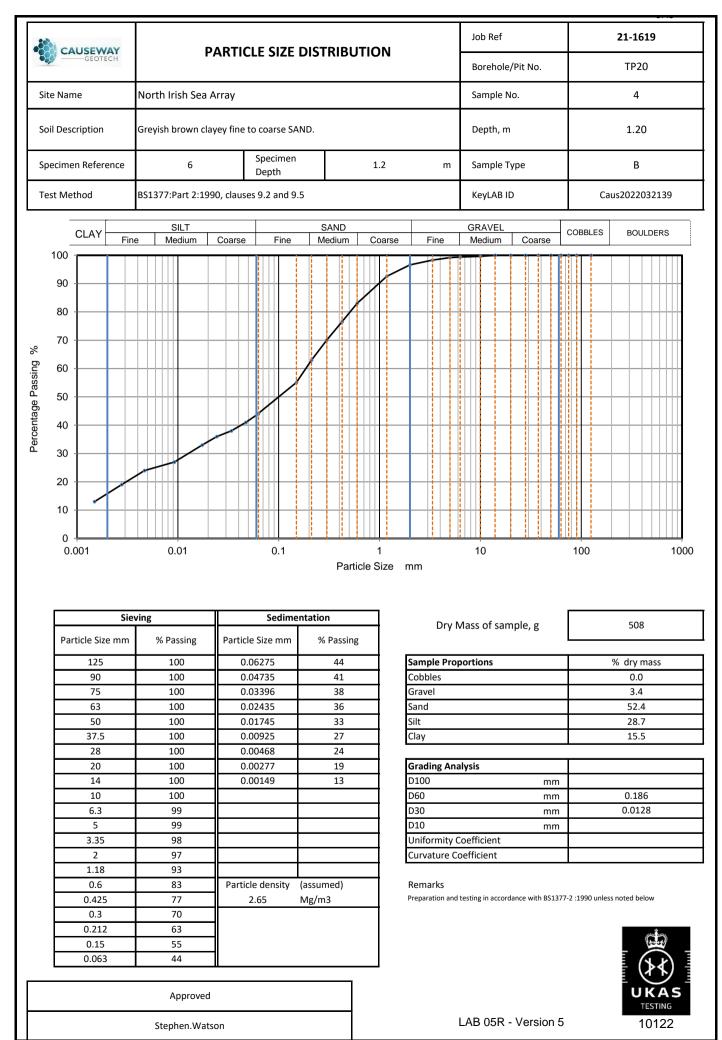
Stephen.Watson

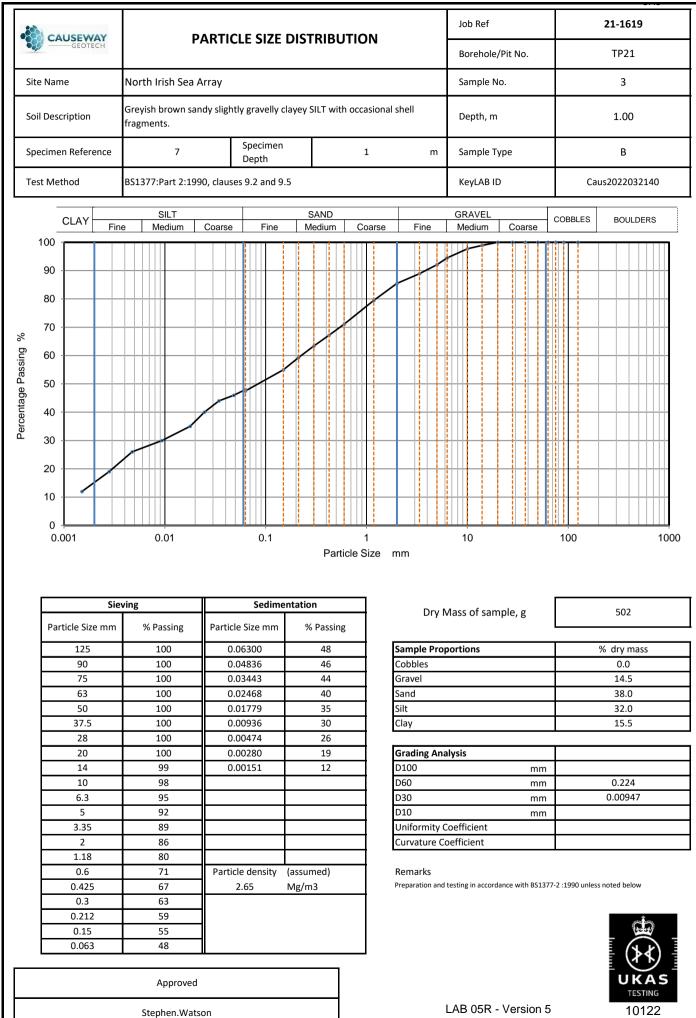




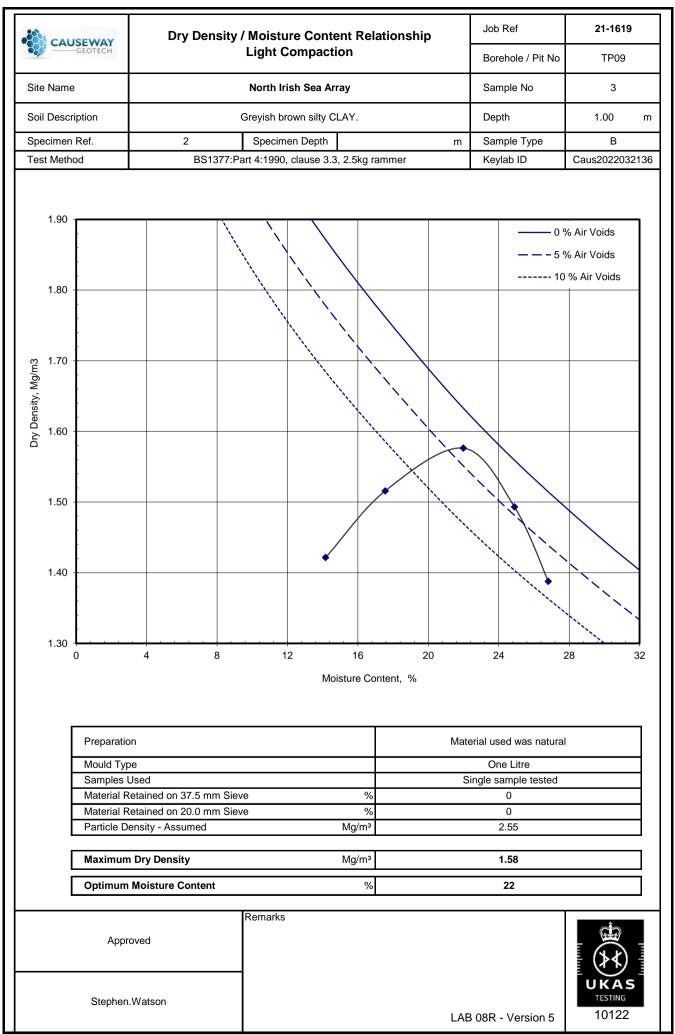
Stephen.Watson

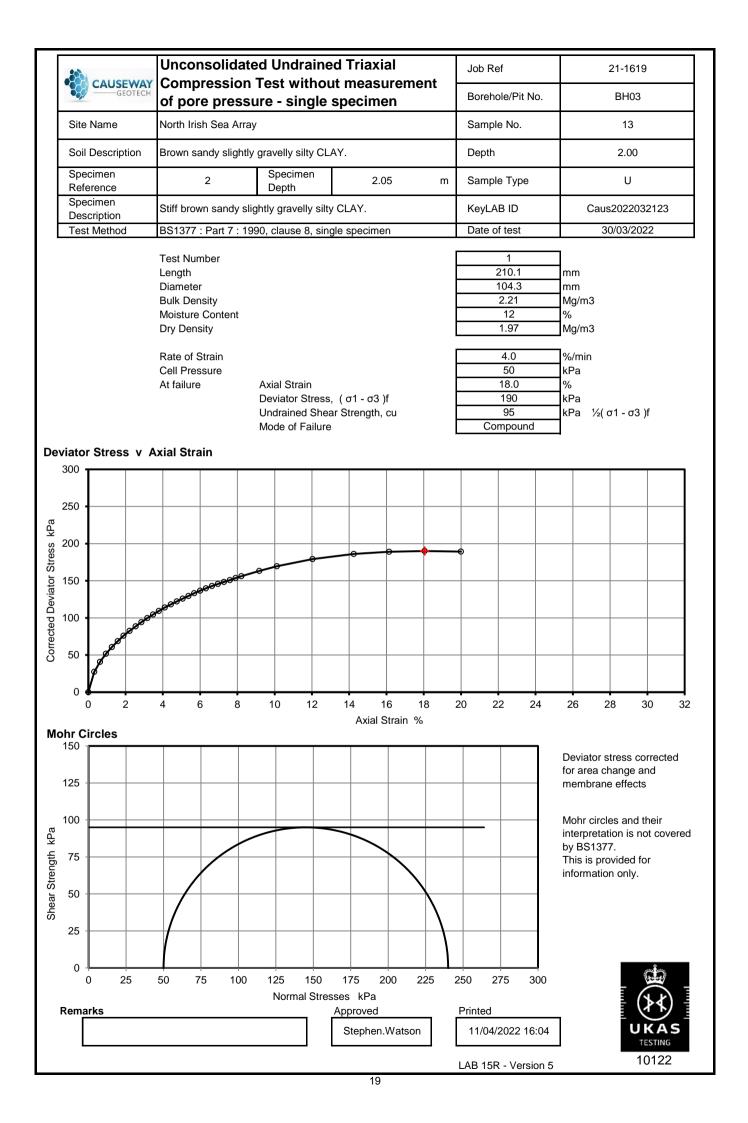


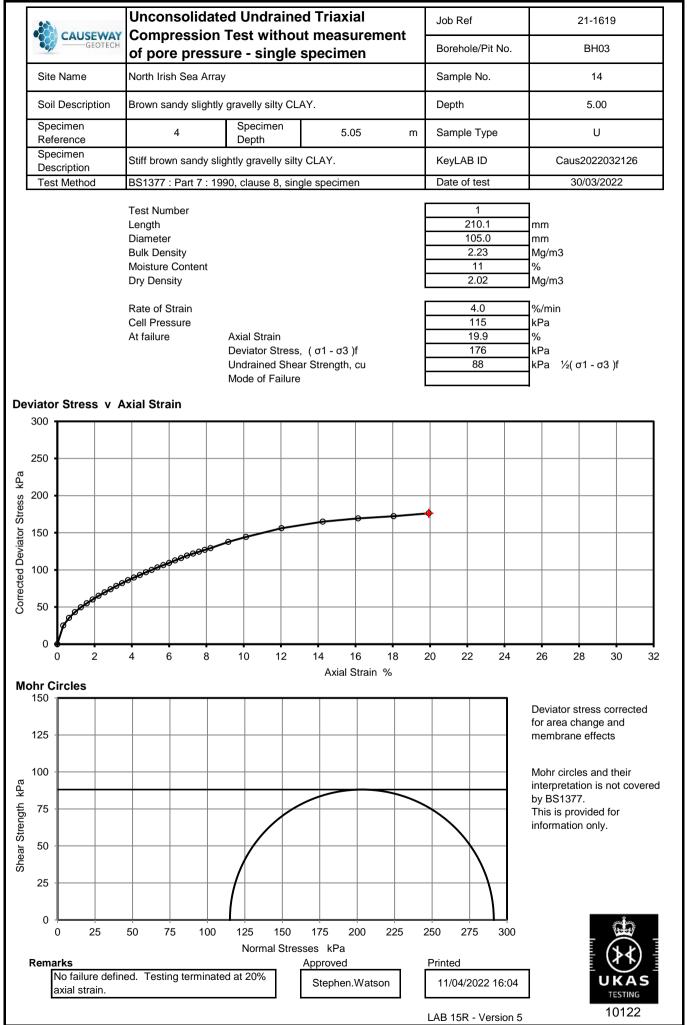




CAL	ISEW			Moisture Condition Value at Natural Moisture Content										
CAC	-GEOT	ECH		Summary of Results										
Project No.			Project I	Name										
21-	1619			North Irish Sea Array										
Hole No.	Def		nple	T	Soil Description	Retained on 20mm sieve	Moisture Content <20mm	Moisture Condition Value	Method of Interpretation	Remarks				
	Ref	Тор	Base	Туре		%	%							
TP01	3	1.00		в	Greyish brown sandy slightly gravelly silty CLAY.	0	20	13.0	Best fit line					
TP02	3	1.00		в	Greyish brown sandy slightly gravelly silty CLAY.	12	96	8.8	Best fit line					
TP07	4	1.00		В	Greyish brown sandy slightly gravelly sitty CLAY.	14	16	8.7	Best fit line					
TP09	4	1.20		в	Greyish brown sandy slightly gravelly silty CLAY.	0	23	13.9	Best fit line					
TP21	3	1.00		в	Greyish brown slightly sandy silty CLAY with occasional shell fragments.	4	69	7.8	Best fit line					
	LAB 10R - Version 6													
Key Test performed in accordance with BS1377:Part4:1990, clause 5.4 unless annotated otherwise				Date Printed 04/11/20	22 00:00	Approved By Stepher	n.Watson							









## LABORATORY REPORT



4043

### Contract Number: PSL22/2280

Report Date: 27 April 2022

Client's Reference: 21-1619

Client Name: Causeway Geotech 8 Drumahiskey Road Ballymoney Co.Antrim BT53 7QL

### For the attention of: Stephen Watson

Contract Title: North Irish Sea Array

Date Received:	28/3/2022
Date Commenced:	28/3/2022
Date Completed:	27/4/2022

### Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

A Watkins (Director) R Berriman (Quality Manager)

Ste

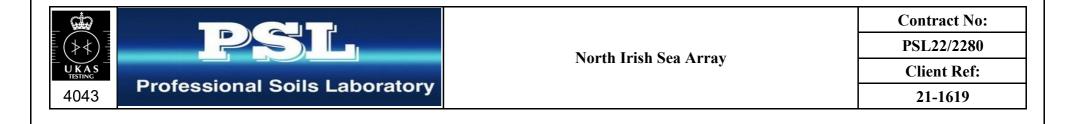
S Royle (Laboratory Manager)

L Knight (Assistant Laboratory Manager) S Eyre (Senior Technician) T Watkins (Senior Technician)

5 – 7 Hexthorpe Road, Hexthorpe, Doncaster DN4 0AR tel: +44 (0)844 815 6641 fax: +44 (0)844 815 6642 e-mail: rberriman@prosoils.co.uk awatkins@prosoils.co.uk Page 1 of

## SUMMARY OF LABORATORY SOIL DESCRIPTIONS

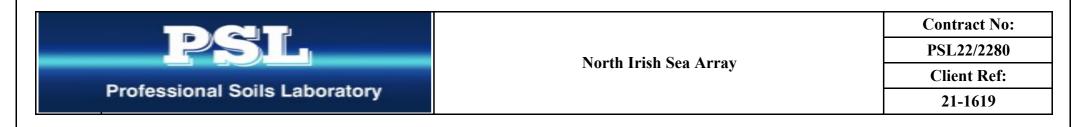
Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
<b>TP01</b>	4	В	1.20		Dark brown slightly gravelly sandy CLAY.
<b>TP02</b>	4	В	1.20		Brown gravelly sandy CLAY.
<b>TP07</b>	5	В	1.20		Brown gravelly sandy CLAY.
<b>TP09</b>	4	В	1.20		Dark brown slightly sandy CLAY.
TP20	3	В	1.00		Brown slightly gravelly slightly sandy CLAY.
<b>TP21</b>	3	В	1.00		Dark brown sandy CLAY with some organic material.



# SUMMARY OF THERMAL PROPERTY TESTS

### In accordance with ASTM-D5334

Hole	Sample	Sample	Тор	Base	Moisture Content	Bulk Density	Dry Density	Thermal Conductivity	Thermal Resistivity	Remarks
Number	Number	Туре	Depth	Depth	%	Mg/m <sup>3</sup>	Mg/m <sup>3</sup>			Kemai Ks
			m	m				W/m K	C.cm/W	
<b>TP01</b>	4	В	1.20		19	2.01	1.68	1.893	52.8	
<b>TP02</b>	4	В	1.20		14	2.18	1.91	2.171	46.1	
<b>TP07</b>	5	В	1.20		16	2.14	1.84	2.095	47.7	
<b>TP09</b>	4	В	1.20		21	1.99	1.65	1.662	60.2	
<b>TP20</b>	3	В	1.00		31	1.86	1.42	1.657	60.4	
<b>TP21</b>	3	В	1.00		55	1.60	1.03	1.153	86.8	





HEAD OFFICE Causeway Geotech Ltd 8 Drumahiskey Road Ballymoney Co. Antrim, N. Ireland, BT53 7QL NI: +44 (0)28 276 66640 Registered in Northern Ireland. Company Number: NI610766

#### REGIONAL OFFICE Causeway Geotech (IRL) Ltd Unit 1 Fingal House Stephenstown Industrial Estate Balbriggan, Co Dublin, Ireland, K32 VR66 ROI: +353 (0)1 526 7465 ROI: +3533 (0)1 526 7465 Company Number 633786

www.causewaygeotech.com

### SOIL AND ROCK SAMPLE ANALYSIS LABORATORY TEST REPORT

15 April 2022

Project Name:	North Irish Sea Array
Project No.:	21-1619
Client:	Statkraft
Engineer:	ARUP

We are pleased to attach the results of laboratory testing carried out for the above project. This memo and its attachments constitute a report of the results of tests as detailed in the Contents page(s). This testing was performed between 24/03/2022 and 15/04/2022.

The attached results complete the testing requested and we would therefore wish to confirm that samples will be retained without charge for a period of 28 days from the above date after which they will be appropriately disposed of unless we receive written instructions to the contrary prior to that date.

We trust our report meets with your approval but if you have any queries or require additional information, please do not hesitate to contact the undersigned.

Han Notin

Stephen Watson Laboratory Manager Signed for and on behalf of Causeway Geotech Ltd



### Project Name: North Irish Sea Array

### **Report Reference:** Schedule 6

The table below details the tests carried out, the specifications used, and the number of tests included in this report. The results contained in this report relate to the sample(s) as received

Tests marked with\* in this report are not United Kingdom Accreditation Service (UKAS) accredited and are not included in Causeway Geotech Limited's scope of UKAS Accreditation Schedule of Tests. Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Material tested	Type of test/Properties measured/Range of measurement	Standard specifications	No. of results included in the report
SOIL	Moisture Content of Soil	BS 1377-2: 1990: Cl 3.2	13
SOIL	Liquid and Plastic Limits of soil-4 point cone penetrometer method	BS 1377-2: 1990: Cl 4.4, 5.3 & 5.4	6
SOIL	Particle size distribution - wet sieving	BS 1377-2: 1990: Cl 9.2	6
SOIL	Particle size distribution - sedimentation hydrometer method	BS 1377-2: 1990: Cl 9.5	6

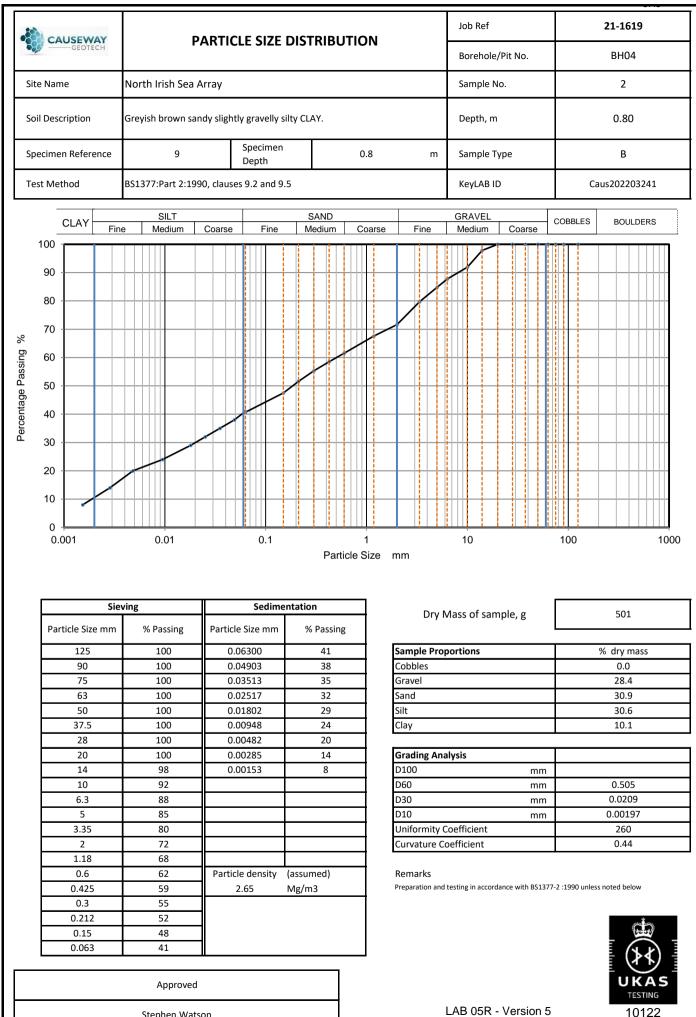
### SUB-CONTRACTED TESTS

In agreement with Client, the following tests were conducted by an approved sub-contractor. All subcontracting laboratories used are UKAS accredited.

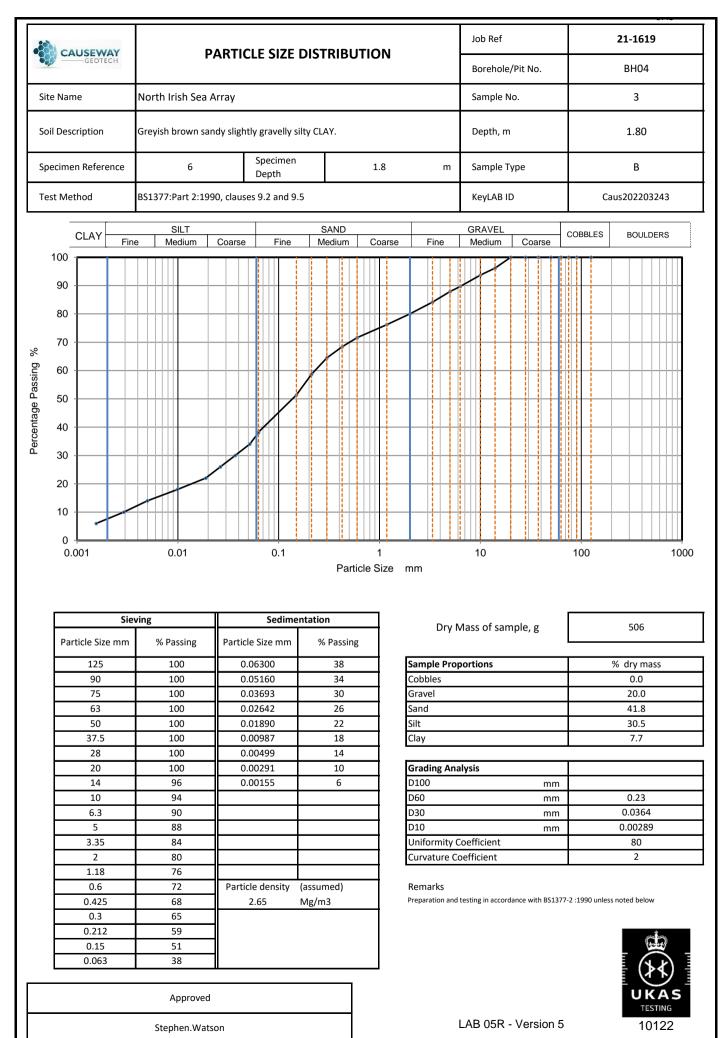
Material tested	Type of test/Properties measured/Range of measurement	Standard specifications	No. of results included in the report
SOIL – Subcontracted to Eurofins Chemtest Ltd (UKAS 2183)	BRE Test - Suite B		3

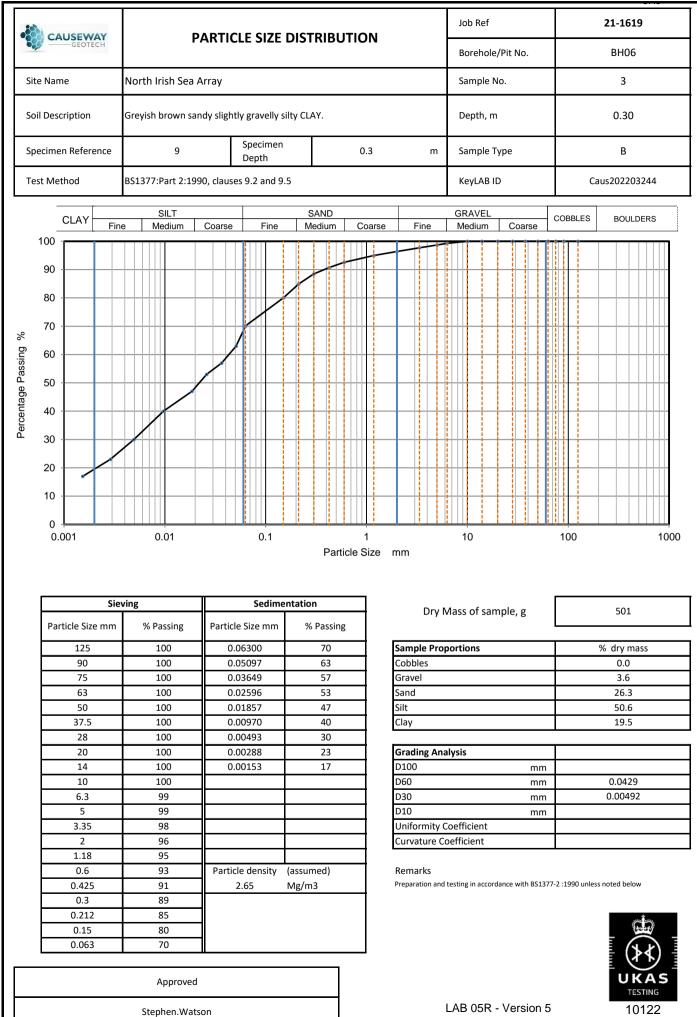
	JSE GEO	<b>VAY</b> TECH			Summar	las	ssification Test Results							
Project No.			Project	Name										
21-1	619				North Irish Sea Array									
Hole No.	Ref	Тор	mple Base	Туре	Soil Description	Dens bulk Mg/m	dry	W %	Passing 425µm %	LL %	PL %	PI %	Particle density Mg/m3	Casagrande Classification
BH04	1	0.30	0.50	В	Greyish brown sandy slightly gravelly silty CLAY.			23.0						
BH04	2	0.80	1.00	в	Greyish brown sandy slightly gravelly silty CLAY.			15.0	69	32	17	15		CL
BH04	4	1.20		D	Greyish brown sandy slightly gravelly silty CLAY.			25.0						
BH04	3	1.80	2.00	в	Greyish brown very sandy slightly gravelly silty CLAY.			19.0						
BH06	3	0.30	0.50	В	Greyish brown sandy slightly gravelly silty CLAY.			44.0	90	54	28	26		СН
BH06	8	1.20		D	Greyish brown sandy slightly gravelly silty CLAY.			14.0	70	30	16	14		CL
BH06	6	2.80	3.00	в	Greyish brown sandy slightly gravelly silty CLAY.			14.0	64	26	15	11		CL
BH06	7	3.80	4.00	в	Greyish brown sandy slightly gravelly silty CLAY.			14.0						
BH07	3	0.30	0.50	в	Greyish brown sandy slightly gravelly silty CLAY.			31.0						
BH07	11	1.20	1.65	U	Greyish brown sandy slightly gravelly silty CLAY.			40.0						
BH07	5	1.80	2.00	в	Greyish brown sandy slightly gravelly silty CLAY.			17.0	75	34	18	16		CL
BH07	8	2.00		D	Greyish brown sandy slightly gravelly silty CLAY.			19.0						
All tests perfor	med i	n accord	lance wit	h BS1	377:1990 unless specified	otherwise	e		·		<u> </u>		LAE	3 01R Version 5
Key       Density test       Liquid Limit       Particle density         Linear measurement unless :       4pt cone unless :       sp - small pyknometer         wd - water displacement       cas - Casagrande method       gj - gas jar         wi - immersion in water       1pt - single point test			15/04/2022			Appr		By Watson	UKAS TESTING 10122					

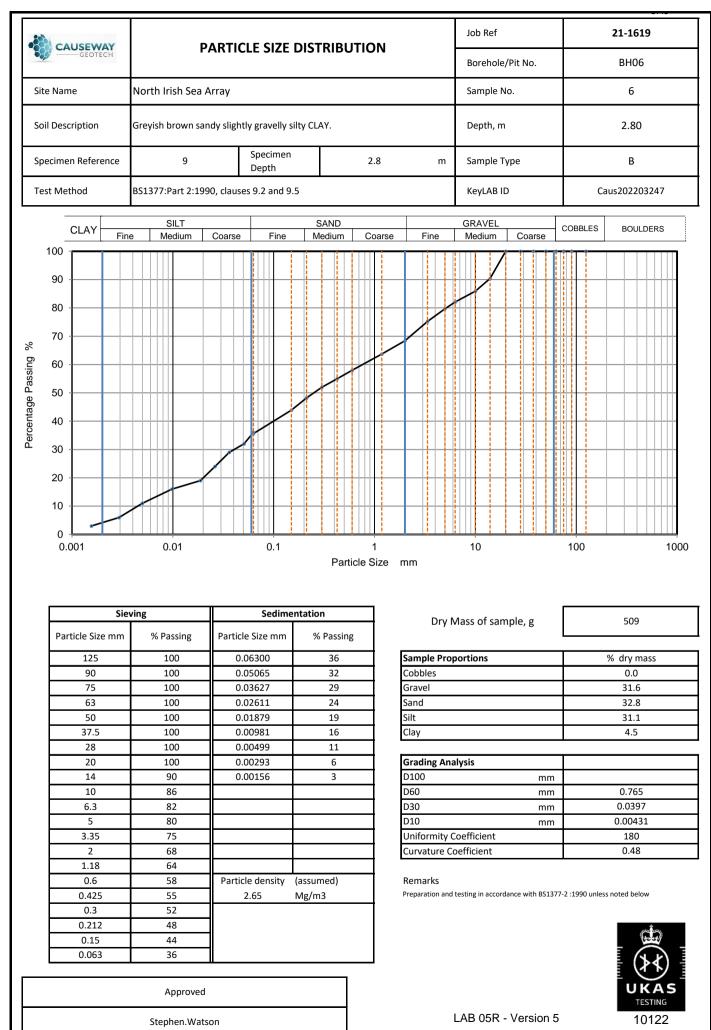
CAUSEWAY GEOTECH					Summary of Classification Test Results										
Project	No.			Project	roject Name										
	21-1	619				North Irish Sea Array									
Hole	e No.	Ref	Saı Top	mple Base	Туре	Soil Description	Dens bulk Mg/n	dry	w %	Passing 425µm %	LL %	PL %	PI %	Particle density Mg/m3	Casagrande Classification
В⊦	107	6	2.80	3.00	в	Greyish brown sandy slightly gravelly silty CLAY.			14.0						
В⊦	107	7	3.80	4.00	в	Greyish brown sandy gravelly silt CLAY.	y		13.0	69	30	15	15		CL
All tests	s perfor	med i	n accord	lance wit	th BS1	377:1990 unless specified	d otherwis	е	_	_	_	_	_	LAE	3 01R Version 5
Кеу		neasure	ment unles	S :	Liquid Limit Particle densit 4pt cone unless : sp - small pyke			insity				Appr	Approved By		
wd - water displacement wi - immersion in water				rasagrande method gj - g ngle point test	jas jar					Step	hen.	Watson	testing 10122		

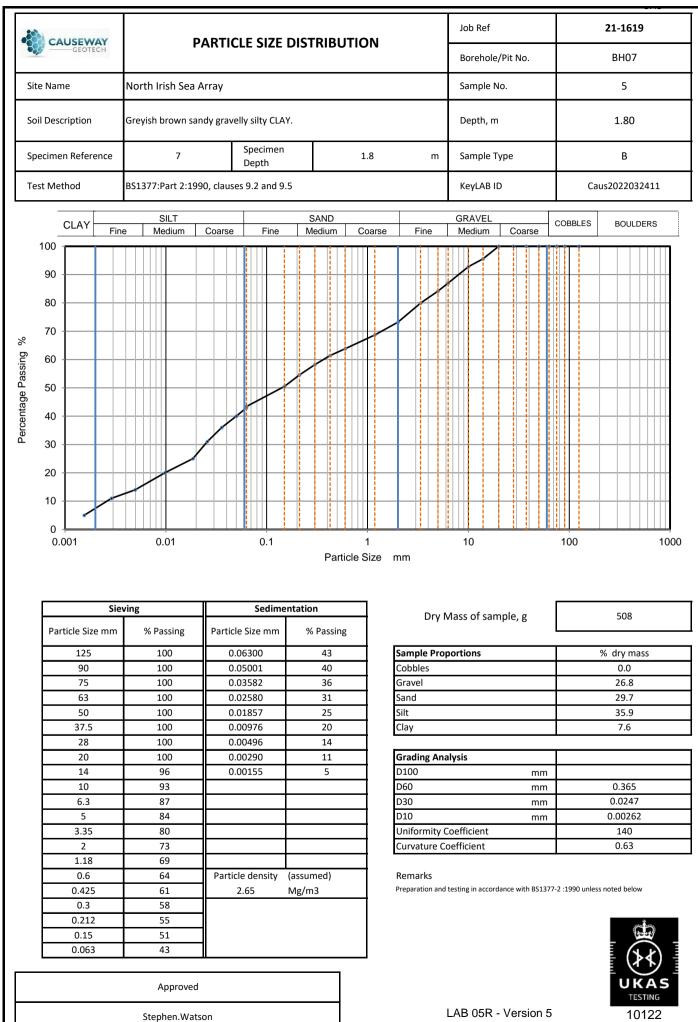


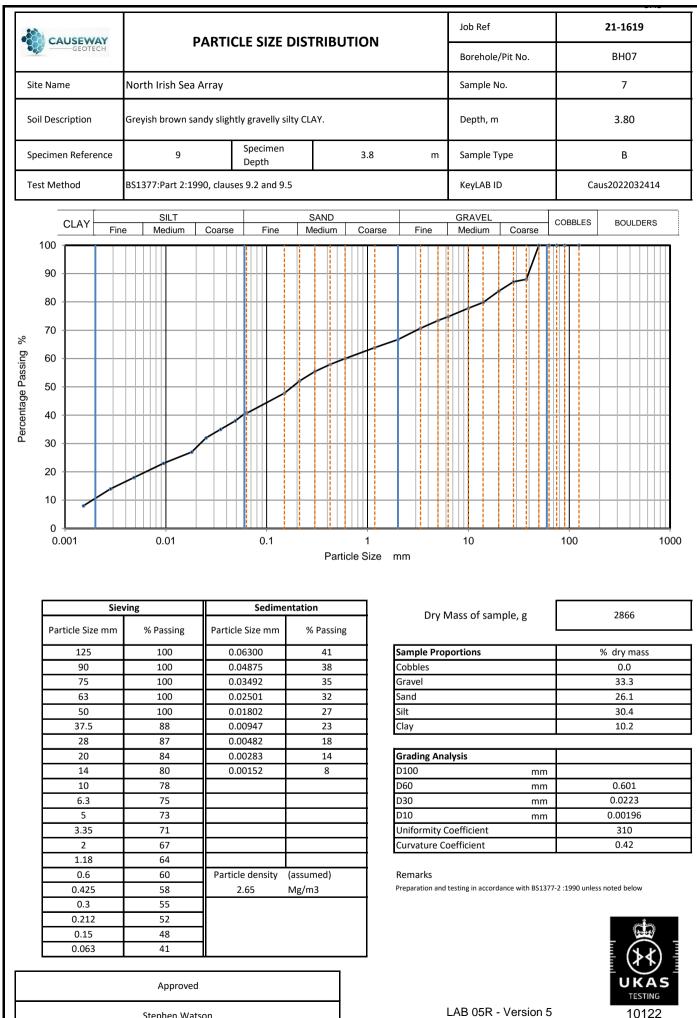
Stephen.Watson











Stephen.Watson

## 🔅 eurofins

### Chemtest

Eurofins Chemtest Ltd Depot Road Newmarket CB8 0AL Tel: 01638 606070 Email: info@chemtest.com

Report No.:	22-12440-1		
Initial Date of Issue:	11-Apr-2022		
Client	Causeway Geotech Ltd		
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL		
Contact(s):	Carin Cornwall Colm Hurley Darren O'Mahony Gabriella Horan Joe Gervin John Cameron Lucy Newland Martin Gardiner Matthew Gilbert Neil Haggan Paul Dunlop Sean Ross Stephen Franey Stephen Watson Stuart Abraham Thomas McAllister		
Project	21-1619 North Irish Sea Array		
Quotation No.:		Date Received:	01-Apr-2022
Order No.:		Date Instructed:	01-Apr-2022
No. of Samples:	3		
Turnaround (Wkdays):	7	Results Due:	11-Apr-2022
Date Approved:	11-Apr-2022		
Approved By:			
Soul	-		

**Details:** 

Stuart Henderson, Technical Manager



# 🔅 eurofins

### Chemtest

Eurofins Chemtest Ltd Depot Road Newmarket CB8 0AL Tel: 01638 606070 Email: info@chemtest.com

### <u> Results - Soil</u>

#### Project: 21-1619 North Irish Sea Array

Client: Causeway Geotech Ltd	Chemtest Job No.:			22-12440	22-12440	22-12440	
Quotation No.:	Chemtest Sample ID.:			1403841	1403842	1403843	
Order No.:	Client Sample Ref.:			2	4	7	
		Sa	ample Lo	ocation:	BH04	BH06	BH07
			Sampl	e Type:	SOIL	SOIL	SOIL
			Top De	oth (m):	0.8	0.8	3.8
	Date Sampled:				31-Mar-2022	31-Mar-2022	31-Mar-2022
Determinand	Accred.	SOP	Units	LOD			
Moisture	N	2030	%	0.020	12	22	11
рН	U	2010		4.0	8.7	8.4	8.7
Sulphate (2:1 Water Soluble) as SO4	U 2120 g/l 0.010		0.026	0.022	< 0.010		
Sulphate (Total)	U 2430 % 0.010			0.037	0.054	0.035	
Sulphate (Acid Soluble)	U	2430	%	0.010	0.016	< 0.010	0.016

### Test Methods

SOP	Title	Parameters included	Method summary					
2010	pH Value of Soils	рН	pH Meter					
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.					
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930					
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES					
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.					

### **Report Information**

Key	
U	UKAS accredited
М	MCERTS and UKAS accredited
Ν	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
Т	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection
	Comments or interpretations are beyond the scope of LIKAS appreditation

Comments or interpretations are beyond the scope of UKAS accreditation The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request None of the results in this report have been recovery corrected All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis All Asbestos testing is performed at the indicated laboratory Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

#### **Sample Deviation Codes**

- A Date of sampling not supplied
- B Sample age exceeds stability time (sampling to extraction)
- C Sample not received in appropriate containers
- D Broken Container
- E Insufficient Sample (Applies to LOI in Trommel Fines Only)

### Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt All water samples will be retained for 14 days from the date of receipt Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to: <u>customerservices@chemtest.com</u>



HEAD OFFICE Causeway Geotech Ltd 8 Drumahiskey Road Ballymoney Co. Antrim, N. Ireland, BT53 7QL NI: +44 (0)28 276 66640 Registered in Northern Ireland. Company Number: NI610766

#### REGIONAL OFFICE Causeway Geotech (IRL) Ltd Unit 1 Fingal House Stephenstown Industrial Estate Balbriggan, Co Dublin, Ireland, K32 VR66 ROI: +353 (0)1 526 7465 ROI: +3533 (0)1 526 7465 Company Number 633786

www.causewaygeotech.com

### SOIL AND ROCK SAMPLE ANALYSIS LABORATORY TEST REPORT

15 April 2022

Project Name:	North Irish Sea Array
Project No.:	21-1619
Client:	Statkraft
Engineer:	ARUP

We are pleased to attach the results of laboratory testing carried out for the above project. This memo and its attachments constitute a report of the results of tests as detailed in the Contents page(s). This testing was performed between 24/03/2022 and 15/04/2022.

The attached results complete the testing requested and we would therefore wish to confirm that samples will be retained without charge for a period of 28 days from the above date after which they will be appropriately disposed of unless we receive written instructions to the contrary prior to that date.

We trust our report meets with your approval but if you have any queries or require additional information, please do not hesitate to contact the undersigned.

Han Notin

Stephen Watson Laboratory Manager Signed for and on behalf of Causeway Geotech Ltd



### Project Name: North Irish Sea Array

### **Report Reference:** Schedule 7

The table below details the tests carried out, the specifications used, and the number of tests included in this report. The results contained in this report relate to the sample(s) as received

Tests marked with\* in this report are not United Kingdom Accreditation Service (UKAS) accredited and are not included in Causeway Geotech Limited's scope of UKAS Accreditation Schedule of Tests. Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

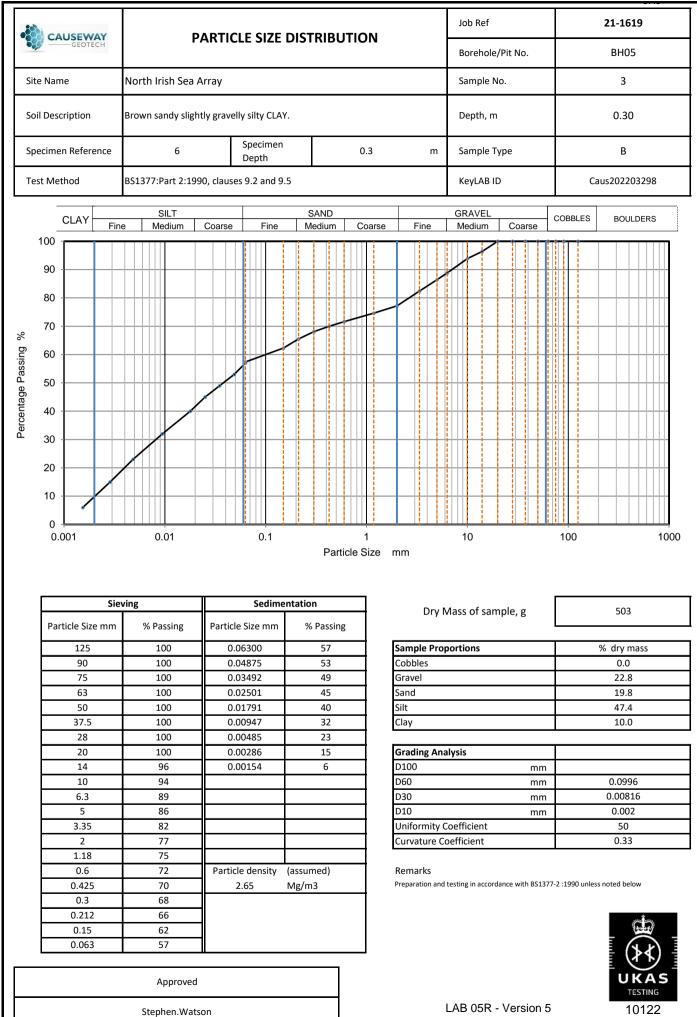
Material tested	Type of test/Properties measured/Range of measurement	Standard specifications	No. of results included in the report		
SOIL	Moisture Content of Soil	BS 1377-2: 1990: Cl 3.2	11		
SOIL	Liquid and Plastic Limits of soil-4 point cone penetrometer method	BS 1377-2: 1990: Cl 4.4, 5.3 & 5.4	10		
SOIL	Particle size distribution - wet sieving	BS 1377-2: 1990: Cl 9.2	10		
SOIL	Particle size distribution - sedimentation hydrometer method	BS 1377-2: 1990: Cl 9.5	10		
SOIL	Undrained shear strength – triaxial compression without measurement of pore pressure (loads from 0.12 to 24 kN)	BS 1377-7: 1990: Cl 8	2		

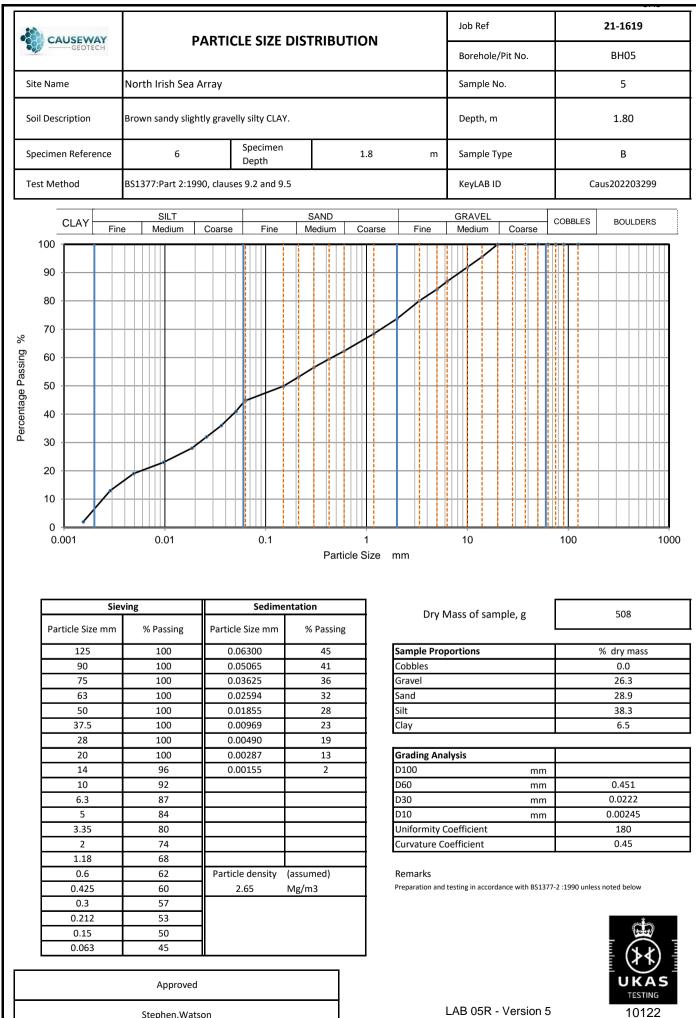
### SUB-CONTRACTED TESTS

In agreement with Client, the following tests were conducted by an approved sub-contractor. All subcontracting laboratories used are UKAS accredited.

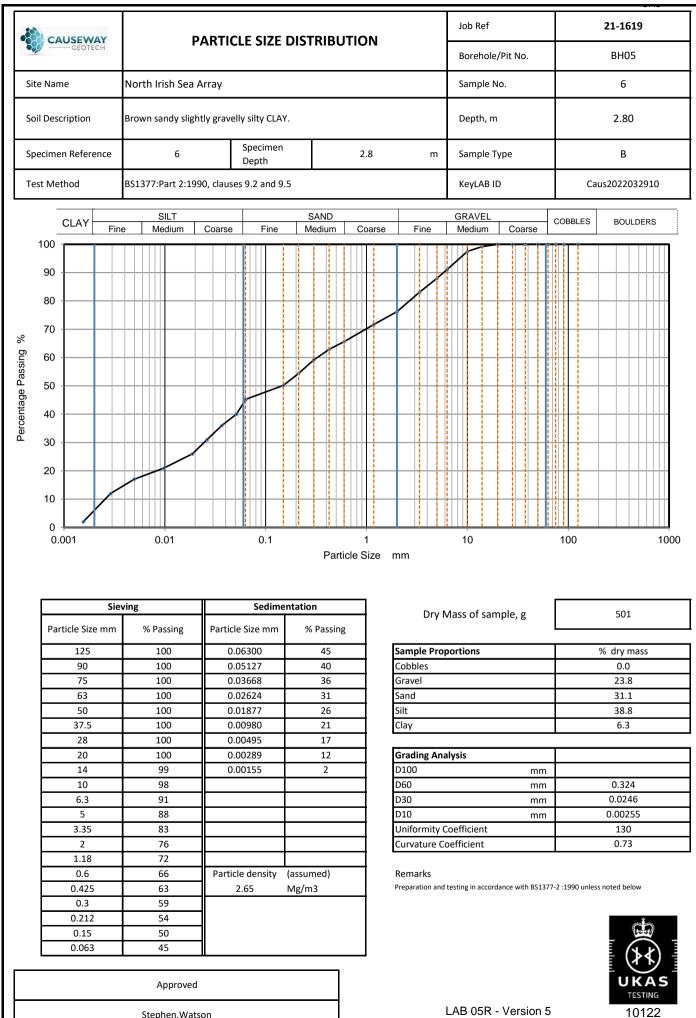
Material tested	Type of test/Properties measured/Range of measurement	Standard specifications	No. of results included in the report
SOIL – Subcontracted to Eurofins Chemtest Ltd (UKAS 2183)	BRE Test - Suite B		4

CAUSEWAY GEOTECH			Summary of Classification Test Results											
Project No.		Project Name												
21-1619			North Irish Sea Array											
Hole No.	Ref	Saı Top	mple Base	Туре	Soil Description	Dens bulk Mg/m	dry	W %	Passing 425µm %	LL %	PL %	PI %	Particle density Mg/m3	Casagrande Classification
BH05	3	0.30	0.50	в	Brown sandy slightly gravelly silty CLAY.			23.0	72	43	22	21		CI
BH05	5	1.80	2.00	В	Brown sandy slightly gravelly silty CLAY.			15.0	71	31	15	16		CL
BH05	6	2.80	3.00	в	Brown sandy slightly gravelly silty CLAY.			12.0	58	31	16	15		CL
BH05	14	3.00	3.45	U	Brown slightly sandy gravelly silty CLAY.			13.0	60	27	15	12		CL
BH05	8	4.80	5.00	В	Brown sandy slightly gravelly silty CLAY.			14.0						
BH05	15	6.00	6.45	U	Brown sandy slightly gravelly silty CLAY.			13.0	67	29	15	14		CL
BH16	3	0.30	0.50	в	Brown sandy slightly gravelly silty CLAY.			25.0	82	40	22	18		CI
BH16	5	1.80	2.00	в	Brown sandy slightly gravelly silty CLAY.			15.0	74	31	18	13		CL
BH16	7	3.80	4.00	В	Greyish brown sandy slightly gravelly silty CLAY.			13.0	69	28	15	13		CL
BH16	14	6.00	6.45	U	Greyish brown sandy slightly gravelly silty CLAY.			9.8	65	25	14	11		CL
BH16	15	9.00	9.45	U	Greyish brown sandy slightly gravelly silty CLAY.			10.0	63	25	14	11		CL
All tests perfor	All tests performed in accordance with BS1377:1990 unless specified otherwise LAB 01R Version 5													
	neasure ter displ	ment unles acement in water	s :	cas - C		e density nall pyknom s jar	eter	Date F	Printed	22	Appr		By Watson	UKAS TESTING 10122

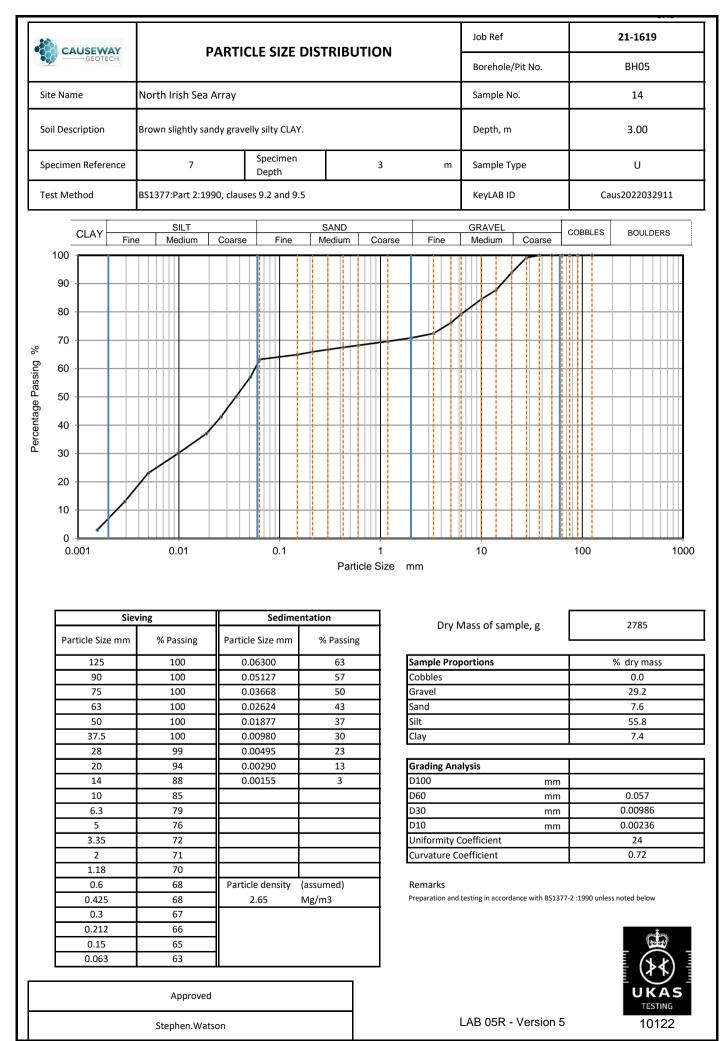


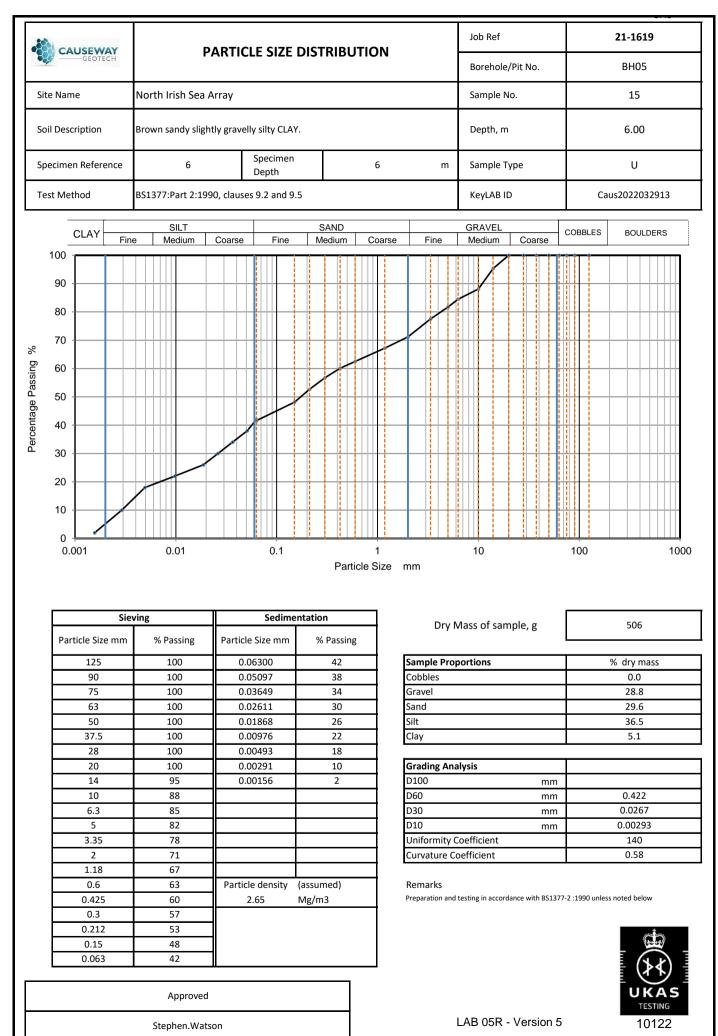


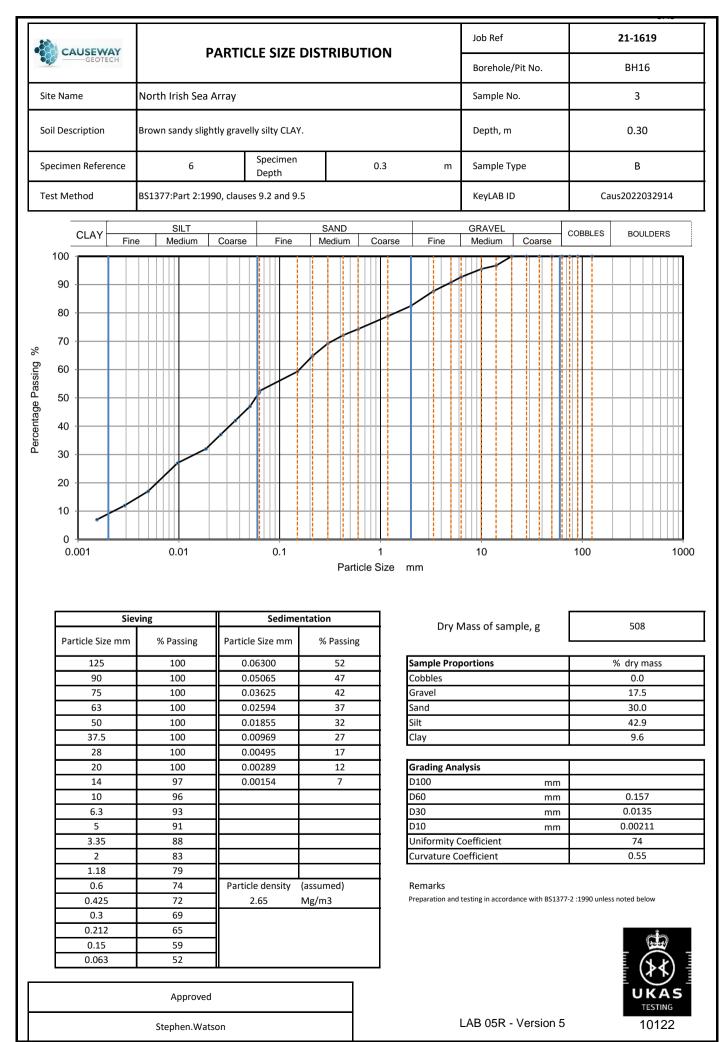
Stephen.Watson

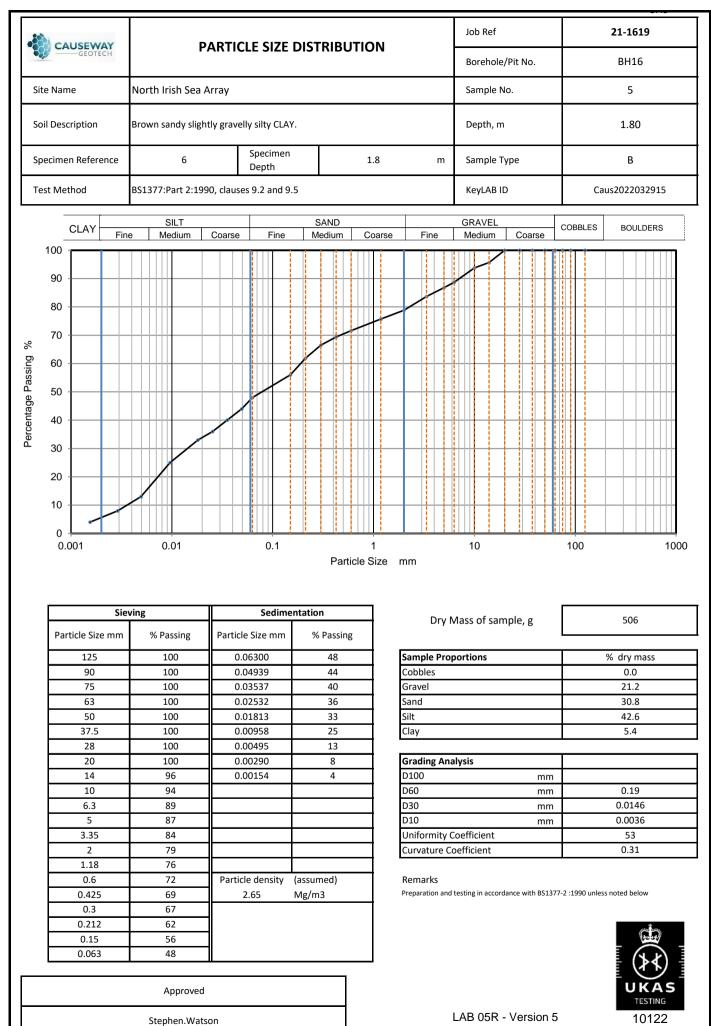


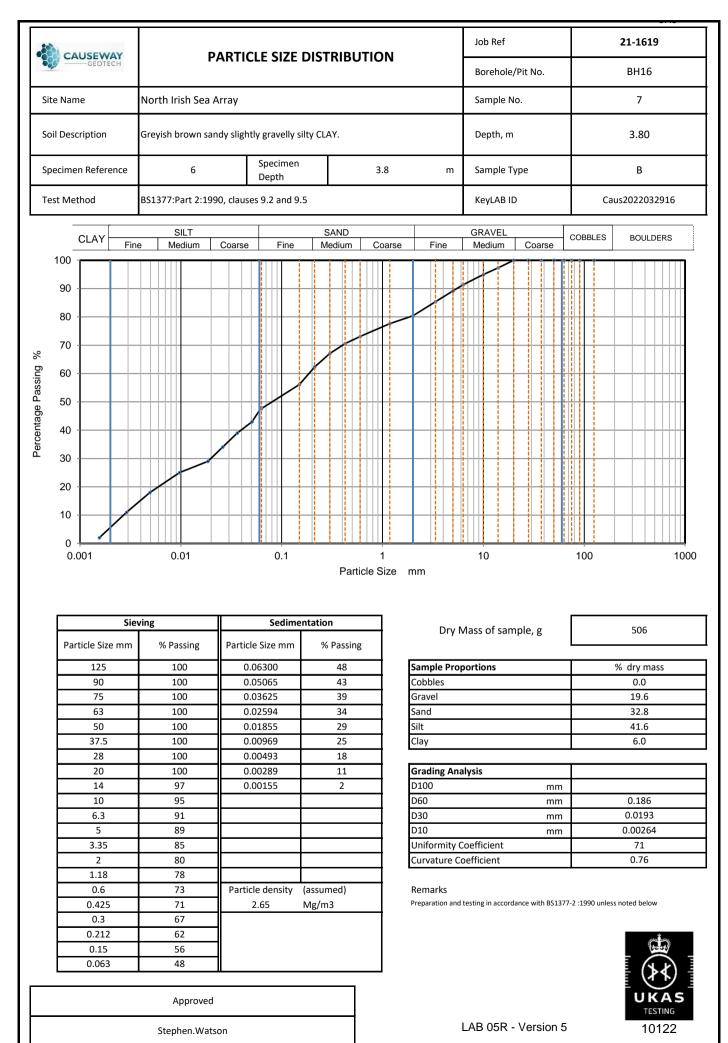
Stephen.Watson

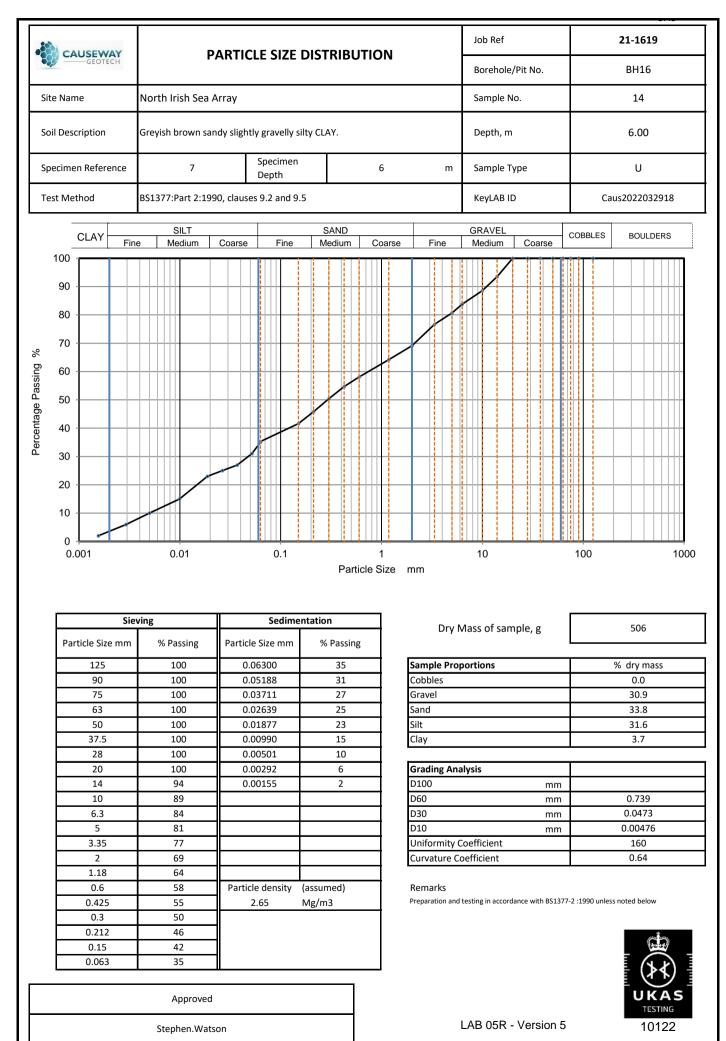


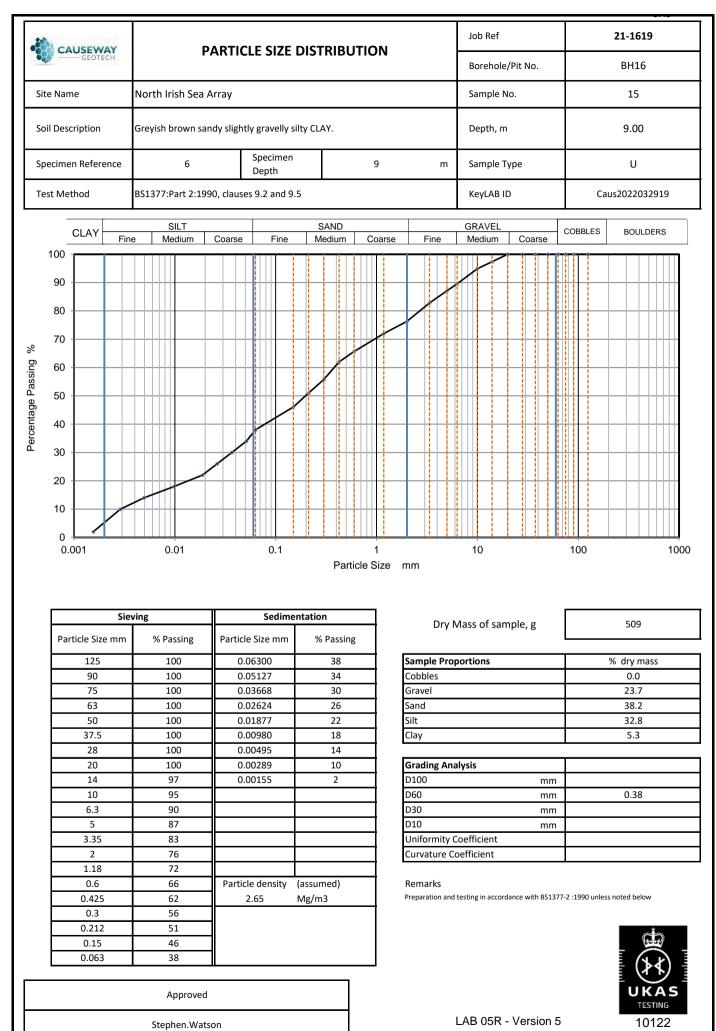


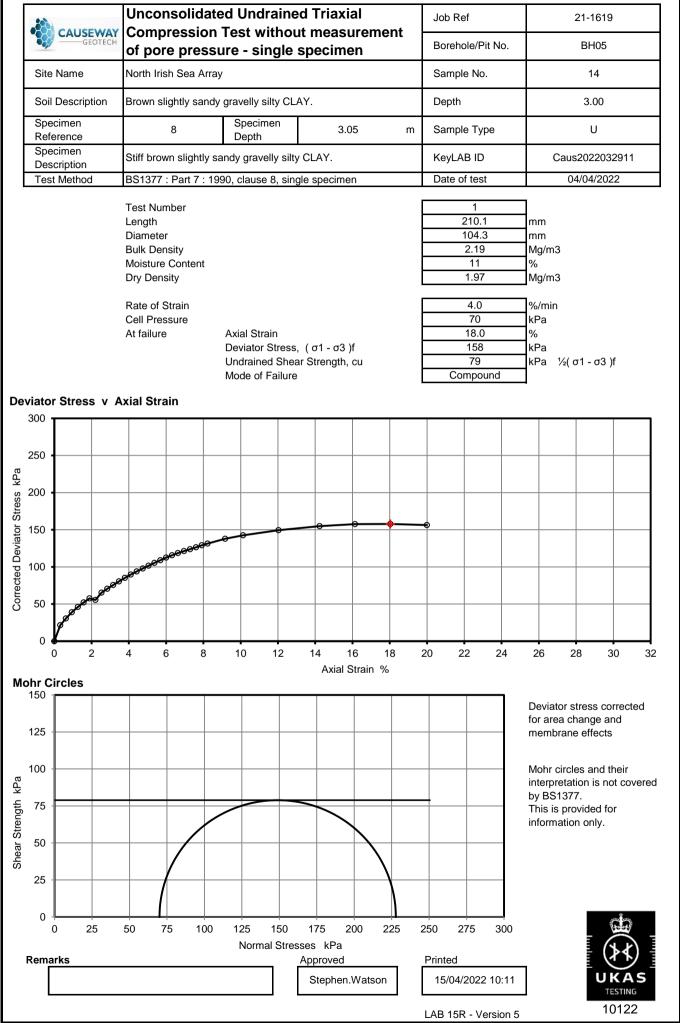


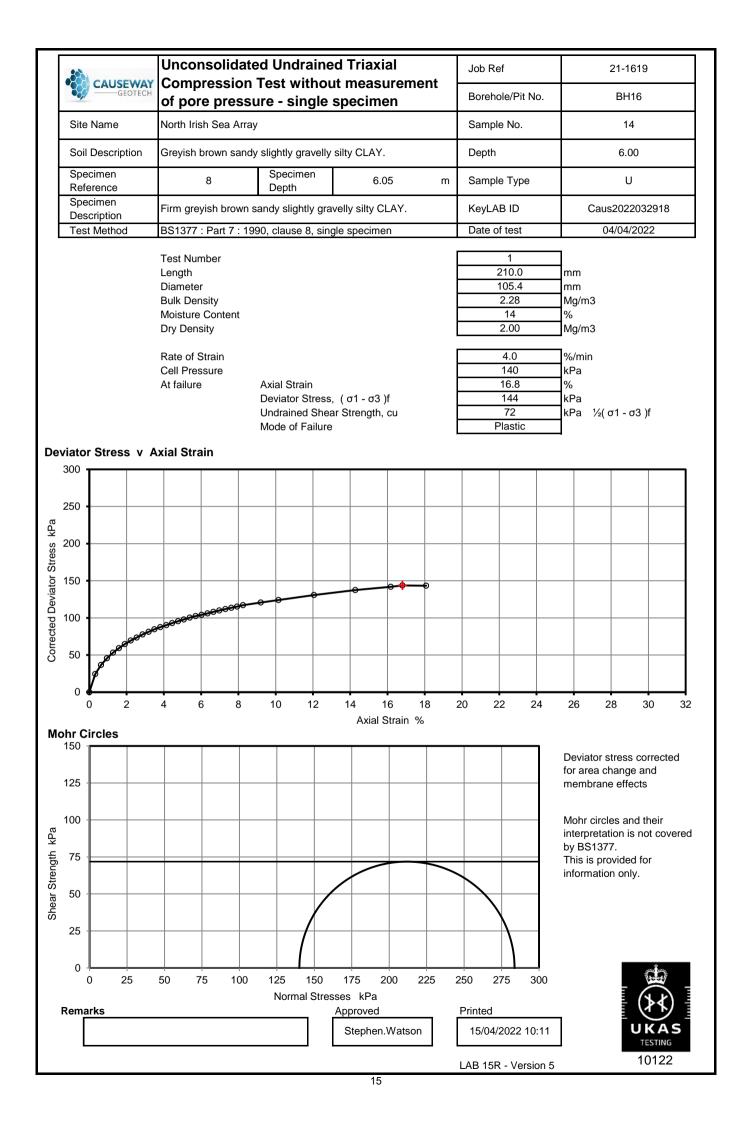












## 🔅 eurofins

### Chemtest

Eurofins Chemtest Ltd Depot Road Newmarket CB8 0AL Tel: 01638 606070 Email: info@chemtest.com

Report No.:	22-12442-1		
Initial Date of Issue:	08-Apr-2022		
Client	Causeway Geotech Ltd		
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL		
Contact(s):	Carin Cornwall Colm Hurley Darren O'Mahony Gabriella Horan Joe Gervin John Cameron Lucy Newland Martin Gardiner Matthew Gilbert Neil Haggan Paul Dunlop Sean Ross Stephen Franey Stephen Watson Stuart Abraham Thomas McAllister		
Project	21-1619 North Irish Sea Array		
Quotation No.:		Date Received:	01-Apr-2022
Order No.:		Date Instructed:	01-Apr-2022
No. of Samples:	4		
Turnaround (Wkdays):	7	Results Due:	11-Apr-2022
Date Approved:	08-Apr-2022		
Approved By:			
Soul			

**Details:** 

Stuart Henderson, Technical Manager



# 🔅 eurofins

#### Chemtest

Eurofins Chemtest Ltd Depot Road Newmarket CB8 0AL Tel: 01638 606070 Email: info@chemtest.com

## <u>Results - Soil</u>

#### Project: 21-1619 North Irish Sea Array

Client: Causeway Geotech Ltd	Chemtest Job No.:			22-12442	22-12442	22-12442	22-12442	
Quotation No.:	(	Chemtest Sample ID.:			1403851	1403852	1403853	1403854
Order No.:	Client Sample Ref.:			3	5	5	8	
		Sample Location:			BH05	BH05	BH16	BH16
		Sample Type:				SOIL	SOIL	SOIL
		Top Depth (m):			0.3	1.8	1.8	4.8
		Date Sampled:		31-Mar-2022	31-Mar-2022	31-Mar-2022	31-Mar-2022	
Determinand	Accred.	SOP	Units	LOD				
Moisture	Ν	2030	%	0.020	22	15	16	14
рН	U	2010		4.0	8.4	8.6	8.8	8.8
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.048	0.029	0.019	0.052
Sulphate (Total)	U	2430	%	0.010	0.66	1.9	0.28	0.040
Sulphate (Acid Soluble)	U	2430	%	0.010	< 0.010	0.24	0.19	0.19

## Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	рН	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.

### **Report Information**

Key	
U	UKAS accredited
М	MCERTS and UKAS accredited
Ν	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
Т	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection
	Comments or interpretations are beyond the scope of LIKAS appreditation

Comments or interpretations are beyond the scope of UKAS accreditation The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request None of the results in this report have been recovery corrected All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis All Asbestos testing is performed at the indicated laboratory Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

#### **Sample Deviation Codes**

- A Date of sampling not supplied
- B Sample age exceeds stability time (sampling to extraction)
- C Sample not received in appropriate containers
- D Broken Container
- E Insufficient Sample (Applies to LOI in Trommel Fines Only)

#### Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt All water samples will be retained for 14 days from the date of receipt Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to: <u>customerservices@chemtest.com</u>



HEAD OFFICE Causeway Geotech Ltd 8 Drumahiskey Road Ballymoney Co. Antrim, N. Ireland, BT53 7QL NI: +44 (0)28 276 66640 Registered in Northern Ireland. Company Number: NI610766

#### REGIONAL OFFICE Causeway Geotech (IRL) Ltd Unit 1 Fingal House Stephenstown Industrial Estate Balbriggan, Co Dublin, Ireland, K32 VR66 ROI: +353 (0)1 526 7465 ROI: +3533 (0)1 526 7465 Company Number 633786

www.causewaygeotech.com

#### 20 April 2022

# SOIL AND ROCK SAMPLE ANALYSIS LABORATORY TEST REPORT

Project Name:	North Irish Sea Array
Project No.:	21-1619
Client:	Statkraft
Engineer:	ARUP

We are pleased to attach the results of laboratory testing carried out for the above project. This memo and its attachments constitute a report of the results of tests as detailed in the Contents page(s). This testing was performed between 28/03/2022 and 20/04/2022.

The attached results complete the testing requested and we would therefore wish to confirm that samples will be retained without charge for a period of 28 days from the above date after which they will be appropriately disposed of unless we receive written instructions to the contrary prior to that date.

We trust our report meets with your approval but if you have any queries or require additional information, please do not hesitate to contact the undersigned.

Stephen Watson Laboratory Manager Signed for and on behalf of Causeway Geotech Ltd



#### Project Name: North Irish Sea Array

#### **Report Reference:** Schedule 8

The table below details the tests carried out, the specifications used, and the number of tests included in this report. The results contained in this report relate to the sample(s) as received

Tests marked with\* in this report are not United Kingdom Accreditation Service (UKAS) accredited and are not included in Causeway Geotech Limited's scope of UKAS Accreditation Schedule of Tests. Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Material tested	Type of test/Properties measured/Range of measurement	Standard specifications	No. of results included in the report		
SOIL	Moisture Content of Soil	BS 1377-2: 1990: Cl 3.2	14		
SOIL	Liquid and Plastic Limits of soil-4 point cone penetrometer method	BS 1377-2: 1990: Cl 4.4, 5.3 & 5.4	8		
SOIL	Particle size distribution - wet sieving	BS 1377-2: 1990: Cl 9.2	6		
SOIL	Particle size distribution - sedimentation hydrometer method	BS 1377-2: 1990: Cl 9.5	5		
SOIL	Undrained shear strength – triaxial compression without measurement of pore pressure (loads from 0.12 to 24 kN)	BS 1377-7: 1990: Cl 8	2		

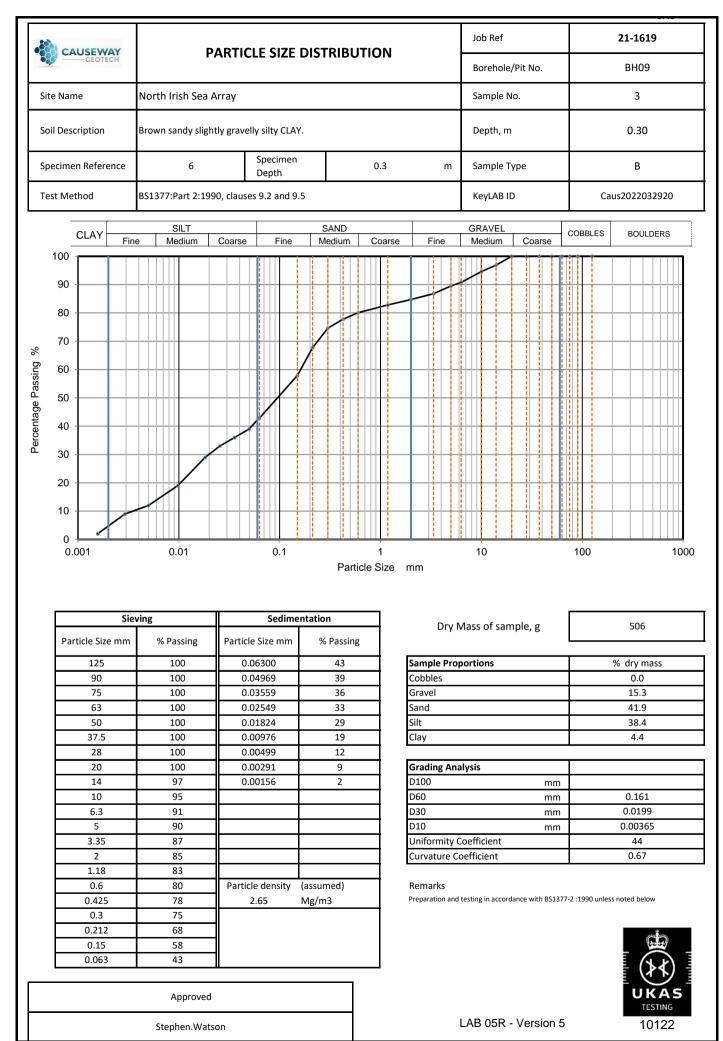
#### SUB-CONTRACTED TESTS

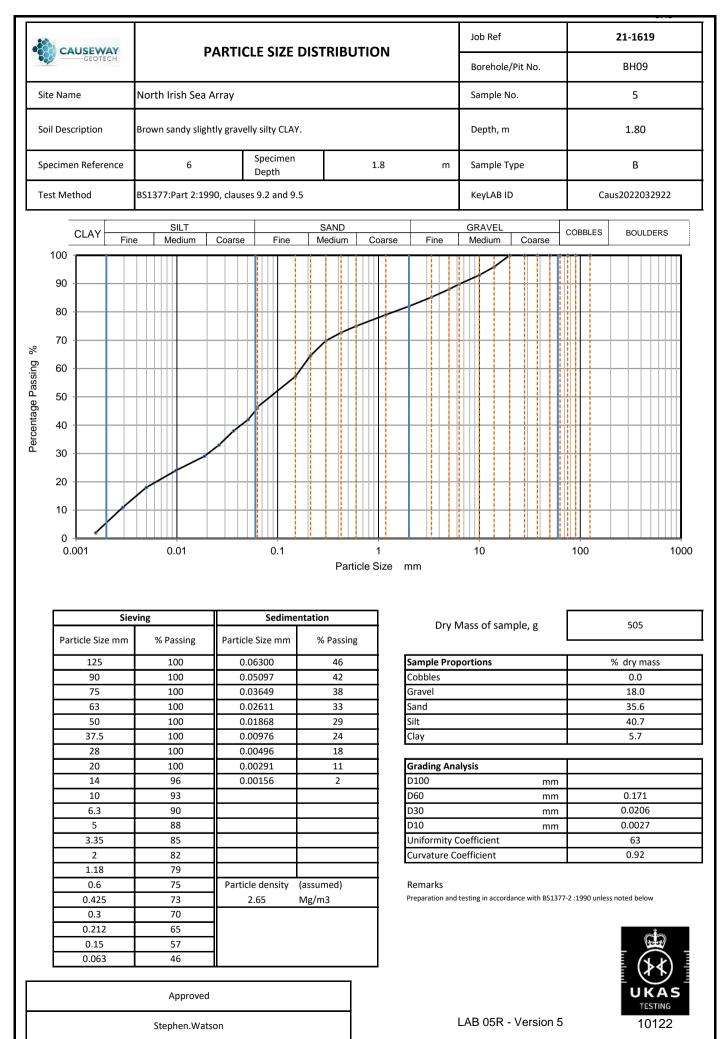
In agreement with Client, the following tests were conducted by an approved sub-contractor. All subcontracting laboratories used are UKAS accredited.

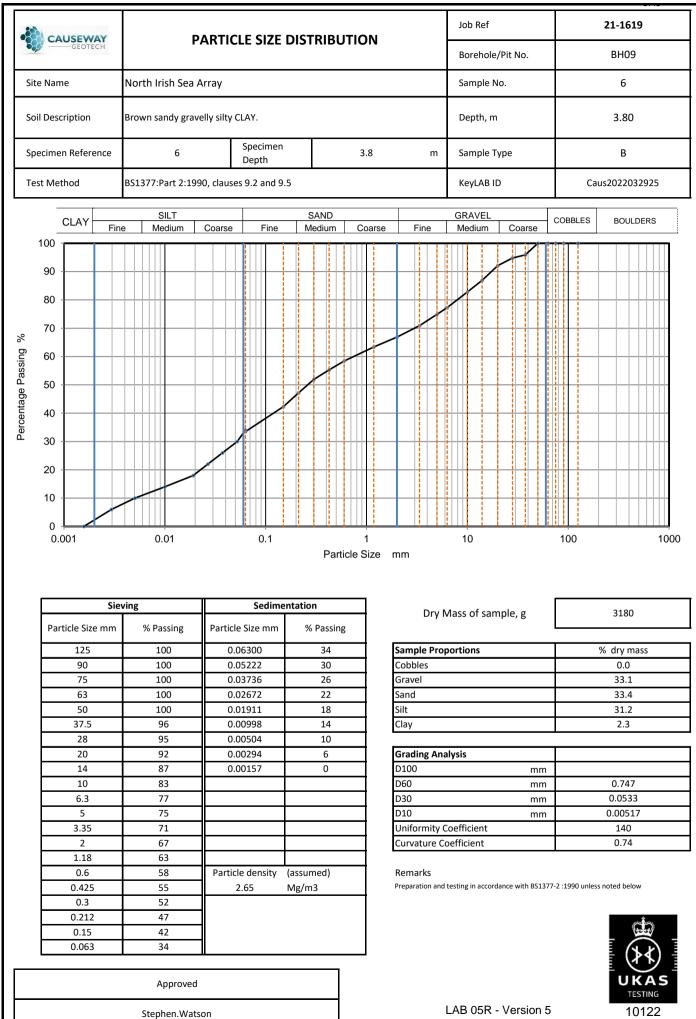
Material tested	Type of test/Properties measured/Range of measurement	Standard specifications	No. of results included in the report
SOIL – Subcontracted to Eurofins Chemtest Ltd (UKAS 2183)	BRE Test - Suite B		2

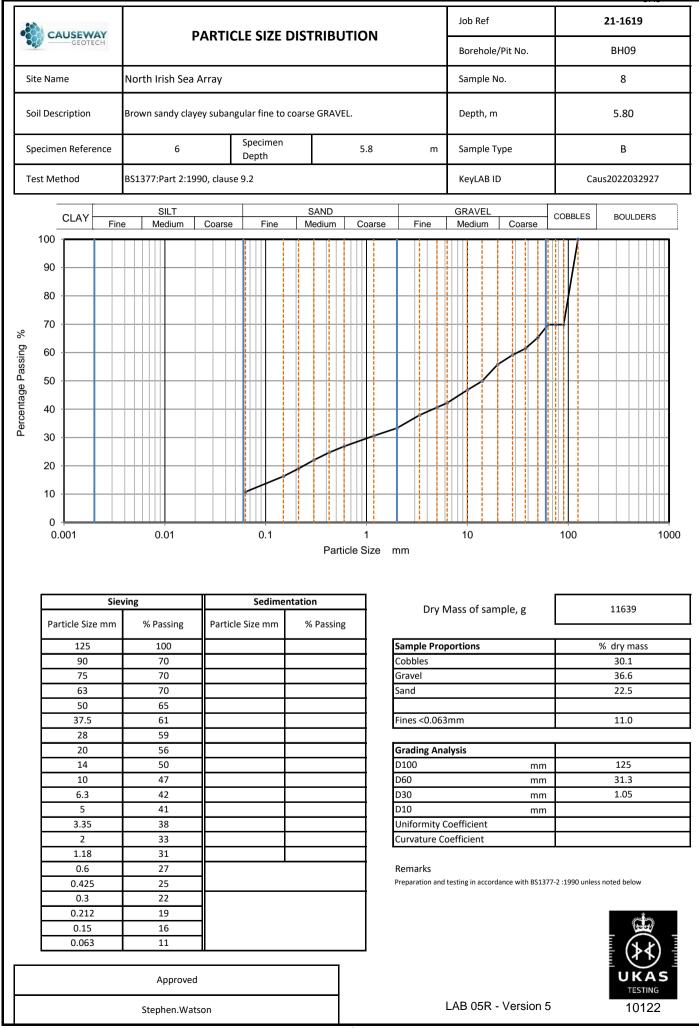
5.80 0.80	Sample           op         Base           .30         0.50           .80         2.00           .80         4.00           .80         5.00           .80         6.00	t Name Type B B D B B B B B	Soil Description	N Dens bulk Mg/m	ity dry	rish Se w % 22.0 14.0 8.0 11.0 12.0 6.2	Passing 425µm % 81 77 58 58	LL % 30 25 25 25	PL % 18 15 14	PI % 12 10 11	Particle density Mg/m3	Casagrande Classification CL CL CL
f Top 0.30 1.80 3.00 4.80 5.80	Top         Base           .30         0.50           .80         2.00           .80         4.00           .80         5.00           .80         6.00	B D B B B	Brown sandy slightly gravelly silty CLAY. Brown sandy slightly gravelly silty CLAY. Brown sandy slightly gravelly silty CLAY. Brown sandy gravelly silty CLAY. Brown sandy slightly gravelly silty CLAY.	Dens bulk	ity dry	<ul> <li>W</li> <li>%</li> <li>22.0</li> <li>14.0</li> <li>8.0</li> <li>11.0</li> <li>12.0</li> </ul>	Passing 425µm % 81 77 58	% 30 25 25	%       18       15       14	% 12 10 11	density	Classification CL CL
f Top 0.30 1.80 3.00 4.80 5.80	Top         Base           .30         0.50           .80         2.00           .80         4.00           .80         5.00           .80         6.00	B D B B B	Brown sandy slightly gravelly silty CLAY. Brown sandy slightly gravelly silty CLAY. Brown sandy slightly gravelly silty CLAY. Brown sandy gravelly silty CLAY. Brown sandy slightly gravelly silty CLAY.	bulk	dry	% 22.0 14.0 8.0 11.0 12.0	425µm % 81 77 58	% 30 25 25	%       18       15       14	% 12 10 11	density	Classification CL CL CL
1.80 3.00 3.80 4.80 5.80	.80 2.00 .00 .00 .80 4.00 .80 5.00 .80 6.00	B B B	CLAY. Brown sandy slightly gravelly silty CLAY. Brown sandy slightly gravelly silty CLAY. Brown sandy gravelly silty CLAY. Brown sandy slightly gravelly silty CLAY.			22.0 14.0 8.0 11.0 12.0	81 77 58	30 25 25	18 15 14	12 10 11		CL
3.00 3.80 4.80 5.80	.00 4.00 .80 5.00 .80 6.00	D B B	CLAY. Brown sandy slightly gravelly silty CLAY. Brown sandy gravelly silty CLAY. Brown sandy slightly gravelly silty CLAY. Brown sandy clayey subangular			8.0 11.0 12.0	58	25	14	11		CL
3.80 4.80 5.80	.80 4.00 .80 5.00 .80 6.00	в	CLAY. Brown sandy gravelly silty CLAY. Brown sandy slightly gravelly silty CLAY. Brown sandy clayey subangular			11.0						
4.80	.80 5.00	в	Brown sandy slightly gravelly silty CLAY. Brown sandy clayey subangular			12.0						
5.80	.80 6.00	В	CLAY. Brown sandy clayey subangular				53	24	13	11		CL
	_					6.2	53	24	13	11		CL
0.80	.80 1.00	в										
			Brown sandy slightly gravelly silty CLAY.			16.0	69	33	18	15		CL
1.80	.80 2.00	в	Greyish brown sandy slightly gravelly silty CLAY.			14.0						
2.80	.80 3.00	в	Greyish brown sandy slightly gravelly silty CLAY.			14.0	70	28	16	12		CL
3.80	.80 4.00	в	Greyish brown sandy slightly gravelly silty CLAY.			16.0						
4.80	.80 5.00	в	Greyish brown sandy slightly gravelly silty CLAY.			15.0	70	27	14	13		CL
5.80	.80 6.00	в	Greyish brown sandy slightly gravelly silty CLAY.			15.0						
in acco	ccordance w	ith BS1	377:1990 unless specified	otherwise	e						LAB	01R Version 5
rement un		4pt con	ne unless : sp - sn	nall pyknom				22	Appr	oved	Ву	
	5 n ad	5.80 6.00 n accordance w ment unless : acement	5.80 6.00 B n accordance with BS1 Liquid ment unless : 4pt cor acement cas - C	4.80       5.00       B       gravelly silty CLAY.         5.80       6.00       B       Greyish brown sandy slightly gravelly silty CLAY.         n accordance with BS1377:1990 unless specified       Liquid Limit       Particle         ment unless :       4pt cone unless :       sp - sn acement         cas - Casagrande method       gj - gar	4.80       5.00       B       gravelly silty CLAY.         5.80       6.00       B       Greyish brown sandy slightly gravelly silty CLAY.         n accordance with BS1377:1990 unless specified otherwise         Liquid Limit       Particle density         ment unless :       4pt cone unless :       sp - small pyknom         acement       cas - Casagrande method       gj - gas jar	4.80       5.00       B       gravelly silty CLAY.         5.80       6.00       B       Greyish brown sandy slightly gravelly silty CLAY.         5.80       6.00       B       Greyish brown sandy slightly gravelly silty CLAY.         accordance with BS1377:1990 unless specified otherwise         Liquid Limit       Particle density         ment unless :       4pt cone unless :       sp - small pyknometer         acement       cas - Casagrande method       gj - gas jar	4.80       5.00       B       gravelly silty CLAY.       15.0         5.80       6.00       B       Greyish brown sandy slightly gravelly silty CLAY.       15.0         5.80       6.00       B       Greyish brown sandy slightly gravelly silty CLAY.       15.0         n accordance with BS1377:1990 unless specified otherwise       15.0       15.0         Liquid Limit       Particle density       Date F         acement       cas - Casagrande method       gj - gas jar	4.80       5.00       B       gravelly silty CLAY.       15.0       70         5.80       6.00       B       Greyish brown sandy slightly gravelly silty CLAY.       15.0       15.0         5.80       6.00       B       Greyish brown sandy slightly gravelly silty CLAY.       15.0       15.0         n accordance with BS1377:1990 unless specified otherwise       Date Printed       20/04/20         ment unless :       4pt cone unless :       sp - small pyknometer       20/04/20         acement       cas - Casagrande method       gj - gas jar       20/04/20	4.80       5.00       B       gravelly silty CLAY.       15.0       70       27         5.80       6.00       B       Greyish brown sandy slightly gravelly silty CLAY.       15.0       15.0       70       27         5.80       6.00       B       Greyish brown sandy slightly gravelly silty CLAY.       15.0       15.0       15.0       10	4.80       5.00       B       gravelly silty CLAY.       15.0       70       27       14         5.80       6.00       B       Greyish brown sandy slightly gravelly silty CLAY.       15.0       15.0       14         5.80       6.00       B       Greyish brown sandy slightly gravelly silty CLAY.       15.0       15.0       14         n accordance with BS1377:1990 unless specified otherwise       15.0       15.0       14       14         n accordance with BS1377:1990 unless specified otherwise       Date Printed       Appr         ment unless :       4pt cone unless :       sp - small pyknometer       20/04/2022       Appr         acement       cas - Casagrande method       gj - gas jar       20/04/2022       Appr	4.80       5.00       B       gravelly silty CLAY.       15.0       70       27       14       13         5.80       6.00       B       Greyish brown sandy slightly gravelly silty CLAY.       15.0       15.0       10       1       1         n accordance with BS1377:1990 unless specified otherwise       15.0       Date Printed       Approved         ment unless :       4pt cone unless :       sp - small pyknometer       20/04/2022       Approved	4.80       5.00       B       gravelly silty CLAY.       15.0       70       27       14       13         5.80       6.00       B       Greyish brown sandy slightly gravelly silty CLAY.       15.0       15.0       10       1       1       1         5.80       6.00       B       Greyish brown sandy slightly gravelly silty CLAY.       15.0       15.0       1

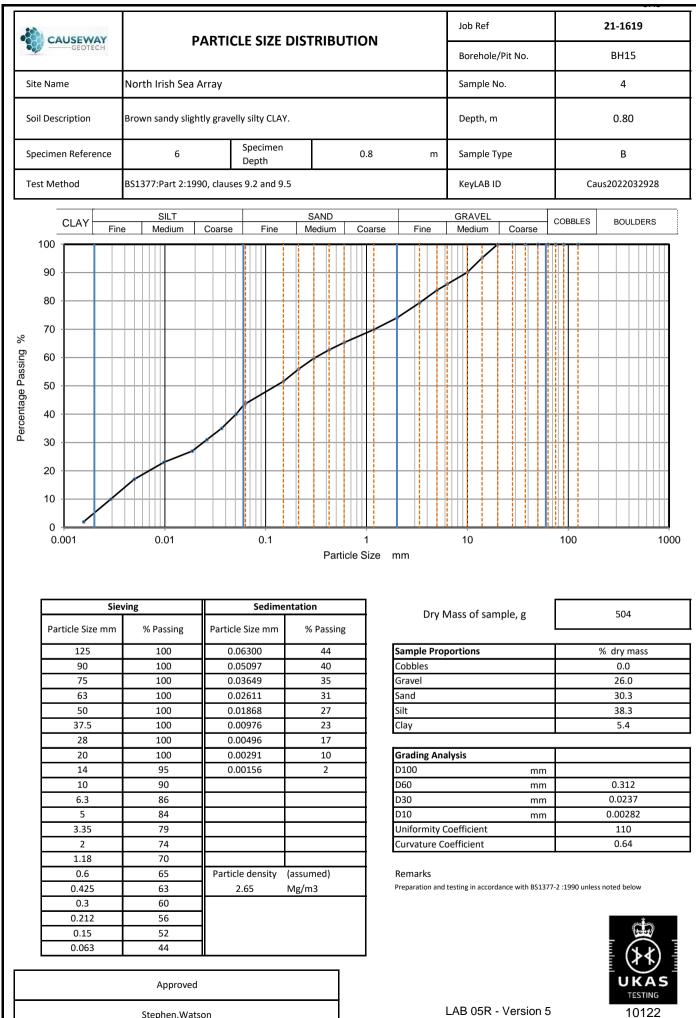
•	CAL	JSE GEO	<b>VAY</b> TECH		Summary of Clas						ation	Test	Res	sult	S	
Project				Project	Name	•										
	21-1	619				I				rish Se	ea Array		1	-		
Hole	e No.		Sai	mple	1	Soil Description		Dens bulk	ity dry	W	Passing 425µm	LL	PL	ΡI	Particle density	Casagrande
		Ref	Тор	Base	Туре			Mg/m		%	%	%	%	%	Mg/m3	Classification
В⊦	115	18	6.00	6.45	U	Greyish brown sandy slightly gravelly silty CLAY.	/			14.0	65	28	14	14		CL
BH	115	16	8.00		D	Greyish brown sandy slightly gravelly silty CLAY.	/			15.0						
All tests	s perfor	med i	n accord	lance wit	th BS1	377:1990 unless spec	cified	otherwise	е	_	_	_	_	_	LAE	3 01R Version 5
Кеу		neasure	ment unles	s :		ne unless :	sp - sn	e density nall pyknom	eter	Date F	Printed 20/04/20	22	Appr	oved	By	
	wd - wat wi - imn		acement in water			asagrande method ngle point test	gj - gas	s jar					Step	hen.	Watson	testing 10122



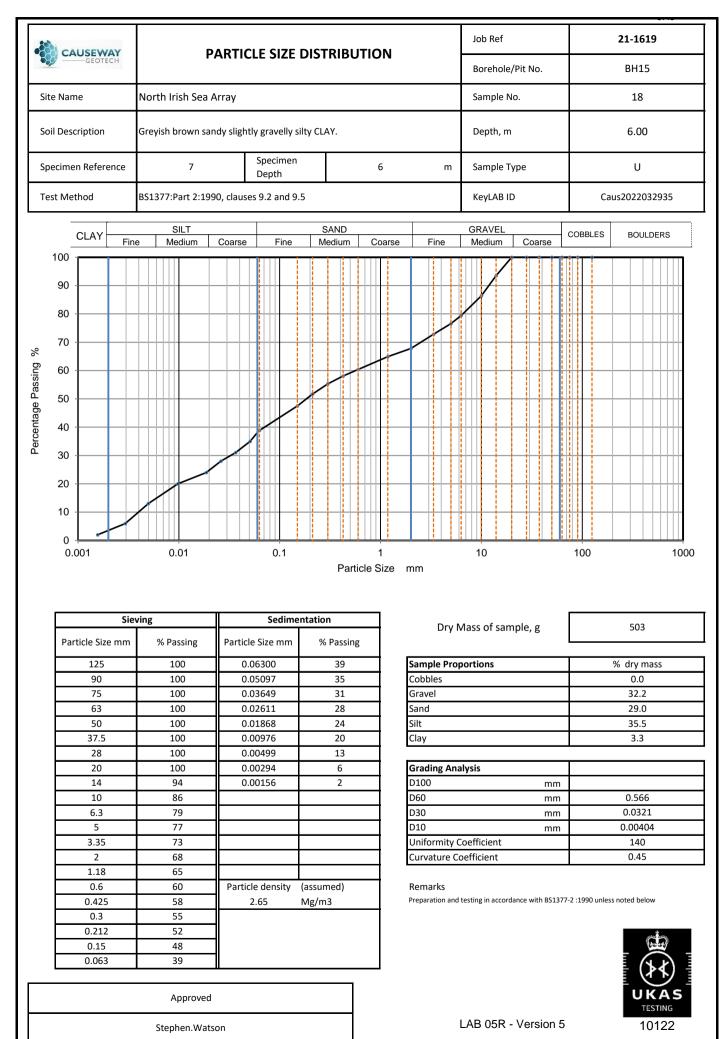


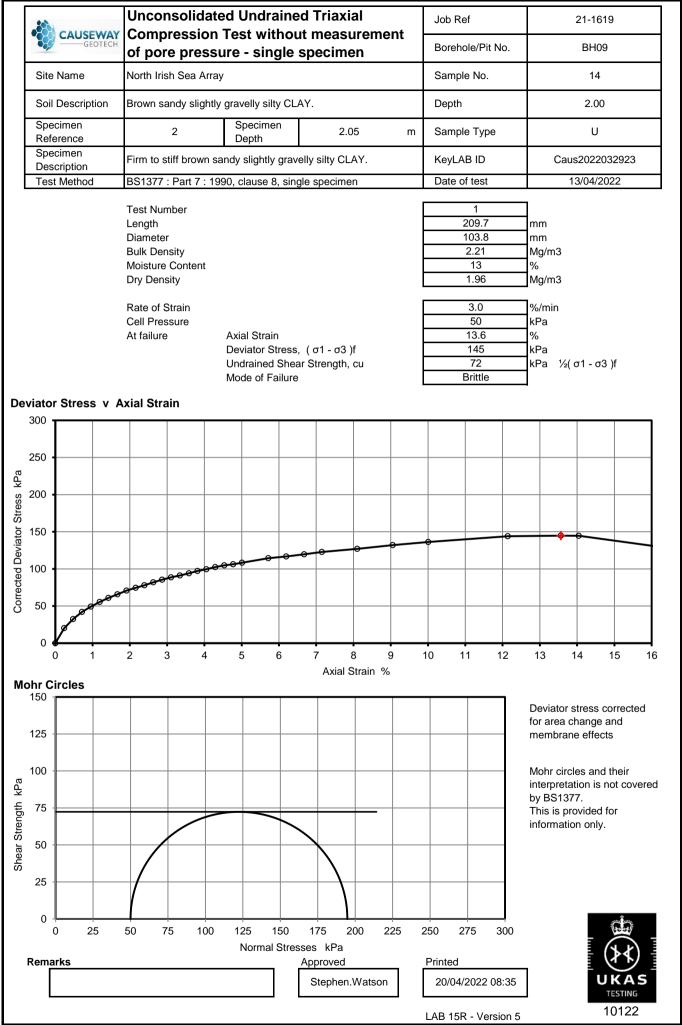


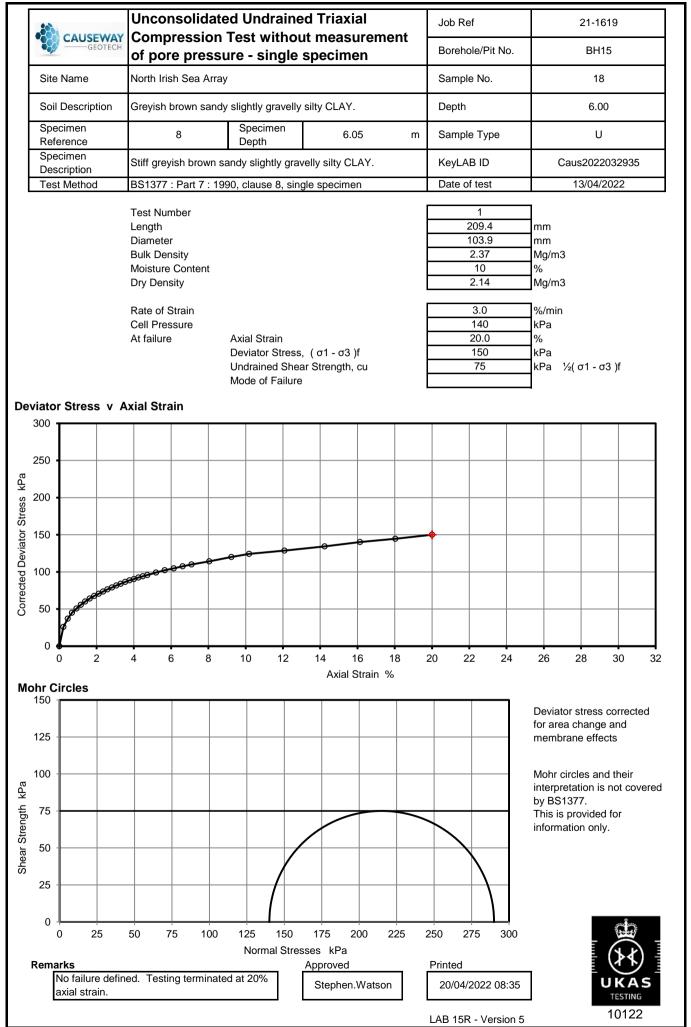




Stephen.Watson







## 🔅 eurofins

### Chemtest

Eurofins Chemtest Ltd Depot Road Newmarket CB8 0AL Tel: 01638 606070 Email: info@chemtest.com

Report No.:	22-12437-1		
Initial Date of Issue:	07-Apr-2022		
Client	Causeway Geotech Ltd		
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL		
Contact(s):	Carin Cornwall Colm Hurley Darren O'Mahony Gabriella Horan Joe Gervin John Cameron Lucy Newland Martin Gardiner Matthew Gilbert Neil Haggan Paul Dunlop Sean Ross Stephen Franey Stephen Watson Stuart Abraham Thomas McAllister		
Project	21-1619 North Irish Sea Array		
Quotation No.:		Date Received:	01-Apr-2022
Order No.:		Date Instructed:	01-Apr-2022
No. of Samples:	2		
Turnaround (Wkdays):	7	Results Due:	11-Apr-2022
Date Approved:	07-Apr-2022		
Approved By:			
Sont	-		

**Details:** 

Stuart Henderson, Technical Manager



# 🔅 eurofins

#### Chemtest

Eurofins Chemtest Ltd Depot Road Newmarket CB8 0AL Tel: 01638 606070 Email: info@chemtest.com

#### Project: 21-1619 North Irish Sea Array

Client: Causeway Geotech Ltd		Che	ntest Jo	22-12437	22-12437	
Quotation No.:	(	Chemte	st Sam	ple ID.:	1403832	1403833
Order No.:		Clie	nt Samp	6	17	
		Sa	ample Lo	ocation:	BH09	BH15
			Sampl	SOIL	SOIL	
			Top Dep	3.8	1.2	
	Date Sampled:				31-Mar-2022	31-Mar-2022
Determinand	Accred.	SOP	Units	LOD		
Moisture	N	2030	%	0.020	13	15
рН	U	2010		4.0	8.8	8.7
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.089	0.023
Sulphate (Total)	U	2430	%	0.010	0.15	0.28
Sulphate (Acid Soluble)	U	2430	%	0.010	0.11	0.013

## Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	рН	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.

### **Report Information**

Key	
U	UKAS accredited
М	MCERTS and UKAS accredited
Ν	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
Т	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection
	Comments or interpretations are beyond the scope of LIKAS appreditation

Comments or interpretations are beyond the scope of UKAS accreditation The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request None of the results in this report have been recovery corrected All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis All Asbestos testing is performed at the indicated laboratory Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

#### **Sample Deviation Codes**

- A Date of sampling not supplied
- B Sample age exceeds stability time (sampling to extraction)
- C Sample not received in appropriate containers
- D Broken Container
- E Insufficient Sample (Applies to LOI in Trommel Fines Only)

#### Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt All water samples will be retained for 14 days from the date of receipt Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to: <u>customerservices@chemtest.com</u>



HEAD OFFICE Causeway Geotech Ltd 8 Drumahiskey Road Ballymoney Co. Antrim, N. Ireland, BT53 7QL NI: +44 (0)28 276 66640

Registered in Northern Ireland. Company Number: NI610766 REGIONAL OFFICE Causeway Geotech (IRL) Ltd Unit 1 Fingal House Stephenstown Industrial Estate

Balbriggan, Co Dublin, Ireland, K32 VR66 ROI: +353 (0)1 526 7465

Registered in Ireland. Company Number: 633786

www.causewaygeotech.com

#### SOIL AND ROCK SAMPLE ANALYSIS LABORATORY TEST REPORT

24 May 2022

Project Name:	North Irish Sea Array
Project No.:	21-1619
Client:	Statkraft
Engineer:	ARUP

We are pleased to attach the results of laboratory testing carried out for the above project. This memo and its attachments constitute a report of the results of tests as detailed in the Contents page(s). This testing was performed between 06/05/2022 and 24/05/2022.

The attached results complete the testing requested and we would therefore wish to confirm that samples will be retained without charge for a period of 28 days from the above date after which they will be appropriately disposed of unless we receive written instructions to the contrary prior to that date.

We trust our report meets with your approval but if you have any queries or require additional information, please do not hesitate to contact the undersigned.

John Worm

Stephen Watson Laboratory Manager Signed for and on behalf of Causeway Geotech Ltd













Project Name: North Irish Sea Array

**Report Reference:** Schedule 9 - FINAL

The table below details the tests carried out, the specifications used, and the number of tests included in this report. The results contained in this report relate to the sample(s) as received

Tests marked with\* in this report are not United Kingdom Accreditation Service (UKAS) accredited and are not included in Causeway Geotech Limited's scope of UKAS Accreditation Schedule of Tests. Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Material tested	Type of test/Properties measured/Range of measurement	Standard specifications	No. of results included in the report
SOIL	Moisture Content of Soil	BS 1377-2: 1990: Cl 3.2	14
SOIL	Liquid and Plastic Limits of soil-4 point cone penetrometer method	BS 1377-2: 1990: Cl 4.4, 5.3 & 5.4	14
SOIL	Particle size distribution - wet sieving	BS 1377-2: 1990: Cl 9.2	14
SOIL	Particle size distribution - sedimentation hydrometer method	BS 1377-2: 1990: Cl 9.5	12

### SUB-CONTRACTED TESTS

In agreement with Client, the following tests were conducted by an approved sub-contractor. All subcontracting laboratories used are UKAS accredited.

Material tested	Type of test/Properties measured/Range of measurement	Standard specifications	No. of results included in the report
SOIL – subcontracted to Pro Soils Limited <i>(UKAS 4043)</i>	Effective shear strength consolidated-undrained triaxial compression test with measurement of pore pressure (up to 4 days)	BS 1377-8:1990	1
	Extra over days (more than initial 4 days)		3

		<b>NAY</b> TECH			Summar	y of C	las	sific	ation	Test	Res	sult	S	
Project No. 21-1	619		Project	Name		Ν	Jorth	Irish Se	a Array					
211		Sar	nple			Dens		w	Passing	LL	PL	ΡI	Particle	
Hole No.	Ref	Тор	Base	Туре	Soil Description	bulk dry Mg/m3		%	425µm %	%	%	%	density Mg/m3	Casagrande Classification
BH04		4.00	5.00	С	Brown sandy gravelly silty CLAY.			10.0	62	29	14	15		CL
BH04		7.00	8.25	с	Brown sandy gravelly clayey SILT.			10.0	60	21	17	4		ML
BH06		5.50	6.13	с	Brown sandy gravelly silty CLAY.			12.0	54	29	14	15		CL
BH06		5.75	5.90	с	Brown gravelly slightly silty fine to coarse SAND.			9.7	40	25	16	9		CL
BH06		6.13	7.00	с	Brown sandy slightly gravelly silty CLAY.			49.0	84	32	18	14		CL
BH06		8.50	9.50	С	Brown sandy gravelly silty CLAY.			9.7	46	25	16	9		CL
BH06		10.00	10.15	с	Brown sandy slightly gravelly silty CLAY.			32.0	84	30	13	17		CL
BH06		14.50	14.90	С	Brown sandy slightly gravelly silty CLAY.			34.0	72	27	19	8		CL
BH06		14.90	15.45	С	Brown slightly sandy slightly clayey subangular fine to coarse GRAVEL with cobbles.			9.7	58	27	21	6		ML/CL
BH06		15.45	15.90	с	Brown sandy gravelly silty CLAY.			12.0	58	26	11	15		CL
BH07		5.70		С	Brown sandy slightly gravelly silty CLAY.			11.0	74	25	12	13		CL
BH07		7.30	8.00	с	Brown sandy slightly gravelly silty CLAY.			10.0	58	25	16	9		CL
All tests perfor	med i	n accord	ance wit	h BS1	377:1990 unless specified	otherwis	е						LAB	01R Version 5
	neasure er displ	ment unles acement in water	s :	cas - C		e density nall pyknom s jar	neter	Date F	Printed	22	Appr		By Watson	UKAS TESTING 10122

GEOTECH				Summar	y of C	las	sific	ation	Test	Res	sult	S		
Project No.			Project	Name										
21-	1619 I	Sar	nple			1			a Array	LL	PL	ΡI	Particle	
Hole No.	Ref	Тор	Base	Туре	Soil Description	Dens bulk Mg/m	dry	W %	Passing 425µm %	%	PL %	РI %	density Mg/m3	Casagrande Classification
BH18		3.70	5.20	С	Brown sandy gravelly silty CLAY.			8.3	60	29	17	12		CL
BH18		5.20	6.70	С	Brown sandy slightly gravelly silty CLAY.			11.0	61	28	17	11		CL
All tests perfo	rmed i	n accord	ance wit	h BS1	377:1990 unless specified	otherwis	e						LAE	01R Version 5
wd - w	measure ater displ	ment unles acement	s :	cas - C	e unless : sp - sr asagrande method gj - ga	e density nall pyknom s jar	eter	Date F	Printed	22	Appr	oved	Ву	
wi-in	wi - immersion in water				ngle point test						Step	hen.	Watson	10122

•2	CA	USEWAY				I	PAR	TIC	LE S	SIZE	DI	ST	RIE	SU-	τις	DN					Job	Ref						2	1-16	19	
•3	/	GEOTECH				-															Bor	ehole	e/Pit	No.					BH04	4	
Site	e Nan	ne	Ν	lorth	Irisł	h Sea	Arra	у													Sample No.										
Soi	l Deso	cription	В	rown	sanc	dy gra	velly	silty C	LAY.												Dep	oth, n	n				4.00				
Spe	ecime	en Reference				9		Specimen Depth			1	4			4 m				Sample Type				с								
Tes	st Me	thod	В	BS1377:Part 2:1990, clauses 9.2 and 9.5															KeyLAB ID						(	Caus	2022	0428	3		
	-	CLAY	ine	SILT ne Medium				arse		Fine			AND diun		С	oarse	•	Fi	ne		GRA Med	VEL ium	(	Coarse	•	COE	BLES		BOU	LDER	6
	100																														
	90	<b> </b>		+++								_					_					_						_			
	80																						1								
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	70																		/												_
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		125	+		100	)	_	0.0	6300	)			33				Sa	amp	le Pr	opo	rtior	IS				Т		%	dry n	าลรร	
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	╞──	0.425	╈		52		╢		2.65	1		/m3								nd tes	ting ir	n accor	dance	with BS	51377	7-2 :1	990 unl	ess no	ted bel	ow	
		0.3			50											1															
					46																										



Approved

43

33

0.15

0.063

							<del></del>
i c	CAUSEWAY	F	PARTICLE SIZE			Job Ref	21-1619
	GEOTECH		ANTICLE SILL .	DISTRICC.		Borehole/Pit No.	BH04
Site Na	ame	North Irish Sea A	Array			Sample No.	
Soil De	escription	Brown sandy grav	velly clayey SILT.			Depth, m	7.00
specim	nen Reference	9	Specimen Depth		7 m	m Sample Type	С
Гest М	Nethod	BS1377:Part 2:19	90, clauses 9.2 and 9.	.5		KeyLAB ID	Caus202204289
		SILT		SAND		GRAVEL	<u> </u>
	CLAY	SILT Fine Medium	Coarse Fine	SAND Medium	Coarse Fine		COBBLES BOULDERS
100							······
90							
80							
70							
60	, <del>     </del>					1	
50	,					+++++++++++++++++++++++++++++++++++++++	
40							
30							
20	' <b> </b>						
10	,						
0							
U	0.001	0.01	0.1	Particle	1 e Size mm	10	100 100
F	S	ieving	Sedime	ntation	_ Dr	ry Mass of sample, g	2834
Pa	Particle Size mm	<u> </u>	Particle Size mm	% Passing			
$\vdash$	125 90	100 100	0.06300 0.04875	27 25	Sample P Cobbles	Proportions	% dry mass 0.0
F	90 75	100	0.03492	25	Gravel		47.2
F	63	100	0.02532	19	Sand		26.3
$\vdash$	50 37.5	100	0.01823 0.00958	16 13	Silt Clay		<u> </u>
$\vdash$	28	92	0.00958	13	Ciay		0.0
	20	85	0.00283	9	Grading A	Analvsis	1
	14	75	0.00152	5	D100	mm	1
	10	68	<b>1</b>	í The second sec	D60	mm	
	6.3	62	1	í	D30	mm	
	5	59	<b>1</b> г	í	D10	mm	
	3.35	56	1	í		ty Coefficient	1400
	-	50		4			0.35

Remarks

Curvature Coefficient

Preparation and testing in accordance with BS1377-2 :1990 unless noted below



0.35

Approved

53

51

47

45

43

40

36

27

Particle density

2.65

(assumed)

Mg/m3

2

1.18

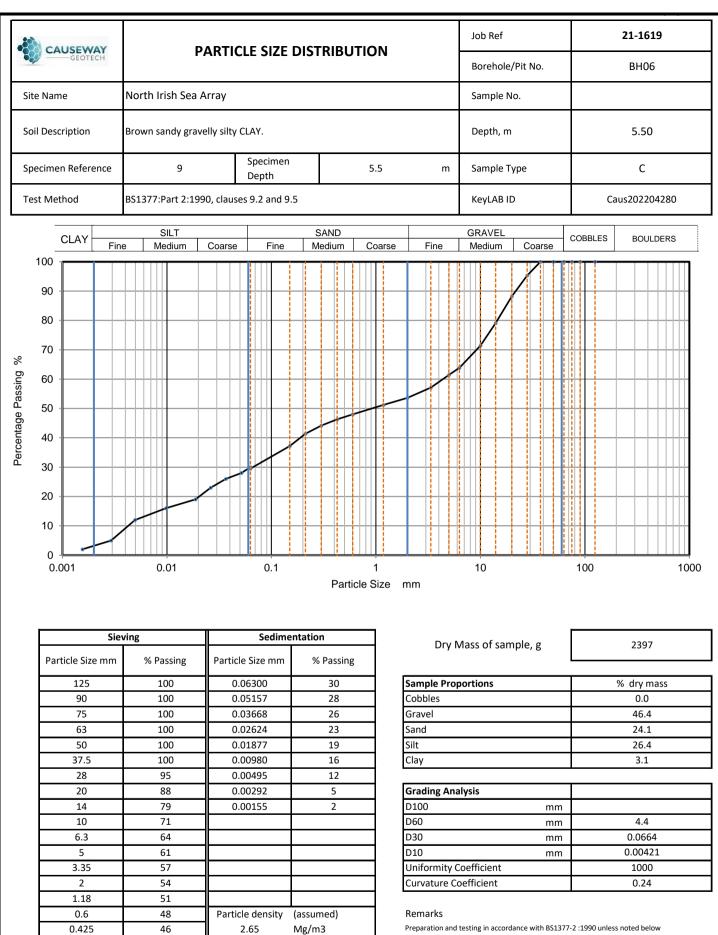
0.6

0.425

0.3

0.212 0.15

0.063



Preparation and testing in accordance with BS1377-2 :1990 unless noted below



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44

41

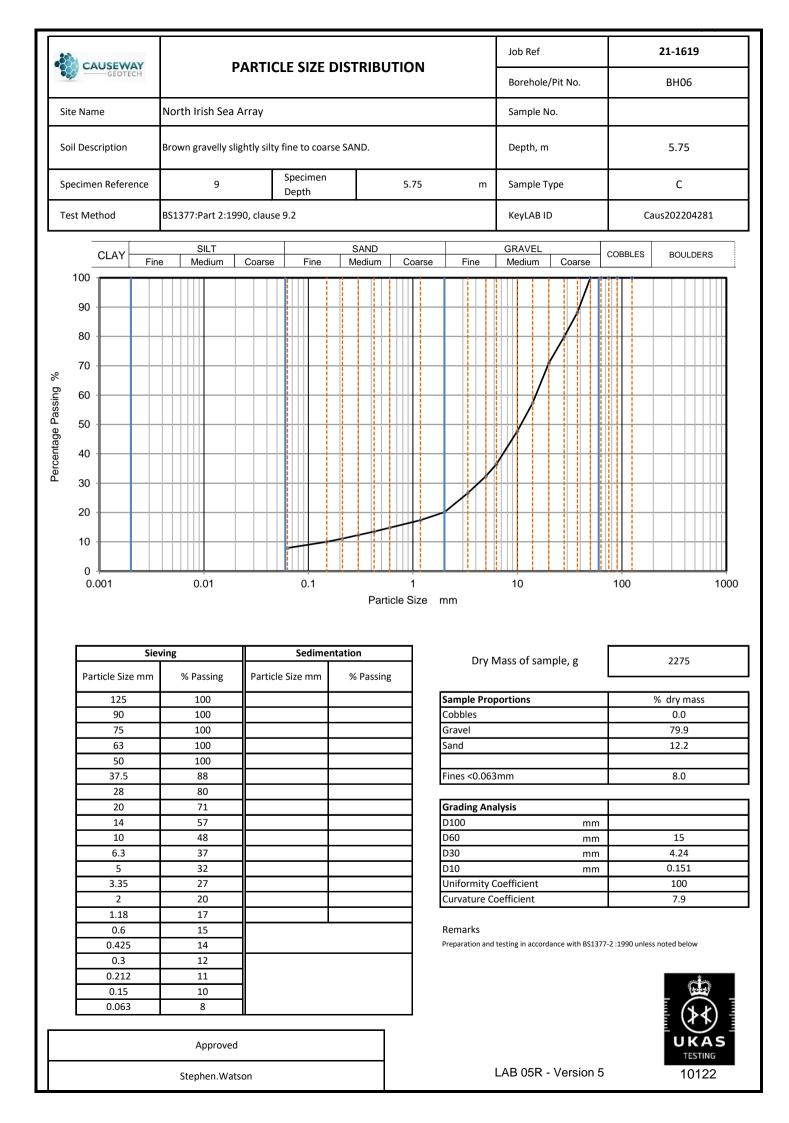
37

30

0.3 0.212

0.15

0.063



Ster Name         North Irish Sea Array         Sample No.           Sold Description         Brown sandy slightly gravely silty CLAY.         Depth, m         6.13           Specimen Reference         9         Specimen         Specimen         Supple Type         C           Test Method         B1377/Part 2:1390, clauses 9.2 and 9.5         KeyLAB ID         Caus202204/282           CLAV         Fine         Modum         Coarse         Fine         Modum         Coarse         Communication         Bioucos           00         Output         Fine         Modum         Coarse         Fine         Modum         Coarse         Communication         Bioucos         Coarse         Communication         Bioucos         Coarse         <	•	GEOTECH	Р	ARTICLE SIZE	DISTRIBUTION		Job Ref Borehole/Pit No.		<b>1-1619</b> BH06
Specimen         P         Specimen         C.13         n         Sample Type         C           Test Method         IB1377.Part 2:1990, (auses 9.2 and 9.5         Key AB ID         Caus20220222           CLAV         Fine         Medum         Coarse         Fine         Medum         Fine         Medum         Fine         Medum         Fine         Medum         Medum         Fine	Site	e Name	North Irish Sea /	Array					
Specimen neterence         9         Depth         0.13         m         Sample type         C           Test Method         B1377.Part 2:1990, clusses 9.2 and 9.5         Kry A8 ID         Caus202204282           CLAY         Fine         Medum         Coarse         Coarse         Fine         Medum         Coarse         Coarse         Coarse         Fine         Medum         Coarse         Fine         Medum         Coarse         Coarse         Coarse         Coarse         Coarse         Coarse         Coarse         Fine         Medum         Coarse         Fine         Medum         Coarse	Soi	l Description	Brown sandy sligh	tly gravelly silty CLAY			Depth, m		6.13
Test Method         B1377/Part 2:1990, dauses 9.2 and 9.5         KeyLAB ID         Caus20202282           CLAY         Fine         Medium         Coarse         Coerse         Coerse         Coerse         Coerse         Coerse         Fine         Medium         Coarse         Fine         Medium	Spe	ecimen Reference	9		6.13	m	Sample Type		С
LLV         Fine         Medium         Coarse         Fine         Medium         Coarse         Units         BOUDERS           100         0	Tes	st Method	BS1377:Part 2:199		5		KeyLAB ID	Caus	202204282
No         Sectimentation           0		CLAY		Coorea Fina		Fine		COBBLES	BOULDERS
Second         Second<		FI	ne Medium	Coarse Fine	Medium Coarse	Fine	Medium Coarse		
No         Sectimentation           125         100         0.03939         44           75         100         0.03939         44           75         100         0.03939         44           75         100         0.03939         44           75         100         0.02832         37           50         100         0.0149         17           10         94         10         10.25           11.8         81         10           1.18         81         10           0.6         78         Particle density (asumed)           1.18         81         1           0.212         70         0.0149           0.15         64         10									
Seving         Sedimentation           Particle Size mm         N Particle Size mm           N         Particle Size mm		80				-			
Serving         Sedimentation           Particle Size mm         0           10         0.01           90         100           0.001         0.03337           90         100         0.04339           113         0.00252         17           10         0.00477         29           28         100         0.00477           28         100         0.00477           10         94         10           11.18         81           2.13         76           0.425         76           0.215         64		70							
Sieving         Sedimentation           Particle Size mm         0.0         0.0         0.0         0.0         0.0           Variable Size mm         % Passing         Particle Size mm         0.0         0.0         0.0           125         100         0.06300         48         0.0		60		/					
Sieving         Sedimentation           Particle Size mm         0.0         0.0         0.0         0.0         0.0           Variable Size mm         % Passing         Particle Size mm         0.0         0.0         0.0           125         100         0.06300         48         0.0	>	50							
Sieving         Sedimentation           Particle Size mm         0.0         0.0         0.0         0.0         0.0           Variable Size mm         % Passing         Particle Size mm         0.0         0.0         0.0           125         100         0.06300         48         0.0		40							
Image: second		30							
0       0.01       0.1       0.1       1       10       10       10       10         Particle Size mm         125       100       0.06300       48       0       0.0       0.0       508         125       100       0.06330       48       0       0.0       508       0       0         125       100       0.06330       48       0       0.0       0.0       0		20							
0.01       0.1       1       1       10       100       100       100         Particle Size mm         Particle Size mm       % Passing       Particle Size mm       % Passing         125       100       0.06300       48         90       1000       0.04939       44         75       100       0.03537       40         63       100       0.02532       37         50       100       0.00947       29         28       100       0.00479       25         20       1000       0.00280       21         14       97       0.00149       17         10       94		10							
Sieving         Sedimentation           Particle Size mm         % Passing           125         100         0.06300         48           90         100         0.04939         44           75         100         0.03537         40           63         100         0.02532         37           50         100         0.00479         25           20         100         0.00479         25           20         100         0.00280         21           14         97         0.00149         17           100         94         100         19.2           3.35         88         100         0.00280         21           1.14         97         0.00149         17         100         mm           0.6         78         Particle density (assumed)         100         mm         0.014           1.18         81         100         100         mm         1010         mm           0.6         78         Particle density (assumed)         0.3         74         0.25         76         2.65         Mg/m3           0.15         64         0.15         54         10			0.01	0.1	<u> </u>		10	100	100
Particle Size mm         % Passing         Particle Size mm         % Passing           125         100         0.06300         48           90         100         0.04939         44           75         100         0.03537         40           63         100         0.02532         37           50         100         0.002532         37           50         100         0.00497         29           28         100         0.00280         21           14         97         0.00149         17           10         94         10         19.2           335         88         100         0.1149           1.18         81         100         0.0149           0.6         78         Particle density (assumed)         2.65 Mg/m3           0.3         74         0.212         70           0.15         64         1         1					Particle Size	mm			
125         100         0.06300         48           90         100         0.04939         44           75         100         0.03537         40           63         100         0.02532         37           50         100         0.01813         33           37.5         100         0.00947         29           28         100         0.00479         25           20         100         0.00280         21           14         97         0.00149         17           10         94         100         119           6.3         92         100         0.0149           1.18         81         100         119           0.6         78         Particle density (assumed)         0.425           0.425         76         2.65         Mg/m3           0.15         64         1         1		Si	eving	Sedime	ntation	Dry I	Vass of sample, g		508
90         100         0.04939         44           75         100         0.03537         40           63         100         0.02532         37           50         100         0.01813         33           37.5         100         0.00947         29           28         100         0.00280         21           14         97         0.00149         17           6.3         92         100         0.0149           6.3         92         100         0.0149           5         91         100         0.0149           6.3         92         100         0.0149           1.18         81         100         0.0149           1.18         81         100         0.0114           0.6         78         Particle density (assumed)         2.65         Mg/m3           0.3         74         0.212         70         0.15         64		Particle Size mm	% Passing	Particle Size mm	% Passing				
75         100         0.03537         40           63         100         0.02532         37           50         100         0.01813         33           37.5         100         0.00947         29           28         100         0.00479         25           20         100         0.00280         21           14         97         0.00149         17           10         94							portions	%	
50         100         0.01813         33           37.5         100         0.00947         29           28         100         0.00479         25           20         100         0.00280         21           14         97         0.00149         17           10         94         0.0119         17           6.3         92         0.0114           5         91         0.0114           3.35         88         0.0114           2         83         0.0114           1.18         81         0.0114           0.6         78         Particle density (assumed)         2.65           0.3         74         2.65         Mg/m3									
37.5       100       0.00947       29         28       100       0.00479       25         20       100       0.00280       21         14       97       0.00149       17         10       94       10       10         6.3       92       10       100         5       91       10       100         3.35       88       100       0.0114         1.18       81       100       100       100         0.6       78       Particle density (assumed)       2.65       Mg/m3         0.3       74       2.65       Mg/m3       Preparation and testing in accordance with BS1377-2 :1990 unless noted below		63							
28       100       0.00479       25         20       100       0.00280       21         14       97       0.00149       17         10       94       17         6.3       92       100         5       91       100         3.35       88       100         1.18       81       100         0.6       78       Particle density (assumed)         0.3       74       2.65         0.15       64       Kemarks									
20       100       0.00280       21         14       97       0.00149       17         10       94       10       10         6.3       92       10       10         5       91       10       0.0149         3.35       88       10       10         1.18       81       10         0.6       78       Particle density (assumed)         0.425       76       2.65         0.3       74       70         0.15       64       Kemarks						Clay			19.2
14       97       0.00149       17         10       94           6.3       92           6.3       92           5       91           3.35       88           2       83           1.18       81           0.6       78       Particle density (assumed)           0.3       74        2.65       Mg/m3          0.15       64						Grading An	alvsis		
10       94       Image: mark set of the start set of the s									
5       91       Image: model with the second secon		10	94			D60			0.119
3.35       88       Image: Mark Solution of the state of the			92				mm		0.0114
2     83     Image: Curvature Coefficient       1.18     81     Image: Curvature Coefficient       0.6     78     Particle density (assumed)       0.6     76     2.65       0.3     74       0.212     70       0.15     64				II					
1.18         81         Particle density         (assumed)           0.6         78         Particle density         (assumed)           0.425         76         2.65         Mg/m3           0.3         74         Preparation and testing in accordance with BS1377-2:1990 unless noted below           0.212         70         Image: Construct of the second seco		5		1		I Initormity (	Loefficient	1	
0.6         78         Particle density (assumed)         Remarks           0.425         76         2.65         Mg/m3           0.3         74		5 3.35	88						
0.425         76         2.65         Mg/m3         Preparation and testing in accordance with BS1377-2:1990 unless noted below           0.3         74		5 3.35 2	88 83						
0.3         74           0.212         70           0.15         64		5 3.35 2 1.18	88 83 81	Particle density	(assumed)	Curvature C			
0.15 64		5 3.35 2 1.18 0.6	88 83 81 78			Curvature C Remarks	oefficient	77-2 :1990 unless no	ted below
		5 3.35 2 1.18 0.6 0.425	88 83 81 78 76			Curvature C Remarks	oefficient	77-2 :1990 unless no	ted below
		5 3.35 2 1.18 0.6 0.425 0.3 0.212	88 83 81 78 76 74 70			Curvature C Remarks	oefficient	7-2 :1990 unless no	ted below

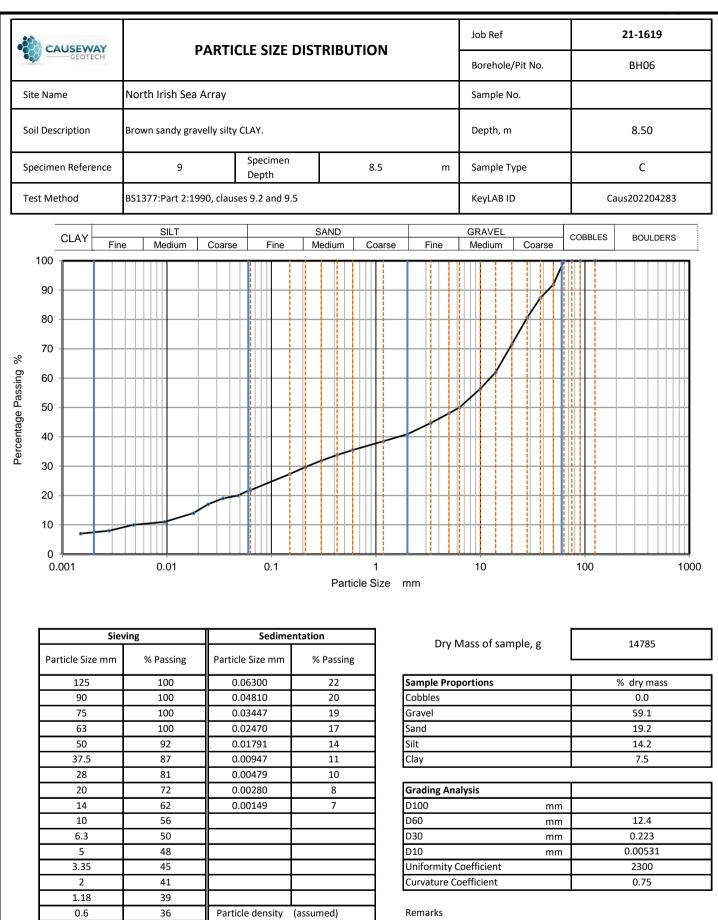
LAB 05R - Version 5

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TESTING

10122

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Remarks

Preparation and testing in accordance with BS1377-2 :1990 unless noted below



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2.65

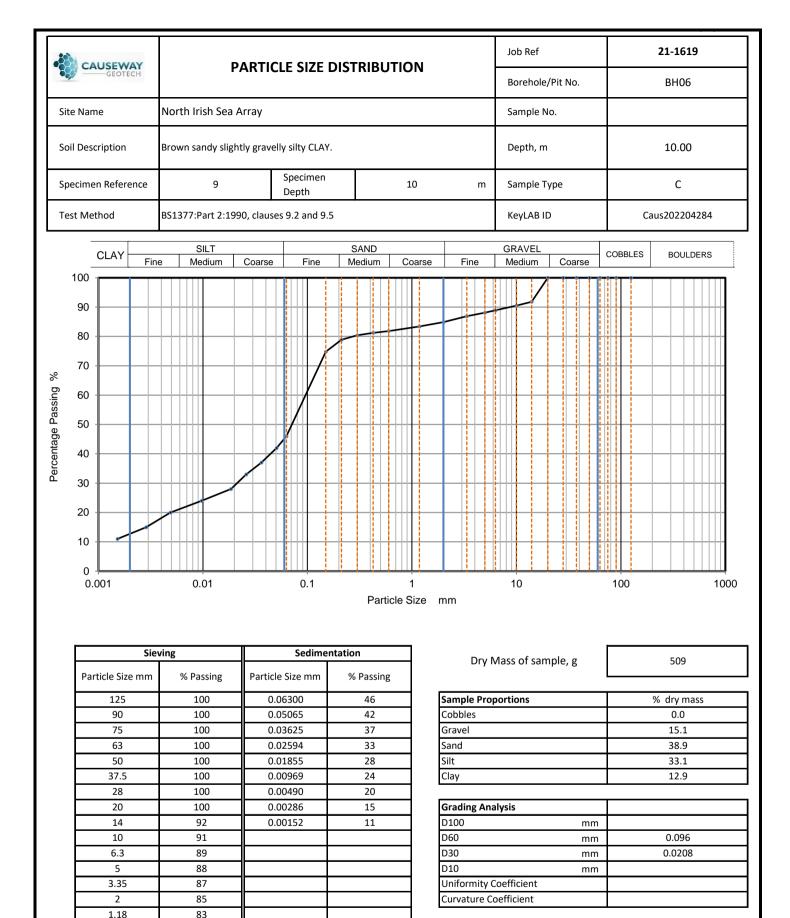
Mg/m3

0.425

0.3 0.212

0.15

0.063



Remarks

Preparation and testing in accordance with BS1377-2 :1990 unless noted below



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82

81

80

79

75

46

Particle density

2.65

(assumed)

Mg/m3

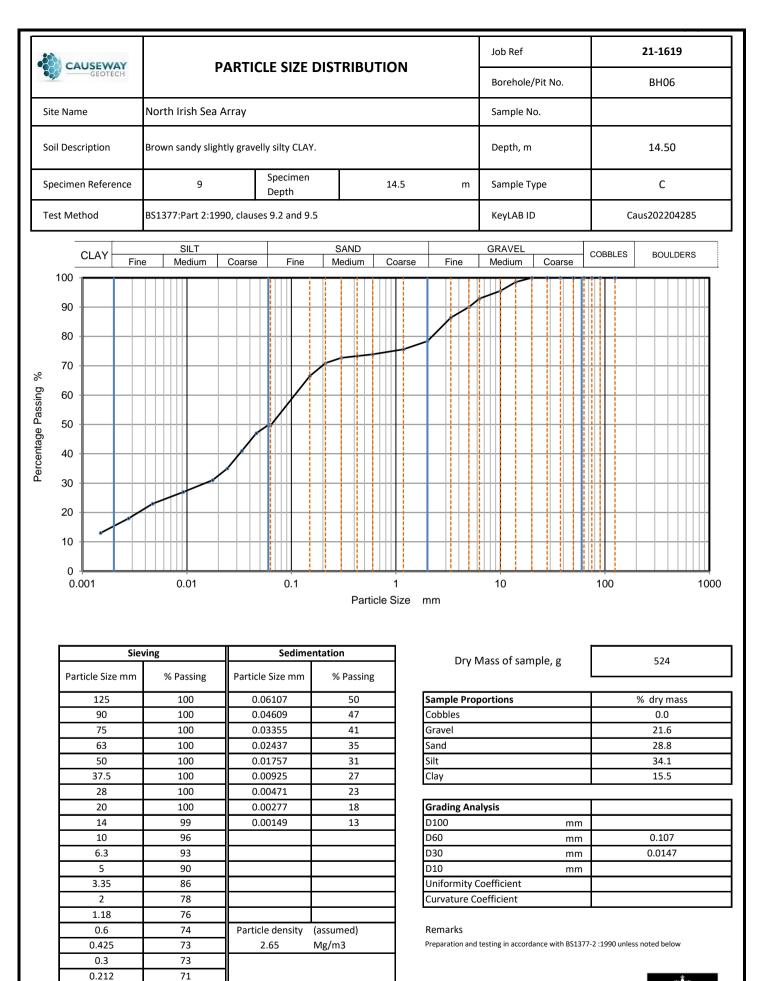
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0.425

0.3

0.15

0.063





Stephen.Watson

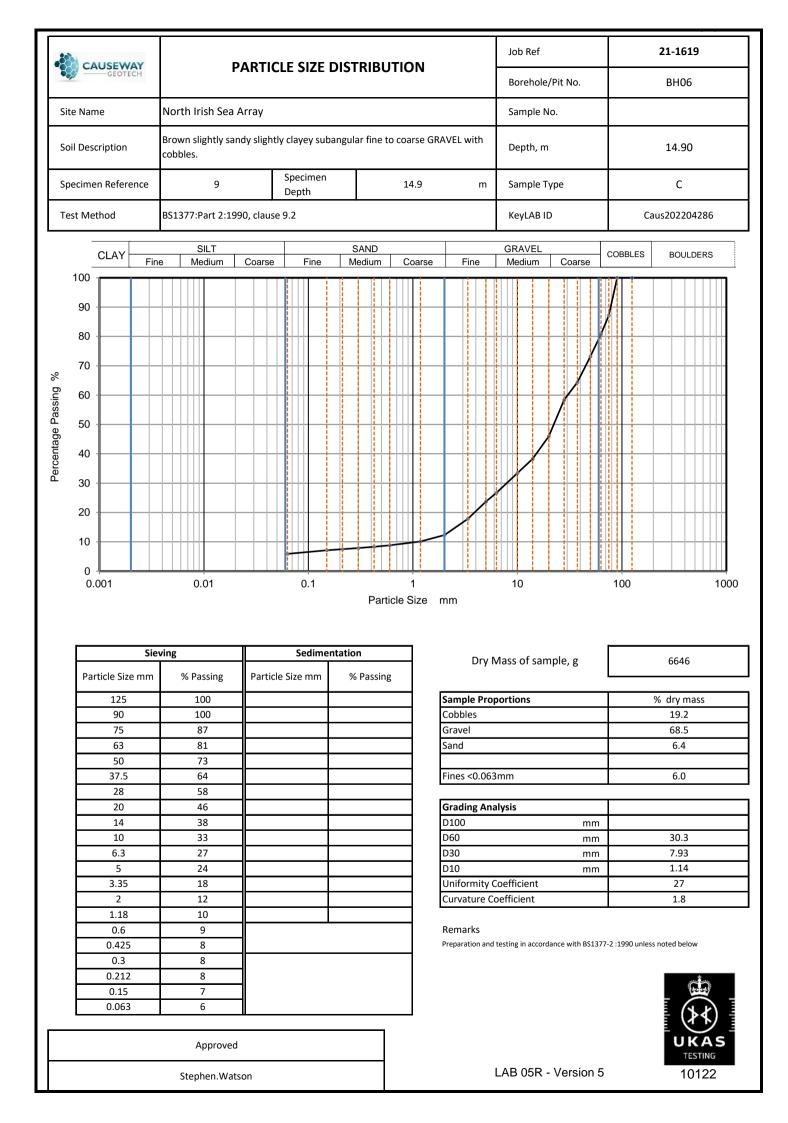
Approved

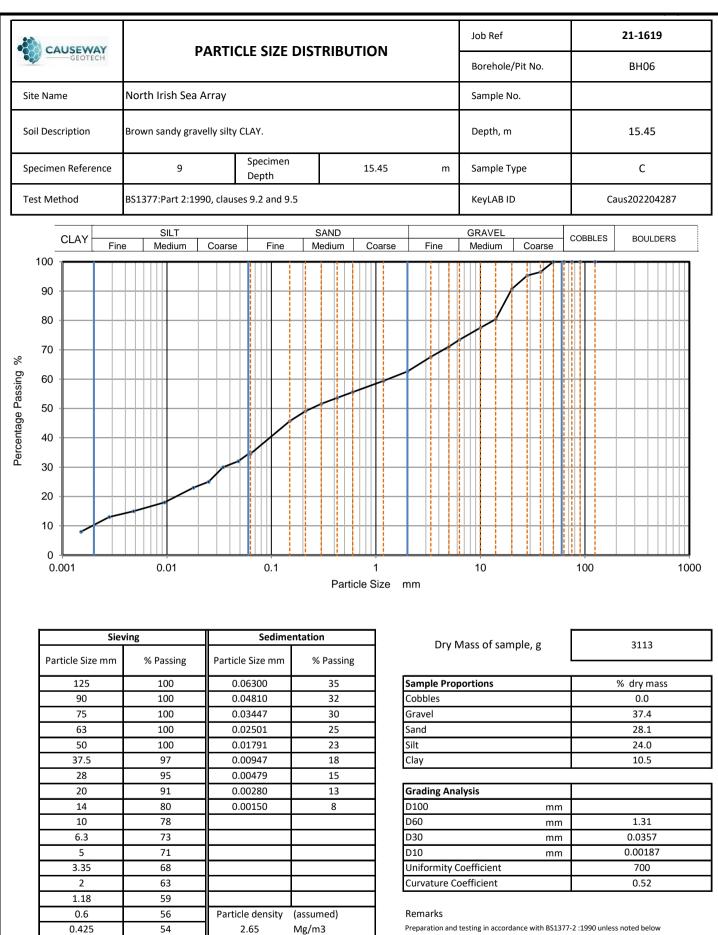
67

50

0.15

0.063





Preparation and testing in accordance with BS1377-2 :1990 unless noted below



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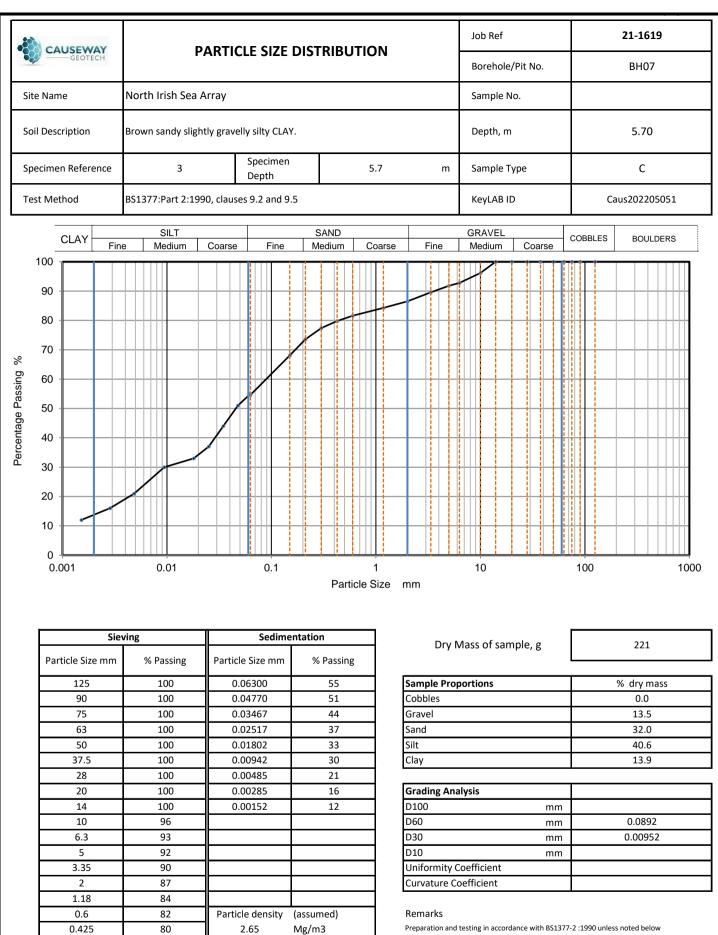
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0.3

0.212 0.15

0.063

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Preparation and testing in accordance with BS1377-2 :1990 unless noted below



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77

74

68

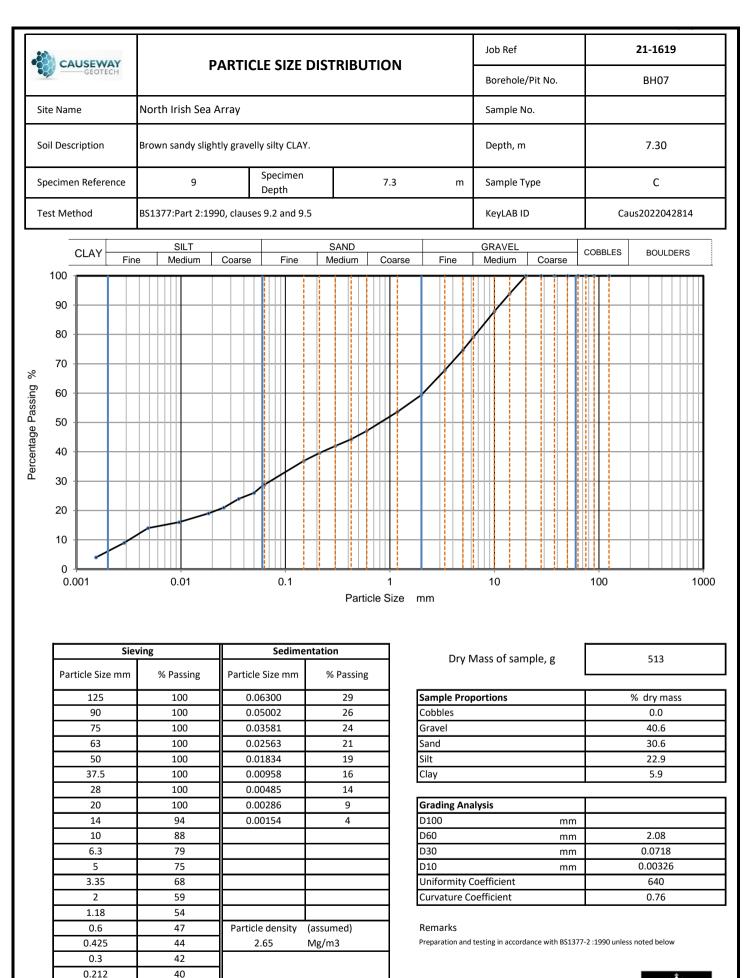
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0.3

0.212 0.15

0.063

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29

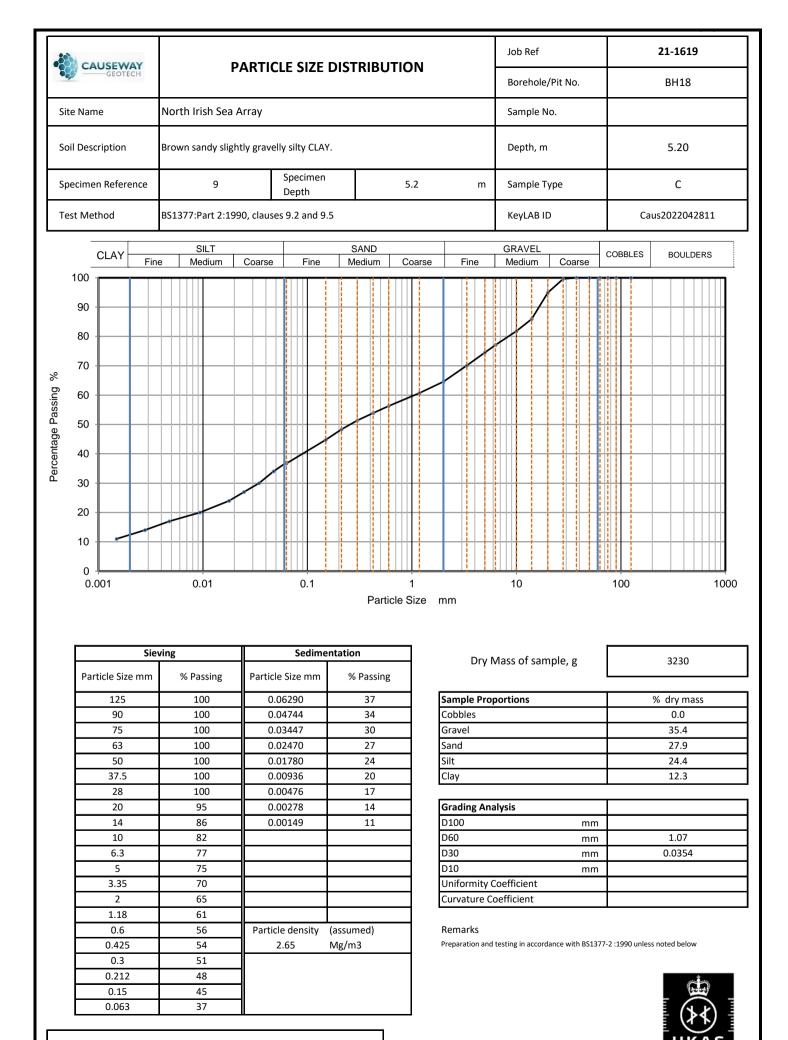
0.212

0.063

Exercision         PARTICLE SIZE DISTRIBUTION         Burchol/PR No.         BH18           Site Name         North Irish Sea Array         Sample No.         Depth, m         3.70           Specimen         Brown sandy gravely sitty CuV.         Depth, m         3.70         Sample Type         C           Test Method         RS1377.Part 2:1990, clauses 9.2 and 9.5         KeyLAB ID         Caus202024281D           Vulner         Test Method         RS1377.Part 2:1990, clauses 9.2 and 9.5         KeyLAB ID         Caus202024281D           Vulner         Test Method         RS1377.Part 2:1990, clauses 9.2 and 9.5         KeyLAB ID         Caus20204281D           Vulner         Test Method         RS1377.Part 2:1990, clauses 9.2 and 9.5         KeyLAB ID         Caus20204281D           Vulner         Test Method         Cause         Test Method         Cause         Counce           00         Out         Out         Test Method         Cause         Counce         Counce         Counce           00         Out         Out         Test Method         Cause         Counce	-23	CAL	USEWA	Y				דו ופוסדסוח			Job Ref			21-1619
Soil Description         Brown sandy gravelly silty CLY.         Depth         3.7         Depth, m         3.70           Specimen Reference         9         Specimen         3.7         m         Sample Type         C           Test Method         B1377/Part 2:1990, cluuces 9.2 and 9.5         KeyLAB ID         Cuus2022042810           Image: Specimen Reference         9         Specimen Reference         Course Course         Fire         Medium         Course         Course C	18			-1		ANTIC					Borehole/	Pit No.		BH18
Spectmen Reference         9         Specimen Depth         3.7         Sample Type         C           Test Method         B31377.Part 2:1990, clauses 9.2 and 9.5         KeyLAB ID         Cause2022042810           CLAV         Fine         Medium         Coarse         Fine         Medium         Coarse         Coarse         Coarse         Coarse         Fine         Medium         Coarse         Fine         Medium         Coarse         Coarse         Coarse         Coarse         Fine         Medium         Coarse         Coarse         Coarse         Coarse         Fine         Medium         Coarse         Coarse         Coarse         Fine         Medium         Coarse         Coarse         Coarse         Coarse         Fine         Medium         Coarse         Fine         Medium         Coarse	Sit	e Nam	е		North Irish Sea	Array			Sample N	0.				
Specimen network         9         Depth         3.7         m         Sample Type         C           Test Method         851377.Part 21990, clauses 9.2 and 9.5         KeyLAB ID         Caus202202310           CLAV         Fine         Medium         Coarse         Fine         Medium         Coarse         Coar	So	il Descr	ription		Brown sandy gra	velly silty C	CLAY.				Depth, m			3.70
Test Method         B1377-Part 2:1980, dauses 9.2 and 9.5         KeyLAB ID         Cuu20202810           CLAV         File         Medium         Coarse         Coarse         File         Medium         Coarse         Coarse         File         Medium         Coarse         File         Medium <t< td=""><td>Sp</td><td>ecimer</td><td>n Referen</td><td>се</td><td>9</td><td></td><td></td><td>n</td><td>3.7</td><td>m</td><td>Sample Ty</td><td>/pe</td><td></td><td>С</td></t<>	Sp	ecimer	n Referen	се	9			n	3.7	m	Sample Ty	/pe		С
LLAT         Fine         Medium         Coarse         Fine         Medium         Coarse         Umails         BOUDES           100         0	Te	st Metl	hod		BS1377:Part 2:19	990, clause		9.5			KeyLAB ID	)	Ca	aus2022042810
Image         Medium         Coarse         Image         Medium         Coarse           100         0 <t< td=""><td></td><td>(</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>COBBLES</td><td>BOULDERS</td></t<>		(											COBBLES	BOULDERS
Sieving         Sedimentation           125         100         0.0300         19           90         100         0.0530         19           90         100         0.05327         17           125         100         0.03547         16           125         100         0.03547         16           125         100         0.03547         16           125         100         0.03547         16           125         100         0.03547         16           125         100         0.02534         13           20         75         0.00253         13           20         75         0.00253         13           20         75         0.00233         9           10         53         12.0         12.5           118         30         12.5         100           0.425         2.65         Mg/m3         100         10.5           118         30         1.25         100         100         100           118         30         1.25         100         100         100           118         30         1.25 <t< td=""><td></td><td>_</td><td></td><td>Fin</td><td>e Medium</td><td>Coarse</td><td>Fine</td><td>Medium</td><td>Coarse</td><td>Fine</td><td>Medium</td><td>Coarse</td><td></td><td></td></t<>		_		Fin	e Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse		
Sieving         Sedimentation           0		90 -												
No         Set/ing         Set/inc         Set/inc <thset inc<="" th=""> <thset inc<="" th=""> <thset in<="" td=""><td></td><td>80 -</td><td></td><td>_</td><td></td><td></td><td></td><td>+  i +  i   +</td><td></td><td></td><td></td><td></td><td></td><td></td></thset></thset></thset>		80 -		_				+  i +  i   +						
Sieving         Sedimentation           Particle Size mm         % Passing           90         0           90         0           90         0           00         0.01           0.01         0.01           0.02         0.01           0.001         0.02           0.002         0.000           0.001         0.0000           0.001         0.00000           0.001         0.000000	ź	70 -									/			
30       0		60 -	0											
30       0		50 -		_										
30       0		40 -		_							/			
10       0.01       0.1       1       10       100       100       100         Particle Size mm       National Size mm         National Size mm       National Size mm       National Size mm       National Size mm       National Size mm         National Size mm       National Size mm       National Size mm       National Size mm       National Size mm         125       100       0.05300       19       Size mm       National Size mm       National Size mm         125       100       0.05127       17       Size mm       National Size mm       National Size mm         37.5       92       0.01845       11       Size mm       Size mm       Size mm       Size mm         10       53       0.00152       5       Size mm       Size mm       Size mm       Size mm         10       53       40       0.00152       Size mm       Size mm       Size mm       Size mm       Size mm         11.18       30       0.00152       Size mm       Size	ופור	30 -		_						-				
0       0.01       0.1       1       1       10       100       100         Particle Size mm         125       100       0.06300       19         90       100       0.05127       17         75       100       0.03647       16         63       100       0.02594       15         50       92       0.01845       14         20       75       0.00238       9         14       63       0.00152       5         10       53       10       12.5         10       53       10       12.5         10       53       11         14       63       0.00152         5       40       11         118       30       11         0.6       28       Particle density (assumed)         0.425       27       2.5       Mg/m3         0.3       22       12.5       Mg/m3		20 -		_										
Sieving       Sedimentation         Particle Size mm       Particle Size mm         Sieving       Particle Size mm         125       100       0.05300       19         90       100       0.05127       17         75       100       0.03647       16         63       1000       0.02594       15         50       92       0.01845       14         37.5       92       0.00958       13         20       75       0.00239       9         14       63       0.00152       5         100       53       10       12.8         5.5       40       10         1.18       30       10         0.425       27       2.65         0.3       25       10.1       3300         0.425       27       2.65       Mg/m3         0.212       24       0.15       22         0.212       24       0.15       22		10 -												
Sieving       Sedimentation         Particle Size mm       % Passing         Particle Size mm       % Passing         90       100       0.05127         90       100       0.05127         75       100       0.03647         63       100       0.02594         50       92       0.01845         0.37.5       92       0.00958         14       63       0.00152         6.3       42				-										
Particle Size mm         % Passing         Particle Size mm         % Passing           125         100         0.06300         19           125         100         0.05127         17           63         100         0.03647         16           63         100         0.02594         15           50         92         0.01845         14           63         0.00         13.9           50         92         0.00958         13           20         75         0.00283         9           14         63         0.00152         5           10         53         1         060           5         40         10         53           6.3         42         10           1.18         30         10           0.6         28         Particle density (assumed)           0.425         27         2.65         Mg/m3           0.3         25         0.212         24           0.15         22         1         1			001		0.01		0.1		-	mm	10		100	10
90         100         0.05127         17           75         100         0.03647         16           63         100         0.02594         15           50         92         0.01845         14           37.5         92         0.00958         13           28         84         0.00485         11           20         75         0.00283         9           14         63         0.00152         5           10         53         0         100           5         40         0         10           5         40         0         10           2         33         0         100           1.18         30         0         100           0.6         28         Particle density (assumed)         2.65           0.212         24         0.15         22			001	Sie				Partic	-				100	
75         100         0.03647         16           63         100         0.02594         15           50         92         0.01845         14           37.5         92         0.00958         13           28         84         0.00485         11           20         75         0.00283         9           14         63         0.00152         5           10         53		0.0			ving	Particle	Sedim	Partic	-			iple, g	100	
63         100         0.02594         15           50         92         0.01845         14           37.5         92         0.00958         13           28         84         0.00485         11           20         75         0.00283         9           14         63         0.00152         5           10         53		0.0	ticle Size r		ving % Passing		<b>Sedim</b> e Size mm	Partic entation % Passing	-	Dry I	Mass of sam	iple, g		4533
50       92       0.01845       14         37.5       92       0.00958       13         28       84       0.00485       11         20       75       0.00283       9         14       63       0.00152       5         10       53       0       10         5       40       0       105         3.35       36       0       105         1.18       30       0       0.00387         0.6       28       Particle density (assumed)       2.65         0.212       24       0.15       22		0.0	ticle Size r 125 90		ving % Passing 100 100	0.0	<b>Sedim</b> e Size mm 06300 05127	entation % Passing 19 17	-	Dry N Sample Pro Cobbles	Mass of sam	iple, g		4533 % dry mass 0.0
37.5       92       0.00958       13         28       84       0.00485       11         20       75       0.00283       9         14       63       0.00152       5         10       53       1       100       53         6.3       42       1       100       1.05         5       40       1       1.05       100       1.05         1.18       30       1       1.18       300       1         0.6       28       Particle density (assumed)       2.65       Mg/m3       1         0.3       25       27       2.65       Mg/m3       Preparation and testing in accordance with B51377-2:1990 unless noted below		0.0	ticle Size r 125 90 75		ving % Passing 100 100 100	0.0	<b>Sedim</b> e Size mm 06300 05127 03647	entation % Passing 19 17 16	-	Dry N Sample Prop Cobbles Gravel	Mass of sam	iple, g		4533 % dry mass 0.0 67.4
20       75       0.00283       9         14       63       0.00152       5         10       53		0.0	ticle Size r 125 90 75 63		ving % Passing 100 100 100 100	0.0	<b>Sedim</b> e Size mm 06300 05127 03647 02594	entation % Passing 19 17 16 15	-	Dry N Sample Prop Cobbles Gravel Sand	Mass of sam	iple, g		4533 % dry mass 0.0 67.4 13.9
14       63       0.00152       5         10       53       1       1         6.3       42       1       10         5       40       1       10         3.35       36       1       10         2       33       1       10         1.18       30       1       10         0.6       28       Particle density (assumed)       2.65         0.3       25       27       2.65       Mg/m3         0.15       22       24       1       1		0.0	ticle Size r 125 90 75 63 50 37.5		ving % Passing 100 100 100 100 92 92 92	0.0 0.0 0.0 0.0 0.0 0.0	Sedim e Size mm 06300 05127 03647 02594 01845 00958	Partic Partic % Passing 19 17 16 15 14 13	-	Dry N Sample Prop Cobbles Gravel Sand Silt	Mass of sam	iple, g		4533 % dry mass 0.0 67.4 13.9 12.0
10       53       Image: mark stress of the stress		0.0	ticle Size r 125 90 75 63 50 37.5 28		ving % Passing 100 100 100 100 92 92 92 84	0.0 0.0 0.0 0.0 0.0 0.0 0.0	Sedim e Size mm 06300 05127 03647 02594 01845 00958 00485	Partice Par	-	Dry N Sample Prop Cobbles Gravel Sand Silt Clay	Mass of sam	iple, g		4533 % dry mass 0.0 67.4 13.9 12.0
6.3       42       Image: mark stress of the stress		0.0	ticle Size r 125 90 75 63 50 37.5 28 20		ving % Passing 100 100 100 92 92 92 84 75		Sedim e Size mm 06300 05127 03647 02594 01845 00958 00485 00485	entation % Passing 19 17 16 15 14 13 11 9	-	Dry N Sample Prop Cobbles Gravel Sand Silt Clay Grading Ana	Mass of sam			4533 % dry mass 0.0 67.4 13.9 12.0
5       40       Image: model of the system of the		0.0	ticle Size r 125 90 75 63 50 37.5 28 20 14		ving % Passing 100 100 100 100 92 92 84 84 75 63		Sedim e Size mm 06300 05127 03647 02594 01845 00958 00485 00485	entation % Passing 19 17 16 15 14 13 11 9	-	Dry N Sample Prop Cobbles Gravel Sand Silt Clay Grading Ana D100	Mass of sam	mm		4533 % dry mass 0.0 67.4 13.9 12.0 6.7
2       33       Image: Curvature Coefficient       22         1.18       30       Image: Curvature Coefficient       22         0.6       28       Particle density (assumed)       Remarks         0.425       27       2.65       Mg/m3         0.3       25       Image: Curvature Coefficient       22         0.212       24       Image: Curvature Coefficient       22		0.0	ticle Size r 125 90 75 63 50 37.5 28 20 14 10		ving % Passing 100 100 100 92 92 92 84 75 63 53		Sedim e Size mm 06300 05127 03647 02594 01845 00958 00485 00485	entation % Passing 19 17 16 15 14 13 11 9	-	Dry N Sample Prop Cobbles Gravel Sand Silt Clay D100 D60	Mass of sam	mm		4533 % dry mass 0.0 67.4 13.9 12.0 6.7 12.8
1.18         30         Remarks           0.6         28         Particle density (assumed)         Particle density (assumed)           0.425         27         2.65         Mg/m3           0.3         25         Preparation and testing in accordance with BS1377-2 :1990 unless noted below           0.15         22         Preparation and testing in accordance with BS1377-2 :1990 unless noted below		0.0	ticle Size r 125 90 75 63 50 37.5 28 20 14 10 6.3 5		ving % Passing 100 100 100 92 92 92 84 75 63 53 53 42 40		Sedim e Size mm 06300 05127 03647 02594 01845 00958 00485 00485	entation % Passing 19 17 16 15 14 13 11 9	-	Dry N Sample Proj Cobbles Gravel Sand Silt Clay D100 D60 D30 D10	Vlass of sam	mm mm		4533 % dry mass 0.0 67.4 13.9 12.0 6.7 12.8 1.05 0.00387
0.628Particle density 2.65(assumed) Mg/m3Remarks Preparation and testing in accordance with BS1377-2:1990 unless noted below0.3250.212240.1522		0.0	ticle Size r 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35		ving % Passing 100 100 100 92 92 92 84 75 63 53 42 40 36		Sedim e Size mm 06300 05127 03647 02594 01845 00958 00485 00485	entation % Passing 19 17 16 15 14 13 11 9	-	Dry N Sample Proj Cobbles Gravel Sand Silt Clay D100 D60 D30 D10 Uniformity (	Vlass of sam	mm mm		4533 % dry mass 0.0 67.4 13.9 12.0 6.7 12.8 1.05 0.00387 3300
0.425         27         2.65         Mg/m3         Preparation and testing in accordance with BS1377-2 :1990 unless noted below           0.3         25         0.212         24         0.15         22         0 <td></td> <td>0.0</td> <td>ticle Size r 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2</td> <td></td> <td>ving % Passing 100 100 100 92 92 92 84 75 63 53 42 40 40 36 33</td> <td></td> <td>Sedim e Size mm 06300 05127 03647 02594 01845 00958 00485 00485</td> <td>entation % Passing 19 17 16 15 14 13 11 9</td> <td>-</td> <td>Dry N Sample Proj Cobbles Gravel Sand Silt Clay D100 D60 D30 D10 Uniformity (</td> <td>Vlass of sam</td> <td>mm mm</td> <td></td> <td>4533 % dry mass 0.0 67.4 13.9 12.0 6.7 12.8 1.05 0.00387 3300</td>		0.0	ticle Size r 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2		ving % Passing 100 100 100 92 92 92 84 75 63 53 42 40 40 36 33		Sedim e Size mm 06300 05127 03647 02594 01845 00958 00485 00485	entation % Passing 19 17 16 15 14 13 11 9	-	Dry N Sample Proj Cobbles Gravel Sand Silt Clay D100 D60 D30 D10 Uniformity (	Vlass of sam	mm mm		4533 % dry mass 0.0 67.4 13.9 12.0 6.7 12.8 1.05 0.00387 3300
0.3         25           0.212         24           0.15         22		0.0	ticle Size r 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 2 1.18		ving % Passing 100 100 100 92 92 84 75 63 53 42 40 36 33 33 30		Sedim e Size mm 06300 05127 03647 02594 01845 00958 00485 00958 00485 00283 00152	Particle entation % Passing 19 17 16 15 14 13 11 9 5 	-	Dry N Sample Prop Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10 Uniformity C Curvature C	Vlass of sam	mm mm		4533 % dry mass 0.0 67.4 13.9 12.0 6.7 12.8 1.05 0.00387 3300
0.15 22		0.0	ticle Size r 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 3.35 2 1.18 0.6		ving % Passing 100 100 100 92 92 84 75 63 53 42 40 36 33 30 28	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Sedim e Size mm 06300 05127 03647 02594 01845 00958 00958 00485 00958 00152 00152 00152	Particle entation % Passing 19 17 16 15 14 13 11 9 5 5 10 10 10 10 10 10 10 10 10 10	-	Dry N Sample Prop Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10 Uniformity C Curvature C	Mass of sam	mm mm mm		4533 % dry mass 0.0 67.4 13.9 12.0 6.7 12.8 1.05 0.00387 3300 22
		0.0	ticle Size r 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6 0.425		ving % Passing 100 100 100 92 92 84 75 63 53 42 40 36 33 30 28 28 27	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Sedim e Size mm 06300 05127 03647 02594 01845 00958 00958 00485 00958 00152 00152 00152	Particle entation % Passing 19 17 16 15 14 13 11 9 5 5 10 10 10 10 10 10 10 10 10 10	-	Dry N Sample Prop Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10 Uniformity C Curvature C	Mass of sam	mm mm mm		4533 % dry mass 0.0 67.4 13.9 12.0 6.7 12.8 1.05 0.00387 3300 22
0.063 19		0.0	ticle Size r 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6 0.425 0.3		ving % Passing 100 100 100 92 92 92 84 75 63 53 63 53 63 53 42 40 36 33 30 28 27 25	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Sedim e Size mm 06300 05127 03647 02594 01845 00958 00958 00485 00958 00152 00152 00152	Particle entation % Passing 19 17 16 15 14 13 11 9 5 	-	Dry N Sample Prop Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10 Uniformity C Curvature C	Mass of sam	mm mm mm		4533 % dry mass 0.0 67.4 13.9 12.0 6.7 12.8 1.05 0.00387 3300 22
		0.0	ticle Size r 125 90 75 63 50 37.5 28 20 14 10 6.3 5 3.35 2 1.18 0.6 0.425 0.3 0.212 0.15		ving % Passing 100 100 100 92 92 92 84 75 63 53 63 53 63 53 42 42 40 36 33 30 28 27 25 24 24 22	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Sedim e Size mm 06300 05127 03647 02594 01845 00958 00958 00485 00958 00152 00152 00152	Particle entation % Passing 19 17 16 15 14 13 11 9 5 	-	Dry N Sample Prop Cobbles Gravel Sand Silt Clay Grading Ana D100 D60 D30 D10 Uniformity C Curvature C	Mass of sam	mm mm mm		4533 % dry mass 0.0 67.4 13.9 12.0 6.7 12.8 1.05 0.00387 3300 22

Stephen.Watson

LAB 05R - Version 5



LAB 05R - Version 5

10122

Approved

Stephen.Watson



# LABORATORY REPORT



4043

## Contract Number: PSL22/3162

Report Date: 24 May 2022

Client's Reference: 21-1619

Client Name: Causeway Geotech 8 Drumahiskey Road Ballymoney Co.Antrim BT53 7QL

#### For the attention of: Stephen Watson

Contract Title: North Irish Sea Array (NISA)

Date Received:4/5/2022Date Commenced:4/5/2022Date Completed:24/5/2022

### Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

A Watkins (Director) R Berriman (Quality Manager) S Royle (Laboratory Manager)

D Burton (Advanced Testing Manager)

L Knight (Senior Technician) S Eyre (Senior Technician)

Page 1 of

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#### Summary Report

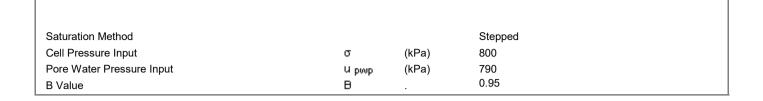
Sample Details	Depth Description Type	7.00-7.30m Brown gravelly sandy CLAY. Undisturbed, vertical orientation.								
sketch showing specimen location in original sample	Initial Sample Length Initial Sample Diameter Initial Sample Weight Initial Bulk Density Particle Density	Lo Do Wo Po Ps	(mm) (mm) (gr) (Mg/m3) (Mg/m3)	140.0 70.1 1115.0 2.06 2.66						
Initial Conditions				Stage 1	2	3	4			
Initial Cell Pressure		σ3i	(kPa)	850	900	1000				
Initial Back Pressure		υы	(kPa)	800	800	800				
Membrane Thickness		ть	(mm)	0.600						
Displacement Input		LIP	(mm)	CH 2						
Load Input		N IP	(N)	CH 1						
Pore Water Pressure Input		Ա բաթ	(kPa)	CH 3						
Sample Volume		v	(cc)	CH 2						
Initial Moisture		ωi	(%)	11						
Initial Dry Density		ρdi	(Mg/m3)	1.86						
Initial Voids Ratio		ei		0.432						
Initial Degree of Saturation		Si	(%)	68						
B Value		В	-	0.95						
Final Conditions										
Final Moisture		ωf	(%)	15						
Final Dry Density		ρdf	(Mg/m3)	1.95						
Final Voids Ratio		ef		0.367						
Final Degree of Saturation		Sf	(%)	100.0						
				Stage 1 Max. Dev.	2 Max. Dev.	3 Max. Dev.	4			
Failure Criteria			•	Stress	Stress	Stress				
Strain At Failure		δf /	(%) (/-D)	0.93	8.01	19.85				
Stress At Failure		(σ1-σ3) σο'	. ,	54.7	110.3	336.6				
Minor Stress At Failure		σ3' σ.'	(kPa)	13.3	36.2	127.0				
Major Stress At Failure		σ1' σ1'/σ3'	(kPa)	68.0 5.111	146.5 4.048	463.6 3.650				
Principal Stress Ratio At Failure										

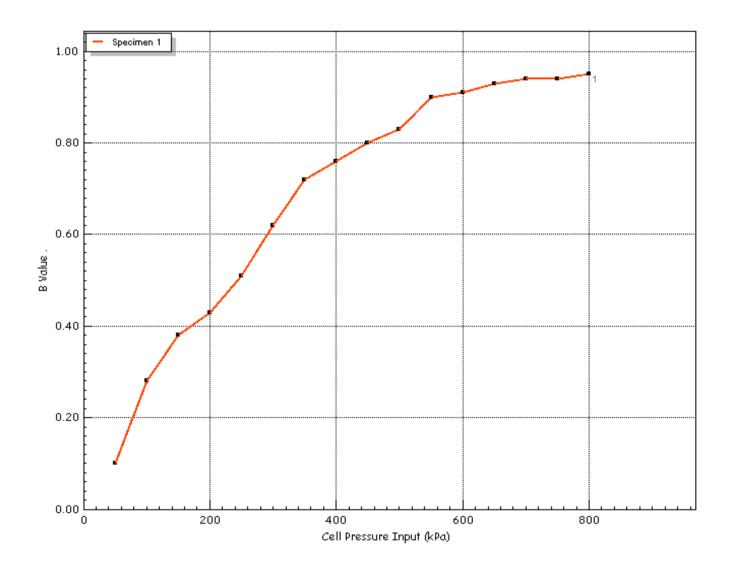


- (H)	Test Method	BS1377-8 : 1990 : Clause 7	Test Name Test Date	BH07 7.00-7.30m C 12/05/2022	
·(><)=			Borehole	BH07	
	Jobfile	North Irish Sea Array NISA	Sample	7.00-7.30m C	
U K A S TESTING	Client	Causeway	Depth	7.00-7.30m	
4043			i		



#### Saturation Plots



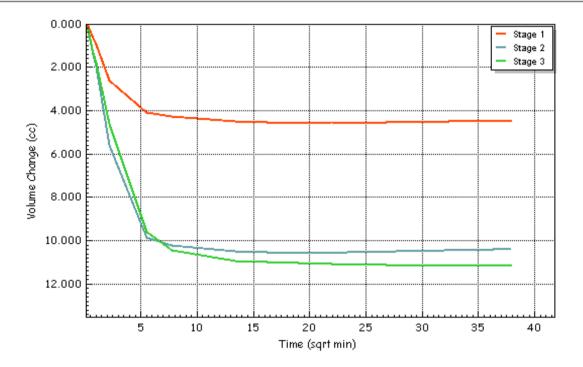


- (H)	Test Method	BS1377-8 : 1990 :	Clause 7	Test Name Test Date	BH07 7.00-7.30m C 12/05/2022
	Jobfile	North Irish Sea Ar	ray NISA	Borehole Sample	BH07 7.00-7.30m C
4043	Client	Causeway		Depth	7.00-7.30m



#### **Consolidation Plots**

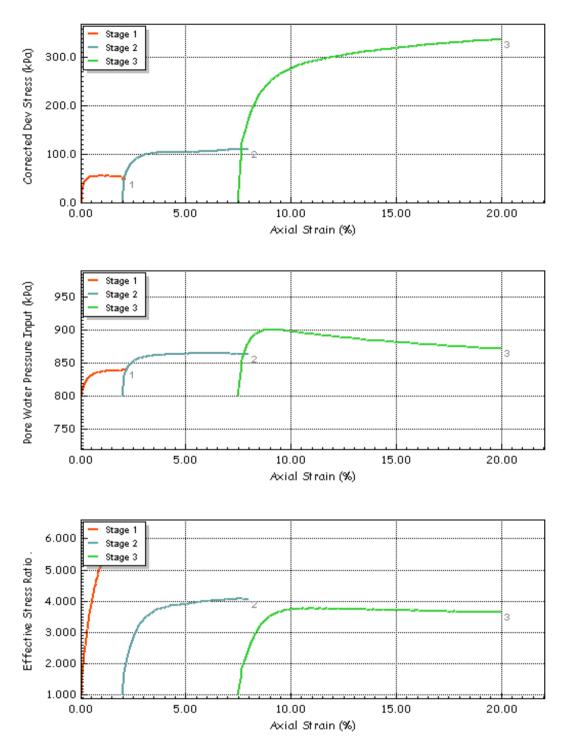
Initial Back Pressureubi(kPa)800800800Pore Water Pressure Inputu $\mu_{WVP}$ (kPa)837893979Drainage Methodu $\mu_{WVP}$ (kPa)837893979Final ConditionsStage 123PWP Dissipation %U%(%)100.00100.00100.00Volumetric Strain $\epsilon_v \%$ (%)0.821.932.07Corrected LengthL c(mm)139.6135.7126.6Corrected AreaA c(cm2)38.3838.7340.63Corrected VolumeV c(cc)535.883525.463514.301t100t 100(min)13.6714.8926.02Consolidationc v(m2/year)7.4406.8313.909Compressibilitym v(m2/MN)0.2200.2080.116Test Timet F(h:m:s)02:00:0002:00:0022:00:00Estimated Strain to Failuret F(%)5.05.05.0	Initial Conditions			Stage 1	2	3
Pore Water Pressure Input Drainage Method         u         μ         μ         kPa         837         893         979           Badial+One         End         Radial+One         End         Radial+One         End           Final Conditions         Stage 1         2         3           PWP Dissipation %         U%         (%)         100.00         100.00         100.00           Volumetric Strain         ε v %         (%)         0.82         1.93         2.07           Corrected Length         L c         (mm)         139.6         135.7         126.6           Corrected Area         A c         (cm2)         38.38         38.73         40.63           Corrected Volume         V c         (cc)         535.883         525.463         514.301           t100         t100         (min)         13.67         14.89         26.02           Consolidation         c v         (m2/year)         7.440         6.831         3.909           Compressibility         m v         (m2/MN)         0.220         0.208         0.116           Test Time         t F         (h:ms)         5.0         5.0         5.0	Initial Cell Pressure	σз	(kPa)	850	900	1000
Drainage Method       Radial+One End         Final Conditions       Stage 1       2       3         PWP Dissipation %       U%       (%)       100.00       100.00       100.00         Volumetric Strain $\epsilon_v \%$ (%)       0.82       1.93       2.07         Corrected Length       L C       (mm)       139.6       135.7       126.6         Corrected Area       A C       (cm2)       38.38       38.73       40.63         Corrected Volume       V C       (cc)       535.883       525.463       514.301         t100       t 100       (min)       13.67       14.89       26.02         Consolidation       c v       (m2/WN)       0.220       0.208       0.116         Test Time       t F       (h:m:s)       02:00:00       02:00:00       02:00:00         Estimated Strain to Failure       t F       (h:m:s)       02:00:00       5.0       5.0	Initial Back Pressure	и Бі	(kPa)	800	800	800
Final Conditions       Stage 1       2       3         PWP Dissipation %       U%       (%)       100.00       100.00       100.00         Volumetric Strain       ε v %       (%)       0.82       1.93       2.07         Corrected Length       L c       (mm)       139.6       135.7       126.6         Corrected Area       A c       (cm2)       38.38       38.73       40.63         Corrected Volume       V c       (cc)       535.883       525.463       514.301         t100       t 100       (min)       13.67       14.89       26.02         Consolidation       c v       (m2/year)       7.440       6.831       3.909         Compressibility       m v       (m2/MN)       0.220       0.208       0.116         Test Time       t F       (h:m:s)       02:00:00       02:00:00       02:00:00         Estimated Strain to Failure       5 %       (%)       5.0       5.0       5.0	Pore Water Pressure Input	И рмр	(kPa)	837	893	979
Stage 1       2       3         PWP Dissipation %       U%       (%)       100.00       100.00       100.00         Volumetric Strain       ε v %       (%)       0.82       1.93       2.07         Corrected Length       L c       (mm)       139.6       135.7       126.6         Corrected Area       A c       (cm2)       38.38       38.73       40.63         Corrected Volume       V c       (cc)       535.883       525.463       514.301         t100       t 100       (min)       13.67       14.89       26.02         Consolidation       c v       (m2/year)       7.440       6.831       3.909         Compressibility       m v       (m2/MN)       0.220       0.208       0.116         Test Time       £ %       (%)       5.0       5.0       5.0       5.0	Drainage Method			Radial+On	e End	
PWP Dissipation %U%(%)100.00100.00100.00Volumetric Strainεν%(%)0.821.932.07Corrected LengthL c(mm)139.6135.7126.6Corrected AreaA c(cm2)38.3838.7340.63Corrected VolumeV c(cc)535.883525.463514.301t100t 100(min)13.6714.8926.02Consolidationc v(m2/year)7.4406.8313.909Compressibilitym v(m2/MN)0.2200.2080.116Test Timet F Estimated Strain to Failuret F ε %(%)5.05.05.0	Final Conditions					
Volumetric Strain $\epsilon_v \%$ $(\%)$ $0.82$ $1.93$ $2.07$ Corrected LengthL c(mm) $139.6$ $135.7$ $126.6$ Corrected AreaA c(cm2) $38.38$ $38.73$ $40.63$ Corrected VolumeV c(cc) $535.883$ $525.463$ $514.301$ t100t 100(min) $13.67$ $14.89$ $26.02$ Consolidationc v(m2/year) $7.440$ $6.831$ $3.909$ Compressibilitym v(m2/MN) $0.220$ $0.208$ $0.116$ Test Timet F(h:m:s) $02:00:00$ $5.0$ $5.0$				-		
Corrected LengthL c(mm)139.6135.7126.6Corrected AreaA c(cm2)38.3838.7340.63Corrected VolumeV c(cc)535.883525.463514.301t100t 100(min)13.6714.8926.02Consolidationc v(m2/year)7.4406.8313.909Compressibilitym v(m2/MN)0.2200.2080.116Test Timet F(h:m:s)02:00:005.05.05.0	PWP Dissipation %		( )	100.00		100.00
Corrected Area       A c       (cm2)       38.38       38.73       40.63         Corrected Volume       V c       (cc)       535.833       525.463       514.301         t100       t 100       (min)       13.67       14.89       26.02         Consolidation       c v       (m2/year)       7.440       6.831       3.909         Compressibility       m v       (m2/MN)       0.220       0.208       0.116         Test Time       t F       (h:m:s)       02:00:00       5.0       5.0       5.0	Volumetric Strain	εν%	(%)	0.82	1.93	2.07
Corrected VolumeV c(ma)535.883525.463514.301t100t 100(min)13.6714.8926.02Consolidationc v(m2/year)7.4406.8313.909Compressibilitym v(m2/MN)0.2200.2080.116Test Timet F(h:m:s)02:00:005.05.05.0	Corrected Length	Lc	(mm)	139.6	135.7	126.6
t100     t 100     (min)     13.67     14.89     26.02       Consolidation     c v     (m2/year)     7.440     6.831     3.909       Compressibility     m v     (m2/MN)     0.220     0.208     0.116       Test Time     t F     (h:m:s)     02:00:00     5.0     5.0     5.0	Corrected Area	Ac	(cm2)	38.38	38.73	40.63
Consolidation         c v         (m2/year)         7.440         6.831         3.909           Compressibility         m v         (m2/MN)         0.220         0.208         0.116           Test Time         t F         (h:m:s)         02:00:00         02:00:00         02:00:00           Estimated Strain to Failure         ε %         (%)         5.0         5.0         5.0	Corrected Volume	Vс	(cc)	535.883	525.463	514.301
Compressibility         m v         (m2/MN)         0.220         0.208         0.116           Test Time         t F         (h:m:s)         02:00:00         02:00:00         02:00:00           Estimated Strain to Failure         ε %         (%)         5.0         5.0         5.0	t100	t 100	(min)	13.67	14.89	26.02
Test Time         t F         (h:m:s)         02:00:00         02:00:00         02:00:00           Estimated Strain to Failure         ε %         (%)         5.0         5.0         5.0	Consolidation	сv	(m2/year)	7.440	6.831	3.909
Estimated Strain to Failure ε% (%) 5.0 5.0 5.0	Compressibility	m v	(m2/MN)	0.220	0.208	0.116
	Test Time	t F	(h:m:s)	02:00:00	02:00:00	02:00:00
Shear Machine Speed d r (mm/min) 0.05817 0.05817 0.05817	Estimated Strain to Failure	ε%	(%)	5.0	5.0	5.0
	Shear Machine Speed	dr	(mm/min)	0.05817	0.05817	0.05817



do	Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH07 7.00-7.30m C
- 🖼 -			Test Date	12/05/2022
· (>4) =			Borehole	BH07
	Jobfile	North Irish Sea Array NISA	Sample	7.00-7.30m C
U K A S TESTING	Client	Causeway	Depth	7.00-7.30m
4043			-	



Shear Stage Plots



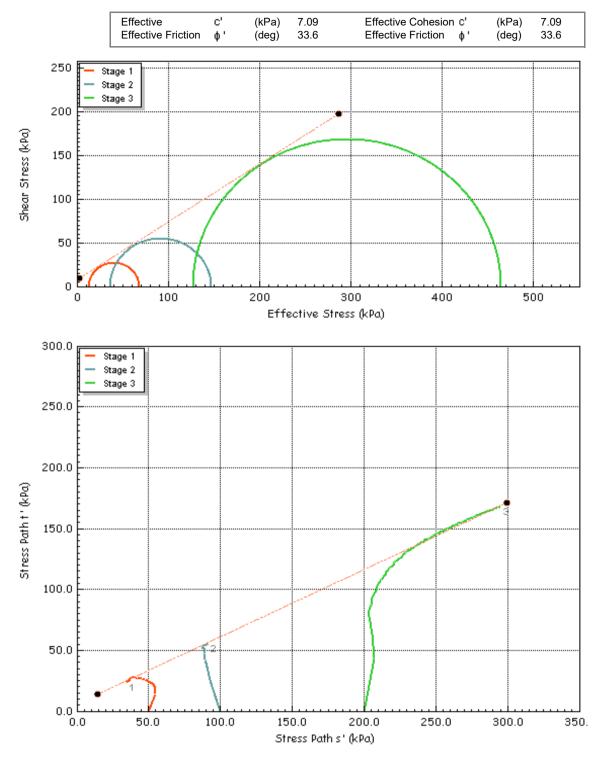
da	Test Method	BS1377-8 : 1990 :	Clause 7	Test Name	BH07 7.00-7.30m C
- 👾 -				Test Date	12/05/2022
· (}\$)]				Borehole	BH07
	Jobfile	North Irish Sea Ar	ray NISA	Sample	7.00-7.30m C
UKAS	Client	Causeway		Depth	7.00-7.30m
4043					



# **Effective Stress Triaxial Compression**

## **Consolidated Undrained**

#### **Shear Stage Plots**



do	Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BH07 7.00-7.30m C
- 👾 _			Test Date	12/05/2022
· (}4) =			Borehole	BH07
	Jobfile	North Irish Sea Array NISA	Sample	7.00-7.30m C
U K A S TESTING	Client	Causeway	Depth	7.00-7.30m
4043				





HEAD OFFICE Causeway Geotech Ltd 8 Drumahiskey Road Ballymoney Co. Antrim, N. Ireland, BT53 7QL NI: +44 (0)28 276 66640 Registered in Northern Ireland. Company Number: NI610766

#### REGIONAL OFFICE Causeway Geotech (IRL) Ltd Unit 1 Fingal House Stephenstown Industrial Estate Balbriggan, Co Dublin, Ireland, K32 VR66 ROI: +353 (0)1 526 7465 Registered in Ireland. Company Number. 633786

www.causewaygeotech.com

# SOIL AND ROCK SAMPLE ANALYSIS LABORATORY TEST REPORT

16 May 2022

Project Name:	North Irish Sea Array
Project No.:	21-1619
Client:	Statkraft
Engineer:	ARUP

We are pleased to attach the results of laboratory testing carried out for the above project. This memo and its attachments constitute a report of the results of tests as detailed in the Contents page(s). This testing was performed between 29/04/2022 and 16/05/2022.

The attached results complete the testing requested and we would therefore wish to confirm that samples will be retained without charge for a period of 28 days from the above date after which they will be appropriately disposed of unless we receive written instructions to the contrary prior to that date.

We trust our report meets with your approval but if you have any queries or require additional information, please do not hesitate to contact the undersigned.

Stephen Watson Laboratory Manager Signed for and on behalf of Causeway Geotech Ltd



### Project Name: North Irish Sea Array

### **Report Reference:** Schedule 10

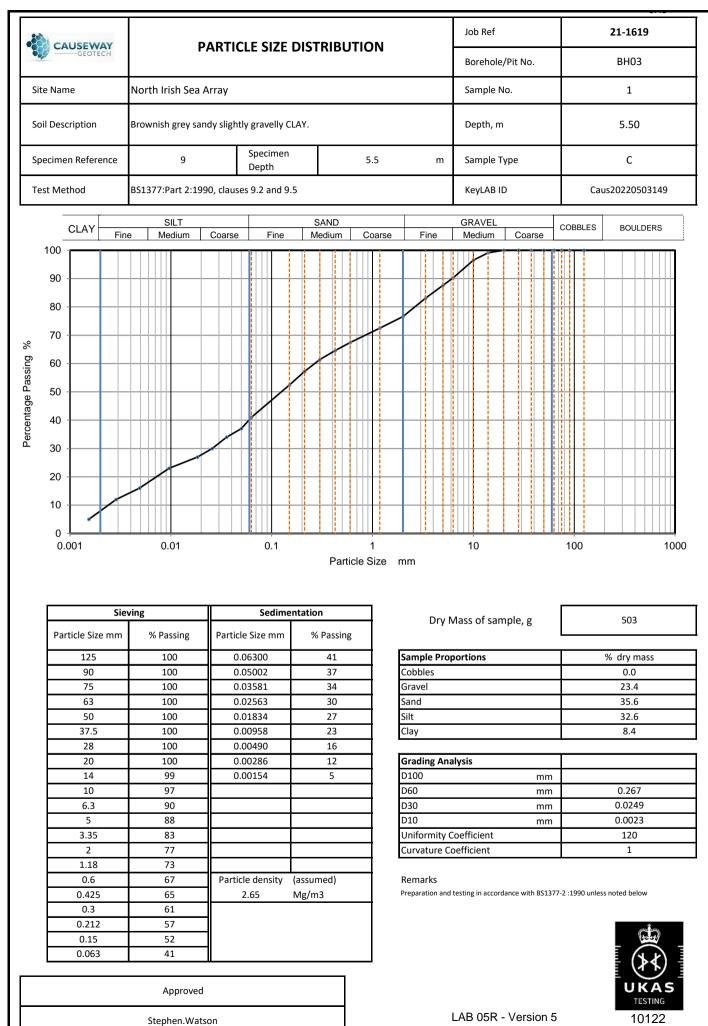
The table below details the tests carried out, the specifications used, and the number of tests included in this report. The results contained in this report relate to the sample(s) as received

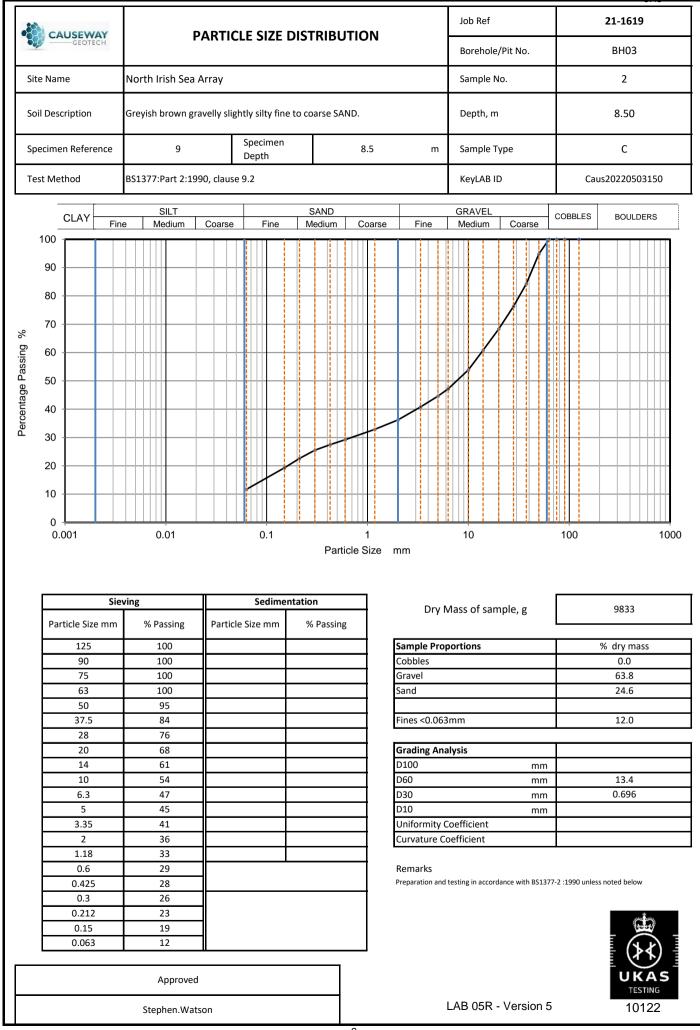
Tests marked with\* in this report are not United Kingdom Accreditation Service (UKAS) accredited and are not included in Causeway Geotech Limited's scope of UKAS Accreditation Schedule of Tests. Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

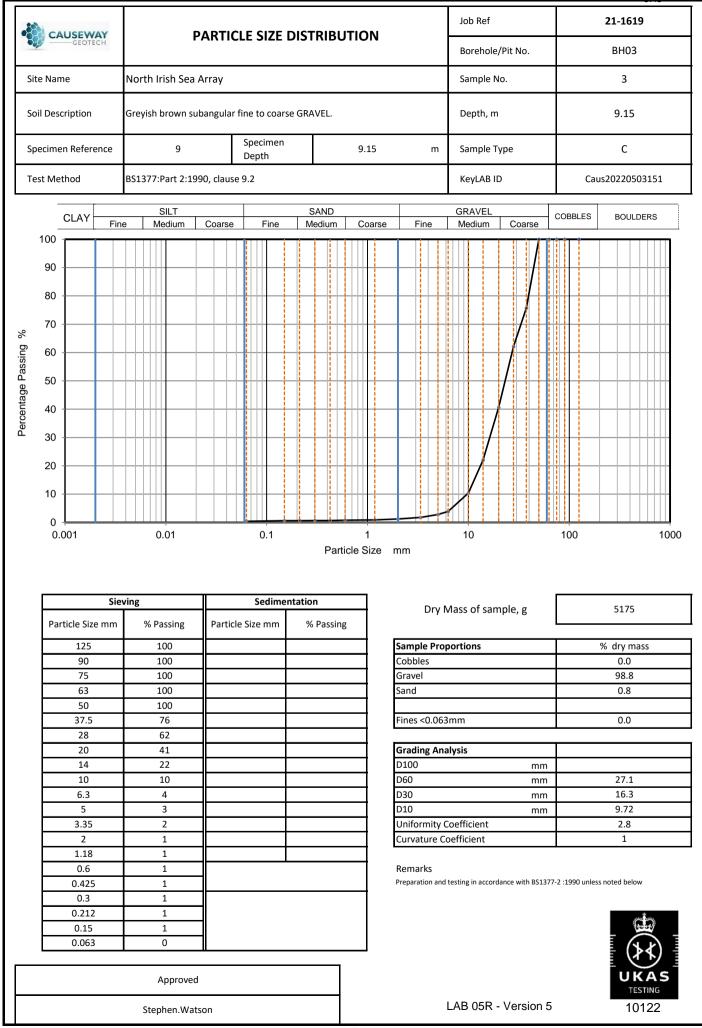
Material tested	Type of test/Properties measured/Range of measurement	Standard specifications	No. of results included in the report
SOIL	Moisture Content of Soil	BS 1377-2: 1990: Cl 3.2	15
SOIL	Liquid and Plastic Limits of soil-1 point cone penetrometer method	BS 1377-2: 1990: Cl 4.4, 5.3 & 5.4	2
SOIL	Liquid and Plastic Limits of soil-4 point cone penetrometer method	BS 1377-2: 1990: Cl 4.4, 5.3 & 5.4	12
SOIL	Particle size distribution - wet sieving	BS 1377-2: 1990: Cl 9.2	15
SOIL	Particle size distribution - sedimentation hydrometer method	BS 1377-2: 1990: Cl 9.5	10

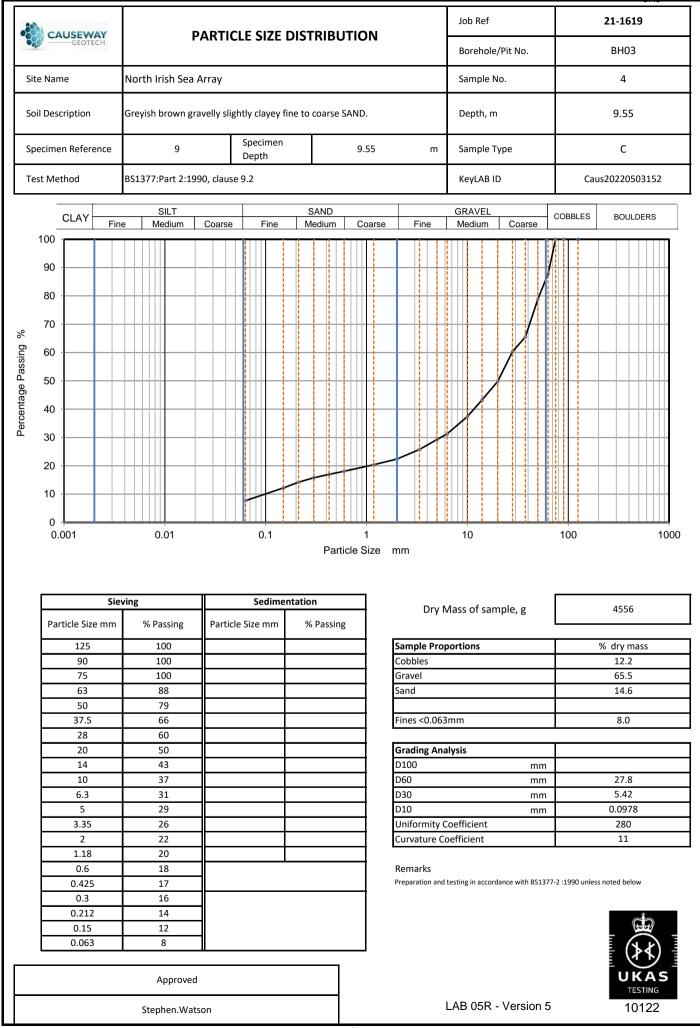
	JSE GEO	<b>VAY</b> TECH			Summar	y of C	las	sific	ation	Test	Res	sult	S	
Project No. 21-1	619		Project	Project Name North Irish Sea Array										
Hole No.	Ref	Sar Top	nple Base	Туре	Soil Description	Dens bulk Mg/m	dry	W %	Passing 425µm %	LL %	PL %	PI %	Particle density Mg/m3	Casagrande Classification
BH03	1	5.50	6.80	с	Brownish grey sandy slightly gravelly CLAY.			18.0	63	28	13	15		CL
BH03	вноз 2 8.50		9.15	с	Greyish brown gravelly slightly silty fine to coarse SAND.			7.9	40	23	18	5		ML
BH03	3	9.15	9.55	с	Greyish brown subangular fine to coarse GRAVEL.			1.8						
BH03	4	9.55	10.00	С	Greyish brown gravelly slightly clayey fine to coarse SAND.			5.6	31	20 -1pt	13	7		CL
BH03	5	10.00	10.25	С	Greyish brown gravelly slightly clayey fine to coarse SAND.			8.4	38	26	16	10		CL
BH03	6	10.25	11.05	с	Greyish brown gravelly clayey fine to coarse SAND.			13.0	44	27	16	11		CL
BH03	7	11.05	11.50	с	Greyish brown gravelly clayey fine to coarse SAND with cobbles.			5.2	61	24	15	9		CL
BH05	8	7.50	8.50	С	Greyish brown clayey fine to coarse SAND.			19.0	43	27	14	13		CL
BH05	9	8.50	9.00	с	Greyish brown sandy slightly gravelly silty CLAY.			12.0	58	29	15	14		CL
BH05	10	10.50	11.40	с	Greyish brown slightly gravelly clayey fine to coarse SAND.			39.0	79	26	18	8		CL
BH05	11	11.40	12.50	с	Dark greyish brown very gravelly silty fine to coarse SAND with cobbles.			6.6	34	25 -1pt	16	9		CL
BH06	12	7.00	7.35	С	Brown sandy gravelly silty CLAY.			17.0	69	23	15	8		CL
All tests perfor	med i	n accord	lance wit	h BS1	377:1990 unless specified	otherwise	e						LAB	01R Version 5
	neasure er displ	ment unles acement in water	Liquid Limit Particle density				Date F	Printed 6/05/20	22	Appr		By Watson	UKAS TESTING 10122	

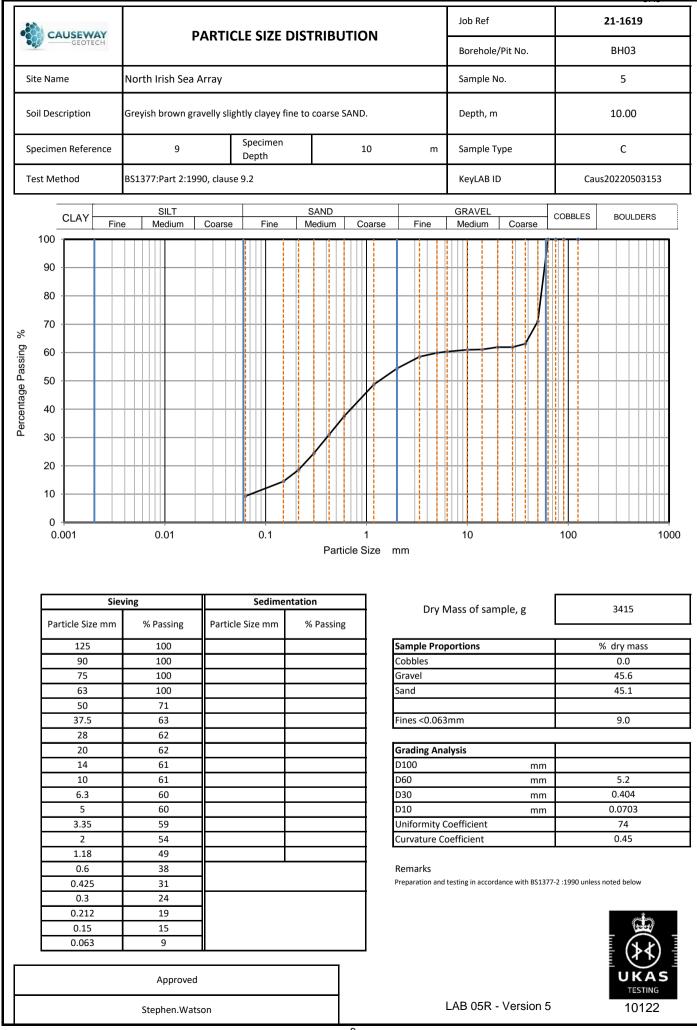
	<b>VAY</b> TECH		Summary of Classification Test Results												
Project No.	040		Project Name North Irish Sea Array												
21-1	619 I	Sor	nple		[										
Hole No.			-	Туре	Soil Description	Dens bulk Mg/m	dry	W %	Passing 425µm %	LL %	PL %	PI %	Particle density Mg/m3	Casagrande Classification	
BH06	13	14.50	14.90	с	Brown sandy slightly gravelly silty CLAY.			32.0	91	28	20	8		CL	
BH06	14	14.90	15.45	с	Brown sandy gravelly silty CLAY.			23.0	68	22	15	7		CL	
BH06	15	15.45	15.90	с	Brown slightly sandy clayey subangular fine to coarse GRAVEL with cobbles.			7.2	60	22	15	7		CL	
All tests perfor	med i	n accord	ance wit	ith BS1377:1990 unless specified otherwise				<u> </u>				LAB 01R Version 5			
	neasure ter displ	ment unles acement in water	Liquid Limit Particle d ss : 4pt cone unless : sp - smal cas - Casagrande method gj - gas ja 1pt - single point test					Date F	Printed 16/05/20	22	Appro		By Watson		

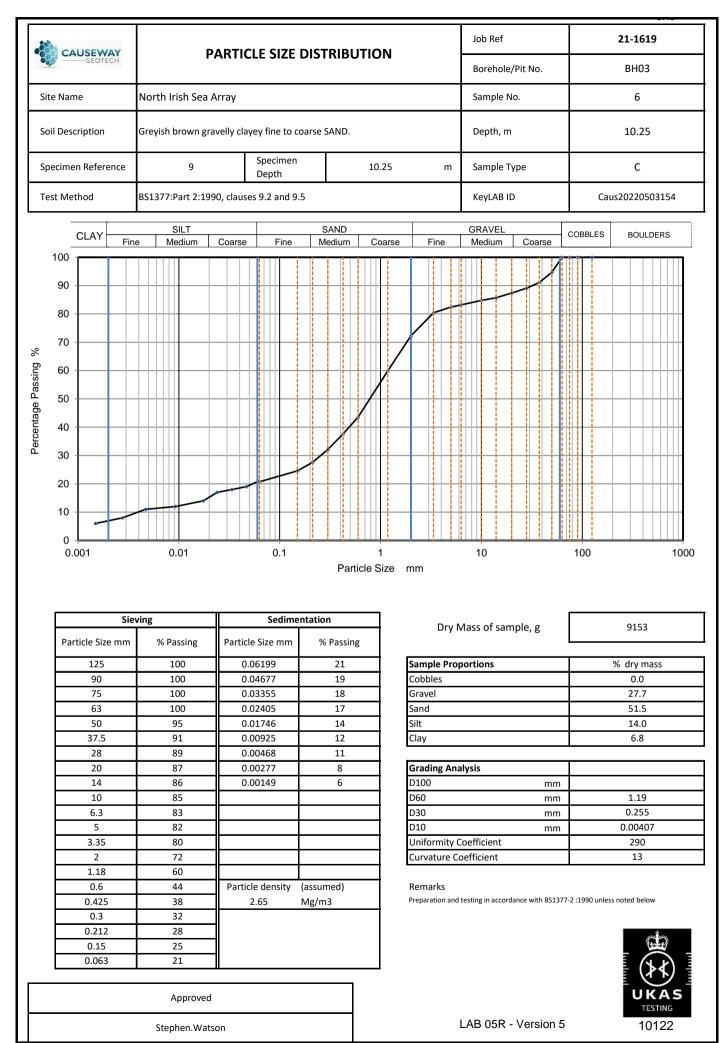


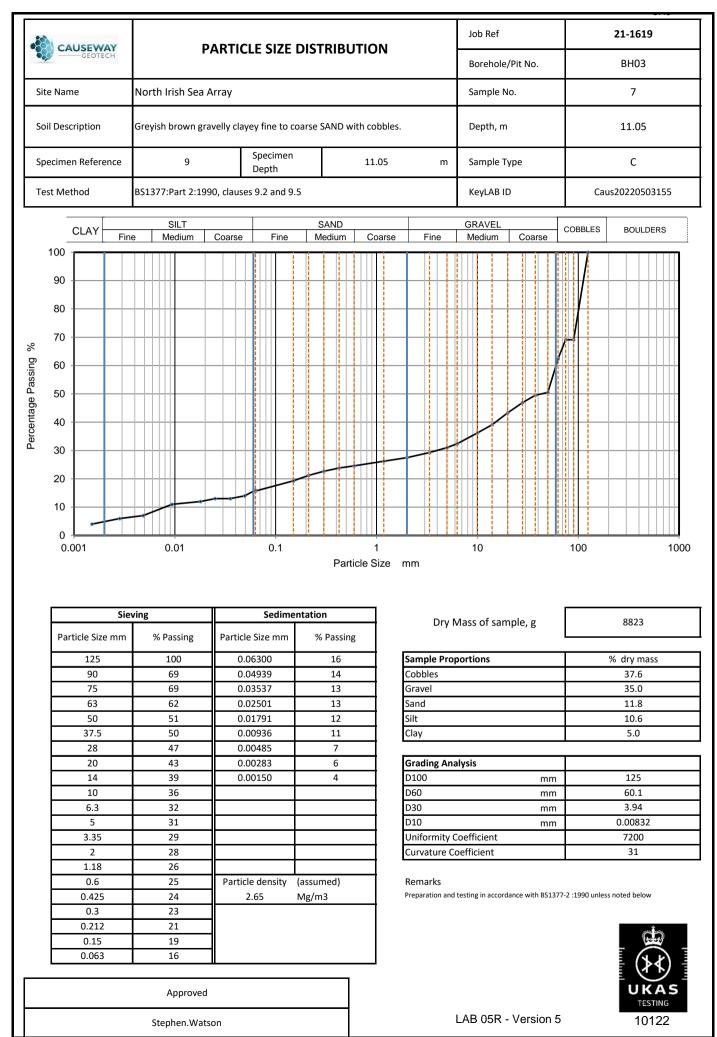


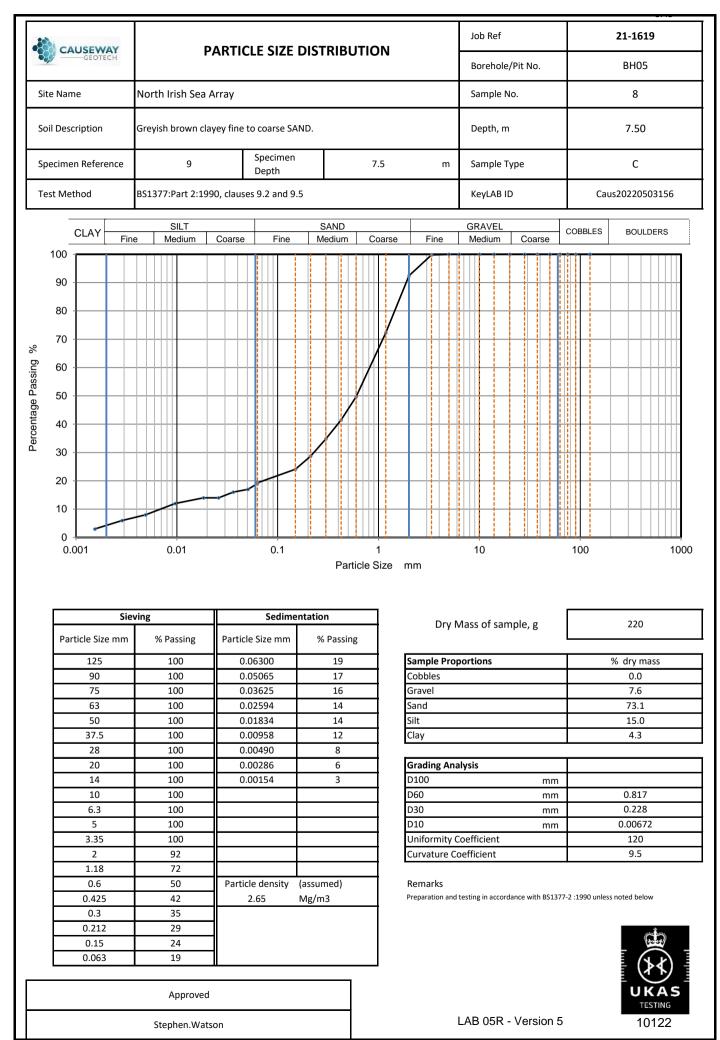


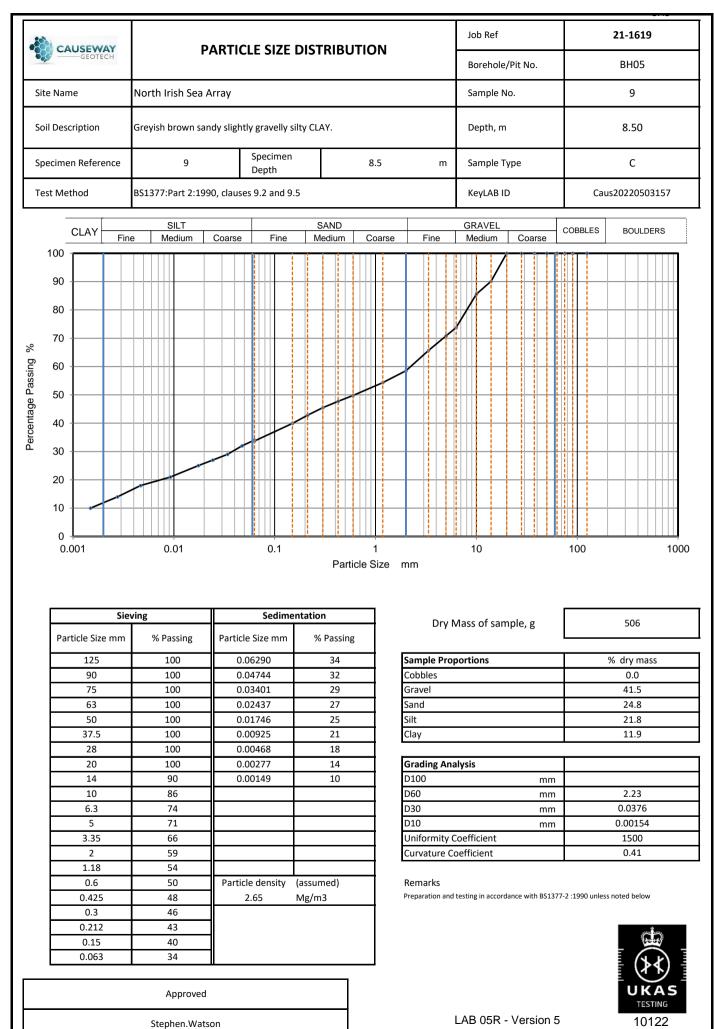


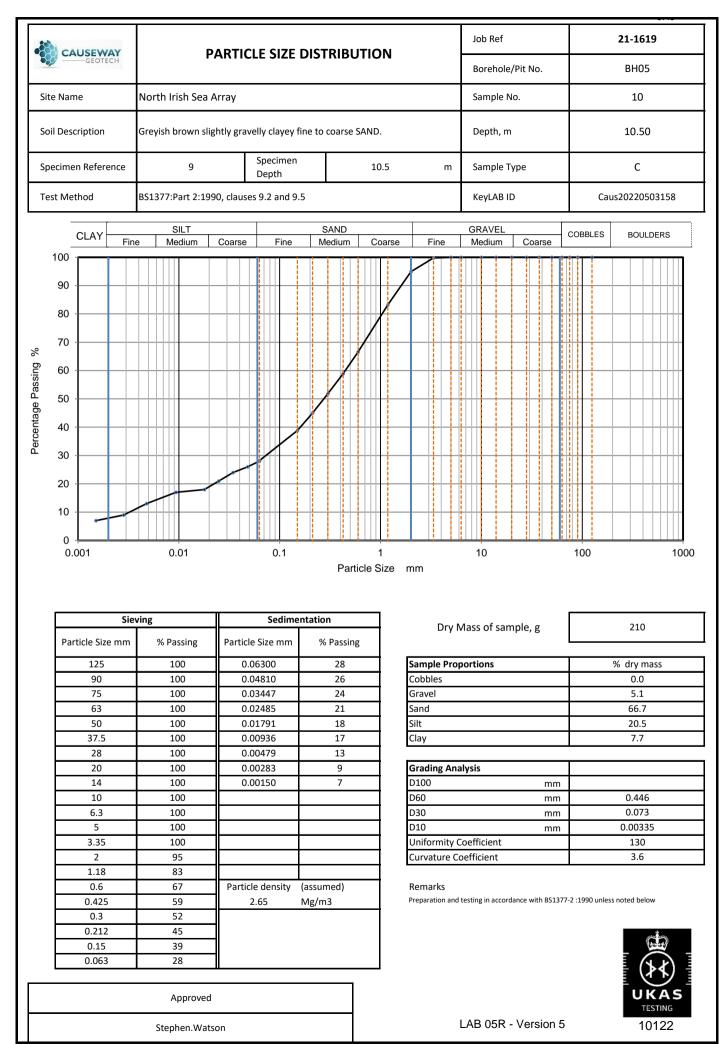


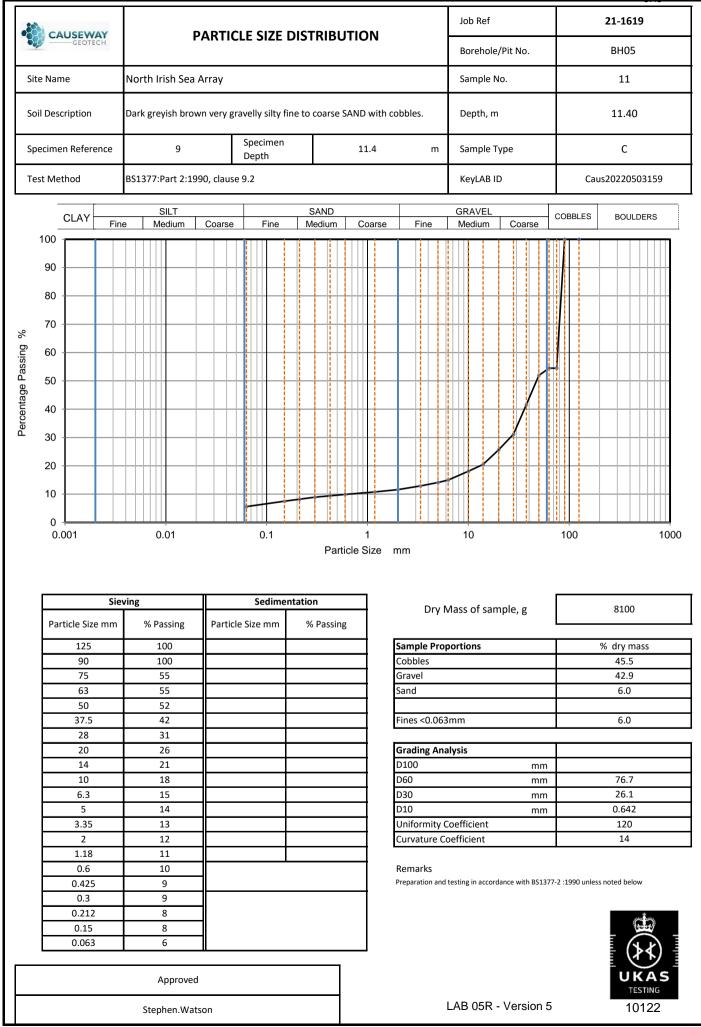


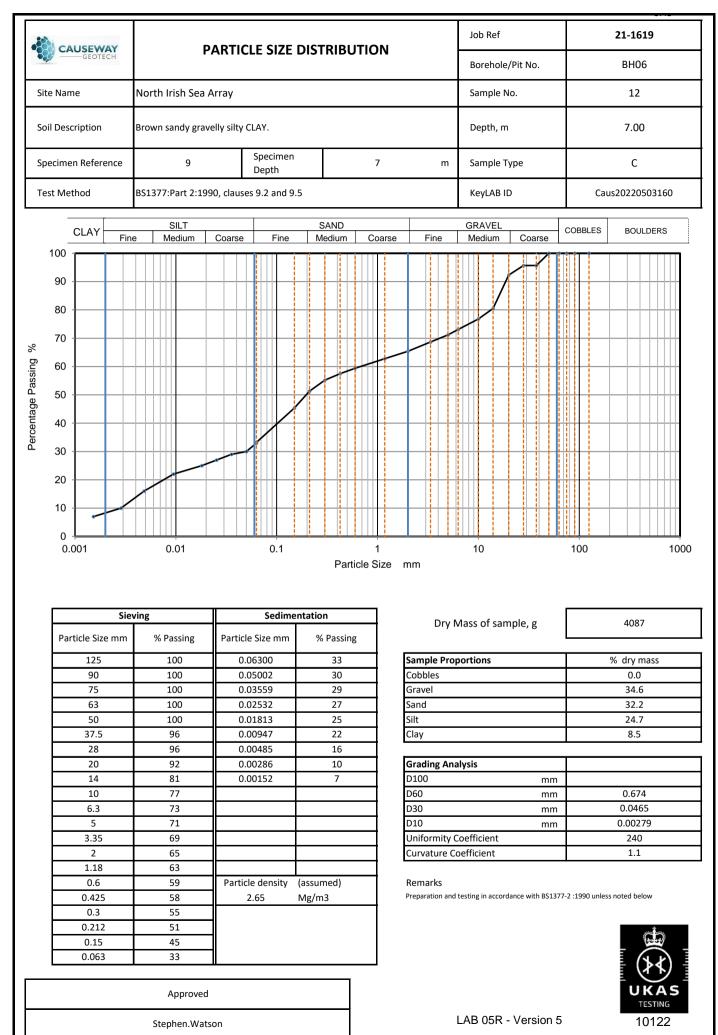


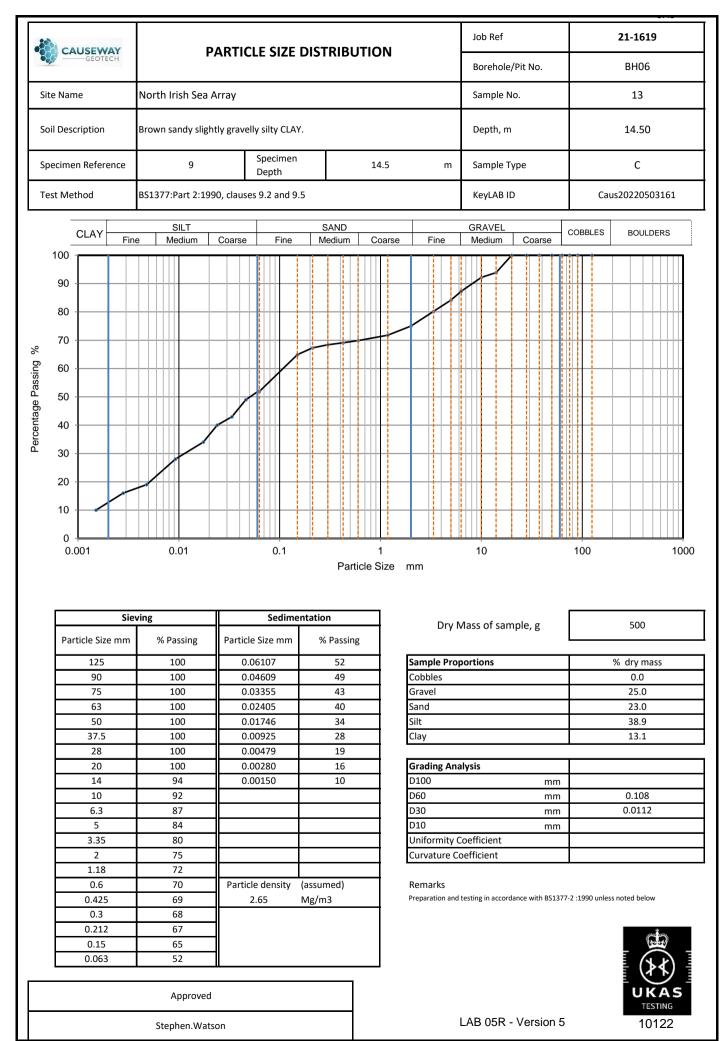


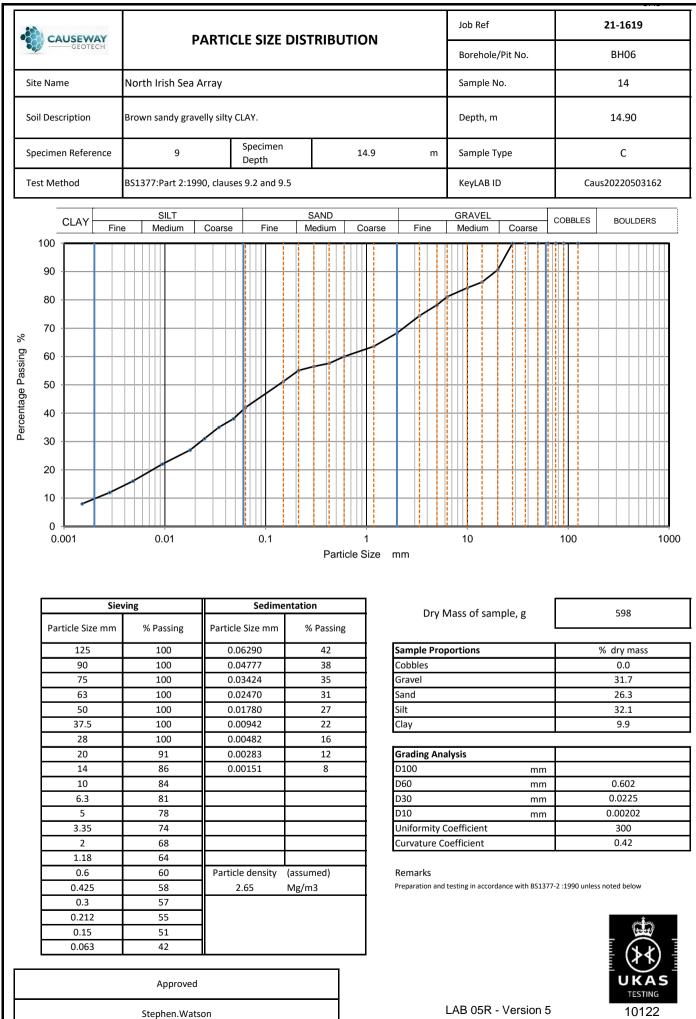


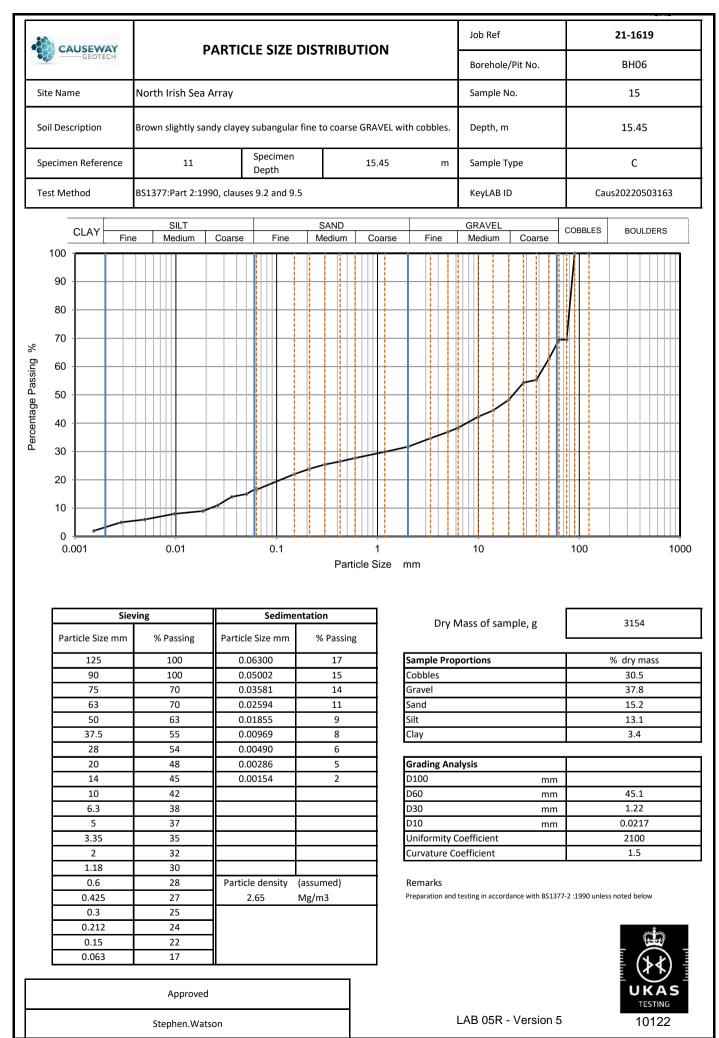














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Registered in Northern Ireland. Company Number: NI610766 REGIONAL OFFICE Causeway Geotech (IRL) Ltd Unit 1 Fingal House tephenstown Industrial Estate

Stephenstown Industrial Estate Balbriggan, Co Dublin, Ireland, K32 VR66 **ROI:** +353 (0)1 526 7465

> Registered in Ireland. Company Number: 633786

www.causewaygeotech.com

# SOIL AND ROCK SAMPLE ANALYSIS LABORATORY TEST REPORT

2 June 2022

Project Name:	North Irish Sea Array
Project No.:	21-1619
Client:	Statkraft
Engineer:	ARUP

We are pleased to attach the results of laboratory testing carried out for the above project. This memo and its attachments constitute a report of the results of tests as detailed in the Contents page(s). This testing was performed between 19/05/2022 and 02/05/2022.

The attached results complete the testing requested and we would therefore wish to confirm that samples will be retained without charge for a period of 28 days from the above date after which they will be appropriately disposed of unless we receive written instructions to the contrary prior to that date.

We trust our report meets with your approval but if you have any queries or require additional information, please do not hesitate to contact the undersigned.

John Worm

Stephen Watson Laboratory Manager Signed for and on behalf of Causeway Geotech Ltd











BRITISH

DRILLING ASSOCIATION Project Name: North Irish Sea Array

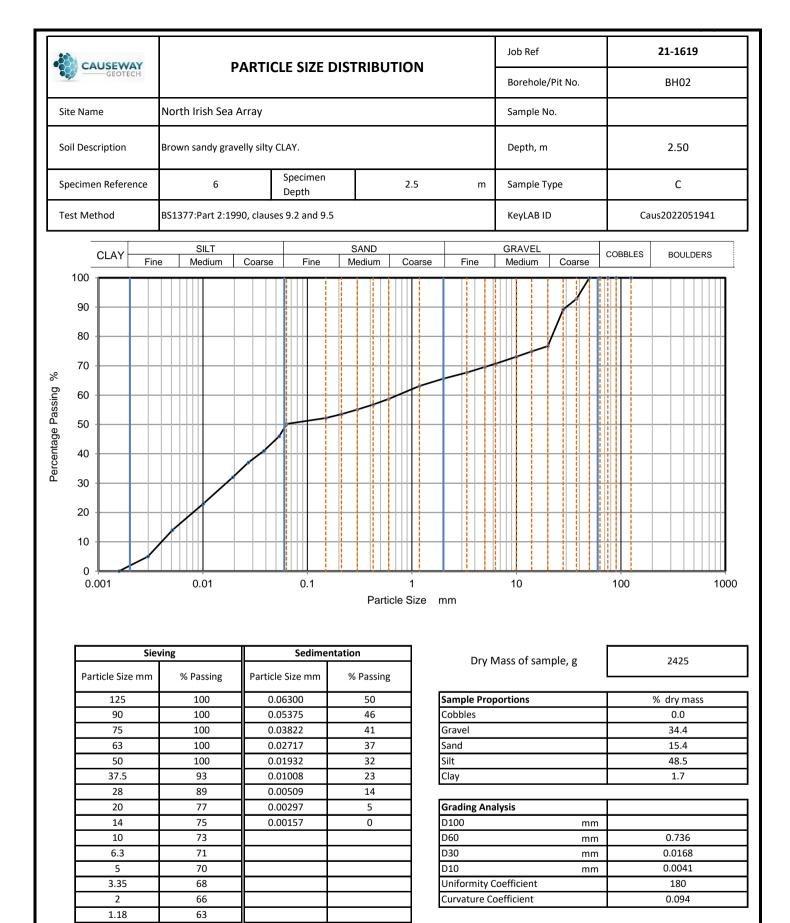
**Report Reference:** Schedule 11

The table below details the tests carried out, the specifications used, and the number of tests included in this report. The results contained in this report relate to the sample(s) as received

Tests marked with\* in this report are not United Kingdom Accreditation Service (UKAS) accredited and are not included in Causeway Geotech Limited's scope of UKAS Accreditation Schedule of Tests. Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Material tested	Type of test/Properties measured/Range of measurement	Standard specifications	No. of results included in the report
SOIL	Moisture Content of Soil	BS 1377-2: 1990: Cl 3.2	2
SOIL	Liquid and Plastic Limits of soil-4 point cone penetrometer method	BS 1377-2: 1990: Cl 4.4, 5.3 & 5.4	2
SOIL	Particle size distribution - wet sieving	BS 1377-2: 1990: Cl 9.2	3
SOIL	Particle size distribution - sedimentation hydrometer method	BS 1377-2: 1990: Cl 9.5	1

GEOTECH		<b>Y</b> H	Summary of Classification Test Results												
Project No.		Pro	Project Name												
21-1619				North Irish Sea Array											
Hole No	o. R	ef To	Sample		Гуре	Soil Description	Dens bulk Mg/m	dry	W %	Passing 425µm %	LL %	PL %	PI %	Particle density Mg/m3	Casagrande Classification
BH02		2.5	50 4.	.00	с	Brown sandy gravelly silty CLAY.			13.0	54	30	17	13		CL
BH16		10.	.00 11	.50	С	Brown sandy slightly clayey subangular fine to coarse GRAVEL.			9.5	48	26	15	11		CL
All tests p	erforme	d in acc	cordance	e with	BS1	377:1990 unless specified	otherwise	e						LAB	01R Version 5
Linear measurement unless :			4ŗ		e unless : sp - sr	Particle density sp - small pyknometer gj - gas jar		Date Printed 06/02/2022 00:00		Approved By					
wi - immersion in water			1p	pt - sir	ngle point test						Step	hen.'	Watson	10122	



Remarks

Preparation and testing in accordance with BS1377-2 :1990 unless noted below



Approved

59

57

55

54

52

50

Particle density

2.65

(assumed)

Mg/m3

0.6

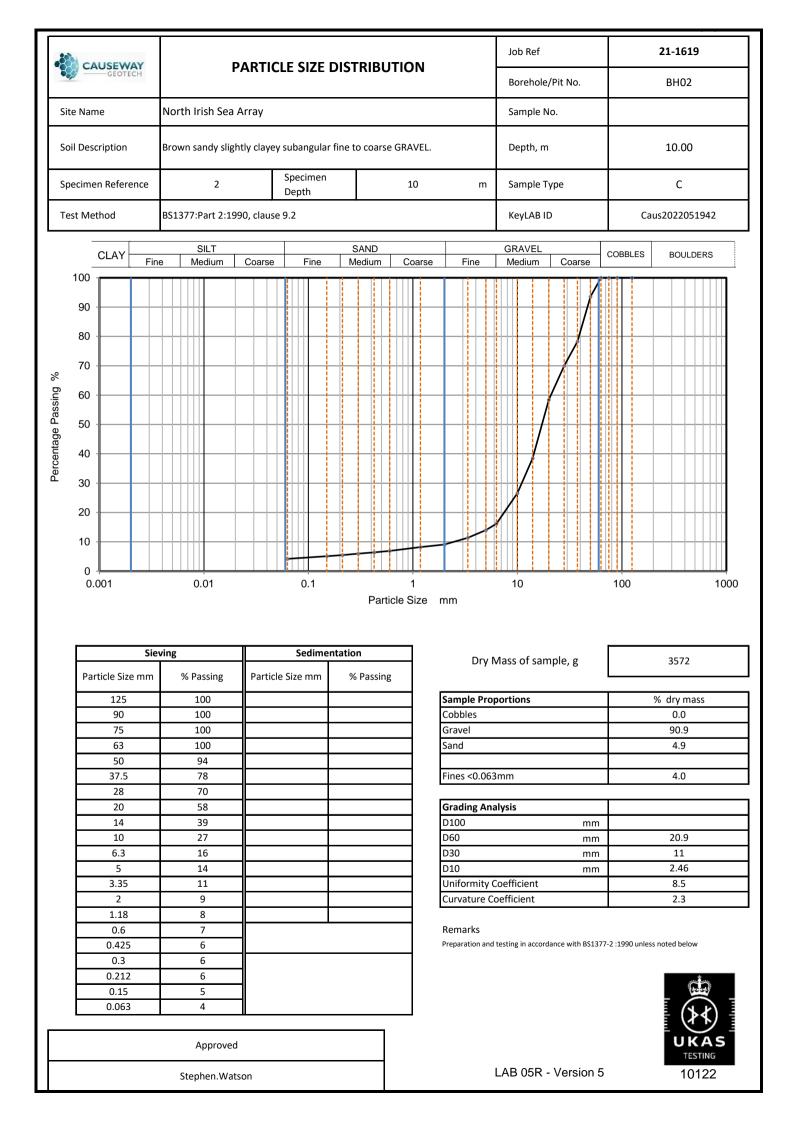
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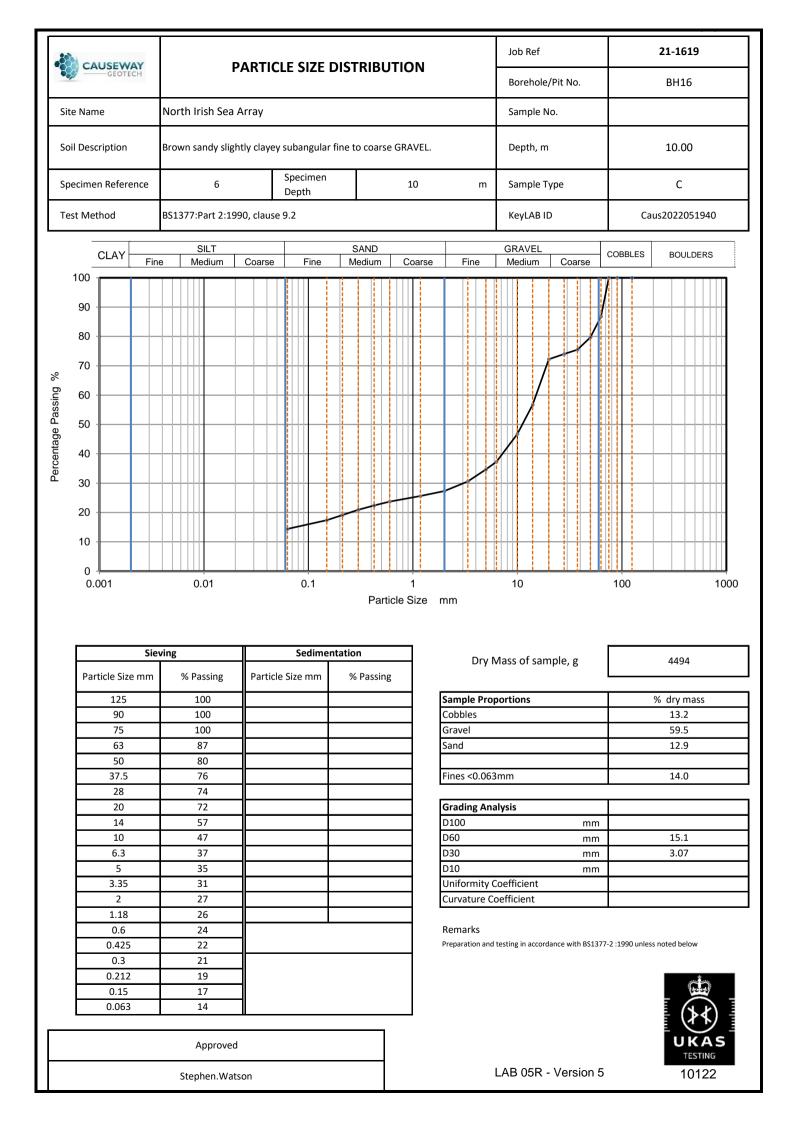
0.3

0.15

0.063

Stephen.Watson







#### LABORATORY RESTRICTION REPORT

Project Reference	21-1619		То	Colm Hurley
Project Name	Nort Irish Sea Array		Position	Project Manager
			From	Stephen Watson
TR reference	21-1619 /	G11	Position	Laboratory Manager

The following sample(s) and test(s) are restricted as detailed below. Could you please complete the "Required Action" column and return the completed form to the laboratory.

Hole	Numerica	Sample	Turn	Test	Reason for Restriction	Required Action		
Number	Number	Depth (m)	Туре	Туре				
BH02		11.50- 13.00	с	PSD	No suitbale sample - rockhead	CANCEL		
or electi	onic repor	ting a forn	n of d name	e is	Laboratory Signature Stephen Watson	Project Manager Signature Colm Hurley		
cceptab					Date 31 May 2022	Date 31 May 2022		



# APPENDIX G ENVIRONMENTAL LABORATORY TEST RESULTS



# 🔅 eurofins

### Chemtest

Eurofins Chemtest Ltd Depot Road Newmarket CB8 0AL Tel: 01638 606070 Email: info@chemtest.com

Report No.:	22-10214-1		
Initial Date of Issue:	25-Mar-2022		
Client	Causeway Geotech Ltd		
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL		
Contact(s):	Colm Hurley Stephen Watson Carin Cornwall Darren O'Mahony Gabriella Horan Joe Gervin John Cameron Lucy Newland Martin Gardiner Matthew Gilbert Michelle Gaffney Neil Haggan Paul Dunlop Paul McNamara Sean Ross Stephen Franey Stuart Abraham		
Project	21-1619 North Irish Sea Array		
Quotation No.:	Q21-26199	Date Received:	17-Mar-2022
Order No.:		Date Instructed:	17-Mar-2022
No. of Samples:	20		
Turnaround (Wkdays):	7	Results Due:	25-Mar-2022
Date Approved:	25-Mar-2022		
Approved By:			
and			

**Details:** 

Stuart Henderson, Technical Manager



# eurofins 👬

## Chemtest

Eurofins Chemtest Ltd Depot Road Newmarket CB8 0AL Tel: 01638 606070 Email: info@chemtest.com

Client: Causeway Geotech Ltd			C	hemtest	Job No.:	22-10214	22-10214	22-10214	22-10214	22-10214	22-10214	22-10214	22-10214
Quotation No.: Q21-26199			Chen	ntest Sa	mple ID.:	1393655	1393656	1393657	1393658	1393659	1393660	1393661	1393662
				Sample	Location:	TP01	TP01	TP02	TP02	TP07	TP07	TP09	TP09
				San	nple Type:	SOIL							
					Depth (m):	0.5	1.0	0.5	1.0	0.5	1.0	0.5	1.0
				Date	Sampled:	15-Mar-2022							
Determinand	Accred.	SOP	Туре	Units	LOD								
Total Dissolved Solids	N	1020	10:1	mg/l	1.0	100	85	98	78	120	59	78	91
Chloride	U	1220	10:1	mg/l	1.0	3.8	1.9	2.4	1.8	1.7	< 1.0	1.7	2.4
Fluoride	U	1220	10:1	mg/l	0.050	0.51	0.54	0.39	0.31	0.37	0.24	0.44	0.82
Sulphate	U	1220	10:1	mg/l	1.0	15	14	9.3	6.3	18	4.1	12	13
Arsenic (Dissolved)	U	1455	10:1	mg/l	0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0007	< 0.0002
Barium (Dissolved)	U	1455	10:1	mg/l	0.005	0.006	0.006	0.006	< 0.005	0.006	< 0.005	< 0.005	< 0.005
Cadmium (Dissolved)	U	1455	10:1	mg/l	0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011
Chromium (Dissolved)	U	1455	10:1	mg/l	0.0005	0.0007	0.0005	0.0009	0.0008	0.0006	0.0005	0.0009	< 0.0005
Copper (Dissolved)	U	1455	10:1	mg/l	0.0005	0.0006	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.0024	< 0.0005
Mercury (Dissolved)	U	1455	10:1	mg/l	0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Molybdenum (Dissolved)	U	1455	10:1	mg/l	0.0002	0.0020	0.0078	0.0033	0.0080	0.0030	0.0066	0.0013	0.0044
Nickel (Dissolved)	U	1455	10:1	mg/l	0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.0009	< 0.0005
Lead (Dissolved)	U	1455	10:1	mg/l	0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Antimony (Dissolved)	U	1455	10:1	mg/l	0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Selenium (Dissolved)	U	1455	10:1	mg/l	0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.0011	0.0056
Zinc (Dissolved)	U	1455	10:1	mg/l	0.002	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
Dissolved Organic Carbon	U	1610	10:1	mg/l	2.0	16	12	14	12	16	11	18	14
Total Phenols	U	1920	10:1	mg/l	0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030

Client: Causeway Geotech Ltd			CI	hemtest	Job No.:	22-10214	22-10214	22-10214	22-10214	22-10214	22-10214	22-10214	22-10214
Quotation No.: Q21-26199			Chen	ntest Sa	mple ID.:	1393663	1393664	1393665	1393666	1393667	1393668	1393669	1393670
				Sample	Location:	TP08	TP08	TP12	TP12	TP05	TP05	TP04	TP04
				San	nple Type:	SOIL							
				Тор [	Depth (m):	0.5	1.0	0.5	1.0	0.5	1.0	0.5	1.0
				Date	Sampled:	14-Mar-2022							
Determinand	Accred.	SOP	Туре	Units	LOD								
Total Dissolved Solids	N	1020	10:1	mg/l	1.0	65	72	85	78	33	65	52	59
Chloride	U	1220	10:1	mg/l	1.0	1.1	1.4	1.5	1.2	1.0	1.5	3.2	1.2
Fluoride	U	1220	10:1	mg/l	0.050	0.33	0.29	0.40	0.76	0.20	0.24	0.25	0.34
Sulphate	U	1220	10:1	mg/l	1.0	7.0	6.3	3.9	7.0	8.5	10	18	4.7
Arsenic (Dissolved)	U	1455	10:1	mg/l	0.0002	0.0003	< 0.0002	0.0011	< 0.0002	0.0020	< 0.0002	0.0006	< 0.0002
Barium (Dissolved)	U	1455	10:1	mg/l	0.005	0.005	0.007	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Cadmium (Dissolved)	U	1455	10:1	mg/l	0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011
Chromium (Dissolved)	U	1455	10:1	mg/l	0.0005	0.0011	0.0013	0.0010	0.0006	0.0022	0.0005	0.0009	< 0.0005
Copper (Dissolved)	U	1455	10:1	mg/l	0.0005	0.0013	< 0.0005	0.0024	< 0.0005	0.0035	< 0.0005	0.0014	< 0.0005
Mercury (Dissolved)	U	1455	10:1	mg/l	0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Molybdenum (Dissolved)	U	1455	10:1	mg/l	0.0002	0.0007	0.0059	0.0021	0.0088	0.0006	0.0006	0.0003	0.0048
Nickel (Dissolved)	U	1455	10:1	mg/l	0.0005	< 0.0005	< 0.0005	0.0015	< 0.0005	0.0035	< 0.0005	0.0010	< 0.0005
Lead (Dissolved)	U	1455	10:1	mg/l	0.0005	< 0.0005	< 0.0005	0.0006	< 0.0005	0.0017	< 0.0005	< 0.0005	< 0.0005
Antimony (Dissolved)	U	1455	10:1	mg/l	0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Selenium (Dissolved)	U	1455	10:1	mg/l	0.0005	< 0.0005	0.0019	0.0006	0.0007	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Zinc (Dissolved)	U	1455	10:1	mg/l	0.002	< 0.003	< 0.003	0.003	< 0.003	0.006	< 0.003	< 0.003	< 0.003
Dissolved Organic Carbon	U	1610	10:1	mg/l	2.0	24	13	23	13	16	9.2	11	8.7
Total Phenols	U	1920	10:1	mg/l	0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030

Client: Causeway Geotech Ltd			C	hemtest	t Job No.:	22-10214	22-10214	22-10214	22-10214
Quotation No.: Q21-26199			Chen	ntest Sa	ample ID.:	1393671	1393672	1393673	1393674
				Sample	Location:	TP11	TP11	TP03	TP03
				San	nple Type:	SOIL	SOIL	SOIL	SOIL
				Тор [	Depth (m):	0.5	1.0	0.5	1.0
				Date	Sampled:	14-Mar-2022	14-Mar-2022	14-Mar-2022	14-Mar-2022
Determinand	Accred.	SOP	Туре	Units	LOD				
Total Dissolved Solids	N	1020	10:1	mg/l	1.0	26	59	33	26
Chloride	U	1220	10:1	mg/l	1.0	5.7	2.0	1.2	< 1.0
Fluoride	U	1220	10:1	mg/l	0.050	0.16	0.27	0.55	0.40
Sulphate	U	1220	10:1	mg/l	1.0	9.3	7.3	11	3.1
Arsenic (Dissolved)	U	1455	10:1	mg/l	0.0002	0.0021	< 0.0002	0.0017	< 0.0002
Barium (Dissolved)	U	1455	10:1	mg/l	0.005	< 0.005	< 0.005	0.005	< 0.005
Cadmium (Dissolved)	U	1455	10:1	mg/l	0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011
Chromium (Dissolved)	U	1455	10:1	mg/l	0.0005	0.0019	0.0006	0.0021	0.0006
Copper (Dissolved)	U	1455	10:1	mg/l	0.0005	0.0034	< 0.0005	0.0037	0.0006
Mercury (Dissolved)	U	1455	10:1	mg/l	0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Molybdenum (Dissolved)	U	1455	10:1	mg/l	0.0002	0.0004	0.0003	0.0008	0.0012
Nickel (Dissolved)	U	1455	10:1	mg/l	0.0005	0.0037	< 0.0005	0.0028	< 0.0005
Lead (Dissolved)	U	1455	10:1	mg/l	0.0005	0.0008	< 0.0005	0.0010	< 0.0005
Antimony (Dissolved)	U	1455	10:1	mg/l	0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Selenium (Dissolved)	U	1455	10:1	mg/l	0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Zinc (Dissolved)	U	1455	10:1	mg/l	0.002	0.005	< 0.003	0.007	< 0.003
Dissolved Organic Carbon	U	1610	10:1	mg/l	2.0	13	8.8	18	5.5
Total Phenols	U	1920	10:1	mg/l	0.030	< 0.030	< 0.030	< 0.030	< 0.030

Client: Causeway Geotech Ltd		Ch	emtest	Job No.:	22-10214	22-10214	22-10214	22-10214	22-10214	22-10214	22-10214	22-10214	22-10214
Quotation No.: Q21-26199		Chem	test Sar	nple ID.:	1393655	1393656	1393657	1393658	1393659	1393660	1393661	1393662	1393663
				Location:	TP01	TP01	TP02	TP02	TP07	TP07	TP09	TP09	TP08
				ole Type:	SOIL								
				epth (m):	0.5	1.0	0.5	1.0	0.5	1.0	0.5	1.0	0.5
				Sampled:		15-Mar-2022	14-Mar-2022						
				stos Lab:	COVENTRY								
Determinand	Accred.	SOP	Units	LOD									
ACM Type	U	2192		N/A	-	-	-	-	-	-	-	-	-
					No Asbestos								
Asbestos Identification	U	2192		N/A	Detected								
Moisture	N	2030	%	0.020	18	16	16	11	16	16	27	18	18
рН	U	2010		4.0	8.5	8.5	8.5	8.7	8.6	8.7	8.2	8.5	8.5
Arsenic	U	2450	mg/kg	1.0	11	12	13	12	9.9	14	6.9	15	1.9
Barium	U	2450	mg/kg	10	54	58	68	50	57	66	60	83	62
Cadmium	U	2450	mg/kg	0.10	0.85	1.1	1.2	0.82	0.89	0.96	0.88	1.5	0.66
Mercury Low Level	U	2450	mg/kg	0.05	0.06	0.08	0.09	< 0.05	0.08	0.08	0.06	0.09	< 0.05
Molybdenum	U	2450	mg/kg	2.0	2.4	2.5	2.3	< 2.0	< 2.0	2.8	< 2.0	3.0	< 2.0
Antimony	N	2450	mg/kg	2.0	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Copper	U	2450	mg/kg	0.50	22	29	31	20	26	24	18	34	15
Nickel	U	2450	mg/kg	0.50	33	44	54	34	39	38	25	62	25
Lead	U	2450	mg/kg	0.50	19	15	18	10	12	13	15	20	6.8
Selenium	U	2450	mg/kg	0.20	0.61	0.57	0.43	0.29	0.24	0.21	0.91	2.0	< 0.20
Zinc	U	2450	mg/kg	0.50	50	56	59	37	44	49	48	67	32
Chromium (Trivalent)	N	2490	mg/kg	1.0	18	19	22	18	17	21	18	24	20
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
LOI	U	2610	%	0.10	4.8	3.4	4.0	2.6	4.2	2.4	10	5.0	3.6
Total Organic Carbon	U	2625	%	0.20	1.8	1.1	1.1	0.57	1.3	0.66	3.3	1.2	0.94
Mineral Oil	N	2670	mg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	Ν	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

Client: Causeway Geotech Ltd Chemtest Job No			Job No.:	22-10214	22-10214	22-10214	22-10214	22-10214	22-10214	22-10214	22-10214	22-10214	
Quotation No.: Q21-26199				nple ID.:	1393655	1393656	1393657	1393658	1393659	1393660	1393661	1393662	1393663
				Location:	TP01	TP01	TP02	TP02	TP07	TP07	TP09	TP09	TP08
				ple Type:	SOIL								
				epth (m):	0.5	1.0	0.5	1.0	0.5	1.0	0.5	1.0	0.5
			Date \$	Sampled:	15-Mar-2022	14-Mar-2022							
			Asbe	stos Lab:	COVENTRY								
Determinand	Accred.	SOP	Units	LOD									
Total Petroleum Hydrocarbons	Ν	2680	mg/kg	10.0	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Benzene	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Toluene	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Ethylbenzene	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
m & p-Xylene	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
o-Xylene	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Methyl Tert-Butyl Ether	U		mg/kg	0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Naphthalene	N	2800	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Acenaphthylene	Ν	2800	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Acenaphthene	N	2800	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Fluorene	Ν	2800	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Phenanthrene	Ν	2800	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Anthracene	Ν	2800	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Fluoranthene	Ν	2800	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.17	< 0.010	< 0.010	< 0.010	< 0.010
Pyrene	Ν	2800	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.15	< 0.010	< 0.010	< 0.010	< 0.010
Benzo[a]anthracene	Ν		mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Chrysene	Ν	2800	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo[b]fluoranthene	N	2800	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo[k]fluoranthene	Ν	2800	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo[a]pyrene	Ν	2800	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Indeno(1,2,3-c,d)Pyrene	N		mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Dibenz(a,h)Anthracene	Ν		mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo[g,h,i]perylene	Ν	2800	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Coronene	Ν		mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total Of 17 PAH's	Ν	2800	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	0.32	< 0.20	< 0.20	< 0.20	< 0.20
PCB 28	Ν		mg/kg	0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
PCB 52	Ν		mg/kg	0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
PCB 90+101	Ν	2815	mg/kg	0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
PCB 118	Ν		mg/kg	0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
PCB 153	Ν		mg/kg		< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
PCB 138	Ν	2815	mg/kg	0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
PCB 180	Ν	2815	mg/kg	0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Total PCBs (7 congeners)	Ν	2815	mg/kg	0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010

Client: Causeway Geotech Ltd		Ch	emtest	Job No.:	22-10214	22-10214	22-10214	22-10214	22-10214	22-10214	22-10214	22-10214	22-10214
Quotation No.: Q21-26199				nple ID.:	1393664	1393665	1393666	1393667	1393668	1393669	1393670	1393671	1393672
				Location:	TP08	TP12	TP12	TP05	TP05	TP04	TP04	TP11	TP11
				ole Type:	SOIL								
				epth (m):	1.0	0.5	1.0	0.5	1.0	0.5	1.0	0.5	1.0
				Sampled:		14-Mar-2022							
				stos Lab:	COVENTRY								
Determinand	Accred.	SOP	Units	LOD									
ACM Type	U	2192		N/A	-	-	-	-	-	-	-	-	-
		1			No Asbestos								
Asbestos Identification	U	2192		N/A	Detected								
Moisture	Ν	2030	%	0.020	14	20	20	17	17	17	9.5	15	16
рН	U	2010		4.0	8.5	8.5	8.5	7.8	8.2	8.1	8.5	8.0	8.2
Arsenic	U	2450	mg/kg	1.0	7.7	12	11	9.8	12	15	15	16	16
Barium	U	2450	mg/kg	10	42	62	46	65	32	53	60	63	50
Cadmium	U	2450	mg/kg	0.10	0.58	1.2	0.94	0.70	0.61	0.87	0.90	0.92	0.70
Mercury Low Level	U	2450	mg/kg	0.05	0.06	0.06	0.07	< 0.05	0.05	0.09	0.05	0.08	0.05
Molybdenum	U	2450	mg/kg	2.0	< 2.0	2.3	2.7	< 2.0	< 2.0	2.3	2.5	2.1	< 2.0
Antimony	N	2450	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Copper	U	2450	mg/kg	0.50	19	28	28	17	19	31	23	27	28
Nickel	U	2450	mg/kg	0.50	32	49	51	28	30	48	38	52	44
Lead	U	2450	mg/kg	0.50	11	20	16	16	9.0	12	11	14	13
Selenium	U	2450	mg/kg	0.20	0.84	0.80	0.62	0.38	0.26	0.37	< 0.20	0.34	0.32
Zinc	U	2450	mg/kg	0.50	44	66	57	59	36	61	41	62	54
Chromium (Trivalent)	N	2490	mg/kg	1.0	22	23	17	22	15	31	23	31	27
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
LOI	U	2610	%	0.10	3.1	5.0	4.3	3.2	3.6	3.8	2.6	3.7	3.3
Total Organic Carbon	U	2625	%	0.20	0.90	1.4	1.1	1.1	0.90	0.99	0.55	0.99	0.70
Mineral Oil	N	2670	mg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

Client: Causeway Geotech Ltd		Chem	est Job No	.: 22-10214	22-10214	22-10214	22-10214	22-10214	22-10214	22-10214	22-10214	22-10214
Quotation No.: Q21-26199		Chemtes	Sample ID	.: 1393664	1393665	1393666	1393667	1393668	1393669	1393670	1393671	1393672
		San	ple Locatio	n: TP08	TP12	TP12	TP05	TP05	TP04	TP04	TP11	TP11
			Sample Typ		SOIL							
		Т	op Depth (m	): 1.0	0.5	1.0	0.5	1.0	0.5	1.0	0.5	1.0
			ate Sample		14-Mar-2022							
		1	sbestos La	COVENTRY								
Determinand	Accred.	SOP U	nits LOD									
Total Petroleum Hydrocarbons	Ν	2680 m	g/kg 10.0	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Benzene	U	2760 m	g/kg 0.001	0 < 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Toluene	U	2760 m	g/kg 0.001	0 < 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Ethylbenzene	U	2760 m	g/kg 0.001	0 < 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
m & p-Xylene	U	2760 m	g/kg 0.001	0 < 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
o-Xylene	U	2760 m	g/kg 0.001	0 < 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Methyl Tert-Butyl Ether	U		g/kg 0.001	0 < 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Naphthalene	Ν	2800 m	g/kg 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Acenaphthylene	Ν	2800 m	g/kg 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Acenaphthene	Ν	2800 m	g/kg 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Fluorene	Ν	2800 m	g/kg 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Phenanthrene	Ν	2800 m	g/kg 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Anthracene	Ν	2800 m	g/kg 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Fluoranthene	Ν	2800 m	g/kg 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Pyrene	Ν	2800 m	g/kg 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo[a]anthracene	Ν	2800 m	g/kg 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Chrysene	Ν	2800 m	g/kg 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo[b]fluoranthene	Ν	2800 m	g/kg 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo[k]fluoranthene	Ν	2800 m	g/kg 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo[a]pyrene	Ν	2800 m	g/kg 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Indeno(1,2,3-c,d)Pyrene	Ν	2800 m	g/kg 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Dibenz(a,h)Anthracene	Ν	2800 m	g/kg 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo[g,h,i]perylene	Ν		g/kg 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Coronene	Ν		g/kg 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Total Of 17 PAH's	Ν		g/kg 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
PCB 28	Ν		g/kg 0.001		< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
PCB 52	Ν		g/kg 0.001	0 < 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
PCB 90+101	Ν	2815 m	g/kg 0.001	0 < 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
PCB 118	Ν	2815 m	g/kg 0.001	0 < 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
PCB 153	Ν		g/kg 0.001	0 < 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
PCB 138	Ν	2815 m	g/kg 0.001	0 < 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
PCB 180	Ν		g/kg 0.001	0 < 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Total PCBs (7 congeners)	Ν	2815 m	g/kg 0.001	0 < 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010

Client: Causeway Geotech Ltd		Ch	emtest .	Job No.:	22-10214	22-10214
Quotation No.: Q21-26199		Chem	test San	nple ID.:	1393673	1393674
		9		_ocation:	TP03	TP03
				ole Type:	SOIL	SOIL
				epth (m):	0.5	1.0
				Sampled:	14-Mar-2022	14-Mar-2022
		-		stos Lab:	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD		
АСМ Туре	U	2192		N/A	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	16	11
рН	U	2010		4.0	7.6	8.1
Arsenic	U	2450	0 0	1.0	12	13
Barium	U	2450		10	47	56
Cadmium	U	2450	mg/kg	0.10	0.81	0.31
Mercury Low Level	U	2450	3 3	0.05	0.06	< 0.05
Molybdenum	U	2450	00	2.0	< 2.0	< 2.0
Antimony	N	2450	0 0	2.0	< 2.0	< 2.0
Copper	U	-	mg/kg	0.50	22	32
Nickel	U	2450	0 0	0.50	32	39
Lead	U	2450		0.50	17	7.0
Selenium	U	2450		0.20	0.29	< 0.20
Zinc	U	2450	00	0.50	53	48
Chromium (Trivalent)	N N	2490 2490	0 0	1.0	24	35
Chromium (Hexavalent)	U	2490	тт <u>д</u> /кд	0.50 0.10	< 0.50 4.2	< 0.50 2.4
Total Organic Carbon	U	2625	%	0.10	4.2	0.40
Mineral Oil	N	2670		10	< 10	< 10
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680		1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	U	2680		1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	U	2680	0 0	1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	U	2680		1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	U	2680	00	1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	U	2680	00	1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	0 0	1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	U	2680	0 0	1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	Ν	2680	mg/kg	1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0

Client: Causeway Geotech Ltd		Ch	emtest .	Job No.:	22-10214	22-10214
Quotation No.: Q21-26199				nple ID.:	1393673	1393674
		2	Sample I	_ocation:	TP03	TP03
				ole Type:	SOIL	SOIL
				epth (m):	0.5	1.0
			Date S	Sampled:	14-Mar-2022	14-Mar-2022
				stos Lab:	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD		
Total Petroleum Hydrocarbons	Ν	2680	mg/kg	10.0	< 10	< 10
Benzene	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010
Toluene	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010
Ethylbenzene	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010
m & p-Xylene	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010
o-Xylene	U	2760	mg/kg		< 0.0010	< 0.0010
Methyl Tert-Butyl Ether	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010
Naphthalene	Ν	2800	mg/kg	0.010	< 0.010	< 0.010
Acenaphthylene	Ν	2800	mg/kg	0.010	< 0.010	< 0.010
Acenaphthene	Ν	2800	mg/kg	0.010	< 0.010	< 0.010
Fluorene	Ν	2800	mg/kg	0.010	< 0.010	< 0.010
Phenanthrene	Ν	2800	mg/kg	0.010	< 0.010	< 0.010
Anthracene	Ν	2800	mg/kg	0.010	< 0.010	< 0.010
Fluoranthene	Ν	2800	mg/kg	0.010	< 0.010	< 0.010
Pyrene	Ν	2800	mg/kg	0.010	< 0.010	< 0.010
Benzo[a]anthracene	Ν	2800	mg/kg	0.010	< 0.010	< 0.010
Chrysene	Ν	2800	mg/kg	0.010	< 0.010	< 0.010
Benzo[b]fluoranthene	Ν	2800	mg/kg	0.010	< 0.010	< 0.010
Benzo[k]fluoranthene	Ν	2800	mg/kg	0.010	< 0.010	< 0.010
Benzo[a]pyrene	Ν	2800	mg/kg	0.010	< 0.010	< 0.010
Indeno(1,2,3-c,d)Pyrene	Ν	2800	mg/kg	0.010	< 0.010	< 0.010
Dibenz(a,h)Anthracene	Ν	2800	mg/kg	0.010	< 0.010	< 0.010
Benzo[g,h,i]perylene	Ν	2800	mg/kg	0.010	< 0.010	< 0.010
Coronene	Ν	2800	mg/kg	0.010	< 0.010	< 0.010
Total Of 17 PAH's	Ν	2800	mg/kg	0.20	< 0.20	< 0.20
PCB 28	Ν	2815	mg/kg	0.0010	< 0.0010	< 0.0010
PCB 52	Ν	2815	mg/kg		< 0.0010	< 0.0010
PCB 90+101	Ν	2815	mg/kg	0.0010	< 0.0010	< 0.0010
PCB 118	Ν	2815	mg/kg	0.0010	< 0.0010	< 0.0010
PCB 153	Ν	2815	mg/kg	0.0010	< 0.0010	< 0.0010
PCB 138	Ν	2815	mg/kg	0.0010	< 0.0010	< 0.0010
PCB 180	Ν	2815	mg/kg	0.0010	< 0.0010	< 0.0010
Total PCBs (7 congeners)	Ν	2815	mg/kg	0.0010	< 0.0010	< 0.0010

# Test Methods

SOP	Title	Parameters included	Method summary
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	рН	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3- band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35–C44Aromatics: >C5–C7, >C7–C8, >C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35–C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS

## **Test Methods**

SOP	Title	Parameters included	Method summary
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
640		<b>3</b> . <b>3</b>	ComplianceTest for Leaching of Granular Waste Material and Sludge

### **Report Information**

Key	
U	UKAS accredited
Μ	MCERTS and UKAS accredited
Ν	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
Т	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection
	Comments or interpretations are beyond the scope of LIKAS appreditation

Comments or interpretations are beyond the scope of UKAS accreditation The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request None of the results in this report have been recovery corrected All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently

corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis All Asbestos testing is performed at the indicated laboratory Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

#### **Sample Deviation Codes**

- A Date of sampling not supplied
- B Sample age exceeds stability time (sampling to extraction)
- C Sample not received in appropriate containers
- D Broken Container
- E Insufficient Sample (Applies to LOI in Trommel Fines Only)

#### Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt All water samples will be retained for 14 days from the date of receipt Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to: <u>customerservices@chemtest.com</u>

# 🔅 eurofins



Eurofins Chemtest Ltd Depot Road Newmarket CB8 0AL Tel: 01638 606070 Email: info@chemtest.com

Report No.:	22-10615-1		
Initial Date of Issue:	04-Apr-2022		
Client	Causeway Geotech Ltd		
Client Address:	8 Drumahiskey Road Balnamore Ballymoney County Antrim BT53 7QL		
Contact(s):	Carin Cornwall Colm Hurley Darren O'Mahony Gabriella Horan Joe Gervin John Cameron Lucy Newland Martin Gardiner Matthew Gilbert Neil Haggan Paul Dunlop Sean Ross Stephen Franey Stephen Watson Stuart Abraham Thomas McAllister		
Project	21-1619 North Irish Sea Array		
Quotation No.:	Q21-26199	Date Received:	21-Mar-2022
Order No.:		Date Instructed:	22-Mar-2022
No. of Samples:	6		
Turnaround (Wkdays):	7	Results Due:	30-Mar-2022
Date Approved:	04-Apr-2022		
Approved By:			
sant	-		

**Details:** 

201.

Stuart Henderson, Technical Manager



# 🔅 eurofins

### Chemtest

Eurofins Chemtest Ltd Depot Road Newmarket CB8 0AL Tel: 01638 606070 Email: info@chemtest.com

Client: Causeway Geotech Ltd			CI	nemtest	t Job No.:	22-10615	22-10615	22-10615	22-10615	22-10615	22-10615
Quotation No.: Q21-26199			Chen	ntest Sa	mple ID.:	1395603	1395604	1395605	1395606	1395607	1395608
					Location:	BH03	BH03	TP20	TP20	TP21	TP21
				San	nple Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Тор [	Depth (m):	0.50	1.00	0.50	1.00	0.50	1.00
				Date	Sampled:	15-Feb-2022	15-Feb-2022	15-Feb-2022	15-Feb-2022	15-Feb-2022	15-Feb-2022
Determinand	Accred.	SOP	Туре	Units	LOD						
Total Dissolved Solids	Ν	1020	10:1	mg/l	1.0	33	33	13	26	91	52
Chloride	U	1220	10:1	mg/l	1.0	18	1.5	< 1.0	< 1.0	7.0	3.7
Fluoride	U	1220	10:1	mg/l	0.050	0.11	0.11	0.12	0.21	0.13	0.11
Sulphate	U	1220	10:1	mg/l	1.0	1.4	1.9	< 1.0	2.1	13	< 1.0
Arsenic (Dissolved)	U	1455	10:1	mg/l	0.0002	0.0006	< 0.0002	< 0.0002	< 0.0002	0.0012	0.0012
Barium (Dissolved)	U	1455	10:1	mg/l	0.005	0.014	< 0.005	< 0.005	< 0.005	0.015	0.011
Cadmium (Dissolved)	U	1455	10:1	mg/l	0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011	< 0.00011
Chromium (Dissolved)	U	1455	10:1	mg/l	0.0005	0.0013	0.0015	0.0008	0.0016	0.0013	0.0005
Copper (Dissolved)	U	1455	10:1	mg/l	0.0005	0.0009	0.0008	< 0.0005	0.0009	0.0010	0.0012
Mercury (Dissolved)	U	1455	10:1	mg/l	0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Molybdenum (Dissolved)	U	1455	10:1	mg/l	0.0002	0.0006	0.0006	0.0002	0.0003	0.0019	0.0015
Nickel (Dissolved)	U	1455	10:1	mg/l	0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.0008	0.0005
Lead (Dissolved)	U	1455	10:1	mg/l	0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.0016	0.0010
Antimony (Dissolved)	U	1455	10:1	mg/l	0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.0010	0.0005
Selenium (Dissolved)	U	1455	10:1	mg/l	0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Zinc (Dissolved)	U	1455	10:1	mg/l	0.002	0.030	0.006	0.003	0.013	0.012	0.005
Dissolved Organic Carbon	U	1610	10:1	mg/l	2.0	8.0	8.4	5.7	6.3	14	12
Total Phenols	U	1920	10:1	mg/l	0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030

Client: Causeway Geotech Ltd		Ch	emtest .	Job No.:	22-10615	22-10615	22-10615	22-10615	22-10615	22-10615
Quotation No.: Q21-26199		Chem	test San	nple ID.:	1395603	1395604	1395605	1395606	1395607	1395608
		ŝ	Sample I	_ocation:	BH03	BH03	TP20	TP20	TP21	TP21
			Samp	ole Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top De	epth (m):	0.50	1.00	0.50	1.00	0.50	1.00
			Date S	Sampled:	15-Feb-2022	15-Feb-2022	15-Feb-2022	15-Feb-2022	15-Feb-2022	15-Feb-2022
			Asbes	stos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD						
АСМ Туре	U	2192		N/A	-	-	-	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected					
Moisture	N	2030	%	0.020	18	11	30	25	24	36
рН	U	2010		4.0	[B] 8.3	[B] 8.6	[B] 8.2	[B] 8.2	[B] 8.2	[B] 8.1
Arsenic	U	2450	mg/kg	1.0	12	11	6.0	4.8	13	10
Barium	U	2450	mg/kg	10	91	56	91	82	190	97
Cadmium	U	2450	mg/kg	0.10	1.3	0.78	0.75	0.89	1.9	1.2
Mercury Low Level	U	2450	mg/kg	0.05	0.05	< 0.05	< 0.05	< 0.05	0.07	0.09
Molybdenum	U	2450	mg/kg	2.0	2.0	< 2.0	< 2.0	< 2.0	3.1	< 2.0
Antimony	N	2450	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	2.0	< 2.0
Copper	U	2450	mg/kg	0.50	20	21	16	14	30	27
Nickel	U	2450	mg/kg	0.50	47	29	22	18	38	25
Lead	U	2450	mg/kg	0.50	16	9.2	12	11	24	24
Selenium	U	2450	mg/kg	0.20	0.30	< 0.20	0.72	0.59	1.2	1.3
Zinc	U	2450	mg/kg	0.50	56	43	47	45	93	110
Chromium (Trivalent)	N	2490	mg/kg	1.0	20	17	18	15	34	16
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
LOI	U	2610	%	0.10	4.1	1.9	9.0	5.1	13	7.6
Total Organic Carbon	U	2625	%	0.20	[B] 1.0	[B] 0.30	[B] 2.4	[B] 1.1	[B] 4.4	[B] 2.4
Mineral Oil	N	2670	mg/kg	10	[B] < 10	[B] < 10	[B] < 10	[B] < 10	[B] < 10	[B] 110
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] 110
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] 110
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] 19
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] 460
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] 480

Client: Causeway Geotech Ltd				Job No.:	22-10615	22-10615	22-10615	22-10615	22-10615	22-10615
Quotation No.: Q21-26199		Chem	test Sar	nple ID.:	1395603	1395604	1395605	1395606	1395607	1395608
		5	Sample I	_ocation:	BH03	BH03	TP20	TP20	TP21	TP21
			Samp	ole Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				epth (m):	0.50	1.00	0.50	1.00	0.50	1.00
			Date S	Sampled:	15-Feb-2022	15-Feb-2022	15-Feb-2022	15-Feb-2022	15-Feb-2022	15-Feb-2022
			Asbes	stos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD						
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	[B] < 10	[B] 590				
Benzene	U	2760	mg/kg	0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010
Toluene	U	2760	mg/kg	0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010
Ethylbenzene	U	2760	mg/kg	0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010
m & p-Xylene	U	2760	mg/kg	0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010
o-Xylene	U	2760	mg/kg	0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010
Methyl Tert-Butyl Ether	U	2760	mg/kg	0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010
Naphthalene	N	2800	mg/kg	0.010	[B] < 0.010	[B] < 0.010	[B] < 0.010	[B] < 0.010	[B] 0.12	[B] 0.22
Acenaphthylene	N	2800	mg/kg	0.010	[B] < 0.010	[B] < 0.010	[B] < 0.010	[B] < 0.010	[B] 0.11	[B] 0.44
Acenaphthene	N	2800	mg/kg	0.010	[B] < 0.010	[B] < 0.010	[B] < 0.010	[B] < 0.010	[B] 0.099	[B] 0.11
Fluorene	N	2800	mg/kg	0.010	[B] < 0.010	[B] < 0.010	[B] < 0.010	[B] < 0.010	[B] 0.081	[B] 0.16
Phenanthrene	N	2800	mg/kg	0.010	[B] < 0.010	[B] < 0.010	[B] 0.13	[B] < 0.010	[B] 0.56	[B] 1.4
Anthracene	N	2800	mg/kg	0.010	[B] < 0.010	[B] < 0.010	[B] 0.068	[B] < 0.010	[B] 0.18	[B] 0.56
Fluoranthene	N	2800	mg/kg	0.010	[B] < 0.010	[B] < 0.010	[B] 0.14	[B] 0.070	[B] 2.3	[B] 8.3
Pyrene	N	2800	mg/kg	0.010	[B] < 0.010	[B] < 0.010	[B] 0.16	[B] 0.088	[B] 2.3	[B] 8.5
Benzo[a]anthracene	N	2800	mg/kg	0.010	[B] < 0.010	[B] < 0.010	[B] 0.14	[B] < 0.010	[B] 1.6	[B] 5.5
Chrysene	N	2800	mg/kg	0.010	[B] < 0.010	[B] < 0.010	[B] 0.085	[B] < 0.010	[B] 1.7	[B] 6.2
Benzo[b]fluoranthene	N	2800	mg/kg	0.010	[B] < 0.010	[B] < 0.010	[B] < 0.010	[B] < 0.010	[B] 3.4	[B] 12
Benzo[k]fluoranthene	N	2800	mg/kg	0.010	[B] < 0.010	[B] < 0.010	[B] < 0.010	[B] < 0.010	[B] 1.2	[B] 4.2
Benzo[a]pyrene	N	2800	mg/kg	0.010	[B] < 0.010	[B] < 0.010	[B] < 0.010	[B] < 0.010	[B] 3.4	[B] 11
Indeno(1,2,3-c,d)Pyrene	N	2800	mg/kg	0.010	[B] < 0.010	[B] < 0.010	[B] < 0.010	[B] < 0.010	[B] 2.9	[B] 11
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.010	[B] < 0.010	[B] < 0.010	[B] < 0.010	[B] < 0.010	[B] 0.48	[B] 1.4
Benzo[g,h,i]perylene	N	2800	mg/kg	0.010	[B] < 0.010	[B] < 0.010	[B] < 0.010	[B] < 0.010	[B] 2.7	[B] 9.1
Coronene	N	2800	mg/kg	0.010	[B] < 0.010	[B] < 0.010	[B] < 0.010	[B] < 0.010	[B] < 0.010	[B] < 0.010
Total Of 17 PAH's	N	2800	mg/kg	0.20	[B] < 0.20	[B] < 0.20	[B] 0.72	[B] < 0.20	[B] 23	[B] 80
PCB 28	N	2815	mg/kg	0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010
PCB 52	N	2815	mg/kg	0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010
PCB 90+101	Ν	2815	mg/kg	0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010
PCB 118	N	2815	mg/kg	0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010
PCB 153	N	2815	mg/kg	0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010
PCB 138	N	2815	mg/kg	0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010
PCB 180	N	2815	mg/kg	0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010
Total PCBs (7 congeners)	Ν	2815	mg/kg	0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010	[B] < 0.0010

### **Deviations**

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request. The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1395603			BH03	15-Feb-2022	В	Amber Glass 250ml
1395603			BH03	15-Feb-2022	В	Amber Glass 60ml
1395603			BH03	15-Feb-2022	В	Plastic Tub 500g
1395604			BH03	15-Feb-2022	В	Amber Glass 250ml
1395604			BH03	15-Feb-2022	В	Amber Glass 60ml
1395604			BH03	15-Feb-2022	В	Plastic Tub 500g
1395605			TP20	15-Feb-2022	В	Amber Glass 250ml
1395605			TP20	15-Feb-2022	В	Amber Glass 60ml
1395605			TP20	15-Feb-2022	В	Plastic Tub 500g
1395606			TP20	15-Feb-2022	В	Amber Glass 250ml
1395606			TP20	15-Feb-2022	В	Amber Glass 60ml
1395606			TP20	15-Feb-2022	В	Plastic Tub 500g
1395607			TP21	15-Feb-2022	В	Amber Glass 250ml
1395607			TP21	15-Feb-2022	В	Amber Glass 60ml
1395607			TP21	15-Feb-2022	В	Plastic Tub 500g
1395608			TP21	15-Feb-2022	В	Amber Glass 250ml
1395608			TP21	15-Feb-2022	В	Amber Glass 60ml
1395608			TP21	15-Feb-2022	В	Plastic Tub 500g

# Test Methods

SOP	Title	Parameters included	Method summary
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	рН	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3- band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35–C44Aromatics: >C5–C7, >C7–C8, >C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35–C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS

## **Test Methods**

SOP	Title	Parameters included	Method summary
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
640	Characterisation of Waste (Leaching C10)	<b>3</b> 1 <b>3</b>	ComplianceTest for Leaching of Granular Waste Material and Sludge

### **Report Information**

Key	
U	UKAS accredited
Μ	MCERTS and UKAS accredited
Ν	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
Т	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection
	Comments or interpretations are beyond the scope of LIKAS appreditation

Comments or interpretations are beyond the scope of UKAS accreditation The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request None of the results in this report have been recovery corrected All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently

corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis All Asbestos testing is performed at the indicated laboratory Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

#### **Sample Deviation Codes**

- A Date of sampling not supplied
- B Sample age exceeds stability time (sampling to extraction)
- C Sample not received in appropriate containers
- D Broken Container
- E Insufficient Sample (Applies to LOI in Trommel Fines Only)

#### Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt All water samples will be retained for 14 days from the date of receipt Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to: <u>customerservices@chemtest.com</u>



# APPENDIX H SPT HAMMER ENERGY MEASUREMENT REPORT





in accordance with BSEN ISO 22476-3:2005

Southern Testing
Unit 11
Charlwoods Road
East Grinstead
West Sussex
RH19 2HU

#### **Instrumented Rod Data**

Diameter d <sub>r</sub> (mm):	54
Wall Thickness tr (mm):	6.0
Assumed Modulus E <sub>a</sub> (GPa):	200
Accelerometer No.1:	64786
Accelerometer No.2:	64789

SPT Hammer Ref:	0208
Test Date:	12/02/2022
Report Date:	14/02/2022
File Name:	0208.spt
Test Operator:	NPB

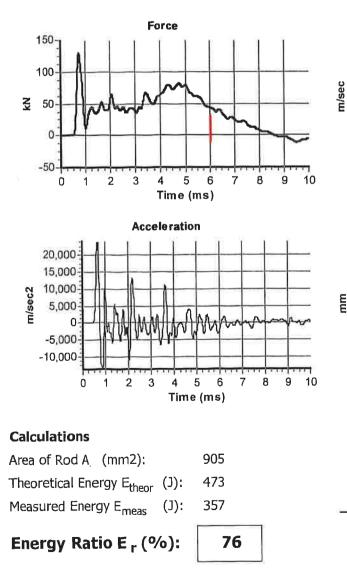
#### **SPT Hammer Information**

Hammer Mass	m (kg):	63.0
Falling Height	h (mm):	760
SPT String Leng	gth L (m):	12.0

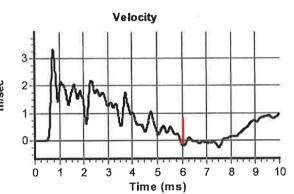
**Comments / Location** 

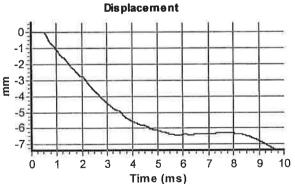
CAUSEWAY

26



The recommended calibration interval is 12 months





Signed: N Burrows Title: FOC Manager



in accordance with BSEN ISO 22476-3:2005

Southern Testing
Unit 11
Charlwoods Road
East Grinstead
West Sussex
RH19 2HU

#### **Instrumented Rod Data**

Diameter d <sub>r</sub> (mm):	54
Wall Thickness t <sub>r</sub> (mm):	6.0
Assumed Modulus $E_a$ (GPa):	200
Accelerometer No.1:	64786
Accelerometer No.2:	64789

SPT Hammer Ref:	0643
Test Date:	12/02/2022
Report Date:	14/02/2022
File Name:	0643.spt
Test Operator:	NPB

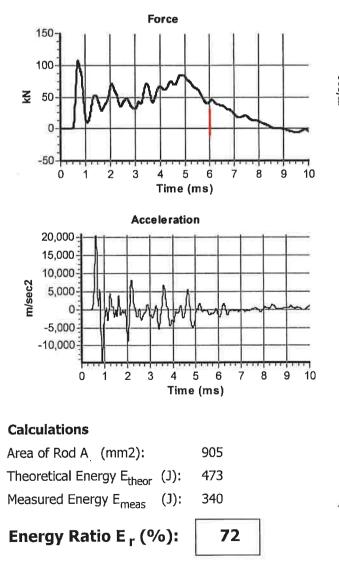
#### **SPT Hammer Information**

Hammer Mass	m (kg):	63.0
Falling Height	h (mm):	760
SPT String Len	gth L (m):	12.0

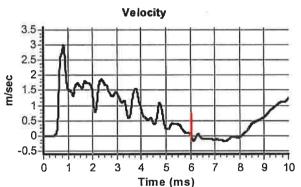
#### **Comments / Location**

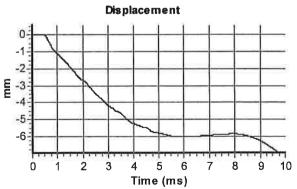
CAUSEWAY

\*:



The recommended calibration interval is 12 months





Signed: N Burrows Title: FOC Manager



in accordance with BSEN ISO 22476-3:2005

Southern Testing
Unit 11
Charlwoods Road
East Grinstead
West Sussex
RH19 2HU

#### **Instrumented Rod Data**

Diameter d <sub>r</sub> (mm):	54
Wall Thickness tr (mm):	6.0
Assumed Modulus E <sub>a</sub> (GPa):	200
Accelerometer No.1:	64786
Accelerometer No.2:	64789

SPT Hammer Ref:	1387
Test Date:	12/02/2022
Report Date:	14/02/2022
File Name:	1387.spt
Test Operator:	NPB

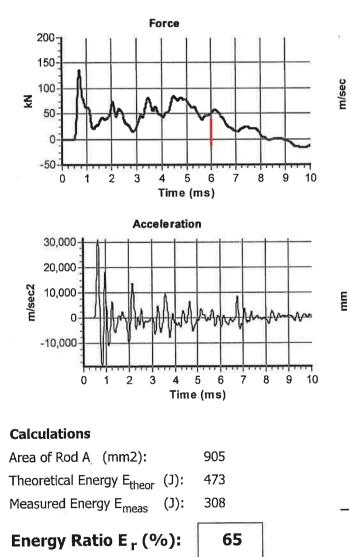
#### **SPT Hammer Information**

Hammer Mass	m (kg):	63.0
Falling Height	h (mm):	760
SPT String Leng	gth L (m):	12.0

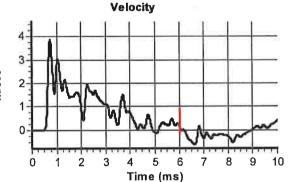
#### **Comments / Location**

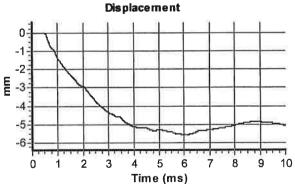
CAUSEWAY

i



The recommended calibration interval is 12 months





NPBuracens

Signed: N Burrows Title: FOC Manager



in accordance with BSEN ISO 22476-3:2005

Southern Testing
Unit 11
Charlwoods Road
East Grinstead
West Sussex
RH19 2HU

#### **Instrumented Rod Data**

Diameter d <sub>r</sub> (mm):	54	
Wall Thickness tr (mm):	6.0	
Assumed Modulus $E_a$ (GPa):	200	
Accelerometer No.1:	64786	
Accelerometer No.2:	64789	

SPT Hammer Ref:	1376
Test Date:	14/02/2022
Report Date:	14/02/2022
File Name:	1376.spt
Test Operator:	NPB

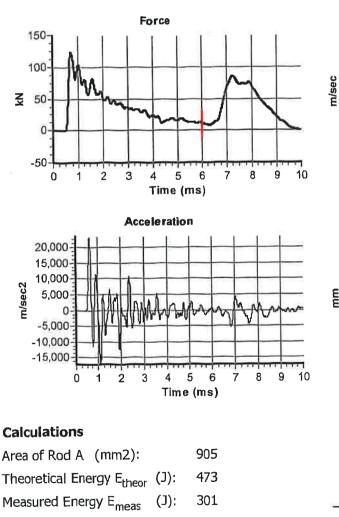
#### **SPT Hammer Information**

Hammer Mass	m (kg):	63.0
Falling Height	h (mm):	760
SPT String Leng	gth L (m):	12.0

#### **Comments / Location**

CAUSEWAY

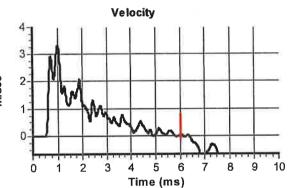
#2

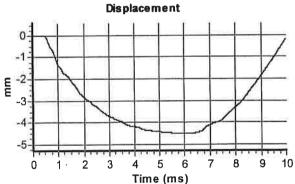


## Energy Ratio E<sub>r</sub> (%):

The recommended calibration interval is 12 months

64





Signed: N Burrows Title: FOC Manager



# APPENDIX I DOWNHOLE GEOPHYSICS



**REPORT ON THE** 

### **GEOPHYSICAL LOGGING**

OF

### SIX BOREHOLES

### FOR THE

### NORTH IRISH SEA ARRAY

### NEAR BALBRIGGAN, NORTHERN IRELAND



8 DRUMAHISKEY ROAD BALLYMONEY CO. ANTRIM BT53 7QL

### MAY2022/CAUSE2022\_NISA\_Report

	Name	Date
Logged by:	M. Hand	04.05.2022 06.05.2022
Report by:	M. Hand	07.06.2022
Checked by:	M. Kynaston	17.06.2022

EUROPEAN GEOPHYSICAL SERVICES LTD

22 The Stables, Sansaw Business Park, Hadnall, Shrewsbury, Shropshire. SY4 4AS T: 01939210710 / office@europeangeophysical.com www.europeangeophysical.com

Registered in England & Wales No. 2962962 VAT No. GB648 4148 18

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1.	INTRODUCTION	.1
2.	THE GEOPHYSICAL LOGGING METHODS	. 2
3.	SITE DETAILS	. 5
4.	BOREHOLE LOGGING CONSTRAINTS	.7

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Figure 3.1	Location map showing the main area of investigation highlighted by the red striped area. Aerial image showing the location of five of the six boreholes, just north of Balbriggan.		
Figure 3.2			
Figure 3.3	Location map showing the location of borehole 9, just North of Swords (highlighted by a red striped circle).		
Figure 3.4	Aerial map showing borehole 9's location.		
Figure 4	Geophysical Logs		
Appendix 1	Geophysical Logs		

## 1.0 INTRODUCTION

At the request of Causeway Geotech geophysical logging was carried out in the following boreholes.

The work was carried out by European Geophysical Services on the  $4^{th}$  May 2022 and the  $6^{th}$  May 2022.

The following logs were run:

BH	Logs	From (m)	To (m)
1	Natural Gamma (GV NGRS) 3-Arm Caliper (GV CAL3) Focused Resistivity (GV DLL3) Sonic Velocity (GV ASNC) Fluid Temperature & Conductivity (GV TCIS) Fluid Velocity (GV IFM)	0.6	22.2
2		0.9	28
4		0.6	17.7
9		1	19.6
17		1	25
18		1	27

### 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 4x4 van 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.

### 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 (FWS)

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 dependent 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.

### 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.

### 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. Flow (Q) in I/s may then be derived from the fluid velocity (FV) and caliper (Cal) data.Optional paragraph

Where practicable the log may be run in conjunction with a temporary and easily removable pumping system.

### 2.0 THE GEOPHYSICAL LOGGING METHODS

### P Wave Velocity (Vp) - unlined

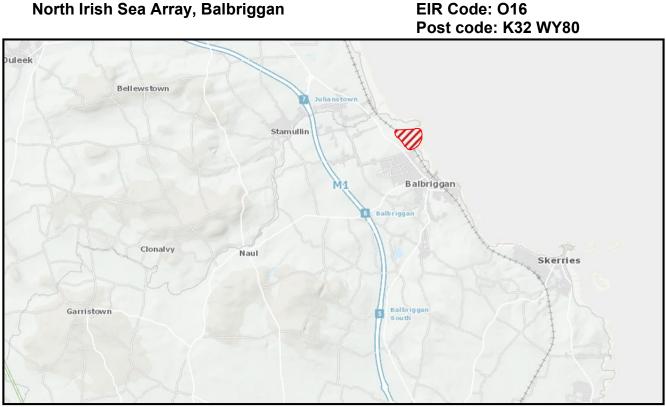
Within the unlined section the full wave form is recorded and analysed for the first arrival i.e. P Wave. The time of this arrival is corrected for tool stand off and inverted to produce the P Wave velocity of the formation.

The P Wave velocity log may be used for identifying variations in hardness and porosity.

Estimates of S wave velocity *may only be obtained under suitable conditions*. These waves are normally identified by higher amplitudes and phase changes after the P wave arrivals.

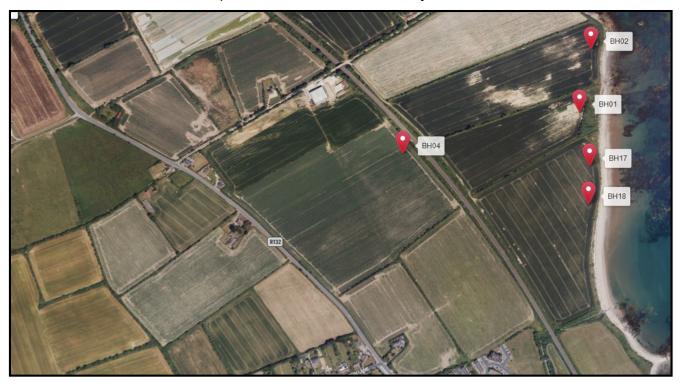
Shear wave arrivals occur after the P-wave. They are waves that have travelled across the borehole fluid to the rock as P-waves and have undergone P to S conversion. Shear waves which refract at the fluid/rock boundary at the S-wave critical angle travel through the rock at  $V_s$  and if modal conversion back to P wave occurs the waves can be received by the tool.

Results can be affected by the competency of the rock material, low velocity zones, irregular boundary conditions and complex interactions of non-direct P-waves and other fast waves. This last factor can be the main limiter on Shear wave identification in wireline logging.



### 3.0 SITE DETAILS North Irish Sea Array, Balbriggan

**Figure 3.1** Location map showing the main area of investigation highlighted by the red striped area © Ordnance Survey Ireland 2022.



**Figure 3.2** Aerial image showing the location of five of the six boreholes, just north of Balbriggan © Applemaps 2022.

### 3.0 SITE DETAILS North Irish Sea Array

EIR Code: O19 Post Code: K67 R2K0



**Figure 3.3** Location map showing the location of borehole 9, just north of Swords (highlighted by the red striped circle) © Ordnance Survey Ireland 2022.

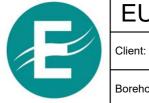


**Figure 3.4** Aerial map showing borehole 9's location © Applemaps 2022.

### 5.0 BOREHOLE LOGGING CONSTRAINTS

- Vehicle access restrictions Offroad
- Tool access restrictions None
- **Borehole conditions** Most of the boreholes had either collapsed or silted up slightly from their drilled depths.
- Lack of fluid filled column
   None
- Time constraint None

Appendix 1 Geophysical Logs



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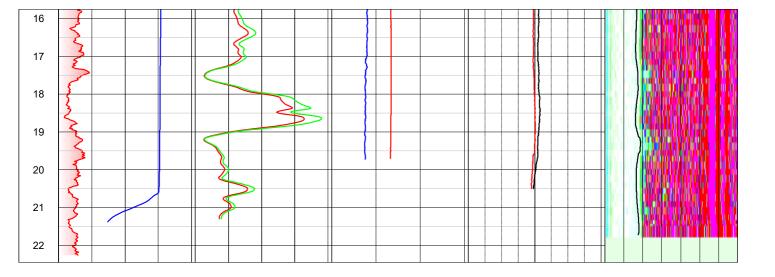
## **Causeway Geotech**

Log Type:

Borehole: BH01

Composite Final

Locatio	on: <b>Bal</b> l	briggan	l			Area:	Count	y Dubl	in		Grid R	ef:	719758	8.67E 7	6537	1.97N	Ele	evatio	on: <b>3.</b> {	53	
Drilled	Depth:	(m)			30					Date:					0	4.05.2	022				
Logged	d Depth	: (m)			22.2					Record	ed By:				N	I. Han	d				
Loggin	g Datur	n:				nd lev	el			Remark	s: Th	e bo	orehole h some too	as colla	psed	to arou	nd 21	1.5m	(dipped	on the	e
Logged	l Interv	al: (m)			0.6 -	22.2					ter	mina	ated at a	round 2	0.5m	to prev	ent th	natery ne imp	peller fr	om co	ming
Fluid L	evel: (n	า)			0.8						into	o co	ntact wit	n the co	llapse	ed mate	rial.				
		E RE								CASII	NG R										
Bit: (mr	m)			n: (m)			o: (m)			Туре		<u> </u>	ze: (mm	)	-	om: (m)			To: (m	)	
154			4			30				PLAST	IC	11	5		-0.′	19			4		
Depth		Natural (	Gamma	a	R	esistivit	y Shalle		Flu	uid Tempera	ature			Fluid Ve	locity		ı.—	-	Transit <sup>-</sup>	Time	
1:100	0	AF Cali		200	0 F		m.m ity Dee	10000 p	10	°C EC25		13	-100 Fluid	/mm Velocity		100	100		uSe able De		800 _og
	0	mr	n	200	0	Ohi	m.m	10000	600	μS/cm	80	00	-100	mm/	s	100	0				1000
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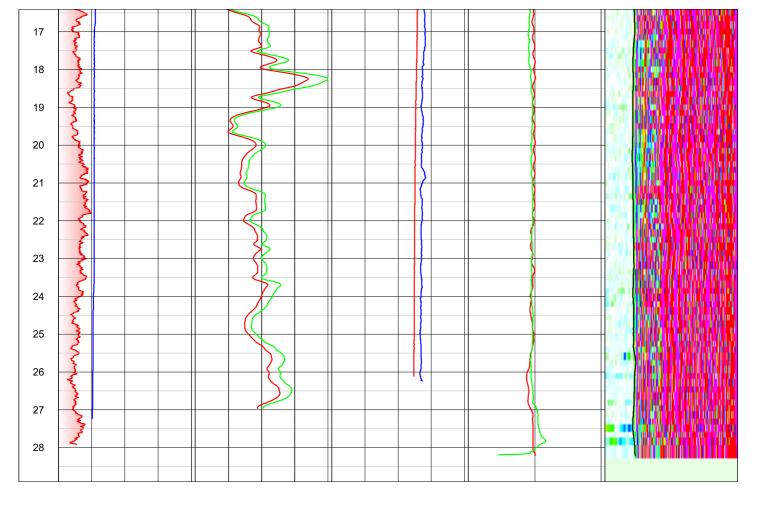


EURO	PEAN GEC	PHYSICAL SERVIC	CES LTD
Client:	Causeway	/ Geotech	Log Type:

Borehole: BH02

Composite Final

Locatio	on: Bal	briggan	l		ļ	Area:	Count	y Dubl	in		G	Frid Re	ef:	719788.43E 76	5520.35N	Elevati	on: <b>5.4</b> :	3
Drilled	Depth:	(m)			30					0	Date:				04.05.20	)22		
Logged	d Depth	ı: (m)			28					F	Recorded	d By:			M. Hand	ł		
Loggin	g Datu	n:			Grour	nd lev	el			F	Remarks:	Bor	reh	ole has collapsed	to approxim	ately 28.	1m.	
Logged	d Interv	al: (m)			0.9 - 2	28												
Fluid L	evel: (n	n)			1.7													
		E RE									CASIN	G RI						
Bit: (m	m)		From:	(m)			o: (m)				уре		<u> </u>	ize: (mm)	From: (m)		To: (m)	
154			6			30				F	PLASTIC	;	11	15	0		6	
Depth		Natural C	Samma		Re	esistivit	y Shallo			uid T	emperat	ure		Fluid Velo	ocity		Transit T	ime
1:100	0	AP Calip		200			m.m ity Dee	8000	10		°C EC25	1	12	-100 mm/s Fluid Velocit	100	100 Vari	uSec iable Den	
	100	mr		300			m.m	8000	700		uS/cm	90		-100 mm/s				800 800
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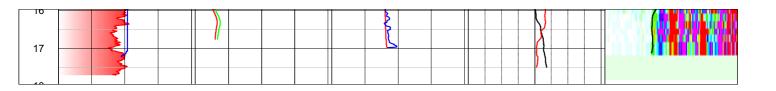
 EUROPEAN GEOPHYSICAL SERVICES LTD

 Client:
 Causeway Geotech

Borehole: BH04

Composite Final

Locatio	on: Balbrigg	jan			Area:	Count	y Dubl	in		G	rid Re	ef: <b>71</b> 9	9338.6	E 765	263.5	53N	Elevat	tion: <b>13.</b>	04	
Drilled	Depth: (m)			20					Da	ate:					04	.05.20	)22			
Logged	d Depth: (m)			17.7					R	ecorded	I By:				М.	Hand	1			
	g Datum:			Grou	Ind le	vel			Re	emarks:	Bor	ehole h	nas colla	apsed	to app	oroxim	ately 18	m.		
Logged	d Interval: (m	ו)		0.6 -	17.7															
Fluid L	evel: (m)			0.6																
BOR	EHOLE R	ECOR	D						С	ASIN	g Ri	ECOF	RD							
Bit: (m	m)	From	n: (m)		Т	o: (m)			Ту	/pe		Size:	(mm)		Fron	n: (m)		To: (m)		
154		6			2	0			PI	LASTIC	;	115			-0.3			6		
D																				
Depth		al Gamma		L		ity Shallo				emperatu				id Velo	-			Transit T		
1:100		API Caliper	200			nm.m vity Dee	1500	10		°C C25	1	2 -10	0 Fluid Ve	mm/s			100	uSec riable Den		00
	<b> </b>	-		<b>—</b>				II										lable Del		
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EUROPEAN GEOPHYSICAL SEF	RVICESLID
Client: Causeway Geotech	Log Type:

Borehole:

Composite Final

BH09

Caliper Resistivity Deep EC25 Fluid Velocity - Repeat Variable Density Log	Locatio	n: S	words			ŀ	rea:	Count	y Dubli	in		G	rid Re	ef:	71	8991	E 749	337	'N	Elevat	ion: <b>10.54</b>	
Logging Datum:         Ground level         Remarks:         Heavy mud below 15.5m. Fluid weldy by gaterminated at 15m.           Logging Datum:         0.9 - 18.6         Pluid Level:         Pluid Evel:         Pluid Evel	Drilled	Dept	h: (m)			20						Date:							06.05.20	)22		
Legged Interval: (m)  Leg Det  Structure  Function  From: (m)  Fro	Logged	l Dep	oth: (m)			19.6					F	Recorded	By:						M. Hand	1		
Logged Interval: (m) 4.5 BOREHOLE RECORD Bit: (mm) From: (m) To: (m) To: (m) Type Size: (mm) From: (m) To: (m) 154 7.2 20 PLASTIC 115 4.36 7.2 Depth Netward Gamma Resistivity Shallow Fluid Temporature Fluid Volocity Transit Time 1:00 ARI 200 0 Ohm.m 5000 400 μScm 700 -100 mm/s 100 100 υScc 80 Resistivity Deep 1 EC25 Fluid Volocity - Transit Time 1:00 0 mm 300 0 Ohm.m 5000 400 μScm 700 -100 mm/s 100 100 υScc 80 1 0 mm 300 0 Ohm.m 5000 400 μScm 700 -100 mm/s 100 100 υScc 80 1 0 mm 300 0 Ohm.m 5000 400 μScm 700 -100 mm/s 100 100 υScc 80 1 0 mm 300 0 Ohm.m 5000 400 μScm 700 -100 mm/s 100 100 υScc 80 1 0 mm 300 0 Ohm.m 5000 400 μScm 700 -100 mm/s 100 100 υScc 80 1 0 mm 300 0 Ohm.m 5000 400 μScm 700 -100 mm/s 100 100 υScc 80 1 0 mm 300 0 Ohm.m 5000 400 μScm 700 -100 mm/s 100 100 υScc 80 1 0 mm 300 0 Ohm.m 5000 400 μScm 700 -100 mm/s 100 100 υScc 80 1 0 mm 300 0 Ohm.m 5000 400 μScm 700 -100 mm/s 100 100 υScc 80 1 0 mm 300 0 Ohm.m 5000 400 μScm 700 -100 mm/s 100 100 υScc 80 1 0 mm 300 0 Ohm.m 5000 400 μScm 700 -100 mm/s 100 100 υScc 80 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Loggin	g Da	tum:			Grour	d lev	vel			F	Remarks:	Hea	av	y mi	ud bel	ow 15.	5m.	Fluid veloc	city logs	terminated at 1	5m
BOREHOLE RECORD         CASING RECORD           Bit: (mm)         From: (m)         To: (m)         Type         Size: (mm)         From: (m)         To: (m)           184         7.2         20         PLASTIC         115         0.36         7.2           Depth         Natural Gamma         Resistivity Shallow         Fluid Temperature         Fluid Velocity         Transit Time           1:00         API         200         Omm         5000         11         rc         12         100         mode status         Variable Density Log           0         mm         300         O         Omm         5000         11         rc         12         100         mode status         Variable Density Log           1         0         mm         300         O         Omm         5000         100         mm/s         100         100         BEC           3         4         0         0         Omm         5000         100         Imm/s         100         100         BEC           1         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0 <td>Logged</td> <td>l Inte</td> <td>rval: (m)</td> <td></td> <td></td> <td>0.9 - 1</td> <td>9.6</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>bel</td> <td>ow</td> <td>/ this</td> <td>s dept</td> <td>ner bei n.</td> <td>com</td> <td>ing comple</td> <td>etery bloc</td> <td>ked when pass</td> <td>ang</td>	Logged	l Inte	rval: (m)			0.9 - 1	9.6						bel	ow	/ this	s dept	ner bei n.	com	ing comple	etery bloc	ked when pass	ang
Bit. (nm)         From: (m)         To: (m)         Type         Size: (nm)         From: (m)         To: (m)           154         7.2         20         PLASTIC         115         0.36         7.2           Depth         Natural Gamma         Resistivity Shallow         Fluid Temperature         Fluid Velocity         Transit Time           1100         0         API         200         0         Ohm.m< 5000	Fluid L	evel:	(m)			4.5																
154         7.2         20         PLASTIC         115         -0.36         7.2           Depth         Natural Gamma         Resistivity Shallow         Fluid Temperature         Fluid Velocity         Transit Time           1100         API         200         O         Ohmm         6000         11         °C         12         100         mm's         100         100         use etc.         Resistivity Deep         EC25         Fluid Velocity         Variable Density Log         Resistivity Oracle of the technic te	BOR	EHC	DLE RE	CORE	)						(	CASIN	G RI	E	co	RD						
Depth         Natural Gamma         Resistivity Shallow         Fluid Temperature         Fluid Velocity         Transit Time           1:100         API         200         Omm         5000         11         *C         12         100         mm's         100         100         uSec         80           Caliper         Resistivity Deep         EC25         Fluid Velocity         Repeat         Variable Density Log           0         mm         300         O         Omm         5000         400         µSkm         700         100         mm's         100         100         sec         80           1         0         mm         300         O         Omm         5000         400         µSkm         700         100         mm's         100         80           1         0 <td>Bit: (m</td> <td>n)</td> <td></td> <td>From</td> <td>: (m)</td> <td></td> <td>Т</td> <td>o: (m)</td> <td></td> <td></td> <td>T</td> <td>Гуре</td> <td></td> <td>S</td> <td>ize:</td> <td>(mm</td> <td>)</td> <td>F</td> <td>From: (m)</td> <td></td> <td>To: (m)</td> <td></td>	Bit: (m	n)		From	: (m)		Т	o: (m)			T	Гуре		S	ize:	(mm	)	F	From: (m)		To: (m)	
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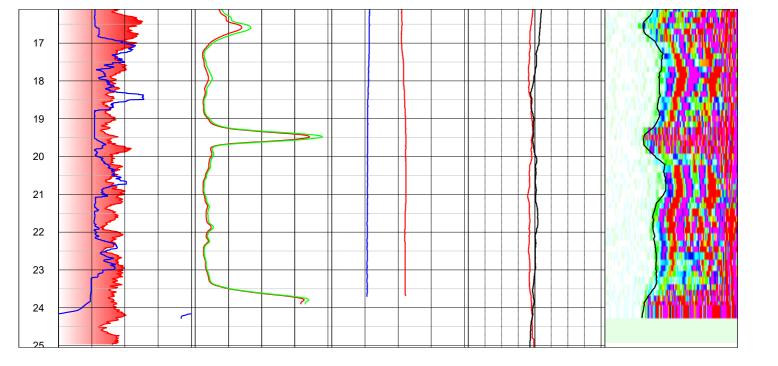
EUROPEAN GEOPH	YSICAL SERVIC	CES LTD
Client: Causeway Ge	otech	Log Type:

**Causeway Geotech** 

**BH17** Borehole:

Composite Final

Locatio	on: <b>Bal</b>	lbriggan	1			Area:	Count	ty Dubli	'n		Grid R€	əf: <b>71</b> !	9790.17	7E 76	35252	2.88N	Eleva	ation: <b>5.85</b>	
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Logge	d Depth	ו: (m)			25						ded By:					I. Hand			
Loggin	ig Datu	m:			Grou	ınd lev	'el			Remar	ks: Bor	ehole ł	has colla	apsed	to ap	proxim	ately 25	īm.	
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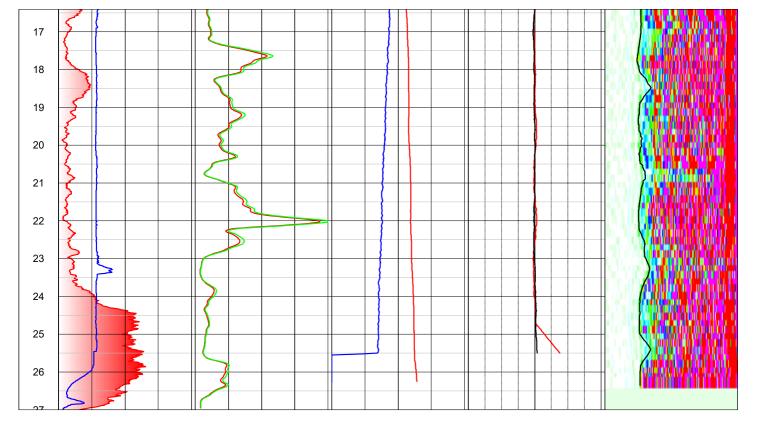
EUROPEAN GEOPHYSICAL SERVIO	CES LTD
Client: Causeway Geotech	Log Type:

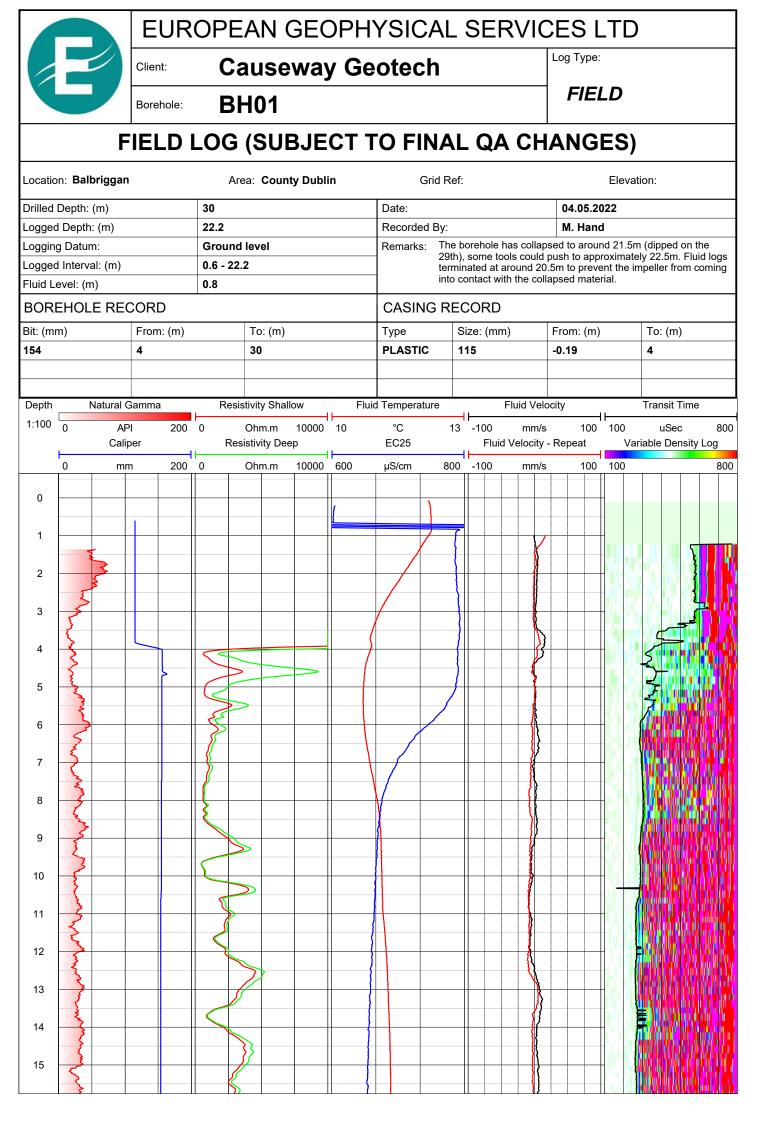
**Causeway Geotech** 

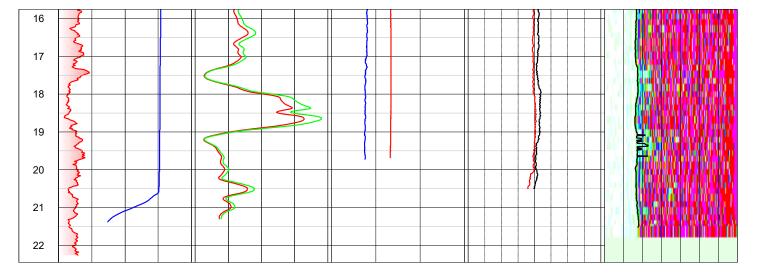
**BH18** Borehole:

Composite Final

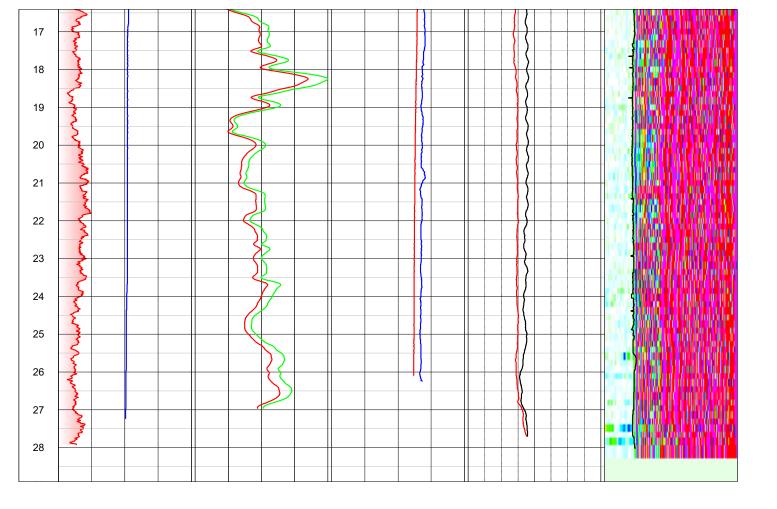
Caliper Resistivity Deep EC25 Fluid Velocity - Repeat Variable Density Log	Locatio	on: Balbriggan		A	rea: Co	ounty Dubli	n		Grid	Re	f: <b>719790</b> .	.13E 76	65252	2.97N	Elevat	tion: <b>8.09</b>	
Legged Depth: (m) 1-27 Fluid Level: (m) 1-27 Flui	Drilled	Depth: (m)		30				Date	ə:				04	4.05.20	)22		
Logged Interval: (m)         1 - 27           Fluid Level: (m)         1.4           BOREHOLE RECORD         CASING RECORD           Bit: (mm)         From: (m)         To: (m)           144         7         30           PLASTIC         128         -0.28         7           Depth         Natural Gamma         Resistivity Shallow         Fluid Temperature         Fluid Velocity         Transit Time           1:00         O         Ohmm         4000         600         10         cc         12         100         mm*s         100         100         user         Variable Density top           0         O         Ohmm         4000         600         user         100         mm*s         100         100         user           1         O         O         Ohmm         4000         600         user         100         100         user           1         O         O         Ohmm         4000         600         user         100         100         100           1         O         O         Ohmm         400         O         10         100         100         100         100         100         100				27				Rec	orded By	<i>'</i> :			M	. Hanc	ł		
Fluid Level: (m)         1.4           BOREHOLE RECORD         CASING RECORD           Bit (mn)         From: (m)         To: (m)         Type         Size (mn)         From: (m)         To: (n)           154         7         30         PLASTIC         126         -0.28         7           Depth         Natural Gamma         Resistivity Shallow         Fluid Temperature         Fluid Velocity         Transit Time           1:00         0         API         200         0         Ohm m         4000         100         rc         12         -100         mm/s         100         100         use           1:00         0         API         200         Ohm m         4000         00         rc         12         -100         mm/s         100         100         use           1:00         mm         300         Ohm m         4000         00         ps/rem         800         100         mm/s         100         100         100           1         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0				Groun	d level			Rem	narks: B	lore	hole has co	ollapsed	to are	ound 27	7.5m.		
Fluid Level: (m)         1.4           BOREHOLE RECORD         CASING RECORD           Bit: (mm)         From: (m)         To: (m)         Type         Size (mm)         From: (m)         To: (n)           154         7         30         PLASTIC         126         -0.28         7           Depth         Natural Gamma         Resistivity Shallow         Fluid Temperature         Fluid Velocity         Transit Time           1:100         0         API         200         0         Ohm.m         4000         100         TC         12         100         mm/s         100         100         use           1:100         0         API         200         0         Ohm.m         4000         00         µS/m         800         100         mm/s         100         100         use         Variable Density Log           1         0         0         0         0         0         0         µS/m         800         100         mm/s         100         100           1         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0				1 - 27				1									
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154     7     30     PLASTIC     126     4.28     7       Depth     Natural Gamma     Resistivity Shallow     Floid Temperature     Floid Velocity     Transit Time       1:00     API     200     O     Ohmm     4000     100     °C     12     100     mmV     100     wise       100     mm     300     Ohmm     4000     600     µs/cm     800     100     mov     100       1     mm     300     Ohmm     4000     600     µs/cm     800     100     mov     100       1     mm     300     Ohmm     4000     600     µs/cm     800     100     mov     100       1     mm     300     Ohmm     4000     600     µs/cm     800     100     mov     100       1     mm     300     Ohmm     4000     600     µs/cm     800     100     mov     100       1     mm     300     Ohmm     4000     100     100     100     100       1     mm     100     Imm     100     Imm     100     Imm     100       1     Imm     Imm     Imm     Imm     Imm     Imm     Imm     <	BOR	EHOLE REG	CORD					CA	SING F	RE	CORD						
Depth         Natural Gamma         Resistivity Shallow         Fluid Temperature         Fluid Velocity         Transit Time           1:00         API         200         0         Ohn.m         4000         10         °C         12         100         mm/s         100         100         usec           100         mm         300         0         Ohn.m         4000         00         µS/cm         800         100         mm/s         100         100         usec           100         mm         300         0         Ohn.m         4000         00         µS/cm         800         100         mm/s         100         100         usec           11         100         mm/s         100         0	Bit: (m	m)	From: (m)		То: (і	m)		Тур	е	:	Size: (mm)	)	Fro	m: (m)		To: (m)	
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Caliper       Resistivity Deep       EC25       Fluid Velocity - Repeat       Variable Density Log         100       mm       300       Ohm.m       400       600 $\mu$ S/cm       800       -100       mm/s       100         1       Image: Caliper information of the state of the			200 Pl				<b> </b>		-	12			-	100	100	uSec	800
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Client:
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## EUROPEAN GEOPHYSICAL SERVICES LTD

## **Causeway Geotech**

Log Type:

Borehole: BH04

FIELD

### FIELD LOG (SUBJECT TO FINAL QA CHANGES)

Location: Balbriggan Area: County Dublin Grid Ref: Elevation:																						
Drilled Depth: (m) 20									Date:				4.05.20	)22								
Logged Depth: (m) 17.7								F	Recorded	By:				М	. Hanc	k						
Logging Datum: Ground level								F	Remarks:	Boi	rehole	e has	collapsed	l to ap	proxim	ately 18	m.					
Logged Interval: (m) 0.6 - 17.7																						
Fluid Level: (m) 0.6																						
BOREHOLE RECORD								CASING RECORD														
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