Environmental Impact Assessment Report



Volume 10: Appendices (Onshore)

Appendix 21.1 Project Specific Surveys











North Irish Sea Array Landfall – Ground Investigation

Client: Statkraft Limited

Client's Representative: Arup

Report No.: 21-1619A

Date: December 2022

Status: Final Report





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Document Control Sheet

Report No.:		21-1619								
Project Title:		North Irish Sea	Array							
Client:		Statkraft Limite	d							
Client's Repres	entative:	Arup								
Revision:	A01.	Status:	Final Report	Issue Date:	December 2022					
Prepared by:		Reviewed by:		Approved by:						
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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.

Abbreviations used	on exploratory hole logs
U	Nominal 100mm diameter undisturbed open tube sample (thick walled sampler).
UT	Nominal 100mm diameter undisturbed open tube sample (thin walled sampler).
P	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 strength VR: 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.
$\overline{\nabla}$	Water strike: initial depth of strike.
T	Water strike: depth water rose to.
Abbreviations relating t	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 23rd of February and the 26th 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 ($SPT_{(s)}$) or solid cone attachment ($SPT_{(c)}$). 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.

Table 1: Groundwater strikes encountered during ground investigation.

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

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.

Table 2: Groundwater monitoring records.

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

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





Project No.: 21-1619A

Client: Statkraft Limited

Arup

Client's

Project Name:

North Irish Sea Array Landfall Representative:

Legend Key



Title:

Site Location Plan

Last Revised: Scale: 02/12/2022 1:20000



Project No.: 21-1619A

Client: Statkraft Limited

Arup

Client's

Project Name:

North Irish Sea Array Landfall Representative:

Legend Key

Locations By Type - CP+RC

Locations By Type - RC

Locations By Type - TP



Title:

Exploratory Hole Location Plan

Last Revised: Scale: 02/12/2022 1:5500



APPENDIX B
BOREHOLE LOGS



		ALIC		\A.	/ A	_				ct No.	Project Name: North Irish Sea Array Landfall	Boreh			
		AUS	GEC	ТС	EC	Н			21-1	619A	Client: Statkraft Limited Client's Rep Arup	ВН	01		
Meth		Plant			_		Base	-	Coord	linates	Final Depth: 30.00 m Start Date: 21/04/2022 Driller: MV	Sheet	1 of 5		
Rotary D Rotary (Comacch Comacch				00 70	l l		719758.67 E 765371.97 N			Scale:			
Depth	Samuelas	/ Field December	TCD	ccn	non	FI	Casing	Water	/653/ Level	Depth	Elevation: 3.53 mOD End Date: 25/04/2022 Logger: DN		_		
(m)	Samples	/ Field Records	ICK	SCR	KŲD	FI	Depth (m)	Depth (m)	mOD	(m)	Legend Description TOPSOIL- Brown sandy gravelly CLAY.	Mater Back			
1.20 1.20 - 1.65 2.70 2.70 - 3.00	D2 SPT(S) N for 150r	(S) N=10 (Z),2,2,4) nmer SN = 0643 (S) N=6 (1,2/6 150mm) nmer SN = 0643				1.20 Dry 0.83 - 2.70 0.53 - 3.00					Firm brown sandy gravelly CLAY (Driller's description) Firm dark brown sandy gravelly CLAY. Sand is fine to coarse. Grav subangular fine to coarse. Medium strong grey ANDESITE with white calcite veins (up to 50 thick) at various orientations. Partially weathered: slightly reduce strength, slightly closer fracture spacing with discolouration on jour surfaces. Discolouration: 1. 10-20 degree joints, medium spaced (40/300/740), undulating rough with orangish brown discolouration on joint surfaces. 2. 30-40 degree joints, widely spaced (130/1950/6500), undulating rough with brown discolouration on joint surfaces. 3. 80-90 degree joints, very widely spaced (3200/6000/10000), undulating, rough with yellowish brown discolouration on fracture surfaces.	nnm d int ,	1.0 — 1.5 — 2.0 — 3.0 — 3.5 — 4.0 —		
5.20 6.70			100	95	80	-					3.85-4.10m: Vesicular andesite with quartz mineralisation		4.5 - 5.0 - 5.5 - 6.0 - 7.0 -		
			TCR	SCR	RQD	FI				-	· · · · · · · · · · · · · · · · · · ·				
	Water	Strikes	ICR	JUR	ч-	ema	rke				1				
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			GEC	DTI	EC	Н			21-1	ct No. 619A	Project Client: Client's	Name: North Iris Statkraft Rep Arup		y Landfall				hole ID H01
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Rotary	Coring	Comacch	nio 40	05	2.	2.70		.00	719758.67 E 765371.97 N		Elevatio	n: 3.53 mOD	End Date:	25/04/2022	Logger:	DM		NAL
Depth (m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend			cription	'		Mater Ba	ıckfill
8.20			100	100	90	_				-		Medium strong grey thick) at various orie strength, slightly clo surfaces. Discolouration: 1. 10-20 degree join rough with orangish 2. 30-40 degree join rough with brown d	entations. Par iser fracture s its, medium s i brown discol its, widely spa	tially weathered pacing with disc paced (40/300/7 louration on join aced (130/1950/	: slightly re olouration '40), undula t surfaces. 6500), und	educed on joint ating,		7.5 -
			100	100	97					-		3. 80-90 degree join undulating, rough w surfaces.	ts, very widel	y spaced (3200/	6000/1000			8.5 - 9.0 -
9.70						-				-								9.5 -
			100	100	97					-								10.5 -
11.20						_				-								11.5
			100	90	87					-								12.0 —
12.70						_				-								12.5
			100	97	87					-		13.80-13.95m: Bed of furt	her weakened gree	enish grey tuff				13.5 -
14.20										-								14.5
	147 :	Chuilin	TCR	SCR	Ч-	_												
Struck at (m) 2.80		Strikes Time (min)	Rose	e to (r	n) _F	ocati	dug ir on: La	nspect andfal comp	l	cavated to	o 1.20m.							
Casing		Core	Barro	el														
2.70	Diam (mm) 200 150	SK	(6L															
30.00	Flush Type Termination						e ason neduled d	epth.						02/12/2	Updated 12/2022 AGS			

	C	AUS	E	W	EC	Н			21-1	ect No. 619A	Project I Client: Client's	Name: North Iri		y Landfall			В	orehole ID BH01		
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Depth (m)	Samples /	Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend		Des	cription		1	Water	Backfill		
15.70			100	100	97					-		Medium strong grey thick) at various orie strength, slightly closurfaces. Discolouration: 1. 10-20 degree join rough with orangish 2. 30-40 degree join rough with brown d 3. 80-90 degree join	entations. Par oser fracture s onts, medium so on brown discol onts, widely spa discolouration onts, very widel	tially weathered pacing with discong with di	: slightly rolouration 740), undu t surfaces 6500), und s. 6000/100	educed n on joint lating, dulating,		15.0		
			100	100	97					-		undulating, rough w surfaces.	ith yellowish	brown discoloui	ation on f	racture		16.0		
17.20			100	100	97													17.5		
18.70			100	97	90	4												18.5		
20.20																		19.5 —		
			100	100	87							21.40-21.70m: Bed of furt	ther weakened gree	nish grey tuff with whi	te calcite mine	eralisation		21.0 —		
21.70										-								-		
			TCR	SCR	RQD	FI					-									
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Casing E	Details Diam (mm)	Core		el	7															
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			ater	-					heduled d	epth.						02/12/				

	C	AUS	SE	W	/ A	Y			Project 21-1 6		Project Name: North Iri	Borehole ID BH01			
			GEC	ТС	EC	Н					Client's Rep Arup				
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Rotary Co	oring	Comacch	110 40	J5	2.	70	30.00		719758.67 E 765371.97 N		Elevation: 3.53 mOD	End Date: 25/04/2022	Logger: DM	FINAL	
Depth (m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description		ਬੇ Backfill	
23.20			100	100	93						thick) at various ori strength, slightly cle surfaces. Discolouration: 1. 10-20 degree joi rough with orangisl 2. 30-40 degree joi rough with brown of 3. 80-90 degree joi	y ANDESITE with white calcite entations. Partially weathered oser fracture spacing with disconts, medium spaced (40/300/7) in brown discolouration on join tiss, widely spaced (130/1950/liscolouration on joint surface ints, very widely spaced (3200/with yellowish brown discolour	: slightly reduced olouration on joint (40), undulating, t surfaces. 6500), undulating, s. 6000/10000),	2	22.0 —
			93	85	70					· · · · · · · · · · · · · · · · · · ·				2	23.5 — - 23.5 — 24.0 —
24.70			100	100	97										25.0 — - - 25.0 — - - 25.5 —
26.20			90	85	80									2	26.0 — - - 26.5 — - - 27.0 —
27.70			100	95	90									2	27.5 —
20.20									-	-				2	29.0
29.20			TCR	SCR	RQD										
truck at (m) Ca		Strikes Time (min)	Rose	e to (r	n) H	ocati	dug ir on: La	ndfal	ion pit exc l. leted.	avated to	1.20m.				
	iam (mm)	Core	Barro 6L	el											
2.70 30.00	200 150			e	T	ermi	inatio	on Re	eason				Last U	pdated I	
	Flush Type Termination Water Terminated at:							nth			02/12		.		

	C	AUS	SE'	W	/Δ	Υ			Project	ct No.	Project Name: North Irish Sea Array Landfall Client: Statkraft Limited						Borehole ID BH01		
			GEC	ЭΤ	EC	Н				Client's Rep Arup							51101		
Metho Rotary Dr	illing	Plant I	nio 40	05	0.	00	Base 2.7	70	Coord		Final De		Start Date:	21/04/2022	Driller: N	/W	Sheet 5 of 5 Scale: 1:40		
Rotary Co	oring	Comacch	110 403		2.	70	30.00		719758.67 E 765371.97 N		Elevation: 3.53 mOD		End Date:	25/04/2022	Logger: D	DM	FINAL		
Depth (m)	Samples /	Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	1	Des	cription	*	Water	Backfill		
ruck at (m) Ca 2.80	Water:			SCR	RQD R	lema land o	rks	spect	-26.47		1.20m.	Medium strong grey thick) at various oristrength, slightly closurfaces. Discolouration: 1. 10-20 degree joir rough with orangist 2. 30-40 degree joir rough with brown d 3. 80-90 degree joir undulating, rough w surfaces.	entations. Par oser fracture s ints, medium so in brown discol ints, widely spa liscolouration ints, very widel with yellowish	tially weathered: pacing with disco paced (40/300/7 louration on joint aced (130/1950/6 on joint surfaces y spaced (3200/6	: slightly reduction or 40), undulatit surfaces. 6500), undulatit.	50mm uced n joint ing, ating,	30.5 30.5 31.6 32.5 33.6 34.6 35.6		
Casing Do To (m) Di 2.70 30.00	etails iam (mm) 200 150		(6L			ermi	natio	n Re	ason						T	Last Upda	ted		
												02/12/202	P-i						

-82									Proje	ct No.	Project	Name: North Iri	sh Sea Arra	y Landfall			В	orehole	ID
	C	AUS	E	M	A	Y			21-1	619A	Client:	Statkraft	Limited					BH02	
		(GEC)	EC	Н					Client's	Rep Arup							
Metho Rotary Dr	rilling	Plant I	nio 40)5	0.	00	Base 2.5)		inates	Final De	pth: 30.00 m	Start Date:	13/04/2022	Driller:	RS	1	heet 1 of Scale: 1:4	
Rotary Co	oring	Comacch	110 40	J5	2.	50	30.0	0		8.43 E 0.35 N	Elevatio	n: 5.43 mOD	End Date:	21/04/2022	Logger:	EM		FINAL	-
Depth (m)	Samples /	/ Field Records	TCR	SCR	RQD	FI	Depth [Vater epth (m)	Level mOD	Depth (m)	Legend		Des	cription			Water	Backfill	
- Pro-			63			AZCL		with the second	2.93	- 2.50		Soft brown slightly s Gravel is subangular Soft brown slightly s Sand is fine to coars are subangular of va 2.50-3.05m: AZCL	sandy gravelly	CLAY with low o	cobble cont	ent.			0.5 1.0 1.5 2.0 2.5
50			90	76	13	NI			0.78	4.65		Weak (locally very v weathered: reduced discolouration and of Discontinuities: 1. 20-30 degree bed planar, smooth to ro brown staining on no (up to 3mm thick) o 2. 50-60 degree join to rough with patch (<1mm thick) on mo	d strength, muclay deposits of ding fracture bugh, with dainost fracture son most fracture son most fracture son most fractures at 5.90-6.0 y brown stain	ich closer fractuon fracture surfa s, medium space k reddish brown surfaces and bro re surfaces. Om and 6.10-6.2 ing and patchy b	re spacing vaces and clased (130/357) and orangown clay dep	with y infill. 7/750), gish posits 7, smooth			4.0 4.5 5.0 5.5
00			100	88	36	12				- - - - - - -		7.00-7.10m: Soft light bro	wn slightly sandy s	īty clay infill					7.0
										-									
	\A/=+-	Chriling	TCR	SCR	RQD		l												L
ck at (m) Ca		Strikes Time (min)	Rose	e to (i	m) H	ocatio elevie	dug ins on: Lan wer co	dfall mpl	eted.			d during drilling.							
Casing D	etails Diam (mm)	Core		el															
2.50	200	Si	K6L																
30.00	150	Flush	Тур	e	T	ermi	natio	n Re	ason							Last Up	date	d	j
		W	ater		T	ermir	nated a	t sch	neduled de	epth						02/12/	/2022	A	H

								Proje	ct No.	roject Name: North Irish Sea Array Landfall	Borehole II
		AUS	E		A	H		21-1	619A	lient: Statkraft Limited	BH02
										lient's Rep Arup	
Rotary Dr Rotary Co	rilling	Comacch Comacch	nio 40		0.0	(m) 00 50	2.50 30.00		dinates 38.43 E	inal Depth: 30.00 m Start Date: 13/04/2022 Driller: RS	Sheet 2 of 5 Scale: 1:40
notary et	or mig	Comacci	110 40	,,,	2	50			20.35 N	levation: 5.43 mOD End Date: 21/04/2022 Logger: EM	4 FINAL
Depth (m)	Samples /	Field Records	TCR	SCR	RQD	FI	Casing Water Depth Depth (m) (m)	Level mOD	Depth (m)	egend Description	backfill
.50			98	65	30			-2.22	7.65	Weak (locally very weak) brownish grey GREYWACKE. Distinctly weathered: reduced strength, much closer fracture spacing with discolouration and clay deposits on fracture surfaces and clay in Discontinuities: 1. 20-30 degree bedding fractures, medium spaced (130/357/7: planar, smooth to rough, with dark reddish brown and orangish brown staining on most fracture surfaces and brown clay deposed (up to 3mm thick) on most fracture surfaces. 2. 50-60 degree joints at 5.90-6.00m and 6.10-6.20m, planar, so to rough with patchy brown staining and patchy brown clay deposed (<1mm thick) on most joint surfaces.	fill. 50), its
			100	55	13	>20				Weak (locally very weak) grey GREYWACKE. Distinctly weathere much closer fracture spacing, reduced strength with clay depos and discolouration on fracture surfaces. Discontinuities: 1. 35-45 degree bedding fractures, medium spaced (200/375/7/planar, smooth to rough with strong dark brown and reddish br staining on most fracture surfaces 2. 50-60 degree joints at 7.83-8.05m, planar, smooth to rough w brown staining and light brown clay deposits (up to 3mm thick) joint surface.	900), pwn vith 9
0.00			100	60	46	NI 13					10.
1.50								-5.37	- 10.80	Medium strong grey ANDESITE with white calcite veins (up to 90 thick) at various orientations. Partially weathered: slightly reductive strength with discolouration and clay deposits on fracture surfations Discontinuities: 1. 5-15 degree joints, medium spaced (150/428/960), slightly undulating, rough with orangish brown and brown staining on rejoint surfaces and patchy brown clay deposits (up to 5mm thick some joint surfaces)	ced 11.
			100	53	46	NI			-	2. 50-60 degree joint at 11.05-11.16m, undulating, rough with orangish brown and brown staining, patchy greyish brown clay deposits (<1mm thick) and white calcite mineralisation on joint surface 3. 70 degree joint at 13.00-13.30m, undulating, rough with rare patchy orangish brown staining and white calcite mineralisation joint surface 12.40-12.80m: recovered as subangular medium to coarse gravel	
3.00									-		13
						4		-7.87	- - 13.30	Medium strong grey ANDESITE with white calcite veins (up to 2: thick) at various orientations. Largely unweathered: slightly clos	
			100	96	96				-	fracture spacing. Discontinuities: 1. 20-30 degree joints, widely spaced (450/1300/1300), planar, rough, clean 2. 50-60 degree joints at 16.70-16.85m and 17.15-17.30m, plan rough, clean 3. 5 degree joint at 14.33m, planar, rough, clean	ar,
4.50									-	3.5 degree joint at 14.55m, planar, rough, crean	14.
		<u> </u>	TCR	SCR	RQD						
uck at (m) Ca		Strikes Time (min)	Rose	to (n	n) H	ocatio elevie	dug inspect on: Landfall ewer compl	eted.		20m er added during drilling.	
Casing D To (m) D 2.50	Details Diam (mm) 200	Core SF	Barre	el							
30.00	150	Flush	Тур	е	To	ermi	nation Re	ason		L	ast Updated
		I	ater		_		nated at sch				02/12/2022

	C	AUS	E	V	/A EC	Y H			Project 21-16		Project Name: North Irish Sea Array Landfall Client: Statkraft Limited	Borehole IE BH02
Metho	od	Plant I	Used		Ton	(m)	Base (m)	Coord	inates	Client's Rep Arup	Sheet 3 of 5
Rotary Dr Rotary Co	illing	Comacch	nio 40	05	0.	00 50	2.50)	719788		inal Depth: 30.00 m Start Date: 13/04/2022 Driller: R	S Scale: 1:40
Kotary CC	JIIIIg	Comacci	110 40	JJ	2.	30			765520		levation: 5.43 mOD End Date: 21/04/2022 Logger: E	M FINAL
Depth (m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Depth De	ater epth m)	Level mOD	Depth (m)	Legend Description	at Backfill S
16.00			100	100	100						Medium strong grey ANDESITE with white calcite veins (up to 2 thick) at various orientations. Largely unweathered: slightly cle fracture spacing. Discontinuities: 1. 20-30 degree joints, widely spaced (450/1300/1300), planar rough, clean 2. 50-60 degree joints at 16.70-16.85m and 17.15-17.30m, pla rough, clean 3. 5 degree joint at 14.33m, planar, rough, clean	ser 15.0
			100	100	100	2				- - - - - - -		16.5
17.50			100	100	100					- - - - - - - - - - -		17.5 18.0
19.00			100	100	100				-14.17	- 19.60	Medium strong grey ANDESITE with white calcite veins (up to 5 thick) at various orientations. Largely unweathered: slightly cld fracture spacing Discontinuities: 1. 5-10 degree joints at 24.25m, 25.15m, and 25.40m, planar, it clean	ser 20.0
20.50			100	100	100						2. 30-40 degree joints at 21.55m and 27.35m, planar, rough wi white calcite mineralisation on joint surfaces, otherwise clean 3. 60-70 degree joint at 19.5-19.85m, undulating, rough, clean 4. 70-80 degree joint at 24.60-25.00m, undulating, rough with orangish brown staining on joint surface, otherwise clean	20.5
			TCR	SCR	RQD	FI				-	V ^V V [†]	
truck at (m) Ca	asing to (m)		Rose	e to (r	m) H	land of the control o	dug insp on: Land ewer co	dfall mple	eted.		20m ter added during drilling.	
	iam (mm)	Core SI	Barr o (6L	eı								
2.50 30.00	200 150	Flush		e	 T	ermi	nation	Re	ason			Last Updated
			ater	-					eduled de	epth		02/12/2022 \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\

	C	AUS	E	V TC	/A EC	Y				ct No. 619A	Project Name: North Irish Sea Array Landfall Client: Statkraft Limited	Borehole BH02	
							_	, ,			Client's Rep Arup		
Rotary Di Rotary C	rilling	Comacch Comacch	nio 40	05	0.	(m) .00 .50	2.	e (m) 50 .00		8.43 E	Final Depth: 30.00 m Start Date: 13/04/2022 Driller: RS	Sheet 4 of Scale: 1:4	
notary C	ormg	Comacci	110 40	55	2.	.50	30	.00		0.35 N	Elevation: 5.43 mOD End Date: 21/04/2022 Logger: EM	FINAL	-
Depth (m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend Description	Mackfill Mackfill	
22.00			100	100	100					-	Medium strong grey ANDESITE with white calcite veins (up to 5m thick) at various orientations. Largely unweathered: slightly close fracture spacing Discontinuities: 1. 5-10 degree joints at 24.25m, 25.15m, and 25.40m, planar, rou clean 2. 30-40 degree joints at 21.55m and 27.35m, planar, rough with white calcite mineralisation on joint surfaces, otherwise clean 3. 60-70 degree joint at 19.5-19.85m, undulating, rough, clean 4. 70-80 degree joint at 24.60-25.00m, undulating, rough with orangish brown staining on joint surface, otherwise clean	ih,	22.0 —
23.50			100	100	100					-			23.5 — - - 24.0 — - - - 24.5 —
25.00			100	100	100	2				-			25.0 — 25.0 — - - - 25.5 — - -
26.50						_				-			26.0 — - - - 26.5 — -
			96	96	96					-			27.0 — - - - - 27.5 — - -
28.00			100							-			28.0 — - - 28.5 — - - - 29.0 —
			TOP	905	POP	FI	1			-	XX.M		:
	Water	Strikes	ICR	SUR	RQD	Rema	irks						<u> </u>
truck at (m) C			Rose	e to (m) ⊦ L T	land ocati elevi	dug ir on: La ewer	ndfal compl	leted.		.20m ter added during drilling.		
	Diam (mm)	Core	Barro 6L	el									
2.50 30.00	200 150	Flush		e	T	erm	inati	on Re	eason		La:	t Updated	7
			ater						neduled de	epth		2/12/2022	50

8		ΔΠΙ	ie'	W	/ / \	Y				ct No.		Name: North Iri		y Landfall			Borehol	
			GEC	TI	ECI				21-1	619A	Client:	Statkraft	Limited				BH02	Ľ
NA -AL	nd T	Dia	llee-		Terr	/m-\	Dar	11	C '	linct	Client's	Rep Arup	T		I		cl. · =	
Rotary Dr	Orilling Comacchio 405 0.00 Coring Comacchio 405 2.50 Samples / Field Records TCR SCR ROD FI	2.5	50	71978	o 42 E	Final De	pth: 30.00 m	Start Date:	13/04/2022	Driller:	RS	Sheet 5 of Scale: 1						
notary CC	Top (m) Ba Drilling Comacchio 405 0.00 Coring Comacchio 405 2.50 3 Samples / Field Records TCR SCR RQD FI Content of the cont	30.			8.43 E 0.35 N	Elevatio	n: 5.43 mOD	End Date:	21/04/2022	Logger:	EM	FINA	L					
Depth (m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend			cription			Backfill	
.50										-		Medium strong gree thick) at various orie fracture spacing						29.5
.50			100							-		Discontinuities: 1. 5-10 degree joint	s at 24.25m, 2	25.15m, and 25.4	10m, planar	, rough,		
.00									-24.57	_ _ 30.00	XXX	clean 2. 30-40 degree joir						30.0
										-		white calcite minera 3. 60-70 degree joir	nt at 19.5-19.8	5m, undulating,	rough, clea	in		
										_		4. 70-80 degree joir orangish brown stai	ining on joint :	surface, otherwi		h		30.
										-			End of Bore	hole at 30.00m				
										-								21
										<u> </u> -								31
										-								
										<u> </u>								31
										-								
										-								32
										-								
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										-								
										<u> </u>								36
										-								
			TCR	SCR	RQD	FI												$\frac{1}{2}$
	Water	Strikes	1		_	ema	rks			<u> </u>								
k at (m) Ca	asing to (m)	Time (min)	Rose	to (n			dug in on: La		ion pit ex	cavated to	1.20m							
					Te	elevie	wer o	compl	eted.	- مادرد	uata = 11	al alconing destilis						
					N	o not	nceab	ie gro	oundwater	r strikes- v	vater adde	d during drilling.						
Casing D	etails	Core	Barre	el	+													
	iam (mm) 200	SI	K6L															
0.00	150	Flush	тур	е	To	ermi	natic	n Re	ason							Last Upda	ted	=
		14/	ater					at cok	neduled de	anth						02/12/20		Ė

	ع (د	AUS	E	W.	A C	Y				ect No. L 619A	Client:	: Name: North Iri Statkraft		y Landfall			В	orehol BH0	
											Client's	Rep: Arup							
Meth Cable Per Rotary C	cussion	Plant L Dando Comacch	2000		Top (0.0	00	5.5 20.	0		dinates 14.12 E	Final De	epth: 20.00 m	Start Date:	15/03/2022	Driller:	BM+RS		Sheet 1 Scale: 1	
									7653	19.80 N	Elevatio	9.63 mOD	End Date:	12/03/2022	Logger:	CH+TH		FINA	۱L
Depth (m)	Sample / Tests	Fie	eld Rec	ords			Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend			cription			Water	Backfil	_
20 0 50	D4								0.22	0.30		MADE GROUND: So coarse. Gravel is sul				e to			
30 - 0.50 50	B1 ES								8.33	0.30		Firm brownish grey							0.5
10	LS									ŧ		coarse. Gravel is sul	bangular to su	brounded fine to	o meaium.				
30 - 1.00	B2									ŧ									
00	ES									F									1.
20 20 - 1.65	D7	N=15 (2,3/3,	2 / 5)	Hami	mar S	. NI –	1 00	Dry		Ē.									
1.05	381 (3)	N=15 (2,3/3) 0199	3,4,3)	Папп	mer s	oivi =	1.00	Dry	7.13	1.50		e: 1	II 61 AV 6				-		1.
										ŧ		Firm brown sandy g subangular to subro			arse. Grave	ei is			
80 - 2.00	В3									ŧ								H	
0	U13	Ublow=20 90	0%				1.50	Dry	6.63	2.00		Firm grey slightly sa				coarse.	1	H	. 2.
										E		Gravel is subangula	r to subround	ed fine to mediu	m.				
		Slow soons	0.24.7	,4) Hammer SN = 3.00 Dry						E							_	∴ 	. 2.
30 - 3.00	B4	Siow seepage	c dl Z.							E							1	\Box	
30 - 3.00	D8									E									* 3.
0 - 3.45			3,3,4)	3,4) Hammer SN = 3.00 Dry						ŧ								. : ∏:	: 1
		0199	3,3,4) Hammer SN = 3.00 Dry							F									*
										E								:°	3.
80 - 4.00	В5		3,4,5) Hammer SN = 3.00 Dry							E								ĿН·	
00	D9			4,5) Hammer SN = 3.00 Dry						F								$\Box \Box$. 4.
0 - 4.45	SPT (S)		3,4,5)	Hamı	mer S	N =	3.00	Dry		ŧ									•
		0199							4.43	4.50								l∴H.	•
									4.13	4.50		Very stiff brown sar			o coarse. (Gravel is	1		4.
										E		subangular to subro	ounded fine to	coarse.					
00 - 5.45	U14	Ublow=30 10	00%				3.00	Dry		F									5.
										ŧ									
									_	5.50	20	0.155	.166 .				1		5.
50 50 - 6.80	D10 C1								3.13	Ē 3.50		Stiff becoming very with low cobble cor							
										Ė	0 0 0 0 0	fine to medium of v			13 3UL	Juniacu			
00 00 - 7.00	D11 B6						3.00	Dry		F									6.
00 - 6.45	SPT(S) N		80							Ē	a o o a								
	(5,7/9,9									(1.95)	a .0.0 9								6.
	натте	r SN = 0199								E	a 00 0								
00				[[E	200 ° 0								,
50					Τ,	AZCL				ŧ									•
30 - 7.52	SPT(S) N				Ĺ	1_CL	3.00	Dry		<u> </u>	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0						▾		
	(15,25/5 75mm)	50 for Hammer SN							1.18	7.45	0000	Very stiff greyish br					1		7.
	= 0199		73							E		content. Sand is fine mudstone and sand		ravel is subangul	ar fine to o	coarse of			
	Slow se 7.30m	epage at								(1.05)									8.
50	D12									ŧ	a 00 g								
									0.45		a 00 0								
50 50 - 9.15	C2			İ					0.13	8.50	××××	Very stiff dark grey			nd is fine to	coarse.	1		8.
50 - 8.68	SPT(C)		100							(0.65)	(x x x x x	Gravel is subangula	r fine to coars	e.					
		o for 25mm) r SN = 1376	100							F .	×.x.x	Dark grey subangul	ar fine to coar	se GRAVEL of mi	udstone ar	nd			9.
15 - 9.55	C3	. 5.4 - 15/0	Ш]					-0.52	9.15	****	sandstone.]		
		. C	TCR	SCR	RQD		<u> </u>		.		<u>.</u>								\perp
ck a+ /~\		Strikes) Time (min)	Rosa	to Im) Er			elling To (Detail:	s ne (hh:mm)	Remarks		L-JL 400						
2.60 7.30	2.60 7.30	, (11111)	11036		,, 110	J.111 (I	•••) د،	,	···· (minimi)	Location:	inspection pit excava Landfall.	ileu (ö 1.20m						
Casing [Details	Water	Adde	ed	1														
To (m)	Diam (mm	From (m)	То	(m)	1														
3.00 5.50	200 200				F	•	De:	-1 ,	FI. ·	Trees	Ta	Lan Darrer				1	٠ - اه -	- d	_
20.00	150				(.ore	Barr	eı	Flush	Туре	iermina	tion Reason				Last Up	odate	ea	
		1				SI	(6L		Wa	ater	Terminate	d at scheduled depth	١.			02/12	/2022	2	14

	CA	AUS	E	VV DTE	A	Y			-	ect No. 1619A	Project Client: Client's	Name: North Irish Sea Array Landfall Statkraft Limited Rep: Arup		ehole 3H03	
Metho Cable Percu Rotary Co	ussion	Plant U Dando 2 Comacch	2000		0.0		Base 5.5 20.	50	7194	rdinates 114.12 E	Final De		Sca	et 2 o ale: 1:	50
										319.80 N	Elevatio	, , ,		INAL	-
Depth (m)	Samples / Fie	eld Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend		Water	Backfill	L
.55 - 10.00	C4								-0.92	(0.40) 9.55	a ; 0 ° .	Dark grey subangular fine to coarse GRAVEL of mudstone and sandstone.			9.5
										(0.45)	2 0 0 0 2 0 0 0	Very stiff brown slightly sandy very gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse.			
0.00 0.00 - 10.25	C5								-1.37	10.00		Very stiff dark brownish grey sandy gravelly CLAY. Sand is fine to			10.0
0.00 - 10.16									-1.62	10.25		coarse. Gravel is subangular fine to coarse. Grey slightly gravelly clayey fine to coarse SAND. Gravel is subangular			
	10mm) Han									(0.80)		fine to coarse.			10.5
0.25 - 11.05	= 1376 C6		100							ŧ					
1.05 - 11.50	C7								-2.42	11.05		Very stiff dark brown slightly sandy gravelly CLAY with low cobble			11.0
1.50										(0.70)		content. Sand is fine to coarse. Gravel is subrounded fine to coarse.			11.5
1.50 - 11.61	. ,								-3.12	11.75	0 0 0 4 0 0 0				
	90mm/50 for 20mm) Han								5.12	11.75		Weak massive greyish brown MUDSTONE with medium spaced thin beds of weak yellowish brown fine grained SANDSTONE. Partially			12.0
	= 1376		100	55	33							weathered: reduced strength, closer fracture spacing, dark brown discolouration and clay infill on fracture surfaces.			l
						12						Discontinuities:			12.5
										Ė		1. 20 to 30 degree joints, closely spaced (30/140/370) planar to rough, dark brown staining on joint surfaces, brown slightly sandy			l
.00										-		clay infill on most joint surfaces (2 to 20mm thick). 2.~60 degree joint at 12.25m to 12.40m, planar, rough, dark brown			13.0
						>20				(3.15)		staining on joint surface. 3. 70 to 80 degree joints at 11.80m to 11.95m and 12.6m to 12.45m,			l
										[(3.13)		planar, rough, dark brown staining on joint surfaces.			13.
			33	4	0							490 degree joint at 14.65m to 14.90m, undulating, rough, dark ornagish brown staining on joint surface.			
						AZCL				F		ornagish brown staining on joint surface. 13.00m to 13.50m: Recovered as clayey subangular fine to coarse GRAVEL 13.50m to 14.50m: AZCL due to disturbance difficulties.			14.
															l
1.50												Weak massive dark grey MUDSTONE. Partially weathered: slightly reduced strength, closer fractures spacing, orangish brown			14.5
						10			-6.27	14.90		discolouration on fracture surfaces. Discontinuities:			l
									0.27			1. 20 to 40 degree joints, very closely spaced (20/43/60) planar,			15.0
			87	42	27	>20				(0.65)		rough, orangish brown staining on joint surfaces. Medium strong massive grey GREYWACKE with rare greyish white			l
									-6.92	15.55		calcite veins of various orientations (1 to 3mm thick). Partially weathered: slightly reduced strength, closer fracture spacing, dark			15.5
												orangish brown discolouration on most fracture surfaces. Discontinuities:			l
5.00												1. 20 to 40 degree joints, closely spaced (50/180/500) planar, rough,			16.0
												orangish brown staining on most joint surfaces. 2. 50 to 60 degree joints, medium spaced (55/470/600) slightly			16.
			83	63	41	8				(2.35)		undulating, rough, dark brown staining on joint surfaces. Weak thickly laminated dark grey MUDSTONE with frequent calcite			16.:
			63	03	41					[(====,		mineralisation parallel to bedding (up to 30mm thick). Partially weathered: slightly reduced strength, closer fracture spacing,			17.
										Ī		orangish brown discolouration on most fracture surfaces, some clay infill.			l
.50										ŧ		Discontinuities:			17.
										Ē		1. 10 to 20 degree bedding fractures, closely spaced (30/80/110) planar rough, orangish brown staining on most fracture surfaces,			1
			60	37	15				-9.27	17.90		dark brown gravelly infill on some fractures up to 45mm thick. 2.~50 degree joint at 18.00m to 18.07m, planar, rough, patchy brown			18.0
						14				(0.50)		staining on joint surface. 18.10m to 18.16m: Firm dark brown gravelly clay infill- 20 degree bedding fractures 45mm			1
									-9.77	18.40		thick. No recovery			18.5
	Motor C:	rikas	TCR	SCR	RQD	FI	Ch:-	olii	Dot-	le	Pows-II				L
ıck at (m) Ca	Water St sing to (m) Ti		Rose	to (n	n) Fi	rom (elling To (r	n) Ti	me (hh:mm)	Remarks Hand dug	inspection pit excavated to 1.20m			
2.60 7.30	2.60 7.30										Location:				
Cocin = D	ntaile	\A/=+	ر د له ۸	- d	4										
Casing De		Water from (m)	_	e d (m)	\exists										
3.00 5.50	200						<u> </u>			L T	T			-	_
20.00	150				'		Barr	ei		h Type		ion Reason Last Upda			
						S	K6L		W	/ater	Terminate	d at scheduled depth. 02/12/20	122	A	J

8	C	AUS	E	W	A	Y				ect No. 1619A	Client:	Name: North Iri Statkraft		,				orehole BH03	
			GEC	ITC	EC	Н					Client's	Rep: Arup							
Met		Plant I				(m)			Coor	dinates	Final De		Start Date:	15/03/2022	Drillor	BM+RS		heet 3 of	
Cable Pe Rotary	rcussion Coring	Dando Comacch				.00 .50	5. 20		7194	14.12 E	rillal De	20.00 111	Start Date.	13/03/2022	Dillier.	DIVITIO	:	Scale: 1:5	0
									7653	19.80 N	Elevatio	n: 8.63 mOD	End Date:	12/03/2022	Logger:	CH+TH		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	_
						AZCL						No recovery							
.00																		1	19.0
			0	0	0	NR				(1.60)								11	19.5
.00									-11.37	20.00			End of Bore	hole at 20.00m				2	20.0
										Ē			LIN OF BUILD	noic at 20.00III					
										Ē								20	20.5
										Ė									
										<u>-</u>								2	21.0
										Ė									
																		2	21.5
										Ē									22.0
										E									22.0
										Ē								2:	22.5
										E									
										F								2:	23.0
																		2:	23.5
										-								2-	24.0
																		2-	24.5
																		20	25.0
																			٥.٠
										-								2	25.5
										Ė									
										-								20	26.0
										Ė									
										E								20	26.5
										Ė									
										-								2	27.0
										Ė									
										Ē								2	27.5
			TCR	SCR	RQD	FI				ŧ									
		Strikes	'						g Detail		Remarks								_
2.60	2.60) Time (min)	Rose	e to (r	n) F	rom (m)	To (m) Tin	ne (hh:mm)	Hand dug Location:	inspection pit excava Landfall.	ted to 1.20m						
7.30	7.30																		
	Details	Water																	
o (m) 3.00	Diam (mm)	From (m)	To	o (m)	\dashv														
5.50 20.00	200 150				\vdash	Core	Barı	el	Flush	Туре	Termina	tion Reason				Last Up	date	d	ī
_0.00	130	1					K6L			iter		d at scheduled depth				02/12/			Ť

		AUS	E	W OTI	A ECI	Y H			•	ect No. 1619A	oject Name: North Irish Sea Array Lient: Statkraft Limited ient's Rep: Arup	.aiiuiaii		Borehole I
Meth					<u> </u>			• •	Coor	dinates	nal Depth: 20.00 m Start Date: 16	6/03/2022 Driller:	RS+BM	Sheet 1 of
Rotary (Oriling	Sample / Comacchio 405 3.00		1	00 00 .00		38.60 E 63.53 N	evation: 13.04 mOD End Date: 25		EM+CH	Scale: 1:50			
Depth (m)	Sample / Tests	Fie	eld Re	cords			Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	gend Descript	tion	Water	Backfill
											TOPSOIL- Soft brown sandy gravelly C	CLAY.		
0.30 - 0.50	B1								12.74	0.30	Firm becoming stiff brownish grey slip		elly CLAY.	
											Gravel is subangular to subrounded f	nne to medium.		
).80 - 1.00	B2													
.20	D4	N 0 /1 1 /2 2	2.21		c		1 00	D					_	
.20 - 1.65		0199				N =	1.00	Dry						
.80 - 2.00	В3	Slow seepage	e at 1	30m	1									
.00	D5	N. 26 /2 5 /5	c 7 0	١		CN 1	4 50							
.00 - 2.45			0,7,8	, Han	ımer	>IN =	1.50	υry	10.74	2.30	Very stiff brown sandy gravelly CLAY.	Sand is fine to coarse 6	Gravel is	
										-	subangular to subrounded fine to coa			
		Slow seepage	e at 2	2.80						Ē	<u> </u>		_	
3.00 - 3.12	SPT (S)						3.00	2.70	10.04	3.00	Brown sandy gravelly CLAY (Driller's c	description)		3
					1199					-	*****		_	
		Water strike	at 3.5	50m							# 현실 설립 교육 (1985년) 일본 등 (1987년)			
										4.00				
.00 - 5.00	С								9.04	4.00	Stiff brown slightly sandy gravelly CLA boulder content. Sand is fine to coars			
											coarse of various lithologies. Cobbles	s are subrounded of var		
			73								intrologies predominantly innestone	and madatone.		
										-				5
						AZCL								
5.50										(3.00)				5
										-				
			73											
						AZCL								
7.00 7.00 - 8.25	С								6.04	7.00	Stiff brown slightly sandy gravelly SIL		ent. Sans	
										Ē	is fine to coarse. Gravel is subangular	i iiie to coarse.		
			100	15	6					(1.25)	×× ×××			
			100	13						-	Weak (locally very weak) thinly lamin weathered : much closer fracture spa			8
									4.79	8.25	clay deposits, clay infill and discolour			
3.50										Ė	\$\hat{\times}\$\hat{\times}\$ Discontinuities: 1. 35 to 45 degree bedding fractures,			8
										Ē	$\begin{array}{ccc} \times \times \times \\ \times \times \times \end{array}$ planar, smooth with orangish brown deposits and clay infill (up to 80mm t			
			100	87	6					-	2. 70 degree joint at 8.70m to 8.90m,	, 12.30m to 12.60m, slig	ghtly	9
			T0-	00-	PCT					-	surface.	() i = 2 3 (mot) (,	
	Water	Strikes	ICR	SCR	KQD		Chis	elling	g Detail	s	marks			
ruck at (m) 1.30) Time (min)	Rose	e to (r	n) F			To (me (hh:mm)	nd dug inspection pit excavated to 1.20m			
2.80 3.50	2.80 3.50										ation: Landfall. viewer completed.			
To (m)	Details Diam (mm)				\dashv									
3.00 4.00	200	,		,										
20.00						Core	Barı	el	Flush	Туре	mination Reason		Last Updat	
						S	K6L		W	ater	minated at scheduled depth		02/12/202	2 AC

	rcussion Dando 2000 0.00 Driling Comacchio 405 3.00 Coring Comacchio 405 4.00 Samples / Field Records TCR SCR RQD FI C 100 26 0	Н			21-1	ect No. 619A	Project Na Client: Client's Re	me: North Iri Statkraft p: Arup		y Landfall			В	orehole BH04					
Metho Cable Percu	d Plant Used Top (n ussion Dando 2000 0.00 Comacchio 405 3.00 Comacchio 405 4.00 Samples / Field Records TCR SCR RQD F			Base 3.0			dinates	Final Depth:	20.00 m	Start Date:	16/03/2022	Driller:	RS+BM		Sheet 2 c Scale: 1:				
Rotary Dr Rotary Co	C C C C C C C C C C	4.0 20.			38.60 E 53.53 N	Elevation:	13.04 mOD	End Date:	25/03/2022	Logger:	EM+CH		FINAI	L					
Depth (m)		Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	1	Desc	ription	•		Water	Backfill						
9.65 - 9.75	С										××××× clay	ak (locally very v athered : much c y deposits, clay in continuities:	closer fracture nfill and discol	spacing, further ouration in fract	weakene ure surfac	d with es.			9.5 -
10.00											×××××	35 to 45 degree the sar, smooth with bosits and clay in	n orangish bro	wn staining and	light brow	n clay			10.0 —
10.35 - 10.45	C									××××× ××××× ××××× und	70 degree joint a dulating, rough w face.	t 8.70m to 8.9	0m, 12.30m to 1	.2.60m, sli	ghtly			10.5 -	
.1.50											× × × × × × × × × × × × × × × × × × ×								11.5
	100 26 0 100 27 100 100 0 100								(6.35)	X X X X X X X X X X X X X X X X X X X								12.0 -	
13.00											× × × × × × × × × × × × × × × × × × ×								13.0 -
	Samples / Field Records TCR SCR RQD FI							X X X X X X X X X X X X X X X X X X X								13.5			
											×××××	dium strong indi tially weathered							14.0 -
											×××××	faces, pyrite specontinuities:	ckled through	out.					
4.50									-1.56	14.60	::::: pla	15 degree beddir nar, rough with o	dark discoloura						14.5
			100	98	90	4				(1.40)	2. 6	fracture surfaces 50 to 70 degree jo h patchy brown s faces.	oints at 15.20						15.0 -
15.50 - 15.70	С										red	ak thinly laminat uced strength, c deposits on fra- neralisation.	lsoer fracture	spacing, with dis	scolouratio	1			15.5
16.00									-2.96	16.00	Dis	continuities: 5 to 15 degree be	edding fracture	es closely snaced	1 (50//210) nlanar			16.0 -
										Ė	sm	ooth, with orang cture surfaces.							16.5
.6.70 - 16.80	С		100	65	0						Me	.00m to 16.20m: Soft g dium strong indi	istinctly thickly	laminated grey					20.3
										(1.80)	we	ite quartz veins a athered: closer f	racture spacin	g, with clay depo		Partially			17.0 -
						5					Dis	colouration on fr			1/42//50	0) 1			
.7.50									4		sm	35 to 45 degree booth with grey clown staining on f	lay deposits (u	p to 4mm thick)					17.5
18.15 - 18.50	С		100	99	80				-4.76	17.80	2. 8	80- to 90 degree gh with strong d at surfaces, othe 60 to 70 degree j	joint at 18.00r lark brown and rwise clean.	n to 18.60m, slig I dark orangish b	prown stai	ning on			18.0 -
			TCP	SCP	ROD	FI				Ē		chy orangish bro					-		18.5
									Details		Remarks								
1.30 2.80 3.50	1.30 2.80	Time (min)	Rose	to (n	n) Fr	rom (m)	To (n	n) Tim	e (hh:mm)	Hand dug inspo Location: Land Televiewer con		ted to 1.20m						
Casing De	etails	Water	Add	ed	\dashv														
	iam (mm) 200	From (m)		(m)															
4.00	200 150				-	Core	Barr	el	Flush	Туре	Termination	Reason				Last Up	date	ed T	J
						S	K6L		Wa	ter	Terminated at	scheduled depth	ı			02/12/	2022	Δ	G,

Mark		Plant	GEC	DTI	EC	Н	Do-	100	21-:	ect No. 1619A dinates	Project Client: Client's	Name: North Iri Statkraft Rep: Arup		y Landfall				BH04	•
Metl Cable Per Rotary	rcussion	Dando Comacch	2000)	0.	(m) 00 00	1	e (m) 00 00		38.60 E	Final De	pth: 20.00 m	Start Date:	16/03/2022	Driller:	RS+BM		heet 3 of Scale: 1:5	
Rotary	Coring	Comacch	nio 40	05	4.	00		.00		63.53 N	Elevatio	n: 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	
9.00			100		35				-6.96	20.00		Medium strong indi white quartz veins a weathered: closer f discolouration on fr Discontinuities: 1. 35 to 45 degree the smooth with grey of brown staining on f 2. 80- to 90 degree rough with strong of joint surfaces, othe 3. 60 to 70 degree j patchy orangish brown	at 45 degree a racture spacin acture surface bedding fractular deposits (uracture surface joint at 18.00 lark brown and rwise clean. oint at 19.85n own staining on staining on the stature of the statur	ngles (up to 40m g, with clay depo is. res closely space p to 4mm thick) es. n to 18.60m, slig d dark orangish b	om thick). If osits and ed (12//600 and orang other undul prown stair undululating, ro	Partially D) planar, ish ating, ning on ugh, with			19.0 · 19.5 20.0 · 20.5 21.0 · 21.5 22.0 · 22.5 23.0 · 24.5 24.5 25.0 · 26.5 27.0 ·
	Water	Strikes	TCR	SCR	RQD	FI	Chis	elline	g Detail	s	Remarks								
1.30 2.80 3.50 Casing	Casing to (m) Time (min) Water	Add		n) F	rom (To (me (hh:mm)	Hand dug Location:	inspection pit excava	ted to 1.20m						
3.00 4.00	200 200				-	Core	Barr	rel	Flush	туре	Terminat	ion Reason				Last Up	date	d 💻	-
20.00	150						K6L	CI		ater		d at scheduled depth				02/12/			4

		AUS	E	W ITC	A ECI	Y H				ect No. .619A	Client:			y candrali			В	BH05	
Meth Cable Per		Plant U Dando			-		Base 6.0		Coord	dinates	Final De	epth: 20.00 m	Start Date:	22/03/2022	Driller:	BM+JG		Sheet 1 o	
Rotary (Field Records Field Records Casing Depth (P) 14 (2,2/3,3,4,4) Hammer SN = 1.00 99 25 (4,4/4,7,7,7) Hammer SN = 1.50 99 low=25 100% 3.00 99 w seepage 4.30						30.91 E 55.28 N	Elevatio	on: 10.24 mOD	End Date:	30/03/2022	Logger:	CH+RC		Scale: 1		
Depth (m)	Sample / Tests	Fie	eld Re	cords			Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend		Des	cription	\	1	Water	Backfill	Τ
												TOPSOIL-Soft brown	n sandy gravel	ly CLAY.					
0.30 - 0.50	В3																		ı
0.50	ES1																		0.5
0.80 - 1.10	В4																		ı
.00	ES2								9.24	1.00		Firm brownish grey	slightly sandy	slightly gravelly	CLAV Sand	l is fine to	-		1.0
20	D10											coarse. Gravel is sub				i is fille to			
1.20 - 1.65	SPT (S)	N=14 (2,2/3, 0199	3,4,4) Ham	nmer	SN =	1.00	Dry		E									1.0
		0199								E									1.:
.80 - 2.00	B5																		
2.00	D11	N 25 /4 1/1	, . -	·\ . ·		C+:				-									2.0
2.00 - 2.45	SPT (S)	N=25 (4,4/4, 0199	9				υry	8.04	2.20		Stiff grey slightly sa	ndy slightly gr	avelly CLAY. Sand	is fine to	coarse.	1		I	
									Ē		Gravel is subangula							2.5	
			3.00 Dr					E									1		
2.80 - 3.00	В6									[1
3.00 - 3.45	U14	Ublow=25 10	00%				3.00	Dry	7.24	3.00		Stiff grey slightly sa			is fine to	coarse.	1		3.
										Ė		Gravel is subangula	r fine to medi	um.					1
		N=22 (4,4/5,5,6,6) Hammer SN = 3.00 Di				-									3.				
		0199														ı			
.80 - 4.00	B7																		1.
.00 .00 - 4.45	D12 SPT (S)	N=22 (4.4/5.	5.6.6	i) Ham	nmer	SN =	3.00	Drv											4.
	(-)	0199						1		É							•		ı
		Slow seepag	e 4.3	υ						Ė									4.
1.80 - 5.00	B8									Ē									1
5.00	D13									E									5.
5.00 - 5.45		N=24 (4,5/5,	5,6,8) Ham	nmer	SN =	3.00												ı
		0199								[
										E									5.5
6.00 - 6.45	II15 IIb	low-25 80%	l		1	1	3 00	Dry	4.24	6.00		Stiff greyish brown	cliabtly candy	gravelly CLAV Sa	nd is fine t	o coarce			6.0
0.43	013 00	10W-23 80%					3.00	ыу	4.24			Gravel is subangula				o coarse.			
										[lithologies.							6.5
																			0.2
			57	0	0					(1.50)		6.85m to 7.50m: AZCL		_					
										F		TOOM, ALOE		_					7.0
7.30 - 7.50	В9					AZCL				F									ı
7.50							3.00	Drv	2.74	7.50		<u> </u>		•			1		7.5
7.50 - 8.50	C8							1	•		× ×	Dark greyish brown subangular to subro							
7.50 - 7.63	SPT(S) 1 105mm	N=50 (31 for /50 for								,,	\star, \times, \star					-			ı
		Hammer SN								(1.00)	\times \times								8.0
	= 0199		100	0	0					Ē	×××								
3.50 - 9.00	С9								1.74	8.50	×××	Stiff dark greyish br	own slightly s	andy gravelly CL	AY Sandie	fine to	-		8.5
8.50 - 8.76	SPT(C) I									(0.60)		medium. Gravel is s							
9.00	(5,11/4 110mm) Hammer								(0.00)									9.0
	SN = 02	09							1.14	9.10		Dark grey slightly sa GRAVEL of mixed lit				arse `	1		1
			TCR	SCR	RQD	FI				F		SIGNEL OF HILKER III	viogics. sall	a is mile to coals	<u></u>		1		1
	Wate	r Strikes	•	1			Chise	elling	Details	5	Remarks	·					-		_
) Time (min)	Rose	e to (r	n) F	rom (To (ne (hh:mm)	Hand dug	inspection pit excava	ted to 1.20m						
4.30	4.30										Location:	Landfall							
Casing	Details	Water	Δdd	led	\dashv														
	Diam (mm			o (m)	\dashv														
6.00	200	` ,																	
20.00	150					Core	Barr	el	Flush	Туре	Terminat	tion Reason	-			Last Up	odate	ed	Ī
		1	1		- 1											1			~

	/ –		GEC	VV DTE	ECI	Н		2	21-16	et No. 619A	Project Client: Client's	Name: North Iri Statkraft Rep: Arup		y Landfall			Вс	BH05	D
Metho Cable Percu Rotary Co	ıssion	Plant U Dando Comacch	2000		0.	(m) 00 00	6.0 20.0	00	Coord 719530 76515		Final De	•		22/03/2022		BM+JG CH+RC		heet 2 of 3 Scale: 1:50 FINAL	
Depth (m)	Samples /	Field Records	TCR	SCR	RQD	FI	Casing Depth (m)		Level mOD	Depth (m)	Legend	,	Des	cription		-	Water	Backfill	_
10.00 - 10.45	SPT(C) N (4,6/9,9,		39	0	0	AZCL				(1.40)		Dark grey slightly sa GRAVEL of mixed lit 9.60m to 10.50m: AZCL				arse		9.5	
10.50		SN = 0209							0.26	10.50								10.5	
10.50 - 11.40	C10								0.26		* * * * * * * * *	Dark greyish brown angular to subangu			AND. Grave	lis			
			73	0	0				4.46	(0.90)	`* * * * * * *							11.0	.0 -
1.50 - 11.95	(4,9/10,	=50 13,12,15) · SN = 0209				AZCL		-	1.16	(0.60)		Stiff dark greyish br cobble content. Sar fine to coarse of mi	nd is fine to co	arse. Gravel is a	ngular to sı	ubangular		11.5	.5
.2.00								-	1.76	12.00	4.00.0	Greyish brown sligh			se GRAVEL	of mixed		12.0	.0 –
								-	2.36	(0.60) 12.60		Weak (locally very v	weak) grevish	brown TUFF. Par	rtially weat	hered:		12.5	.5
			77	0	0	>20						significantly reduce blackish brown disc Discontinuities: 1. 45 to 55 degree j frequent pervasive	strength, muc colouration on oints closely s	ch closer fractur fracture surface paced (10/90/1	e spacing fes.	requent		13.0	.0 -
5.00			100	24	0					(4.50)		requests per tosse	Sidenisi Sion	. scanning on joi				14.0 14.0	.0 -
6.50			100	19	0	20						Medium strong indi Partially weathered frequent heavy blad Discontinuities: 1. 20 to 45 degree j	l: reduced stre ckish brown di	ngth, closer frac scolouration on	cture spacir fracture su	ng and urfaces.		15.5 16.0	.0 -
			100	36	0			-	6.86	17.10		and frequent blacki deep. 2.0 65 to 75 degree frequent heavy black deep.	ish brown stair	ning on joint sur	faces up to , planar, ro	5mm ugh and		17.0	.0 -
0.00						16			7.76	(0.90)		Medium strong (loc weathered: reduced frequent pervasive	d strength, mu	ich closer fractu	re spacing	and		17	
8.00								-	7.76	- 18.00		surfaces. Discontinuities: 1. 45 to 55 degree j	oints closely s	paced (10/65/1	00) planar,	rough		18.0	.0-
			TCR	SCR	RQD	_					\\\\\\\	and frequent perva	sive blackish b	nown staining o	ii joint surf	aces.	-	18.3	_
ruck at (m) Ca: 4.30 Casing De To (m) Di	sing to (m) 4.30	Strikes Time (min) Water From (m)	Add		n) F			To (m)		(hh:mm)	Remarks Hand dug Location:	inspection pit excava	ted to 1.20m						
6.00 20.00	200 150						Barre K6L	el	Flush 1			tion Reason				Last Up 02/12/			Į

CAUSEWAY GEOTECH Mathed Rept Mad Top (m) Page (m)								21-1	ect No. L619A	Project Name: North Irish Sea Array Landfall Client: Statkraft Limited Client's Rep: Arup						Borehole ID BH05			
Cable Percussion		Dando	Dando 2000			70p (m) B 0.00 6.00		(m) 00 .00	719530.91 E 765155.28 N		Final Depth: 20.00 m Elevation: 10.24 mOD				Driller:	Driller: BM+JG		Sheet 3 of Scale: 1:5 FINAL	
Depth				con			Casing	Water	Level	Depth		10.24 11100			LOSSEI	CITIC	ter	I	- T
(m) 9.50 9.60 - 19.80 9.80 - 20.10 10.00	C12	/ Field Records	93	27 100 SCR	0 100	>20	Casing Depth (m)	Walter begin by the control of the c	-9.06 -9.76	(m) (1.30) 19.30 (0.70) - 20.00	Legend	Medium strong (loc weathered: reducer frequent pervasive surfaces. Discontinuities: 1. 45 to 55 degree j and frequent perva Medium strong ligh reduced strength at Discontinuities: 1. 25 to 45 degree j rough, unstained. 2. 10.20m joint at 1	cally weak) dai d strength, mu blackish brow ioints closely s isive blackish t it grey ANDESI ind closer fract ioints at 19.40	n discolouration paced (10/65/10 prown staining o TE. Partially wea ure spacing. m to 19.45m and	re spacing on fracture 00) planar, n joint sur athered: sl d 19.60m, tained.	rough faces.	Water	Backfill	19.0 - 19.5 20.0 - 20.5 21.0 - 22.5 23.0 - 23.5 24.0 - 25.5 26.0 - 27.5
		Strikes						elling	g Detail	S	Remarks							1	
Casing De To (m) Di 6.00 20.00	4.30	Water	Add					To (ne (hh:mm)	Location:		ted to 1.20m			l act U	da*-	od I	
							Barr K6L	ei		Type ater		tion Reason d at scheduled depth	١.			02/12/			4

		AUS	E	W DTE	A	Y				ect No. 1619A	Client:	Name: North Iri		y Landfall			В	oreho BH		ID
D.O. a.l.							.	/\	C	-1:	Client's	Rep: Arup	T		1		<u> </u>			_
Meth Cable Per Rotary (rcussion	Plant L Dando Comacch	2000)	0.0 4.0	00	4.0 20.0	0	7194	54.92 E 55.97 N	Final De	•		21/03/2022		BM+RS		Scale:	1:5	0
Depth	Sample /						Casing	Water	Level	Depth	Elevatio	n: 11.95 mOD	ļ	29/03/2022	Logger:	CH+EM	-a	FIN.	_	_
(m)	Tests	Fie	eld Re	cords			Casing Depth (m)	Water Depth (m)	mOD	(m)	Legend	TOPSOIL-Soft brown		cription	u CLAV San	d is fino	Water	Back	ill	_
0.30 - 0.50 0.50 0.80 - 1.00	B3 ES1 B4											to coarse. Gravel is								0.5
.00 .20 .20 - 1.65	D8 SPT (S)	N=16 (1,2/3, 0199	5,5,3) Ham	mer :	SN =	1.00	Dry	10.95	1.00		Stiff brownish grey sis subangular to sub			ne to coarse	e. Gravel				1.0
80 - 2.00 2.00 - 2.45	B5 U11	Ublow=20 90 Slow seepago		.00m			1.50	1.90	10.15	1.80		Stiff brownish sligh coarse. Gravel is sub					•			2.0
.80 - 3.00 .00 .00 - 3.45	B6 D9 SPT (S)	N=16 (2,3/3, 0199	4,4,5) Ham	mer :	5N =	3.00	Dry												3.0
3.80 - 4.00 1.00	B7						3.00	Dry	7.95	4.00		Dark greyish brown	very clayey fi	ne to medium SA	AND.					4.0
.00 - 4.45	SPT(S) N (3,4/4,5 Hamme		37			AZCL				(1.15)		4.00m to 4.93m: AZCL du	ie to disturbance by	SPI						4.5
									6.80	5.15	24 00 0 00 00 1	Very stiff dark greyi:					-			5.0
.50 .50 - 6.13 .75 - 5.90	c c									(0.98)		coarse of various lit lithologies. 5.75m to 5.90m: Bed of c.	hologies. Cob	bles are sub ang	0					5.5
.13 - 7.00	С		42			AZCL			5.82	6.13		Dark greyish brown	very clayey fi	ne to coarse SAN	ID					6.0
.00 .00 - 7.35	C12								4.95	7.00		Dark greyish brown								7.0
			25			AZCL				(1.50)		of various lithologie coarse. Cobbles are 7.38m to 8.50m: AZCL po	sub angular o	f various litholog		ine to				7.5
.50 .50 - 9.50	С								3.45	8.50		Very stiff brown slig Sand is fine to coars								8.5
			65 TCR	SCR	ROD	FI				(1.00)		lithologies								9.0
		r Strikes						elling	Details	s	Remarks									_
2.00	2.00	Water) From (m)	Add		n) Fr	rom (r	m)	To (r	m) Tim	ne (hh:mm)	Hand dug Location: I	inspection pit excava Landfall.	ted to 1.20m							
3.00	200 150	,		···/	_	Core	Barre	el	Flush	Туре	Terminat	ion Reason				Last Up	odate	ed	Ē	Ī
						SI	(6L		Wa	iter	Terminate	d at scheduled depth				02/12/	/2022	<u> </u>	1	Ą

		AUS	SE'	W	A	Y				ct No. 619A	Project Client:	Name: North Iri		y Landfall			В	orehole	
			3 = (711		П					Client's	Rep: Arup							
Meth Cable Per Rotary (rcussion	Plant Dando Comacch	2000)	0.	(m) 00 00	Base 4.0 20.	00		dinates 54.92 E	Final De	epth: 20.00 m	Start Date:	21/03/2022	Driller:	BM+RS		Sheet 2 o Scale: 1:	
o.u.,		001114001					20.			55.97 N	Elevatio	n: 11.95 mOD	End Date:	29/03/2022	Logger:	CH+EM		FINA	L
Depth (m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend			cription			Water	Backfill	
						AZCL			2.45	9.50		Very stiff brown slig Sand is fine to coars lithologies	se. Gravel is su	bangular fine to	coarse of	various			9.5
0.00										(0.65)		Stiff brown slightly is subangular fine to			ie to coarsi	e. Gravel			10.0 -
0.00 - 10.1	15 C		73						1.80	10.15		Very stiff brown slig boulder content. Sa coarse of various lit	ind is fine to c						10.5
4.50						AZCL						11.10m to 11.50m: AZCL	possibly washed or	ut due to flush					
1.50			0			NR													11.5
3.00			0			INK				(4.35)									12.5 13.0 -
			0			NR													13.5 14.0 ·
4.50									-2.55	14.50									14.5
4.50 - 14.9 4.50 - 14.9									2.55	(0.40)		Very stiff greyish bri fine to coarse. Grav							
4.90 - 15.4 4.90 - 15.4	45 C		96						-2.95	14.90		Greyish brown sand with low cobble cor	ntent. Sand is						15.0
5.45 - 15.9 5.45 - 15.9									-3.50	15.45		very stiff brown slig Sand is fine to coars	htly sandy gra						15.5
6.00												lithologies.							16.0
			73							(2.05)									16.5 17.0
7.50						AZCL			-5.55	17.50		December 19, 1, 21	-111 **	D =:					17.5
			44						-5.80	(0.25)		Brown slightly grave angular fine to med No recovery.	lium of variou	s lithologies.	ט. Gravely	ris sub			18.0
						AZCL						18.17m to 19.00m: AZCL	possibly washed of	ur due lo TIUSN					18.5
		. Ct. !!	TCR	SCR	RQD	FI	<u></u>	. 12:	.	1									<u>_</u>
ruck at (m) 2.00		r Strikes i) Time (min)	Rose	e to (n	n) F	rom (To (1	m) Tim	e (hh:mm)	Remarks Hand dug Location:	inspection pit excava	ted to 1.20m						
	Diam (mm	Water) From (m)		ed o (m)															
3.00 20.00	200 150					Core	Barr	el	Flush	Туре	Terminat	tion Reason				Last Up	date	ed T	_
						S	K6L		Wa	ter	Terminate	d at scheduled depth	ı.			02/12/	/2022		G

		AUS					L		21-	ect No. 1619A	Project Client: Client's	Name: North Iri Statkraft Rep: Arup		ay Landfall				orehole BH06	j
Meth Cable Pero Rotary C	cussion	Plant I Dando Comacch	2000	0	0.	(m) 00 00	1	e (m) 00 .00		54.92 E	Final De	pth: 20.00 m	Start Date:	21/03/2022	Driller:	BM+RS	1	Sheet 3 of Scale: 1:5	
										55.97 N	Elevatio	n: 11.95 mOD	End Date:	29/03/2022	Logger:	CH+EM	_	FINAL	
Depth (m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	No receivery	Des	cription			Water	Backfill	L
9.00										(2.25)		No recovery.							19.0 19.5
0.00									-8.05	20.00			End of Bore	Phole at 20.00m			-		20.0
																			21.0
																			21.5 22.0
																			22.5
																			23.0
																			23.5
																			24.5
																			25.0
																			25.5
																			26.0
										-									27.0
																			27.5
		· · ·	TCR	SCR	RQD	FI	<u> </u>	ļ.,		<u> </u>									L
2.00	Casing to (m 2.00	Strikes Time (min)			n) F	rom (To (g Detail m) Ti	me (hh:mm)	Remarks Hand dug Location: L	inspection pit excava	ited to 1.20m						
Casing D To (m) D 3.00 20.00	Details Diam (mm) 200 150	Water From (m)		led o (m)		Core	Barı	rel	Fluel	ı Type	Terminat	ion Reason				Last Up	date	ed 💻	-
							K6L			ater		d at scheduled depth	1			02/12/			ż

			iEC	OTE	ECH	-			21-1	ect No. .619A	Project Name: North Irish Sea Array Landfall Client: Statkraft Limited Client's Rep: Arup	Borehole ID BH07
Meth Cable Per		Plant U			Top		Base 4.0		Coor	dinates	Final Depth: 15.50 m Start Date: 21/03/2022 Driller: JG+BM	Sheet 1 of 2
Rotary C		Comacch			4.0	- 1	15.			17.44 E 79.09 N	Elevation: 19.70 mOD End Date: 28/03/2022 Logger: RC+CH	Scale: 1:50 FINAL
Depth (m)	Sample / Tests	Fie	ld Re	cords			Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend Description	Backfill Backfill
0.30 - 0.50 0.50 0.80 - 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. Firm becoming stiff brownish grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse.	0.5 -
1.20 - 1.65 1.80 - 2.00 2.00 2.00 - 2.45	B5 D8 SPT (S)	N=11 (2,2/2,3 0199) Ham	nmer S		1.50				medium.	2.0 —
2.80 - 3.00 3.00 3.00 - 3.45	B6 D9 SPT (S)	N=16 (2,3/3,4 0199	4,4,5)) Ham	ımer S	SN =	3.00	Dry	16.30	3.40	Very stiff brown slightly sandy slightly gravelly CLAY. Sand is fine to	3.0 -
3.80 - 4.00	В7									[coarse. Gravel is subangular to subrounded fine to coarse.	
4.00 4.00 - 4.45 4.00 - 4.05	SPT(S) N 25mm/	low=50 0% l=50 (25 for 50 for Hammer SN	92	0	0		3.00 3.00		15.70	(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
5.50 5.50 - 5.95 5.70	(3,4/6,6		100	0	0		5.50	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.	6.0 -
7.00 7.00 7.00 - 7.45 7.30 - 8.00	C SPT(C) N (4,4/7,8 Hamme C		100	0	0		7.00	Dry	12.70 11.90	7.00	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.	7.0 -
8.50									11.90	(1.90)	Extremely weak light greyish brown BRECCIA. Destructured: greatly weakened, matrix weakened and disturbed with frequent clay infill on fracture surfaces. Recovered as: (stiff light greyish brown slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is angular fine to coarse of breccia. Cobbles are angular of breccia.	8.0 -
			100 TCR	0 scr	0 RQD	FI						9.0 —
truck at (m) (Strikes Time (min)	Rose	to (n	n) Fr			elling To (m) Tin	ne (hh:mm)	Remarks Hand dug inspection pit excavated to 1.20m	
Casing I	Details Diam (mm) 200	Water	Add								ocation: Landfall. Io groundwater encountered- water added during drilling.	
15.50	150				(Core		el	Flush			pdated
						SI	K6L		Wa	iter	erminated at scheduled depth 02/1	^{2/2022} AGS

	C	AUS	E	W OT I	A	Y			-	ct No. 619A	Client:	Name: North Iri		y Landfall			В	orehole BH07	
Meth	nd	Plant I	Ised		Ton	(m)	Base	(m)	Coore	linates	Client's	Rep: Arup					c	hoot 2 o	
Cable Pero Rotary C	cussion	Dando Comacch	2000)	0.	00 00	4.0 15.	00	71931	17.44 E	Final De	•		21/03/2022		JG+BM		heet 2 c	:50
						1				79.09 N	Elevatio	n: 19.70 mOD	End Date:	28/03/2022	Logger:	RC+CH		FINAL	
Depth (m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	mOD	Depth (m)	Legend	Extremely weak ligh		cription	***************************************	groothy	Water	Backfill	
10.00			83	0	0	-			10.00	9.70		weakened, matrix v on fracture surface: sandy gravelly CLAY Gravel is angular fir breccia. Extremely weak light weakened, matrix v on fracture surface: sandy gravelly CLAY Gravel is angular fir breccia.	veakened and s. Recovered a with low coble to coarse of the torown BRECoveakened and s Recovered a with low coble	disturbed with s: (stiff light gre- ble content. San- breccia. Cobble CCIA. Destructur- disturbed with las: (stiff light gre- ble content. San-	frequent c yish brown d is fine to s are angu ed: greatly frequent cl yish brown d is fine to	lay infill slightly coarse. lar of ay infill a slightly coarse.			9.5
1.50						_													11.5
			86	0	0		_		7.70	12.00		Extremely weak dar reduced strength, n dark orangish brow surfaces.	nuch closer fra	acture spacing w	ith freque	nt strong	-		12.0 – 12.5
.3.00						>20				(1.35)		Discontinuities: 1. 0-20 degree joint frequent heavy oral whole diameter of the street of the stree	ngish brown s						13.0 -
			100	0	0	18	-		6.35	13.35		Very weak dark bro reduced strength, c orangish brown distributions: 1. 0 to 15 degree jo with frequent heaver the disperse of the strength of	loser fracture colouration or ints closely sp y dark orangis	spacing with fre fracture surface aced (50/150/40	quent hea es. 00) planar,	rough	-		13.5 14.0
4.50			100	100	0	11	-			(2.15)		entire diameter of t 2. 55 to 75 degree j 14.10m to 14.20m a frequent heavy dark diameter of core.	oints from 13. and 14.50m to	14.60m, planar	, rough and	t t			14.5 15.0
5.25									4.20	15.50			End of Bore	hole at 15.50m					15.5
																			16.5 17.0 -
																			18.0 -
			TCR	SCR	RQD	FI													18.5
uck at (m) C		Strikes Time (min)	Rose	e to (r	n) F	rom (elling To (g Details m) Tim	e (hh:mm)	Location:	inspection pit excava		during drilling.					
	Details Diam (mm) 200	Water From (m)		ed (m)															
4.00 15.50	150 150					Core	Barr	el	Flush	Туре	Termina	tion Reason				Last Up	date	d	J

AS							ct No.	Project	Name: North Iri	sh Sea Arra	y Landfall			В	orehole	
		AUSEW	AY			21-1	619A	Client:	Statkraft	Limited					BH15	,
		——GEOTI	ECH					Client's	Rep: Arup							
Metho		Plant Used	Top (m)	_		Coord	inates	Final De	enth: 1450 m	Start Date:	24/03/2022	Driller:	RS+BM	9	Sheet 1 c	of 2
Cable Percu Rotary Dri		Dando 2000 Comacchio 405	0.00 8.00	8.0 8.5		71871	5.01 E	i iiiai De	. pui. 14.30 IN	Start Date:	∠ + / U3/ ∠UZZ	Dimer:	INJETU		Scale: 1:	50
Rotary Co	-	Comacchio 405	8.50	14.5		76491	3.01 N	Elevatio	n: 32.12 mOD	End Date:	28/04/2022	Logger:	EM+CH		FINAI	L
Depth (m)	Sample / Tests	Field Records		Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	AAADE CDOUND C		cription			Water	Backfill	
30 - 0.50	В3								MADE GROUND: So coarse. Gravel is sub				e to			
50 0.50	ES1					31.72	0.40	********	Firm brownish grey				I is fine to	1		0.5
80 - 1.00	B4								medium. Gravel is s	ubangular to :	subrounded fine	to coarse.				ı
00	ES2															1.0
20 - 1.65	U17	Ublow=15 100%		1.00	Dry											ı
							Ė									1.5
																1
80 - 2.00 00	B5 D11					30.12	2.00									٠,
00 00 - 2.45		N=19 (3,3/4,4,5,6) Han	nmer SN =	1.50	Dry	50.12	2.00		Stiff brown slightly s Gravel is subangula				o coarse.			2.0
		0199					[Graver is subdiffuld	. to subiduild	a mie to mediu					ı
																2.5
80 - 3.00	В6						Ė									1
00 00 - 3.45	D12 SPT (S)	N=24 (5,6/6,6,5,7) Han	nmar SN =	3 00	Dry											3.0
	5. 1 (5)	0199	514 -		7		Ē									
							Ė									3.5
80 - 4.00	В7															
00	D13		_				E									4.0
00 - 4.45	SPT (S)	N=23 (4,5/5,6,6,6) Han 0199	nmer SN =	3.00	Dry		<u> </u>									ĺ
							-									4.5
80 - 5.00	B8						[l
.00 - 5.00	D14						<u>E</u>							\preceq		5.0
.00 - 5.45		N=26 (5,5/6,6,6,8) Han	nmer SN =	3.00	Dry		Ē									ĺ
		0199 Slow seepage at 5.00m	1				Ē									5.5
.80 - 6.00 .00 - 6.45	B9 U18			3.00	Dry											6.0
.00 - 0.45	019	Ublow=30 100%		3.00	υιγ		Ė									0.0
							Ē.									ĺ
																6.5
							ŧ									1
							-									7.0
.30 - 7.50	B10															ĺ
50 50 - 7.95	D15	N=31 (6,6/7,8,8,8) Han	nmer CNI –	3 00	Dry		-									7.5
.50 - 7.35	3F (3)	0199	iiilei siv =	3.00	ыу		Ė									ĺ
.00	D16						-									8.0
.00 - 8.12		N=50 (25 for 25mm/50		3.00	Dry		E									1
		100mm) Hammer SN =	0133			23.62	8.50		Weathered rock rec	covered as: bro	own slightly sand	ly verv clav	vev			8.5
							(0.40)		angular fine to coar	se GRAVEL of	siltstone.					1
		100 73	16	1		23.22	8.90	× × × × × × × × × × × × × × × × × × ×	Weak (locally very weathered: reduced							9.0
							[×××××:	discolouration, clay							4
	144		RQD FI	<u> </u>		D		D- ** *								上
uck at (m) Ca		r Strikes) Time (min) Rose to (r	n) From		lling To (r	Details n) Time	(hh:mm)	Remarks Hand dug	inspection pit excava	ted to 1.20m						
5.00	5.00	20 4.90						Location: I								
To (m) Di	etails iam (mm 200	Water Added) From (m) To (m)														
8.50	200		Core	Barre	el	Flush	Туре	Terminat	tion Reason				Last Up	odate	ed 🔳	7
14.50	150		1										· ·			_

	C	AUS	E							ct No. 619A	Project Name: North Irish Sea Array Landfall Client: Statkraft Limited	Во	rehol BH1	
Meth	nod	Plant l					Base	(m)	Coord	linatos	Client's Rep: Arup	Cı	200+ 2	of 2
Cable Per Rotary D	cussion	Dando Comacch	2000		0.	(m) 00 00	8.0 8.1	00		.5.01 E	Final Depth: 14.50 m Start Date: 24/03/2022 Driller: RS+BM		neet 2 cale: 1	
Rotary C		Comacch				50	14			3.01 N	Elevation: 32.12 mOD End Date: 28/04/2022 Logger: EM+CH		FINA	.L
Depth (m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)		Water	Backfil	ı
.0.00			100	70	14	16				(3.20)	Weak (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 brown and orangish brown staining on joint surface.			9.5
1.50							-							11.5
			100	78	0	>20			20.02	12.10	XXXXX XXXXX XXXXX XXXXX XXXXX Weak thickly laminated grey SILTSTONE with white quartz veins (up			12.0 –
2.00				70							\times \tim			12.5 13.0 -
3.00			80	60	13	10				(2.40)	>			13.5
4.50							-		17.62	14.50	End of Borehole at 14.50m			14.5 15.0 -
														15.5 16.0 - 16.5 17.0 -
														18.5
		C+-''	TCR	SCR	RQD	FI	<u> </u>	_,,,,	- D · · · ·	<u> </u>	Domestic .			
5.00 Casing [Casing to (m 5.00	Strikes Time (min) 20 Water From (m)	Add	i.90	m) F	rom (ellinį To (g Details	e (hh:mm)	Remarks Hand dug inspection pit excavated to 1.20m Location: Landfall.			
3.00 8.50 14.50	200 200 200 150	(111)		···/		Core	Barı	el	Flush	Туре	Termination Reason Last Upda	ate	d E	
						S	K6L		Wat	ter	Terminated at scheduled depth. 02/12/20	022	A	GS

	C	CAUSEV	VAY TECH			-	ect No. .619A	Project Client: Client's	Name: North Iri Statkraft Rep: Arup		y Landfall			В	orehol BH1	
Meth	nod	Plant Used	Top (m)	Base	(m)	Coor	dinates			c	22/02/2		D1.1 ==	S	heet 1	of 2
Cable Per Rotary (Dando 2000 Comacchio 405	0.00 10.00		.00		96.53 E	Final De			23/02/2022		BM+RS		Scale: 1	
Depth	Sample /			Casing	Water	Level	22.39 N Depth	Elevatio	31.97 MOD		26/04/2022	Logger:	CH+EM	'n	FINA	_
(m)	Tests	Field Reco	rds	Casing Depth (m)	Water Depth (m)	mOD	(m)	Legend	MADE GROUND: So		cription	aliabely ava	vallu	Water	Backfil	
).30 - 0.50).50	B3 ES1					31.27	0.70		CLAY. Sand is fine to to medium.	coarse. Grave	el is subangular t	o subroun	ded fine			0.5
.80 - 1.00	B4 ES2								Firm brownish grey coarse. Gravel is sub				l is fine to			1.0 -
20	D9															1.0
.20 - 1.65	SPT (S)	N=14 (2,3/3,3,4,4) H 0199	lammer SN =	1.00	Dry											1.5
.80 - 2.00	B5															
.00 .00 - 2.45	D10 SPT (S)	N=20 (4,4/4,5,5,6) H	lammer SN =	1.50	Dry		E									2.0 -
		0199				29.67	2.30		Stiff becoming very Sand is fine to coars medium.							2.5
.80 - 3.00	В6								mediam.							
.00 - 3.45	U13	Ublow=25 80%		3.00	Dry											3.0 -
																2.5
																3.5
.80 - 4.00	B7															4.0
00 00 - 4.45	D11 SPT (S)	N=20 (4,4/5,5,5,5) H	lammer SN =	3.00	Dry											4.0
		0199					E									4.5
							ŧ									4.5
.80 - 5.00 .00	B8 D12						E							\succeq		5.0
00 00 - 5.45		N=21 (5,7/5,5,5,6) H	lammer SN =	3.00	Dry		ŧ							1		0.0
		0199 Slow seepage at 5.0	0m													5.5
																. 3.3
.00 - 6.45	U14	Ublow=25 100%		3.00	Dry											6.0
.00 0.43	014	0510W=25 10078		3.00	D.,											
																° 6.5
																•
																7.0
.50 - 7.95	SPT (S)	N=36 (5,5/6,7,8,15)	Hammer SN	3 00												7.5
.50 7.55	31 1 (3)	= 0199	riammer 514	3.00												
																8.0
							E									
							E									8.5
							ŧ									•
.00 - 9.45	U15	Ublow=30 90%		3.00		22.97	9.00		Very stiff brown slig coarse. Gravel is sub							9.0
	147:-	u Chuilea -		<u>Cr.</u>		~ D-+ · ''		Perra 1					-			\perp
ruck at (m)	Casing to (m	r Strikes n) Time (min) Rose to	o (m) From		ellin _i To (m) Tim	ne (hh:mm)	Remarks Hand dug	inspection pit excava	ted to 1.20m						
5.00 9.90	5.00 9.90	20 4.9 20 4.2	0					Location:								
Casing I		Water Added														
To (m)	Diam (mm	From (m) To (r	11)													
			Core	e Barı	el	Flush	Туре	Terminat	tion Reason				Last Up	date	ed	J
				SK6L		Wa	iter	Terminate	d at scheduled depth				02/12/	/2022		

(m) 10.00 - 10.45 S	Ssion ing Sample / Tests	Fast seepage	2000 nio 4()	0. 10	(m) 00 .00	Base 10. 15.	.00		inates 6.53 E	Client's Final De	-	Start Date:	23/02/2022	Driller:	BM+RS		Sheet 2 Scale: 1	
Depth (m) S. (1.50	Ssion ing Sample / Tests	Dando Comacch Fie Fast seepage =50 15,15,9,11)	2000 nio 4() 05	0. 10	00	10.	.00			Final De	pth: 15.00 m	Start Date:	23/02/2022	Driller:	BM+RS			
(m) 0.00 - 10.45 S (:	Tests SPT(S) N (15,18/1	Fast seepage =50 15,15,9,11)		cords														Jeane, 1	_:50
(m) .0.00 - 10.45 S (1) H	Tests SPT(S) N (15,18/1	Fast seepage =50 15,15,9,11)		cords			Carion	Water	76482 Level	2.39 N Depth	Elevatio	n: 31.97 mOD		26/04/2022	Logger:	CH+EM	in	FINA	_
(: H	SPT(S) N (15,18/1	I=50 15,15,9,11)	at 9.				Casing Depth (m)	Water Depth (m)	mOD	(m)	Legend		Desc	ription			Water	Backfill	1
				90m			3.00	8.00	21.97	10.00		Brown slightly sand various lithologies.		-	o coarse G	RAVEL of	\square		9.5
			100	56	0				21.32	10.65		Medium strong to w Partially weathered strength with clay d Discontinuities: 1. 30-40 degree bec	l: much closer leposits and di dding fractures	fracture spacing, scolouration on s, closely spaced	, slightly re fracture su (100/159/	duced irfaces. 180),	-		11.0 •
3.00			80	40	13	16			19.57	12.40		planar, smooth with on most fracture su (up to 5mm thick) o 2. 80-90 degree joir with dark brown sta	orfaces and broom some fractunt at 12.10-12. aining on joint	wn slightly grav re surfaces. 30m, slightly und surface.	relly clay de	eposits			11.5
						2 AZCL			23.07		X X X X X X X X X X X X X X X X X X X	Medium strong indi Partially weathered discolouration on fr Discontinuities: 1. 10-20 degree bed planar, smooth to ro deposits (up to 3mr	: closer fracture racture surface dding fractures ough with bro	re spacing with c is. s, medium space wnish grey and g	d (150/260 rey sandy	ts and 0/280), clay			12.5
			100	80	13	14				(2.60)	X X X X X X X X X X X X X X X X X X X	orangish brown stai 2. 70-80 degree joir with localised brow orangish brown stai 3. 60-70 degree joir patchy orangish bro	ining on most nt at 13.35-13. In clay depositi ining on joint s nts at 14.00-14	fracture surfaces 90m, undulating s (up to 4mm thi urface. 50m, undulatin	s. , smooth t ck) and pa	o rough tchy dark			13.5
4.50			100	90	40						× × × × × × × × × × × × × × × × × × ×								14.5
ruck at (m) Casin	ng to (m 5.00	20	Rose 4	1.90				ellinį To (g Details m) Time	e (hh:mm)	Remarks Hand dug Location: 1	inspection pit excava		hole at 15.00m			-		15.5 16.0 16.5 17.0
9.90 S	9.90	20 Water	Add	1.20															
	ails m (mm)	,	Тс) (m)															

		AUS	E	V TC	VA	Y				ct No. 619A	Project Client: Client's	Name: North Iri Statkraft		y Landfall			В	oreho BH1	
Meth Rotary D		Plant I				(m) .00	Base 7.0		Coord	inates	Final De	epth: 29.50 m	Start Date:	01/04/2022	Driller:	JG		heet 1	
Rotary C	_	Comacch				.00	29.			0.17 E 2.88 N	Elevatio	on: 5.85 mOD	End Date:	04/04/2022	Logger:	RC		Scale: 1	
Depth (m)	Samples	/ Field Records	TCR	SC	R RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	,	Des	cription		1	Water	Backfi	
(,							()	()		-		TOPSOIL - Brown sa	ndy gravelly (CLAY.					-
1.00 - 1.45	SPT(C) N (3,5/5,5								5.55	- 0.30		Firm brown sandy C	CLAY (Driller's	description)			_		0.5 —
		,o,ə) r SN = 1387							4.65	- 1.20		Stiff dark sandy grav	velly CLAY (Dr	iller's descriptior	n)		-		1.5 —
2.50 - 2.95		N=50 11,13,15) r SN = 1387								-									2.5 — - - 3.0 — - - - 3.5 —
4.00 - 4.45		N=46 0,13,16) r SN = 1387							1.85	- 4.00		Dense gravelly SANI	D (Driller's de	scription)			-		4.0 — 4.0 — 4.5 — 5.0 — 5.0
5.50 - 5.95	SPT(C) N (4,4/6,5 Hamme								-0.15	- 6.00		Greenish grey angu Weak light greenish oriented 160mm th weathered: reducec occasional clay infill Discontinuities: 1. 10 to 30 degree j and occasional grey to 5mm thick. 2. 30 to 45 degree j rough and occasion surfaces up to 20mi	grey GREYW. ick veins of gr d strength, mi l on fracture s oints closely s rish brown gra oints medium al greyish bro	ACKE with occasi reyish white calci uch closer fractu urfaces. spaced (50/130/3 rivelly clay infill of spaced (100/31	ional rando ite. Partiall re spacing 350) plana n joint surf 0/700) pla	omly y and r, rough faces up			5.5 —
									-1.15	- - 7.00		3. 55 to 75 degree j 8.80m to 9.10m and	oints from 7.2						7.0 —
										- -		frequent light grey at thick.			-				-
			TCR	sc	R RQD	FI													\perp
	Casing to (m	Strikes Time (min)			(m) _L	_ocati		ndfal		cavated to	1.20m.								
Casing D	Details Diam (mm)	Core		el															
7.00	200 150	Flush	(6L 1 Typ	e	1	Гегт	inatio	n Re	eason							Last Up	odate	d 📕	
		W	ater		Т	Termi	nated	at scł	heduled de	epth.						02/12,	/2022	P	IGS

	C	AUS	E	W)T	/A	Y			Projec 21-10		Project Name: North Irish Sea Array Landfall Client: Statkraft Limited	Borehole ID BH17
			1 = (J							Client's Rep Arup	
Meth Rotary D Rotary C	rilling	Plant I Comacch Comacch	nio 60	01	0.	(m) 00 00	7.00 29.5		Coord 71979		inal Depth: 29.50 m Start Date: 01/04/2022 Driller: JG	Sheet 2 of 5 Scale: 1:40
notary	5011116	comucer		-	,.	00			76525		Elevation: 5.85 mOD End Date: 04/04/2022 Logger: RC	FINAL
Depth (m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Casing W Depth De (m) (nter pth n)	Level mOD	Depth (m)	Legend Description	Backfill
8.50			100	10	0	>20				- - - - - - - - -	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, rougl and occasional greyish brown gravelly clay infill on joint surfaces u 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 surfaces up to 20mm thick.	
9.40 - 9.65	C1		100	19	0	6				- - - - - - - -	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.	9.0 — 9.0 — - - - - 9.5 —
10.00						>20				- - - - - - -		10.0 — - - - - - - 10.5 —
			100	7	0				-4.85	- 10.70 - - - - -	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	11.0
11.50			100	10	0	>20				- - - - - - - - - -	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 planar, smooth, occasional heavy light brownish orange staining up 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 12.50 and 12.80m to 13.00m, undulating, rough, unstained and occasion dark grey gravelly clay infill on joint surfaces up to 8mm thick.)m
13.00										- - -		13.0
13.80 - 14.0	0 C2		100	45	15	11				- - - - - - -		13.5
14.50			TCR	SCR	RQD	FI				- - - -		14.5
	Water	Strikes				ema	rks				I .	
Struck at (m) (Rose	e to (r	m) H	land o		lfall		avated to	.20m.	
7.00	Diam (mm) 200	Core	 Barre (6L	el				_				
29.50	150	Flush	Тур	е	T	ermi	nation	Re	ason		Las	Updated
		W	ater		Te	ermin	nated at	sch	neduled de	epth.	02	/12/2022 AGS

Rotary Coring Comacchio 601 7.00 29.50 719790.17 E	ish white gth, closer e fill on lanar, rough, 0/250/500)m staining up	Sheet 3 of 1 Scale: 1:40 FINAL Backfill 15
Rotary Coring Comacchio 601 7.00 29.50 719790.17 E 765252.88 N Elevation: 5.85 mOD End Date: 04/04/2022 Logi Depth (m) Samples / Field Records TCR SCR RQD FI Casing Depth (m) Description -8.95 14.80 Nedium strong indistinctly thinly laminated dark grey Now with occasional randomly oriented 1 to 7mm thick grey calcite veins. Partially weathered: slightly reduced strer fracture spacing, occasional heavy light brownish orange discolouration on fracture surfaces ad occasional clay in fracture surfaces. Discontinuities: 100 74 30 8 10.00 Nedium strong indistinctly thinly laminated dark grey Now with occasional randomly oriented 1 to 7mm thick grey calcite veins. Partially weathered: slightly reduced strer fracture spacing, occasional heavy light brownish orange discolouration on fracture surfaces. Discontinuities: 100 74 30 8 10.00 Nedium strong indistinctly thinly laminated dark grey Now with occasional randomly oriented 1 to 7mm thick grey calcite veins. Partially weathered: slightly reduced strer fracture spacing, occasional heavy light brownish orange discolouration on fracture surfaces. Now Nedium strong indistinctly thinly laminated dark grey Now Nedium strong indistinctly thinly laminated lam	MUDSTONE ish white gth, closer e fill on lanar, rough, 0/250/500)m staining up	FINAL Backfill Backfill
Samples / Field Records TCR SCR RQD FI Depth (m)	ish white gth, closer e fill on lanar, rough, 0/250/500)m staining up	15
-8.95 14.80 with occasional randomly oriented 1 to 7mm thick grey calcite veins. Partially weathered: slightly reduced strer fracture spacing, occasional heavy light brownish orang discolouration on fracture surfaces ad occasional clay in fracture surfaces. Discontinuities: 1.00 74 30	ish white gth, closer e fill on lanar, rough, 0/250/500)m staining up	
xxxxx surfaces up to 5mm thick.	fracture	
16.40 - 16.70 C4 100 60 50 100 60 50 100 60 50 100 60 50 100 60 50 100 60 50 100 60 50 100 60 50 100 60 50 100 60 50 100 60 50 100 60 50 100 60 50 100 60 50 100 60 50 100 60 50 100 60 60 50 100 60 60 60 60 60 60 60 60 60 60 60 60 6	thick. ILTSTONE alcite veins. pacing,	16
17.50 -11.25	aces up to	17
100 30 0 14.890 C6 15.20m and 1.2.55 to 75 degree joints from 14.80m to 15.20m and 1.5.40m, undulating, rough and occasional heavy brown staining on joint surfaces up to 20mm deep.	ed dark grey h closer acing.	18
19.00 19.20 - 19.40 C7 C7 19.00 -13.15 19.00 -13.15 19.00 -13.15 19.00 -13.15 19.00 -13.15 19.00 -13.15 19.00 -13.15 19.00 -13.15 19.00 -13.15 19.00 -13.15 19.00 -13.15 -19.00 -13.15 -19.00 -13.15 -19.00 -13.15 -19.00 -13.15 -19.00 -13.15 -19.00 -13.15 -19.00 -13.15 -19.00 -19.0	mented light reduced	19 19 20
20.50 -14.45 -14.45 20.30 -14.45	strength,	20
100 10 0 10 0 10 0 10 0 10 0 10 0 10 0	lly clay infill 0) undulating,	21
- ×××× ××××× ×××××		
TCR SCR RQD FI		
Water Strikes Struck at (m) Casing to (m) Time (min) Rose to (m) Hand dug inspection pit excavated to 1.20m. Location: Landfall Televiewer completed.		
Casing Details Core Barrel To (m) Diam (mm) 7.00 200		
29.50 150 Flush Type Termination Reason Water Terminated at scheduled depth.	Last Upo	

Method	Borehole ID BH17	sh Sea Array Landfall Limited	Client:	Project No. 21-1619A			Y	A	VV OT E	E	AUS —G	C	
Rotary Coring	Cl 14 CF		Client's	Coordinates	(m)	Paca	· /m \	Ton		lead	Dlant II	ad I	Moth
Despit Samplex Flaid Raccode TCR SCR RDD FT	Sheet 4 of 5 Scale: 1:40		-	719790.17 E	00	7.0	.00	0.)1	io 60	Comacchi	rilling	Rotary [
100 28 28 100 28 100 28 100 28 100 28 100 28 100 28 100 28 100 28 100 28 100 28 100 28 100 28 100 28 100 28 100 28 100 28 100 28 28 100 28 100 28 100 28 100 28 100 28 100 28 100 28 100 28 100 28 100 28 100 28 100 28 100 28 100 28 100 28 100 28 100 28 28 100 28 100 28 100 28 100 28 100 28 100	FINAL	Logger: RC Logger: RC	Elevation		Water	Casing							
23.35 - 23.50 (9 23.50 - 24.00 C10	Backfill 22.0 —	ally weak) indistinctly thinly laminated light FONE. Partially weathered: reduced strength, e spacing and occasional clay infill on fracture oints closely spaced (50/40/300) slightly	×××× ×××× ×××× ×××× ×××× ×××× ×××× ×××× ××××		Depth (m)	Depth (m)	FI					Samples /	(m)
23.80 - 24.00 C10 100 68 35 100 35 7 >20 26.50 100 64 41 10 100 64 41 10	23.0	oints medium spaced (200/500/1000) undulating, al light grey gravelly clay infill on joint surfaces up apt gravelly clay (fault gauge). k grey TUFF. Partially weathered: slightly reduced	××××× ××××× ××××× ××××× ××××× ×××××	17.45 23.30		_	5	0	38	100) C9	
26.50 100 35 7	24.0 — 24.0 — 24.5 — 24.5 —	oints medium spaced (50/260/700) undulating, and clean. oints medium spaced (100/430/800)plaanr,		-				35	68	100		C10	
28.00	25.0 — - - - 25.5 — - - - - - - - - - - - - - - - - - - -					-	>20	7	35	100		5 C11	
	26.5 — 26.5 — 27.0 — 27.0 — 27.5 —			-			10	41	64	100			26.50
TCR SCR RQD FI	28.0 — - - - 28.5 — - - - 29.0 —									100			28.00
	-		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	-			FI	RQD	SCR	TCR			
Water Strikes Struck at (m) Casing to (m) Time (min) Rose to (m) Casing Details To (m) Diam (mm) Remarks Hand dug inspection pit excavated to 1.20m. Location: Landfall Televiewer completed.			o 1.20m.		ndfall	dug in on: La	Hand (Locatio	n) H		Barre	Time (min)	Casing to (m)	Casing
7.00 200 SK6L	odated ==	Last Up		son	on Re	inatio	[ermi	T	2			200	7.00
Figure 1 termination reason		02/12/							-				

	C	AUS	E	W	A	Y				ct No. 619A	Project Client:	Name: North Iri		y Landfall		E	Borehole II
		_(3 E C	711							Client's	Rep Arup					
Metho Rotary Dri	illing	Plant I	nio 60	01	0.0	00	7.0	00		inates	Final De	pth: 29.50 m	Start Date:	01/04/2022	Driller: JG		Sheet 5 of 5 Scale: 1:40
Rotary Co	oring	Comacch	110 60)1	7.0	00	29.	.50	71979 76525	2.88 N	Elevatio	n: 5.85 mOD	End Date:	04/04/2022	Logger: RC		FINAL
Depth (m)	Samples /	Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	,	Des	cription		Water	Backfill
9.50			TCR	SCR	RQD				-23.65	29.50		Medium strong dar strength and closer Discontinuities: 1. 10 to 25 degree j rough, unstained ar 2. 25 to 45 degree j rough, unstained, c	fracture spac oints medium nd clean. oints medium lean.	ing. spaced (50/260	/700) undulatii	uced	29 30 30 31 31 32 32 33 33 34 34 35 36
		Strikes			_	ema											
ick at (m) Ca	sing to (m)	Time (min)	Rose	to (n	Lo	ocatio	on: La	ndfall	ion pit exc l leted.	cavated to	1.20m.						
	iam (mm)	Core	Barre	el													
7.00 29.50	200 150	Flush		e	To	ermi	natio	on Re	ason						La	ast Updat	ed 🔳 i
			ater	-					neduled de							02/12/202	

									Proje	ct No.	Project Name:	North Iri	sh Sea Arra	y Landfall			Bor	ehole	ID
	C	AUS	E	W	A	Y			21-1	619A	Client:	Statkraft	Limited				E	8H18	
		(GEC		EC	Н					Client's Rep	Arup							
Meth Rotary D Rotary C	rilling	Plant I Comacch Comacch	hio 40		0.	(m) 00 70	2.1 30.	70		dinates 90.13 E	Final Depth:	30.00 m	Start Date:	11/04/2022	Driller:	MW		et 1 of ale: 1:4	
Notary C	Johns	Comacci	110 40		۷.	70	30.	00		34.97 N	Elevation:	8.09 mOD	End Date:	13/04/2022	Logger:	TH	F	INAL	
Depth (m)	Samples	/ Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend			cription			Water	ackfill	
									7.89	- 0.20	<i>Y</i> /> <i>Y</i> />		ndy gravelly C	LAY. 	ionl				
1.20 1.20 - 1.65	D1 SPT(S) N (2,3/3,3, Hammed						1.20	Dry				own sandy g	raveny CLAT (ormer's descripti	onj				1.0 =
2.70 2.70 - 3.15	D2 SPT(S) N (1,3/4,4, Hammer		90				2.70	Dry	5.39	2.70	CLAY. Sa			rown slightly san el is subrounded					2.5
3.70 3.70 - 5.20 3.70 - 4.15 3.70	D3 C SPT(S) N (2,4/4,4, Hammer		47			AZCL	3.70	Dry	4.39	3.70	Gravel is	s subangulai	slightly sandy fine to coars e to disturbances i	gravelly CLAY. Sa e. _{Tom} SPT	nd is fine to	o coarse.			4.0 —
5.20 - 6.70 5.20 - 5.65 5.20	C SPT(S) N (3,6/6,7, Hammer		50			AZCL	-5.20				Medium frequen 30mm t Partially spacing Disconti	n strong (loc it greyish wh thick) and oc weathered , orangish b inuities:	nite calcite vei casional pyrit : slightly redu rown discolor	essive grey GREY\ ns of various orie e crystals (1 to 2 ced strength, clo uration on some	entation (u mm in dian ser fracture fracture su	p to meter. e irfaces.			5.5
6.70 - 6.84 6.70	105mm/	l=50 (42 for /50 for Hammer SN		SCR	RQD	FI			1.09	7.00	rough, c 2. 65 to white ca 3. 80 to to 8.83r brown s 15mm t	orangish bro 70 degree jo alcite minera 90 degree jo m and 8.42m staining and	wn staining o oint, at 7.10m alisation on jo oints, at 7.58n n to 8.60m, pl gravelly clay i h white calcit	n spaced (120/36 n some joint surf n to 7.30m, plana int surface (up to m to 7.70m, 8.20 anar, rough, pato nfill on most join e mineralisation	r, smooth, o 2mm thic m to 9.00m hy dark ora t surfaces (greyish :k). n, 8.45m angish (up to			6.5 - 7.0 —
		Strikes			_	ema	rks			•									
truck at (m) C	Casing to (m)	Time (min)	Rose	to (r	Le	ocatio elevie	on: La ewer d	ndfall ompl	eted.	cavated to red- water	1.20m added during drilling	ng.							
Casing D		Core	Barre	el	\dashv														
2.70	Diam (mm) 200	SI	K6L																
30.00	150	Flush	тур	е	T	ermi	natio	n Re	ason							Last Up	dated		J
		W			_				eduled d							02/12/		D 7	3

Meth		Plant	GEC	ТС	EC	Н	Base (m)	21-1	ect No. 619A	roject Name: North Irish Sea Array Landfall lient: Statkraft Limited lient's Rep Arup	Borehole ID BH18 Sheet 2 of 5
Rotary D Rotary C	rilling	Comacch Comacch	nio 40	05	0.	00 70	2.70 30.00	71979	90.13 E	inal Depth: 30.00 m Start Date: 11/04/2022 Driller: M	W Scale: 1:40
Depth			1	l			Casing Water	76513	34.97 N Depth		
(m)	Samples /	/ Field Records	TCR	SCR	RQD	FI	Depth Depth (m)	mOD	(m)	egend Description Medium strong (locally weak) massive grey GREYWACKE with	Backfill
8.20			83	50	50				- - - - - -	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 surfaction Discontinuities: 1. 20 to 40 degree joints, medium spaced (120/360/1000) planar rough, orangish brown staining on some joint surfaces.	er. ces.
9.00 - 9.15 9.15 - 9.40	c c		100	62	57	5			-	2. 65 to 70 degree joint, at 7.10m to 7.30m, planar, smooth, gre 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 to 8.83m and 8.42m to 8.60m, planar, rough, patchy dark orang brown staining and gravelly clay infill on most joint surfaces (up 15mm thick), greyish white calcite mineralisation on some joint surfaces (up to 10mm thick).	.45m 8.5 - ish to
9.45 - 9.55 9.55 9.70	c c							-1.71	- - - 9.80	Medium strong massive greyish black MUDSTONE with frequengreyish white calcite veins (up to 20mm thick) occasional pyrite crystals (up to 2mm in diameter). Partially weathered: slightly	All leading
			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 10.55n steeped, rough, grey calcite mineralisation on most joint surface 3. 70 to 90 degree joints, at 9.80m to 10.00m, 10.25m to 10.34r 10.65m to 10.80m, undulating, rough, patchy dark orangish bro staining on some joint surfaces.	es. m and 10.5 -
11.20						3		-2.71	- 10.80 - - - -	Medium strong (locally weak) massive grey calcareous GREYWA 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. Discontinuities:	11.0
			100	72	63			-3.61	11.70	1. 20 to 30 degree joints, at 11.57m, planar, rough, patchy brow staining on joint surface. 2. 60 to 90 degree joints, at 10.82m to 11.10m, 11.20m to 11.30 and 11.40m to 11.50m, undulating, rough. Weak massive dark grey MUDSTONE with frequent calcite veins predominantly subvertical orientation (up to 60mm thick). Parti weathered: reduced strength, slightly closer fracture spacing, in on most fracture surfaces.	Om 12.0 —
12.70						3			- - - - -	Discontinuities: 1. 70 to 90 degree joints, at 11.70m to 12.00m, 11.90m to 12.90m 12.10m to 12.45m, 12.60m to 13.25m and 12.30m to 12.40m, undulating, rough, grey clayey gravelly infill on most joint surfac (up to 35mm thick). Medium strong massive grey GREYWACKE with occasional greyi	res 13.0 —
			100	82	82	4		-5.16	13.25	white calcite veins of various orientations (2 to 6mm thick). Part weathered: slightly reduced strength, slightly closer fracture spa patchy calcite mineralisation on some fracture surfaces. Discontinuities: 1. 30 to 50 degree joints, medium, spaced (130/355/650) planal 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	13.5 -
14.20									- - - -	 16.80m, planar, rough,. grey claicte mineralisation and blackish staining on joint surfaces. 3. 70 to 90 degree joints, at 13.70m to 14.04m, 14.00m to 14.20m 14.47 to 14.80m and 15.60m to 16.20m, 16.60m to 16.70m, undulating, rough, grey calcite mineralisation on most joint surf 	Om,
	\A/at-	C+riles-	TCR	SCR	RQD		rks				
Struck at (m) C		Strikes Time (min)	Rose	e to (r	n) H	ocati elevie	dug inspect on: Landfal ewer comp	l. leted.		20m Ided during drilling.	
Casing D To (m) D 2.70	Details Diam (mm) 200	Core Sk	Barr	el							
30.00	150	Flush	Typ	е			nation Re		epth.		ast Updated 02/12/2022 \\CS

									Proje	ct No.	Project Name: North Irish Sea Array Landfall	Borehole ID
	C	AUS	E	W	A	Y			21-1	619A	Client: Statkraft Limited	BH18
		(EC)	EC	Н					Client's Rep Arup	
Metho Rotary Dri		Plant I				(m) 00	Base 2.7	_	Coord	linates	Final Depth: 30.00 m Start Date: 11/04/2022 Driller: MW	Sheet 3 of 5
Rotary Co		Comacch				70	30.0	- 1	71979	0.13 E		Scale: 1:40
									76513	4.97 N	Elevation: 8.09 mOD End Date: 13/04/2022 Logger: TH	FINAL
Depth (m)	Samples /	Field Records	TCR	SCR	RQD	FI	Depth	Vater Depth (m)	Level mOD	Depth (m)	Legend Description	Backfill
	4.85 - 14.95 C 5.40 - 15.50 C 5.70									- - - - - - - - -	Medium strong massive grey GREYWACKE with occasional greyish white calcite veins of various orientations (2 to 6mm thick). Partially weathered: slightly reduced strength, slightly closer fracture spacing, 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 grey staining on joint surfaces.	15.0 — 15.5 -
7.20									-8.71	- 16.80	3. 70 to 90 degree joints, at 13.70m to 14.04m, 14.00m to 14.20m, 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.	16.0 -
17.20									-8.71	10.80	Medium strong light grey TUFF with rare greyish white calcite veins. Partially weathered: slightly reduced strength, greyish black staining on most fracture surfaces. Discontinuities: 1. 20 to 35 degree joints, widely spaced (430/975/1200) planar to undulating, rough.	17.0 —
			100	96	82					-	2. 40 to 60 degree joints, medium spaced (110/490/980) planar, rough, patchy grey calcite mineralisation and greyish black staining on most joint surfaces, greenish grey clayey gravelly infill on some joints (up to 45mm thick). 3. 70 to 80 degree joints at 17.10m to 17.40m, 18.70m to 19.00m, 19.25m to 19.40m, 20.55m to 20.75m and 21.30m to 22.00m, undulating, rough, greyish white and greenish grey staining calcite mineralisation on most joint surfaces.	17.5 - 18.0 - 18.5 -
18.70			100	78	68	4				-		19.0 -
20.20										-		20.0 –
			90	65	42					-		20.5 -
21.70						9				- - -		21.5 -
			TCR	SCP	RQD	FI				-	XXXX	
	Water	Strikes	1		Ц_	ema	rks				L	
truck at (m) Cas			Rose	to (r	n) H	and o ocation	dug ins on: Lar ewer co	dfall mpl	leted.		1.20m added during drilling.	
	iam (mm)	Core Sk	 Barr o	el	\exists							
2.70 30.00	200 150	Flush		e	T	ermi	natio	ı Re	eason		Last U	pdated II
			,,,		1 1							

			GEC	VV DTI	EC	Н			21-1	ct No. 619A	Project Name: North Irish Sea Array Landfall Client: Statkraft Limited Client's Rep Arup	Borehole ID BH18				
Rotary Dri	illing	Comacch Comacch	nio 40		0.	(m) 00 70	2.7 30.0	0		0.13 E	Final Depth: 30.00 m Start Date: 11/04/2022 Driller: MW	Sheet 4 of 5 Scale: 1:40				
D th	Rotary Drilling Rotary Coring Tom Tom Tom Tom Rotary Drilling Rotary Com Com Rotary Coring Rotary Field Rec Rotary Com Rotary Co			1		1	Casing	Water	76513	4.97 N	Elevation: 8.09 mOD End Date: 13/04/2022 Logger: TH	FINAL				
	Samples /	Field Records	TCR	SCR	RQD	FI	Depth	Depth (m)	mOD	Depth (m)	Legend Description △△△ Medium strong light grey TUFF with rare greyish white calcite veins.	Backfill				
22.30 - 22.45 22.90 - 23.10 23.20			100	77	61					-	Partially weathered: slightly reduced strength, greyish black staining on most fracture surfaces. Discontinuities: 1. 20 to 35 degree joints, widely spaced (430/975/1200) planar to undulating, rough. 2. 40 to 60 degree joints, medium spaced (110/490/980) planar, rough, patchy grey calcite mineralisation and greyish black staining on most joint surfaces, greenish grey clayey gravelly infill on some joints (up to 45mm thick). 3. 70 to 80 degree joints at 17.10m to 17.40m, 18.70m to 19.00m,	22.5 — 22.5 — 23.0 —				
23.20			100	64	53	5				-	19.25m to 19.40m, 20.55m to 20.75m and 21.30m to 22.00m, undulating, rough, greyish white and greenish grey staining calcite mineralisation on most joint surfaces.	23.5 — - - 24.0 — - - 24.5 —				
24.70			100	72	72	4			-16.51	24.60	Medium strong grey TUFF with frequent greyish white calcite vein s of various orientations (2 to 25mm thick). Partially weathered: slightly reduced strength, slightly fracture spacing, infill and orangish brown discolouration on some fracture surfaces. Discontinuities: 1. 20 to 30 degree joints, widely spaced (500/770/1500) planar to undulating, rough. 2. 60 to 70 degree joints, at 25.56m to 25.70m, 25.80m to 25.90m, 25.87m to 26.00m, 28.00m to 28.15m, 28.25m to 28.40m, 28.23m to 28.45m and 29.20m to 29.40m, planar, rough, greyish white calcite mineralisation on most joint surfaces, greenish grey gravelly clay infill on some joint surfaces 92 to 5mm thick). 3. 80 to 90 degree joints, at 27.10m to 27.80m, 28.20m to 28.60m,	25.0 — 25.0 — 25.5 — 25.5 — 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 on joint surfaces, clayey gravelly infill on some joint surfaces. 27.10m to 27.70m: Stiff greenish grey clayey gravelly fault gauge on ~80 degree joint.	26.5 — 26.5 — 27.0 — 27.0 — 27.5 —				
27.70			100	75	65	5				-		28.0 — 28.5 — 28.5 —				
29.20			TCR	SCR	RQD	FI				-						
	Water	Strikes			Ь	ema	rks		<u> </u>	I	1					
Struck at (m) Ca			Rose	to (r	m) H	land o ocation	dug ins on: Lar ewer co	dfal omp	leted.		1.20m added during drilling.					
Casing De	etails iam (mm)	Core		el	7											
2.70 30.00	200 150	51	(6L		1	or	in atta	a D :	2000		T teatre	dated ====				
		Flush W	า Typ ater	e					eason heduled d	epth.	02/12/:					
		***	utci			CITIIII	iateu e	1 301	ricadica a	срии.	02/12/	²⁰²² AG				

		ALIC			/ A \	V				ct No.		Name: North Iri		,			-		e ID
		AUS	GEC	I T C	ECI	H			21-1	619A	Client:	Statkraft	Limited					BH18	į
							L				Client's	Rep Arup	1		1				
Metho Rotary Dri	illing	Plant I Comacch Comacch	nio 40)5	0.0	(m) 00 70	Base 2.1 30.	70	71979		Final De	pth: 30.00 m	Start Date:	11/04/2022	Driller:	MW		heet 5 o Scale: 1:4	
Rotary Co	n ing	Comacci	11U 4U	, ,	۷.	, 0		.00		4.97 N	Elevatio	n: 8.09 mOD	End Date:	13/04/2022	Logger:	TH		FINAL	_
Depth (m)	Samples /	Field Records	TCR	SCR	RQD	FI	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend			cription			Water	Backfill	
0.00	Water	Strikes	100	755	_	FI ema	rks		-21.91	- 30.00		Medium strong grey of various orientatic slightly reduced stre brown discolouratic Discontinuities: 1. 20 to 30 degree jundulating, rough. 2. 60 to 70 degree jundulating, rough. 28.45m and 29.20m mineralisation on mon some joint surfact 3. 80 to 90 degree jundulating, revish white calcitic joint surfaces, clayer	ons (2 to 25mi ength, slightly on on some fra oints, widely s oints, at 25.56 28.00m to 28 n to 29.40m, p nost joint surfa ces 92 to 5mn oints, at 27.10 and 29.80m t e mineralisatic by gravelly infil	m thick). Partially fracture spacing acture surfaces. spaced (500/770 fm to 25.70m, 25.15m, 28.25m to lanar, rough, greaces, greenish grathick). Om to 27.80m, 28.25 a 30.00m, undul on and greyish bl	y weathere;, infill and /1500) plai 5.80m to 2! 28.40m, 2 yyish white ey gravelly 3.20m to 2! ating, roug lack stainin	ed: orangish nar to 5.90m, 8.23m to calcite clay infill 8.60m,			30.5 31.5 32.5 33.5 34.5 35.5
ck at (m) Ca		Time (min)	Rose	to (n	n) H	and o	dug in		ion pit exc	avated to	1.20m								
					Lo Te	ocatio elevie	on: La ewer d	ndfall compl	eted.			ring drilling.							
Casing De	etails	Core	Barre	<u> </u>	\dashv														
(m) Di	am (mm)		(6L																
70 0.00	200 150				Т.	ermi	natio	n Re	ason						I	Last Upo	late	d 💻	_
	Flush Type Termination					ıı Ke	สวบท							rast Obc	ale	" E			



APPENDIX C CORE PHOTOGRAPHS





BH01 (Box 1) 2.70-3.70m



BH01 (Box 2) 3.70-5.20m



BH01 (Box 3) 5.20-6.70m

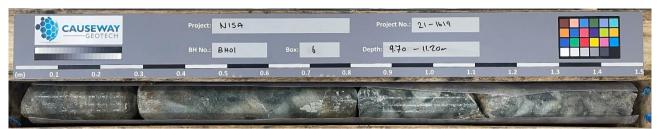


BH01 (Box 4) 6.70-8.20m



BH01 (Box 5) 8.20-9.70m





BH01 (Box 6) 9.70-11.20m



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





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

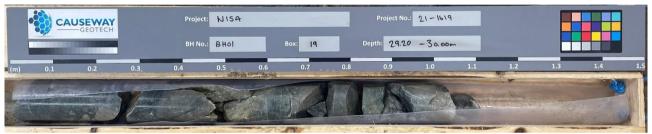




BH01 (Box 17) 26.20-27.70m



BH01 (Box 18) 27.70-29.20m



BH01 (Box 19) 29.20-30.00m





BH02 (Box 1) 2.50-4.00 m



BH02 (Box 2) 4.00-5.50m



BH02 (Box 3) 5.50-7.00m



BH02 (Box 4) 7.00-8.50 m



BH02 (Box 5) 8.50-10.00m



BH02 (Box 6) 10.00-11.50m





BH02 (Box 7) 11.50-13.00m



BH02 (Box 8) 13.00-14.50m



BH02 (Box 9) 14.50-16.00m



BH02 (Box 10) 16.00-17.50m



BH02 (Box 11) 17.50-19.00m



BH02 (Box 12) 19.00-20.50m





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





BH03 (Box 1) 5.50-7.00m



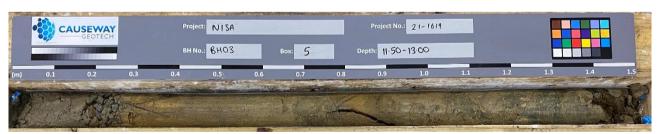
BH03 (Box 2) 7.00-8.50m



BH03 (Box 3) 8.50-10.00m



BH03 (Box 4) 10.00-11.50m



BH03 (Box 5) 11.50-13.00m





BH03 (Box 6) 13.00-14.50m



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



North Irish Sea Array

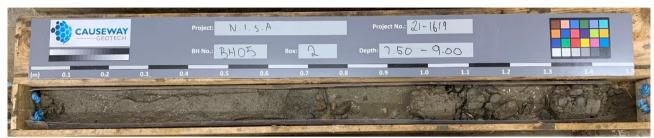


BH04 (Box 11) 19.00-20.00m

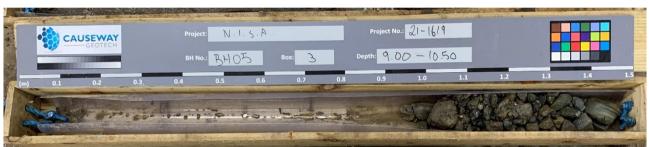




BH05 (Box 1) 6.00-7.50m



BH05 (Box 2) 7.50-9.00m



BH05 (Box 3) 9.00-10.50m

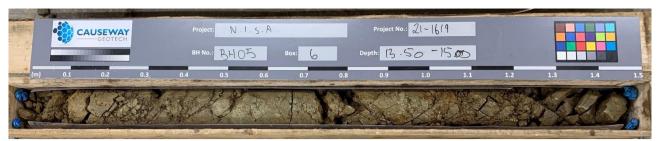


BH05 (Box 4) 10.50-12.00m

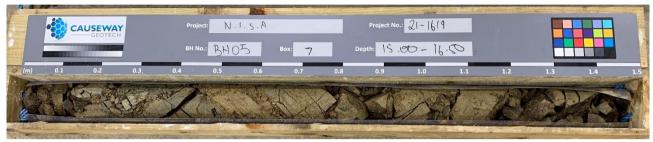


BH05 (Box 5) 12.00-13.50m

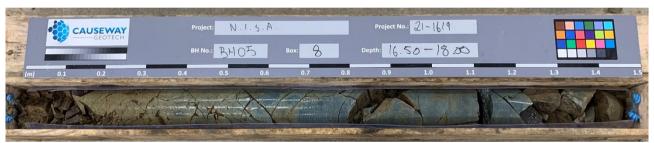




BH05 (Box 6) 13.50-15.00m



BH05 (Box 7) 15.00-16.50 m



BH05 (Box 8) 16.50-18.00m

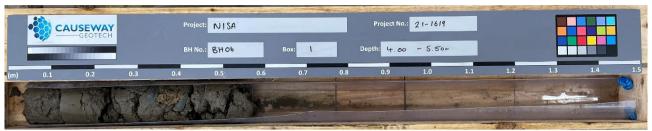


BH05 (Box 9) 18.00-19.50m



BH05 (Box 10) 19.50-20.00m





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 1) 4.00-5.50m



BH07 (Box 2) 5.50-7.00m



BH07 (Box 3) 7.00-8.50m



BH07 (Box 4) 8.50-10.00m



BH07 (Box 5) 10.00-11.50m





BH07 (Box 6) 11.50-13.00m

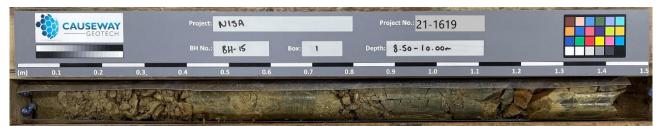


BH07 (Box 7) 13.00-14.50m

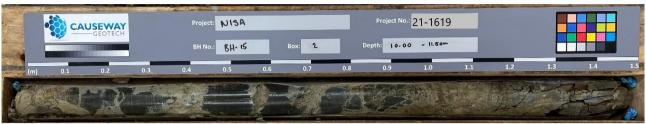


BH07 (Box 8) 14.50-15.25m





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





BH16 (Box 1) 10.00-11.50m



BH16 (Box 2) 11.50-13.00m

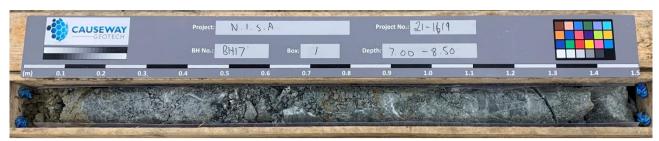


BH16 (Box 3) 13.00-14.50m



BH16 (Box 4) 14.50-15.00m





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

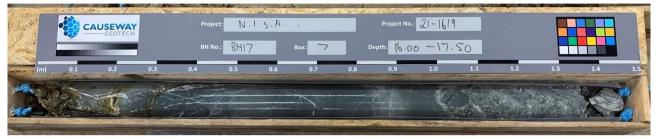


BH17 (Box 5) 13.00-14.50m

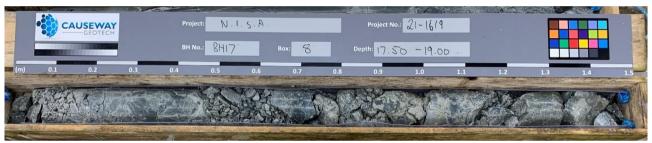




BH17 (Box 6) 14.50-16.00m



BH17 (Box 7) 16.00-17.50m



BH17 (Box 8) 17.50-19.00m



BH17 (Box 9) 19.00-20.50m

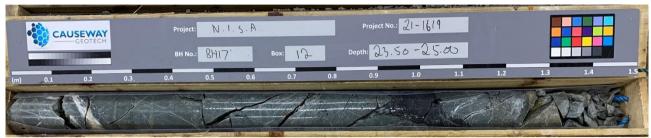


BH17 (Box 10) 20.50-22.00m





BH17 (Box 11) 22.00-23.50m



BH17 (Box 12) 23.50-25.00m

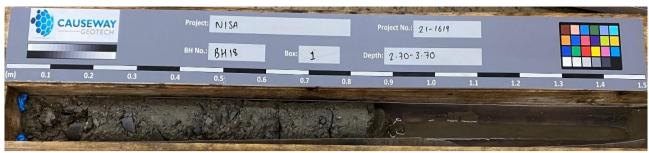


BH17 (Box 13) 25.00-26.50m



BH17 (Box 14) 26.50-28.00m

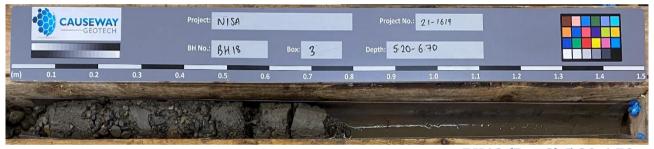




BH18 (Box 1) 2.70-3.70m



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





BH18 (Box 6) 9.70-11.20m



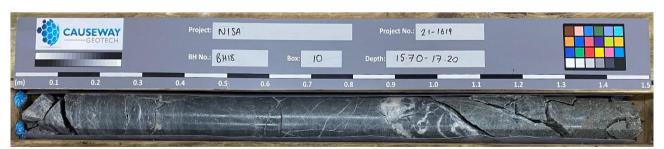
BH18 (Box 7) 11.20-12.70m



BH18 (Box 8) 12.70-14.20m



BH18 (Box 9) 14.20-15.70m

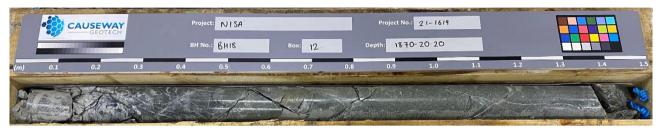


BH18 (Box 10) 15.70-17.20m

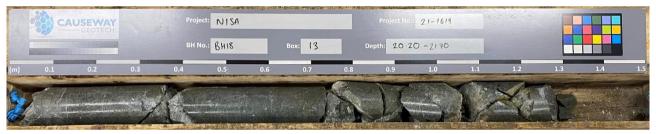




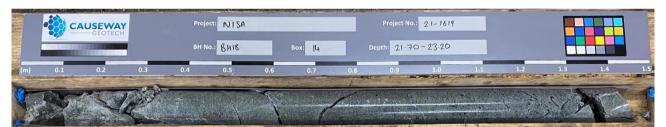
BH18 (Box 11) 17.20-18.70m



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





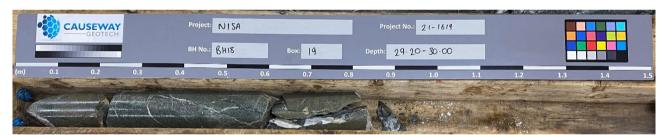
BH18 (Box 16) 24.70-26.20m



BH18 (Box 17) 26.20-27.70m



BH18 (Box 18) 27.70-29.20m



BH18 (Box 19) 29.20-30.00m



North Irish Sea Array	Report No.: 21-1619





APPENDIX D
TRIAL PIT LOGS



			Proj	ect No.	Project	: Name:		Trial I	Pit ID
	CAUS	SEWAY		1619A		rish Sea Array Landfall			
		SEWAY GEOTECH	Coor	dinates	Client:	ft Limited		TP	01
Method:				54.42 E		s Representative:		Sheet	1 of 1
Trial Pitting			7652	36.57 N	Arup			Scale:	
Plant:				vation	Date:	Logger:		FIN	ΔΙ
6T Tracked Ex Depth	Sample /	1	6.28	8 mOD Depth	15/03/				, (2
(m)	Tests	Field Records	(mOD)	(m)	Legend	Description TOPSOIL - Brown sandy gravelly CLAY.		Water	
				-		TOPSOIL - BIOWITSAITUY BRAVETTY CLAT.			=
			5.98	0.30					
			3.50	- 0.50		Stiff yellowish brown slightly sandy slightly gravelly CLAY. Sand is f coarse. Gravel is subrounded fine to coarse of mudstone.	fine to		_
0.50 0.50	ES ES1			-					0.5 —
				-					-
1.00	В3		5.38	0.90	0.000 B	Stiff grey slightly sandy slightly gravelly CLAY with low cobble con			1.0
1.00	ES					Sand is fine to coarse. Gravel is subrounded fine to medium of mi lithologies predominantly mudstone. Cobbles are of mudstone.	xea		-
1.00 1.20	ES2 B4		5.08	1.20	D	End of trial pit at 1.20m			_
		Slow seepage at 1.2		-					_
				-					1.5 —
				-					-
				[_
									-
				<u>-</u>					2.0
									_
				-					_
				-					2.5 —
									_
				-					
				-					_
				-					3.0
				-					
				-					_
				-					3.5 —
				-					_
				[_
				-					
				-					4.0
				<u> </u>					_
				<u> </u>					_
				-					
				-					4.5 —
				<u> </u>					_
				<u> </u>					_
				-				+	
	er Strikes	Depth: 1.20		narks:	16.11			1	
Struck at (m) 1.20	Remark Slow seepa	S 1.00	Loca	ation: Land	ıtall.				
1.20	1.2	Length: 3.00							
		Stability:	Terr	mination R	eason		Last Upda	ited	
		Stable	Slow	progress d	ue to macl	nine size.	02/12/20	22	AGS

			Proi	ect No.	Project	Name:		Т	ial Pit ID
	CALIG	CEVA/AV		1619A		rish Sea Array Landfall			
	CAUS	SEWAY GEOTECH	Coor	dinates	Client:				TP02
			7196	80.68 E		ft Limited			
Method: Trial Pitting				19.19 N	Client's Arup	Representative:			eet 1 of 1
Plant:			Ele	vation	Date:		Logger:	5	cale: 1:25
6T Tracked Exc	avator			3 mOD	15/03/	2022	RS		FINAL
Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	· ·	Water	
			8.78	0.30		TOPSOIL- Brown sandy gravelly CLAY. Stiff brown slightly sandy slightly gravelly CLAY with Sand is fine to coarse. Gravel is subrounded fine to	low cobble cor	ntent.	-
0.50 0.50 0.50	ES ES1	HVP=155, HVR=23		- - - - - - -		Cobbles are of limestone.			0.5 — — —
1.00 1.00 1.00 1.20	B3 ES ES2 B4			- - - - - -					1.0
				- - - - - - -					1.5 —
			7.18	1.90	2.5.00 2.5.00	End of trial pit at 1.90m			2.0 —
				-					- - -
				- - - -					2.5 —
				-					_ _ _
				- - -					3.0 —
				-					3.5 —
				- - - -					-
				- - - - -					4.0
				-					- - -
				- - - -					4.5 — — —
				- - -					- -
Wate	r Strikes	<u> </u>	Ren	narks:					
Struck at (m)	Remarks	Depth: 1.90 Width: 1.00 Length: 2.50	She	groundwat ar vane con ation: Land	mpleted.	ntered.			
		Stability:	Terr	nination R	eason			Last Update	
		Stable		progress d		nine size.		02/12/2022	AGS

A-N			Proi	ect No.	Proiec	t Name:		Tr	ial Pit ID
	CALL	CEVAZAN		1619A	1 -	Irish Sea Array Landfall			
RH	CAU	SEWAY GEOTECH	Cool	rdinates	Client:				ТРОЗ
		GEOTECH			Statkra	aft Limited			
Method:				324.72 E 194.71 N	Client'	s Representative:		Sh	eet 1 of 1
Trial Pitting					Arup			Sc	ale: 1:25
Plant:				vation	Date:	Logge	er:		FINAL
6T Tracked E Depth	Sample /		Level	6 mOD Depth	14/03/	<u> </u>			
(m)	Tests	Field Records	(mOD)	(m)	Legend	Description TOPSOIL- Brown sandy gravelly CLAY.		Water	
				-		TOPSOIL- Brown sandy gravelly CLAY.			-
				-					-
			32.26	0.30		Brown very sandy very clayey subrounded to subangular fine GRAVEL of mixed lithologies with high cobble content. Sand is	to coarse]
0.50	ES			-		coarse. Cobbles are of mixed lithologies.	Time to		0.5 —
0.50	ES1								-
				-					
				[-					
1.00	В3		31.56	1.00		Firm brown slightly sandy slightly gravelly CLAY. Sand is fine to	coarse.		1.0
1.00 1.00	ES ES2					Gravel is subangular fine to medium.	Course		-
1.20	B4	Slow seepage at 1.3		-				┰	
		Siow Scepage at 1.5		-					_
									1.5 —
				-					_
									-
				-					2.0
			30.36	2.20					
						End of trial pit at 2.20m			-
				-					-
				-					2.5 —
									-
				-					-
				-					3.0
				-					-
				[-
				-					3.5 —
				-					-
				-					
				-					4
				-					4.0
				-					
				-					_
				[-
				-					4.5 —
				-					7
				-					-
				-					
Wat	ter Strikes		Ren	narks:					
Struck at (m	n) Remarl	140' 111 4 00		ation: Land	dfall				
1.30	Slow seepa	width: 1.00 Length: 2.50							
	1.3	Stability:	Torr	mination F	Reason		Last Upo	lated	
		Unstable		v progress d		thine size	02/12/2		V C C
ĺ		Olistable	3100	hingis22 g	ue to mac	ATTIC SIZE.	02/12/2	.022	1:15 7

4-5			Proi	ect No.	Proiect	: Name:		Т	rial Pit ID
4	CA114			1619A	1	rish Sea Array Landfall		'	
	CAU	SEWAY GEOTECH		dinates	Client:			$\overline{}$	TP04
	(GEOTECH			1	ft Limited			
Method:				52.35 E	Client's	s Representative:		Sł	neet 1 of 1
Trial Pitting				38.10 N	Arup			S	cale: 1:25
Plant:				vation	Date:		Logger:		FINAL
6T Tracked Exc				7 mOD	14/03/	2022	RS		TINAL
Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description		Water	
(m) 0.50 0.50 1.00 1.00 1.00 1.20	ES ES1 B3 ES ES2 B4	HVP=138, HVR=20	28.87	1.80		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. End of trial pit at 1.80m	ow cobble contendedium of limesto	nt.	1.0 — 1.5 — 2.0 — 3.5 — 4.0 — 4.5 — 4.5 — —
				-					
Wate	r Strikes	Donth: 1.00		narks:	1	l			
Struck at (m)	Remark	Depth: 1.80 Width: 1.00		groundwat					
		Width: 1.00 Length: 3.00		ar vane co ation: Lanc					
								A 11/2 - 1 ·	
		Stability:		nination R				t Update	" الليا
		Stable	Slow	progress d	ue to macl	nine size.	02	2/12/2022	AGS

200				ect No.		Name:		Т	rial Pit ID
	CAU	SEWAY GEOTECH		1619A	North I	rish Sea Array Landfall			TP05
		GEOTECH		dinates		ft Limited			11 03
Method:				80.25 E	Client's	Representative:		Sł	neet 1 of 1
Trial Pitting				40.50 N	Arup			S	cale: 1:25
Plant: 6T Tracked Ex	veavator			vation 5 mOD	Date: 14/03/	Logg 2022 RS	ger:		FINAL
Depth	Sample /	Field Personal	Level	Depth				ter	
(m)	Tests	Field Records	(mOD)	(m)	Legend	Description TOPSOIL- Brown sandy gravelly CLAY.		Water	
						, ,			_
			19.44	0.30		Stiff yellowish brown slightly sandy slightly gravelly CLAY wit	h low cobblo		_
				-	a . 0 0 0 0 0 0 0	content. Sand is fine to coarse. Gravel is subangular fine to n	nedium of		_
0.50 0.50	B3 ES					mixed lithologies. Cobbles are of mudstone.			0.5 —
0.50	ES1			-	0 0 0 a 0 0 0				_
				-					_
1.00	B4			[-					1.0
1.00 1.00	ES ES2								_
1.20	B5			-					_ _
				ŀ					_
				-	2 0 0 0 a 0 0 0				1.5 —
		Slow seepage at 1.7	18.05	1.70	2. ° 0. °	Brown very gravelly very silty fine to coarse SAND. Gravel is s		•	_
					××××	fine to medium of mixed lithologies.	subangular		_
2.00	B6				×××				2.0 —
2.00	Во			-	×××				
					× × × × ×				_
			17.34	2.40	× × ×	<u> </u>			_
						End of trial pit at 2.40m			2.5 —
									_
				-					_
				[_
				-					3.0
				-					_
				-					_
				-					3.5 —
				-					_
				-					-
				<u> </u>					_
				<u> </u>					4.0
				<u> </u>					_
				<u> </u>					_
				-					4.5 —
				-					-
				<u> </u>					
				<u> </u>					=
				<u> </u>					
Wat Struck at (m	ter Strikes Remark	Depth: 2.40		narks: ation: Lanc	lfall.				
1.70	Slow seepa	ge at Width: 1.00							
	1.7	Length: 3.00							
		Stability:		mination R			Last Up		
ĺ		Unstable	Slow	progress d	ue to macl	nine size.	02/12/	2022	AUS

A-N			Proi	ect No.	Proiec	t Name:		Т	rial Pit ID
	CALL			1619A	1	Irish Sea Array Landfall			
	CAU	SEWAY GEOTECH		dinates	Client:				TP07
	(GEOTECH			Statkra	aft Limited			
Method:				90.98 E	Client'	s Representative:		Sł	eet 1 of 1
Trial Pitting			7652	33.68 N	Arup				cale: 1:25
Plant:				vation	Date:	Logge	r:		FINAL
6T Tracked Ex	cavator			2 mOD	15/03/	/2022 RS			FINAL
	Sample / Tests	Field Records		Depth (m)	Legend	Description		Water	
Depth (m) 0.50 0.50 0.50 0.50 1.00 1.00 1.20	,	Field Records Slow seepage at 2.00	7.72	1.50	+		edium of nestone.	Mater Water Water	1.0
				-					4.5 — — —
	ou Chuil		Don	narks:					
Struck at (m)	er Strikes Remarks	Depth: 2.00	l l	narкs: ation: Lanc	dfall				
2.00	Slow seepag	140 111 4 00							
	2.00	Length: 2.50							
		Stability:	Terr	mination F	Reason		Last Up	date	d T
		Stable	Slow	/ progress d	ue to mac	hine size.	02/12/		AGS

			Proi	ect No.	Project	t Name:		Tr	ial Pit ID
A Real				1619A		Irish Sea Array Landfall			
	CAU	SEWAY GEOTECH		rdinates	Client:				TP08
		GEOTECH				ift Limited			
Method:				882.81 E	Client'	s Representative:		Sh	eet 1 of 1
Trial Pitting				236.56 N	Arup			Sc	cale: 1:25
Plant:				vation	Date:	Logger:	:		FINAL
6T Tracked Ex		1		0 mOD	14/03/	/2022 RS			IIIVAL
Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description		Water	
				-		TOPSOIL- Brown sandy gravelly CLAY.			=
									-
			11.60	0.30		Firm brownish yellow slightly sandy slightly gravelly CLAY. Sand i	s fine to		-
0.50	ES			_		coarse. Gravel is subangular fine to coarse of mixed lithologies.			0.5
0.50	ES1		11.30	0.60	× × × >	Stiff grey slightly sandy slightly gravelly SILT with low cobble con	tent		-
					× × × ×	Sand is fine to coarse. Gravel is subrounded fine to coarse of mix			-
				-	(× × ×)	lithologies predominantly limestone.			-
1.00	В3			-	(× × ×)				1.0
1.00 1.00	ES ES2			-	(× · × . ×)				-
1.20	B4			-	× × × ×				-
		Slow seepage at 1.4		_	× × × ×			•	
		Slow seepage at 1.4		-	× × × ×				1.5 —
				_	× × × ×				-
			10.20	1.70		End of trial pit at 1.70m			-
				-					2.0
				-					-
				-					-
				-					2.5 —
									-
				-					-
				_					
				-					3.0
									-
				-					-
				-					
				Ė					3.5 —
				-					-
				-					
				-]
				_					4.0
				-					-
				-]
				-					_
				-					4.5
				-					7
				-					
				-					-
	er Strikes	Depth: 1.70	l l	narks: ation: Land	lfall				
Struck at (m) 1.40) Remark Slow seepa	1400		ciii Luiil					
	1.4	Length: 3.00							
		Stability:	Teri	mination R	leason		Last Upo	lated	
		Stable	Slov	v progress d	ue to mac	hine size.	02/12/2	022	AGS

262				ect No.		Name:		T	rial Pit ID
	CAUS	EWAY EOTECH		1619A	North I	rish Sea Array Landfall			TP09
	———G	EOTECH		dinates		ft Limited			11 03
Method:				37.39 E		Representative:		Sh	eet 1 of 1
Trial Pitting				68.70 N	Arup		I-	S	cale: 1:25
Plant: 6T Tracked Ex	cavator			vation 5 mOD	Date: 15/03/	2022	Logger: RS		FINAL
Depth	Sample /	Field Records	Level	Depth	Legend	Description	11.5	Water	
(m)	Tests	rieu recorus	(mOD) 3.75	(m)	Legellu	TOPSOIL- Brown sandy gravelly CLAY. Stiff grey slightly sandy slightly gravelly CLAY. Sand Gravel is subangular fine of mixed lithologies.	is fine to coars		- - - -
0.50 0.50	ES ES1			- - - - - - -					0.5 — — — —
1.00 1.00 1.00 1.20	B3 ES ES2 B4								1.0
			2.15	1.90					1.5 — — —
				-		End of trial pit at 1.90m			2.0
				- - - - - -					2.5 — — —
				- - - - - -					3.0
				- - - - - -					3.5 — — —
				-					4.0
				- - - - -					 4.5
				-					- - -
Wate	er Strikes	B	Ren	narks:					
Struck at (m)		Depth: 1.90 Width: 1.00 Length: 2.50		groundwat ation: Land		ntered .			
		Stability:	Terr	nination R	eason			Last Update	d III
		Stable	Slow	progress d	ue to macl	nine size.		02/12/2022	AGS

			Proi	ect No.	Proiect	t Name:		1 -	rial Pit ID
A 200		CEVAVAN		1619A		rish Sea Array Landfall			
	CAU	SEWAY GEOTECH		dinates	Client:				TP11
		GEOTECH			Statkra	ft Limited			
Method:				45.88 E 96.74 N	Client's	s Representative:		S	heet 1 of 1
Trial Pitting					Arup		_	9	Scale: 1:25
Plant:			1	vation	Date:	2022	Logger:		FINAL
6T Tracked E	Sample /		Level	Depth	14/03/		RS	5	
(m)	Tests	Field Records	(mOD)	(m)	Legend	Description CONTRACTOR OF THE		Water	
0.50 0.50 1.00 1.00 1.20	ES ES1 B3 ES ES2 B4	Slow seepage at 1.0	22.86	0.30		Stiff brown slightly sandy gravelly CLAY with high cobl fine to coarse. Gravel is subrounded to subangular fin mixed lithologies. Cobbles are of mixed lithologies. End of trial pit at 2.00m	ble content. Sa le to coarse of		1.5 — 2.0 — 2.5 —
									3.0 —
				-					4.0
				-					-
Wat	ter Strikes	B. II. aas	Ren	narks:	1				
Struck at (m	ı) Remark		Loca	ation: Land	lfall.				
1.00	Slow seepa 1.0	ge at Width: 1.00 Length: 3.00							
	1.0			minest -	1005		1 -	and the tree	
		Stability:		nination R				st Update	
		Unstable	Slow	progress d	ue to macl	hine size.		02/12/2022	ACHS

A-N			Proi	ect No.	Project	t Name:		T	rial Pit ID
	CA11	CEVAVAN		1619A		rish Sea Array Landfall		-	
	CAU	SEWAY GEOTECH		rdinates	Client:				TP12
		GEOTECH			Statkra	ft Limited			
Method:				39.96 E	Client's	s Representative:		Sł	neet 1 of 1
Trial Pitting				70.89 N	Arup			S	cale: 1:25
Plant:				vation	Date:	Logg	er:		FINAL
6T Tracked Ex		T		9 mOD	14/03/	2022 RS			111777
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 B4	Seepage at 1.	5.49	0.30		Firm yellowish brown slightly sandy slightly gravelly CLAY. Sar coarse. Gravel is subangular fine to medium of mixed lithology. Stiff grey slightly sandy slightly gravelly CLAY. Sand is fine to compare the subangular fine of mixed lithologies.	gies.	▼	1.5
			3.19	3.00		End of trial pit at 3.00m			2.0 ————————————————————————————————————
									3.5 — — — — — — — — — — — — — — — — — — —
				-					
				-					4.5 —
				-					-
				-					-
				-					-
			1	<u> </u>					
	ter Strikes	Depth: 3.00		narks: ation: Land	Hfall				
Struck at (m)		(S 100	Loca	ucioii. Ldii(aiaii				
1.00	Seepage a	Length: 3.00							
		Stability:	Tom	mination F	Pascan		Last Up	data	d = -=
		Stable	Tern	ninated at s	cheduled o	depth	02/12/	2022	ACES



APPENDIX E TRIAL PIT PHOTOGRAPHS





TP01





TP01







TP01







TP01





TP02







TP02







TP02





TP02







TP03







TP03







TP03







TP03





TP03





TP04





TP04







TP04







TP04





TP04





TP04





TP04





TP05







TP05







TP05





TP05





TP05





TP05







TP07







TP07







TP07





TP07





TP08







TP08







TP08





TP08







TP09







TP09







TP09







TP09





TP09





TP11







TP11







TP11







TP11





TP12





TP12







TP12



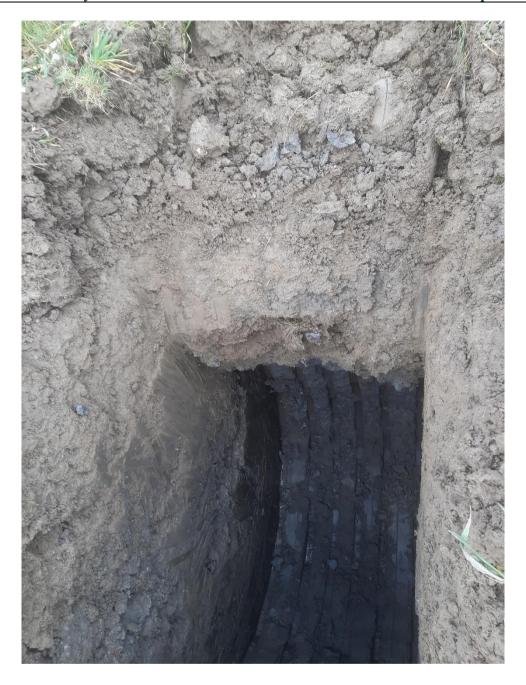




TP12







TP12





APPENDIX F GEOTECHNICAL LABORATORY TEST RESULTS





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> 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

27 April 2022

Registered in Ireland. Company Number: 633786

www.causewaygeotech.com

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.

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	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 sub-contracting 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 Classification Test Results

Project No.

Project Name

21-1619

North Irish Sea Array

									,					
		Sar	nple			Dens		W	Passing	LL	PL	PΙ	Particle	Casagrande
Hole No.	Ref	Тор	Base	Туре	Soil Description	bulk Mg/m	dry	%	425µm %	%	%	%	density Mg/m3	Classification
TP03	3	1.00		В	Brown slightly gravelly silty fine to coarse SAND.	IVIg/II		14.0	51	23	17	6	Wg/III3	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		СІ
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		СІ
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		СІ
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 performed in accordance with BS1377:1990 unless specified otherwise

LAB 01R Version 5

Key Date Printed Approved By Density test Liquid Limit Particle density Linear measurement unless : 4pt cone unless : sp - small pyknometer 04/11/2022 00:00 wd - water displacement cas - Casagrande method gj - gas jar 10122 wi - immersion in water 1pt - single point test Stephen.Watson



Summary of Classification Test Results

Project No. Project Name

21-1619

North Irish Sea Array

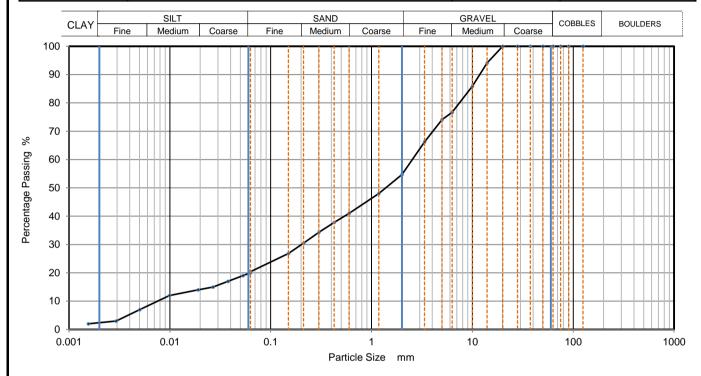
THORIT HIGH GOAT WILLY														
Hole No.			nple		Soil Description	Dens bulk	ity dry	W	Passing 425µm	LL	PL	PI	Particle density	Casagrande Classification
	Ref	Тор	Base	Туре		Mg/m		%	%	%	%	%	Mg/m3	Classification
TP12	4	1.20		В	Greyish brown sandy slightly gravelly silty CLAY.			22.0						
										1				

All tests performed in accordance with BS1377:1990 unless specified otherwise

LAB 01R Version 5

Key Date Printed Approved By Density test Liquid Limit Particle density Linear measurement unless : 4pt cone unless : sp - small pyknometer 04/11/2022 00:00 wd - water displacement cas - Casagrande method gj - gas jar 10122 wi - immersion in water 1pt - single point test Stephen.Watson

CAUSEWAY	DARTI	CLE SIZE DIST	PIRLITION	Job Ref	21-1619	
—— GEOTECH	FANII	CLL SIZE DIST	INIDOTION		Borehole/Pit No.	TP03
Site Name	North Irish Sea Array			Sample No.	3	
Soil Description	Brown slightly gravelly sil	ty fine to coarse SA	Depth, m	1.00		
Specimen Reference	6	Specimen Depth	1	m	Sample Type	В
Test Method	BS1377:Part 2:1990, clau	ses 9.2 and 9.5			KeyLAB ID	Caus2022032141



Siev	/ing	Sedimentation				
Particle Size mm	% Passing	Particle Size mm	% Passing			
125	100	0.06300	20			
90	100	0.05308	19			
75	100	0.03774	17			
63	100	0.02683	15			
50	100	0.01908	14			
37.5	100	0.00990	12			
28	100	0.00503	7			
20	100	0.00293	3			
14	94	0.00155	2			
10	86					
6.3	77					
5	74					
3.35	66					
2	55					
1.18	48					
0.6	41	Particle density	(assumed)			
0.425	38	2.65	Mg/m3			
0.3	34					
0.212	31					
0.15	27					
0.063	20					

Dry Mass of sample, g	504

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	45.3
Sand	34.3
Silt	18.0
Clay	2.4

Grading Analysis		
D100	mm	
D60	mm	2.53
D30	mm	0.202
D10	mm	0.0077
Uniformity Coefficient		330
Curvature Coefficient		2.1

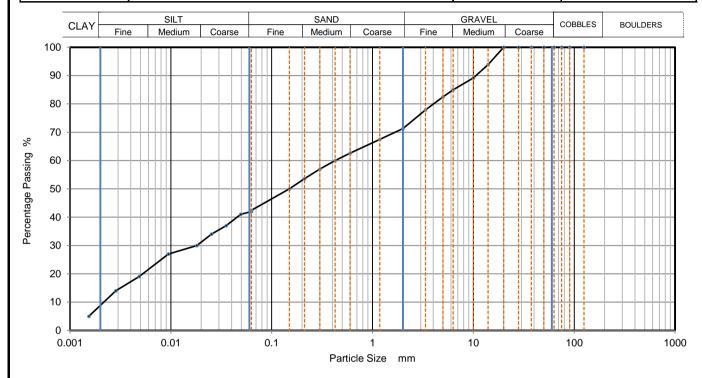
Preparation and testing in accordance with BS1377-2:1990 unless noted below





LAB 05R - Version 5

	CAUSEWAY	DAD			Job Ref	21-1619	
	PARTICLE SIZE DISTRIBUTION					Borehole/Pit No.	TP04
Si	te Name	North Irish Sea Array	/		Sample No.	3	
So	oil Description	Brown sandy slightly g	ravelly silty CLAY.	Depth, m	1.00		
SI	pecimen Reference	6	Specimen Depth	1	m	Sample Type	В
To	est Method	BS1377:Part 2:1990, cl	auses 9.2 and 9.5			KeyLAB ID	Caus2022032142



Siev	/ing	Sedimentation				
Particle Size mm	% Passing	Particle Size mm	% Passing			
125	100	0.06300	42			
90	100	0.04939	41			
75	100	0.03537	37			
63	100	0.02532	34			
50	100	0.01813	30			
37.5	100	0.00947	27			
28	100	0.00485	19			
20	100	0.00284	14			
14	94	0.00154	5			
10	89					
6.3	85					
5	83					
3.35	78					
2	71					
1.18	68					
0.6	63	Particle density	(assumed)			
0.425	60	2.65	Mg/m3			
0.3	57					
0.212	54					
0.15	50					
0.063	42					

Dry Mass of sample, g	509

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	28.7
Sand	28.9
Silt	33.3
Clay	9.1

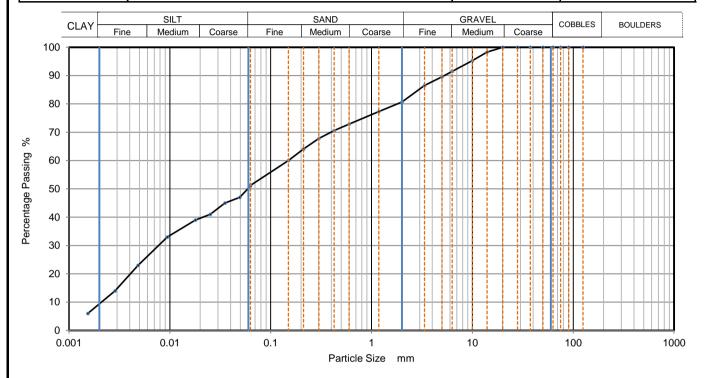
Grading Analysis		
D100	mm	
D60	mm	0.423
D30	mm	0.018
D10	mm	0.00213
Uniformity Coefficient		200
Curvature Coefficient		0.36

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





CAUSEWAY	PARTICLE SIZE DISTRIBUTION -		Job Ref	21-1619	
— GEOTECH			Borehole/Pit No.	TP05	
Site Name	North Irish Sea Array			Sample No.	3
Soil Description	Brown sandy slightly gravelly silty CLAY.			Depth, m	0.50
Specimen Reference	6 Specimen 0.5 m			Sample Type	В
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2022032144



Cinui		ll Cadima	entation
Sieving		Seaime	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	51
90	100	0.04939	47
75	100	0.03515	45
63	100	0.02517	41
50	100	0.01791	39
37.5	100	0.00942	33
28	100	0.00485	23
20	100	0.00286	14
14	98	0.00154	6
10	95		
6.3	92		
5	90		
3.35	87		
2	81		
1.18	77		
0.6	73	Particle density	(assumed)
0.425	71	2.65	Mg/m3
0.3	68		
0.212	64	1	
0.15	60	1	
0.063	51	11	

Dry Mass of sample, g	509

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	19.3
Sand	29.5
Silt	41.6
Clay	9.6

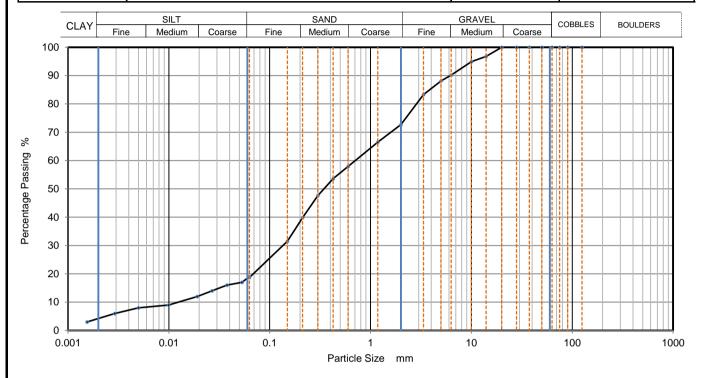
Grading Analysis		
D100	mm	
D60	mm	0.15
D30	mm	0.00787
D10	mm	0.00206
Uniformity Coefficient		73
Curvature Coefficient		0.2

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





CAUSEWAY	PARTICLE SIZE DISTRIBUTION -		Job Ref	21-1619	
— БЕОТЕСН			Borehole/Pit No.	TP05	
Site Name	North Irish Sea Array			Sample No.	6
Soil Description	Brown slightly gravelly clayey fine to coarse SAND.			Depth, m	2.00
Specimen Reference	6 Specimen 2 m			Sample Type	В
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2022032146



Sieving		Sedimo	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	19
90	100	0.05308	17
75	100	0.03774	16
63	100	0.02683	14
50	100	0.01908	12
37.5	100	0.00996	9
28	100	0.00501	8
20	100	0.00290	6
14	97	0.00154	3
10	95		
6.3	90		
5	88		
3.35	83		
2	73		
1.18	67		
0.6	58	Particle density	(assumed)
0.425	54	2.65	Mg/m3
0.3	48		
0.212	40		
0.15	32		
0.063	19		

Dry Mass of sample, g	508
mple Proportions	% dry mass

Sample Proportions	% dry mass	
Cobbles	0.0	
Gravel	27.3	
Sand	54.0	
Silt	14.3	
Clay	4.4	

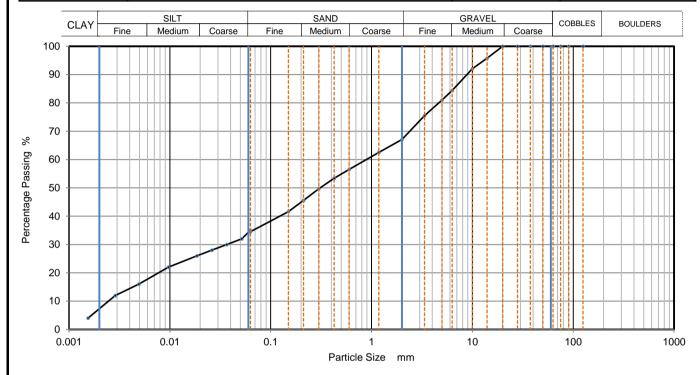
Grading Analysis		
D100	mm	
D60	mm	0.709
D30	mm	0.135
D10	mm	0.0114
Uniformity Coefficient		62
Curvature Coefficient		2.3

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





CAUSEWAY	PARTICLE SIZE DISTRIBUTION		Job Ref	21-1619	
—— GEOTECH	PANII	PARTICLE SIZE DISTRIBUTION		Borehole/Pit No.	TP08
Site Name	North Irish Sea Array			Sample No.	3
Soil Description	Greyish brown sandy slightly gravelly silty CLAY.			Depth, m	1.00
Specimen Reference	6 Specimen 1 m			Sample Type	В
Test Method	<u> </u>			KeyLAB ID	Caus2022032147



Sievi	ing	Sedimo	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	35
90	100	0.05157	32
75	100	0.03668	30
63	100	0.02609	28
50	100	0.01855	26
37.5	100	0.00969	22
28	100	0.00493	16
20	100	0.00287	12
14	96	0.00154	4
10	92		
6.3	84		
5	81		
3.35	76		
2	67		
1.18	63		
0.6	57	Particle density	(assumed)
0.425	53	2.65	Mg/m3
0.3	50		
0.212	46	1	
0.15	42	1	
0.063	35	1	

Dry Mass of sample, g	507

Sample Proportions	% dry mass		
Cobbles	0.0		
Gravel	32.9		
Sand	32.6		
Silt	27.1		
Clay	7.4		

Grading Analysis		
D100	mm	
D60	mm	0.89
D30	mm	0.0341
D10	mm	0.00243
Uniformity Coefficient		370
Curvature Coefficient		0.54

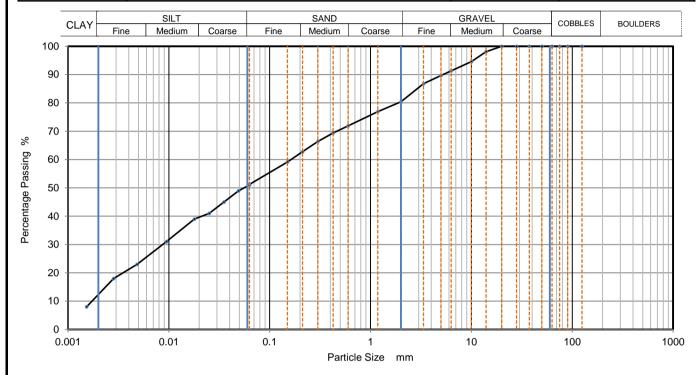
Preparation and testing in accordance with BS1377-2:1990 unless noted below





LAB 05R - Version 5

CAUSEWAY	PARTICLE SIZE DISTRIBUTION		Job Ref	21-1619	
—— GEOTECH	PANII	ANTICLE SIZE DISTRIBUTION		Borehole/Pit No.	TP11
Site Name	North Irish Sea Array			Sample No.	3
Soil Description	Greyish brown sandy slightly gravelly silty CLAY.			Depth, m	1.00
Specimen Reference	6 Specimen 1 m			Sample Type	В
Test Method				KeyLAB ID	Caus2022032149



Sievi	ing	Sedimo	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	51
90	100	0.04907	49
75	100	0.03515	45
63	100	0.02517	41
50	100	0.01791	39
37.5	100	0.00947	31
28	100	0.00485	23
20	100	0.00283	18
14	98	0.00153	8
10	95		
6.3	91		
5	90		
3.35	87		
2	80		
1.18	77		
0.6	72	Particle density	(assumed)
0.425	69	2.65	Mg/m3
0.3	66		
0.212	63		
0.15	59	1	
0.063	51	1	

Dry Mass of sample, g	509

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	19.6
Sand	29.2
Silt	38.5
Clay	12.7

Grading Analysis		
D100	mm	
D60	mm	0.163
D30	mm	0.00893
D10	mm	0.0017
Uniformity Coefficient		96
Curvature Coefficient		0.29

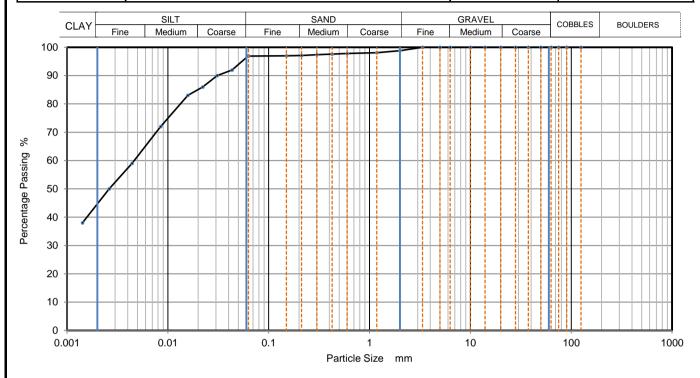
Preparation and testing in accordance with BS1377-2:1990 unless noted below





LAB 05R - Version 5

CAUSEWAY	PARTICLE SIZE DISTRIBUTION		Job Ref	21-1619		
GEOTECH GEOTECH	PANI	PARTICLE SIZE DISTRIBUTION		Borehole/Pit No.	TP12	
Site Name	North Irish Sea Array			Sample No.	3	
Soil Description	Greyish brown silty CLAY.			Depth, m	1.00	
Specimen Reference	7 Specimen 1 m			Sample Type	В	
Test Method	BS1377:Part 2:1990, clau	uses 9.2 and 9.5			KeyLAB ID	Caus2022032152



Siev	ing	Sodim	entation	
Jiev	g	Jedini		
Particle Size mm	% Passing	Particle Size mm	% Passing	
125	100	0.06300	97	
90	100	0.04328	92	
75	100	0.03086	90	
63	100	0.02218	86	
50	100	0.01581	83	
37.5	100	0.00848	72	
28	100	0.00442	59	
20	100	0.00262	50	
14	100	0.00142	38	
10	100			
6.3	100			
5	100			
3.35	100			
2	99			
1.18	98			
0.6	98	Particle density	(assumed)	
0.425	98	2.65	Mg/m3	
0.3	97			
0.212	97	1		
0.15	97	1		
0.063	97			

Dry Mass of sample, g	373	
-----------------------	-----	--

Sample Proportions	% dry mass		
Cobbles	0.0		
Gravel	1.2		
Sand	1.9		
Silt	52.3		
Clay	44.6		

Grading Analysis		
D100	mm	
D60	mm	0.00473
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

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





LAB 05R - Version 5



Moisture Condition Value at Natural Moisture Content Summary of Results

Project No.

Project Name

21-1619

North Irish Sea Array

21	1013			Notiti ilish Sea Allay						
Hole No.	Ref		nple Base	Туре	Soil Description	Retained on 20mm sieve	Moisture Content <20mm	Moisture Condition Value	Method of Interpretation	Remarks
		i i		``		%	%			
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

04/12/2022 00:00

Approved By

Stephen.Watson





eurofins Chemtest

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL

Tel: 01638 606070 Email: info@chemtest.com

Final Report

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 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:

Details: Stuart Henderson, Technical

Manager



Eurofins Chemtest Ltd Depot Road Newmarket CB8 0AL

Tel: 01638 606070 Email: info@chemtest.com

Results - Soil

Project: 21-1619 North Irish Sea Array

Client: Causeway Geotech Ltd	Chemtest Job No.:				22-11176	22-11176	22-11176
Quotation No.:	(Chemte	st Sam	ple ID.:	1398031	1398032	1398033
Order No.:		Clie	nt Samp	le Ref.:	4	3	4
		Sa	ample Lo	ocation:	TP04	TP08	TP12
				е Туре:		SOIL	SOIL
		Top Depth (m):				1.0	1.2
	Date Sampled:			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 **UKAS** accredited MCERTS and UKAS accredited M Unaccredited Ν This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for S this analysis This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited SN 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 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: customerservices@chemtest.com



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

(Director) (Quality Manager) (Laboratory Manager)

EK#

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

Page 1 of

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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.
TP04	3	В	1.00		Brown gravelly sandy CLAY.
TP05	6	В	2.00		Brown slightly gravelly sandy CLAY.
TP08	4	В	1.20		Brown gravelly sandy CLAY.
TP11	3	В	1.00		Brown gravelly sandy CLAY.
TP12	3	В	1.00		Brown slightly gravelly CLAY.



North Irish Sea Array

Contract No:
PSL22/2277
Client Ref:
21-1619

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	Type	Depth	Depth	%	Mg/m ³	Mg/m ³	XX7/ X7	C MY	1101111111111
			m	m				W/m K	C.cm/W	
TP03	3	В	1.00		13			2.177	45.9	
TP04	3	В	1.00		13			1.957	51.1	
TP05	6	В	2.00		17			2.169	46.1	
TP08	4	В	1.20		15			2.231	44.8	
TP11	3	В	1.00		21			1.894	52.8	
TP12	3	В	1.00		24			1.507	66.3	

		Contract No:
	North Irish Sea Array	PSL22/2277
Professional Called about the	North Irish Sea Array	Client Ref:
Professional Soils Laboratory		21-1619



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Registered in Ireland. Company Number: 633786

www.causewaygeotech.com

SOIL AND ROCK SAMPLE ANALYSIS LABORATORY TEST REPORT

28 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 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.

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 sub-contracting 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



Summary of Classification Test Results

Project No.

Project Name

21-1619

North Irish Sea Array

Ref	Sar	nple			Dens	_{itv}	w	Passing	LL	PL	PΙ	Particle	
Ref							**	. accing		. –			Cooogranda
	Тор	Base	Туре	Soil Description	bulk Mg/m	dry	%	425μm %	%	%	%	density Mg/m3	Casagrande Classification
2	0.80	1.00	В	Brown sandy slightly gravelly silty CLAY.	Ivig/III	3	23.0	83	42	21	21	Wg/IIIO	CI
3	1.80	2.00	В	Brown sandy slightly gravelly silty CLAY.			14.0						
4	2.80	3.00	В	Brown sandy slightly gravelly silty CLAY.			13.0						
5	3.80	4.00	В	Brown sandy slightly gravelly silty CLAY.			13.0	65	30	16	14		CL
14	5.00	5.45	D	Brown sandy slightly gravelly silty CLAY.			13.0						
10	5.50		D	Brown sandy slightly gravelly silty CLAY.			11.0	60	25	14	11		CL
12	7.50		D	Brown sandy slightly gravelly silty CLAY.			22.0						
3	1.00		В	Greyish brown sandy slightly gravelly silty CLAY.			17.0	92	45	22	23		СІ
3	1.00		В	Greyish brown sandy slightly gravelly silty CLAY.			14.0	67	30	19	11		CL
4	1.00		В	Greyish brown sandy slightly gravelly silty CLAY.			16.0	65	30	19	11		CL
6	2.00		В	Greyish brown sandy slightly gravelly silty CLAY.			14.0	67	40	16	24		CI
4	1.20		В	Greyish brown silty CLAY.			23.0	98	41	22	19		CI
	3 4 5 14 10 12 3 4 6	3 1.80 4 2.80 5 3.80 14 5.00 10 5.50 12 7.50 3 1.00 4 1.00 6 2.00	3 1.80 2.00 4 2.80 3.00 5 3.80 4.00 14 5.00 5.45 10 5.50	3 1.80 2.00 B 4 2.80 3.00 B 5 3.80 4.00 B 14 5.00 5.45 U 12 7.50 D D 3 1.00 B B 4 1.00 B B 6 2.00 B B	3 1.80 2.00 B Brown sandy slightly gravelly sitty CLAY. 4 2.80 3.00 B Brown sandy slightly gravelly sitty CLAY. 5 3.80 4.00 B Brown sandy slightly gravelly sitty CLAY. 14 5.00 5.45 U Brown sandy slightly gravelly sitty CLAY. 10 5.50 D Brown sandy slightly gravelly sitty CLAY. 11 7.50 D Brown sandy slightly gravelly sitty CLAY. 12 7.50 D Brown sandy slightly gravelly sitty CLAY. 3 1.00 B Greyish brown sandy slightly gravelly sitty gravelly sitty CLAY. 4 1.00 B Greyish brown sandy slightly gravelly sitty CLAY. 6 2.00 B Greyish brown sandy slightly gravelly sitty CLAY.	2 0.80 1.00 B Brown sandy slightly gravelly silty CLAY. 3 1.80 2.00 B Brown sandy slightly gravelly silty CLAY. 4 2.80 3.00 B Brown sandy slightly gravelly silty CLAY. 5 3.80 4.00 B Brown sandy slightly gravelly silty CLAY. 14 5.00 5.45 U Brown sandy slightly gravelly silty CLAY. 10 5.50 D Brown sandy slightly gravelly silty CLAY. 11 7.50 D Brown sandy slightly gravelly silty CLAY. 3 1.00 B Greyish brown sandy slightly gravelly silty CLAY. 4 1.00 B Greyish brown sandy slightly gravelly silty CLAY. 2 0.80 1.00 B Brown sandy slightly gravelly silty CLAY. 3 1.80 2.00 B Brown sandy slightly gravelly silty CLAY. 4 2.80 3.00 B Brown sandy slightly gravelly silty CLAY. 5 3.80 4.00 B Brown sandy slightly gravelly silty CLAY. 14 5.00 5.45 U Brown sandy slightly gravelly silty CLAY. 10 5.50 D Brown sandy slightly gravelly silty CLAY. 12 7.50 D Brown sandy slightly gravelly silty CLAY. 3 1.00 B Greyish brown sandy slightly gravelly silty gravelly silty CLAY. 4 1.00 B Greyish brown sandy slightly gravelly silty Gravelly silty CLAY. 6 2.00 B Greyish brown sandy slightly gravelly silty CLAY.	2 0.80 1.00 B Brown sandy slightly gravelly silty CLAY. 23.0 3 1.80 2.00 B Brown sandy slightly gravelly silty CLAY. 14.0 4 2.80 3.00 B Brown sandy slightly gravelly silty CLAY. 13.0 5 3.80 4.00 B Brown sandy slightly gravelly silty CLAY. 13.0 14 5.00 5.45 U Brown sandy slightly gravelly silty CLAY. 11.0 10 5.50 D Brown sandy slightly gravelly silty CLAY. 22.0 3 1.00 B Greyish brown sandy slightly gravelly silty CLAY. 17.0 3 1.00 B Greyish brown sandy slightly gravelly silty CLAY. 14.0 4 1.00 B Greyish brown sandy slightly gravelly silty CLAY. 16.0 6 2.00 B Greyish brown sandy slightly gravelly slightly gravelly silty CLAY. 14.0	2 0.80 1.00 B Brown sandy slightly gravelly silty 23.0 83 3 1.80 2.00 B Brown sandy slightly gravelly silty 14.0 4 2.80 3.00 B Brown sandy slightly gravelly silty 13.0 5 3.80 4.00 B Brown sandy slightly gravelly silty 13.0 14 5.00 5.45 U Brown sandy slightly gravelly silty 13.0 10 5.50 D Brown sandy slightly gravelly silty 11.0 60 12 7.50 D Brown sandy slightly gravelly silty 22.0 22.0 3 1.00 B Greyish brown sandy slightly gravelly silty 17.0 92 3 1.00 B Greyish brown sandy slightly gravelly slightly 14.0 67 4 1.00 B Greyish brown sandy slightly gravelly slightly 16.0 65 6 2.00 B Greyish brown sandy slightly 14.0 67	2 0.80 1.00 B Brown sandy slightly gravelly silty CLAY. 23.0 83 42 3 1.80 2.00 B Brown sandy slightly gravelly silty CLAY. 14.0 14.0 4 2.80 3.00 B Brown sandy slightly gravelly silty CLAY. 13.0 65 30 5 3.80 4.00 B Brown sandy slightly gravelly silty CLAY. 13.0 65 30 14 5.00 5.45 U Brown sandy slightly gravelly silty CLAY. 11.0 60 25 12 7.50 D Brown sandy slightly gravelly silty CLAY. 22.0 22.0 3 1.00 B Greyish brown sandy slightly gravelly silty CLAY. 17.0 92 45 3 1.00 B Greyish brown sandy slightly gravelly slightly gravelly silty CLAY. 14.0 67 30 4 1.00 B Greyish brown sandy slightly gravelly slightl	2 0.80 1.00 B Brown sandy slightly gravelly silty 23.0 83 42 21 3 1.80 2.00 B Brown sandy slightly gravelly silty 14.0 14.0 14.0 14.0 14.0 14.0 15.0 15.0 15.0 15.0 15.0 15.0 15.0 16.0	2 0.80 1.00 B Brown sandy slightly gravelly silty 23.0 83 42 21 21 3 1.80 2.00 B Brown sandy slightly gravelly silty 14.0 14.0 14.0 14.0 14.0 14.0 15.0	2 0.80 1.00 B Brown sandy slightly gravelly silty	

All tests performed in accordance with BS1377:1990 unless specified otherwise

LAB 01R Version 5

Key Date Printed Approved By Density test Liquid Limit Particle density Linear measurement unless : 4pt cone unless : sp - small pyknometer 04/11/2022 00:00 wd - water displacement cas - Casagrande method gj - gas jar 10122 wi - immersion in water 1pt - single point test Stephen.Watson



Summary of Classification Test Results

Project No. Project Name

21-1619

North Irish Sea Array

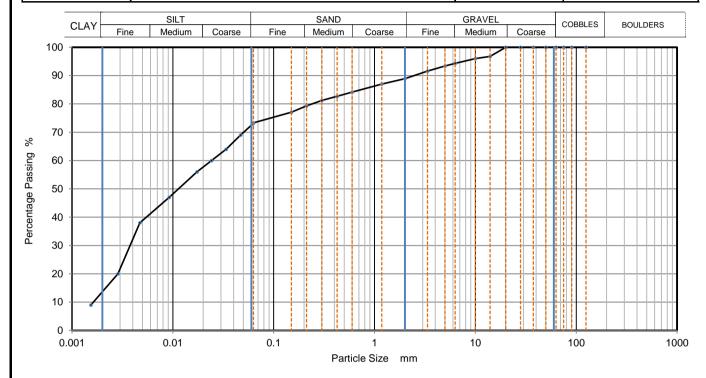
21-1	019					- 11	OHH	11511 36	a Array					
Hole No.			nple	1	Soil Description	Dens bulk	ity dry	W	Passing 425µm	LL	PL	PI	Particle density	Casagrande
1.0.0 . 10.	Ref	Тор	Base	Туре	Con Decempnen	Mg/m		%	%	%	%	%	Mg/m3	Classification
TP20	3	1.00		В	Greyish brown sandy slightly gravelly silty CLAY.			32.0	89	53	26	27		СН
TP20	4	1.20		В	Greyish brown clayey fine to coarse SAND.			37.0	93	40	22	18		CI
TP21	3	1.00		В	Greyish brown sandy slightly gravelly clayey SILT with occasional shell fragments.			58.0	96	53	35	18		МН

All tests performed in accordance with BS1377:1990 unless specified otherwise

LAB 01R Version 5

Key Date Printed Approved By Density test Liquid Limit Particle density Linear measurement unless : 4pt cone unless : sp - small pyknometer 04/11/2022 00:00 wd - water displacement cas - Casagrande method gj - gas jar 10122 wi - immersion in water 1pt - single point test Stephen.Watson

CAUSEWAY	DAD	TICLE SIZE DIST	Job Ref	21-1619		
GEOTECH GEOTECH	PANI	ICLE SIZE DIS	INIBUTION	Borehole/Pit No.	BH03	
Site Name	North Irish Sea Array				Sample No.	2
Soil Description	Brown sandy slightly gr	avelly silty CLAY.		Depth, m	0.80	
Specimen Reference	6	Specimen Depth	0.8	m	Sample Type	В
Test Method	BS1377:Part 2:1990, cla	nuses 9.2 and 9.5		KeyLAB ID	Caus2022032121	



Sievi	ng	Sedimentation				
Particle Size mm	% Passing	Particle Size mm	% Passing			
125	100	0.06230	73			
90	100	0.04701	69			
75	100	0.03373	64			
63	100	0.02418	60			
50	100	0.01734	56			
37.5	100	0.00919	47			
28	100	0.00471	38			
20	100	0.00285	20			
14	97	0.00154	9			
10	96					
6.3	94					
5	93					
3.35	92					
2	89					
1.18	87					
0.6	84	Particle density	(assumed)			
0.425	83	2.65	Mg/m3			
0.3	81					
0.212	79					
0.15	77	1				
0.063	73	1				

Dry Mass of sample, g	509		
mple Proportions	% dry mass		

Sample Proportions	% dry mass		
Cobbles	0.0		
Gravel	11.1		
Sand	15.6		
Silt	59.7		
Clay	13.6		

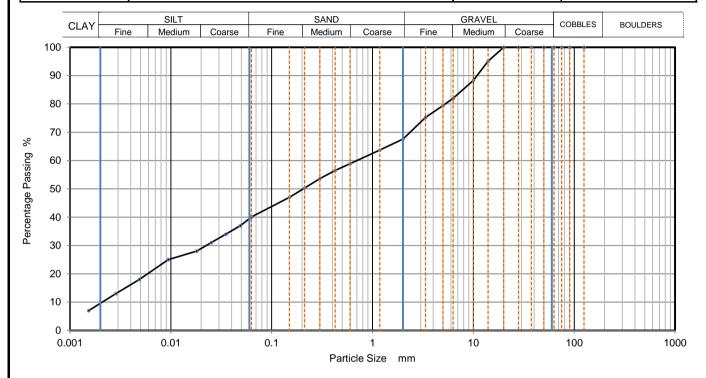
Grading Analysis		
D100	mm	
D60	mm	0.0242
D30	mm	0.00378
D10	mm	0.00164
Uniformity Coefficient		15
Curvature Coefficient		0.36

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





CAUSEWAY	DADTI	CLE SIZE DIST	Job Ref	21-1619		
—— GEOTECH	PANII	CLE SIZE DIST	IKIBOTION	Borehole/Pit No.	вноз	
Site Name	North Irish Sea Array				Sample No.	5
Soil Description	Brown sandy slightly grav	elly silty CLAY.		Depth, m	3.80	
Specimen Reference	6	Specimen Depth	3.8	m	Sample Type	В
Test Method	BS1377:Part 2:1990, clau	ses 9.2 and 9.5		KeyLAB ID	Caus2022032125	



Sie	ving	Sedimentation			
Particle Size mm	% Passing	Particle Size mm	% Passing		
125	100	0.06300	40		
90	100	0.04903	37		
75	100	0.03513	34		
63	100	0.02517	31		
50	100	0.01802	28		
37.5	100	0.00942	25		
28	100	0.00485	18		
20	100	0.00285	13		
14	95	0.00153	7		
10	88				
6.3	82				
5	79				
3.35	75				
2	68				
1.18	64				
0.6	59	Particle density	(assumed)		
0.425	57	2.65	Mg/m3		
0.3	54				
0.212	50				
0.15	47				
0.063	40				

Dry Mass of sample, g	508

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	32.4
Sand	27.5
Silt	30.1
Clay	10.0

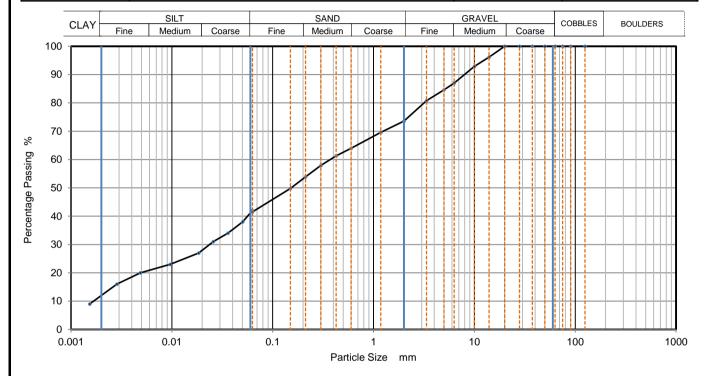
Grading Analysis		
D100	mm	
D60	mm	0.702
D30	mm	0.022
D10	mm	0.002
Uniformity Coefficient		350
Curvature Coefficient		0.34

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





CAUSEWAY	PARTICLE SIZE DISTRIBUTION		Job Ref	21-1619	
GEOTECH	PAN	PARTICLE SIZE DISTRIBUTION		Borehole/Pit No.	вноз
Site Name	North Irish Sea Array			Sample No.	10
Soil Description	Brown sandy slightly gravelly silty CLAY.			Depth, m	5.50
Specimen Reference	6 Specimen 5.5 m			Sample Type	D
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2022032127



Sieving		Sedimo	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	42
90	100	0.05033	38
75	100	0.03604	34
63	100	0.02580	31
50	100	0.01846	27
37.5	100	0.00965	23
28	100	0.00488	20
20	100	0.00285	16
14	96	0.00153	9
10	93		
6.3	87		
5	85		
3.35	81		
2	74		
1.18	70		
0.6	64	Particle density	(assumed)
0.425	61	2.65	Mg/m3
0.3	58		
0.212	54		
0.15	50		
0.063	42		

Dry Mass of sample, g	501

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	26.4
Sand	32.2
Silt	29.3
Clay	12.1

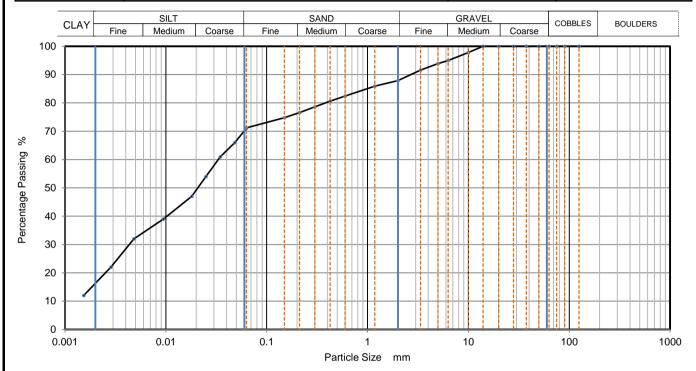
Grading Analysis		
D100	mm	
D60	mm	0.372
D30	mm	0.0242
D10	mm	0.00167
Uniformity Coefficient		220
Curvature Coefficient		0.95

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





CAUSEWAY	PARTICLE SIZE DISTRIBUTION -		Job Ref	21-1619	
—— GEOTECH	PANII	PARTICLE SIZE DISTRIBUTION		Borehole/Pit No.	TP01
Site Name	North Irish Sea Array			Sample No.	3
Soil Description	Greyish brown sandy slightly gravelly silty CLAY.			Depth, m	1.00
Specimen Reference	7 Specimen 1 m			Sample Type	В
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2022032129



Sieving		Sedim	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	71
90	100	0.04837	66
75	100	0.03467	61
63	100	0.02501	54
50	100	0.01802	47
37.5	100	0.00948	39
28	100	0.00482	32
20	100	0.00285	22
14	100	0.00153	12
10	98		
6.3	95		
5	94		
3.35	92		
2	88		
1.18	86		
0.6	82	Particle density	(assumed)
0.425	81	2.65	Mg/m3
0.3	79		
0.212	77		
0.15	75		
0.063	71	1	

501	
	501

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	12.1
Sand	16.6
Silt	54.8
Clay	16.5

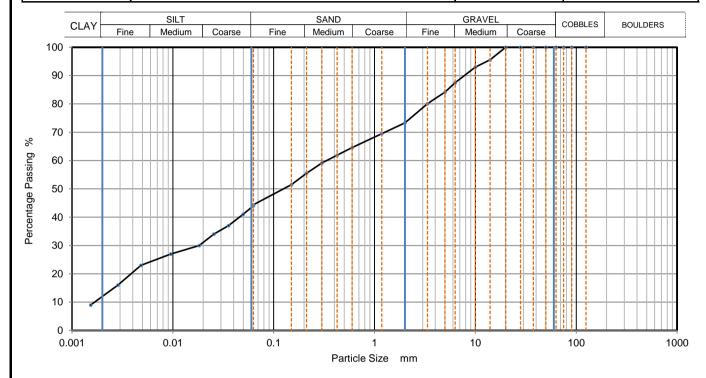
Grading Analysis		
D100	mm	
D60	mm	0.0326
D30	mm	0.00435
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

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





CAUSEWAY	Y PARTICLE SIZE DISTRIBUTION		Job Ref	21-1619		
GEOTECH	PANI	ICLE SIZE DIST	TRIBUTION		Borehole/Pit No.	TP02
Site Name	North Irish Sea Array	North Irish Sea Array			Sample No.	3
Soil Description	Greyish brown sandy slightly gravelly silty CLAY.			Depth, m	1.00	
Specimen Reference	7	7 Specimen 1 m			Sample Type	В
Test Method	BS1377:Part 2:1990, cla	uses 9.2 and 9.5			KeyLAB ID	Caus2022032131



Sievi	ng	Sedimo	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	44
90	100	0.04969	41
75	100	0.03559	37
63	100	0.02549	34
50	100	0.01824	30
37.5	100	0.00953	27
28	100	0.00482	23
20	100	0.00285	16
14	96	0.00153	9
10	93		
6.3	88		
5	84		
3.35	80		
2	73		
1.18	70		
0.6	65	Particle density	(assumed)
0.425	62	2.65	Mg/m3
0.3	59		
0.212	56		
0.15	52	1	
0.063	44	1	

Dry Mass of sample, g	509	
imple Proportions	% dry mass	

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	26.7
Sand	28.9
Silt	32.5
Clay	11.9

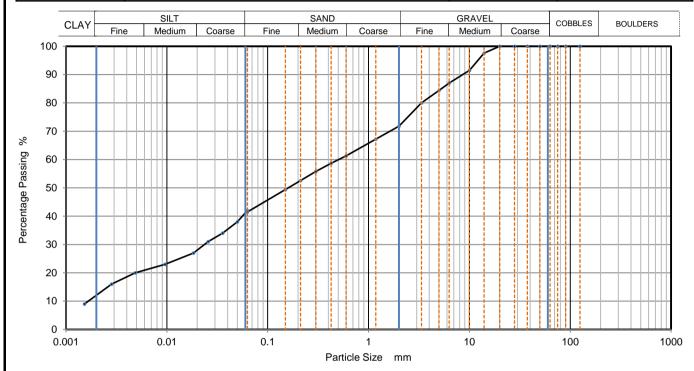
Grading Analysis		
D100	mm	
D60	mm	0.335
D30	mm	0.0176
D10	mm	0.00169
Uniformity Coefficient		200
Curvature Coefficient		0.55

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





CAUSEWAY	PARTICLE SIZE DISTRIBUTION		Job Ref	21-1619		
—— GEOTECH	PANII	CLE SIZE DIST	NOLL MIST KIROLLON		Borehole/Pit No.	TP07
Site Name	North Irish Sea Array	North Irish Sea Array			Sample No.	4
Soil Description	Greyish brown sandy slightly gravelly silty CLAY.			Depth, m	1.00	
Specimen Reference	7 Specimen 1 m		Sample Type	В		
Test Method	BS1377:Part 2:1990, clau	ses 9.2 and 9.5			KeyLAB ID	Caus2022032133



Siev	ring	Sedim	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	42
90	100	0.05000	38
75	100	0.03581	34
63	100	0.02564	31
50	100	0.01835	27
37.5	100	0.00959	23
28	100	0.00485	20
20	100	0.00283	16
14	98	0.00152	9
10	92		
6.3	87		
5	84		
3.35	80		
2	72		
1.18	67		
0.6	61	Particle density	(assumed)
0.425	59	2.65	Mg/m3
0.3	56		
0.212	53	1	
0.15	49	1	
0.063	42	1	

Dry Mass of sample, g	508

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	28.2
Sand	30.4
Silt	29.2
Clay	12.2

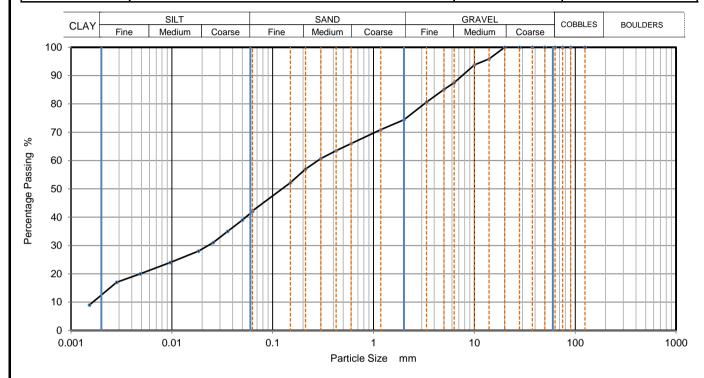
Grading Analysis		
D100	mm	
D60	mm	0.504
D30	mm	0.0241
D10	mm	0.00166
Uniformity Coefficient		300
Curvature Coefficient		0.7

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





CAUSEWAY	CAUSEWAY PARTICLE SIZE DISTRIBUTION		Job Ref	21-1619		
— GEOTECH	PANII	CLE SIZE DIST			Borehole/Pit No.	TP07
Site Name	North Irish Sea Array	North Irish Sea Array			Sample No.	6
Soil Description	Greyish brown sandy slightly gravelly silty CLAY.			Depth, m	2.00	
Specimen Reference	6	6 Specimen 2 m			Sample Type	В
Test Method	BS1377:Part 2:1990, clau	ses 9.2 and 9.5			KeyLAB ID	Caus2022032135



Siev	/ing	Sedimo	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	42
90	100	0.05000	39
75	100	0.03581	35
63	100	0.02564	31
50	100	0.01835	28
37.5	100	0.00959	24
28	100	0.00485	20
20	100	0.00283	17
14	96	0.00152	9
10	94		
6.3	88		
5	85		
3.35	81		
2	74		
1.18	71		
0.6	66	Particle density	(assumed)
0.425	64	2.65	Mg/m3
0.3	61		_
0.212	57		
0.15	52		
0.063	42		

Dry Mass of sample, g	507

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	25.6
Sand	32.2
Silt	29.8
Clay	12.4

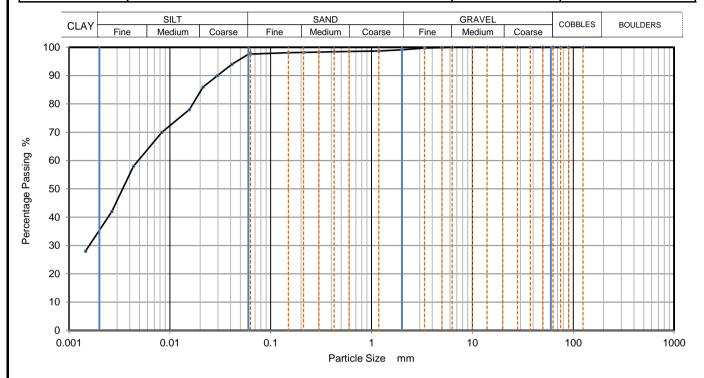
Grading Analysis		
D100	mm	
D60	mm	0.281
D30	mm	0.023
D10	mm	0.00163
Uniformity Coefficient		170
Curvature Coefficient		1.2

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





CAUSEWAY	PARTICLE SIZE DISTRIBUTION		Job Ref	21-1619		
—— GEOTECH	PANII	PARTICLE SIZE DISTRIBUTION		Borehole/Pit No.	TP09	
Site Name	North Irish Sea Array	North Irish Sea Array			Sample No.	4
Soil Description	Greyish brown silty CLAY.			Depth, m	1.20	
Specimen Reference	7 Specimen 1.2 m			Sample Type	В	
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2022032137	



		П	
Sieving		Sedim	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	98
90	100	0.04115	94
75	100	0.02965	90
63	100	0.02135	86
50	100	0.01562	78
37.5	100	0.00833	70
28	100	0.00435	58
20	100	0.00265	42
14	100	0.00146	28
10	100		
6.3	100		
5	100		
3.35	100		
2	99		
1.18	99		
0.6	99	Particle density	(assumed)
0.425	98	2.65	Mg/m3
0.3	98		
0.212	98	1	
0.15	98	1	
0.063	98	1	

Dry Mass of sample, g	508

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	0.9
Sand	1.5
Silt	62.3
Clay	35.3

Grading Analysis		
D100	mm	
D60	mm	0.00492
D30	mm	0.0016
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

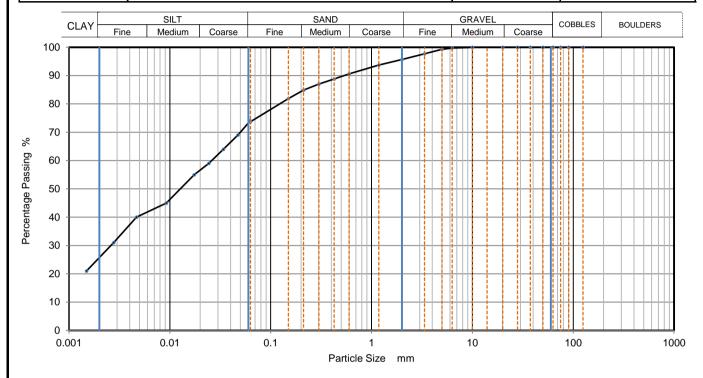
Preparation and testing in accordance with BS1377-2:1990 unless noted below





LAB 05R - Version 5

CAUSEWAY	PARTICLE SIZE DISTRIBUTION -		Job Ref	21-1619	
— БЕОТЕСН			Borehole/Pit No.	TP20	
Site Name	North Irish Sea Array	North Irish Sea Array		Sample No.	3
Soil Description	Greyish brown sandy slightly gravelly silty CLAY.			Depth, m	1.00
Specimen Reference	6 Specimen 1 m		Sample Type	В	
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2022032138



Sieving		Sedimo	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06275	74
90	100	0.04735	69
75	100	0.03396	64
63	100	0.02435	59
50	100	0.01745	55
37.5	100	0.00925	45
28	100	0.00468	40
20	100	0.00277	31
		0.00149	21
10	100		
6.3	100		
5	99		
3.35	98		
2	96		
1.18	94		
0.6	91	Particle density	(assumed)
0.425	89	2.65	Mg/m3
0.3	87		_
0.212	85		
0.15	82		
0.063	74		

Dry Mass of sample, g	503
·	

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	4.3
Sand	22.1
Silt	47.7
Clay	25.9

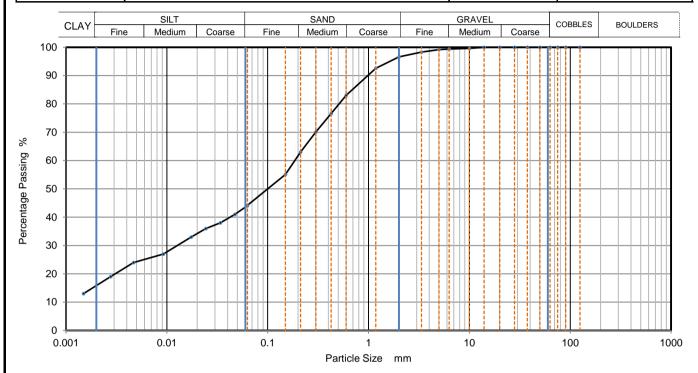
Grading Analysis		
D100	mm	
D60	mm	0.0253
D30	mm	0.00261
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

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





CAUSEWAY	DADT	ICI E SIZE DIST	FDIDLITION	Job Ref	21-1619	
PARTICLE SIZE DISTRIBUTION					Borehole/Pit No.	TP20
Site Name	North Irish Sea Array			Sample No.	4	
Soil Description	Greyish brown clayey fir	ne to coarse SAND.		Depth, m	1.20	
Specimen Reference	6	Specimen Depth	1.2	Sample Type	В	
Test Method	BS1377:Part 2:1990, cla	uses 9.2 and 9.5		KeyLAB ID	Caus2022032139	



Siev	/ing	Sedimentation ng Particle Size mm % Passing 0.06275 44 0.04735 41 0.03396 38 0.02435 36 0.01745 33 0.00925 27 0.00468 24 0.00277 19 0.00149 13			
Particle Size mm	% Passing	Particle Size mm	% Passing		
125	100	0.06275	44		
90	100	0.04735	41		
75	100	0.03396	38		
63	100	0.02435	36		
50	100	0.01745	33		
37.5	100	0.00925	27		
28	100	0.00468	24		
20	100	0.00277	19		
14	100	0.00149	13		
10	100				
6.3	99				
5	99				
3.35	98				
2	97				
1.18	93				
0.6	83	Particle density	(assumed)		
0.425	77	2.65	Mg/m3		
0.3	70		_		
0.212	63				
0.15	55				
0.063	44				

Dry Mass of sample, g	508
•	

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	3.4
Sand	52.4
Silt	28.7
Clay	15.5

Grading Analysis		
D100	mm	
D60	mm	0.186
D30	mm	0.0128
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

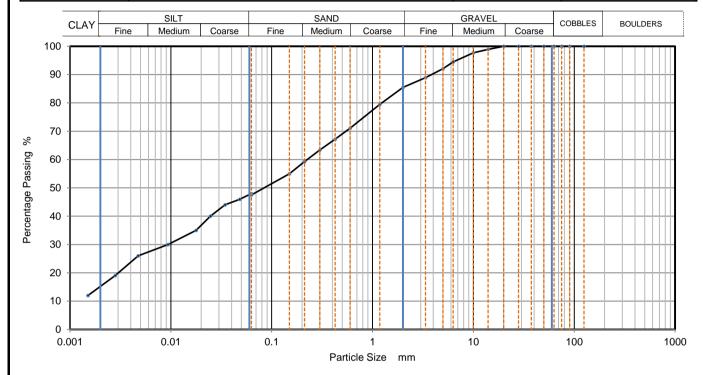
Preparation and testing in accordance with BS1377-2:1990 unless noted below





LAB 05R - Version 5

CAUSEWAY	DARTI	CI E SIZE DIST	Job Ref	21-1619		
PARTICLE SIZE DISTRIBUTION					Borehole/Pit No.	TP21
Site Name	North Irish Sea Array			Sample No.	3	
Soil Description	Greyish brown sandy sligl fragments.	ntly gravelly clayey s	SILT with occasional shell	Depth, m	1.00	
Specimen Reference	7 Specimen 1 m				Sample Type	В
Test Method	BS1377:Part 2:1990, claus	1377:Part 2:1990, clauses 9.2 and 9.5				Caus2022032140



Sie	ving	Sedimo	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	48
90	100	0.04836	46
75	100	0.03443	44
63	100	0.02468	40
50	100	0.01779	35
37.5	100	0.00936	30
28	100	0.00474	26
20	100	0.00280	19
14	99	0.00151	12
10	98		
6.3	95		
5	92		
3.35	89		
2	86		
1.18	80		
0.6	71	Particle density	(assumed)
0.425	67	2.65	Mg/m3
0.3	63		
0.212	59		
0.15	55		
0.063	48		

Dry Mass of sample, g	502

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	14.5
Sand	38.0
Silt	32.0
Clay	15.5

Grading Analysis		
D100	mm	
D60	mm	0.224
D30	mm	0.00947
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

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







Moisture Condition Value at Natural Moisture Content Summary of Results

Project No.

Project Name

21-1619

North Irish Sea Array

21-	1619					North I	irish Sea Array	У		
Hole No.		Sar	mple	1	Soil Description	Retained on 20mm sieve		Moisture Condition Value	Method of Interpretation	Remarks
110.0 110.	Ref	Тор	Base	Туре	Con Decempation	%	%			romano
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 sity CLAY.	12	96	8.8	Best fit line	
TP07	4	1.00		В	Greyish brown sandy slightly gravelly silty 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	
			l	I	l	<u> </u>			LA	B 10R - Version 6

Key

Test performed in accordance with BS1377:Part4:1990, clause 5.4 unless

annotated otherwise

Date Printed

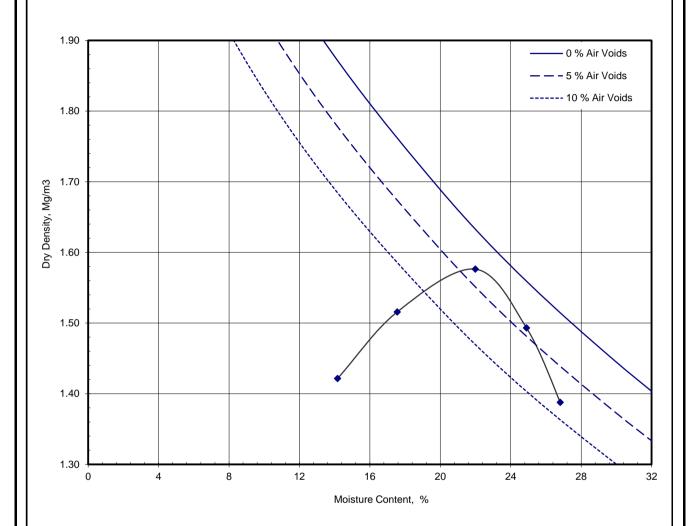
04/11/2022 00:00

Approved By

Stephen.Watson



CALISEWAY	Dry Dens	sity / Moisture Conte	Job Ref	21-1619		
CAUSEWAY		Light Compact	on	Borehole / Pit No	TP09	
Site Name		North Irish Sea Ar	Sample No	3		
Soil Description		Greyish brown silty CLAY.			1.00	m
Specimen Ref.	2	Specimen Depth	Sample Type	В		
Test Method	BS13	77:Part 4:1990, clause 3.3	Keylab ID	Caus202203	32136	



Preparation		Material used was natural
Mould Type		One Litre
Samples Used		Single sample tested
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	0
Particle Density - Assumed	Mg/m³	2.55

Maximum Dry Density	Mg/m³	1.58	
Optimum Moisture Content	%	22	

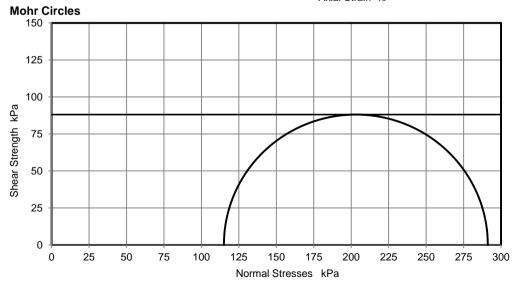
Approved Remarks

UKAS
TESTING
10122

Stephen.Watson

	In the second se	1	
CAUSEWAY ——GEOTECH	Unconsolidated Undrained Triaxial Compression Test without measurement	Job Ref	21-1619
————GEOTECH	of pore pressure - single specimen	Borehole/Pit No.	BH03
Site Name	North Irish Sea Array	Sample No.	13
Soil Description	Brown sandy slightly gravelly silty CLAY.	Depth	2.00
Specimen Reference	Specimen 2.05 m	Sample Type	U
Specimen Description	Stiff brown sandy slightly gravelly silty CLAY.	KeyLAB ID	Caus2022032123
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen	Date of test	30/03/2022
	Test Number Length Diameter Bulk Density Moisture Content Dry Density	1 210.1 104.3 2.21 12 1.97	mm mm Mg/m3 % Mg/m3
	Rate of Strain Cell Pressure	4.0 50	%/min kPa
	At failure Axial Strain Deviator Stress, (σ1 - σ3)f	18.0 190	% kPa
	Undrained Shear Strength, cu Mode of Failure	95 Compound	kPa ½(σ1 - σ3)f
Deviator Stress v A		Compound	I
300			
250			
		•	
to 150 +			
ted Deviator Stress kPa 100 •			
OO 100 - 100			
Š 50			
o /		20 20 24	
0 2	4 6 8 10 12 14 16 18 Axial Strain %	20 22 24	26 28 30 32
Mohr Circles 150			Deviator stress corrected for area change and membrane effects
100 - Ba		+	Mohr circles and their interpretation is not covered by BS1377.
Shear Strength kPa			This is provided for information only.
25			
0 25	Normal Stresses kPa	250 275 300	
Remarks	Approved Stephen.Watson	Printed 11/04/2022 16:04	UKAS TESTING
		LAB 15R - Version 5	10122

	Unconsolidat	ed Undrain	ed Triaxial		Job Ref			21-16	619	_	
CAUSEWAY GEOTECH	Compression			ment		/=·····					
deoreen	of pore press	ure - single	specimen		Borehole	e/Pit No.		BH)3		
Site Name	North Irish Sea Arra	ıy			Sample	No.		14	ļ		
Soil Description	Brown sandy slightly	y gravelly silty Cl	_AY.		Depth			5.0	0		
Specimen Reference	4	Specimen Depth	5.05	m	Sample	Туре		U			
Specimen Description	Stiff brown sandy sli	•	ty CLAY.		KeyLAB	ID	С	aus2022	2032126		
est Method	BS1377 : Part 7 : 19	990, clause 8, sir	ngle specimen		Date of t	test		30/03/2	2022		
	Test Number Length Diameter Bulk Density Moisture Content Dry Density				21 10 2	1 0.1 05.0 .23 11 .02	mm mm Mg/m3 % Mg/m3				
itor Stress v <i>l</i>	Cell Pressure At failure	At failure Axial Strain Deviator Stress, (σ 1 - σ 3)f Undrained Shear Strength, cu Mode of Failure						%/min kPa % kPa kPa ½(σ1 - σ3)f			
0											
0 -											
° I					•						
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	200000000000000000000000000000000000000										
	year and the same of the same									_	
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					+			28	30	3	
0 0 2	4 6 8	10 12	14 16	18	20 22	24					
	4 6 8	10 12	14 16 Axial Strai		20 22	24	26	20	30	•	



This is provided for information only.



Remarks
No failure defined. Testing terminated at 20% axial strain.

Approved

Stephen.Watson

Printed

11/04/2022 16:04

LAB 15R - Version 5





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 R Berriman

(Director) (Quality Manager) (Laboratory Manager)

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

8/

S Royle

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

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



North Irish Sea Array

Contract No:
PSL22/2280
Client Ref:
21-1619

SUMMARY OF THERMAL PROPERTY TESTS

In accordance with ASTM-D5334

Hele	Commis	G1-	Ton	D	Moisture	Bulk	Dry	Thermal	Thermal	
Hole Number	Sample Number	Sample Type	Top Depth	Base Depth	Content %	Density Mg/m ³	Density Mg/m ³	Conductivity	Resistivity	Remarks
rvamber	rvanibei	Турс	m	m	70	IVIg/III	IVI <u>g</u> /III	W/m K	C.cm/W	
TP01	4	В	1.20		19	2.01	1.68	1.893	52.8	
TP02	4	В	1.20		14	2.18	1.91	2.171	46.1	
TP07	5	В	1.20		16	2.14	1.84	2.095	47.7	
TP09	4	В	1.20		21	1.99	1.65	1.662	60.2	
TP20	3	В	1.00		31	1.86	1.42	1.657	60.4	
TP21	3	В	1.00		55	1.60	1.03	1.153	86.8	

		Contract No:
	North Irish Sea Array	PSL22/2280
Professional Cailed about any	North Irish Sea Array	Client Ref:
Professional Soils Laboratory		21-1619



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Registered in Northern Ireland. Company Number: NI610766

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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

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.

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 sub-contracting 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



Summary of Classification Test Results

Project No. Project Name

21-1619

North Irish Sea Array

	010								armay	•				
		Sar	nple			Dens		W	Passing	LL	PL	PΙ	Particle	Casagrande
Hole No.	Ref	Тор	Base	Туре	Soil Description	bulk	dry		425µm				density	Classification
		- '		71		Mg/m	13	%	%	%	%	%	Mg/m3	
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						
ВН06	3	0.30	0.50	В	Greyish brown sandy slightly gravelly silty CLAY.			44.0	90	54	28	26		СН
ВН06	8	1.20		D	Greyish brown sandy slightly gravelly silty CLAY.			14.0	70	30	16	14		CL
вно6	6	2.80	3.00	В	Greyish brown sandy slightly gravelly silty CLAY.			14.0	64	26	15	11		CL
вно6	7	3.80	4.00	В	Greyish brown sandy slightly gravelly silty CLAY.			14.0						
ВН07	3	0.30	0.50	В	Greyish brown sandy slightly gravelly silty CLAY.			31.0						
ВН07	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
ВН07	8	2.00		D	Greyish brown sandy slightly gravelly silty CLAY.			19.0						

All tests performed in accordance with BS1377:1990 unless specified otherwise

LAB 01R Version 5

Key Date Printed Approved By Density test Liquid Limit Particle density Linear measurement unless : 4pt cone unless : sp - small pyknometer 15/04/2022 wd - water displacement cas - Casagrande method gj - gas jar 10122 wi - immersion in water 1pt - single point test Stephen.Watson



Summary of Classification Test Results

Project No. Project Name

21-1619

North Irish Sea Array

21-1619 North Irish Sea Array														
Hole No.			nple		Soil Description	Dens bulk	ity dry	w	Passing 425µm	LL	PL	PI	Particle density	Casagrande Classification
	Ref	Тор	Base	Туре	200 200 April 100	Mg/m		%	%	%	%	%	Mg/m3	Classification
ВН07	6	2.80	3.00	В	Greyish brown sandy slightly gravelly silty CLAY.			14.0						
ВН07	7	3.80	4.00	В	Greyish brown sandy gravelly silty CLAY.			13.0	69	30	15	15		CL

All tests performed in accordance with BS1377:1990 unless specified otherwise

1pt - single point test

wi - immersion in water

LAB 01R Version 5

Key

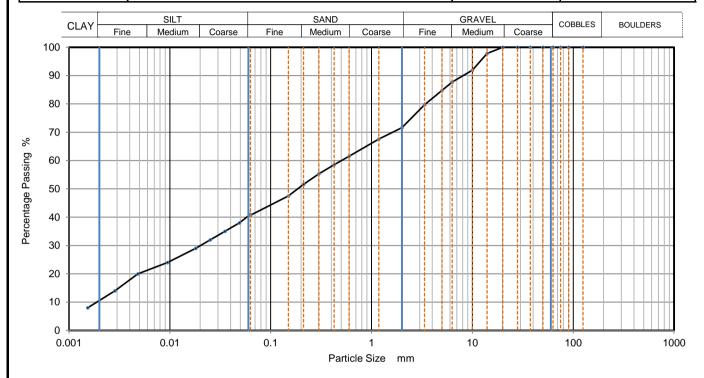
Density test
Liquid Limit
Particle density

Linear measurement unless:
4pt cone unless:
sp - small pyknometer
wd - water displacement
cas - Casagrande method
gj - gas jar

Date Printed
Approved By



CAUSEWAY	PARTICLE SIZE DISTRIBUTION				Job Ref	21-1619
—— GEOTECH					Borehole/Pit No.	вно4
Site Name	North Irish Sea Array	North Irish Sea Array				2
Soil Description	Greyish brown sandy slightly gravelly silty CLAY.				Depth, m	0.80
Specimen Reference	9 Specimen 0.8 m				Sample Type	В
Test Method	3S1377:Part 2:1990, clauses 9.2 and 9.5				KeyLAB ID	Caus202203241



Sievi	ing	Sedimo	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	41
90	100	0.04903	38
75	100	0.03513	35
63	100	0.02517	32
50	100	0.01802	29
37.5	100	0.00948	24
28	100	0.00482	20
20	100	0.00285	14
14	98	0.00153	8
10	92		
6.3	88		
5	85		
3.35	80		
2	72		
1.18	68		
0.6	62	Particle density	(assumed)
0.425	59	2.65	Mg/m3
0.3	55		
0.212	52	1	
0.15	48	1	
0.063	41	1	

Dry Mass of sample, g	501

Sample Proportions	% dry mass		
Cobbles	0.0		
Gravel	28.4		
Sand	30.9		
Silt	30.6		
Clay	10.1		

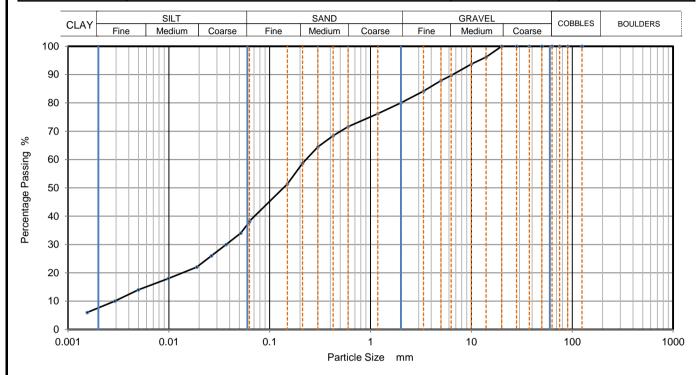
Grading Analysis		
D100	mm	
D60	mm	0.505
D30	mm	0.0209
D10	mm	0.00197
Uniformity Coefficient		260
Curvature Coefficient		0.44

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





CAUSEWAY	PARTICLE SIZE DISTRIBUTION				Job Ref	21-1619
—— GEOTECH					Borehole/Pit No.	ВН04
Site Name	North Irish Sea Array	North Irish Sea Array				3
Soil Description	Greyish brown sandy slightly gravelly silty CLAY.				Depth, m	1.80
Specimen Reference	6 Specimen 1.8 m				Sample Type	В
Test Method	3S1377:Part 2:1990, clauses 9.2 and 9.5				KeyLAB ID	Caus202203243



Sievi	ng	Sedimo	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	38
90	100	0.05160	34
75	100	0.03693	30
63	100	0.02642	26
50	100	0.01890	22
37.5	100	0.00987	18
28	100	0.00499	14
20	100	0.00291	10
14	96	0.00155	6
10	94		
6.3	90		
5	88		
3.35	84		
2	80		
1.18	76		
0.6	72	Particle density	(assumed)
0.425	68	2.65	Mg/m3
0.3	65		
0.212	59	1	
0.15	51	1	
0.063	38	1	

Dry Mass of sample, g	506
	•

Sample Proportions	% dry mass		
Cobbles	0.0		
Gravel	20.0		
Sand	41.8		
Silt	30.5		
Clay	7.7		

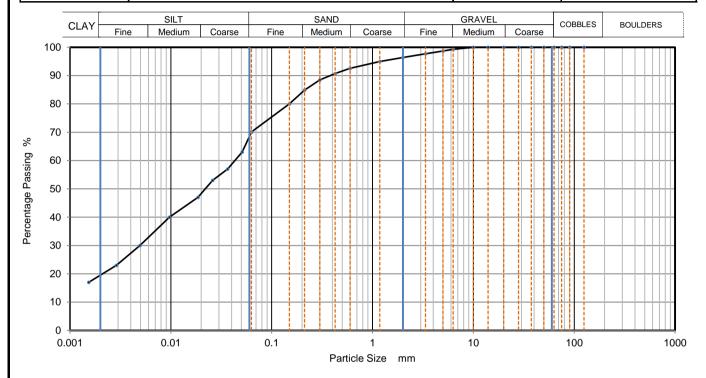
Grading Analysis		
D100	mm	
D60	mm	0.23
D30	mm	0.0364
D10	mm	0.00289
Uniformity Coefficient		80
Curvature Coefficient		2

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





CAUSEWAY	PARTICLE SIZE DISTRIBUTION				Job Ref	21-1619
—— GEOTECH					Borehole/Pit No.	вно6
Site Name	North Irish Sea Array	North Irish Sea Array				3
Soil Description	Greyish brown sandy slightly gravelly silty CLAY.				Depth, m	0.30
Specimen Reference	9 Specimen 0.3 m				Sample Type	В
Test Method	3S1377:Part 2:1990, clauses 9.2 and 9.5				KeyLAB ID	Caus202203244



Sieving		Sedimo	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	70
90	100	0.05097	63
75	100	0.03649	57
63	100	0.02596	53
50	100	0.01857	47
37.5	100	0.00970	40
28	100	0.00493	30
20	100	0.00288	23
14	100	0.00153	17
10	100		
6.3	99		
5	99		
3.35	98		
2	96		
1.18	95		
0.6	93	Particle density	(assumed)
0.425	91	2.65	Mg/m3
0.3	89		
0.212	85	1	
0.15	80	1	
0.063	70	1	

Dry Mass of sample, g	501
·	

Sample Proportions	% dry mass		
Cobbles	0.0		
Gravel	3.6		
Sand	26.3		
Silt	50.6		
Clay	19.5		

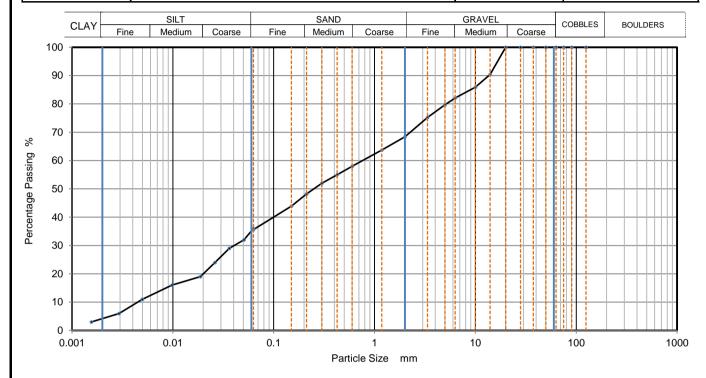
Grading Analysis		
D100	mm	
D60	mm	0.0429
D30	mm	0.00492
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

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





CAUSEWAY	PARTICLE SIZE DISTRIBUTION -		Job Ref	21-1619	
—— GEOTECH			Borehole/Pit No.	вно6	
Site Name	North Irish Sea Array			Sample No.	6
Soil Description	Greyish brown sandy slightly gravelly silty CLAY.			Depth, m	2.80
Specimen Reference	9 Specimen 2.8 m		Sample Type	В	
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus202203247



Sieving		Sedimo	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	36
90	100	0.05065	32
75	100	0.03627	29
63	100	0.02611	24
50	100	0.01879	19
37.5	100	0.00981	16
28	100	0.00499	11
20	100	0.00293	6
14	90	0.00156	3
10	86		
6.3	82		
5	80		
3.35	75		
2	68		
1.18	64		
0.6	58	Particle density	(assumed)
0.425	55	2.65	Mg/m3
0.3	52		
0.212	48		
0.15	44		
0.063	36		

Dry Mass of sample, g	509

Sample Proportions	% dry mass		
Cobbles	0.0		
Gravel	31.6		
Sand	32.8		
Silt	31.1		
Clay	4.5		

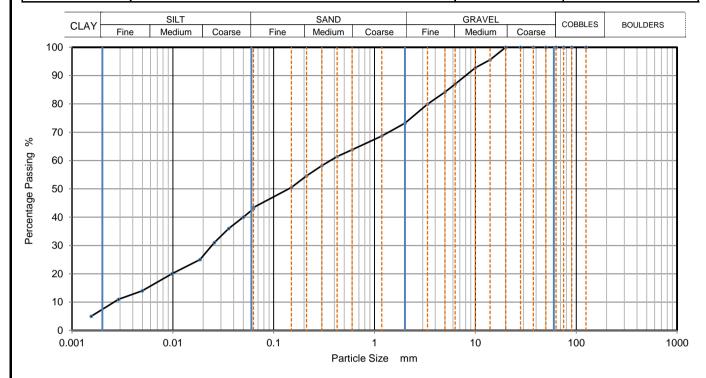
Grading Analysis		
D100	mm	
D60	mm	0.765
D30	mm	0.0397
D10	mm	0.00431
Uniformity Coefficient		180
Curvature Coefficient		0.48

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





CAUSEWAY	PARTICLE SIZE DISTRIBUTION		Job Ref	21-1619	
GEOTECH	PARTICLE SIZE DISTRIBUTION			Borehole/Pit No.	вно7
Site Name	North Irish Sea Array			Sample No.	5
Soil Description	Greyish brown sandy gravelly silty CLAY.			Depth, m	1.80
Specimen Reference	7 Specimen 1.8 m		Sample Type	В	
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2022032411



Sieving		Sedimo	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	43
90	100	0.05001	40
75	100	0.03582	36
63	100	0.02580	31
50	100	0.01857	25
37.5	100	0.00976	20
28	100	0.00496	14
20	100	0.00290	11
14	96	0.00155	5
10	93		
6.3	87		
5	84		
3.35	80		
2	73		
1.18	69		
0.6	64	Particle density	(assumed)
0.425	61	2.65	Mg/m3
0.3	58		
0.212	55	1	
0.15	51	1	
0.063	43	1	

Dry Mass of sample, g	508	
nple Proportions	% dry mass	
phlos	0.0	

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	26.8
Sand	29.7
Silt	35.9
Clay	7.6

Grading Analysis		
D100	mm	
D60	mm	0.365
D30	mm	0.0247
D10	mm	0.00262
Uniformity Coefficient		140
Curvature Coefficient		0.63

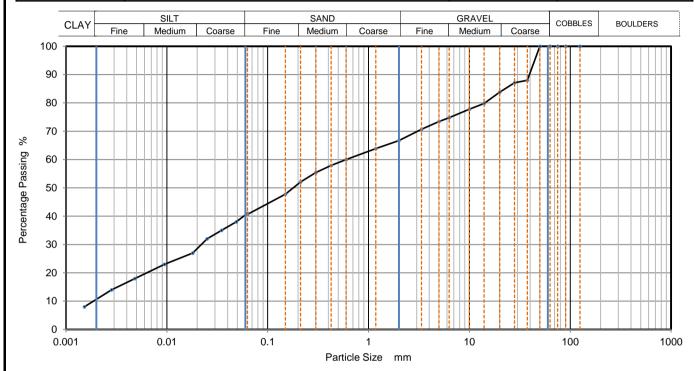
Preparation and testing in accordance with BS1377-2:1990 unless noted below





LAB 05R - Version 5

CAUSEWAY	PARTI	Job Ref	21-1619		
—— GEOTECH	PANII	Borehole/Pit No.	ВН07		
Site Name	North Irish Sea Array			Sample No.	7
Soil Description	Greyish brown sandy slig	htly gravelly silty CL	AY.	Depth, m	3.80
Specimen Reference	9	Specimen Depth	3.8	Sample Type	В
Test Method	BS1377:Part 2:1990, clau	ses 9.2 and 9.5		KeyLAB ID	Caus2022032414



Sievi	ng	Sedimentation					
Particle Size mm	% Passing	Particle Size mm	% Passing				
125	100	0.06300	41				
90	100	0.04875	38				
75	100	0.03492	35				
63	100	0.02501	32				
50	100	0.01802	27				
37.5	88	0.00947	23				
28	87	0.00482	18				
20	84	0.00283	14				
14	80	0.00152	8				
10	78						
6.3	75						
5	73						
3.35	71						
2	67						
1.18	64						
0.6	60	Particle density	(assumed)				
0.425	58	2.65	Mg/m3				
0.3	55						
0.212	52	1					
0.15	48	1					
0.063	41	1					

Dry Mass of sample, g	2866					
Sample Proportions	% dry mass					
Cobbles	0.0					
Gravel	33.3					
Sand	26.1					
Silt	30.4					

10.2

Grading Analysis		
D100	mm	
D60	mm	0.601
D30	mm	0.0223
D10	mm	0.00196
Uniformity Coefficient		310
Curvature Coefficient		0.42

Remarks

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





LAB 05R - Version 5



Eurofins Chemtest Ltd Depot Road Newmarket CB8 0AL

Chemtest

Tel: 01638 606070 Email: info@chemtest.com

Final Report

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:

Details: Stuart Henderson, Technical

Manager



Eurofins Chemtest Ltd Depot Road Newmarket CB8 0AL

Tel: 01638 606070 Email: info@chemtest.com

Results - Soil

Project: 21-1619 North Irish Sea Array

Client: Causeway Geotech Ltd	Chemtest Job No.:			22-12440	22-12440	22-12440	
Quotation No.:	Chemtest Sample		ple ID.:	1403841	1403842	1403843	
Order No.:	Client Sampl		le Ref.:	2	4	7	
	Sample Location:		BH04	BH06	BH07		
	Sample Type:			SOIL	SOIL	SOIL	
	Top Depth (m):				0.8	0.8	3.8
			Date Sa	ampled:	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		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 **UKAS** accredited MCERTS and UKAS accredited M Unaccredited Ν This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for S this analysis This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited SN 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 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: customerservices@chemtest.com



HEAD OFFICE Causeway Geotech Ltd

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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

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.

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 sub-contracting 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



Summary of Classification Test Results

Project No.

Project Name

21-1619

North Irish Sea Array

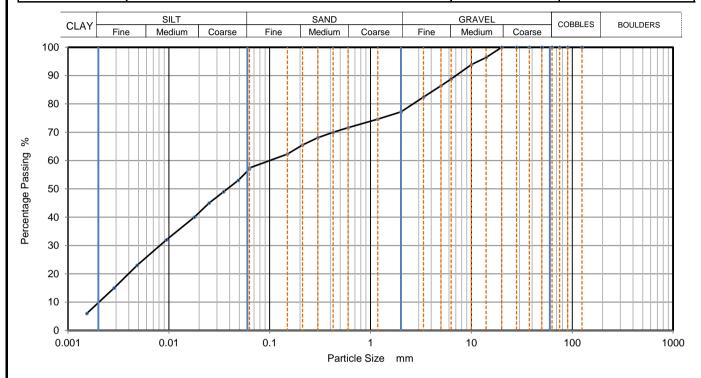
Hole No. Ref Top Base Type Soil Description Density Majora % % % % % % % % %	211									armay			1		
BH05 3 0.30 0.50 B Brown sandy slightly gravely silty 23.0 72 43 22 21 CI	Hole No.				L	Soil Description			W	Passing 425µm	LL	PL	PI	Particle density	Classification
BH05		Ref	Тор	Base	Туре	·	Mg/m	3	%	%	%	%	%	Mg/m3	Classification
BH05 6 2.80 3.00 B Strown sandy slightly gravelly silty 12.0 58 31 16 15 CL	BH05	3	0.30	0.50	В				23.0	72	43	22	21		CI
BH05	BH05	5	1.80	2.00	В				15.0	71	31	15	16		CL
BH05	BH05	6	2.80	3.00	В				12.0	58	31	16	15		CL
BH05	BH05	14	3.00	3.45	U				13.0	60	27	15	12		CL
BH16	BH05	8	4.80	5.00	В	Brown sandy slightly gravelly silty CLAY.			14.0						
BH16	BH05	15	6.00	6.45	U				13.0	67	29	15	14		CL
BH16 7 3.80 4.00 B Greyish brown sandy slightly gravelly silty CLAY. BH16 14 6.00 6.45 U Greyish brown sandy slightly gravelly silty CLAY. BH16 15 0.00 0.45 U Greyish brown sandy slightly gravelly silty CLAY. BH16 16 0.00 0.45 U Greyish brown sandy slightly gravelly silty CLAY.	BH16	3	0.30	0.50	В				25.0	82	40	22	18		СІ
BH16	BH16	5	1.80	2.00	В				15.0	74	31	18	13		CL
9.8 65 25 14 11 CL	BH16	7	3.80	4.00	В				13.0	69	28	15	13		CL
	BH16	14	6.00	6.45	U				9.8	65	25	14	11		CL
	BH16	15	9.00	9.45	U				10.0	63	25	14	11		CL

All tests performed in accordance with BS1377:1990 unless specified otherwise

LAB 01R Version 5

Key Date Printed Approved By Density test Liquid Limit Particle density Linear measurement unless : 4pt cone unless : sp - small pyknometer 15/04/2022 wd - water displacement cas - Casagrande method gj - gas jar 10122 wi - immersion in water 1pt - single point test Stephen.Watson

CAUSEWAY	DADTICI E CIZE DISTRIBILITIONI				Job Ref	21-1619
—— GEOTECH	PARTICLE SIZE DISTRIBUTION –			Borehole/Pit No.	вн05	
Site Name	North Irish Sea Array	Jorth Irish Sea Array			Sample No.	3
Soil Description	Brown sandy slightly gr	Brown sandy slightly gravelly silty CLAY.			Depth, m	0.30
Specimen Reference	6	6 Specimen 0.3 m			Sample Type	В
Test Method	BS1377:Part 2:1990, cla	uses 9.2 and 9.5			KeyLAB ID	Caus202203298



Sievi	ing	Sedimo	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	57
90	100	0.04875	53
75	100	0.03492	49
63	100	0.02501	45
50	100	0.01791	40
37.5	100	0.00947	32
28	100	0.00485	23
20	100	0.00286	15
14	96	0.00154	6
10	94		
6.3	89		
5	86		
3.35	82		
2	77		
1.18	75		
0.6	72	Particle density	(assumed)
0.425	70	2.65	Mg/m3
0.3	68		
0.212	66	1	
0.15	62	1	
0.063	57	1	

Dry Mass of sample, g	503

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	22.8
Sand	19.8
Silt	47.4
Clay	10.0

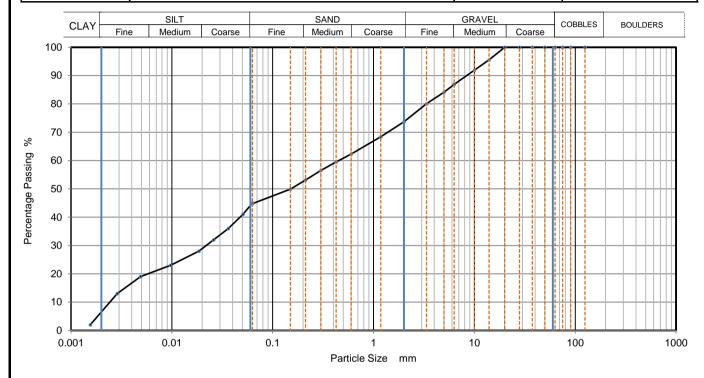
Grading Analysis		
D100	mm	
D60	mm	0.0996
D30	mm	0.00816
D10	mm	0.002
Uniformity Coefficient		50
Curvature Coefficient		0.33

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





CAUSEWAY	CAUSEWAY PARTICLE SIZE DISTRIBUTION			Job Ref	21-1619	
—— GEOTECH	PANII	CLE SIZE DIST	IKIBOTION		Borehole/Pit No.	ВН05
Site Name	North Irish Sea Array	North Irish Sea Array			Sample No.	5
Soil Description	Brown sandy slightly gravelly silty CLAY.			Depth, m	1.80	
Specimen Reference	6 Specimen 1.8 m			Sample Type	В	
Test Method	BS1377:Part 2:1990, clau	ses 9.2 and 9.5			KeyLAB ID	Caus202203299



Siev	ving	Sedim	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	45
90	100	0.05065	41
75	100	0.03625	36
63	100	0.02594	32
50	100	0.01855	28
37.5	100	0.00969	23
28	100	0.00490	19
20	100	0.00287	13
14	96	0.00155	2
10	92		
6.3	87		
5	84		
3.35	80		
2	74		
1.18	68		
0.6	62	Particle density	(assumed)
0.425	60	2.65	Mg/m3
0.3	57		
0.212	53		
0.15	50		
0.063	45		

Dry Mass of sample, g	508
	- 4 .

Sample Proportions	% dry mass		
Cobbles	0.0		
Gravel	26.3		
Sand	28.9		
Silt	38.3		
Clay	6.5		

Grading Analysis		
D100	mm	
D60	mm	0.451
D30	mm	0.0222
D10	mm	0.00245
Uniformity Coefficient		180
Curvature Coefficient		0.45

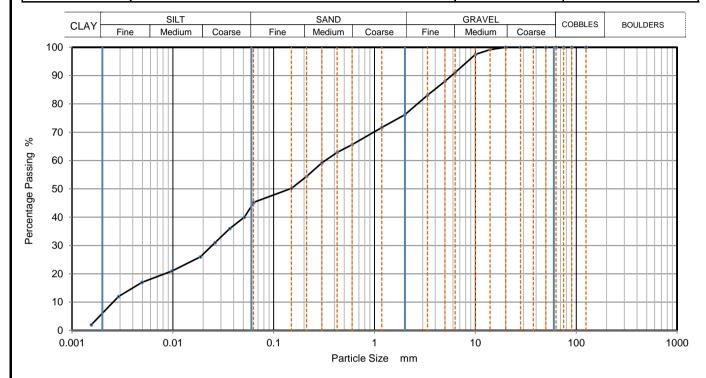
Preparation and testing in accordance with BS1377-2:1990 unless noted below





LAB 05R - Version 5

CAUSEWAY	PARTICLE SIZE DISTRIBUTION			Job Ref	21-1619	
GEOTECH GEOTECH	PAN	ICLE SIZE DIS	LE SIZE DISTRIBUTION -			BH05
Site Name	North Irish Sea Array	North Irish Sea Array			Sample No.	6
Soil Description	Brown sandy slightly gravelly silty CLAY.			Depth, m	2.80	
Specimen Reference	6	6 Specimen 2.8 m			Sample Type	В
Test Method	BS1377:Part 2:1990, cla	nuses 9.2 and 9.5			KeyLAB ID	Caus2022032910



Sievi	ing	Sedimentation		
Particle Size mm	% Passing	Particle Size mm	% Passing	
125	100	0.06300	45	
90	100	0.05127	40	
75	100	0.03668	36	
63	100	0.02624	31	
50	100	0.01877	26	
37.5	100	0.00980	21	
28	100	0.00495	17	
20	100	0.00289	12	
14	99	0.00155	2	
10	98			
6.3	91			
5	88			
3.35	83			
2	76			
1.18	72			
0.6	66	Particle density	(assumed)	
0.425	63	2.65	Mg/m3	
0.3	59			
0.212	54	1		
0.15	50	1		
0.063	45	1		

Dry Mass of sample, g	501
•	

Sample Proportions % dry mass	
Cobbles	0.0
Gravel	23.8
Sand	31.1
Silt	38.8
Clay	6.3

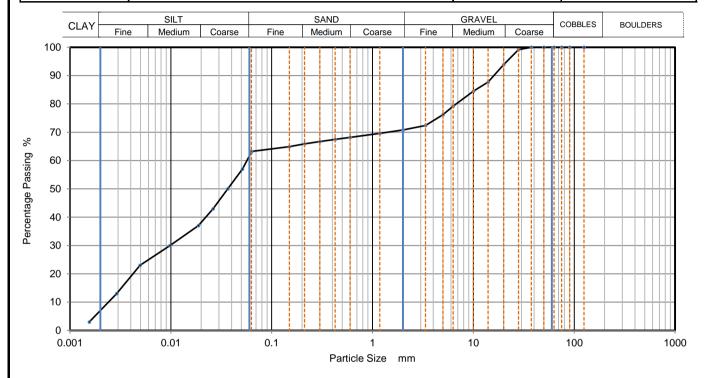
Grading Analysis		
D100	mm	
D60	mm	0.324
D30	mm	0.0246
D10	mm	0.00255
Uniformity Coefficient		130
Curvature Coefficient		0.73

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





CAUSEWAY	PARTICLE SIZE DISTRIBUTION		Job Ref	21-1619	
—— GEOTECH	PANII	PARTICLE SIZE DISTRIBUTION		Borehole/Pit No.	вн05
Site Name	North Irish Sea Array			Sample No.	14
Soil Description	Brown slightly sandy gravelly silty CLAY.			Depth, m	3.00
Specimen Reference	7 Specimen 3 m			Sample Type	U
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2022032911



Sieving		Sedim	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	63
90	100	0.05127	57
75	100	0.03668	50
63	100	0.02624	43
50	100	0.01877	37
37.5	100	0.00980	30
28	99	0.00495	23
20	94	0.00290	13
14	88	0.00155	3
10	85		
6.3	79		
5	76		
3.35	72		
2	71		
1.18	70		
0.6	68	Particle density	(assumed)
0.425	68	2.65	Mg/m3
0.3	67		
0.212	66	1	
0.15	65	1	
0.063	63	1	

Dry Mass of sample, g	2785
•	

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	29.2
Sand	7.6
Silt	55.8
Clay	7.4

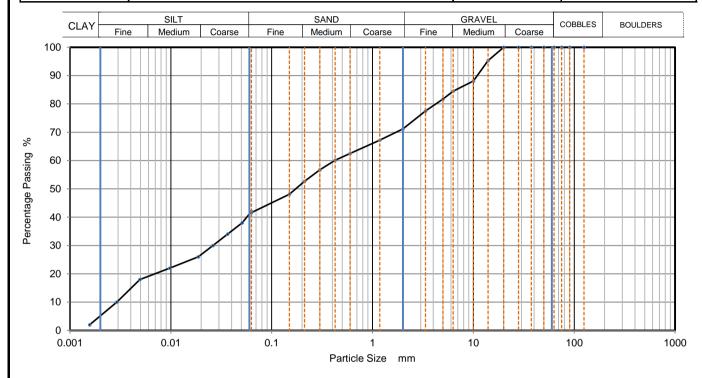
Grading Analysis		
D100	mm	
D60	mm	0.057
D30	mm	0.00986
D10	mm	0.00236
Uniformity Coefficient		24
Curvature Coefficient		0.72

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





CAUSEWAY	PARTICLE SIZE DISTRIBUTION		Job Ref	21-1619	
GEOTECH			Borehole/Pit No.	вно5	
Site Name	North Irish Sea Array			Sample No.	15
Soil Description	Brown sandy slightly gravelly silty CLAY.			Depth, m	6.00
Specimen Reference	6 Specimen 6 m			Sample Type	U
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2022032913



Sieving		Sedimo	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	42
90	100	0.05097	38
75	100	0.03649	34
63	100	0.02611	30
50	100	0.01868	26
37.5	100	0.00976	22
28	100	0.00493	18
20	100	0.00291	10
14	95	0.00156	2
10	88		
6.3	85		
5	82		
3.35	78		
2	71		
1.18	67		
0.6	63	Particle density	(assumed)
0.425	60	2.65	Mg/m3
0.3	57		
0.212	53	1	
0.15	48	1	
0.063	42	1	

Dry Mass of sample, g	506

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	28.8
Sand	29.6
Silt	36.5
Clay	5.1

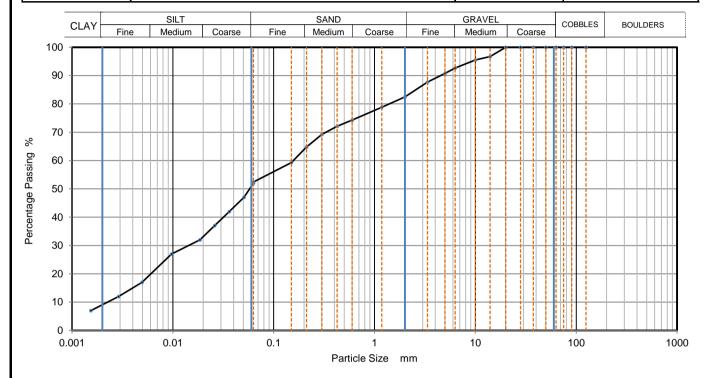
Grading Analysis		
D100	mm	
D60	mm	0.422
D30	mm	0.0267
D10	mm	0.00293
Uniformity Coefficient		140
Curvature Coefficient		0.58

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





CAUSEWAY	PARTICLE SIZE DISTRIBUTION -		Job Ref	21-1619		
— БЕОТЕСН	PAN	TICLE SIZE DISTRIBUTION		Borehole/Pit No.	BH16	
Site Name	North Irish Sea Array	North Irish Sea Array			Sample No.	3
Soil Description	Brown sandy slightly gravelly silty CLAY.			Depth, m	0.30	
Specimen Reference	6 Specimen 0.3 m			Sample Type	В	
Test Method	BS1377:Part 2:1990, cla	nuses 9.2 and 9.5			KeyLAB ID	Caus2022032914



Sieving		Sedimo	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	52
90	100	0.05065	47
75	100	0.03625	42
63	100	0.02594	37
50	100	0.01855	32
37.5	100	0.00969	27
28	100	0.00495	17
20	100	0.00289	12
14	97	0.00154	7
10	96		
6.3	93		
5	91		
3.35	88		
2	83		
1.18	79		
0.6	74	Particle density	(assumed)
0.425	72	2.65	Mg/m3
0.3	69		_
0.212	65		
0.15	59		
0.063	52		

Dry Mass of sample, g	508

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	17.5
Sand	30.0
Silt	42.9
Clay	9.6

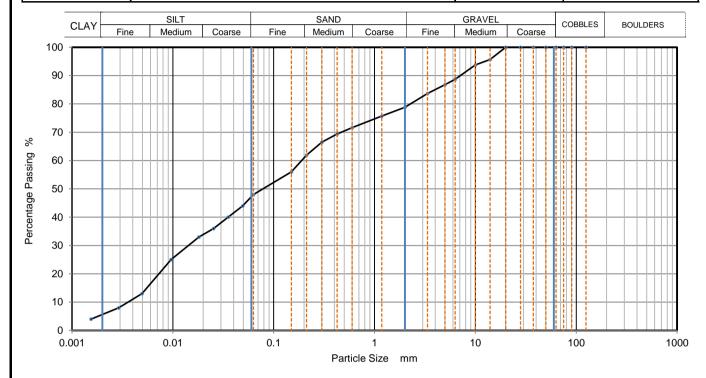
Grading Analysis		
D100	mm	
D60	mm	0.157
D30	mm	0.0135
D10	mm	0.00211
Uniformity Coefficient		74
Curvature Coefficient		0.55

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





CAUSEWAY	PARTICLE SIZE DISTRIBUTION -		Job Ref	21-1619		
GEOTECH GEOTECH	PANI	TICLE SIZE DISTRIBUTION		Borehole/Pit No.	BH16	
Site Name	North Irish Sea Array	North Irish Sea Array			Sample No.	5
Soil Description	Brown sandy slightly gravelly silty CLAY.			Depth, m	1.80	
Specimen Reference	6 Specimen 1.8 m			Sample Type	В	
Test Method	BS1377:Part 2:1990, cla	nuses 9.2 and 9.5			KeyLAB ID	Caus2022032915



Siev	/ing	Sedimo	entation
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	36
50	100	0.01813	33
37.5	100	0.00958	25
28	100	0.00495	13
20	100	0.00290	8
14	96	0.00154	4
10	94		
6.3	89		
5	87		
3.35	84		
2	79		
1.18	76		
0.6	72	Particle density	(assumed)
0.425	69	2.65	Mg/m3
0.3	67		
0.212	62		
0.15	56		
0.063	48		

Dry Mass of sample, g	506

Sample Proportions	% dry mass		
Cobbles	0.0		
Gravel	21.2		
Sand	30.8		
Silt	42.6		
Clay	5.4		

Grading Analysis		
D100	mm	
D60	mm	0.19
D30	mm	0.0146
D10	mm	0.0036
Uniformity Coefficient		53
Curvature Coefficient		0.31

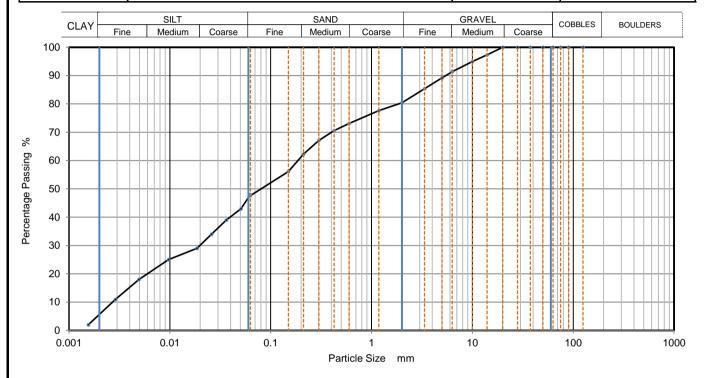
Preparation and testing in accordance with BS1377-2:1990 unless noted below





LAB 05R - Version 5

CAUSEWAY	PARTICLE SIZE DISTRIBUTION -		Job Ref	21-1619		
—— GEOTECH	PANII	ICLE SIZE DISTRIBUTION -		Borehole/Pit No.	BH16	
Site Name	North Irish Sea Array	North Irish Sea Array			Sample No.	7
Soil Description	Greyish brown sandy slightly gravelly silty CLAY.			Depth, m	3.80	
Specimen Reference	6 Specimen 3.8 m			Sample Type	В	
Test Method	<u> </u>			KeyLAB ID	Caus2022032916	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	48
90	100	0.05065	43
75	100	0.03625	39
63	100	0.02594	34
50	100	0.01855	29
37.5	100	0.00969	25
28	100	0.00493	18
20	100	0.00289	11
14	97	0.00155	2
10	95		
6.3	91		
5	89		
3.35	85		
2	80		
1.18	78		
0.6	73	Particle density	(assumed)
0.425	71	2.65	Mg/m3
0.3	67		
0.212	62		
0.15	56		
0.063	48		

Dry Mass of sample, g	506

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	19.6
Sand	32.8
Silt	41.6
Clay	6.0

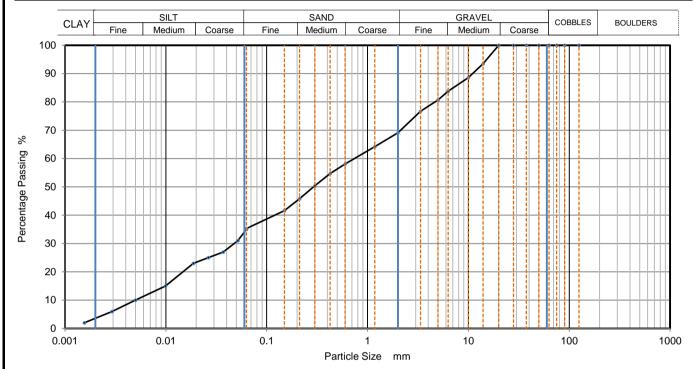
Grading Analysis		
D100	mm	
D60	mm	0.186
D30	mm	0.0193
D10	mm	0.00264
Uniformity Coefficient		71
Curvature Coefficient		0.76

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





CAUSEWAY	PARTICLE SIZE DISTRIBUTION		Job Ref	21-1619		
—— GEOTECH			Borehole/Pit No.	BH16		
Site Name	North Irish Sea Array			Sample No.	14	
Soil Description	Greyish brown sandy slightly gravelly silty CLAY.			Depth, m	6.00	
Specimen Reference	7	Specimen Depth	6	m	Sample Type	U
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2022032918	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	35
90	100	0.05188	31
75	100	0.03711	27
63	100	0.02639	25
50	100	0.01877	23
37.5	100	0.00990	15
28	100	0.00501	10
20	100	0.00292	6
14	94	0.00155	2
10	89		
6.3	84		
5	81		
3.35	77		
2	69		
1.18	64		
0.6	58	Particle density	(assumed)
0.425	55	2.65	Mg/m3
0.3	50		
0.212	46		
0.15	42		
0.063	35		

Dry Mass of sample, g	506
•	

Sample Proportions	% dry mass	
Cobbles	0.0	
Gravel	30.9	
Sand	33.8	
Silt	31.6	
Clay	3.7	

Grading Analysis		
D100	mm	
D60	mm	0.739
D30	mm	0.0473
D10	mm	0.00476
Uniformity Coefficient		160
Curvature Coefficient		0.64

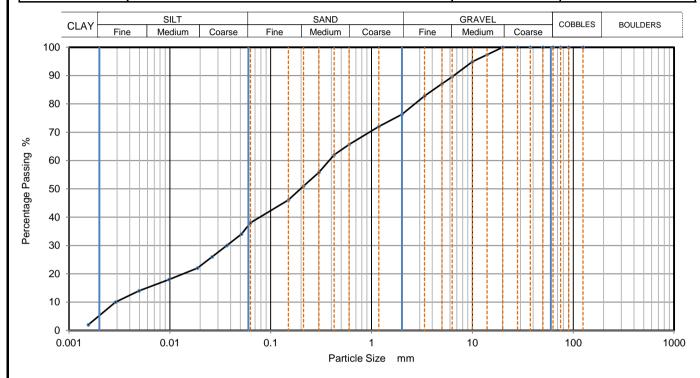
Preparation and testing in accordance with BS1377-2:1990 unless noted below





LAB 05R - Version 5

CAUSEWAY PARTICLE SIZE DISTRIBUTION			Job Ref	21-1619		
GEOTECH GEOTECH	PANI	ARTICLE SIZE DISTRIBUTION			Borehole/Pit No.	BH16
Site Name	North Irish Sea Array	North Irish Sea Array				15
Soil Description	Greyish brown sandy slightly gravelly silty CLAY.				Depth, m	9.00
Specimen Reference	6 Specimen 9 m			Sample Type	U	
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2022032919	



Siev	/ing	Sedimentation			
Particle Size mm	% Passing	Particle Size mm	% Passing		
125	100	0.06300	38		
90	100	0.05127	34		
75	100	0.03668	30		
63	100	0.02624	26		
50	100	0.01877	22		
37.5	100	0.00980	18		
28	100	0.00495	14		
20	100	0.00289	10		
14	97	0.00155	2		
10	95				
6.3	90				
5	87				
3.35	83				
2	76				
1.18	72				
0.6	66	Particle density	(assumed)		
0.425	62	2.65	Mg/m3		
0.3	56		_		
0.212	51				
0.15	46				
0.063	38				

Dry Mass of sample, g	509

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	23.7
Sand	38.2
Silt	32.8
Clay	5.3

Grading Analysis		
D100	mm	
D60	mm	0.38
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

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





	_							ī		
CAUSEWAY GEOTECH	Unconsolidate Compression					Job Ref			21-1619)
——— GEOTECH	of pore press					Borehole/P	it No.		BH05	
Site Name	North Irish Sea Arra	у				Sample No.			14	
Soil Description	Brown slightly sandy		AY.			Depth			3.00	
Specimen Reference	8	Specimen Depth	3.0)5 ı	m	Sample Typ	oe		U	
Specimen Description	Stiff brown slightly sa	tiff brown slightly sandy gravelly silty CLAY. KeyLAB ID Caus2022032911					2911			
Test Method	BS1377 : Part 7 : 19	90, clause 8, sin	gle specime	n		Date of test	İ		04/04/202	22
	Diameter 104.3 Bulk Density 2.19 Moisture Content 11						mm mm Mg/m3 % Mg/m3			
	Rate of Strain					4.0		%/min		
	Cell Pressure At failure	Axial Strain				70 18.0		kPa %		
	Attailute	Deviator Stress				158		kPa	·	
		Undrained Shea Mode of Failure	-	cu		79 Compoi	ınd	kPa ⅓	(σ1 - σ3))†
Deviator Stress v A	Axial Strain									
300										
250										
ω 200 -										
ed Deviator Stress kPa										
viato • 150 •	- 200	-	-		-					
өд р _ө 100 •					\dashv					
Correction 20										
0 2	4 6 8	10 12	14 1	6 18	20) 22	24	26	28 3	30 32
Mohr Circles			Axial S	Strain %						
150								for area	r stress co change a ane effects	nd
Shear Strength kPa								interpret by BS13 This is p		ot covered
25 0 25	50 75 100	125 150		000 225	25	50 275	300			d
Remarks		Normal Stres	Approved		P	rinted		7		⊁ ≰) ▮
			Stephen.	Watson		15/04/2022	10:11			KAS ESTING
			14		L	LAB 15R - Version 5 10122			0122	

4.5	Unconsolidate	ed Undraine	ed Triaxial		Job Ref			21-1619	
CAUSEWAY ——GEOTECH	Compression of pore press			ent	Borehole/Pi	t No.		BH16	
Site Name	North Irish Sea Arra		оросинон		Sample No.			14	
Soil Description	Greyish brown sand	y slightly gravelly	silty CLAY.		Depth			6.00	
Specimen Reference	8	Specimen Depth	6.05	m	Sample Typ	е		U	
Specimen Description	Firm greyish brown	•	velly silty CLAY.		KeyLAB ID	KeyLAB ID Caus2022032918			
Test Method	BS1377 : Part 7 : 19	90, clause 8, sin	gle specimen		Date of test		(04/04/2022	2
Diameter 105.4 Bulk Density 2.28 Moisture Content 14						mm mm Mg/m3 % Mg/m3			
	Rate of Strain Cell Pressure At failure	Axial Strain Deviator Stress Undrained Shea Mode of Failure	ar Strength, cu		4.0 140 16.8 144 72 Plastio		%/min kPa % kPa kPa ½(σ1-σ3)f		
Deviator Stress v A	xial Strain								
300									
250									
ed Deviator Stress kPa									
tg. 150 -			0	—					
d Devis	000000000000000000000000000000000000000	•							
Lect Lect									
Š 50									
0 0 2	4 6 8	10 12	14 16	18 2	20 22	24	26	28 30	32
Mohr Circles			Axial Strain ^o	%					
150								stress corr change and ne effects	
Shear Strength KPa 25 - 25							interpreta by BS137	ovided for	
0 0 25 Remarks	50 75 100	125 150 Normal Stres		n [250 275 Printed 15/04/2022 LAB 15R - Ve]		AS STING



eurofins Chemtest

Eurofins Chemtest Ltd Depot Road Newmarket CB8 0AL

Tel: 01638 606070 Email: info@chemtest.com

Final Report

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

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Darren O'Mahony
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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:

Details: Stuart Henderson, Technical

Manager



Eurofins Chemtest Ltd Depot Road Newmarket CB8 0AL

Tel: 01638 606070 Email: info@chemtest.com

Results - Soil

Project: 21-1619 North Irish Sea Array

Client: Causeway Geotech Ltd		Cher	ntest J	ob 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		
		Sa	ample Lo	ocation:	BH05	BH05	BH16	BH16
			Sampl	е Туре:	SOIL	SOIL	SOIL	SOIL
			Top De	oth (m):	0.3	1.8	1.8	4.8
			Date Sa	ampled:	31-Mar-2022	31-Mar-2022	31-Mar-2022	31-Mar-2022
Determinand	Accred.	SOP	Units	LOD				
Moisture	N	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 **UKAS** accredited MCERTS and UKAS accredited M Unaccredited Ν This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for S this analysis This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited SN 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 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: customerservices@chemtest.com



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

20 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 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 sub-contracting 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



Summary of Classification Test Results

Project No.

Project Name

21-1	1619		North Irish Sea Array											
21-	1013		<u> </u>											
Hole No.	Ref	Top	mple Base	Туре	Soil Description	Dens bulk	ity dry	W	Passing 425µm	LL	PL	PI	Particle density	Casagrande Classification
	Kei	тор	base	туре		Mg/m	13	%	%	%	%	%	Mg/m3	Ciacomeanori
BH09	3	0.30	0.50	В	Brown sandy slightly gravelly silty CLAY.			22.0	81	30	18	12		CL
BH09	5	1.80	2.00	В	Brown sandy slightly gravelly silty CLAY.			14.0	77	25	15	10		CL
BH09	10	3.00		D	Brown sandy slightly gravelly silty CLAY.			8.0						
ВН09	6	3.80	4.00	В	Brown sandy gravelly silty CLAY.			11.0	58	25	14	11		CL
ВН09	7	4.80	5.00	В	Brown sandy slightly gravelly silty CLAY.			12.0						
BH09	8	5.80	6.00	В	Brown sandy clayey subangular fine to coarse GRAVEL.			6.2	53	24	13	11		CL
BH15	4	0.80	1.00	В	Brown sandy slightly gravelly silty CLAY.			16.0	69	33	18	15		CL
BH15	5	1.80	2.00	В	Greyish brown sandy slightly gravelly silty CLAY.			14.0						
BH15	6	2.80	3.00	В	Greyish brown sandy slightly gravelly silty CLAY.			14.0	70	28	16	12		CL
BH15	7	3.80	4.00	В	Greyish brown sandy slightly gravelly silty CLAY.			16.0						

All tests performed in accordance with BS1377:1990 unless specified otherwise

В

В

BH15

BH15

4.80

5.80

5.00

6.00

Greyish brown sandy slightly

Greyish brown sandy slightly

gravelly silty CLAY.

gravelly silty CLAY.

LAB 01R Version 5

Key Date Printed Approved By Density test Liquid Limit Particle density Linear measurement unless : 4pt cone unless : sp - small pyknometer 20/04/2022 wd - water displacement cas - Casagrande method gj - gas jar 10122 wi - immersion in water 1pt - single point test Stephen.Watson

15.0

15.0

70

27

14 13





Summary of Classification Test Results

Project No. Project Name

21-1619

North Irish Sea Array

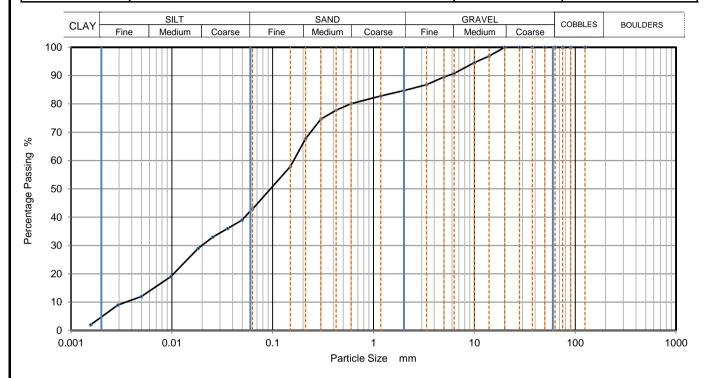
21-1	619		North Irish Sea Array											
Hole No.		Sar	nple		Soil Description	Dens bulk	ity dry	W Passing 425µm		LL	PL	PI	Particle density	Casagrande Classification
TIOIE NO.	Ref	Тор	Base	Туре	Soil Description	Mg/m		%	%	%	%	%	Mg/m3	Classification
BH15	18	6.00	6.45	U	Greyish brown sandy slightly gravelly silty CLAY.			14.0	65	28	14	14		CL
BH15	16	8.00		D	Greyish brown sandy slightly gravelly silty CLAY.			15.0						
	· · ·				I.									

All tests performed in accordance with BS1377:1990 unless specified otherwise

LAB 01R Version 5

Key Date Printed Approved By Density test Liquid Limit Particle density Linear measurement unless : 4pt cone unless : sp - small pyknometer 20/04/2022 wd - water displacement cas - Casagrande method gj - gas jar 10122 wi - immersion in water 1pt - single point test Stephen.Watson

CAUSEWAY PARTICLE SIZE DISTRIBUTION -			Job Ref	21-1619		
— GEOTECH	PANII	PARTICLE SIZE DISTRIBUTION				вн09
Site Name	North Irish Sea Array	Iorth Irish Sea Array				3
Soil Description	Brown sandy slightly grav	Brown sandy slightly gravelly silty CLAY.				0.30
Specimen Reference	6 Specimen 0.3 m			Sample Type	В	
Test Method	3S1377:Part 2:1990, clauses 9.2 and 9.5				KeyLAB ID	Caus2022032920



Siev	ving	Sedimentation			
Particle Size mm	% Passing	Particle Size mm	% Passing		
125	100	0.06300	43		
90	100	0.04969	39		
75	100	0.03559	36		
63	100	0.02549	33		
50	100	0.01824	29		
37.5	100	0.00976	19		
28	100	0.00499	12		
20	100	0.00291	9		
14	97	0.00156	2		
10	95				
6.3	91				
5	90				
3.35	87				
2	85				
1.18	83				
0.6	80	Particle density	(assumed)		
0.425	78	2.65	Mg/m3		
0.3	75				
0.212	68				
0.15	58				
0.063	43				

Dry Mass of sample, g	506

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	15.3
Sand	41.9
Silt	38.4
Clay	4.4

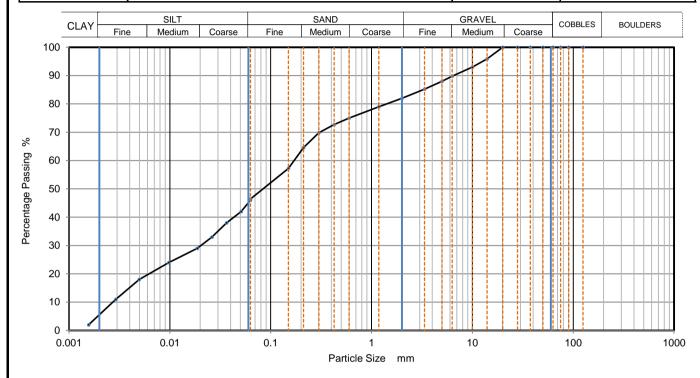
Grading Analysis		
D100	mm	
D60	mm	0.161
D30	mm	0.0199
D10	mm	0.00365
Uniformity Coefficient		44
Curvature Coefficient	0.67	

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





CAUSEWAY PARTICLE SIZE DISTRIBUTION			Job Ref	21-1619		
GEOTECH	PANI	PARTICLE SIZE DISTRIBUTION –				вно9
Site Name	North Irish Sea Array	North Irish Sea Array				5
Soil Description	Brown sandy slightly gr	Brown sandy slightly gravelly silty CLAY.				1.80
Specimen Reference	6 Specimen 1.8 m			Sample Type	В	
Test Method	3S1377:Part 2:1990, clauses 9.2 and 9.5				KeyLAB ID	Caus2022032922



Sievi	ng	Sedimo	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	46
90	100	0.05097	42
75	100	0.03649	38
63	100	0.02611	33
50	100	0.01868	29
37.5	100	0.00976	24
28	100	0.00496	18
20	100	0.00291	11
14	96	0.00156	2
10	93		
6.3	90		
5	88		
3.35	85		
2	82		
1.18	79		
0.6	75	Particle density	(assumed)
0.425	73	2.65	Mg/m3
0.3	70		
0.212	65	1	
0.15	57	1	
0.063	46	1	

Dry Mass of sample, g	505
	•

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	18.0
Sand	35.6
Silt	40.7
Clay	5.7

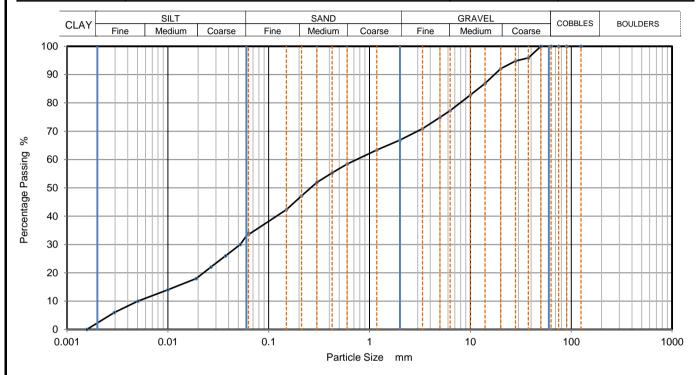
Grading Analysis		
D100	mm	
D60	mm	0.171
D30	mm	0.0206
D10	mm	0.0027
Uniformity Coefficient		63
Curvature Coefficient		0.92

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





CAUSEWAY	AUSEWAY PARTICLE SIZE DISTRIBUTION			Job Ref	21-1619	
—— GEOTECH	PANII	TE SIZE DISTRIBUTION -		Borehole/Pit No.	вн09	
Site Name	North Irish Sea Array	lorth Irish Sea Array			Sample No.	6
Soil Description	Brown sandy gravelly silty CLAY.			Depth, m	3.80	
Specimen Reference	6 Specimen 3.8 m		Sample Type	В		
Test Method	BS1377:Part 2:1990, clau	ses 9.2 and 9.5			KeyLAB ID	Caus2022032925



Sievi	ing	Sedimo	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	34
90	100	0.05222	30
75	100	0.03736	26
63	100	0.02672	22
50	100	0.01911	18
37.5	96	0.00998	14
28	95	0.00504	10
20	92	0.00294	6
14	87	0.00157	0
10	83		
6.3	77		
5	75		
3.35	71		
2	67		
1.18	63		
0.6	58	Particle density	(assumed)
0.425	55	2.65	Mg/m3
0.3	52		
0.212	47		
0.15	42		
0.063	34	1	

Dry Mass of sample, g	3180

Sample Proportions	% dry mass		
Cobbles	0.0		
Gravel	33.1		
Sand	33.4		
Silt	31.2		
Clay	2.3		

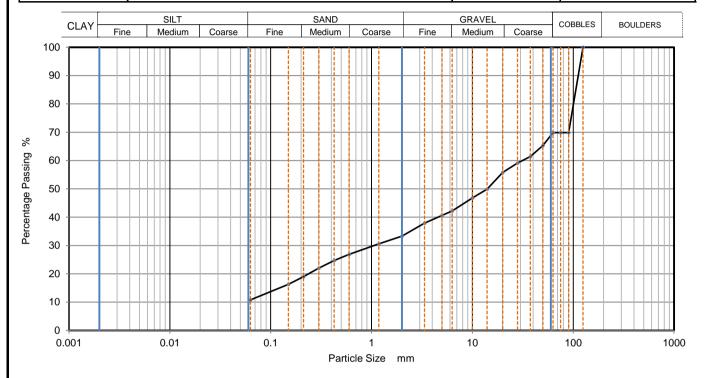
Grading Analysis		
D100	mm	
D60	mm	0.747
D30	mm	0.0533
D10	mm	0.00517
Uniformity Coefficient		140
Curvature Coefficient		0.74

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





CAUSEWAY PARTICLE SIZE DISTRIBUTION		Job Ref	21-1619			
—— GEOTECH	PANII	CLE SIZE DIST	PIZE DISTRIBUTION -		Borehole/Pit No.	вн09
Site Name	North Irish Sea Array	North Irish Sea Array			Sample No.	8
Soil Description	Brown sandy clayey subangular fine to coarse GRAVEL.			Depth, m	5.80	
Specimen Reference	6 Specimen 5.8 m		Sample Type	В		
Test Method	BS1377:Part 2:1990, clau	se 9.2			KeyLAB ID	Caus2022032927



Siev	/ing	Sedimer	ntation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	70		
75	70		
63	70		
50	65		
37.5	61		
28	59		
20	56		
14	50		
10	47		
6.3	42		
5	41		
3.35	38		
2	33		
1.18	31		
0.6	27		
0.425	25		
0.3	22		
0.212	19		
0.15	16		
0.063	11		

Dry Mass of sample, g	11639

Sample Proportions	% dry mass
Cobbles	30.1
Gravel	36.6
Sand	22.5
Fines <0.063mm	11.0

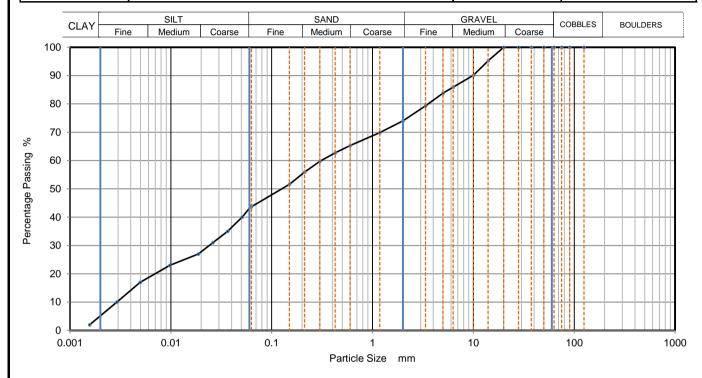
Grading Analysis		
D100	mm	125
D60	mm	31.3
D30	mm	1.05
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

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





CAUSEWAY	CALISEWAY DARTICLE SIZE DISTRIBUTION			Job Ref	21-1619	
— БЕОТЕСН	PANI	RTICLE SIZE DISTRIBUTION -			Borehole/Pit No.	BH15
Site Name	North Irish Sea Array	North Irish Sea Array			Sample No.	4
Soil Description	Brown sandy slightly gravelly silty CLAY.			Depth, m	0.80	
Specimen Reference	6 Specimen 0.8 m		Sample Type	В		
Test Method	BS1377:Part 2:1990, cla	uses 9.2 and 9.5			KeyLAB ID	Caus2022032928



Siev	/ing	Sedimo	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	44
90	100	0.05097	40
75	100	0.03649	35
63	100	0.02611	31
50	100	0.01868	27
37.5	100	0.00976	23
28	100	0.00496	17
20	100	0.00291	10
14	95	0.00156	2
10	90		
6.3	86		
5	84		
3.35	79		
2	74		
1.18	70		
0.6	65	Particle density	(assumed)
0.425	63	2.65	Mg/m3
0.3	60		
0.212	56		
0.15	52		
0.063	44		

Dry Mass of sample, g	504

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	26.0
Sand	30.3
Silt	38.3
Clay	5.4

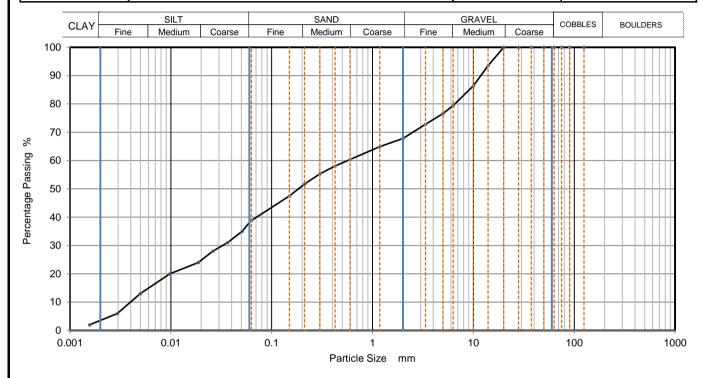
Grading Analysis		
D100	mm	
D60	mm	0.312
D30	mm	0.0237
D10	mm	0.00282
Uniformity Coefficient		110
Curvature Coefficient		0.64

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





CAUSEWAY	DADT	ICLE SIZE DIST	Job Ref	21-1619		
— БЕОТЕСН	PANI	ICLE SIZE DIST	INIBUTION	Borehole/Pit No.	BH15	
Site Name	North Irish Sea Array				Sample No.	18
Soil Description	Greyish brown sandy sli	ghtly gravelly silty CL	Depth, m	6.00		
Specimen Reference	7	Specimen Depth	6	m	Sample Type	U
Test Method	BS1377:Part 2:1990, cla	uses 9.2 and 9.5			KeyLAB ID	Caus2022032935



Sievi	ng	Sedim	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	39
90	100	0.05097	35
75	100	0.03649	31
63	100	0.02611	28
50	100	0.01868	24
37.5	100	0.00976	20
28	100	0.00499	13
20	100	0.00294	6
14	94	0.00156	2
10	86		
6.3	79		
5	77		
3.35	73		
2	68		
1.18	65		
0.6	60	Particle density	(assumed)
0.425	58	2.65	Mg/m3
0.3	55		
0.212	52	1	
0.15	48	1	
0.063	39	1	

Dry Mass of sample, g	503

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	32.2
Sand	29.0
Silt	35.5
Clay	3.3

Grading Analysis		
D100	mm	
D60	mm	0.566
D30	mm	0.0321
D10	mm	0.00404
Uniformity Coefficient		140
Curvature Coefficient		0.45

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



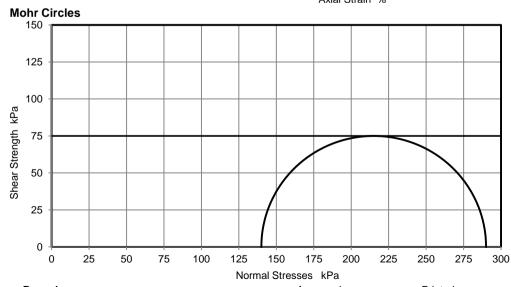


LAB 05R - Version 5

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CAUSEWAY ——GEOTECH		Unconsolidated Undrained Triaxial Compression Test without measurement						Ref			21-1619		
GEOTECH	of pore press						Borel	nole/Pit N	No.		BH09		
Site Name	North Irish Sea Arra	у					Samp	ole No.			14		
Soil Description	Brown sandy slightly	gravelly silty	CLAY.				Depth				2.00		
Specimen Reference	2 Specimen 2.05 m						Sample Type				U		
Specimen Description	Firm to stiff brown sandy slightly gravelly silty CLAY. KeyLAB ID							Cau	ıs202203	2923			
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen Date of test							13/04/2022					
	Test Number Length Diameter Bulk Density Moisture Content Dry Density							1 209.7 103.8 2.21 13 1.96		mm mm Mg/m3 % Mg/m3			
	Rate of Strain Cell Pressure							3.0 50		%/min kPa			
	At failure	Axial Strain Deviator Str	ess (c	τ1 - σ3)	\f			13.6 145		% kPa			
		Undrained S Mode of Fail	hear S					72 Brittle		kPa ½(σ1 - σ3)	Æ	
Deviator Stress v A	Axial Strain	Mode of Fall	iuie			,		Dittie		1			
300								T					
250													
§ 200 -													
が jg 150 -									0	•	•		
ed Deviator Stress kPa				•—	•								
100 t	000000000000000000000000000000000000000												
O 50													
o /													
0 1	2 3 4	5 6	7		8 Strain ⁹		10	11	12	13	14 1	15 16	
Mohr Circles	T T T			1					_				
125									_	Deviator for area of membrar	change ar	nd	
100										Mohr circ	les and t	heir	
											ation is no	ot covered	
th 75			_		 					This is pri	ovided fo	ır	
Shear Strength kPa											,		
25													
25													
0 25	50 75 100	125 15 Normal S			200	225 2	250	275	300				
Remarks		. 13	App	oroved			Printed			1			
			S	stephen.	.Watso	n	20/04	1/2022 0	8:35]		KAS ESTING	
		LAB 15R - Version 5							ion 5		10	0122	

CAUSEWA —— GEOTECI		Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen							21-1	619	
GEOTECH	of pore pressi	ure - single	specimen		Borehol	e/Pit No).		ВН	15	
Site Name	North Irish Sea Array	У			Sample	No.			1	В	
Soil Description	Greyish brown sand	Depth			6.00						
Specimen Reference	8	8 Specimen 6.05 m				Туре			ι	J	
Specimen Description	Stiff greyish brown s	•	velly silty CLAY.		KeyLAE	3 ID		C	aus202	203293	5
Test Method	BS1377 : Part 7 : 19	90, clause 8, sin	gle specimen		Date of	test			13/04	/2022	
	Test Number Length Diameter Bulk Density Moisture Content Dry Density				10	1 09.4 03.9 2.37 10	 	mm mm Mg/m3 % Mg/m3			
	Rate of Strain Cell Pressure	Axial Strain				3.0		%/min kPa %			
ator Stross V	At failure	Deviator Stress Undrained Shea Mode of Failure	ar Strength, cu			20.0 150 75		кРа	∕₂(σ1 - ·	σ3)f	
		Deviator Stress Undrained Shea	ar Strength, cu			150		кРа	⁄₂(σ1 - ·	σ3)f	
00		Deviator Stress Undrained Shea	ar Strength, cu			150		кРа	/ ₂ (σ1 - ·	σ3)f	
ator Stress v		Deviator Stress Undrained Shea	ar Strength, cu			150		кРа	½(σ1 -	σ3)f	
00		Deviator Stress Undrained Shea	ar Strength, cu			150		кРа	/ ₂ (σ1 -	σ3)f	_
50		Deviator Stress Undrained Shea	ar Strength, cu			150		кРа	/ ₂ (σ1 -	σ3)f	
50		Deviator Stress Undrained Shea	ar Strength, cu			150		кРа	⁄2(σ1 -	σ3)f	
50		Deviator Stress Undrained Shea	ar Strength, cu			150		кРа	⁄2(σ1 - ·	σ3)f	
500		Deviator Stress Undrained Shea	ar Strength, cu			150		кРа	⁄2(σ1 -	σ3)f	
500		Deviator Stress Undrained Shea	ar Strength, cu			150		кРа	⁄2(σ1 -	σ3)f	
500		Deviator Stress Undrained Shea	ar Strength, cu			75		кРа	28	30)f	
50	Axial Strain	Deviator Stress Undrained Shea Mode of Failure	ar Strength, cu			75		«Pa 1			



Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.



No failure defined. Testing terminated at 20% axial strain.

Approved
Stephen.Watson

Printed

20/04/2022 08:35

LAB 15R - Version 5



10122



eurofins Chemtest

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL

Tel: 01638 606070 Email: info@chemtest.com

Final Report

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

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John Cameron
Lucy Newland
Martin Gardiner
Matthew Gilbert
Neil Haggan
Paul Dunlop
Sean Ross
Stephen Franey

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:

Details: Stuart Henderson, Technical

Manager



Eurofins Chemtest Ltd Depot Road Newmarket CB8 0AL

Tel: 01638 606070 Email: info@chemtest.com

Results - Soil

Project: 21-1619 North Irish Sea Array

Client: Causeway Geotech Ltd		Che	mtest Jo	ob No.:	22-12437	22-12437
Quotation No.:	(Chemte	st Sam	1403832	1403833	
Order No.:		Clie	nt Samp	6	17	
		Sa	ample Lo	BH09	BH15	
			Sampl	е Туре:	SOIL	SOIL
			Top Dep	oth (m):	3.8	1.2
			Date Sa	ampled:	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 **UKAS** accredited MCERTS and UKAS accredited M Unaccredited Ν This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for S this analysis This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited SN 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 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: customerservices@chemtest.com



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

24 May 2022

Registered in Ireland. Company Number: 633786

www.causewaygeotech.com

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 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.

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 sub-contracting 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)	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



Summary of Classification Test Results

Project No.

Project Name

21-1619

North Irish Sea Array

Hole No.		Sar	mple	1	Soil Description	Density bulk (y dry	W	Passing 425µm	LL	PL	ΡI	Particle density	Casagrande
Hole No.	Ref	Тор	Base	Туре	Soil Description	Mg/m3	-	%	%	%	%	%	Mg/m3	Classification
BH04		4.00	5.00	С	Brown sandy gravelly silty CLAY.			10.0	62	29	14	15	Ü	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
ВН07		7.30	8.00	С	Brown sandy slightly gravelly silty CLAY.			10.0	58	25	16	9		CL
			·				_							·

All tests performed in accordance with BS1377:1990 unless specified otherwise

LAB 01R Version 5

Key

Density test Liquid Limit Particle density

Linear measurement unless : 4pt cone unless : sp - small pyknometer

1pt - single point test

wd - water displacement wi - immersion in water

cas - Casagrande method

gj - gas jar

Date Printed

Approved By

Stephen.Watson

17/05/2022



10122



Summary of Classification Test Results

Project No. Project Name

21-1619

North Irish Sea Array

21-1	1-1019 North Histi Sea Array													
Hole No.			mple		Soil Description	Dens bulk	ity dry	w	Passing 425µm	LL	PL	PI	Particle density	Casagrande
	Ref	Тор	Base	Type		Mg/m		%	%	%	%	%	Mg/m3	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
													1 4 5	01P Version 5

All tests performed in accordance with BS1377:1990 unless specified otherwise

LAB 01R Version 5

Key

Density test Liquid Limit

Particle density

4pt cone unless: sp - small pyknometer

wd - water displacement wi - immersion in water

Linear measurement unless:

cas - Casagrande method

1pt - single point test

gj - gas jar

Date Printed

Approved By

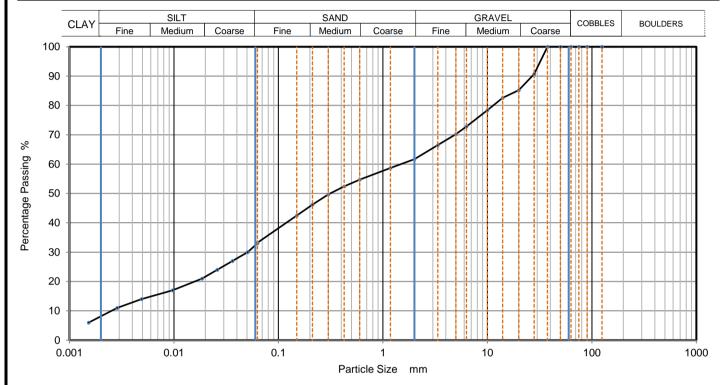
Stephen.Watson

17/05/2022



10122

CAUSEWAY	DART	ICLE SIZE DIS	TDIRLITION	Job Ref	21-1619	
—— GEOTECH	PARI	ICLE SIZE DIS	IKIBUTION	Borehole/Pit No.	BH04	
Site Name	North Irish Sea Array			Sample No.		
Soil Description	Brown sandy gravelly sil	ty CLAY.		Depth, m	4.00	
Specimen Reference	9	Specimen Depth	4	m	Sample Type	С
Test Method	BS1377:Part 2:1990, cla	uses 9.2 and 9.5			KeyLAB ID	Caus202204288



Siev	/ing	Sedimentation				
Particle Size mm	% Passing	Particle Size mm	% Passing			
125	100	0.06300	33			
90	100	0.05065	30			
75	100	0.03625	27			
63	100	0.02594	24			
50	100	0.01855	21			
37.5	100	0.00969	17			
28	91	0.00490	14			
20	85	0.00286	11			
14	83	0.00153	6			
10	78					
6.3	73					
5	70					
3.35	67					
2	62					
1.18	59					
0.6	55	Particle density	(assumed)			
0.425	52	2.65	Mg/m3			
0.3	50					
0.212	46					
0.15	43					
0.063	33					

	_
Dry Mass of sample, g	2414

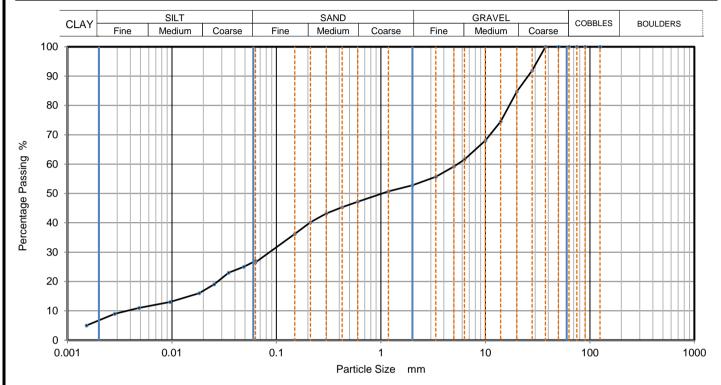
Sample Proportions	% dry mass			
Cobbles	0.0			
Gravel	38.3			
Sand	28.5			
Silt	24.8			
Clay	8.4			

Grading Analysis		
D100	mm	
D60	mm	1.48
D30	mm	0.0504
D10	mm	0.00248
Uniformity Coefficient		590
Curvature Coefficient		0.69





CAUSEWAY	DART	ICLE SIZE DIS	TDIDLITION	Job Ref	21-1619	
—— GEOTECH	PARI	ICLE SIZE DIS	IKIBUTIUN	Borehole/Pit No.	ВН04	
Site Name	North Irish Sea Array			Sample No.		
Soil Description	Brown sandy gravelly cla	ayey SILT.		Depth, m	7.00	
Specimen Reference	9	Specimen Depth	7	m	Sample Type	С
Test Method	BS1377:Part 2:1990, cla	uses 9.2 and 9.5			KeyLAB ID	Caus202204289



Siev	/ing	Sedimentation				
Particle Size mm	% Passing	Particle Size mm	% Passing			
125	100	0.06300	27			
90	100	0.04875	25			
75	100	0.03492	23			
63	100	0.02532	19			
50	100	0.01823	16			
37.5	100	0.00958	13			
28	92	0.00485	11			
20	85	0.00283	9			
14	75	0.00152	5			
10	68					
6.3	62					
5	59					
3.35	56					
2	53					
1.18	51					
0.6	47	Particle density	(assumed)			
0.425	45	2.65	Mg/m3			
0.3	43					
0.212	40					
0.15	36					
0.063	27					

Dry Mass of sample, g	2834
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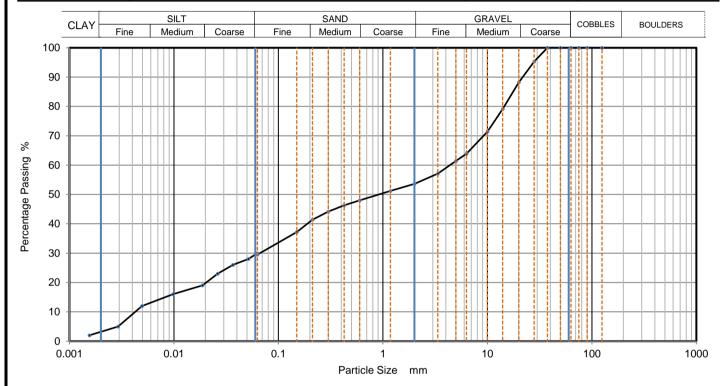
Sample Proportions % dry mass	
Cobbles	0.0
Gravel	47.2
Sand	26.3
Silt	19.9
Clay	6.6

Grading Analysis		
D100	mm	
D60	mm	5.41
D30	mm	0.0865
D10	mm	0.00389
Uniformity Coefficient		1400
Curvature Coefficient		0.35





CAUSEWAY	DARTICLE CIZE DISTRIBUTION		Job Ref	21-1619	
GEOTECH GEOTECH	PARTICLE SIZE DISTRIBUTION			Borehole/Pit No.	вно6
Site Name	North Irish Sea Array			Sample No.	
Soil Description	Brown sandy gravelly silty CLAY.			Depth, m	5.50
Specimen Reference	9 Specimen 5.5 m Depth			Sample Type	С
Test Method	Test Method BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus202204280

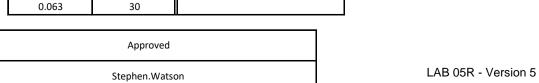


Sieving		Sedimo	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	30
90	100	0.05157	28
75	100	0.03668	26
63	100	0.02624	23
50	100	0.01877	19
37.5	100	0.00980	16
28	95	0.00495	12
20	88	0.00292	5
14	79	0.00155	2
10	71		
6.3	64		
5	61		
3.35	57		
2	54		
1.18	51		
0.6	48	Particle density	(assumed)
0.425	46	2.65	Mg/m3
0.3	44		
0.212	41		
0.15	37		
0.063	30		

Dry Mass of sample, g	2397
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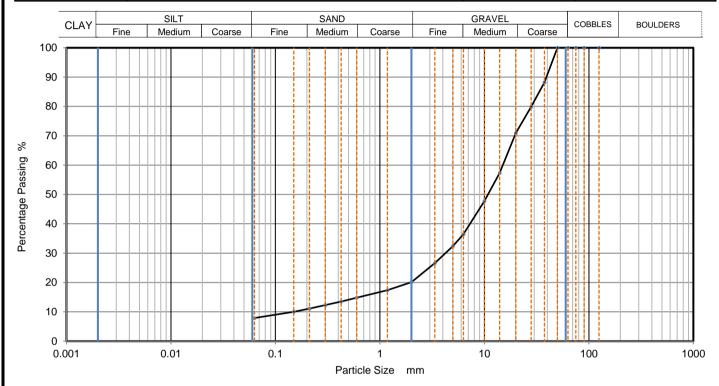
Sample Proportions	% dry mass
Cobbles	0.0
Gravel	46.4
Sand	24.1
Silt	26.4
Clay	3.1

Grading Analysis		
D100	mm	
D60	mm	4.4
D30	mm	0.0664
D10	mm	0.00421
Uniformity Coefficient		1000
Curvature Coefficient		0.24





CAUSEWAY	DARTICLE CIZE DISTRIBUTION		Job Ref	21-1619	
—— GEOTECH	PARII	PARTICLE SIZE DISTRIBUTION -		Borehole/Pit No.	вно6
Site Name	North Irish Sea Array			Sample No.	
Soil Description	Brown gravelly slightly silty fine to coarse SAND.			Depth, m	5.75
Specimen Reference	9 Specimen 5.75 m Depth			Sample Type	С
Test Method	Test Method BS1377:Part 2:1990, clause 9.2			KeyLAB ID	Caus202204281



Sieving		Sedime	ntation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	88		
28	80		
20	71		
14	57		
10	48		
6.3	37		
5	32		
3.35	27		
2	20		
1.18	17		
0.6	15		
0.425	14]	
0.3	12		
0.212	11		
0.15	10]	
0.063	8		

Dry Mass of sample, g	2275
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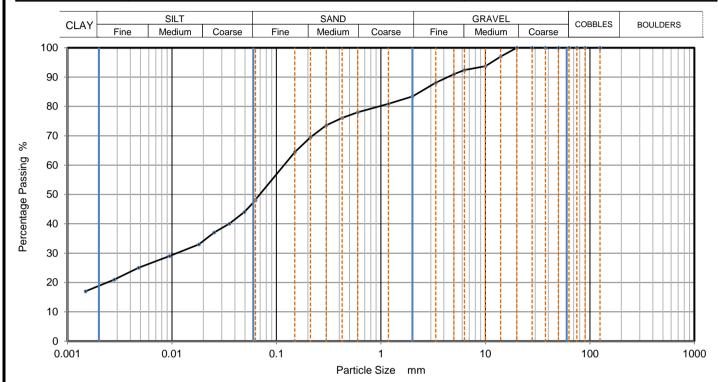
Sample Proportions	% dry mass
Cobbles	0.0
Gravel	79.9
Sand	12.2
Fines < 0.063mm	8.0

Grading Analysis		
D100	mm	
D60	mm	15
D30	mm	4.24
D10	mm	0.151
Uniformity Coefficient		100
Curvature Coefficient		7.9





CAUSEWAY PARTICLE SIZE DISTRIBUTION			Job Ref	21-1619	
—— GEOTECH	GEOTECH PARTICLE SIZE DISTRIBUTION			Borehole/Pit No.	вно6
Site Name	North Irish Sea Array			Sample No.	
Soil Description	Brown sandy slightly gravelly silty CLAY.			Depth, m	6.13
Specimen Reference	9 Specimen 6.13 m			Sample Type	С
Test Method				KeyLAB ID	Caus202204282



Siev	/ing	Sedimo	entation
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	0.01813	33
37.5	100	0.00947	29
28	100	0.00479	25
20	100	0.00280	21
14	97	0.00149	17
10	94		
6.3	92		
5	91		
3.35	88		
2	83		
1.18	81		
0.6	78	Particle density	(assumed)
0.425	76	2.65	Mg/m3
0.3	74		
0.212	70]	
0.15	64]	
0.063	48		

Dry Mass of sample, g	508
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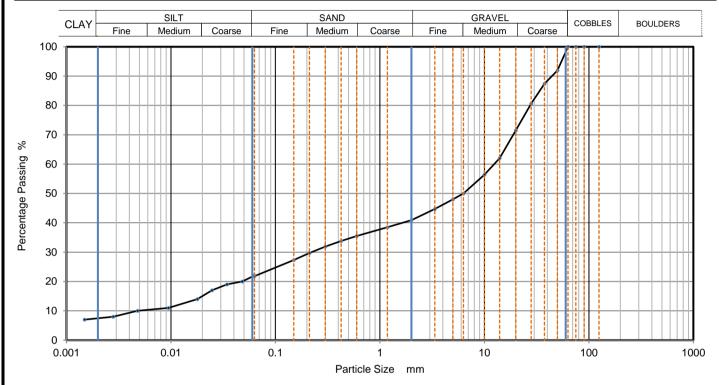
Sample Proportions	% dry mass		
Cobbles	0.0		
Gravel	16.6		
Sand	35.2		
Silt	29.0		
Clay	19.2		

Grading Analysis		
D100	mm	
D60	mm	0.119
D30	mm	0.0114
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		





CAUSEWAY PARTICLE SIZE DISTRIBUTION			Job Ref	21-1619		
GEOTECH GEOTECH	PARTICLE SIZE DISTRIBUTION			Borehole/Pit No.	вно6	
Site Name	North Irish Sea Array	North Irish Sea Array			Sample No.	
Soil Description	Brown sandy gravelly silty CLAY.			Depth, m	8.50	
Specimen Reference	9 Specimen 8.5 m			Sample Type	С	
Test Method					KeyLAB ID	Caus202204283



Sieving		Sedime	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	22
90	100	0.04810	20
75	100	0.03447	19
63	100	0.02470	17
50	92	0.01791	14
37.5	87	0.00947	11
28	81	0.00479	10
20	72	0.00280	8
14	62	0.00149	7
10	56		
6.3	50		
5	48		
3.35	45		
2	41		
1.18	39		
0.6	36	Particle density	(assumed)
0.425	34	2.65	Mg/m3
0.3	32		
0.212	30		
0.15	27		
0.063	22		

Dry Mass of sample, g	14785
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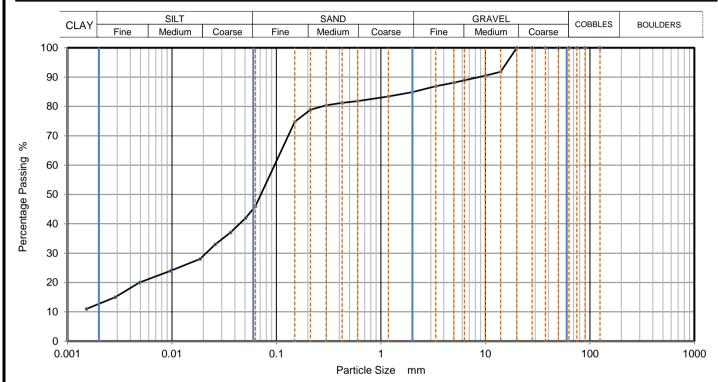
Sample Proportions	% dry mass		
Cobbles	0.0		
Gravel	59.1		
Sand	19.2		
Silt	14.2		
Clay	7.5		

Grading Analysis		
D100	mm	
D60	mm	12.4
D30	mm	0.223
D10	mm	0.00531
Uniformity Coefficient		2300
Curvature Coefficient		0.75





CAUSEWAY PARTICLE SIZE DISTRIBUTION		Job Ref	21-1619		
—— GEOTECH	GEOTECH PARTICLE SIZE DISTRIBUTION			Borehole/Pit No.	вно6
Site Name	North Irish Sea Array			Sample No.	
Soil Description	Brown sandy slightly gravelly silty CLAY.			Depth, m	10.00
Specimen Reference	9 Specimen 10 m			Sample Type	С
Test Method				KeyLAB ID	Caus202204284



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	46
90	100	0.05065	42
75	100	0.03625	37
63	100	0.02594	33
50	100	0.01855	28
37.5	100	0.00969	24
28	100	0.00490	20
20	100	0.00286	15
14	92	0.00152	11
10	91		
6.3	89		
5	88		
3.35	87		
2	85		
1.18	83		
0.6	82	Particle density	(assumed)
0.425	81	2.65	Mg/m3
0.3	80		
0.212	79]	
0.15	75]	
0.063	46		

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	15.1
Sand	38.9
Silt	33.1
Clay	12.9

Grading Analysis		
D100	mm	
D60	mm	0.096
D30	mm	0.0208
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

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

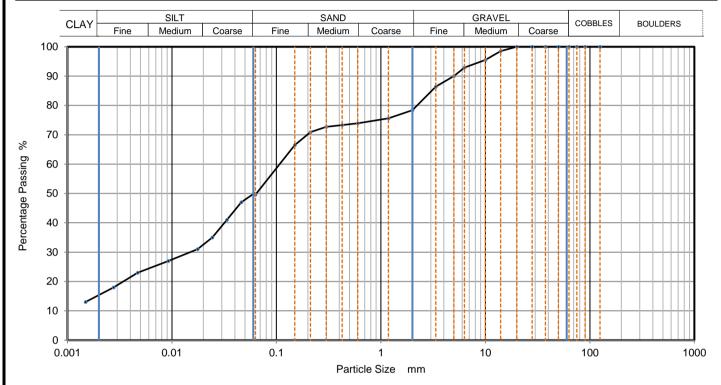




LAB 05R - Version 5

10122

CAUSEWAY PARTICLE SIZE DISTRIBUTION			Job Ref	21-1619		
—— GEOTECH	PARI	ICLE SIZE DIS	F SIZE DISTRIBUTION			вно6
Site Name	North Irish Sea Array	Jorth Irish Sea Array			Sample No.	
Soil Description	Brown sandy slightly gravelly silty CLAY.			Depth, m	14.50	
Specimen Reference	9	Specimen Depth	14.5	m	Sample Type	С
Test Method	BS1377:Part 2:1990, cla	uses 9.2 and 9.5			KeyLAB ID	Caus202204285



Siev	/ing	Sedimo	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06107	50
90	100	0.04609	47
75	100	0.03355	41
63	100	0.02437	35
50	100	0.01757	31
37.5	100	0.00925	27
28	100	0.00471	23
20	100	0.00277	18
14	99	0.00149	13
10	96		
6.3	93		
5	90		
3.35	86		
2	78		
1.18	76		
0.6	74	Particle density	(assumed)
0.425	73	2.65	Mg/m3
0.3	73		
0.212	71		
0.15	67		
0.063	50		

Dry Mass of sample, g	524
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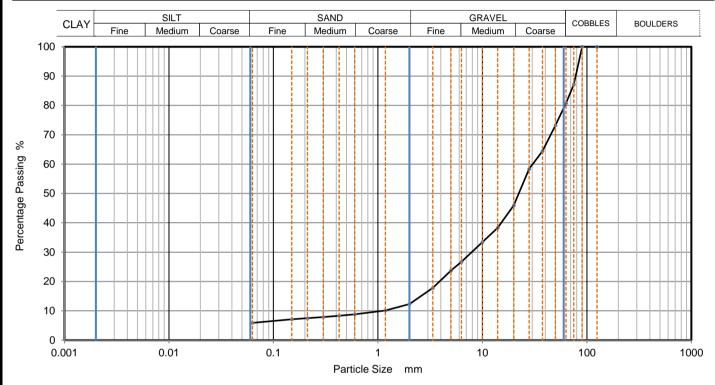
Sample Proportions	% dry mass
Cobbles	0.0
Gravel	21.6
Sand	28.8
Silt	34.1
Clay	15.5

Grading Analysis		
D100	mm	
D60	mm	0.107
D30	mm	0.0147
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		





CAUSEWAY PARTICLE SIZE DISTRIBUTION			Job Ref	21-1619	
GEOTECH	PARII	CLE SIZE DIS	IKIBUTION	Borehole/Pit No.	вно6
Site Name	North Irish Sea Array	Jorth Irish Sea Array			
Soil Description	Brown slightly sandy slightly clayey subangular fine to coarse GRAVEL with cobbles.			Depth, m	14.90
Specimen Reference	9	9 Specimen 14.9 m			С
Test Method	BS1377:Part 2:1990, clau	se 9.2		KeyLAB ID	Caus202204286



Siev	ving	Sedime	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	87		
63	81		
50	73		
37.5	64		
28	58		
20	46		
14	38		
10	33		
6.3	27		
5	24		
3.35	18		
2	12		
1.18	10		
0.6	9		
0.425	8		
0.3	8		
0.212	8]	
0.15	7]	
0.063	6		

	_
Dry Mass of sample, g	6646

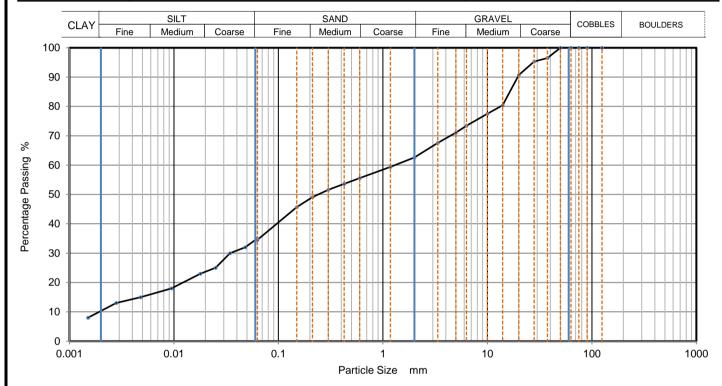
Sample Proportions	% dry mass
Cobbles	19.2
Gravel	68.5
Sand	6.4
Fines < 0.063mm	6.0

Grading Analysis		
D100	mm	
D60	mm	30.3
D30	mm	7.93
D10	mm	1.14
Uniformity Coefficient		27
Curvature Coefficient		1.8





CAUSEWAY PARTICLE SIZE DISTRIBUTION -			Job Ref	21-1619		
—— GEOTECH	PARII	LE SIZE DISTRIBUTION -			Borehole/Pit No.	вно6
Site Name	North Irish Sea Array	Jorth Irish Sea Array			Sample No.	
Soil Description	Brown sandy gravelly silty CLAY.			Depth, m	15.45	
Specimen Reference	9	Specimen Depth	15.45	m	Sample Type	С
Test Method	BS1377:Part 2:1990, clau	ses 9.2 and 9.5			KeyLAB ID	Caus202204287



Siev	/ing	Sedimentation		
Particle Size mm	% Passing	Particle Size mm	% Passing	
125	100	0.06300	35	
90	100	0.04810	32	
75	100	0.03447	30	
63	100	0.02501	25	
50	100	0.01791	23	
37.5	97	0.00947	18	
28	95	0.00479	15	
20	91	0.00280	13	
14	80	0.00150	8	
10	78			
6.3	73			
5	71			
3.35	68			
2	63			
1.18	59			
0.6	56	Particle density	(assumed)	
0.425	54	2.65	Mg/m3	
0.3	52			
0.212	49			
0.15	46			
0.063	35			

Dry Mass of sample, g	3113
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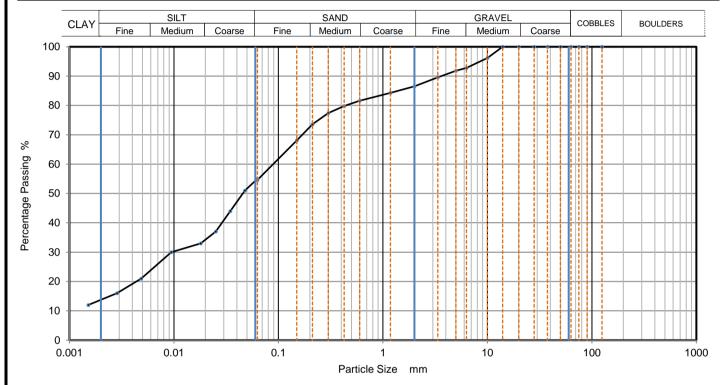
Sample Proportions	% dry mass
Cobbles	0.0
Gravel	37.4
Sand	28.1
Silt	24.0
Clay	10.5

Grading Analysis		
D100	mm	
D60	mm	1.31
D30	mm	0.0357
D10	mm	0.00187
Uniformity Coefficient		700
Curvature Coefficient		0.52





CAUSEWAY	DARTICLE CIZE DISTRIBUTION		Job Ref	21-1619	
—— GEOTECH	PARTICLE SIZE DISTRIBUTION			Borehole/Pit No.	вно7
Site Name	North Irish Sea Array			Sample No.	
Soil Description	Brown sandy slightly gravelly silty CLAY.		Depth, m	5.70	
Specimen Reference	Specimen 5.7 m			Sample Type	С
Test Method BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus202205051	



Sieving		Sedimo	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	55
90	100	0.04770	51
75	100	0.03467	44
63	100	0.02517	37
50	100	0.01802	33
37.5	100	0.00942	30
28	100	0.00485	21
20	100	0.00285	16
14	100	0.00152	12
10	96		
6.3	93		
5	92		
3.35	90		
2	87		
1.18	84		
0.6	82	Particle density	(assumed)
0.425	80	2.65	Mg/m3
0.3	77		
0.212	74		
0.15	68		
0.063	55		

Dry Mass of sample, g	221
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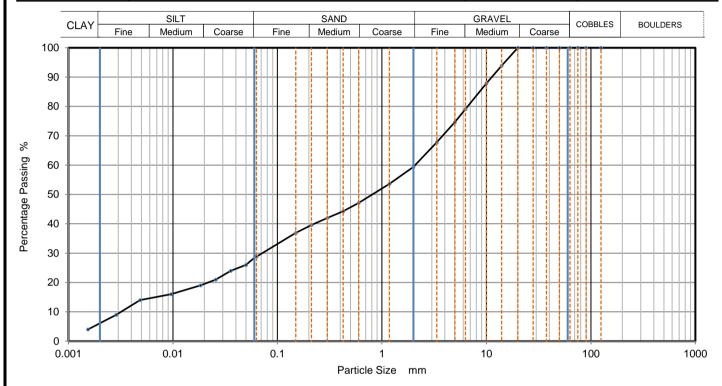
Sample Proportions	% dry mass
Cobbles	0.0
Gravel	13.5
Sand	32.0
Silt	40.6
Clay	13.9

Grading Analysis		
D100	mm	
D60	mm	0.0892
D30	mm	0.00952
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		





CAUSEWAY	DARTICLE CIZE DISTRIBUTION		Job Ref	21-1619	
—— GEOTECH	PARTICLE SIZE DISTRIBUTION			Borehole/Pit No.	вно7
Site Name	North Irish Sea Array			Sample No.	
Soil Description	Brown sandy slightly gravelly silty CLAY.			Depth, m	7.30
Specimen Reference	9 Specimen 7.3 m			Sample Type	С
Test Method BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus2022042814	



Sieving		Sedime	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	29
90	100	0.05002	26
75	100	0.03581	24
63	100	0.02563	21
50	100	0.01834	19
37.5	100	0.00958	16
28	100	0.00485	14
20	100	0.00286	9
14	94	0.00154	4
10	88		
6.3	79		
5	75		
3.35	68		
2	59		
1.18	54		
0.6	47	Particle density	(assumed)
0.425	44	2.65	Mg/m3
0.3	42		
0.212	40		
0.15	37		
0.063	29		

Dry Mass of sample, g	513
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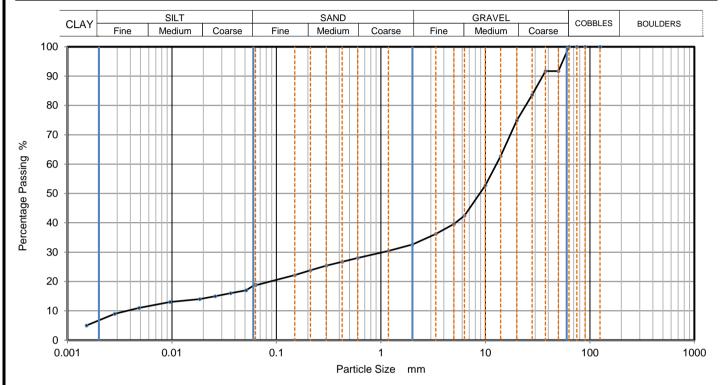
Sample Proportions	% dry mass
Cobbles	0.0
Gravel	40.6
Sand	30.6
Silt	22.9
Clay	5.9

Grading Analysis		
D100	mm	
D60	mm	2.08
D30	mm	0.0718
D10	mm	0.00326
Uniformity Coefficient		640
Curvature Coefficient		0.76





CAUSEWAY PARTICLE SIZE DISTRIBUTION		Job Ref	21-1619			
GEOTECH	PANI	PARTICLE SIZE DISTRIBUTION			Borehole/Pit No.	BH18
Site Name	North Irish Sea Array	North Irish Sea Array			Sample No.	
Soil Description	Brown sandy gravelly silty CLAY.				Depth, m	3.70
Specimen Reference	9	Specimen 3.7 m		Sample Type	С	
Test Method	BS1377:Part 2:1990, cla	uses 9.2 and 9.5			KeyLAB ID	Caus2022042810



Siev	/ing	Sedimentation			
Particle Size mm	% Passing	Particle Size mm	% Passing		
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		
37.5	92	0.00958	13		
28	84	0.00485	11		
20	75	0.00283	9		
14	63	0.00152	5		
10	53				
6.3	42				
5	40				
3.35	36				
2	33				
1.18	30				
0.6	28	Particle density	(assumed)		
0.425	27	2.65	Mg/m3		
0.3	25				
0.212	24				
0.15	22				
0.063	19				

Dry Mass of sample, g	4533
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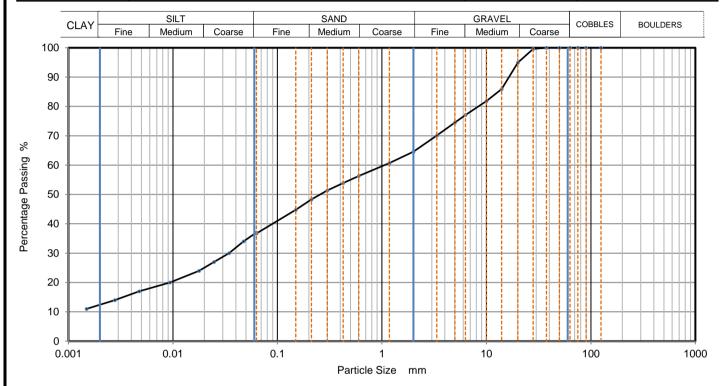
Sample Proportions	% dry mass
Cobbles	0.0
Gravel	67.4
Sand	13.9
Silt	12.0
Clay	6.7

Grading Analysis		
D100	mm	
D60	mm	12.8
D30	mm	1.05
D10	mm	0.00387
Uniformity Coefficient		3300
Curvature Coefficient		22





CAUSEWAY PARTICLE SIZE DISTRIBUTION		Job Ref	21-1619			
GEOTECH GEOTECH	PARII	PARTICLE SIZE DISTRIBUTION		Borehole/Pit No.	BH18	
Site Name	North Irish Sea Array				Sample No.	
Soil Description	Brown sandy slightly gravelly silty CLAY.			Depth, m	5.20	
Specimen Reference	9	Specimen 5.2 m		Sample Type	С	
Test Method	BS1377:Part 2:1990, clau	ses 9.2 and 9.5			KeyLAB ID	Caus2022042811



Siev	/ing	Sedime	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06290	37
90	100	0.04744	34
75	100	0.03447	30
63	100	0.02470	27
50	100	0.01780	24
37.5	100	0.00936	20
28	100	0.00476	17
20	95	0.00278	14
14	86	0.00149	11
10	82		
6.3	77		
5	75		
3.35	70		
2	65		
1.18	61		
0.6	56	Particle density	(assumed)
0.425	54	2.65	Mg/m3
0.3	51		
0.212	48		
0.15	45		
0.063	37		

Dry Mass of sample, g	3230
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Sample Proportions	% dry mass
Cobbles	0.0
Gravel	35.4
Sand	27.9
Silt	24.4
Clay	12.3

Grading Analysis		
D100	mm	
D60	mm	1.07
D30	mm	0.0354
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		







LABORATORY **REPORT**



Contract Number: PSL22/3162

24 May 2022 Report Date:

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: 4/5/2022 Date Commenced: 4/5/2022 Date 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 R Berriman S Royle

(Director) (Quality Manager) (Laboratory Manager)

L Knight S Eyre D Burton (Senior Technician) (Senior Technician) (Advanced Testing Manager)

Page 1 of

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fax: +44 (0)844 815 6642 e-mail: rberriman@prosoils.co.uk

awatkins@prosoils.co.uk

Consolidated Undrained

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		U bi	(kPa)	800	800	800	
Membrane Thickness		m ь	(mm)	0.600			
Displacement Input		LIP	(mm)	CH 2			
Load Input		N IP	(N)	CH 1			
Pore Water Pressure Input		ս բաբ	(kPa)	CH 3			
Sample Volume		٧	(cc)	CH 2			
Initial Moisture		ωί	(%)	11			
Initial Dry Density		ρdi	(Mg/m3)	1.86			
Initial Voids Ratio		e i		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.	Max. Dev.	4
Failure Criteria				Stress	Stress	Stress	
Strain At Failure		ξ f	(%)	0.93	8.01	19.85	
Stress At Failure Minor Stress At Failure		(σ1-σ3)		54.7	110.3	336.6	
Major Stress At Failure		σ3' σ1'	(kPa) (kPa)	13.3 68.0	36.2 146.5	127.0 463.6	
Principal Stress Ratio At Failure		σ1'/σ3'	(rra)	5.111	4.048	3.650	
inopai onos rano At i andre		51,03		5.111	-1.0-10	0.000	



Plasti

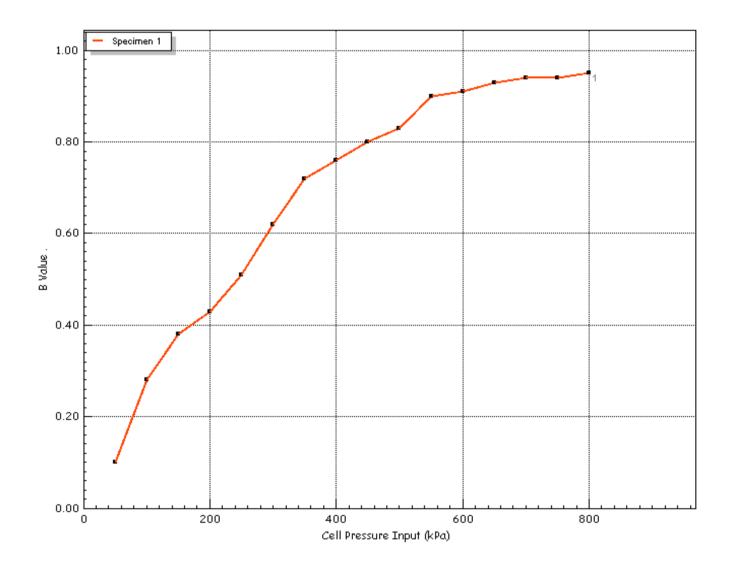
. 奥 -	Test Method	BS1377-8 : 1990 : C	Clause 7	Test Name Test Date	BH07 7.00-7.30m C 12/05/2022
. (≯≮).≣				Borehole	BH07
	Jobfile	North Irish Sea Arra	y NISA	Sample	7.00-7.30m C
U K A S TESTING	Client	Causeway		Depth	7.00-7.30m
4043					



Consolidated Undrained

Saturation Plots

Saturation Method			Stepped	
Cell Pressure Input	σ	(kPa)	800	
Pore Water Pressure Input	U pwp	(kPa)	790	
B Value	В	•	0.95	



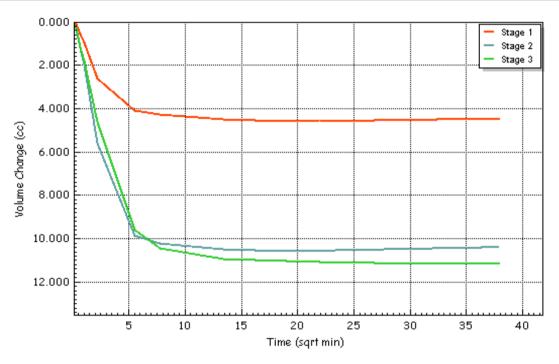
_ (c)	Test Method	BS1377-8 : 1990 : Clause 7	Test Name Test Date	BH07 7.00-7.30m C 12/05/2022	
UKAS TESTING	Jobfile Client	North Irish Sea Array NISA Causeway	Borehole Sample Depth	BH07 7.00-7.30m C 7.00-7.30m	
4043			·		



Consolidated Undrained

Consolidation Plots

nitial Conditions			Stage 1	2	3
Initial Cell Pressure	σз	(kPa)	850	900	1000
Initial Back Pressure	и ы	(kPa)	800	800	800
Pore Water Pressure Input	u pwp	(kPa)	837	893	979
Drainage Method			Radial+On	e End	
Final Conditions				_	_
		(0/)	Stage 1	2	3
PWP Dissipation %	U%	(%)	100.00	100.00	100.00
Volumetric Strain	εν%	(%)	0.82	1.93	2.07
Corrected Length	Lc	(mm)	139.6	135.7	126.6
Corrected Area	Аc	(cm2)	38.38	38.73	40.63
Corrected Volume	٧c	(cc)	535.883	525.463	514.301
t100	t 100	(min)	13.67	14.89	26.02
Consolidation	cv	(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	٤%	(%)	5.0	5.0	5.0
Shear Machine Speed	dг	(mm/min)	0.05817	0.05817	0.05817
Notes					

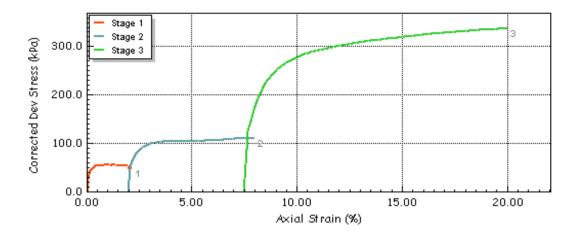


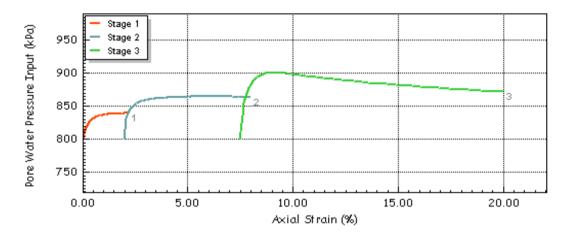
_ #	Test Method	BS1377-8 : 1990 : Clause 7	Test Name Test Date	BH07 7.00-7.30m C 12/05/2022
UKAS TESTING 4043	Jobfile Client	North Irish Sea Array NISA Causeway	Borehole Sample Depth	BH07 7.00-7.30m C 7.00-7.30m

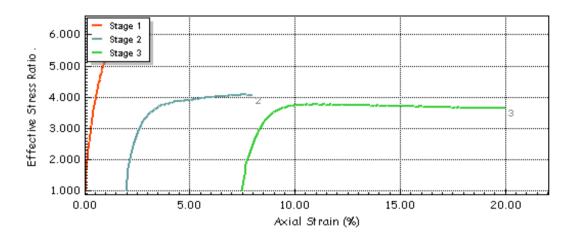


Consolidated Undrained

Shear Stage Plots





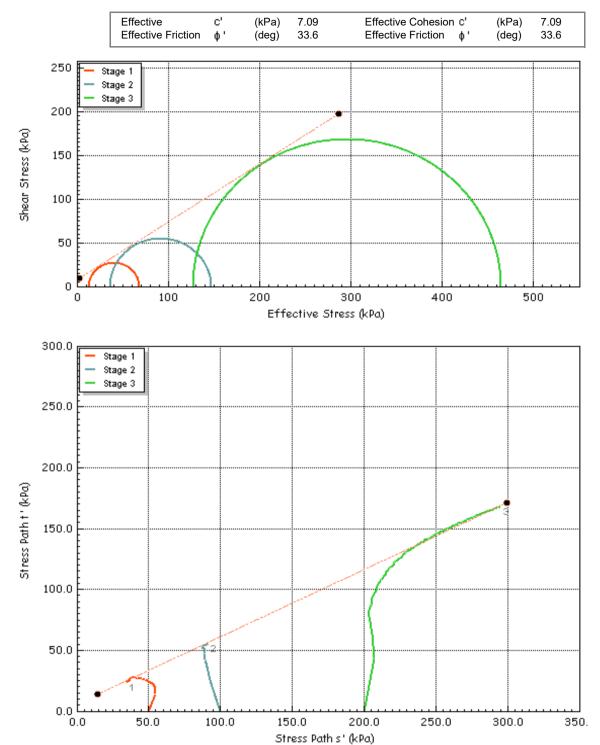


_ de e _	Test Method	BS1377-8 : 1990 : Clause 7	Test Name Test Date	BH07 7.00-7.30m C 12/05/2022				
UKAS TESTING	Jobfile Client	North Irish Sea Array NISA Causeway	Borehole Sample Depth	BH07 7.00-7.30m C 7.00-7.30m				
TESTING 4043	Client	Causeway	Depth	7.00-7.30M				



Consolidated Undrained

Shear Stage Plots



_ @	Test Method	BS1377-8 : 1990 : Clause 7	Test Name Test Date	BH07 7.00-7.30m C 12/05/2022	
. (44) =			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	Ollone	Causeway	Dopui		





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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



Summary of Classification Test Results

Project Name

21-1619

North Irish Sea Array

21-1	013			North firsh Sea Afray										
Hole No.		Sar	mple	l	Soil Description	Dens bulk	ity dry	W	Passing 425µm	LL	PL	PI	Particle density	Casagrande
11010140.	Ref	Тор	Base	Туре	Con Beschphon	Mg/m		%	%	%	%	%	Mg/m3	Classification
ВН03	1	5.50	6.80	С	Brownish grey sandy slightly gravelly CLAY.			18.0	63	28	13	15		CL
ВН03	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						
ВН03	4	9.55	10.00	С	Greyish brown gravelly slightly clayey fine to coarse SAND.			5.6	31	20 -1pt	13	7		CL
ВН03	5	10.00	10.25	С	Greyish brown gravelly slightly clayey fine to coarse SAND.			8.4	38	26	16	10		CL
ВН03	6	10.25	11.05	С	Greyish brown gravelly clayey fine to coarse SAND.			13.0	44	27	16	11		CL
ВН03	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 performed in accordance with BS1377:1990 unless specified otherwise

LAB 01R Version 5

Key Date Printed Approved By Density test Liquid Limit Particle density Linear measurement unless : 4pt cone unless : sp - small pyknometer 16/05/2022 wd - water displacement cas - Casagrande method gj - gas jar 10122 wi - immersion in water 1pt - single point test Stephen.Watsor



Summary of Classification Test Results

Project Name

21-1	619			North Irish Sea Array										
Hole No.			mple	1	Soil Description	Dens bulk	ity dry	W	Passing 425µm	LL	PL	PI	Particle density	Casagrande
TIOIC IVO.	Ref	Тор	Base	Туре	Odii Description	Mg/m		%	%	%	%	%	Mg/m3	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
ВН06	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 performed in accordance with BS1377:1990 unless specified otherwise

1pt - single point test

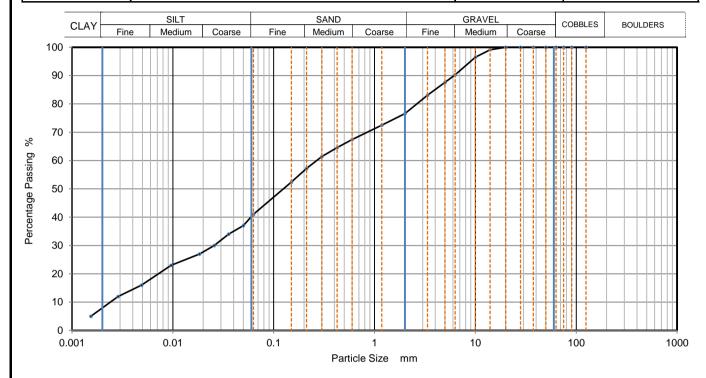
wi - immersion in water

LAB 01R Version 5

Stephen.Watson

Key Date Printed Approved By Density test Liquid Limit Particle density Linear measurement unless : 4pt cone unless : sp - small pyknometer 16/05/2022 wd - water displacement cas - Casagrande method gj - gas jar

CAUSEWAY	DADT	Job Ref	21-1619			
GEOTECH GEOTECH	PANI	TICLE SIZE DIST	INIBOTION	Borehole/Pit No.	BH03	
Site Name	North Irish Sea Array			Sample No.	1	
Soil Description	Brownish grey sandy sli	ghtly gravelly CLAY.		Depth, m	5.50	
Specimen Reference	9	9 Specimen 5.5 m				С
Test Method	BS1377:Part 2:1990, cla	uses 9.2 and 9.5	KeyLAB ID	Caus20220503149		



Sieving		Sedimo	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	41
90	100	0.05002	37
75	100	0.03581	34
63	100	0.02563	30
50	100	0.01834	27
37.5	100	0.00958	23
28	100	0.00490	16
20	100	0.00286	12
14	99	0.00154	5
10	97		
6.3	90		
5	88		
3.35	83		
2	77		
1.18	73		
0.6	67	Particle density	(assumed)
0.425	65	2.65	Mg/m3
0.3	61		
0.212	57		
0.15	52		
0.063	41		

Dry Mass of sample, g	503	

Sample Proportions	% dry mass		
Cobbles	0.0		
Gravel	23.4		
Sand	35.6		
Silt	32.6		
Clay	8.4		

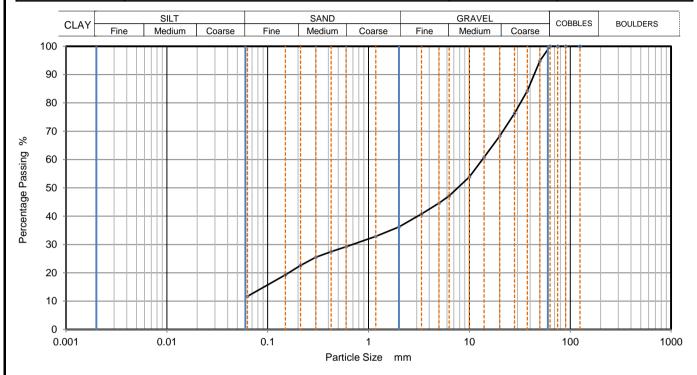
Grading Analysis		
D100	mm	
D60	mm	0.267
D30	mm	0.0249
D10	mm	0.0023
Uniformity Coefficient		120
Curvature Coefficient		1

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





CAUSEWAY	PARTICLE SIZE DISTRIBUTION -		Job Ref	21-1619		
—— GEOTECH			Borehole/Pit No.	вноз		
Site Name	North Irish Sea Array	North Irish Sea Array			Sample No.	2
Soil Description	Greyish brown gravelly slightly silty fine to coarse SAND.			Depth, m	8.50	
Specimen Reference	9 Specimen 8.5 m Depth			Sample Type	С	
Test Method	3S1377:Part 2:1990, clause 9.2			KeyLAB ID	Caus20220503150	



Sieving		Sedime	ntation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	95		
37.5	84		
28	76		
20	68		
14	61		
10	54		
6.3	47		
5	45		
3.35	41		
2	36		
1.18	33		
0.6	29		
0.425	28		
0.3	26		
0.212	23		
0.15	19		
0.063	12		

Dry Mass of sample, g	9833

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	63.8
Sand	24.6
Fines < 0.063 mm	12.0

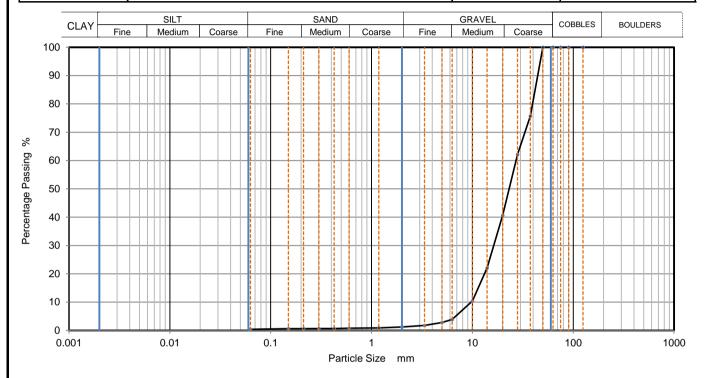
Grading Analysis		
D100	mm	
D60	mm	13.4
D30	mm	0.696
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

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





CAUSEWAY	PARTICLE SIZE DISTRIBUTION -		Job Ref	21-1619		
— GEOTECH			Borehole/Pit No.	вноз		
Site Name	North Irish Sea Array	North Irish Sea Array			Sample No.	3
Soil Description	Greyish brown subangular fine to coarse GRAVEL.			Depth, m	9.15	
Specimen Reference	9 Specimen 9.15 m			Sample Type	С	
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	Caus20220503151	



Sieving		Sedime	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	76		
28	62		
20	41		
14	22		
10	10		
6.3	4		
5	3		
3.35	2		
2	1		
1.18	1		
0.6	1		
0.425	1][
0.3	1		
0.212	1]	
0.15	1]	
0.063	0		

Dry Mass of sample, g	5175
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Sample Proportions	% dry mass
Cobbles	0.0
Gravel	98.8
Sand	0.8
Fines < 0.063mm	0.0

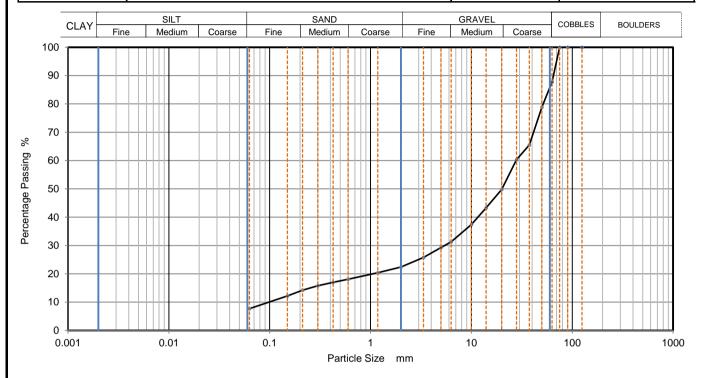
Grading Analysis		
D100	mm	
D60	mm	27.1
D30	mm	16.3
D10	mm	9.72
Uniformity Coefficient		2.8
Curvature Coefficient		1

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





CAUSEWAY	PARTICLE SIZE DISTRIBUTION		Job Ref	21-1619	
GEOTECH	PAN	IRTICLE SIZE DISTRIBUTION		Borehole/Pit No.	вноз
Site Name	North Irish Sea Array	North Irish Sea Array		Sample No.	4
Soil Description	Greyish brown gravelly slightly clayey fine to coarse SAND.			Depth, m	9.55
Specimen Reference	9 Specimen 9.55 m			Sample Type	С
Test Method	thod BS1377:Part 2:1990, clause 9.2			KeyLAB ID	Caus20220503152



Siev	Sieving		ntation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	88		
50	79		
37.5	66		
28	60		
20	50		
14	43		
10	37		
6.3	31		
5	29		
3.35	26		
2	22		
1.18	20		
0.6	18		
0.425	17		
0.3	16		
0.212	14		
0.15	12		
0.063	8		

Dry Mass of sample, g	4556

Sample Proportions	% dry mass
Cobbles	12.2
Gravel	65.5
Sand	14.6
Fines < 0.063mm	8.0

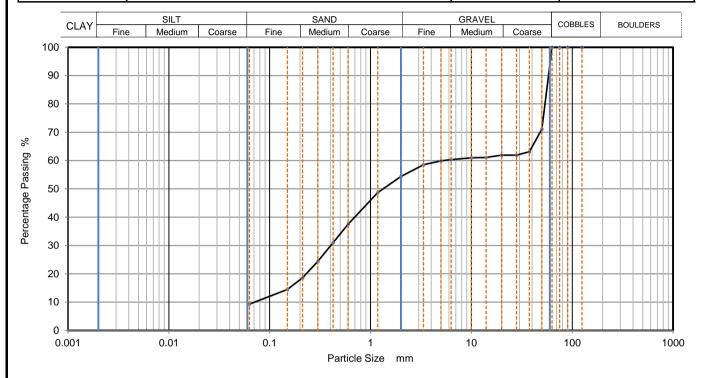
Grading Analysis		
D100	mm	
D60	mm	27.8
D30	mm	5.42
D10	mm	0.0978
Uniformity Coefficient		280
Curvature Coefficient		11

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





CAUSEWAY	PARTICLE SIZE DISTRIBUTION		Job Ref	21-1619	
GEOTECH	PAN	AKTICLE SIZE DISTRIBUTION		Borehole/Pit No.	вноз
Site Name	North Irish Sea Array	North Irish Sea Array		Sample No.	5
Soil Description	Greyish brown gravelly slightly clayey fine to coarse SAND.			Depth, m	10.00
Specimen Reference	9 Specimen 10 m			Sample Type	С
Test Method	hod BS1377:Part 2:1990, clause 9.2			KeyLAB ID	Caus20220503153



Sieving		Sedimer	ntation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	71		
37.5	63		
28	62		
20	62		
14	61		
10	61		
6.3	60		
5	60		
3.35	59		
2	54		
1.18	49		
0.6	38		
0.425	31		
0.3	24		
0.212	19		
0.15	15		
0.063	9		

Dry Mass of sample, g	3415

Sample Proportions	% dry mass	
Cobbles	0.0	
Gravel	45.6	
Sand	45.1	
Fines < 0.063mm	9.0	

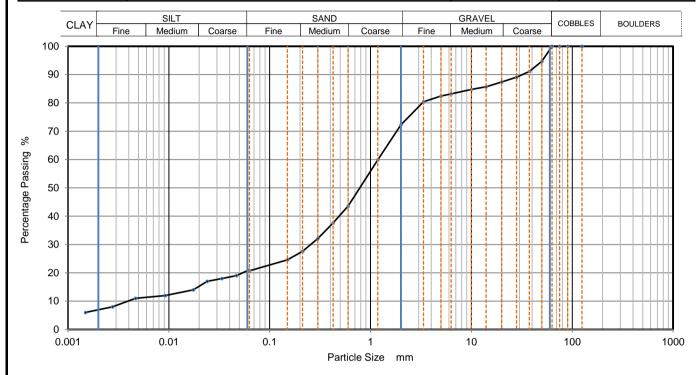
Grading Analysis		
D100	mm	
D60	mm	5.2
D30	mm	0.404
D10	mm	0.0703
Uniformity Coefficient		74
Curvature Coefficient		0.45

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





CAUSEWAY	PARTICLE SIZE DISTRIBUTION			Job Ref	21-1619	
—— GEOTECH	PANTI	CLE SIZE DIST			вноз	
Site Name	North Irish Sea Array	North Irish Sea Array			Sample No.	6
Soil Description	Greyish brown gravelly clayey fine to coarse SAND.			Depth, m	10.25	
Specimen Reference	9	Specimen Depth	10.25	m	Sample Type	С
Test Method	BS1377:Part 2:1990, clau	ses 9.2 and 9.5			KeyLAB ID	Caus20220503154



Siev	ving	Sedimo	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06199	21
90	100	0.04677	19
75	100	0.03355	18
63	100	0.02405	17
50	95	0.01746	14
37.5	91	0.00925	12
28	89	0.00468	11
20	87	0.00277	8
14	86	0.00149	6
10	85		
6.3	83		
5	82		
3.35	80		
2	72		
1.18	60		
0.6	44	Particle density	(assumed)
0.425	38	2.65	Mg/m3
0.3	32		_
0.212	28		
0.15	25		
0.063	21		

Dry Mass of sample, g	9153

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	27.7
Sand	51.5
Silt	14.0
Clay	6.8

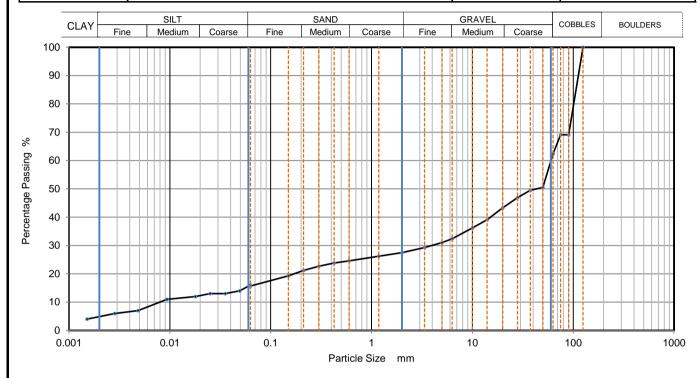
Grading Analysis		
D100	mm	
D60	mm	1.19
D30	mm	0.255
D10	mm	0.00407
Uniformity Coefficient		290
Curvature Coefficient		13

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





CAUSEWAY	PARTICLE SIZE DISTRIBUTION			Job Ref	21-1619		
—— GEOTECH	PANI	ICLE SIZE DIS	Borehole/Pit No.				BH03
Site Name	North Irish Sea Array	North Irish Sea Array			Sample No.	7	
Soil Description	Greyish brown gravelly clayey fine to coarse SAND with cobbles.			Depth, m	11.05		
Specimen Reference	9	9 Specimen 11.05 m			Sample Type	С	
Test Method	BS1377:Part 2:1990, cla	uses 9.2 and 9.5		·	KeyLAB ID	Caus20220503155	



Siev	ving	Sedimo	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	16
90	69	0.04939	14
75	69	0.03537	13
63	62	0.02501	13
50	51	0.01791	12
37.5	50	0.00936	11
28	47	0.00485	7
20	43	0.00283	6
14	39	0.00150	4
10	36		
6.3	32		
5	31		
3.35	29		
2	28		
1.18	26		
0.6	25	Particle density	(assumed)
0.425	24	2.65	Mg/m3
0.3	23		
0.212	21		
0.15	19		
0.063	16		

Dry Mass of sample, g	8823
	•

Sample Proportions	% dry mass	
Cobbles	37.6	
Gravel	35.0	
Sand	11.8	
Silt	10.6	
Clay	5.0	

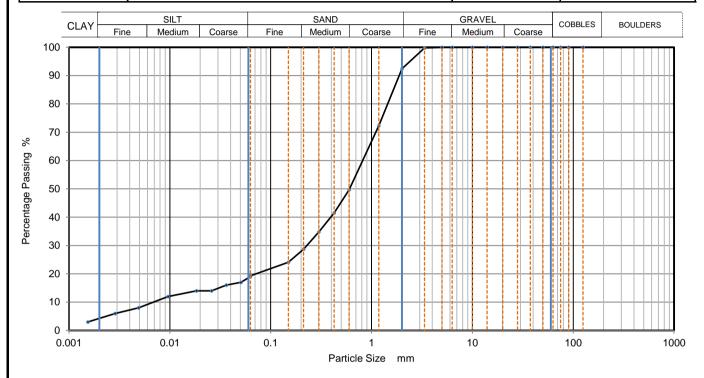
Grading Analysis		
D100	mm	125
D60	mm	60.1
D30	mm	3.94
D10	mm	0.00832
Uniformity Coefficient		7200
Curvature Coefficient		31

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





CAUSEWAY	PARTICLE SIZE DISTRIBUTION -			Job Ref	21-1619	
— GEOTECH	PANII	CLE SIZE DIST			ВН05	
Site Name	North Irish Sea Array	North Irish Sea Array			Sample No.	8
Soil Description	Greyish brown clayey fine to coarse SAND.			Depth, m	7.50	
Specimen Reference	9	9 Specimen 7.5 m			Sample Type	С
Test Method	BS1377:Part 2:1990, clau	ses 9.2 and 9.5			KeyLAB ID	Caus20220503156



Sievi	ng	Sedimentation		
Particle Size mm	% Passing	Particle Size mm	% Passing	
125	100	0.06300	19	
90	100	0.05065	17	
75	100	0.03625	16	
63	100	0.02594	14	
50	100	0.01834	14	
37.5	100	0.00958	12	
28	100	0.00490	8	
20	100	0.00286	6	
14	100	0.00154	3	
10	100			
6.3	100			
5	100			
3.35	100			
2	92			
1.18	72			
0.6	50	Particle density	(assumed)	
0.425	42	2.65	Mg/m3	
0.3	35			
0.212	29			
0.15	24	1		
0.063	19	1		

Dry Mass of sample, g	220

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	7.6
Sand	73.1
Silt	15.0
Clay	4.3

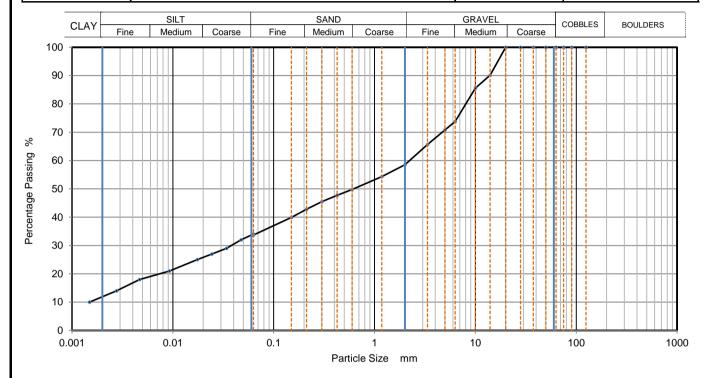
Grading Analysis		
D100	mm	
D60	mm	0.817
D30	mm	0.228
D10	mm	0.00672
Uniformity Coefficient		120
Curvature Coefficient		9.5

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





CAUSEWAY	PARTICLE SIZE DISTRIBUTION		Job Ref	21-1619	
—— GEOTECH	PANI	PARTICLE SIZE DISTRIBUTION		Borehole/Pit No.	вн05
Site Name	North Irish Sea Array		Sample No.	9	
Soil Description	Greyish brown sandy slightly gravelly silty CLAY.		Depth, m	8.50	
Specimen Reference	9 Specimen 8.5 m		Sample Type	С	
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus20220503157



Sieving		Sedimo	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06290	34
90	100	0.04744	32
75	100	0.03401	29
63	100	0.02437	27
50	100	0.01746	25
37.5	100	0.00925	21
28	100	0.00468	18
20	100	0.00277	14
14	90	0.00149	10
10	86		
6.3	74		
5	71		
3.35	66		
2	59		
1.18	54		
0.6	50	Particle density	(assumed)
0.425	48	2.65	Mg/m3
0.3	46		_
0.212	43		
0.15	40		
0.063	34		

Dry Mass of sample, g	506
·	

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	41.5
Sand	24.8
Silt	21.8
Clay	11.9

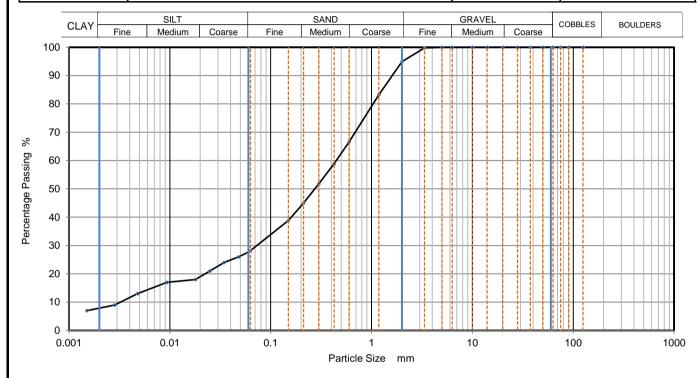
Grading Analysis		
D100	mm	
D60	mm	2.23
D30	mm	0.0376
D10	mm	0.00154
Uniformity Coefficient		1500
Curvature Coefficient		0.41

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





CAUSEWAY	PARTICLE SIZE DISTRIBUTION -		Job Ref	21-1619	
GEOTECH			Borehole/Pit No.	BH05	
Site Name	North Irish Sea Array		Sample No.	10	
Soil Description	Greyish brown slightly gravelly clayey fine to coarse SAND.		Depth, m	10.50	
Specimen Reference	9 Specimen 10.5 m		Sample Type	С	
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus20220503158



Sieving		Sedimo	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	28
90	100	0.04810	26
75	100	0.03447	24
63	100	0.02485	21
50	100	0.01791	18
37.5	100	0.00936	17
28	100	0.00479	13
20	100	0.00283	9
14	100	0.00150	7
10	100		
6.3	100		
5	100		
3.35	100		
2	95		
1.18	83		
0.6	67	Particle density	(assumed)
0.425	59	2.65	Mg/m3
0.3	52		
0.212	45		
0.15	39		
0.063	28		

Dry Mass of sample, g	210
•	·

Sample Proportions % dry mass	
Cobbles	0.0
Gravel	5.1
Sand	66.7
Silt	20.5
Clay	7.7

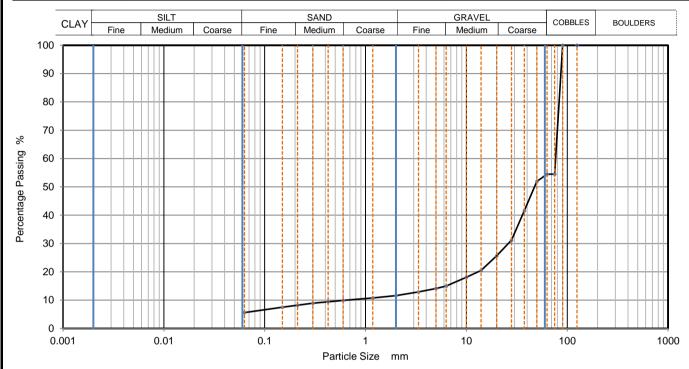
Grading Analysis		
D100	mm	
D60	mm	0.446
D30	mm	0.073
D10	mm	0.00335
Uniformity Coefficient		130
Curvature Coefficient		3.6

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





			Job Ref	21-1619	
CAUSEWAY	PARTICLE SIZE DISTRIBUTION		JOD KEI	21-1019	
GEOTECH	TAKII	CLE SIZE DISTRIBUTION		Borehole/Pit No.	ВН05
Site Name	North Irish Sea Array	North Irish Sea Array			11
Soil Description	Dark greyish brown very gravelly silty fine to coarse SAND with cobbles.			Depth, m	11.40
Specimen Reference	9 Specimen 11.4 m			Sample Type	С
Test Method	BS1377:Part 2:1990, claus	BS1377:Part 2:1990, clause 9.2			Caus20220503159



Siev	/ing	Sedime	ntation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	55		
63	55		
50	52		
37.5	42		
28	31		
20	26		
14	21		
10	18		
6.3	15		
5	14		
3.35	13		
2	12		
1.18	11		
0.6	10		
0.425	9		
0.3	9		
0.212	8		
0.15	8		
0.063	6		

Dry Mass of sample, g	8100

Sample Proportions	% dry mass
Cobbles	45.5
Gravel	42.9
Sand	6.0
Fines < 0.063 mm	6.0

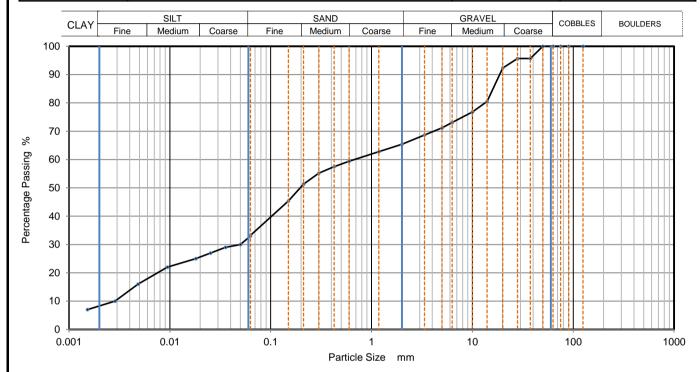
Grading Analysis		
D100	mm	
D60	mm	76.7
D30	mm	26.1
D10	mm	0.642
Uniformity Coefficient		120
Curvature Coefficient		14

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





CAUSEWAY	PARTICLE SIZE DISTRIBUTION		Job Ref	21-1619		
—— GEOTECH	PAN	TICLE SIZE DISTRIBUTION		Borehole/Pit No.	вно6	
Site Name	North Irish Sea Array			Sample No.	12	
Soil Description	Brown sandy gravelly silty CLAY.			Depth, m	7.00	
Specimen Reference	9 Specimen 7 m			Sample Type	С	
Test Method	BS1377:Part 2:1990, cla	auses 9.2 and 9.5			KeyLAB ID	Caus20220503160



Sieving		Sedime	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	33
90	100	0.05002	30
75	100	0.03559	29
63	100	0.02532	27
50	100	0.01813	25
37.5	96	0.00947	22
28	96	0.00485	16
20	92	0.00286	10
14	81	0.00152	7
10	77		
6.3	73		
5	71		
3.35	69		
2	65		
1.18	63		
0.6	59	Particle density	(assumed)
0.425	58	2.65	Mg/m3
0.3	55		
0.212	51		
0.15	45		
0.063	33		

Dry Mass of sample, g	4087
1 5	0/ 1

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	34.6
Sand	32.2
Silt	24.7
Clay	8.5

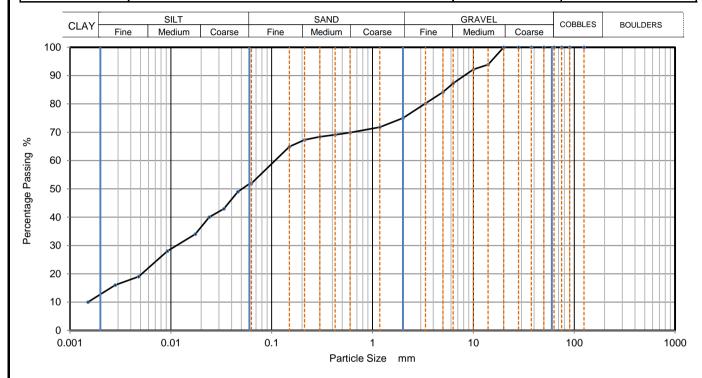
Grading Analysis		
D100	mm	
D60	mm	0.674
D30	mm	0.0465
D10	mm	0.00279
Uniformity Coefficient		240
Curvature Coefficient		1.1

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





CAUSEWAY	PARTICLE SIZE DISTRIBUTION -		Job Ref	21-1619		
GEOTECH GEOTECH	PAN	KTICLE SIZE DISTRIBUTION		Borehole/Pit No.	вн06	
Site Name	North Irish Sea Array			Sample No.	13	
Soil Description	Brown sandy slightly gravelly silty CLAY.			Depth, m	14.50	
Specimen Reference	9 Specimen 14.5 m			Sample Type	С	
Test Method	BS1377:Part 2:1990, cl	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus20220503161



Sieving		Sedimo	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06107	52
90	100	0.04609	49
75	100	0.03355	43
63	100	0.02405	40
50	100	0.01746	34
37.5	100	0.00925	28
28	100	0.00479	19
20	100	0.00280	16
14	94	0.00150	10
10	92		
6.3	87		
5	84		
3.35	80		
2	75		
1.18	72		
0.6	70	Particle density	(assumed)
0.425	69	2.65	Mg/m3
0.3	68		
0.212	67		
0.15	65		
0.063	52		

Dry Mass of sample, g	500

Sample Proportions	% dry mass	
Cobbles	0.0	
Gravel	25.0	
Sand	23.0	
Silt	38.9	
Clay	13.1	

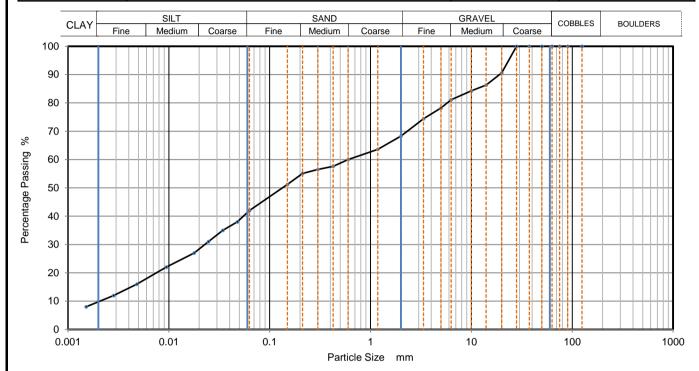
Grading Analysis		
D100	mm	
D60	mm	0.108
D30	mm	0.0112
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

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





CAUSEWAY	PARTICLE SIZE DISTRIBUTION		Job Ref	21-1619	
—— GEOTECH			Borehole/Pit No.	вно6	
Site Name	North Irish Sea Array			Sample No.	14
Soil Description	Brown sandy gravelly silty CLAY.			Depth, m	14.90
Specimen Reference	9 Specimen 14.9 m Depth		Sample Type	С	
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus20220503162



Sieving		Sedimentation		
Particle Size mm	% Passing	Particle Size mm	% Passing	
125	100	0.06290	42	
90	100	0.04777	38	
75	100	0.03424	35	
63	100	0.02470	31	
50	100	0.01780	27	
37.5	100	0.00942	22	
28	100	0.00482	16	
20	91	0.00283	12	
14	86	0.00151	8	
10	84			
6.3	81			
5	78			
3.35	74			
2	68			
1.18	64			
0.6	60	Particle density	(assumed)	
0.425	58	2.65	Mg/m3	
0.3	57		_	
0.212	55			
0.15	51			
0.063	42			

Dry Mass of sample, g	598

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	31.7
Sand	26.3
Silt	32.1
Clay	9.9

Grading Analysis		
D100	mm	
D60	mm	0.602
D30	mm	0.0225
D10	mm	0.00202
Uniformity Coefficient		300
Curvature Coefficient		0.42

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

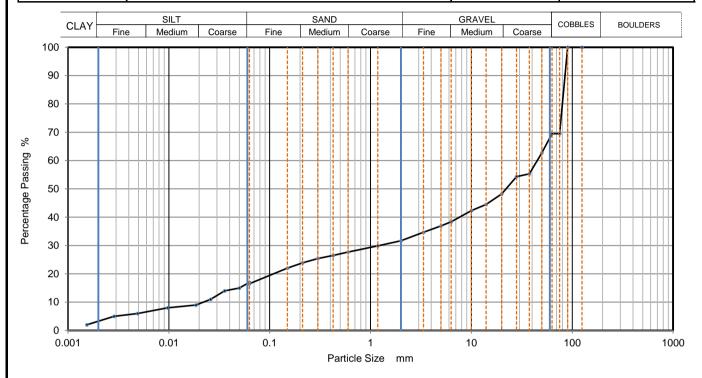




LAB 05R - Version 5

10122

CAUSEWAY	PARTICLE SIZE DISTRIBUTION -		Job Ref	21-1619	
GEOTECH			Borehole/Pit No.	вно6	
Site Name	North Irish Sea Array		Sample No.	15	
Soil Description	Brown slightly sandy clayey subangular fine to coarse GRAVEL with cobbles.		Depth, m	15.45	
Specimen Reference	Specimen 15.45 m Depth		Sample Type	С	
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	Caus20220503163



Sieving		Sedimo	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	17
90	100	0.05002	15
75	70	0.03581	14
63	70	0.02594	11
50	63	0.01855	9
37.5	55	0.00969	8
28	54	0.00490	6
20	48	0.00286	5
14	45	0.00154	2
10	42		
6.3	38		
5	37		
3.35	35		
2	32		
1.18	30		
0.6	28	Particle density	(assumed)
0.425	27	2.65	Mg/m3
0.3	25		
0.212	24		
0.15	22		
0.063	17		

Dry Mass of sample, g	3154

Sample Proportions	% dry mass			
Cobbles	30.5			
Gravel	37.8			
Sand	15.2			
Silt	13.1			
Clay	3.4			

Grading Analysis		
D100	mm	
D60	mm	45.1
D30	mm	1.22
D10	mm	0.0217
Uniformity Coefficient		2100
Curvature Coefficient		1.5

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







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> Registered in Ireland. Company Number: 633786

www.causewaygeotech.com

2 June 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 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.

Stephen Watson

Laboratory Manager

Signed for and on behalf of Causeway Geotech Ltd















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



Summary of Classification Test Results

Project No.

Project Name

21-1619

North Irish Sea Array

		Sar	nple			Densi	ty	W	Passing 425µm	LL	PL	PI	Particle	Casagrande
Hole No.	Ref	Тор	Base	Туре	Soil Description	bulk Mg/m	dry 3	%	425μm %	%	%	%	density Mg/m3	Classification
BH02		2.50	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

Key

Density test Liquid Limit Particle density

Linear measurement unless: 4pt cone unless: sp - small pyknometer

wd - water displacement wi - immersion in water

cas - Casagrande method

1pt - single point test

gj - gas jar

Date Printed

Approved By

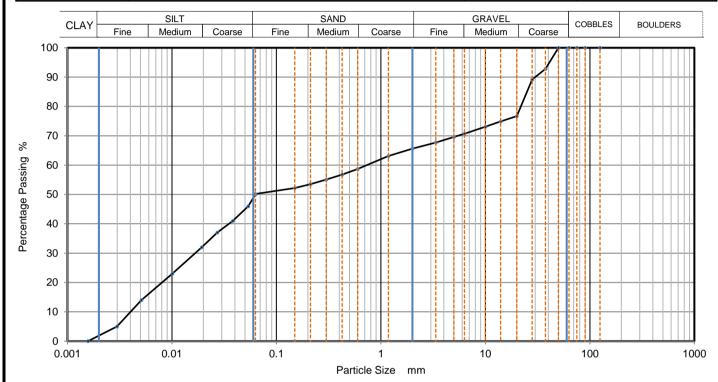
Stephen.Watson

06/02/2022 00:00



10122

CAUSEWAY	DARTI	CLE SIZE DIST	Job Ref	21-1619		
GEOTECH GEOTECH	PARII	CLE SIZE DIS	IKIBUTIUN	Borehole/Pit No.	ВНО2	
Site Name	North Irish Sea Array				Sample No.	
Soil Description	Brown sandy gravelly silty CLAY.				Depth, m	2.50
Specimen Reference	6 Specimen 2.5 m				Sample Type	С
Test Method	BS1377:Part 2:1990, clau	ses 9.2 and 9.5	•	KeyLAB ID	Caus2022051941	



Siev	ving	Sedimo	entation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.06300	50
90	100	0.05375	46
75	100	0.03822	41
63	100	0.02717	37
50	100	0.01932	32
37.5	93	0.01008	23
28	89	0.00509	14
20	77	0.00297	5
14	75	0.00157	0
10	73		
6.3	71		
5	70		
3.35	68		
2	66		
1.18	63		
0.6	59	Particle density	(assumed)
0.425	57	2.65	Mg/m3
0.3	55		
0.212	54]	
0.15	52]	
0.063	50		

Dry Mass of sample, g	2425
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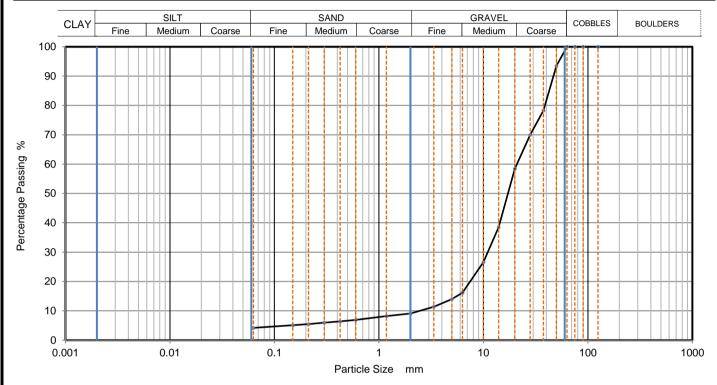
Sample Proportions	% dry mass
Cobbles	0.0
Gravel	34.4
Sand	15.4
Silt	48.5
Clay	1.7

Grading Analysis		
D100	mm	
D60	mm	0.736
D30	mm	0.0168
D10	mm	0.0041
Uniformity Coefficient		180
Curvature Coefficient		0.094





CAUSEWAY PARTICLE SIZE DISTRIBUTION			Job Ref	21-1619		
—— GEOTECH	PARI	TICLE SIZE DISTRIBUTION			Borehole/Pit No.	вно2
Site Name	North Irish Sea Array	North Irish Sea Array			Sample No.	
Soil Description	Brown sandy slightly clayey subangular fine to coarse GRAVEL.			Depth, m	10.00	
Specimen Reference	2 Specimen 10 m			Sample Type	С	
Test Method	BS1377:Part 2:1990, cla	use 9.2			KeyLAB ID	Caus2022051942



Siev	ing	Sedimen	itation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	94		
37.5	78		
28	70		
20	58		
14	39		
10	27		
6.3	16		
5	14		
3.35	11		
2	9		
1.18	8		
0.6	7		
0.425	6		
0.3	6		
0.212	6		
0.15	5		
0.063	4	1	

	_
Dry Mass of sample, g	3572

Sample Proportions	% dry mass
Cobbles	0.0
Gravel	90.9
Sand	4.9
Fines < 0.063mm	4.0

Grading Analysis		
D100	mm	
D60	mm	20.9
D30	mm	11
D10	mm	2.46
Uniformity Coefficient		8.5
Curvature Coefficient		2.3

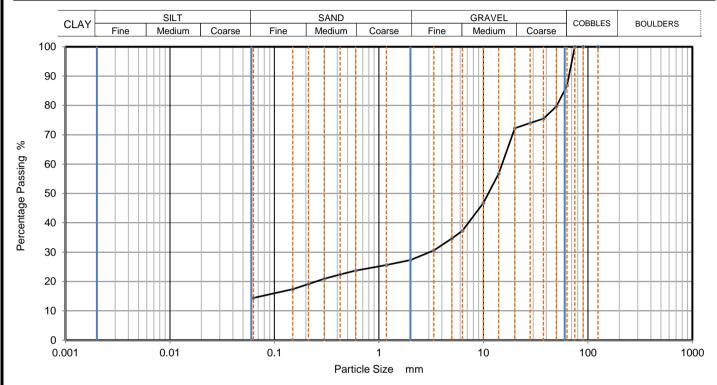
Remarks

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





CAUSEWAY PARTICLE SIZE DISTRIBUTION			Job Ref	21-1619		
—— GEOTECH	PARI	TICLE SIZE DISTRIBUTION			Borehole/Pit No.	BH16
Site Name	North Irish Sea Array	North Irish Sea Array			Sample No.	
Soil Description	Brown sandy slightly clayey subangular fine to coarse GRAVEL.			Depth, m	10.00	
Specimen Reference	6 Specimen 10 m			Sample Type	С	
Test Method	BS1377:Part 2:1990, cla	use 9.2			KeyLAB ID	Caus2022051940



Sievi	ing	Sedime	ntation
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	87		
50	80		
37.5	76		
28	74		
20	72		
14	57		
10	47		
6.3	37		
5	35		
3.35	31		
2	27		
1.18	26		
0.6	24		
0.425	22	1	
0.3	21		
0.212	19		
0.15	17		
0.063	14		

Dry Mass of sample, g	4494
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Sample Proportions	% dry mass		
Cobbles	13.2		
Gravel	59.5		
Sand	12.9		
Fines < 0.063mm	14.0		

Grading Analysis		
D100	mm	
D60	mm	15.1
D30	mm	3.07
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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







LABORATORY RESTRICTION REPORT

Project Reference	21-1619	То	Colm Hurley	
Project Name	Nort Irish Sea Array		Position	Project Manager
i roject ivallie	Noit ilish Sea Allay	Nort Ilish Sea Allay		Stephen Watson
TR reference	21-1619 / 0	311	From	Otophen Watson
TK reference	21-1019 /	111	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 Sample Test Number Number Depth Type Type Reason for Restriction Req					
Number	Depth	Туре	Туре	Reason for Restriction	Required Action
	(m)				
	11.50- 13.00	С	PSD	No suitbale sample - rockhead	CANCEL
	Number	Number Depth (m)	Number Depth Type (m) 11.50-	Number Depth Type Type (m) 11.50-	Number Depth Type Type Reason for Restriction 11.50- C DCD No suitbale counts realthead

For electronic reporting a form of electronic signature or printed name is acceptable

Laboratory Signature Stephen Watson	Project Manager Signature Colm Hurley
· ·	,
Date	Date
31 May 2022	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

Final Report

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:

Details: Stuart Henderson, Technical

Manager



Chemtest

Eurofins Chemtest Ltd Depot Road Newmarket CB8 0AL

Tel: 01638 606070

Email: info@chemtest.com

Client: Causeway Geotech Ltd			CI	nemtest	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	ple Type:	SOIL							
				Top [Depth (m):	0.5	1.0	0.5	1.0	0.5	1.0	0.5	1.0
				Date	Sampled:	15-Mar-2022	15-Mar-2022	15-Mar-2022	15-Mar-2022	15-Mar-2022	15-Mar-2022	15-Mar-2022	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

Oli de Control de Cont	-,			l 1 1	I.I. M.	00.40044	00.40044	00.40044	00.40044	00.40044	00.40044	00.40044	00.40044
Client: Causeway Geotech Ltd					Job No.:	22-10214	22-10214	22-10214	22-10214	22-10214	22-10214	22-10214	22-10214
Quotation No.: Q21-26199					mple ID.:	1393663	1393664	1393665	1393666	1393667	1393668	1393669	1393670
					Location:	TP08	TP08	TP12	TP12	TP05	TP05	TP04	TP04
				San	nple Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top [Depth (m):	0.5	1.0	0.5	1.0	0.5	1.0	0.5	1.0
		Date Sampled:				14-Mar-2022	14-Mar-2022	14-Mar-2022	14-Mar-2022	14-Mar-2022	14-Mar-2022	14-Mar-2022	14-Mar-2022
Determinand	Accred.	SOP	Type	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	Job No.:	22-10214	22-10214	22-10214	22-10214
Quotation No.: Q21-26199			Chen	ntest Sa	mple ID.:	1393671	1393672	1393673	1393674
				Sample	Location:	TP11	TP11	TP03	TP03
				San	nple Type:	SOIL	SOIL	SOIL	SOIL
				Top [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	Type	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				nple ID.:	1393655	1393656	1393657	1393658	1393659	1393660	1393661	1393662	1393663
Quetalier 11011 Q21 20100				_ocation:	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	OOVEITIT	COVERTICE	COVERNIA	COVENIA	OOVEIVII	OOVEIVII	COVERTICE	OUVERTICE	COVERTIC
ACM Type	U	2192	- Cinto	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
pH	U	2010	70	4.0	8.5	8.5	8.5	8.7	8.6	8.7	8.2	8.5	8.5
Arsenic	Ü	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	%	0.10	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		1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
·	U	2680	mg/kg		< 1.0		< 1.0			< 1.0			
Aliphatic TPH > C8-C10	U	+	mg/kg	1.0		< 1.0		< 1.0	< 1.0		< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12 Aliphatic TPH >C12-C16	U	2680 2680	mg/kg mg/kg	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		1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	N N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 1.0 < 5.0	< 1.0 < 5.0	< 1.0 < 5.0	< 1.0 < 5.0	< 5.0	< 5.0
Total Aliphatic Hydrocarbons Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 5.0 < 1.0	< 5.0 < 1.0	< 5.0 < 1.0	< 5.0 < 1.0	< 5.0 < 1.0	< 5.0 < 1.0	< 5.0 < 1.0	< 5.0 < 1.0	< 5.0 < 1.0
	N		mg/kg	1.0			< 1.0			< 1.0	< 1.0		< 1.0
Aromatic TPH > C7-C8	U	2680 2680	mg/kg		< 1.0	< 1.0		< 1.0	< 1.0			< 1.0	
Aromatic TPH > C8-C10		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		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		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.:			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
			Sam	ple Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top D	epth (m):	0.5	1.0	0.5	1.0	0.5	1.0	0.5	1.0	0.5
				Sampled:	15-Mar-2022	15-Mar-2022	15-Mar-2022	15-Mar-2022	15-Mar-2022	15-Mar-2022	15-Mar-2022	15-Mar-2022	14-Mar-2022
				stos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD									
Total Petroleum Hydrocarbons	N	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	2760	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	N	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	N	2800	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Phenanthrene	N	2800	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Anthracene	N	2800	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Fluoranthene	N	2800	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.17	< 0.010	< 0.010	< 0.010	< 0.010
Pyrene	N	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	N	2800	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Chrysene	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[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	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[a]pyrene	N	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	2800	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	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[g,h,i]perylene	N	2800	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Coronene	N	2800	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	N	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	N	2815	mg/kg		< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
PCB 52	N	2815	mg/kg		< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
PCB 90+101	N	2815	mg/kg		< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
PCB 118	N	2815	mg/kg		< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
PCB 153	N		mg/kg	0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
PCB 138	N		mg/kg		< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
PCB 180	N	2815	mg/kg		< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Total PCBs (7 congeners)	N	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
Quetaus:::10:: Q2:: 20:00				ocation:	TP08	TP12	TP12	TP05	TP05	TP04	TP04	TP11	TP11
				ole Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	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	14-Mar-2022	14-Mar-2022	14-Mar-2022	14-Mar-2022	14-Mar-2022	14-Mar-2022	14-Mar-2022	14-Mar-2022
				stos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD	3372	001211111	0012.1111	3372	3372	0012.1111	331211111	331211111	331211111
ACM Type	U	2192	Cinto	N/A	-	-	-	-	-	-	-	-	-
,				-	No Asbestos	No Asbestos	No Asbestos	No Asbestos	No Asbestos	No Asbestos	No Asbestos	No Asbestos	No Asbestos
Asbestos Identification	U	2192		N/A	Detected								
Moisture	N	2030	%	0.020	14	20	20	17	17	17	9.5	15	16
pH	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				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.:	1393664	1393665	1393666	1393667	1393668	1393669	1393670	1393671	1393672
		(Sample	Location:	TP08	TP12	TP12	TP05	TP05	TP04	TP04	TP11	TP11
				ple Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top D	epth (m):	1.0	0.5	1.0	0.5	1.0	0.5	1.0	0.5	1.0
			Date S	Sampled:	14-Mar-2022	14-Mar-2022	14-Mar-2022	14-Mar-2022	14-Mar-2022	14-Mar-2022	14-Mar-2022	14-Mar-2022	14-Mar-2022
				stos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD									
Total Petroleum Hydrocarbons	N	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	2760	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	N	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	N	2800	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Phenanthrene	N	2800	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Anthracene	N	2800	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
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
Pyrene	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[a]anthracene	N	2800	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Chrysene	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[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	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[a]pyrene	N	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	2800	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	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[g,h,i]perylene	N	2800	mg/kg	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Coronene	N	2800	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	N	2800	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
PCB 28	N	2815	mg/kg	0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
PCB 52	N	2815	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	N	2815			< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
PCB 118	N	2815	mg/kg	0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
PCB 153	N	2815	mg/kg	0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
PCB 138	N	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	N	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)	N	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				Job No.:	22-10214	22-10214
Quotation No.: Q21-26199				nple ID.:	1393673	1393674
		9	Sample I	_ocation:	TP03	TP03
			Samp	ole Type:	SOIL	SOIL
			Top De	epth (m):	0.5	1.0
			Date S	Sampled:	14-Mar-2022	14-Mar-2022
		Asbestos Lab:				COVENTRY
Determinand	Accred.	SOP	Units	LOD		
ACM Type	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	mg/kg	1.0	12	13
Barium	Ū	2450		10	47	56
Cadmium	Ü	2450	0	0.10	0.81	0.31
Mercury Low Level	Ü	2450	mg/kg	0.05	0.06	< 0.05
Molybdenum	U	2450	mg/kg	2.0	< 2.0	< 2.0
Antimony	N	2450	mg/kg	2.0	< 2.0	< 2.0
Copper	U	2450	mg/kg	0.50	22	32
Nickel	Ü	2450	mg/kg	0.50	32	39
Lead	Ü	2450	mg/kg	0.50	17	7.0
Selenium	Ü	2450	mg/kg	0.20	0.29	< 0.20
Zinc	Ü	2450	mg/kg	0.50	53	48
Chromium (Trivalent)	N	2490	mg/kg	1.0	24	35
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50
LOI	U	2610	%	0.10	4.2	2.4
Total Organic Carbon	Ü	2625	%	0.20	1.4	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	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	Ü	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	Ü	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	Ū	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	Ü	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	Ü	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	Ū	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	Ü	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	Ü	2680		1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	Ü	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	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	Chemtest Job No			Job No.:	22-10214	22-10214
Quotation No.: Q21-26199		Chem	test San	nple ID.:	1393673	1393674
		S	Sample I	_ocation:	TP03	TP03
			Samp	ole Type:	SOIL	SOIL
			Top De	epth (m):	0.5	1.0
			Date S	Sampled:	14-Mar-2022	14-Mar-2022
			Asbes	stos Lab:	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD		
Total Petroleum Hydrocarbons	N	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	< 0.0010
Methyl Tert-Butyl Ether	U	2760	mg/kg	0.0010	< 0.0010	< 0.0010
Naphthalene	N	2800	mg/kg	0.010	< 0.010	< 0.010
Acenaphthylene	N	2800	mg/kg	0.010	< 0.010	< 0.010
Acenaphthene	N	2800	mg/kg	0.010	< 0.010	< 0.010
Fluorene	N	2800	mg/kg	0.010	< 0.010	< 0.010
Phenanthrene	N	2800	mg/kg	0.010	< 0.010	< 0.010
Anthracene	N	2800	mg/kg	0.010	< 0.010	< 0.010
Fluoranthene	N	2800	mg/kg	0.010	< 0.010	< 0.010
Pyrene	N	2800	mg/kg	0.010	< 0.010	< 0.010
Benzo[a]anthracene	N	2800	mg/kg	0.010	< 0.010	< 0.010
Chrysene	N	2800	mg/kg	0.010	< 0.010	< 0.010
Benzo[b]fluoranthene	N	2800	mg/kg	0.010	< 0.010	< 0.010
Benzo[k]fluoranthene	N	2800	mg/kg	0.010	< 0.010	< 0.010
Benzo[a]pyrene	N	2800	mg/kg	0.010	< 0.010	< 0.010
Indeno(1,2,3-c,d)Pyrene	N	2800	mg/kg	0.010	< 0.010	< 0.010
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.010	< 0.010	< 0.010
Benzo[g,h,i]perylene	N	2800	mg/kg	0.010	< 0.010	< 0.010
Coronene	N	2800	mg/kg	0.010	< 0.010	< 0.010
Total Of 17 PAH's	N	2800	mg/kg	0.20	< 0.20	< 0.20
PCB 28	N	2815	mg/kg	0.0010	< 0.0010	< 0.0010
PCB 52	N	2815	mg/kg	0.0010	< 0.0010	< 0.0010
PCB 90+101	N	2815	mg/kg	0.0010	< 0.0010	< 0.0010
PCB 118	N	2815	mg/kg	0.0010	< 0.0010	< 0.0010
PCB 153	N	2815	mg/kg	0.0010	< 0.0010	< 0.0010
PCB 138	N	2815	mg/kg	0.0010	< 0.0010	< 0.0010
PCB 180	N	2815	mg/kg	0.0010	< 0.0010	< 0.0010
Total PCBs (7 congeners)	N	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	determination by inductively coupled plasma
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)		ComplianceTest for Leaching of Granular Waste Material and Sludge

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 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: customerservices@chemtest.com



Eurofins Chemtest Ltd Depot Road Newmarket CB8 0AL

Tel: 01638 606070 Email: info@chemtest.com

Final Report

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
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Sean Ross
Stephen Franey

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:

Details: Stuart Henderson, Technical

Manager



Eurofins Chemtest Ltd Depot Road Newmarket CB8 0AL

Tel: 01638 606070 Email: info@chemtest.com

Client: Causeway Geotech Ltd			CI	hemtest	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
				Sample	Location:	BH03	BH03	TP20	TP20	TP21	TP21
				San	nple Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top 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	Type	Units	LOD						
Total Dissolved Solids	N	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				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
		5	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						
ACM Type	U	2192		N/A	=	-	-	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos	No Asbestos	No Asbestos	No Asbestos	No Asbestos	No Asbestos
Aspestos identification	U	2192		IN/A	Detected	Detected	Detected	Detected	Detected	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	Ü	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	Ü	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	Ü	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	Ü	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		Cho	emtest .	Job No.:	22-10615	22-10615	22-10615	22-10615	22-10615	22-10615
Quotation No.: Q21-26199		Chemi	test Sar	nple ID.:	1395603	1395604	1395605	1395606	1395607	1395608
		5	Sample I	Location:	BH03	BH03	TP20	TP20	TP21	TP21
			Samp	ole Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top D	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		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	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 118	N		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)	N	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	determination by inductively coupled plasma
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)		ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key **UKAS** accredited MCERTS and UKAS accredited M Unaccredited Ν This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for S this analysis This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited SN 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 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: customerservices@chemtest.com



APPENDIX H SPT HAMMER ENERGY MEASUREMENT REPORT





in accordance with BSEN ISO 22476-3:2005

Southern Testing

Unit 11

RH19 2HU

Charlwoods Road East Grinstead West Sussex

SPT Hammer Ref: 0208

Test Date:

12/02/2022

Report Date:

14/02/2022

File Name:

0208.spt

Test Operator:

NPB

Instrumented Rod Data

Diameter d_r (mm):

54

Wall Thickness t_r (mm):

6.0

Assumed Modulus Ea (GPa): 200

64786

Accelerometer No.1: Accelerometer No.2:

64789

SPT Hammer Information

Hammer Mass m (kg):

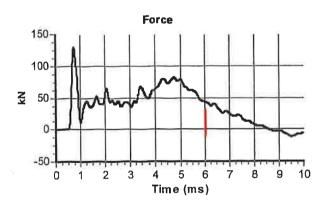
Falling Height h (mm):

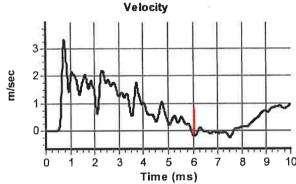
760

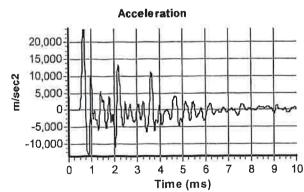
SPT String Length L (m): 12.0

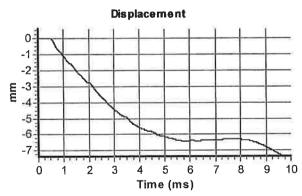
Comments / Location

CAUSEWAY









Calculations

Area of Rod A (mm2):

905

Theoretical Energy E_{theor} (J):

473

Measured Energy E_{meas}

357

(J):

Energy Ratio E_r (%):

76

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

SPT Hammer Ref: 0643

Test Date:

12/02/2022

Report Date:

14/02/2022

File Name:

0643.spt

Test Operator:

NPB

Instrumented Rod Data

Diameter d_r (mm):

54

Wall Thickness t_r (mm):

6.0

Assumed Modulus Ea (GPa): 200

0.0

Accelerometer No.1:

64786

Accelerometer No.2:

64789

SPT Hammer Information

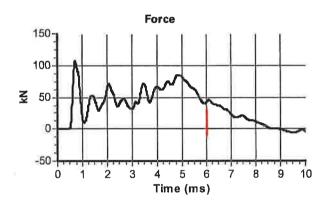
Hammer Mass m (kg): 63

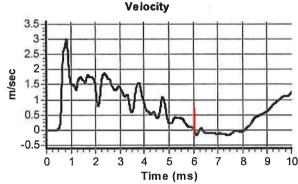
Falling Height h (mm): 760

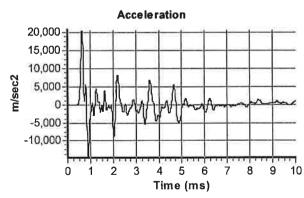
SPT String Length L (m): 12.0

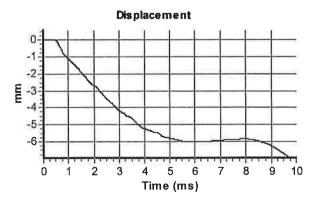
Comments / Location

CAUSEWAY









Calculations

Area of Rod A (mm2):

905

Theoretical Energy E_{theor} (J):

473

Measured Energy E_{meas}

(J): 340

Energy Ratio E_r (%):

72

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

SPT Hammer Ref: 1387

Test Date:

12/02/2022

Report Date:

14/02/2022

File Name:

1387.spt

Test Operator:

NPB

Instrumented Rod Data

Diameter d_r (mm):

54

Wall Thickness t_r (mm):

6.0

Assumed Modulus Ea (GPa): 200

Accelerometer No.1:

64786

Accelerometer No.2:

64789

SPT Hammer Information

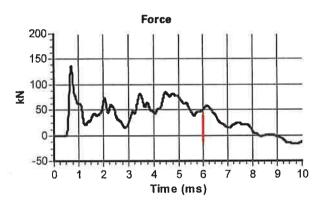
Hammer Mass m (kg):

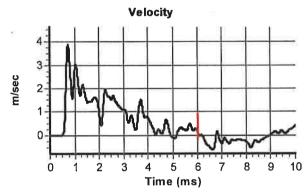
Falling Height h (mm): 760

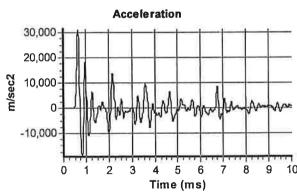
SPT String Length L (m): 12.0

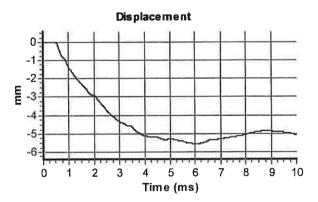
Comments / Location

CAUSEWAY









Calculations

Area of Rod A (mm2):

905

Theoretical Energy E_{theor} (J):

473

Measured Energy E_{meas}

308 (J):

Energy Ratio E_r (%):

65

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

SPT Hammer Ref: 1376

Test Date:

14/02/2022

Report Date:

14/02/2022

760

File Name:

1376.spt

Test Operator:

NPB

Instrumented Rod Data

Diameter d_r (mm):

54

Wall Thickness tr (mm):

6.0

Assumed Modulus Ea (GPa): 200

64786

Accelerometer No.1: Accelerometer No.2:

64789

SPT Hammer Information

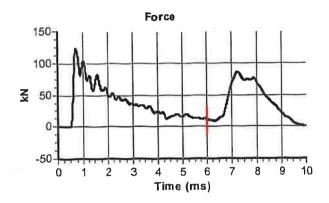
Hammer Mass m (kg):

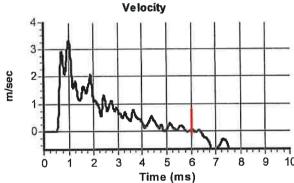
Falling Height h (mm):

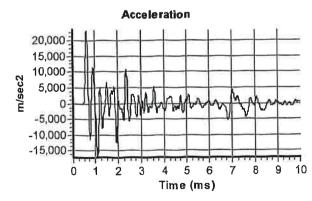
SPT String Length L (m): 12.0

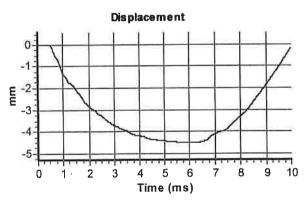
Comments / Location

CAUSEWAY









Calculations

Area of Rod A (mm2):

905

Theoretical Energy E_{theor} (J):

473

Measured Energy E_{meas} (J):

301

Energy Ratio E_r (%):

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

Prepared For:



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

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4. BOREHOL	E LOGGING CONSTRAINTS7
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Figure 3.1	Location map showing the main area of investigation highlighted by the red striped area.
Figure 3.2	Aerial image showing the location of five of the six boreholes, just
Figure 3.3	north of Balbriggan. Location map showing the location of borehole 9, just North of
Figure 3.4	Swords (highlighted by a red striped circle). 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 4th May 2022 and the 6th May 2022.

The following logs were run:

ВН	Logs	From (m)	To (m)
1		0.6	22.2
2	Natural Gamma (GV NGRS) 3-Arm Caliper (GV CAL3)	0.9	28
4	Focused Resistivity (GV DLL3) Sonic Velocity (GV ASNC) Fluid Temperature & Conductivity (GV TCIS)	0.6	17.7
9	Fluid Velocity (GV IFM)	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 K⁴⁰, though the U²³⁸ series of elements and the Th²³² 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 dependant upon resolution required.

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

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

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.

EIR Code: O16

3.0 SITE DETAILS North Irish Sea Array, Balbriggan

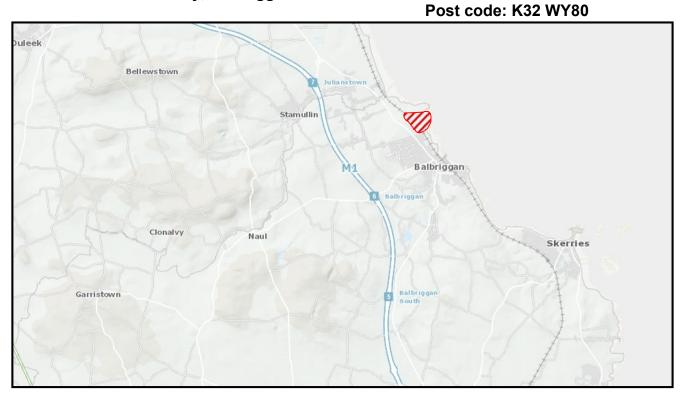


Figure 3.1 Location map showing the main area of investigation highlighted by the red striped area © Ordnance Survey Ireland 2022.

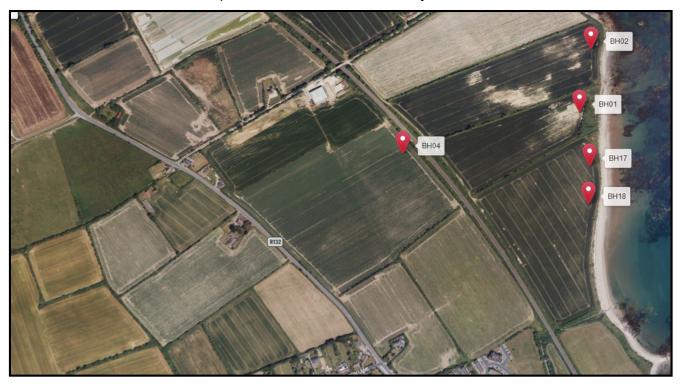


Figure 3.2 Aerial image showing the location of five of the six boreholes, just north of Balbriggan © Applemaps 2022.

SITE DETAILS 3.0 **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.

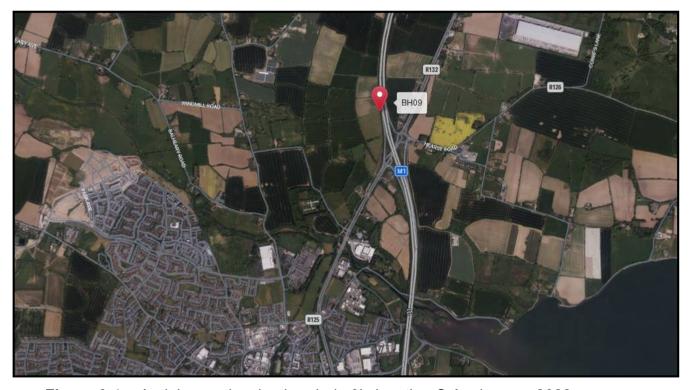


Figure 3.4 Aerial map showing borehole 9's location © Applemaps 2022.

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

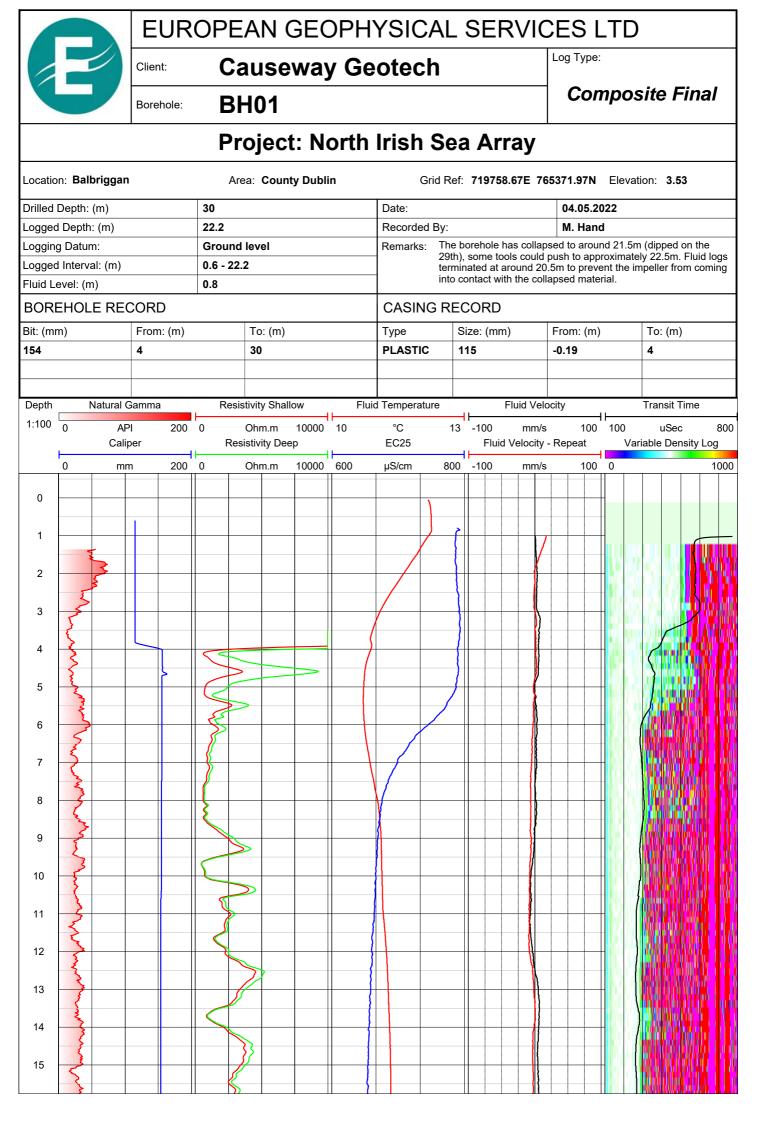
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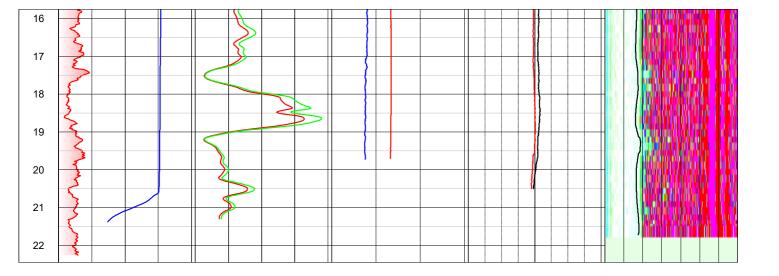
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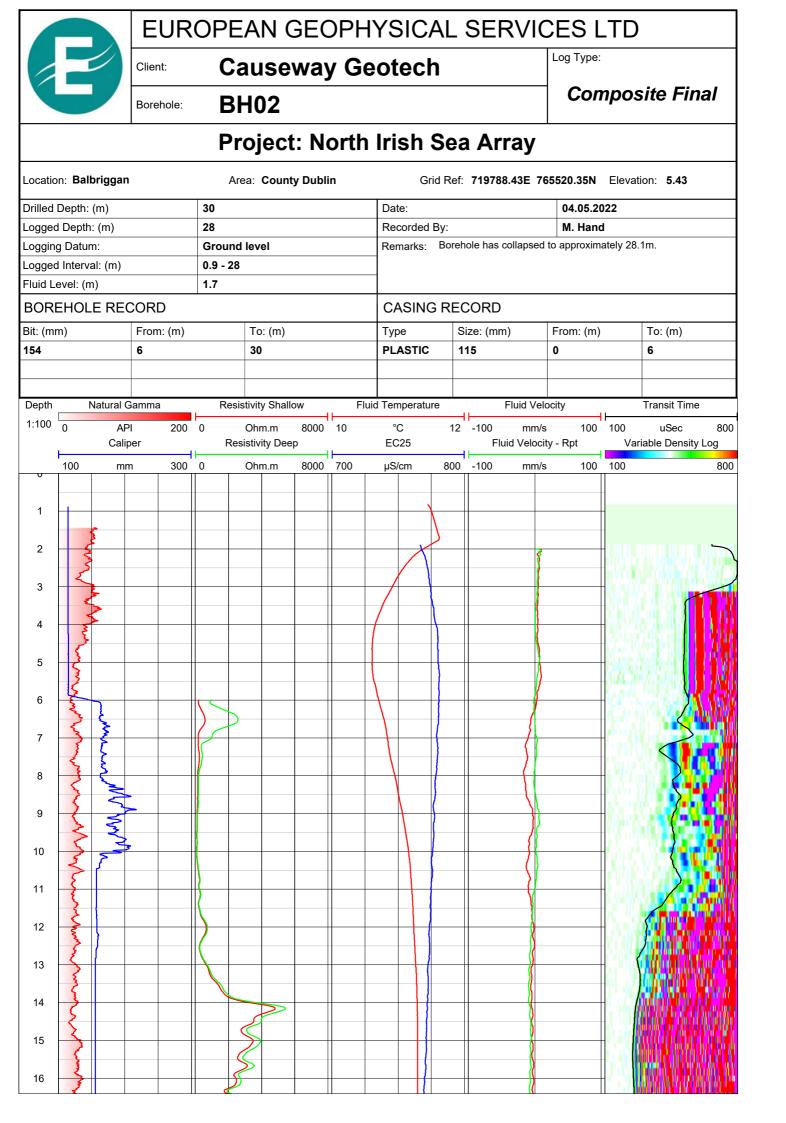
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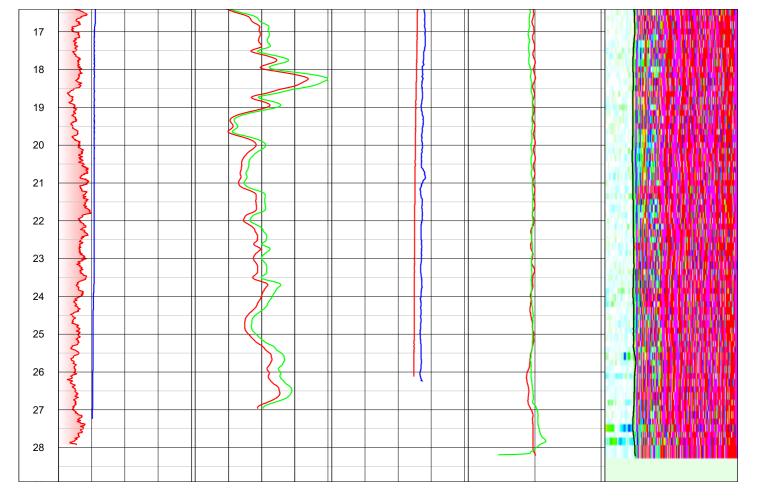
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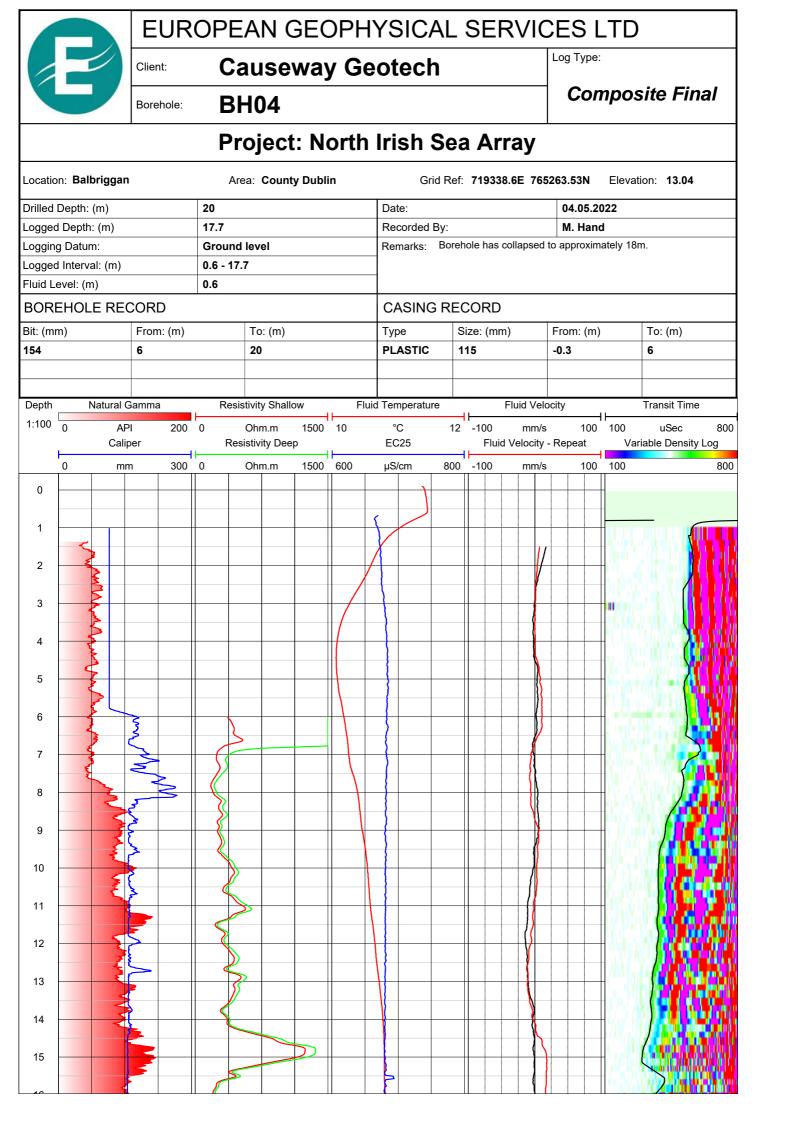
Appendix 1 Geophysical Logs



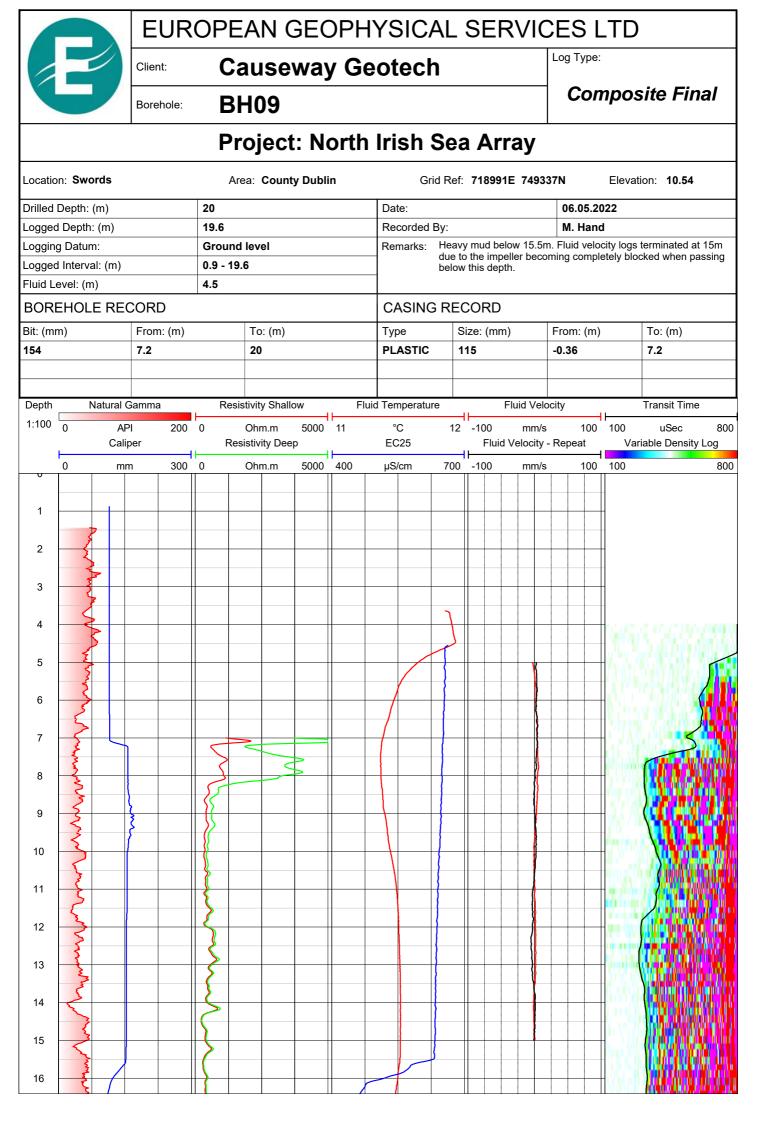




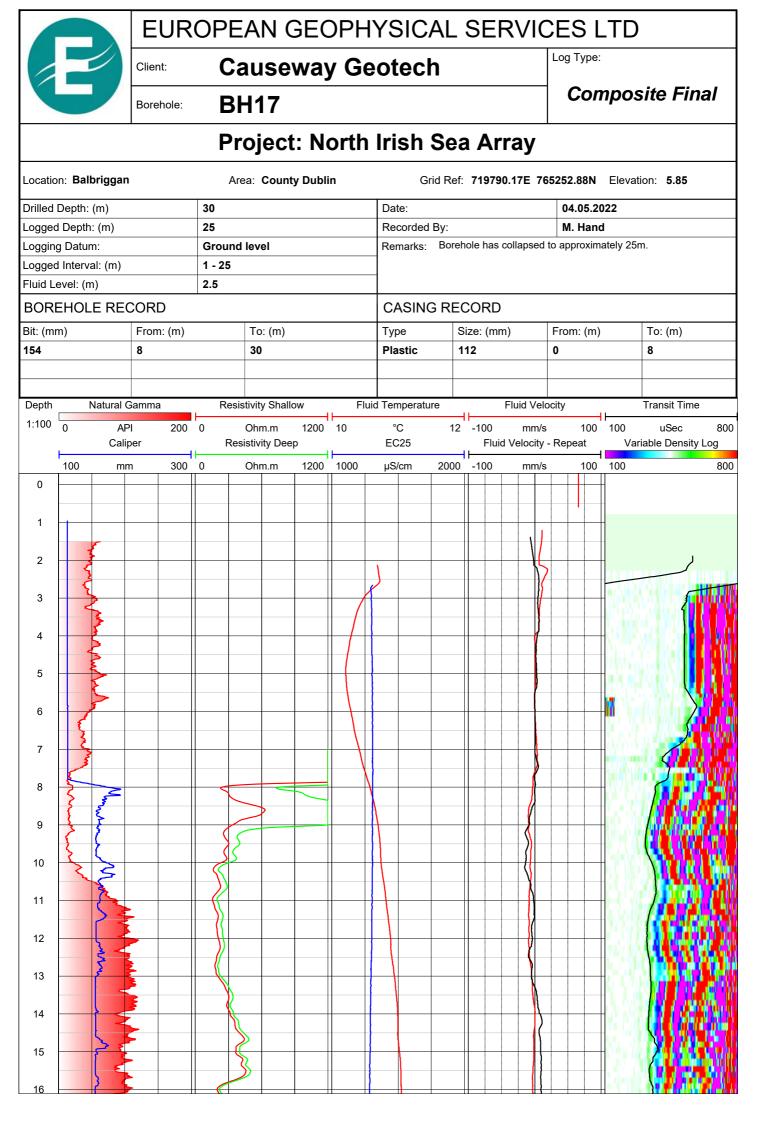


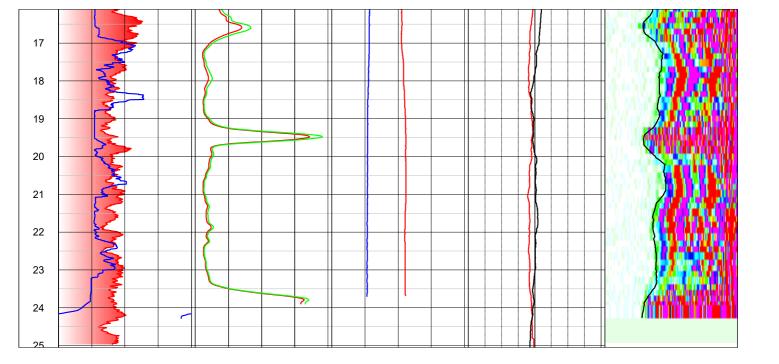


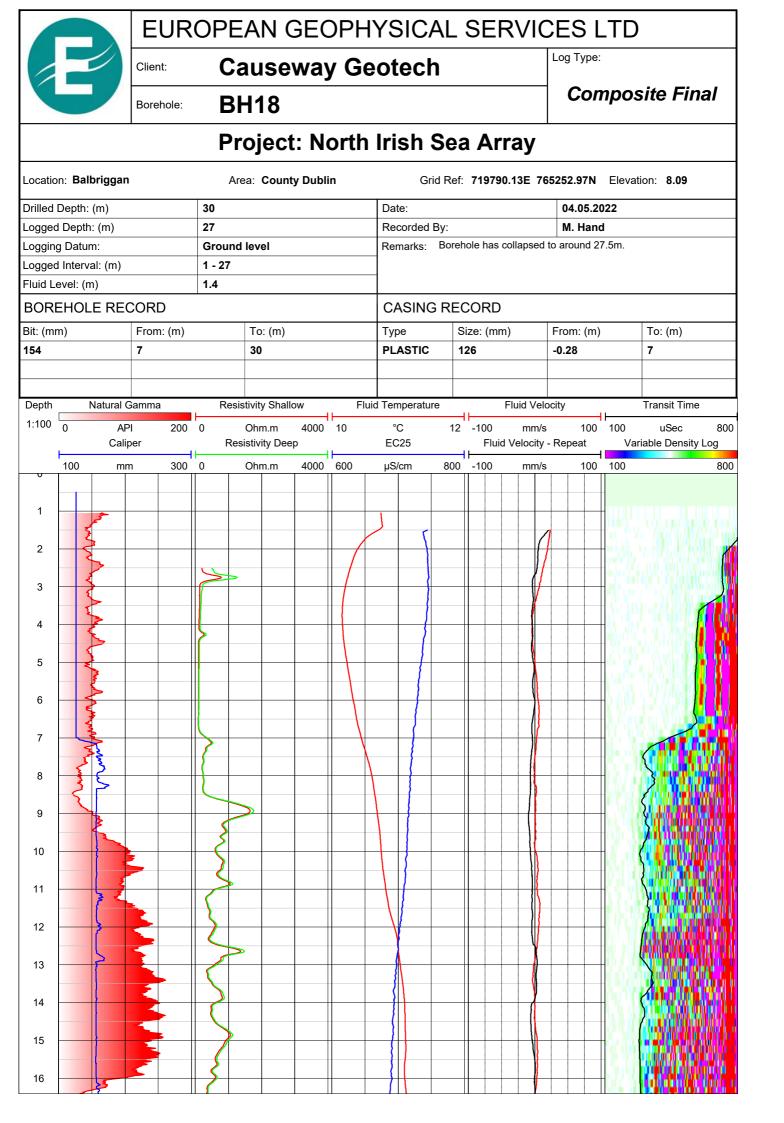
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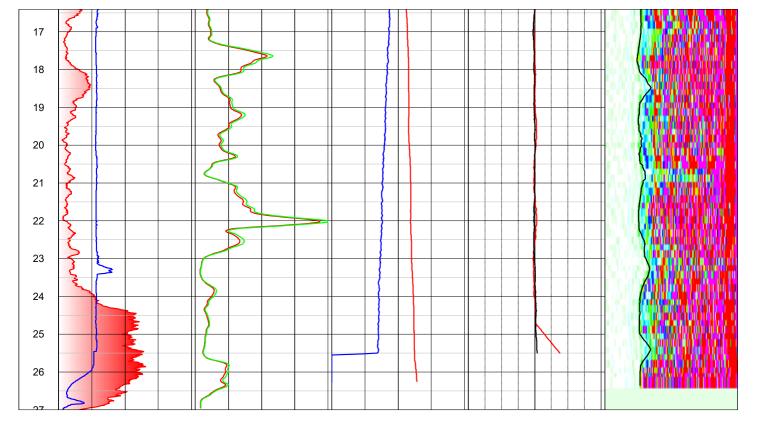


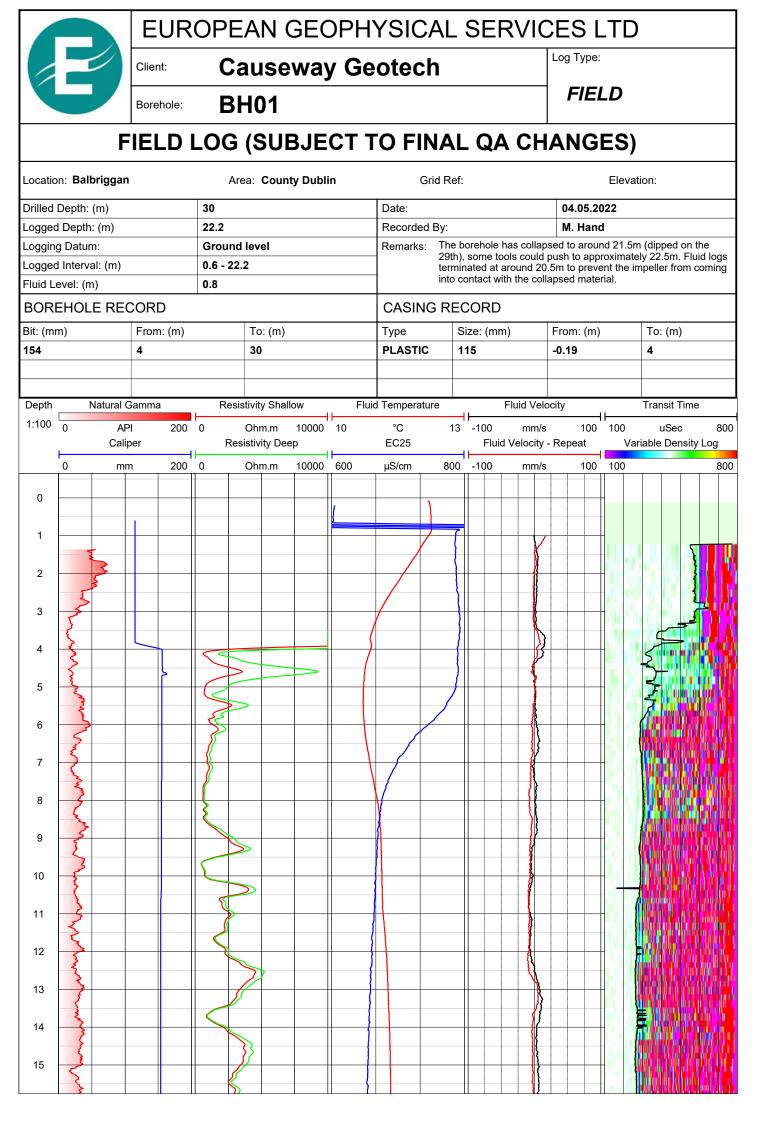
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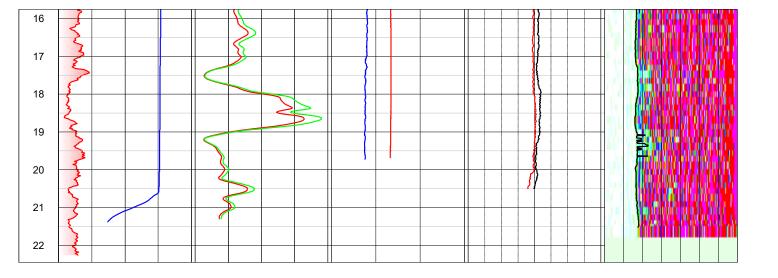


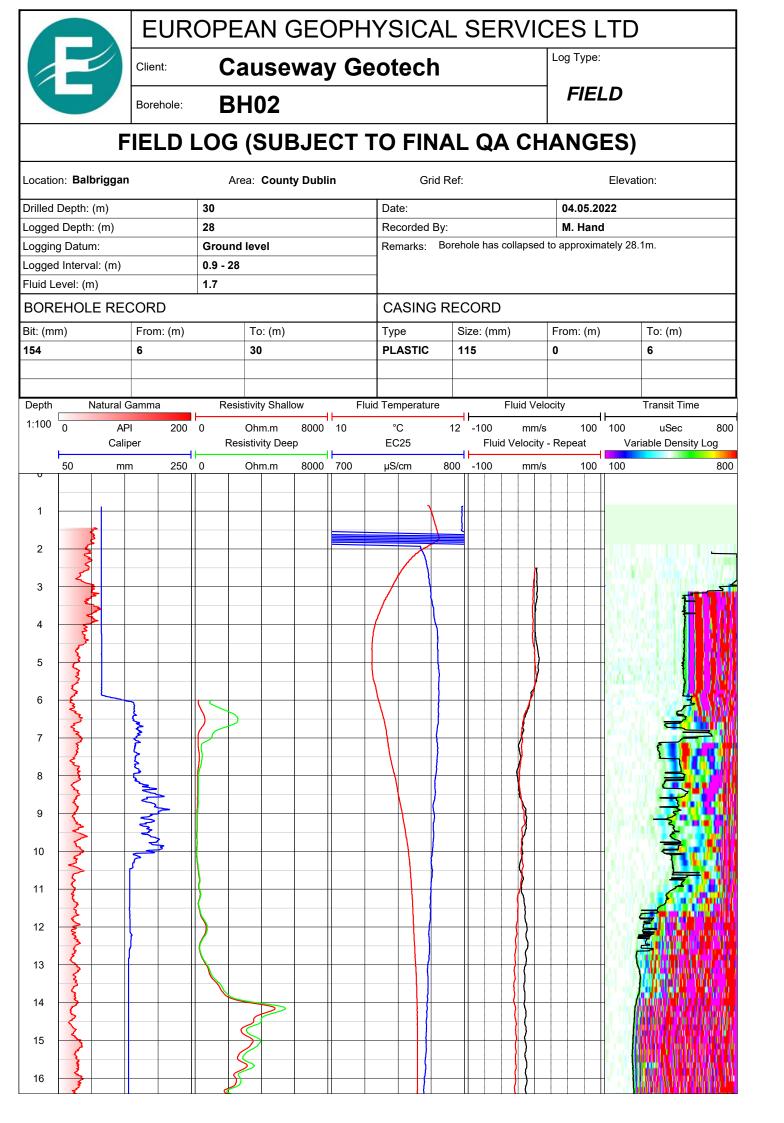


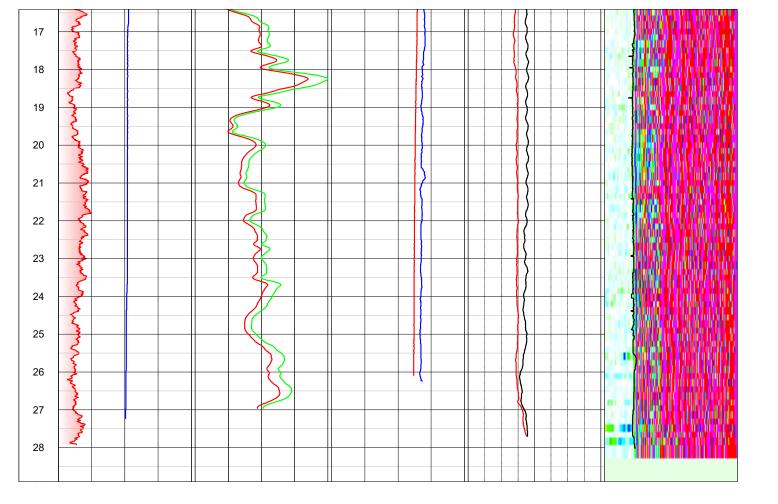


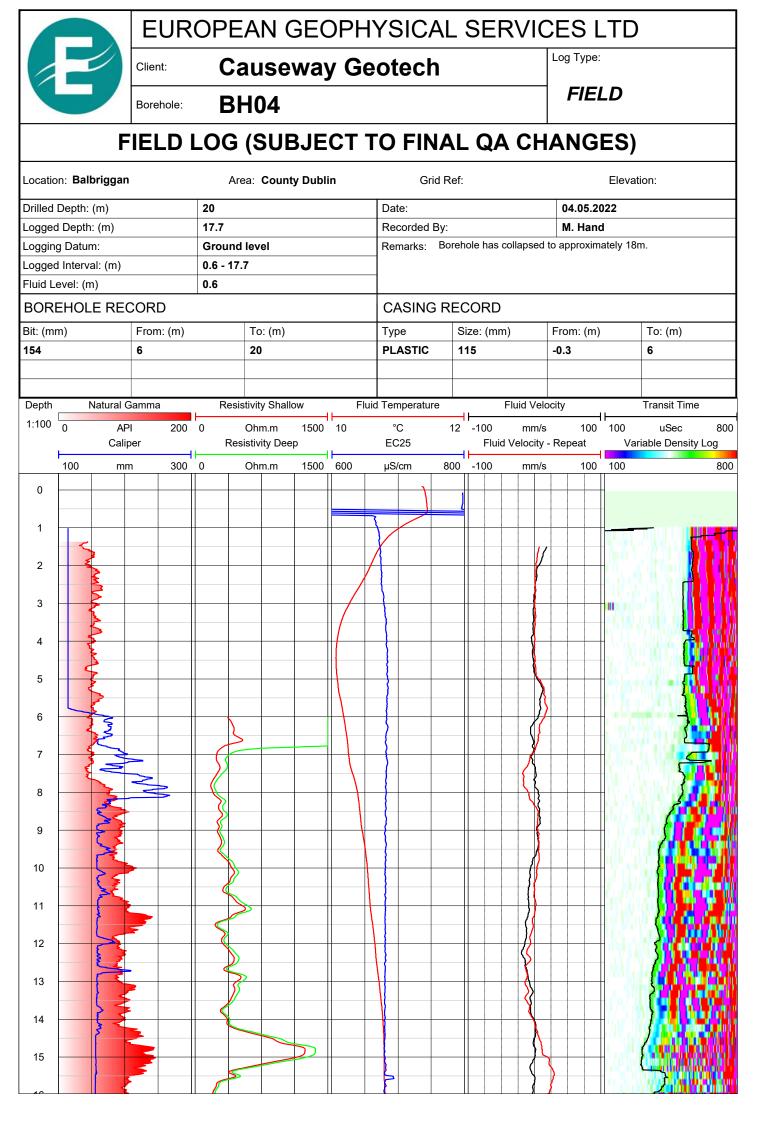












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