APPENDIX 5-12

LANDFALL SITE INVESTIGATIONS

IRISH DRILLING LIMITED

LOUGHREA, CO. GALWAY, IRELAND

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SITE INVESTIGATION

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SCEIRDE ROCKS LANDFALL

FACTUAL REPORT

Corio Generation,
50 Cowcross Street,
London,
EC1M 3HE,
UK.

GDG,
Nutgrove Office Park,
Rathfarnham,
Dublin 14.
D14 X627

	Prepared by	Approved by	Rev. Issue Date:	Revision No.
	Ronan Killeen	Declan Joyce	22nd February 2023	22 CE/106_001
Signature				

FOREWORD

The borehole and trial pit records have been compiled from an examination of the samples by a Geotechnical Engineer and from the Drillers' descriptions.

The report presents an opinion on the configuration of the strata within the site based on the borehole and trial pit results. The assumptions, though reasonable, are given for guidance only and no liability can be accepted for changes in conditions not revealed by the boreholes and trial pits.

The fieldwork was carried out in accordance with IS EN 1997-2 and BS5930, 2015 Code of Practice for Site Investigations with precedence given to IS EN 1997-2 where applicable.

Contents:

1.0 Introduction.

Irish Drilling Ltd. (IDL) was instructed by Corio Generation Ltd to carry out a site investigation at the site of the proposed Sceirde Rocks Landfall Project.

This site investigation was carried out to provide detailed factual geotechnical information of the underlying ground conditions for a proposed Horizontal Directional Drilling (HDD) Design at the proposed landfall site.

The fieldwork commenced on November 21st 2022 and was completed on November 28th 2022.

2.0 Site & Geology

The site is located approximately near Doonbeg, County Clare.

The fieldwork was carried out predominantly on agricultural lands.

Geological Survey maps of the area indicate that the site is underlain by Siltstone and Sandstone Rock Formations known as 'Gull Island' Formation.

A Site Plan, prepared by the client's consulting engineers and showing approximate fieldwork locations, is included as Appendix 8 of this factual report.

3.0 Fieldwork.

The following plant was mobilised to site to carry out fieldwork operations:
1nr. CAT 130x Tracked Excavator.
1nr. GT1100 GoTract Rotary Core Drill Rig.

Fieldwork carried out to date has included the following:

Two trial pits were excavated on site using a tracked excavator.

The pits were logged and photographed by an Engineer with observations made on ground conditions, pit stability and water ingress.

Small and bulk disturbed soil samples were recovered at each change in strata and the samples were returned to the laboratory and presented for testing.

In situ testing consisting of Thermal Conductivity and Resistivity were carried out in the pits and the records of same are included as Appendix 3.

The pits were excavated to depths ranging from 0.90m to 1.70m below ground level and detailed engineering logs for the trial pits completed are included with this report in Appendix 1.

Two rotary core boreholes were carried out to establish overburden conditions and rockhead and to establish the nature and integrity of the underlying rock.

The rotary core boreholes were completed using wireline drilling techniques, with HQ size (64mm core diameter, 96mm hole diameter) drill strings to recover soil and rock core samples.

A water based flush system was used as the drilling medium while a biodegradable polymer gel was also used where necessary to aid the drilling and soil / rock recovery process.

The samples were stored in wooden boxes and returned to the laboratory where there were logged and photographed by a Geotechnical Engineer and presented for testing.

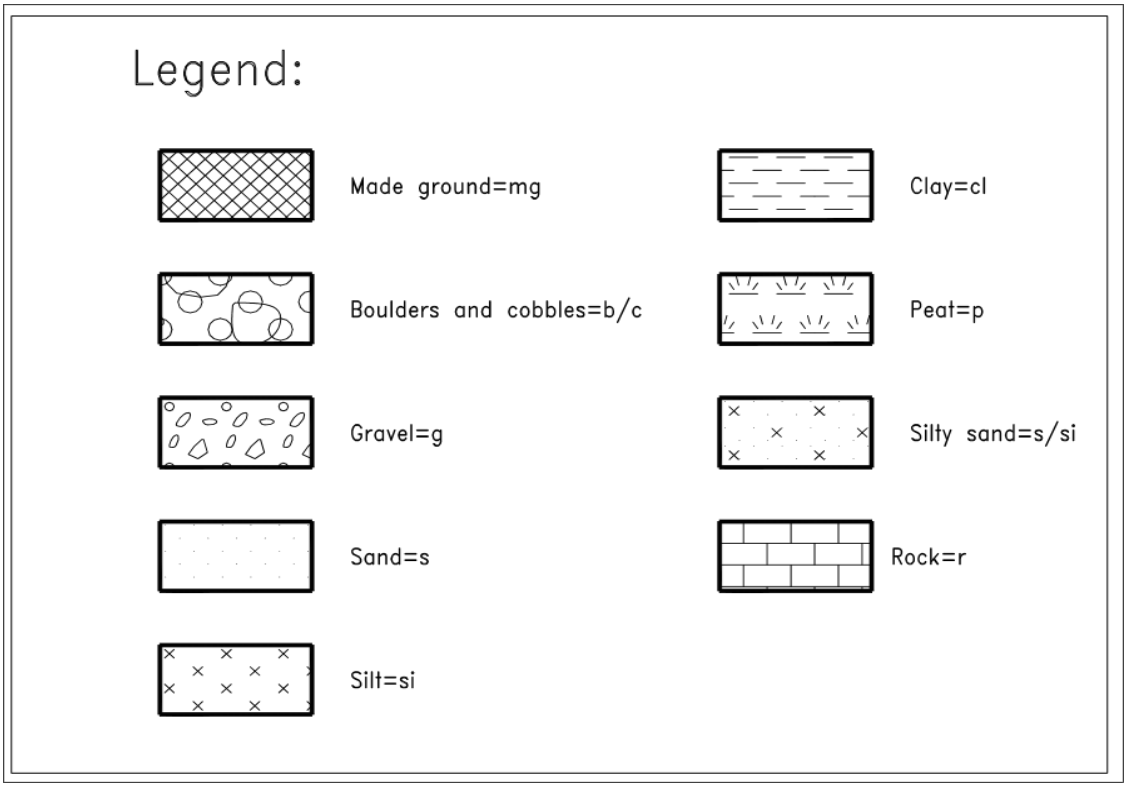
The rotary core boreholes were carried out to depths ranging from 23.70m to 31.00m below ground level.

A 50mm diameter standpipe was installed in rotary core borehole BH 01 to allow for the monitoring of groundwater levels over a prolonged period of time.

A data logger was subsequently installed at BH 01 to allow for continuous recording of groundwater readings over a prolonged period of time. The data logger was installed on December 1st 2022 and was removed on February 3rd 2022 and the records of the readings over this period of time are included as appendix 9.

Detailed engineering logs for the rotary core boreholes completed are included with this report in Appendix 2.

The following Key Legend Table details the symbology used on the engineering logs to describe ground conditions encountered:



Ground conditions encountered during the completion of the fieldwork were typical and as expected for this region and predominantly consisted of Glacial Tills overlying bedrock.

The Glacial Tills in general consisted of grey slightly sandy silt and/or slightly sandy slightly gravelly silt with occasional, some or many cobbles and boulders.

Intact bedrock was encountered at many of the boreholes at a depth ranging from 2.60m to 3.50m below ground level. Bedrock is described as weak, locally strong and/or strong, locally weak thinly laminated fine and medium grained siltstone.

Bedding planes are defined as the surface that separates one stratum, layer or bed stratified rock from another. Discontinuity is defined as the plane of physical weakness where the

tensile strength perpendicular to the discontinuity or the shear strength along the discontinuity is lower than that of the surrounding soil or rock material.

Weathered bedrock was also encountered in the boreholes at shallower depths and for detailed descriptions of ground conditions encountered please refer to the engineering logs included in appendices 1 and 2 of this report.

The fieldwork was carried out in accordance with IS EN 1997-2 and BS5930, 2015 Code of Practice for Site Investigations with precedence given to IS EN 1997-2 where applicable.

The fieldwork locations were set out on site using a Trimble CU Bluetooth GPS Surveying Unit and the co-ordinates are included on the logs presented in the appendices.

All fieldwork co-ordinates are reported to Irish Transverse Mercator (ITM) with Reduced Levels recorded relative to Malin Head Datum and with an accuracy level of + or – 0.10m.

4.0 Laboratory Testing

Representative samples recovered from the boreholes and trial pits were scheduled for testing in the laboratory.

The test schedules were prepared by the Client's Engineer and included some or all of the following tests on disturbed soil samples and soil core samples:

* Natural Moisture Content.
* Atterberg Limits.
* Particle Size Distribution.
* Particle Density.
* Organic Content.
* Chemical (pH).
* Compaction.

The test schedules also included some or all of the following tests on rock core samples:

* Point Load.
* UCS.
* Single Point Thermal Resistivity (ASTM5334).
* Five Point Thermal Resistivity.
* Cerchar.
* Thermal Conductivity & Resistivity.

The soil and rock descriptions as noted on the borehole and trial pit logs are in general visual descriptions as observed and logged by our Engineers and are described in accordance with IS EN 1997-2 and BS5930, 2015 Code of Practice for Site Investigations.

Soils descriptions (cohesive or otherwise) are also initially assessed based on the texture and 'feel' of the soil materials as witnessed by our Geotechnical Engineers and in accordance with IS EN 1997-2 and BS5930.

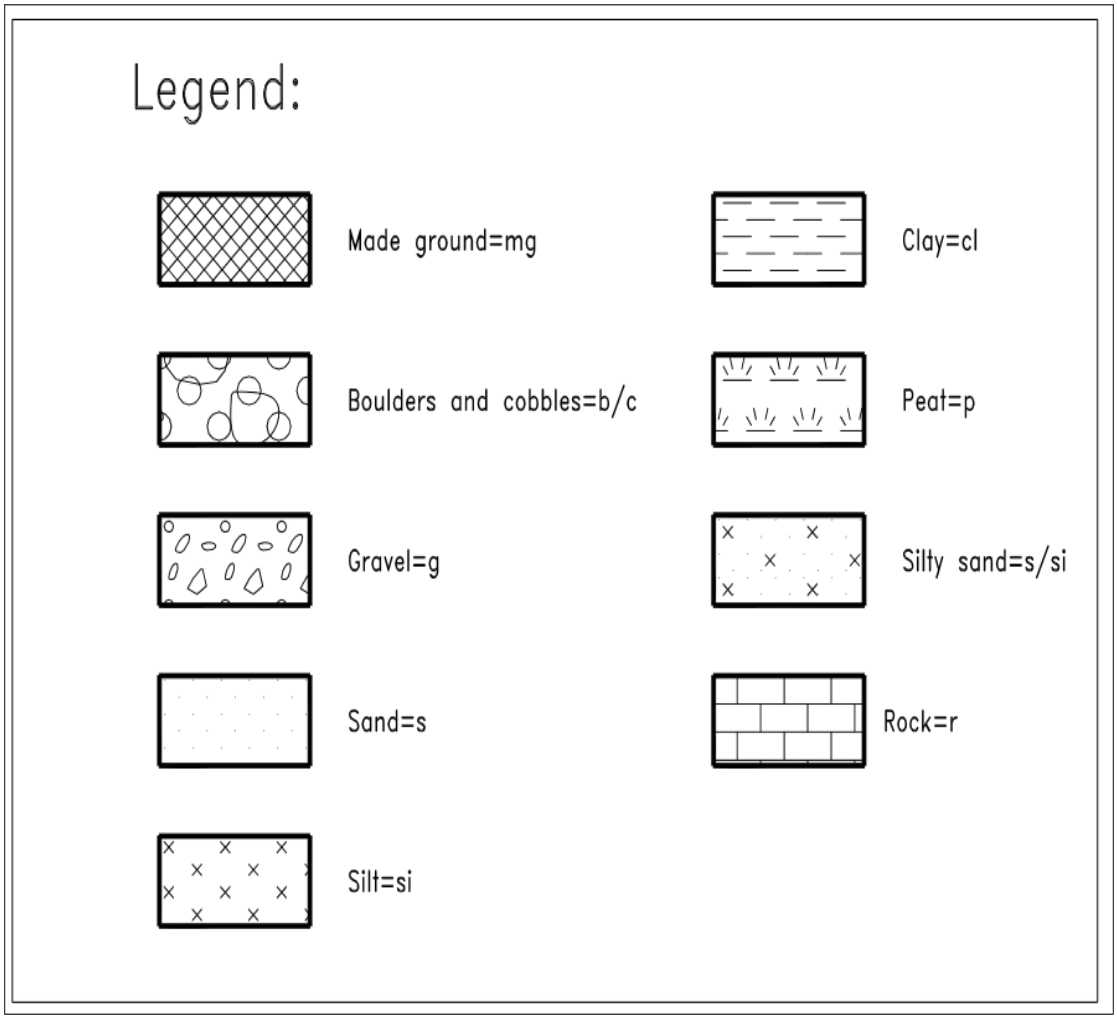
Where laboratory classification tests have been carried out on soil or rock samples then these visual descriptions have been amended accordingly to take into account the results of these classification tests.

The records of all fieldwork, laboratory test results and photographs are included in the appendices of this Factual Report.

Ronan Killeen
Chartered Engineer
Irish Drilling Limited
February 23rd 2023

Appendix 01
Trial Pit Records

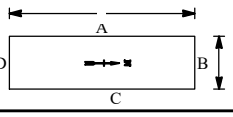
The following Key Legend Table details the symbology used in general on the engineering logs to describe ground conditions encountered:



PROJECT: Sceirde Rocks Landfall		**TRIALPIT: TP-01**
LOCATION: Doonbeg, Co Clare		**Sheet 1 of 1**
CLIENT: Corio Generation	**Co-ordinates:**	**Rig: CAT 130A**
ENGINEER: GDG	**E 494,407.1 N 667,724.8**	**Rev: DRAFT**
Ground level: 13.59m O.D.		**DATE: 24.11.22**

GROUNDWATER
Water strikes: **Rose to after:**
1st: dry
2nd:
3rd:

PIT DIRECTION: 0°
PIT DIMENSION: 3.00m * 1.00
LOGGED BY: DOR



Shoring/Support: N/A
Stability: Pit stable.

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0										
							13.24	0.35	TOPSOIL: Soft dark brown gravelly SILT.	
			B 1 D 2 D 3 00 4	0.50-0.90 0.50-0.90 0.50-0.90 0.50-0.90					Firm grey slightly sandy organic SILT with low cobble content and low boulder content. Cobbles are angular to subangular of shale. Boulders are angular to subangular of shale. 0.70m: thermal resistivity test expedited.	
							12.69	0.90		
						END			TP terminated at 0.90m bgl. Obstruction as rock.	
1										
2										
3										

Remarks: Thermal resistivity test at 0.70m bgl. TP dry on excavation. TP backfilled with arisings.

Scale: 1:15

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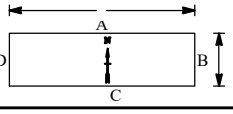
Fax

TRIALPIT SCEIRDE ROCK TPS FILE 1 NOV 29 2022.GPJ ID GINT AGS 4_0_4.GDT 22/2/23

PROJECT: Sceirde Rocks Landfall	**TRIALPIT: TP-02**
LOCATION: Doonbeg, Co Clare	**Sheet 1 of 1**
CLIENT: Corio Generation	**Co-ordinates: E 494,340.7 N 667,821.0**
ENGINEER: GDG	**Rig: CAT 130A**
	Rev: DRAFT
Ground level: 7.28m O.D.	**DATE: 24.11.22**

GROUNDWATER
Water strikes: **Rose to after:**
1st: dry
2nd:
3rd:

PIT DIRECTION: 90°
PIT DIMENSION: 3.00m * 1.00
LOGGED BY: DOR



Shoring/Support: N/A
Stability: Pit stable.

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							7.08	0.20	TOPSOIL: Soft dark brown gravelly SILT.	
			100 4	0.30-0.75					Firm grey slightly sandy organic SILT with low cobble content. Cobbles are subangular to angular of shale.	
			B 1	0.50-0.90						
			D 2	0.50-0.90						
			D 3	0.50-0.90						
									0.70m: thermal resistivity test expedited.	
1							6.08	1.20		
			B 5	1.30-1.70					Firm grey orange slightly gravelly slightly sandy organic SILT with medium cobble content and low boulder content. Cobbles are subangular to angular of shale. Boulders are subangular to angular of shale.	
			B 6	1.30-1.70						
			D 7	1.30-1.70						
							5.58	1.70		
							END		TP terminated at 1.70m bgl. Obstruction as rock.	
2										
3										

Remarks: Thermal resistivity test at 0.70m bgl. TP dry on excavation. TP backfilled with arisings.

Scale: 1:15

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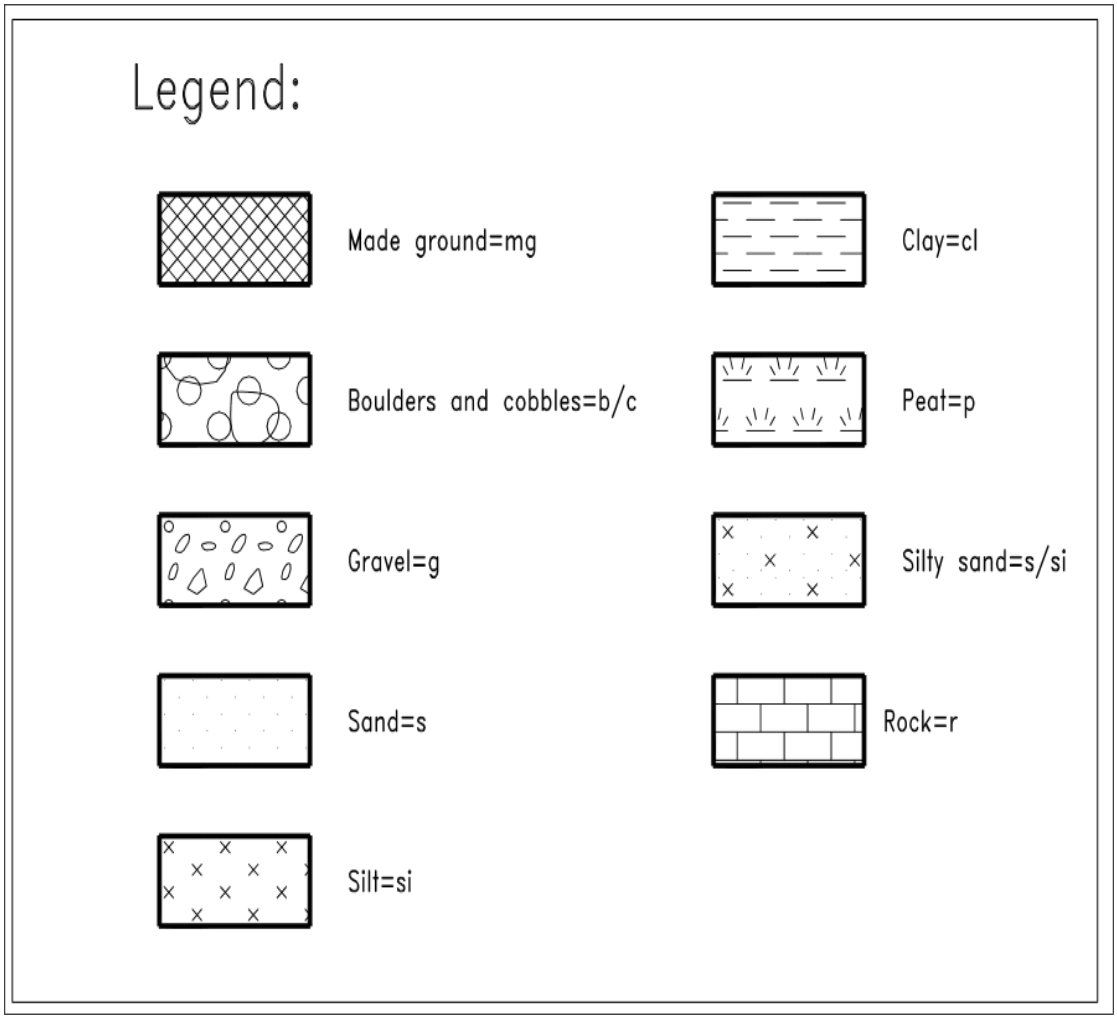
TRIALPIT SCEIRDE ROCK TPS FILE 1 NOV 29 2022.GPJ ID GINT AGS 4_0_4.GDT 22/2/23

Appendix 02
Borehole Records
(Rotary Core)

The following Key Legend Table details the symbology used in general on the engineering logs to describe ground conditions encountered:



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DRILLHOLE LOG

Project	Location	DRILLHOLE No
Sceirde Rocks Landfall	Doonbeg, Co Clare	**BH-01**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2022CE106	23-11-22 28-11-22	7.85	E 494,304.2 N 667,880.9

Engineer	Sheet	Status
GDG	1 of 4	DRAFT

RUN DETAILS

Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)
0.00	- - -	NA			(1.50)
1.50			6.35		1.50
		NA	6.25		1.60
			6.15		1.70
	100 (20) -				
2.60		NI			(1.80)
	100 - -				
3.50			4.35		3.50
		18			
	100 (20) -				
4.70		28			
	100 (88) -				
5.50		27			
	100 (96) -				
6.40		20			
	100 (94) -				
7.30		15			
	100 (92) -				
8.00					

STRATA DESCRIPTION

Discontinuities	Detail	Main
0.00 - 1.70 : overburden.		Open hole drilling. No recovery.
1.70 - 3.50 Non-intact as weathered rock.		Soft orangish brown SILT. (0.10m recovered). Brown sandstone COBBLE. Weathered rock. Recovered as angular fine to coarse gravel sized clasts of strong and medium strong thinly laminated grey and dark grey fine grained siltstone with surficial orangish brown iron stain and powder. 3.00m to 3.50m: weak dark grey silty fine gravel sized clasts as probable residual rock.
3.50 - 31.00 Discontinuities, very closely and closely spaced to 10.20m, then locally medium spaced, from 18.00m becoming medium spaced, locally closely spaced, dipping 12 to 14°, planar, smooth, with 0.5 to 2mm thick grey silt smear.		Strong, locally weak and medium strong, thinly laminated grey and dark grey fine and medium grained SILTSTONE thickly interbedded with 1 to 5mm thick light grey fine sandstone laminae.
7.55 - 7.80 Joint, subvertical dip, planar, smooth, with 0.5 to 1mm thick grey silt smear, open.		

Instrument/Backfill

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
			1.50	96			

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	31	Polymer	100

GENERAL REMARKS

1 litre of polydrill used.
50mm standpipe installed.

All dimensions in metres Scale 1:50	Client: Corio Generation	Method/ Plant Used CS14		Driller AZ	Logged By EAT

IDL AGS4 UK DH (SPTS) SCEIRDE ROCK RC FILE 1 NOV 30 2022.GPJ ID GINT AGS 4_0_4.GDT 22/2/23

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
Sceirde Rocks Landfall	Doonbeg, Co Clare	**BH-01**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2022CE106	23-11-22 28-11-22	7.85	E 494,304.2 N 667,880.9

Engineer	Sheet	Status
GDG	2 of 4	DRAFT

RUN DETAILS						STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
	100 (94) 16	18				7.85 - 7.90 Joint, dipping 45°, stepped, smooth, with 0.5 to 1mm thick grey silt smear, open.		Strong, locally weak and medium strong, thinly laminated grey and dark grey fine and medium grained SILTSTONE thickly interbedded with 1 to 5mm thick light grey fine sandstone laminae. *(continued)*	
9.60	100 (94) 52	11				8.80 - 8.90 Joint, dipping 60°, stepped, smooth, with 0.5 to 1mm thick grey silt smear, open. 9.00 - 9.15 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick grey silt smear, open.			
10.10	100 (96) 62	5						10.30-10.50m: UCS Test-extremely weak, fractured at minimum loading.	
11.50	100 (91) 72	5							
24.11 13.00 25.11	100 (92) 74	5 6							
14.50	100 (90) 70	3 4							

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
24/11/22	17.00	13.00					
25/11/22	08.00	13.00					

Rotary Flush

From (m)	To (m)	Type	Return (%)

GENERAL REMARKS

1 litre of polydrill used.
50mm standpipe installed.

All dimensions in metres Scale 1:50	Client: Corio Generation	Method/ Plant Used CS14		Driller AZ	Logged By EAT

IDL AGS4 UK DH (SPTS) SCEIRDE ROCK RC FILE 1 NOV 30 2022.GPJ ID GINT AGS 4_0_4.GDT 22/2/23

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
Sceirde Rocks Landfall	Doonbeg, Co Clare	**BH-01**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2022CE106	23-11-22 28-11-22	7.85	E 494,304.2 N 667,880.9

Engineer	Sheet	Status
GDG	3 of 4	DRAFT

RUN DETAILS				STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
16.10								Strong, locally weak and medium strong, thinly laminated grey and dark grey fine and medium grained SILTSTONE thickly interbedded with 1 to 5mm thick light grey fine sandstone laminae. *(continued)*	
	100 (95) 71	4			(27.50)				
17.60		7							
	100 (78) 71	3						18.60m to 20.00m: thinly interbedded grey and dark grey fine grained limestone.	
19.10									
	100 (94) 70	5							
20.60		5							
	100 (90) 79	2							
22.20									
	100 (92) 63	7							
23.10									
	100 (95)	4							

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	1 litre of polydrill used. 50mm standpipe installed.

All dimensions in metres Scale 1:50	Client: Corio Generation	Method/ Plant Used CS14		Driller AZ	Logged By EAT

IDL AGS4 UK DH (SPTS) SCEIRDE ROCK RC FILE 1 NOV 30 2022.GPJ ID GINT AGS 4_0_4.GDT 22/2/23

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
Sceirde Rocks Landfall	Doonbeg, Co Clare	**BH-01**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2022CE106	23-11-22 28-11-22	7.85	E 494,304.2 N 667,880.9

Engineer	Sheet	Status
GDG	4 of 4	DRAFT

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
	71							Strong, locally weak and medium strong, thinly laminated grey and dark grey fine and medium grained SILTSTONE thickly interbedded with 1 to 5mm thick light grey fine sandstone laminae. *(continued)*	
24.70		8							
	100 (95) 86	3						25.70m to 25.75m: medium strong fissile.	
26.30		6							
	70 (64) 30	4							
28.00		NR				27.70 - 28.00 Possible area of core loss. No recovery as washout of fines during drilling. No record of cavity.			
	100 (94) 80	7							
29.50		5							
	100 (98) 67	6							
25.11 31.00 28.11			-23.16		31.00			BH terminated at 31.00m bgl on REs instruction.	

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
25/11/22	15.00	31.00					
28/11/22	08.00	31.00					

Rotary Flush

From (m)	To (m)	Type	Return (%)

GENERAL REMARKS

1 litre of polydrill used.
50mm standpipe installed.

All dimensions in metres Scale 1:50	Client: Corio Generation	Method/ Plant Used CS14		Driller AZ	Logged By EAT

IDL AGS4 UK DH (SPTS) SCEIRDE ROCK RC FILE 1 NOV 30 2022.GPJ ID GINT AGS 4_0_4.GDT 22/2/23

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
Sceirde Rocks Landfall	Doonbeg, Co Clare	**BH-02**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2022CE106	21-11-22 22-11-22	9.90	E 494,376.4 N 667,776.1

Engineer	Sheet	Status
GDG	1 of 3	DRAFT

RUN DETAILS					STRATA			
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities	Detail	Main
0.00						0.00 - 1.80 : overburden.		Open hole drilling. No recovery.
	- - -	NA			(1.50)			
1.50			8.40		1.50			
			8.20	× × ×	1.70			Very soft orangish brown slightly sandy SILT. Sand is coarse. 1.60m: becoming grey.
		NA	8.10	○ ○	1.80			
	100 - -					1.80 - 2.60 Non-intact as weathered rock.		Subangular to subrounded fine limestone and siltstone GRAVEL.
		NI			(0.80)			
21.11 2.60 22.11			7.30		2.60			Weathered rock. Recovered as angular fine to coarse gravel sized clasts of strong and medium strong thinly laminated grey and dark grey fine grained siltstone with surficial orangish brown iron stain and powder.
		5				2.60 - 23.70 Discontinuities, very closely locally closely spaced to 11.10m, then locally medium spaced, dipping 10 to 12°, planar, smooth, with 0.5 to 1mm thick grey silt smear.		
	100 (89) 8	28						Weak, locally strong, thinly laminated grey and dark grey fine and medium grained SILTSTONE thickly interbedded with 1 to 5mm thick light grey fine sandstone laminae.
4.20								
		18						
	100 (87) 8							
5.60		22						
	100 (95) -	23						
7.20								
		16						
	100 (94)							

Instrument/ Backfill

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
21/11/22	17.00	2.60	1.50	96			
22/11/22	08.00	2.60					

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	23.7	Polymer	100

GENERAL REMARKS

2 litres of polydrill used.
BH backfilled.

All dimensions in metres Scale 1:50	Client: Corio Generation	Method/ Plant Used CS14		Driller AZ	Logged By EAT

IDL AGS4 UK DH (SPTS) SCEIRDE ROCK RC FILE 1 NOV 30 2022.GPJ ID GINT AGS 4_0_4.GDT 22/2/23

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
Sceirde Rocks Landfall	Doonbeg, Co Clare	**BH-02**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2022CE106	21-11-22 22-11-22	9.90	E 494,376.4 N 667,776.1

Engineer	Sheet	Status
GDG	2 of 3	DRAFT

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
	22							Weak, locally strong, thinly laminated grey and dark grey fine and medium grained SILTSTONE thickly interbedded with 1 to 5mm thick light grey fine sandstone laminae. *(continued)*	
8.60		2							
	100 (95) -	20							
10.20									
		14							
	100 (94) 35								
11.60		12							
	100 (86) 65	8							
13.20					(21.10)				
		7							
	100 (94) 75								
14.60		8							
	100 (89) 69	9							

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	2 litres of polydrill used. BH backfilled.

All dimensions in metres Scale 1:50	Client: Corio Generation	Method/ Plant Used CS14		Driller AZ	Logged By EAT

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Sceirde Rocks Landfall	Doonbeg, Co Clare	**BH-02**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2022CE106	21-11-22 22-11-22	9.90	E 494,376.4 N 667,776.1

Engineer	Sheet	Status
GDG	3 of 3	DRAFT

RUN DETAILS				STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
16.20								Weak, locally strong, thinly laminated grey and dark grey fine and medium grained SILTSTONE thickly interbedded with 1 to 5mm thick light grey fine sandstone laminae. *(continued)*	
	100 (95) 72	7							
17.60		6							
	100 (95) 90	4						18.55-18.65m: point load test-very weak.	
19.20									
	100 (85) 56	12							
20.50		6							
	100 (95) 92	6							
22.10									
	100 (96) 80	8							
22.11 23.70		5	-13.81		23.70				
								BH terminated at 23.70m bgl on REs instruction.	

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
22/11/22	17.00	23.70										2 litres of polydrill used. BH backfilled.

All dimensions in metres Scale 1:50	Client: Corio Generation	Method/ Plant Used CS14		Driller AZ	Logged By EAT

IDL AGS4 UK DH (SPTS) SCEIRDE ROCK RC FILE 1 NOV 30 2022.GPJ ID GINT AGS 4_0_4.GDT 22/2/23

Appendix 03
Thermal Resistivity/Conductivity Records

IRISH DRILLING LTD.
Loughrea Co. Galway

Tel: (091) 841274 Fax: (091) 880861

Project: Sceirdre Rocks Landfall
Client: Corio
Location: Doonbeg, County Clare
Date: 24/11/2022

Sheet No. 1
Checked: RK

Thermal Conductivity / Thermal Resistivity Records

Date	Location	Depth m(bgl)	Thermal Conductivity (W/m.K) K	Thermal Resistivity (K.m/W) R	Temperature Celcius
24/11/2022	TP 01	0.70	1.189	0.841	10.161
24/11/2022	TP 02	0.70	1.225	0.816	9.615

Appendix 04
Groundwater Readings

Sceirde Rocks Landfall GI, Doonbeg - Water Levels

Dates		12/07/2022	05/01/2023	03/02/2023	03/02/2023
Locations					
BH 01		6.4m	5.2m	5.08m	Logger Removed

Remarks:
Readings recorded from ground level to top of water level.

Appendix 05
Laboratory Test Results

Project ID	2022CE106							Client	Corio Generation			Remarks			Turnaround																		
Project Name	Sceirde Rocks Landfall							Due Date	29/11/2022 12:30																								
Schedule ID	2022CE106_1							Scheduled Date	29/11/2022 12:30																								

Sample Details							Classification						Chemical / Concrete								Compaction			Rock		Other							
Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Density by Gas Jar	Particle Density by Small Pyknometer	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	Sulphate Total	Sulphate Water Gravimetric	Carbonate Titration	ph	Chloride Content	Chloride Content Acid	Compaction Light	Compaction Heavy	Compaction Vibrating Hammer	Rock Uniaxial compression	Point Load	Single point Thermal resistivity testing as per ASTM5334	Five point Thermal resistivity testing	CERCHAR test for abrasivity	Thermal Conductivity and Resistivity	Thermal Conductivity, Resistivity, Vol.			
TP-01	0.50	0.90	B	1	24/11/22						1										1						1						TR: 5 Point (1st test to be done at natural moisture content of sample and 5th test to be done on completely dried material. In between tests to be done on evenly spread moisture content values.)
TP-01	0.50	0.90	D	2	24/11/22		1	1					1																				ALS 230112-87
TP-01	0.50	0.90	D	3	24/11/22																												
TP-01	0.50	0.90	U100	4	24/11/22		1																			1							Compacted at Optimum moisture content (OMC)
TP-02	0.30	0.75	U100	4	24/11/22		1																			1							Compacted at Optimum moisture content (OMC)
TP-02	0.50	0.90	B	1	24/11/22																					1							Compacted at Optimum moisture content (OMC)
TP-02	0.50	0.90	D	2	24/11/22		1	1					1					1															ALS 230112-87
TP-02	0.50	0.90	D	3	24/11/22																												
TP-02	1.30	1.70	B	5	24/11/22																1						1						TR: 5 Point (1st test to be done at natural moisture content of sample and 5th test to be done on completely dried material. In between tests to be done on evenly spread moisture content values.)
TP-02	1.30	1.70	B	6	24/11/22						1																						
TP-02	1.30	1.70	D	7	24/11/22		1	1		1			1																				ALS 230112-87
BH-01	0.00	1.50	C		24/11/22																												
BH-01	1.50	2.60	C		24/11/22																												
BH-01	2.60	3.50	C		24/11/22																												
BH-01	3.50	4.70	C		24/11/22																												

0 = test scheduled,
1 = test completed as scheduled,
0* = sample not suitable for scheduled test

Project ID	2022CE106			Client	Corio Generation		Remarks		Turnaround		
Project Name	Sceirde Rocks Landfall			Due Date	29/11/2022 12:30						
Schedule ID	2022CE106_1			Scheduled Date	29/11/2022 12:30						

Sample Details							Classification						Chemical / Concrete								Compaction			Rock		Other							
Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Density by Gas Jar	Particle Density by Small Pyknometer	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	Sulphate Total	Sulphate Water Gravimetric	Carbonate Titration	ph	Chloride Content	Chloride Content Acid	Compaction Light	Compaction Heavy	Compaction Vibrating Hammer	Rock Uniaxial compression	Point Load	Single point Thermal resistivity testing as per ASTM5334	Five point Thermal resistivity testing	CERCHAR test for abrasivity	Thermal Conductivity and Resistivity	Thermal Conductivity, Resistivity, Vol.			
BH-01	4.70	5.50	C		24/11/22																											
BH-01	5.50	6.40	C		24/11/22																			1				*	*			
BH-01	6.40	7.30	C		24/11/22																											
BH-01	7.30	8.00	C		24/11/22																											
BH-01	8.00	9.60	C		24/11/22																							1				moved down to first available specimen
BH-01	9.60	10.10	C		24/11/22																			1	1							
BH-01	10.11	11.50	C		24/11/22																											
BH-01	11.50	13.00	C		24/11/22																				1			1				
BH-01	13.00	14.50	C		25/11/22																											
BH-01	14.50	16.10	C		25/11/22																				1							
BH-01	16.10	17.60	C		25/11/22																				1							
BH-01	17.60	19.10	C		25/11/22																											
BH-01	19.10	20.60	C		25/11/22																											
BH-01	20.60	22.20	C		25/11/22																											
BH-01	22.20	23.10	C		25/11/22																			1	1							
BH-01	23.10	24.70	C		25/11/22																											
BH-01	24.70	26.30	C		25/11/22																							1	1	*			
BH-01	26.30	28.00	C		25/11/22																											
BH-01	28.00	29.50	C		25/11/22																				1							
BH-01	29.50	31.00	C		25/11/22																											
BH-02	0.00	1.50	C		21/11/22																											
BH-02	1.50	2.60	C		22/11/22																											
BH-02	2.60	4.20	C		22/11/22																				1							
BH-02	4.20	5.60	C		22/11/22																								*	*		
BH-02	5.60	7.20	C		22/11/22																											
BH-02	7.20	8.60	C		22/11/22																				1							
BH-02	8.60	10.20	C		22/11/22																								1				moved down to first available specimen
BH-02	10.20	11.60	C		22/11/22																											
BH-02	11.60	13.20	C		22/11/22																			1	1			1				
BH-02	13.20	14.60	C		22/11/22																											
BH-02	14.60	16.20	C		22/11/22																								1	*		

0 = test scheduled,
1 = test completed as scheduled,
0* = sample not suitable for scheduled test

Project ID	2022CE106	Client	Corio Generation	Remarks	
Project Name	Sceirde Rocks Landfall	Due Date	29/11/2022 12:30	Turnaround	
Schedule ID	2022CE106_1	Scheduled Date	29/11/2022 12:30		

Sample Details							Classification						Chemical / Concrete								Compaction			Rock		Other							
Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Density by Gas Jar	Particle Density by Small Pyknometer	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	Sulphate Total	Sulphate Water Gravimetric	Carbonate Titration	ph	Chloride Content	Chloride Content Acid	Compaction Light	Compaction Heavy	Compaction Vibrating Hammer	Rock Uniaxial compression	Point Load	Single point Thermal resistivity testing as per ASTM5334	Five point Thermal resistivity testing	CERCHAR test for abrasivity	Thermal Conductivity and Resistivity	Thermal Conductivity, Resistivity, Vol.		
BH-02	16.20	17.60	C		22/11/22																											
BH-02	17.60	19.20	C		22/11/22																			1	1							
BH-02	19.20	20.50	C		22/11/22																											
BH-02	20.50	22.10	C		22/11/22																											
BH-02	22.10	23.70	C		22/11/22																				1							
	Completed				10/02/23		5	3	0	1	2	0	3	0	0	0	0	1	0	0	2	0	0	4	12	3	2	3	4	0	0	0

0 = test scheduled,
1 = test completed as scheduled,
0* = sample not suitable for scheduled test

Summary of Classification Test Results

Project No.	Project Name
2022CE106	Sceirde Rocks Landfall

Hole No.	Sample Ref	Top	Base	Type		Soil Description	Density bulk Mg/m3	Density dry Mg/m3	w %	Passing 425µm %	LL %	PL %	PI %	Particle density Mg/m3	Remarks
TP-01	1	0.50	0.90	B		Grey slightly sandy SILT.			29.0	97					
TP-01	2	0.50	0.90	D		Grey slightly sandy SILT.			29.0		43	26	17		MI
TP-01	4	0.50	0.90	U100		Grey slightly sandy SILT.			29.0						
TP-02	4	0.30	0.75	U100		Grey slightly sandy SILT.			23.0						
TP-02	1	0.50	0.90	B		Grey slightly sandy SILT.			18.0						
TP-02	2	0.50	0.90	D		Grey slightly sandy SILT.			18.0	65	39	24	15		CI
TP-02	5	1.30	1.70	B		Grey-orange slightly sandy slightly gravelly SILT.			18.0						
TP-02	6	1.30	1.70	B		Grey-orange slightly sandy slightly gravelly SILT.			18.0	64					
TP-02	7	1.30	1.70	D		Grey-orange slightly sandy slightly gravelly SILT.			18.0		40	23	17	2.64-gj	MI

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

Key w = water content, LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index

Density test: wd - water displacement; wi - immersion in water

Linear measurement unless : 4pt cone unless : Liquid Limit; 1pt - single point test; NP - Non Plastic

Particle density: sp - small pyknometer; gj - gas jar

Date Printed: 02/10/2023 00:00

QC From No: R1

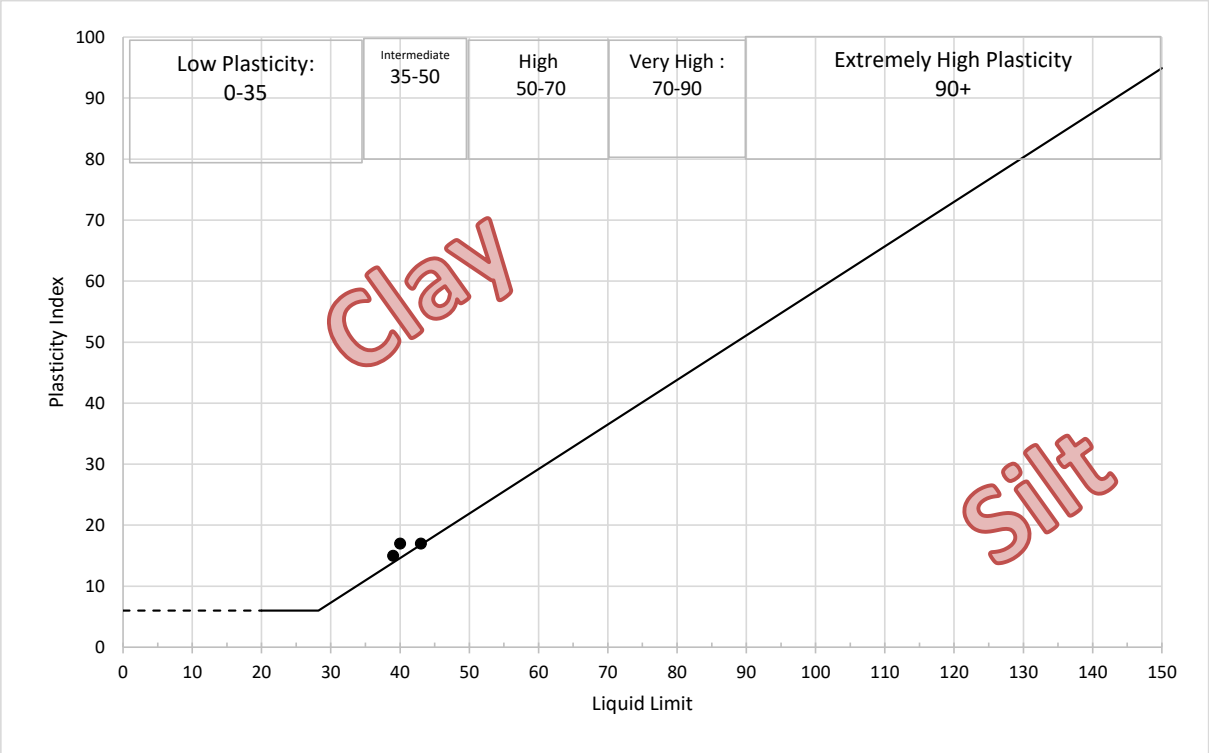
Approved By: DCD

Table 1 sheet 1

Tested in: Irish Drilling Ltd.(IDL), Old Galway Road, Loughrea, Co. Galway, Ireland. H62VX39

Approved Signatures: Dympna Darcy (DCD) Lab Manager, Declan Joyce (DJ) Chartered Geotechnical Engineer, Ronan Killeen (RK) Quality Manager.

	Plasticity (A-Line) Chart	Project Number
Project Name:	**Sceirde Rocks Landfall**	
Location:		2022CE106



Abreviations in the remarks column of the Classification Summary Sheet: C = Clay, M = Silt

Plasticity abeviations: L = Low, I = Intermediate = H = High, V = Very High, E = Extremely High.

The letter O is added to the symbol of any material containing a significant proportion of organic material.

Chart taken from BS5930: 2010

QC Form: R1

Particle Density by Gas Jar Tests - Summary of Results

Project No.: 2022CE106

Project Name: Sceirde Rocks Landfall

Hole No.	Sample				Soil Description at test horizon	Particle Density Mg/m3	Remarks
	Ref	Top	Base	Type			
TP-02	7	1.30	1.70	D	Grey-orange slightly sandy slightly gravelly SILT.	2.64	

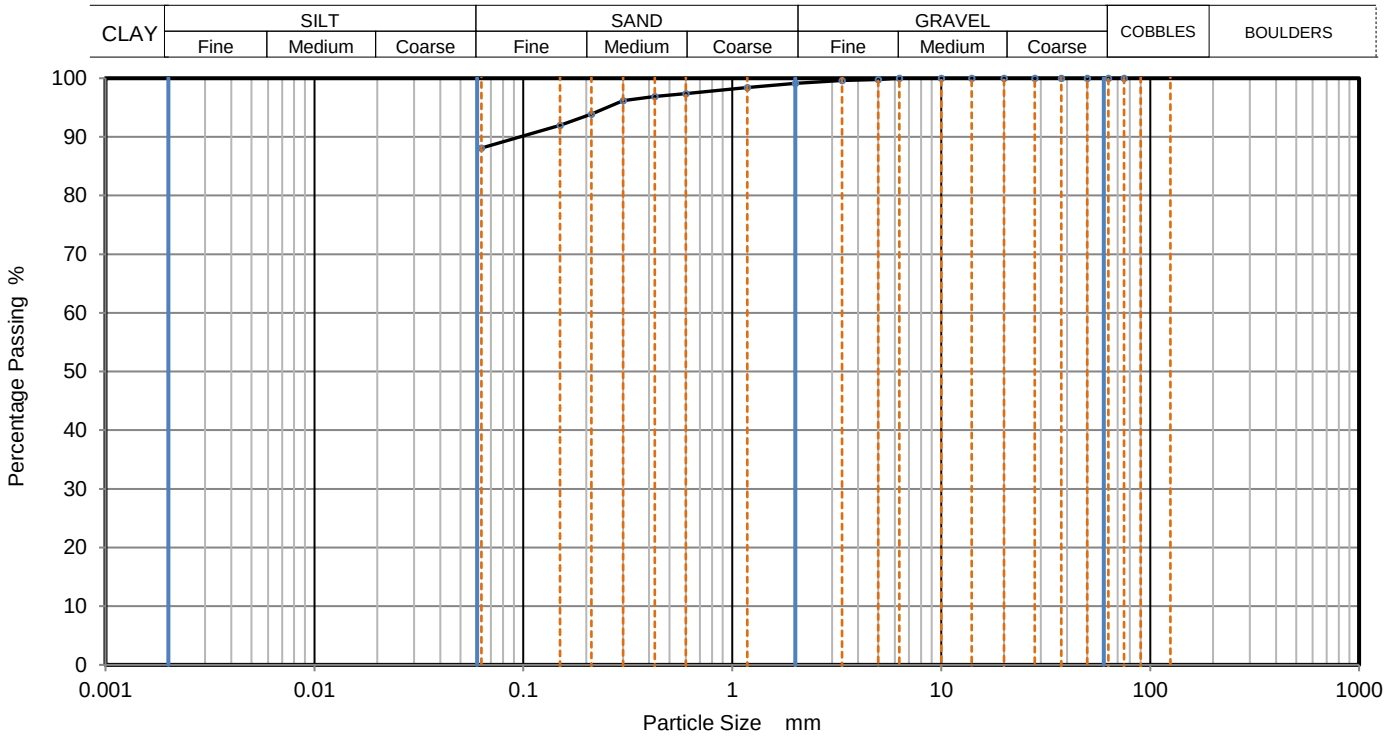
Notes
Tests performed in accordance with BS 1377 unless annotated otherwise
Gas Jar tests to BS1377: Part 2 : 1990, clause 8.2

Date Printed: 13/02/2023

Table: 15

sheet

IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**	Job Ref	**2022CE106**
		Borehole/Pit No.	TP-01
Site Name	Sceirde Rocks Landfall	Sample No.	1
Soil Description	Grey slightly sandy SILT.	Depth, m	0.50
Specimen Reference	Specimen Depth: m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2	KeyLAB ID	IDL1202211290



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	99		
1.18	98		
0.6	97		
0.425	97		
0.3	96		
0.212	94		
0.15	92		
0.063	88		

Dry Mass of sample, g	344

Sample Proportions	% dry mass
Very coarse	0
Gravel	1
Sand	11
Fines <0.063mm	88

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

Remarks

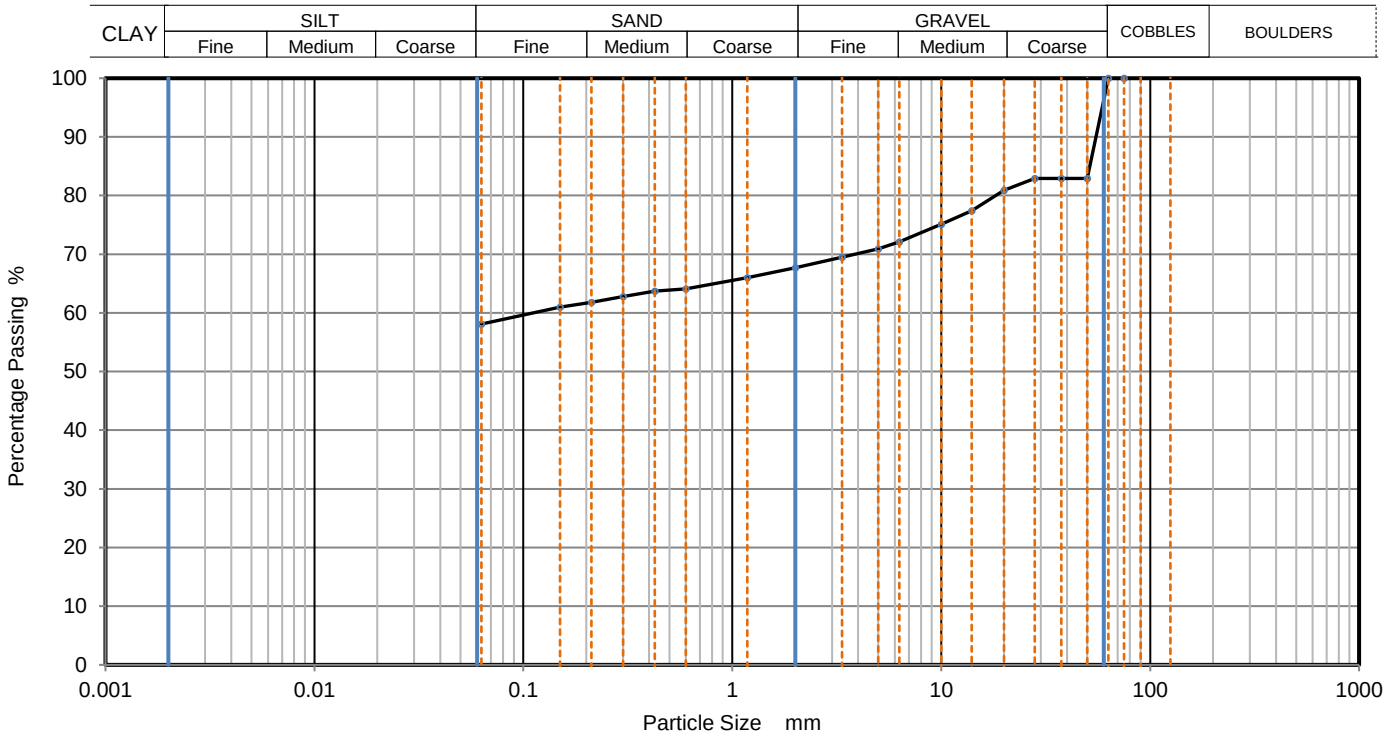
Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	
		Dympna Darcy B.Sc.	13/02/2023 16:09	**1** QC From No:R2

Tested in: Irish Drilling Ltd.(IDL), Old Galway Road, Loughrea, Co. Galway, Ireland. H62VX39

Approved Signatures: Dympna Darcy (DCD) Lab Manager, Declan Joyce (DJ) Chartered Geotechnical Engineer, Ronan Killeen (RK) Quality Manager.

IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2022CE106**
				Borehole/Pit No.	TP-02
Site Name	Sceirde Rocks Landfall			Sample No.	6
Soil Description	Grey-orange slightly sandy slightly gravelly SILT.			Depth, m	1.30
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL1202211299



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	83		
37.5	83		
28	83		
20	81		
14	77		
10	75		
6.3	72		
5	71		
3.35	70		
2	68		
1.18	66		
0.6	64		
0.425	64		
0.3	63		
0.212	62		
0.15	61		
0.063	58		

Dry Mass of sample, g	672

Sample Proportions	% dry mass
Very coarse	0
Gravel	32
Sand	10
Fines <0.063mm	58

Grading Analysis		
D100	mm	
D60	mm	0.11
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

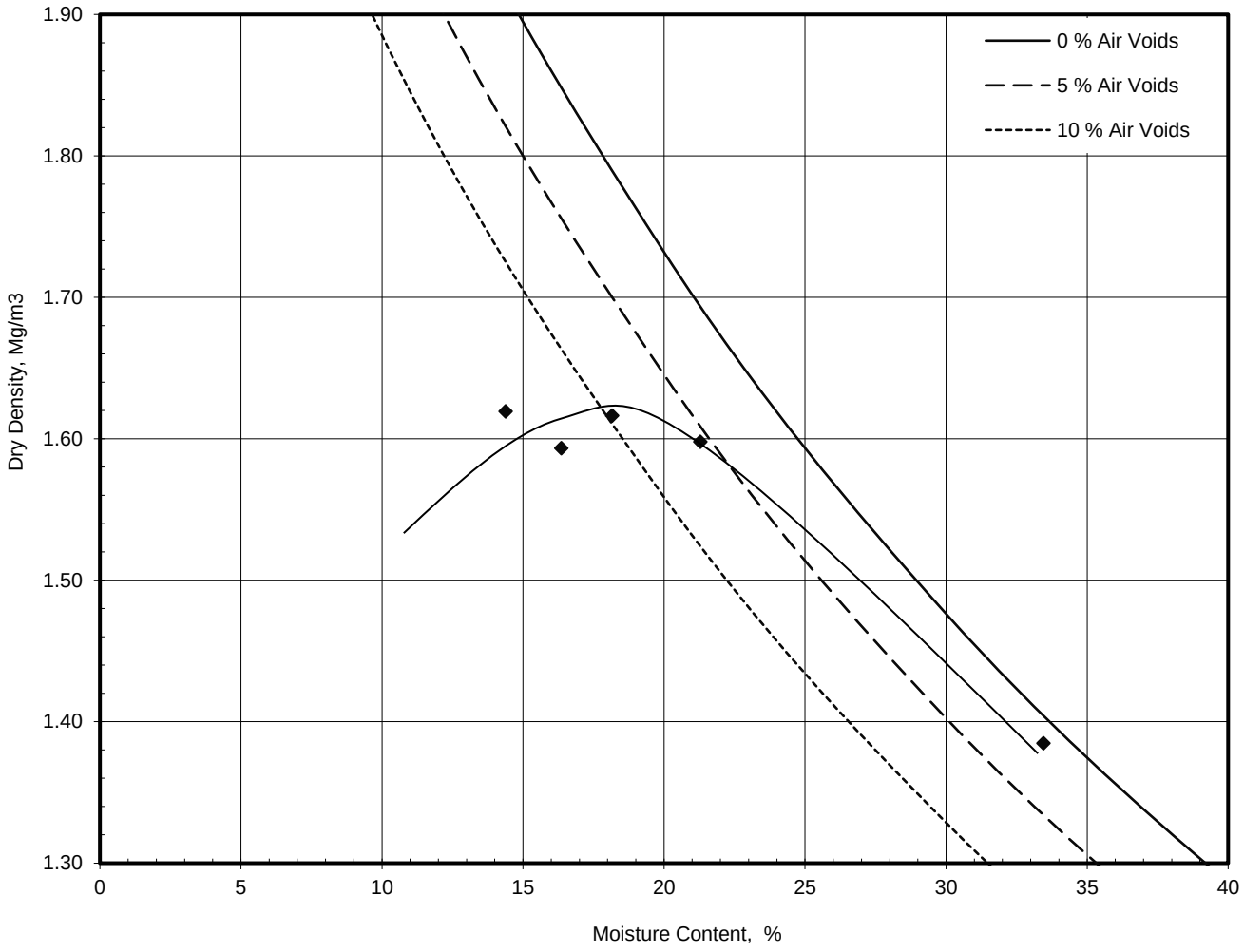
Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	
		Dympna Darcy B.Sc.	13/02/2023 16:09	**1** QC From No:R2

Tested in: Irish Drilling Ltd.(IDL), Old Galway Road, Loughrea, Co. Galway, Ireland. H62VX39

Approved Signatures: Dympna Darcy (DCD) Lab Manager, Declan Joyce (DJ) Chartered Geotechnical Engineer, Ronan Killeen (RK) Quality Manager.

IDL	Dry Density / Moisture Content Relationship Light Compaction			Job Ref	2022CE106
				Borehole / Pit No	TP-01
Site Name	**Sceirde Rocks Landfall**			Sample No	1
Soil Description	Grey slightly sandy SILT.			Depth	0.50 m
Specimen Ref.		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 4:1990, clause 3.4, 2.5kg rammer			Keylab ID	IDL1202211290
				Compaction Test Reference/No.	



Preparation		Material used was natural and air dried
Mould Type		CBR
Samples Used		Composite specimens tested
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	0
Particle Density - Assumed	Mg/m³	2.65

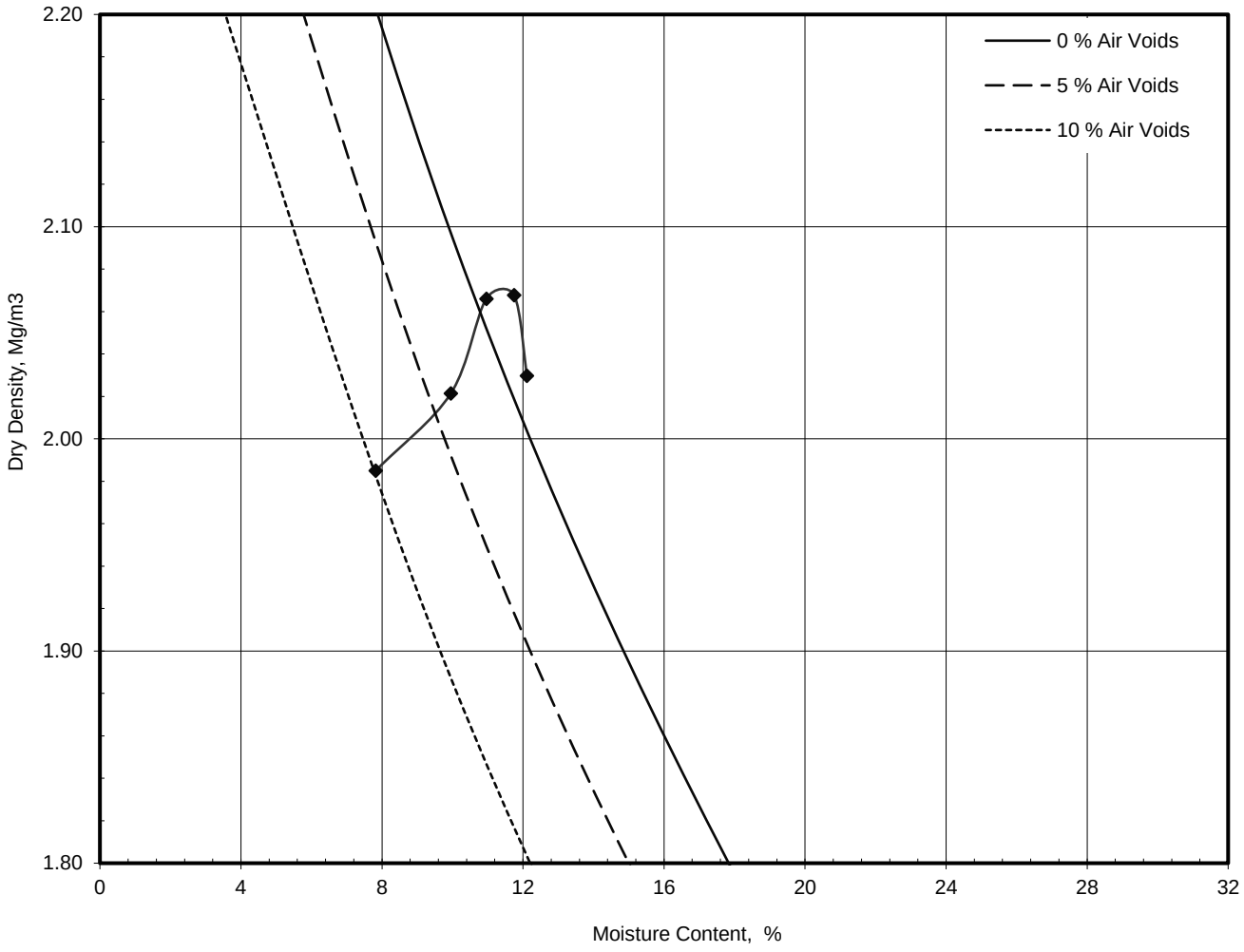
Maximum Dry Density	Mg/m³	**1.62**

Optimum Moisture Content	%	**18**

Operator	Checked	Approved	Remarks / Report Date:	**QC Form R4**
Administrator		DCD (13.02.23)		Sheet 1 of 1

Tested in: Irish Drilling Ltd.(IDL), Old Galway Road, Loughrea, Co. Galway, Ireland. H62VX39
Approved Signatures: Dympna Darcy (DCD) Lab Manager, Declan Joyce (DJ) Chartered Geotechnical Engineer, Ronan Killeen (RK) Quality Manager.

IDL	Dry Density / Moisture Content Relationship Light Compaction			Job Ref	2022CE106
				Borehole / Pit No	TP-02
Site Name	**Sceirde Rocks Landfall**			Sample No	5
Soil Description	Grey-orange slightly sandy slightly gravelly SILT.			Depth	1.30 m
Specimen Ref.		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 4:1990, clause 3.4, 2.5kg rammer			Keylab ID	IDL1202211298
				Compaction Test Reference/No.	



Preparation		Material used was natural and air dried
Mould Type		CBR
Samples Used		Composite specimens tested
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	4
Particle Density - Assumed	Mg/m³	2.65

Maximum Dry Density	Mg/m³	**2.07**

Optimum Moisture Content	%	**11**

Operator	Checked	Approved	Remarks / Report Date:	**QC Form R4**
Administrator		DCD 13.02.23		Sheet 1 of 1

Tested in: Irish Drilling Ltd.(IDL), Old Galway Road, Loughrea, Co. Galway, Ireland. H62VX39
Approved Signatures: Dympna Darcy (DCD) Lab Manager, Declan Joyce (DJ) Chartered Geotechnical Engineer, Ronan Killeen (RK) Quality Manager.

IDL

Point Load Strength Index Tests
Summary of Results

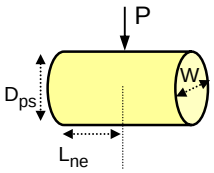
Project No.: 2022CE106

Project Name: Sceirde Rocks Landfall

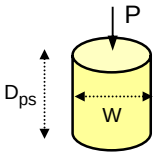
Borehole No.	Sample			Specimen		Rock Type and Test condition	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P	Equivalent diameter, De	Point Load Strength Index		Remarks (including water content if measured)
	Top Depth	Base Depth	Type	Top	Base		Type (D, A, I, B)	Direction (L, P or U)		Lne	W	Dps	Dps'			Is	Is(50)	
	m	m		m	m					mm	mm	mm	mm	kN	mm	MPa	MPa	
BH-01	5.50	6.4	C	6	6.05		D	U	YES		63.4		63.4	2.3	63.4	0.6	0.6	Weak
BH-01	9.60	10.1	C	9.7	9.80		D	U	YES		63.4		63.4	3.4	63.4	0.9	0.9	Weak
BH-01	11.50	13	C	12.5	12.60		D	U	YES		63.4		63.4	4.7	63.4	1.2	1.3	Medium Strong
BH-01	14.50	16.1	C	15	15.10		D	U	YES		63.4		63.4	5.2	63.4	1.3	1.4	Medium Strong
BH-01	16.10	17.6	C	17.4	17.50		D	U	YES		63.4		63.4	7.4	63.4	1.8	2.0	Strong
BH-01	22.20	23.1	C	22.6	22.70		D	U	YES		63.4		63.4	12.4	63.4	3.1	3.4	Strong
BH-01	28.00	29.5	C	28.4	28.55		D	U	YES		63.4		63.4	7.7	63.4	1.9	2.1	Strong
BH-02	2.60	4.2	C	3.7	3.80		D	U	YES		63.4		63.4	0.6	63.4	0.2	0.2	Weak
BH-02	7.20	8.6	C	7.7	7.80		D	U	YES		63.4		63.4	2.2	63.4	0.5	0.6	Weak
BH-02	11.60	13.2	C	11.6	11.70		D	U	YES		63.4		63.4	1.1	63.4	0.3	0.3	Weak
BH-02	17.60	19.2	C	18.55	18.65		A	U			63.4		63.4	0.4	71.5	0.1	0.1	Very Weak
BH-02	22.10	23.7	C	23.1	23.25		D	U			63.4		63.4	1.9	63.4	0.5	0.5	Weak

Test Type
D - Diametral, A - Axial, I - Irregular Lump, B - Block
Direction
L - parallel to planes of weakness
P - perpendicular to planes of weakness
U - unknown or random
Dimensions
Dps - Distance between platens (platen separation)
Dps' - at failure (see ISRM note 6)
Lne - Length from platens to nearest free end
W - Width of shortest dimension perpendicular to load, P

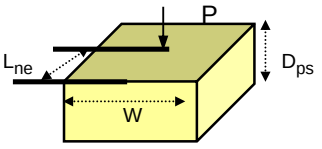
Diametral



Axial



Block/irregular lump



Test performed in accordance with ISRM Suggested Methods : 2007, unless noted otherwise
Detailed legend for test and dimensions, based on ISRM, is shown above.
Size factor, F = (De/50)0.45 for all tests.

Date Printed: 13/02/2023

Approved By: DCD

Table: 1 sheet 1

Tested in: Irish Drilling Ltd.(IDL), Old Galway Road, Loughrea, Co. Galway, Ireland. H62VX39
Approved Signatures: Dympna Darcy (DCD) Lab Manager, Declan Joyce (DJ) Chartered Geotechnical Engineer, Ronan Killeen (RK) Quality Manager.

IDL

UNIAXIAL COMPRESSION TEST ON ROCK - SUMMARY OF RESULTS

Project No.: 2022CE106

Project Name: Sceirde Rocks Landfall

Hole No.	Sample				Specimen Depth (m)	Specimen Dimensions2			Bulk Density2	Water Content 1	Uniaxial Compression3				Remarks
	Ref	Top	Base	Type		Dia. mm	Length mm	H/D	Mg/m3	%	Condition	Stress Rate MPa/s	Mode of failure	UCS MPa	
BH-01		9.60	10.10	C	10.3-10.5	63.4	165.7	2.6	2.68		as received	0.0106	S	0.0	Extremely Weak - Fractured at minimum loading
BH-01		22.20	23.10	C	23.9-24.05	63.4	167.4	2.6	2.70		as received	0.2854	AC	52.5	Strong
BH-02		11.60	13.20	C	12.7-12.9	63.4	165.9	2.6	2.71		as received	0.1001	S + AC	21.8	Weak
BH-02		17.60	19.20	C	18.65-18.92	63.4	167.6	2.6	2.71		as received	0.1121	S	20.4	Weak

Notes

1 ISRM p87 test 1, water content at 105 ± 3 oC, specimen as tested for UCS

2 ISRM p86 clause (vii), Caliper method used for determination of bulk volume and derivation of bulk density

3 ISRM p153 part 1, determination of Uniaxial Compressive Strength (UCS) of Rock Materials

above notes apply unless annotated otherwise in the remarks

Mode of failure :

S - Single shear MS - multiple shear

AC - Axial cleavage F - Fragmented

Test Specification: International Society for Rock Mechanics, The complete ISRM suggested methods for Rock Characterization Testing and Monitoring, 2007

Date Printed: 13/02/2023

Approved By: DCD

Table: sheet 1 of 1

Irish Drilling Ltd.

Summary of Thermal Conductivity test results

Project No.: 2022CE106

Project Name: Sceirde Rocks Landfall

Hole No.	Sample					Date of test	Bulk density	Dry density	Water Content	Thermal Conductivity	Thermal Resistivity	Remarks
	Ref	Top	Base	Type	Description		Mg/m3	Mg/m3	%	W/m.K	m.K/W	
TP-01	1	0.50	0.90	B	Grey slightly sandy SILT.	12/01/2023	1.85	1.39	33.5	1.67	0.60	
TP-01	1	0.50	0.90	B		24/01/2023	1.94	1.60	21.3	2.03	0.49	
TP-01	1	0.50	0.90	B		31/01/2023	1.91	1.62	18.2	1.72	0.58	
TP-01	1	0.50	0.90	B		03/02/2023	1.85	1.59	16.4	1.26	0.79	
TP-01	1	0.50	0.90	B		03/02/2023	1.85	1.62	14.4	1.26	0.80	
TP-01	4	0.50	0.90	U100	Grey slightly sandy SILT.	12/01/2023			28.6	0.73	1.37	
TP-01	4	0.50	0.90	U100	Grey slightly sandy SILT.	12/01/2023				1.71	0.59	
TP-02	4	0.30	0.75	U100	Grey slightly sandy SILT.	24/01/2023			23.1	0.92	1.09	
TP-02	4	0.30	0.75	U100	Grey slightly sandy SILT.	24/01/2023				1.63	0.62	
TP-02	1	0.50	0.90	B	Grey slightly sandy SILT.	19/01/2023				1.72	0.58	
TP-02	5	1.30	1.70	B	Grey-orange slightly sandy slightly gravelly SILT.	03/02/2023	2.29	2.06	11.0	1.82	0.55	
TP-02	5	1.30	1.70	B		07/01/2023	2.14	1.99	7.8	0.99	1.01	
TP-02	5	1.30	1.70	B		09/02/2023	2.22	2.02	10.0	1.48	0.68	
TP-02	5	1.30	1.70	B		09/02/2023	2.25	2.02	11.3	1.53	0.65	
TP-02	5	1.30	1.70	B		09/02/2023	2.28	2.03	12.1	1.71	0.59	

Notes

Tests performed in accordance with in house method based on ASTM D5334 using a direct reading system in accordance with the Manufacturer's instructions.

System calibrated against reference standard prior to each suite of tests.

Calculations performed using intergrated algorithms for non-steady state thermal probe technique.

Date Printed: 13/02/2023

Approved By: SCS

Table 1

sheet 1

GEOLABS Limited
Bucknalls Lane
Garston
Watford
Hertfordshire
WD25 9XX
Tel: +44(0) 1923 892 190
Fax: +44(0) 1923 892 191
email: admin@geolabs.co.uk
web: www.geolabs.co.uk

Irish Drilling Limited
Old Galway Road
Loughrea
Co.Galway
Eire

27 January 2023
Report No : GEO/37267/01

For the attention of Ms D Darcy

Date samples received	18/01/2023
Date written instructions received	11/01/2023
Date testing commenced	19/01/2023
Date of sample disposal	**24/02/2023**

Our ref **GEO / 37267**
Your Ref **2022CE106**

Project **SCEIRDE ROCKS LANDFALL**

Further to your instructions we have pleasure in enclosing the results of the tests you requested in the attached figures.

LABORATORY TEST REPORT

Item No	Test Quantity	Description
1	3	Cerchar Abrasivity
2	4	Thermal Conductivity and Resistivity

Any opinions or interpretations expressed herein are outside the scope of UKAS accreditation. All results contained in this report are provisional unless signed by an approved signatory. The results contained in this report relate only to samples received in the laboratory and are tested 'as received' unless otherwise stated. This report should not be reproduced, except in full, without the written approval of the laboratory. The results reported are applicable only to the test items received by the laboratory.

All the necessary data required by the documented test procedures has been recorded and will be stored for a period of not less than 6 years. This data will be issued to yourselves at your request. All samples will be disposed of after the date shown above. Written confirmation will be required to retain the samples beyond this period and a storage charge may be applied.

We trust that the above meets your requirements and should you require any further information or assistance, please do not hesitate to contact us.

Yours faithfully
on behalf of **GEOLABS Limited**

C Clergeaud
Head of Department

ISRM Suggested Methods - Rock Characterization Testing and Monitoring 2007 - 2014

CERCHAR ABRASIVITY

Sample details					Cerchar Abrasivity									
Borehole Ref.	Sample Ref.	Depth (m)	Description	D. Tested	Water Content (%)	Max Grain Size (mm)	Direction of Stylus	Specimen Condition as tested	As measured readings d (0.01 mm)	Standard Deviation of CAI	CAI Mean pin wear (mm)	Surface condition (correction)	CAI mean index	Abrasivity Classification
BH-01		12.00-12.10	Very strong thinly laminated dark grey SILTSTONE. Fresh to slightly weathered	25/01/23	As received	0.10	No weakness	As received	18,15,14,13,12	0.23	0.14	Rough Sample No correction needed	**1.4**	**Low**
BH-01		24.70-24.80	Very strong thinly laminated dark grey SILTSTONE. Fresh to slightly weathered	25/01/23	As received	0.10	No weakness	As received	10,15,14,13,13	0.19	0.13	Saw-cut Sample: (1.14 * CAI)	**1.5**	**Low**
BH-02		12.00-12.10	Very strong thinly laminated dark grey SILTSTONE. Fresh to slightly weathered	25/01/23	As received	0.10	No weakness	As received	16,17,15,13,14	0.16	0.15	Rough Sample No correction needed	**1.5**	**Low**

Notes: Stylus Rockwell Hardness and tip shape: 55 ± 1 conical. CERCHAR Apparatus: Type 2 (West). Measurement method: Side and/or Top view under microscope > 50x magnification

Checked and Approved by

CC

C Clergeaud (Snr. Geologist)

Date: 27/01/2023

Project Number:

GEO / 37267

Project Name:

SCEIRDE ROCKS LANDFALL
2022CE106

GEOLABS®

ISRM Suggested Methods - Rock Characterization Testing and Monitoring 2007 - 2014

CERCHAR ABRASIVITY

Borehole Ref.:	BH-01
Sample Ref.:	
Depth (m):	12.00-12.10

Description:
Very strong thinly laminated dark grey SILTSTONE. Fresh to slightly weathered

Sample details

Maximum grain size (mm)	0.1
Condition as tested	As received
Planes of weakness	Lamination
Direction of stylus	No weakness
Surface condition (correction)	Rough Sample (no correction needed)

Equipment used

Cerchar apparatus Type 2 (West):
In this apparatus the sample moves under a stationary stylus with a specific speed.

Stylus : Made of steel with a Rockwell Hardness of HRC 55±1.

Test No.		1	2	3	4	5
Measurement d_1	*mm*	*0.17*	*0.15*	*0.12*	*0.13*	*0.12*
Measurement d_2	*mm*	*0.19*	*0.14*	*0.15*	*0.14*	*0.13*
Measurement d_3	*mm*	*0.19*	*0.15*	*0.15*	*0.13*	*0.12*
Measurement d_4	*mm*	*0.17*	*0.16*	*0.14*	*0.12*	*0.12*
Measurement d_5	*mm*	*0.19*	*0.14*	*0.13*	*0.13*	*0.12*
Mean reading d_M	*mm*	0.18	0.15	0.14	0.13	0.12
Mean pin wear	*mm*					0.14
CERCHAR-Abrasivity-Index (**CAI**)						1.44
Standard deviation of **CAI**						*0.23*
Classification of **CAI**						**Low abrasiveness**

*Measurements done under >50x magnification calibrated microscope. Using top and side view

Classification of CAI	
0.1-0.4	Extremely low
0.5-0.9	Very low
1.0-1.9	Low
2.0-2.9	Medium
3.0-3.9	High
4.0-4.9	Very high
≥5	Extremely high

Date tested: 25 January 2023

Photograph

Not required

Checked and Approved by

CC

C Clergeaud (Snr. Geologist)

Date: 27/01/2023

Project Number:

GEO / 37267

Project Name:

SCEIRDE ROCKS LANDFALL
2022CE106

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ISRM Suggested Methods - Rock Characterization Testing and Monitoring 2007 - 2014

CERCHAR ABRASIVITY

Borehole Ref.:	BH-01
Sample Ref.:	
Depth (m):	24.70-24.80

Description:
Very strong thinly laminated dark grey SILTSTONE. Fresh to slightly weathered

Sample details

Maximum grain size (mm)	0.1
Condition as tested	As received
Planes of weakness	Lamination
Direction of stylus	No weakness
Surface condition (correction)	Saw-cut Sample:(1.14 * CAI)

Equipment used

Cerchar apparatus Type 2 (West):
In this apparatus the sample moves under a stationary stylus with a specific speed.

Stylus : Made of steel with a Rockwell Hardness of HRC 55±1.

Test No.		1	2	3	4	5
Measurement d_1	*mm*	*0.10*	*0.13*	*0.14*	*0.13*	*0.13*
Measurement d_2	*mm*	*0.11*	*0.16*	*0.15*	*0.14*	*0.14*
Measurement d_3	*mm*	*0.10*	*0.16*	*0.14*	*0.13*	*0.13*
Measurement d_4	*mm*	*0.09*	*0.15*	*0.13*	*0.13*	*0.13*
Measurement d_5	*mm*	*0.11*	*0.14*	*0.14*	*0.13*	*0.13*
Mean reading d_M	*mm*	0.10	0.15	0.14	0.13	0.13
Mean pin wear	*mm*					0.13
CERCHAR-Abrasivity-Index (**CAI**)						1.48
Standard deviation of **CAI**						*0.19*
Classification of **CAI**						**Low abrasiveness**

Classification of CAI	
0.1-0.4	Extremely low
0.5-0.9	Very low
1.0-1.9	Low
2.0-2.9	Medium
3.0-3.9	High
4.0-4.9	Very high
≥5	Extremely high

Date tested: 25 January 2023

*Measurements done under >50x magnification calibrated microscope. Using top and side view

Photograph

Not required

Checked and Approved by

CC

C Clergeaud (Snr. Geologist)

Date: 27/01/2023

Project Number:

GEO / 37267

Project Name:

SCEIRDE ROCKS LANDFALL
2022CE106

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ISRM Suggested Methods - Rock Characterization Testing and Monitoring 2007 - 2014

CERCHAR ABRASIVITY

Borehole Ref.:	BH-02
Sample Ref.:	
Depth (m):	12.00-12.10

Description:
Very strong thinly laminated dark grey SILTSTONE. Fresh to slightly weathered

Sample details

Maximum grain size (mm)	0.1
Condition as tested	As received
Planes of weakness	Lamination
Direction of stylus	No weakness
Surface condition (correction)	Rough Sample (no correction needed)

Equipment used

Cerchar apparatus Type 2 (West):
In this apparatus the sample moves under a stationary stylus with a specific speed.

Stylus : Made of steel with a Rockwell Hardness of HRC 55±1.

Test No.		1	2	3	4	5
Measurement d_1	*mm*	*0.14*	*0.17*	*0.15*	*0.13*	*0.14*
Measurement d_2	*mm*	*0.17*	*0.16*	*0.16*	*0.13*	*0.15*
Measurement d_3	*mm*	*0.17*	*0.17*	*0.15*	*0.14*	*0.14*
Measurement d_4	*mm*	*0.16*	*0.18*	*0.14*	*0.12*	*0.14*
Measurement d_5	*mm*	*0.15*	*0.16*	*0.15*	*0.13*	*0.14*
Mean reading d_M	*mm*	0.16	0.17	0.15	0.13	0.14
Mean pin wear	*mm*					0.15
CERCHAR-Abrasivity-Index (**CAI**)						1.50
Standard deviation of **CAI**						*0.16*
Classification of **CAI**						**Low abrasiveness**

Classification of CAI	
0.1-0.4	Extremely low
0.5-0.9	Very low
1.0-1.9	Low
2.0-2.9	Medium
3.0-3.9	High
4.0-4.9	Very high
≥5	Extremely high

Date tested: 25 January 2023

*Measurements done under >50x magnification calibrated microscope. Using top and side view

Photograph

Not required

Checked and Approved by CC C Clergeaud (Snr. Geologist) Date: 27/01/2023	Project Number: **GEO / 37267** Project Name: **SCEIRDE ROCKS LANDFALL** **2022CE106**	GEOLABS®

ASTM D 5334-14

THERMAL CONDUCTIVITY OF SOIL AND SOFT ROCK BY THERMAL NEEDLE PROBE

Location	BH-01
Sample Depth (m)	8.20
Sample Type	C

Description:
Very strong thinly laminated dark grey SILTSTONE. Fresh to slightly weathered

Date tested: 25/01/2023

Equipment and Methodology details

Decagon Devices KD2 Pro Thermal Conductivity meter with RK-1 Needle Probe. The KD2 Pro complies fully with ASTM D5334-08. Data is recorded every second over a 60 second period to an internal microprocessor and an alogrithm used to calculate the best fit of the steady state data and the thermal conductivity derived. This obviates the need for a graphical plot of temperature against time.

Sample details

Sample diameter	64.10	mm	Bulk Density	2.40	Mg/m³
Sample length	113.60	mm	Dry Density	2.38	Mg/m³
Sample mass	880.70	g	Moisture Content	0.8	%
Test Temperature	20.52	ºC			

Sample Preparation

Sample is Undisturbed. The probe has been inserted by pushing into a predrilled hole. Thermal paste used to provide better thermal contact

Calibration factor 0.99

Thermal Conductivity	**2.52**	**W/(m·k)**
Thermal Resistivity	**0.40**	**(m·k)/W**

Remarks

Probe inserted at 30º angle relative to lamination

Processed by **MB**

Checked and Approved by:

C Clergeaud - Head of Department
27/01/2023

Project Number:
GEO / 37267

Project Name:
SCEIRDE ROCKS LANDFALL
2022CE106

GEOLABS®

ASTM D 5334-14

THERMAL CONDUCTIVITY OF SOIL AND SOFT ROCK BY THERMAL NEEDLE PROBE

Location	BH-01
Sample Depth (m)	25.70
Sample Type	C

Description:
Very strong thinly laminated dark grey SILTSTONE. Fresh to slightly weathered

Date tested: 25/01/2023

Equipment and Methodology details

Decagon Devices KD2 Pro Thermal Conductivity meter with RK-1 Needle Probe. The KD2 Pro complies fully with ASTM D5334-08. Data is recorded every second over a 60 second period to an internal microprocessor and an alogrithm used to calculate the best fit of the steady state data and the thermal conductivity derived. This obviates the need for a graphical plot of temperature against time.

Sample details

Sample diameter	63.90	mm	Bulk Density	2.70	Mg/m³
Sample length	102.10	mm	Dry Density	2.69	Mg/m³
Sample mass	886.90	g	Moisture Content	0.5	%
Test Temperature	20.37	ºC			

Sample Preparation

Sample is Undisturbed. The probe has been inserted by pushing into a predrilled hole. Thermal paste used to provide better thermal contact

Calibration factor 0.99

Thermal Conductivity	**1.85**	**W/(m·k)**
Thermal Resistivity	**0.54**	**(m·k)/W**

Remarks

Probe inserted at 30º angle relative to lamination

Processed by **KJ**

Checked and Approved by:

C Clergeaud - Head of Department
27/01/2023

Project Number:
GEO / 37267

Project Name:
SCEIRDE ROCKS LANDFALL
2022CE106

GEOLABS®

ASTM D 5334-14

THERMAL CONDUCTIVITY OF SOIL AND SOFT ROCK BY THERMAL NEEDLE PROBE

Location	BH-02
Sample Depth (m)	9.70
Sample Type	C

Description:
Very strong thinly laminated dark grey SILTSTONE. Fresh to slightly weathered

Date tested: 25/01/2023

Equipment and Methodology details

Decagon Devices KD2 Pro Thermal Conductivity meter with RK-1 Needle Probe. The KD2 Pro complies fully with ASTM D5334-08. Data is recorded every second over a 60 second period to an internal microprocessor and an alogrithm used to calculate the best fit of the steady state data and the thermal conductivity derived. This obviates the need for a graphical plot of temperature against time.

Sample details

Sample diameter	63.20	mm	Bulk Density	2.68	Mg/m³
Sample length	108.00	mm	Dry Density	2.67	Mg/m³
Sample mass	910.80	g	Moisture Content	0.4	%
Test Temperature	18.57	ºC			

Sample Preparation

Sample is Undisturbed. The probe has been inserted by pushing into a predrilled hole. Thermal paste used to provide better thermal contact

Calibration factor 0.99

Thermal Conductivity	**3.57**	**W/(m·k)**
Thermal Resistivity	**0.28**	**(m·k)/W**

Remarks

Probe inserted at 45º angle relative to lamination

Processed by **KJ**

Checked and Approved by:

C Clergeaud - Head of Department
27/01/2023

Project Number:
GEO / 37267

Project Name:
SCEIRDE ROCKS LANDFALL
2022CE106

GEOLABS®

ASTM D 5334-14

THERMAL CONDUCTIVITY OF SOIL AND SOFT ROCK BY THERMAL NEEDLE PROBE

Location	BH-02
Sample Depth (m)	15.10
Sample Type	C

Description:
Very strong thinly laminated dark grey SILTSTONE. Fresh to slightly weathered

Date tested: 25/01/2023

Equipment and Methodology details

Decagon Devices KD2 Pro Thermal Conductivity meter with RK-1 Needle Probe. The KD2 Pro complies fully with ASTM D5334-08. Data is recorded every second over a 60 second period to an internal microprocessor and an alogrithm used to calculate the best fit of the steady state data and the thermal conductivity derived. This obviates the need for a graphical plot of temperature against time.

Sample details

Sample diameter	63.20	mm	Bulk Density	2.71	Mg/m³
Sample length	118.20	mm	Dry Density	2.70	Mg/m³
Sample mass	1002.50	g	Moisture Content	0.6	%
Test Temperature	18.56	ºC			

Sample Preparation

Sample is Undisturbed. The probe has been inserted by pushing into a predrilled hole. Thermal paste used to provide better thermal contact

Calibration factor 0.99

Thermal Conductivity	**2.86**	**W/(m·k)**
Thermal Resistivity	**0.35**	**(m·k)/W**

Remarks

Probe inserted at 45º angle relative to lamination

Processed by **KJ**

Checked and Approved by:

C Clergeaud - Head of Department
27/01/2023

Project Number:
GEO / 37267

Project Name:
SCEIRDE ROCKS LANDFALL
2022CE106

GEOLABS®

Unit 7-8 Hawarden Business Park
Manor Road (off Manor Lane)
Hawarden
Deeside
CH5 3US
Tel: (01244) 528777
email: hawardencustomerservices@alsglobal.com
Website: www.alsenvironmental.co.uk

Irish Drilling Limited
Old Galway Road
Loughrea
Co. Galway

Attention: Dympna Darcy

CERTIFICATE OF ANALYSIS

Date of report Generation:	20 January 2023
Customer:	Irish Drilling Limited
Sample Delivery Group (SDG):	230112-87
Your Reference:	2022CE106
Location:	Sceirde Rocks Landfall
Report No:	675712
Order Number:	12034

We received 3 samples on Thursday January 12, 2023 and 3 of these samples were scheduled for analysis which was completed on Friday January 20, 2023. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Laboratories (UK) Limited Hawarden.

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.
Incorrect sampling dates and/or sample information will affect the validity of results.

Approved By:

Sonia McWhan

Operations Manager

CERTIFICATE OF ANALYSIS

SDG: 230112-87 **Report Number:** 675712 **Superseded Report:**
Client Ref.: 2022CE106 **Location:** Sceirde Rocks Landfall

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
27398440	TP-01	D2	0.50 - 0.90	24/11/2022
27398446	TP-01	D7	1.30 - 1.70	24/11/2022
27398444	TP-02	D2	0.50 - 0.90	24/11/2022

Only received samples which have had analysis scheduled will be shown on the following pages.

CERTIFICATE OF ANALYSIS

SDG: 230112-87 **Report Number:** 675712 **Superseded Report:**
Client Ref.: 2022CE106 **Location:** Sceirde Rocks Landfall

Results Legend

X **Test**

N **No Determination Possible**

Sample Types -
S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

			Lab Sample No(s)		
			27398440	27398446	27398444
			Customer Sample Reference		
			TP-01	TP-01	TP-02
			AGS Reference		
			D2	D7	D2
			Depth (m)		
			0.50 - 0.90	1.30 - 1.70	0.50 - 0.90
			Container		
			250g Amber Jar (ALE210)	250g Amber Jar (ALE210)	250g Amber Jar (ALE210)
			Sample Type		
			S	S	S
pH	All	NDPs: 0 Tests: 1			X
Sample description	All	NDPs: 0 Tests: 3	X	X	X
Total Organic Carbon	All	NDPs: 0 Tests: 3	X	X	X

CERTIFICATE OF ANALYSIS

SDG: 230112-87 **Report Number:** 675712 **Superseded Report:**
Client Ref.: 2022CE106 **Location:** Sceirde Rocks Landfall

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
27398440	TP-01	0.50 - 0.90	Dark Brown	Silty Clay Loam	Stones	None
27398446	TP-01	1.30 - 1.70	Light Brown	Silty Clay Loam	Stones	None
27398444	TP-02	0.50 - 0.90	Light Brown	Silty Clay Loam	None	None

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally ocurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

Validated

CERTIFICATE OF ANALYSIS

SDG: 230112-87 **Report Number:** 675712 **Superseded Report:**
Client Ref.: 2022CE106 **Location:** Sceirde Rocks Landfall

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+$@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	TP-01	TP-01	TP-02			
			Depth (m)	0.50 - 0.90	1.30 - 1.70	0.50 - 0.90			
			Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)			
			Date Sampled	24/11/2022	24/11/2022	24/11/2022			
			Sample Time	-	-	-			
			Date Received	12/01/2023	12/01/2023	12/01/2023			
			SDG Ref	230112-87	230112-87	230112-87			
			Lab Sample No.(s)	27398440	27398446	27398444			
			AGS Reference	D2	D7	D2			
Moisture Content Ratio (% of as received sample)	%	PM024		20	13	19			
Soil Organic Matter (SOM)	<0.35 %	TM132		0.881 @ #	0.498 @ #	0.476 @ #			
pH	1 pH Units	TM133				6.36 @ M			

Table of Results - Appendix

Method No	Reference	Description
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Laboratories (UK) Limited Hawarden (Method codes TM).

CERTIFICATE OF ANALYSIS

SDG: 230112-87 **Report Number:** 675712 **Superseded Report:**
Client Ref.: 2022CE106 **Location:** Sceirde Rocks Landfall

Test Completion Dates

Lab Sample No(s)	27398440	27398446	27398444
Customer Sample Ref.	TP-01	TP-01	TP-02
AGS Ref.	D2	D7	D2
Depth	0.50 - 0.90	1.30 - 1.70	0.50 - 0.90
Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
pH			13-Jan-2023
Sample description	12-Jan-2023	12-Jan-2023	12-Jan-2023
Total Organic Carbon	20-Jan-2023	20-Jan-2023	20-Jan-2023

Appendix

General

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. For dried and crushed preparations of soils volatile loss may occur e.g volatile mercury.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17 Data retention. All records, communications and reports pertaining to the analysis are archived for seven years from the date of issue of the final report.

18. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as “mixed hydrocarbons”. Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

19. **Sample Deviations**

If a sample is classed as deviated then the associated results may be compromised.

1	**Container with Headspace provided for volatiles analysis**
2	**Incorrect container received**
3	**Deviation from method**
4	**Matrix interference**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to late arrival of instructions or samples**
§	**Sampled on date not provided**

20. **Asbestos**

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2021), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as “Not detected”. If no asbestos fibre types are found all will be reported as “Not detected” and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials and soils are obtained from supplied bulk materials andd soils which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2021).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining.

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

Appendix 06
Trial Pit Photographs

Figure 1 H:\22CE106_Corio Doonbeg\Tp1...jpg

Figure 2 H:\22CE106_Corio Doonbeg\Tp1...jpg

Figure 3 H:\22CE106_Corio Doonbeg\Tp2...jpg

Figure 4 H:\22CE106_Corio Doonbeg\Tp2...jpg

Appendix 07
Rotary Core Photographs


Corio Generation,
Sceirde Rocks Landfall,
(Doonbeg) Co. Clare
2022 CE 106
BH 1
Box
1. 2 3.
START 1.5m
Corio Generation,
Sceirde Rocks Landfall,
(Doonbeg) Co. Clare
2022 CE 106
BH 1
Box
4. 5 6.
10 20 30 40 50 60 70 80 90 100 110 120 130 140 150


Corio Generation,
Sceirde Rocks Landfall,
(Doonbeg) Co. Clare
2022 CE 106
BH 1
Box
7. 8. 9.
19.1
20.6
20.6m
22.2
23.1
24.7
10 20 30 40 50 60 70 80 90 100 110 120 130 140
Corio Generation,
Sceirde Rocks Landfall,
(Doonbeg) Co. Clare
2022 CE 106
BH 1
Box
10. 11.
26.3
28m
29.5
31
10 20 30 40 50 60 70 80 90 100 110 120 130 140


Corio Generation,
Sceirde Rocks Landfall,
(Doonbeg) Co. Clare
2022 CE 106
BH 2
Box
1. 2 3
Corio Generation,
Sceirde Rocks Landfall,
(Doonbeg) Co. Clare
2022 CE 106
BH 2
Box
4. 5 6.


Corio Generation,
Sceirde Rocks Landfall,
(Doonbeg) Co. Clare
2022 CE 106
BH 2
Box
7. 8. 9.
192
205
221
237
EOH
10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

Appendix 08
Site Plan

494400

667800

Boreholes			
id	Name	X (ITM)	Y (ITM)
1	BH01	494304	667881
2	BH02	494377	667777

Trial Pits			
id	Name	X (ITM)	Y (ITM)
1	TP01	494407	667724
2	TP02	494314	667853

BH01

TP02

BH02

TP01

0 100 200 300 m

667800

494400

Ground Investigation Layout

Legend

- Borehole Locations
- Trial Pit Locations

CORIO

GDG GAVIN & DOHERTY GEOSOLUTIONS

Gavin & Doherty Geosolutions
Unit A2, Nutgrove Office Park
Rathfarnham, Dublin 14, D14 X627
T: +353 1 207 1000
info@gdgeo.com

Geodetic Parameters:

Datum: IRENET95
Projection: Transverse Mercator
Ellipsoid: GRS 1980
Prime meridian: Greenwich
Unit: metre
EPSG: 2157

N

Map Number: 22308-GDG-GI-Layout-01-01

Revision	Date	Remarks	Drawn	Checked	Approved
0	28/10/2022	First issue	CE	SC	
1	10/10/2022	First issue	SC	SC	

EPSG:	Plot Size	Datum	Projection
2157	A3	IRENET95	Transverse Mercator

Appendix 09
Data Logger