



Priority Geotechnical Ltd.
Tel: 021 4631600
Fax: 021 4638690
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Drilled By:

KM

Logged By:

SR

Borehole No.

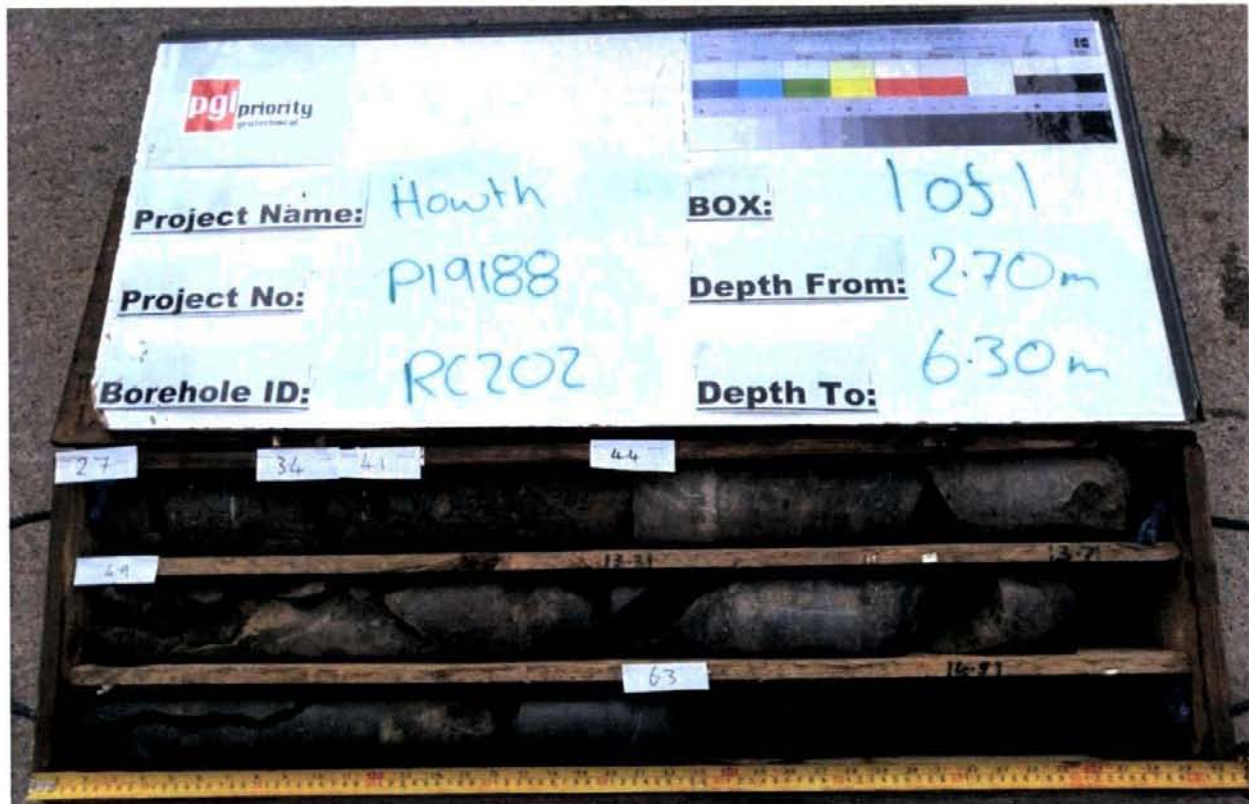
RC202

Sheet 1 of 1

Project Name:	Howth Fishing Harbour Centre Dredging	Project No. P19188	Co-ords:	728274E - 739735N	Hole Type RC
Location:	Howth Harbour, Co. Dublin		Level:	-3.09 m OD	Scale 1:50
Client:	Department of Agriculture, Food and the Marine		Dates:	09/12/2019 09/12/2019	

Well	Water Strike (m)	Depth (m)	Type /Fs (min, max, avg)	Coring (%)			Depth (m) / FI (/m)	Level (mOD)	Legend	Stratum Description	
				TCR	SCR	RQD					
										Refer to BH202 for detailed overburden description.	1
											2
		2.70 - 3.40		29	0	0	2.70	-5.79		Core run attempted. Poor recovery. Driller described: Clay with boulder content.	3
		25 (13-16/25 for 40mm) (C)					3.40	-6.49		Grey, slightly sandy gravelly CLAY with low cobble content.	4
		0 (45 for 120mm) (C)		83	0	0	4.10	-7.19		Core run attempted. Poor recovery. Driller described: Clay with boulder content.	4
		4.40 - 4.90		100	100	73	4.40	-7.49		Lithology: Strong, dark grey, LIMESTONE.	5
							2/m			Weathering: Slightly weathered with light clay smearing on fracture surfaces.	5
		4.90 - 6.30	50mm 200mm 140mm	96	93	24	7/m			Fractures: Lightly to moderately fractured. 1st set dips 0 to 20 degrees, with close to medium spacing and planar rough to undulate rough fracture surface texture. 2nd set dips 70 to 85 degrees, with close to medium spacing and undulate rough fracture surface texture.	6
							6.30	-9.39		End of Borehole at 6.300m	7
											8
											9

Groundwater:					Hole Information:			Equipment:	EMCI-450.
Struck (m bgl)	Level (m bgl)	After (min)	Sealed	Comment	Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)	Method:	Compressed air mist.
				Drilled over water.	6.30	76	104		
Remarks:					Shift Data:				
Borehole terminated at 6.50m below seabed level.					Groundwater (m bgl)	Shift	Hole Depth (m bgl)	Remarks	
						09/12/2019 08:00 09/12/2019 18:00	0.00 6.30	Start of shift. End of borehole.	



Number: RC202	Project Howth Fishing Harbour Centre Project No P19188 Engineer Malachy Walsh & Partners	
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Priority Geotechnical Ltd. Tel: 021 4631600 Fax: 021 4638690 www.prioritygeotechnical.ie						Drilled By PC		Borehole No. BH203	
						Logged By SR		Sheet 1 of 1	
Project Name: Howth Fishing Harbour Centre Dredging				Project No. P19188		Co-ords: 728376E - 739860N		Hole Type CP	
Location: Howth Harbour, Co. Dublin						Level: -4.39 m OD		Scale 1:50	
Client: Department of Agriculture, Food and the Marine						Date: 05/12/2019 - 05/12/2019			

Well Backfill	Water Strike (m bgl)	Sample and In Situ Testing			Depth (m bgl)	Level (mOD)	Legend	Stratum Description	
		Depth (m bgl)	Type	Results					
		0.00 - 1.00	B				Grey, silty gravelly SAND with shell content. Sand is fine to coarse. Gravel is fine to coarse and angular to sub-angular.		
		1.00 - 2.00 1.00	B SPT (C)	N=82 (15, 19/18, 19, 20, 25)	1.00	-5.39	Stiff, grey, slightly gravelly CLAY with cobble content. Gravel is fine to coarse and sub-angular to sub-rounded.	1	
		2.00	SPT (C)	50 (25 for 0mm/50 for 0mm)	2.20	-6.59		2	
		End of Borehole at 2.200m							
								3	
								4	
								5	
								6	
								7	
								8	
								9	

Groundwater:					Hole Information:			Chiselling Details:			
Struck (m bgl)	Rose to (m bgl)	After (mins)	Sealed (m bgl)	Comment	Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)	Top (m)	Base (m)	Duration (hh:mm)	Tool
				Drilled over water.	2.20	200	200	2.00	2.20	02:00	Chisel
					Equipment: Dando 2000.						

Remarks: Borehole terminated at 2.20m below seabed level due to refusal.						Shift Data:									
						<table style="width:100%; border-collapse: collapse;"> <tr> <th style="width: 15%;">GW (m bgl)</th> <th style="width: 25%;">Shift</th> <th style="width: 15%;">Depth (m bgl)</th> <th style="width: 45%;">Remarks</th> </tr> <tr> <td></td> <td>05/12/2019 08:00</td> <td>0.00</td> <td>Start of shift.</td> </tr> <tr> <td>N/A</td> <td>05/12/2019 18:00</td> <td>2.20</td> <td>End of borehole.</td> </tr> </table>				GW (m bgl)	Shift	Depth (m bgl)	Remarks		05/12/2019 08:00
GW (m bgl)	Shift	Depth (m bgl)	Remarks												
	05/12/2019 08:00	0.00	Start of shift.												
N/A	05/12/2019 18:00	2.20	End of borehole.												

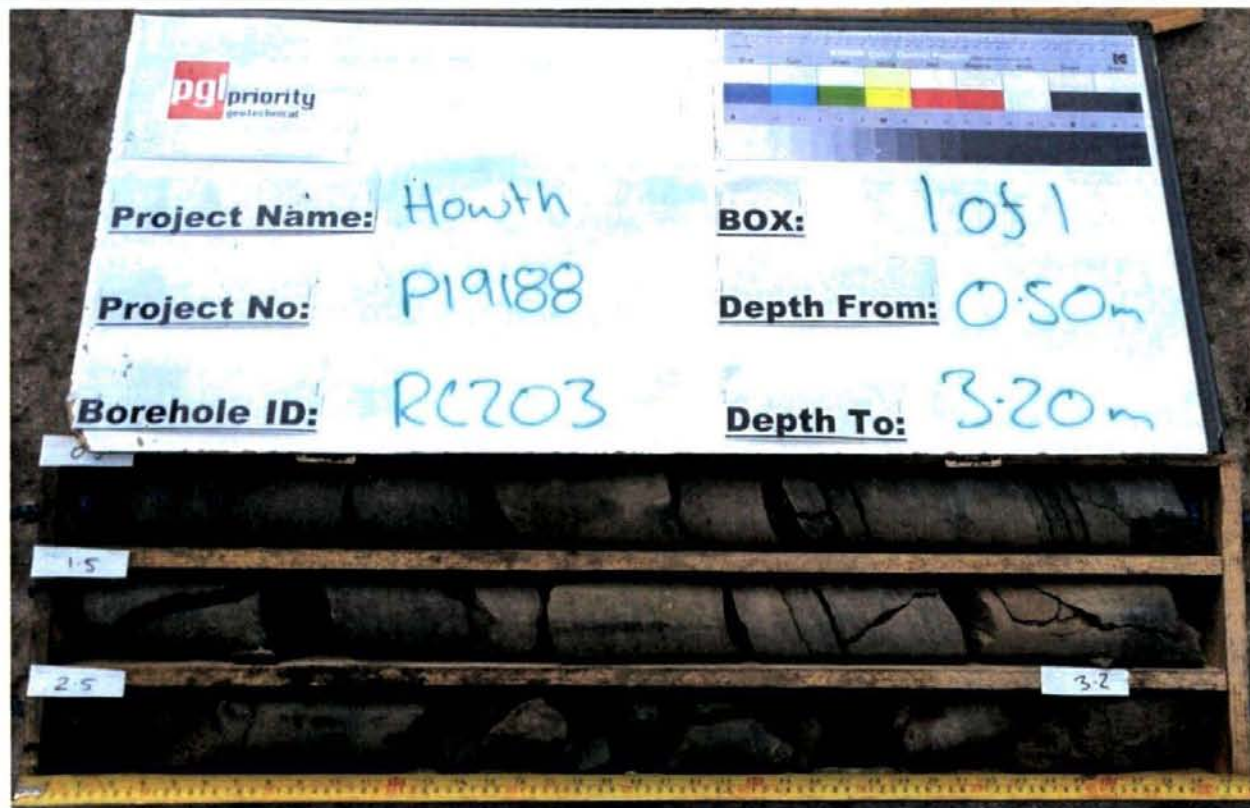
		Priority Geotechnical Ltd. Tel: 021 4631600 Fax: 021 4638690 www.prioritygeotechnical.ie				Drilled By: KM		Borehole No. RC203 Sheet 1 of 1	
						Logged By: SR			
Project Name: Howth Fishing Harbour Centre Dredging		Project No. P19188		Co-ords: 728376E - 739860N		Hole Type RC			
Location: Howth Harbour, Co. Dublin		Level: -6.59 m OD		Scale 1:50					
Client: Department of Agriculture, Food and the Marine		Dates: 06/12/2019 06/12/2019							

Well	Water Strike (m)	Depth (m)	Type /Fs (min, max, avg)	Coring (%)			Depth (m) / FI (/m)	Level (mOD)	Legend	Stratum Description	
				TCR	SCR	RQD					
		30 (25 for 75mm/30 for 0mm) (C) 0.50 - 1.50	10mm 150mm 80mm	95	95	13	0.50 13/m	-7.09		Open hole boring. Driller described: Boulders.	1
		1.50 - 2.50	30mm 120mm 60mm	100	100	0	10/m			Lithology: Strong, dark grey, muddy LIMESTONE. Weathering: Slightly weathered with light clay smear on some fracture surfaces.	2
		2.50 - 3.20	40mm 180mm 50mm	100	29	17	6/m 3.20	-9.79		Fractures: Heavily fractured, though mostly solid with some broken portions. Main set dips 10 to 25 degrees, with very close to close spacing and planar rough to undulate rough fracture surface textures. 2nd set dips 70 degrees, with wide spacing and undulate rough fracture surface textures. 3rd set dips 85 degrees, with wide spacing and undulate rough fracture surface textures.	3
										2.80m - 3.20m Not intact. End of Borehole at 3.200m	4
											5
											6
											7
											8
											9

Groundwater:				Hole Information:			Equipment: EMCI-450.	
Struck (m bgl)	Level (m bgl)	After (min)	Sealed	Comment	Hole Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)	Method:
				Drilled over water.	3.20	76	104	Compressed air mist.

Remarks: Borehole terminated at 3.20m below seabed level.	Shift Data:	Groundwater (m bgl)	Shift 06/12/2019 08:00 06/12/2019 18:00	Hole Depth (m bgl) 0.00 3.20	Remarks Start of shift. End of borehole.

Photographic Record



Number:

RC203

Project
Project No
Engineer

Howth Fishing Harbour Centre
P19188
Malachy Walsh & Partners

Project Name: Howth Fishing Harbour Centre Dredging

Project No.	P19188
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Co-ords:728224E - 739695N
Level:

Date
05/12/2019

Location: Howth Harbour, Co. Dublin

Dimensions (m):

Scale
1:25

Client: Department of Agriculture, Food and the Marine

Depth:
0.10m BGL

Logged
SR

Water Strike & Backfill	Samples & In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description
	Depth (m)	Type	Results				
	0.00 - 0.10	B		0.10			Brown, SAND. Sand is fine to medium. End of Pit at 0.100m

Stability:	N/A
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Plant: Van Veen grab sampler.

Backfill: N/A

Groundwater: N/A

Remarks: Sample collected from seabed using a Van Veen grab sampler.

Project Name: Howth Fishing Harbour Centre Dredging

Project No.
P19188

Co-ords:728435E - 739752N
Level:

Date
05/12/2019

Location: Howth Harbour, Co. Dublin

Dimensions (m):

Scale
1:25

Client: Department of Agriculture, Food and the Marine

Depth:
0.50m BGL

Logged
AO

[illegible]

Stability:	N/A
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Plant: 25t long reach excavator.

Backfill: N/A

Groundwater: N/A

Remarks: Sample collected from seabed using a long reach excavator.

Project Name: Howth Fishing Harbour Centre Dredging

Project No.	P19188
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Co-ords: 728381E - 739674N
Level:

Date
05/12/2019

Location: Howth Harbour, Co. Dublin

Dimensions (m):

Scale
1:25

Client: Department of Agriculture, Food and the Marine

Depth:
0,50m BGL

Logged
AO

Water Strike & Backfill	Samples & In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description
	Depth (m)	Type	Results				
	0.00 - 0.50 0.00 - 0.50	B ES		0.50			Marine deposits. Soft, black, organic slightly sandy slightly gravelly SILT with strong organic odour and metal, plastic, rubber, general waste content. End of Pit at 0.500m

Stability:	N/A
------------	-----

Plant: 25t long reach excavator.

Backfill: N/A

Groundwater: N/A

Remarks:	Sample collected from seabed using a long reach excavator.
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Backfill:	N/A
Remarks:	Sample collected from seabed using a long reach excavator.

Project Name:	Howth Fishing Harbour Centre Dredging	Project No.	P19188	Co-ords: 728836E - 739667N	Date	05/12/2019
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Location: Howth Harbour, Co. Dublin	Dimensions (m):		Scale 1:25
Client: Department of Agriculture, Food and the Marine	Depth: 0.50m BGL		Logged AO

Water Strike & Backfill	Samples & In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description
	Depth (m)	Type	Results				
	0.00 - 0.50 0.00 - 0.50	B ES		0.50		 Marine deposits. Very soft, black, slightly sandy slightly gravelly organic CLAY with high cobble content. Gravel is fine to coarse, angular to sub-rounded and of varied lithology. Cobbles are sub-rounded and of varied lithology.	
						End of Pit at 0.500m	

Stability: N/A Plant: 25t long reach excavator. Backfill: N/A	Groundwater: N/A
Remarks: Sample collected from seabed using a long reach excavator.	



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Trial Pit No
LB207
Sheet 1 of 1

Project Name: Howth Fishing Harbour Centre Dredging

Project No.
P19188

Co-ords: 728808E - 739475N
Level:

Date
05/12/2019

Location: Howth Harbour, Co. Dublin

Dimensions (m):



Scale
1:25

Client: Department of Agriculture, Food and the Marine

Depth:
0.50m BGL

Logged
AO

Water Strike & Backfill	Samples & In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description
	Depth (m)	Type	Results				
	0.00 - 0.50 0.00 - 0.50	B ES		0.50			Very soft, black, slightly gravelly slightly sandy organic SILT with organic odour.
							End of Pit at 0.500m
							06-07-2021F 21A/03681 FINGAL CO CO PL DEPT

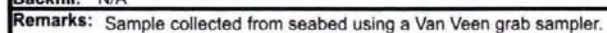
Stability: N/A

Plant: 25t long reach excavator.

Backfill: N/A

Groundwater: N/A

Remarks: Sample collected from seabed using a long reach excavator.





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Trial Pit No
SP02
Sheet 1 of 1

Project Name: Howth Fishing Harbour Centre Dredging

Project No.
P19188

Co-ords: 728360E - 739407N
Level:

Date
12/12/2019

Location: Howth Harbour, Co. Dublin

Dimensions (m):

Scale
1:25

Client: Department of Agriculture, Food and the Marine

Depth:
0.10m BGL

Logged
DMC

Water Strike & Backfill	Samples & In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	
	Depth (m)	Type	Results					
	0.00 - 0.10	ES		0.10		× × × × × × × × × × × ×	Soft, black, organic SILT. End of Pit at 0.100m	1
								2
								3
								4
								5

Stability: N/A

Plant: Van Veen.

Backfill: N/A

Groundwater: N/A

Remarks: Sample collected from seabed using a Van Veen grab sampler.

 Priority Geotechnical Ltd. Tel: 021 4631600 Fax: 021 4638690 www.prioritygeotechnical.ie					Drilled By PC		Borehole No. SP03		
					Logged By AO		Sheet 1 of 1		
Project Name: Howth Fishing Harbour Centre Dredging			Project No. P19188		Co-ords: 728343E - 739497N			Hole Type CP	
Location: Howth Harbour, Co. Dublin					Level: -6.28 m OD			Scale 1:50	
Client: Department of Agriculture, Food and the Marine					Date: 12/12/2019 - 12/12/2019				

Well Backfill	Water Strike (m bgl)	Sample and In Situ Testing			Depth (m bgl)	Level (mOD)	Legend	Stratum Description	
		Depth (m bgl)	Type	Results					
		0.00 - 1.00	B				Black SILT.		
					1.00	-7.28	End of Borehole at 1.000m	1	
								2	
								3	
								4	
								5	
								6	
								7	
								8	
								9	

Groundwater:					Hole Information:			Chiselling Details:			
Struck (m bgl)	Rose to (m bgl)	After (mins)	Sealed (m bgl)	Comment	Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)	Top (m)	Base (m)	Duration (hh:mm)	Tool
				N/A	1.00	200	200				
					Equipment: Dando 2000						

Remarks: Borehole terminated at 1.00m below seabed level.	Shift Data:		
	GW (m bgl)	Shift	Depth (m bgl)
		12/12/2019 08:00 12/12/2019 18:00	0.00 1.00
			Remarks Start of shift. End of borehole.



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Trial Pit No

SP04

Sheet 1 of 1

Project Name: Howth Fishing Harbour Centre Dredging

Project No.

P19188

Co-ords: 728366E - 739489N

Level:

Date

12/12/2019

Location: Howth Harbour, Co. Dublin

Dimensions (m):

Scale

1:25

Client: Department of Agriculture, Food and the Marine

Depth:
0.10m BGL

Logged
DMC

Water Strike & Backfill	Samples & In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	
	Depth (m)	Type	Results					
	0.00 - 0.10	ES		0.10		× × × × × × 0.00 - 0.10	Soft, black, organic SILT. End of Pit at 0.100m	1
								2
								3
								4
								5

Stability: N/A

Plant: Van Veen.

Backfill: N/A

Groundwater: N/A

Remarks: Sample collected from seabed using a Van Veen grab sampler.

Remarks: Sample collected from seabed using a Van Veen grab sampler.

Project Name: Howth Fishing Harbour Centre Dredging

Project No.
P19188

Co-ords: 728425E - 739601N
Level:

Date
05/12/2019

Location: Howth Harbour, Co. Dublin

Dimensions (m):

Scale
1:25

Client: Department of Agriculture, Food and the Marine

Depth:
0.10m BGL

Logged
AO

[illegible]

Stability:	N/A
Plant:	25t long reach excavator.
Backfill:	N/A

Groundwater:	N/A
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Backfill:	N/A
Remarks:	Sample collected from seabed using a long reach excavator.



						Priority Geotechnical Ltd. Tel: 021 4631600 Fax: 021 4638690 www.prioritygeotechnical.ie						Drilled By PC		Borehole No. SP08		
												Logged By AO		Sheet 1 of 1		
Project Name: Howth Fishing Harbour Centre Dredging							Project No. P19188			Co-ords: 728437E - 739684N					Hole Type CP	
Location: Howth Harbour, Co. Dublin							Level: -5.51 m OD					Scale 1:50				
Client: Department of Agriculture, Food and the Marine							Date: 12/12/2019 - 12/12/2019									
Well Backfill	Water Strike (m bgl)	Sample and In Situ Testing			Depth (m bgl)	Level (mOD)	Legend	Stratum Description								
		Depth (m bgl)	Type	Results												
		0.00 - 1.00	B				x x x x x	Black SILT.								
		1.00 - 2.00	B				x x x x x			1						
					2.00	-7.51	x x x x x	End of Borehole at 2.000m		2						
										3						
										4						
										5						
										6						
										7						
										8						
										9						
Groundwater:					Hole Information:					Chiselling Details:						
Struck (m bgl)	Rose to (m bgl)	After (mins)	Sealed (m bgl)	Comment	Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)	Top (m)	Base (m)	Duration (hh:mm)	Tool					
				N/A	2.00	200	200									
					Equipment:		Dando 2000									
Remarks:							Shift Data:		Shift		Depth (m bgl) Remarks					
Borehole terminated at 2.00m below seabed level.							GW (m bgl)		12/12/2019 08:00		0.00 Start of shift.					
									12/12/2019 18:00		2.00 End of borehole.					

[illegible]

Project Name: Howth Fishing Harbour Centre Dredging

Project No.	P19188
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Co-ords: 728494E - 739751N
Level:

Date
09/12/2019

Location: Howth Harbour, Co. Dublin

Dimensions (m):

Scale
1:25

Client: Department of Agriculture, Food and the Marine

Depth:
0.10m BGL

Logged
AO

[illegible]

Stability:	N/A
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Plant: Van Veen.

Backfill:

Groundwater: N/A

Remarks: Sample collected from seabed using a Van Veen grab sampler.

Remarks: Sample collected from seabed using a Van Veen grab sampler.

Project Name: Howth Fishing Harbour Centre Dredging

Project No.	P19188
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Co-ords: 728548E - 739798N
Level:

Date
11/12/2019

Location: Howth Harbour, Co. Dublin

Dimensions (m):

Scale
1:25

Client: Department of Agriculture, Food and the Marine

Depth:
0.10m BGL

Logged
AO

[illegible]

Stability:	N/A
Plant:	Van Veen.
Backfill:	N/A

Groundwater: N/A

Backfill:	N/A
Remarks:	Sample collected from seabed using a Van Veen grab sampler.



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Drilled By
PC
Logged By
AO

Borehole No.
SP13
Sheet 1 of 1

Project Name: Howth Fishing Harbour Centre Dredging Project No. P19188 Co-ords: 728545E - 739754N Hole Type CP

Location: Howth Harbour, Co. Dublin Level: -5.36 m OD Scale 1:50

Client: Department of Agriculture, Food and the Marine Date: 12/12/2019 - 12/12/2019

Well Backfill	Water Strike (m bgl)	Sample and In Situ Testing			Depth (m bgl)	Level (mOD)	Legend	Stratum Description	
		Depth (m bgl)	Type	Results					
		0.00 - 1.00	B				XXXXXX	Black SILT.	
		1.00 - 2.00	B				XXXXXX		1
					2.00	-7.36	XXXXXX	End of Borehole at 2.000m	2
									3
									4
									5
									6
									7
									8
									9

Groundwater:					Hole Information:			Chiselling Details:			
Struck (m bgl)	Rose to (m bgl)	After (mins)	Sealed (m bgl)	Comment	Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)	Top (m)	Base (m)	Duration (hh:mm)	Tool
				N/A	2.00	200	200				
					Equipment:	Dando 2000					

Remarks:	Shift Data:		Shift		Depth (m bgl)	Remarks
			GW (m bgl)			
Borehole terminated at 2.00m below seabed level.				12/12/2019 08:00	0.00	Start of shift.
				12/12/2019 18:00	2.00	End of borehole.

		Priority Geotechnical Ltd. Tel: 021 4631600 Fax: 021 4638690 www.prioritygeotechnical.ie			Drilled By PC		Borehole No. SP14		
				Logged By AO		Sheet 1 of 1			
Project Name:		Howth Fishing Harbour Centre Dredging		Project No. P19188		Co-ords:		728701E - 739720N	Hole Type CP
Location:		Howth Harbour, Co. Dublin				Level:		-4.52 m OD	Scale 1:50
Client:		Department of Agriculture, Food and the Marine				Date:		12/12/2019 - 12/12/2019	
Well Backfill	Water Strike (m bgl)	Sample and In Situ Testing			Depth (m bgl)	Level (mOD)	Legend	Stratum Description	
		Depth (m bgl)	Type	Results					
		0.00 - 1.00	B				XXXXXX	Black SILT.	1
		1.00 - 2.00	B				XXXXXX		2
					2.00	-6.52		End of Borehole at 2.000m	3
									4
									5
									6
									7
									8
									9
Groundwater:					Hole Information:			Chiselling Details:	
Struck (m bgl)	Rose to (m bgl)	After (mins)	Sealed (m bgl)	Comment	Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)	Top (m)	Base (m)
				N/A	2.00	200	200		
					Equipment:	Dando 2000		Duration (hh:mm)	Tool
Remarks:					Shift Data:		Shift	Depth (m bgl)	Remarks
Borehole terminated at 2.00m below seabed level.					12/12/2019 08:00		0.00	Start of shift.	
					12/12/2019 18:00		2.00	End of borehole.	

Remarks: Sample collected from seabed using a Van Veen grab sampler.

Project Name: Howth Fishing Harbour Centre Dredging

Project No.
P19188

Co-ords: 728578E - 739655N
Level:

Date
12/12/2019

Location: Howth Harbour, Co. Dublin

Dimensions (m):

Scale
1:25

Client: Department of Agriculture, Food and the Marine

Depth:
0.10m BGL

Logged
AO

[illegible]

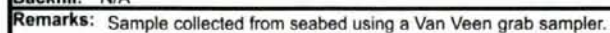
Stability: N/A

Plant: Van Veen.

Backfill: N/A

Groundwater: N/A

Backfill:	N/A
Remarks:	Sample collected from seabed using a Van Veen grab sampler.





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Trial Pit No

SP20

Sheet 1 of 1

Project Name: Howth Fishing Harbour Centre Dredging

Project No.

P19188

Co-ords: 728597E - 739386N

Level:

Date

07/12/2019

Location: Howth Harbour, Co. Dublin

Dimensions (m):



Scale

1:25

Client: Department of Agriculture, Food and the Marine

Depth:

0.10m BGL

Logged

AO

Water Strike & Backfill	Samples & In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	
	Depth (m)	Type	Results					
	0.00 - 0.10	ES		0.10		X, Mo X, X, X X, Mo X, X, X	Soft, black, organic SILT. End of Pit at 0.100m	1
								2
								3
								4
								5

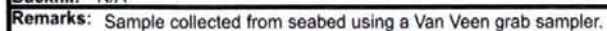
Stability: N/A

Plant: Van Veen.

Backfill: N/A

Groundwater: N/A

Remarks: Sample collected from seabed using a Van Veen grab sampler.



Project Name: Howth Fishing Harbour Centre Dredging

Project No.
P19188

Co-ords: 728783E - 739433N
Level:

Date
05/12/2019

Location: Howth Harbour, Co. Dublin

Dimensions (m):

Scale
1:25

Client: Department of Agriculture, Food and the Marine

Depth:
0.10m BGL

Logged
AO

[illegible]

Stability:	N/A
------------	-----

Plant: 25t long reach excavator.

Backfill: N/A

Groundwater: N/A

Backfill:	N/A
Remarks:	Sample collected from seabed using a long reach excavator.

		Priority Geotechnical Ltd. Tel: 021 4631600 Fax: 021 4638690 www.prioritygeotechnical.ie			Drilled By Logged By AO		Borehole No. SP23 Sheet 1 of 1		
Project Name: Howth Fishing Harbour Centre Dredging				Project No. P19188		Co-ords: 728792E - 739389N		Hole Type CP	
Location: Howth Harbour, Co. Dublin				Level: -0.98 m OD		Scale 1:50			
Client: Department of Agriculture, Food and the Marine				Date: 05/12/2019					

Well Backfill	Water Strike (m bgl)	Sample and In Situ Testing			Depth (m bgl)	Level (mOD)	Legend	Stratum Description	
		Depth (m bgl)	Type	Results					
		1.00	ES		1.00 1.00	-1.98 -1.98	 Very soft, brown black, slightly sandy organic gravelly SILT with high cobble content. Gravel is angular to sub-rounded and of varied lithology. Cobbles are angular to sub-angular and of Limestone lithology.		
							Suspected bedrock. End of Borehole at 1.000m	1	
								2	
								3	
								4	
								5	
								6	
								7	
								8	
								9	

Groundwater:					Hole Information:			Chiselling Details:			
Struck (m bgl)	Rose to (m bgl)	After (mins)	Sealed (m bgl)	Comment	Depth (m bgl)	Hole Dia (mm)	Casing Dia (mm)	Top (m)	Base (m)	Duration (hh:mm)	Tool
				N/A	1.00						
					Equipment:						
					25t long reach excavator.						

Remarks: Sample collected from seabed using a long reach excavator. Seabed lies 4.20m below quayside. Pit terminated at 1.00m below seabed due to refusal on suspected bedrock.					Shift Data:			
					GW (m bgl)	Shift	Depth (m bgl)	Remarks

KEY TO SYMBOLS - LABORATORY TEST RESULT

U	Undisturbed Sample	
P	Piston Sample	
TWS	Thin Wall Sample	
B	Bulk Sample - Disturbed	
D	Jar Sample - Disturbed	
W	Water Sample	
pH	Acidity/Alkalinity Index	
SO ₃	% - Total Sulphate Content (acid soluble)	
SO ₃	g/ltr - Water Soluble Sulphate (Water or 2:1 Aqueous Soil Extract)	
+	Calcareous Reaction	
Cl	Chloride Content	
PI	Plasticity Index	
<425	% of material in sample passing 425 micron sieve	
LL	Liquid Limit	
PL	Plastic Limit	
MC	Water Content	
NP	Non Plastic	
Y _b	Bulk Density	
Y _d	Dry Density	
Ps	Particle Density	
U/D	Undrained/Drained Triaxial	
U/C	Unconsolidated/Consolidated Triaxial	
T/M	Single Stage/Multistage Triaxial	
100/38	Sample Diameter (mm)	
REM	Remoulded Triaxial Test Specimen	
TST	Triaxial Suction Test	
V	Vane Test	
DSB	Drained Shear Box	
RSB	Residual Shear Box	
RS	Ring Shear	
σ_3	Cell Pressure	
$\sigma_1 - \sigma_3$	Deviator Stress	
c	Cohesion	
c ₋	Effective Cohesion Intercept	
ϕ	Angle of Shearing Resistance - Degrees	
ϕ_{-}	Effective Angle of Shearing Resistance	
ϵ_f	Strain at Failure	
*	Failed under 1 st Load	
**	Failed under 2 nd Load	
#	Untestable	
##	Excessive Strain	
p _{-o}	Effective Overburden Pressure	
m _v	Coefficient of Volume Decrease	
c _v	Coefficient of Consolidation	
Opt	Optimum	
Nat	Natural	
Std	Standard Compaction - 2.5kg Rammer	(¶ CBR)
Hvy	Heavy Compaction - 4.5kg Rammer	(§ CBR)
Vib	Vibratory Compaction	
CBR	California Bearing Ratio	
Sat m.c.	Saturation Moisture Content	
MCV	Moisture Condition Value	

Key sheet

McCumiskey House, Richview,
Clonskeagh Road, Dublin 14, Ireland,
D14 YR62

Teach Mhic Chumascaigh Dea-
Radharc, Bóthar Cluain Sceach, Baile
Átha Cliath 14, Éire, D14 YR62

T: +353 1 268 0100
F: +353 1 268 0199
E: info@epa.ie
W: www.epa.ie

LoCall: 1890 33 55 99

Laboratory Test Report

Report Date: 18th March 2020

Samples Tested on Behalf of: Priority Geotechnical Ltd

Laboratory Analysis: High Resolution Gamma Spectrometry with appropriate density correction

Sample Type: Marine Sediment

Date of Receipt: 19th December 2019

Date of Analysis: 20th and 25th February 2020

Results:

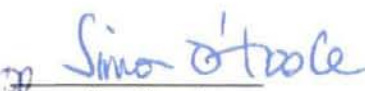
ORM Reference	Client Reference	Coordinates	Nuclide	Activity Concentration (Bq/kg, dry) ¹
ES1901046	SP06	Not Provided	K-40 I-131 Cs-134 Cs-137 Am-241 Ra-226 Ra-228	614.1 ± 8.8 nd nd 78.51 ± 1.1 14.70 ± 0.3 21.30 ± 0.8 32.25 ± 1.3
ES1901047	SP12	Not Provided	K-40 I-131 Cs-134 Cs-137 Am-241 Ra-226 Ra-228	482.3 ± 6.7 nd nd 13.00 ± 0.2 5.5 ± 0.2 19.34 ± 0.6 21.89 ± 0.8

Note:

- (1) Quoted uncertainties are ±1 SD counting statistics
- (2) nd = not detected

The Office of Radiation Protection and Environmental Monitoring received two grab sediment samples from Priority Geotechnical Ltd. These samples were taken at Howth Co Dublin on 6th December 2019 in support of application for a Capital/Maintenance Dredging Permit. The samples were prepared by placing an aliquot in a well-defined counting geometry and then measured on a high-resolution gamma spectrometer. Appropriate density corrections were applied to the resultant spectra to take account of the differences in sample density. Dry to wet weight ratio was determined for the sample. Results are quoted on a dry weight basis.

The results indicate that dumping of these materials at sea will not result in a radiological hazard.


Lorraine Currihan
Laboratory Manager

Notes:

- This report relates only to the samples tested.
- This report shall not be reproduced except in full, without the approval of the Institute
- The following scientific officers may sign test reports on behalf of the lab manager: Mr Simon O'Toole, Dr Chris Burbidge.
- Where applicable, the number following the symbol $\pm$ is the combined standard uncertainty and not a confidence interval.

Certificate of Analysis



Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR00525
Issue Version	1
Customer	Priority Geotechnical, Unit 12, Owenacurra Business Park, Midleton, Co. Cork
Customer Reference	Howth Dredging
Date Sampled	05-12/12/19
Date Received	20-Dec-19
Date Reported	24-Jan-20
Condition of samples	Frozen Satisfactory

A handwritten signature in blue ink, appearing to read 'Marya Hubbard'.

Authorised by: Marya Hubbard

Position: Laboratory Manager

Any additional opinions or interpretations found in this report, are outside the scope of UKAS accreditation.

This report shall not be reproduced, except in full, without the written permission of the laboratory.
Results contained herewith only apply to the samples tested.

Certificate of Analysis



Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwell House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID: MAR00525
Issue Version: 1
Customer Reference: Howth Dredging

		Units	%	%	%	%
		Method No	ASC/SOP/303	SUB_01*	SUB_01*	SUB_01*
		Limit of Detection	0.2	N/A	N/A	N/A
		Accreditation	UKAS	N	N	N
Client Reference:	SOCOTEC Ref:	Matrix	Total Moisture @ 120°C	Gravel (>2mm)	Sand (63-2000 µm)	Silt (<63 µm)
SP01	MAR00525.001	Sediment	69.9	1.1	9.5	89.5
SP02	MAR00525.002	Sediment	62.5	0.0	11.9	88.1
SP03	MAR00525.003	Sediment	49.4	11.0	14.2	74.8
SP04	MAR00525.004	Sediment	64.6	1.7	11.0	87.3
SP05	MAR00525.005	Sediment	63.1	0.0	8.5	91.5
SP06	MAR00525.006	Sediment	57.8	0.0	10.9	89.1
SP07	MAR00525.007	Sediment	47.5	23.5	17.9	58.5
SP08	MAR00525.008	Sediment	55.6	0.0	12.2	87.8
SP09	MAR00525.009	Sediment	52.2	0.0	11.5	88.5
SP10	MAR00525.010	Sediment	57.3	0.0	11.0	89.0
SP11	MAR00525.011	Sediment	30.3	0.0	48.9	51.1
SP12	MAR00525.012	Sediment	51.1	0.0	15.5	84.5
SP13	MAR00525.013	Sediment	49.8	0.0	15.1	84.9
SP14	MAR00525.014	Sediment	50.3	0.0	11.1	88.9
SP15	MAR00525.015	Sediment	62.8	0.0	9.7	90.3
SP16	MAR00525.016	Sediment	63.0	0.0	22.9	77.1
SP17	MAR00525.017	Sediment	56.4	0.0	12.2	87.8
SP18	MAR00525.018	Sediment	60.6	0.0	8.8	91.2
SP19	MAR00525.019	Sediment	59.4	0.0	7.1	92.9
SP20	MAR00525.020	Sediment	66.5	0.0	7.1	92.9
SP21	MAR00525.021	Sediment	67.9	0.0	5.5	94.5
SP22	MAR00525.022	Sediment	18.4	0.0	35.7	64.3
SP23	MAR00525.023	Sediment	40.8	47.8	13.1	39.0

* See Report Notes

Certificate of Analysis



Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID MAR00525

Issue Version 1

Customer Reference Howth Dredging

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	SOCOTEC Env Chem*	SOCOTEC Env Chem*	SOCOTEC Env Chem*	SOCOTEC Env Chem*	SOCOTEC Env Chem*	SOCOTEC Env Chem*	SOCOTEC Env Chem*
		Limit of Detection	1	0.1	0.5	2	2	0.5	3
		Accreditation	UKAS	N	N	UKAS	UKAS	N	N
Client Reference:	SOCOTEC Ref:	Matrix	Arsenic (HF-MS)	Cadmium (HF-MS)	Chromium (HF-MS)	Copper (HF-MS)	Lead (HF-MS)	Nickel (HF-MS)	Zinc (HF-MS)
SP01	MAR00525.001	Sediment	31.1	1.1	81.0	110	46.2	34.7	256
SP02	MAR00525.002	Sediment	33.8	1.0	79.0	47.1	54.8	34.5	196
SP03	MAR00525.003	Sediment	30.4	1.0	58.2	33.9	42.8	38.1	145
SP04	MAR00525.004	Sediment	28.1	1.1	72.1	75.8	46.7	31.3	228
SP05	MAR00525.005	Sediment	29.3	0.9	76.3	61.2	44.8	32.4	255
SP06	MAR00525.006	Sediment	26.7	1.2	80.0	45.6	59.2	33.4	244
SP07	MAR00525.007	Sediment	30.3	0.8	118	93.4	101	45.5	333
SP08	MAR00525.008	Sediment	32.4	1.3	72.3	38.7	67.7	41.8	188
SP09	MAR00525.009	Sediment	38.1	1.0	72.4	54.8	51.4	36.0	377
SP10	MAR00525.010	Sediment	37.1	0.8	77.1	34.1	34.5	39.3	148
SP11	MAR00525.011	Sediment	38.0	0.6	34.7	15.1	24.1	15.9	63.0
SP12	MAR00525.012	Sediment	43.2	0.9	72.2	44.7	46.7	30.4	153
SP13	MAR00525.013	Sediment	45.9	1.1	76.2	33.7	61.6	38.8	165
SP14	MAR00525.014	Sediment	40.9	1.0	75.2	32.4	50.6	33.2	171
SP15	MAR00525.015	Sediment	40.4	1.0	69.4	28.2	38.0	31.5	125
SP16	MAR00525.016	Sediment	37.1	0.8	62.1	21.8	34.3	27.6	110
SP17	MAR00525.017	Sediment	38.2	0.8	69.5	25.4	36.7	32.5	137
SP18	MAR00525.018	Sediment	36.7	0.7	75.7	29.9	39.1	32.0	133
SP19	MAR00525.019	Sediment	37.1	0.8	72.7	26.6	38.2	33.1	123
Certified Reference Material 2702 (% Recovery)			122	99~	98~	107	102	95~	97~
QC Blank			<1	<0.1	<0.5	<2	<2	<0.5	<3

* See Report Notes

~ Indicates result is for an in-house Reference Material as no Certified Reference Materials are available.

Certificate of Analysis



Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID MAR00525
Issue Version 1
Customer Reference Howth Dredging

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	%M/M	%
Method No		SOCOTEC Env Chem*	SOCOTEC Env Chem*	SOCOTEC Env Chem*	SOCOTEC Env Chem*	SOCOTEC Env Chem*	SOCOTEC Env Chem*	SOCOTEC Env Chem*
Limit of Detection		10	0.5	1	0.01	0.02	0.12	
Accreditation		UKAS	N	UKAS	N	UKAS	N	
Client Reference:	SOCOTEC Ref:	Matrix	Aluminium(HF-OES)	Lithium(HF-OES)	Manganese(HF-OES)	Mercury (Tot.MS)	Total Organic Carbon	Carbonate %
SP01	MAR00525.001	Sediment	52300	46.2	434	0.06	2.40	10.6
SP02	MAR00525.002	Sediment	48900	42.8	466	0.08	1.88	9.6
SP03	MAR00525.003	Sediment	44000	36.7	640	0.09	1.41	12.0
SP04	MAR00525.004	Sediment	49000	43.1	431	0.06	2.02	11.0
SP05	MAR00525.005	Sediment	50500	41.9	478	0.07	1.85	10.1
SP06	MAR00525.006	Sediment	49000	43.1	372	0.10	1.89	6.7
SP07	MAR00525.007	Sediment	8400	7.4	109	0.06	1.90	20.6
SP08	MAR00525.008	Sediment	12500	10.0	142	0.12	1.58	11.5
SP09	MAR00525.009	Sediment	11600	10.2	118	0.07	1.62	10.6
SP10	MAR00525.010	Sediment	11700	9.4	113	0.05	1.27	10.3
SP11	MAR00525.011	Sediment	6200	5.2	76	0.03	0.83	8.4
SP12	MAR00525.012	Sediment	11500	9.7	102	0.08	1.61	9.6
SP13	MAR00525.013	Sediment	12300	10.0	120	0.13	1.74	10.6
SP14	MAR00525.014	Sediment	12400	10.9	106	0.09	1.72	9.6
SP15	MAR00525.015	Sediment	12100	10.3	114	0.06	1.58	9.8
SP16	MAR00525.016	Sediment	10500	8.6	110	0.05	1.72	10.1
SP17	MAR00525.017	Sediment	11600	9.9	122	0.06	1.56	10.8
SP18	MAR00525.018	Sediment	12300	10.6	105	0.05	1.58	9.1
SP19	MAR00525.019	Sediment	11400	9.7	109	0.05	1.66	9.6
Certified Reference Material 2702 (% Recovery)			102	107	100	100~	93~	98~
QC Blank			<10	<0.5	<1	<0.01	<0.02	<0.12

* See Report Notes
~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are available.

Certificate of Analysis



Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID MAR00525
 Issue Version 1
 Customer Reference Howth Dredging

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	SOCOTEC Env Chem*	SOCOTEC Env Chem*	SOCOTEC Env Chem*	SOCOTEC Env Chem*	SOCOTEC Env Chem*	SOCOTEC Env Chem*	SOCOTEC Env Chem*
		Limit of Detection	1	0.1	0.5	2	2	0.5	3
		Accreditation	UKAS	N	N	UKAS	UKAS	N	N
Client Reference:	SOCOTEC Ref:	Matrix	Arsenic (HF-MS)	Cadmium (HF-MS)	Chromium (HF-MS)	Copper (HF-MS)	Lead (HF-MS)	Nickel (HF-MS)	Zinc (HF-MS)
SP20	MAR00525.020	Sediment	11.2	0.5	62.0	44.2	36.9	27.7	126
SP21	MAR00525.021	Sediment	18.5	0.6	65.1	42.2	38.7	29.3	137
SP22	MAR00525.022	Sediment	51.8	0.4	81.8	11.5	13.1	30.0	17.1
SP23	MAR00525.023	Sediment	40.0	0.7	53.9	320	392	25.7	249
Certified Reference Material 2702 (% Recovery)			86	101~	98~	105	105	97~	99~
QC Blank			<1	<0.1	<0.5	<2	<2	<0.5	<3

* See Report Notes
 ~ Indicates result is for an In-house Reference Material as
 no Certified Reference Materials are available.

Certificate of Analysis



Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID MAR00525
Issue Version 1
Customer Reference Howth Dredging

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	%M/M	%
		Method No	SOCOTEC Env Chem*	SOCOTEC Env Chem*	SOCOTEC Env Chem*	SOCOTEC Env Chem*	SOCOTEC Env Chem*	SOCOTEC Env Chem*
		Limit of Detection	10	0.5	1	0.01	0.02	0.12
		Accreditation	UKAS	N	UKAS	N	UKAS	N
Client Reference:	SOCOTEC Ref:	Matrix	Aluminium(HF-OES)	Lithium(HF-OES)	Manganese(HF-OES)	Mercury (Tot.MS)	Total Organic Carbon	Carbonate %
SP20	MAR00525.020	Sediment	53600	47.7	488	0.07	1.88	9.8
SP21	MAR00525.021	Sediment	56000	49.2	489	0.08	1.85	9.6
SP22	MAR00525.022	Sediment	51600	50.3	1420	0.06	1.11	12.0
SP23	MAR00525.023	Sediment	36000	33.0	516	0.34	1.41	11.0
Certified Reference Material 2702 (% Recovery)			112	108	101	100~	102~	100~
QC Blank			<10	<0.5	<1	<0.01	<0.02	<0.12

* See Report Notes
~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are available.

Certificate of Analysis



Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID: MAR00525
 Issue Version: 1
 Customer Reference: Howth Dredging

		Units	µg/Kg (Dry Weight)	
		Method No	ASC/SOP/301	
		Limit of Detection	1	1
		Accreditation	N	N
Client Reference:	SOCOTEC Ref:	Matrix	Dibutyltin (DBT)	Tributyltin (TBT)
SP01	MAR00525.001	Sediment	24.7	87.8
SP02	MAR00525.002	Sediment	17.5	84.2
SP03	MAR00525.003	Sediment	<5	42.8
SP04	MAR00525.004	Sediment	26.7	88.6
SP05	MAR00525.005	Sediment	21.9	86.0
SP06	MAR00525.006	Sediment	248	1030
SP07	MAR00525.007	Sediment	24.3	111
SP08	MAR00525.008	Sediment	636	6480
SP09	MAR00525.009	Sediment	16.4	72.5
SP10	MAR00525.010	Sediment	<5	25.7
Certified Reference Material BCR-646 (% Recovery)			86	74
QC Blank			<1	<1

* See Report Notes

Certificate of Analysis



Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID MAR00525
Issue Version 1
Customer Reference Howth Dredging

		Units	ug/Kg (Dry Weight)	
		Method No	ASC/SOP/301	
		Limit of Detection	1	1
		Accreditation	N	N
Client Reference:	SOCOTEC Ref:	Matrix	Dibutyltin (DBT)	Tributyltin (TBT)
SP11	MAR00525.011	Sediment	<5	<5
SP12	MAR00525.012	Sediment	88.0	669
SP13	MAR00525.013	Sediment	26.9	91.4
SP14	MAR00525.014	Sediment	12.1	43.3
SP15	MAR00525.015	Sediment	<5	<5
SP16	MAR00525.016	Sediment	<5	<5
SP17	MAR00525.017	Sediment	<5	<5
SP18	MAR00525.018	Sediment	<5	<5
SP19	MAR00525.019	Sediment	<5	<5
SP20	MAR00525.020	Sediment	<5	<5
SP21	MAR00525.021	Sediment	<5	<5
SP22	MAR00525.022	Sediment	8.90	16.9
SP23	MAR00525.023	Sediment	459	1470
Certified Reference Material BCR-646 (% Recovery)			97	69
QC Blank			<1	<1

* See Report Notes

Certificate of Analysis



Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID: MAR00525
Issue Version: 1
Customer Reference: Howth Dredging

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS
Client Reference:	SOCOTEC Ref:	Matrix	ACENAPTH	ACENAPHY	ANTHRACN	BAA	BAP	BBF
SP01	MAR00525.001	Sediment	11.3	18.0	25.6	53.5	72.5	113
SP02	MAR00525.002	Sediment	19.9	10.6	63.5	129	162	135
SP03	MAR00525.003	Sediment	10.2	15.4	42.9	72.2	103	81.3
SP04	MAR00525.004	Sediment	609	18.7	158	718	667	675
SP05	MAR00525.005	Sediment	3.82	7.51	14.6	38.9	53.0	82.3
SP06	MAR00525.006	Sediment	312	18.3	664	862	925	721
SP07	MAR00525.007	Sediment	6.74	8.97	20.1	34.4	54.1	92.5
SP08	MAR00525.008	Sediment	18.0	20.1	51.6	122	185	217
SP09	MAR00525.009	Sediment	129	9.33	50.9	122	124	135
SP10	MAR00525.010	Sediment	7.30	6.91	10.5	35.8	53.3	98.7
SP11	MAR00525.011	Sediment	2.20	4.18	12.6	25.7	36.8	39.2
SP12	MAR00525.012	Sediment	8.92	8.75	32.0	62.0	104	118
SP13	MAR00525.013	Sediment	15.6	24.8	64.6	172	237	292
SP14	MAR00525.014	Sediment	6.92	18.9	41.5	111	153	157
SP15	MAR00525.015	Sediment	4.54	7.07	24.2	51.1	67.8	88.4
SP16	MAR00525.016	Sediment	4.24	7.76	17.1	45.4	59.7	93.1
SP17	MAR00525.017	Sediment	10.3	7.00	36.8	124	149	149
SP18	MAR00525.018	Sediment	4.67	7.87	21.2	48.0	61.3	71.8
SP19	MAR00525.019	Sediment	6.08	8.34	16.8	38.1	52.7	80.6
SP20	MAR00525.020	Sediment	5.08	8.76	21.9	55.6	81.1	92.7
Certified Reference Material CRM 1941b (% Recovery)			100	97	99	89	100	97
QC Blank			<1	<1	<1	<1	<1	<1

For full analyte name see method summaries

~ Indicates result is for an in-house Reference Material as no Certified Reference Materials are available

As the method uses surrogate standards to correct for losses, the RM results are reported as percentage trueness, not recovery.

Certificate of Analysis



Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwell House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID: MAR00525
Issue Version: 1
Customer Reference: Howth Dredging

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS
Client Reference:	SOCOTEC Ref:	Matrix	BENZGHIP	BKF	CHRYSENE	DBENZAH	FLUORANT	FLUORENE
SP01	MAR00525.001	Sediment	106	56.9	101	15.0	104	39.2
SP02	MAR00525.002	Sediment	137	79.0	175	27.8	315	28.5
SP03	MAR00525.003	Sediment	93.3	81.2	111	19.1	135	23.8
SP04	MAR00525.004	Sediment	416	424	640	97.4	1430	244
SP05	MAR00525.005	Sediment	74.2	46.5	69.5	10.3	72.5	17.4
SP06	MAR00525.006	Sediment	540	504	928	103	2090	355
SP07	MAR00525.007	Sediment	68.7	38.6	76.6	11.2	65.6	40.4
SP08	MAR00525.008	Sediment	172	135	182	31.7	207	37.6
SP09	MAR00525.009	Sediment	101	98	169	21.0	373	45.2
SP10	MAR00525.010	Sediment	84.9	51.9	65.7	11.0	77.7	18.0
SP11	MAR00525.011	Sediment	36.0	26.1	39.4	7.97	45.9	10.3
SP12	MAR00525.012	Sediment	99.0	80.2	103	21.3	118	22.5
SP13	MAR00525.013	Sediment	229	148	253	49.8	307	35.2
SP14	MAR00525.014	Sediment	138	87.8	131	28.6	216	28.6
SP15	MAR00525.015	Sediment	88.5	62.6	94.9	15.3	96.1	17.3
SP16	MAR00525.016	Sediment	81.1	56.8	71.3	12.3	79.7	16.0
SP17	MAR00525.017	Sediment	125	103	162	30.0	244	20.2
SP18	MAR00525.018	Sediment	65.5	40.2	70.6	12.2	97.9	16.9
SP19	MAR00525.019	Sediment	75.6	36.2	66.4	12.3	74.9	20.7
SP20	MAR00525.020	Sediment	101	69.0	94.7	16.2	112	22.8
Certified Reference Material CRM 1941b (% Recovery)			100	91	99	92	97	97
QC Blank			<1	<1	<1	<1	<1	<1

For full analyte name see method summaries

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As the method uses surrogate standards to correct for losses, the RM results are reported as percentage trueness, not recovery.

Certificate of Analysis



Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID: MAR00525
Issue Version: 1
Customer Reference: Howth Dredging

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/306
		Limit of Detection	1	1	1	1	100
		Accreditation	UKAS	UKAS	UKAS	UKAS	N
Client Reference:	SOCOTEC Ref:	Matrix	INDPYR	NAPTH	PHENANT	PYRENE	THC
SP01	MAR00525.001	Sediment	76.4	48.9	85.1	187	2940000
SP02	MAR00525.002	Sediment	126	35.4	73.0	320	1260000
SP03	MAR00525.003	Sediment	88.1	48.5	87.6	165	527000
SP04	MAR00525.004	Sediment	438	50.5	948	1230	1700000
SP05	MAR00525.005	Sediment	68.6	31.3	56.0	114	1140000
SP06	MAR00525.006	Sediment	614	170	1960	1850	2890000
SP07	MAR00525.007	Sediment	69.9	45.8	78.0	166	1330000
SP08	MAR00525.008	Sediment	176	63.1	119	295	1250000
SP09	MAR00525.009	Sediment	106	44.4	260	340	1120000
SP10	MAR00525.010	Sediment	79.8	36.4	62.8	111	937000
SP11	MAR00525.011	Sediment	35.2	30.4	41.0	46.8	103000
SP12	MAR00525.012	Sediment	99.0	41.6	118	157	601000
SP13	MAR00525.013	Sediment	247	74.3	158	323	770000
SP14	MAR00525.014	Sediment	141	48.1	128	212	500000
SP15	MAR00525.015	Sediment	83.0	35.5	75.5	97.0	356000
SP16	MAR00525.016	Sediment	73.6	38.8	67.4	84.6	297000
SP17	MAR00525.017	Sediment	135	38.7	143	204	221000
SP18	MAR00525.018	Sediment	70.8	31.6	70.5	91.0	235000
SP19	MAR00525.019	Sediment	73.0	35.7	61.7	77.1	282000
SP20	MAR00525.020	Sediment	95.5	47.9	84.0	108	385000
Certified Reference Material CRM 1941b (% Recovery)			91	103	99	97	108~
QC Blank			<1	<1	<1	<1	<100

For full analyte name see method summaries

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As the method uses surrogate standards to correct for losses, the RM results are reported as percentage trueness, not recovery.

Certificate of Analysis



Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID: MAR00525
 Issue Version: 1
 Customer Reference: Howth Dredging

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS
Client Reference:	SOCOTEC Ref:	Matrix	ACENAPTH	ACENAPHY	ANTHRACN	BAA	BAP	BBF
SP21	MAR00525.021	Sediment	5.80	7.39	21.9	52.7	79.2	104
SP22	MAR00525.022	Sediment	46.7	6.79	32.1	19.6	15.7	14.8
SP23	MAR00525.023	Sediment	107	57.6	353	851	836	792
Certified Reference Material CRM 1941b (% Recovery)			110	106	100	91	103	97
QC Blank			<1	<1	<1	<1	<1	<1

For full analyte name see method summaries

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Certificate of Analysis



Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID MAR00525
 Issue Version 1
 Customer Reference Howth Dredging

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS	UKAS	UKAS	UKAS	UKAS	UKAS
Client Reference:	SOCOTEC Ref:	Matrix	BENZGHIP	BKF	CHRYSENE	DBENZAH	FLUORANT	FLUORENE
SP21	MAR00525.021	Sediment	97.1	58.8	84.6	18.6	98.2	25.6
SP22	MAR00525.022	Sediment	11.6	17.3	28.1	1.69	48.1	460
SP23	MAR00525.023	Sediment	475	484	895	123	1470	186
Certified Reference Material CRM 1941b (% Recovery)			102	99	100	96	97	107
QC Blank			<1	<1	<1	<1	<1	<1

For full analyte name see method summaries

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Certificate of Analysis



Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID MAR00525
Issue Version 1
Customer Reference Howth Dredging

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/306
		Limit of Detection	1	1	1	1	100
		Accreditation	UKAS	UKAS	UKAS	UKAS	N
Client Reference:	SOCOTEC Ref:	Matrix	INDPYR	NAPTH	PHENANT	PYRENE	THC
SP21	MAR00525.021	Sediment	88.0	47.9	82.2	97.8	321000
SP22	MAR00525.022	Sediment	4.41	429	720	85.0	12200
SP23	MAR00525.023	Sediment	537	176	1040	1330	496000
Certified Reference Material CRM 1941b (% Recovery)			93	112	97	98	105~
QC Blank			<1	<1	<1	<1	<100

For full analyte name see method summaries

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Certificate of Analysis



Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID MAR00525
 Issue Version 1
 Customer Reference Howth Dredging

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.08	0.08	0.08	0.08	0.08	0.08
		Accreditation	N	N	N	N	N	N
Client Reference:	SOCOTEC Ref:	Matrix	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153
SP01	MAR00525.001	Sediment	0.41	0.39	0.38	0.66	0.74	0.61
SP02	MAR00525.002	Sediment	0.64	0.54	0.38	0.61	0.71	0.66
SP03	MAR00525.003	Sediment	0.67	0.74	0.90	0.83	1.85	1.70
SP04	MAR00525.004	Sediment	0.46	0.46	0.46	0.64	1.40	1.23
SP05	MAR00525.005	Sediment	0.45	0.44	0.24	0.46	0.54	0.44
SP06	MAR00525.006	Sediment	0.73	0.71	0.77	1.01	1.46	1.28
SP07	MAR00525.007	Sediment	0.47	0.94	1.09	1.20	1.58	1.40
SP08	MAR00525.008	Sediment	0.82	2.26	0.96	0.89	1.43	1.18
SP09	MAR00525.009	Sediment	0.44	0.39	0.27	0.51	0.50	0.48
SP10	MAR00525.010	Sediment	0.35	0.31	0.18	0.28	0.35	0.35
Certified Reference Material SRM 1941b (% Recovery)			58	101	83	89	127	87
QC Blank			<0.08	<0.08	<0.08	<0.08	<0.08	<0.08

For full analyte name see method summaries

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Certificate of Analysis



Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID MAR00525
Issue Version 1
Customer Reference Howth Dredging

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.08	0.1	0.1	0.1	0.1	0.1	0.1
		Accreditation	N	N	N	N	N	N	N
Client Reference:	SOCOTEC Ref:	Matrix	PCB180	AHCH	BHCH	GHCH	DIELDRIN	HCB	DDE
SP01	MAR00525.001	Sediment	0.25	<0.1	<0.1	<0.1	0.45	0.12	0.41
SP02	MAR00525.002	Sediment	0.27	<0.1	<0.1	0.10	0.21	0.12	0.53
SP03	MAR00525.003	Sediment	0.90	<0.1	<0.1	<0.1	0.28	0.11	0.77
SP04	MAR00525.004	Sediment	0.82	0.13	0.14	0.23	0.32	0.22	0.39
SP05	MAR00525.005	Sediment	0.19	<0.1	<0.1	<0.1	<0.1	0.13	0.20
SP06	MAR00525.006	Sediment	0.72	<0.1	<0.1	0.41	0.35	0.13	0.94
SP07	MAR00525.007	Sediment	0.62	<0.1	<0.1	<0.1	0.26	0.11	0.30
SP08	MAR00525.008	Sediment	0.48	<0.1	<0.1	<0.1	0.34	<0.1	1.12
SP09	MAR00525.009	Sediment	0.17	<0.1	<0.1	<0.1	<0.1	0.12	0.13
SP10	MAR00525.010	Sediment	0.14	<0.1	<0.1	<0.1	<0.1	0.86	<0.1
Certified Reference Material SRM 1941b (% Recovery)			81	89~	123~	116~	93~	132	66
QC Blank			<0.08	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

For full analyte name see method summaries

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Certificate of Analysis



Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID MAR00525
 Issue Version 1
 Customer Reference Howth Dredging

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.1	0.1
		Accreditation	N	N
Client Reference:	SOCOTEC Ref:	Matrix	DDT	DDD
SP01	MAR00525.001	Sediment	<0.1	0.35
SP02	MAR00525.002	Sediment	0.20	0.63
SP03	MAR00525.003	Sediment	<0.1	0.65
SP04	MAR00525.004	Sediment	<0.1	0.49
SP05	MAR00525.005	Sediment	<0.1	0.26
SP06	MAR00525.006	Sediment	<0.1	0.97
SP07	MAR00525.007	Sediment	<0.1	0.37
SP08	MAR00525.008	Sediment	<0.1	1.06
SP09	MAR00525.009	Sediment	<0.1	0.39
SP10	MAR00525.010	Sediment	0.15	0.22
Certified Reference Material SRM 1941b (% Recovery)			94	136~
QC Blank			<0.1	<0.1

For full analyte name see method summaries

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Certificate of Analysis



Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID: MAR00525
Issue Version: 1
Customer Reference: Howth Dredging

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.08	0.08	0.08	0.08	0.08	0.08
		Accreditation	N	N	N	N	N	N
Client Reference:	SOCOTEC Ref:	Matrix	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153
SP11	MAR00525.011	Sediment	0.17	0.16	<0.08	<0.08	0.12	0.11
SP12	MAR00525.012	Sediment	0.49	0.43	0.29	0.40	0.58	0.53
SP13	MAR00525.013	Sediment	0.91	0.85	0.57	0.61	0.79	0.86
SP14	MAR00525.014	Sediment	0.34	0.29	0.18	0.29	0.35	0.30
SP15	MAR00525.015	Sediment	0.32	0.22	0.14	0.24	0.25	0.25
SP16	MAR00525.016	Sediment	0.27	0.19	0.14	0.17	0.27	0.20
SP17	MAR00525.017	Sediment	0.39	0.34	0.15	0.20	0.30	0.17
SP18	MAR00525.018	Sediment	0.40	0.40	0.20	0.30	0.32	0.28
SP19	MAR00525.019	Sediment	0.44	0.39	0.20	0.28	0.34	0.28
SP20	MAR00525.020	Sediment	0.50	0.43	0.26	0.44	0.48	0.35
SP21	MAR00525.021	Sediment	0.47	0.39	0.26	0.33	0.34	0.36
SP22	MAR00525.022	Sediment	1.37	1.63	0.34	0.09	0.13	0.10
SP23	MAR00525.023	Sediment	1.43	5.20	6.30	6.67	9.27	7.94
Certified Reference Material SRM 1941b (% Recovery)			60	106	95	90	122	88
QC Blank			<0.08	<0.08	<0.08	<0.08	<0.08	<0.08

For full analyte name see method summaries

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Certificate of Analysis



Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID: MAR00525
Issue Version: 1
Customer Reference: Howth Dredging

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.08	0.1	0.1	0.1	0.1	0.1	0.1
		Accreditation	N	N	N	N	N	N	N
Client Reference:	SOCOTEC Ref:	Matrix	PCB180	AHCH	BHCH	GHCH	DIELDRIN	HCB	DDE
SP11	MAR00525.011	Sediment	<0.08	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
SP12	MAR00525.012	Sediment	0.37	<0.1	<0.1	<0.1	<0.1	0.10	0.53
SP13	MAR00525.013	Sediment	0.37	<0.1	<0.1	<0.1	0.17	0.13	1.32
SP14	MAR00525.014	Sediment	0.14	<0.1	<0.1	<0.1	0.13	<0.1	0.29
SP15	MAR00525.015	Sediment	0.11	<0.1	<0.1	<0.1	0.10	<0.1	0.25
SP16	MAR00525.016	Sediment	0.08	<0.1	<0.1	<0.1	<0.1	<0.1	0.17
SP17	MAR00525.017	Sediment	<0.08	<0.1	<0.1	<0.1	<0.1	<0.1	0.22
SP18	MAR00525.018	Sediment	0.09	<0.1	<0.1	<0.1	<0.1	<0.1	0.13
SP19	MAR00525.019	Sediment	0.13	<0.1	<0.1	<0.1	<0.1	0.12	0.20
SP20	MAR00525.020	Sediment	0.13	<0.1	<0.1	<0.1	<0.1	0.13	0.30
SP21	MAR00525.021	Sediment	<0.08	<0.1	<0.1	<0.1	<0.1	<0.1	0.25
SP22	MAR00525.022	Sediment	<0.08	<0.1	<0.1	0.12	<0.1	0.25	<0.1
SP23	MAR00525.023	Sediment	4.42	0.16	<0.1	0.25	3.55	0.28	1.23
Certified Reference Material SRM 1941b (% Recovery)			83	99~	127~	127~	111~	98~	77
QC Blank			<0.08	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

For full analyte name see method summaries

~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are available.

Certificate of Analysis



Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID MAR00525
Issue Version 1
Customer Reference Howth Dredging

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.1	0.1
		Accreditation	N	N
Client Reference:	SOCOTEC Ref:	Matrix	DDT	DDD
SP11	MAR00525.011	Sediment	<0.1	<0.1
SP12	MAR00525.012	Sediment	0.58	1.90
SP13	MAR00525.013	Sediment	0.10	1.63
SP14	MAR00525.014	Sediment	<0.1	0.65
SP15	MAR00525.015	Sediment	<0.1	0.27
SP16	MAR00525.016	Sediment	<0.1	0.24
SP17	MAR00525.017	Sediment	<0.1	0.29
SP18	MAR00525.018	Sediment	0.15	0.19
SP19	MAR00525.019	Sediment	<0.1	0.27
SP20	MAR00525.020	Sediment	<0.1	0.44
SP21	MAR00525.021	Sediment	<0.1	0.49
SP22	MAR00525.022	Sediment	<0.1	<0.1
SP23	MAR00525.023	Sediment	0.57	8.16
Certified Reference Material SRM 1941b (% Recovery)			91	107~
QC Blank			<0.1	<0.1

For full analyte name see method summaries

~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are available.

Certificate of Analysis



Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID MAR00525

Issue Version 1

Customer Reference Howth Dredging

REPORT NOTES

Method Code	Sample ID	The following information should be taken into consideration when using the data contained within this report
SOCOTEC Env Chem*	MAR00525.001-023	Analysis was conducted by an internal SOCOTEC laboratory. UKAS accredited analysis by this laboratory is under UKAS number 1252.
SUB_01*	MAR00525.001-023	Analysis was conducted by an approved subcontracted laboratory.
ASC/SOP/301	MAR00525.003, .010, .011, .015-021.	The matrix of this sample has been found to interfere with the result for this test. The sample has therefore been diluted, but in doing so, the detection limit for this test has been elevated.
ASC/SOP/303/304	MAR00525.001-023	Chrysene is known to coelute with Triphenylene and these peaks can not be resolved. It is believed Triphenylene is present in these samples therefore it is suggested that the Chrysene results should be taken as a Chrysene (inc. Triphenylene). This should be taken into consideration when utilising the data.

DEVIATING SAMPLE STATEMENT

Deviation Code	Deviation Definition	Sample ID	Deviation Details. The following information should be taken into consideration when using the data contained within this report
D1	Holding Time Exceeded	N/A	N/A
D2	Handling Time Exceeded	N/A	N/A
D3	Sample Contaminated through Damaged Packaging	N/A	N/A
D4	Sample Contaminated through Sampling	N/A	N/A
D5	Inappropriate Container/Packaging	N/A	N/A
D6	Damaged in Transit	N/A	N/A
D7	Insufficient Quantity of Sample	N/A	N/A
D8	Inappropriate Headspace	N/A	N/A
D9	Retained at Incorrect Temperature	N/A	N/A
D10	Lack of Date & Time of Sampling	N/A	N/A
D11	Insufficient Sample Details	N/A	N/A
D12	Sample integrity compromised or not suitable for analysis	N/A	N/A

Certificate of Analysis



Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID: MAR00525
Issue Version: 1
Customer Reference: Howth Dredging

Method	Sample and Fraction Size	Method Summary
Total Solids	Wet Sediment	Calculation (100%-Moisture Content) Moisture content determined by drying a portion of the sample at 105°C to constant weight.
Metals	Air dried and ground	HF/Boric extraction followed by ICP analysis.
Total Organic Carbon (TOC)	Air dried and ground	Carbonate removal and sulphurous acid/combustion at 1600°C/NDIR.
Carbonate %	Air dried and ground	Quantitative digestion with Hydrochloric Acid back titration with 1M Sodium Hydroxide to pH 7
Organotins	Wet Sediment	Solvent extraction and derivatisation followed by GC-MS analysis.
Polyaromatic Hydrocarbons (PAH)	Wet Sediment	Solvent extraction and clean up followed by GC-MS analysis.
Total Hydrocarbon Content (THC)	Wet Sediment	Solvent extraction and clean up followed by GC-FID analysis.
Polychlorinated Biphenyls (PCBs)	Air dried and sieved to <2mm	Solvent extraction and clean up followed by GC-MS-MS analysis.
Organochlorine Pesticides (OCPs)	Air dried and sieved to <2mm	Solvent extraction and clean up followed by GC-MS-MS analysis.

Analyte Definitions					
Analyte Abbreviation	Full Analyte name	Analyte Abbreviation	Full Analyte name	Analyte Abbreviation	Full Analyte name
ACENAPTH	Acenaphthene	C2N	C2-naphthalenes	THC	Total Hydrocarbon Content
ACENAPHY	Acenaphthylene	C3N	C3-naphthalenes	AHCH	alpha-Hexachlorocyclohexane
ANTHRACN	Anthracene	CHRYSENE	Chrysene	BHCH	beta-Hexachlorocyclohexane
BAA	Benzo[a]anthracene	DBENZAH	Diben[ah]anthracene	GHCH	gamma-Hexachlorocyclohexane
BAP	Benzo[a]pyrene	FLUORANT	Fluoranthene	DIELDRIN	Dieldrin
BBF	Benzo[b]fluoranthene	FLUORENE	Fluorene	HCB	Hexachlorobenzene
BEP	Benzo[e]pyrene	INDPYR	Indeno[1,2,3-cd]pyrene	DDE	p,p'-Dichlorodiphenyldichloroethylene
BENZGHIPI	Benzo[ghi]perylene	NAPTH	Naphthalene	DDT	p,p'-Dichlorodiphenyltrichloroethane
BKF	Benzo[k]fluoranthene	PERYLENE	Perylene		
C1N	C1-naphthalenes	PHENANT	Phenanthrene		
C1PHEN	C1-phenanthrene	PYRENE	Pyrene		

06-07-2021F 21A/0368
FINGAL CO CO PL DEPT

Our Ref: EFS/204510 (Ver. 1)

Your Ref:

January 24, 2020



Environmental Chemistry

SOCOTEC UK Limited

Bretby Business Park

Ashby Road

Burton-on-Trent

Staffordshire

DE15 0YZ

Telephone: 01283 554400

Facsimile: 01283 554422

Colette Kelly
Priority Geotechnical Limited
Unit 12
Owenacurra Business Park
Midleton
County Cork
Ireland

For the attention of Colette Kelly

Dear Colette Kelly

Sample Analysis - Howth

Samples from the above site have been analysed in accordance with the schedule supplied.

The sample details and the results of analyses for these samples are given in the appended report.

An invoice for this work will follow under a separate cover.

Where appropriate the samples will be kept until 02/02/20 when they will be discarded. Please call 01283 554463 for an extension of this date.

Please be aware that our policy for the retention of paper based laboratory records and analysis reports is 6 years.

The work was carried out in accordance with SOCOTEC UK Limited (Multi-Sector Services) Standard Terms and Conditions of Contract.

If I can be of any further assistance please do not hesitate to contact me.

Yours sincerely

for SOCOTEC UK Limited

A handwritten signature in black ink, appearing to read 'A Tave', written over a horizontal line.

A Tave

Project Co-ordinator

01283 554463

TEST REPORT



Report No. EFS/204510 (Ver. 1)

Priority Geotechnical Limited
Priority Geotechnical Limited
Unit 12
Owenacurra Business Park
Midleton
County Cork
Ireland

Site: Howth

The 10 samples described in this report were registered for analysis by SOCOTEC UK Limited on 22-Dec-2019. This report supersedes any versions previously issued by the laboratory.

The analysis was completed by: 24-Jan-2020

Tests where the accreditation is set to N or No, and any individual data items marked with a * are not UKAS accredited. Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

The following tables are contained in this report:

Table 1 Main Analysis Results (Pages 2 to 4)
Subcontracted Analysis Reports (Pages 5 to 6)
The accreditation status of subcontracted analysis is displayed on the appended subcontracted analysis reports.
Analytical and Deviating Sample Overview (Page 7)
Table of Method Descriptions (Page 8)
Table of Report Notes (Page 9)
Table of Sample Descriptions (Appendix A Page 1 of 1)

On behalf of
SOCOTEC UK Lim 
Becky Batham Operations Manager
Energy & Waste Services

Date of Issue: 24-Jan-2020

Tests marked '*' have been subcontracted to another laboratory.
Where samples have been flagged as deviant on the Analytical and Deviating Sample Overview, for any reason, the data may not be representative of the sample at the point of sampling and the validity of the data may be affected. SOCOTEC UK Limited accepts no responsibility for any sampling not carried out by our personnel.

[illegible]

[illegible]

Bretby Business Park, Ashby Road
Burton-on-Trent, Staffordshire, DE15 0YZ
Tel +44 (0) 1283 554400
Fax +44 (0) 1283 554422

Priority Geotechnical Limited

Contact

Colette Kelly

Howth

Sample Analysis

Date Printed

24-Jan-2020

Report Number

EFS/204510

Table Number

1

[illegible]

CERTIFICATE OF ANALYSIS

ANALYSIS REQUESTED BY: SOCOTEC UK Ltd
Environmental Chemistry
PO Box 100
Burton upon Trent
Staffordshire
DE15 0XD

CONTRACT NO: S10328-14

DATE OF ISSUE: 16.01.20

DATE SAMPLES RECEIVED: 03.01.20

DATE SAMPLES ANALYSED: 16.01.20

DESCRIPTION: Ten soil/loose aggregate samples.

ANALYSIS REQUESTED: Qualitative analysis of samples for determination of presence/type of asbestos.

METHODS:

Our method involves initial examination of the samples followed by detailed analysis of representative sub-samples. The sub-samples are analysed qualitatively for asbestos by polarised light and dispersion staining as described by the Health and Safety Executive in HSG 248.

RESULTS:

Initial Screening

No asbestos was detected in any of the soil samples by stereo-binocular and polarised light microscopy.

A summary of the results is given in Table 1.





CONTRACT NO: S10328-14
DATE OF ISSUE: 15.01.20

RESULTS: (cont.)

Table 1: Qualitative Results

SOCOTEC Job I.D: S204510

IOM sample number	Client sample number	ACM type detected	PLM result
S69775	S1982192 SP01	-	No Asbestos Detected
S69776	S1982193 SP03	-	No Asbestos Detected
S69777	S1982194 SP05	-	No Asbestos Detected
S69778	S1982195 SP10	-	No Asbestos Detected
S69779	S1982196 SP12	-	No Asbestos Detected
S69780	S1982197 SP14	-	No Asbestos Detected
S69781	S1982198 SP17	-	No Asbestos Detected
S69782	S1982199 SP19	-	No Asbestos Detected
S69783	S1982200 SP20	-	No Asbestos Detected
S69784	S1982201 SP22	-	No Asbestos Detected

Our detection limit for this method is 0.001%.

COMMENTS:

IOM Consulting cannot accept responsibility for samples that have been incorrectly collected or despatched by external clients.

Any opinions and interpretations expressed herein are out with the scope of our UKAS accreditation.

AUTHORISED BY:

D Third
Scientific Technician

Consignment No S90692
Date Logged 22-Dec-2019
In-House Report Due 14-Jan-2020

Please note the results for any subcontracted analysis (identified with a '^') is likely to take up to an additional five working days.

[illegible]

	Analysis Required
	Analysis dependant upon trigger result - Note: due date may be affected if triggered
	No analysis scheduled
A	Analysis Subcontracted - Note: due date may vary

EFS/204510 Ver. 1

Method Descriptions

Matrix	MethodID	Analysis Basis	Method Description
Soil	CEN Leachate	As Received	Determination of Oversize and Inert Material Content prior to leaching sample
Soil	ICPWSS	Oven Dried @ < 35°C	Determination of Water Soluble Sulphate in soil samples by water extraction followed by ICPOES detection
Soil	LOI(%MM)	Oven Dried @ < 35°C	Determination of loss on ignition for soil samples at specified temperature by gravimetry
Soil	PAHMSUS	As Received	Determination of Polycyclic Aromatic Hydrocarbons (PAH) by hexane/acetone extraction followed by GCMS detection
Soil	PCBECD	As Received	Determination of Polychlorinated Biphenyl (PCB) congeners/arocloris by hexane/acetone extraction followed by GCECD detection
Soil	PHSOIL	As Received	Determination of pH of 2.5:1 deionised water to soil extracts using pH probe.
Soil	SubCon*	*	Contact Laboratory for details of the methodology used by the sub-contractor.
Soil	TPHFIDUS	As Received	Determination of hexane/acetone extractable Hydrocarbons in soil with GCFID detection.
Soil	VOCHSAS	As Received	Determination of Volatile Organic Compounds (VOC) by Headspace GCMS
Soil	WSLM59	Oven Dried @ < 35°C	Determination of Organic Carbon in soil using sulphurous Acid digestion followed by high temperature combustion and IR detection

Where individual results are flagged see report notes for status.

Report Notes

Generic Notes

Soil/Solid Analysis

Unless stated otherwise,

- Results expressed as mg/kg have been calculated on the basis indicated in the Method Description table.
- All results on MCERTS reports are reported on a 105°C dry weight basis with the exception of pH and conductivity.
- Sulphate analysis not conducted in accordance with BS1377
- Water Soluble Sulphate is on a 2:1 water:soil extract

Waters Analysis

Unless stated otherwise results are expressed as mg/l

Nil: Where "Nil" has been entered against Total Alkalinity or Total Acidity this indicates that a measurement was not required due to the inherent pH of the sample.

Oil analysis specific

Unless stated otherwise,

- Results are expressed as mg/kg
- SG is expressed as g/cm³ @ 15°C

Gas (Tedlar bag) Analysis

Unless stated otherwise, results are expressed as ug/l

Asbestos Analysis

CH Denotes Chrysotile

TR Denotes Tremolite

CR Denotes Crocidolite

AC Denotes Actinolite

AM Denotes Amosite

AN Denotes Anthophyllite

NAIIS No Asbestos Identified in Sample

NADIS No Asbestos Detected In Sample

Symbol Reference

^ Sub-contracted analysis.

\$\$ Unable to analyse due to the nature of the sample

¶ Samples submitted for this analyte were not preserved on site in accordance with laboratory protocols.

This may have resulted in deterioration of the sample(s) during transit to the laboratory.

Consequently the reported data may not represent the concentration of the target analyte present in the sample at the time of sampling

¥ Results for guidance only due to possible interference

& Blank corrected result

I.S Insufficient sample to complete requested analysis

I.S(g) Insufficient sample to re-analyse, results for guidance only

Intf Unable to analyse due to interferences

N.D Not determined

N.Det Not detected

N.F No Flow

NS Information Not Supplied

Req Analysis requested, see attached sheets for results

▮ Raised detection limit due to nature of the sample

* All accreditation has been removed by the laboratory for this result

‡ MCERTS accreditation has been removed for this result

§ accreditation has been removed for this result as it is a non-accredited matrix

Note: The Laboratory may only claim that data is accredited when all of the requirements of our Quality System have been met. Where these requirements have not been met the laboratory may elect to include the data in its final report and remove the accreditation from individual data items if it believes that the validity of the data has not been affected. If further details are required of the circumstances which have led to the removal of accreditation then please do not hesitate to contact the laboratory.

Sample Descriptions

Client : Priority Geotechnical Limited
Site : Howth
Report Number : S20_4510

Note: major constituent in upper case

Lab ID Number	Client ID	Description
CL/1982192	SP01	Brown SILT
CL/1982193	SP03	Brown SILT
CL/1982194	SP05	Brown SILT
CL/1982195	SP10	Brown SILT
CL/1982196	SP12	Brown SILT
CL/1982197	SP14	Brown SILT
CL/1982198	SP17	Brown SILT
CL/1982199	SP19	Brown SILT
CL/1982200	SP20	Brown SILT
CL/1982201	SP22	Brown Gravel SILT

Our Ref: EXR/297184 (Ver. 1)

Your Ref:

January 10, 2020



Environmental Chemistry
SOCOTEC UK Limited
Bretby Business Park
Ashby Road
Burton-on-Trent
Staffordshire
DE15 0YZ

Telephone: 01283 554400
Facsimile: 01283 554422

Colette Kelly
Priority Geotechnical Limited
Unit 12
Owenacurra Business Park
Midleton
County Cork
Ireland

For the attention of Colette Kelly

Dear Colette Kelly

CEN Leachate 10:1 - Howth

Samples from the above site have been analysed in accordance with the schedule supplied.
The sample details and the results of analyses for these samples are given in the appended report.

An invoice for this work will follow under a separate cover.

Please be aware that our policy for the retention of paper based laboratory records and analysis reports is 6 years.

The work was carried out in accordance with SOCOTEC UK Limited (Multi-Sector Services) Standard Terms and Conditions of Contract.

If I can be of any further assistance please do not hesitate to contact me.

Yours sincerely

for SOCOTEC UK Limited

A handwritten signature in dark ink, appearing to read 'K Smith'.

K Smith
Project Co-ordinator
01283 554434

TEST REPORT



Report No. EXR/297184 (Ver. 1)

Priority Geotechnical Limited
Priority Geotechnical Limited
Unit 12
Owenacurra Business Park
Midleton
County Cork
Ireland

Site: Howth

The 10 samples described in this report were registered for analysis by SOCOTEC UK Limited on 22-Dec-2019. This report supersedes any versions previously issued by the laboratory.

The analysis was completed by: 10-Jan-2020

Tests where the accreditation is set to N or No, and any individual data items marked with a * are not UKAS accredited. Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

The following tables are contained in this report:

Table 1 Main Analysis Results (Pages 2 to 3)
Analytical and Deviating Sample Overview (Pages 4 to 5)
Table of Method Descriptions (Page 6)
Table of Report Notes (Page 7)
Table of Sample Descriptions (Appendix A Page 1 of 1)

On behalf of
SOCOTEC UK Lim 
Becky Batham Operations Manager
Energy & Waste Services

Date of Issue: 10-Jan-2020

Tests marked '^' have been subcontracted to another laboratory.

Where samples have been flagged as deviant on the Analytical and Deviating Sample Overview, for any reason, the data may not be representative of the sample at the point of sampling and the validity of the data may be affected. SOCOTEC UK Limited accepts no responsibility for any sampling not carried out by our personnel.

[illegible]

Bretby Business Park, Ashby Road
Burton-on-Trent, Staffordshire, DE15 0YZ
Tel +44 (0) 1283 554400
Fax +44 (0) 1283 554422

[illegible]

Customer Priority Geotechnical Limited
 Site Howth
 Report No W297184

Consignment No S90692
 Date Logged 22-Dec-2019
 In-House Report Due 14-Jan-2020

Please note the results for any subcontracted analysis (identified with a '^') is likely to take up to an additional five working days.

ID Number	Description	MethodID		CUSTOMER	ICPMSW	Nickel as Ni MS (Dissolved)	Chromium as Cr MS (Dissolved)	Cadmium as Cd MS (Dissolved)	Copper as Cu MS (Dissolved)	Lead as Pb MS (Dissolved)	Zinc as Zn MS (Dissolved)	Arsenic as As MS (Dissolved)	Mercury as Hg MS (Dissolved)	Selenium as Se MS (Dissolved)	Molybdenum as Mo MS (Dissolved)	Antimony as Sb MS (Dissolved)	Total Sulphur as SO ₄ (Diss) VAR	Barium as Ba (Dissolved) VAR	Fluoride as F	Chloride as Cl (Kone)	Leachate Prep	Phenols - HPLC
		Matrix Type	Sampled																			
EX/2029496	SP01	Laboratory Produced Leachate	22/12/19																			
EX/2029497	SP03	Laboratory Produced Leachate	22/12/19																			
EX/2029498	SP05	Laboratory Produced Leachate	22/12/19																			
EX/2029499	SP10	Laboratory Produced Leachate	22/12/19																			
EX/2029500	SP12	Laboratory Produced Leachate	22/12/19																			
EX/2029501	SP14	Laboratory Produced Leachate	22/12/19																			
EX/2029502	SP17	Laboratory Produced Leachate	22/12/19																			
EX/2029503	SP19	Laboratory Produced Leachate	22/12/19																			
EX/2029504	SP20	Laboratory Produced Leachate	22/12/19																			
EX/2029505	SP22	Laboratory Produced Leachate	22/12/19																			

Note: We will endeavour to prioritise samples to complete analysis within holding time; however any delay could result in samples becoming deviant whilst being processed in the laboratory.

If sampling dates are missing or matrices unclassified then results will not be ISO 17025 accredited. Please contact us as soon as possible to provide missing information in order to reinstate accreditation.

Deviating Sample Key

- A The sample was received in an inappropriate container for this analysis
- B The sample was received without the correct preservation for this analysis
- C Headspace present in the sample container
- D The sampling date was not supplied so holding time may be compromised - applicable to all analysis
- E Sample processing did not commence within the appropriate holding time
- F Sample processing did not commence within the appropriate handling time

Requested Analysis Key

- Analysis Required
- Analysis dependant upon trigger result - Note: due date may be affected if triggered
- No analysis scheduled
- ^ Analysis Subcontracted - Note: due date may vary

The integrity of data for samples/analysis that have been categorised as Deviating may be compromised. Data may not be representative of the sample at the time of sampling. Where individual results are flagged see report notes for status.

CEN Leachate 10:1 Analysis

SOCOTEC UK Ltd Environmental Chemistry
Analytical and Deviating Sample Overview

W297184

Customer Priority Geotechnical Limited
 Site Howth
 Report No W297184

Consignment No S90692
 Date Logged 22-Dec-2019
 In-House Report Due 14-Jan-2020

Please note the results for any subcontracted analysis (identified with a '^') is likely to take up to an additional five working days.

ID Number	Description	MethodID		WSLM13	WSLM27
		Matrix Type	Sampled	Total Organic Carbon	Total Dissolved Solids
				✓	
EX/2029496	SP01	Laboratory Produced Leachate	22/12/19	EF	
EX/2029497	SP03	Laboratory Produced Leachate	22/12/19	EF	
EX/2029498	SP05	Laboratory Produced Leachate	22/12/19	EF	
EX/2029499	SP10	Laboratory Produced Leachate	22/12/19	EF	
EX/2029500	SP12	Laboratory Produced Leachate	22/12/19	EF	
EX/2029501	SP14	Laboratory Produced Leachate	22/12/19	EF	
EX/2029502	SP17	Laboratory Produced Leachate	22/12/19	EF	
EX/2029503	SP19	Laboratory Produced Leachate	22/12/19	EF	
EX/2029504	SP20	Laboratory Produced Leachate	22/12/19	EF	
EX/2029505	SP22	Laboratory Produced Leachate	22/12/19	EF	

Note: We will endeavour to prioritise samples to complete analysis within holding time; however any delay could result in samples becoming deviant whilst being processed in the laboratory.

If sampling dates are missing or matrices unclassified then results will not be ISO 17025 accredited. Please contact us as soon as possible to provide missing information in order to reinstate accreditation.

Deviating Sample Key

- A The sample was received in an inappropriate container for this analysis
- B The sample was received without the correct preservation for this analysis
- C Headspace present in the sample container
- D The sampling date was not supplied so holding time may be compromised - applicable to all analysis
- E Sample processing did not commence within the appropriate holding time
- F Sample processing did not commence within the appropriate handling time

Requested Analysis Key

- Analysis Required
- Analysis dependant upon trigger result - Note: due date may be affected if triggered
- No analysis scheduled
- ^ Analysis Subcontracted - Note: due date may vary

The integrity of data for samples/analysis that have been categorised as Deviating may be compromised. Data may not be representative of the sample at the time of sampling. Where individual results are flagged see report notes for status.

Method Descriptions

Matrix	MethodID	Analysis Basis	Method Description
Water	ICPMSW	As Received	Direct quantitative determination of Metals in water samples using ICPMS
Water	ICPWATVAR	As Received	Direct determination of Metals and Sulphate in water samples using ICPOES
Water	ISEF	As Received	Determination of Fluoride in water samples by Ion Selective Electrode (ISE)
Water	KONENS	As Received	Direct analysis using discrete colorimetric analysis
Water	PHEHPLCUV	As Received	Determination of Phenols by HPLC with UV Detection
Water	WSLM13	As Received	Instrumental analysis using acid/persulphate digestion and non-dispersive IR detection
Water	WSLM27	As Received	Gravimetric Determination

Where individual results are flagged see report notes for status.

Report Notes

Generic Notes

Soil/Solid Analysis

Unless stated otherwise,

- Results expressed as mg/kg have been calculated on the basis indicated in the Method Description table.

All results on MCERTS reports are reported on a 105°C dry weight basis with the exception of pH and conductivity.

- Sulphate analysis not conducted in accordance with BS1377

- Water Soluble Sulphate is on a 2:1 water:soil extract

Waters Analysis

Unless stated otherwise results are expressed as mg/l

Nil: Where "Nil" has been entered against Total Alkalinity or Total Acidity this indicates that a measurement was not required due to the inherent pH of the sample.

Oil analysis specific

Unless stated otherwise,

- Results are expressed as mg/kg

- SG is expressed as g/cm³ @ 15°C

Gas (Tedlar bag) Analysis

Unless stated otherwise, results are expressed as ug/l

Asbestos Analysis

CH Denotes Chrysotile

TR Denotes Tremolite

CR Denotes Crocidolite

AC Denotes Actinolite

AM Denotes Amosite

AN Denotes Anthophyllite

NAIS No Asbestos Identified in Sample

NADIS No Asbestos Detected In Sample

Symbol Reference

^ Sub-contracted analysis.

\$\$ Unable to analyse due to the nature of the sample

¶ Samples submitted for this analyte were not preserved on site in accordance with laboratory protocols.

This may have resulted in deterioration of the sample(s) during transit to the laboratory.

Consequently the reported data may not represent the concentration of the target analyte present in the sample at the time of sampling

¥ Results for guidance only due to possible interference

& Blank corrected result

I.S Insufficient sample to complete requested analysis

I.S(g) Insufficient sample to re-analyse, results for guidance only

Intf Unable to analyse due to interferences

N.D Not determined

N.Det Not detected

N.F No Flow

NS Information Not Supplied

Req Analysis requested, see attached sheets for results

► Raised detection limit due to nature of the sample

* All accreditation has been removed by the laboratory for this result

‡ MCERTS accreditation has been removed for this result

§ accreditation has been removed for this result as it is a non-accredited matrix

Note: The Laboratory may only claim that data is accredited when all of the requirements of our Quality System have been met. Where these requirements have not been met the laboratory may elect to include the data in its final report and remove the accreditation from individual data items if it believes that the validity of the data has not been affected. If further details are required of the circumstances which have led to the removal of accreditation then please do not hesitate to contact the laboratory.

Sample Descriptions

Client : Priority Geotechnical Limited
Site : Howth
Report Number : W29_7184

Lab ID Number	Client ID	Description
EX/2029496	SP01	Laboratory Produced Leachate
EX/2029497	SP03	Laboratory Produced Leachate
EX/2029498	SP05	Laboratory Produced Leachate
EX/2029499	SP10	Laboratory Produced Leachate
EX/2029500	SP12	Laboratory Produced Leachate
EX/2029501	SP14	Laboratory Produced Leachate
EX/2029502	SP17	Laboratory Produced Leachate
EX/2029503	SP19	Laboratory Produced Leachate
EX/2029504	SP20	Laboratory Produced Leachate
EX/2029505	SP22	Laboratory Produced Leachate



Final Report

Report No.: 19-42058-1

Initial Date of Issue: 06-Jan-2020

Client Priority Geotechnical Ltd

Client Address: Unit 12
Owenacurra Business Park
Midleton
County Cork
Ireland

Contact(s): Colette Kelly

Project P19188 Howth

Quotation No.: Q17-09116 **Date Received:** 17-Dec-2019

Order No.: 12451 **Date Instructed:** 17-Dec-2019

No. of Samples: 20

Turnaround (Wkdays): 7 **Results Due:** 02-Jan-2020

Date Approved: 06-Jan-2020

Approved By:


Details: Glynn Harvey, Laboratory Manager

Results - Soil

Client: Priority Geotechnical Ltd	Chemtest Job No.:	19-42058	19-42058	19-42058	19-42058	19-42058	19-42058	19-42058	19-42058	19-42058	19-42058	19-42058
Quotation No.: Q17-09116	Chemtest Sample ID.:	944589	944590	944591	944592	944593	944594	944595	944596	944597		
	Sample Location:	SP01	SP03	SP05	SP07	SP09	SP10	SP12	SP14	SP16		
	Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL		
	Date Sampled:	07-Dec-2019	12-Dec-2019	07-Dec-2019	07-Dec-2019	07-Dec-2019	07-Dec-2019	12-Dec-2019	12-Dec-2019	12-Dec-2019		
	Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY		
Determinand	Accred.	SOP	Units	LOD								
ACM Type	U	2192		N/A	-	Fibres/Clumps	-	-	-	-	-	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	Chrysotile	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
ACM Detection Stage	U	2192		N/A	-	Stereo Microscopy	-	-	-	-	-	-
Moisture	N	2030	%	0.020	72	47	53	42	50	44	49	50
pH	U	2010		4.0	8.3	8.6	8.3	8.5	8.7	8.8	8.6	8.8
Sulphate (2:1 Water Soluble) as SO ₄	U	2120	g/l	0.010	0.79	0.55	1.1	1.5	0.67	0.29	1.1	0.34
Cyanide (Total)	U	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.60	< 0.50	< 0.50
Arsenic	U	2450	mg/kg	1.0	17	26	14	28	16	12	14	17
Boron	N	2450	mg/kg	0.40	31	29	26	19	30	27	27	32
Cadmium	U	2450	mg/kg	0.10	0.41	0.59	0.24	0.19	0.27	0.18	0.23	0.34
Chromium	U	2450	mg/kg	1.0	40	45	43	64	38	27	34	39
Copper	U	2450	mg/kg	0.50	100	55	47	400	78	30	41	43
Mercury	U	2450	mg/kg	0.10	0.13	0.22	< 0.10	0.12	0.10	< 0.10	< 0.10	0.10
Nickel	U	2450	mg/kg	0.50	30	45	33	36	31	23	26	32
Lead	U	2450	mg/kg	0.50	59	70	34	65	59	27	36	41
Zinc	U	2450	mg/kg	0.50	220	170	120	270	160	93	100	120
Organic Matter	U	2625	%	0.40	5.0	3.1	2.9	4.8	3.3	2.1	2.4	2.4
Total TPH >C6-C40	U	2670	mg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Naphthalene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno[1,2,3-c,d]Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz[a,h]Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Coronene	N	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 17 PAH's	N	2700	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Total Phenols	U	2920	mg/kg	0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30

Results - Soil

Client: Priority Geotechnical Ltd	Chemtest Job No.:	19-42058	19-42058	19-42058	19-42058	19-42058	19-42058	19-42058	19-42058	19-42058	19-42058	19-42058	19-42058
Quotation No.: Q17-09116	Chemtest Sample ID.:	944598	944599	944600	944601	944602	944603	944604	944605	944606			
	Sample Location:	SP17	SP19	SP20	SP22	LB201	LB202	LB203	LB204	LB205			
	Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL			
	Date Sampled:	07-Dec-2019	12-Dec-2019	07-Dec-2019	07-Dec-2019	07-Dec-2019	07-Dec-2019	07-Dec-2019	07-Dec-2019	07-Dec-2019			
	Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY			
Determinand	Accred.	SOP	Units	LOD									
ACM Type	U	2192		N/A	-	-	-	-	-	-	-	-	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
ACM Detection Stage	U	2192		N/A	-	-	-	-	-	-	-	-	-
Moisture	N	2030	%	0.020	53	58	59	18	47	43	58	49	36
pH	U	2010		4.0	8.5	8.5	8.5	8.7	8.7	8.7	8.7	8.7	8.8
Sulphate (2:1 Water Soluble) as SO ₄	U	2120	g/l	0.010	1.1	1.1	0.69	0.54	0.67	1.6	0.64	0.70	0.63
Cyanide (Total)	U	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Arsenic	U	2450	mg/kg	1.0	18	15	14	68	17	23	17	17	27
Boron	N	2450	mg/kg	0.40	31	30	30	20	26	28	32	27	27
Cadmium	U	2450	mg/kg	0.10	0.21	0.18	0.19	0.10	0.32	0.50	0.83	0.55	0.31
Chromium	U	2450	mg/kg	1.0	37	32	34	14	33	74	43	34	25
Copper	U	2450	mg/kg	0.50	36	30	52	39	43	320	130	58	27
Mercury	U	2450	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.22	0.13	0.40	0.43
Nickel	U	2450	mg/kg	0.50	31	27	28	100	36	49	33	28	25
Lead	U	2450	mg/kg	0.50	35	33	35	110	38	150	120	57	55
Zinc	U	2450	mg/kg	0.50	98	120	150	19	130	550	610	160	86
Organic Matter	U	2625	%	0.40	2.8	2.6	2.8	1.9	2.2	2.9	3.3	3.3	2.2
Total TPH >C6-C40	U	2670	mg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Naphthalene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.22
Acenaphthylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.14
Acenaphthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.21
Phenanthrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.95
Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.33
Fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	1.8
Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	2.2
Benzo[a]anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	1.1
Chrysene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.94
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	1.7
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.69
Benzo[a]pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	1.3
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.74
Dibenz[a,h]Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.15
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.77
Coronene	N	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 17 PAH's	N	2700	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	13
Total Phenols	U	2920	mg/kg	0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	0.35	1.0	< 0.30	< 0.30

Project: P19188 Howth

Client: Priority Geotechnical Ltd	Chemtest Job No.:				19-42058	19-42058
Quotation No.: Q17-09116	Chemtest Sample ID.:				944607	944608
	Sample Location:				LB206	LB207
	Sample Type:				SOIL	SOIL
	Date Sampled:				07-Dec-2019	07-Dec-2019
	Asbestos Lab:				COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD		
ACM Type	U	2192		N/A	-	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected
ACM Detection Stage	U	2192		N/A	-	-
Moisture	N	2030	%	0.020	14	49
pH	U	2010		4.0	8.7	8.5
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.59	1.3
Cyanide (Total)	U	2300	mg/kg	0.50	< 0.50	< 0.50
Arsenic	U	2450	mg/kg	1.0	64	17
Boron	N	2450	mg/kg	0.40	12	30
Cadmium	U	2450	mg/kg	0.10	6.7	0.34
Chromium	U	2450	mg/kg	1.0	31	32
Copper	U	2450	mg/kg	0.50	38	74
Mercury	U	2450	mg/kg	0.10	0.10	0.17
Nickel	U	2450	mg/kg	0.50	42	28
Lead	U	2450	mg/kg	0.50	380	52
Zinc	U	2450	mg/kg	0.50	1100	130
Organic Matter	U	2625	%	0.40	0.88	2.4
Total TPH >C6-C40	U	2670	mg/kg	10	380	< 10
Naphthalene	U	2700	mg/kg	0.10	< 0.10	< 0.10
Acenaphthylene	U	2700	mg/kg	0.10	< 0.10	< 0.10
Acenaphthene	U	2700	mg/kg	0.10	< 0.10	< 0.10
Fluorene	U	2700	mg/kg	0.10	< 0.10	< 0.10
Phenanthrene	U	2700	mg/kg	0.10	1.1	< 0.10
Anthracene	U	2700	mg/kg	0.10	0.40	< 0.10
Fluoranthene	U	2700	mg/kg	0.10	1.5	< 0.10
Pyrene	U	2700	mg/kg	0.10	1.7	< 0.10
Benzo[a]anthracene	U	2700	mg/kg	0.10	1.0	< 0.10
Chrysene	U	2700	mg/kg	0.10	0.71	< 0.10
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	1.1	< 0.10
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	0.60	< 0.10
Benzo[a]pyrene	U	2700	mg/kg	0.10	1.2	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	0.78	< 0.10
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	0.22	< 0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	0.71	< 0.10
Coronene	N	2700	mg/kg	0.10	< 0.10	< 0.10
Total Of 17 PAH's	N	2700	mg/kg	2.0	11	< 2.0
Total Phenols	U	2920	mg/kg	0.30	< 0.30	< 0.30

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	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.
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
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.
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
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	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-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

Report Information

Key

- U UKAS accredited
- M MCERTS and UKAS accredited
- N 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
- T 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"

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 45 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

06-07-2021F 21A/0368
FINGAL CO CO PL DEPT

Appendix 2.2

Geotechnical Investigation, laboratory testing Factual report



Our Ref: JMS/Rp/P19188 + attachments (*.pdf)

30th October, 2020

Messrs. Malachy Walsh & Partners

Reen Point,

Blennerville,

Tralee,

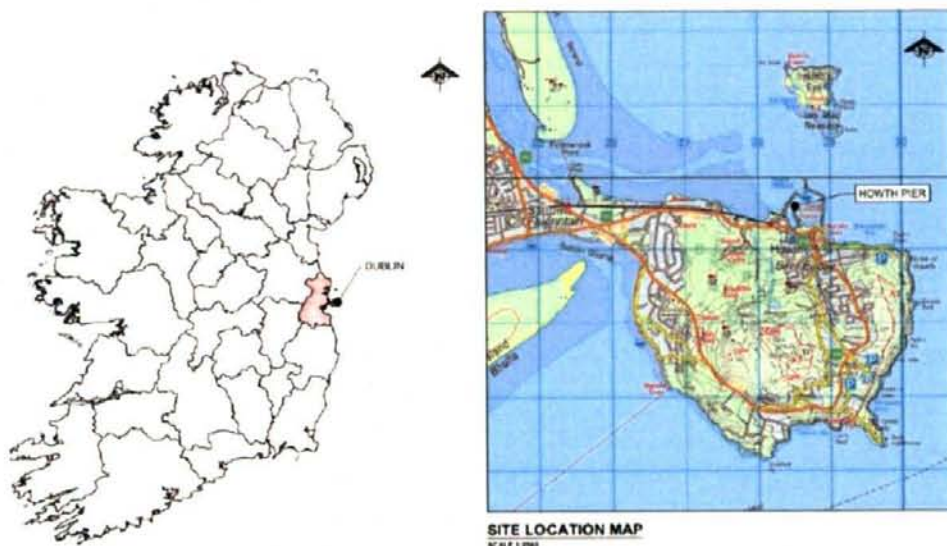
Co. Kerry.

Re: Howth Fishing Harbour Centre Dredging – Ground Investigation, Laboratory Testing Factual Report.

Introduction

In September 2019, Priority Geotechnical (PGL) were requested by Malachy Walsh & Partners, Consulting Engineers (MWP) on behalf of their Client: Department of Agriculture, Food and the Marine to undertake a laboratory evaluation (and trial evaluation) of the addition of Ordinary Portland Cement (OPC) and Ground Granulated Blast Furnace Slag (GGBS) (binder mix) to sediment samples taken at Howth Harbour for the purpose of stabilizing the organic silt sediment.

The port of Howth is one of six Fishery Harbour Centres owned and managed by the Minister for Agriculture, Food and the Marine. The Marine Engineering Division has responsibility for the delivery of Safety and Maintenance works and the management of Capital Works within the harbour.



Objectives

The objective of the investigations was to establish the optimum binder mix content of OPC/ GGBS addition to improve and stabilise the sediment.

This report presents the records and data obtained with regard to the laboratory evaluation to the sampled sediment at Howth Harbour.

A separate factual report outlining the site investigation has been compiled.

Laboratory Works

Laboratory testing was scheduled by Malachy Walsh in collaboration with PGL. Testing was carried out by PGL in accordance with the BS1377 (1990), Methods of test for soils for civil engineering purposes and the ISRM suggested methods for rock characterisation, testing and monitoring. Testing was undertaken by PGL along with GSTL UK. and Chemtest UK Ltd. on behalf of PGL.

The harbour was divided into three areas of interest, namely; The Mooring Area (MG), Trawler Basin (TR) and Marina Area (MA).

A laboratory test procedure was developed in general accordance with the recommendations and procedures set out by Mr. Peter Seymour, acting as sediment stabilization consultant on the project.

The trial stage of the lab testing consisted of base line characterisation of the sediments to better understand the natural properties of the sediment.

A sediment slurry representative of the MG, TR and MA areas was generated to which binder mix was added in the ratio of 30 OPC to 70 GGBS giving a binder content of 150kg/m³. The consistency of the slurry and binder mix was developed to give a pumpable liquid with a flow rate of 40secs per litre through a Marsh Funnel. An additional sediment slurry was generated by combining the material from the three representative areas to which binder mix in various ratios was added. Observational data was gathered during the base line testing phase. The laboratory test data carried out during is accompanying this factual report and summarised as follows;

Base line Sediment Testing	
Type	Nr.
Natural Moisture Content	31 incl. base, binder and composite mixes
Atterberg Limits	03
Particle Size Distribution	03 including 03Nr. hydrometer on fine soils. Incl. base, binder and composite mixes
pH	03
Loss on ignition	06
Organic Matter	06
Soil metals	03
Leachate metals	03

The slurries (sediment & binder mix) were poured into cylindrical moulds 50mm diameter x 90mm height and cured at 15 degrees Celsius for a period of days ranging from 7 to 120 days. These samples were subsequently extruded and tested for strength by means of Unconfined Compressive Strength (UCS). Selected samples were tested for batch leachate testing (10:1 ratio). Other samples were extruded and tested for resistance to leachability by the monolithic tank test (NAN 7375:2004). The slurries (sediment & binder mix) were poured into larger cylindrical moulds (100mm diameter 200mm height) and cured for 28 days at fifteen degrees Celcius and subsequently tested for permeability in a triaxial cell.

The laboratory test data carried out during this testing phase is accompanying this factual report and summarised as follows;

Sediment Molded Sample Testing	
Type	Nr.
UCS 7 Day	39
UCS 28 Day	39
UCS 76 Day	27
UCS 90 Day	27
UCS 120 Day	27
Permeability testing in triaxial cell 28 days	13
Monolithic Tank Test 14 days	104
Monolithic Tank Test 28 days	104
Monolithic Tank Test 60 days	56
Monolithic Tank Test 90 days	56
Batch leachate testing	23

Should you have any queries in relation to the data collected and presented, or the subsequent analysis; please do not hesitate to contact our office.

Yours sincerely,
For **Priority Geotechnical**,

A handwritten signature in blue ink, appearing to read 'J McSweeney', with a stylized flourish at the end.

James McSweeney BSc
Engineering Geologist

No responsibility or liability can be held by PGL for ground conditions between or extraneous to exploratory locations. The exploratory logs provide for ground profiles and configuration of strata relevant to the investigation depths achieved during the fieldworks. Caution shall be taken when extrapolating between such exploratory locations.

The interpretation of the current data set may be subject to change where additional data becomes available.

This report has been prepared for the Client and their Representative as outline, herein. The information should not be used without their prior written permission. PGL accepts no responsibility or liability for this document being used other than for the purposes for which it was intended

Base line Sediment Testing	
Type	Nr.
Natural Moisture Content	31 incl. base, binder and composite mixes
Atterberg Limits	03
Particle Size Distribution	03 including 03Nr. hydrometer on fine soils. Incl. base, binder and composite mixes
pH	03
Loss on ignition	06
Organic Matter	06
Soil metals	03
Leachate metals	03

Total Cubes/Cylinders Required
209

TABLE 1

One Location From Each Area

Mix Number	Binder Content (kg/m ³)	OPC Content	GGBS Content	STRENGTH TESTING - UCS Testing					PERMEABILITY TESTING IN TRIAXIAL CELL 28 Days	Monolithic Tank Test (NAN 7375:2004) **			
				7 day	28 day	60 day	90 day	120 day		14 day	28 day	60 day	90 day
Trawler Basin	150	30	70	3	3	3	3	3	1	1	1	1	1
Mooring Area	150	30	70	3	3	3	3	3	1	1	1	1	1
Marina Area	150	30	70	3	3	3	3	3	1	1	1	1	1

TABLE 2

Aggregation of Remaining Samples

Mix Number	Binder Content (kg/m ³)	OPC Content	GGBS Content	STRENGTH TESTING - UCS Testing					PERMEABILITY TESTING IN TRIAXIAL CELL 28 Days	Monolithic Tank Test (NAN 7375:2004)			
				7 day	28 day	60 day	90 day	120 day		14 day	28 day	60 day	90 day
1	125	40	60	3	3	3	3	3	1	1	1	-	-
2	125	30	70	3	3	3	3	3	1	1	1	1	1
3	125	20	80	3	3	-	-	-	1	1	1	-	-
4	150	40	60	3	3	3	3	3	1	1	1	1	1
5	150	30	70	3	3	3	3	3	1	1	1	1	1
6	150	20	80	3	3	3	3	3	1	1	1	1	1
7	175	40	60	3	3	-	-	-	1	1	1	-	-
8	175	30	70	3	3	-	-	-	1	1	1	-	-
9	175	20	80	3	3	-	-	-	1	1	1	-	-
10	150	100	0	3	3	3	3	-	1	1	1	-	-

Yellow cell indicates test samples from which material to be taken for Batch Leact tests

- Start curing for strength tests one week before curing for leachates samples (to provide a stagger in results)
- Tests in Table 1 will start one week before tests in Table 2
- Samples to be cured in water kept at 15°C
- Temperature of samples to be measured using an additional (sacrificial) sample for each batch; measured at time of mixing and then daily during curing
- Strength Test Cylinder size: 50mm dia x 87.5mm high specimens
- Leaching Test Cylinder Size: 50mm x 87.5mm
- pH to be measured on interstitial water in sediment before mixing, and after mixing at 1hr, 24hr and 48hr
- Samples for strength and leaching tests to be both taken from one single batch of mixed sediment and binders - to limit variability across the test types
- Water content of sediments to be measured before and after mixing with binders + additional water
- Bulk density of sediments to be measured before mixing with water and binders
- Target water content of combined mixture to be approx 60% water by weight - or sufficient to get a homogeneous, pumpable mix - whichever is the lower.
- Binders will be first mixed with water to create a slurry for mixing with a sediment slurry
- For reference only, the fluidity of the mixed binder sediment system will be measured using EN 445 - testing of grouts for prestressing tendons
- Permeability to be measured on 100mm diameter sample
- GGBS - Ecocem Dublin
- OPC cement - Lagan CEM I

Cube No	Cube Name	Cube Size	UCS Testing					Permeability in a triaxial Cell					Monolithic Tank Test				
			7 Days Curing	28 days Curing	76 days Curing	90 days curing	120 days curing					28 days Curing		14 Days Curing	28 days Curing	60 days Curing	90 days curing
61	1MX7A	50X90mm	x														
62	1MX7B	50X90mm	x														
63	1MX7C	50X90mm	x														
64	1MXM14	50X90mm												x			
65	1MX28A	50X90mm		x													
66	1MX28B	50X90mm		x													
67	1MX28C	50X90mm		x													
68	1MXM28	50X90mm													x		
69	1MXP28	100x200 mm										x					
70	1MX60A	50X90mm			x												
71	1MX60B	50X90mm			x												
72	1MX60C	50X90mm			x												
73	1MX90A	50X90mm				x											
74	1MX90B	50X90mm				x											
75	1MX90C	50X90mm				x											
76	1MX120A	50X90mm					x										
77	1MX120B	50X90mm					x										
78	1MX120C	50X90mm					x										
79	2MX7A	50X90mm	x														
80	2MX7B	50X90mm	x														
81	2MX7C	50X90mm	x														
82	2MXM14	50X90mm												x			
83	2MX28A	50X90mm		x													
84	2MX28B	50X90mm		x													
85	2MX28C	50X90mm		x													
86	2MXM28	50X90mm													x		
87	2MXP28	100x200 mm										x					
88	2MX60A	50X90mm			x												
89	2MX60B	50X90mm			x												
90	2MX60C	50X90mm			x												
91	2MXM60	50X90mm														x	
92	2MX90A	50X90mm				x											
93	2MX90B	50X90mm				x											
94	2MX90C	50X90mm				x											
95	2MXM90	50X90mm															x
96	2MX120A	50X90mm					x										
97	2MX120B	50X90mm					x										
98	2MX120C	50X90mm					x										
99	3MX7A	50X90mm	x														
100	3MX7B	50X90mm	x														
101	3MX7C	50X90mm	x														
102	3MXM14	50X90mm												x			
103	3MX28A	50X90mm		x													
104	3MX28B	50X90mm		x													
105	3MX28C	50X90mm		x													
106	3MXM28	50X90mm													x		
108	3MXP28	100x200 mm										x					

			UCS Testing					Permeability in a triaxial Cell					Monolithic Tank Test					
			7 Days Curing	28 days Curing	76 days Curing	90 days curing	120 days curing					28 days Curing			14 Days Curing	28 days Curing	60 days Curing	90 days curing
Cube No	Cube Name	Cube Size																
109	4MX7A	50X90mm	x															
110	4MX7B	50X90mm	x															
111	4MX7C	50X90mm	x															
112	4MXM14	50X90mm												x				
113	4MX28A	50X90mm		x														
114	4MX28B	50X90mm		x														
115	4MX28C	50X90mm		x														
116	4MXM28	50X90mm													x			
117	4MXP28	100x200 mm										x						
118	4MX60A	50X90mm			x													
119	4MX60B	50X90mm			x													
120	4MX60C	50X90mm			x													
121	4MXM60	50X90mm														x		
122	4MX90A	50X90mm				x												
123	4MX90B	50X90mm				x												
124	4MX90C	50X90mm				x												
125	4MXM90	50X90mm															x	
126	4MX120A	50X90mm					x											
127	4MX120B	50X90mm					x											
128	4MX120C	50X90mm					x											
129	5MX7A	50X90mm	x															
130	5MX7B	50X90mm	x															
131	5MX7C	50X90mm	x															
132	5MXM14	50X90mm													x			
133	5MX28A	50X90mm		x														
134	5MX28B	50X90mm		x														
135	5MX28C	50X90mm		x														
136	5MXM28	50X90mm														x		
137	5MXP28	100x200 mm										x						
138	5MX60A	50X90mm			x													
139	5MX60B	50X90mm			x													
140	5MX60C	50X90mm			x													
141	5MXM60	50X90mm															x	
142	5MX90A	50X90mm				x												
143	5MX90B	50X90mm				x												
144	5MX90C	50X90mm				x												
145	5MXM90	50X90mm																x
146	5MX120A	50X90mm					x											
147	5MX120B	50X90mm					x											
148	5MX120C	50X90mm					x											
149	6MX7A	50X90mm	x															
150	6MX7B	50X90mm	x															
151	6MX7C	50X90mm	x															
152	6MXM14	50X90mm													x			
153	6MX28A	50X90mm																
154	6MX28B	50X90mm		x														
155	6MX28C	50X90mm		x														

[illegible]

Location	Code	Sample Name		Initial Wt of Sediment (g)	Initial % MC	Initial Temp of Sediment	Initial pH	Loss on Ignition	Organic Matter Content	Volume of Sediment Slurry	pH of Sediment Slurry	OPC (g)	GGBS (g)	pH of Binder	Initial Temp of Sediment + Binder Mix	pH of Binder + Sediment Mix	pH of Binder + Sediment Mix after 24hr	Temp of Sediment + Binder Mix after 24hr	pH of Binder + Sediment Mix after 4day	Temp of Sediment + Binder Mix after 4day
Trawler Basin	TR	LB203	Composite	91839	118	10	8.1	10	3.5	1 litre	7.87	45	105	12.49	11	11.57	12.66	15	12.17	16
Mooring Area	MG	LB204	Composite	100170	96	10	8.6	9.3	2.9	1 litre	8.41	45	105	12.49	11	11.8	12.55	15	12.07	16
Marina Area	MA	LB207	Composite	123596	103	9.5	7.9	6.9	2.6	1 litre	8.31	45	105	12.49	11	11.71	12.66	15	12.21	16

Mix No	Volume of Sediment Slurry	pH of Sediment Slurry	OPC (g)	GGBS (g)	pH of Binder	Initial Temp of Sediment + Binder Mix	pH of Binder + Sediment Mix	pH of Binder + Sediment Mix after 24hr	Temp of Sediment + Binder Mix after 24hr	pH of Binder + Sediment Mix after 4day	Temp of Sediment + Binder Mix after 4day
1	1 litre	7.51	50	75	12.64	12	11.9	12.88	15	11.92	15
2	1 litre	7.5	37.5	87.5	12.6	12	11.74	12.7	15	11.91	15
3	1 litre	7.51	25	100	12.58	13	11.8	12.42	15	11.27	15
4	1 litre	7.5	60	90	12.53	14	12.09	12.81	15.5	11.66	15
5	1 litre	7.5	45	105	12.58	14	11.79	12.6	15	11.74	15
6	1 litre	7.5	30	120	12.58	13.5	12.1	12.22	16	11.46	15
7	1 litre	7.5	70	105	12.58	13	12.05	12.47	16	11.97	15
8	1 litre	7.51	52.5	122.5	12.6	15	12.21	12.41	16.5	11.78	15
9	1 litre	7.51	35	140	12.56	13.5	12.09	12.37	16.5	11.66	15
10	1 litre	7.5	175	0	12.87	13	12.34	12.61	16.5	12.32	15

Strength Testing

Mix No	Binder Content (Kg/m3)	OPC Content	GGBS Content	UCS Day 7		UCS Day 28		UCS Day 76		UCS Day 90		UCS Day 120	
				UCS kPa	Cu Kn	UCS kPa	Cu Kn	UCS kPa	Cu Kn	UCS kPa	Cu Kn	UCS kPa	Cu Kn
TRA	150	30	70	Broke on extrusion		0.2	0.1	0.23	0.11	0.08	0.04	0.23	0.11
TRB	150	30	70	0.033	0.016	0.27	0.14	0.24	0.12	0.18	0.09	0.11	0.06
TRC	150	30	70	Broke on extrusion		0.33	0.16	0.3	0.15	0.3	0.14	0.04	0.02
MGA	150	30	70	0.008	0.004	0.2	0.1	0.18	0.09	0.29	0.14	0.14	0.07
MGB	150	30	70	0.012	0.006	0.08	0.04	0.12	0.06	0.09	0.04	0.12	0.06
MGC	150	30	70	0.008	0.004	0.17	0.09	0.23	0.12	0.24	0.12	0.12	0.06
MAA	150	30	70	0.02	0.014	0.08	0.04	0.18	0.089	0.22	0.11	0.13	0.06
MAB	150	30	70	0.036	0.018	0.085	0.043	0.16	0.08	0.13	0.07	0.12	0.06
MAC	150	30	70	0.02	0.01	0.16	0.082	0.19	0.095	0.13	0.07	0.16	0.08
1A	125	40	60	0.003	0.001	0.06	0.03	0.14	0.07	0.22	0.11	0.03	0.02
1B	125	40	60	0.0015	0.0007	0.065	0.032	0.18	0.09	0.11	0.06	0.13	0.06
1C	125	40	60	0.0015	0.0007	0.05	0.02	0.1	0.05	0.04	0.02	0.26	0.13
2A	125	30	70	0.0075	0.004	0.06	0.03	0.23	0.11	0.13	0.06	0.12	0.06
2B	125	30	70	0.011	0.006	0.09	0.05	0.24	0.12	0.16	0.08	0.19	0.09
2C	125	30	70	0.016	0.008	0.09	0.05	0.14	0.07	0.11	0.06	0.12	0.06
3A	125	20	80	0.035	0.018	0.08	0.04						
3B	125	20	80	0.026	0.013	0.12	0.06						
3C	125	20	80	0.011	0.006	0.19	0.09						
4A	150	40	60	0.013	0.005	0.09	0.05	0.13	0.06	0.1	0.05	0.14	0.07
4B	150	40	60	0.018	0.009	0.04	0.02	0.12	0.06	0.23	0.11	0.05	0.02
4C	150	40	60	0.014	0.006	0.04	0.02	0.23	0.12	0.18	0.09	0.24	0.12
5A	150	30	70	0.029	0.014	0.06	0.03	0.22	0.11	0.22	0.11	0.16	0.08
5B	150	30	70	0.035	0.018	0.04	0.02	0.3	0.15	0.18	0.1	0.27	0.14
5C	150	30	70	0.036	0.017	0.05	0.03	0.03	0.011	0.2	0.1	0.09	0.05
6A	150	20	80	0.034	0.017	0.11	0.06	0.26	0.13	0.3	0.15	0.2	0.1
6B	150	20	80	0.048	0.024	0.07	0.04	0.17	0.08	0.4	0.2	0.27	0.14
6C	150	20	80	0.03	0.015	0.07	0.04	0.15	0.08	0.23	0.12	0.06	0.03

7A	175	40	60	0.007	0.0034	0.07	0.04						
7B	175	40	60	0.01	0.0052	0.07	0.04						
7C	175	40	60	0.013	0.007	0.16	0.08						
8A	175	30	70	0.03	0.015	0.25	0.12						
8B	175	30	70	0.03	0.015	0.2	0.1						
8C	175	30	70	0.038	0.019	0.11	0.06						
9A	175	20	80	0.061	0.03	0.3	0.15						
9B	175	20	80	0.082	0.04	0.33	0.16						
9C	175	20	80	0.055	0.027	0.31	0.15						
10A	150	100	0	0.02	0.01	0.056	0.028	0.06	0.03	0.02	0.01	0.05	0.02
10B	150	100	0	0.025	0.012	0.04	0.02	0.06	0.03	0.06	0.03	0.04	0.02
10C	150	100	0	0.024	0.012	0.02	0.008	0.03	0.02	0.08	0.04	Broke on Extrusion	

	Natural Moisture Content/Atterberg Limits Summary BS 1377 : Part 2 : 1990 : Clause 3	Job Ref
Location	Howth	P19188

Hole ID	Sample Ref	Depth (m)	Sample Type	Sample Description	MC	LL	PL	PI	% Pass 425
LB203	120mls	0	B		230				
LB203	150mls	0	B		267				
LB203	B1	0	B		131				
LB203	B2	0	B		113				
LB203	B3	0	B		124				
LB203	B4	0	B		125				
LB203	B5	0	B		119				
LB203	Binder	0	B		199				
LB203	C2	0	B	Slightly sandy slightly gravelly SILT	116	94	56	38	97.5
LB203	Composite	0	D		118				
LB203	sed mix	0	B		391				
LB204	B1	0	B		95				
LB204	B2	0	B		102				
LB204	B3	0	B		97				
LB204	B4	0	B		92				
LB204	B5	0	B		19				
LB204	Binder	0	B		124				
LB204	C2	0	B	Slightly sandy slightly gravelly SILT	73	80	50	30	90.1
LB204	Composite	0	D		96				
LB204	sed mix	0	B		365				

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

Job Ref

P19188

Borehole / Pit
No

LB203

Location

Howth

Sample No

C2

Depth

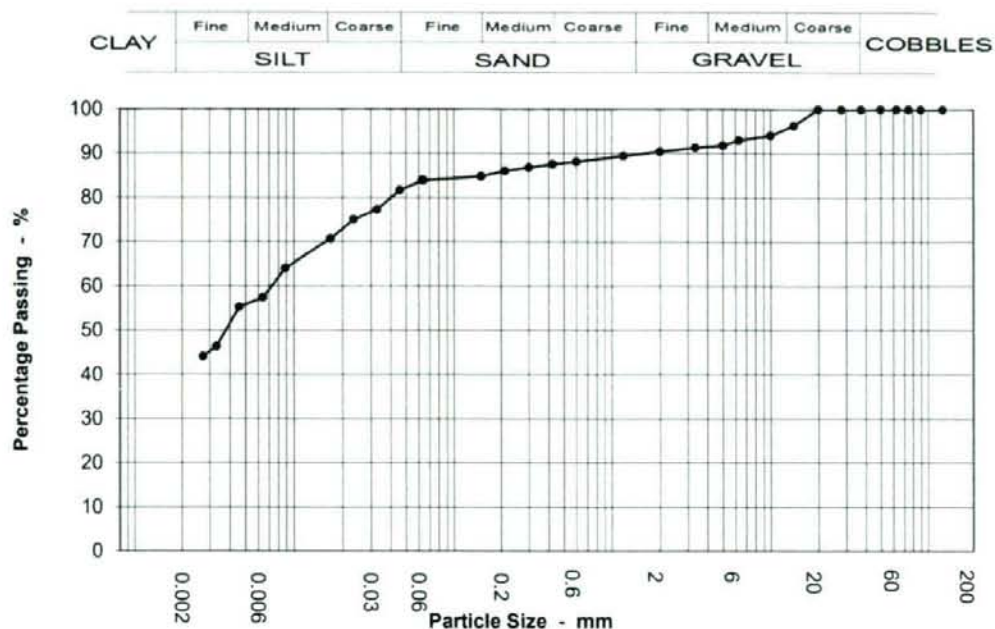
0.00 m

Soil Description

Slightly sandy slightly gravelly SILT

Sample type

B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.064	84
90	100	0.046	82
75	100	0.033	77
63	100	0.023	75
50	100	0.017	71
37.5	100	0.009	64
28	100	0.006	57
20	100	0.005	55
14	96	0.003	46
10	94	0.003	44
6.3	93	0.001	33
5	92		
3.35	91		
2	90		
1.18	89		
0.6	88		
0.425	87		
0.3	87		
0.212	86		
0.15	85		
0.063	84		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.5
Sedimentation	Clause 9.5

Sample Proportions	
Cobbles	0.0
Gravel	10.0
Sand	6.0
Silt	45.0
Clay	39.0

Grading Analysis	
D100	20.00
D60	0.01
D10	
Uniformity Coefficient	

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

Job Ref

P19188

Borehole / Pit
No

LB204

Location

Howth

Sample No

C2

Depth

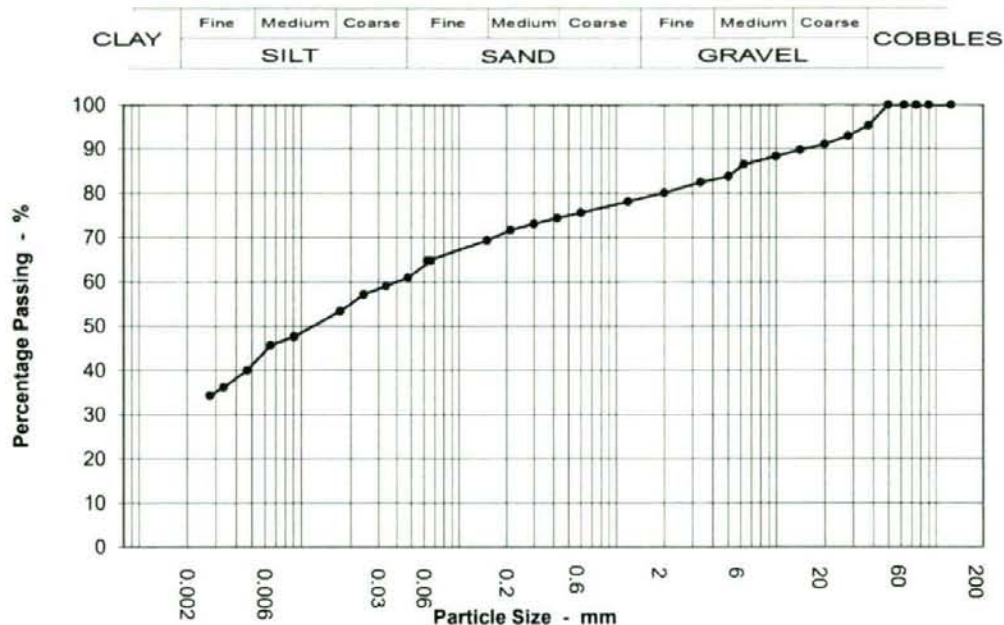
0.00 m

Soil Description

Slightly sandy slightly gravelly SILT

Sample type

B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.066	65
90	100	0.048	61
75	100	0.034	59
63	100	0.024	57
50	100	0.017	53
37.5	95	0.009	48
28	93	0.006	46
20	91	0.005	40
14	90	0.003	36
10	88	0.003	34
6.3	86	0.001	29
5	84		
3.35	82		
2	80		
1.18	78		
0.6	76		
0.425	74		
0.3	73		
0.212	72		
0.15	69		
0.063	65		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.5
Sedimentation	

Sample Proportions	
Cobbles	0.0
Gravel	20.0
Sand	15.0
Silt	33.0
Clay	31.0

Grading Analysis	
D100	50.00
D60	0.04
D10	
Uniformity Coefficient	

PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

Job Ref

P19188

Borehole / Pit
No

LB207

Location

Howth

Sample No

C2

Depth

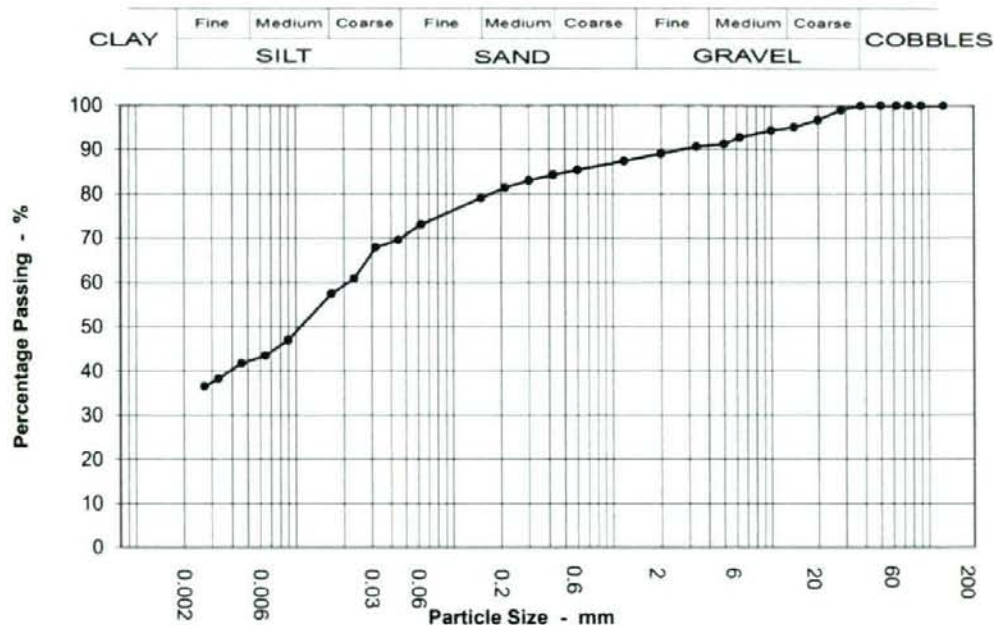
0.00 m

Soil Description

Slightly gravelly slightly sandy SITL

Sample type

B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.062	73
90	100	0.045	70
75	100	0.032	68
63	100	0.023	61
50	100	0.017	57
37.5	100	0.009	47
28	99	0.006	43
20	97	0.005	42
14	95	0.003	38
10	94	0.003	37
6.3	93	0.001	30
5	91		
3.35	91		
2	89		
1.18	87		
0.6	85		
0.425	84		
0.3	83		
0.212	81		
0.15	79		
0.063	73		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.5
Sedimentation	Clause 9.5

Sample Proportions	
Cobbles	0.0
Gravel	11.0
Sand	16.0
Silt	40.0
Clay	33.0

Grading Analysis	
D100	37.50
D60	0.02
D10	
Uniformity Coefficient	



The right chemistry to deliver results

Chemtest Ltd.

Depot Road

Newmarket

CB8 0AL

Tel: 01638 606070

Email: info@chemtest.com

Final Report

Report No.: 20-02547-1
Initial Date of Issue: 30-Jan-2020
Client: Priority Geotechnical Ltd
Client Address: Unit 12
Owenacurra Business Park
Midleton
County Cork
Ireland
Contact(s): Colette Kelly
Project: P19188 Howth
Quotation No.:
Order No.: 12451
No. of Samples: 6
Turnaround (Wkdays): 7
Date Approved: 30-Jan-2020
Approved By:
Details: Darrell Hall, Director

Date Received: 28-Jan-2020

Date Instructed: 28-Jan-2020

Results Due: 05-Feb-2020



Project: P19188 Howth

Client: Priority Geotechnical Ltd

Quotation No.:

Order No.: 12451

Client Sample Ref.:

Sample Location:

Sample Type:

Date Sampled:

Accred. SOP Units LOD

N 2030 % 0.020 50

U 2010 4.0

U 2610 % 0.10 10

U 2625 % 0.40 3.3

Determinand

Moisture

pH

LOI

Organic Matter

Results - Soil

Chemtest Job No.:	20-02547	20-02547	20-02547	20-02547	20-02547	20-02547	20-02547	20-02547	20-02547
Chemtest Sample ID.:	959683	959684	959685	959686	959687	959688	959689	959690	959691
Client Sample Ref.:	B1	C1	B2	C1	B4	C1	B4	C1	C1
Sample Location:	LB203	LB203	LB204	LB204	LB207	LB207	LB207	LB207	LB207
Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Date Sampled:	23-Jan-2020	23-Jan-2020	23-Jan-2020	23-Jan-2020	23-Jan-2020	23-Jan-2020	23-Jan-2020	23-Jan-2020	23-Jan-2020
Accred. SOP Units LOD									
N 2030 %	0.020	49	46	40	48	43	48	43	43
U 2010	4.0	8.1	8.6	8.6	9.3	7.9	9.3	7.9	7.9
U 2610 %	0.10	10	9.3	9.3	9.3	6.9	9.3	6.9	6.9
U 2625 %	0.40	3.5	4.3	2.9	2.9	2.6	2.9	2.9	2.6
Determinand									
Moisture									
pH									
LOI									
Organic Matter									

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	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.
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.

Report Information

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- U/S Unsuitable Sample
- N/E not evaluated
- < "less than"
- > "greater than"

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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 45 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



Final Report

Report No.: 20-03433-1
Initial Date of Issue: 19-Feb-2020
Client: Priority Geotechnical Ltd
Client Address: Unit 12
 Owenacurra Business Park
 Midleton
 County Cork
 Ireland

Contact(s): Colette Kelly
Project: P19188 Howth

Quotation No.: **Date Received:** 04-Feb-2020

Order No.: 12451 **Date Instructed:** 05-Feb-2020

No. of Samples: 3 **Results Due:** 13-Feb-2020

Turnaround (Wkdays): 7

Date Approved: 14-Feb-2020

Approved By:

Details: Glynn Harvey, Laboratory Manager

Chemtest
 The right chemistry to deliver results
 Chemtest Ltd.
 Depot Road
 Newmarket
 CB8 0AL
 Tel: 01638 606070
 Email: info@chemtest.com



The right chemistry to deliver results

Results - Leachate

Client: Priority Geotechnical Ltd		Chemtest Job No.:	20-03433	20-03433	20-03433
Quotation No.:		Chemtest Sample ID.:	963611	963612	963613
Order No. - 12451		Client Sample Ref.:	C1	C1	C1
		Sample Location:	LB203	LB204	LB207
		Sample Type	SOIL	SOIL	SOIL
		Date Sampled	31-Jan-2020	31-Jan-2020	31-Jan-2020
Determinand	Accred.	SOP	Type	Units	LOD
Chloride	U	1220	10:1	mg/l	1.0
Sulphate	U	1220	10:1	mg/l	1.0
Calcium	U	1415	10:1	mg/l	5.0
Sodium	U	1415	10:1	mg/l	0.50
Arsenic (Dissolved)	U	1450	10:1	µg/l	1.0
Cadmium (Dissolved)	U	1450	10:1	µg/l	0.060
Chromium (Dissolved)	U	1450	10:1	µg/l	1.0
Copper (Dissolved)	U	1450	10:1	µg/l	1.0
Mercury (Dissolved)	U	1450	10:1	µg/l	0.50
Nickel (Dissolved)	U	1450	10:1	µg/l	1.0
Lead (Dissolved)	U	1450	10:1	µg/l	1.0
Selenium (Dissolved)	U	1450	10:1	µg/l	1.0
Tin (Dissolved)	U	1450	10:1	µg/l	1.0
Vanadium (Dissolved)	U	1450	10:1	µg/l	1.0
Zinc (Dissolved)	U	1450	10:1	µg/l	1.0
Dibutyl Tin	N	1730	10:1	µg/l	0.050
Tributyl Tin	N	1730	10:1	µg/l	0.050

Project: P19188 Howth

Client: Priority Geotechnical Ltd	Chemtest Job No.:	20-03433	20-03433	20-03433
Quotation No.:	Chemtest Sample ID.:	963611	963612	963613
Order No.: 12451	Client Sample Ref.:	C1	C1	C1
	Sample Location:	LB203	LB204	LB207
	Sample Type:	SOIL	SOIL	SOIL
	Date Sampled:	31-Jan-2020	31-Jan-2020	31-Jan-2020
Determinand	Accred.	SOP	Units	LOD
Moisture	N	2030	%	0.020
Sulphate (2:1 Water Soluble) as SO ₄	U	2120	g/l	0.010
Chloride (Water Soluble)	U	2220	g/l	0.010
Calcium	N	2400	mg/l	20
Sodium	N	2400	mg/l	2.0
Arsenic	U	2450	mg/kg	1.0
Cadmium	U	2450	mg/kg	0.10
Chromium	U	2450	mg/kg	1.0
Tin	N	2450	mg/kg	5.0
Copper	U	2450	mg/kg	0.50
Mercury	U	2450	mg/kg	0.10
Nickel	U	2450	mg/kg	0.50
Lead	U	2450	mg/kg	0.50
Selenium	U	2450	mg/kg	0.20
Vanadium	U	2450	mg/kg	5.0
Zinc	U	2450	mg/kg	0.50
Dibutyl Tin	N	2730	µg/kg	10
Tributyl Tin	N	2730	µg/kg	10

SOP	Title	Parameters included	Method summary
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.
1415	Cations in Waters by ICP-MS	Sodium, Potassium, Calcium, Magnesium	Direct determination by inductively coupled plasma - mass spectrometry (ICP-MS).
1450	Metals in Waters by ICP-MS	Metals including: Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Mercury, Molybdenum, Nickel, Selenium, Tin, Vanadium, Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1730	Organic-Leads	Organic-Leads	Solvent extraction / GC/MS detection
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.
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron, Sulphate, Magnesium, Chromium	Aqueous extraction / ICP-OES
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measurement by Aquakem 600 Discrete Analyser using ionic nitrate / mercuric thiocyanate.
2400	Cations	Cations	ICP-MS
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.
2730	Organic-Leads	Organic-Leads	Solvent extraction / GC/MS detection
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	Compliance test for Leaching of Granular Waste Material and Sludge

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Sediment Molded Sample Testing	
Type	Nr.
UCS 7 Day	39
UCS 28 Day	39
UCS 76 Day	27
UCS 90 Day	27
UCS 120 Day	27
Permeability testing in triaxial cell 28 days	13
Monolithic Tank Test 14 days	104
Monolithic Tank Test 28 days	104
Monolithic Tank Test 60 days	56
Monolithic Tank Test 90 days	56
Batch leachate testing	23



Laboratory Report

GSTL

GEO Site & Testing Services Ltd

Permeability in a Triaxial Cell

BS 1377 : Part 6 : 1990 Clause 6

Contract Number: 48237

Client Ref: P19188

Report Date: 07-04-2020

Client PO: 12726

Client **Priority Geotechnical Limited**
Unit 12
Owenacurra Business Park
Midleton
Co. Cork.

Contract Title: **Howth**
For the attention of: **Colette Kelly**

Date Received: 20-03-2020

Date Completed: 07-04-2020

Test Description

Determination of Permeability in a triaxial cell
PLEASE NOTE IT IS LIKELY THIS TEST WILL INCUR EXTRA OVER DAY CHARGES.

BS 1377 : 1990 - Part 6 : 6 - * UKAS

Extra Over days for Triaxial Permeability tests (4 Days Over)

Disposal of samples for job

Qty

13

52

1

Specimen Details

Borehole	TRP28
Sample No.	9
Depth	m
Date	02/04/2020
Disturbed / Undisturbed	U

Description of Specimen

Black silty stiff CLAY

Initial Specimen Conditions

Height	mm	178.00
Diameter	mm	104.00
Area	mm ²	8494.87
Volume	cm ³	1512.09
Mass	g	1747.80
Dry Mass	g	828.10
Density	Mg/m ³	1.16
Dry Density	Mg/m ³	0.55
Moisture Content	%	111.1
Voids Ratio		3.839
Specific Gravity	kN/m ³	2.65
(assumed/measured)		assumed

Final Specimen Conditions

Moisture Content	%	111.06
Density	Mg/m ³	1.16
Dry Density	Mg/m ³	0.55

Test Setup

Date started	24/03/2020
Date Finished	01/04/2020
Top Drain Used	y
Base Drain Used	y
Pressure System Number	PCELL 1
Cell Number	CCELL 1

Checked and Approved By

02/04/20
Date

Client Ref

P19188

Contract No

48237

Howth



Notes: Observations and Interpretations are outside the UKAS Accreditation
* - denotes test included in laboratory scope of accreditation
- denotes test carried out by approved contractor
@ - denotes non accredited tests

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 except in full, without the prior written approval of the laboratory.

Approved Signatories:

Emma Sharp (Office Manager) - Paul Evans (Quality/Technical Manager) - Richard John (Advanced Testing Manager)
Sean Penn (Administrative/Accounts Assistant) - Shaun Jones (Laboratory manager) - Wayne Honey (Administrative/Quality Assistant)

GEO Site & Testing Services Ltd

Unit 3-4, Heol Aur, Dafen Ind Estate, Dafen, Llanelli, Carmarthenshire SA14 8QN

Tel: 01554 784040 Fax: 01554 784041 info@gstl.co.uk gstl.co.uk

Permeability in a Triaxial Cell

BS 1377 : Part 6 : 1990 Clause 6

Specimen Details

Borehole	TRP28
Sample No.	9
Depth	m
Date	02/04/2020

Saturation

Cell Pressure Incr.	kPa	50.00
Back Pressure Incr.	kPa	48.00
Differential Pressure	kPa	2.00
Final Cell Pressure	kPa	300.00
Final Pore Pressure	kPa	300.00
Final B Value		0.96

Consolidation

Effective Pressure	kPa	100.00
Cell Pressure	kPa	300.00
Back Pressure	kPa	200.00
Excess Pore Pressure	kPa	100.00
Pore Pressure at End	kPa	200.00
Consolidated Volume	cm ³	1508.39
Consolidated Height	mm	177.85
Consolidated Area	mm ²	8481.01
Vol. Compressibility	m ³ /MN	697.3163
Consolidation Coef.	m ² /yr.	0.0245
Final Voids Ratio		3.827

Permeability

Cell Pressure	kPa	300.00
Effective Cell Pressure	kPa	100.00
Back Pressure Diff.	kPa	20.00
Mean Rate of Flow	ml/min	0.00037
Average Temperature	°C	20

Vertical Permeability $l\ m/s$

6.24×10^{-11}

D.P. Gans

Checked and Approved By

02/04/20
Date

Client Ref
P19188
Contract No
48237



Howth

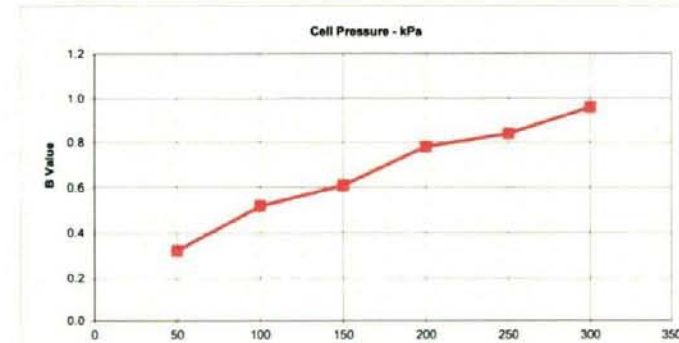
Permeability in a Triaxial Cell

BS 1377 : Part 6 : 1990 Clause 6

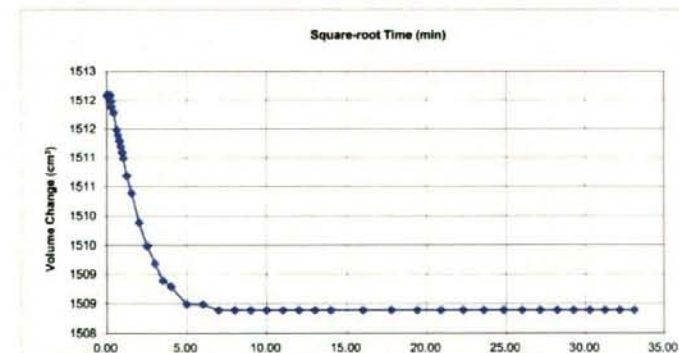
Specimen Details

Borehole	TRP28
Sample No.	9
Depth	m
Date	02/04/2020

Saturation Stage



Consolidation Stage



D.P. Gans

Checked and Approved By

02/04/20
Date

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Howth