

## **Appendix 13.1B**

Arklow SI Causeway 2018



**CAUSEWAY**  
— GEOTECH

## Arklow Sewerage Scheme - Marine Outfall Site Investigation

Client: Irish Water

Client's Representative: Byrne Looby ARUP J.V

Report No.: 17-0167

Date: January 2018

Status: Final for Issue





**Project No.:** 17-0167

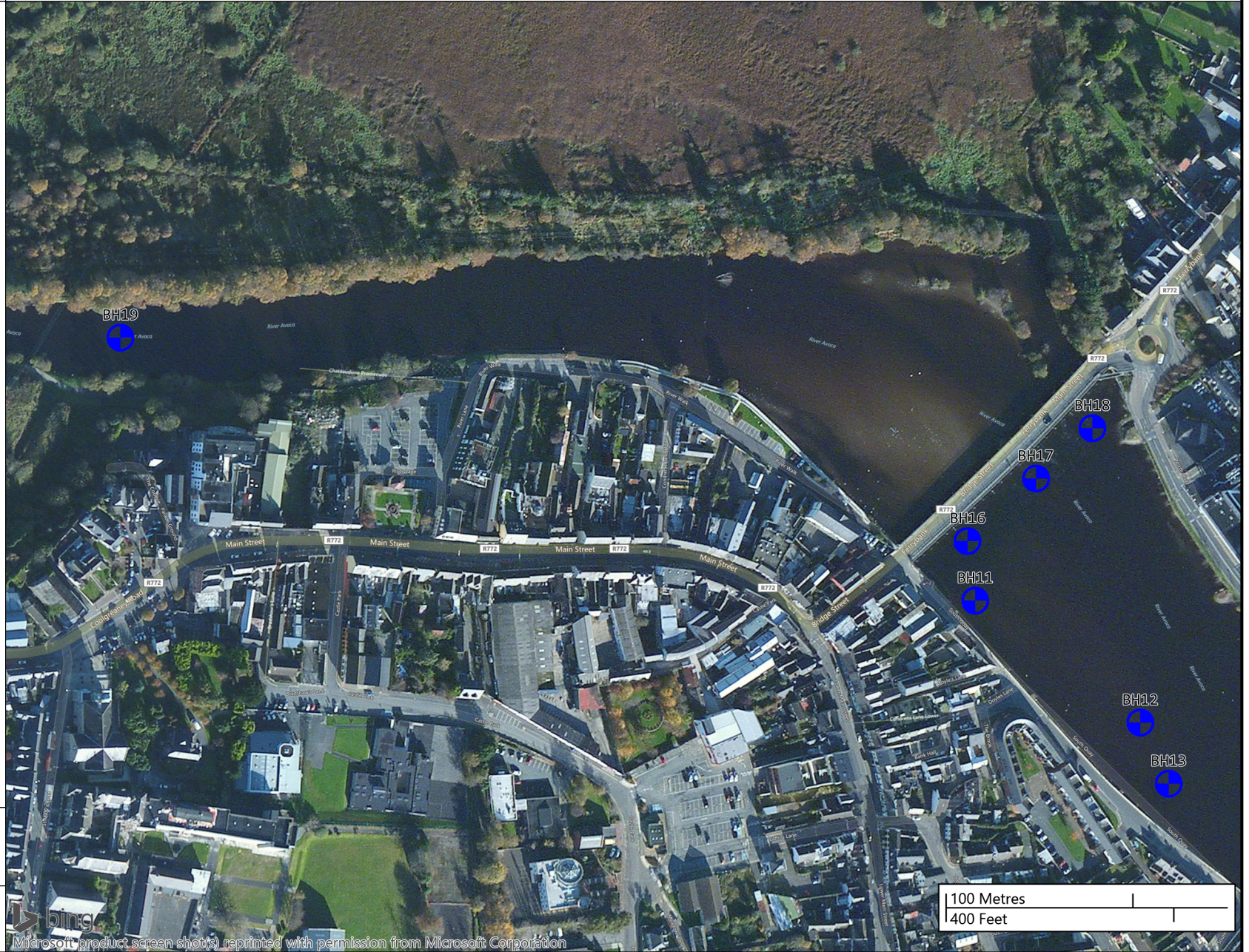
**Client:** Irish Water

**Project Name:** Arklow Sewerage Scheme Marine Outfall GI

**Client's Representative:** Byrne Looby ARUP J.V.

**Legend Key**

- ⊕ Locations By Type - CP
- ⊗ Locations By Type - CP+RC



**Title:**  
Exploratory Hole Location Plan

**Last Revised:**  
22/11/2017

**Scale:**  
1:3000







**Project No.:** 17-0167

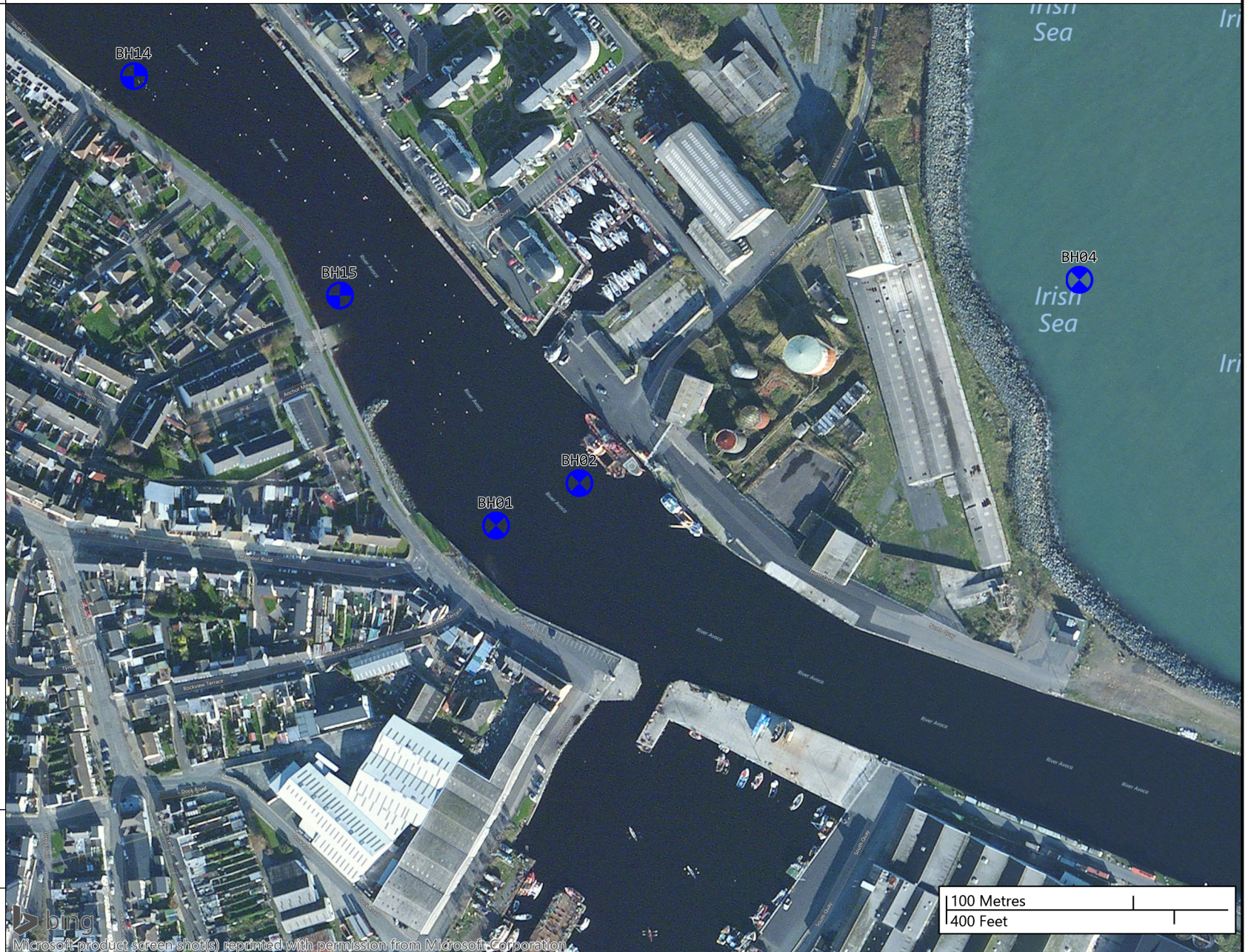
**Client:** Irish Water

**Project Name:** Arklow Sewerage Scheme Marine Outfall GI

**Client's Representative:** Byrne Looby ARUP J.V.

**Legend Key**

-  Locations By Type - CP
-  Locations By Type - CP+RC



**Title:**  
Exploratory Hole Location Plan

**Last Revised:**  
22/11/2017

**Scale:**  
1:3000

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100 Metres  
400 Feet





**CAUSEWAY**  
GEOTECH

<b>Project No.:</b> 17-0167		<b>Project Name:</b> Arklow Sewerage Scheme Marine Outfall GI		<b>Borehole No.:</b> BH01
<b>Coordinates:</b> 325103.16 E		<b>Client:</b> Irish Water		Sheet 1 of 3
<b>Method</b> Cable Percussion Rotary Drilling		<b>Plant Used</b> Dando 3000 Comacchio 405		<b>Scale:</b> 1:50
<b>Top</b> 0.00		<b>Base</b> 20.50		<b>Driller:</b> CC+TA
<b>Ground Level:</b> -3.86 mOD		<b>Dates:</b> 01/09/2017 - 05/09/2017		<b>Logger:</b> SG

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.00 - 1.00	B1							Black very gravelly silty fine to coarse SAND. Gravel is subrounded fine to medium.		
0.50	ES28					(1.00)				
1.00	D2				-4.86	1.00		Loose to medium dense black sandy slightly silty subrounded fine to coarse GRAVEL. Sand is fine to coarse.		
1.00 - 2.00	B3									
1.00 - 1.45	SPT (S)	1.00	Dry	N=9 (1,2/2,2,2,3)						
1.50	ES29					(1.80)				
2.00	D4									
2.00 - 2.45	SPT (S)	2.00	Dry	N=12 (2,2/3,3,3,3)						
2.50	ES30									
2.80 - 3.50	B5				-6.66	2.80		Medium dense greyish brown very gravelly slightly silty fine to coarse SAND. Gravel is subrounded fine.		
3.00	D6									
3.00 - 3.45	SPT (S)	3.00	Dry	N=14 (2,3/4,4,3,3)						
3.50	ES31					(1.70)				
3.50 - 4.50	B7									
4.00	D8									
4.00 - 4.45	SPT (S)	4.00	Dry	N=18 (3,3/4,4,5,5)						
4.50	ES32				-8.36	4.50		Firm brown slightly sandy slightly gravelly SILT. Sand is fine to coarse. Gravel is subrounded fine.		
4.50 - 4.80	B9					(0.30)				
4.80 - 5.50	B10				-8.66	4.80		Medium dense brown very sandy slightly silty subrounded fine to medium GRAVEL. Sand is fine to coarse. Locally thin bands of brown silt.		
5.00 - 5.45	SPT (S)	5.00	Dry	N=12 (1,2/2,3,3,4)						
5.50	ES33					(1.10)				
5.80 - 7.00	B11									
6.00 - 6.45	UT34	6.00	Dry	Ublow=37 100%	-9.76	5.90		Very stiff greyish brown slightly sandy slightly gravelly SILT. Sand is fine to coarse. Gravel is subrounded fine to medium.		
6.50	D12									
7.00	D13									
7.00 - 7.45	SPT (S)	7.00	Dry	N=8 (1,2/2,2,2,2)						
7.60 - 9.00	B14				-11.46	7.60		Firm brownish grey slightly sandy slightly gravelly SILT. Sand is fine to coarse. Gravel is subrounded fine.		
8.00 - 8.45	UT35	8.00	Dry	Ublow=59 100%						
8.50	D15									
8.70 - 10.00	B16				-12.56	8.70		Medium dense brownish grey very silty fine to coarse SAND.		
9.00	D17									
9.00 - 9.45	SPT (S)	9.00	Dry	N=12 (1,1/2,3,3,4)						
10.00 - 10.35	UT36	10.0	Dry	Ublow=61 80%	-13.96	10.10		Soft grey slightly sandy SILT. Sand is fine to coarse.		
10.10 - 10.50	B18	0				(0.40)				

<b>Remarks</b> Deck to Bed = 6.20m  Terminated at scheduled depth	<b>Core Barrel</b> SK6L	<b>Water Strikes</b>				<b>Chiselling Details</b>		
		Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
	<b>Flush Type</b>	<b>Water Added</b>		<b>Casing Details</b>				
		From (m)	To (m)	To (m)	Diam (mm)			





**CAUSEWAY**  
GEOTECH

<b>Project No.:</b> 17-0167				<b>Project Name:</b> Arklow Sewerage Scheme Marine Outfall GI				<b>Borehole No.:</b> BH01	
<b>Coordinates:</b> 325103.16 E				<b>Client:</b> Irish Water				Sheet 2 of 3	
<b>Method</b> Cable Percussion Rotary Drilling		<b>Plant Used</b> Dando 3000 Comacchio 405		<b>Top</b> 0.00		<b>Base</b> 20.50		<b>Scale:</b> 1:50	
173070.75 N				<b>Client's Representative:</b> Byrne Looby ARUP J.V.				<b>Driller:</b> CC+TA	
<b>Ground Level:</b> -3.86 mOD				<b>Dates:</b> 01/09/2017 - 05/09/2017				<b>Logger:</b> SG	

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
10.50	D19				-14.36	10.50	XXXX	Soft grey slightly sandy SILT. Sand is fine to coarse.		
10.50 - 12.00	B20					(2.20)		Medium dense grey very silty fine to coarse SAND with thin bands of greyish brown silt.		
11.00 - 11.45	SPT (S) N=13	11.0 0	Dry	N=13 (1,2/3,3,3,4)						
12.00 - 12.45	SPT (S) N=12	12.0 0	Dry	N=12 (2,3/3,3,3,3)						
12.70 - 13.50	B21				-16.56	12.70		Medium dense to dense greyish brown very sandy silty subrounded fine to coarse GRAVEL with low cobble content. Sand is fine to coarse.		
13.00 - 13.45	SPT (S) N=21	13.0 0	Dry	N=21 (1,2/4,5,5,7)						
14.00	D22					(4.30)				
14.00 - 15.00	B23									
14.00 - 14.45	SPT (S) N=28	14.0 0	Dry	N=28 (3,4/6,6,7,9)						
15.00	D24									
15.00 - 16.00	B25									
15.00 - 15.45	SPT (S) N=31	15.0 0	Dry	N=31 (6,7/9,7,7,8)						
16.00 - 17.00	B26									
16.00 - 16.45	SPT (S) N=31	16.0 0	Dry	N=31 (4,6/7,8,8,8)						
17.00 - 17.45	SPT (S) N=26	17.0 0	Dry	N=26 (2,4/5,5,7,9)	-20.86	17.00		Medium dense to dense brownish grey very sandy very silty subrounded fine to medium GRAVEL. Sand is fine to coarse.		
17.30 - 18.00	B37									
18.00	D38					(3.50)				
18.00 - 19.00	B39									
18.00 - 18.45	SPT (S) N=18	18.0 0	Dry	N=18 (2,3/4,4,5,5)						
19.00	D40									
19.00 - 20.00	B41									
19.00 - 19.45	SPT (S) N=32	19.0 0	Dry	N=32 (3,4/7,8,9,8)						
20.00	D42									
20.00 - 20.45	SPT (S) N=29	20.0 0	Dry	N=29 (2,3/5,7,8,9)						
20.20 - 20.50	B27				-24.36	20.50		Very dense greyish brown gravelly slightly silty fine to coarse SAND. Gravel		
	TCR	SCR	RQD	FI						

<b>Remarks</b> Deck to Bed = 6.20m  Terminated at scheduled depth	<b>Core Barrel</b> SK6L	<b>Water Strikes</b>				<b>Chiselling Details</b>		
		Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
	<b>Flush Type</b>	<b>Water Added</b>		<b>Casing Details</b>				
		From (m)	To (m)	To (m)	Diam (mm)			
			15.00	250				





**CAUSEWAY**  
GEOTECH

<b>Project No.:</b> 17-0167	<b>Project Name:</b> Arklow Sewerage Scheme Marine Outfall GI	<b>Borehole No.:</b> BH01
<b>Coordinates:</b> 325103.16 E	<b>Client:</b> Irish Water	Sheet 3 of 3
<b>Method</b> Cable Percussion Rotary Drilling	<b>Plant Used</b> Dando 3000 Comacchio 405	<b>Top</b> 0.00
<b>Base</b> 20.50 25.00	<b>Client's Representative:</b> Byrne Looby ARUP J.V.	<b>Scale:</b> 1:50
<b>Ground Level:</b> -3.86 mOD	<b>Dates:</b> 01/09/2017 - 05/09/2017	<b>Driller:</b> CC+TA
		<b>Logger:</b> SG

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
21.00 - 21.45					N=50 (6,6/7,13,14,16)				is subrounded fine to medium.		
23.00 - 23.40					N=50 (6,7/50 for 250mm)		(4.50)				
25.00 - 25.34					50 (6,9/50 for 185mm)	-28.86	25.00		End of Borehole at 25.00m		

<b>Remarks</b> Deck to Bed = 6.20m  Terminated at scheduled depth	<b>Core Barrel</b> SK6L	<b>Water Strikes</b>				<b>Chiselling Details</b>		
		Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
	<b>Flush Type</b>	<b>Water Added</b>		<b>Casing Details</b>				
		From (m)	To (m)	To (m)	Diam (mm)			
			24.80	200				





**CAUSEWAY**  
GEOTECH

<b>Project No.:</b> 17-0167				<b>Project Name:</b> Arklow Sewerage Scheme Marine Outfall GI				<b>Borehole No.:</b> BH02	
<b>Coordinates:</b> 325147.66 E				<b>Client:</b> Irish Water				Sheet 1 of 3	
<b>Method</b> Cable Percussion Rotary Drilling		<b>Plant Used</b> Dando 3000 Comacchio 405		<b>Top</b> 0.00 18.00		<b>Base</b> 18.00 25.00		<b>Scale:</b> 1:50	
173094.73 N				<b>Client's Representative:</b> Byrne Looby ARUP J.V.				<b>Driller:</b> CC+SS	
<b>Ground Level:</b> -1.28 mOD				<b>Dates:</b> 29/08/2017 - 31/08/2017				<b>Logger:</b> SG	

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.00 - 1.00	B1							Black very sandy slightly silty subrounded to rounded fine to coarse GRAVEL. Sand is fine to coarse.		
0.50	ES28					(1.00)				
1.00	D14									
1.00 - 2.00	B2					-2.28	1.00	Soft black slightly gravelly very sandy SILT with organic matter. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium.		
1.00 - 1.45	SPT (S)	1.00		N=8 (1,2/2,2,2,2)						
1.50	N=8 ES29					(1.30)				
2.00	D15									
2.00 - 2.45	SPT (S)	2.00		N=5 (1,1/1,1,1,2)						
2.30 - 3.00	N=5 B3					-3.58	2.30	Loose black very sandy slightly silty subrounded to rounded fine to coarse GRAVEL. Sand is fine to coarse.		
2.50	ES30									
3.00	D16									
3.00 - 4.00	B4									
3.00 - 3.45	SPT (S)	3.00		N=8 (1,2/1,2,2,3)						
3.50	N=8 ES31					(2.60)				
4.00	D17									
4.00 - 4.45	SPT (S)	4.00		N=10 (1,1/2,2,3,3)						
4.50	N=10 ES32									
4.90 - 6.00	B5									
5.00 - 5.45	UT24			Ublow=76 100%		-6.18	4.90	Firm brown CLAY.		
5.50	ES33					(1.10)				
6.00	D18									
6.00 - 6.40	B6									
6.00 - 6.45	SPT (S)	6.00		N=15 (1,2/3,3,4,5)				Medium dense brown very sandy silty subangular to subrounded fine to medium GRAVEL. Sand is fine to coarse.		
6.40 - 7.00	N=15 B7					-7.88	6.60	Firm to stiff brown CLAY.		
7.00 - 7.45	UT25			Ublow=65 100%						
7.00 - 8.00	B8					-8.18	6.90	Firm brownish grey slightly sandy CLAY. Sand is fine to medium.		
7.50	D19									
8.00 - 8.45	SPT (S)	8.00		N=7 (2,1/2,1,2,2)						
8.00 - 8.45	N=7					(2.10)				
9.00 - 10.00	B9									
9.00 - 9.45	UT26			Ublow=30 0%		-10.28	9.00	Grey silty fine SAND.		
9.00 - 9.45	UT26									
10.00 - 11.00	B10									
10.00 - 10.45	SPT (S)	10.0		N=8 (1,2/2,2,2,2)				Firm brownish grey slightly sandy CLAY. Sand is fine to medium.		
10.00 - 10.45	N=8	0				-11.08	9.80			

<b>Remarks</b> Deck to bed = 5.30m  Terminated at scheduled depth	<b>Core Barrel</b>	<b>Water Strikes</b>				<b>Chiselling Details</b>		
		Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
	<b>Flush Type</b>	<b>Water Added</b>		<b>Casing Details</b>		11.00	12.80	01:00
		From (m)	To (m)	To (m)	Diam (mm)			
		2.50	15.00					



**CAUSEWAY**  
GEOTECH

<b>Project No.:</b> 17-0167				<b>Project Name:</b> Arklow Sewerage Scheme Marine Outfall GI				<b>Borehole No.:</b> BH02	
<b>Coordinates:</b> 325147.66 E				<b>Client:</b> Irish Water				Sheet 2 of 3	
<b>Method</b> Cable Percussion Rotary Drilling		<b>Plant Used</b> Dando 3000 Comacchio 405		<b>Top</b> 0.00		<b>Base</b> 18.00		<b>Scale:</b> 1:50	
173094.73 N				<b>Client's Representative:</b> Byrne Looby ARUP J.V.				<b>Driller:</b> CC+SS	
<b>Ground Level:</b> -1.28 mOD				<b>Dates:</b> 29/08/2017 - 31/08/2017				<b>Logger:</b> SG	

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
10.50	D20							Firm brownish grey slightly sandy CLAY. Sand is fine to medium.		
10.50 - 10.95	UT27			Ublow=59 100%		(1.70)				
11.00	D21									
11.00 - 11.45	SPT (S) N=15	11.0	0	N=15 (2,2/3,3,3,6)						
11.50 - 12.50	B11				-12.78	11.50		Medium dense brown very sandy silty subangular to subrounded fine to coarse GRAVEL with low cobble and boulder content. Sand is fine to coarse. Cobbles and boulders are subrounded to rounded.		
12.00 - 12.45	SPT (S) N=23	12.0	0	N=23 (3,4/6,5,6,6)		(2.25)				
13.00 - 14.00	B12									
13.00 - 13.45	SPT (S) N=24	13.0	0	N=24 (2,4/5,6,6,7)						
14.00	D22				-15.02	13.75		Dense brown sandy subangular to subrounded fine to coarse GRAVEL with medium cobble and boulder content. Sand is fine to coarse. Cobbles and boulders are subangular to subrounded.		
14.00 - 15.00	B13									
14.00 - 14.45	SPT (S) N=39	14.0	0	N=39 (4,6/7,9,10,13)						
15.00	D23									
15.00 - 16.00	B35									
15.00 - 15.45	SPT (S) N=34	15.0	0	N=34 (6,9/7,8,8,11)		(3.15)				
16.00	D34									
16.00 - 16.45	SPT (S) N=34			N=34 (4,6/7,9,8,10)						
16.90 - 17.50	B37				-18.18	16.90		Dense grey sandy silty subangular to subrounded fine to coarse GRAVEL. Sand is fine to coarse.		
17.00	D36									
17.00 - 17.45	SPT (S) N=32	17.0	0	N=32 (4,6/7,7,8,10)		(1.10)				
18.00 - 18.05	SPT (C)	18.0	0	50 (25 for 25mm/50 for 25mm)		18.00		Amphibolite BOULDER.		
18.00 - 18.05					-19.68	18.40		Grey sandy silty subangular to subrounded fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subangular to subrounded predominantly of amphibolite.		
19.00 - 19.45				N=35 (5,6/8,8,9,10)						
19.00										
20.00 - 20.45				N=38 (5,7/9,8,10,11)						

<b>Remarks</b> Deck to bed = 5.30m  Terminated at scheduled depth	<b>Core Barrel</b>	<b>Water Strikes</b>				<b>Chiselling Details</b>		
		Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
	<b>Flush Type</b>	<b>Water Added</b>		<b>Casing Details</b>				
		From (m)	To (m)	To (m)	Diam (mm)			
			16.50	250				
			18.00	200				





**CAUSEWAY**  
GEOTECH

<b>Project No.:</b> 17-0167	<b>Project Name:</b> Arklow Sewerage Scheme Marine Outfall GI	<b>Borehole No.:</b> <b>BH02</b>
<b>Coordinates:</b> 325147.66 E	<b>Client:</b> Irish Water	Sheet 3 of 3
<b>Method</b> Cable Percussion Rotary Drilling	<b>Plant Used</b> Dando 3000 Comacchio 405	<b>Top</b> 0.00
<b>Base</b> 18.00	<b>Client's Representative:</b> Byrne Looby ARUP J.V.	<b>Scale:</b> 1:50
<b>Ground Level:</b> -1.28 mOD	<b>Dates:</b> 29/08/2017 - 31/08/2017	<b>Driller:</b> CC+SS
		<b>Logger:</b> SG

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
21.00 - 21.45					N=43 (6,6/10,11,10,12)				Grey sandy silty subangular to subrounded fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subangular to subrounded predominantly of amphibolite.		
22.00 - 22.45	0				N=42 (6,7/10,10,11,11)		(5.10)				
23.00 - 23.45					N=48 (7,7/11,12,13,12)						
23.50	80					-24.78	23.50		Medium strong to strong dark bluish grey AMPHIBOLITE recovered as subangular to subrounded fine to coarse GRAVEL and subrounded to rounded cobbles.		
25.00 - 25.26 25.00					50 (12,21/50 for 110mm)	-26.28	25.00		End of Borehole at 25.00m		

<b>Remarks</b> Deck to bed = 5.30m  Terminated at scheduled depth	<b>Core Barrel</b>	<b>Water Strikes</b>				<b>Chiselling Details</b>		
		Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
	<b>Flush Type</b>	<b>Water Added</b>		<b>Casing Details</b>				
		From (m)	To (m)	To (m)	Diam (mm)			



**CAUSEWAY**  
GEOTECH

<b>Project No.:</b> 17-0167	<b>Project Name:</b> Arklow Sewerage Scheme Marine Outfall GI	<b>Borehole No.:</b> BH11
<b>Coordinates:</b> 324730.75 E	<b>Client:</b> Irish Water	Sheet 1 of 2
<b>Method</b> Cable Percussion	<b>Plant Used</b> Dando 3000	<b>Top</b> 0.00
<b>Base</b> 10.70	<b>Client's Representative:</b> Byrne Looby ARUP J.V.	<b>Scale:</b> 1:50
<b>Ground Level:</b> -0.33 mOD	<b>Dates:</b> 02/11/2017	<b>Driller:</b> AH
		<b>Logger:</b> LN

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.50	D1 ES11							Medium dense grey very sandy slightly silty subangular to subrounded fine to coarse GRAVEL. Sand is fine to coarse.		
0.80 - 1.20	B19									
1.00 - 1.45	SPT (S) N=14			N=14 (3,3/3,4,3,4)						
1.50	D2 ES12							Medium dense grey sandy subangular to subrounded fine to coarse GRAVEL with low cobble content. Sand is medium to coarse. Cobbles are subangular to subrounded of mixed lithologies.		
1.80 - 2.20	B20					(4.00)				
2.00 - 2.45	SPT (C) N=19			N=19 (3,4/5,5,4,5)						
2.50	D3 ES13							Stiff grey slightly sandy slightly gravelly CLAY . Sand is fine to coarse. Gravel is subangular to subrounded fine.		
2.80 - 3.20	B21									
3.00 - 3.45	SPT (C) N=20			N=20 (4,5/5,5,4,6)						
3.50	D4 ES14							Stiff grey slightly sandy slightly silty CLAY . Sand is fine to coarse.		
3.80 - 4.20	B22									
4.00 - 4.45	SPT (C) N=30			N=30 (5,6/7,8,7,8)	-4.33	4.00				
4.50	D5 ES15							Dense grey sandy slightly silty subangular to subrounded fine to coarse GRAVEL with low cobble and boulder content. Sand is fine to coarse.		
4.80 - 5.20	B23					(1.40)				
5.00 - 5.45	SPT (C) N=23			N=23 (4,6/6,5,6,6)						
5.50	D6 ES16							Terminated at refusal on large boulder		
5.80 - 6.20	B24									
6.00 - 6.50	U17			Ublow=40 98%		(1.10)				
6.50	D7									
6.80 - 7.20	B25									
7.00 - 7.45	SPT (S) N=27			N=27 (5,6/6,7,6,8)	-6.83	6.50				
7.50	D8									
7.80 - 8.20	B26									
8.00 - 8.50	U18			Ublow=38 97%		(3.10)				
8.50	D9									
8.80 - 9.20	B27									
9.00 - 9.45	SPT (S) N=27			N=27 (5,7/6,6,7,8)						
9.50	D10									
9.80 - 10.20	B28				-9.93	9.60				

<b>Remarks</b> Drilled from floating platform   Terminated at refusal on large boulder	<b>Water Strikes</b>				<b>Chiselling Details</b>		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
	9.60	9.60	20	0.80	0.80	0.90	00:30
					10.50	10.70	01:00
<b>Water Added</b>		<b>Casing Details</b>					
From (m)	To (m)	To (m)	Diam (mm)				





**CAUSEWAY**  
GEOTECH

<b>Project No.:</b> 17-0167	<b>Project Name:</b> Arklow Sewerage Scheme Marine Outfall GI	<b>Borehole No.:</b> BH11
<b>Coordinates:</b> 324730.75 E	<b>Client:</b> Irish Water	Sheet 2 of 2
173452.99 N	<b>Client's Representative:</b> Byrne Looby ARUP J.V.	<b>Scale:</b> 1:50
<b>Ground Level:</b> -0.33 mOD	<b>Dates:</b> 02/11/2017	<b>Driller:</b> AH
		<b>Logger:</b> LN

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
10.00 - 10.45	SPT (S) N=49			N=49 (8,9,10,12,12,15)	-11.03	(1.10) 10.70		Cobbles and boulders are subrounded to rounded of mixed lithologies.		
								End of Borehole at 10.70m		

<b>Remarks</b> Drilled from floating platform   Terminated at refusal on large boulder	<b>Water Strikes</b>				<b>Chiselling Details</b>		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
					0.80	0.90	00:30
					10.50	10.70	01:00
	<b>Water Added</b>		<b>Casing Details</b>				
	From (m)	To (m)	To (m)	Diam (mm)			
			10.70	200			



**CAUSEWAY**  
GEOTECH

<b>Project No.:</b> 17-0167	<b>Project Name:</b> Arklow Sewerage Scheme Marine Outfall GI	<b>Borehole No.:</b> BH12
<b>Coordinates:</b> 324821.38 E	<b>Client:</b> Irish Water	Sheet 1 of 2
173389.74 N	<b>Client's Representative:</b> Byrne Looby ARUP J.V.	<b>Scale:</b> 1:50
<b>Ground Level:</b> -0.88 mOD	<b>Dates:</b> 24/08/2017	<b>Driller:</b> CC
		<b>Logger:</b> SG

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.00 - 1.00	B1							Medium dense brown very sandy slightly silty subangular to subrounded fine to medium GRAVEL. Sand is fine to coarse.		
0.50	ES21					(1.30)				
1.00	D10									
1.00 - 1.45	SPT (S) N=15	1.00		N=15 (2,3/3,4,4,4)	-2.18	1.30		Medium dense brown sandy slightly silty subangular to subrounded fine to medium GRAVEL. Sand is fine to coarse.		
1.30 - 2.00	B2									
1.50	ES22					(1.00)				
2.00	D11									
2.00 - 2.45	SPT (S) N=11	2.00		N=11 (1,1/2,3,3,3)	-3.18	2.30		Firm to stiff grey slightly sandy CLAY. Sand is fine to coarse.		
2.30 - 3.00	B3									
2.50	ES23									
3.00 - 3.45	UT18			Ublow=89 100%						
3.00 - 4.00	B4									
3.50	D12									
	ES24									
4.00	D13									
4.00 - 5.00	B5									
4.00 - 4.45	SPT (S) N=37	4.00		N=37 (5,6/7,8,9,13)						
4.50	ES25									
5.00 - 5.45	UT19			Ublow=83 100%						
5.50	D14					(6.10)				
	ES26									
5.50 - 6.50	B6									
6.50	D15									
6.50 - 6.95	SPT (S) N=32	6.50		N=32 (5,4/6,8,8,10)						
7.00 - 8.00	B7									
8.00 - 8.45	UT20			Ublow=61 100%						
8.40 - 9.50	B8				-9.28	8.40		Brown sandy silty subangular to subrounded fine GRAVEL. Sand is fine to coarse.		
8.50	D16					(1.10)				
9.50	D17									
9.50 - 10.50	B9				-10.38	9.50		Firm brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium.		
9.50 - 9.95	SPT (S) N=11	9.50		N=11 (2,2/2,3,3,3)		(1.00)				

<b>Remarks</b> Deck to Bed = 2.60m  Terminated at scheduled depth	<b>Water Strikes</b>				<b>Chiselling Details</b>		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hr:mm)
	<b>Water Added</b>		<b>Casing Details</b>				
	From (m)	To (m)	To (m)	Diam (mm)			
	1.50	9.50					





**CAUSEWAY**  
GEOTECH

<b>Project No.:</b> 17-0167	<b>Project Name:</b> Arklow Sewerage Scheme Marine Outfall GI	<b>Borehole No.:</b> BH12
<b>Coordinates:</b> 324821.38 E	<b>Client:</b> Irish Water	Sheet 2 of 2
173389.74 N	<b>Client's Representative:</b> Byrne Looby ARUP J.V.	<b>Scale:</b> 1:50
<b>Ground Level:</b> -0.88 mOD	<b>Dates:</b> 24/08/2017	<b>Driller:</b> CC
		<b>Logger:</b> SG

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
					-11.38	10.50		Firm brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium.		
								End of Borehole at 10.50m		

**Remarks**  
Deck to Bed = 2.60m

Terminated at scheduled depth

Water Strikes				Chiselling Details		
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hr:mm)
Water Added		Casing Details				
From (m)	To (m)	To (m)	Diam (mm)			
		10.50	200			



**CAUSEWAY**  
GEOTECH

<b>Project No.:</b> 17-0167	<b>Project Name:</b> Arklow Sewerage Scheme Marine Outfall GI	<b>Borehole No.:</b> BH13
<b>Coordinates:</b> 324837.57 E	<b>Client:</b> Irish Water	Sheet 1 of 2
<b>Method</b> Cable Percussion	<b>Plant Used</b> Dando 3000	<b>Top</b> 0.00
<b>Base</b> 10.50	<b>Client's Representative:</b> Byrne Looby ARUP J.V.	<b>Scale:</b> 1:50
<b>Ground Level:</b> -0.95 mOD	<b>Dates:</b> 23/08/2017	<b>Driller:</b> CC
		<b>Logger:</b> SG

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.00 - 1.00	B1							Medium dense brown sandy slightly silty subangular to subrounded fine GRAVEL. Sand is fine to coarse.		
0.50	ES20					(1.60)				
1.00	D9									
1.00 - 1.45	SPT (S) N=17	1.00		N=17 (2,3/4,4,4,5)						
1.50	ES21									
1.60 - 2.00	B2				-2.55	1.60		Medium dense brown very sandy slightly silty subangular to subrounded fine to medium GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subrounded.		
2.00	D10									
2.00 - 2.45	SPT (S) N=23	2.00		N=23 (3,4/5,6,6,6)		(1.30)				
2.50	ES22									
2.90 - 4.00	B3									
3.00 - 3.45	UT17			Ublow=86 100%	-3.85	2.90		Stiff grey slightly sandy CLAY. Sand is fine to coarse.		
3.50	D11									
	ES23									
4.00	D12									
4.00 - 5.00	B4									
4.00 - 4.45	SPT (S) N=43	4.00		N=43 (5,5/8,8,12,15)						
4.50	ES24									
5.00 - 5.45	UT18			Ublow=83 100%		(4.10)				
5.50	D13									
	ES25									
5.50 - 6.50	B5									
6.50	D14									
6.50 - 6.95	SPT (S) N=37	6.50		N=37 (4,6/6,8,10,13)						
7.00 - 8.00	B6				-7.95	7.00		Stiff grey CLAY.		
8.00 - 8.45	UT19			Ublow=31 100%		(1.90)				
8.50	D15									
8.90 - 9.40	B7				-9.85	8.90		Brown sandy silty subangular to subrounded fine to coarse GRAVEL. Sand is fine to coarse.		
9.40 - 10.50	B8									
9.50	D16									
9.50 - 9.95	SPT (S) N=10	9.50		N=10 (1,2/2,2,3,3)	-10.35	9.40		Firm slightly sandy CLAY. Sand is fine to coarse.		

<b>Remarks</b> Deck to Bed = 2.50m  Terminated at scheduled depth	<b>Water Strikes</b>				<b>Chiselling Details</b>		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hr:mm)
	<b>Water Added</b>		<b>Casing Details</b>				
	From (m)	To (m)	To (m)	Diam (mm)			
	1.60	9.00					



**CAUSEWAY**  
GEOTECH

<b>Project No.:</b> 17-0167	<b>Project Name:</b> Arklow Sewerage Scheme Marine Outfall GI	<b>Borehole No.:</b> BH13
<b>Coordinates:</b> 324837.57 E	<b>Client:</b> Irish Water	Sheet 2 of 2
173357.32 N	<b>Client's Representative:</b> Byrne Looby ARUP J.V.	<b>Scale:</b> 1:50
<b>Ground Level:</b> -0.95 mOD	<b>Dates:</b> 23/08/2017	<b>Driller:</b> CC
		<b>Logger:</b> SG

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
					-11.45	10.50		Firm slightly sandy CLAY. Sand is fine to coarse.		
								End of Borehole at 10.50m		

<b>Remarks</b> Deck to Bed = 2.50m  Terminated at scheduled depth	<b>Water Strikes</b>				<b>Chiselling Details</b>		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
	<b>Water Added</b>		<b>Casing Details</b>				
From (m)	To (m)	To (m)	Diam (mm)				
		10.50	200				



**CAUSEWAY**  
GEOTECH

<b>Project No.:</b> 17-0167	<b>Project Name:</b> Arklow Sewerage Scheme Marine Outfall GI	<b>Borehole No.:</b> BH14
<b>Coordinates:</b> 324901.92 E	<b>Client:</b> Irish Water	Sheet 1 of 2
173307.18 N	<b>Client's Representative:</b> Byrne Looby ARUP J.V.	<b>Scale:</b> 1:50
<b>Ground Level:</b> -1.55 mOD	<b>Dates:</b> 02/08/2017	<b>Driller:</b> CC
		<b>Logger:</b> SG

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.00 - 0.90	B1							Black very sandy silty subangular to subrounded fine to medium GRAVEL. Sand is fine to coarse.		
0.25	ES19					(0.90)				
0.75	ES20									
0.90 - 1.50	B2				-2.44	0.90		Medium dense black very sandy slightly silty subangular to subrounded fine to coarse GRAVEL. Sand is fine to coarse.		
1.00	D11									
1.00 - 1.45	SPT (S) N=15	1.00		N=15 (2,3/3,4,4,4)						
1.25	ES21									
1.75	ES22					(1.60)				
2.00	D12									
2.00 - 2.50	B3									
2.00 - 2.45	SPT (S) N=12	2.00		N=12 (1,2/3,3,3,3)						
2.25	ES23				-4.04	2.50		Stiff grey slightly sandy CLAY. Sand is fine to coarse.		
2.50 - 3.00	B4									
2.75	ES24									
3.00 - 3.45	UT17			Ublow=83 100%						
3.50	D13									
3.50 - 4.00	B5									
4.00	D14									
4.00 - 4.45	ES25 SPT (S) N=37	4.00		N=37 (6,6/7,8,10,12)						
4.50 - 5.00	B6									
5.00	ES26									
5.00 - 5.45	UT18			Ublow=81 100%		(5.20)				
5.50	D15									
5.50 - 6.00	B7									
6.50 - 6.95	SPT (S) N=33	6.50		N=33 (4,5/6,8,9,10)						
7.00 - 7.70	B8									
7.70 - 8.50	B9				-9.24	7.70		Medium dense brown very silty sandy subangular to subrounded fine to medium GRAVEL. Sand is fine to coarse		
8.00 - 8.45	SPT (S) N=14	8.00		N=14 (1,2/3,3,4,4)						
9.00 - 10.00	B10					(2.30)				
9.50	D16									
9.50 - 9.95	SPT (S) N=25	9.50		N=25 (3,4/5,5,7,8)						
					-11.54	10.00				

<b>Remarks</b> Deck to Bed = 3.20m  Terminated at scheduled depth	<b>Water Strikes</b>				<b>Chiselling Details</b>		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
					2.30	2.50	01:00
	<b>Water Added</b>		<b>Casing Details</b>				
From (m)	To (m)	To (m)	Diam (mm)				
2.00	10.00	10.00	200				





**CAUSEWAY**  
GEOTECH

<b>Project No.:</b> 17-0167	<b>Project Name:</b> Arklow Sewerage Scheme Marine Outfall GI	<b>Borehole No.:</b> BH14
<b>Coordinates:</b> 324901.92 E	<b>Client:</b> Irish Water	Sheet 2 of 2
173307.18 N	<b>Client's Representative:</b> Byrne Looby ARUP J.V.	<b>Scale:</b> 1:50
<b>Ground Level:</b> -1.55 mOD	<b>Dates:</b> 02/08/2017	<b>Driller:</b> CC
		<b>Logger:</b> SG

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
10.00 - 10.45	SPT (S) N=30	10.00	0	N=30 (4,5/6,6,9,9)				End of Borehole at 10.00m		

<b>Remarks</b> Deck to Bed = 3.20m  Terminated at scheduled depth	<b>Water Strikes</b>				<b>Chiselling Details</b>		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
					2.30	2.50	01:00
	<b>Water Added</b>		<b>Casing Details</b>				
From (m)	To (m)	To (m)	Diam (mm)				



**CAUSEWAY**  
GEOTECH

<b>Project No.:</b> 17-0167	<b>Project Name:</b> Arklow Sewerage Scheme Marine Outfall GI	<b>Borehole No.:</b> BH15
<b>Coordinates:</b> 325015.88 E	<b>Client:</b> Irish Water	Sheet 1 of 2
<b>Method</b> Cable Percussion	<b>Plant Used</b> Dando 3000	<b>Top</b> 0.00
<b>Base</b> 12.38	<b>Client's Representative:</b> Byrne Looby ARUP J.V.	<b>Scale:</b> 1:50
<b>Ground Level:</b> -2.16 mOD	<b>Dates:</b> 25/08/2017	<b>Driller:</b> CC
		<b>Logger:</b> SG

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.00 - 1.00	B1							MADE GROUND: Medium dense black slightly sandy slightly silty subrounded fine to medium GRAVEL with fragments of red brick and organics. Sand is fine to coarse.		
0.50	ES28					(1.50)				
1.00	D12									
1.00 - 1.45	SPT (S) N=10	1.00		N=10 (2,2/2,2,3,3)						
1.50	ES29				-3.66	1.50		Grey very gravely slightly silty fine to coarse SAND with low cobble content and occasional shells. Gravel is subrounded fine to coarse.		
1.50 - 2.00	B2					(0.50)				
2.00	D13				-4.16	2.00		Loose to medium dense grey fine to medium SAND.		
2.00 - 2.50	B3									
2.00 - 2.45	SPT (S) N=9	2.00		N=9 (1,2/2,2,3)						
2.50	ES30									
3.00	D14									
3.00 - 3.45	SPT (S) N=15	3.00		N=15 (2,3/3,4,4,4)		(2.70)				
3.50	ES31									
3.50 - 4.00	B4									
4.00	D15									
4.00 - 4.20	B5									
4.00 - 4.45	SPT (S) N=20	4.00		N=20 (3,4/4,5,5,6)						
4.50	ES32				-6.86	4.70		Stiff grey slightly sandy CLAY. Sand is fine to coarse.		
4.70 - 6.00	B6									
5.00 - 5.45	UT25			Ublow=92 100%						
5.50	D16									
5.50	ES33					(2.30)				
6.00 - 7.00	B7									
6.50	D17									
6.50 - 6.95	SPT (S) N=44	6.50		N=44 (7,7/8,11,11,14)						
7.00 - 8.00	B8				-9.16	7.00		Medium dense brown very sandy slightly silty subangular to subrounded fine to coarse GRAVEL. Sand is fine to coarse.		
7.50	D18									
7.50 - 7.95	SPT (S) N=15	7.50		N=15 (1,2/3,3,4,5)		(1.50)				
8.50	D19				-10.66	8.50		Firm brown slightly gravely slightly sandy CLAY. Sand is fine to coarse. Gravel is subrounded fine to coarse.		
8.50 - 9.50	B9									
8.50 - 8.95	SPT (S) N=22	8.50		N=22 (3,3/4,5,6,7)		(1.00)				
9.00 - 9.45	UT26			Ublow=57 100%						
9.50	D20				-11.66	9.50		Firm to stiff thinly laminated brown slightly sandy slightly gravely CLAY. Sand is fine to coarse. Gravel is subrounded fine to medium.		
9.50 - 10.00	B10									
10.00 - 11.00	B11									

<b>Remarks</b> Deck to Bed = 4.00m  Terminated at refusal on large boulder/possible bedrock	<b>Water Strikes</b>				<b>Chiselling Details</b>		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hr:mm)
	<b>Water Added</b>		<b>Casing Details</b>				
	From (m)	To (m)	To (m)	Diam (mm)			
	2.00	12.00					



**CAUSEWAY**  
GEOTECH

<b>Project No.:</b> 17-0167	<b>Project Name:</b> Arklow Sewerage Scheme Marine Outfall GI	<b>Borehole No.:</b> BH15
<b>Coordinates:</b> 325015.88 E	<b>Client:</b> Irish Water	Sheet 2 of 2
173192.19 N	<b>Client's Representative:</b> Byrne Looby ARUP J.V.	<b>Scale:</b> 1:50
<b>Ground Level:</b> -2.16 mOD	<b>Dates:</b> 25/08/2017	<b>Driller:</b> CC
		<b>Logger:</b> SG

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
10.00 - 10.45	SPT (S) N=12	10.00	0	N=12 (1,2/3,3,3,3)				Firm to stiff thinly laminated brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subrounded fine to medium.		
10.50	D21									
11.00 - 11.45	UT27			Ublow=50 100%		(2.88)				
11.00 - 12.00	B24									
11.45	D22									
12.00	D23									
12.00 - 12.38	SPT (S)	12.00	0	N=50 (2,3/50 for 235mm)	-14.54	12.38		End of Borehole at 12.38m		

<b>Remarks</b> Deck to Bed = 4.00m  Terminated at refusal on large boulder/possible bedrock	<b>Water Strikes</b>				<b>Chiselling Details</b>		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hr:mm)
	<b>Water Added</b>		<b>Casing Details</b>				
From (m)	To (m)	To (m)	Diam (mm)				
		12.45	200				



**CAUSEWAY**  
GEOTECH

<b>Project No.:</b> 17-0167	<b>Project Name:</b> Arklow Sewerage Scheme Marine Outfall GI	<b>Borehole No.:</b> BH16
<b>Coordinates:</b> 324725.91 E	<b>Client:</b> Irish Water	Sheet 1 of 2
<b>Method</b> Cable Percussion	<b>Plant Used</b> Dando 3000	<b>Top</b> 0.00
<b>Base</b> 11.50	<b>Client's Representative:</b> Byrne Looby ARUP J.V.	<b>Scale:</b> 1:50
<b>Ground Level:</b> -4.33 mOD	<b>Dates:</b> 05/11/2017	<b>Driller:</b> AH
		<b>Logger:</b> LN

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.50	D20 ES1					(0.80)		Grey sandy slightly silty subangular to subrounded fine to coarse GRAVEL with medium cobble and boulder content. Sand is fine to coarse. Cobbles and boulders are subangular to subrounded.		
0.80 - 1.20	B7			N=5 (1,2/1,1,2,1)	-5.13	0.80		Soft grey sandy slightly gravelly silty CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium.		
1.00 - 1.45	SPT (S) N=5					(1.00)				
1.50	D21 ES2							Very soft grey slightly sandy clayey SILT. Sand is fine to coarse.		
1.80 - 2.20	B8			Ublow=8 89%	-6.13	1.80				
2.00 - 2.50	UT18									
2.50	D22 ES3							Loose grey gravelly very silty fine to coarse SAND. Gravel is subangular to subrounded fine.		
2.80 - 3.20	B9			N=6 (1,1/2,1,1,2)		(2.70)				
3.00 - 3.45	SPT (S) N=6									
3.50	D23 ES4									
3.80 - 4.00	B10			Ublow=10 93%	-8.83	4.50				
4.00 - 4.50	UT17									
4.50	D24 ES5									
4.80 - 5.20	B11			N=7 (5,2/2,2,1,2)		(1.40)				
5.00 - 5.45	SPT (S) N=7									
5.50	D25 ES6									
5.80 - 6.20	B12			N=20 (3,4/4,5,5,6)	-10.23	5.90		Medium dense grey sandy slightly silty subangular to subrounded fine to coarse GRAVEL with medium cobble and boulder content. Sand is fine to coarse. Cobbles and boulders are subrounded to rounded.		
6.00 - 6.45	SPT (C) N=20									
6.50	D26									
6.80 - 7.20	B13			N=23 (4,4/5,6,5,7)		(3.40)				
7.00 - 7.45	SPT (C) N=23									
7.50	D27									
7.80 - 8.20	B19			N=31 (4,5/6,7,8,10)						
8.00 - 8.45	SPT (C) N=31									
8.50	D28									
8.80 - 9.20	B14			N=39 (6,5/8,10,11,10)						
9.00 - 9.45	SPT (C) N=39									
9.50	D29				-13.63	9.30		Medium dense to dense grey slightly gravelly slightly silty fine to coarse SAND. Gravel is subangular to subrounded fine to medium.		
9.80 - 10.20	B15									

<b>Remarks</b> Drilled from floating platform  Terminated at virtual refusal in granular material	<b>Water Strikes</b>				<b>Chiselling Details</b>		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hr:mm)
	<b>Water Added</b>		<b>Casing Details</b>				
	From (m)	To (m)	To (m)	Diam (mm)			





**CAUSEWAY**  
GEOTECH

<b>Project No.:</b> 17-0167	<b>Project Name:</b> Arklow Sewerage Scheme Marine Outfall GI	<b>Borehole No.:</b> BH16
<b>Coordinates:</b> 324725.91 E	<b>Client:</b> Irish Water	Sheet 2 of 2
173484.90 N	<b>Client's Representative:</b> Byrne Looby ARUP J.V.	<b>Scale:</b> 1:50
<b>Ground Level:</b> -4.33 mOD	<b>Dates:</b> 05/11/2017	<b>Driller:</b> AH
		<b>Logger:</b> LN

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
10.00 - 10.45	SPT (C) N=27			N=27 (5,6/7,6,6,8)				Medium dense to dense grey slightly gravelly slightly silty fine to coarse SAND. Gravel is subangular to subrounded fine to medium.		
10.50	D30					(2.20)				
10.80 - 11.20	B16									
11.00 - 11.45	SPT (C) N=45			N=45 (6,8/10,12,11,12)						
					-15.83	11.50		End of Borehole at 11.50m		

<b>Remarks</b> Drilled from floating platform    Terminated at virtual refusal in granular material	<b>Water Strikes</b>				<b>Chiselling Details</b>		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
	<b>Water Added</b>		<b>Casing Details</b>				
	From (m)	To (m)	To (m)	Diam (mm)			
			11.50	200			



**CAUSEWAY**  
GEOTECH

<b>Project No.:</b> 17-0167	<b>Project Name:</b> Arklow Sewerage Scheme Marine Outfall GI	<b>Borehole No.:</b> BH17
<b>Coordinates:</b> 324761.67 E	<b>Client:</b> Irish Water	Sheet 1 of 2
<b>Method</b> Cable Percussion	<b>Plant Used</b> Dando 3000	<b>Top</b> 0.00
<b>Base</b> 12.90	<b>Client's Representative:</b> Byrne Looby ARUP J.V.	<b>Scale:</b> 1:50
<b>Ground Level:</b> -0.96 mOD	<b>Dates:</b> 03/11/2017	<b>Driller:</b> AH
		<b>Logger:</b> LN

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.50	D1 ES29							Medium dense brown very sandy slightly silty subangular to subrounded fine to coarse GRAVEL with medium cobble and boulder content. Sand is fine to coarse. Cobbles and boulders are subangular to subrounded of mixed lithologies.		
0.80 - 1.20	B15			N=27 (3,8/4,7,8,8)						
1.00 - 1.45	SPT (C) N=27									
1.50	D2 ES30									
1.80 - 2.20	B16			N=20 (4,3/4,5,5,6)		(4.10)				
2.00 - 2.45	SPT (C) N=20									
2.50	D3 ES31									
2.80 - 3.20	B17			N=22 (4,5/5,6,6,5)						
3.00 - 3.45	SPT (C) N=22									
3.50	D4 ES32									
3.80 - 4.20	B18			N=21 (3,4/5,5,6,5)						
4.00 - 4.45	SPT (C) N=21			Water strike at 4.10m	-5.06	4.10		Medium dense grey sandy slightly silty subangular to subrounded fine to coarse GRAVEL with low cobble and boulder content. Sand is fine to coarse. Cobbles and boulders are subangular to subrounded of mixed lithologies.		
4.50	D5 ES33					(1.10)				
4.80 - 5.20	B19			N=11 (3,4/5,2,2,2)						
5.00 - 5.45	SPT (C) N=11				-6.16	5.20				
5.50	D7 ES34							Very soft grey silty sandy slightly gravelly clayey SILT . Sand is fine to coarse. Gravel is subangular to subrounded fine to medium.		
5.80 - 6.00	B20			Ublow=12 98%		(1.60)				
6.00 - 6.50	UT27									
6.50	D8							Soft to firm grey slightly sandy slightly clayey SILT . Sand is fine to coarse.		
6.80 - 7.20	B21			N=9 (2,3/2,2,3,2)	-7.76	6.80				
7.00 - 7.45	SPT (S) N=9									
7.50	D9									
7.80 - 8.00	B22			Ublow=15 98%						
8.00 - 8.50	UT28					(2.90)				
8.50	D10									
8.80 - 9.20	B23			N=16 (3,3/4,4,4,4)						
9.00 - 9.45	SPT (S) N=16									
9.50	D11									
9.80 - 10.20	B24				-10.66	9.70		Dense grey slightly sandy subangular to subrounded fine to coarse GRAVEL with low cobble and boulder content. Sand is fine to coarse. Cobbles and		

<b>Remarks</b> Drilled from floating platform  Terminated at refusal on large boulder	<b>Water Strikes</b>				<b>Chiselling Details</b>		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
	4.10	4.10			12.90	12.90	01:00
	<b>Water Added</b>		<b>Casing Details</b>				
From (m)	To (m)	To (m)	Diam (mm)				



**CAUSEWAY**  
GEOTECH

<b>Project No.:</b> 17-0167	<b>Project Name:</b> Arklow Sewerage Scheme Marine Outfall GI	<b>Borehole No.:</b> BH17
<b>Coordinates:</b> 324761.67 E	<b>Client:</b> Irish Water	Sheet 2 of 2
173519.44 N	<b>Client's Representative:</b> Byrne Looby ARUP J.V.	<b>Scale:</b> 1:50
<b>Ground Level:</b> -0.96 mOD	<b>Dates:</b> 03/11/2017	<b>Driller:</b> AH
		<b>Logger:</b> LN

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
10.00 - 10.45	SPT (C) N=36			N=36 (8,7/8,9,9,10)				boulders are subrounded to rounded of mixed lithologies.		
10.50	D12									
10.80 - 11.20	B25					(2.00)				
11.00 - 11.45	SPT (C) N=40			N=40 (8,7/8,10,10,12)						
11.50	D13									
11.80 - 12.20	B26				-12.66	11.70		Very stiff grey slightly sandy slightly gravelly silty CLAY with low cobble and boulder content. Sand is fine to coarse. Gravel is subangular to subrounded fine. Cobbles and boulders are subangular to subrounded of mixed lithologies.		
12.00 - 12.45	SPT (S) N=36			N=36 (7,8/8,8,9,11)		(1.20)				
12.50	D14									
					-13.86	12.90		End of Borehole at 12.90m		

<b>Remarks</b> Drilled from floating platform    Terminated at refusal on large boulder	<b>Water Strikes</b>				<b>Chiselling Details</b>		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
					12.90	12.90	01:00
	<b>Water Added</b>		<b>Casing Details</b>				
From (m)	To (m)	To (m)	Diam (mm)				
		12.90	200				



**CAUSEWAY**  
GEOTECH

<b>Project No.:</b> 17-0167	<b>Project Name:</b> Arklow Sewerage Scheme Marine Outfall GI	<b>Borehole No.:</b> BH18
<b>Coordinates:</b> 324791.47 E	<b>Client:</b> Irish Water	Sheet 1 of 2
<b>Method</b> Cable Percussion	<b>Plant Used</b> Dando 3000	<b>Top</b> 0.00
<b>Base</b> 11.30	<b>Client's Representative:</b> Byrne Looby ARUP J.V.	<b>Scale:</b> 1:50
<b>Ground Level:</b> -0.72 mOD	<b>Dates:</b> 06/11/2017	<b>Driller:</b> AH
		<b>Logger:</b> LN

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.50	D18 ES9							Medium Dense greyish black sandy slightly silty subangular to subrounded fine to coarse GRAVEL with medium cobble and boulder content. Sand is fine to coarse. Cobbles and boulders are subangular to subrounded of mixed lithologies.		
0.80 - 2.20	B1			N=11 (3,4/3,3,2,3)						
1.00 - 1.45	SPT (C) N=11									
1.50	D19 ES10					(3.00)				
2.00 - 2.50	UT15			Ublow=11 98%						
2.50	D20 ES11							Soft grey slightly sandy silty CLAY with occasional bands of grey SAND throughout. Sand is fine to coarse.		
2.80 - 4.20	B2			N=7 (1,1/1,2,2,2)	-3.72	3.00				
3.00 - 3.45	SPT (S) N=7									
3.50	D21 ES12									
4.00 - 4.50	UT16			Ublow=14 97%						
4.50	D22 ES13							Soft to firm grey slightly sandy slightly gravelly silty CLAY with occasional bands of grey SAND throughout. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium		
4.80 - 6.20	B3			N=9 (1,1/2,2,2,3)	-7.52	6.80				
5.00 - 5.45	SPT (S) N=9									
5.50	D23 ES14									
6.00 - 6.50	UT17			Ublow=16 88%						
6.50	D24							Dense grey very sandy slightly silty subangular to subrounded fine to coarse GRAVEL with low cobble and boulder content. Sand is fine to coarse. Cobbles and boulders are subrounded to rounded of mixed lithologies.		
6.80 - 7.20	B4			N=7 (2,2/1,2,2,2)	-9.02	8.30				
7.00 - 7.45	SPT (S) N=7									
7.50	D25					(1.50)				
7.80 - 8.20	B5			N=24 (2,3/4,5,7,8)						
8.00 - 8.45	SPT (C) N=24									
8.50	D26									
8.80 - 9.20	B6			N=41 (6,8/8,10,10,13)						
9.00 - 9.45	SPT (C) N=41									
9.50	D27									
9.80 - 10.20	B7									

<b>Remarks</b> Drilled from floating platform   Terminated at virtual refusal in granular material	<b>Water Strikes</b>				<b>Chiselling Details</b>		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hr:mm)
	<b>Water Added</b>		<b>Casing Details</b>				
	From (m)	To (m)	To (m)	Diam (mm)			





**CAUSEWAY**  
GEOTECH

<b>Project No.:</b> 17-0167	<b>Project Name:</b> Arklow Sewerage Scheme Marine Outfall GI	<b>Borehole No.:</b> BH18
<b>Coordinates:</b> 324791.47 E	<b>Client:</b> Irish Water	Sheet 2 of 2
173547.27 N	<b>Client's Representative:</b> Byrne Looby ARUP J.V.	<b>Scale:</b> 1:50
<b>Ground Level:</b> -0.72 mOD	<b>Dates:</b> 06/11/2017	<b>Driller:</b> AH
		<b>Logger:</b> LN

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
10.00 - 10.45	SPT (C) N=49			N=49 (7,7,10,12,13,14)				Dense grey very sandy slightly silty subangular to subrounded fine to coarse GRAVEL with low cobble and boulder content. Sand is fine to coarse. Cobbles and boulders are subrounded to rounded of mixed lithologies.		
10.50	D28									
10.80 - 11.20	B8									
11.00 - 11.20	SPT (C)			50 (8,17/50 for 50mm)	-12.02	11.30		End of Borehole at 11.30m		

<b>Remarks</b> Drilled from floating platform    Terminated at virtual refusal in granular material	<b>Water Strikes</b>				<b>Chiselling Details</b>		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
	<b>Water Added</b>		<b>Casing Details</b>				
From (m)	To (m)	To (m)	Diam (mm)				
		11.30	200				



**CAUSEWAY**  
GEOTECH

<b>Project No.:</b> 17-0167	<b>Project Name:</b> Arklow Sewerage Scheme Marine Outfall GI	<b>Borehole No.:</b> BH19
<b>Coordinates:</b> 324266.57 E	<b>Client:</b> Irish Water	Sheet 1 of 1
<b>Method</b> Cable Percussion	<b>Plant Used</b> Dando 3000	<b>Top</b> 0.00
<b>Base</b> 6.50	<b>Client's Representative:</b> Byrne Looby ARUP J.V.	<b>Scale:</b> 1:50
<b>Ground Level:</b> -1.20 mOD	<b>Dates:</b> 07/11/2017	<b>Driller:</b> AH
		<b>Logger:</b> LN

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.50	D15 ES7							Medium dense grey very sandy slightly silty subangular to subrounded fine to coarse GRAVEL with low cobble and boulder content. Sand is fine to coarse. Cobbles and boulders are subangular to subrounded of mixed lithologies.		
0.80 - 1.20	B1					(1.80)				
1.00 - 1.45	SPT (S) N=24			N=24 (4,6/5,8,6,5)						
1.50	D16 ES8							Very soft greyish brown sandy organic silty CLAY. Sand is fine to coarse.		
1.80 - 2.20	B2				-3.00	1.80				
2.00 - 2.50	UT13			Ublow=12 100%		(0.80)				
2.50	D17 ES9							Loose grey slightly gravelly very silty fine to coarse SAND. Gravel is subangular to subrounded fine to medium.		
2.80 - 3.20	B3				-3.80	2.60				
3.00 - 3.45	SPT (S) N=8			N=8 (2,1/2,2,2,2)		(0.90)				
3.50	D18 ES10							Very soft greyish brown sandy slightly gravelly clayey SILT. Sand is fine to coarse. Gravel is subangular to subrounded fine.		
3.80 - 4.20	B4				-4.70	3.50				
4.00 - 4.50	UT14			Ublow=15 100%		(1.80)				
4.50	D19 ES11							Weathered grey AMPHIBOLITE recovered as sandy slightly silty angular to subangular medium to coarse GRAVEL and low cobble content. Sand is fine to coarse. Gravel is composed exclusively of amphibolite. Cobbles are angular to subangular of amphibolite.		
4.80 - 5.20	B5				-6.50	5.30				
5.00 - 5.45	SPT (S) N=17			N=17 (2,2/4,3,5,5)		(1.20)				
5.50	D20 ES12							End of Borehole at 6.50m		
5.80 - 6.20	B6				-7.70	6.50				
6.00 - 6.45	SPT (C) N=45			N=45 (4,5/8,10,12,15)						

<b>Remarks</b> Drilled from floating platform    Terminated on large boulder/weathered bedrock	<b>Water Strikes</b>				<b>Chiselling Details</b>		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hr:mm)
	<b>Water Added</b>		<b>Casing Details</b>				
From (m)	To (m)	To (m)	Diam (mm)				
		6.50	200				