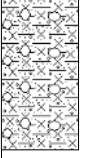
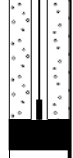



Causeway Geotech Ltd					Project no. 14-645	Project Name: Greater Dublin Drainage Scheme Ground Investigation	Borehole No. BH125				
Method:					Co-ords:	Client:	Sheet 1 of 2				
0.00 4.00 Cable Percussion 4.00 11.20 Rotary Drilling					317260.55mE	Irish Water	Scale: 1:50				
Plant:					242227.75mN	Client's Representative:	Crew: CC+SJ				
Dando 2000+Beretta T41					Ground Level:	Dates:	Logged By: DOM				
55.75MOD					15/01/2015						
Depth (m)	TCR	SCR	RQD	FI	Field Records	Level & Depth	Stratum Description	Legend & Water Strikes	Backfill Installs		
0.35	B					(0.35) 55.40 0.35	TOPSOIL				
							Stiff brown slightly sandy slightly gravelly slightly silty CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse				
1.20	D				N=19 (2,3/4,4,5,6)	(1.45)					
1.20	SPT (S)										
1.20	D										
1.80	B					53.95 1.80	Very stiff black slightly sandy slightly gravelly slightly silty CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse				
2.00	SPT (S)				N=50 (17 for 90mm/10,11,15,14)						
2.00	D										
3.00	SPT (S)				50 (6,9/50 for 200mm)	(2.20)					
3.00	D										
3.00	D										
3.50	B										
4.00	D				50 (10,15/50 for 150mm)	51.75 4.00	Very stiff dark gray slightly sandy slightly gravelly slightly silty CLAY with large boulders. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Boulders are subangular to subrounded				
4.00	D										
4.00	SPT (S)										
6.20	SPT (S)				50 (10,29/50 for 75mm)						
7.70	SPT (S)				50 (12,13/50 for 10mm)	(7.20)					
9.20	SPT (S)				80 (8,32/80 for 150mm)						
Continued on next sheet											
Remarks SPTs carried out using SPT hammer CC04.						Core Barrel:		Water Strikes:			
						Flush Type:		Struck (m)	Rose to (m)		Time (min)
								2.80	2.6		20
						Water Added:		Casing:			
From (m)	To (m)	To (m)	Diameter (mm)								
		4.00	200								
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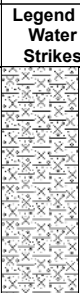

<b>Causeway Geotech Ltd</b>			<b>Project no.</b> 14-645	<b>Project Name:</b> Greater Dublin Drainage Scheme Ground Investigation	<b>Borehole No.</b> BH125
<b>Method:</b> 0.00 4.00 Cable Percussion 4.00 11.20 Rotary Drilling			<b>Co-ords:</b> 317260.55mE 242227.75mN	<b>Client:</b> Irish Water	<b>Sheet 2 of 2</b>
<b>Plant:</b> Dando 2000+Beretta T41			<b>Ground Level:</b> 55.75MOD	<b>Client's Representative:</b> Tobin Consulting Engineers	<b>Scale:</b> 1:50
				<b>Dates:</b> 15/01/2015	<b>Crew:</b> CC+SJ
					<b>Logged By:</b> DOM

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level & Depth	Stratum Description	Legend & Water Strikes	Backfill Installs
						44.55 11.20	----- End of core at 11.20 m		

<b>Remarks</b> SPTs carried out using SPT hammer CC04.	<b>Core Barrel:</b>		<b>Water Strikes:</b>		
			<b>Struck (m)</b> 2.80	<b>Rose to (m)</b> 2.6	<b>Time (min)</b> 20
	<b>Flush Type:</b>				
	<b>Water Added:</b>		<b>Casing:</b>		
<b>From (m)</b>	<b>To (m)</b>	<b>To (m)</b>	<b>Diameter (mm)</b>		
		4.00	200		



Causeway Geotech Ltd				Project no. 14-645	Project Name: Greater Dublin Drainage Scheme Ground Investigation	Borehole No. BH126			
<b>Method:</b> 0.00 4.70 Cable Percussion 4.70 11.70 Rotary Drilling				<b>Co-ords:</b> 318086.46mE	<b>Client:</b> Irish Water	Sheet 1 of 2			
<b>Plant:</b> Dando 2000+Beretta T41				242037.20mN	<b>Client's Representative:</b> Tobin Consulting Engineers	<b>Scale:</b> 1:50			
				<b>Ground Level:</b> 51.32MOD	<b>Dates:</b> 16/01/2015	<b>Crew:</b> CC+GT			
<b>Depth (m)</b>	<b>TCR</b>	<b>SCR</b>	<b>RQD</b>	<b>FI</b>	<b>Field Records</b>	<b>Level &amp; Depth</b>	<b>Stratum Description</b>	<b>Legend &amp; Water Strikes</b>	<b>Backfill Installs</b>
0.20	B					0.20 51.12 0.20	TOPSOIL Stiff brown slightly sandy slightly gravelly slightly silty CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse		
1.20	D				N=23 (3,3/4,5,7,7)	1.20 50.12 1.20	Very stiff black slightly sandy slightly gravelly slightly silty CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse		
1.20	SPT (S)								
1.20	D								
1.70	B								
2.00	D				N=49 (7,10/10,11,13,15)				
2.00	SPT (S)								
2.50	D								
2.50	B								
3.00	SPT (S)				50 (6,9/50 for 150mm)	3.50			
3.00	D								
3.50	B								
3.50	D								
4.00	D				50 (25 for 130mm/50 for 130mm)				
4.00	SPT (S)								
4.50	D					46.62 4.70	Very stiff to hard black slightly sandy slightly gravelly slightly silty CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse		
5.50	SPT (S)				50 (25 for 20mm/50 for 0mm)				
7.00	SPT (S)				50 (25 for 3mm/50 for 0mm)	7.00			
8.50	SPT (S)				50 (25 for 20mm/50 for 0mm)				
10.00	SPT (S)				50 (25 for 0mm/50 for 0mm)				
							Continued on next sheet		
<b>Remarks</b>					<b>Core Barrel:</b>		<b>Water Strikes:</b>		
					<b>Flush Type:</b>		<b>Struck (m)</b> 7.00	<b>Rose to (m)</b> 7.0	<b>Time (min)</b> 10
					<b>Water Added:</b>		<b>Casing:</b>		
					<b>From (m)</b>	<b>To (m)</b>	<b>To (m)</b>	<b>Diameter (mm)</b>	
		4.70	200						
									
<small>www.causewaygeotech.com © Causeway Geotech Ltd</small>									

<b>Causeway Geotech Ltd</b>					<b>Project no.</b> 14-645	<b>Project Name:</b> Greater Dublin Drainage Scheme Ground Investigation	<b>Borehole No.</b> BH126								
<b>Method:</b> 0.00 4.70 Cable Percussion 4.70 11.70 Rotary Drilling					<b>Co-ords:</b> 318086.46mE	<b>Client:</b> Irish Water	Sheet 2 of 2								
<b>Plant:</b> Dando 2000+Beretta T41					242037.20mN	<b>Client's Representative:</b> Tobin Consulting Engineers	<b>Scale:</b> 1:50								
					<b>Ground Level:</b> 51.32MOD	<b>Dates:</b> 16/01/2015	<b>Crew:</b> CC+GT								
<b>Depth (m)</b>	<b>TCR</b>	<b>SCR</b>	<b>RQD</b>	<b>FI</b>	<b>Field Records</b>	<b>Level &amp; Depth</b>	<b>Stratum Description</b>	<b>Legend &amp; Water Strikes</b>	<b>Backfill Installs</b>						
11.50					50 (25 for 20mm/50 for 225mm)	39.62 11.70	End of core at 11.70 m								
<b>Remarks</b>						<b>Core Barrel:</b>	<b>Water Strikes:</b>	 www.causewaygeotech.com © Causeway Geotech Ltd							
						<b>Flush Type:</b>	<table border="1"> <tr> <td><b>Struck (m)</b></td> <td><b>Rose to (m)</b></td> <td><b>Time (min)</b></td> </tr> <tr> <td>7.00</td> <td>7.0</td> <td>10</td> </tr> </table>			<b>Struck (m)</b>	<b>Rose to (m)</b>	<b>Time (min)</b>	7.00	7.0	10
<b>Struck (m)</b>	<b>Rose to (m)</b>	<b>Time (min)</b>													
7.00	7.0	10													
						<b>Water Added:</b>	<b>Casing:</b>								
						<table border="1"> <tr> <td><b>From (m)</b></td> <td><b>To (m)</b></td> <td><b>To (m)</b></td> <td><b>Diameter (mm)</b></td> </tr> <tr> <td></td> <td></td> <td>4.70</td> <td>200</td> </tr> </table>	<b>From (m)</b>	<b>To (m)</b>	<b>To (m)</b>	<b>Diameter (mm)</b>			4.70	200	
<b>From (m)</b>	<b>To (m)</b>	<b>To (m)</b>	<b>Diameter (mm)</b>												
		4.70	200												


Causeway Geotech Ltd				Project no. 14-645	Project Name: Greater Dublin Drainage Scheme Ground Investigation	Borehole No. BH127			
Method: 0.00 4.50 Cable Percussion 4.50 9.50 Rotary Drilling				Co-ords: 318292.95mE 241991.77mN	Client: Irish Water	Sheet 1 of 1			
Plant: Dando 2000+Beretta T41				Ground Level: 49.17MOD	Client's Representative: Tobin Consulting Engineers	Scale: 1:50			
				Dates: 14/01/2015		Crew: CC+SJ			
						Logged By: DOM+			
Depth (m)	TCR	SCR	RQD	FI	Field Records	Level & Depth	Stratum Description	Legend & Water Strikes	Backfill Installs
0.30 - 1.20	B					(0.30) 48.87 0.30	TOPSOIL		
1.20 - 1.20	1.20 SPT (S) D		1.20		N=31 (4,6/6,7,9,9)	(1.50)	Stiff to very stiff brown grey slightly sandy slightly gravelly slightly clayey SILT. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse.		
1.80 - 2.00	B					47.37 1.80	Very stiff black slightly sandy slightly gravelly slightly silty CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse.		
2.00 - 2.00	2.45 SPT (S) D B		2.45		N=49 (6,8/10,11,13,15)				
2.50 - 3.00									
3.00 - 3.00	D SPT (S)				50 (9,15/50 for 150mm)	(2.70)			
4.00 - 4.00	4.00 D SPT (S)		4.00		50 (11,14/50 for 150mm)	44.67 4.50	Dark grey slightly sandy slightly gravelly slightly silty CLAY with large boulder. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse.		
6.00	SPT (S)				86 (11,34/86 for 150mm)	(5.00)			
7.50	SPT (S)				50 (25 for 60mm/50 for 10mm)				
9.50	SPT (S)				50 (7,35/50 for 75mm)	39.67 9.50	----- End of core at 9.50 m -----		
Remarks SPTs carried out using SPT hammer CC04.					Core Barrel:		Water Strikes:		
					Flush Type:		Struck (m)	Rose to (m)	Time (min)
					Water Added:		Casing:		
					From (m)	To (m)	To (m)	Diameter (mm)	
							4.50	200	
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Causeway Geotech Ltd				Project no. 14-645	Project Name: Greater Dublin Drainage Scheme Ground Investigation	Borehole No. BH128			
<b>Method:</b> 0.00 3.60 Cable Percussion 3.60 8.00 Rotary Drilling				<b>Co-ords:</b> 318814.73mE	<b>Client:</b> Irish Water	Sheet 1 of 1			
<b>Plant:</b> Dando 2000+Beretta T41				241844.11mN	<b>Client's Representative:</b> Tobin Consulting Engineers	Scale: 1:50			
				<b>Ground Level:</b> 45.95MOD	<b>Dates:</b> 06/01/2015	Crew: CC+SJ			
<b>Depth (m)</b>	<b>TCR</b>	<b>SCR</b>	<b>RQD</b>	<b>FI</b>	<b>Field Records</b>	<b>Level &amp; Depth</b>	<b>Stratum Description</b>	<b>Legend &amp; Water Strikes</b>	<b>Backfill Installs</b>
0.00 - 0.30	B					(0.30)	TOPSOIL		
0.30 - 1.10	B					45.65 0.30 (0.80)	Firm to stiff light brown slightly sandy slightly gravelly slightly clayey SILT with occasional cobbles and boulders. Sand is fine to coarse. Gravel is subrounded to subangular fine to coarse.		
1.10 - 2.00 1.20 1.20	B D U					44.85 1.10	Very stiff black slightly sandy gravelly slightly silty CLAY with occasional cobbles and boulders. Gravel is subrounded to subangular fine to coarse.		
2.00 2.00	SPT (S) D				N=41 (4,8/10,10,11,10)	(2.50)			
2.50 - 3.00	B								
3.00	U								
3.50 3.50	D SPT (S)				50 (25 for 25mm/50 for 50mm)	42.35 3.60	Very stiff to hard dark grey slightly sandy slightly gravelly slightly silty CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse		
5.00	SPT (S)				50 (9,26/50 for 75mm)	(4.40)			
6.50	SPT (S)				50 (7,32/50 for 75mm)				
8.00	SPT (S)				50 (6,28/50 for 75mm)	37.95 8.00	----- End of core at 8.00 m		
<b>Remarks</b> SPT's carried out using SPT Hammer CC04					<b>Core Barrel:</b>		<b>Water Strikes:</b>		
					<b>Flush Type:</b>		<b>Struck (m)</b> 3.60	<b>Rose to (m)</b> 3.10	<b>Time (min)</b> 20
					<b>Water Added:</b>		<b>Casing:</b>		
					<b>From (m)</b>	<b>To (m)</b>	<b>To (m)</b> 3.60	<b>Diameter (mm)</b> 200	
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Causeway Geotech Ltd					Project no. 14-645	Project Name: Greater Dublin Drainage Scheme Ground Investigation	Borehole No. BH130		
Method: 0.00 4.00 Cable Percussion 4.00 7.60 Rotary Drilling					Co-ords: 320784.92mE 242815.26mN	Client: Irish Water	Sheet 1 of 1		
Plant: Dando 2000+Baretta T41					Ground Level: 28.54MOD	Client's Representative: Tobin Consulting Engineers	Scale: 1:50		
					Dates: 22/01/2015	Crew: MMC+GT	Logged By:		
Depth (m)	TCR	SCR	RQD	FI	Field Records	Level & Depth	Stratum Description	Legend & Water Strikes	Backfill Installs
0.50 - 1.00	D					(0.40) 28.14 0.40	TOPSOIL - Light brown slightly sandy clay with rootlets		
0.50 - 1.00	B						Firm brown mottled grey slightly sandy slightly gravelly slightly silty CLAY. Gravel is subrounded to angular fine to coarse of sandstone		
1.20	SPT				N=14 (3,3/4,3,3,4)	(1.10) 27.04 1.50	Stiff grey mottled brown slightly gravelly slightly silty CLAY. Gravel is subrounded to angular fine to coarse of sandstone		
1.20 - 1.65	(S)								
1.20 - 1.65	B								
1.20 - 1.65	D								
2.00	SPT				N=21 (5,4/5,6,5,5)	(1.00) 26.04 2.50	Stiff dark grey slightly sandy slightly gravelly slightly silty CLAY. Sand is fine to coarse. Gravel is subangular to rounded fine to coarse.		
2.00 - 2.45	(S)								
2.00 - 2.45	B								
2.00 - 2.45	D								
3.00	SPT				N=25 (6,5/6,6,7,6)	(1.50) 24.54 4.00	Very stiff dark grey slightly sandy slightly gravelly slightly silty CLAY. Sand is fine to coarse. Gravel is subangular to rounded fine to coarse.		
3.00 - 3.45	(S)								
3.00 - 3.45	D								
3.00 - 3.45	B								
4.00	SPT				N=30 (7,6/7,8,8,7)	(3.60) 20.94 7.60	End of core at 7.60 m		
4.00 - 4.45	(S)								
4.00 - 4.45	B								
4.00 - 4.50	D								
5.00	SPT				N=30 (7,7/6,7,8,9)				
5.00 - 5.45	(S)								
5.00 - 5.45	B								
5.00 - 5.45	D								
7.00	SPT				50 (25 for 2mm/50 for 3mm)				
	(S)								

Remarks

<b>Core Barrel:</b>		<b>Water Strikes:</b>		
		Struck (m)	Rose to (m)	Time (min)
		7.00	7.0	10
<b>Flush Type:</b>				
<b>Water Added:</b>		<b>Casing:</b>		
From (m)	To (m)	To (m)	Diameter (mm)	
		7.60	150	



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Causeway Geotech Ltd				Project no. 14-645	Project Name: Greater Dublin Drainage Scheme Ground Investigation	Borehole No. BH131				
Method:				Co-ords:	Client:	Sheet 1 of 1				
0.00 3.00 Cable Percussion 3.00 5.60 Rotary Drilling 5.60 7.60 Rotary Coring				321261.16mE	Irish Water	Scale: 1:50				
Plant:				242801.77mN	Client's Representative:	Crew: MMC+GT				
Dando 2000+Beretta T41				Ground Level:	Dates:	Logged By: +MFG				
22.70MOD				21/01/2015						
Depth (m)	TCR	SCR	RQD	FI	Field Records	Level & Depth	Stratum Description	Legend & Water Strikes	Backfill Installs	
0.50 - 1.00	D					(0.10) 22.60 0.10 22.40 0.30	TOPSOIL White mottled grey slightly clayey slightly silty fine to coarse SAND			
0.50 - 1.00	B						Stiff brown mottled grey slightly sandy gravelly slightly silty CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse			
1.20	SPT (S)				N=17 (4,4/3,4,5,5)	(1.90)				
1.20 - 1.65	D									
1.20 - 1.65	B									
2.00	SPT (S)				N=19 (4,5/6,5,4,4)	20.50 2.20				
2.00 - 2.45	B						Stiff to very stiff dark grey slightly sandy slightly gravelly slightly silty CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse.			
2.00 - 2.45	D									
2.50 - 3.00	B					(0.80)				
2.50 - 3.00	D									
3.00	SPT (S)				50 (25 for 30mm/50 for 20mm)	19.70 3.00				
							Stiff dark grey CLAY with frequent boulders.			
5.00	SPT (S)				50 (25 for 5mm/50 for 5mm)	(2.60)				
5.60 - 6.60						17.10 5.60	Medium strong, thinly laminated to very thinly bedded, dark grey ARGILLACEOUS LIMESTONE.  Partially weathered.  DS1: Joints, close to medium spaced, horizontal to 20° planar, smooth to rough, open, occasional oxidised brown, rare slickensides.			
6.60 - 7.60	90	84	84			(2.00)				
				4						
	90	85	76			15.10 7.60	End of core at 7.60 m			
Remarks					Core Barrel: +Impreg		Water Strikes: Struck (m)   Rose to (m)   Time (min) 5.00   5.0   10			AGS
					Flush Type:					
					Water Added: From (m)   To (m)		Casing: To (m)   Diameter (mm) 5.50   150			
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Causeway Geotech Ltd					Project no. 14-645	Project Name: Greater Dublin Drainage Scheme Ground Investigation	Borehole No. BH132		
Method: 0.00 4.50 Rotary Drilling 4.50 7.60 Rotary Coring					Co-ords: 321296.46mE	Client: Irish Water	Sheet 1 of 1		
Plant: Beretta T41					242799.15mN	Client's Representative: Tobin Consulting Engineers	Scale: 1:50		
					Ground Level: 22.49MOD	Dates: 11/02/2015	Crew: GT		
Depth (m)	TCR	SCR	RQD	FI	Field Records	Level & Depth	Stratum Description	Legend & Water Strikes	Backfill Installs
						0.20 0.20	TOPSOIL		
						22.29 0.20	Brown marly CLAY		
4.50 - 5.50	95	91	49	NI		20.49 2.00	Grey slightly slightly sandy slightly gravelly slightly silty CLAY with occasional cobbles and boulders. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse.		
						17.99 4.50	Medium strong thinly laminated dark grey to black CARBONACEOUS LIMESTONE with fine to coarse sand sized pyrite crystals scattered throughout.  Partially weathered: Slightly closer fracture spacing and patchy brownish grey staining on some joints.		
5.50 - 6.50	75	48	15	20		14.89 7.60	DS1: Bedding, thinly laminated 40 to 50°, smooth, typically closed to often open at very close or close spacing, unstained.  DS2: Joints, medium spaced, 70 to 90°, planar, smooth, open, patchy light brownish grey staining.  DS3: Calcite vein at 4.95m, 45°, planar, rough, open, up to 5mm calcite, unstained.		
						14.89 7.60	End of core at 7.60 m		
6.50 - 7.60	77	27	0	20					

Remarks

<b>Core Barrel:</b> T2101		<b>Water Strikes:</b>		
<b>Flush Type:</b>		Struck (m)	Rose to (m)	Time (min)
<b>Water Added:</b>		<b>Casing:</b>		
From (m)	To (m)	To (m)	Diameter (mm)	
		4.50	151	




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Causeway Geotech Ltd				Project no. 14-645	Project Name: Greater Dublin Drainage Scheme Ground Investigation	Borehole No. BH133			
Method: 0.00 5.50 Cable Percussion 5.50 7.60 Rotary Drilling				Co-ords: 321944.99mE 242233.04mN	Client: Irish Water	Sheet 1 of 1			
Plant: Dando 2000+Beretta T41				Ground Level: 18.76MOD	Client's Representative: Tobin Consulting Engineers	Scale: 1:50			
				Dates: 23/01/2015		Crew: MMc+GT			
						Logged By: DOM			
Depth (m)	TCR	SCR	RQD	FI	Field Records	Level & Depth	Stratum Description	Legend & Water Strikes	Backfill Installs
0.50 - 1.00 0.50 - 1.00	D B					(0.40) 18.36 0.40 (0.20) 18.16 0.60	TOPSOIL - Brown slightly sandy firm clay with rootlets  Brown clayey silty fine to medium SAND		
1.20 1.20 - 1.65 1.20 - 1.65	SPT (S) B D				N=19 (4,5/5,4,5,5)		Stiff to very stiff brown slightly sandy slightly gravelly slightly silty CLAY. Sand is fine to coarse. Gravel is subrounded to angular fine to coarse		
2.00 2.00 - 2.35 2.00 - 2.45	2.00 SPT (S) B D		2.00		N=19 (5,5/4,5,5,5)	(2.70)			
3.00 3.00 - 3.45 3.00 - 3.45	SPT (S) 3.00 B D		3.00		N=31 (9,8/7,8,9,7)	15.46 3.30	Very stiff black slightly sandy slightly gravelly slightly silty CLAY. Sand is fine to coarse. Gravel is subrounded to angular fine to coarse		
4.00 4.00 - 4.45 4.00 - 4.45	SPT (S) 4.00 B D		4.00		N=31 (7,8/7,9,7,8)				
5.00 5.00 - 5.45 5.00 - 5.45	SPT (S) 5.00 B D		5.00		N=37 (9,10/8,10,9,10)	(3.70)			
5.50	5.50 SPT (S)		5.50		50 (25 for 81mm/50 for 125mm)				
6.50	SPT (S)				50 (25 for 50mm/50 for 40mm)				
						11.76 7.00	Coarse GRAVEL (possible boulder)		
						(0.60) 11.16 7.60	----- End of core at 7.60 m		


Remarks	<b>Core Barrel:</b>		<b>Water Strikes:</b>		
			Struck (m)	Rose to (m)	Time (min)
			7.00	7.0	10
	<b>Flush Type:</b>				
<b>Water Added:</b>		<b>Casing:</b>			
From (m)	To (m)	To (m)	Diameter (mm)		
0.00	5.50	5.50	200		



  
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Causeway Geotech Ltd			Project no. 14-645	Project Name: Greater Dublin Drainage Scheme Ground Investigation	Borehole No. BH134			
Method: 0.00 7.50 Cable Percussion			Co-ords: 322387.05mE	Client: Irish Water	Sheet 1 of 1			
Plant: Dando 3000			241837.46mN	Client's Representative: Tobin Consulting Engineers	Scale: 1:50			
			Ground Level: 11.63MOD	Dates: 08/01/2015 - 09/01/2015	Crew: CC			
Depth (m)	Sample / Test	Casing Depth (m)	Water Depth (m)	Field Records	Level & Depth	Stratum Description	Legend & Water Strikes	Backfill Installs
0.30 - 1.20	B				(0.30) 11.33 0.30	TOPSOIL		
1.20 1.20	D U				(1.50)	Firm to stiff brown slightly sandy slightly gravelly slightly silty CLAY. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse.		
1.80 - 2.50 2.00 2.00	B SPT(S) D			N=50 (6,9/50 for 240mm)	9.83 1.80	Very stiff dark grey to black slightly sandy slightly gravelly slightly silty CLAY with occasional cobbles. Sand is fine to coarse. Gravel is subangular to subrounded, fine to coarse.		
3.00 3.00	SPT(S) D			50 (8,13/50 for 200mm)	(2.70)			
3.50 - 4.00	B							
4.00 4.00	SPT(S) D			50 (25 for 140mm/50 for 130mm)				
4.50 - 6.00	B				7.13 4.50	Very stiff dark greyish brown slightly sandy slightly gravelly slightly silty CLAY with occasional cobbles and rare boulders. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse.		
5.00 5.00	SPT(S) D			N=50 (7,9/50 for 235mm)				
6.50 6.50	SPT(S) D			N=50 (9,11/12,12,13,13)	(3.00)			
					4.13 7.50	End of borehole at 7.50 m		

<b>Remarks</b> SPT's carried out using SPT Hammer CC04 Refusal met on possible large boulder	<b>Chiselling:</b>			<b>Water Strikes:</b>		
	<b>From (m)</b>	<b>To (m)</b>	<b>Time (hh:mm)</b>	<b>Struck (m)</b>	<b>Rose to (m)</b>	<b>Time (min)</b>
	0.00	1.30	01:00	7.00	6.50	20
	7.20	7.80	01:30			
<b>Water Added:</b>			<b>Casing:</b>			
<b>From (m)</b>	<b>To (m)</b>		<b>To (m)</b>	<b>Diameter (mm)</b>		
			7.50	200		

  
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Causeway Geotech Ltd			Project no. 14-645	Project Name: Greater Dublin Drainage Scheme Ground Investigation	Borehole No. BH135									
Method: 0.00 8.40 Cable Percussion			Co-ords: 322408.09mE	Client: Irish Water	Sheet 1 of 1									
Plant: Dando 2000			241838.13mN	Client's Representative: Tobin Consulting Engineers	Scale: 1:50									
			Ground Level: 11.18MOD	Dates: 27/01/2015	Crew: MMc									
Depth (m)	Sample / Test	Casing Depth (m)	Water Depth (m)	Field Records	Level & Depth	Stratum Description	Legend & Water Strikes	Backfill Installs						
0.50 - 1.00	D				(0.30) 10.88 0.30	TOPSOIL								
0.50 - 1.00	B					Stiff to very stiff brown mottled grey slightly sandy slightly gravelly silty CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse, of various lithologies.								
1.20	SPT(S)			N=20 (3,3/4,5,6,5)										
1.20 - 1.65	D				(2.40)									
1.20 - 1.65	B													
2.00	SPT(S)			N=36 (3,5/7,10,10,9)										
2.00 - 2.45	D													
2.00 - 2.45	B													
3.00	SPT(S)			N=33 (4,5/6,8,10,9)	8.48 2.70									
3.00 - 3.45	D					Very stiff dark grey slightly sandy slightly gravelly slightly silty CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of various lithologies.								
3.00 - 3.45	B													
4.00	SPT(S)			N=36 (6,8/7,9,10,10)										
4.00 - 4.45	B													
4.00 - 4.45	D				(3.80)									
5.00	SPT(S)			N=43 (8,9/10,11,10,12)										
5.00 - 5.45	B													
5.00 - 5.45	D													
6.50	SPT(S)			N=50 (7,9/50 for 275mm)	4.68 6.50									
6.50 - 6.95	D					Very stiff brown slightly sandy slightly gravelly slightly silty CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of various lithologies, gravelly below 7m.								
6.50 - 6.95	B				(0.90)									
					3.78 7.40									
						Very stiff brown slightly sandy slightly gravelly slightly silty CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of various lithologies.								
8.00	SPT(C)			50 (9,10/50 for 160mm)	(1.00)									
8.00 - 8.40	B													
8.00 - 8.40	D				2.78 8.40									
						----- End of borehole at 8.40 m								
Remarks						Chiselling:			Water Strikes:					
						From (m)	To (m)	Time (hh:mm)	Struck (m)	Rose to (m)	Time (min)			
						7.40	8.40	02:00	7.40	6.5	20			
						Water Added:			Casing:					
						From (m)	To (m)		To (m)	Diameter (mm)				
														
						www.causewaygeotech.com © Causeway Geotech Ltd								

Causeway Geotech Ltd				Project no. 14-645	Project Name: Greater Dublin Drainage Scheme Ground Investigation	Borehole No. BH137			
Method: 0.00 7.60 Cable Percussion 7.60 10.90 Symmetrix				Co-ords: 323078.15mE 241730.65mN	Client: Irish Water	Sheet 1 of 2			
Plant: Dando 2000+Beretta T41				Ground Level: 8.68MOD	Client's Representative: Tobin Consulting Engineers	Scale: 1:50			
				Dates: 27/01/2015		Crew: MMc			
						Logged By: DOM			
Depth (m)	TCR	SCR	RQD	FI	Field Records	Level & Depth	Stratum Description	Legend & Water Strikes	Backfill Installs
0.50 - 1.00	D					(0.50)	TOPSOIL - soft to firm brown sandy clay with rootlets.		
0.50 - 1.00	B					8.18 0.50	Stiff brown slightly sandy slightly gravelly silty CLAY. Sand is fine to coarse. Gravel is subangular to rounded fine to coarse.		
1.20	SPT				N=23 (5,6/5,7,6,5)				
1.20 - 1.65	(S)								
1.20 - 1.65	B								
1.20 - 1.65	D								
2.00	SPT				N=24 (5,7/6,5,6,7)				
2.00 - 2.45	(S)					(3.20)			
2.00 - 2.45	D								
2.00 - 2.45	B								
3.00	SPT				N=29 (6,7/8,7,7,7)				
3.00 - 3.45	(S)								
3.00 - 3.45	B								
3.00 - 3.45	D								
4.00	SPT				N=40 (7,8/8,9,10,13)				
4.00 - 4.45	(S)					4.98 3.70	Very stiff dark grey slightly sandy slightly gravelly slightly silty CLAY with occasional cobbles. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of various lithologies.		
4.00 - 4.45	B					(1.30)			
4.00 - 4.45	D								
5.00	SPT				N=48 (7,8/10,14,12,12)				
5.00 - 5.45	(S)					3.68 5.00	Very stiff dark grey slightly sandy gravelly slightly silty CLAY with occasional cobbles. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of various lithologies.		
5.00 - 5.45	D								
5.00 - 5.45	B								
6.50	D				N=46 (9,10/11,12,12,11)				
6.50	B								
6.50	SPT								
6.50	(S)								
7.40	SPT				50 (10,11/50 for 125mm)				
7.40 - 7.80	(C)					(5.90)			
7.40 - 7.80	B								
7.40 - 7.80	D								
9.00	SPT				50 (25 for 0mm/50 for 0mm)		Coarse GRAVEL (possibly a broken up boulder)		
	(S)								

Continued on next sheet

**Remarks**

Refusal met on possible large boulder at 7.6m

**Core Barrel:**

**Water Strikes:**

Struck (m)	Rose to (m)	Time (min)
9.50	9.50	10

**Flush Type:**

**Water Added:**

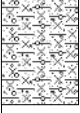

From (m)	To (m)

**Casing:**

To (m)	Diameter (mm)
7.60	200



<b>Causeway Geotech Ltd</b>			<b>Project no.</b> 14-645	<b>Project Name:</b> Greater Dublin Drainage Scheme Ground Investigation	<b>Borehole No.</b> BH137
<b>Method:</b> 0.00 7.60 Cable Percussion 7.60 10.90 Symmetrix			<b>Co-ords:</b> 323078.15mE	<b>Client:</b> Irish Water	<b>Sheet 2 of 2</b>
<b>Plant:</b> Dando 2000+Beretta T41			241730.65mN	<b>Client's Representative:</b> Tobin Consulting Engineers	<b>Scale:</b> 1:50
			<b>Ground Level:</b> 8.68MOD	<b>Dates:</b> 27/01/2015	<b>Crew:</b> MMc
					<b>Logged By:</b> DOM

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level & Depth	Stratum Description	Legend & Water Strikes	Backfill Installs
						-2.22 10.90	----- End of core at 10.90 m		

<b>Remarks</b>  Refusal met on possible large boulder at 7.6m	<b>Core Barrel:</b>		<b>Water Strikes:</b>		
			<b>Struck (m)</b> 9.50	<b>Rose to (m)</b> 9.50	<b>Time (min)</b> 10
	<b>Flush Type:</b>				
	<b>Water Added:</b>		<b>Casing:</b>		
<b>From (m)</b>	<b>To (m)</b>	<b>To (m)</b>	<b>Diameter (mm)</b>		
		7.60	200		



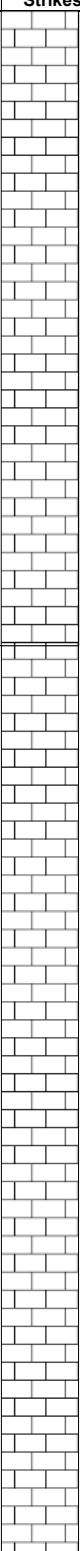

Causeway Geotech Ltd			Project no. 14-645	Project Name: Greater Dublin Drainage Scheme Ground Investigation	Borehole No. BH138																					
Method: 0.00 7.50 Cable Percussion			Co-ords: 323173.16mE	Client: Irish Water	Sheet 1 of 1																					
Plant: Dando3000			241183.17mN	Client's Representative: Tobin Consulting Engineers	Scale: 1:50																					
			Ground Level: 4.22MOD	Dates: 10/12/2014	Crew: CC																					
Depth (m)	Sample / Test	Casing Depth (m)	Water Depth (m)	Field Records	Level & Depth	Stratum Description	Legend & Water Strikes	Backfill Installs																		
0.00 - 0.90	B				(0.90)	Firm to stiff brown sandy gravelly CLAY with occasional cobbles and boulders. Sand is fine to coarse. Gravel is angular to subrounded, fine to coarse.																				
0.90 - 1.50 1.00 1.00	B D SPT(C)	1.00	0.7	N=16 (3,3/4,3,4,5)	3.32 0.90	Medium dense grey slightly silty slightly sandy subangular to rounded fine to coarse GRAVEL with occasional cobbles. Sand is fine to coarse.																				
2.00 2.00	SPT(C) D	2.00	1.2	N=12 (2,3/3,3,3,3)	(2.70)																					
2.50 - 3.00	B																									
3.00 3.00	SPT(C) D	3.00	2.6	N=17 (1,1/2,3,5,7)																						
3.60 - 4.00	B				0.62 3.60	Very stiff dark grey to black slightly sandy slightly gravelly slightly silty CLAY with occasional cobbles and boulders. Sand is fine to coarse. Gravel is angular to subrounded, fine to coarse.																				
4.00	U																									
4.50	D																									
5.00 5.00	D SPT(S)	5.00	4.8	50 (8,12/50 for 200mm)																						
5.50 - 6.00	B				(3.90)																					
6.00 6.00	SPT(S) D	6.00		50 (3,11/50 for 150mm)																						
6.50 - 7.00	B																									
7.00 7.00	SPT(S) D	7.00		50 (25 for 75mm/50 for 125mm)																						
					-3.28 7.50	End of borehole at 7.50 m																				
Remarks						<table border="1"> <tr> <th colspan="3">Chiselling:</th> <th colspan="3">Water Strikes:</th> </tr> <tr> <th>From (m)</th> <th>To (m)</th> <th>Time (hh:mm)</th> <th>Struck (m)</th> <th>Rose to (m)</th> <th>Time (min)</th> </tr> <tr> <td>0.00</td> <td>1.00</td> <td>00:30</td> <td>0.90</td> <td>0.50</td> <td>20</td> </tr> </table>	Chiselling:			Water Strikes:			From (m)	To (m)	Time (hh:mm)	Struck (m)	Rose to (m)	Time (min)	0.00	1.00	00:30	0.90	0.50	20		
Chiselling:			Water Strikes:																							
From (m)	To (m)	Time (hh:mm)	Struck (m)	Rose to (m)	Time (min)																					
0.00	1.00	00:30	0.90	0.50	20																					
<table border="1"> <tr> <th colspan="2">Water Added:</th> <th colspan="2">Casing:</th> </tr> <tr> <th>From (m)</th> <th>To (m)</th> <th>To (m)</th> <th>Diameter (mm)</th> </tr> <tr> <td>0.90</td> <td>3.60</td> <td>7.50</td> <td>200</td> </tr> </table>						Water Added:		Casing:		From (m)	To (m)	To (m)	Diameter (mm)	0.90	3.60	7.50	200									
Water Added:		Casing:																								
From (m)	To (m)	To (m)	Diameter (mm)																							
0.90	3.60	7.50	200																							

Causeway Geotech Ltd					Project no. 14-645	Project Name: Greater Dublin Drainage Scheme Ground Investigation	Borehole No. BH139					
<b>Method:</b> 0.00 14.50 Cable Percussion 14.50 78.40 Rotary Coring					<b>Co-ords:</b> 323824.04mE 241663.70mN	<b>Client:</b> Irish Water	Sheet 1 of 8					
<b>Plant:</b> Dando 2000+Beretta T41					<b>Ground Level:</b> 9.07MOD	<b>Client's Representative:</b> Tobin Consulting Engineers	Scale: 1:50					
						<b>Dates:</b> 04/02/2015 - 12/02/2015	Crew: MMcC					
							Logged By: DOM +MFG					
Depth (m)	TCR	SCR	RQD	FI	Field Records	Level & Depth	Stratum Description	Legend & Water Strikes	Backfill Installs			
0.50 - 1.00 0.50 - 1.00	D B					(0.40) 8.67 0.40	TOPSOIL					
1.20 1.20 - 1.65 1.20 - 1.65	SPT (S) B D				N=19 (5,6/5,5,4,5)	(2.30)	Stiff brown slightly sandy slightly gravelly slightly silty CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse, various lithologies.					
2.00 2.00 - 2.45 2.00 - 2.45	SPT (S) D B				N=26 (7,6/7,7,6,6)							
3.00 3.00 - 3.45 3.00 - 3.45	SPT (S) D B				N=42 (7,9/10,11,10,11)	6.37 2.70	Very stiff black slightly sandy slightly gravelly slightly silty CLAY with occasional cobbles. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse.					
4.00 4.00 - 4.45 4.00 - 4.45	SPT (S) D B				N=36 (7,8/8,10,9,9)							
5.00 5.00 - 5.45 5.00 - 5.45	SPT (S) B D				N=41 (8,9/9,10,12,10)	(4.80)						
6.00 - 6.45	B											
6.50 6.50	D SPT (S)				N=37 (7,9/10,8,9,10)							
8.00 8.00 - 8.45 8.00 - 8.45	SPT (S) D B				N=25 (6,7/6,7,6,6)	1.57 7.50	Stiff dark grey slightly sandy slightly gravelly slightly silty CLAY with occasional cobbles. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse.					
Continued on next sheet												
<b>Remarks</b>						<b>Core Barrel:</b>						
						<b>Flush Type:</b>				Water Strikes:		
										Struck (m)	Rose to (m)	Time (min)
						<b>Water Added:</b>		<b>Casing:</b>				
						From (m)		To (m)		To (m)		Diameter (mm)
								74.50 200				
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Causeway Geotech Ltd					Project no. 14-645	Project Name: Greater Dublin Drainage Scheme Ground Investigation	Borehole No. BH139			
Method: 0.00 14.50 Cable Percussion 14.50 78.40 Rotary Coring					Co-ords: 323824.04mE 241663.70mN	Client: Irish Water	Sheet 2 of 8			
Plant: Dando 2000+Beretta T41					Ground Level: 9.07MOD	Client's Representative: Tobin Consulting Engineers	Scale: 1:50			
					Dates: 04/02/2015 - 12/02/2015	Crew: MMcC	Logged By: DOM +MFG			
Depth (m)	TCR	SCR	RQD	FI	Field Records	Level & Depth	Stratum Description	Legend & Water Strikes	Backfill Installs	
14.50 - 15.60						(7.00)				
	100	0	0	NA		-5.43 14.50	Dark brown clayey very gravelly SAND with occasional cobbles and boulders. Sand is fine to coarse. Gravel is angular to subangular fine to coarse. Cobbles are subangular to subrounded. <i>14.6m to 14.90m: Limestone boulder</i>			
15.60 - 16.90						(1.50)				
	100	0	0	NI		-6.93 16.00	Extremely weak to weak grey and light brown LIMESTONE.  Distinctly weathered to destructured: greatly weakened, much closer fracture spacing and frequently recovered as ordered to disordered lithorelics in light brown sandy clay matrix.			
16.90 - 18.40						(4.10)				
	100	22	0	20						
18.40 - 19.90										
	100	4	0	NI						
19.90 - 21.40						-11.03 20.10	Weak to medium strong, locally very weak, grey with light brown patches			
Continued on next sheet										
Remarks						Core Barrel:		Water Strikes:		
						Flush Type:		Struck (m)	Rose to (m)	Time (min)
						Water Added:		Casing:		
						From (m)	To (m)	To (m)	Diameter (mm)	





Causeway Geotech Ltd					Project no. 14-645	Project Name: Greater Dublin Drainage Scheme Ground Investigation	Borehole No. BH139										
Method: 0.00 14.50 Cable Percussion 14.50 78.40 Rotary Coring					Co-ords: 323824.04mE 241663.70mN	Client: Irish Water	Sheet 3 of 8										
Plant: Dando 2000+Beretta T41					Ground Level: 9.07MOD	Client's Representative: Tobin Consulting Engineers	Scale: 1:50										
					Dates: 04/02/2015 - 12/02/2015	Crew: MMcC	Logged By: DOM +MFG										
Depth (m)	TCR	SCR	RQD	FI	Field Records	Level & Depth	Stratum Description	Legend & Water Strikes	Backfill Installs								
21.40 - 22.90	100	76	40	5			LIMESTONE.  Distinctly weathered, occasionally partially destructured: weakened, closer fracture spacing. Yellowish light brown oxidation staining penetrating in.  DS1: Joints, close to medium spaced, subhorizontal to 50°, planar to irregular, smooth to rough, open, typically filled with 1 to 10mm soft light brown sandy clay, oxidation staining often penetrating in.  DS2: Joints, medium spaced, 70° to vertical, undulating, smooth to rough, open, typically filled with 1 to 10mm soft light brown sandy clay.										
22.90 - 24.40	100	37	9	15		(4.50)											
24.40 - 25.80	100	60	9	10			24.0m to 24.6m: <i>Very weak, partially destructured.</i>										
25.80 - 27.40	100	67	33	NI		-15.53 24.60	Medium strong, grey LIMESTONE.  Partially weathered.  DS1: Joints, medium spaced, horizontal to 40°, planar, smooth to rough, open, occasionally clean, typically filled with 10 to 20mm light brown soft sandy clay.  DS2: Joints, medium to widely spaced, 70° to subvertical, planar to undulating, smooth to rough, open, thin light brown clay film.										
27.40 - 28.90	100	90	30	8													
28.90 - 30.40	100	80	26			(6.05)											
30.40 - 31.90	100	90	73	5													
Continued on next sheet																	
Remarks						Core Barrel:				<table border="1"> <tr> <th>Struck (m)</th> <th>Rose to (m)</th> <th>Time (min)</th> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table>	Struck (m)	Rose to (m)	Time (min)				
						Struck (m)	Rose to (m)				Time (min)						
						Flush Type:											
Water Added:			Casing:														
From (m)		To (m)	To (m)	Diameter (mm)													
			74.50	200													

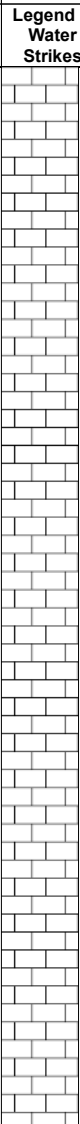



Causeway Geotech Ltd				Project no. 14-645	Project Name: Greater Dublin Drainage Scheme Ground Investigation	Borehole No. BH139			
Method: 0.00 14.50 Cable Percussion 14.50 78.40 Rotary Coring				Co-ords: 323824.04mE 241663.70mN	Client: Irish Water	Sheet 4 of 8			
Plant: Dando 2000+Beretta T41				Ground Level: 9.07MOD	Client's Representative: Tobin Consulting Engineers	Scale: 1:50			
				Dates: 04/02/2015 - 12/02/2015	Crew: MMcC	Logged By: DOM +MFG			
Depth (m)	TCR	SCR	RQD	FI	Field Records	Level & Depth	Stratum Description	Legend & Water Strikes	Backfill Installs
31.90 - 33.40	100	87	57	NI		-21.58 30.65	<p>Medium strong, grey to dark grey LIMESTONE with soft clay joint horizons.</p> <p>Partially weathered: oxidation staining penetrating in from some joints.</p> <p>DS1: Clay filled joints, close to medium spaced, subhorizontal to 50°, planar to slightly undulating, smooth, open, filled with 10 to 50mm soft orangey or yellowish light brown clay.</p> <p>DS2: Joints, widely spaced, 70° to subvertical, planar to undulating, smooth to rough, open, occasionally incipient, typically stained brown.</p>		
33.40 - 34.90	100	75	43	8		(7.55)			
34.90 - 36.40	100	65	17	15					
36.40 - 37.90	100	91	86	4					
37.90 - 39.40	96	80	72	NI		-29.13 38.20	<p>Extremely weak to weak, grey LIMESTONE.</p> <p>Distinctly weathered to destructured: greatly weakened, much closer fracture spacing and largely recovered as ordered lithorelics in yellowish grey clay matrix.</p>		
39.40 - 40.90	100	20	12	NI		(1.20)			
39.40 - 40.90	80	0	0			-30.33 39.40	<p>Extremely weak light grey fine grained SANDSTONE interbedded with extremely weak yellowish light grey SILTSTONE.</p> <p>Destructured: greatly weakened, mottled oxidation staining throughout. Largely recovered as firm to stiff sandy clay.</p>		
Continued on next sheet									
Remarks					Core Barrel:		Water Strikes:		
					Flush Type:		Struck (m)	Rose to (m)	Time (min)
					Water Added:		Casing:		
					From (m)	To (m)	To (m)	Diameter (mm)	
							74.50	200	
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Causeway Geotech Ltd				Project no. 14-645	Project Name: Greater Dublin Drainage Scheme Ground Investigation	Borehole No. BH139			
Method: 0.00 14.50 Cable Percussion 14.50 78.40 Rotary Coring				Co-ords: 323824.04mE 241663.70mN	Client: Irish Water	Sheet 5 of 8			
Plant: Dando 2000+Beretta T41				Ground Level: 9.07MOD	Client's Representative: Tobin Consulting Engineers	Scale: 1:50			
				Dates: 04/02/2015 - 12/02/2015		Crew: MMcC			
						Logged By: DOM +MFG			
Depth (m)	TCR	SCR	RQD	FI	Field Records	Level & Depth	Stratum Description	Legend & Water Strikes	Backfill Installs
40.90 - 42.40	94	0	0	NI		(3.75)			
42.40 - 43.90	100	0	0	NI		-34.08 43.15 (0.70)	Extremely weak light grey mottled yellow MUDSTONE.  Destructured: greatly weakened, mottled yellow oxidation staining throughout. Recovered as stiff clay.		
43.90 - 45.40	100	13	0	NI		-34.78 43.85 (1.75)	Extremely weak to very weak, light grey fine grained SANDSTONE, with coarse sand-sized clear to brown calcite crystals occurring with increasing frequency from 44.9m to 45.6m.  Distinctly weathered to destructured: greatly weakened, mottled oxidation staining, largely recovered as clayey sand.		
45.40 - 46.90	88	67	67	2		-36.53 45.60 (1.00)	Weak to medium strong grey and yellow LIMESTONE.  Distinctly weathered slightly weakened, mottled oxidation staining, gravel-sized vugs created by dissolution.		
46.90 - 48.40	94	38	13	10		-37.53 46.60 (0.50) -38.03 47.10	Extremely weak, light grey to yellow fine grained SANDSTONE, with frequent coarse sand-sized clear to brown calcite crystals.  Destructured: greatly weakened, mottled oxidation staining, recovered as clayey sand. Very weak to weak grey LIMESTONE with extremely weak SANDSTONE horizons.  Distinctly weathered to destructured: greatly weakened, much closer fracture spacing, locally recovered as ordered lithorelics in light brown, sandy clay matrix. Occasional red staining on some joints.		
48.40 - 49.90	93	31	0	NI		(4.95)			
49.90 - 51.40	63	10	0	NI			49.70m to 49.90m: Extremely weak destructured sandstone: possibly indicative of the type of material lost in subsequent two core runs. 49.90m to 51.40m: AZCL		
Continued on next sheet									
Remarks					Core Barrel:		Water Strikes:		
					Flush Type:		Struck (m)	Rose to (m)	Time (min)
					Water Added:		Casing:		
					From (m)	To (m)	To (m)	Diameter (mm)	
							74.50	200	
									
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Causeway Geotech Ltd					Project no. 14-645	Project Name: Greater Dublin Drainage Scheme Ground Investigation	Borehole No. BH139						
Method: 0.00 14.50 Cable Percussion 14.50 78.40 Rotary Coring					Co-ords: 323824.04mE 241663.70mN	Client: Irish Water	Sheet 6 of 8						
Plant: Dando 2000+Beretta T41					Ground Level: 9.07MOD	Client's Representative: Tobin Consulting Engineers	Scale: 1:50						
					Dates: 04/02/2015 - 12/02/2015	Crew: MMcC	Logged By: DOM +MFG						
Depth (m)	TCR	SCR	RQD	FI	Field Records	Level & Depth	Stratum Description	Legend & Water Strikes	Backfill Installs				
51.40 - 52.90													
	37	2	0			-42.98 52.05 (0.85)	NO RECOVERY						
52.90 - 54.40							Weak to medium strong, locally very weak close to some joints grey occasionally mottled yellow LIMESTONE.  Partially to distinctly weathered: Closer fracture spacing, greatly weakened at some joints with yellow oxidation staining penetrating in.  DS1: Joints, close to medium spaced, 30° to 50°, planar to stepped or undulating, smooth to rough, open, filled with <1 to 30mm light brown or yellow soft to stiff sandy clay. Red staining on some joints. Yellow staining often penetrating in up to 50mm, with corresponding very weak zone and occasionally very closely spaced anastomosing incipient joints.  DS2: Joints, widely spaced, subvertical, undulating and very irregular, smooth to rough, open, to incipient, filled with 1 to 20mm light brown or yellow firm sandy clay.						
54.40 - 55.90	100	77	57										
				11									
55.90 - 57.40	100	40	26										
57.40 - 58.90	100	100	95	3		(8.80)							
58.90 - 60.40	100	73	15										
				14									
60.40 - 61.90	100	53	23										
				5									
Continued on next sheet													
Remarks						Core Barrel:		Water Strikes:					
						Flush Type:		Struck (m)	Rose to (m)		Time (min)		
						Water Added:		Casing:					
						From (m)	To (m)	To (m)	Diameter (mm)				
								74.50	200				

Causeway Geotech Ltd				Project no. 14-645	Project Name: Greater Dublin Drainage Scheme Ground Investigation	Borehole No. BH139			
Method: 0.00 14.50 Cable Percussion 14.50 78.40 Rotary Coring				Co-ords: 323824.04mE 241663.70mN	Client: Irish Water	Sheet 7 of 8			
Plant: Dando 2000+Beretta T41				Ground Level: 9.07MOD	Client's Representative: Tobin Consulting Engineers	Scale: 1:50			
				Dates: 04/02/2015 - 12/02/2015		Crew: MMcC			
						Logged By: DOM +MFG			
Depth (m)	TCR	SCR	RQD	FI	Field Records	Level & Depth	Stratum Description	Legend & Water Strikes	Backfill Installs
61.90 - 63.40						-52.63 61.70	Medium strong to strong thin to thickly laminated dark grey ARGILLACEOUS LIMESTONE.  Mostly unweathered.  DS1: Bedding, thin to thickly laminated, 30 to 50°, planar, smooth to rough, typically closed to occasionally open at medium to wide spacing, typically unstained. One at 63.75m stained blood red.  DS2: Calcite veins at 72.4-73.3m, closely spaced, 50 to 80°, planar and stepped, closed with up to 30mm calcite. Open at 72.4m to 72.5m with brown sandy clay film and brown staining.		
	100	100	100	3					
63.40 - 64.90									
	100	100	100						
64.90 - 66.40									
	100	100	100						
66.40 - 67.90				2		(16.70)			
	100	100	100						
67.90 - 69.40									
	100	100	100						
69.40 - 70.90									
	100	100	100	1					
70.90 - 72.40									
Continued on next sheet									
Remarks					Core Barrel:		Water Strikes:		
					Flush Type:		Struck (m)	Rose to (m)	Time (min)
					Water Added:		Casing:		
					From (m)	To (m)	To (m)	Diameter (mm)	
							74.50	200	
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Causeway Geotech Ltd					Project no. 14-645	Project Name: Greater Dublin Drainage Scheme Ground Investigation	Borehole No. BH139			
Method: 0.00 14.50 Cable Percussion 14.50 78.40 Rotary Coring					Co-ords: 323824.04mE 241663.70mN	Client: Irish Water	Sheet 8 of 8			
Plant: Dando 2000+Beretta T41					Ground Level: 9.07MOD	Client's Representative: Tobin Consulting Engineers	Scale: 1:50			
					Dates: 04/02/2015 - 12/02/2015	Crew: MMcC	Logged By: DOM +MFG			
Depth (m)	TCR	SCR	RQD	FI	Field Records	Level & Depth	Stratum Description	Legend & Water Strikes	Backfill Installs	
72.40 - 73.90	100	100	100				72.4m to 73.3m: Calcite veins			
73.90 - 75.40	100	83	70							
75.40 - 76.90	100	100	100	3						
76.90 - 78.40	100	95	60			76.8m to 78.0m: 50 to 70mm thick vein, subvertical, planar, slightly undulating, closed to incipient, filled with calcite and quartz mineralisation, and stiff yellowish brown clay.				
						-69.33 78.40	End of core at 78.40 m			
Remarks						Core Barrel:		Water Strikes:		
						Flush Type:		Struck (m)	Rose to (m)	Time (min)
						Water Added:				
						From (m)	To (m)	To (m)	Diameter (mm)	
								74.50	200	
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