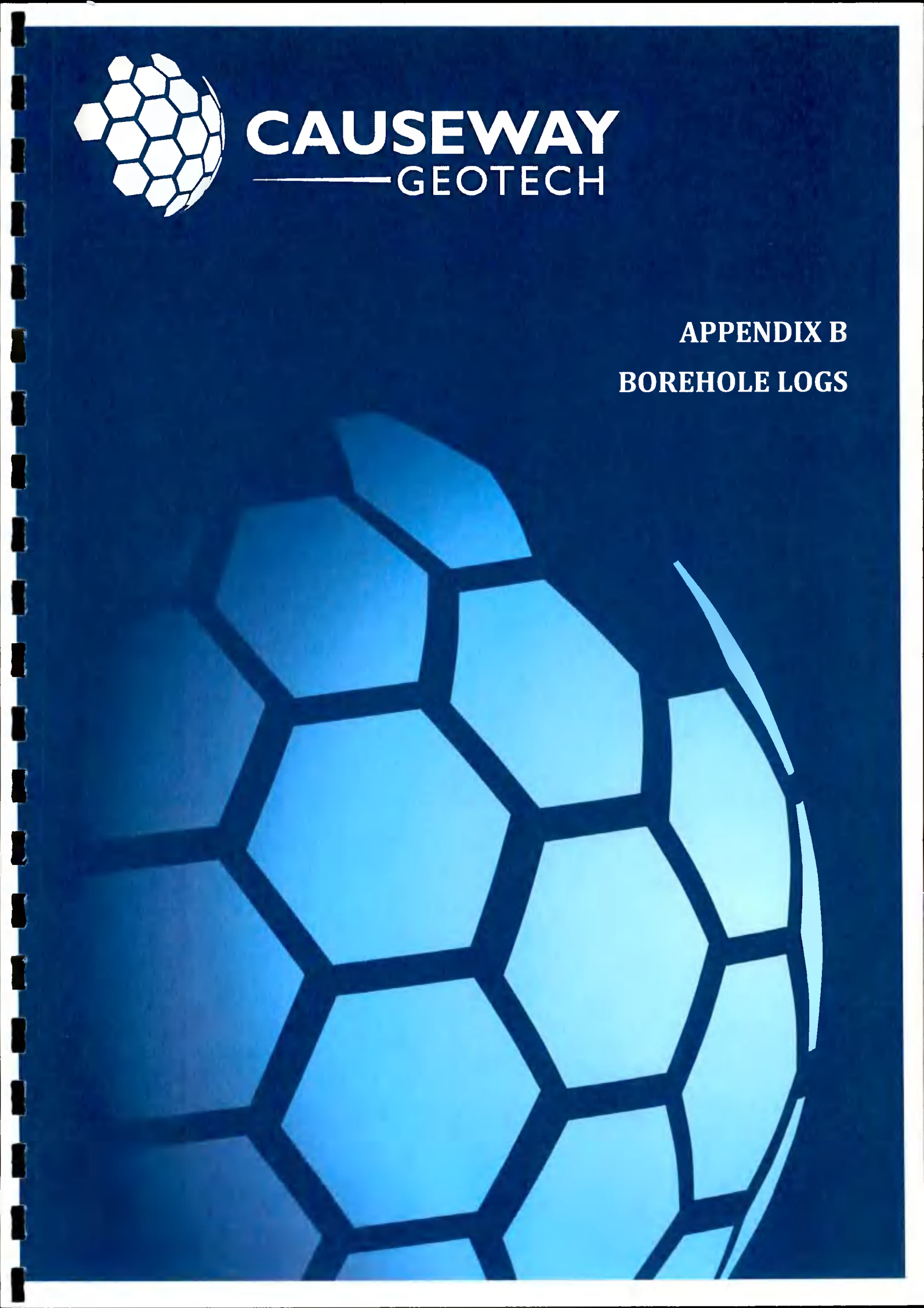
CAUSEWAY GEOTECH

APPENDIX B

BOREHOLE LOGS



CAUSEWAY GEOTECH

Project No.:	Project Name:	Borehole No.:
17-1375	Saggart Reservoir Site Investigation	BH01
Coordinates:	**Client:**	Sheet 1 of 1
303507.38 E	Irish Water	
226194.37 N	**Client's Representative:** RPS Consulting Engineers	**Scale:** 1:50
Ground Level: 139.27 mOD	**Dates:** 21/02/2018 - 20/03/2018	**Driller:** DMcA
		Logger: MFG

Method	Plant Used	Top	Base
Cable Percussion	Dando 2500	0.00	1.90

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							Stiff brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse.		
0.50	ES4									
1.00	ES5					(1.90)				
1.00 - 1.90	B2									
1.20 - 1.65	SPT (S) N=15			N=15 (2,3/3,3,4,5)						
1.60	D3									
					137.37	1.90		End of Borehole at 1.90m		

Remarks
Hand dug inspection pit excavated from 0-1.20m.

Terminated on refusal at 1.90m. Moved to rebore position BH01A.

Water Strikes				Chiselling Details		
Struck at (m)	Casing to (m)	Time (mm)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
				1.90	1.90	01:00

Water Added		Casing Details	
From (m)	To (m)	To (m)	Diam (mm)
		1.90	200

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2500	0.00	6.60
Roatry Drilling	Hanjin 8D	6.60	11.00
Rotary Coring	Hanjin 8D	11.00	14.00

Project No.: 17-1375

Project Name: Saggart Reservoir Site Investigation

Borehole No.: BH01A

Coordinates: 303507.38 E, 226194.37 N

Client: Irish Water

Sheet 1 of 2

Client's Representative: RPS Consulting Engineers

Scale: 1:50

Driller: DMcA

Ground Level: 139.27 mOD

Dates: 22/02/2018

Logger: MFG

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
						(3.00)		Very stiff brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles and boulders are subangular.		
1.90 - 2.90	B1									
2.00 - 2.45	SPT (S) N=32	2.00		N=32 (3,5/7,7,9,9)						
2.40	D7									
2.90 - 3.70	B2									
3.00 - 3.45	SPT (S) N=21	3.00	2.10	N=21 (4,4/5,5,5,6)	136.27	3.00		Stiff brown slightly sandy gravelly CLAY with low cobble and boulder content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles and boulders are subangular.		
3.40	D8					(0.90)				
3.70 - 3.90	B3									
3.90 - 4.90	B4				135.37	3.90		Very dense grey sandy clayey angular fine to coarse GRAVEL with and occasional bands of stiff brown sandy gravelly clay.		
4.00 - 4.29	SPT (S)	4.00	3.60	50 (12,13/50 for 140mm)						
4.30	D9									
4.90 - 5.90	B5					(2.00)				
5.00 - 5.20	SPT (S)	5.00	4.10	50 (25 for 110mm/50 for 95mm)						
5.30	D10									
5.90 - 6.60	B6				133.37	5.90		Very dense grey subangular medium GRAVEL with bands of stiff black sandy gravelly clay with low cobble and boulder content.		
6.00 - 6.21	SPT (S)	6.00	4.80	50 (25 for 105mm/50 for 105mm)		(0.70)				
6.30	D11					6.60				
					132.67	(0.30)		BOULDER		
					132.37	6.90		Very stiff dark brown slightly sandy slightly gravelly CLAY. (Driller's Description)		
						(2.80)				
8.50 - 8.95	SPT (S) N=48	8.50		N=48 (6,9/9,11,14,14)						
					129.57	9.70		Weathered ROCK (Driller's description)		
						(1.30)				

Remarks
Hand dug inspection pit excavated from 0-1.20m

Core Barrel: T2-101

Flush Type:

Water Strikes				Chiselling Details		
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
				6.60	6.60	01:00

Water Added		Casing Details	
From (m)	To (m)	To (m)	Diam (mm)
3.90	6.60	6.60	200

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2500	0.00	6.60
Roatry Drilling	Hanjin 8D	6.60	11.00
Rotary Coring	Hanjin 8D	11.00	14.00

Project No.: 17-1375

Project Name: Saggart Reservoir Site Investigation

Borehole No.: BH01A

Coordinates: 303507.38 E, 226194.37 N

Client: Irish Water

Sheet 2 of 2

Client's Representative: RPS Consulting Engineers

Scale: 1:50

Driller: DMcA

Ground Level: 139.27 mOD

Dates: 22/02/2018

Logger: MFG

Depth (m)	Sample / Tests		Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
									Weathered ROCK (Driller's description)		
	100	39	39	20+ 6		128.27	11.00		Weak to medium strong interbedded SANDSTONE and thinly laminated MUDSONE. Distinctly weathered: slightly reduced strength, much closer fracture spacing. Rust oxidation staining on fracture surfaces. Discontinuities: 1. 5 to 10 degree joints, closely spaced (60/80/250), stepped, rough). 2. 45 degree joints, closely spaced (80/100/350), planar, rough. 3. 75 to 90 degree bedding fractures, very closely spaced, stepped, smooth.		
12.00	100	0	0				(3.00)				
13.00	100	10	10	20+							
14.00						125.27	14.00		End of Borehole at 14.00m		

TCR | SCR | RQD | FI

Remarks
Hand dug inspection pit excavated from 0-1.20m.

Core Barrel	Water Strikes				Chiselling Details		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
T2-101					6.60	6.60	01:00

Flush Type	Water Added		Casing Details	
	From (m)	To (m)	To (m)	Diam (mm)

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2500	0.00	15.50
Geobor S	Hanjin 8D	15.50	18.50
Rotary Coring	Hanjin 8D	18.50	26.50

Project No.: 17-1375

Project Name: Saggart Reservoir Site Investigation

Borehole No.: BH02

Coordinates: 303806.00 E, 226123.94 N

Client: Irish Water

Sheet 1 of 3

Client's Representative: RPS Consulting Engineers

Scale: 1:50

Driller: DMC+JG

Ground Level: 147.57 mOD

Dates: 29/04/2018

Logger: CH+TH

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description
0.00 - 0.40	B1					(0.40)		TOPSOIL
0.40 - 1.40	B2				147.17	0.40		Stiff brown sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subrounded fine to coarse.
0.50	ES38							
1.00	ES39					(1.30)		
1.20 - 1.65	SPT (S) N=25			N=25 (3,4/5,6,6,8)				
1.40 - 1.70	B3							
1.60	D21							
1.70 - 2.70	B4				145.87	1.70		Dense greyish brown very sandy slightly clayey rounded fine to coarse GRAVEL. Sand is fine to coarse.
2.00 - 2.45	SPT (S) N=38	2.00	1.30	N=38 (3,6/7,8,10,13)				
2.40	D22							
2.70 - 3.70	B5 B6							
3.00 - 3.45	SPT (S) N=43	3.00	2.10	N=43 (1,5/10,11,11,11)				
3.40	D23							
3.70 - 4.70	B7							
4.00 - 4.45	SPT (S) N=39	4.00	2.70	N=39 (3,4/7,8,11,13)		(5.00)		
4.40	D24							
4.70 - 5.70	B8							
5.00 - 5.45	SPT (S) N=38	5.00	3.60	N=38 (3,4/6,9,10,13)				
5.40	D25							
5.70 - 6.70	B9							
6.00 - 6.45	SPT (S) N=46	6.00	4.20	N=46 (2,5/8,10,12,16) Water strike at 6.00m				
6.40	D26							
6.70 - 7.30	B10				140.87	6.70		Dense greyish very gravelly slightly clayey brown fine to coarse SAND.
7.00 - 7.45	SPT (S) N=46	7.00	4.70	N=46 (3,5/9,10,13,14)		(0.60)		
7.30 - 8.10	B11				140.27	7.30		Very stiff grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse.
7.40	D27							
8.00 - 8.45	SPT (S) N=31	8.00	4.90	N=31 (3,4/6,8,8,9)				
8.10 - 9.10	B12							
8.40	D28							
9.00 - 9.36	SPT (S)	9.00	5.10	50 (4,9/50 for 215mm)		(4.20)		
9.10 - 9.60	B13							
9.30	D29							
10.00 - 10.50	B14							
10.00 - 10.45	SPT (S) N=47	10.00	4.70	N=47 (10,10/10,12,12,13)				

Water

Backfill

Remarks

Hand dug inspection pit excavated from 0-1.20m.

Core Barrel: SK6LT2-101

Flush Type:

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
6.00	6.00	20	6.00
26.00	26.00	20	26.00

Water Added

From (m)	To (m)
1.70	15.50

Casing Details

To (m)	Diam (mm)

Chiselling Details

From (m)	To (m)	Time (hh:mm)
1.90	2.60	01.00
5.70	6.20	01.00
11.60	12.00	01.00

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2500	0.00	15.50
Geobor S	Hanjin 8D	15.50	18.50
Rotary Coring	Hanjin 8D	18.50	26.50

Project No.: 17-1375
Project Name: Saggart Reservoir Site Investigation
Borehole No.: BH02
Coordinates: 303806.00 E, 226123.94 N
Client: Irish Water
Sheet 2 of 3
Client's Representative: RPS Consulting Engineers
Scale: 1:50
Ground Level: 147.57 mOD
Dates: 29/04/2018
Driller: DMC+JG
Logger: CH+TH

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
10.40	D30 D32							Very stiff grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse.		
11.00 - 11.50	B15									
11.00 - 11.45	SPT (S) N=51	11.00	3.60	N=51 (10,10/11,12,13,15)						
11.40	D31 D33				136.07	11.50		Very stiff brown slightly sandy gravelly CLAY with thin lenses of sandy gravel. Sand is fine to coarse. Gravel is subrounded fine to coarse.		
12.00 - 12.50	B16					(1.00)				
12.00 - 12.34	SPT (S)	12.00	4.20	50 (6,10/50 for 190mm)						
12.30	D34				135.07	12.50		Very stiff dark grey slightly sandy slightly gravelly CLAY. Gravel is subangular fine to coarse of limestone. Sand is fine to coarse.		
12.50 - 13.00	B17					(0.50)				
13.00 - 13.50	B18				134.57	13.00		Very stiff brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is subrounded fine to coarse.		
13.00 - 13.44	SPT (S)	13.00	5.70	50 (6,7/50 for 285mm)		(0.50)				
13.30	D35				134.07	13.50		Very dense brown sandy slightly clayey subrounded fine to coarse GRAVEL of mixed lithologies. Sand is fine to coarse		
14.00 - 14.50	B19									
14.00 - 14.44	SPT (S)	14.00	7.10	N=52 (7,8/52 for 285mm)						
14.50	D36					(2.00)				
15.00 - 15.50	B20									
15.00 - 15.42	SPT (S)	15.00	7.90	N=50 (3,5/50 for 265mm)						
15.50	D37				132.07	15.50		Medium dense sandy subangular to subrounded fine to coarse GRAVEL with occasional cobbles and boulders. Sand is fine to coarse. Cobbles and boulders are subrounded.		
						(1.50)				
					130.57	17.00		Very stiff brownish grey sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mixed lithologies. Cobbles are subangular		
	100					(7.00)				
20.00										
	TCR	SCR	RQD	FI						

Remarks
Hand dug inspection pit excavated from 0-1.20m

Core Barrel	Water Strikes				Chiselling Details		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
SK6LT2-101					1.90	2.60	01:00
					5.70	6.20	01:00
					11.60	12.00	01:00

Flush Type	Water Added		Casing Details	
	From (m)	To (m)	To (m)	Diam (mm)
			18.50	200

CAUSEWAY GEOTECH

Project No.:	Project Name:	Borehole No.:
17-1375	Saggart Reservoir Site Investigation	BH02
Coordinates:	**Client:**	Sheet 3 of 3
303806.00 E	Irish Water	
226123.94 N	**Client's Representative:** RPS Consulting Engineers	**Scale:** 1:50
Ground Level: 147.57 mOD	**Dates:** 29/04/2018	**Driller:** DMC +JG
		Logger: CH+TH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2500	0.00	15.50
Geobor S	Hanjin 8D	15.50	18.50
Rotary Coring	Hanjin 8D	18.50	26.50

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
	100										
21.50											
	100										
23.00											
	100										
						123.57	24.00		Stiff light brown sandy very gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mixed lithologies. Cobbles are subangular		
24.50									*24.00m - 26.00m: clay is dry and compacted with low moisture content*		
	100						(2.50)				
26.00					Water strike at 26.00m						
	60										
26.50						121.07	26.50		End of Borehole at 26.50m		

TCR	SCR	RQD	FI

Remarks
Hand dug inspection pit excavated from 0-1.20m.

Core Barrel	Water Strikes				Chiselling Details		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
SK6LT2-101	6.00	6.00	20	6.00	1.90	2.60	01:00
	26.00	26.00	20	26.00	5.70	6.20	01:00
					11.60	12.00	01:00

Flush Type	Water Added		Casing Details	
	From (m)	To (m)	To (m)	Diam (mm)
			26.50	152

CAUSEWAY GEOTECH

Project No.:	Project Name:	Borehole No.:
17-1375	Saggart Reservoir Site Investigation	BH03
Coordinates:	**Client:**	Sheet 1 of 2
303529.39 E	Irish Water	
226088.91 N	**Client's Representative:** RPS Consulting Engineers	**Scale:** 1:50
Ground Level:	**Dates:**	**Driller:** DMC+JG
139.30 mOD	07/03/2018	**Logger:** CH+ST

Method	Plant Used	Top	Base
Cable Percussion	Dando 25000	0.00	2.30
Rotary Drilling	Hanjin 8D	2.30	5.50
Rotary Coring	Hanjin 8D	5.60	6.00
Open Hole Drilling	Hanjin 8D	6.00	11.70

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.00 - 0.30	B7					(0.30)		TOSPOIL		
0.30 - 1.30	B6				139.00	0.30		Firm brown slightly sandy slightly gravelly SILT. Sand is fine to coarse. Gravel is fine to medium.		
0.50	ES2									
1.00	ES1									
1.20 - 1.65	SPT (S) N=11			N=11 (2,3/2,3,3,3)		(2.30)				
1.30 - 2.30	B5									
1.60	D4			Water strike at 1.60m						
2.00 - 2.26	SPT (S)			50 (4,8/50 for 115mm)						
2.30	D3				136.70	2.60		Large BOULDER		
2.60 - 2.82	SPT (S)			50 (25 for 145mm/50 for 70mm)	136.40	(0.30) 2.90		Stiff slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Sand is fine to coarse.		
4.00 - 4.45	SPT (S)			23 (6,7/7,8,8,)		(2.60)				
	100				133.80	5.50 (0.50)		Very stiff dark grey slightly sandy very gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse of mixed lithologies predominately limestone.		
6.00					133.30	6.00		Very stiff slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles are subrounded.		
7.00 - 7.45	SPT (S)			50 (5,12/18,18,14,)	132.30	(1.00) 7.00		Very stiff black slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles are subrounded.		
8.50 - 8.88	SPT (S)			49 (6,13/49 for 225mm)		(4.70)				
10.00 - 10.38	SPT (S)			49 (6,13/49 for 225mm)						

Remarks
Hand dug inspection pit excavated from 0-1.20m.

Core Barrel	Water Strikes				Chiselling Details		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
T2-101	1.60	1.60	20	1.40	2.30	2.60	01:00

Flush Type	Water Added		Casing Details	
	From (m)	To (m)	To (m)	Diam (mm)

CAUSEWAY GEOTECH

Project No.:	Project Name:	Borehole No.:
17-1375	Saggart Reservoir Site Investigation	BH03
Coordinates:	**Client:**	Sheet 2 of 2
303529.39 E	Irish Water	
226088.91 N	**Client's Representative:** RPS Consulting Engineers	**Scale:** 1:50
Ground Level:	**Dates:**	**Driller:** DMC+JG
139.30 mOD	07/03/2018	**Logger:** CH+ST

Method	Plant Used	Top	Base
Cable Percussion	Dando 25000	0.00	2.30
Rotary Drilling	Hanjin 8D	2.30	5.50
Rotary Coring	Hanjin 8D	5.60	6.00
Open Hole Drilling	Hanjin 8D	6.00	11.70

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
								Very stiff black slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles are subrounded.		
11.70 - 12.08	SPT (S)			50 (2,10/50 for 225mm)	127.60	11.70		End of Borehole at 11.70m		

Remarks
Hand dug inspection pit excavated from 0-1.20m.

Core Barrel	Water Strikes				Chiselling Details		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
T2-101	1.60	1.60	20	1.40	2.30	2.60	01:00

Flush Type	Water Added		Casing Details	
	From (m)	To (m)	To (m)	Diam (mm)

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2500	0.00	1.80

Project No.: 17-1375	**Project Name:** Saggart Reservoir Site Investigation	**Borehole No.:** BH04
Coordinates: 303495.47 E 226147.58 N	**Client:** Irish Water	Sheet 1 of 1
	Client's Representative: RPS Consulting Engineers	**Scale:** 1:50
Ground Level: 138.58 mOD	**Dates:** 23/04/2018	**Driller:** DM
		Logger: CH

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.00 - 0.30	B4					(0.30)		TOPSOIL.		
0.30 - 1.30	B5				138.28	0.30		Firm brown sandy slightly gravelly SILT. Sand is fine to coarse. Gravel is subangular fine to medium.		
0.50	ES2									
1.00	ES1					(1.50)				
1.20 - 1.65	SPT (S) N=15	1.20		N=15 (2,3/4,3,4,4)						
1.30 - 1.80	B6									
1.60	D3									
					136.78	1.80		End of Borehole at 1.80m		

Remarks
Hand dug inspection pit excavated from 0-1.20m.

Terminated on refusal at 1.80m. Moved to rebore position BH04A.

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Water Added

From (m)	To (m)

Casing Details

To (m)	Diam (mm)
1.80	200

Chiselling Details

From (m)	To (m)	Time (hh:mm)
1.80	1.90	01:00

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2500	0.00	4.20
Rotary Drilling	Hanjin 8D	4.20	11.50
Rotary Coring	Hanjin 8D	11.50	12.00

Project No.: 17-1375

Project Name: Saggart Reservoir Site Investigation

Borehole No.: BH04A

Coordinates: 303495.47 E, 226147.58 N

Client: Irish Water

Sheet 1 of 2

Client's Representative: RPS Consulting Engineers

Scale: 1:50

Driller: DMC+JG

Ground Level: 138.58 mOD

Dates: 22/02/2018

Logger: CH+SG

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
						(0.30)		TOPSOIL.		
					138.28	0.30		Stiff brown slightly sandy slightly gravelly CLAY with low to medium cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles are angular.		
1.80 - 2.80	B3									
2.00 - 2.44	SPT (S)	2.00		N=49 (2,3/49 for 290mm)		(3.60)				
2.40	D6									
2.80 - 3.90	B2									
3.00 - 3.45	SPT (S) N=29	3.00		N=29 (3,5/8,7,6,8)						
3.40	D5									
3.90 - 4.20	B1				134.68	3.90 (0.30)		Stiff black slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse.		
4.20 - 4.65	SPT (S) N=50	4.00		N=50 (4,5/6,14,17,13)	134.38	4.20		Very stiff slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse.		
4.60	D4									
5.50 - 5.89	SPT (C)			N=50 (6,8/50 for 240mm)						
7.00 - 7.39	SPT (C)			N=50 (5,6/50 for 240mm)		(7.30)				
8.50 - 8.78	SPT (C)			N=43 (6,9/43 for 125mm)						

Remarks
Hand dug inspection pit excavated from 0-1.20m

Core Barrel: T2-101

Flush Type:

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Water Added

From (m)	To (m)

Casing Details

To (m)	Diam (mm)

Chiselling Details

From (m)	To (m)	Time (hh:mm)
2.40	2.70	00:30
3.90	4.20	01:00

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2500	0.00	4.20
Rotary Drilling	Hanjin 8D	4.20	11.50
Rotary Coring	Hanjin 8D	11.50	12.00

Project No.: 17-1375	**Project Name:** Saggart Reservoir Site Investigation	**Borehole No.:** BH04A
Coordinates: 303495.47 E 226147.58 N	**Client:** Irish Water	Sheet 2 of 2
	Client's Representative: RPS Consulting Engineers	**Scale:** 1:50
Ground Level: 138.58 mOD	**Dates:** 22/02/2018	**Driller:** DMC+JG
		Logger: CH+SG

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
								Very stiff slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse.		
	100				127.08	11.50 (0.50)		Very stiff grey slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse of mixed lithologies predominately sandstone and slatey mudstone. Cobbles are subangular.		
12.00					126.58	12.00		End of Borehole at 12.00m		

TCR	SCR	RQD	FI

Remarks
Hand dug inspection pit excavated from 0-1.20m.

Core Barrel T2-101

Flush Type

Water Strikes				Chiselling Details		
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
				2.40	2.70	00:30
				3.90	4.20	01:00

Water Added		Casing Details	
From (m)	To (m)	To (m)	Diam (mm)

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2500	0.00	2.30
Rotary Drilling	Hanjin 8D	2.30	13.00

Project No.: 17-1375
Project Name: Saggart Reservoir Site Investigation
Borehole No.: BH05
Coordinates: 303489.30 E, 226104.44 N
Client: Irish Water
Client's Representative: RPS Consulting Engineers
Ground Level: 137.01 mOD
Dates: 06/03/2018
Sheet 1 of 2
Scale: 1:50
Driller: DMC+JG
Logger: CH

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description
0.00 - 1.20	B7					(0.20)		TOPSOIL.
0.20 - 1.20	B6				136.81	0.20		Stiff brown CLAY with cobbles and boulders. Cobbles and boulders are subrounded.
0.50	ES2							
1.00	ES1							
1.20 - 1.65	SPT (S) N=19			N=19 (2,3/5,4,5,5)		(2.10)		
1.60	D4							
2.00 - 2.43	SPT (S)			N=50 (4,4/50 for 280mm)				
2.20 - 2.30	B5				134.71	2.30		Very stiff slightly silty slightly gravelly sandy CLAY. (Driller's description)
2.30	D3							
2.60 - 2.96	SPT (C)			N=50 (6,9/50 for 210mm)				
4.00 - 7.00	B8							
4.00 - 4.34	SPT (S)			N=51 (7,9/51 for 190mm)				
5.50 - 5.92	SPT (S)			N=50 (9,10/50 for 265mm)				
						(10.70)		
7.00 - 10.00	B9							
7.00 - 7.28	SPT (S)			N=41 (9,11/41 for 135mm)				
8.50 - 8.76	SPT (S)			N=44 (10,13/44 for 110mm)				
10.00 - 10.33	SPT (S)			N=50 (8,11/50 for 180mm)				

Water | Backfill

Remarks
Hand dug inspection pit excavated from 0-1.20m

Core Barrel

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
11.00	11.00		

Chiselling Details

From (m)	To (m)	Time (hh:mm)
2.30	2.60	01.00

Flush Type

Water Added

From (m)	To (m)

Casing Details

To (m)	Diam (mm)

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2500	0.00	2.30
Rotary Drilling	Hanjin 8D	2.30	13.00

Project No.: 17-1375

Project Name: Saggart Reservoir Site Investigation

Borehole No.: BH05

Coordinates: 303489.30 E, 226104.44 N

Client: Irish Water

Sheet 2 of 2

Client's Representative: RPS Consulting Engineers

Scale: 1:50

Driller: DMC+JG

Ground Level: 137.01 mOD

Dates: 06/03/2018

Logger: CH

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
								Very stiff slightly silty slightly gravelly sandy CLAY. (Driller's description)		
				Water strike at 11.0m					▼	
11.50 - 11.88	SPT (S)			N=50 (9,13/50 for 225mm)						
					124.01	13.00		End of Borehole at 13.00m		

Remarks
Hand dug inspection pit excavated from 0-1.20m.

Core Barrel

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
11.00	11.00		

Chiselling Details

From (m)	To (m)	Time (hh:mm)
2.30	2.60	01.00

Flush Type

Water Added

From (m)	To (m)

Casing Details

To (m)	Diam (mm)

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2500	0.00	3.00
Rotary Drilling	Beretta T44	3.00	3.80
Geobor S	Beretta T44	3.80	12.80

Project No.: 17-1375

Project Name: Saggart Reservoir Site Investigation

Borehole No.: BH06

Coordinates: 303589.07 E, 226243.29 N

Client: Irish Water

Sheet 1 of 2

Client's Representative: RPS Consulting Engineers

Scale: 1:50

Driller: DMcA+GT

Ground Level: 143.12 mOD

Dates: 20/02/2018

Logger: MFG+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							Firm brown slightly sandy slightly gravelly CLAY with low cobble and boulder content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles and boulders are subrounded.		
0.50	ES8									
						(1.60)				
1.00	ES9									
1.00 - 2.60	B2									
1.20 - 1.65	SPT (S) N=13			N=13 (3,3/3,4,3,3)						
1.60	D5				141.52	1.60		Very stiff brownish grey sandy gravelly CLAY with high boulder content and low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles and boulders are subangular to subrounded.		
1.60 - 2.60	B3									
2.00 - 2.40	SPT (S)	2.00		N=50 (5,7/50 for 255mm)						
						(1.40)				
2.40	D6									
2.60 - 3.00	B4									
						3.00				
3.00 - 3.30	SPT (S)	3.00		N=50 (11,13/50 for 145mm)	140.12			Very stiff blackish grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles are subangular.		
3.30	D7					(0.80)				
						3.80				
	100				139.32			Very stiff brownish black slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles are of various lithologies predominately limestone and sandstone.		
5.30										
	100					(4.30)				
6.80										
	100									
					135.02	8.10		Firm to stiff brown slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse.		
8.30										
	93					(1.90)				
9.80										
					133.12	10.00		Medium strong greenish grey thinly laminated coarse grained cemented SANDSTONE. Partially weathered: slightly reduced strength, black reddish		
	TCR SCR RQD FI									

Remarks

Hand dug inspection pit excavated from 0-1.20m.
Cored from 3.80m to 12.80m using Geobore S.

Core Barrel	Water Strikes				Chiselling Details		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
SK6L					3.00	3.30	01:00

Flush Type	Water Added		Casing Details	
	From (m)	To (m)	To (m)	Diam (mm)
			3.00	200

CAUSEWAY GEOTECH

Project No.:	Project Name:	Borehole No.:
17-1375	Saggart Reservoir Site Investigation	BH06
Coordinates:	**Client:**	Sheet 2 of 2
303589.07 E	Irish Water	
226243.29 N	**Client's Representative:** RPS Consulting Engineers	**Scale:** 1:50
Ground Level: 143.12 mOD	**Dates:** 20/02/2018	**Driller:** DMcA +GT
		Logger: MFG+SG

Method	Plant Used	Top	Base
Cable Percussion	Dando 2500	0.00	3.00
Rotary Drilling	Beretta T44	3.00	3.80
Geobor S	Beretta T44	3.80	12.80

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
	100	25	20	6			(1.00)		Medium strong greenish grey thinly laminated coarse grained cemented SANDSTONE. Partially weathered: slightly reduced strength, black reddish discolouration on fracture surface with clay. Fine sediment in fractures and joints.		
						132.12	11.00		Discontinuities: 1. 45 degree joints closely spaced (100/100/160), stepping, rough. Oxidation staining on joint surface.		
11.30				10					Weak thinly laminated grey slaty MUDSTONE. Partially weathered: slightly reduced strength, slightly closer fracture spacing. Black and orange staining on fracture and joint surfaces with clay sediment in joints.		
	100	20	20				(1.80)		Discontinuities: 1. 5 to 10 degree joints closely spaced (60/100/120), stepped, smooth, orange staining. 2. 75 to 80 degree bedding fractures, very closely spaced (20/40/60), planar, smooth, black and orange staining.		
				7							
12.80						130.32	12.80		End of Borehole at 12.80m		

TCR	SCR	RQD	FI

Remarks
Hand dug inspection pit excavated from 0-1.20m
Cored from 3.80m to 12.80m using Geobore S.

Core Barrel	Water Strikes				Chiselling Details		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
SK6L					3.00	3.30	01:00

Flush Type	Water Added		Casing Details	
	From (m)	To (m)	To (m)	Diam (mm)

CAUSEWAY GEOTECH

Project No.:	Project Name:	Borehole No.:
17-1375	Saggart Reservoir Site Investigation	BH07
Coordinates:	**Client:**	Sheet 1 of 2
303569.28 E	Irish Water	
226115.31 N	**Client's Representative:** RPS Consulting Engineers	**Scale:** 1:50
Ground Level: 141.58 mOD	**Dates:** 27/02/2018 - 27/03/2018	**Driller:** DMC+JG
		Logger: CH+ST

Method	Plant Used	Top	Base
Cable Percussion	Dando 2500	0.00	3.70
Rotary Coring	Hanjin 8D	3.70	16.00

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.00 - 0.30	B6					(0.30)		TOPSOIL		
0.30 - 1.30	B7				141.28	0.30		Firm to stiff brown slightly sandy slightly gravelly CLAY with medium cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse of mixed lithologies. Cobbles are subangular.		
0.50	ES2									
1.00	ES1									
1.20 - 1.51	SPT (S)			7 (2,2/7 for 160mm)						
1.30 - 2.30	B8									
1.60	D5									
						(3.40)				
2.20 - 2.65	SPT (S) N=26	2.00		N=26 (2,2/5,9,6,6)						
2.30 - 3.30	B9									
2.60	D4									
3.00 - 3.45	SPT (S) N=50	3.00		N=50 (5,5/7,9,12,22)						
3.30 - 3.70	B10									
3.40	D3									
					137.88	3.70 (0.30)		BOULDER		
4.00 - 7.00				B11	137.58	4.00		Stiff dark grey silty gravelly CLAY with cobbles and boulders. (Driller's description)		
4.00 - 4.15				25 (8,25/25 for 0mm)						
5.50 - 5.78				50 (9,20/50 for 125mm)						
7.00 - 10.00				B12		(7.50)				
8.50 - 8.85				50 (8,11/50 for 200mm)						
10.00 - 12.50				B13						
10.00 - 10.18				25 (12,27/25 for 35mm)						

TCR	SCR	RQD	FI

Remarks
Hand dug inspection pit excavated from 0-1.20m

Core Barrel	Water Strikes				Chiselling Details		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
T2-101					3.70	4.00	01:00

Flush Type	Water Added		Casing Details	
	From (m)	To (m)	To (m)	Diam (mm)
			3.70	200

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2500	0.00	3.70
Rotary Coring	Hanjin 8D	3.70	16.00

Project No.: 17-1375
Project Name: Saggart Reservoir Site Investigation
Borehole No.: BH07
Coordinates: 303569.28 E, 226115.31 N
Client: Irish Water
Sheet 2 of 2
Client's Representative: RPS Consulting Engineers
Scale: 1:50
Driller: DMC +JG
Ground Level: 141.58 mOD
Dates: 27/02/2018 - 27/03/2018
Logger: CH+ST

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
									Stiff dark grey silty gravelly CLAY with cobbles and boulders. (Driller's description)		
						130.08	11.50 (0.50)		Sandy GRAVEL with pieces of rock. (Driller's description)		
						129.58	12.00 (0.50)		Boulder (Driller's description)		
						129.08	12.50		Stiff brown slightly sandy very gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse of mixed lithologies predominately shale.		
	42										
13.50											
							(3.00)				
	0	0	0								
15.50						126.08	15.50		Weak brownish red SHALE/MUDSTONE. Partially weathered; reduced strength, highly fractured staining on fracture surface.		
	0	60	60				(0.50)		Discontinuities:		
16.00						125.58	16.00		1. 30 to 40 degree bedding fractures very closely spaced (05/08/12 planar, smooth, stained.		
									2. Subvertical fractures planar, smooth, stained.		
									End of Borehole at 16.00m		
	TCR	SCR	RQD	FI							

Remarks
Hand dug inspection pit excavated from 0-1.20m.

Core Barrel	Water Strikes				Chiselling Details		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh mm)
T2-101					3.70	4.00	01.00

Flush Type	Water Added		Casing Details	
	From (m)	To (m)	To (m)	Diam (mm)

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2500	0.00	3.40
Rotary Drilling	Hanjin 8D	3.40	10.00

Project No.: 17-1375

Project Name: Saggart Reservoir Site Investigation

Borehole No.: BH08

Coordinates: 303589.06 E, 226087.01 N

Client: Irish Water

Sheet 1 of 1

Client's Representative: RPS Consulting Engineers

Scale: 1:50

Driller: DMC+JG

Ground Level: 141.45 mOD

Dates: 08/03/2018 - 30/03/2018

Logger: CH

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.00 - 0.20	B6					(0.20)		TOPSOIL.		
0.20 - 1.20	B7				141.25	0.20		Firm becoming stiff light brown slightly sandy gravelly CLAY with occasional cobbles and boulders. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of mixed lithologies.		
0.50	ES2									
1.00	ES1									
1.20 - 2.20	B8									
1.20 - 1.65	SPT (S) N=12	1.00		N=12 (2,3/3,2,3,4) Water strike at 1.50m						
1.60	D5					(3.20)				
2.00 - 2.45	SPT (S) N=22	2.00	0.90	N=22 (3,4/6,5,5,6)						
2.20 - 3.10	B9									
2.40	D4									
3.00 - 3.45	SPT (S) N=37	3.00	1.10	N=37 (4,7/6,7,10,14)						
3.10 - 3.40	B10									
3.40	D3				138.05	3.40		Very stiff dark slightly sandy slightly gravelly boulder CLAY. Sand is fine to coarse. Gravel is subanguar fine to coarse of mixed lithologies		
4.00 - 7.00	B11									
5.50 - 5.92	SPT (S)			N=50 (11,13/50 for 265mm)						
						(6.60)				
7.00 - 10.00	B12									
7.00 - 7.32	SPT (S)			N=50 (12,15/50 for 170mm)						
8.50 - 8.78	SPT (S)			25 (13,18/25 for 125mm)						
10.00 - 10.28	SPT (S)			25 (12,18/25 for 135mm)	131.45	10.00		End of Borehole at 10.00m		

Remarks
Hand dug inspection pit excavated from 0-1.20m

Core Barrel

Water Strikes				Chiselling Details		
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
1.50	1.50	20	0.60	3.40	3.50	01:00

Flush Type

Water Added		Casing Details	
From (m)	To (m)	To (m)	Diam (mm)
		10.00	200

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 25000	0.00	2.70
Rotary Drilling	Hanjin 8D	2.70	12.00

Project No.: 17-1375

Coordinates: 303567.28 E, 226046.24 N

Ground Level: 139.14 mOD

Project Name: Saggart Reservoir Site Investigation

Client: Irish Water

Client's Representative: RPS Consulting Engineers

Dates: 11/04/2018 - 16/04/2018

Borehole No.: BH09

Sheet 1 of 2

Scale: 1:50

Driller: DMC+JG

Logger: CH

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.00 - 0.30	B5					(0.30)		TOPSOIL		
0.30 - 1.30	B6				138.84	0.30		Firm brown slightly sandy slightly gravelly CLAY with high cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles are subangular.		
0.50	ES2									
1.00	ES1					(1.50)				
1.20 - 1.65	SPT (S) N=15			N=15 (2,3/4,3,4,4)						
1.30 - 1.80	B7									
1.60	D4									
1.80 - 2.70	B8				137.34	1.80		Stiff grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subrounded fine to medium.		
2.00 - 2.45	SPT (S) N=28			N=28 (3,5/6,7,7,8)						
2.40	D3					(0.90)				
2.70 - 2.90	B9				136.44	2.70 (0.30)		BOULDER		
					136.14	3.00		Very stiff dark greyish brown sandy gravelly CLAY with cobbles and boulder. (Driller's description)		
4.00 - 7.00	B10					(9.00)				
7.00 - 10.00	B11									
8.50 - 8.93	SPT (S)			N=50 (8,8/50 for 275mm)						
10.00 - 12.00	B12									
10.00 - 10.30	SPT (S)			36 (11,11/36 for 145mm)						

Remarks

Hand dug inspection pit excavated from 0-1.20m.

Core Barrel

Flush Type

Water Strikes				Chiselling Details		
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
				2.00	2.90	01:00

Water Added		Casing Details	
From (m)	To (m)	To (m)	Diam (mm)
		2.70	200

CAUSEWAY GEOTECH

Project No.:	Project Name:	Borehole No.:
17-1375	Saggart Reservoir Site Investigation	BH09
Coordinates:	**Client:**	Sheet 2 of 2
303567.28 E	Irish Water	
226046.24 N	**Client's Representative:** RPS Consulting Engineers	**Scale:** 1:50
Ground Level: 139.14 mOD	**Dates:** 11/04/2018 - 16/04/2018	**Driller:** DMC+JG
		Logger: CH

Method	Plant Used	Top	Base
Cable Percussion	Dando 25000	0.00	2.70
Rotary Drilling	Hanjin 8D	2.70	12.00

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
								Very stiff dark greyish brown sandy gravelly CLAY with cobbles and boulder. (Driller's description)		
11.50 - 11.69	SPT (S)			25 (14,25/25 for 40mm)						
					127.14	12.00		End of Borehole at 12.00m		

Remarks
Hand dug inspection pit excavated from 0-1.20m.

Core Barrel

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Chiselling Details

From (m)	To (m)	Time (hh:mm)
2.00	2.90	01:00

Flush Type

Water Added

From (m)	To (m)

Casing Details

To (m)	Diam (mm)
12.00	152

CAUSEWAY GEOTECH

Project No.:	Project Name:	Borehole No.:
17-1375	Saggart Reservoir Site Investigation	BH10
Coordinates: 303637.24 E 226042.46 N	**Client:** Irish Water	Sheet 1 of 2
	Client's Representative: RPS Consulting Engineers	**Scale:** 1:50
Ground Level: 142.31 mOD	**Dates:** 10/04/2018	**Driller:** DMC+JG
		Logger: CH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2500	0.00	4.50
Rotary Drilling	Hanjin 8D	4.50	18.00

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description
0.00 - 0.60	B6					(0.60)		MADE GROUND: Soft brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse.
0.50	ES2				141.71	0.60		
0.60 - 1.60	B7							Firm brown slightly sandy slightly gravelly CLAY with low cobble content Sand is fine to coarse. Gravel is subrounded fine to coarse
1.00	ES1							
1.20 - 1.65	SPT (S) N=10			N=10 (1,2/2,3,2,3)				
1.60	D5					(2.00)		
1.60 - 2.60	B8							
2.00 - 2.45	SPT (S) N=14	2.00		N=14 (2,3/4,3,3,4)				
2.40	D4							
2.60 - 3.80	B9				139.71	2.60		Stiff brown slightly sandy slightly gravelly CLAY with low cobble content Sand is fine to coarse. Gravel is subrounded fine to coarse
3.00 - 3.45	SPT (S) N=19	3.00		N=19 (2,2/4,4,4,7)				
3.40	D3					(1.20)		
3.80 - 4.50	B10			Water strike at 3.80m	138.51	3.80		Very stiff dark grey slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is subrounded fine to coarse.
4.00 - 4.34	SPT (S)	4.00	3.90	N=50 (9,11/50 for 185mm)				
						(2.00)		
5.50 - 8.50	B11							
					136.51	5.80		Very stiff dark greyish brown sandy gravelly silty CLAY with cobbles and boulder. (Driller's description)
7.00 - 7.45	SPT (S) N=30			N=30 (5,5/6,8,8,8)				
8.50 - 11.50	B12							

Water

Backfill

Remarks
Hand dug inspection pit excavated from 0-1.20m.

Core Barrel

Water Strikes				Chiselling Details		
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
3.80 16.00	3.80	20	3.70	4.00	4.50	02:00

Flush Type

Water Added		Casing Details	
From (m)	To (m)	To (m)	Diam (mm)
		4.50	200

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2500	0.00	4.50
Rotary Drilling	Hanjin 8D	4.50	18.00

Project No.: 17-1375

Project Name: Saggart Reservoir Site Investigation

Borehole No.: BH10

Coordinates: 303637.24 E, 226042.46 N

Client: Irish Water

Sheet 2 of 2

Client's Representative: RPS Consulting Engineers

Scale: 1:50

Driller: DMC+JG

Ground Level: 142.31 mOD

Dates: 10/04/2018

Logger: CH

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
								Very stiff dark greyish brown sandy gravelly silty CLAY with cobbles and boulder. (Driller's description)		
11.50 - 14.50	B13							*Clay damp at 12.00 to 14.00m*		
						(9.20)				
14.50 - 18.00	B14									
14.50 - 14.83	SPT (S)			N=50 (8,11/50 for 180mm)						
					127.31	15.00		Dark grey sandy clayey GRAVEL (Driller's description)		
				Water Strike at 16.00m						
						(3.00)				
					124.31	18.00		End of Borehole at 18.00m		

Remarks
Hand dug inspection pit excavated from 0-1.20m.

Core Barrel

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
3.80 16.00	3.80	20	3.70

Chiselling Details

From (m)	To (m)	Time (hh:mm)
4.00	4.50	02.00

Flush Type

Water Added

From (m)	To (m)

Casing Details

To (m)	Diam (mm)

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 25000	0.00	2.50
Symmetrix	Hanjin 8D	2.50	2.90
Geobor S	Hanjin 8D	2.90	12.00

Project No.: 17-1375

Coordinates: 303648.96 E, 226092.19 N

Ground Level: 144.40 mOD

Project Name: Saggart Reservoir Site Investigation

Client: Irish Water

Client's Representative: RPS Consulting Engineers

Dates: 09/03/2018 - 01/04/2018

Borehole No.: BH11

Sheet 1 of 2

Scale: 1:50

Driller: DMC+JG

Logger: CH+TH

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.00 - 0.30	B5					(0.30)		TOPSOIL.		
0.30 - 1.30	B6			Water strike at 0.30m	144.10	0.30		Firm light brown slightly sandy slightly gravelly CLAY with cobbles and boulders. Sand is fine to coarse. Gravel is subrounded to subangular fine to coarse of mixed lithologies. Cobbles and boulders are subangular.		
0.50	ES2									
1.00	ES1									
1.20 - 1.65	SPT (S) N=14	1.00		N=14 (2,2/3,4,3,4)		(1.70)				
1.30 - 2.30	B7									
1.60	D4									
2.00 - 2.45	SPT (S) N=27	2.00		N=27 (2,3/5,9,6,7)	142.40	2.00		Very stiff brown sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mixed lithologies. Cobbles are angular.		
2.30 - 2.90	B8					(0.75)				
2.40	D3									
2.90 - 3.12	SPT (C) 100			23 (24,27/23 for 75mm)	141.65	2.75		Stiff brownish grey sandy gravelly CLAY with medium cobble content and low boulder content. Sand is fine to coarse. Gravel is subangular fine to coarse of mixed lithologies. Cobbles and boulders are angular to subangular.		
3.50	86					(2.75)				
5.00	86				138.90	5.50		Grey sandy clayey subangular fine to coarse GRAVEL of mixed lithologies with medium cobble content. Sand is fine to coarse. Cobbles are subangular.		
6.50	70					(2.50)				
8.00	70				136.40	8.00		Grey slightly sandy slightly clayey subangular fine to coarse GRAVEL of mixed lithologies with low cobble and boulder content. Sand is fine to coarse. Cobbles and boulders are subangular.		
9.50					134.90	9.50		Grey slightly sandy slightly clayey subangular fine to coarse GRAVEL with medium cobble content. Sand is fine to coarse. Cobbles and boulders are subangular.		
					134.30	(0.60) 10.10		Grey sandy clayey subangular fine to coarse GRAVEL with medium cobble		

TCR | SCR | RQD | FI

Remarks

Hand dug inspection pit excavated from 0-1.20m

Core Barrel: SK6L

Flush Type:

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
0.30	0.30		

Chiselling Details

From (m)	To (m)	Time (hh:mm)
2.50	2.90	01:00

Water Added

From (m)	To (m)

Casing Details

To (m)	Diam (mm)
2.50	200

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 25000	0.00	2.50
Symmetrix	Hanjin 8D	2.50	2.90
Geobor S	Hanjin 8D	2.90	12.00

Project No.: 17-1375

Project Name: Saggart Reservoir Site Investigation

Borehole No.: BH11

Coordinates: 303648.96 E, 226092.19 N

Client: Irish Water

Sheet 2 of 2

Client's Representative: RPS Consulting Engineers

Scale: 1:50

Driller: DMC +JG

Ground Level: 144.40 mOD

Dates: 09/03/2018 - 01/04/2018

Logger: CH+TH

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
	83						(1.90)		Grey sandy clayey subangular fine to coarse GRAVEL with medium cobble content. Sand is fine to coarse. Cobbles are subangular.		
12.00						132.40	12.00		End of Borehole at 12.00m		

Remarks
Hand dug inspection pit excavated from 0-1.20m

Core Barrel: SK6L

Water Strikes

Struck at (m)	Casing to (m)	Time (mn)	Rose to (m)
0.30	0.30		

Chiselling Details

From (m)	To (m)	Time (hh:mm)
2.50	2.90	01:00

Flush Type

Water Added

From (m)	To (m)

Casing Details

To (m)	Diam (mm)
12.00	152

CAUSEWAY GEOTECH

Project No.:	Project Name:	Borehole No.:
17-1375	Saggart Reservoir Site Investigation	BH12
Coordinates: 303595.52 E 226150.43 N	**Client:** Irish Water	Sheet 1 of 2
	Client's Representative: RPS Consulting Engineers	**Scale:** 1:50
Ground Level: 142.69 mOD	**Dates:** 26/02/2018 - 28/03/2018	**Driller:** DMC+JG
		Logger: CH

Method	Plant Used	Top	Base
Cable Percussion	Dando 25000	0.00	3.60
Rotary Drilling	Hanjin 8D	3.60	12.00

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.00 - 0.20	B6					(0.20)		TOPSOIL.		
0.20 - 1.20	B8				142.49	0.20		Firm brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is subrounded fine to coarse.		
0.50	ES2					(1.00)				
1.00	ES1									
1.20 - 2.20	B9				141.49	1.20		Stiff becoming very stiff brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is subrounded to subangular fine to coarse of mixed lithologies. Cobbles are subangular.		
1.20 - 1.65	SPT (S) N=18			N=18 (2,2/4,5,5,4)						
1.60	D5									
2.00 - 2.45	SPT (S) N=34	2.00		N=34 (2,4/9,8,8,9)						
2.20 - 3.20	B10									
2.40	D4					(2.40)				
3.00 - 3.42	SPT (S)	3.00		N=50 (2,3/50 for 265mm)						
3.20 - 3.60	B11									
3.40	D3									
					139.09	3.60		Very stiff dark brown sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium.		
4.00 - 7.00	B11									
4.00 - 4.26	SPT (S)			50 (8,18/50 for 115mm)						
5.50 - 5.71	SPT (S)			50 (22,3/50 for 60mm)						
7.00 - 10.00	B12					(8.40)				
7.00 - 7.18	SPT (S)			50 (14,20/50 for 35mm)						
8.50 - 8.78	SPT (S)			50 (8,20/50 for 125mm)						
10.00 - 12.00	B13									
10.00 - 10.40	SPT (S)			N=50 (9,10/50 for 245mm)						

Remarks
Hand dug inspection pit excavated from 0-1.20m.

Core Barrel

Flush Type

Water Strikes			
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Chiselling Details		
From (m)	To (m)	Time (hh:mm)
3.60	3.90	01.00

Water Added	
From (m)	To (m)

Casing Details	
To (m)	Diam (mm)
3.60	200

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 25000	0.00	3.60
Rotary Drilling	Hanjin 8D	3.60	12.00

Project No.: 17-1375

Project Name: Saggart Reservoir Site Investigation

Borehole No.: BH12

Coordinates: 303595.52 E 226150.43 N

Client: Irish Water

Sheet 2 of 2

Client's Representative: RPS Consulting Engineers

Scale: 1:50

Driller: DMC+JG

Ground Level: 142.69 mOD

Dates: 26/02/2018 - 28/03/2018

Logger: CH

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
11.50 - 11.80	SPT (S)			50 (25 for 115mm/50 for 190mm)				Very stiff dark brown sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium.		
					130.69	12.00		End of Borehole at 12.00m		

Remarks
Hand dug inspection pit excavated from 0-1.20m

Core Barrel

Flush Type

Water Strikes				Chiselling Details		
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
				3.60	3.90	01:00

Water Added		Casing Details	
From (m)	To (m)	To (m)	Diam (mm)

CAUSEWAY GEOTECH

Project No.:	Project Name:	Borehole No.:
17-1375	Saggart Reservoir Site Investigation	BH13
Coordinates:	**Client:**	Sheet 1 of 2
303614.55 E	Irish Water	
226192.26 N	**Client's Representative:** RPS Consulting Engineers	**Scale:** 1:50
Ground Level: 143.72 mOD	**Dates:** 19/02/2018	**Driller:** DMcA+JG
		Logger: MFG

Method	Plant Used	Top	Base
Cable Percussion	Dando 2500	0.00	3.00
Rotary Drilling	Hanjin 8D	3.00	15.00

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	B3							Firm brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse.		
0.50	ES1									
1.00	ES2					(2.00)				
1.00 - 2.00	B4									
1.20 - 1.65	SPT (S) N=10			N=10 (3,2/2.3,2,3)						
1.60	D6									
2.00 - 3.00	B5				141.72	2.00		Stiff light brown slightly sandy slightly gravelly CLAY with high cobble and boulder content. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles and boulders are angular.		
2.00 - 2.45	SPT (S) N=17	2.00		N=17 (3,4/4,5,4,4)						
2.40	D7					(1.00)				
3.00 - 3.30	SPT (S)	3.00		50 (22,3/50 for 150mm) Water Strike at 3.10m	140.72	3.00		Very stiff dark brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular is fine to coarse of mixed lithologies.		
3.40	D8									
4.00 - 7.00	B9									
4.00 - 4.40	SPT (S)			N=50 (20,25/50 for 255mm)						
5.50 - 5.92	SPT (S)			N=50 (13,22/50 for 275mm)						
						(6.70)				
7.00 - 9.70	B10									
7.00 - 7.42	SPT (S)			N=50 (12,18/50 for 275mm)						
8.50 - 8.93	SPT (S)			N=50 (14,20/50 for 275mm)						
10.00 - 12.00	B11				134.02	9.70		Dark brown sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of mixed lithologies.		
10.00 - 10.41	SPT (S)			N=50 (15,25/50 for 260mm)						

Remarks
Hand dug inspection pit excavated from 0-1.20m.

Core Barrel

Water Strikes				Chiselling Details		
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
3.10		5	3.00	3.10	3.20	00:30

Flush Type

Water Added		Casing Details	
From (m)	To (m)	To (m)	Diam (mm)
		3.00	200

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2500	0.00	3.00
Rotary Drilling	Hanjin 8D	3.00	15.00

Project No.:	17-1375
Project Name:	Saggart Reservoir Site Investigation
Borehole No.:	BH13
Coordinates:	303614.55 E, 226192.26 N
Client:	Irish Water
Client's Representative:	RPS Consulting Engineers
Ground Level:	143.72 mOD
Dates:	19/02/2018
Sheet	2 of 2
Scale:	1:50
Driller:	DMcA+JG
Logger:	MFG

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
						(2.30)		Dark brown sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of mixed lithologies.		
					131.72	12.00				
						(1.00)		Weathered SANDSTONE (Driller's description)		
					130.72	13.00				
						(2.00)		SANDSTONE (Driller's description)		
					128.72	15.00		End of Borehole at 15.00m		

Remarks
Hand dug inspection pit excavated from 0-1.20m.

Core Barrel

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
3.10		5	3.00

Chiselling Details

From (m)	To (m)	Time (hh:mm)
3.10	3.20	00:30

Flush Type

Water Added

From (m)	To (m)

Casing Details

To (m)	Diam (mm)
13.00	150

CAUSEWAY GEOTECH

Project No.:	Project Name:	Borehole No.:
17-1375	Saggart Reservoir Site Investigation	BH14
Coordinates: 303674.70 E 226195.89 N	**Client:** Irish Water	Sheet 1 of 2
	Client's Representative: RPS Consulting Engineers	**Scale:** 1:50
Ground Level: 145.65 mOD	**Dates:** 18/04/2018	**Driller:** SS+JG
		Logger: CH+TH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2000	0.00	6.20
Geobor S	Hanjin 8D	6.20	14.00

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
					145.45	(0.20) 0.20		TOPSOIL		
0.50	D3 ES1							Very stiff greyish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subrounded fine to coarse.		
0.80 - 1.20	B9									
1.00	ES2									
1.20 - 1.65	SPT (S) N=46			N=46 (13,10/11,12,13,10)						
1.50	D4									
1.80 - 2.20	B10									
2.00 - 2.45	SPT (S) N=30			N=30 (8,8/7,8,7,8)		(3.90)				
2.50	D5									
2.80 - 3.20	B11									
3.00 - 3.45	SPT (S) N=34			N=34 (5,9/9,8,7,10)						
3.50	D6									
3.80 - 4.20	B12									
					141.55	4.10		BOULDER recovered through chiseling as dark grey angular gravel.		
4.50	D7					(1.10)				
4.80 - 5.20	B13									
					140.45	5.20		Stiff to very stiff brown sandy gravelly CLAY with low cobble and boulder content. Sand is fine to coarse. Gravel is subrounded fine to coarse.		
5.50	D8					(0.60)				
5.80 - 6.20	B14				139.85	5.80		Very stiff brownish grey sandy gravelly CLAY. Sand is fine to coarse. Gravel is subrounded fine to medium.		
6.00 - 6.10	SPT (S)			50 (50 for 80mm/50 for 15mm)		(0.40)				
					139.45	6.20		Stiff brownish grey sandy very gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse of mixed lithologies. Cobbles are subangular.		
	100					(0.90)				
					138.55	7.10		Stiff yellowish brown sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse of mixed lithologies		
8.00										
	100					(3.40)				
9.50										
	100	26	12							
	TCR	SCR	RQD	FI						

NA

Remarks
Hand dug inspection pit excavated from 0-1.20m.

Core Barrel	Water Strikes				Chiselling Details		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
SK6L					4.10	5.30	01:00

Flush Type	Water Added		Casing Details	
	From (m)	To (m)	To (m)	Diam (mm)
	1.30	6.20		

CAUSEWAY GEOTECH

Project No.:	Project Name:	Borehole No.:
17-1375	Saggart Reservoir Site Investigation	BH14
Coordinates:	**Client:**	Sheet 2 of 2
303674.70 E	Irish Water	
226195.89 N	**Client's Representative:** RPS Consulting Engineers	**Scale:** 1:50
Ground Level: 145.65 mOD	**Dates:** 18/04/2018	**Driller:** SS+JG
		Logger: CH+TH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2000	0.00	6.20
Geobor S	Hanjin 8D	6.20	14.00

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
						135.15	10.50		Stiff yellowish brown sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse of mixed lithologies		
				18			(0.50)		Very weak yellowish brown SANDSTONE. Distinctly weathered: pervasive yellowish brown discolouration, reduced strength, closer fracture spacing. Discontinuities: 1. 50 to 70 degree fractures, very closely spaced (30/45/50) undulating, smooth, patchy brown staining on fracture surfaces.		
11.00						134.65	11.00		Weak yellowish brown SANDSTONE. Distinctly weathered: pervasive yellowish brown discolouration, reduced strength. Discontinuities: 1. 0 to 20 degree joints, medium spaced (300/420/860) planar, smooth patchy yellowish brown staining on joint surfaces with clay. 2. 80 to 90 degree joints at 12.20m to 12.50m and 13.00m to 13.50m undulating, smooth, patchy yellowish brown staining on joint surface with clay.		
	100	82	60	3							
				12							
12.50							(3.00)				
				4							
	100	68	62	12							
				4							
14.00						131.65	14.00		End of Borehole at 14.00m		

TCR	SCR	RQD	FI

Remarks
Hand dug inspection pit excavated from 0-1.20m

Core Barrel	Water Strikes				Chiselling Details		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
SK6L					4.10	5.30	01:00

Flush Type	Water Added		Casing Details	
	From (m)	To (m)	To (m)	Diam (mm)

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2000	0.00	7.00
Rotary Drilling	Hanjin 8D	7.00	14.00

Project No.: 17-1375

Project Name: Saggart Reservoir Site Investigation

Borehole No.: BH15

Coordinates: 303710.39 E, 226135.62 N

Client: Irish Water

Sheet 1 of 2

Client's Representative: RPS Consulting Engineers

Scale: 1:50

Ground Level: 145.76 mOD

Dates: 30/03/2018 - 17/04/2018

Driller: SS+JG

Logger: CH+JG

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description
						(0.20)		TOPSOIL.
					145.56	0.20		
						(0.40)		Firm brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is subrounded fine to coarse with occasional boulders.
0.50	D8				145.16	0.60		
	ES15							
0.80 - 1.20	B1							Stiff brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is subrounded fine to coarse.
1.00	ES16					(0.60)		
1.20 - 1.65	SPT (S) N=16			N=16 (3,4/4,3,4,5)	144.56	1.20		
1.50	D9							Stiff to very stiff greyish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subrounded fine to medium.
1.80 - 2.20	B2							
2.00 - 2.37	SPT (S)			50 (13,11/50 for 220mm)		(1.40)		
2.50	D10							
2.80 - 3.20	B3				143.16	2.60		
3.00 - 3.20	SPT (S)			50 (19,6/50 for 50mm)				Very stiff brown slightly sandy slightly gravelly CLAY with low cobble and boulder content. Sand is fine to coarse. Gravel is subangular fine to coarse.
3.50	D11							
3.80 - 4.20	B4							
						(3.00)		
4.50	D12							
4.80 - 5.20	B5							
5.50	D13							
5.80 - 6.20	B6				140.16	5.60		
6.00 - 6.30	SPT (S)			50 (11,13/50 for 150mm)				Very stiff dark grey slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse.
						(1.40)		
6.50	D14							
6.80 - 7.00	B7							
7.00 - 10.00	B17					7.00		
7.00 - 7.43	SPT (S)			N=50 (13,11/50 for 279mm)	138.76			Very stiff dark grey sandy gravelly CLAY with cobbles (Driller's description)
						(2.00)		
8.50 - 8.95	SPT (S) N=45			N=45 (7,8/9,10,11,15)				
					136.76	9.00		Very stiff light brown sandy gravelly CLAY (Driller's description)
						(1.00)		
10.00 - 13.00	B18				135.76	10.00		
10.00 - 10.30	SPT (S)			50 (10,11/50 for 145mm)				Dense dark grey sandy GRAVEL (Driller's description)

Backfill

Remarks

Hand dug inspection pit excavated from 0-1.20m.

Core Barrel

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
10.00	10.00	10	10.00

Chiselling Details

From (m)	To (m)	Time (hh:mm)
0.00	1.20	00:45
4.60	5.30	00:30

Flush Type

Water Added

From (m)	To (m)
2.60	7.00

Casing Details

To (m)	Diam (mm)

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2000	0.00	7.00
Rotary Drilling	Hanjin 8D	7.00	14.00

Project No.: 17-1375

Project Name: Saggart Reservoir Site Investigation

Borehole No.: BH15

Coordinates: 303710.39 E, 226135.62 N

Client: Irish Water

Sheet 2 of 2

Client's Representative: RPS Consulting Engineers

Scale: 1:50

Ground Level: 145.76 mOD

Dates: 30/03/2018 - 17/04/2018

Driller: SS+JG

Logger: CH+JG

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
						(3.00)		Dense dark grey sandy GRAVEL (Driller's description)		
13.00 - 14.00	B19				132.76	13.00		CONGLOMERATE (Driller's description)		
						(1.00)				
					131.76	14.00		End of Borehole at 14.00m		

Remarks
Hand dug inspection pit excavated from 0-1.20m

Core Barrel

Flush Type

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
10.00	10.00	10	10.00

Water Added

From (m)	To (m)

Casing Details

To (m)	Diam (mm)
14.00	200

Chiselling Details

From (m)	To (m)	Time (hh:mm)
0.00	1.20	00:45
4.60	5.30	00:30

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2500	0.00	7.50
Rotary Drilling	Hanjin 8D	7.50	25.00

Project No.: 17-1375

Project Name: Saggart Reservoir Site Investigation

Borehole No.: BH16

Coordinates: 303813.97 E, 226143.19 N

Client: Irish Water

Sheet 1 of 3

Client's Representative: RPS Consulting Engineers

Scale: 1:50

Driller: DMC+JG

Ground Level: 146.37 mOD

Dates: 28/03/2018 - 19/04/2018

Logger: AOK

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description
0.00 - 1.20	B10							Stiff brown sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subrounded fine to coarse. Cobbles are subangular.
0.50	ES2					(1.20)		
1.00	ES1							
1.20 - 2.20	B11				145.17	1.20		Dense brown gravelly very silty fine to coarse SAND.
1.20 - 1.65	SPT (S) N=33			N=33 (3,5/7,8,9,9)				
1.60	D3					(1.30)		
2.00 - 2.45	SPT (S) N=32			N=32 (2,3/6,8,8,10)				
2.20 - 2.50	B12							
2.40	D4				143.87	2.50		Very stiff greyish brown sandy slightly gravelly CLAY . Sand is fine to coarse. Gravel is subangular fine to coarse.
2.50 - 3.50	B13							
3.00 - 3.45	SPT (S) N=46			N=46 (3,4/7,11,12,16)				
3.40	D5							
3.50 - 4.50	B14							
4.00 - 4.45	SPT (S) N=46			N=46 (3,4/7,11,12,16)				
4.40	D6							
4.50 - 5.50	B15					(4.40)		
5.00 - 5.45	SPT (S) N=50			N=50 (4,5/9,10,13,18)				
5.40	D7							
5.50 - 5.90	B							
6.00 - 6.32	SPT (S)			50 (7,12/50 for 170mm)				
6.30	D8							
6.90 - 7.50	B17				139.47	6.90		Very stiff grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subrounded fine.
7.00 - 7.45	SPT (S) N=44			N=44 (4,6/9,11,12,12)		(0.60)		
7.40	D9				138.87	7.50		Dark grey sandy GRAVEL with cobbles (Driller's description)

Water

Backfill

Remarks

Hand dug inspection pit excavated from 0-1.20m

Core Barrel

Flush Type

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
7.50	24.50	10	7.50
24.50	24.50	10	24.50

Water Added

From (m)	To (m)
1.20	7.50

Casing Details

To (m)	Diam (mm)

Chiselling Details

From (m)	To (m)	Time (hh:mm)
7.50	7.60	01:00

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2500	0.00	7.50
Rotary Drilling	Hanjin 8D	7.50	25.00

Project No.: 17-1375	**Project Name:** Saggart Reservoir Site Investigation	**Borehole No.:** BH16
Coordinates: 303813.97 E 226143.19 N	**Client:** Irish Water	Sheet 2 of 3
	Client's Representative: RPS Consulting Engineers	**Scale:** 1:50
Ground Level: 146.37 mOD	**Dates:** 28/03/2018 - 19/04/2018	**Driller:** DMC+JG
		Logger: AOK

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
						(11.00)		Dark grey sandy GRAVEL with cobbles (Driller's description)		
					127.87	18.50		Very stiff dark brownish grey sandy gravelly CLAY with cobbles (Driller's description)		

Remarks
Hand dug inspection pit excavated from 0-1.20m

Core Barrel

Water Strikes

Struck at (m)	Casing to (m)	Time (mins)	Rose to (m)
7.50	24.50	10	7.50
24.50	24.50	10	24.50

Chiselling Details

From (m)	To (m)	Time (hh:mm)
7.50	7.60	01:00

Flush Type

Water Added

From (m)	To (m)

Casing Details

To (m)	Diam (mm)
18.50	200
25.00	152

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2500	0.00	7.50
Rotary Drilling	Hanjin 8D	7.50	25.00

Project No.: 17-1375	**Project Name:** Saggart Reservoir Site Investigation	**Borehole No.:** BH16
Coordinates: 303813.97 E 226143.19 N	**Client:** Irish Water	Sheet 3 of 3
	Client's Representative: RPS Consulting Engineers	**Scale:** 1:50
Ground Level: 146.37 mOD	**Dates:** 28/03/2018 - 19/04/2018	**Driller:** DMC+JG
		Logger: AOK

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
						(6.00)		Very stiff dark brownish grey sandy gravelly CLAY with cobbles (Driller's description)		
					121.87	24.50 (0.50)		Weathered SANDSTONE (Driller's description)		
					121.37	25.00		End of Borehole at 25.00m		

Remarks
Hand dug inspection pit excavated from 0-1.20m

Core Barrel	Water Strikes				Chiselling Details		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
					7.50	7.60	01:00

Flush Type	Water Added		Casing Details	
	From (m)	To (m)	To (m)	Diam (mm)

CAUSEWAY GEOTECH

Project No.:	Project Name:	Borehole No.:
17-1375	Saggart Reservoir Site Investigation	BH17
Coordinates:	**Client:**	Sheet 1 of 2
303717.11 E	Irish Water	
226044.94 N	**Client's Representative:** RPS Consulting Engineers	**Scale:** 1:50
Ground Level: 148.12 mOD	**Dates:** 09/04/2018 - 23/04/2018	**Driller:** DMC+JG
		Logger: CH+JG

Method	Plant Used	Top	Base
Cable Percussion	Dando 2500	0.00	5.40
Symmetrix	Hanjin 8D	5.40	20.50

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.00 - 0.20	B7					(0.20)		TOPSOIL		
0.20 - 1.20	B8				147.92	0.20		Stiff to very stiff brown sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subrounded fine to coarse.		
0.50	ES2									
1.00	ES1									
1.20 - 2.20	B9									
1.20 - 1.65	SPT (S) N=35			N=35 (3,5/7,8,9,11)		(2.60)				
1.60	D6									
2.00 - 2.45	SPT (S) N=33	2.00	1.10	N=33 (3,4/6,8,9,10)						
2.20 - 2.80	B10									
2.40	D5									
2.80 - 3.50	B11				145.32	2.80		Stiff grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subrounded fine to coarse.		
3.00 - 3.45	SPT (S) N=25	3.00	1.70	N=25 (2,6/3,4,8,10)		(0.70)				
3.40	D4									
3.50 - 4.50	B12				144.62	3.50		Very stiff brown slightly sandy gravelly CLAY with low cobble content. Sand is fie to coarse. Gravel is subangular fine to coarse.		
4.00 - 4.45	SPT (S) N=31	4.00	1.30	N=31 (3,5/6,7,9,9)						
4.40	D3					(2.40)				
4.50 - 5.40	B13									
5.00 - 5.16	SPT (C)	5.00	1.90	50 (25 for 85mm/50 for 80mm)						
					142.22	5.90		Stiff dark slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles are subrounded.		
7.00 - 10.00				B14		(4.10)				
10.00 - 13.00				B15 Water strike at 10.00m	138.12	10.00 (0.50)		Sandy subangular to subrounded fine to coarse GRAVEL. Sand is fine to		

TCR	SCR	RQD	FI

Remarks
Hand dug inspection pit excavated from 0-1.20m.

Core Barrel

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
10.00	10.00	20	10.00
15.00	15.00		

Chiselling Details

From (m)	To (m)	Time (hh:mm)
5.40	5.40	01:00

Flush Type

Water Added

From (m)	To (m)
1.60	5.40

Casing Details

To (m)	Diam (mm)

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2500	0.00	5.40
Symmetrix	Hanjin 8D	5.40	20.50

Project No.: 17-1375

Project Name: Saggart Reservoir Site Investigation

Borehole No.: BH17

Coordinates: 303717.11 E, 226044.94 N

Client: Irish Water

Client's Representative: RPS Consulting Engineers

Ground Level: 148.12 mOD

Dates: 09/04/2018 - 23/04/2018

Sheet 2 of 2

Scale: 1:50

Driller: DMC +JG

Logger: CH+JG

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
						137.62	10.50		Sandy subangular to subrounded fine to coarse GRAVEL. Sand is fine to coarse		
									Stiff dark brown slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles are subrounded.		
							(4.50)				
13.00 - 16.00					B16						
					Seepage at 15.00m	133.12	15.00		Stiff dark brown silty slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles are subrounded.		
16.00 - 19.00					B17						
							(5.50)				
19.00 - 20.50					B18						
						127.62	20.50		End of Borehole at 20.50m		

TCR	SCR	RQD	FI

Remarks

Hand dug inspection pit excavated from 0-1.20m.

Core Barrel

Flush Type

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
10.00	10.00	20	10.00
15.00	15.00		

Chiselling Details

From (m)	To (m)	Time (hh:mm)
5.40	5.40	01:00

Water Added

From (m)	To (m)

Casing Details

To (m)	Diam (mm)
20.50	200

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2500	0.00	3.00
Rotary Drilling	Hanjin 8D	3.00	15.00

Project No.: 17-1375

Project Name: Saggart Reservoir Site Investigation

Borehole No.: BH18

Coordinates: 303772.31 E, 226037.74 N

Client: Irish Water

Sheet 1 of 2

Client's Representative: RPS Consulting Engineers

Scale: 1:50

Driller: DMC+JG

Ground Level: 148.74 mOD

Dates: 09/04/2018

Logger: CH

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.00 - 0.40	B4					(0.40)		TOPSOIL		
0.40 - 1.40	B5				148.34	0.40		Stiff brown slightly gravelly sandy CLAY with low cobble content. Sand is fine to coarse. Gravel is subrounded fine to coarse.		
0.50	ES2									
1.00	ES1					(1.00)				
1.20 - 1.65	SPT (S) N=30			N=30 (2,3/5,7,9,9)						
1.40 - 2.40	B6				147.34	1.40		Very dense brownish grey very sandy clayey angular fine to coarse GRAVEL. Sand is fine to coarse.		
1.60	D3 D8									
2.00 - 2.14	SPT (C)	2.00	1.10	N=50 (25 for 85mm/50 for 60mm)		(1.60)				
2.40 - 3.00	B7									
3.00 - 3.14	SPT (C)	3.00	1.70	N=50 (25 for 75mm/50 for 60mm)	145.74	3.00		MADE GROUND: Worked CLAY (Driller's description)		
						(2.50)				
5.50 - 8.50	B9				143.24	5.50		Very stiff brown slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse		
						(1.00)				
					142.24	6.50		Very stiff dark grey slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles are subrounded		
7.00 - 7.08	SPT (S)	7.00		N=50 (25 for 75mm/50 for 0mm)						
						(7.50)				
8.50 - 11.50	B10									
8.50 - 8.80	SPT (S)	8.50		N=50 (14,19/50 for 150mm)						
10.00 - 10.26	SPT (S)	10.00		N=46 (10,16/46 for 115mm)						

Remarks
Hand dug inspection pit excavated

Core Barrel

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Chiselling Details

From (m)	To (m)	Time (hh:mm)
1.80	3.00	02:30

Flush Type

Water Added

From (m)	To (m)
1.40	3.00

Casing Details

To (m)	Diam (mm)
3.00	200

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2500	0.00	3.00
Rotary Drilling	Hanjin 8D	3.00	15.00

Project No.: 17-1375

Project Name: Saggart Reservoir Site Investigation

Borehole No.: BH18

Coordinates: 303772.31 E, 226037.74 N

Client: Irish Water

Sheet 2 of 2

Client's Representative: RPS Consulting Engineers

Scale: 1:50

Driller: DMC+JG

Ground Level: 148.74 mOD

Dates: 09/04/2018

Logger: CH

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
								Very stiff dark grey slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles are subrounded		
11.50 - 15.00	B11									
11.50 - 11.72	SPT (S)	11.50		N=50 (25 for 75mm/50 for 145mm)						
13.00 - 13.00	SPT (S)	13.00		N=50 (25 for 0mm/50 for 0mm)						
					134.74	14.00		Stiff dark grey slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles are subrounded		
14.50 - 14.69	SPT (S)	14.50		N=25 (17,8/25 for 40mm)		(1.00)				
					133.74	15.00		End of Borehole at 15.00m		

Remarks
Hand dug inspection pit excavated

Core Barrel

Water Strikes				Chiselling Details		
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
				1.80	3.00	02:30

Flush Type

Water Added		Casing Details	
From (m)	To (m)	To (m)	Diam (mm)

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2500	0.00	3.00
Geobor S	Hanjin 8D	3.00	11.00
Rotary Drilling	Hanjin 8D	11.00	20.00

Project No.: 17-1375

Project Name: Saggart Reservoir Site Investigation

Borehole No.: BH19

Coordinates: 303769.40 E, 226097.06 N

Client: Irish Water

Client's Representative: RPS Consulting Engineers

Scale: 1:50

Driller: DMC+JG

Ground Level: 147.95 mOD

Dates: 04/04/2018 - 25/04/2018

Logger: CH+TH

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.00 - 0.40	B5					(0.40)		TOPSOIL		
0.40 - 1.40	B6				147.55	0.40		Stiff brown slightly sandy gravelly CLAY with medium cobble content. Sand is fine to coarse. Gravel is angular fine to coarse.		
0.50	ES2									
1.00	ES1									
1.20 - 1.65	SPT (S) N=21			N=21 (2,3/5,5,6,5)						
1.40 - 2.40	B7									
1.60	D4					(2.60)				
2.00 - 2.45	SPT (S) N=25	2.00	1.20	N=25 (3,4/5,7,6,7)						
2.40	D3									
					144.95	3.00		Grey slightly sandy slightly clayey angular to subangular fine to coarse GRAVEL with medium cobble content. Sand is fine to coarse. Cobbles are angular of mixed lithologies		
						(1.00)				
	86				143.95	4.00		Very stiff brownish grey sandy gravelly CLAY with low cobble and boulder content. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mixed lithologies. Cobbles and boulders are angular of mixed lithologies		
5.00										
	100					(3.60)				
6.50										
	80				140.35	7.60		Greyish brown sandy clayey angular to subangular fine to coarse GRAVEL of mixed lithologies. Sand is fine to coarse		
						(0.40)				
8.00				Waterstrike at 8.0m	139.95	8.00		Greyish brown slightly sandy slightly clayey angular to subangular fine to coarse GRAVEL of mixed lithologies with low boulder content. Sand is fine to coarse. Boulders are angular of sandstone		
	20					(3.00)				
	TCR SCR RQD FI									

Remarks

Hand dug inspection pit excavated from 0-1.20m

Core Barrel	Water Strikes				Chiselling Details		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
SK6L	8.00	8.00	20	8.00	2.40	3.00	01:30

Flush Type	Water Added		Casing Details	
	From (m)	To (m)	To (m)	Diam (mm)
	1.70	3.00		

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2500	0.00	3.00
Geobor S	Hanjin 8D	3.00	11.00
Rotary Drilling	Hanjin 8D	11.00	20.00

Project No.: 17-1375

Project Name: Saggart Reservoir Site Investigation

Borehole No.: BH19

Coordinates: 303769.40 E, 226097.06 N

Client: Irish Water

Sheet 2 of 2

Client's Representative: RPS Consulting Engineers

Scale: 1:50

Driller: DMC +JG

Ground Level: 147.95 mOD

Dates: 04/04/2018 - 25/04/2018

Logger: CH+TH

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
									Greyish brown slightly sandy slightly clayey angular to subangular fine to coarse GRAVEL of mixed lithologies with low boulder content. Sand is fine to coarse. Boulders are angular of sandstone		
11.00 - 12.00	B8				B8	136.95	11.00		Dense GRAVEL with COBBLES and BOULDERS. (Driller's description)		
14.00 - 17.00	B9						(9.00)				
17.00 - 20.00	B10										
						127.95	20.00		End of Borehole at 20.00m		

Remarks
Hand dug inspection pit excavated from 0-1.20m.

Core Barrel	Water Strikes				Chiselling Details		
	Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
SK6L	8.00	8.00	20	8.00	2.40	3.00	01:30

Flush Type	Water Added		Casing Details	
	From (m)	To (m)	To (m)	Diam (mm)
			20.00	200

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2500	0.00	9.30
Symmetrix	Hanjin 8D	9.30	9.50
Geobor S	Hanjin 8D	9.50	17.00

Project No.: 17-1375

Project Name: Saggart Reservoir Site Investigation

Borehole No.: BH20

Coordinates: 303765.59 E, 226127.61 N

Client: Irish Water

Sheet 1 of 2

Client's Representative: RPS Consulting Engineers

Scale: 1:50

Driller: DMcA+IG

Ground Level: 146.75 mOD

Dates: 26/04/2018

Logger: CH+TH

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.00 - 0.20	B1					(0.20)		TOPSOIL.		
0.20 - 1.20	B2				146.55	0.20		Possible MADE GROUND: Stiff brown sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse.		
0.50	ES21									
1.00	ES22									
1.20 - 2.20	B3					(2.00)				
1.20 - 1.65	SPT (S) N=29			N=29 (3,4/6,7,7,9)						
1.60	D12									
2.00 - 2.38	SPT (C)	2.00	1.30	N=50 (4,5/50 for 235mm)						
2.20 - 3.20	B4				144.55	2.20		Dense brown very sandy clayey GRAVEL. Gravel is subangular fine to coarse. Cobbles are subangular.		
2.40	D13									
						(1.00)				
3.00 - 3.45	SPT (S) N=41	3.00	1.90	N=41 (3,6/7,9,11,14)						
3.20 - 4.20	B5				143.55	3.20		Dense brownish grey very sandy clayey angular fine to coarse GRAVEL. Sand is fine to coarse.		
3.40	D14									
4.00 - 4.38	SPT (S)	4.00	2.60	50 (5,6/50 for 225mm)						
4.20 - 5.20	B6									
4.30	D15									
5.00 - 5.32	SPT (S)	5.00	1.80	49 (6,9/49 for 170mm)						
5.20 - 6.20	B7									
5.30	D16									
						(5.20)				
6.00 - 6.30	SPT (S)	6.00	2.20	50 (6,11/50 for 150mm)						
6.20 - 7.20	B8									
6.30	D17									
7.00 - 7.26	SPT (S)	7.00	2.90	50 (7,13/50 for 105mm)						
7.20 - 8.20	B9									
7.30	D18									
8.00 - 8.30	SPT (S)	8.00	3.70	50 (6,15/50 for 150mm)						
8.20 - 8.40	B10									
8.40	D19				138.35	8.40		Very stiff dark grey slightly sandy gravelly CLAY with medium cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse.		
8.40 - 8.90	B11									
8.90 - 9.22	SPT (S)	8.50	5.60	50 (7,12/50 for 175mm)		(0.90)				
9.40	D20					9.30 (0.20) 9.50		Stiff dark grey slightly sandy slightly gravelly CLAY with low cobble content.		
					137.45	(0.15) 9.65		Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse. Cobbles are subrounded.		
	100				137.25	(1.05)		Soft grey sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse of mixed lithologies		
					137.10			Stiff grey sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular		
	TCR	SCR	RQD	FI						

Remarks
Hand dug inspection pit excavated from 0-1.20m.

Core Barrel: SK6L

Flush Type:

Water Strikes			
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Water Added		Casing Details	
From (m)	To (m)	To (m)	Diam (mm)
2.20	8.40	9.50	200

Chiselling Details		
From (m)	To (m)	Time (hh:mm)
1.90	2.20	01:00
8.90	8.90	01:00

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2500	0.00	9.30
Symmetrix	Hanjin 8D	9.30	9.50
Geobor S	Hanjin 8D	9.50	17.00

Project No.: 17-1375

Project Name: Saggart Reservoir Site Investigation

Borehole No.: BH20

Coordinates: 303765.59 E, 226127.61 N

Client: Irish Water

Sheet 2 of 2

Client's Representative: RPS Consulting Engineers

Scale: 1:50

Ground Level: 146.75 mOD

Dates: 26/04/2018

Driller: DMcA +JG

Logger: CH+TH

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
						136.05	10.70 (0.30)		Stiff grey sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse of mixed lithologies		
									Firm grey gravelly very sandy CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse of mixed lithologies		
11.00						135.75	11.00		Stiff grey sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse of mixed lithologies. Cobbles are subangular		
	100						(1.20)				
						134.55	12.20 (0.30)		Grey slightly sandy clayey subangular fine to coarse GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are subangular		
12.50						134.25	12.50 (0.30)		Stiff grey sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse		
						133.95	12.80 (0.50)		Stiff light brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse of mixed lithologies		
	100	0	0	20		133.45	13.30		Weak narrowly foliated yellowish brown SHALE. Distinctly weathered: closer fracture spacing, reduced strength, yellowish orange discolouration		
				10					Discontinuity Set 1: 0-30 degree joints, closely spaced (90/180/290), planar, smooth, yellowish brown staining on joint surfaces with clay infill		
14.00				20					Discontinuity Set 2: 60-80 degree foliation fractures, very closely spaced, (20/50/70), planar, smooth, strong orangish brown staining on fracture surfaces		
	100	0	0	18			(2.60)				
				20							
15.50				20							
	100	18	13			130.85	15.90		Weak yellowish brown SANDSTONE. Distinctly weathered: reduced strength, pervasive yellowish brown discolouration		
				12			(1.10)		Discontinuity Set 1: 0-30 degree joints, closely spaced, (130/190/240), planar, smooth, patchy brown staining on joint surfaces with clay infill		
17.00						129.75	17.00		Discontinuity Set 2: 80-90 degree joints, probably closely spaced, planar, smooth, patchy orange mottled brown staining on joint surfaces		
									End of Borehole at 17.00m		
	TCR	SCR	RQD	FI							

Remarks
Hand dug inspection pit excavated from 0-1.20m.

Core Barrel: SK6L

Flush Type:

Water Strikes			
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Water Added		Casing Details	
From (m)	To (m)	To (m)	Diam (mm)
		17.00	152

Chiselling Details		
From (m)	To (m)	Time (hh:mm)
1.90	2.20	01:00
8.90	8.90	01.00

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2000	0.00	8.50
Rotary Drilling	Hanjin 8D	8.50	11.50
Rotary Coring	Hanjin 8D	11.50	13.85

Project No.: 17-1375

Project Name: Saggart Reservoir Site Investigation

Borehole No.: BH21

Coordinates: 303761.50 E, 226216.78 N

Client: Irish Water

Sheet 1 of 2

Client's Representative: RPS Consulting Engineers

Scale: 1:50

Ground Level: 145.85 mOD

Dates: 10/04/2018

Driller: SS+JG

Logger: CH+ST

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
					145.75	(0.10) 0.10		TOPSOIL		
								Firm becoming stiff brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse.		
0.50	D1									
	ES18									
0.80 - 1.20	B10									
1.00	ES19									
1.20 - 1.65	SPT (S) N=13			N=13 (2,3/6,3,2,2)						
1.50	D2									
1.80 - 2.20	B11									
2.00 - 2.45	SPT (S) N=22			N=22 (5,5/4,5,6,7)		(3.70)				
2.50	D3									
2.80 - 3.20	B12									
3.00 - 3.45	SPT (S) N=30			N=30 (8,6/6,7,8,9)						
3.50	D4									
3.80 - 4.20	B13				142.05	3.80				
4.00 - 4.45	SPT (C) N=45			N=45 (9,9/10,14,11,10)				Dense brown very sandy clayey subrounded fine to coarse GRAVEL. Sand is fine to coarse.		
4.50	D5									
4.80 - 5.20	B14									
5.00 - 5.45	SPT (C) N=65			N=65 (10,13/17,17,16,15)						
5.50	D6					(3.10)				
5.80 - 6.20	B15									
6.00 - 6.14	SPT (C)			50 (25 for 85mm/50 for 50mm)						
6.50	D7									
6.80 - 7.20	B16									
7.00 - 7.11	SPT (S)			50 (50 for 90mm/50 for 20mm)	138.95	6.90		Very stiff brown slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to coarse.		
7.50	D8									
7.80 - 8.50	B17					(1.60)				
8.00 - 8.09	SPT (S)			50 (50 for 80mm/50 for 10mm)						
8.50	D9				137.35	8.50		Stiff light brown sandy gravelly CLAY with cobbles. (Driller's description)		
						(3.00)				

Remarks
Hand dug inspection pit excavated from 0-1.20m.

Core Barrel: T2-101

Flush Type:

Water Strikes				Chiselling Details		
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
				4.60	4.90	00:30

Water Added		Casing Details	
From (m)	To (m)	To (m)	Diam (mm)
1.20	8.50	8.50	200

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2000	0.00	8.50
Rotary Drilling	Hanjin 8D	8.50	11.50
Rotary Coring	Hanjin 8D	11.50	13.85

Project No.: 17-1375

Project Name: Saggart Reservoir Site Investigation

Borehole No.: BH21

Coordinates: 303761.50 E, 226216.78 N

Client: Irish Water

Sheet 2 of 2

Client's Representative: RPS Consulting Engineers

Scale: 1:50

Ground Level: 145.85 mOD

Dates: 10/04/2018

Driller: SS+JG

Logger: CH+ST

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
								Stiff light brown sandy gravelly CLAY with cobbles. (Driller's description)		
	100				134.35	11.50 (1.00)		Stiff brown slightly sandy very gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse of mixed lithologies predominately limestone.		
12.50	100	10	0	20	133.35	12.50 (1.35)		Weak brownish grey SHALE/MUDSTONE. Partially weathered: reduced strength, highly fractured red staining on fracture surface. Discontinues: 1. 30 to 40 degree bedding fractures extremely closely spaced (05/08/12) planar, smooth, stained. 2. Subvertical fractures, planar, smooth, stained.		
13.50	100	0	0							
13.85					132.00	13.85		End of Borehole at 13.85m		

TCR | SCR | RQD | FI

Remarks
Hand dug inspection pit excavated from 0-1.20m

Core Barrel: T2-101

Flush Type:

Water Strikes				Chiselling Details		
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
				4.60	4.90	00:30

Water Added		Casing Details	
From (m)	To (m)	To (m)	Diam (mm)

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2000	0.00	7.50
Rotary Drilling	Hanjin 8D	7.50	12.70
Rotary Coring	Hanjin 8D	12.70	14.70

Project No.: 17-1375
Project Name: Saggart Reservoir Site Investigation
Borehole No.: BH22
Coordinates: 303808.04 E, 226219.41 N
Client: Irish Water
Sheet 1 of 2
Client's Representative: RPS Consulting Engineers
Scale: 1:50
Ground Level: 144.76 mOD
Dates: 10/04/2018
Driller: SS+JG
Logger: CH+ST

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description
								Stiff brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subrounded fine to coarse.
0.50	D8							
	ES15							
0.80 - 1.20	B1							
1.00	ES16							
1.20 - 1.65	SPT (S) N=23			N=23 (6,6/6,7,6,4)		(2.40)		
1.50	D9							
1.80 - 2.20	B2							
2.00 - 2.45	SPT (S) N=20			N=20 (6,5/5,6,4,5)				
					142.36	2.40		
2.50	D10					(0.60)		Brownish grey very sandy clayey subrounded fine to coarse GRAVEL. Sand is fine to coarse.
2.80 - 3.20	B3							
3.00 - 3.08	SPT (S)			50 (250 for 75mm/50 for 0mm)	141.76	3.00		Very dense grey very sandy clayey subrounded fine to coarse GRAVEL. Sand is fine to coarse.
3.50	D11							
3.80 - 4.20	B4							
4.00 - 4.19	SPT (C)			50 (17,8/50 for 40mm)				
4.50	D12					(3.30)		
4.80 - 5.20	B5							
5.00 - 5.40	SPT (C)			N=50 (10,11/50 for 245mm)				
5.50	D13							
5.80 - 6.20	B6							
					138.46	6.30		Very stiff dark grey sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to medium.
6.50	D14							
6.80 - 7.20	B7					(1.20)		
7.00 - 10.00	B17 B19							
7.00 - 7.11	SPT (S)			50 (50 for 85mm/50 for 25mm) Water strike at 7.00m	137.26	7.50		Very stiff dark grey sandy gravelly CLAY with cobbles (Driller's description)
8.50 - 8.65	SPT (S)			50 (25 for 125mm/50 for 30mm)		(3.00)		
10.00 - 12.00	B18 B20							

Remarks
Hand dug inspection pit excavated from 0-1.20m.

Core Barrel: T2-101
Flush Type:

Water Strikes			
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
7.00	7.00		
10.50	1.50		

Water Added		Casing Details	
From (m)	To (m)	To (m)	Diam (mm)
1.20	7.50	7.50	200

Chiselling Details		
From (m)	To (m)	Time (hh:mm)

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2000	0.00	7.50
Rotary Drilling	Hanjin 8D	7.50	12.70
Rotary Coring	Hanjin 8D	12.70	14.70

Project No.: 17-1375

Project Name: Saggart Reservoir Site Investigation

Borehole No.: BH22

Coordinates: 303808.04 E, 226219.41 N

Client: Irish Water

Sheet 2 of 2

Client's Representative: RPS Consulting Engineers

Scale: 1:50

Ground Level: 144.76 mOD

Dates: 10/04/2018

Driller: SS+JG

Logger: CH+ST

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
				Water strike at 10.50m	134.26	10.50		Very stiff dark grey sandy gravelly CLAY with cobbles (Driller's description)		
								Highly fractured SHALE (Driller's description)		
						(1.50)				
					132.76	12.00		Sandy CONGLOMERATE (Driller's description)		
						(0.70)				
					132.06	12.70 (0.20)		Stiff brown slightly sandy very gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse of mixed lithologies predominately shale.		
	100 0 0				131.86	12.90		Weak brownish grey SHALE/MUDSTONE. Partially weathered reduced strength highly fractured, red staining, on fracture surface. Discontinuities: 1. 30 to 40 degree bedding fractures extremely closely spaced (05/08/12) planar, smooth, stained.		
13.70			20			(1.80)		2. Subvertical fractures, planar, smooth, stained.		
	100 8 0									
14.70					130.06	14.70		End of Borehole at 14.70m		

TCR	SCR	RQD	FI

Remarks
Hand dug inspection pit excavated from 0-1.20m.

Core Barrel: T2-101

Flush Type:

Water Strikes				Chiselling Details		
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	From (m)	To (m)	Time (hh:mm)
7.00	7.00					
10.50	1.50					

Water Added		Casing Details	
From (m)	To (m)	To (m)	Diam (mm)

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2500	0.00	1.20

Project No.: 17-1375

Project Name: Saggart Reservoir Site Investigation

Borehole No.: BH23

Coordinates: 303708.89 E, 226094.11 N

Client: Irish Water

Sheet 1 of 1

Client's Representative: RPS Consulting Engineers

Scale: 1:50

Driller: DMC

Ground Level: 148.00 mOD

Dates: 13/03/2018

Logger: CH

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.00 - 0.20	BS					(0.20)		TOPSOIL.		
0.20 - 1.20	B4				147.80	0.20		Stiff brown slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of mixed lithologies. Cobbles are subangular.		
0.50	ES2					(1.00)				
1.00	ES1									
1.20 - 1.65	SPT (S) N=19			N=19 (3,4/5,5,4,5)	146.80	1.20		End of Borehole at 1.20m		
1.60	D3									

Remarks
Hand dug inspection pit excavated from 0-1.20m.

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Chiselling Details

From (m)	To (m)	Time (hh:mm)
1.20	1.20	01:00

Water Added

From (m)	To (m)

Casing Details

To (m)	Diam (mm)

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2500	0.00	5.50
Rotary Drilling	Hanjin 8D	5.50	20.00

Project No.: 17-1375

Project Name: Saggart Reservoir Site Investigation

Borehole No.: BH23A

Coordinates: 303708.89 E 226094.11 N

Client: Irish Water

Sheet 1 of 2

Client's Representative: RPS Consulting Engineers

Scale: 1:50

Driller: DMC+JG

Ground Level: 148.00 mOD

Dates: 22/03/2018 - 05/04/2018

Logger: CH

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
					147.80	(0.20) 0.20		TOPSOIL.		
						(1.00)		Stiff brown slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of mixed lithologies. Cobbles are subangular.		
1.20 - 1.50	B1				146.80	1.20 (0.30)		Stiff brown slightly sandy gravelly CLAY. Gravel is angular fine. Sand is fine to coarse.		
1.50 - 1.70	B2				146.50	1.50		Loose brown slightly sandy subrounded fine to coarse GRAVEL with occasional cobbles and boulders. Sand is fine to coarse. Cobbles and boulders are rounded.		
1.70 - 2.60	B3									
1.70 - 2.15	SPT (S) N=9	1.50	1.10	N=9 (4,5/5,2,1,1)						
2.10	D7					(1.10)				
2.60 - 3.60	B4				145.40	2.60		Very stiff dark brown gravelly slightly sandy CLAY with occasional cobbles and boulders. Sand is fine to coarse. Gravel is subangular fine to coarse of mixed lithologies. Cobbles and boulders are angular.		
3.00 - 3.45	SPT (S) N=33	3.00	1.90	N=33 (3,5/6,6,8,13)						
3.40	D8									
3.60 - 4.60	B5									
4.00 - 4.45	SPT (C) N=33	4.00	2.70	N=33 (4,6/8,9,4,12)		(2.90)				
4.40	D9									
4.60 - 5.20	B6									
5.00 - 5.30	SPT (C)	5.00	3.60	50 (6,9/50 for 155mm)						
5.40	D10				142.50	5.50		Very stiff dark greyish brown sandy gravelly CLAY with cobbles and boulder (Driller's description)		
7.00 - 7.30	SPT (S)			50 (9,16/50 for 150mm)						
8.50 - 8.64	SPT (S)			50 (25 for 105mm/50 for 30mm)						
10.00 - 10.24	SPT (S)			50 (25 for 125mm/50 for 115mm)						

Remarks

Hand dug inspection pit excavated from 0-1.20m.

Attempted to core 15.50 to 18.00m but only recovered some gravel and cobbles

Core Barrel

Flush Type

Water Strikes			
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Water Added	
From (m)	To (m)

Casing Details	
To (m)	Diam (mm)
5.50	200

Chiselling Details		
From (m)	To (m)	Time (hh:mm)
1.70	1.90	00:30
5.20	5.50	01:00

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2500	0.00	5.50
Rotary Drilling	Hanjin 8D	5.50	20.00

Project No.: 17-1375

Project Name: Saggart Reservoir Site Investigation

Borehole No.: BH23A

Coordinates: 303708.89 E, 226094.11 N

Client: Irish Water

Sheet 2 of 2

Client's Representative: RPS Consulting Engineers

Scale: 1:50

Driller: DMC+JG

Ground Level: 148.00 mOD

Dates: 22/03/2018 - 05/04/2018

Logger: CH

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
								Very stiff dark greyish brown sandy gravelly CLAY with cobbles and boulder (Driller's description)		
11.50 - 11.80	SPT (S)			59 (12,16/59 for 150mm)						
13.00 - 13.22	SPT (S)			50 (13,17/50 for 75mm)						
14.50 - 14.71	SPT (S)			25 (15,19/25 for 60mm)		(14.50)				
					128.00	20.00		End of Borehole at 20.00m		

Remarks

Hand dug inspection pit excavated from 0-1.20m.

Attempted to core 15.50 to 18.00m but only recovered some gravel and cobbles.

Core Barrel

Water Strikes			
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Chiselling Details		
From (m)	To (m)	Time (hh:mm)
1.70	1.90	00:30
5.20	5.50	01:00

Flush Type

Water Added		Casing Details	
From (m)	To (m)	To (m)	Diam (mm)

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2500	0.00	4.50
Rotary Drilling	Hanjin 8D	4.50	18.50

Project No.: 17-1375

Project Name: Saggart Reservoir Site Investigation

Borehole No.: BH24

Coordinates: 303828.93 E, 226100.83 N

Client: Irish Water

Sheet 1 of 2

Client's Representative: RPS Consulting Engineers

Scale: 1:50

Driller: DMC+JG

Ground Level: 148.72 mOD

Dates: 05/04/2018 - 11/04/2018

Logger: CH

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
0.00 - 0.40	B5					(0.40)		TOPSOIL		
0.40 - 1.40	B6				148.32	0.40		Firm to stiff light brown sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subrounded fine to coarse.		
1.20 - 1.65	SPT (S) N=19			N=19 (2,3/4,4,5,6)		(1.30)				
1.40 - 1.70	B7									
1.60	D1									
1.70 - 2.60	B8				147.02	1.70		Stiff brown slightly sandy gravelly CLAY with high cobble content and occasional boulders. Sand is fine to coarse. Gravel is subangular fine to coarse. Cobbles are subangular.		
2.00 - 2.45	SPT (S) N=38	2.00	1.30	N=38 (3,4/6,7,9,16)		(0.90)				
2.40	D2									
2.60 - 3.00	B9				146.12	2.60		Very stiff dark grey slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse.		
3.00 - 4.00	B10									
3.00 - 3.45	SPT (S) N=44	3.00	2.60	N=44 (4,6/7,11,12,14)						
3.40	D3					(1.90)				
4.00 - 4.50	D11									
4.00 - 4.32	SPT (C)	4.00	3.80	50 (7,11/50 for 170mm)						
4.20	D4				144.22	4.50		Very stiff dark grey sandy gravelly CLAY with cobbles. (Driller's description)		
4.50 - 7.50	B12 B13									
5.50 - 5.68	SPT (S)			50 (10,15/50 for 35mm)						
7.00 - 7.42	SPT (S)			N=50 (10,15/50 for 265mm)						
7.50 - 10.50	B14					(7.00)				
8.50 - 8.76	SPT (S)			50 (11,17/50 for 110mm)						
10.00 - 10.16	SPT (S)			50 (25 for 120mm/50 for 40mm)						

Remarks

Hand dug inspection pit excavated from 0-1.20m.

Core Barrel

Flush Type

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
11.50	11.50	10	11.50
14.00	18.50	10	14.00

Chiselling Details

From (m)	To (m)	Time (hh:mm)
1.90	2.00	00:30
4.50	4.50	01:00

Water Added

From (m)	To (m)

Casing Details

To (m)	Diam (mm)

CAUSEWAY GEOTECH

Method	Plant Used	Top	Base
Cable Percussion	Dando 2500	0.00	4.50
Rotary Drilling	Hanjin 8D	4.50	18.50

Project No.: 17-1375	**Project Name:** Saggart Reservoir Site Investigation
Coordinates: 303828.93 E 226100.83 N	**Client:** Irish Water
Ground Level: 148.72 mOD	**Client's Representative:** RPS Consulting Engineers
	Dates: 05/04/2018 - 11/04/2018

Borehole No.: BH24

Sheet 2 of 2

Scale: 1:50

Driller: DMC+JG

Logger: CH

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Legend	Description	Water	Backfill
10.50 - 13.50	B15 B16							Very stiff dark grey sandy gravelly CLAY with cobbles. (Driller's description)		
					137.22	11.50				
						(0.75)		Dark grey gravelly SAND (Driller's description)		
					136.47	12.25				
								Very stiff dark grey sandy gravelly CLAY (Driller's description)		
13.00 - 13.14	SPT (S)			50 (25 for 100mm/50 for 40mm)		(1.75)				
14.00 - 18.50	B17				134.72	14.00		Dark grey sandy slightly clayey subangular fine to coarse GRAVEL.		
						(4.50)				
					130.22	18.50		End of Borehole at 18.50m		

Remarks
Hand dug inspection pit excavated from 0-1.20m

Core Barrel

Flush Type

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
11.50	11.50	10	11.50
14.00	18.50	10	14.00

Water Added

From (m)	To (m)

Casing Details

To (m)	Diam (mm)
16.00	152
18.50	100

Chiselling Details

From (m)	To (m)	Time (hh:mm)
1.90	2.00	00:30
4.50	4.50	01.00

Appendix 2: Slope Stability Check Report

Temporary Works Design Report

Saggart Reservoir

Slope Stability Check for Filling of Hinchs Field

Contractor	Coffey Construction
Project No.	2965
Design Report No:	NK-2965-REP- 008

Rev.	Date	Description	Designed by	Checked By
1	13/09/21	first issue	dg	nk
-				
-				
-				
-				
-				

N Kealy Engineering Ltd
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Arquen House, 4 - 6 Spicer Street, St. Albans, AL3 4PQ
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info@nke.ie info@kealyengineering.co.uk

Introduction

NK Engineering have been appointed by Coffey Construction to assess the slope stability of the proposed filling of the area adjacent to the reservoir site known as Hinchs Field.
The field shall be filled and compacted with surplus arisings from the reservoir site works.

Design Basis

The excavation slope stability shall utilise GEO5 Slope Stability Analysis software to calculate the circular slip surface with the lowest stability rating.

Results Summary

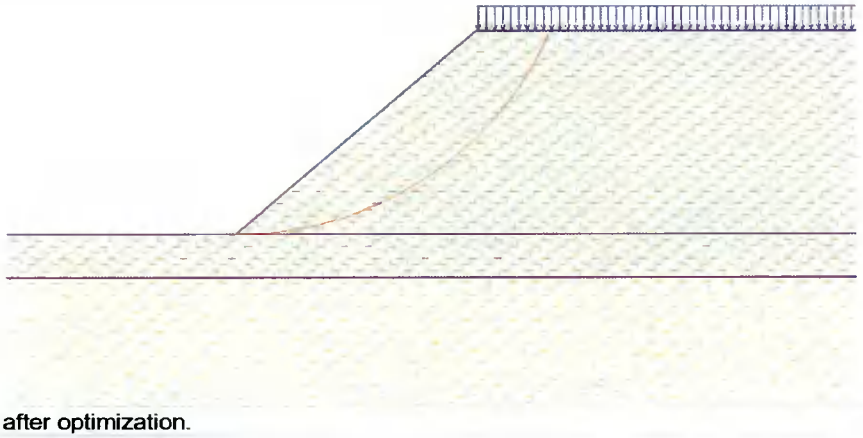
- Excavation slope not to exceed 40 degrees
- Long term surcharge loading to top of embankment not to exceed 5kPa

Slope Stability

The stability of the excavated slope is assessed using GEO5 Slope Stability Analysis software to verify that a minimum factor of safety of 1.5 is achieved for all slip surfaces using the Bishop method of analysis.

The critical slip surface is shown below with the full analysis report contained in Appendix A and verified the stability of the excavation.

Name : Hinchs Field – 7m Maximum Height	Stage - analysis : 1 - 1



The slip surface after optimization.

Slope stability verification (Bishop)

Sum of active forces : F_a = 250.70 kN/m
Sum of passive forces : F_p = 390.95 kN/m

Sliding moment : M_a = 2958.30 kNm/m
Resisting moment : M_p = 4613.25 kNm/m
Factor of safety = 1.56 > 1.50
Slope stability ACCEPTABLE

Appendix A - Slope Stability Analysys

Slope stability analysis

Input data

Project

Task : Slope Stability - Liam Hinch Field
Description : Hinchs Field
Customer : Coffey Construction
Author : D Nolan
Date : 12/09/2021
Project ID : 2965

Settings

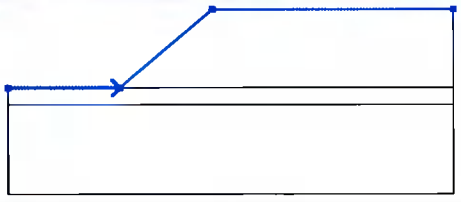
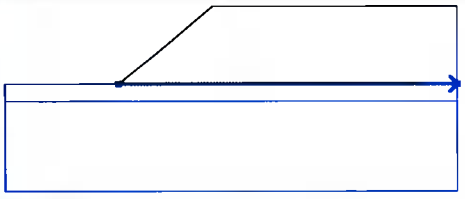
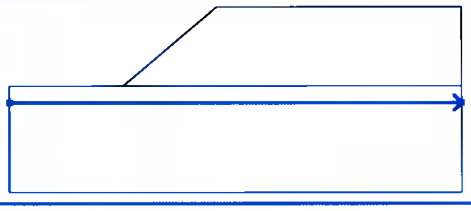
Standard - safety factors

Stability analysis

Earthquake analysis : Standard
Verification methodology : Safety factors (ASD)

Safety factors		
Permanent design situation		
Safety factor :	SF_s =	1.50 [–]

Interface

No.	Interface location	Coordinates of interface points [m]					
		x	z	x	z	x	z
1		0.00	0.00	10.00	0.00	18.34	7.00
		40.00	7.00				
2		10.00	0.00	40.00	0.00		
3		0.00	-1.50	40.00	-1.50		

Soil parameters - effective stress state

No.	Name	Pattern	φ_{ef} [°]	c_{ef} [kPa]	γ [kN/m^3]
1	Sandy clay (CS), firm consistency		24.50	14.00	18.50

No.	Name	Pattern	φ_{ef} [°]	c_{ef} [kPa]	γ [kN/m^3]
2	Sandy clay (CS), stiff consistency, Sr < 0.8		24.50	33.00	18.50
3	Sandy clay (CS), very stiff consistency, Sr > 0.8		24.50	40.00	18.00

Soil parameters - uplift

No.	Name	Pattern	γ_{sat} [kN/m^3]	γ_s [kN/m^3]	n [–]
1	Sandy clay (CS), firm consistency		18.50		
2	Sandy clay (CS), stiff consistency, Sr < 0.8		18.50		
3	Sandy clay (CS), very stiff consistency, Sr > 0.8		18.00		

Soil parameters

Sandy clay (CS), firm consistency

Unit weight :	γ =	18.50 kN/m^3
Stress-state :		effective
Angle of internal friction :	φ_{ef} =	24.50 °
Cohesion of soil :	c_{ef} =	14.00 kPa
Saturated unit weight :	γ_{sat} =	18.50 kN/m^3

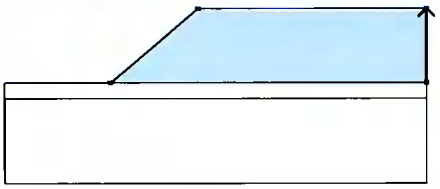
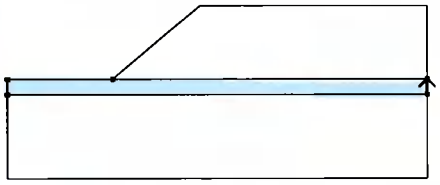
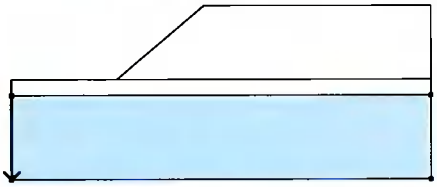
Sandy clay (CS), stiff consistency, Sr < 0.8

Unit weight :	γ =	18.50 kN/m^3
Stress-state :		effective
Angle of internal friction :	φ_{ef} =	24.50 °
Cohesion of soil :	c_{ef} =	33.00 kPa
Saturated unit weight :	γ_{sat} =	18.50 kN/m^3

Sandy clay (CS), very stiff consistency, Sr > 0.8

Unit weight :	γ =	18.00 kN/m^3
Stress-state :		effective
Angle of internal friction :	φ_{ef} =	24.50 °
Cohesion of soil :	c_{ef} =	40.00 kPa
Saturated unit weight :	γ_{sat} =	18.00 kN/m^3

Assigning and surfaces

No.	Surface position	Coordinates of surface points [m] x	z	x	z	Assigned soil
1		40.00 18.34	0.00 7.00	40.00 10.00	7.00 0.00	Sandy clay (CS), firm consistency
2		40.00 10.00 0.00	-1.50 0.00 -1.50	40.00 0.00	0.00 0.00	Sandy clay (CS), firm consistency
3		0.00 40.00	-1.50 -9.50	0.00 40.00	-9.50 -1.50	Sandy clay (CS), stiff consistency, Sr < 0.8

Surcharge

No.	Type	Type of action	Location z [m]	Origin x [m]	Length l [m]	Width b [m]	Slope α [°]	Magnitude q, q_1, f, F, x	Magnitude q_2, z	Magnitude unit
1	strip	variable	on terrain	x = 18.40	l = 21.00		0.00	5.00		kN/m^2

Surcharges

No.	Name
1	Non Vehciular Surcharge Loading

Water

Water type : No water

Tensile crack

Tensile crack not input.

Earthquake

Earthquake not included.

Settings of the stage of construction

Design situation : permanent

Results (Stage of construction 1)

Analysis 1

Circular slip surface

Slip surface parameters					
Center :	x =	10.11 [m]	Angles :	α_1 =	-0.53 [°]
	z =	11.80 [m]		α_2 =	66.00 [°]
Radius :	R =	11.80 [m]			
The slip surface after optimization.					

Slope stability verification (Bishop)

Sum of active forces : F_a = 250.70 kN/m

Sum of passive forces : F_p = 390.95 kN/m

Sliding moment : M_a = 2958.30 kNm/m

Resisting moment : M_p = 4613.25 kNm/m

Factor of safety = 1.56 > 1.50

Slope stability ACCEPTABLE

Optimization of circular slip surface (Bishop)

No.	Center		Radius	FS	Verification
	x [m]	z [m]	R [m]		
1	10.11	11.80	11.80	1.56	ACCEPTABLE
2	10.11	11.80	11.80	1.56	ACCEPTABLE
3	10.11	11.80	11.80	1.56	ACCEPTABLE
4	-91.45	411.67	422.16	3.64	ACCEPTABLE
5	11.69	17.83	20.25	2.60	ACCEPTABLE
6	14.31	7.83	14.52	3.68	ACCEPTABLE
7	4.50	45.28	45.34	2.17	ACCEPTABLE
8	10.11	11.80	11.80	1.56	ACCEPTABLE
9	-15.26	97.58	99.60	2.68	ACCEPTABLE
10	11.54	15.46	16.90	1.97	ACCEPTABLE
11	20.42	7.02	5.75	10.20	ACCEPTABLE
12	13.90	8.23	12.33	2.97	ACCEPTABLE
13	-0.43	24.17	25.23	140.99	ACCEPTABLE
14	3.35	18.12	18.17	111.08	ACCEPTABLE
15	6.47	30.99	31.04	1.89	ACCEPTABLE
16	10.11	11.80	11.80	1.56	ACCEPTABLE
17	-15.33	97.30	98.65	3.11	ACCEPTABLE
18	-1.83	47.74	48.46	2.07	ACCEPTABLE
19	11.36	13.96	14.79	1.81	ACCEPTABLE
20	17.96	7.68	6.48	3.51	ACCEPTABLE
21	13.42	8.69	11.12	2.44	ACCEPTABLE
22	6.32	12.97	12.97	3.33	ACCEPTABLE
23	7.75	23.20	23.23	1.73	ACCEPTABLE
24	10.11	11.80	11.80	1.56	ACCEPTABLE
25	8.37	24.88	23.25	2.09	ACCEPTABLE
26	3.46	30.19	30.48	1.83	ACCEPTABLE
27	11.16	13.03	13.49	1.72	ACCEPTABLE
28	15.95	8.48	7.44	2.35	ACCEPTABLE
29	12.89	9.19	10.58	1.86	ACCEPTABLE
30	8.31	13.27	12.00	2.96	ACCEPTABLE
31	7.76	11.80	11.80	2.05	ACCEPTABLE
32	10.39	7.71	8.18	1.90	ACCEPTABLE
33	8.58	18.78	18.80	1.65	ACCEPTABLE

No.	Center		Radius	FS	Verification
	x [m]	z [m]	R [m]		
34	15.60	9.23	7.95	2.23	ACCEPTABLE
35	10.11	11.80	11.80	1.56	ACCEPTABLE
36	12.90	12.02	10.79	1.80	ACCEPTABLE
37	12.63	8.00	6.77	1.80	ACCEPTABLE
38	-7.59	49.62	52.15	2.04	ACCEPTABLE
39	9.88	17.82	16.59	1.82	ACCEPTABLE
40	6.11	22.19	22.31	1.69	ACCEPTABLE
41	10.96	12.48	12.73	1.66	ACCEPTABLE
42	14.34	9.26	8.42	1.93	ACCEPTABLE
43	12.35	9.70	10.46	1.73	ACCEPTABLE
44	12.83	7.73	6.54	1.81	ACCEPTABLE
45	6.36	15.21	15.35	1.93	ACCEPTABLE
46	9.49	12.28	11.16	1.94	ACCEPTABLE
47	8.54	11.80	11.80	1.71	ACCEPTABLE
48	10.45	8.84	9.06	1.72	ACCEPTABLE
49	9.11	16.18	16.19	1.60	ACCEPTABLE
50	13.60	10.69	9.59	1.84	ACCEPTABLE
51	10.11	11.80	11.80	1.56	ACCEPTABLE
52	11.28	13.19	12.32	1.69	ACCEPTABLE
53	11.73	9.28	8.43	1.69	ACCEPTABLE
54	3.36	25.89	26.49	1.76	ACCEPTABLE
55	10.17	15.17	14.32	1.70	ACCEPTABLE
56	7.61	18.03	18.08	1.63	ACCEPTABLE
57	14.31	7.82	7.67	1.95	ACCEPTABLE
58	10.77	12.16	12.30	1.63	ACCEPTABLE
59	13.12	9.93	9.29	1.75	ACCEPTABLE
60	11.84	10.18	10.58	1.66	ACCEPTABLE
61	11.75	9.25	8.40	1.69	ACCEPTABLE
62	7.56	14.14	14.20	1.70	ACCEPTABLE
63	9.84	12.00	11.19	1.73	ACCEPTABLE
64	9.07	11.80	11.80	1.61	ACCEPTABLE
65	12.43	7.01	7.42	1.72	ACCEPTABLE
66	11.46	8.07	8.45	1.68	ACCEPTABLE
67	11.94	7.32	7.91	1.72	ACCEPTABLE
68	10.42	9.69	9.80	1.65	ACCEPTABLE
69	12.62	8.00	7.30	1.73	ACCEPTABLE
70	9.46	14.60	14.61	1.64	ACCEPTABLE
71	12.31	11.36	10.56	1.70	ACCEPTABLE
72	10.11	11.80	11.80	1.56	ACCEPTABLE
73	10.65	13.12	12.53	1.64	ACCEPTABLE
74	11.16	10.13	9.56	1.63	ACCEPTABLE
75	6.57	19.06	19.26	1.65	ACCEPTABLE
76	10.22	13.84	13.27	1.64	ACCEPTABLE
77	8.51	15.67	15.69	1.59	ACCEPTABLE
78	13.08	8.99	8.74	1.73	ACCEPTABLE
79	10.61	11.99	12.06	1.60	ACCEPTABLE

No.	Center		Radius	FS	Verification
	x [m]	z [m]	R [m]		
80	12.21	10.47	10.00	1.66	ACCEPTABLE
81	11.40	10.59	10.80	1.62	ACCEPTABLE
82	11.15	10.15	9.57	1.63	ACCEPTABLE
83	8.40	13.38	13.41	1.62	ACCEPTABLE
84	9.97	11.90	11.33	1.65	ACCEPTABLE
85	9.41	11.80	11.80	1.58	ACCEPTABLE
86	11.88	8.18	8.39	1.63	ACCEPTABLE
87	13.08	7.30	7.12	1.77	ACCEPTABLE
88	11.14	9.11	9.30	1.62	ACCEPTABLE
89	12.50	8.15	7.78	1.69	ACCEPTABLE
90	11.61	8.38	8.69	1.65	ACCEPTABLE
91	10.36	10.32	10.38	1.62	ACCEPTABLE
92	11.89	9.06	8.56	1.65	ACCEPTABLE
93	9.68	13.61	13.62	1.62	ACCEPTABLE
94	11.51	11.65	11.09	1.64	ACCEPTABLE
95	10.11	11.80	11.80	1.56	ACCEPTABLE
96	10.38	12.81	12.42	1.61	ACCEPTABLE
97	10.80	10.69	10.31	1.60	ACCEPTABLE
98	8.04	16.00	16.07	1.60	ACCEPTABLE
99	10.21	13.08	12.70	1.61	ACCEPTABLE
100	9.07	14.26	14.27	1.57	ACCEPTABLE
101	12.17	9.85	9.61	1.64	ACCEPTABLE
102	10.47	11.90	11.94	1.59	ACCEPTABLE
103	11.55	10.87	10.53	1.62	ACCEPTABLE
104	11.05	10.93	11.03	1.59	ACCEPTABLE
105	10.79	10.72	10.33	1.61	ACCEPTABLE
106	8.96	12.87	12.88	1.59	ACCEPTABLE
107	10.03	11.85	11.47	1.61	ACCEPTABLE
108	9.65	11.80	11.80	1.57	ACCEPTABLE
109	11.42	9.15	9.26	1.59	ACCEPTABLE
110	12.29	8.45	8.26	1.66	ACCEPTABLE
111	10.87	9.90	9.98	1.59	ACCEPTABLE
112	11.84	9.13	8.85	1.63	ACCEPTABLE
113	11.27	9.27	9.43	1.61	ACCEPTABLE
114	10.30	10.78	10.81	1.60	ACCEPTABLE
115	11.35	9.87	9.52	1.61	ACCEPTABLE
116	9.83	12.98	12.99	1.61	ACCEPTABLE
117	11.01	11.76	11.38	1.61	ACCEPTABLE
118	10.11	11.80	11.80	1.56	ACCEPTABLE
119	10.25	12.52	12.26	1.59	ACCEPTABLE
120	10.56	11.07	10.81	1.59	ACCEPTABLE
121	8.83	14.38	14.40	1.58	ACCEPTABLE
122	10.19	12.63	12.37	1.59	ACCEPTABLE
123	9.43	13.39	13.40	1.64	ACCEPTABLE
124	11.52	10.47	10.28	1.60	ACCEPTABLE
125	10.36	11.85	11.87	1.58	ACCEPTABLE

No.	Center		Radius	FS	Verification
	x [m]	z [m]	R [m]		
126	11.09	11.16	10.93	1.59	ACCEPTABLE
127	10.77	11.18	11.23	1.58	ACCEPTABLE
128	10.55	11.08	10.83	1.59	ACCEPTABLE
129	9.34	12.51	12.52	1.57	ACCEPTABLE
130	10.07	11.83	11.57	1.59	ACCEPTABLE
131	9.80	11.80	11.80	1.56	ACCEPTABLE
132	11.05	9.91	9.96	1.57	ACCEPTABLE
133	11.67	9.38	9.22	1.61	ACCEPTABLE
134	10.65	10.47	10.51	1.58	ACCEPTABLE
135	11.33	9.90	9.70	1.60	ACCEPTABLE
136	10.98	9.97	10.05	1.59	ACCEPTABLE
137	10.25	11.10	11.12	1.59	ACCEPTABLE
138	10.96	10.46	10.22	1.59	ACCEPTABLE
139	9.92	12.58	12.58	1.56	ACCEPTABLE
140	10.70	11.80	11.55	1.59	ACCEPTABLE
141	10.11	11.80	11.80	1.56	ACCEPTABLE
142	10.19	12.30	12.13	1.58	ACCEPTABLE
143	10.41	11.31	11.14	1.58	ACCEPTABLE
144	9.29	13.43	13.44	1.57	ACCEPTABLE
145	10.16	12.34	12.17	1.58	ACCEPTABLE
146	9.66	12.84	12.84	1.56	ACCEPTABLE
147	11.07	10.89	10.76	1.58	ACCEPTABLE
148	10.29	11.83	11.84	1.57	ACCEPTABLE
149	10.78	11.36	11.20	1.58	ACCEPTABLE
150	10.57	11.37	11.40	1.58	ACCEPTABLE
151	10.40	11.33	11.15	1.58	ACCEPTABLE
152	9.60	12.28	12.28	1.56	ACCEPTABLE
153	10.08	11.82	11.64	1.58	ACCEPTABLE
154	9.90	11.80	11.80	1.56	ACCEPTABLE
155	10.77	10.48	10.50	1.57	ACCEPTABLE
156	11.21	10.09	9.97	1.59	ACCEPTABLE
157	10.49	10.88	10.91	1.58	ACCEPTABLE
158	10.96	10.48	10.33	1.58	ACCEPTABLE
159	10.73	10.51	10.55	1.58	ACCEPTABLE
160	10.21	11.33	11.33	1.56	ACCEPTABLE
161	10.69	10.89	10.72	1.58	ACCEPTABLE
162	9.98	12.31	12.32	1.59	ACCEPTABLE
163	10.49	11.81	11.64	1.58	ACCEPTABLE
164	10.11	11.80	11.80	1.56	ACCEPTABLE
165	10.16	12.14	12.02	1.57	ACCEPTABLE
166	10.31	11.48	11.36	1.57	ACCEPTABLE
167	9.58	12.85	12.86	1.62	ACCEPTABLE
168	10.15	12.15	12.04	1.57	ACCEPTABLE
169	9.81	12.49	12.49	1.56	ACCEPTABLE
170	10.76	11.19	11.09	1.57	ACCEPTABLE
171	10.23	11.82	11.82	1.56	ACCEPTABLE

No.	Center		Radius	FS	Verification
	x [m]	z [m]	R [m]		
172	10.56	11.50	11.40	1.57	ACCEPTABLE
173	10.43	11.51	11.52	1.56	ACCEPTABLE
174	10.30	11.49	11.37	1.57	ACCEPTABLE
175	9.77	12.12	12.12	1.56	ACCEPTABLE
176	10.09	11.81	11.69	1.57	ACCEPTABLE
177	9.97	11.80	11.80	1.56	ACCEPTABLE
178	10.57	10.89	10.90	1.56	ACCEPTABLE
179	10.87	10.61	10.52	1.58	ACCEPTABLE
180	10.37	11.18	11.19	1.57	ACCEPTABLE
181	10.69	10.89	10.79	1.57	ACCEPTABLE
182	10.55	10.90	10.93	1.58	ACCEPTABLE
183	10.18	11.48	11.48	1.56	ACCEPTABLE
184	10.50	11.18	11.07	1.57	ACCEPTABLE
185	10.03	12.14	12.14	1.56	ACCEPTABLE
186	10.36	11.81	11.70	1.57	ACCEPTABLE
187	10.11	11.80	11.80	1.56	ACCEPTABLE
188	10.14	12.03	11.95	1.57	ACCEPTABLE
189	10.24	11.58	11.51	1.57	ACCEPTABLE
190	9.76	12.49	12.49	1.56	ACCEPTABLE
191	10.14	12.03	11.96	1.57	ACCEPTABLE
192	9.91	12.25	12.25	1.56	ACCEPTABLE
193	10.55	11.39	11.32	1.57	ACCEPTABLE
194	10.19	11.81	11.81	1.56	ACCEPTABLE
195	10.41	11.60	11.53	1.57	ACCEPTABLE
196	10.32	11.60	11.61	1.57	ACCEPTABLE
197	10.24	11.59	11.51	1.57	ACCEPTABLE
198	9.88	12.01	12.01	1.56	ACCEPTABLE
199	10.10	11.81	11.73	1.57	ACCEPTABLE
200	10.02	11.80	11.80	1.56	ACCEPTABLE
201	10.42	11.18	11.18	1.56	ACCEPTABLE
202	10.63	10.99	10.92	1.57	ACCEPTABLE
203	10.29	11.38	11.38	1.56	ACCEPTABLE
204	10.50	11.18	11.11	1.57	ACCEPTABLE
205	10.41	11.19	11.20	1.56	ACCEPTABLE
206	10.16	11.59	11.59	1.56	ACCEPTABLE
207	10.37	11.38	11.31	1.57	ACCEPTABLE
208	10.05	12.03	12.03	1.56	ACCEPTABLE
209	10.28	11.81	11.74	1.57	ACCEPTABLE
210	10.11	11.80	11.80	1.56	ACCEPTABLE
211	10.13	11.95	11.90	1.56	ACCEPTABLE
212	10.20	11.66	11.61	1.56	ACCEPTABLE
213	9.88	12.25	12.25	1.56	ACCEPTABLE
214	10.13	11.95	11.90	1.56	ACCEPTABLE
215	9.98	12.10	12.10	1.56	ACCEPTABLE
216	10.40	11.52	11.48	1.56	ACCEPTABLE
217	10.16	11.81	11.81	1.56	ACCEPTABLE

No.	Center		Radius	FS	Verification
	x [m]	z [m]	R [m]		
218	10.31	11.67	11.62	1.56	ACCEPTABLE
219	10.25	11.67	11.67	1.56	ACCEPTABLE
220	10.20	11.66	11.61	1.56	ACCEPTABLE
221	9.96	11.94	11.94	1.56	ACCEPTABLE
222	10.10	11.80	11.75	1.56	ACCEPTABLE
223	10.05	11.80	11.80	1.56	ACCEPTABLE
224	10.32	11.38	11.38	1.56	ACCEPTABLE
225	10.46	11.25	11.20	1.57	ACCEPTABLE
226	10.23	11.52	11.52	1.56	ACCEPTABLE
227	10.38	11.38	11.33	1.57	ACCEPTABLE
228	10.32	11.38	11.39	1.57	ACCEPTABLE
229	10.14	11.66	11.66	1.56	ACCEPTABLE
230	10.29	11.52	11.47	1.56	ACCEPTABLE
231	10.07	11.95	11.95	1.56	ACCEPTABLE
232	10.22	11.81	11.76	1.56	ACCEPTABLE
233	10.11	11.80	11.80	1.56	ACCEPTABLE
234	10.12	11.90	11.87	1.56	ACCEPTABLE
235	10.17	11.70	11.67	1.56	ACCEPTABLE
236	9.96	12.10	12.10	1.56	ACCEPTABLE
237	10.12	11.90	11.87	1.56	ACCEPTABLE
238	10.02	12.00	12.00	1.56	ACCEPTABLE
239	10.31	11.62	11.58	1.56	ACCEPTABLE
240	10.15	11.80	11.81	1.58	ACCEPTABLE
241	10.25	11.71	11.68	1.56	ACCEPTABLE
242	10.21	11.71	11.71	1.56	ACCEPTABLE
243	10.17	11.71	11.67	1.56	ACCEPTABLE
244	10.01	11.90	11.90	1.56	ACCEPTABLE
245	10.11	11.80	11.77	1.56	ACCEPTABLE
246	10.07	11.80	11.80	1.56	ACCEPTABLE
247	10.25	11.52	11.52	1.56	ACCEPTABLE
248	10.35	11.43	11.40	1.56	ACCEPTABLE
249	10.19	11.61	11.61	1.56	ACCEPTABLE
250	10.29	11.52	11.49	1.56	ACCEPTABLE
251	10.25	11.52	11.52	1.56	ACCEPTABLE
252	10.13	11.70	11.71	1.58	ACCEPTABLE
253	10.23	11.61	11.58	1.56	ACCEPTABLE
254	10.08	11.90	11.90	1.56	ACCEPTABLE
255	10.18	11.81	11.77	1.56	ACCEPTABLE
256	10.11	11.80	11.80	1.56	ACCEPTABLE
257	10.12	11.87	11.85	1.56	ACCEPTABLE
258	10.15	11.74	11.71	1.56	ACCEPTABLE
259	10.01	12.00	12.00	1.56	ACCEPTABLE
260	10.12	11.87	11.85	1.56	ACCEPTABLE
261	10.05	11.93	11.93	1.56	ACCEPTABLE
262	10.24	11.68	11.66	1.56	ACCEPTABLE
263	10.13	11.80	11.80	1.56	ACCEPTABLE

No.	Center		Radius	FS	Verification
	x [m]	z [m]	R [m]		
264	10.20	11.74	11.72	1.56	ACCEPTABLE
265	10.17	11.74	11.74	1.56	ACCEPTABLE
266	10.15	11.74	11.72	1.56	ACCEPTABLE
267	10.04	11.86	11.86	1.56	ACCEPTABLE
268	10.11	11.80	11.78	1.56	ACCEPTABLE
269	10.08	11.80	11.80	1.56	ACCEPTABLE
270	10.21	11.61	11.61	1.56	ACCEPTABLE
271	10.27	11.55	11.53	1.56	ACCEPTABLE
272	10.16	11.67	11.67	1.56	ACCEPTABLE
273	10.23	11.61	11.59	1.56	ACCEPTABLE
274	10.20	11.61	11.61	1.56	ACCEPTABLE
275	10.12	11.74	11.74	1.56	ACCEPTABLE
276	10.19	11.67	11.65	1.56	ACCEPTABLE
277	10.09	11.87	11.87	1.56	ACCEPTABLE
278	10.16	11.80	11.78	1.56	ACCEPTABLE
279	-91.45	411.67	422.16	3.64	ACCEPTABLE
280	28.92	19.49	14.72	63880636.39	ACCEPTABLE
281	17.41	19.66	23.10	3.48	ACCEPTABLE
282	-3.46	189.61	187.66	5.58	ACCEPTABLE
283	25.42	11.49	15.06	12.25	ACCEPTABLE
284	18.86	9.96	21.15	5.23	ACCEPTABLE
285	-89.55	405.00	415.23	3.64	ACCEPTABLE
286	11.20	17.01	20.26	2.81	ACCEPTABLE
287	14.65	23.42	27.52	3.41	ACCEPTABLE
288	19.12	17.01	20.26	3.95	ACCEPTABLE
289	17.60	8.01	19.16	5.17	ACCEPTABLE
290	8.52	9.50	12.63	3.05	ACCEPTABLE
291	9.21	7.45	11.69	3.38	ACCEPTABLE
292	19.40	15.87	19.47	4.08	ACCEPTABLE
293	11.20	17.01	20.25	2.81	ACCEPTABLE
294	17.79	11.65	16.94	3.77	ACCEPTABLE
295	10.66	13.42	14.38	1.81	ACCEPTABLE
296	6.48	36.29	36.83	2.43	ACCEPTABLE
297	16.76	12.42	13.21	2.60	ACCEPTABLE
298	12.76	10.65	16.46	3.32	ACCEPTABLE
299	-29.06	55.69	67.94	10.92	ACCEPTABLE
300	7.60	7.70	10.67	4.09	ACCEPTABLE
301	16.46	13.27	13.85	2.52	ACCEPTABLE
302	-210.72	745.66	774.91	4.76	ACCEPTABLE
303	-205.44	745.66	774.91	3.17	ACCEPTABLE
304	10.66	13.42	14.38	1.81	ACCEPTABLE
305	13.43	15.36	15.98	1.99	ACCEPTABLE
306	10.93	9.13	9.33	1.64	ACCEPTABLE
307	2.90	38.70	37.82	2.27	ACCEPTABLE
308	5.85	25.83	25.83	1.77	ACCEPTABLE
309	11.29	11.81	13.16	1.84	ACCEPTABLE

No.	Center x [m]	Center z [m]	Radius R [m]	FS	Verification
310	16.94	7.01	6.59	2.95	ACCEPTABLE
311	12.98	7.45	10.56	2.66	ACCEPTABLE
312	7.31	10.15	10.31	2.93	ACCEPTABLE
313	9.01	17.69	18.04	1.85	ACCEPTABLE
314	-143.76	328.00	360.36	4.48	ACCEPTABLE
315	10.93	9.13	9.33	1.64	ACCEPTABLE
316	-11.13	61.00	63.54	2.32	ACCEPTABLE
317	8.60	19.56	18.63	1.80	ACCEPTABLE
318	7.68	18.83	18.86	1.64	ACCEPTABLE
319	13.89	16.33	14.30	2.21	ACCEPTABLE
320	13.47	8.85	6.81	1.87	ACCEPTABLE
321	-32.89	132.96	138.50	2.73	ACCEPTABLE
322	-15.76	80.84	84.21	2.19	ACCEPTABLE
323	9.80	19.11	19.21	1.81	ACCEPTABLE
324	15.67	11.89	10.29	2.33	ACCEPTABLE
325	12.51	12.58	13.42	1.83	ACCEPTABLE
326	13.53	8.75	6.73	1.87	ACCEPTABLE
327	-22.61	64.22	71.35	2.97	ACCEPTABLE
328	4.64	19.69	19.94	1.95	ACCEPTABLE
329	9.64	10.95	11.11	1.73	ACCEPTABLE
330	14.48	7.29	5.55	2.00	ACCEPTABLE
331	4.73	31.36	31.51	1.85	ACCEPTABLE
332	14.61	14.54	12.61	2.23	ACCEPTABLE
333	7.68	18.83	18.86	1.64	ACCEPTABLE
334	8.77	24.13	22.88	1.98	ACCEPTABLE
335	11.33	12.29	10.85	1.75	ACCEPTABLE
336	1.53	40.05	39.93	2.10	ACCEPTABLE
337	-3.98	47.85	49.48	1.95	ACCEPTABLE
338	15.70	8.90	8.45	2.27	ACCEPTABLE
339	9.30	18.77	18.78	1.68	ACCEPTABLE
340	13.65	13.41	12.12	1.96	ACCEPTABLE
341	11.60	13.72	14.05	1.73	ACCEPTABLE
342	11.02	12.80	11.37	1.76	ACCEPTABLE
343	2.54	26.67	26.84	2.07	ACCEPTABLE
344	5.42	19.69	19.94	1.75	ACCEPTABLE
345	12.80	7.72	8.04	1.72	ACCEPTABLE
346	11.39	9.27	9.68	1.65	ACCEPTABLE
347	14.21	7.58	6.62	1.92	ACCEPTABLE
348	11.93	8.33	8.97	1.70	ACCEPTABLE
349	9.24	13.02	13.03	1.57	ACCEPTABLE
350	11.46	14.64	13.32	1.79	ACCEPTABLE
351	12.21	8.47	7.18	1.80	ACCEPTABLE
352	-23.17	80.15	86.16	2.22	ACCEPTABLE
353	8.02	21.18	20.17	1.86	ACCEPTABLE
354	3.74	26.69	27.10	1.77	ACCEPTABLE
355	10.43	13.39	13.54	1.66	ACCEPTABLE

No.	Center		Radius	FS	Verification
	x [m]	z [m]	R [m]		
356	13.94	9.93	8.92	1.87	ACCEPTABLE
357	11.96	10.34	10.92	1.70	ACCEPTABLE
358	12.02	8.73	7.42	1.80	ACCEPTABLE
359	4.93	17.22	17.58	2.13	ACCEPTABLE
360	7.84	14.36	13.56	2.13	ACCEPTABLE
361	7.63	13.06	13.09	1.81	ACCEPTABLE
362	10.02	9.39	9.52	1.75	ACCEPTABLE
363	13.17	7.18	6.06	1.86	ACCEPTABLE
364	8.11	17.99	18.00	1.62	ACCEPTABLE
365	12.91	11.89	10.64	1.80	ACCEPTABLE
366	9.24	13.02	13.03	1.57	ACCEPTABLE
367	9.88	15.52	14.68	1.70	ACCEPTABLE
368	11.16	9.99	9.10	1.69	ACCEPTABLE
369	-0.28	32.32	33.62	1.86	ACCEPTABLE
370	8.83	17.38	16.64	1.73	ACCEPTABLE
371	5.88	21.00	21.23	1.68	ACCEPTABLE
372	13.92	8.40	8.04	1.86	ACCEPTABLE
373	10.16	13.14	13.19	1.62	ACCEPTABLE
374	12.60	10.73	9.96	1.71	ACCEPTABLE
375	11.36	10.93	11.19	1.64	ACCEPTABLE
376	10.91	10.34	9.46	1.70	ACCEPTABLE
377	6.34	15.86	16.08	1.80	ACCEPTABLE
378	8.59	13.64	12.99	1.81	ACCEPTABLE
379	8.15	13.06	13.09	1.67	ACCEPTABLE
380	12.06	7.44	7.70	1.67	ACCEPTABLE
381	11.12	8.50	8.76	1.66	ACCEPTABLE
382	13.01	7.35	6.75	1.78	ACCEPTABLE
383	11.61	7.74	8.18	1.69	ACCEPTABLE
384	9.88	10.40	10.44	1.67	ACCEPTABLE
385	12.12	8.62	7.80	1.70	ACCEPTABLE
386	8.49	16.21	16.22	1.60	ACCEPTABLE
387	11.52	12.65	11.77	1.69	ACCEPTABLE
388	9.24	13.02	13.03	1.57	ACCEPTABLE
389	9.40	15.07	14.54	1.65	ACCEPTABLE
390	10.49	11.01	10.42	1.64	ACCEPTABLE
391	4.55	22.37	22.87	1.71	ACCEPTABLE
392	9.09	15.60	15.09	1.66	ACCEPTABLE
393	7.11	17.92	18.06	1.63	ACCEPTABLE
394	12.58	9.73	9.32	1.68	ACCEPTABLE
395	9.92	13.03	13.05	1.61	ACCEPTABLE
396	11.60	11.38	10.82	1.64	ACCEPTABLE
397	10.83	11.46	11.56	1.60	ACCEPTABLE
398	10.30	11.29	10.70	1.65	ACCEPTABLE
399	7.29	14.94	15.07	1.68	ACCEPTABLE
400	8.89	13.36	12.89	1.70	ACCEPTABLE
401	8.50	13.06	13.09	1.62	ACCEPTABLE

No.	Center		Radius	FS	Verification
	x [m]	z [m]	R [m]		
402	11.43	8.75	8.85	1.60	ACCEPTABLE
403	12.68	7.79	7.46	1.71	ACCEPTABLE
404	10.68	9.71	9.80	1.61	ACCEPTABLE
405	12.07	8.69	8.21	1.66	ACCEPTABLE
406	11.18	8.94	9.13	1.63	ACCEPTABLE
407	9.73	11.17	11.18	1.63	ACCEPTABLE
408	11.30	9.82	9.24	1.64	ACCEPTABLE
409	8.73	15.10	15.11	1.58	ACCEPTABLE
410	10.67	12.94	12.35	1.63	ACCEPTABLE
411	9.24	13.02	13.03	1.57	ACCEPTABLE
412	9.26	14.51	14.16	1.62	ACCEPTABLE
413	10.06	11.69	11.30	1.62	ACCEPTABLE
414	6.55	18.31	18.55	1.64	ACCEPTABLE
415	9.18	14.62	14.28	1.62	ACCEPTABLE
416	7.86	16.13	16.21	1.60	ACCEPTABLE
417	11.57	10.72	10.37	1.62	ACCEPTABLE
418	9.73	13.00	13.00	1.56	ACCEPTABLE
419	9.91	14.24	13.85	1.62	ACCEPTABLE
420	10.47	11.77	11.38	1.60	ACCEPTABLE
421	7.34	17.94	18.07	1.62	ACCEPTABLE
422	9.74	14.53	14.15	1.62	ACCEPTABLE
423	8.54	15.84	15.87	1.59	ACCEPTABLE
424	11.95	10.76	10.47	1.64	ACCEPTABLE
425	10.15	13.04	13.06	1.60	ACCEPTABLE
426	11.28	11.91	11.54	1.62	ACCEPTABLE
427	10.79	11.92	11.99	1.60	ACCEPTABLE
428	10.44	11.82	11.43	1.60	ACCEPTABLE
429	8.47	14.28	14.32	1.59	ACCEPTABLE
430	9.59	13.15	12.79	1.61	ACCEPTABLE
431	9.26	13.01	13.01	1.57	ACCEPTABLE
432	11.22	9.96	10.03	1.58	ACCEPTABLE
433	12.12	9.18	8.94	1.64	ACCEPTABLE
434	10.64	10.79	10.84	1.58	ACCEPTABLE
435	11.63	9.95	9.63	1.62	ACCEPTABLE
436	11.08	10.07	10.19	1.60	ACCEPTABLE
437	10.00	11.81	11.82	1.59	ACCEPTABLE
438	11.08	10.81	10.44	1.60	ACCEPTABLE
439	9.42	14.31	14.31	1.57	ACCEPTABLE
440	10.66	12.97	12.58	1.62	ACCEPTABLE
441	9.73	13.00	13.00	1.56	ACCEPTABLE
442	9.81	13.87	13.62	1.60	ACCEPTABLE
443	10.22	12.19	11.92	1.59	ACCEPTABLE
444	8.26	16.01	16.07	1.59	ACCEPTABLE
445	9.75	13.98	13.73	1.60	ACCEPTABLE
446	8.95	14.84	14.85	1.58	ACCEPTABLE
447	11.26	11.46	11.23	1.60	ACCEPTABLE

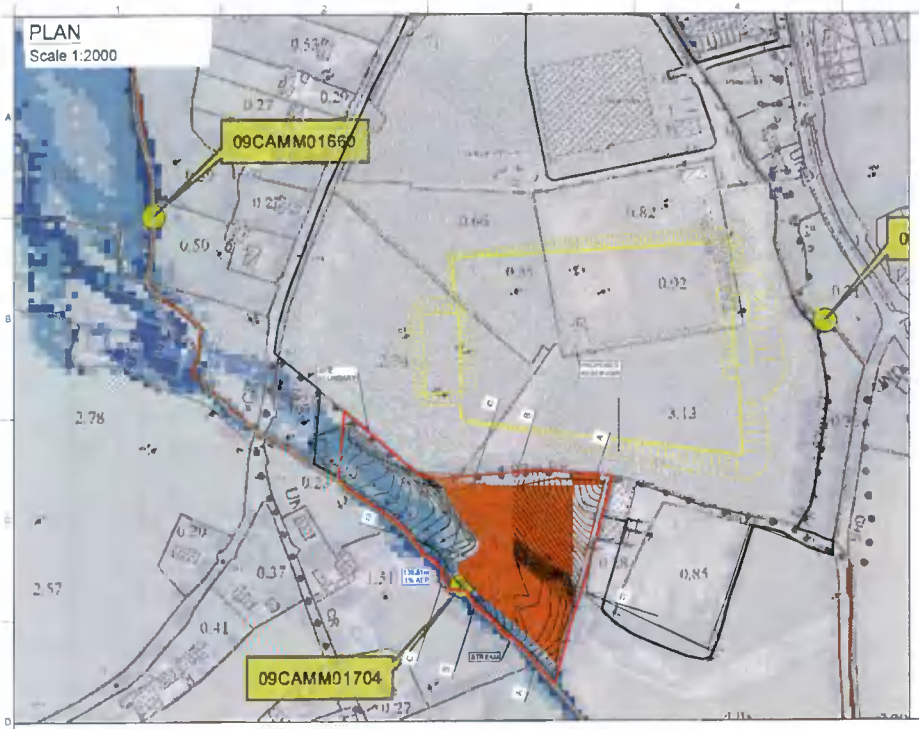
No.	Center		Radius	FS	Verification
	x [m]	z [m]	R [m]		
448	10.03	13.01	13.02	1.59	ACCEPTABLE
449	10.79	12.25	11.99	1.60	ACCEPTABLE
450	10.48	12.24	12.26	1.58	ACCEPTABLE
451	10.20	12.22	11.96	1.59	ACCEPTABLE
452	8.89	13.85	13.88	1.57	ACCEPTABLE
453	9.64	13.09	12.84	1.60	ACCEPTABLE
454	9.41	13.01	13.01	1.57	ACCEPTABLE
455	10.80	10.82	10.85	1.57	ACCEPTABLE
456	11.45	10.23	10.03	1.60	ACCEPTABLE
457	10.38	11.45	11.47	1.58	ACCEPTABLE
458	11.08	10.82	10.59	1.59	ACCEPTABLE
459	10.74	10.88	10.93	1.58	ACCEPTABLE
460	9.92	12.18	12.19	1.60	ACCEPTABLE
461	10.66	11.48	11.23	1.59	ACCEPTABLE
462	9.52	13.87	13.87	1.57	ACCEPTABLE
463	10.33	13.01	12.75	1.60	ACCEPTABLE
464	9.73	13.00	13.00	1.56	ACCEPTABLE
465	9.77	13.60	13.43	1.59	ACCEPTABLE
466	10.05	12.46	12.29	1.58	ACCEPTABLE
467	8.80	14.90	14.93	1.58	ACCEPTABLE
468	9.75	13.64	13.47	1.59	ACCEPTABLE
469	9.21	14.20	14.21	1.57	ACCEPTABLE
470	10.77	11.95	11.79	1.59	ACCEPTABLE
471	9.93	13.00	13.00	1.56	ACCEPTABLE
472	10.45	12.49	12.31	1.58	ACCEPTABLE
473	10.25	12.47	12.48	1.58	ACCEPTABLE
474	10.04	12.48	12.31	1.58	ACCEPTABLE
475	9.17	13.57	13.59	1.68	ACCEPTABLE
476	9.68	13.06	12.89	1.58	ACCEPTABLE
477	9.52	13.01	13.01	1.56	ACCEPTABLE
478	10.49	11.47	11.48	1.56	ACCEPTABLE
479	10.61	11.90	11.73	1.58	ACCEPTABLE
480	10.77	11.02	10.86	1.58	ACCEPTABLE
481	9.74	13.00	13.00	1.56	ACCEPTABLE
482	10.56	11.97	11.81	1.58	ACCEPTABLE
483	10.08	12.44	12.44	1.56	ACCEPTABLE
484	11.40	10.61	10.51	1.60	ACCEPTABLE
485	10.64	11.53	11.56	1.58	ACCEPTABLE
486	11.12	11.07	10.93	1.59	ACCEPTABLE
487	10.91	11.08	11.14	1.58	ACCEPTABLE
488	10.78	11.00	10.84	1.58	ACCEPTABLE
489	9.99	11.93	11.93	1.56	ACCEPTABLE
490	10.06	12.45	12.28	1.58	ACCEPTABLE
491	10.30	11.43	11.26	1.58	ACCEPTABLE
492	9.15	13.60	13.61	1.57	ACCEPTABLE
493	10.04	12.48	12.31	1.58	ACCEPTABLE

No.	Center		Radius	FS	Verification
	x [m]	z [m]	R [m]		
494	9.53	13.00	13.00	1.56	ACCEPTABLE
495	10.97	11.01	10.86	1.58	ACCEPTABLE
496	10.18	11.95	11.95	1.56	ACCEPTABLE
497	10.67	11.48	11.32	1.58	ACCEPTABLE
498	10.47	11.48	11.50	1.57	ACCEPTABLE
499	10.28	11.45	11.28	1.58	ACCEPTABLE
500	9.47	12.41	12.42	1.64	ACCEPTABLE
501	9.96	11.95	11.78	1.58	ACCEPTABLE
502	9.78	11.93	11.93	1.56	ACCEPTABLE
503	10.67	10.57	10.60	1.57	ACCEPTABLE
504	11.11	10.19	10.05	1.59	ACCEPTABLE
505	10.39	10.98	11.00	1.58	ACCEPTABLE
506	10.86	10.58	10.42	1.58	ACCEPTABLE
507	10.64	10.60	10.64	1.58	ACCEPTABLE
508	10.10	11.44	11.44	1.56	ACCEPTABLE
509	10.58	11.00	10.83	1.58	ACCEPTABLE
510	9.87	12.45	12.45	1.56	ACCEPTABLE
511	10.37	11.95	11.78	1.58	ACCEPTABLE
512	9.99	11.93	11.93	1.56	ACCEPTABLE
513	10.03	12.29	12.17	1.57	ACCEPTABLE
514	10.19	11.60	11.48	1.57	ACCEPTABLE
515	9.45	13.00	13.01	1.64	ACCEPTABLE
516	10.02	12.29	12.18	1.57	ACCEPTABLE
517	9.68	12.63	12.63	1.56	ACCEPTABLE
518	10.65	11.31	11.20	1.57	ACCEPTABLE
519	10.12	11.94	11.94	1.56	ACCEPTABLE
520	10.17	12.28	12.17	1.57	ACCEPTABLE
521	10.32	11.62	11.50	1.57	ACCEPTABLE
522	9.59	13.01	13.01	1.56	ACCEPTABLE
523	10.16	12.30	12.18	1.57	ACCEPTABLE
524	9.82	12.63	12.63	1.56	ACCEPTABLE
525	10.77	11.32	11.22	1.58	ACCEPTABLE
526	10.24	11.96	11.96	1.56	ACCEPTABLE
527	10.57	11.64	11.53	1.57	ACCEPTABLE
528	10.44	11.64	11.65	1.56	ACCEPTABLE
529	10.32	11.62	11.51	1.57	ACCEPTABLE
530	9.77	12.27	12.27	1.56	ACCEPTABLE
531	10.10	11.95	11.84	1.57	ACCEPTABLE
532	9.98	11.94	11.94	1.56	ACCEPTABLE
533	10.58	11.01	11.03	1.57	ACCEPTABLE
534	10.88	10.74	10.65	1.58	ACCEPTABLE
535	10.38	11.31	11.32	1.57	ACCEPTABLE
536	10.70	11.02	10.92	1.57	ACCEPTABLE
537	10.56	11.03	11.06	1.58	ACCEPTABLE
538	10.19	11.62	11.62	1.56	ACCEPTABLE
539	10.51	11.31	11.20	1.57	ACCEPTABLE

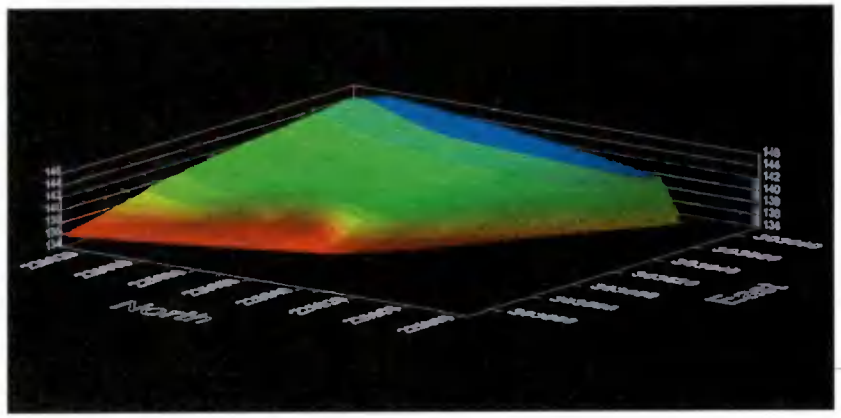
No.	Center		Radius	FS	Verification
	x [m]	z [m]	R [m]		
540	10.04	12.29	12.29	1.56	ACCEPTABLE
541	10.37	11.95	11.84	1.57	ACCEPTABLE
542	10.12	11.94	11.94	1.56	ACCEPTABLE
543	10.15	12.17	12.09	1.57	ACCEPTABLE
544	10.25	11.72	11.65	1.57	ACCEPTABLE
545	9.77	12.64	12.64	1.56	ACCEPTABLE
546	10.15	12.18	12.10	1.57	ACCEPTABLE
547	9.92	12.40	12.40	1.56	ACCEPTABLE
548	10.56	11.52	11.45	1.57	ACCEPTABLE
549	10.20	11.95	11.95	1.56	ACCEPTABLE
550	10.42	11.74	11.66	1.57	ACCEPTABLE
551	10.33	11.74	11.74	1.56	ACCEPTABLE
552	10.25	11.73	11.65	1.57	ACCEPTABLE
553	9.89	12.16	12.16	1.56	ACCEPTABLE
554	10.11	11.95	11.87	1.57	ACCEPTABLE
555	10.03	11.94	11.94	1.56	ACCEPTABLE
556	10.43	11.31	11.32	1.56	ACCEPTABLE
557	10.64	11.12	11.05	1.57	ACCEPTABLE
558	10.30	11.51	11.52	1.57	ACCEPTABLE
559	10.51	11.31	11.24	1.57	ACCEPTABLE
560	10.42	11.32	11.33	1.56	ACCEPTABLE
561	10.17	11.72	11.73	1.58	ACCEPTABLE
562	10.38	11.52	11.44	1.57	ACCEPTABLE
563	10.06	12.17	12.17	1.56	ACCEPTABLE
564	10.29	11.95	11.87	1.57	ACCEPTABLE
565	10.12	11.94	11.94	1.56	ACCEPTABLE
566	10.14	12.10	12.04	1.57	ACCEPTABLE
567	10.21	11.80	11.75	1.56	ACCEPTABLE
568	9.89	12.40	12.40	1.56	ACCEPTABLE
569	10.14	12.10	12.05	1.57	ACCEPTABLE
570	9.99	12.24	12.24	1.56	ACCEPTABLE
571	10.41	11.66	11.61	1.57	ACCEPTABLE
572	10.17	11.95	11.95	1.56	ACCEPTABLE
573	10.32	11.80	11.76	1.56	ACCEPTABLE
574	10.26	11.80	11.81	1.57	ACCEPTABLE
575	10.21	11.80	11.75	1.56	ACCEPTABLE
576	9.96	12.09	12.09	1.56	ACCEPTABLE
577	10.11	11.94	11.89	1.56	ACCEPTABLE
578	10.06	11.94	11.94	1.56	ACCEPTABLE
579	10.08	12.10	12.05	1.56	ACCEPTABLE
580	10.15	11.79	11.74	1.56	ACCEPTABLE
581	9.83	12.40	12.40	1.56	ACCEPTABLE
582	10.08	12.10	12.05	1.56	ACCEPTABLE
583	9.93	12.24	12.24	1.56	ACCEPTABLE
584	10.36	11.66	11.61	1.57	ACCEPTABLE
585	10.12	11.94	11.94	1.56	ACCEPTABLE

No.	Center		Radius	FS	Verification
	x [m]	z [m]	R [m]		
586	10.26	11.80	11.75	1.56	ACCEPTABLE
587	10.21	11.80	11.80	1.56	ACCEPTABLE
588	10.15	11.80	11.75	1.56	ACCEPTABLE
589	9.91	12.09	12.09	1.56	ACCEPTABLE
590	10.05	11.95	11.89	1.57	ACCEPTABLE
591	10.00	11.94	11.94	1.56	ACCEPTABLE
592	10.28	11.51	11.51	1.56	ACCEPTABLE
593	10.42	11.38	11.33	1.57	ACCEPTABLE
594	10.19	11.65	11.65	1.56	ACCEPTABLE
595	10.33	11.51	11.47	1.56	ACCEPTABLE
596	10.27	11.51	11.52	1.57	ACCEPTABLE
597	10.09	11.79	11.79	1.56	ACCEPTABLE
598	10.24	11.65	11.60	1.56	ACCEPTABLE
599	10.02	12.09	12.09	1.56	ACCEPTABLE
600	10.17	11.95	11.90	1.56	ACCEPTABLE
601	10.06	11.94	11.94	1.56	ACCEPTABLE
602	10.07	12.05	12.01	1.56	ACCEPTABLE
603	10.12	11.84	11.81	1.56	ACCEPTABLE
604	9.91	12.24	12.24	1.56	ACCEPTABLE
605	10.07	12.04	12.01	1.56	ACCEPTABLE
606	9.97	12.14	12.14	1.56	ACCEPTABLE
607	10.26	11.75	11.72	1.56	ACCEPTABLE
608	10.10	11.94	11.94	1.56	ACCEPTABLE
609	10.20	11.85	11.82	1.56	ACCEPTABLE
610	10.16	11.85	11.85	1.56	ACCEPTABLE
611	10.12	11.85	11.81	1.56	ACCEPTABLE
612	9.96	12.04	12.04	1.56	ACCEPTABLE
613	10.05	11.94	11.91	1.56	ACCEPTABLE
614	10.02	11.94	11.94	1.56	ACCEPTABLE
615	10.21	11.65	11.65	1.56	ACCEPTABLE
616	10.30	11.56	11.53	1.56	ACCEPTABLE
617	10.14	11.74	11.75	1.58	ACCEPTABLE
618	10.24	11.65	11.62	1.56	ACCEPTABLE
619	10.20	11.65	11.65	1.56	ACCEPTABLE
620	10.08	11.84	11.84	1.56	ACCEPTABLE
621	10.18	11.75	11.72	1.56	ACCEPTABLE
622	10.04	12.04	12.04	1.56	ACCEPTABLE
623	10.13	11.95	11.91	1.56	ACCEPTABLE
624	10.06	11.94	11.94	1.56	ACCEPTABLE
625	10.07	12.01	11.99	1.56	ACCEPTABLE
626	10.10	11.88	11.85	1.56	ACCEPTABLE
627	9.96	12.14	12.14	1.56	ACCEPTABLE
628	10.07	12.01	11.99	1.56	ACCEPTABLE
629	10.00	12.07	12.07	1.56	ACCEPTABLE
630	10.19	11.81	11.79	1.56	ACCEPTABLE
631	10.09	11.94	11.94	1.56	ACCEPTABLE

PLAN
Scale 1:2000

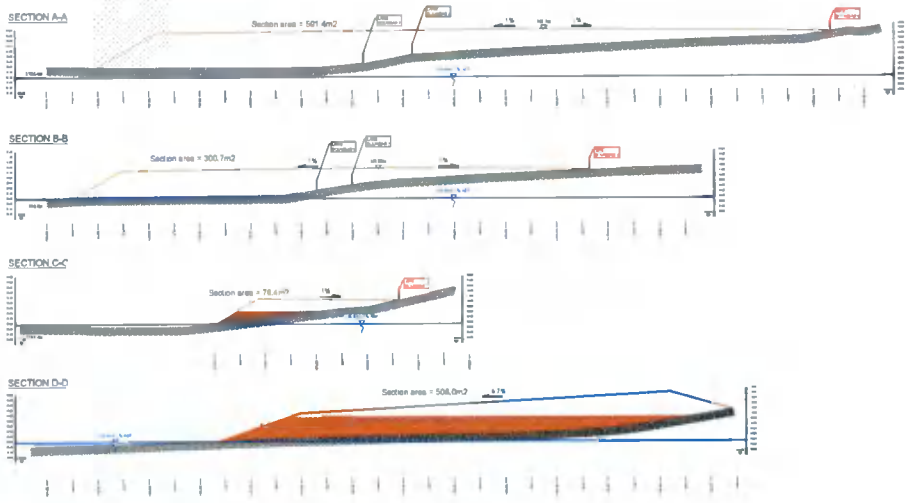


CUT / FILL MODEL



APPROX. FILL VOLUME: 38,370.84 m3
FILL SURFACE AREA: 11,747.00 m2

SECTIONS
Scale 1:500



CUT / FILL VOLUMES

SURFACE TO SURFACE VOLUME REPORT

Trimble
5475 Kellenburger Road
Dayton, Ohio 45424-1099, USA
1-937-233-8921

Project: C:\Users\Dell\Desktop\Liam Hinch Field\liam hinch field 3.prp
Report Generated: 30 marca 2021 19:52:55

Where the second surface is above the first the volume is reported as fill.
Where the second surface is below the first the volume is reported as excavation.

Shrinkage/swell factors: Excavation 1.0000 Fill 1.0000

First Surface Layer Name	Number of Points	Second Surface Layer Name	Number of Points
GL	74	1_FILL	71

Excavation Volume (Cu. m.)	Fill Volume (Cu. m.)
0.93	38,371.76

Net Difference: 38,370.84 Cu. m. Borrow

NOTES
1 ALL DIMENSIONS ARE IN METRES (m) UNLESS NOTED OTHERWISE
2 ALL LEVELS & ARE IN METRES AND RELATE TO THE ORDNANCE SURVEY DATUM MALIN HEAD (m) UNLESS NOTED OTHERWISE
3 ENSURE THIS DRAWING IS THE RELEVANT REVISION AND READ IN CONJUNCTION WITH ALL RELEVANT DOCUMENTS
4 TO BE VIEWED ON A1 PAPER SIZE

KEY / SYMBOLS
- SITE BOUNDARY / FENCE
- L. HINCH FILED BOUNDARY
- INFILL BOUNDARY
- FILL AREA

REV	DESCRIPTION	DATE	BY	CHECK
04	FLOOD RISK INCLUDED	29/03/21	PW	AC
03	SITE BOUNDARIES ADDED	02/03/21	PW	AC
02	REVISED LEVELS	17/02/21	PW	AC
01	FOR INFORMATION	12/02/21	PW	AC

APPROVED BY: AC	SIGNED	DATE	29/03/21
CHECKED BY: PS	SIGNED	DATE	29/03/21
DRAWN BY: PW	SIGNED	DATE	29/03/21

CLIENT
UISCE EIREANN WATER
IRISH WATER
COLVIL HOUSE,
24-26 TALBOT STREET,
MOUNTJOY,
DUBLIN 1 D01 NP86

CLIENT'S REPRESENTATIVE
rps

CONTRACTOR
coffey
Athenry
Co. Galway

PROJECT
SAGGART RESERVOIR
DESIGN AND BUILT CONTRACT

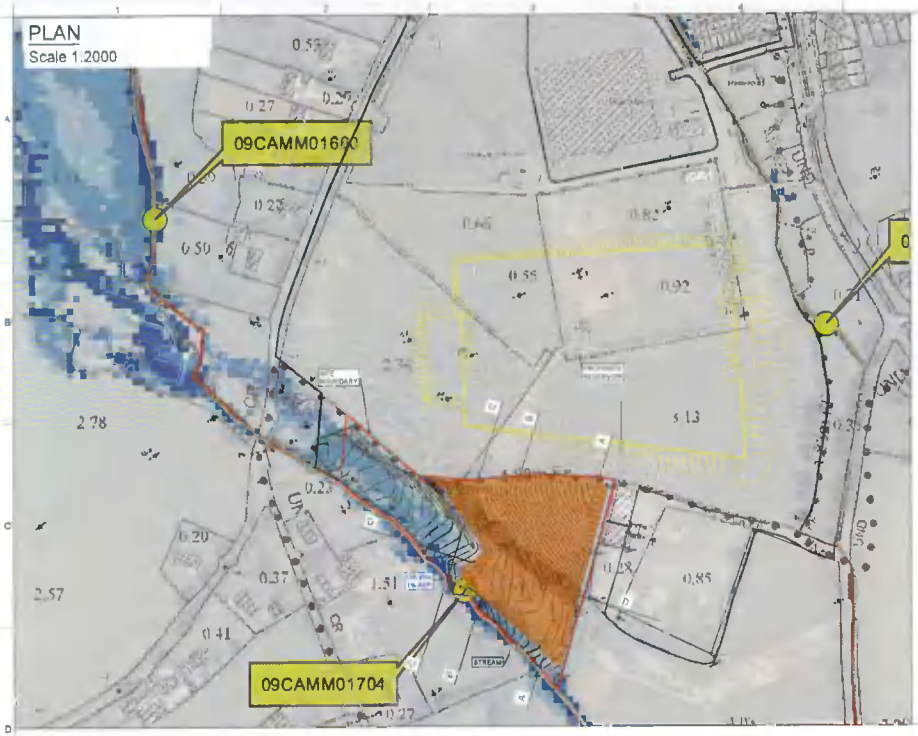
PROJECT NO
J1387

TITLE
LIAM HINCH FIELD
SECTIONS

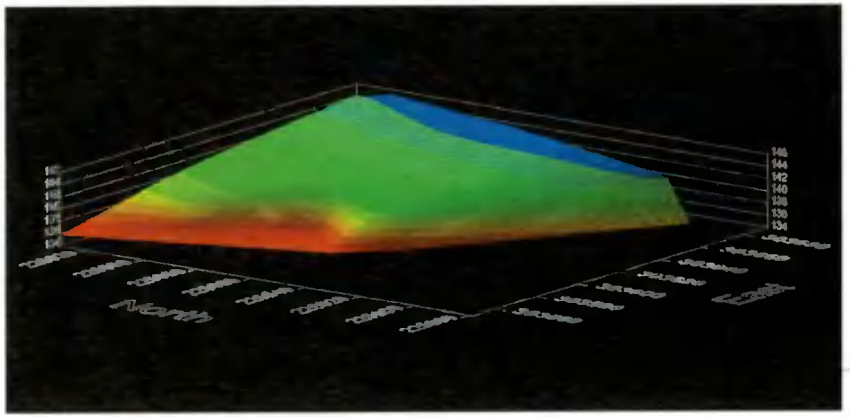
STATUS
FOR INFORMATION

DRAWING NO. J1387-LH-001
REVISION 05

PLAN
Scale 1:2000

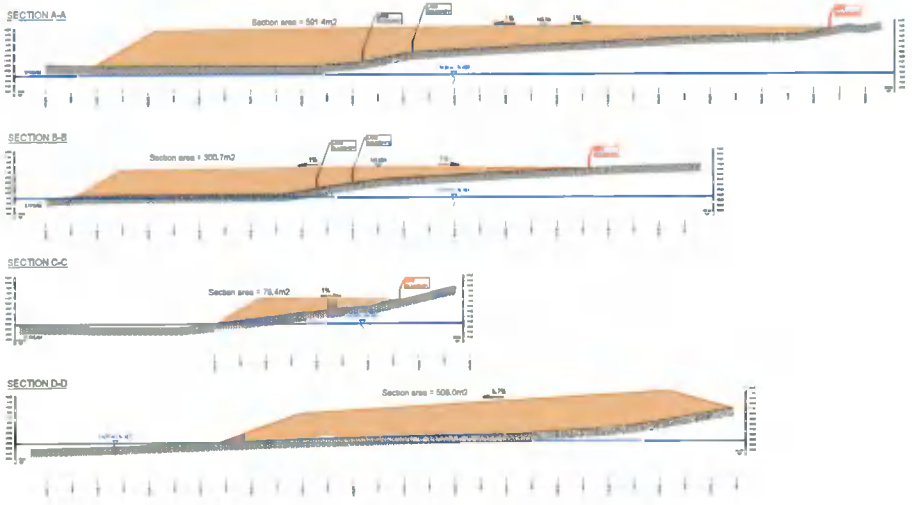


CUT / FILL MODEL



APPROX. FILL VOLUME: 38,370.84 m3
FILL SURFACE AREA: 11,747.00 m2

SECTIONS
Scale 1:500



CUT / FILL VOLUMES

SURFACE TO SURFACE VOLUME REPORT

Trimble
5475 Kellenburger Road
Dayton, Ohio 45424-1099, USA
1-937-233-8921

Project: C:\Users\Dell\Desktop\Liam Hinch Field\liam hinch field 3.pro
Report Generated: 30 marca 2021 19:52:55

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2. ALL LEVELS ARE IN METRES AND RELATE TO THE ORDNANCE SURVEY DATUM MALIN HEAD (m) UNLESS NOTED OTHERWISE.
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KEY / SYMBOLS
- SITE BOUNDARY / FENCE
- L. HINCH FILED BOUNDARY
- INFILL BOUNDARY
- FILL AREA

REV	DESCRIPTION	DATE	BY	CHECK
04	FLOOD RISK INCLUDED	29/03/21	PW	AC
03	SITE BOUNDARIES ADDED	29/03/21	PW	AC
02	REVISED LEVELS	29/03/21	PW	AC
01	FOR INFORMATION	29/03/21	PW	AC

APPROVED BY	AC	SIGNED	DATE 29/03/21
CHECKED BY	PB	SIGNED	DATE 29/03/21
DRAWN BY	PW	SIGNED	DATE 29/03/21

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CLIENT
IRISH WATER
COLVIL HOUSE,
24-26 TALBOT STREET
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DESIGN AND BUILT CONTRACT

PROJECT NO.
J1387

TITLE
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SECTIONS

STATUS
FOR INFORMATION

DRAWING NO.
J1387-LH-001

REVISION
05