Tionscadal Soláthair Uisce
Water Supply Project

Environmental Impact Assessment Report (EIAR)

Volume 6 of 6: Appendices

(Appendix 10.8) BPT Ground Investigations

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Uisce Éireann
Irish Water

Jacobs

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WSP LOT 2, BREAK PRESSURE TANK

GROUND INVESTIGATION CONTRACT FACTUAL REPORT

FINAL

Irish Water,
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Dublin 1.

Mott MacDonald Ireland,
Consulting Engineers,
Rockfield,
Dundrum,
Dublin 16.

	Prepared by	Approved by	Rev. Issue Date:	Revision No.
	Ronan Killeen	Declan Joyce	5th April 2023	21 _OY _102/23
Signature	RK	DJ		

FOREWORD

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

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

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

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5.1 Introduction.

The Water Supply Project (WSP) – Eastern and Midlands Region is a scheme to provide water from the River Shannon and pipe it east to the Dublin Region.

The proposed scheme extends from Parteen Basin in North Tipperary to Peamount Reservoir in West Dublin with a proposal to transport water approximately 170km.

The proposed civil works will include the construction of some or all of the following:

- Raw Water Abstraction Point.
- Raw Water Intake and Pumping Station.
- Raw Water Rising Main.
- Water Treatment Plant connected to the Raw Water Rising Main.
- A pressurised pipeline extending from the WTP to a new Break Pressure Tank (BPT).
- A gravity fed pipeline from the BPT to a Terminal Point Reservoir (TPR).

The geotechnical investigation works for the overall project has been divided into three lots as follows:

Lot 1 (Contract 1):

- Raw Water Intake
- Raw Water Rising Main
- Water Treatment Plant
- Pipeline Ch.0 to Ch36,000 (36km)

Lot 2 (Contract 2):

- Break Pressure Tank
- Booster Pumping Station
- Pipeline Ch.36,000 to Ch. 103,000 (67km)

Lot 3 (Contract 3):

- Termination Point Reservoir
- Pipeline Ch. 103,000 to 170,000 (67km)

Irish Drilling Ltd. (IDL) has been awarded Lot 2 (Contract 2) and as part of this contract IDL has been instructed by Mott Macdonald Ireland, Consulting Engineers, on behalf of Irish Water to carry out a site investigation at the location of the proposed Break Pressure Tank Site.

This site investigation was carried out to provide detailed factual geotechnical information of the underlying ground conditions at the site.

The factual report issued here for the Break Pressure Tank Site will be collated with all other factual reports generated for the WSP Project (Lots 1 to 3) to provide the client with a factual report for the overall WSP Eastern and Midlands Region Project.

The fieldwork commenced on May 11th 2022 and was completed on October 27th 2022.

5.2 Site & Geology

5.2.1 Site

The site is located north of Cloughjordan, County Tipperary and adjacent to the Knockanacree Woodlands. Access to the site is directly off the R490 National Secondary Road (Old Birr Road).

The fieldwork was carried out predominantly on agricultural lands. Weather conditions in general were quite variable with the majority of the fieldwork carried out over a typical summer period in Ireland.

A Site Plan, prepared by the client's representatives and amended by IDL to show 'As-Built' fieldwork locations, is included with this report.

5.2.2 Superficial Geology

The following were the main published information sources used:
Geological Map of Ireland: 1:100,000 scale map series.

Overview of Subsoil Geology
Glacial Till:
Glacial Till is what was often referred to as 'Boulder Clay'. It is a diverse material that is largely deposited sub-glacially and has a wide range of characteristics due to the variety of parent materials and different processes of deposition. Tills are tightly packed, unsorted, heterogeneous, unbedded, and can have a wide range of particle sizes and types, which are often but not exclusively angular or sub-angular. The type of parent material plays a critical role in providing the particles that create different subsoil permeability with e.g. sandstones giving rise to a high proportion of sand sized grains in the till matrix.

The Quaternary sediments at this location are Till derived from limestone (Map Reference GSI: 1:50,000).

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

The Glacial Tills in general consisted of slightly gravelly sandy silt/clay with limestone cobbles and boulders and/or silty sand and/or limestone gravel with limestone cobbles and boulders.

5.2.3 Solid Geology

The Geological Map of Ireland: (GSI 1:100,000 scale map series) indicate that the site is underlain by massive unbedded grey sparry fine grained limestone rock of the Dinantian Waulsortian Limestone Formation which is locally weakly dolomitised.

Intact bedrock was encountered in the rotary core boreholes at depths varying from 0.30m to 38.80m below ground level.

Bedrock is predominantly described as very strong, grey, fine grained Limestone.

Weathered bedrock was also encountered in a number of boreholes at shallower depths.

Furthermore bedrock was not encountered in a number of the rotary core boreholes before borehole termination and for detailed descriptions of the overburden and bedrock encountered please refer to the borehole engineering logs included as Appendix 5A.

5.3 Fieldwork.

The fieldwork was carried out in accordance with IS EN 1997-2 and BS5930:2015+A1:2020 Code of Practice for Site Investigations with precedence given to IS EN 1997-2 where applicable.

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

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

The soil and rock descriptions as noted on the borehole and trial pit logs are in general visual descriptions as observed and logged by our Engineers and are described in accordance with IS EN 1997-2 and BS5930:2015+A1:2020 Code of Practice for Site Investigations.

Soils descriptions (cohesive or otherwise) are also initially assessed based on the texture and 'feel' of the soil materials as witnessed by our Geotechnical Engineers and in accordance with IS EN 1997-2 and BS5930:2015+A1:2020.

5.3.1 Fieldwork Plant:

The following plant was mobilised to site by IDL to carry out fieldwork operations:
1nr. Zaxis LCV 12T Tracked Excavator.
1nr. Dando 2000 Cable Percussive Boring Rig.
1nr. DeltaBase 520 Rotary Core Drilling Rig.
1nr. Commachio 605 Rotary Core Drilling Rig.
1nr. Yanmarr All-Terrain Support Vehicle.
1nr. GeoboreS Drill String.
1nr. HQ Rotary Core Drill String.
1nr. Permeability Test Equipment.
1nr. Honda Water Supply Pump.
1nr. Drilling Water Recirculation Tank Syatem.

The following plant was mobilised to site by In-Situ Site Investigations Ltd. to carry out fieldwork operations:
1nr. High Pressure Dilatometer (HPD) Test Equipment.

5.3.2 Fieldwork Operations:

A general summary of fieldwork operations carried out to date includes the following:

- Ecological Survey prior to mobilisation to site.
- Completion of 23nr GeoboreS Boreholes.
- Completion of 8nr Cable Percussive with Rotary Core 'follow-on' Boreholes.
- Excavation of 41nr Trial Pits.
- Completion of Standard Penetration Tests in overburden at borehole locations.
- Completion of 5nr Variable Head Permeability Tests at three borehole locations.
- Completion of 4nr Soil Infiltration Test to BRE 365.
- Completion of 7nr Pressuremeter Tests at three borehole locations.
- Completion of 1nr Packer Permeability Test.
- Completion of 4nr Plate Bearing Tests.
- Installation of 10nr 50mm diameter standpipes at ten borehole locations.

5.3.3 Ecological Survey:

Prior to mobilisation of plant and personnel to site an ecological survey was commissioned by IDL. The survey was carried out by Moore Group, Environmental Consultants, and their scope included a study/review of any ecological and/or environmental issues on site that may have been influenced by fieldwork operations.

A record of their observations was presented as a 'stand-alone' report and presented to the client's consultants prior to mobilisation to site.

5.3.4 Archaeological Survey:

Prior to mobilisation of plant and personnel to site an archaeological desktop study was commissioned by IDL. The study was carried out by Through Time Ltd and a summary of their study concluded that the site was not deemed an area of archaeological interest and as such the completion of fieldwork operations did not require the presence of an Archaeologist.

5.3.5 Cable Percussive with Rotary Core 'Follow-On' Boreholes:

Eight cable percussion (Shell & Auger) with rotary core 'follow-on' boreholes were completed using a Dando 2000 Cable Percussive Boring Rig and an DB520 Rotary Core Drill Rig.

The eight boreholes are identified as follows:
BPT-BH001
BPT-BH002
BPT-BH005
BPT-BH009
BPT-BH011
BPT-BH012
BPT-BH013
BPT-BH014

The borehole depths ranged from 10.00m to 20.00m below ground level. The boreholes were carried out to establish overburden conditions and rockhead and to establish the nature and integrity of the underlying rock.

The cable percussive element of the boreholes were bored to 'refusal' or to depths as instructed by the client's representatives while the rotary core boreholes were carried out as 'follow-on' rotary core boreholes at locations where the cable percussive boreholes encountered relatively 'shallow' refusals.

In–Situ testing consisting of Standard Penetration Tests were carried out at regular intervals (predominantly 1.0m intervals) or as instructed by the client's representatives.

Disturbed bulk and tub soil samples were taken at each change in strata and were returned to the laboratory and logged by a Geotechnical Engineer and presented for testing. Groundwater samples were taken where possible and returned to the laboratory for storage and analysis.

The rotary core drilling was carried out using GBS size (102mm core diameter, 146mm hole diameter) drill strings with wireline drilling techniques were used to recover the core samples.

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

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

A 50mm diameter standpipe was installed in the following boreholes and as instructed by the Client's Engineer, to allow for monitoring of groundwater levels over a prolonged period of time: BPT-BH011, BPT-BH012 and BPT-BH014.

Groundwater readings recorded during the completion of fieldwork activities are included with this report as Appendix 5J.

Variable Head Permeability Tests were carried out at borehole location BPT-BH011 and the records of same are included as Appendix 5E, Part 2.

Detailed engineering logs for the cable percussive with rotary core 'follow-on' boreholes completed are included with this report in Appendix 5A.

5.3.6 Soils/Rock Rotary Core Boreholes (GeoboreS):
Twenty-three rotary core boreholes using GeoboreS drilling techniques were carried out to establish overburden conditions and rockhead and to establish the nature and integrity of the underlying rock.

The twenty-three boreholes completed using GeoboreS drilling techniques are identified as follows:

BPT-BH003	BPT-BH015	BPT-BH022	BPT-BH028
BPT-BH004	BPT-BH016	BPT-BH023	BPT-BH029
BPT-BH006	BPT-BH018	BPT-BH024	BPT-BH030
BPT-BH007	BPT-BH019	BPT-BH025	BPT-BH031
BPT-BH008	BPT-BH020	BPT-BH026	BPT-BH032
BPT-BH010	BPT-BH021	BPT-BH027	

Borehole BPT-BH017 was cancelled on client instruction.

The borehole depths ranged from 13.00m to 43.00m below ground level.

The rotary core boreholes were carried out as ‘stand-alone’ rotary core boreholes using wireline drilling techniques to recover soil and rock core samples.

GeoboreS drill strings ((101mm core diameter, 146mm hole diameter) were used to recover soil core samples in the overburden.

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

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

In-Situ testing consisting of Standard Penetration Tests were carried out in the overburden at regular intervals.

A 50mm diameter standpipe was installed in the following boreholes and as instructed by the Client’s Engineer, to allow for monitoring of groundwater levels over a prolonged period of time: BPT-BH003, BPT-BH004, BPT-BH006, BPT-BH007, BPT-BH008, BPT-BH031 and BPT-BH032.

Groundwater readings recorded during the completion of fieldwork activities are included with this report as Appendix 5J.

Variable Head Permeability Tests was carried out at the following borehole standpipe locations: BPT-BH004, BPT-BH007 and BPT-BH008.
The records of these tests are included as Appendix 5E, Part 2.

A packer permeability test was carried out at borehole BPT-BH007 and the records of same are included as Appendix 5e, Part 4.

Pressuremeter testing was carried out by In-Situ Site Investigations Limited at the following borehole locations: BPT-BH003, BPT-BH007 and BPT-BH010.

The testing consisted of seven High-Pressure Dilatometer (HPD) tests carried out during the drilling of these boreholes and the records of same are included with this factual report in Appendix 5F as a ‘stand-alone’ report.

Detailed engineering logs for the soils/rock rotary core boreholes (GeoboreS) completed are included with this report in Appendix 5A.

5.3.7 Trial Pits:
Forty-one trial pits were excavated on site using a 12T tracked excavator.

The forty-one trial pits completed are identified as follows:

BPT-TP001	BPT-TP007	BPT-TP013	BPT-TP019	BPT-TP025
BPT-TP002	BPT-TP008	BPT-TP014	BPT-TP020	BPT-TP026(INF003)
BPT-TP003	BPT-TP009	BPT-TP015	BPT-TP021	BPT-TP027(INF004)
BPT-TP004	BPT-TP010	BPT-TP016	BPT-TP022	BPT-TP028
BPT-TP005	BPT-TP011	BPT-TP017	BPT-TP023	BPT-TP029
BPT-TP006	BPT-TP012	BPT-TP018	BPT-TP024	BPT-TP030

BPT-TP031
BPT-TP032
BPT-TP033
BPT-TP034
BPT-TP035
BPT-TP036
BPT-TP037
BPT-TP038
BPT-TP039
BPT-INF001
BPT-INF002

The pits were logged and photographed by an Engineer with observations made on ground conditions, pit stability, water ingress and services encountered. The pits were excavated to depths ranging from 0.10m to 3.00m below ground level.

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

In-Situ tests consisting of plate bearing tests were carried out at four trial pit locations (BPT-TP004, BPT-TP015, BPT-TP036 and BPT-TP039) and the records of same are included as Appendix 5E, Part 3.

A soil infiltration test was carried out at four locations:
BPT-INF001
BPT-INF002
BPT-INF003
BPT-INF004.

BPT-INF003 was carried out at trial pit location BPT-TP026 and BPT-INF004 was completed at trial pit location BPT-TP027. The soil infiltration tests were carried out in accordance with BRE 365 and the records of same are included as Appendix 5E, Part 1.

Detailed engineering logs for the trial pits completed are included with this report in Appendix 5C.

5.3.8 Geophysical Survey:
Geophysical surveying at the Break Pressure Tank site was carried out by Minerex Geophysics Limited.

The survey consisted of Microgravity, Seismic Refraction and 2-D Resistivity and the records of same were presented as a ‘stand-alone’ report and included here with this report as Appendix 5G.

5.4 Laboratory Testing

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

The test schedules were prepared by the Client's Engineer and included the following tests on tubs and bulk disturbed soil samples and soil core samples:

Test Type:	Number of Tests
Moisture Content	80
Atterberg Limits	72
Particle Size Distribution	60
Hydrometer	55
BRE, Suite B	18
Moisture Conditions Value	01
CBR	06
Chemical (pH, Sulphate)	18
Compaction (Light/Heavy)	03
Small Direct Shearbox	04
Triaxial UU Multi Specimen	02
Triaxial QU	02
Triaxial Unconsolidated Undrained	01
Consolidation	01

The test schedules also included the following tests rock core samples:

Test Type:	Number of Tests
UCS Tests	22
UCS/Young's Modulus/Poisson's Ratio	01
Point Load	185
Mohr Hardness	09
Water Absorption & Particle Density	02
Magnessium Sulphate Soundness	00
LA Abrasion	14
Slake Durability	05
Flakiness Index	02
Petrographic Analysis	02
Chemical Analysis	01
Brazilian Tensile Rock Test	01
Direct Shear Strength of Rock Discontinuity	03

The test schedules were carried out predominantly at the IDL Laboratory located at Loughrea, County Galway. IDL is currently undergoing the process of achieving ISO:9001 accreditation.

A number of specialist tests not available at the IDL laboratory were carried out by designated laboratories on a subcontract basis as follows:

ALS Ltd., Hawarden, UK:

- Laboratory chemical tests (BRE, Suite B)
- Groundwater samples tests (Mott MacDonald Groundwater Suite)

ALS Ltd., Hawarden, UK is accredited to ISO/IEC 17025:2017 (UKAS).

NMTL, Carlow, County Carlow:

- Shear Strength
- Triaxial
- Consolidation (Oedometer) Tests

Structural Soils Ltd., Castleford, UK:

- Mohr Hardness
- UCS with Young's Modulus and Poisson's Ratio
- Magnessium Sulphate Soundness
- Brazilian Tensile Strength
- Direct Shear
- Petrographic Analysis

Structural Soils Ltd., Castleford, UK is accredited to ISO/IEC 17025:2017 (UKAS).

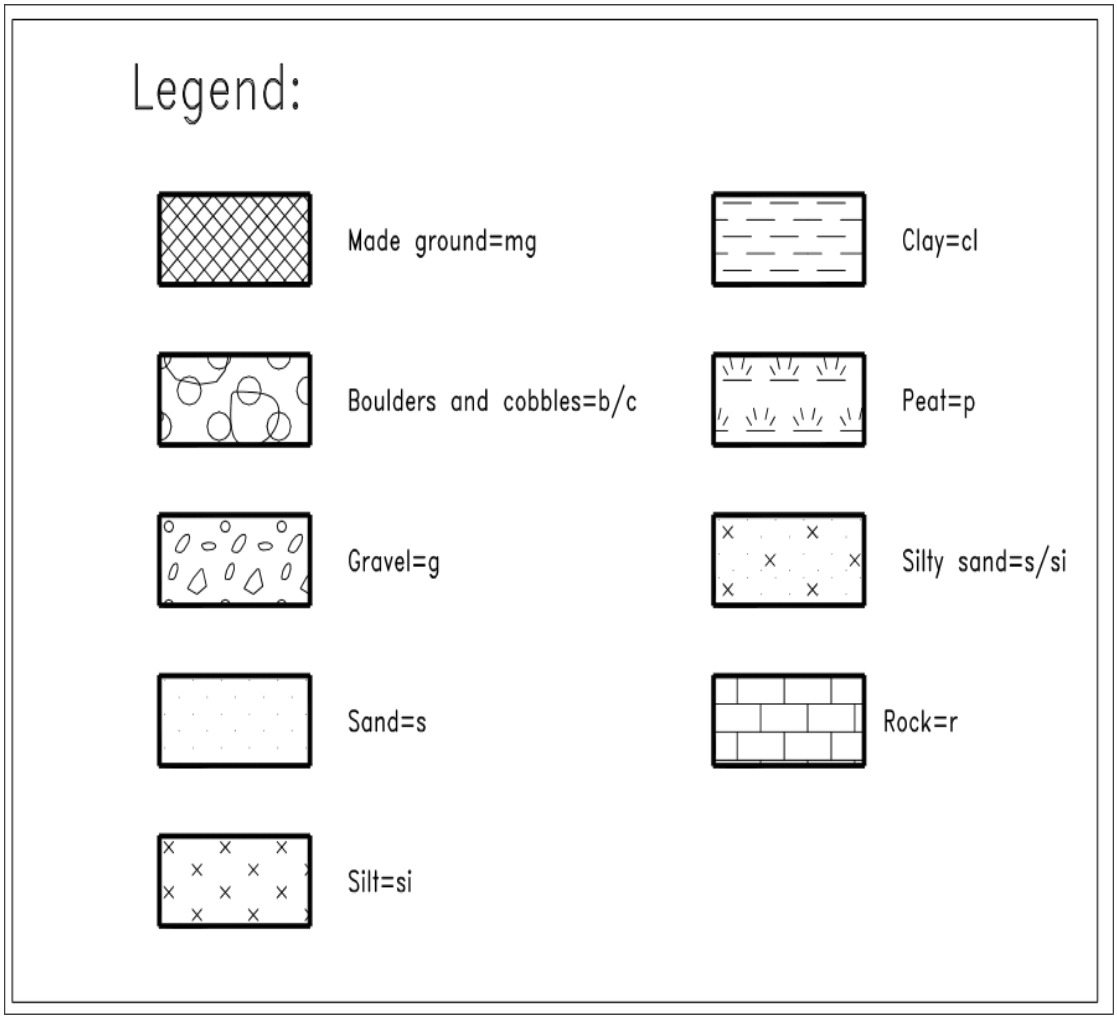
Where laboratory classification tests have been carried out on soil and/or rock samples, descriptions on logs have been amended accordingly to take into account the results of these classification tests.

Ronan Killeen

Ronan Killeen
Chartered Engineer
Irish Drilling Limited
March 31st 2023

Appendix 5A
Borehole Records

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



The following abbreviations are included on fieldwork logs:

NI: Non-Intact
NR: No Recovery

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BOREHOLE LOG

Project	Location	BOREHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH001**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	16-05-22 30-05-22	134.68	E 597,139.6 N 689,972.1

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Mott MacDonald	Water strikes: 1st: dry 2nd: 3rd: Rose to (@ 20 min.): Sealed at:	Sheet 1 of 3 Rev.

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
0.00-1.00	B1			134.63		0.05	TOPSOIL: Grass over firm brown SILT with rootlets.	
						(1.65)	Stiff dark reddish brown slightly sandy slightly gravelly SILT. Sand is fine to coarse. Gravel is subangular fine of assorted grey limestone.	
1.00	SPT	N = 22 (3, 4, 5, 5, 6, 6)						
1.00	D2							
1.00-1.70	B4			132.98		1.70		
							borehole continued by coring	

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
16-05-22	15.30	1.70	1.70			1.7	1.7	3600			BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Dando 2000/DB-Boart	Bit Design	Driller CR/DK	Logged By EAT

IDL AGS3 UK BH BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH001**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	16-05-22 30-05-22	134.68	E 597,139.6 N 689,972.1

Engineer	Sheet	Status
Mott MacDonald	2 of 3	FINAL / REVFINAL

RUN DETAILS / STRATA

Depth / Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Instrument/ Backfill
16.05 1.70	50 (19) 14	1.70 (50/0mm) 3	132.98		1.70	1.70 - 15.40 Discontinuities, medium spaced, locally very closely and closely spaced, dipping 12 to 14°, stepped, rough, with 0.5 to 4mm thick orangish brown clay smear.	Very strong locally strong massive grey 'marbled' light grey and white fine and coarse grained LIMESTONE. UCS - 2.10m to 2.24m: strong.	
2.00	100 (81) 62	7				2.80 - 3.15 Joint, subvertical dip, stepped, smooth, with 0.5 to 4mm thick orangish brown clay smear, open to moderately wide.	Point Load Test - 2.60m to 2.80m: strong.	
3.50		5					Point Load Test - 3.30m to 3.40m: very strong. Point Load Test - 3.50m to 3.90m: very strong.	
	100 (96) 61	8				4.25 - 4.80 Joint, subvertical dip, stepped, rough, with 0.5 to 2mm thick orangish brown clay smear, open.		
5.00								
	100 (90) 19	8				5.30 - 5.70 Joint, subvertical dip, stepped, rough, with 0.5 to 2mm thick orangish brown clay smear, open. 5.90 - 6.10 Joint, subvertical dip, undulating, tight. 6.20 - 6.60 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear, open. 6.65 - 6.75 Joint, dipping 60°, undulating, smooth, with 0.5 to 2mm thick brown clay smear, open.		
6.50		9						
	100 (74) 51	10				7.45 - 8.90 Joint, subvertical dip, tight to 7.60m, then stepped, rough, with 0.5 to 4mm thick orangish brown clay smear, open to moderately wide.		
8.00								
	100 (67) 53	9			(13.70)			
9.50		6						

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
16/05/22	15.30	1.70	1.70	203			

Rotary Flush

From (m)	To (m)	Type	Return (%)
1.7	8	Water	100
8	15.4	Water	0

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Dando 2000/DB-Boart		Driller: CR/DK	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH001**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	16-05-22 30-05-22	134.68	E 597,139.6 N 689,972.1

Engineer	Sheet	Status
Mott MacDonald	3 of 3	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
	100 (91) 61	6				10.00 - 10.30 Joint, subvertical dip, stepped, rough, with 0.5 to 2mm thick orangish brown clay smear, open.		Very strong locally strong massive grey 'marbled' light grey and white fine and coarse grained LIMESTONE. *(continued)*	
11.00									
	100 (87) 74	6							
12.50		5				12.50 - 12.60 Joint, dipping 60°, stepped, rough, with 0.5 to 2mm thick orangish brown clay smear, open.			
	100 (97) 94	2							
14.00									
	100 (78) 56	2							
15.40		NI	119.28		15.40	14.80 - 15.40 Joint, subvertical dip, stepped, rough, with 0.5 to 5mm thick orangish brown clay smear, open to 14.80m, then non-intact as possible drilling induced.		BH terminated at 15.40m bgl on REs instruction.	

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
30/05/22	17.00	15.40										BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Dando 2000/DB-Boart		Driller: CR/DK	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

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BOREHOLE LOG

Project	Location	BOREHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH002**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	17-05-22 16-06-22	138.73	E 597,184.3 N 689,977.9

Engineer	GROUNDWATER STRIKES	Sheet
Mott MacDonald	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: dry 2nd: 3rd:	1 of 3 Rev.

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	**DESCRIPTION**	
0.00-0.50	B1			138.43		0.30	TOPSOIL: Grass over firm brown sandy SILT. Sand is fine to coarse.	
				138.23		0.50	Weathered LIMESTONE rock. Strong and very strong massive grey 'marbled' white fine and coarse grained limestone recovered as angular fine to coarse gravel and cobble sized clasts with some orangish brown clay and surficial orangish brown iron stain. *borehole continued by coring*	

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
17-05-22	10.00	0.50	0.50			0.3	0.5	3600			BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Dando 2000/Geo 602	Bit Design	Driller CR/BD	Logged By EAT

IDL AGS3 UK BH BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH002**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	17-05-22 16-06-22	138.73	E 597,184.3 N 689,977.9

Engineer	Sheet	Status
Mott MacDonald	2 of 3	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities / Detail	Main	Instrument/ Backfill
17.05 0.50	70	0.50 (50/0mm)	138.23		0.50	0.50 - 4.00 Non-intact as weathered rock.	Weathered LIMESTONE rock. Strong and very strong massive grey 'marbled' white fine and coarse grained limestone recovered as angular fine to coarse gravel and cobble sized clasts with some orangish brown clay and surficial orangish brown iron stain.	
1.00	-							
	100 (37)							
	-							
2.10								
	100 (82)	NI NI					Point Load Test - 2.25m to 2.37m: strong.	
2.70	-						Point Load Test - 2.62m to 2.83m: strong.	
	100 (46) 16							
4.00						4.00 - 5.10 Non-intact as weathered rock. No recovery as washout of fines during drilling. No record of cavity.		
	90 (57) 41	NR NR			(8.40)		Point Load Test - 4.50m to 4.60m: very strong.	
5.10						5.10 - 8.90 Non-intact as weathered rock.		
	100 (71) 35							
6.10								
	100 (41) 12							
7.00		NI NI						
	100 (42)							
	-							
8.10								

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
17/05/22	10.00	0.50	0.50	203			

Rotary Flush

From (m)	To (m)	Type	Return (%)
0.5	15	Water	100

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used	Dando 2000/Geo 602		Driller CR/BD	Logged By EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH002**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	17-05-22 16-06-22	138.73	E 597,184.3 N 689,977.9

Engineer	Sheet	Status
Mott MacDonald	3 of 3	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities / Detail	Main	Instrument/ Backfill
	100 (66) 36		129.83		8.90			
		6 6				8.90 - 15.00 Discontinuities, medium spaced, locally closely spaced, dipping 12 to 14°, stepped, smooth, with 0.5 to 3mm thick orangish brown clay smear.	Very strong massive grey 'marbled' white and grey fine and coarse grained LIMESTONE.	
9.70						9.60 - 9.70 Joint, dipping 60°, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.	Point Load Test - 9.00m to 9.10m: strong. Point Load Test - 9.10m to 9.20m: very strong. Point Load Test - 9.20m to 9.30m: very strong. Point Load Test - 9.30m to 9.40m: very strong. Point Load Test - 9.40m to 9.50m: very strong. Point Load Test - 9.50m to 9.60m: very strong. Point Load Test - 9.60m to 9.70m: very strong.	
	100 (90) 58	4 4						
11.10						11.10 - 11.15 Joint, dipping 45°, planar, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.		
		3 3						
	100 (97) 90				(6.10)			
		4 4						
12.70						12.75 - 13.15 Joint, subvertical dip, planar, smooth, with 0.5 to 2mm thick orangish brown clay smear and minor orangish brown iron stain and smear, open.		
	100 (66) -	NI NI				13.20 - 13.60 2 No parallel joints, subvertical dip, planar, smooth, with 0.5 to 3mm thick orangish brown clay smear, open to moderately wide.		
14.10						13.70 - 14.15 2 No perpendicular joints, subvertical dip, stepped, rough, with 0.5 to 2mm thick light orangish brown clay smear, open.		
	100 (85) 52	6 6				14.40 - 14.70 Joint, subvertical dip, stepped, rough, with 0.5 to 4mm thick light orangish brown clay smear, open to moderately wide.		
16.06 15.00			123.73		15.00		BH terminated at 15.00m bgl on REs instruction.	

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
16/06/22	16.00	15.00					

Rotary Flush

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

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Dando 2000/Geo 602		Driller: CR/BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH003**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	30-05-22 01-06-22	145.64	E 597,216.3 N 689,990.4

Engineer: Mott MacDonald

Sheet 1 of 4

Status FINAL / REVFINAL

RUN DETAILS / STRATA

Depth / Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Instrument / Backfill
0.00					(0.60)	0.00 - 0.60 m: overburden	No recovery.	
			145.04		0.60			
	71 (27) 5					0.60 - 4.10 Non-intact as weathered rock.	Weathered LIMESTONE rock. Strong locally very strong and medium strong massive grey 'marbled' white fine and coarse grained limestone recovered as angular fine to coarse gravel and cobble sized clasts with some orangish brown clay and minor surficial orangish brown iron stain.	
2.10								
		NI			(3.50)	2.10 - 2.50 Probable joint, apparently subvertical dip, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear, open, non-intact.	Point Load Test - 2.30m to 2.50m: medium strong. Point Load Test - 2.50m to 2.60m: weak.	
	100 (73) 17							
3.60						3.30 - 3.60 Probable joint, apparently subvertical dip, stepped, smooth, with 0.5 to 10mm thick orangish brown clay smear, open to moderately wide.		
			141.54		4.10	3.60 - 3.95 Probable joint, apparently subvertical dip, stepped, rough, with 0.5 to 3mm thick orangish brown clay smear, open to moderately wide.	Very strong massive grey 'marbled' light grey and white fine and coarse grained LIMESTONE.	
	100 (79) 57	4				4.10 - 9.60 Discontinuities, medium spaced, locally closely spaced, dipping 12 to 14°, stepped, rough, with 0.5 to 2mm thick orangish brown clay smear and minor orangish brown iron stain and powder.		
5.10							Point Load Test - 5.10m to 5.25m: strong. UCS - 5.26m to 5.60m: strong.	
30.05 5.60 30.05	100 (98) 96	5				4.65 - 4.70 Joint, dipping 45°, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.	5.60m to 7.60m: reduced from GBS to HQ core size to expedite HPD test.	
	100 (96) 61					5.60 - 5.66 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick dark orangish brown clay smear, open.		
6.70		9				5.90 - 6.30 Joint, subvertical dip, stepped, smooth, with 0.5 to 4mm thick light orangish brown clay smear, open to moderately wide.		
	100 (95) 53	2			(5.50)	6.65 - 7.05 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear and minor dark orangish brown iron stain, open.		
30.05 7.60 30.05						7.60 - 8.10 No obvious area of core loss. No recovery as washout of fines during		
	60 (54)	NR						

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
30/05/22	13.00	5.60					
30/05/22	14.00	7.60					

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	14	Water	100

GENERAL REMARKS

50mm standpipe installed.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH003**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	30-05-22 01-06-22	145.64	E 597,216.3 N 689,990.4

Engineer	Sheet	Status
Mott MacDonald	2 of 4	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities Detail	Main	Instrument/ Backfill
8.10	30 100 (89) 18	2 6	136.04		9.60	drilling. No record of cavity. 7.65 - 7.85 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick grey silt smear, open. 8.10 - 8.50 Joint, subvertical dip, stepped, rough, with 0.5 to 2mm thick orangish brown clay smear, open. 8.75 - 9.15 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick orangish brown clay smear, open.	Very strong massive grey 'marbled' light grey and white fine and coarse grained LIMESTONE. *(continued)*	
9.60 30.05 31.05	NI 20 -					9.60 - 13.20 Non-intact as possible weathered rock.	Possible weathered LIMESTONE rock. Very strong massive 'bleached' whitish grey fine and coarse grained limestone recovered as angular fine to coarse gravel sized clasts.	
11.10	-				(3.60)			
13.10	15 -		132.44		13.20			
14.10	40 -					13.20 - 20.60 Non-intact as light greyish brown slightly silty fine and medium sand.	Light greyish brown slightly silty fine and medium SAND. (1.30m recovered).	
	20 -	NI						

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
30/05/22	17.00	10.00					
31/05/22	08.00	10.00					

Rotary Flush

From (m)	To (m)	Type	Return (%)
14	25	Water	0

GENERAL REMARKS

50mm standpipe installed.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH003**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	30-05-22 01-06-22	145.64	E 597,216.3 N 689,990.4

Engineer	Sheet	Status
Mott MacDonald	3 of 4	FINAL / REVFINAL

RUN DETAILS				STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION Discontinuities / Detail / Main	Instrument/ Backfill
16.10						Light greyish brown slightly silty fine and medium SAND. (1.30m recovered). *(continued)*	
	20 -				(7.40)		
18.10							
	12 -						
31.05 31.05							
20.60			125.04		20.60		
	28 -					20.60m to 25.00m: reduced from GBS to HQ core size. Firm light orangish brown slightly sandy gravelly silty CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse of white 'bleached' white dolomitised limestone. (0.70m recovered).	
22.00					(2.90)		
	33 -	NI					
23.50			122.14		23.50		

Drilling Progress and Water Observations							
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
31/05/22	14.00	20.00					

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

GENERAL REMARKS

50mm standpipe installed.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH003**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	30-05-22 01-06-22	145.64	E 597,216.3 N 689,990.4

Engineer	Sheet	Status
Mott MacDonald	4 of 4	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
	20 - -				(1.50)			Light brown slightly silty slightly gravelly fine and medium SAND. Gravel is subrounded fine and medium of brown sandstone and light brown probable dolomitised limestone. (0.30m recovered). *(continued)*	
31.05 25.00			120.64		25.00			BH terminated at 25.00m bgl on REs instruction.	

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
31/05/22	17.00	25.00										50mm standpipe installed.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH004**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	18-05-22 19-05-22	136.48	E 597,164.0 N 689,962.6

Engineer	Sheet	Status
Mott MacDonald	1 of 2	FINAL / REVFINAL

RUN DETAILS / STRATA

Depth / Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities	Detail	Main
0.00			136.38		0.10	0.00 - 15.00 m: overburden		TOPSOIL: Grass over firm dark brown slightly sandy SILT with rootlets. Sand is fine.
			136.28		0.20			Firm dark brown slightly sandy slightly gravelly SILT. Sand is fine to coarse. Gravel is subangular fine of assorted grey limestone.
	40 - -				(1.80)			Stiff brown sandy gravelly SILT. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium of assorted grey limestone.
2.00			134.48		2.00			
	20 - -	3.00 (63)						Very dense angular to subangular fine to coarse assorted dark grey and grey limestone GRAVEL with a little light brown clay. (0.80m recovered).
3.50								3.00m: very dense.
	20 - -	4.50 (70)						4.50m: very dense.
5.00								
	53 - -	6.00 (50/150mm)			(7.50)			
6.50								
	33 - -	7.50 (50/150mm)						
18.05 8.00								

Instrument / Backfill

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
18/05/22	17.00	8.00					
19/05/22	08.00	8.00					

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	15	Water	100

GENERAL REMARKS

50mm standpipe installed.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH004**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	18-05-22 19-05-22	136.48	E 597,164.0 N 689,962.6

Engineer	Sheet	Status
Mott MacDonald	2 of 2	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
19.05								Very dense angular to subangular fine to coarse assorted dark grey and grey limestone GRAVEL with a little light brown clay. (0.80m recovered). *(continued)*	
	27 -								
	-	9.00 (50/0mm)							
9.50			126.98		9.50				
								Light greyish brown slightly silty fine to coarse SAND.	
	27 -								
	-	10.50 (50/75mm)						10.50m: very dense.	
11.00									
	27 -								
	-				(5.50)				
12.50								12.30m to 12.50m: subangular to subrounded fine to coarse assorted grey and white limestone gravel.	
	27 -								
	-								
14.00									
	40 -								
	-								
19.05 15.00			121.48		15.00				
								BH terminated at 15.00m bgl on REs instruction.	

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
19/05/22	14.00	15.00										50mm standpipe installed.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

BOREHOLE LOG

Project	Location	BOREHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH005**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	16-05-22 31-05-22	137.15	E 597,174.2 N 689,942.3

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Mott MacDonald	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: dry 2nd: 3rd:	Sheet 1 of 3 Rev.

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
0.00-1.00	B1			136.95		0.20	TOPSOIL: Grass over firm brown slightly sandy SILT. Sand is coarse.	
				136.55		(0.40) 0.60	Medium dense subrounded fine to medium assorted grey limestone GRAVEL.	
1.00	SPT	N = 16 (2, 3, 4, 4, 4, 4)				(1.40)	Firm orange slightly gravelly slightly sandy SILT. Sand is fine to coarse. Gravel is subrounded fine of assorted grey limestone.	
1.00	D2							
1.00-2.00	B4							
				135.15		2.00		
2.00	SPT	50 for 10 mm (25, 50)		135.05		2.10	Stiff brownish orange slightly gravelly SILT with low cobble content. Gravel is subrounded fine of assorted grey limestone. Cobbles are of assorted grey limestone.	
2.00	D5						*borehole continued by coring*	

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
16-05-22	12.00	2.10	2.10			2	2.1	3600			BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Dando 2000/DB-Boart	Bit Design	Driller CR/DK	Logged By EAT

IDL AGS3 UK BH BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH005**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	16-05-22 31-05-22	137.15	E 597,174.2 N 689,942.3

Engineer	Sheet	Status
Mott MacDonald	2 of 3	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
16.05 2.10			135.05		2.10	2.10 - 2.70 m: overburden		Stiff brownish orange slightly gravelly SILT with low cobble content. Gravel is subrounded fine of assorted grey limestone. Cobbles are of assorted grey limestone.	
					(0.60)			Point Load Test - 2.60m to 2.70m: very strong.	
	100 (53) 50		134.45		2.70	2.70 - 15.00 Discontinuities, medium spaced, locally closely spaced, dipping 12 to 14°, stepped, rough, with 0.5 to 3mm thick orangish brown clay smear.		Very strong locally strong and medium strong massive grey 'marbled' light grey and white fine grained LIMESTONE.	
3.50		4				3.50 - 4.65 Joint, subvertical dip, stepped, rough, with 0.5 to 3mm thick orangish brown clay smear, open to moderately wide.		Point Load Test - 2.70m to 2.80m: very strong.	
	100 (82) 19							Point Load Test - 2.80m to 2.93m: strong.	
		6						Point Load Test - 2.93m to 3.00m: medium strong.	
5.00								Point Load Test - 3.00m to 3.06m: medium strong.	
								Point Load Test - 3.06m to 3.16m: very strong.	
								Point Load Test - 3.16m to 3.22m: very strong.	
						5.35 - 5.60 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick orangish brown clay smear, open.		Point Load Test - 3.22m to 3.32m: very strong.	
	100 (96) 81	3							
								Point Load Test - 6.10m to 6.20m: very strong.	
6.50								Point Load Test - 6.50m to 6.55m: weak.	
		3						Point Load Test - 6.55m to 6.68m: strong.	
						6.80 - 7.80 Joint, subvertical dip, stepped, smooth, with 0.5 to 3mm thick orangish brown clay smear, non-intact, open as drilling induced.		Point Load Test - 6.68m to 6.84m: very strong.	
	100 (61) 37							Point Load Test - 6.90m to 7.00m: very strong.	
		16						Point Load Test - 7.00m to 7.20m: very strong.	
								Point Load Test - 7.25m to 7.35m: strong.	
8.00								Point Load Test - 7.70m to 7.80m: very strong.	
								Point Load Test - 7.80m to 7.90m: very strong.	
		2						Point Load Test - 7.90m to 8.00m: strong.	
	100 (96) 85				(12.30)				
9.50									
		4						Point Load Test - 9.50m to 9.60m: very strong.	
								Point Load Test - 9.60m to 9.68m: very strong.	

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
16/05/22	12.00	2.10	2.10	203				2.1	10.6	Water	100	BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Dando 2000/DB-Boart		Driller: CR/DK	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH005**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	16-05-22 31-05-22	137.15	E 597,174.2 N 689,942.3

Engineer	Sheet	Status
Mott MacDonald	3 of 3	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities / Detail	Main	Instrument/ Backfill
	100 (97) 85	4				10.10 - 10.25 Joint, subvertical dip, undulating, tight.	Point Load Test - 9.68m to 9.83m: very strong. Point Load Test - 9.83m to 9.92m: very strong. Very strong locally strong and medium strong massive grey 'marbled' light grey and white fine grained LIMESTONE. *(continued)* Point Load Test - 10.62m to 10.40m: very strong. Point Load Test - 10.40m to 10.62m: very strong. Point Load Test - 10.62m to 10.69m: strong. Point Load Test - 10.69m to 10.77m: strong. Point Load Test - 10.77m to 10.88m: strong. Point Load Test - 10.88m to 11.00m: strong.	
11.00								
	100 (97) 77	3						
12.50		3						
	100 (92) 91	3						
14.00								
	100 (85) 83	4						
31.05 15.00			122.15		15.00	14.70 - 14.80 Joint, dipping 60°, stepped, rough, with 0.5 to 2mm thick orangish brown clay smear, open.	BH terminated at 15.00m bgl on REs instruction.	

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
31/05/22	17.00	15.00					

Rotary Flush

From (m)	To (m)	Type	Return (%)
10.6	15	Water	0

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Dando 2000/DB-Boart		Driller: CR/DK	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH006**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	17-06-22 17-06-22	140.35	E 597,198.8 N 689,953.2

Engineer	Sheet	Status
Mott MacDonald	1 of 2	FINAL / REVFINAL

RUN DETAILS / STRATA

Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
0.00			140.25		0.10	0.00 - 3.20 m: overburden		TOPSOIL: Grass over firm brown sandy SILT. Sand is fine.	
	39 -				(1.70)			Firm dark reddish brown sandy gravelly SILT. Sand is fine to coarse. Gravel is subrounded to subangular fine to coarse of rare brown sandstone and assorted grey limestone.	
1.80			138.55		1.80				
	100 -				(0.60)			Firm orangish brown CLAY.	
2.50			137.95		2.40				
	85 -				(0.80)			Firm orangish brown sandy gravelly SILT. Sand is fine to coarse. Gravel is subangular to angular fine to coarse of light grey limestone.	
3.20			137.15		3.20				
3.60	100 (48) -	NI				3.20 - 15.00 Discontinuities, medium spaced, locally very closely and closely spaced, dipping 12 to 14°, stepped, rough, with 0.5 to 5mm thick orangish brown clay smear.		Very strong locally medium strong massive grey 'marbled' white and grey fine grained LIMESTONE.	
	100 (54) 40	0				3.21 - 4.20 Probable joint, subvertical dip, stepped, rough, with 0.5 to 20mm thick orangish brown clay smear, open to very wide.		Point Load Test - 4.23m to 4.48m: very strong.	
4.90						4.90 - 8.10 2 No parallel joints, subvertical and vertical dip, stepped, smooth, with 0.5 to 20mm thick orangish brown clay smear, open to very wide, non-intact as angular fine to coarse gravel sized clasts.		Point Load Test - 5.10m to 5.30m: very strong.	
	100 (45) -								
6.50		NI							
	100 (26) -								

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	15	Water	100

GENERAL REMARKS

50mm standpipe installed.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH006**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	17-06-22 17-06-22	140.35	E 597,198.8 N 689,953.2

Engineer	Sheet	Status
Mott MacDonald	2 of 2	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Instrument/ Backfill
8.10							Very strong locally medium strong massive grey 'marbled' white and grey fine grained LIMESTONE. *(continued)* Point Load Test - 8.35m to 8.45m: medium strong.	
	100 (64) 28	2				8.50 - 8.75 Joint, subvertical dip, stepped, rough, with 0.5 to 4mm thick orangish brown clay smear and orange and orangish brown iron stain and smear, open to moderately wide.		
9.60		NI			(11.80)	8.90 - 10.60 Joint, subvertical dip, stepped, rough, with 0.5 to 40mm thick orangish brown clay smear and orangish brown iron stain, open to very wide.		
	100 (32) -	NI						
11.10						11.00 - 11.10 Joint, dipping 60°, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.		
	100 (27) -	9				11.30 - 11.65 Joint, subvertical dip, undulating, locally stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear, open.		
12.60		10				11.70 - 12.05 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick orangish brown clay smear and orangish brown iron stain and powder, open.	12.30m to 12.60m: subvertical white calcitic vein. 12.60m to 14.10m: very strong massive brownish grey 'marbled' brownish white crystalline fine to coarse DOLOMITISED LIMESTONE.	
	100 (78) 34	11				12.10 - 12.95 Joint, subvertical dip, stepped, rough, with 0.5 to 70mm thick orangish brown clay smear, open to very wide.		
14.10						13.70 - 13.75 Joint, dipping 45°, stepped, rough, with 0.5 to 2mm thick orangish brown clay smear, open.		
	100 (84) 68	5				13.70 - 13.95 Joint, dipping 88°, stepped, smooth, with 0.5 to 6mm thick orangish brown clay smear, tight, open as drilling induced.		
17.06 15.00		NI	125.35		15.00	13.95 - 14.30 Joint, subvertical dip, planar, smooth, with 0.5 to 1mm thick orangish brown clay smear, open. 14.70 - 15.00 Joint, subvertical dip, stepped, smooth, with 0.5 to 40mm thick orangish brown clay smear, open to very wide.	BH terminated at 15.00m bgl on REs instruction.	

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
17/06/22	17.00	15.00					

Rotary Flush

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

GENERAL REMARKS

50mm standpipe installed.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH007**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	02-06-22 09-06-22	145.33	E 597,227.5 N 689,970.1

Engineer	Sheet	Status
Mott MacDonald	1 of 4	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Instrument / Backfill
0.00	100 (8) -		145.13		0.20	0.00 - 0.20 m: overburden 0.20 - 2.00 Non-intact as weathered rock.	TOPSOIL: Grass over firm dark reddish brown SILT with rootlets.	
0.60	100 (46) 7	NI			(1.80)		Weathered LIMESTONE rock. Strong locally very strong massive grey 'marbled' white fine grained limestone Recovered as angular fine to coarse gravel and cobble sized clasts with some orangish brown clay.	
			143.33		2.00		Point Load Test - 1.83m to 2.00m: strong.	
2.10	100 (81) 49	12				2.00 - 25.00 Discontinuities, very closely and closely spaced to 2.00m, then medium spaced, locally closely spaced, dipping 12 to 14°, stepped, smooth, with 0.5 to 6mm thick orangish brown clay smear. 2.05 - 2.20 Joint, vertical dip, planar, smooth, with 0.5 to 2mm thick orangish brown clay smear, open. 2.20 - 2.60 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick dark orangish brown clay smear and dark orangish brown and orangish brown iron stain and powder, open. 3.60 - 4.30 Joint, subvertical dip, 'V' shaped, planar, smooth, with 0.5 to 5mm thick orangish brown clay smear, open to moderately wide. 4.20 - 6.20 Joint, vertical dip, stepped, locally planar, rough, with 0.5 to 5mm thick orangish brown clay smear, open to moderately wide.	Very strong locally strong massive grey 'marbled' brownish grey and white fine grained LIMESTONE.	
3.60		6						
	100 (89) 22	16						
02.06 03.06 5.10		12					Point Load Test - 5.60m to 5.80m: strong.	
	100 (92) 21							
6.60		4						
	100 (95) 94	2						

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
02/06/22	17.00	5.00					
03/06/22	08.00	5.00					

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	11.6	Water	100

GENERAL REMARKS

50mm standpipe installed.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH007**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	02-06-22 09-06-22	145.33	E 597,227.5 N 689,970.1

Engineer	Sheet	Status
Mott MacDonald	2 of 4	FINAL / REVFINAL

RUN DETAILS						STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
8.10								Very strong locally strong massive grey 'marbled' brownish grey and white fine grained LIMESTONE. *(continued)*	
		1							
	100 (95) 88								
9.60		6				9.30 - 9.60 Joint, subvertical dip, planar, locally stepped, smooth, with 0.5 to 3mm thick orangish brown clay smear, open to moderately wide.			
	100 (96)								
03.06 03.06 10.10	34					9.75 - 10.20 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick light orangish brown clay smear, open.		10.00m to 12.00m: reduced from GBS to HQ core size to expedite HPD test.	
	100 (79) 61	6							
11.10						10.80 - 11.10 2 No parallel joints, subvertical dip, stepped, rough, with 0.5 to 1mm thick light orangish brown clay smear, open.			
	100 (97) 67	7				11.10 - 11.40 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick light orangish brown clay smear, open.			
03.06 04.06 12.00								Point Load Test - 12.00m to 12.10m: very strong.	
	100 (77) 53	5						Point Load Test - 12.27m to 12.40m: very strong.	
04.06 04.06 13.00								Point Load Test - 12.40m to 12.60m: very strong.	
		3			(23.00)			Point Load Test - 12.60m to 12.74m: strong.	
	100 (97) 96							Point Load Test - 12.74m to 12.93m: strong.	
		6				14.40 - 14.65 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.		Point Load Test - 12.93m to 13.00m: strong.	
07.06 08.06 15.00								13.00m to 15.00m: pressure meter test.	
		0						13.00m to 25.00m: reduced from GBS to HQ core size.	
	100 (98) 83							Point Load Test - 15.20m to 15.38m: medium strong.	
								UCS - 15.55m to 15.85m: very strong.	

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
03/06/22	12.00	10.00					
03/06/22	13.00	12.00					
04/06/22	12.00	12.00					
04/06/22	17.00	13.00					
07/06/22	17.00	15.00					
08/06/22	08.00	15.00					

Rotary Flush

From (m)	To (m)	Type	Return (%)
11.6	25	Water	0

GENERAL REMARKS

50mm standpipe installed.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH007**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	02-06-22 09-06-22	145.33	E 597,227.5 N 689,970.1

Engineer	Sheet	Status
Mott MacDonald	3 of 4	FINAL / REVFINAL

RUN DETAILS						STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
16.60		6				16.40 - 16.60 Joint, vertical dip, stepped, rough, with 0.5 to 1mm thick dark orangish brown clay smear, open.		Very strong locally strong massive grey 'marbled' brownish grey and white fine grained LIMESTONE. *(continued)*	
	100 (90) 68	3				16.70 - 16.80 Joint, dipping 60°, stepped, rough, with 0.5 to 2mm thick orangish brown clay smear, open. 17.15 - 17.40 Joint, subvertical dip, planar, smooth, with 0.5 to 1mm thick light orangish brown clay smear, open.			
18.20								18.00m to 21.00m: Packer test.	
		2				18.55 - 18.60 Joint, dipping 45°, stepped, rough, with 0.5 to 1mm thick orangish brown clay smear, open.		Point Load Test - 18.30m to 18.40m: very strong.	
	100 (96) 90								
19.80		7							
	100 (96) 20	8				20.00 - 21.10 Joint, vertical dip, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear and dark orangish brown iron stain to 20.15m, then minor orangish brown iron stain, open.			
08.06 21.40 09.06									
		3							
	100 (95) 90								
		2				22.60 - 22.80 Joint, subvertical dip, undulating, tight.		22.50m to 22.51m: dark reddish brown silt.	
23.00						22.90 - 23.00 Joint, dipping 60°, undulating, smooth, with 0.5mm thick orangish brown clay smear and dark orangish brown iron stain, open.			
	100 (98) 95	2							

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
08/06/22	17.00	21.40					
09/06/22	08.00	21.40					

Rotary Flush

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

GENERAL REMARKS

50mm standpipe installed.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH007**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	02-06-22 09-06-22	145.33	E 597,227.5 N 689,970.1

Engineer	Sheet	Status
Mott MacDonald	4 of 4	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
24.50	100 (94) 82	3						Very strong locally strong massive grey 'marbled' brownish grey and white fine grained LIMESTONE. *(continued)*	
09.06 25.00			120.33		25.00				
								BH terminated at 25.00m bgl on REs instruction.	

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
09/06/22	16.00	25.00										50mm standpipe installed.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH008**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	20-06-22 22-06-22	138.64	E 597,185.6 N 689,920.7

Engineer	Sheet	Status
Mott MacDonald	1 of 4	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
0.00			138.49		0.15	0.00 - 26.10 m: overburden		TOPSOIL: Grass over firm dark reddish brown sandy SILT with rootlets. Sand is fine.	
	61 -							Firm dark reddish brown sandy gravelly SILT with low cobble content. Sand is fine to coarse. Gravel is subangular to angular fine to coarse of assorted dark grey and grey limestone. Cobbles are of grey limestone.	
1.30									
	100 -				(2.65)				
1.70	-							1.60m: becoming light brownish orange.	
	90 -								
2.70	-		135.84		2.80				
		3.00 (50/150mm)						Very stiff light brownish orange sandy SILT. Sand is fine.	
	50 -				(1.30)				
4.10	-		134.54		4.10				
								Very stiff cream mottled orangish brown slightly gravelly sandy SILT. Sand is fine to coarse. Gravel is subangular and angular fine to medium of assorted dark grey and grey limestone.	
	90 -				(1.30)				
5.10	-		133.24		5.40				
			133.04		5.60			Grey speckled black coarse SAND.	
	100 -							Very stiff cream mottled orangish brown slightly gravelly sandy SILT. Sand is fine to coarse. Gravel is subangular and angular fine to medium of assorted dark grey and grey limestone.	
	-	6.00 (50/150mm)							
6.60									
					(2.90)				
	100 -								
	-								
								7.80m: becoming orange.	

Drilling Progress and Water Observations							
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing

Rotary Flush			
From (m)	To (m)	Type	Return (%)
0	26.1	Water	100

GENERAL REMARKS

50mm standpipe installed.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH008**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	20-06-22 22-06-22	138.64	E 597,185.6 N 689,920.7

Engineer	Sheet	Status
Mott MacDonald	2 of 4	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
8.10			130.14		8.50				
	100 -	9.00 (50/75mm)	129.34		(0.80) 9.30			Stiff orange mottled white slightly gravelly CLAY. Gravel is subangular fine and coarse of grey limestone.	
9.60								Very stiff white mottled orange sandy gravelly SILT. Sand is fine to coarse. Gravel is subangular fine to coarse of massive light grey fine grained limestone.	
	100 -								
20.06 11.10 21.06									
	87 -	12.00 (50/0mm)							
12.60									
	100 -								
13.40	100								
13.60	-								
	27 -				(11.00)				
15.10		15.00 (50/0mm)							
	40 -								

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
20/06/22	17.00	11.10					
21/06/22	08.00	11.10					

Rotary Flush

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

GENERAL REMARKS

50mm standpipe installed.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH008**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	20-06-22 22-06-22	138.64	E 597,185.6 N 689,920.7

Engineer	Sheet	Status
Mott MacDonald	3 of 4	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
16.60	-							Very stiff white mottled orange sandy gravelly SILT. Sand is fine to coarse. Gravel is subangular fine to coarse of massive light grey fine grained limestone. *(continued)*	
	30 -								
17.90		18.00 (50/0mm)							
	53 -								
19.40									
	33 -								
21.06 22.06 20.00									
	67 -		118.34		20.30				
20.60								Very stiff orange mottled white slightly gravelly SILT with low cobble content. Gravel is subangular to angular fine to coarse of massive light grey fine grained limestone. Cobbles are of massive light grey fine grained limestone.	
	100 -	21.00 (50/0mm)			(1.30)				
21.60			117.04		21.60				
	100 -				(1.50)			Stiff orange thinly laminated sandy gravelly SILT. Sand is medium to coarse.Gravel is subangular to angular fine to coarse of massive light grey fine grained limestone. Laminae are 3 to 5mm thick.	
23.10			115.54		23.10				
	100 -							Firm orangish brown sandy gravelly SILT. Sand is fine to coarse. Gravel is subangular fine to coarse of massive light grey fine grained limestone.	

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
21/06/22	17.00	20.00					
22/06/22	08.00	20.00					

Rotary Flush

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

GENERAL REMARKS

50mm standpipe installed.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH008**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	20-06-22 22-06-22	138.64	E 597,185.6 N 689,920.7

Engineer	Sheet	Status
Mott MacDonald	4 of 4	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
	-	24.00 (50/75mm)			(1.90)			Firm orangish brown sandy gravelly SILT. Sand is fine to coarse. Gravel is subangular fine to coarse of massive light grey fine grained limestone. *(continued)*	
24.60			113.64		25.00				
	100 - -				(1.10)			Stiff orange SILT (for 60mm of core diameter). 25.10m to 26.10m: with gravel and cobble sized clasts of massive grey fine grained limestone (for 41mm of core diameter).	
22.06 26.10			112.54		26.10				
								BH terminated at 26.10m bgl on REs instruction.	

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
22/06/22	17.00	26.10										50mm standpipe installed.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

BOREHOLE LOG

Project	Location	BOREHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH009**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	17-05-22 23-06-22	142.18	E 597,212.5 N 689,926.5

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Mott MacDonald	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: dry 2nd: 3rd:	Sheet 1 of 3 Rev.

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
0.00-0.70	B1			141.88		0.30	TOPSOIL: Grass over firm brown slightly sandy SILT with rootlets. Sand is fine.	
				141.48		(0.40) 0.70	Firm grey slightly gravelly slightly sandy SILT. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of assorted dark grey and grey limestone.	
							borehole continued by coring	

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
17-05-22	13.00	0.70	0.70			0.7	0.7	3600			BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Dando 2000/Geo 602	Bit Design	Driller CR/BD	Logged By EAT

IDL AGS3 UK BH BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH009**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	17-05-22 23-06-22	142.18	E 597,212.5 N 689,926.5

Engineer	Sheet	Status
Mott MacDonald	2 of 3	FINAL / REVFINAL

RUN DETAILS

Depth / Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)
17.05 0.70		0.70 (50/10mm)	141.48		0.70
		6			
	80 (71) 23				
		12			
2.00					
		13			
	100 (89) 43				
3.60		8			
	100 (91) 47				
		10			
5.10					
		5			
	100 (96) 70				
6.70		5			
	100 (94) 33				
		10			(14.40)
8.10					
		5			

STRATA

DESCRIPTION

Discontinuities	Detail	Main
0.70 - 15.10 Discontinuities, closely spaced, locally medium spaced to 4.50m, then medium spaced, locally closely spaced, dipping 12 to 14°, stepped, smooth, with 0.5 to 3mm thick orangish brown clay smear. 1.15 - 1.50 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear and minor orangish brown iron stain, open. 2.50 - 2.95 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear and minor orangish brown iron stain, open. 3.80 - 4.20 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear and minor orangish brown iron stain, open. 4.25 - 4.45 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear and minor orangish brown iron stain, open. 6.00 - 6.10 Joint, vertical dip, undulating, tight. 6.15 - 6.25 Joint, vertical dip, undulating, smooth, with 0.5mm thick orangish brown clay smear, open to 10mm wide aperture. 6.70 - 7.05 Joint, subvertical dip, undulating, tight to 6.95m, then open as drilling induced. 7.10 - 9.65 Joint, dipping 86 to 88°, stepped, rough, with 0.5 to 5mm thick orangish brown clay smear and dark orangish brown iron stain and powder, open to moderately wide.		Very strong massive grey 'marbled' grey and white fine grained LIMESTONE. Point Load Test - 1.00m to 1.10m: strong. Point Load Test - 1.10m to 1.20m: medium strong. Point Load Test - 5.50m to 5.60m: strong. UCS - 5.50m to 5.75m: strong. Point Load Test - 5.60m to 5.70m: very strong. Point Load Test - 6.80m to 6.90m: weak.

Instrument/ Backfill

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
17/05/22	13.00	0.70	0.70	203			

Rotary Flush

From (m)	To (m)	Type	Return (%)
0.7	15.1	Water	100

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Dando 2000/Geo 602	Driller CR/BD	Logged By EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH009**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	17-05-22 23-06-22	142.18	E 597,212.5 N 689,926.5

Engineer: Mott MacDonald

Sheet 3 of 3

Status FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
	100 (97) -							Very strong massive grey 'marbled' grey and white fine grained LIMESTONE. *(continued)*	
9.60		8						Point Load Test - 9.60m to 9.70m: very strong.	
	100 (97) 65	2							
11.10		6							
	100 (95) 63					11.75 - 12.05 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear and minor orangish brown iron stain, open. 12.05 - 12.70 Joint, subvertical dip, undulating, tight.			
12.60		3							
	100 (97) 96	2							
14.10									
	100 (98) 97	2							
23.06 15.10			127.08		15.10				
								BH terminated at 15.10m bgl on REs instruction.	

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
23/06/22	16.00	15.10					

Rotary Flush

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

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used	Dando 2000/Geo 602		Driller CR/BD	Logged By EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH010**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	23-05-22 27-05-22	145.10	E 597,240.2 N 689,949.8

Engineer	Sheet	Status
Mott MacDonald	1 of 4	FINAL / REVFINAL

RUN DETAILS

Depth / Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)
0.00			145.00		0.10
			144.70		0.40
	100 (21) -				
1.10					
	100 (30) -	NI			(2.00)
2.30			142.70		2.40
	100 (81) 29	8			
3.30					
		20			
	100 (71) 25				
		10			
4.80					
	100 (87) 38	6			
23.05 6.00 23.05					
	100 (96) 59	7			
		5			
23.05 7.50 23.05					

STRATA

DESCRIPTION

Discontinuities / Detail	Main
0.00 - 0.40 m: overburden	TOPSOIL: Grass over firm dark reddish brown slightly sandy SILT with rootlets. Sand is fine.
0.40 - 2.40 Non-intact as weathered rock.	Firm reddish brown gravelly SILT. Gravel is subangular fine of assorted grey limestone.
0.90 - 2.30 Probable joint, apparently vertical dip, stepped, rough, with 0.5 to 8mm thick orangish brown clay smear, open to moderately wide, non-intact.	Weathered LIMESTONE rock. Strong locally very strong massive grey 'marbled' white fine grained limestone recovered as angular fine to coarse gravel and cobble sized clasts with some orangish brown clay.
2.40 - 25.00 Discontinuities, closely spaced, locally very closely spaced to 3.30m, then medium spaced, locally closely spaced, dipping 12 to 14°, stepped, rough, with 0.5 to 1mm thick orangish brown clay smear and minor orangish brown iron stain and powder. 3.30 - 5.40 Joint, subvertical dip, stepped, rough, with 0.5 to 5mm thick dark orangish brown clay smear, open to moderately wide.	Very strong locally strong massive grey 'marbled' dark grey brownish white and white slightly bioclastic fine grained LIMESTONE. Point Load Test - 2.50m to 2.70m: medium strong.
6.15 - 6.35 Joint, vertical dip, stepped, rough, with 0.5 to 1mm thick orangish brown clay smear and dark orangish brown iron stain, open. 6.25 - 6.35 Joint, dipping 60°, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear and dark orangish brown iron stain, open. 6.50 - 6.55 Joint, dipping 45°, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open. 7.05 - 7.30 Joint, subvertical dip,	6.00m to 7.50m: reduced from GBS to HQ core size to expedite HPD test. Point Load Test - 7.50m to 7.70m: strong. Point Load Test - 7.70m to 7.80m: strong. Point Load Test - 7.80m to 8.00m:

Instrument / Backfill

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
23/05/22	13.00	6.00					
23/05/22	15.00	7.50					

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	9.3	Water	100

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Dando 2000/Geo 602	Driller: CR/BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH010**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	23-05-22 27-05-22	145.10	E 597,240.2 N 689,949.8

Engineer	Sheet	Status
Mott MacDonald	2 of 4	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities / Detail	Main	Instrument/ Backfill
	94 (84) 78	NR				stepped, rough, with 0.5 to 1mm thick orangish brown clay smear and minor orangish brown iron stain, open. 7.10 - 7.40 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick orangish brown clay smear and minor orangish brown iron stain, open. 7.50 - 9.10 No obvious area of core loss. No recovery as washout of fines during drilling. No record of cavity.	medium strong. Very strong locally strong massive grey 'marbled' dark grey brownish white and white slightly bioclastic fine grained LIMESTONE. *(continued)* Point Load Test - 8.00m to 8.27m: medium strong. Point Load Test - 8.27m to 8.50m: strong. Point Load Test - 8.50m to 8.80m: strong. Point Load Test - 8.80m to 9.00m: very strong. 9.25m to 9.30m: subvertical white calcitic vein. 9.30m to 9.40m: weak brown probable residual rock with much iron stain and powder.	
9.10								
	100 (83) 53	6				8.95 - 9.15 Joint, subvertical dip, 'U' shaped, clean, tight, open as drilling induced. 9.25 - 9.50 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear and much orangish brown iron stain and powder, open.		
10.50		4				9.60 - 9.65 Joint, dipping 45°, stepped, rough, with 0.5 to 6mm thick orangish brown clay smear and some dark orangish brown iron stain and powder, open to moderately wide.		
	100 (96) 50							
24.05 11.60 24.05		3				10.20 - 11.00 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open. 11.50 - 11.60 Joint, subvertical dip, stepped, rough, with 0.5 to 2mm thick orangish brown clay smear and minor orangish brown iron stain, open.	11.60m to 16.10m: reduced from GBS to HQ core size to expedite HPD test.	
	100 (96) 90	5						
25.05 13.10 25.05						13.10 - 14.10 No obvious area of core loss. No recovery as washout of fines during drilling. No record of cavity.	Point Load Test - 13.10m to 13.30m: very strong. UCS - 13.30m to 14.10m: strong.	
	80 (75) 65	NR			(22.60)			
14.10								
	100 (88) 84	2						
14.60								
	100 (98) 98	0						

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
24/05/22	12.00	11.60					
25/05/22	12.00	13.10					

Rotary Flush

From (m)	To (m)	Type	Return (%)
9.3	25	Water	0

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used	Dando 2000/Geo 602		Driller CR/BD	Logged By EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH010**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	23-05-22 27-05-22	145.10	E 597,240.2 N 689,949.8

Engineer	Sheet	Status
Mott MacDonald	3 of 4	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities / Detail	Main	Instrument/ Backfill
26.05 26.05 16.10							Very strong locally strong massive grey 'marbled' dark grey brownish white and white slightly bioclastic fine grained LIMESTONE. *(continued)* 16.10m to 17.60m: reduced from GBS to HQ core size to expedite HPD test. Point Load Test - 16.50m to 16.80m: very strong.	
		3				16.45 - 16.50 Joint, dipping 45°, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.		
	100 (97) 92							
26.05 26.05 17.80		2					17.60m to 25.00m: reduced from GBS to HQ core size.	
	100 (98) 94	4						
19.40								
	100 (92) 45	5				19.35 - 19.80 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick orangish brown clay smear and orange and dark orangish brown iron stain and powder, open.		
20.10								
	100 (97) 95	2						
21.70		2						
	100 (96) 90	2				22.15 - 22.30 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick orangish brown clay smear, open.		
23.20								
		1				23.25 - 23.35 Joint, dipping 60°, stepped, smooth, with 0.5 to 1mm thick grey silt smear, open.		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
26/05/22	15.00	16.10					
26/05/22	17.00	17.60					

Rotary Flush

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

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Dando 2000/Geo 602		Driller CR/BD	Logged By EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH010**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	23-05-22 27-05-22	145.10	E 597,240.2 N 689,949.8

Engineer	Sheet	Status
Mott MacDonald	4 of 4	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
	100 (96) 87	2						Very strong locally strong massive grey 'marbled' dark grey brownish white and white slightly bioclastic fine grained LIMESTONE. *(continued)*	
27.05 25.00			120.10		25.00			BH terminated at 25.00m bgl on REs instruction.	

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
27/05/22	17.00	25.00										BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Dando 2000/Geo 602		Driller CR/BD	Logged By EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

BOREHOLE LOG

Project	Location	BOREHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH011**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	17-05-22 24-06-22	144.15	E 597,232.8 N 689,901.8

Engineer	GROUNDWATER STRIKES	Sheet
Mott MacDonald	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: dry 2nd: 3rd:	1 of 3 Rev.

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
0.00-0.60	B1			143.85		0.30	TOPSOIL: Grass over firm brown slightly sandy SILT with rootlets. Sand is fine.	
				143.55		0.60	Dense subangular to subrounded fine to medium assorted dark grey and grey limestone GRAVEL.	
							borehole continued by coring	

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
17-05-22	15.00	0.60	0.60			0.3	0.6	3600			50mm standpipe installed.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Dando 2000/DB-Boart	Bit Design	Driller CR/DK	Logged By EAT

IDL AGS3 UK BH BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH011**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	17-05-22 24-06-22	144.15	E 597,232.8 N 689,901.8

Engineer	Sheet	Status
Mott MacDonald	2 of 3	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Instrument / Backfill
17.05 0.60		0.60 (50/0mm)	143.55		0.60	0.60 - 10.20 Discontinuities, closely and very closely spaced to 4.60m, then medium spaced, locally closely spaced, dipping 10 to 12 and 36 to 38°, stepped, rough, with 0.5 to 3mm thick orangish brown clay smear. 1.50 - 1.60 Joint, dipping 60°, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.	Very strong massive grey 'marbled' light grey white and brownish white fine grained LIMESTONE. Point Load Test - 0.90m to 1.00m: medium strong. Point Load Test - 1.00m to 1.23m: strong.	
		7						
	80 (67) 35							
		10						
2.00								
		15						
	100 (91) 30							
3.60		13				3.60 - 3.80 Joint, vertical dip, stepped, rough, with 0.5 to 1mm thick light brown clay smear over 0.5 to 1mm thick carbonate crystal smear, 30mm wide aperture. 4.30 - 4.60 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick light grey clay smear, open. 4.60 - 4.90 Joint, subvertical dip, undulating, tight.		
	100 (73) 43							
		9						
4.90					(9.60)			
	100 (96) 73	6				5.35 - 5.75 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick brown clay smear and orangish brown iron stain, open.		
6.50		5						
	100 (97) 91						Point Load Test - 7.20m to 7.30m: weak. Point Load Test - 7.30m to 7.45m: very strong. Point Load Test - 7.45m to 7.53m: strong. Point Load Test - 7.53m to 7.62m: strong. Point Load Test - 7.62m to 7.72m: strong. Point Load Test - 7.72m to 7.82m: very strong. Point Load Test - 7.82m to 7.87m: very	
		1						
8.10						7.70 - 8.00 Joint, subvertical dip, undulating, tight.		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
17/05/22	15.00	0.60	0.60	203			

Rotary Flush

From (m)	To (m)	Type	Return (%)
0.6	10.2	Water	100

GENERAL REMARKS

50mm standpipe installed.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Dando 2000/DB-Boart		Driller: CR/DK	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH011**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	17-05-22 24-06-22	144.15	E 597,232.8 N 689,901.8

Engineer	Sheet	Status
Mott MacDonald	3 of 3	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities / Detail	Main	Instrument/ Backfill
	100 (95) 85	3					strong. Point Load Test - 7.87m to 8.07m: strong. Very strong massive grey 'marbled' light grey white and brownish white fine grained LIMESTONE. *(continued)*	
9.70	100 (100)	2				9.55 - 9.70 Joint, subvertical dip, planar, rough, with 0.5 to 1mm thick orangish brown clay smear, open.		
24.06 10.20	100		133.95		10.20			
							BH terminated at 10.20m bgl on REs instruction.	

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
24/06/22	15.00	10.20										50mm standpipe installed.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Dando 2000/DB-Boart		Driller: CR/DK	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

BOREHOLE LOG

Project	Location	BOREHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH012**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	18-05-22 27-06-22	144.63	E 597,219.8 N 689,883.0

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Mott MacDonald	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: dry 2nd: 3rd:	Sheet 1 of 3 Rev.

SAMPLES & TESTS			Water	STRATA				
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Instrument/ Backfill
0.00-0.40	B1			144.53		0.10	TOPSOIL: Grass over firm brown slightly sandy SILT with rootlets. Sand is fine.	
				144.23		0.40	Dense subangular to subrounded fine to medium assorted dark grey and grey limestone GRAVEL.	
							borehole continued by coring	

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
18-05-22	12.00	0.40	0.40			0.2	0.4	3600			50mm standpipe installed.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Dando 2000/Geo 602	Bit Design	Driller CR/BD	Logged By EAT

IDL AGS3 UK BH BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH012**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	18-05-22 27-06-22	144.63	E 597,219.8 N 689,883.0

Engineer	Sheet	Status
Mott MacDonald	2 of 3	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
18.05 0.40		0.40 (50/0mm)	144.23		0.40	0.40 - 0.50 m: overburden		Dense subangular to subrounded fine to medium assorted dark grey and grey limestone GRAVEL.	
	66 -		144.13		0.50	0.50 - 2.10 Non-intact as weathered rock.		Weathered LIMESTONE rock. Strong medium strong and very strong massive grey 'marbled' white fine grained limestone recovered as angular fine to coarse gravel and cobble sized clasts with a little orangish brown clay and minor surficial orangish brown iron stain and powder.	
1.50									
	100 (58) -								
2.10						2.10 - 3.60 No obvious area of core loss. No recovery as washout of fines during drilling. No record of cavity.		Point Load Test - 2.00m to 2.10m: medium strong.	
	93 (43) 22								
3.60		NI			(5.90)	3.60 - 6.40 Non-intact as weathered rock.			
	100 (36) 13								
5.10									
	100 (17) -								
			138.23		6.40				
6.70		2				6.40 - 10.00 Discontinuities, medium spaced, locally closely spaced, dipping 12 to 14°, stepped, smooth, with 0.5 to 1mm thick grey silt smear. 6.50 - 6.70 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick orangish brown clay smear, open.		Very strong massive dark grey 'marbled' light grey white and brownish white fine grained LIMESTONE.	
	100 (93) 89	1						UCS - 7.55m to 7.79m: strong. Point Load Test - 7.60m to 7.80m: very strong.	
8.10					(3.60)				

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
18/05/22	12.00	0.40	0.40	203			

Rotary Flush

From (m)	To (m)	Type	Return (%)
0.4	4.1	Water	100
4.1	10	Water	0

GENERAL REMARKS

50mm standpipe installed.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Dando 2000/Geo 602		Driller: CR/BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH012**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	18-05-22 27-06-22	144.63	E 597,219.8 N 689,883.0

Engineer	Sheet	Status
Mott MacDonald	3 of 3	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
	100 (98) 97	1						Very strong massive dark grey 'marbled' light grey white and brownish white fine grained LIMESTONE. *(continued)*	
9.50									
	100 (98) 97	2							
24.06 10.00			134.63		10.00				
								BH terminated at 10.00m bgl on REs instruction.	

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
24/06/22	16.00	10.00										50mm standpipe installed.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Dando 2000/Geo 602		Driller CR/BD	Logged By EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

BOREHOLE LOG

Project	Location	BOREHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH013**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	18-05-22 28-06-22	145.40	E 597,258.9 N 689,897.9

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Mott MacDonald	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: dry 2nd: 3rd:	Sheet 1 of 3 Rev.

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
0.00-0.20	B1			145.20		0.20	TOPSOIL: Grass over firm brown slightly sandy SILT with rootlets. Sand is fine. *borehole continued by coring*	

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
18-05-22	10.00	0.20	0.20			0.2	0.2	3600			BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Dando 2000/Geo 602	Bit Design	Driller CR/BD	Logged By EAT

IDL AGS3 UK BH BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH013**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	18-05-22 28-06-22	145.40	E 597,258.9 N 689,897.9

Engineer	Sheet	Status
Mott MacDonald	2 of 3	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities / Detail	Main	Instrument/ Backfill
18.05 0.20		0.20 (50/0mm)	145.20 145.00		0.20 0.40	0.20 - 0.40 m: overburden	Firm dark brown slightly gravelly CLAY. Gravel is subangular fine and medium of grey limestone.	
	81 (56) 23	6				0.40 - 10.00 Discontinuities, closely spaced, locally medium spaced to 5.10m, then medium spaced, locally closely spaced, dipping 12 to 14°, stepped, smooth, with 0.5 to 2mm thick light brown clay smear.	Very strong locally strong massive light brownish grey 'marbled' grey and brownish white slightly bioclastic fine grained LIMESTONE.	
1.10								
	100 (94) 57	10					Point Load Test - 1.50m to 1.60m: strong.	
2.10							Point Load Test - 2.00m to 2.10m: strong.	
		11						
	100 (76) 34					3.10 - 3.80 Joint, vertical dip, stepped, rough, with 0.5 to 1mm thick grey silt smear, open to 30mm wide aperture.		
3.70		26					3.70m: becoming grey.	
	100 (82) 44	12				4.70 - 5.05 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick cream silt smear, open.		
5.10					(9.60)		Point Load Test - 5.10m to 5.20m: very strong.	
	50 (98) 94	3						
6.50		5						
	100 (97) 83	5						
8.10								

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
18/05/22	10.00	0.20	0.20	203			

Rotary Flush

From (m)	To (m)	Type	Return (%)
0.2	2.8	Water	100
2.8	10	Water	0

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Dando 2000/Geo 602		Driller: CR/BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH013**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	18-05-22 28-06-22	145.40	E 597,258.9 N 689,897.9

Engineer	Sheet	Status
Mott MacDonald	3 of 3	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
	100 (98) 96	2						Very strong locally strong massive light brownish grey 'marbled' grey and brownish white slightly bioclastic fine grained LIMESTONE. *(continued)* Point Load Test - 8.40m to 8.60m: very strong.	
9.50	100 (92) 90	4							
28.06 10.00			135.40		10.00			BH terminated at 10.00m bgl on REs instruction.	

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
28/06/22	16.00	10.00										BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used	Dando 2000/Geo 602		Driller CR/BD	Logged By EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

BOREHOLE LOG

Project	Location	BOREHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH014**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	18-05-22 29-06-22	145.15	E 597,269.0 N 689,916.3

Engineer	GROUNDWATER STRIKES	Sheet
Mott MacDonald	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: dry 2nd: 3rd:	1 of 4 Rev.

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	
0.00-0.30	B1			144.95		0.20	TOPSOIL: Grass over firm brown slightly sandy SILT with rootlets. Sand is fine.	
							borehole continued by coring	

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
18-05-22	15.00	0.30	0.30			0.2	0.3	3600			50mm standpipe installed.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Dando 2000/Geo 602	Bit Design	Driller CR/BD	Logged By EAT

IDL AGS3 UK BH BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH014**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	18-05-22 29-06-22	145.15	E 597,269.0 N 689,916.3

Engineer	Sheet	Status
Mott MacDonald	2 of 4	FINAL / REVFINAL

RUN DETAILS

Depth / Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)
18.05 18.05 0.30		0.30 (50/30mm)	144.95 144.65		0.20 0.50
	94 (57) 22	5			
1.60		20			
	100 (96) 86				
2.10		11			
	100 (94) 43				
3.70		8			
	100 (91) 60	9			
5.10		4			
	100 (95) 80				
6.70		6			
	100 (97) 87	5			
8.10					

STRATA

DESCRIPTION

Discontinuities / Detail	Main
0.20 - 0.50 m: overburden	Dense subangular to subrounded fine to coarse assorted dark grey and grey limestone GRAVEL.
0.50 - 20.00 Discontinuities, closely spaced, locally medium spaced to 4.40m, then medium spaced, locally closely spaced, dipping 12 to 14°, stepped, smooth, with 0.5 to 7mm thick light orangish brown clay smear.	Very strong locally strong massive grey 'marbled' light grey and white slightly bioclastic fine grained LIMESTONE. 1.00m to 1.40m: strong light brownish grey weakly dolomitised limestone.
	Point Load Test - 2.50m to 2.60m: strong. Point Load Test - 2.60m to 2.70m: strong.
3.40 - 3.55 2 No perpendicular joints, subvertical dip, stepped, smooth, with 0.5 to 1mm thick grey silt smear, open.	
4.05 - 4.45 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick light orangish brown clay smear and minor orangish brown iron stain, open.	
	6.00m to 6.50m: strong light brownish grey weakly dolomitised limestone.

Instrument/ Backfill

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
18/05/22	15.00	0.30	0.30	203			

Rotary Flush

From (m)	To (m)	Type	Return (%)
0.2	20	Water	100

GENERAL REMARKS

50mm standpipe installed.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Dando 2000/Geo 602		Driller CR/BD	Logged By EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH014**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	18-05-22 29-06-22	145.15	E 597,269.0 N 689,916.3

Engineer	Sheet	Status
Mott MacDonald	3 of 4	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
	100 (98) 95	2						Very strong locally strong massive grey 'marbled' light grey and white slightly bioclastic fine grained LIMESTONE. *(continued)*	
9.70		4						Point Load Test - 9.50m to 9.60m: very strong.	
	100 (98) 95	5			(19.50)				
11.10		3							
	100 (97) 95	4							
12.70								UCS - 13.20m to 13.47m: strong.	
	100 (97) 96	4						Point Load Test - 13.70m to 13.80m: very strong.	
14.10		4							
	100 (98) 96								
15.50		3							

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

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used	Dando 2000/Geo 602		Driller CR/BD	Logged By EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH014**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	18-05-22 29-06-22	145.15	E 597,269.0 N 689,916.3

Engineer	Sheet	Status
Mott MacDonald	4 of 4	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities Detail	Main	Instrument/ Backfill
	100 (85) 61	5				16.20 - 16.65 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick brown clay smear and orangish brown iron stain and powder, open.	Very strong locally strong massive grey 'marbled' light grey and white slightly bioclastic fine grained LIMESTONE. *(continued)*	
17.10		2						
	100 (97) 86							
18.70		2				18.50 - 18.70 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick brown clay smear, open.		
	100 (93) 91	1						
29.06 20.00			125.15		20.00			
							BH terminated at 20.00m bgl on REs instruction.	

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
29/06/22	17.00	20.00										50mm standpipe installed.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Dando 2000/Geo 602		Driller: CR/BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH015**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	30-06-22 01-07-22	145.33	E 597,245.6 N 689,884.5

Engineer	Sheet	Status
Mott MacDonald	1 of 2	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities Detail	Main	Instrument/ Backfill
0.00			145.28		0.05	0.00 - 0.50 m: overburden	TOPSOIL: Grass over firm reddish brown slightly sandy SILT with rootlets. Sand is fine.	
			144.83		(0.45) 0.50			
	75 (46) 11	NI				0.50 - 1.00 Non-intact as weathered rock and closely and very closely spaced discontinuities. 1.00 - 15.00 Discontinuities, closely and very closely spaced to 2.50m, then medium spaced, locally closely spaced, dipping 12 to 14°, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear.	Weathered LIMESTONE rock. Very strong massive light grey fine limestone recovered as angular fine to coarse gravel sized clasts. Very strong locally strong massive grey 'marbled' light grey and white slightly bioclastic fine grained LIMESTONE. Point Load Test - 1.00m to 1.20m: strong.	
2.00		NI				1.80 - 2.40 Joint, subvertical dip, stepped, rough, with 0.5 to 8mm thick orangish brown clay smear, open to moderately wide.		
	100 (92) 27	20						
3.50		8				3.65 - 4.15 Joint, subvertical dip, stepped, rough, with 0.5 to 10mm thick orangish brown clay smear and orange and orangish brown iron stain and powder, open to moderately wide.		
	100 (94) 25	13				4.00 - 4.45 Joint, dipping 45°, stepped, rough, with 0.5 to 3mm thick orangish brown clay smear, open to moderately wide.		
5.00						4.55 - 4.60 Joint, dipping 45°, stepped, rough, with 0.5 to 3mm thick orangish brown clay smear, open to moderately wide.	Point Load Test - 4.80m to 5.00m: strong.	
	100 (89) 51	5				5.00 - 5.10 Joint, dipping 60°, stepped, rough, with 0.5 to 2mm thick orangish brown clay smear, open.	UCS - 5.60m to 6.20m: medium strong.	
6.50		3				5.25 - 5.40 Joint, subvertical dip, stepped, rough, with 0.5 to 6mm thick orangish brown clay smear, open to moderately wide. 5.45 - 5.65 Joint, subvertical dip, stepped, rough, with 0.5 to 6mm thick orangish brown clay smear, open to moderately wide.		
	100 (94) 67	3			(14.50)	6.70 - 6.90 Joint, subvertical dip, stepped, rough, with 0.5 to 6mm thick orangish brown clay smear, open to moderately wide.		
8.00						7.45 - 7.50 Joint, dipping 45°, stepped,		

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
								0	15	Water	100	BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH015**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	30-06-22 01-07-22	145.33	E 597,245.6 N 689,884.5

Engineer: Mott MacDonald

Sheet 2 of 2

Status FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities Detail	Main	Instrument/ Backfill
	100 (97) 92	2				rough, with 0.5 to 6mm thick orangish brown clay smear, open to moderately wide. 7.75 - 8.00 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick brown clay smear over 2mm thick white calcite, open. 8.55 - 8.70 Joint, subvertical dip, undulating, tight.	Very strong locally strong massive grey 'marbled' light grey and white slightly bioclastic fine grained LIMESTONE. *(continued)* Point Load Test - 8.30m to 8.50m: strong.	
9.50		2						
30.06 01.07	100 (94) 87						10.10m to 10.15m: horizontal white calcitic vein.	
		1				10.50 - 10.75 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick orangish brown clay smear, open.		
11.00								
	100 (97) 95	0						
12.50		2				12.40 - 12.70 Joint, subvertical dip, stepped, smooth, clean, open as drilling induced.		
	100 (96) 95	3						
14.00								
	100 (100) 100	0						
01.07 15.00			130.33		15.00			
							BH terminated at 15.00m bgl on REs instruction.	

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
30/06/22	17.00	10.00					
01/07/22	08.00	10.00					
01/07/22	12.00	15.00					

Rotary Flush

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

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH016**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	04-07-22 04-07-22	146.39	E 597,260.2 N 689,833.9

Engineer	Sheet	Status
Mott MacDonald	1 of 2	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities / Detail	Main	Instrument/ Backfill
0.00			146.29		0.10	0.00 - 1.00 m: overburden	TOPSOIL: Grass over firm dark reddish brown slightly sandy SILT with rootlets. Sand is fine.	
					(0.90)		Firm dark reddish brown slightly sandy slightly gravelly SILT. Sand is coarse. Gravel is subangular fine of assorted grey limestone.	
	75 (33) 9		145.39		1.00	1.00 - 13.00 Discontinuities, closely spaced, locally medium spaced to 3.00m, then medium spaced, locally closely spaced, dipping 12 to 14°, stepped, smooth, with 0.5 to 3mm thick orangish brown clay smear.	Very strong locally strong and medium strong massive grey 'marbled' light grey and white fine grained LIMESTONE.	
		28					Point Load Test - 1.50m to 1.60m: strong.	
2.00		NR				1.15 - 2.00 Joint, subvertical dip, stepped, rough, with 0.5 to 4mm thick orangish brown clay smear, open to moderately wide.	Point Load Test - 1.60m to 1.70m: strong.	
	94 (85) 53	13				2.00 - 2.10 Possible area of core loss as washout of fines during drilling. No record of cavity.		
						2.50 - 2.75 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear and orangish brown iron stain, open to moderately wide.		
3.60		7						
	100 (97) 90	7					Point Load Test - 4.50m to 4.60m: medium strong.	
5.10						4.95 - 5.10 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick orangish brown clay smear and orangish brown iron stain, open.		
		5						
	100 (95) 89							
6.60		3				6.25 - 6.40 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.		
					(12.00)			
	100 (97) 95	4						
						7.80 - 8.15 Joint, subvertical dip,		

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	13	Water	100

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH016**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	04-07-22 04-07-22	146.39	E 597,260.2 N 689,833.9

Engineer	Sheet	Status
Mott MacDonald	2 of 2	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities Detail	Main	Instrument/ Backfill
8.10	100 (96) 94	1				stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open as drilling induced. 8.55 - 8.60 Joint, dipping 45°, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open. 8.80 - 9.30 Joint, subvertical dip, undulating, tight. 9.20 - 9.25 Joint, dipping 45°, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.	Very strong locally strong and medium strong massive grey 'marbled' light grey and white fine grained LIMESTONE. *(continued)* Point Load Test - 8.20m to 8.30m: strong. UCS - 8.60m to 9.20m: medium strong.	
9.60	100 (97) 96	4 5				10.60 - 10.75 Joint, subvertical dip, undulating, clean, clean, open as drilling induced.		
11.10	100 (97) 96	1				12.20 - 12.75 2 No parallel joints, subvertical dip, undulating, tight.		
12.60	100 (90) 75	3						
04.07 13.00			133.39		13.00		Point Load Test - 12.80m to 12.90m: very strong. BH terminated at 13.00m bgl on REs instruction.	

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
04/07/22	16.00	13.00										BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used Geo 602		Driller BD	Logged By EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH018**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	08-07-22 20-07-22	145.08	E 597,217.6 N 689,980.0

Engineer	Sheet	Status
Mott MacDonald	1 of 6	FINAL / REVFINAL

RUN DETAILS				STRATA			
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail / Main	Instrument/ Backfill
0.00			144.83		0.25	0.00 - 24.60 m: overburden Reddish brown silty subangular fine to coarse light grey limestone GRAVEL.	
	35 - -				(1.95)	Orangish brown silty fine to coarse SAND.	
2.00			142.88		2.20		
			142.78		2.30	Subangular and angular fine and medium light brownish grey limestone GRAVEL with minor surficial orangish brown iron stain.	
	67 - -				(1.20)	Orangish brown silty fine to coarse SAND.	
3.50			141.58		3.50		
			141.48		3.60	Subangular and angular fine and medium light brownish grey limestone GRAVEL with minor surficial orangish brown iron stain.	
	33 - -				(1.80)	Orangish brown slightly silty gravelly fine to coarse SAND. Gravel is subrounded to rounded fine and medium of assorted dark grey and grey limestone.	
08.07 15.07 5.00			139.68		5.40	5.00m: becoming dark brownish grey.	
			139.58		5.50	Subrounded to angular fine to medium dark grey grey and light grey limestone GRAVEL.	
	100 - -		139.38		5.70	Brown slightly silty fine and medium SAND.	
6.50		6.50 (43)			(1.30)	Subrounded to angular fine to medium dark grey grey and light grey limestone GRAVEL with boulder. 6.50m: dense. Core run - 6.50m to 8.00m: 1 No light grey fine grained limestone boulder 520mm in length.	
			138.08		7.00		
	100 - -		137.78		7.30	Orange brown slightly silty angular fine and medium light grey 'marbled' brownish white fine grained limestone GRAVEL.	
8.00							

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
08/07/22	17.00	5.00					
15/07/22	08.00	5.00					

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	43	Polymer	100

GENERAL REMARKS

1 gallon polydrill used. BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH018**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	08-07-22 20-07-22	145.08	E 597,217.6 N 689,980.0

Engineer: Mott MacDonald

Sheet 2 of 6

Status FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities	Detail	Main
		8.00 (50/0mm)						Possible weathered LIMESTONE rock. Very strong massive light grey 'marbled' brownish white fine grained limestone recovered as angular fine and medium gravel cobble and boulder sized clasts. *(continued)* Core run - 8.00m to 9.50m: 1 No light grey fine grained limestone boulder 700mm in length. 1 No light grey fine grained limestone boulder 500mm in length. 1 No light grey fine grained limestone boulder 300mm in length. Point Load Test - 8.00m to 8.10m: strong. UCS - 9.00m to 9.30m: medium strong. Point Load Test - 9.00m to 9.10m: strong.
	93 - -				(2.20)			
9.50			135.58		9.50			
	100 - -	9.50 (50/0mm)			(0.60)			Brown slightly silty subrounded to angular fine to medium dark grey grey and light grey limestone GRAVEL with minor surficial orangish brown iron stain.
10.00			134.98		10.10			
	60 - -				(1.40)			Light brown speckled black silty fine and medium SAND. 11.00m: very dense.
		11.00 (58)						
11.50			133.58		11.50			
15.07			133.38		11.70			Very dense subrounded to angular fine to medium dark grey grey and light grey limestone GRAVEL.
18.07	47 - -							Light greyish brown slightly silty fine and medium SAND.
		12.50 (50/75mm)						
13.00								
	27 - -							
14.50								
		14.50 (55)						14.50m: very dense.
					(6.70)			
	33 - -							

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
15/07/22	17.00	12.00					
18/07/22	08.00	12.00					

Rotary Flush

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

GENERAL REMARKS

1 gallon polydrill used. BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH018**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	08-07-22 20-07-22	145.08	E 597,217.6 N 689,980.0

Engineer	Sheet	Status
Mott MacDonald	3 of 6	FINAL / REVFINAL

RUN DETAILS				STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
								Light greyish brown slightly silty fine and medium SAND. *(continued)*	
17.00									
	67 -								
	-								
			126.68		18.40				
18.50								Light orangish brown silty fine SAND.	
	27 -				(0.60)				
18.07 19.00	-		126.08		19.00				
18.07		19.00 (50/75mm)	125.98		19.10			19.00m: reduce from GBS core format to HQ core format. Subrounded to angular fine to medium dark grey grey and light grey limestone GRAVEL.	
	40 -								
	-								
18.07 20.00 19.07								Orangish brown fine and medium SAND interbedded with subangular and angular fine to medium light brownish grey fine grained limestone gravel.	
					(2.40)				
	40 -								
	-								
21.50			123.58		21.50				
								Very stiff orangish brown slightly gravelly SILT. Gravel is subrounded fine and medium of assorted grey limestone.	
	47 -								
	-								
23.00									
		23.00 (50/75mm)			(3.10)				
	67 -								
	-								

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
18/07/22	15.00	19.00					
18/07/22	17.00	20.00					
19/07/22	08.00	20.00					

Rotary Flush

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

GENERAL REMARKS

1 gallon polydrill used. BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH018**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	08-07-22 20-07-22	145.08	E 597,217.6 N 689,980.0

Engineer	Sheet	Status
Mott MacDonald	4 of 6	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities / Detail	Main	Instrument/ Backfill
24.50			120.48		24.60		Very stiff orangish brown slightly gravelly SILT. Gravel is subrounded fine and medium of assorted grey limestone. *(continued)*	
	100 (52) 30	3				24.60 - 38.80 Non intact as weathered rock and orange clay. No recovery as washout of fines during drilling. No record of cavity. 25.30 - 26.00 Non-intact as orange gravelly silty clay.	Weathered LIMESTONE rock. Strong massive light grey 'marbled' brownish white fine grained limestone interbedded with orange clay recovered as gravel cobble and boulder sized clasts. 25.30m to 26.00m: orange gravelly SILT. Gravel is angular to subangular fine to coarse of light grey fine grained limestone.	
26.00		NI						
	67 (36) 28						UCS - 26.30m to 26.45m: strong.	
							Point Load Test - 27.00m to 27.10m: strong.	
27.50								
	73 (21) -	NI						
29.00								
	93 (62) 34							
30.50		NI				30.10 - 30.25 Probable joint, apparently subvertical dip, stepped, smooth, with 30 to 0.5mm thick orange clay smear, very wide to open.		
		3						
	100 (59) 9					31.00 - 33.50 Probable joint, apparently subvertical dip, stepped, smooth, with 50 to 2mm thick orange clay smear, very wide to open.		
32.00					(14.20)			

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	1 gallon polydrill used. BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH018**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	08-07-22 20-07-22	145.08	E 597,217.6 N 689,980.0

Engineer	Sheet	Status
Mott MacDonald	5 of 6	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
		NI						Weathered LIMESTONE rock. Strong massive light grey 'marbled' brownish white fine grained limestone interbedded with orange clay recovered as gravel cobble and boulder sized clasts. *(continued)*	
	100 (30) 21								
33.50						33.50 - 34.10 Joint, subvertical dip, undulating, tight to 34.25m, then stepped, smooth, with 0.5 to 20mm thick orange clay smear, open to very wide.			
		0							
	100 (67) 43					34.25 - 38.80 Non intact as weathered rock and orange clay. No recovery as washout of fines during drilling. No record of cavity.			
19.07 20.07 35.00						35.15 - 37.90 Probable joint, Non-intact as angular fine to coarse gravel with some orange clay.		35.15m to 37.90m: angular to subangular fine to coarse light grey fine grained limestone gravel with some orange clay.	
	53 (17) -								
36.50		NI							
	53 (10) -								
38.00									
			106.28		38.80				
	95 (80) 67					38.80 - 43.00 Discontinuities, medium spaced, locally closely spaced, dipping 12 to 14°, stepped, smooth, with 0.5 to 3mm thick light brown clay smear.		Strong massive grey 'marbled' light grey and white fine grained LIMESTONE.	
		NI							
40.00									

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
19/07/22	17.00	35.00					
20/07/22	08.00	35.00					

Rotary Flush

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

GENERAL REMARKS

1 gallon polydrill used. BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used Geo 602		Driller BD	Logged By EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH018**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	08-07-22 20-07-22	145.08	E 597,217.6 N 689,980.0

Engineer	Sheet	Status
Mott MacDonald	6 of 6	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities / Detail	Main	Instrument/ Backfill
	100 (93) 80	3			(4.20)	40.65 - 40.70 Joint, dipping 45°, stepped, smooth, with 0.5 to 1mm thick orange clay smear, open. 40.75 - 40.85 Joint, dipping 60°, stepped, rough, clean, open as drilling induced.	Strong massive grey 'marbled' light grey and white fine grained LIMESTONE. *(continued)*	
41.30		0						
	100 (88) 87	1						
20.07 43.00			102.08		43.00		BH terminated at 43.00m bgl on REs instruction.	

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
20/07/22	14.00	43.00										1 gallon polydrill used. BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH019**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	28-07-22 02-08-22	144.32	E 597,205.4 N 689,994.5

Engineer	Sheet	Status
Mott MacDonald	1 of 4	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities Detail	Main	Instrument/ Backfill
0.00			143.82		(0.50) 0.50	0.00 - 0.50 m: overburden	No recovery. Drillers Comment: Clay.	
	75 -					0.50 - 30.50 Discontinuities, medium spaced, locally closely spaced, dipping 12 to 14°, stepped, smooth, with 0.5 to 6mm thick orangish brown clay smear.	Weathered LIMESTONE rock. Very strong massive grey 'marbled' dark grey and white fine grained limestone recovered as angular fine to coarse gravel and cobble sized clasts with some orange clay.	
	-	NI			(1.90)			
2.00			141.92		2.40			
	100 (77) 30	6					Very strong locally strong massive grey 'marbled' dark grey and white fine grained LIMESTONE. Point Load Test - 2.40m to 2.50m: strong.	
28.07 3.50 29.07		11				2.90 - 3.00 Joint, dipping 60°, stepped, smooth, with 0.5 to 30mm thick orangish brown clay smear, open to very wide. 3.10 - 4.00 Joint, subvertical dip, stepped, smooth, with 0.5 to 20mm thick light grey gravelly silt smear, open to very wide.		
	100 (83) 29	6				3.85 - 3.95 Joint, dipping 60°, stepped, rough, with 0.5 to 2mm thick orangish brown clay smear, open. 4.15 - 4.45 2 No parallel joints, subvertical dip, stepped, rough, with 0.5 to 3mm thick orangish grey silt smear, open to moderately wide.		
5.00						4.70 - 4.95 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick brown clay smear over 0.5 to 1mm thick brown carbonate crystal smear, open to moderately wide.		
	100 (69) 31	10				5.00 - 5.65 2 No parallel joints, subvertical dip, stepped, rough, with 0.5 to 30mm thick and 0.5 to 10mm thick angular fine and medium limestone gravel, open to very wide.		
6.50		6				5.70 - 6.00 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick brown clay smear, open. 6.30 - 6.40 Joint, dipping 60°, undulating, tight.		
	100 (93) 42	3				6.45 - 6.60 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear, open. 6.70 - 7.05 Joint, subvertical dip, stepped, rough, with 0.5 to 2mm thick		
8.00								

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
28/07/22	17.00	3.50					0.80
29/07/22	08.00	3.50					3.50

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	13.7	Polymer	100

GENERAL REMARKS

2 gallons polydrill used. BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: DC	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH019**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	28-07-22 02-08-22	144.32	E 597,205.4 N 689,994.5

Engineer: Mott MacDonald

Sheet 2 of 4

Status FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities Detail	Main	Instrument/ Backfill
	100 (94) 52	6				orangish brown clay smear, open. 7.15 - 7.55 2 No parallel joints, subvertical dip, stepped, rough, with 0.5 to 2mm thick orangish brown clay smear, open. 7.75 - 7.95 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick grey silt smear, open.	Very strong locally strong massive grey 'marbled' dark grey and white fine grained LIMESTONE. *(continued)* Point Load Test - 8.00m to 8.10m: strong.	
9.50		6				8.00 - 8.25 2 No perpendicular joints, subvertical dip, stepped, smooth, with 0.5 to 3mm thick orangish brown clay smear, open to moderately wide. 8.30 - 8.50 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear, open.		
	100 (95) 55	4				9.00 - 9.15 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear and orange and orangish brown iron stain, open.		
11.00						9.20 - 10.00 2 No parallel joints, subvertical dip, stepped, smooth, with 0.5 to 2mm thick grey silt smear, open. 10.25 - 10.35 Joint, dipping 60°, planar, smooth, with 0.5 to 2mm thick orangish brown clay smear, open.		
	100 (94) 82	3				10.70 - 10.85 Joint, dipping 60°, undulating, tight.	Point Load Test - 11.60m to 11.80m: strong.	
12.50		3				10.95 - 11.15 2 No parallel joints, subvertical dip, stepped, smooth, with 0.5 to 2mm thick grey silt smear, open. 11.90 - 12.10 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.		
	100 (80) 35	8				12.90 - 13.30 Joint, subvertical dip, stepped, rough, with 0.5 to 3mm thick orangish brown clay smear and angular fine limestone gravel, open to moderately wide.		
14.00						13.60 - 13.95 2 No parallel joints, subvertical dip, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear, open. 13.85 - 14.05 Joint, subvertical dip, stepped, smooth, with 0.5 to 3mm thick orangish brown clay smear, open to moderately wide.		
	100 (94) 89	3						
15.50		2				15.05 - 15.10 Joint, dipping 45°, stepped, smooth, with 0.5 to 50mm thick orangish brown slightly sandy clay smear, open to very wide.	15.05m to 15.10m: orangish brown slightly sandy clay. Sand is fine.	

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
13.8	30.5	Polymer	0

GENERAL REMARKS

2 gallons polydrill used. BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: DC	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH019**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	28-07-22 02-08-22	144.32	E 597,205.4 N 689,994.5

Engineer: Mott MacDonald

Sheet 3 of 4

Status FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities	Detail	Main
	100 (95) 91	1			(28.10)			Point Load Test - 15.90m to 16.00m: strong. Very strong locally strong massive grey 'marbled' dark grey and white fine grained LIMESTONE. *(continued)*
17.00								
	100 (96) 95	2						
18.50		2						Point Load Test - 18.50m to 18.70m: strong.
	100 (96) 95	1						
29.07 02.08 20.00						19.70 - 20.00 Joint, dipping 60°, undulating, tight.		
	100 - 61	2						
21.50		2						
	100 (83) 95	1						
23.00						22.80 - 22.85 Joint, dipping 45°, stepped, smooth, with 0.5 to 1mm thick grey silt smear, open.		
	100 (23) 61	2				23.70 - 24.30 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick		

Instrument / Backfill

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
29/07/22	15.00	20.00					
02/08/22	08.00	20.00					

Rotary Flush

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

GENERAL REMARKS

2 gallons polydrill used. BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: DC	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH019**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	28-07-22 02-08-22	144.32	E 597,205.4 N 689,994.5

Engineer	Sheet	Status
Mott MacDonald	4 of 4	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities Detail	Main	Instrument/ Backfill
						orangish brown slightly sandy clay smear, open.	Very strong locally strong massive grey 'marbled' dark grey and white fine grained LIMESTONE. *(continued)*	
24.50		2				24.65 - 24.70 Joint, dipping 45°, stepped, rough, with 0.5 to 2mm thick orangish brown clay smear, open.		
	100 (8) 94					24.75 - 24.80 Joint, dipping 45°, stepped, rough, with 0.5 to 6mm thick orangish brown clay smear, open to moderately wide.		
		0						
26.00								
		3						
	100 (96) 92							
27.50								
		0						
	100 (100) 95							
		1						
29.00						28.90 - 29.10 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear and minor orange iron stain, open.		
		3				29.20 - 29.40 Joint, subvertical dip, stepped, rough, with 0.5 to 2mm thick orange mottled grey clay smear, open with 40mm wide aperture.		
	100 (96) 69							
		1				30.20 - 30.50 Joint, subvertical dip, stepped, rough, with 0.5 to 2mm thick orangish brown mottled grey silt smear, open with 20mm wide aperture.		
02.08 30.50			113.82		30.50		BH terminated at 30.50m bgl on REs instruction.	

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
02/08/22	15.00	30.50					

Rotary Flush

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

GENERAL REMARKS

2 gallons polydrill used. BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: DC	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH020**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	26-07-22 28-07-22	147.24	E 597,223.0 N 689,997.1

Engineer	Sheet	Status
Mott MacDonald	1 of 5	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Instrument/ Backfill
0.00						0.00 - 15.00 m: overburden	Brown slightly silty angular fine to coarse assorted dark grey and grey limestone GRAVEL with low cobble content. Cobbles are of light grey limestone.	
	25 -				(2.20)			
2.00		2.00 (54)	145.04		2.20		2.00m: very dense.	
	50 -						Soft orangish brown slightly sandy gravelly SILT. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of assorted dark grey and grey limestone.	
3.50		3.50 (39/95mm)						
	100 -							
5.00		5.00 (43)					5.00m: becoming very stiff. 5.30m: becoming sandy.	
	50 -							
6.50		6.50 (49)					6.50m to 6.80m: greyish orangish brown.	
	50 -							
8.00					(11.30)			

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	18.5	Polymer	100

GENERAL REMARKS

4 gallons polydrill used. BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: DC	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH020**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	26-07-22 28-07-22	147.24	E 597,223.0 N 689,997.1

Engineer: Mott MacDonald

Sheet 2 of 5

Status FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities	Detail	Main	Instrument/ Backfill
	70 - -	8.00 (60)						Soft orangish brown slightly sandy gravelly SILT. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of assorted dark grey and grey limestone. *(continued)*	
9.50		9.50 (55)							
	100 - -								
26.07 11.00 27.07		11.00 (24)				11.00 - 12.50 No recovery. Core loss as washout of fines during drilling. No reocrd of cavity.		11.00m to 12.50m: No recovery. Drillers Comment: sand.	
	- - -								
12.50		12.50 (59/160mm)							
	100 - -		133.74		13.50				
			133.24		(0.50) 14.00			Firm orange CLAY.	
14.00		14.00 (75)						Soft orange sandy gravelly SILT. Sand is fine to coarse. Gravel is subangular fine and medium of assorted grey limestone.	
			132.64		(0.60) 14.60				
	100 (22) -		132.24		(0.40) 15.00			Dense orangish brown silty coarse SAND.	
15.50		15.50 5(25/0mm)				15.00 - 21.60 Discontinuities, apparently closely spaced to 15.70m, then medium spaced, dipping 10 to 12°, stepped, smooth, with 0.5 to 6mm thick orangish brown clay smear. 15.75 - 16.10 Joint, subvertical dip,		Very strong massive grey 'marbled' light grey and white fine grained LIMESTONE.	

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
26/07/22	17.00	11.00					2.40
27/07/22	08.00	11.00					10.40

Rotary Flush

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

GENERAL REMARKS

4 gallons polydrill used. BH backfilled.

All dimensions in metres
Scale 1:50

Client: Irish Water

Method/ Plant Used: Geo 602

Driller: DC

Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH020**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	26-07-22 28-07-22	147.24	E 597,223.0 N 689,997.1

Engineer	Sheet	Status
Mott MacDonald	3 of 5	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Instrument/ Backfill
	100 (90) 58	3			(2.10)	stepped, smooth, with 0.5 to 6mm thick orangish brown clay smear, open to moderately wide.	Very strong massive grey 'marbled' light grey and white fine grained LIMESTONE. *(continued)* Point Load Test - 16.50m to 16.60m: medium strong.	
17.00		17.00 (45/85mm)	130.14		17.10			
	100 - -					17.10 - 21.60 Non-intact as orangish brown clay.	Stiff orangish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine and medium of light grey limestone.	
18.50		18.50 (25/0mm) NI						
	100 - -				(4.50)			
20.00		20.00 (67)						
	70 - -	NI						
21.50			125.64		21.60			
	100 (83) 37					21.60 - 26.00 Non intact as weathered rock and orange clay.	Weathered LIMESTONE rock. Very strong massive light grey 'marbled' orangish white and grey fine grained limestone recovered as gravel cobble and boulder sized clasts interbedded with much orange clay. Point Load Test - 22.60m to 22.70m: very strong.	
23.00								
	100 (23) -	NI			(4.40)			

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
18.5	35	Polymer	0

GENERAL REMARKS

4 gallons polydrill used. BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: DC	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH020**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	26-07-22 28-07-22	147.24	E 597,223.0 N 689,997.1

Engineer: Mott MacDonald

Sheet 4 of 5

Status FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities	Detail	Main	Instrument/ Backfill
24.50	100 (8) -							Weathered LIMESTONE rock. Very strong massive light grey 'marbled' orangish white and grey fine grained limestone recovered as gravel cobble and boulder sized clasts interbedded with much orange clay. *(continued)*	
26.00			121.24		26.00				
	100 (96) 77	3				26.00 - 35.00 Discontinuities, medium spaced, locally closely spaced, dipping 10 to 12°, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear. 26.01 - 26.25 Joint, subvertical dip, stepped, rough, with 60 to 1mm thick orangish brown clay smear, very wide to open. 27.00 - 27.20 Joint, dipping 60°, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.		Very strong massive grey 'marbled' light grey and brownish white fine grained LIMESTONE. Point Load Test - 26.50m to 26.50m: very strong. UCS - 27.00m to 27.50m: medium strong.	
27.50		1							
	100 (100) 100	0							
27.07 29.00 28.07									
	100 (96) 65	0				29.90 - 30.50 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear, open.			
30.50		2			(9.00)				
	100 (74) 47	15				31.20 - 31.60 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear, open. 31.55 - 32.75 Joint, subvertical dip, stepped, smooth, with 0.5 to 20mm thick		31.20m to 32.00m: strong locally medium strong.	
32.00									

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
27/07/22	17.00	29.00					18.00
28/07/22	08.00	29.00					29.00

Rotary Flush

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

GENERAL REMARKS

4 gallons polydrill used. BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: DC	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH020**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	26-07-22 28-07-22	147.24	E 597,223.0 N 689,997.1

Engineer	Sheet	Status
Mott MacDonald	5 of 5	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities Detail	Main	Instrument/ Backfill
						orangish brown clay smear, open to very wide.	Very strong massive grey 'marbled' light grey and brownish white fine grained LIMESTONE. *(continued)*	
	100 (91) 49	6						
33.50		2				33.75 - 33.85 Joint, dipping 60°, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.		
	100 (96) 94					34.05 - 34.08 Joint, dipping 8°, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.		
		2				34.60 - 34.65 Joint, dipping 45°, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.		
27.07 35.00			112.24		35.00		BH terminated at 35.00m bgl on REs instruction.	

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
27/07/22	15.00	35.00					35.00					4 gallons polydrill used. BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: DC	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH021**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	21-07-22 22-07-22	145.56	E 597,221.9 N 689,981.5

Engineer	Sheet	Status
Mott MacDonald	1 of 4	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities Detail	Main	Instrument/ Backfill
0.00						0.00 - 2.50 Non intact as weathered rock.	Weathered LIMESTONE rock. Very strong massive grey 'marbled' brownish white fine grained limestone recovered as angular fine to coarse gravel cobble and boulder sized clasts with some orange clay. Core run - 0.00m to 2.00m: 1 No boulder sized clast 380mm in length.	
	100 (27) 14	NI			(2.50)			
2.00			143.06		2.50		Point Load Test - 1.60m to 2.00m: strong.	
	100 (49) 24	3				2.50 - 30.50 Discontinuities, medium spaced, dipping 12 to 14°, stepped, smooth, with 0.5 to 10mm thick orangish brown clay smear.	Very strong locally strong massive grey 'marbled' dark grey and brownish orangish white fine grained LIMESTONE.	
3.50		2				2.85 - 2.95 Joint, dipping 60°, stepped, rough, 0.5 to 2mm thick orangish brown clay smear and orange and orangish brown iron stain, open.		
	100 (98) 84	2				2.95 - 3.15 Joint, subvertical dip, stepped, rough, 0.5 to 2mm thick orangish brown clay smear and orange and orangish brown iron stain, open.	Point Load Test - 4.10m to 4.25m: strong.	
5.00		2				3.40 - 3.60 Joint, subvertical dip, stepped, rough, 0.5 to 2mm thick orangish brown clay smear and orange and orangish brown iron stain, open.	UCS - 4.30m to 4.65m: strong.	
	100 (92) 84	2				3.90 - 4.25 Joint, subvertical dip, stepped, smooth, clean, open as drilling induced.		
6.50		2				4.70 - 4.80 Joint, dipping 60°, stepped, smooth, clean, open as drilling induced.	Point Load Test - 5.90m to 6.10m: very strong.	
	100 (95) 59	2				6.10 - 6.15 Joint, dipping 45°, stepped, smooth, clean, open as drilling induced.		
8.00								

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	14.3	Polymer	100

GENERAL REMARKS

1 gallon polydrill used. BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH021**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	21-07-22 22-07-22	145.56	E 597,221.9 N 689,981.5

Engineer	Sheet	Status
Mott MacDonald	2 of 4	FINAL / REVFINAL

RUN DETAILS						STRATA		
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Instrument/ Backfill
		1				7.90 - 8.50 Joint, subvertical dip, stepped, smooth, 0.5 to 3mm thick orangish brown clay smear, open to moderately wide.	Very strong locally strong massive grey 'marbled' dark grey and brownish orangish white fine grained LIMESTONE. *(continued)*	
	100 (97) 83	NI				8.30 - 8.40 Non-intact as orange clayey angular fine and medium limestone gravel.	8.30m to 8.40m: orangish brown clayey angular fine and medium limestone gravel.	
		3				8.70 - 8.75 Joint, dipping 45°, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.	9.00m to 14.00m: becoming grey 'marbled' light grey and white.	
9.50		2						
	100 (96) 86						Point Load Test - 9.90m to 10.20m: very strong.	
		2				10.60 - 10.80 Joint, vertical dip, stepped, smooth, with 0.5mm thick orangish brown iron stain and powder, open.		
21.07 11.00 22.07								
	100 (95) 92	1						
12.50		2						
	100 (96) 85						Point Load Test - 12.90m to 13.00m: very strong.	
		3						
14.00						13.80 - 14.00 Joint, subvertical dip, stepped, rough, with 0.5 to 4mm thick grey silt smear, open to moderately wide.	14.00m to 14.30m: orangish brown clayey angular fine and medium limestone gravel.	
		NI				14.00 - 14.30 Non-intact as orangish brown clayey angular fine and medium limestone gravel.	14.30m to 30.50m: becoming grey 'marbled' dark grey and brownish orangish white.	
	100 (77) 69	1				14.90 - 14.95 Joint, dipping 45°, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.		
15.50						15.30 - 15.35 Joint, dipping 45°, stepped, smooth, with 0.5 to 4mm thick orangish brown mottled grey clay smear, open to moderately wide.		
		3					Point Load Test - 15.70m to 16.00m: very strong.	

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
21/07/22	17.00	11.00					
22/07/22	08.00	11.00					

Rotary Flush

From (m)	To (m)	Type	Return (%)
14.3	30.5	Polymer	0

GENERAL REMARKS

1 gallon polydrill used. BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH021**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	21-07-22 22-07-22	145.56	E 597,221.9 N 689,981.5

Engineer: Mott MacDonald

Sheet 3 of 4

Status FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Instrument/ Backfill
	100 (95) 33	3			(28.00)	15.50 - 15.65 Joint, subvertical dip, stepped, smooth, 0.5 to 1mm thick orangish brown clay smear, open. 16.00 - 16.90 Joint, subvertical dip, stepped, smooth, 0.5 to 3mm thick orangish brown clay smear, open to moderately wide.	Very strong locally strong massive grey 'marbled' dark grey and brownish orangish white fine grained LIMESTONE. *(continued)*	
17.00								
	100 (95) 75	2				17.25 - 17.30 Joint, dipping 45°, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear, open. 17.45 - 17.70 Joint, subvertical dip, stepped, smooth, 0.5 to 3mm thick orangish brown clay smear, open to moderately wide.		
18.50		3						
	100 (96) 74	2				18.80 - 19.15 Joint, subvertical dip, stepped, smooth, 0.5 to 3mm thick orangish brown clay smear, open to moderately wide. 19.10 - 19.15 Joint, dipping 45°, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear, open.		
20.00								
	100 (97) 67	2				20.50 - 20.75 Joint, subvertical dip, stepped, smooth, 0.5 to 2mm thick orangish brown clay smear and dark orangish brown iron stain and powder, open.		
21.50		3				21.25 - 21.50 Joint, subvertical dip, stepped, smooth, 0.5 to 1mm thick orangish brown clay smear and orange and dark orangish brown iron stain and powder, open.		
	100 (93) 79	6				21.75 - 21.90 Joint, subvertical dip, stepped, smooth, 0.5 to 10mm thick orangish brown clay smear, open to moderately wide. 22.15 - 22.30 Joint, dipping 45°, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.		
23.00								
	100 (96) 94	2				22.30 - 22.35 Joint, dipping 45°, stepped, smooth, with 0.5 to 5mm thick light orangish brown clay smear, open to moderately wide. 22.40 - 22.45 Joint, dipping 45°, stepped, smooth, with 0.5 to 5mm thick	23.80m to 23.90m: medium strong	

Drilling Progress and Water Observations

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

Rotary Flush

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

GENERAL REMARKS

1 gallon polydrill used. BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH021**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	21-07-22 22-07-22	145.56	E 597,221.9 N 689,981.5

Engineer	Sheet	Status
Mott MacDonald	4 of 4	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities Detail	Main	Instrument/ Backfill
24.50		2				light orangish brown clay smear, open to moderately wide. 23.80 - 23.90 Joint, dipping 60°, stepped, rough, 0.5 to 4mm thick orangish brown clay smear, open to moderately wide. 24.60 - 24.70 Joint, dipping 60°, stepped, smooth, 0.5 to 1mm thick orangish brown clay smear, open.	orangish brown staining penetrating 10mm into discontinuity. Very strong locally strong massive grey 'marbled' dark grey and brownish orangish white fine grained LIMESTONE. *(continued)*	
	100 (94) 91							
		3						
26.00								
		3				26.25 - 26.35 Joint, dipping 60°, stepped, rough, 0.5 to 2mm thick orangish brown clay smear, open. 26.60 - 26.90 Joint, subvertical dip, stepped, smooth, 0.5 to 1mm thick orangish brown clay smear and orange and orangish brown iron stain and powder, open.		
	100 (95) 71							
27.50		1						
	100 (96) 95							
		1						
29.00								
		2						
	100 (21) 95							
		1				29.90 - 29.95 Joint, dipping 45°, stepped, smooth, with 0.5 to 1mm thick light orangish brown clay smear, open.		
22.07 30.50			115.06		30.50			
							BH terminated at 30.50m bgl on REs instruction.	

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
22/07/22	16.00	30.50					

Rotary Flush

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

GENERAL REMARKS

1 gallon polydrill used. BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH022**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	03-08-22 04-08-22	143.47	E 597,206.5 N 689,981.8

Engineer: Mott MacDonald

Sheet 1 of 4

Status FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Instrument / Backfill
0.00					(0.50)	0.00 - 0.50 m: overburden	No recovery.	
			142.97		0.50			
	75 (14) -	NI			(2.00)	0.50 - 2.50 Non intact as weathered rock. 0.51 - 1.90 Joint, apparently subvertical dip, stepped, rough, with 0.5 to 3mm thick orangish brown clay smear, open to moderately wide, non-intact.	Weathered LIMESTONE rock. Very strong and strong massive grey 'marbled' dark grey and white fine grained limestone recovered as angular fine to coarse gravel and cobble sized clasts with some orange clay.	
2.00						2.00 - 2.30 Joint, apparently subvertical dip, stepped, rough, with 0.5 to 3mm thick orangish brown clay smear, open to moderately wide, non-intact.		
			140.97		2.50			
	100 (63) 13	5				2.35 - 2.55 Joint, apparently subvertical dip, stepped, rough, with 0.5 to 3mm thick orangish brown clay smear, open to moderately wide, non-intact.	Very strong locally strong massive light grey 'marbled' dark grey and white fine grained LIMESTONE.	
3.50		6				2.50 - 30.50 Discontinuities, medium spaced, locally closely spaced, dipping 12 to 14°, stepped, rough, with 0.5 to 4mm thick orangish brown clay smear. 2.60 - 3.20 Joint, subvertical dip, stepped, rough, with 0.5 to 10mm thick orangish brown clay smear, open to wide.	Point Load Test - 3.30m to 3.50m: strong. 3.50m to 6.30m: additionally 'marbled' orangish white.	
	100 (95) 13	6				3.40 - 3.50 Joint, dipping 60°, stepped, smooth, with 0.5 to 15mm thick orangish brown clay smear, open to very wide.	Point Load Test - 4.50m to 4.60m: medium strong.	
5.00						3.55 - 3.65 Joint, dipping 60°, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.		
	100 (94) 60	3				3.65 - 3.95 Joint, subvertical dip, stepped, rough, with 0.5 to 4mm thick orangish brown clay smear, open to moderately wide.		
6.50		3				3.95 - 5.35 Joint, subvertical dip, stepped, rough, with 0.5 to 5mm thick orangish brown clay smear, open to moderately wide. 5.50 - 5.60 Joint, dipping 60°, stepped, smooth, clean, open as drilling induced.	6.00m to 10.10m: becoming extremely strong.	
	100 (93) 77	3				5.75 - 6.20 Joint, subvertical dip, stepped, rough, with 0.5 to 2mm thick orangish grey silt smear, open. 6.45 - 6.75 Joint, subvertical dip, stepped, smooth, with 0.5 to 4mm thick orangish brown fine sand smear, open to moderately wide.	Point Load Test - 7.00m to 7.20m: very strong. UCS - 7.20m to 7.60m: strong.	
8.00						7.45 - 7.60 Joint, subvertical dip,		

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	30.5	Water	100

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH022**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	03-08-22 04-08-22	143.47	E 597,206.5 N 689,981.8

Engineer: Mott MacDonald

Sheet 2 of 4

Status FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Instrument/ Backfill
						stepped, rough, clean, open as drilling induced.	Very strong locally strong massive light grey 'marbled' dark grey and white fine grained LIMESTONE. *(continued)*	
	100 (94) 86	2				7.90 - 8.25 Joint, subvertical dip, stepped, smooth, with 0.5 to 3mm thick orangish brown fine sand smear, open to moderately wide.		
9.50		3				9.05 - 9.15 Joint, dipping 60°, stepped, smooth, with 0.5 to 2mm thick orangish brown fine sand smear, open.		
						9.55 - 9.70 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.		
	100 (71) 49	3				9.75 - 9.95 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear and minor dark orangish brown iron stain, open.	10.10m to 12.50m: strong with 'anastomosing' white calcitic veins and veinlets.	
11.00						9.85 - 10.30 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick dark orangish brown fine sand smear, open.	10.60m to 10.70m: strong locally medium strong vuggy.	
		4				10.60 - 10.70 Joint, dipping 60°, stepped, rough, with 0.5 to 6mm thick dark brown fine sand smear, open to moderately wide.	Point Load Test - 11.50m to 11.60m: very strong.	
	100 (71) 48					11.90 - 12.50 Joint, subvertical dip, stepped, rough, with 30 to 60mm wide aperture with dark brown fine sand infill up to 10mm thick, very wide.	11.90m to 12.50m: strong locally medium strong with 30 to 60mm wide aperture with dark brown fine sand infill.	
12.50		NI				12.60 - 13.20 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear, open.		
		4						
	100 (94) 65							
		4					Point Load Test - 13.40m to 13.50m: strong.	
03.08 14.00 04.08						13.80 - 14.30 Joint, subvertical dip, stepped, rough, with 0.5 to 3mm thick orangish brown clay smear, open to moderately wide.		
		4				14.30 - 14.40 Joint, subvertical dip, undulating, tight.	14.40m to 15.00m: very strong light whitish brown crystalline weakly dolomitised.	
	100 (94) 29					14.55 - 16.20 Joint, subvertical dip, stepped, rough, with 0.5 to 6mm thick orangish brown clay smear, open to moderately wide.	15.00m to 15.30m: strong locally medium strong vuggy dark brown iron stained calcitic vein.	
15.50		4						

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
03/08/22	17.00	14.00					
04/08/22	08.00	14.00					

Rotary Flush

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

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH022**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	03-08-22 04-08-22	143.47	E 597,206.5 N 689,981.8

Engineer	Sheet	Status
Mott MacDonald	3 of 4	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities Detail	Main	Instrument/ Backfill
	100 (96) -	2			(28.00)	16.25 - 17.40 Joint, subvertical dip, stepped, rough, with 0.5 to 4mm thick dark orangish brown clay smear, open to moderately wide.	Very strong locally strong massive light grey 'marbled' dark grey and white fine grained LIMESTONE. *(continued)*	
17.00	100 (96) 30	5				17.20 - 17.35 Joint, subvertical dip, 'V' shaped, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear and minor orangish brown iron stain, open. 17.70 - 17.95 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.		
18.50	100 (96) 94	3				18.00 - 18.30 Joint, subvertical dip, 'V' shaped, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear and minor orangish brown iron stain, open.		
20.00	100 (98) 97	2 1				19.45 - 19.55 Joint, dipping 60°, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.	Point Load Test - 20.00m to 20.10m: very strong.	
21.50	100 (100) 100	0 0				21.50 - 22.25 Joint, subvertical dip, undulating, tight.		
23.00	100 (96) 90	3				23.45 - 23.55 Joint, dipping 60°, stepped, rough, with 0.5 to 6mm thick orangish brown clay smear, open to		

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

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH022**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	03-08-22 04-08-22	143.47	E 597,206.5 N 689,981.8

Engineer	Sheet	Status
Mott MacDonald	4 of 4	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities Detail	Main	Instrument/ Backfill
						moderately wide. 23.70 - 23.80 Joint, dipping 60°, stepped, rough, with 0.5 to 4mm thick orangish brown clay smear, open to moderately wide. 23.80 - 24.10 Joint, subvertical dip, undulating, tight. 24.80 - 25.05 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open. 24.85 - 25.70 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear, open.	Very strong locally strong massive light grey 'marbled' dark grey and white fine grained LIMESTONE. *(continued)*	
24.50		2						
	100 (94) 53	5						
26.00								
	100 (98) 96	0						
27.50		1				27.40 - 28.10 Joint, subvertical dip, undulating, tight.	27.20m to 30.50m: additionally 'marbled' orangish white.	
	100 (95) 92	1				28.50 - 28.90 Joint, subvertical dip, undulating, tight.		
29.00								
	100 (96) 95	1						
04.08 30.50		3	112.97		30.50	30.20 - 30.50 Joint, subvertical dip, undulating, tight.		
							BH terminated at 30.50m bgl on REs instruction.	

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
04/08/22	17.00	30.50										BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used Geo 602		Driller BD	Logged By EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH023**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	06-07-22 07-07-22	140.86	E 597,203.5 N 689,907.8

Engineer: Mott MacDonald

Sheet 1 of 5

Status FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities / Detail	Main	Instrument/ Backfill
0.00			140.51		0.35	0.00 - 7.40 m: overburden	TOPSOIL: Soft reddish brown slightly sandy SILT with rootlets. Sand is fine.	
	100 - - 25 -				(1.65)		Dark orangish brown silty fine and medium SAND. (0.25m recovered).	
1.50								
	100 -							
2.00		2.00 (32)	138.86		2.00		Firm dark reddish brown sandy gravelly SILT with low cobble content. Sand is fine to coarse. Gravel is subangular to angular fine to coarse of light orangish brown weakly dolomitised limestone. Cobbles are of light orangish brown weakly dolomitised limestone.	
	93 -				(1.30)			
			137.56		3.30			
3.50			137.36		3.50		Subrounded fine and medium assorted grey and dark grey limestone GRAVEL. (0.20m recovered).	
		3.50 (29)					Stiff dark reddish brown sandy gravelly SILT with low cobble content. Sand is fine to coarse. Gravel is subangular to angular fine to coarse of light orangish brown weakly dolomitised limestone. Cobbles are of light orangish brown weakly dolomitised limestone.	
	60 -	NI						
5.00		5.00 (50/0mm)			(3.90)			
	60 -							
6.50		6.50 (50/75mm)						
	100 (41) -		133.46		7.40			
8.00		1				7.40 - 25.00 Discontinuities, medium spaced, locally closely spaced, dipping 12 to 14 °, stepped, smooth, with 0.5 to 20mm thick orange clay smear.	Very strong locally strong massive grey 'marbled' light grey and white fine and coarse grained LIMESTONE.	

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	12.5	Water	100
0	35	Water	100

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH023**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	06-07-22 07-07-22	140.86	E 597,203.5 N 689,907.8

Engineer	Sheet	Status
Mott MacDonald	2 of 5	FINAL / REVFINAL

RUN DETAILS						STRATA		
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION Discontinuities / Detail	Main	Instrument / Backfill
		8.00 (50/0mm)				7.41 - 7.75 Joint, subvertical dip, stepped, smooth, with 63 to 1mm thick orangish brown gravelly clay smear, very wide to open.	Very strong locally strong massive grey 'marbled' light grey and white fine and coarse grained LIMESTONE. *(continued)*	
	100 (77) -	6				7.80 - 7.90 Joint, subvertical dip, 'U' shaped, stepped, rough, with 0.5 to 5mm thick orangish brown gravelly clay smear, open to moderately wide.	Point Load Test - 8.00m to 8.10m: strong.	
9.50		4				8.00 - 9.45 Joint, subvertical dip, stepped, rough, with 10 to 50mm thick orangish brown gravelly clay smear, moderately wide to very wide.	Point Load Test - 9.00m to 9.10m: very strong.	
		4					Point Load Test - 9.50m to 9.60m: very strong.	
	100 (95) 86	1					UCS - 9.60m to 9.90m: very strong.	
06.07 11.00 07.07								
	100 (90) 61	4				11.60 - 12.10 Joint, subvertical dip, planar, smooth, with 0.5 to 2mm thick orangish brown clay smear and orange and dark orangish brown iron stain and powder, open.		
12.50		2				12.30 - 13.50 Joint, subvertical dip, undulating, tight.		
	100 (91) 83	3				13.50 - 14.00 Joint, vertical dip, stepped, rough, with 0.5 to 1mm thick orangish brown fine sand smear, open.		
14.00								
	100 (97) 84	2 NI					Point Load Test - 14.90m to 15.00m: strong.	
18.08 15.50 19.08		5				15.30 - 15.80 Joint, subvertical dip, stepped, rough, clean, open as drilling induced.		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
06/07/22	17.00	11.00					
07/07/22	08.00	11.00					
18/08/22	17.00	15.50					
19/08/22	08.00	15.50					

Rotary Flush

From (m)	To (m)	Type	Return (%)
12.5	25	Water	0

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH023**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	06-07-22 07-07-22	140.86	E 597,203.5 N 689,907.8

Engineer: Mott MacDonald

Sheet 3 of 5

Status FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
	100 (87) 79	3			(17.60)			Very strong locally strong massive grey 'marbled' light grey and white fine and coarse grained LIMESTONE. *(continued)*	
17.00									
	100 (98) 97	0 NI							
18.50		3				18.45 - 20.00 Joint, vertical dip to 17.20m, then subvertical dip, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.			
	100 (94) -	NI 3							
20.00									
	100 (98) 96	1							
21.50		1							
	100 (98) 96	2							
23.00									
	100 (88) 75	1				23.80 - 23.90 Joint, dipping 60°,			

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

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH023**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	06-07-22 07-07-22	140.86	E 597,203.5 N 689,907.8

Engineer	Sheet	Status
Mott MacDonald	4 of 5	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities / Detail	DESCRIPTION Main	Instrument/ Backfill
24.50	100 (96) 94	3				stepped, smooth, with 0.5 to 1mm thick grey silt smear, open.	Very strong locally strong massive grey 'marbled' light grey and white fine and coarse grained LIMESTONE. *(continued)*	
07.07 25.00	100 (94) 92		115.86		25.00		BH terminated at 25.00m bgl on REs instruction.	
26.00								
	100 (94) 93							
27.50								
	100 (96) 94							
19.08 29.00 22.08								
	100 (97) 96							
30.50								
	100 (96) 94							
32.00								

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
07/07/22	17.00	25.00					
19/08/22	17.00	29.00					
22/08/22	08.00	29.00					

Rotary Flush

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

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH023**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	06-07-22 07-07-22	140.86	E 597,203.5 N 689,907.8

Engineer	Sheet	Status
Mott MacDonald	5 of 5	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
	100 (95) 93								
33.50									
	100 (96) 94								
22.08 35.00 22.08									

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
22/08/22	17.00	35.00										BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH024**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	18-08-22 22-08-22	139.83	E 597,196.5 N 689,924.8

Engineer: Mott MacDonald

Sheet 1 of 5

Status FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Instrument/ Backfill
0.00			139.48		0.35	0.00 - 3.50 m: overburden	TOPSOIL: Soft reddish brown mottled grey sandy SILT with rootlets. Sand is fine.	
	100 - -						Angular fine and medium light grey limestone GRAVEL with low boulder content and some orangish brown clay.	
1.50								
	100 - -							
2.00					(3.15)		Core run - 2.00m to 3.50m: 1 No light grey limestone boulder 260mm in length.	
	100 (21) 18						Point Load Test - 2.60m to 2.80m: medium strong.	
3.50		3.50 (50/75mm)	136.33		3.50	3.50 - 5.00 Non-intact as possible weathered rock.	Core run - 3.50m to 5.00m: 1 No light grey limestone boulder 290mm in length.	
	100 (43) 19	NI			(1.50)		Possible weathered LIMESTONE rock. Very strong massive grey 'marbled' brownish grey and white fine grained limestone with 'anastomosing' white calcitic veinlets recovered as angular fine to coarse gravel cobble and boulder sized clasts and some orangish brown clay.	
5.00			134.83		5.00			
	100 - -		134.03		(0.80) 5.80	5.00 - 9.30 Non-intact as orangish brown gravelly clay.	Stiff orangish brown slightly sandy gravelly SILT. Sand is fine to coarse. Gravel is angular fine to medium of light orangish brown and white limestone.	
6.50		6.50 (50/150mm)			(1.50)		Very stiff orangish brown slightly sandy SILT. Sand is fine to medium.	
	100 - -		132.53		7.30			
8.00							Stiff orangish brown slightly sandy CLAY with black coarse sand sized organic fragments. Sand is coarse.	

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	35	Water	100

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH024**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	18-08-22 22-08-22	139.83	E 597,196.5 N 689,924.8

Engineer	Sheet	Status
Mott MacDonald	2 of 5	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Instrument/ Backfill
	100 - -				(2.00)		Stiff orangish brown slightly sandy CLAY with black coarse sand sized organic fragments. Sand is coarse. *(continued)*	
			130.53		9.30			
9.50		9.50 4(50/0mm)			(0.45)	9.30 - 9.75 Discontinuities, apparently closely spaced, dipping 12 to 14°, stepped, smooth, with 0.5 to 2mm thick orange clay smear.	Very strong massive grey 'marbled' white fine grained LIMESTONE. Point Load Test - 9.50m to 9.70m: weak.	
			130.08		9.75	9.75 - 12.20 Non-intact as orangish brown gravelly clay.	Very stiff orangish brown slightly sandy SILT. Sand is coarse.	
	100 (48) 22				(1.25)			
11.00			128.83		11.00			
	100 (20) -				(1.20)		Very stiff orangish brown slightly sandy gravelly SILT. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of light orangish brown and white limestone.	
			127.63		12.20			
12.50						12.20 - 17.00 Non-intact as weathered rock.	Weathered LIMESTONE rock. Very strong and strong massive grey 'marbled' brownish grey and white vuggy fine grained limestone with 'anastomosing' white calcitic veinlets recovered as angular fine to coarse gravel cobble and boulder sized clasts and a little orangish brown clay. Point Load Test - 13.40m to 13.50m: strong.	
	100 (63) 20							
14.00								
	100 (37) 21	NI						
18.08 15.50 19.08								

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
18/08/22	17.00	15.50					
19/08/22	08.00	15.50					

Rotary Flush

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

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH024**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	18-08-22 22-08-22	139.83	E 597,196.5 N 689,924.8

Engineer: Mott MacDonald

Sheet 3 of 5

Status FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities	DESCRIPTION: Detail	DESCRIPTION: Main	Instrument/ Backfill
	100 (26) -				(7.80)			Weathered LIMESTONE rock. Very strong and strong massive grey 'marbled' brownish grey and white vuggy fine grained limestone with 'anastomosing' white calcitic veinlets recovered as angular fine to coarse gravel cobble and boulder sized clasts and a little orangish brown clay. *(continued)*	
17.00						17.00 - 18.50 Non-intact as weathered rock. No recovery as washout of fines during drilling. No record of cavity.			
	67 - -	NI							
18.50						18.50 - 20.00 Non-intact as weathered rock.			
	100 - -	NI							
20.00			119.83		20.00				
	100 (71) 9	4				20.00 - 20.30 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear, open. 20.00 - 35.00 Discontinuities, medium spaced, locally closely spaced, dipping 12 to 14°, stepped, smooth, with 0.5 to 4mm thick orangish brown clay smear. 20.35 - 20.50 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear, open. 20.45 - 20.85 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear, open. 20.85 - 21.35 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear, open.		Very strong locally strong and medium strong massive grey 'marbled' light grey brownish white and white fine grained LIMESTONE. Point Load Test - 20.30m to 20.50m: strong.	
21.50		2							
	100 (93) 79	4						Point Load Test - 21.90m to 22.00m: medium strong. UCS - 22.00m to 22.45m: strong.	
23.00									
	100 (95) 93	2							

Drilling Progress and Water Observations

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

Rotary Flush

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

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH024**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	18-08-22 22-08-22	139.83	E 597,196.5 N 689,924.8

Engineer	Sheet	Status
Mott MacDonald	4 of 5	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
24.50		2						Very strong locally strong and medium strong massive grey 'marbled' light grey brownish white and white fine grained LIMESTONE. *(continued)*	
	100 (94) 92								
		2							
26.00									
	100 (94) 93	2							
27.50		1			(15.00)				
	100 (96) 94								
		2							
19.08 29.00 22.08									
	100 (97) 96	1				29.80 - 30.00 Joint, subvertical dip, undulating locally stepped, smooth, clean, open as drilling induced.			
30.50		3							
	100 (96) 94								
		3							
32.00									

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
19/08/22 22/08/22	17.00 08.00	29.00 29.00										BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH024**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	18-08-22 22-08-22	139.83	E 597,196.5 N 689,924.8

Engineer	Sheet	Status
Mott MacDonald	5 of 5	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
	100 (95) 93	3						Very strong locally strong and medium strong massive grey 'marbled' light grey brownish white and white fine grained LIMESTONE. *(continued)*	
33.50		3				33.45 - 34.00 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.		33.45m to 34.00m: 10 to 15mm wide subvertical white calcitic vein.	
	100 (96) 94	2							
22.08 35.00			104.83		35.00				
								BH terminated at 35.00m bgl on REs instruction.	

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
22/08/22	17.00	35.00										BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH025**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	15-08-22 17-08-22	138.53	E 597,187.0 N 689,944.6

Engineer	Sheet	Status
Mott MacDonald	1 of 5	FINAL / REVFINAL

RUN DETAILS				STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities Detail	Main	Instrument/ Backfill
0.00						0.00 - 0.80 m: overburden	Firm orangish brown slightly gravelly sandy SILT with rootlets. Sand is fine to coarse. Gravel is subangular fine of brownish grey siltstone and brownish grey limestone.	
			137.73		(0.80) 0.80			
	95 (26) -	NI			(1.20)	0.80 - 2.00 Non intact as weathered rock.	Weathered LIMESTONE rock. Very strong massive light grey 'marbled' orangish white and grey fine grained limestone recovered as angular fine to coarse gravel and cobble sized clasts with some orange clay.	
2.00			136.53		2.00			
	100 (85) 41	18				1.90 - 2.35 Joint, subvertical dip, stepped, rough, with 0.5 to 2mm thick orangish brown clay smear, open. 2.00 - 35.00 Discontinuities, medium spaced, locally closely spaced, dipping 12 to 14°, stepped, smooth, with 0.5 to 5mm thick orangish brown clay smear. 2.40 - 2.50 Joint, dipping 60°, stepped, rough, with 0.5 to 2mm thick orangish brown clay smear, open.	Very strong locally weak and strong massive grey 'marbled' orangish white grey and white fine grained LIMESTONE. Point Load Test - 2.00m to 2.10m: weak.	
3.50		6				2.45 - 2.75 Joint, subvertical dip, undulating, tight. 2.70 - 2.95 Joint, subvertical dip, stepped, smooth, with 0.5 to 4mm thick orangish brown clay smear, open to moderately wide.		
	100 (95) 62	3				3.30 - 3.50 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.		
5.00						3.35 - 3.50 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.	Point Load Test - 4.80m to 5.00m: very strong. Point Load Test - 5.10m to 5.30m: strong.	
	100 (92) 56	7				3.50 - 3.70 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open. 4.10 - 4.40 Joint, subvertical dip, planar, smooth, with 0.5 to 2mm thick orangish brown clay smear, open.	Point Load Test - 5.30m to 5.50m: strong. UCS - 5.70m to 6.10m: strong.	
6.50		6				4.55 - 4.65 Joint, dipping 60°, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open. 4.85 - 4.95 Joint, dipping 60°, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.		
	100 (81) 27	8				5.00 - 5.25 Joint, subvertical dip, stepped, rough, with 0.5 to 2mm thick orangish brown clay smear, open. 5.30 - 5.60 Joint, vertical dip, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear, open.		
8.00								

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	35	Water	100

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH025**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	15-08-22 17-08-22	138.53	E 597,187.0 N 689,944.6

Engineer	Sheet	Status
Mott MacDonald	2 of 5	FINAL / REVFINAL

RUN DETAILS						STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
	100 (92) 87	3				6.10 - 7.20 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open. 6.80 - 7.20 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.		Very strong locally weak and strong massive grey 'marbled' orangish white grey and white fine grained LIMESTONE. *(continued)*	
9.50		6				7.65 - 8.05 2 No perpendicular joints, subvertical dip, stepped, smooth, with 0.5 to 3mm thick orangish brown clay smear, open to moderately wide. 8.15 - 8.25 Joint, dipping 60°, stepped, rough, clean, open as drilling induced. 8.55 - 8.65 Joint, dipping 60°, stepped, rough, clean, open as drilling induced. 8.90 - 9.00 Joint, dipping 60°, stepped, rough, clean, open as drilling induced.		Point Load Test - 9.30m to 9.40m: very strong.	
	100 (90) 32	6				9.40 - 9.80 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.			
11.00		10				9.75 - 10.25 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open. 9.95 - 10.20 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.		Point Load Test - 11.30m to 11.50m: strong.	
	100 (91) 55					10.80 - 11.20 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.			
12.50		1				11.60 - 11.75 Joint, subvertical dip, stepped, smooth, with 0.5 to 6mm thick orangish brown clay smear, open to moderately wide. 11.80 - 12.00 Joint, subvertical dip, stepped, rough, with 0.5 to 2mm thick orangish brown clay smear, open.			
	100 (97) 89	2				13.25 - 13.35 Joint, dipping 60°, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.			
14.00						13.90 - 14.00 Joint, dipping 60°, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.			
	100 (97) 75	0							
15.50		3				15.10 - 15.90 Joint, subvertical dip, stepped, rough, with 0.5 to 2mm thick orangish brown clay smear, open.		Point Load Test - 15.80m to 16.00m:	

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

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH025**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	15-08-22 17-08-22	138.53	E 597,187.0 N 689,944.6

Engineer	Sheet	Status
Mott MacDonald	3 of 5	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
	100 (95) 68	3						strong. Very strong locally weak and strong massive grey 'marbled' orangish white grey and white fine grained LIMESTONE. *(continued)*	
17.00						17.00 - 17.45 Joint, subvertical dip, stepped, smooth, with 0.5 to 3mm thick orangish brown clay smear, open to moderately wide.			
	100 (95) 75	2							
15.08 18.50 16.08		2			(33.00)				
	100 (95) 84	3				19.55 - 19.80 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.			
20.00						20.00 - 20.20 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.			
	100 (96) 61	2				20.40 - 20.80 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear, open.			
21.50		2				21.50 - 21.75 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear, open.			
	100 (92) 83	3				22.50 - 22.60 Joint, dipping 60°, stepped, smooth, clean, open as drilling induced.			
23.00						22.80 - 23.10 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick orangish brown clay smear, open.			
	100 (95) 93	2							

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
15/08/22	17.00	18.50					
16/08/22	08.00	18.50					

Rotary Flush

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

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used Geo 602		Driller BD	Logged By EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH025**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	15-08-22 17-08-22	138.53	E 597,187.0 N 689,944.6

Engineer	Sheet	Status
Mott MacDonald	4 of 5	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities	Detail	Main	Instrument/ Backfill
24.50		2						Very strong locally weak and strong massive grey 'marbled' orangish white grey and white fine grained LIMESTONE. *(continued)*	
	100 (82) 52	5				25.30 - 26.05 Joint, subvertical dip, stepped, rough, with 0.5 to 2mm thick orangish brown clay smear, open.		25.30m to 26.00m: vuggy.	
26.00						26.10 - 26.20 Joint, dipping 60°, stepped, rough, with 0.5 to 2mm thick orangish brown clay smear, open.			
	100 (92) 89	2							
27.50		3				27.50 - 27.70 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.			
	100 (92) 90	0							
16.08 29.00 17.08									
	100 (95) 87	4				29.25 - 29.35 Joint, dipping 60°, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.			
30.50		2				30.35 - 30.70 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.			
	100 (96) 91	1							
32.00									

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
16/08/22	17.00	29.00										BH backfilled.
17/08/22	08.00	29.00										

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH025**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	15-08-22 17-08-22	138.53	E 597,187.0 N 689,944.6

Engineer	Sheet	Status
Mott MacDonald	5 of 5	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities Detail	Main	Instrument/ Backfill
	100 (96) 69	1				32.00 - 32.45 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear, open.	Very strong locally weak and strong massive grey 'marbled' orangish white grey and white fine grained LIMESTONE. *(continued)* 32.00m to 32.90m: 0.5 to 20mm wide white calcitic vein.	
33.50		3				33.50 - 33.60 Joint, dipping 60°, stepped, smooth, with 0.5 to 1mm thick grey silt smear, open.		
	100 (96) 94	1						
17.08 35.00			103.53		35.00			
							BH terminated at 35.00m bgl on REs instruction.	

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
17/08/22	17.00	35.00										BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used Geo 602		Driller BD	Logged By EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH026**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	11-08-22 12-08-22	137.60	E 597,178.0 N 689,963.1

Engineer	Sheet	Status
Mott MacDonald	1 of 5	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities / Detail	Main	Instrument/ Backfill
0.00			137.50		0.10	0.00 - 0.10 m: overburden 0.10 - 8.00 Non intact as weathered rock.	TOPSOIL: Grass over firm reddish brown slightly sandy SILT with rootlets. Sand is fine to medium.	
	100 (7) -						Weathered LIMESTONE rock. Strong and very strong massive grey 'marbled' dark grey and white fine grained limestone recovered as angular fine to coarse gravel and cobble sized clasts with some orangish brown clay.	
1.50								
	100 - -							
2.00							2.20m to 8.00m: as cobble and boulder sized clasts. 2.30m to 2.50m: vuggy. Point Load Test - 2.60m to 2.80m: strong.	
	100 (50) 25							
3.50						3.10 - 3.50 2 No perpendicular joints, apparently subvertical dip, stepped, rough, with 0.5 to 1mm thick orangish brown clay smear and orange and orangish brown iron stain and powder, open, non-intact.		
	100 (42) -	NI			(7.90)	3.60 - 4.35 Joint, apparently subvertical dip, stepped, rough, with 0.5 to 3mm thick orangish brown clay smear, open to moderately wide, non-intact. 4.20 - 5.00 2 No perpendicular joints, apparently subvertical dip, stepped, rough, with 0.5 to 3mm thick orangish brown clay smear, open to moderately wide, non-intact.		
5.00						5.00 - 5.85 2 No perpendicular joints, apparently subvertical dip, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open to moderately wide, non-intact.		
	100 (63) 45						Point Load Test - 5.80m to 6.00m: strong. UCS - 6.20m to 6.65m: strong.	
6.50						6.40 - 7.60 2 No perpendicular joints, apparently subvertical dip, stepped, rough, with 0.5 to 8mm thick orangish brown gravelly clay smear, open to moderately wide, non-intact.		
	100 (49) 22							
8.00			129.60		8.00			

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	5.5	Water	100
5.5	35	Water	0

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH026**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	11-08-22 12-08-22	137.60	E 597,178.0 N 689,963.1

Engineer	Sheet	Status
Mott MacDonald	2 of 5	FINAL / REVFINAL

RUN DETAILS					STRATA		
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities Detail	Main	Instrument/ Backfill
	100 (98) 96	0				8.00 - 35.00 Discontinuities, medium spaced, locally closely spaced, dipping 12 to 14°, stepped, smooth, with 0.5 to 3mm thick orangish brown clay smear. 8.60 - 8.75 Joint, subvertical dip, undulating, tight.	Very strong locally medium strong and strong massive grey 'marbled' light grey and white fine grained LIMESTONE.	
9.50		0				9.40 - 9.45 Joint, dipping 45°, stepped, rough, with 0.5 to 2mm thick grey silt smear, open.	Point Load Test - 9.30m to 9.50m: very strong.	
	100 (94) 93	2				10.25 - 10.35 Joint, dipping 60°, stepped, smooth, with 0.5 to 1mm thick grey fine sand smear, open.		
11.00						11.00 - 11.30 Joint, subvertical dip, undulating, tight.		
	100 (85) 64	5				11.65 - 11.85 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open. 11.85 - 11.90 Non-intact as angular fine and medium gravel sized clasts.		
12.50		3				12.25 - 12.50 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear, open.		
	100 (96) 91	2				13.10 - 13.90 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.		
14.00								
	100 (95) 91	3					Point Load Test - 14.50m to 4.70m: medium strong.	
11.08 15.50 11.08		3				15.40 - 15.50 Joint, dipping 60°, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.		

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
11/08/22	08.00	15.50										BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used Geo 602		Driller BD	Logged By EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH026**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	11-08-22 12-08-22	137.60	E 597,178.0 N 689,963.1

Engineer	Sheet	Status
Mott MacDonald	3 of 5	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
	100 (95) 65	5				16.00 - 16.35 Joint, subvertical dip, 'V' shaped, stepped, smooth, with 0.5 to 5mm thick orangish brown clay smear, open to moderately wide.		Very strong locally medium strong and strong massive grey 'marbled' light grey and white fine grained LIMESTONE. *(continued)*	
17.00						16.75 - 16.90 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.			
	100 (95) 67	3				17.30 - 17.70 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick orangish brown clay smear and dark orangish brown iron stain, open. 17.80 - 18.50 Joint, subvertical dip, undulating, with 0.5mm thick orangish brown clay infill, partly open.			
18.50		3						Point Load Test - 18.50m to 18.60m: very strong.	
	100 (98) 90	4				19.50 - 19.95 Joint, dipping 45°, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open. 19.70 - 20.00 Joint, subvertical dip, stepped, smooth, clean, open as drilling induced.			
20.00									
	100 (97) 92	3				20.30 - 20.40 Joint, dipping 60°, stepped, smooth, with 0.5mm thick grey silt smear and minor orangish brown iron stain, open.			
21.50		3			(27.00)				
	100 (91) 71	4				22.60 - 23.35 2 No parallel joints, subvertical dip, stepped, smooth, with 0.5 to 3mm thick orangish brown clay smear, open to moderately wide.			
23.00									
	100 (94) 75	3							

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

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH026**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	11-08-22 12-08-22	137.60	E 597,178.0 N 689,963.1

Engineer	Sheet	Status
Mott MacDonald	4 of 5	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
24.50		3				24.30 - 24.35 Joint, dipping 45°, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.		Very strong locally medium strong and strong massive grey 'marbled' light grey and white fine grained LIMESTONE. *(continued)*	
	100 (95) 67								
		3				25.60 - 26.00 Joint, subvertical dip, stepped, smooth, clean, open as drilling induced.			
26.00									
	100 (98) 97	1				26.70 - 26.80 Joint, dipping 60°, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.			
27.50		2				27.60 - 27.70 Joint, dipping 60°, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.			
	100 (96) 79								
		1				28.70 - 29.00 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.			
29.00									
	100 (96) 74	5				29.40 - 29.80 Joint, subvertical dip, 'V' shaped, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear, open.			
12.08 30.50 12.08		1				30.75 - 30.85 Joint, dipping 60°, stepped, smooth, with 0.5 to 1mm thick grey silt smear, open.			
	100 (95) 92								
		3							
32.00									

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
12/08/22	08.00	30.50										BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH026**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	11-08-22 12-08-22	137.60	E 597,178.0 N 689,963.1

Engineer	Sheet	Status
Mott MacDonald	5 of 5	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities / Detail	Main	Instrument/ Backfill
	100 (99) 98	0					Very strong locally medium strong and strong massive grey 'marbled' light grey and white fine grained LIMESTONE. *(continued)*	
33.50		1				33.25 - 33.65 Joint, subvertical dip, stepped, smooth, clean, open as drilling induced. 33.65 - 33.75 Joint, dipping 60°, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.		
	100 (96) 77	2				34.50 - 34.75 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.		
12.08 35.00			102.60		35.00			
							BH terminated at 35.00m bgl on REs instruction.	

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
12/08/22	17.00	35.00					

Rotary Flush

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

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH027**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	05-08-22 10-08-22	137.04	E 597,169.5 N 689,980.5

Engineer	Sheet	Status
Mott MacDonald	1 of 5	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
0.00			136.94		0.10	0.00 - 30.50 m: overburden		TOPSOIL: Grass over soft reddish brown slightly sandy SILT with rootlets. Sand is fine to medium.	
			136.64		0.40			Firm reddish brown sandy gravelly SILT with rootlets. Sand is coarse. Gravel is subangular fine and medium of assorted grey limestone.	
	67 -				(1.60)			Subangular to subrounded fine to coarse assorted grey limestone GRAVEL. (0.50m recovered).	
2.00	-		135.04		2.00				
		2.00 (40)	134.94		2.10			Dense subrounded to rounded fine and medium assorted grey limestone GRAVEL.	
	53 -							Light orangish brown slightly silty fine and medium SAND.	
3.50	-								
	67 -				(3.80)				
5.00	-	5.00 (42)						5.00m: dense. 5.30m to 5.90m: becoming coarse.	
	100 -		131.14		5.90				
	-		130.84		6.20			Subangular to subrounded fine and medium white to whitish grey 'bleached' fine grained limestone GRAVEL.	
6.50			130.44		(0.40) 6.60			Light orangish brown sandy gravelly SILT. Sand is fine to coarse. Gravel subangular fine and medium 'bleached' whitish brown fine grained limestone.	
	67 -							Light brown slightly silty fine and medium SAND.	
8.00	-								

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	37	Polymer	100

GENERAL REMARKS

2 gallons polydrill used. BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH027**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	05-08-22 10-08-22	137.04	E 597,169.5 N 689,980.5

Engineer	Sheet	Status
Mott MacDonald	2 of 5	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
		8.00 (43)						Light brown slightly silty fine and medium SAND. *(continued)* 8.00m: dense.	
	73 -								
05.08 9.50 08.08					(5.90)				
	73 -	10.00 (51)						10.00m: becoming very dense.	
11.00									
	73 -								
12.50			124.54		12.50				
			124.14		(0.40) 12.90			Subangular to subrounded fine to medium white to whitish grey 'bleached' fine grained limestone and assorted dark grey limestone GRAVEL.	
	73 -				(1.10)			Light brown slightly silty fine and medium SAND.	
14.00			123.04		14.00				
			122.64		(0.40) 14.40			Subangular to subrounded fine to medium white to whitish grey 'bleached' fine grained limestone and assorted dark grey limestone GRAVEL.	
	67 -				(1.10)			Light brown slightly silty fine and medium SAND.	
		15.00 (50)						15.00m: very dense.	
15.50			121.54		15.50				
			121.24		15.80			Subangular to subrounded fine to medium white to whitish grey 'bleached' fine grained limestone and assorted dark grey	

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
05/08/22	17.00	9.50					
08/08/22	08.00	9.50					

Rotary Flush

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

GENERAL REMARKS

2 gallons polydrill used. BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH027**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	05-08-22 10-08-22	137.04	E 597,169.5 N 689,980.5

Engineer	Sheet	Status
Mott MacDonald	3 of 5	FINAL / REVFINAL

RUN DETAILS				STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
	67 -							limestone GRAVEL.
	-							Light brown slightly silty fine and medium SAND. *(continued)*
17.00								16.00m to 16.10m: with subangular to subrounded fine to medium white to whitish grey 'bleached' fine grained limestone gravel.
	73 -				(3.60)			
	-							
18.50								
			117.64		19.40			
	70 -							Subangular to subrounded fine to medium white to whitish grey 'bleached' fine grained limestone and assorted dark grey limestone GRAVEL.
	-				(1.40)			
08.08 20.60 09.08			116.24		20.80			
	67 -	21.00 (43)						Light brown slightly silty fine and medium SAND.
	-							21.00m: dense.
21.50								
	33 -							
	-							
23.00								
					(5.20)			
	53 -							
	-							

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
08/08/22	17.00	20.60					
09/08/22	08.00	20.60					

Rotary Flush

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

GENERAL REMARKS

2 gallons polydrill used. BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH027**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	05-08-22 10-08-22	137.04	E 597,169.5 N 689,980.5

Engineer	Sheet	Status
Mott MacDonald	4 of 5	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
24.50	47 -							Light brown slightly silty fine and medium SAND. *(continued)*	
26.00		26.00 (63)	111.04		26.00			26.00m: becoming very dense. Creamish white SILT.	
27.50	53 -				(4.50)			27.50m to 28.70m: light orangish brown. 27.50m to 27.70m: becoming slightly gravelly. Gravel is subangular fine to coarse of whitish brown 'bleached' fine grained limestone.	
29.00	100 -	29.00 (70)						28.70m to 30.50m: orange.	
09.08 30.50 10.08	93 -		106.54		30.50	30.50 - 33.50 Non intact as weathered rock. 30.51 - 31.50 2 No parallel joints, apparently subvertical dip, stepped, rough, with 0.5 to 20mm thick light orangish brown clay smear, open to very wide, non-intact.		Weathered LIMESTONE rock. Very strong to medium strong massive light grey 'marbled' brownish white fine grained limestone recovered as angular fine to coarse gravel and cobble sized clasts with a little orangish brown clay. Point Load Test - 31.40m to 31.50m: strong.	
32.00	100 (81) 12								

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
09/08/22	17.00	30.50					
10/08/22	08.00	30.50					

Rotary Flush

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

GENERAL REMARKS

2 gallons polydrill used. BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH027**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	05-08-22 10-08-22	137.04	E 597,169.5 N 689,980.5

Engineer	Sheet	Status
Mott MacDonald	5 of 5	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities Detail	Main	Instrument/ Backfill
		NI			(3.00)	32.00 - 33.60 2 No perpendicular joints, apparently subvertical dip, stepped, rough, with 0.5 to 10mm thick orangish brown clay smear, open to wide, non-intact.	Weathered LIMESTONE rock. Very strong to medium strong massive light grey 'marbled' brownish white fine grained limestone recovered as angular fine to coarse gravel and cobble sized clasts with a little orangish brown clay. *(continued)*	
	100 (78) 11							
33.50			103.54		33.50			
		1				33.50 - 37.00 Discontinuities, medium spaced, locally closely spaced, dipping 10 to 12°, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear.	Very strong locally strong massive light grey 'marbled' grey and white fine grained LIMESTONE. UCS - 34.00m to 34.40m: medium strong.	
	100 (93) 80							
		3				34.55 - 34.65 Joint, dipping 60°, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.		
35.00							Point Load Test - 34.80m to 34.95m: strong.	
					(3.50)			
		1					Point Load Test - 35.51m to 35.20m: strong.	
	110 (96) 89							
		2				36.50 - 36.60 Joint, dipping 60°, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.		
10.08 37.00			100.04		37.00			
							BH terminated at 37.00m bgl on REs instruction.	

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
10/08/22	14.00	37.00										2 gallons polydrill used. BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH028**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	23-08-22 25-08-22	139.24	E 597,182.5 N 689,878.9

Engineer	Sheet	Status
Mott MacDonald	1 of 6	FINAL / REVFINAL

RUN DETAILS				STRATA			
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail / Main	Instrument/ Backfill
0.00			139.14		0.10	0.00 - 12.10 m: overburden TOPSOIL: Grass over soft reddish brown sandy SILT with rootlets. Sand is fine to medium.	
	40 - -				(2.70)	Subangular to subrounded fine to coarse light grey limestone and assorted dark grey limestone GRAVEL with a little orangish brown silt.	
2.00			136.44		2.80		
	100 - -	3.00 (74)				Firm orangish brown slightly sandy gravelly SILT. Sand is fine to coarse. Gravel is subangular fine to medium of assorted grey limestone.	
3.50							
	100 - -				(2.90)		
5.00			133.54		5.70		
	60 - -	6.00 (79)				Very dense dark orangish brown silty fine and medium SAND.	
6.50							
	53 - -				(2.30)		
8.00			131.24		8.00		

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	41	Polymer	100

GENERAL REMARKS

3 gallons polydrill used. BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH028**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	23-08-22 25-08-22	139.24	E 597,182.5 N 689,878.9

Engineer	Sheet	Status
Mott MacDonald	2 of 6	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities	Detail	Main	Instrument/ Backfill
	100 - -	9.00 (79)			(1.50)			Stiff dark orangish brown slightly sandy gravelly SILT. Sand is fine to coarse. Gravel is subrounded to subangular fine to coarse of assorted light grey and grey limestone,	
9.50			129.74		9.50				
	93 - -		128.79		(0.95) 10.45			Very stiff slightly sandy SILT. Sand is fine and medium.	
			128.69		10.55			Very dense orangish brown slightly gravelly fine to coarse SAND. Gravel is angular fine and medium of grey limestone.	
			128.54		10.70			Very stiff slightly sandy SILT. Sand is fine and medium.	
11.00			128.44		10.80			Orangish brown slightly gravelly fine to coarse SAND. Gravel is angular fine and medium of grey limestone.	
			128.04		(0.40) 11.20			Very stiff slightly sandy SILT. Sand is fine and medium.	
	100 (17) -	12.00 (62/225mm)	127.14		(0.90) 12.10			Stiff orangish brown CLAY.	
23.08 12.50 24.08		4				12.10 - 15.10 Discontinuities, apparently medium spaced, locally closely spaced, dipping 12 to 14 and 20 to 22°, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear.		Very strong locally strong massive dark grey 'marbled' grey and white fine grained LIMESTONE. Point Load Test - 12.30m to 12.50m: strong. 13.00m to 13.10m: orangish brown clay.	
	100 (75) 61	6			(3.00)				
14.00									
	100 (34) 34	NI							
		15.00 (70)	124.14		15.10				
15.50						15.10 - 34.70 Non intact as gravelly orangish brown clay.		Firm orangish brown sandy gravelly CLAY with low cobble content and low boulder content. Sand is fine to coarse. Gravel is angular fine to coarse of assorted light grey and dark grey limestone.	

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
23/08/22	17.00	12.50					
24/08/22	08.00	12.50					

Rotary Flush

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

GENERAL REMARKS

3 gallons polydrill used. BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH028**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	23-08-22 25-08-22	139.24	E 597,182.5 N 689,878.9

Engineer	Sheet	Status
Mott MacDonald	3 of 6	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
	100 - -							Firm orangish brown sandy gravelly CLAY with low cobble content and low boulder content. Sand is fine to coarse. Gravel is angular fine to coarse of assorted light grey and dark grey limestone. *(continued)*	
17.00									
	100 - -								
		18.00 (82)							
18.50									
	100 - -								
20.60									
	100 - -	21.00 (50/75mm)							
21.50								21.50m: with low cobble content. Cobbles are of light grey limestone.	
	100 - -								
23.00									
	100 - -								

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	3 gallons polydrill used. BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH028**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	23-08-22 25-08-22	139.24	E 597,182.5 N 689,878.9

Engineer	Sheet	Status
Mott MacDonald	4 of 6	FINAL / REVFINAL

RUN DETAILS				STRATA				
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities	Detail	Main	Instrument/ Backfill
24.08 24.50 25.08		24.00 (50/0mm)						Firm orangish brown sandy gravelly CLAY with low cobble content and low boulder content. Sand is fine to coarse. Gravel is angular fine to coarse of assorted light grey and dark grey limestone. *(continued)* Core run - 24.50m to 26.00m: 1 No light brownish white calcitic boulder 680mm in length.	
	100 - -				(19.60)				
26.00									
	100 - -	27.00 (50/75mm)							
27.50									
	100 - -								
29.00									
	100 - -	30.00 (50/0mm)							
30.50									
	100 - -								
32.00									

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
24/08/22	17.00	24.50					
25/08/22	08.00	24.50					

Rotary Flush

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

GENERAL REMARKS

3 gallons polydrill used. BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH028**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	23-08-22 25-08-22	139.24	E 597,182.5 N 689,878.9

Engineer	Sheet	Status
Mott MacDonald	5 of 6	FINAL / REVFINAL

RUN DETAILS						STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
	100 -							Firm orangish brown sandy gravelly CLAY with low cobble content and low boulder content. Sand is fine to coarse. Gravel is angular fine to coarse of assorted light grey and dark grey limestone. *(continued)* Core run - 32.00m to 33.50m: 1 No light grey limestone boulder 260mm in length.	
	-	33.00 (50/0mm)							
33.50									
	100 (17) -		104.54		34.70				
35.00		35.00 (50/0mm) NI	103.74		(0.80) 35.50	34.70 - 35.50 Non intact as weathered rock.		Weathered LIMESTONE rock. Very strong massive light grey 'marbled' orangish white and grey fine grained limestone recovered as angular fine to coarse gravel and cobble sized clasts with a little orangish brown clay.	
	100 (80) 35	1				35.50 - 41.00 Discontinuities, medium spaced, locally closely spaced, dipping 10 to 12°, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear. 35.85 - 36.10 Joint, subvertical dip, 'V' shaped, stepped, rough, with 0.5 to 2mm thick orangish brown clay smear, open. 36.30 - 36.70 Joint, subvertical dip, stepped, smooth, with 0.5 to 3mm thick orangish brown clay smear, open to moderately wide. 36.75 - 36.90 Joint, subvertical dip, stepped, with 0.5 to 2mm thick orangish brown clay smear, closed. 37.15 - 37.30 Joint, subvertical dip, stepped, tight. 37.35 - 37.50 Joint, subvertical dip, stepped, smooth, with 0.5 to 3mm thick orangish brown clay smear, open to moderately wide.		Very strong locally strong massive dark grey 'marbled' grey and white fine grained LIMESTONE. Point Load Test - 35.90m to 36.00m: strong.	
36.50		6							
	100 (97) 89	1						Point Load Test - 37.00m to 37.10m: strong.	
38.00					(5.50)			UCS - 37.70m to 38.00m: strong.	
	100 (96) 92	1				38.55 - 39.60 Joint, subvertical dip, planar, smooth, clean, open as drilling induced.			
39.50		3				39.30 - 39.40 Joint, dipping 60°, stepped, rough, with 0.5 to 1mm thick orangish brown clay smear, open.			

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	3 gallons polydrill used. BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH028**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	23-08-22 25-08-22	139.24	E 597,182.5 N 689,878.9

Engineer	Sheet	Status
Mott MacDonald	6 of 6	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
	100 (95) 92	0						Very strong locally strong massive dark grey 'marbled' grey and white fine grained LIMESTONE. *(continued)*	
25.08 41.00			98.24		41.00				
								BH terminated at 41.00m bgl on REs instruction.	

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
25/08/22	17.00	41.00										3 gallons polydrill used. BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH029**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	26-08-22 29-08-22	145.19	E 597,218.3 N 689,862.3

Engineer: Mott MacDonald

Sheet 1 of 3

Status FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities / Detail	Main	Instrument/ Backfill
0.00			145.09		0.10	0.00 - 0.10 m: overburden 0.10 - 2.00 Non intact as weathered rock.	TOPSOIL: Grass over soft dark brown slightly sandy SILT with rootlets. Sand is fine to medium.	
	100 (12) -	NI			(1.90)		Weathered LIMESTONE rock. Very strong massive light grey 'marbled' orangish white and grey fine grained limestone recovered as angular fine to coarse gravel and cobble sized clasts with a little orangish brown clay and surficial dark orangish brown iron stain and powder.	
2.00			143.19		2.00			
	100 (89) 67	12				2.00 - 20.00 Discontinuities, medium spaced, locally closely spaced, dipping 10 to 12°, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear to 4.00m, then with light grey silt smear.	Very strong locally strong massive dark grey 'marbled' grey and white slightly bioclastic fine grained LIMESTONE.	
							Point Load Test - 2.90m to 3.00m: weak. Point Load Test - 3.00m to 3.14m: strong.	
3.50		4					Point Load Test - 3.50m to 3.70m: weak.	
	100 (89) 38					3.80 - 6.50 Joint, subvertical dip, stepped, smooth, with 0.5 to 4mm thick orangish brown clay smear, open to moderately wide.		
		7						
5.00								
	100 (63) -	8						
6.50		5						
	100 (92) 83						UCS - 7.10m to 7.60m: strong.	
		3					Point Load Test - 7.60m to 7.70m: strong.	
8.00						7.80 - 9.00 Joint, subvertical dip,		

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	1.7	Water	100
1.7	20	Water	0

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH029**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	26-08-22 29-08-22	145.19	E 597,218.3 N 689,862.3

Engineer	Sheet	Status
Mott MacDonald	2 of 3	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
						undulating, tight.		Very strong locally strong massive dark grey 'marbled' grey and white slightly bioclastic fine grained LIMESTONE. *(continued)*	
	100 (98) 97	2							
26.08 9.50 29.08		1							
	100 (98) 97								
		2							
11.00					(18.00)			Point Load Test - 11.00m to 11.10m: very strong.	
	100 (97) 96	1				11.70 - 12.10 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.			
12.50		1							
	100 (97) 88								
		2							
14.00						13.80 - 14.10 Joint, subvertical dip, stepped, rough, with 0.5 to 3mm thick orangish brown clay smear, open to moderately wide. 14.00 - 15.20 Joint, subvertical dip, undulating with 1mm thick orangish brown clay smear, closed.			
	100 (92) 70	1				15.00 - 16.00 Joint, subvertical dip, stepped, rough, with 0.5 to 2mm thick orangish brown clay smear, open.			
15.50		2							

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
26/08/22 29/08/22	17.00 08.00	9.50 9.50										BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH029**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	26-08-22 29-08-22	145.19	E 597,218.3 N 689,862.3

Engineer	Sheet	Status
Mott MacDonald	3 of 3	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities / Detail	Main	Instrument/ Backfill
	100 (96) 53	2					Very strong locally strong massive dark grey 'marbled' grey and white slightly bioclastic fine grained LIMESTONE. *(continued)* Point Load Test - 16.50m to 16.70m: very strong.	
17.00								
	100 (96) 94	2				17.30 - 18.10 Joint, subvertical dip, undulating, tight, with orange and orangish brown iron stain, open as drilling induced.		
18.50		1						
	100 (98) 97	0				18.80 - 19.30 Joint, subvertical dip, undulating, tight.		
29.08 20.00			125.19		20.00	19.60 - 19.80 Joint, subvertical dip, 'U' shaped, undulating, clean, open as drilling induced.		
							BH terminated at 20.00m bgl on REs instruction.	

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
29/08/22	17.00	20.00										BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH030**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	30-08-22 31-08-22	145.90	E 597,254.7 N 609,864.7

Engineer	Sheet	Status
Mott MacDonald	1 of 3	FINAL / REVFINAL

RUN DETAILS

Depth / Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)
0.00			145.85		0.05
			145.60		0.30
	90 (70) 22				
		NI			
2.00					
	100 (73) 43				
3.50		4			
	100 (87) 63				
		6			
5.00					
	100 (97) 94	3			
6.50		2			
	100 (95) 91				
		1			
8.00					

STRATA

DESCRIPTION

Discontinuities	Detail	Main
0.00 - 0.30 m: overburden		TOPSOIL: Grass over firm reddish brown slightly sandy SILT with rootlets. Sand is fine to medium.
0.30 - 2.80 Discontinuities, very closely spaced, locally closely spaced, dipping 12 to 14°, stepped, rough, with 0.5 to 4mm thick orangish brown clay smear. 0.80 - 1.00 2 No parallel joints, subvertical dip, stepped, rough, with 0.5 to 3mm thick orangish brown clay smear, open.		Dark grey limestone COBBLES. Very strong locally strong and medium strong massive grey 'marbled' light grey and white fine grained LIMESTONE.
1.00 - 1.30 Joint, subvertical dip, stepped, rough, with 0.5 to 3mm thick orangish brown clay smear, open.		Point Load Test - 1.60m to 1.80m: weak. Point Load Test - 1.80m to 2.00m: medium strong.
2.80 - 20.00 Discontinuities, medium spaced, locally closely spaced, dipping 12 to 14°, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear.		Point Load Test - 2.80m to 3.00m: weak.
3.80 - 4.30 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.		Point Load Test - 5.60m to 5.70m: medium strong. UCS - 5.70m to 6.30m: strong.
7.70 - 7.80 Joint, dipping 60°, stepped, smooth, with 0.5 to 1mm thick orangish		

Instrument/ Backfill

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	20	Water	100

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH030**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	30-08-22 31-08-22	145.90	E 597,254.7 N 609,864.7

Engineer	Sheet	Status
Mott MacDonald	2 of 3	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities Detail	Main	Instrument/ Backfill
	100 (96) 68	4				brown clay smear and minor orangish brown iron stain, open. 8.25 - 8.65 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick orangish brown clay smear, open.	Very strong locally strong and medium strong massive grey 'marbled' light grey and white fine grained LIMESTONE. *(continued)* Point Load Test - 8.00m to 8.30m: strong.	
9.50		2				9.25 - 9.50 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick light orangish brown clay smear, open.		
	100 (97) 96	2			(19.70)			
11.00								
	100 (97) 68	0				11.25 - 11.80 Joint, subvertical dip, stepped, rough, with 0.5 to 2mm thick orangish brown clay smear, open.		
30.08 31.08 12.50		3				12.40 - 12.80 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear, open.		
	100 (98) 75	2						
14.00						13.90 - 14.10 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick orangish brown clay smear and minor orangish brown iron stain and powder, open.		
	100 (96) 92	1						
15.50						15.15 - 15.20 Joint, dipping 45°, stepped, rough, with 0.5 to 1mm thick orangish brown clay smear, open as drilling induced.		
		1						

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
30/08/22	08.00	12.50					
31/08/22	08.00	12.50					

Rotary Flush

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

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH030**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	30-08-22 31-08-22	145.90	E 597,254.7 N 609,864.7

Engineer	Sheet	Status
Mott MacDonald	3 of 3	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities / Detail	Main	Instrument/ Backfill
	100 (97) 73	2				16.50 - 16.80 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear, open.	Very strong locally strong and medium strong massive grey 'marbled' light grey and white fine grained LIMESTONE. *(continued)*	
17.00								
	100 (98) 97	0						
18.50		1						
	100 (98) 97	1				19.25 - 19.30 Joint, dipping 45°, stepped, smooth, clean, open as drilling induced.		
31.08 20.00			125.90		20.00		BH terminated at 20.00m bgl on REs instruction.	

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
31/08/22	15.00	20.00										BH backfilled.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Irish drilling LTD

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH031**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	01-09-22 02-09-22	145.94	E 597,230.5 N 689,833.2

Engineer	Sheet	Status
Mott MacDonald	1 of 3	FINAL / REVFINAL

RUN DETAILS / STRATA

Depth / Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Instrument / Backfill
0.00			145.54		(0.40) 0.40	0.00 - 0.40 m: overburden	TOPSOIL: Grass over soft dark brown slightly sandy SILT with rootlets. Sand is fine to medium.	
	80 (63) 27	NI				0.40 - 2.40 Joint, subvertical dip, stepped, smooth, clean, open as drilling induced. 0.40 - 20.00 Discontinuities, closely spaced, locally very closely spaced to 1.20m, then medium spaced, locally very closely spaced, dipping 12 to 14°, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear.	Very strong locally medium strong and strong massive dark grey 'marbled' light grey brownish white and white fine grained LIMESTONE.	
		18						
2.00								
	100 (94) 77	11					Point Load Test - 2.50m to 2.60m: medium strong. Point Load Test - 2.60m to 2.70m: medium strong.	
						3.10 - 3.50 Joint, subvertical dip, undulating, tight.		
3.50		6						
							Point Load Test - 3.80m to 4.00m: strong.	
	100 (93) 88							
		6						
5.00								
						5.15 - 5.30 Joint, subvertical dip, stepped, smooth, clean, open as drilling induced. 5.20 - 5.35 Joint, subvertical dip, stepped, rough, with 0.5 to 2mm thick orangish brown clay smear, open. 5.60 - 6.25 Joint, subvertical dip, stepped, smooth, clean, open as drilling induced.		
	100 (94) 88	8					Point Load Test - 6.00m to 6.10m: medium strong.	
6.50		2						
							Point Load Test - 6.90m to 7.00m: medium strong.	
	100 (97) 96						UCS - 7.30m to 7.70m: medium strong.	
		2						
8.00								

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	20	Water	100

GENERAL REMARKS

50mm standpipe installed.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH031**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	01-09-22 02-09-22	145.94	E 597,230.5 N 689,833.2

Engineer	Sheet	Status
Mott MacDonald	2 of 3	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
	100 (97) 96	3						Very strong locally medium strong and strong massive dark grey 'marbled' light grey brownish white and white fine grained LIMESTONE. *(continued)*	
9.50		2						Point Load Test - 9.00m to 9.10m: medium strong.	
	100 (98) 96	2			(19.60)				
11.00									
	100 (97) 96	2							
01.09 12.50 02.09		2				12.60 - 12.80 Joint, subvertical dip, stepped, rough, with 0.5mm thick orangish brown iron stain, 0.5 to 3mm aperture.			
	100 (98) 97	1						Point Load Test - 13.40m to 13.50m: strong.	
14.00									
	100 (98) 97	1							
15.50		2							

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
01/09/22	17.00	12.50					
02/09/22	08.00	12.50					

Rotary Flush

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

GENERAL REMARKS

50mm standpipe installed.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used	Geo 602		Driller BD	Logged By EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH031**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	01-09-22 02-09-22	145.94	E 597,230.5 N 689,833.2

Engineer	Sheet	Status
Mott MacDonald	3 of 3	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
	100 (98) 97	1						Very strong locally medium strong and strong massive dark grey 'marbled' light grey brownish white and white fine grained LIMESTONE. *(continued)*	
17.00								Point Load Test - 17.00m to 17.20m: strong.	
	100 (98) 97	2							
18.50		1							
	100 (98) 97	0							
02.09 20.00			125.94		20.00				
								BH terminated at 20.00m bgl on REs instruction.	

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
02/09/22	17.00	20.00										50mm standpipe installed.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH032**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	05-09-22 08-09-22	146.63	E 597,281.8 N 689,859.9

Engineer	Sheet	Status
Mott MacDonald	1 of 5	FINAL / REVFINAL

RUN DETAILS						STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
0.00			146.53		0.10	0.00 - 2.90 m: overburden		TOPSOIL: Grass over soft reddish brown slightly sandy SILT with rootlets. Sand is fine to medium.	
	40 -							Greyish brown silty sandy subangular to subrounded fine to coarse grey limestone and dark grey limestone GRAVEL. Sand is fine to coarse.	
	-					1.00 - 1.30 Joint, apparently subvertical dip, stepped, rough, with 0.5 to 3mm thick orangish brown clay smear, open.			
					(2.80)				
2.00									
	83 -								
2.60	-								
			143.73		2.90				
	100 (56) -					2.90 - 35.00 Discontinuities, very closely and closely spaced, to 3.50m, then medium spaced, locally closely spaced, dipping 12 to 14 and 20 to 22°, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear.		Very strong locally strong massive brownish grey 'marbled' grey and white slightly bioclastic fine grained LIMESTONE. Point Load Test - 3.30m to 3.50m: medium strong. Point Load Test - 3.50m to 5.00m: strong.	
3.50		8							
	100 (91) 69					4.40 - 4.50 Joint, dipping 60°, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open			
		7							
5.00						5.00 - 5.30 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear, open.		Point Load Test - 5.25m to 5.35m: strong. 5.30m to 8.40m: becoming grey 'marbled' grey and brownish white.	
	100 (96) 85	3							
						6.20 - 6.30 Joint, dipping 60°, stepped, smooth, with 0.5 to 1mm thick grey silt smear, open.			
6.50		4							
	100 (96) 93								
		3							
8.00								Point Load Test - 7.80m to 8.00m: very	

Drilling Progress and Water Observations							
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing

Rotary Flush			
From (m)	To (m)	Type	Return (%)
0	35	Polymer	100

GENERAL REMARKS

1 gallon polydrill used.
50mm standpipe installed.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH032**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	05-09-22 08-09-22	146.63	E 597,281.8 N 689,859.9

Engineer	Sheet	Status
Mott MacDonald	2 of 5	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
	100 (96) 95	1			(11.75)	8.10 - 8.15 Joint, dipping 45°, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.		strong. Very strong locally strong massive brownish grey 'marbled' grey and white slightly bioclastic fine grained LIMESTONE. *(continued)* 8.40m to 14.00m: becoming dark grey 'marbled' grey and white.	
9.50		3							
	100 (98) 95	2						Point Load Test - 9.90m to 10.00m: strong.	
05.09 11.00 06.09									
	47 (40) 33	1				11.40 - 11.65 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open. 11.70 - 12.80 No recovery as washout of fines during drilling. No record of cavity.		11.70m 12.80m: No recovery. No record of cavity.	
12.50		NR							
	93 (17) -					12.80 - 14.00 Joint, vertical dip, stepped, rough, with 70mm wide aperture infilled with orangish brown clay. 12.80 - 20.70 Non-intact as orangish brown clay with gravel and cobble sized limestone clasts. No recovery as washout of fines during drilling. No record of cavity.			
14.00								14.00m to 14.35m: becoming 'marbled' orangish brown. 14.35m to 14.65m: soft orangish brown clay.	
	93 (60) 47	NI	131.98		14.65			Very strong locally strong massive brownish grey 'marbled' grey and white slightly bioclastic fine grained LIMESTONE. Point Load Test - 15.00m to 15.10m: very strong. 15.40m to 15.75m: soft orangish brown clay.	
15.50						15.50 - 15.75 Joint, subvertical dip, stepped, rough, with 80 to 95mm wide aperture infilled with orangish brown			

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
05/09/22	17.00	11.00					
06/09/22	08.00	11.00					

Rotary Flush

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

GENERAL REMARKS

1 gallon polydrill used.
50mm standpipe installed.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH032**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	05-09-22 08-09-22	146.63	E 597,281.8 N 689,859.9

Engineer	Sheet	Status
Mott MacDonald	3 of 5	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities / Detail	Main	Instrument/ Backfill
	93 (74) 67					clay.	Very strong locally strong massive brownish grey 'marbled' grey and white slightly bioclastic fine grained LIMESTONE. *(continued)*	
17.00						16.50 - 16.80 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear, open.		
	93 (74) 64						17.70m to 17.90m: with subvertical 90mm wide white calcitic vein.	
		3				18.00 - 19.80 Joint, subvertical dip, stepped, rough, with 1 to 90mm wide aperture infilled with orangish brown clay.	Point Load Test - 18.00m to 18.10m: strong.	
18.50								
	87 (63) -							
		NI					20.00m to 20.70m: angular fine to coarse gravel and cobble sized clasts with some orangish brown clay.	
20.60								
	93 (53) 37	NI						
21.50		1			(14.35)		Point Load Test - 21.40m to 21.50m: strong. 21.50m to 26.00m: becoming greyish brown weakly dolomitised limestone. 21.60m to 21.70m: soft orangish brown clay.	
	100 (56) 37	2					22.00m to 22.10m: soft orangish brown clay.	
06.09 23.00 07.09								
	100 (91) 78	2				23.65 - 23.80 Joint, subvertical dip, stepped, rough, with 0.5 to 2mm thick	23.60m to 23.80m: becoming strong crystalline.	

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
06/09/22	17.00	23.00					
07/09/22	08.00	23.00					

Rotary Flush

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

GENERAL REMARKS

1 gallon polydrill used.
50mm standpipe installed.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH032**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	05-09-22 08-09-22	146.63	E 597,281.8 N 689,859.9

Engineer	Sheet	Status
Mott MacDonald	4 of 5	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities Detail	Main	Instrument/ Backfill
24.50		2				orangish brown fine sand smear, open.	Very strong locally strong massive brownish grey 'marbled' grey and white slightly bioclastic fine grained LIMESTONE. *(continued)*	
	100 (92) 72					25.00 - 25.10 Joint, dipping 60°, stepped, rough, with 0.5 to 1mm thick orangish brown clay smear, open. 25.20 - 25.25 Joint, dipping 45°, stepped, smooth, 0.5 to 1mm thick orangish brown clay smear, open.	25.10m to 25.15m: with 20mm wide and 20mm deep vugs infilled with brown carbonate crystal smear.	
26.00		9				25.70 - 25.80 Joint, dipping 60°, stepped, rough, with 0.5 to 1mm thick orangish brown clay smear, open. 25.80 - 25.95 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open. 25.85 - 25.95 Joint, dipping 60°, stepped, rough, with 0.5 to 1mm thick orangish brown clay smear, open.		
	87 (66) 47					27.10 - 29.40 Joint, subvertical dip, stepped, rough, with 10 to 90mm wide aperture infilled with orangish brown clay.		
27.50								
	100 (17) -	NI						
29.00			117.63		29.00			
							Extremely strong massive light grey 'marbled' grey and white fine grained LIMESTONE.	
	100 (94) 38	4						
30.50		3					30.50m to 31.05m: with subvertical 50mm wide brownish white calcitic vein.	
	100 (96) 94							
		2						
32.00								

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

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used: Geo 602		Driller: BD	Logged By: EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
Eastern & Midlands WSP Lot 2, BPT Site	County Offaly	**BPT-BH032**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2021OY102	05-09-22 08-09-22	146.63	E 597,281.8 N 689,859.9

Engineer	Sheet	Status
Mott MacDonald	5 of 5	FINAL / REVFINAL

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Index	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Instrument/ Backfill
					(6.00)			Extremely strong massive light grey 'marbled' grey and white fine grained LIMESTONE. *(continued)*	
	100 (97) 96	2				32.35 - 32.45 Joint, dipping 60°, undulating, smooth, clean, open as drilling induced.			
33.50		0						33.00m to 34.35m: with subvertical 4mm wide brownish white calcitic veinlet.	
	100 (97) 96	0							
07.09 35.00 08.09			111.63		35.00			BH terminated at 35.00m bgl on REs instruction.	

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
07/09/22	17.00	35.00					
08/09/22	08.00	35.00					
08/09/22	10.00	35.00					

Rotary Flush

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

GENERAL REMARKS

1 gallon polydrill used.
50mm standpipe installed.

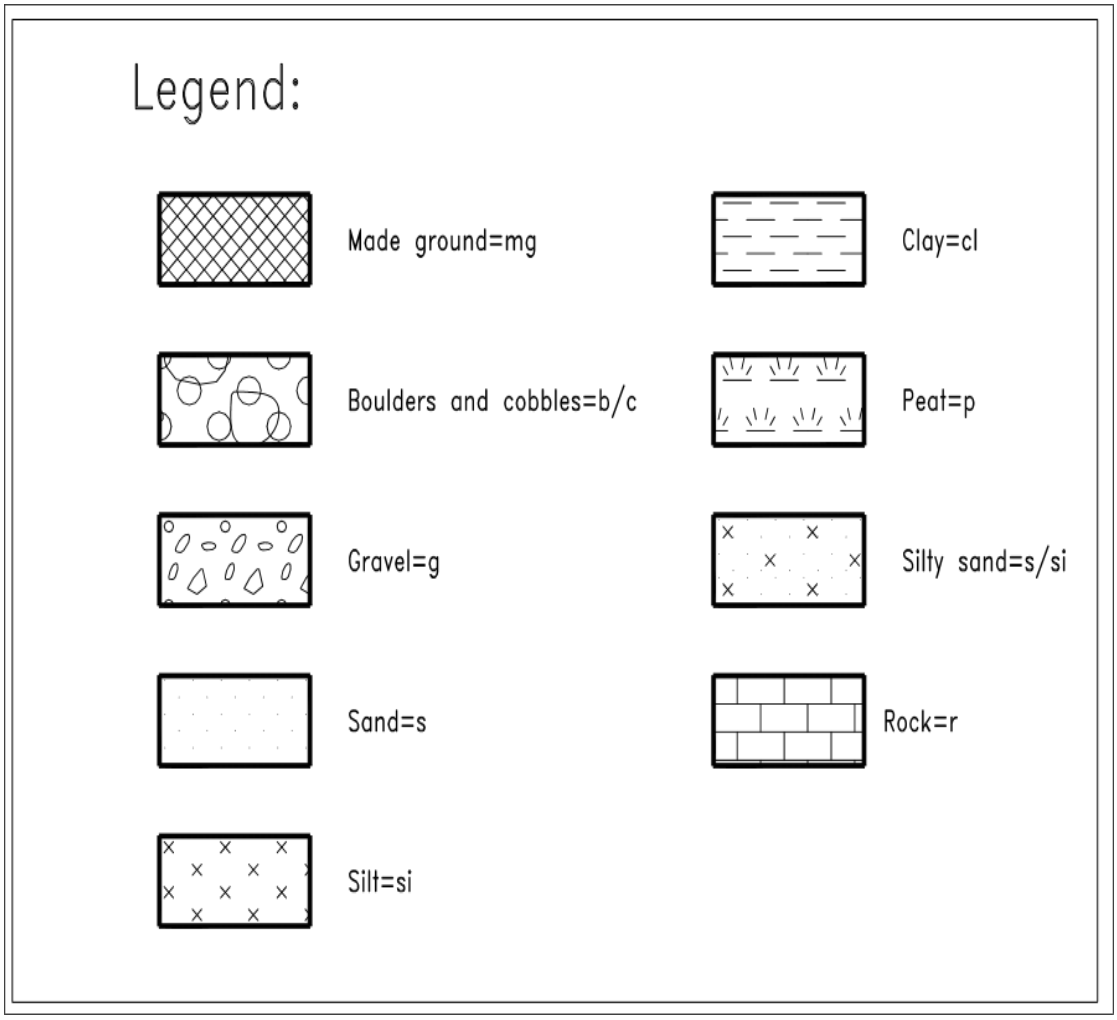
All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used Geo 602		Driller BD	Logged By EAT

IDL AGS4 UK DH (SPTS) BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 5/4/23

Appendix 5B
Dynamic Sampling Records
N/A

Appendix 5C
Trial Pit Records

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



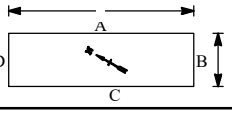
The following abbreviations are included on fieldwork logs:

NI: Non-Intact
NR: No Recovery

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site	**TRIALPIT: BPT-INF001**
LOCATION: County Offaly	**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:** **Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 597,280.2 N 689,839.8** **Rev: FINAL**
Ground level: 147.52m O.D.	**DATE: 19.5.22**

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

PIT DIRECTION: 150°
PIT DIMENSION: 2.40m * 0.60
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							147.32	0.20	TOPSOIL: Grass over firm brown gravelly SILT with low cobble content. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subrounded to rounded of limestone.	
			B 1	0.50-0.80					Firm light greyish brown slightly gravelly slightly sandy SILT with medium cobble content and low boulder content. Sand is fine to coarse. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subrounded to rounded of limestone. Boulders are subrounded to rounded of limestone. Boulders are up to 350mm in length.	
1			D 2	0.80			146.22	1.30		
			B 3	1.50-1.80					Light greyish brown slightly silty very sandy angular to subangular fine to coarse limestone GRAVEL with medium cobble content and medium boulder content. Sand is fine to coarse. Cobbles are angular to subangular of limestone. Boulders are angular to subangular of limestone. Boulders are up to 400mm in length.	
2							145.62	1.90		
						END			TP terminated at 1.90m bgl. Obstruction.	
3										
4										
5										
6										
7										
8										
9										
10										

Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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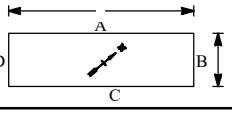
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site		**TRIALPIT: BPT-INF002**
LOCATION: County Offaly		**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:**	**Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 597,240.5 N 689,825.9**	**Rev: FINAL**
Ground level: 145.90m O.D.		**DATE: 19.5.22**

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

PIT DIRECTION: 40°
PIT DIMENSION: 1.60m * 0.60
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							145.70	0.20	TOPSOIL: Grass over firm brown gravelly SILT. Gravel is subangular to rounded fine to coarse of limestone.	
			B 1	0.20-0.40			145.50	0.40	Firm light greyish brown gravelly SILT with medium cobble content. Gravel is angular to subangular fine to coarse of limestone. Cobbles are angular to subangular of limestone.	
			D 2	0.40					TP terminated at 0.40m bgl. Obstruction as probable rock.	
1						END				
2										
3										
4										
5										
6										
7										
8										
9										
10										

Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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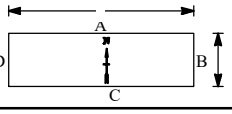
PROJECT: Eastern & Midlands WSP Lot 2, BPT Site	**TRIALPIT: BPT-TP001**
LOCATION: County Offaly	**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:** **Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 597,120.2 N 689,961.1** **Rev: FINAL**
Ground level: 133.78m O.D.	**DATE: 13.5.22**

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

PIT DIRECTION: 90°
PIT DIMENSION: 4.00m * 0.60
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							133.48	0.30	TOPSOIL: Grass over firm orangish brown gravelly SILT. Gravel is subangular to rounded fine to coarse of limestone.	
			B 1 D 2	0.50-0.80 0.80					Soft damp brownish grey slightly sandy very gravelly SILT with medium cobble content and low boulder content. Sand is fine. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subrounded to rounded of limestone. Boulders are subrounded to rounded of limestone. Boulders are up to 350mm in length.	
1							132.38	1.40		
						END			TP terminated at 1.40m bgl. Obstruction as possible large boulders.	
2										
3										
4										
5										
6										
7										
8										
9										
10										

Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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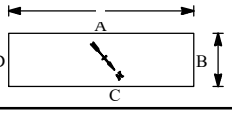
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site		**TRIALPIT: BPT-TP002**
LOCATION: County Offaly		**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:**	**Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 597,165.3 N 689,989.3**	**Rev: FINAL**
Ground level: 136.84m O.D.		**DATE: 11.5.22**

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

PIT DIRECTION: 310°
PIT DIMENSION: 4.00m * 1.00
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0										
			B 1	0.40-0.70			136.44	0.40	TOPSOIL: Grass over firm brown gravelly SILT with low cobble content. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subangular to rounded of limestone.	
			VANE	0.60	19mm vane 10 kN/m²				Soft damp brownish grey slightly sandy gravelly SILT with low cobble content and low boulder content. Sand is fine. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subangular to rounded of limestone. Boulders are subangular to rounded of limestone. Boulders are up to 400mm in length.	
			D 2	0.70	11 kN/m² 10 kN/m²		135.94	0.90		
1									Firm light orangish grey slightly sandy very gravelly SILT with medium cobble content and low boulder content. Sand is fine. Gravel is angular to subangular fine to coarse of limestone. Cobbles are angular to subangular of limestone. Boulders are angular to subangular of limestone. Boulders are up to 400mm in length.	
			B 3	1.40-1.70						
			D 4	1.70			135.04	1.80		
2						**END**			TP terminated at 1.80m bgl. Obstruction as boulders.	
3										
4										
5										
6										
7										
8										
9										
10										

Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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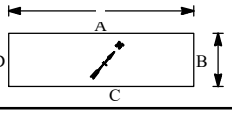
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site		**TRIALPIT: BPT-TP003**
LOCATION: County Offaly		**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:**	**Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 597,218.2 N 690,010.9**	**Rev: FINAL**
Ground level: 148.54m O.D.		**DATE: 17.5.22**

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

PIT DIRECTION: 50°
PIT DIMENSION: 4.00m * 0.60
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0			B 1	0.30-0.60			148.24	0.30	TOPSOIL: Grass over firm brown gravelly SILT with low cobble content. Gravel is angular to subangular fine to coarse of limestone. Cobbles are subangular to rounded of limestone.	
							147.94	0.60	Bluish grey slightly sandy very gravelly angular to subrounded limestone COBBLES with medium boulder content. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of limestone. Boulders are angular to subangular of limestone. Boulders are up to 400mm in length.	
									END	
1									TP terminated at 0.60m bgl. Obstruction as probable rock.	
2										
3										
4										
5										
6										
7										
8										
9										
10										

Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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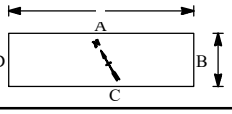
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site		**TRIALPIT: BPT-TP004**
LOCATION: County Offaly		**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:**	**Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 597,144.8 N 689,965.0**	**Rev: FINAL**
Ground level: 135.00m O.D.		**DATE: 18.5.22**

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

PIT DIRECTION: 120°
PIT DIMENSION: 4.00m * 1.00
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							134.80	0.20	TOPSOIL: Grass over firm brown gravelly SILT. Gravel is subangular to rounded fine to coarse of limestone.	
							134.60	0.40	Firm orangish brown gravelly SILT with low cobble content. Gravel is subangular to subrounded fine to coarse of limestone. Cobbles are subrounded to rounded of limestone.	
			B 1 D 2 D 2	0.50-0.80 0.50-0.80 0.80					Soft damp light greyish brown slightly gravelly sandy SILT with medium cobble content and medium boulder content. Sand is fine to coarse. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subrounded to rounded of limestone. Boulders are subangular to subrounded of limestone. Boulders are up to 350mm in length.	
1							133.70	1.30	**END**	
									TP terminated at 1.30m bgl. Obstruction as probable rock.	
2										
3										
4										
5										
6										
7										
8										
9										
10										

Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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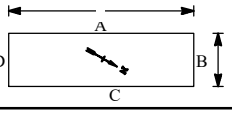
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site		**TRIALPIT: BPT-TP005**
LOCATION: County Offaly		**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:**	**Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 597,135.9 N 689,931.6**	**Rev: FINAL**
Ground level: 135.05m O.D.		**DATE: 13.5.22**

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

PIT DIRECTION: 330°
PIT DIMENSION: 4.00m * 1.00
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							134.85	0.20	TOPSOIL: Grass over firm brown gravelly SILT. Gravel is subangular to rounded fine to coarse of limestone.	
							134.65	0.40	Firm orangish brown gravelly SILT with low cobble content. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subrounded to rounded of limestone.	
			B 1	0.40-0.70						
			VANE	0.60	19mm vane 10 kN/m² 13 kN/m² 8 kN/m²				Soft damp brownish grey slightly sandy gravelly SILT with medium cobble content and medium boulder content. Sand is fine. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subrounded to rounded of limestone. Boulders are subrounded to rounded of limestone. Boulders are up to 400mm in length.	
			D 2	0.70						
1										
			B 3	1.70-2.00						
2			D 4	2.00			132.75	2.30		
						END			TP terminated at 2.30m bgl. Obstruction as probable rock.	
3										
4										
5										
6										
7										
8										
9										
10										

Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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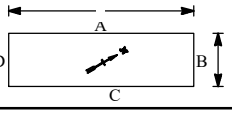
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site	**TRIALPIT: BPT-TP006**
LOCATION: County Offaly	**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:** **Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 597,158.5 N 689,940.8** **Rev: FINAL**
Ground level: 136.38m O.D.	**DATE: 12.5.22**

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

PIT DIRECTION: 30°
PIT DIMENSION: 3.00m * 0.60
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							136.08	0.30	TOPSOIL: Grass over firm brown gravelly SILT with low cobble content. Gravel is angular to subrounded fine to coarse of limestone. Cobbles are subangular to subrounded of limestone.	
			B 1	0.40-0.70					Soft damp grey slightly sandy gravelly SILT with medium cobble content. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of limestone. Cobbles are angular to subrounded of limestone.	
			D 2	0.70						
1							135.28	1.10		
							135.08	1.30	Bluish grey silty gravelly angular to subangular limestone COBBLES with medium boulder content. Gravel is angular to subangular fine to coarse of limestone. Boulders are angular to subangular of limestone. Boulders are up to 400mm in length.	
									END	
									TP terminated at 1.30m bgl. Obstruction as boulders.	
2										
3										
4										
5										
6										
7										
8										
9										
10										

Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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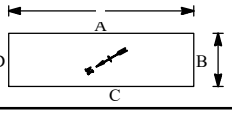
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site		**TRIALPIT: BPT-TP007**
LOCATION: County Offaly		**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:**	**Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 597,208.6 N 689,979.1**	**Rev: FINAL**
Ground level: 143.62m O.D.		**DATE: 17.5.22**

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

PIT DIRECTION: 210°
PIT DIMENSION: 4.00m * 1.00
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							143.42	0.20	TOPSOIL: Grass over firm brown gravelly SILT with some rootlets. Gravel is subangular to subrounded fine to coarse of limestone.	
			B 1	0.30-0.60			143.32	0.30	Firm orangish brown gravelly SILT with low cobble content and low boulder content. Gravel is angular to subangular fine to coarse of limestone. Cobbles are angular to subangular of limestone. Boulders are angular to subangular of limestone. Boulders are up to 300mm in length.	
			D 2	0.50			143.02	0.60	Firm light brown slightly sandy very gravelly SILT with medium cobble content and low boulder content. Sand is fine. Gravel is angular to subangular fine to coarse of limestone. Cobbles are angular to subangular of limestone. Boulders are angular to subangular of limestone. Boulders are up to 300mm in length.	
							142.82	0.80	Greyish bluish brown very gravelly angular to subangular limestone COBBLES with high boulder content. Gravel is angular to subangular fine to coarse of limestone. Boulders are angular to subangular of limestone. Boulders are up to 350mm in length.	
1						END			TP terminated at 0.80m bgl. Obstruction as probable rock.	
2										
3										
4										
5										
6										
7										
8										
9										
10										

Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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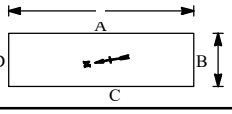
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site		**TRIALPIT: BPT-TP008**
LOCATION: County Offaly		**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:**	**Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 597,235.0 N 689,985.1**	**Rev: FINAL**
Ground level: 147.02m O.D.		**DATE: 17.5.22**

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

PIT DIRECTION: 190°
PIT DIMENSION: 3.00m * 1.00
LOGGED BY: PC



Shoring/Support: N/A
Stability: Pit stable

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							146.72	0.30	TOPSOIL: Grass over firm brown gravelly SILT with low cobble content. Gravel is angular to subrounded fine to coarse of limestone. Cobbles are subangular to subrounded of limestone.	
			B 1	0.30-0.60			146.42	0.60	Brownish bluish grey very gravelly angular to subangular limestone COBBLES with high boulder content. Gravel is angular to subangular fine to coarse of limestone. Boulders are angular to subangular of limestone. Boulders are up to 350mm in length.	
							END		TP terminated at 0.60m bgl. Obstruction as probable rock.	
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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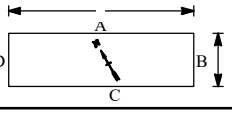
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site	**TRIALPIT: BPT-TP009**
LOCATION: County Offaly	**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:** E 597,168.1 N 689,921.9 / **Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**Rev: FINAL**
Ground level: 137.41m O.D.	**DATE: 12.5.22**

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

PIT DIRECTION: 120°
PIT DIMENSION: 4.00m * 1.00
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							137.11	0.30	TOPSOIL: Grass over firm brown gravelly SILT. Gravel is subangular to subrounded fine to coarse of limestone.	
			B 1	0.40-0.70					Soft damp grey slightly sandy gravelly SILT with low cobble content. Sand is fine. Gravel is angular to subrounded fine to coarse of limestone. Cobbles are subangular to subrounded of limestone.	
			VANE	0.50	19mm vane 8 kN/m²					
1			D 2	0.70	9 kN/m² 8 kN/m²		135.61	1.80		
2			B 3	2.00-2.30			135.11	2.30	Light greyish white silty angular to subangular fine to coarse limestone GRAVEL with low cobble content and low boulder content. Cobbles are angular to subangular of limestone. Boulders are subangular to subrounded of limestone. Boulders are up to 400mm in length.	
			D 4	2.30		END			TP terminated at 2.30m bgl. Obstruction as boulders.	
3										
4										
5										
6										
7										
8										
9										
10										

Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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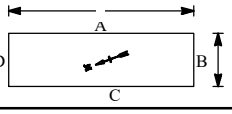
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site		**TRIALPIT: BPT-TP010**
LOCATION: County Offaly		**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:**	**Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 597,215.8 N 689,937.6**	**Rev: FINAL**
Ground level: 142.64m O.D.		**DATE: 17.5.22**

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

PIT DIRECTION: 200°
PIT DIMENSION: 3.00m * 0.60
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							142.39	0.25	TOPSOIL: Grass over firm brown gravelly SILT with low cobble content. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subrounded to rounded of limestone.	
			B 1	0.50-0.80			142.14	0.50	Firm orangish brown gravelly SILT with low cobble content. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subrounded to rounded of limestone.	
			D 2	0.80			141.74	0.90	Firm light greyish brown slightly sandy very gravelly SILT with medium cobble content and low boulder content. Gravel is angular to subrounded fine to coarse of limestone. Cobbles are angular to subrounded of limestone. Boulders are subangular of limestone. Boulders are up to 250mm in length.	
1						END			TP terminated at 0.90m bgl. Obstruction as probable rock.	
2										
3										
4										
5										
6										
7										
8										
9										
10										

Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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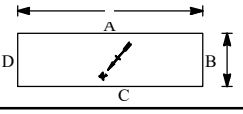
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site	**TRIALPIT: BPT-TP011**
LOCATION: County Offaly	**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:** **Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 597,246.7 N 689,961.5** **Rev: FINAL**
Ground level: 145.85m O.D.	**DATE: 18.5.22**

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

PIT DIRECTION: 230°
PIT DIMENSION: 3.00m * 0.60
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							145.65	0.20	TOPSOIL: Grass over firm brown slightly gravelly SILT. Gravel is subangular to subrounded fine to coarse of limestone.	
			B 1	0.30-0.60			145.25	0.60	Brownish bluish grey very gravelly angular to subangular limestone COBBLES with medium boulder content. Gravel is angular to subangular fine to coarse of limestone. Boulders are angular to subangular of limestone. Boulders are up to 400mm in length.	
							END		TP terminated at 0.60m bgl. Obstruction as probable rock.	
1										
2										
3										
4										
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Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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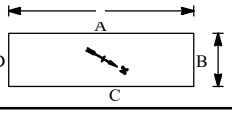
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site		**TRIALPIT: BPT-TP012**
LOCATION: County Offaly		**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:**	**Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 597,154.3 N 689,899.0**	**Rev: FINAL**
Ground level: 137.03m O.D.		**DATE: 13.5.22**

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

PIT DIRECTION: 330°
PIT DIMENSION: 3.00m * 0.60
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							136.83	0.20	TOPSOIL: Grass over firm brown gravelly SILT. Gravel is subangular to rounded fine to coarse of limestone.	
							136.73	0.30	Firm orangish brown gravelly SILT with low cobble content. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subrounded to rounded of limestone.	
			B 1	0.30-0.60						
			D 2	0.60					Soft damp brownish grey slightly sandy gravelly SILT with high cobble content and medium boulder content. Sand is fine. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subrounded to rounded of limestone. Boulders are subrounded to rounded of limestone. Boulders are up to 400mm in length.	
1			B 3	1.30-1.60						
			D 4	1.60			135.43	1.60		
						END			TP terminated at 1.60m bgl. Obstruction as probable rock.	
2										
3										
4										
5										
6										
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10										

Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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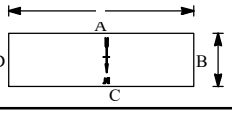
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site	**TRIALPIT: BPT-TP013**
LOCATION: County Offaly	**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:** **Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 597,206.2 N 689,911.6** **Rev: FINAL**
Ground level: 141.29m O.D.	**DATE: 13.5.22**

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

PIT DIRECTION: 270°
PIT DIMENSION: 3.00m * 1.00
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							141.09	0.20	TOPSOIL: Grass over firm brown gravelly SILT with low cobble content. Gravel is subrounded to rounded fine to coarse of limestone. Cobbles are subrounded to rounded of limestone.	
			B 1	0.40-0.70					POSSIBLE MADE GROUND: Bluish grey gravelly subrounded to rounded limestone COBBLES with low boulder content. Gravel is subangular to rounded fine to coarse of limestone. Boulders are subrounded to rounded of limestone. Boulders are up to 250mm in length.	
1							140.29	1.00		
						END			TP terminated at 1.00m bgl. Obstruction as boulders and large boulders.	
2										
3										
4										
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Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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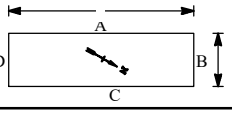
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site	**TRIALPIT: BPT-TP014**
LOCATION: County Offaly	**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:** **Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 597,169.8 N 689,867.9** **Rev: FINAL**
Ground level: 138.69m O.D.	**DATE: 13.5.22**

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

PIT DIRECTION: 330°
PIT DIMENSION: 4.00m * 1.00
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							138.29	0.40	TOPSOIL: Grass and thistles over firm brown gravelly SILT with low cobble content and low boulder content. Gravel is subrounded to rounded fine to coarse of limestone. Cobbles are subrounded to rounded of limestone. Boulders are subrounded to rounded of limestone. Boulders are up to 400mm in length.	
			B 1	0.50-0.80						
			D 2	0.80			137.69	1.00	Soft damp brownish grey slightly sandy gravelly SILT with medium cobble content and medium boulder content. Sand is fine. Gravel is subrounded to rounded fine to coarse of limestone. Cobbles are subrounded to rounded of limestone. Boulders are subrounded to rounded of limestone. Boulders are up to 450mm in length.	
1									Soft damp grey very gravelly SILT with medium cobble content and medium boulder content. Gravel is subrounded to rounded fine to coarse of limestone. Cobbles are subrounded to rounded of limestone. Boulders are subrounded to rounded of limestone. Boulders are up to 500mm in length.	
			B 3	1.80-2.10						
2			D 4	2.10						
							135.69	3.00		
3						END			TP terminated at 3.00m bgl. Obstruction as boulders.	
4										
5										
6										
7										
8										
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10										

Remarks: TP dry on excavation. TP backfilled with arisings.

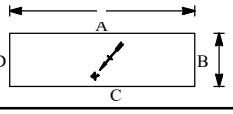
Scale: 1:50

TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site	**TRIALPIT: BPT-TP015**
LOCATION: County Offaly	**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:** E 597,187.2 N 689,886.7
ENGINEER: Mott MacDonald	**Rig: Hitachi Zaxis 130 LCN**
Ground level: 139.46m O.D.	**Rev: FINAL**
	DATE: 12.5.22

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

PIT DIRECTION: 230°
PIT DIMENSION: 3.00m * 1.50
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							139.16	0.30	TOPSOIL: Grass over firm brown slightly gravelly SILT. Gravel is subangular to rounded fine to coarse of limestone.	
			PBT	0.40			138.96	0.50	Firm orangish brown slightly gravelly SILT with low cobble. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subangular to rounded of limestone.	
			B 1	0.50-0.80					Soft damp brownish grey slightly sandy gravelly SILT with low cobble content and low boulder content. Sand is fine. Gravel is angular to subangular fine to coarse of limestone. Cobbles are subangular to subrounded of limestone. Boulders are subangular to subrounded of limestone. Boulders are up to 400mm in length.	
			VANE	0.60	19mm vane 10 kN/m² 14 kN/m² 8 kN/m²					
1			D 2	0.80			138.06	1.40		
			B 3	1.50-1.80					Firm orangish brown slightly gravelly sandy SILT. Sand is fine. Gravel is subangular to subrounded fine to coarse of limestone.	
			D 4	1.80			137.56	1.90		
2			B 5	2.00-2.30					Light whitish orangish brown silty angular to subangular fine to coarse limestone GRAVEL with medium cobble content and medium boulder content. Cobbles are angular to subangular of limestone. Boulders are angular to subangular of limestone. Boulders are up to 350mm in length.	
			D 6	2.30			137.06	2.40		
						END			TP terminated at 2.40m bgl. Obstruction as boulders.	
3										
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Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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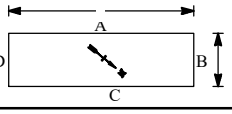
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site		**TRIALPIT: BPT-TP016**
LOCATION: County Offaly		**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:**	**Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 597,225.5 N 689,907.1**	**Rev: FINAL**
Ground level: 143.63m O.D.		**DATE: 17.5.22**

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

PIT DIRECTION: 320°
PIT DIMENSION: 3.00m * 0.60
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0			B 1	0.20-0.40			143.43	0.20	TOPSOIL: Grass over firm brown slightly gravelly SILT with low cobble content. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subrounded to rounded of limestone.	
			D 2	0.40			143.23	0.40	Firm orangish brown gravelly SILT with medium cobble content. Gravel is subangular to subrounded fine to coarse of limestone. Cobbles are subangular to subrounded of limestone.	
							143.13	0.50	Bluish grey gravelly angular to subangular limestone COBBLES with low boulder content. Gravel is angular to subangular fine to coarse of limestone. Boulders are angular to subangular of limestone. Boulders are up to 300mm in length.	
									TP terminated at 0.50m bgl. Obstruction as probable rock.	
1										
2										
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Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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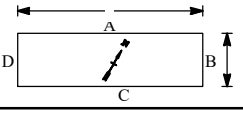
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site		**TRIALPIT: BPT-TP017**
LOCATION: County Offaly		**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:**	**Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 597,245.6 N 689,919.7**	**Rev: FINAL**
Ground level: 144.66m O.D.		**DATE: 18.5.22**

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

PIT DIRECTION: 60°
PIT DIMENSION: 3.00m * 0.60
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0			B 1	0.30-0.50			144.41	0.25	TOPSOIL: Grass over firm brown gravelly SILT. Gravel is subangular to rounded fine to coarse of limestone.	
							144.16	0.50	Brownish bluish grey very gravelly angular to subangular limestone COBBLES with low boulder content. Gravel is angular to subangular fine to coarse of limestone. Boulders are angular to subangular of limestone. Boulders are up to 300mm in length.	
						END			TP terminated at 0.50m bgl. Obstruction as probable rock.	
1										
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Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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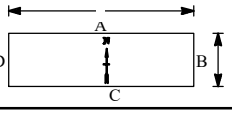
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site	**TRIALPIT: BPT-TP018**
LOCATION: County Offaly	**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:** **Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 597,216.6 N 689,867.7** **Rev: FINAL**
Ground level: 145.21m O.D.	**DATE: 20.5.22**

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

PIT DIRECTION: 90°
PIT DIMENSION: 3.00m * 0.60
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							145.01	0.20	TOPSOIL: Grass over firm brown gravelly SILT. Gravel is subangular to rounded fine to coarse of limestone.	
							144.81	0.40	Brownish bluish grey gravelly angular to subangular limestone COBBLES with low boulder content. Gravel is angular to subangular fine to coarse of limestone. Boulders are angular to subangular of limestone. Boulders are up to 400mm in length.	
							END		TP terminated at 0.40m bgl. Obstruction as probable rock.	
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Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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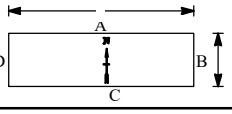
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site	**TRIALPIT: BPT-TP019**
LOCATION: County Offaly	**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:** **Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 597,226.1 N 689,880.6** **Rev: FINAL**
Ground level: 145.08m O.D.	**DATE: 20.5.22**

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

PIT DIRECTION: 90°
PIT DIMENSION: 4.00m * 0.60
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							144.98	0.10	TOPSOIL: Grass over firm brown gravelly SILT with medium cobble content. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subangular to rounded of limestone.	
						END			TP terminated at 0.10m bgl. Obstruction as probable rock.	
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9										
10										

Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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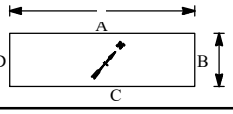
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site		**TRIALPIT: BPT-TP020**
LOCATION: County Offaly		**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:**	**Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 597,265.6 N 689,893.9**	**Rev: FINAL**
Ground level: 145.63m O.D.		**DATE: 18.5.22**

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

PIT DIRECTION: 50°
PIT DIMENSION: 3.00m * 0.60
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							145.38	0.25	TOPSOIL: Grass over firm brown slightly gravelly SILT with low cobble content. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subrounded to rounded of limestone.	
						END			TP terminated at 0.25m bgl. Obstruction as probable rock.	
1										
2										
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10										

Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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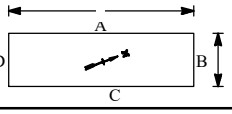
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site		**TRIALPIT: BPT-TP021**
LOCATION: County Offaly		**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:**	**Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 597,264.3 N 689,922.8**	**Rev: FINAL**
Ground level: 145.10m O.D.		**DATE: 18.5.22**

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

PIT DIRECTION: 20°
PIT DIMENSION: 4.00m * 0.60
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0			B 1	0.30-0.60			144.85	0.25	TOPSOIL: Grass over firm brown gravelly SILT. Gravel is subangular to subrounded fine to coarse of limestone.	
							144.50	0.60	Brownish bluish grey very gravelly angular to subangular limestone COBBLES with medium boulder content. Gravel is angular to subangular fine to coarse of limestone. Boulders are angular to subangular of limestone. Boulders are up to 300mm in length.	
									END TP terminated at 0.60m bgl. Obstruction as probable rock.	
1										
2										
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10										

Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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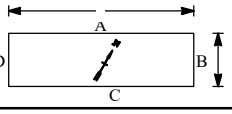
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site		**TRIALPIT: BPT-TP022**
LOCATION: County Offaly		**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:**	**Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 597,249.3 N 689,863.6**	**Rev: FINAL**
Ground level: 146.12m O.D.		**DATE: 20.5.22**

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

PIT DIRECTION: 60°
PIT DIMENSION: 3.00m * 0.60
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0			B 1	0.20-0.50			145.92	0.20	TOPSOIL: Grass over firm brown slightly gravelly SILT with low cobble content. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subrounded to rounded of limestone.	
							145.52	0.60	Brownish bluish grey angular to subangular fine to coarse limestone GRAVEL with high cobble content and medium boulder content. Cobbles are angular to subangular of limestone. Boulders are angular to subangular of limestone. Boulders are up to 300mm in length.	
							END		TP terminated at 0.60m bgl. Obstruction as probable rock.	
1										
2										
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Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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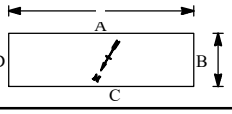
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site	**TRIALPIT: BPT-TP023**
LOCATION: County Offaly	**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:** **Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 597,287.2 N 689,886.4** **Rev: FINAL**
Ground level: 145.51m O.D.	**DATE: 18.5.22**

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

PIT DIRECTION: 240°
PIT DIMENSION: 4.00m * 0.60
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							145.31	0.20	TOPSOIL: Grass over firm brown gravelly SILT with low cobble content. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subrounded to rounded of limestone.	
							145.11	0.40	Firm orangish brown gravelly SILT with medium cobble content. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subrounded to rounded of limestone.	
			B 1 D 2 D 2	0.50-0.80 0.50-0.80 0.80						
1							144.31	1.20	Light greyish brown silty fine to coarse SAND and angular to subangular fine to coarse limestone GRAVEL with medium cobble content and low boulder content. Cobbles are angular to subangular of limestone. Boulders are angular to subangular of limestone. Boulders are up to 350mm in length.	
									END	
									TP terminated at 1.20m bgl. Obstruction as probable rock.	
2										
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Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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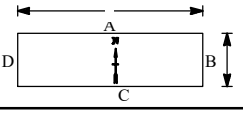
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site	**TRIALPIT: BPT-TP024**
LOCATION: County Offaly	**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:** **Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 597,220.6 N 689,818.0** **Rev: FINAL**
Ground level: 142.45m O.D.	**DATE: 20.5.22**

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

PIT DIRECTION: 90°
PIT DIMENSION: 3.00m * 0.60
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							142.25	0.20	TOPSOIL: Grass over firm brown gravelly SILT with medium cobble content. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subangular to rounded of limestone.	
			B 1	0.30-0.60			141.85	0.60	Brownish bluish grey very gravelly angular to subrounded limestone COBBLES with high boulder content. Gravel is angular to subrounded fine to coarse of limestone. Boulders are angular to subrounded of limestone. Boulders are up to 400mm in length.	
1									TP terminated at 0.60m bgl. Obstruction as probable rock.	
2										
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Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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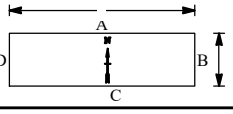
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site	**BPT-TP025(INF003)**
LOCATION: County Offaly	
CLIENT: Irish Water	**Co-ordinates:** **Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 597,229.5 N 689,829.8** **Rev: FINAL**
Ground level: 145.99m O.D.	**DATE: 20.5.22**

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

PIT DIRECTION: 90°
PIT DIMENSION: 3.00m * 0.60
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							145.79	0.20	TOPSOIL: Grass over firm brown gravelly SILT with medium cobble content. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subangular to rounded of limestone.	
							145.59	0.40	Brownish bluish grey gravelly subangular to subrounded limestone BOULDERS with high cobble content. Gravel is angular to subrounded fine to coarse of limestone. Cobbles are angular to rounded of limestone. Boulders are up to 400mm in length.	
							END		TP terminated at 0.40m bgl. Obstruction as probable rock.	
1										
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Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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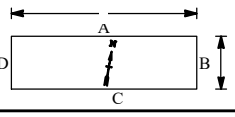
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site	**BPT-TP026(INF004)**
LOCATION: County Offaly	
CLIENT: Irish Water	**Co-ordinates:** **Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 597,241.1 N 689,843.2** **Rev: FINAL**
Ground level: 146.06m O.D.	**DATE: 19.5.22**

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

PIT DIRECTION: 80°
PIT DIMENSION: 1.90m * 0.60
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							145.91	0.15	TOPSOIL: Grass over firm brown gravelly SILT. Gravel is subangular to subrounded fine to coarse of limestone.	
							145.76	0.30	Brownish bluish grey very gravelly angular to subangular limestone COBBLES with high boulder content. Gravel is angular to subangular fine to coarse of limestone. Boulders are angular to subangular of limestone. Boulders are up to 400mm in length.	
						END			TP terminated at 0.30m bgl. Obstruction as probable rock.	
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Remarks: Infiltration test BPT-INF003 expedited. TP dry on excavation. TP backfilled with arisings.

Scale: **1:50**

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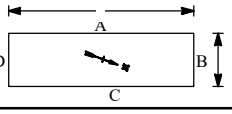
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site	**TRIALPIT: BPT-TP027**
LOCATION: County Offaly	**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:** **Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 597,267.3 N 689,848.8** **Rev: FINAL**
Ground level: 146.55m O.D.	**DATE: 19.5.22**

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

PIT DIRECTION: 340°
PIT DIMENSION: 2.00m * 0.60
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0			B 1 D 2	0.25-0.40 0.40			146.30 146.15	0.25 0.40	TOPSOIL: Grass over firm brown gravelly SILT. Gravel is subangular to rounded fine to coarse of limestone. Firm light greyish brown slightly gravelly slightly sandy SILT with low cobble content and low boulder content. Gravel is subangular to subrounded fine to coarse of limestone. Cobbles are subangular of limestone. Boulders are subangular of limestone. Boulders are up to 350mm in length. TP terminated at 0.40m bgl. Obstruction as probable rock.	
1									**END**	
2										
3										
4										
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10										

Remarks: Infiltration test BPT-INF004 expedited. TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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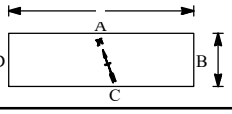
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site		**TRIALPIT: BPT-TP028**
LOCATION: County Offaly		**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:**	**Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 597,303.3 N 689,870.3**	**Rev: FINAL**
Ground level: 145.12m O.D.		**DATE: 20.5.22**

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

PIT DIRECTION: 110°
PIT DIMENSION: 4.00m * 0.60
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							144.92	0.20	TOPSOIL: Crops over firm brown gravelly SILT. Gravel is subangular to rounded fine to coarse of limestone.	
			B 1	0.20-0.40					Firm orangish brown slightly gravelly sandy SILT with low cobble content. Sand is fine to coarse. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subrounded to rounded of limestone.	
			VANE	0.30	19mm vane 14 kN/m²					
			D 2	0.30	15 kN/m²					
			B 3	0.50-0.80	12 kN/m²		144.32	0.80		
							144.22	0.90	Light brown silty angular to subangular fine to coarse limestone GRAVEL with medium cobble content and low boulder content. Cobbles are angular to subangular of limestone. Boulders angular to subangular of limestone.	
1						END			TP terminated at 0.90m bgl. Obstruction as probable rock.	
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10										

Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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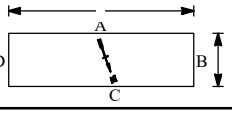
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site	**TRIALPIT: BPT-TP029**
LOCATION: County Offaly	**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:** **Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 597,245.6 N 689,808.2** **Rev: FINAL**
Ground level: 145.85m O.D.	**DATE: 23.5.22**

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

PIT DIRECTION: 290°
PIT DIMENSION: 3.00m * 0.60
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							145.65	0.20	TOPSOIL: Grass over firm brown gravelly SILT with low cobble content. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subrounded to rounded of limestone.	
			B 1	0.20-0.40	12 kN/m²		145.45	0.40	Firm orangish brown gravelly SILT with low cobble content. Gravel is subrounded to rounded fine to coarse of limestone. Cobbles are subrounded to rounded of limestone.	
			VANE	0.30	19mm vane					
			D 2	0.30	11 kN/m²					
			B 3	0.60-0.90	12 kN/m²		144.95	0.90	Firm light greyish brown very gravelly SILT with medium cobble content and medium boulder content. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subangular to rounded of limestone. Boulders are subrounded to rounded of limestone. Boulders are up to 350mm in length.	
1			D 4	0.90		END			TP terminated at 0.90m bgl. Obstruction as probable rock.	
2										
3										
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6										
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8										
9										
10										

Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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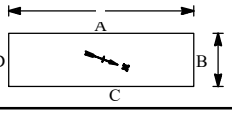
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site		**TRIALPIT: BPT-TP030**
LOCATION: County Offaly		**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:**	**Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 597,292.1 N 689,814.2**	**Rev: FINAL**
Ground level: 146.78m O.D.		**DATE: 23.5.22**

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

PIT DIRECTION: 340°
PIT DIMENSION: 3.00m * 0.60
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							146.58	0.20	TOPSOIL: Grass over firm brown gravelly SILT with medium cobble content and some tree roots. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subrounded to rounded of limestone. Roots are up to 30mm in length.	
			B 1	0.60-0.90					Firm light greyish brown gravelly SILT with medium cobble content and medium boulder content. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subangular to rounded of limestone. Boulders are subrounded to rounded of limestone. Boulders are up to 400mm in length.	
1			D 2	0.90			145.48	1.30		
						END			TP terminated at 1.30m bgl. Obstruction as probable rock.	
2										
3										
4										
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6										
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8										
9										
10										

Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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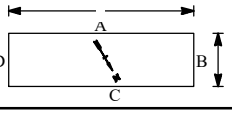
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site		**TRIALPIT: BPT-TP031**
LOCATION: County Offaly		**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:**	**Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 597,105.6 N 689,973.3**	**Rev: FINAL**
Ground level: 132.84m O.D.		**DATE: 16.5.22**

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

PIT DIRECTION: 300°
PIT DIMENSION: 4.00m * 0.60
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							132.74	0.10	MADE GROUND: Grass over firm brown gravelly SILT with many rootlets. Gravel is angular to subangular fine to coarse of limestone.	
							132.44	0.40	MADE GROUND: Bluish grey silty angular to subangular fine to coarse limestone GRAVEL with medium cobble content. Cobbles are angular to subangular of limestone.	
			B 1	0.50-0.80			132.04	0.80	Firm orangish brown slightly sandy very gravelly SILT with low cobble content and low boulder content. Sand is fine. Gravel is subangular to subrounded fine to coarse of limestone. Cobbles are subangular to subrounded of limestone. Boulders are subangular to subrounded of limestone. Boulders are 200mm in length.	
1										
			B 2	1.70-2.00					Soft damp brownish grey very gravelly SILT with medium cobble content and medium boulder content. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subrounded to rounded of limestone. Boulders are subrounded to rounded of limestone. Boulders are up to 400mm in length.	
2			D 3	2.00		**END**	130.84	2.00	TP terminated at 2.00m bgl. Obstruction as boulders.	
3										
4										
5										
6										
7										
8										
9										
10										

Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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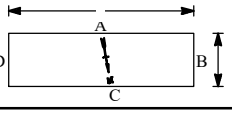
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site	**TRIALPIT: BPT-TP032**
LOCATION: County Offaly	**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:** **Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 597,036.8 N 689,948.4** **Rev: FINAL**
Ground level: 130.26m O.D.	**DATE: 23.5.22**

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

PIT DIRECTION: 280°
PIT DIMENSION: 3.00m * 0.60
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							130.06	0.20	TOPSOIL: Grass over firm brown gravelly SILT with many tree roots. Gravel is subangular to rounded fine to coarse of limestone. Tree roots are up to 20mm thick.	
			B 1	0.30-0.60					Firm light orangish brown gravelly SILT with medium cobble content and low boulder content. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subangular to rounded of limestone. Boulders are subrounded to rounded of limestone. Boulders are up to 300mm in length.	
			D 2	0.60			129.46	0.80		
1									Soft damp light greyish brown gravelly SILT with medium cobble content and medium boulder content. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subangular to rounded of limestone. Boulders are subangular to rounded of limestone. Boulders are up to 350mm in length.	
			B 3	1.30-1.60						
			D 4	1.60						
2							128.26	2.00		
						END			TP terminated at 2.00m bgl. Obstruction as boulders.	
3										
4										
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8										
9										
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Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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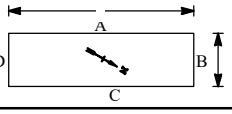
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site	**TRIALPIT: BPT-TP033**
LOCATION: County Offaly	**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:** E 596,919.6 N 690,009.2 — **Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**Rev: FINAL**
Ground level: 123.73m O.D.	**DATE: 23.5.22**

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

PIT DIRECTION: 330°
PIT DIMENSION: 3.00m * 0.60
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							123.53	0.20	TOPSOIL: Grass over firm brown gravelly SILT with low cobble content. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subangular to rounded of limestone.	
			B 1	0.60-0.90					Stiff light orangish brown gravelly SILT with medium cobble content and medium boulder content. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subangular to rounded of limestone. Boulders are subangular to rounded of limestone. Boulders are up to 350mm in length.	
1			D 2	0.90			122.43	1.30		
						END			TP terminated at 1.30m bgl. Obstruction as boulders.	
2										
3										
4										
5										
6										
7										
8										
9										
10										

Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

Irish Drilling Ltd

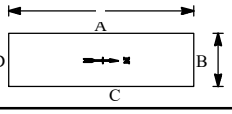
Ph. +353 91841274
Fax

TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site		**TRIALPIT: BPT-TP034**
LOCATION: County Offaly		**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:**	**Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 596,879.4 N 690,063.1**	**Rev: FINAL**
Ground level: 120.33m O.D.		**DATE: 24.5.22**

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

PIT DIRECTION: 0°
PIT DIMENSION: 3.00m * 0.60
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							120.13	0.20	MADE GROUND: Grass over firm brown gravelly SILT with low cobble content and many tree roots. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subangular to rounded of limestone. Tree roots are up to 20mm in length.	
							119.83	0.50	MADE GROUND: Bluish greyish brown silty very gravelly angular to subangular limestone COBBLES with medium boulder content. Gravel is angular to subangular fine to coarse of limestone. Boulders are angular to subangular of limestone. Boulders are up to 400mm in length.	
1			B 1 D 2	0.70-1.00 1.00					Firm light greyish brown gravelly SILT with medium cobble content and medium boulder content. Gravel is subangular to subrounded fine to coarse of limestone. Cobbles are subrounded to rounded of limestone. Boulders are subrounded to rounded of limestone. Boulders are up to 350mm in length.	
							118.63	1.70		
						END			TP terminated at 1.70m bgl. Obstruction as boulders.	
2										
3										
4										
5										
6										
7										
8										
9										
10										

Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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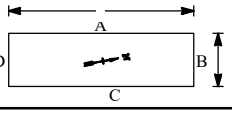
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site	**TRIALPIT: BPT-TP035**
LOCATION: County Offaly	**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:** **Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 596,821.6 N 690,137.3** **Rev: FINAL**
Ground level: 114.43m O.D.	**DATE: 24.5.22**

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

PIT DIRECTION: 10°
PIT DIMENSION: 3.00m * 0.60
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							114.33	0.10	MADE GROUND: Grass over firm brown gravelly SILT with many tree roots. Gravel is subangular to subrounded fine to coarse of limestone. Tree roots are up to 20mm in length.	
							113.83	0.60	MADE GROUND: Orangish greyish brown silty gravelly angular to subangular limestone COBBLES with medium boulder content. Gravel is angular to subangular fine to coarse of limestone. Boulders are subangular to subrounded of limestone. Boulders are up to 350mm in length.	
1			B 1 D 2	0.70-1.00 1.00					Firm light orangish greyish brown gravelly SILT with medium cobble content and low boulder content. Gravel is subangular to subrounded fine to coarse of limestone. Cobbles are subangular to subrounded of limestone. Boulders are subangular to subrounded of limestone. Boulders are up to 400mm in length.	
							112.83	1.60	**END** TP terminated at 1.60m bgl. Obstruction as boulders.	
2										
3										
4										
5										
6										
7										
8										
9										
10										

Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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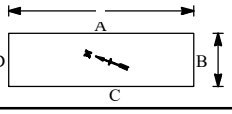
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site	**TRIALPIT: BPT-TP036**
LOCATION: County Offaly	**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:** E 596,834.0 N 690,166.9
ENGINEER: Mott MacDonald	**Rig: Hitachi Zaxis 130 LCN**
Ground level: 114.26m O.D.	**Rev: FINAL**
	DATE: 24.5.22

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

PIT DIRECTION: 160°
PIT DIMENSION: 4.00m * 1.00
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							114.06	0.20	MADE GROUND: Grass over firm brown gravelly SILT. Gravel is subangular to subrounded fine to coarse of limestone.	
							113.86	0.40	MADE GROUND: Orangish brown silty gravelly angular to subrounded limestone COBBLES with high boulder content. Gravel is angular to subrounded fine to coarse of limestone. Boulders are subangular to subrounded of limestone. Boulders are up to 300mm in length.	
			B 1	0.40-0.70						
			D 2	0.70			113.46	0.80	Firm orangish greyish brown gravelly SILT with medium cobble content and low boulder content. Gravel is subangular to subrounded fine to coarse of limestone. Cobbles are subangular to rounded of limestone. Boulders are subangular to rounded of limestone. Boulders are up to 350mm in length.	
1			B 3	1.40-1.70						
			D 4	1.70					Soft damp light brownish grey gravelly SILT with medium cobble content and medium boulder content. Gravel is subangular to subrounded fine to coarse of limestone. Cobbles are subangular to rounded of limestone. Boulders are subrounded to rounded of limestone. Boulders are up to 450mm in length.	
2							112.16	2.10		
							END		TP terminated at 2.10m bgl. Obstruction as boulders.	
3										
4										
5										
6										
7										
8										
9										
10										

Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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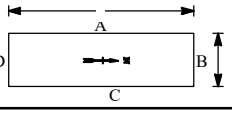
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site	**TRIALPIT: BPT-TP037**
LOCATION: County Offaly	**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:** **Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 596,759.1 N 690,253.8** **Rev: FINAL**
Ground level: 107.21m O.D.	**DATE: 25.5.22**

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

PIT DIRECTION: 0°
PIT DIMENSION: 3.00m * 0.60
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							107.11	0.10	MADE GROUND: Grass over firm brown gravelly SILT with low cobble content and many rootlets. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subangular to rounded of limestone.	
							106.61	0.60	MADE GROUND: Orangish brown silty gravelly subangular to rounded limestone COBBLES with low boulder content. Gravel is subangular to subrounded fine to coarse of limestone. Boulders are subangular to rounded of limestone. Boulders are up to 300mm in length.	
1			B 1 D 2	0.70-1.00 1.00					Firm light brownish grey gravelly SILT with medium cobble content and medium boulder content. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subrounded to rounded of limestone. Boulders are subrounded to rounded of limestone. Boulders are up to 400mm in length.	
							105.81	1.40	END TP terminated at 1.40m bgl. Obstruction as boulders.	
2										
3										
4										
5										
6										
7										
8										
9										
10										

Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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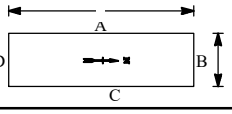
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site		**TRIALPIT: BPT-TP038**
LOCATION: County Offaly		**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:**	**Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 596,745.6 N 690,297.8**	**Rev: FINAL**
Ground level: 105.45m O.D.		**DATE: 25.5.22**

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

PIT DIRECTION: 0°
PIT DIMENSION: 3.00m * 0.60
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0							105.25	0.20	MADE GROUND: Grass over firm brown gravelly SILT with low cobble content and many rootlets. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subrounded to rounded of limestone.	
							104.85	0.60	MADE GROUND: Orangish brown silty gravelly subangular to rounded limestone COBBLES with medium boulder content. Gravel is subangular to rounded fine to coarse of limestone. Boulders are subangular to rounded of limestone. Boulders are up to 400mm in length.	
			B 1	0.70-1.00						
1			D 2	1.00					Firm light orangish greyish brown gravelly SILT with medium cobble content and medium boulder content. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subrounded to rounded of limestone. Boulders are subrounded to rounded of limestone. Boulders are up to 400mm in length.	
							103.95	1.50	**END**	
									TP terminated at 1.50m bgl. Obstruction as boulders.	
2										
3										
4										
5										
6										
7										
8										
9										
10										

Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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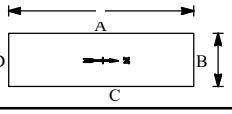
TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

PROJECT: Eastern & Midlands WSP Lot 2, BPT Site	**TRIALPIT: BPT-TP039**
LOCATION: County Offaly	**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:** **Rig: Hitachi Zaxis 130 LCN**
ENGINEER: Mott MacDonald	**E 596,727.4 N 690,335.3** **Rev: FINAL**
Ground level: 100.80m O.D.	**DATE: 25.5.22**

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

PIT DIRECTION: 0°
PIT DIMENSION: 3.00m * 0.60
LOGGED BY: PC



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

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N) / In Situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION	Instrument/ Backfill
0			B 1	0.20-0.50			100.60	0.20	MADE GROUND: Grass over firm brown gravelly SILT with many rootlets. Gravel is subangular to rounded fine to coarse of limestone.	
			PLATE	0.40			100.30	0.50	MADE GROUND: Light orangish brown gravelly SILT with medium cobble content. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subangular to rounded of limestone.	
			D 2	0.50					Firm light greyish brown gravelly SILT with medium cobble content and medium boulder content. Gravel is subangular to rounded fine to coarse of limestone. Cobbles are subangular to rounded of limestone. Boulders are angular to rounded of limestone. Boulders are up to 450mm in length.	
1			B 3	1.00-1.30						
			D 4	1.30			99.40	1.40		
						END			TP terminated at 1.40m bgl. Obstruction.	
2										
3										
4										
5										
6										
7										
8										
9										
10										

Remarks: TP dry on excavation. TP backfilled with arisings.

Scale: 1:50

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TRIALPIT BPT AGS4 COMBINED ALL FILE TO FINAL MARCH 27 2023.GPJ ID GINT AGS 4_0_4.GDT 3/4/23

Appendix 5D
Peat Probe & Russian Core Records
N/A

Appendix 5E
Field / In-Situ Test Results
Part 1: Soil Infiltration

IRISH DRILLING LTD. Loughrea Co. Galway Tel: (091) 841274 info@irishdrilling.ie	*Contract:* WSP Lot 2 BPS SITE *Client:* Irish Water *Engineer:* Mott Macdonald *Date:* 19/05/2022 *Tested by:* PC

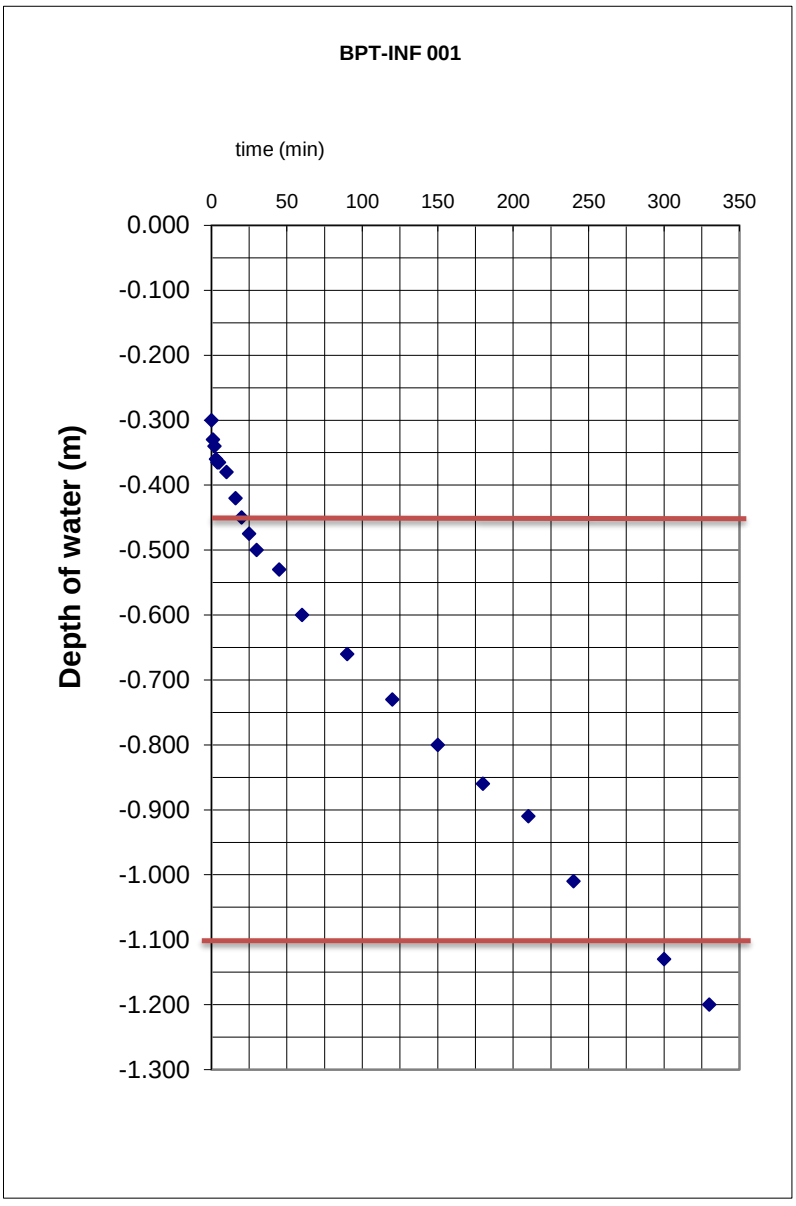
INFILTRATION TEST - to BRE 365

BPT-INF 001

1st FILL

Top of water level: 0.30 m
Base of trial pit: 1.90 m
Dims. of trial pit: 2.4 x 0.6

time min	WL m
0	-0.300
1	-0.330
2	-0.340
3	-0.360
4	-0.365
5	-0.365
10	-0.380
16	-0.420
20	-0.450
25	-0.475
30	-0.500
45	-0.530
60	-0.600
90	-0.660
120	-0.730
150	-0.800
180	-0.860
210	-0.910
240	-1.010
300	-1.130
330	-1.200



Result:
Soil Infiltration Rate = 1.31 x 10^{-5} m/s
T_{75} interpolated.

Co-Ordinates:
Easting: 597280.2
Northing: 689839.8
R.L. 147.52mOD

IRISH DRILLING LTD. Loughrea Co. Galway Tel: (091) 841274 info@irishdrilling.ie	*Contract:* WSP Lot 2 BPS SITE *Client:* Irish Water *Engineer:* Mott Macdonald *Date:* 19/05/2022 *Tested by:* PC

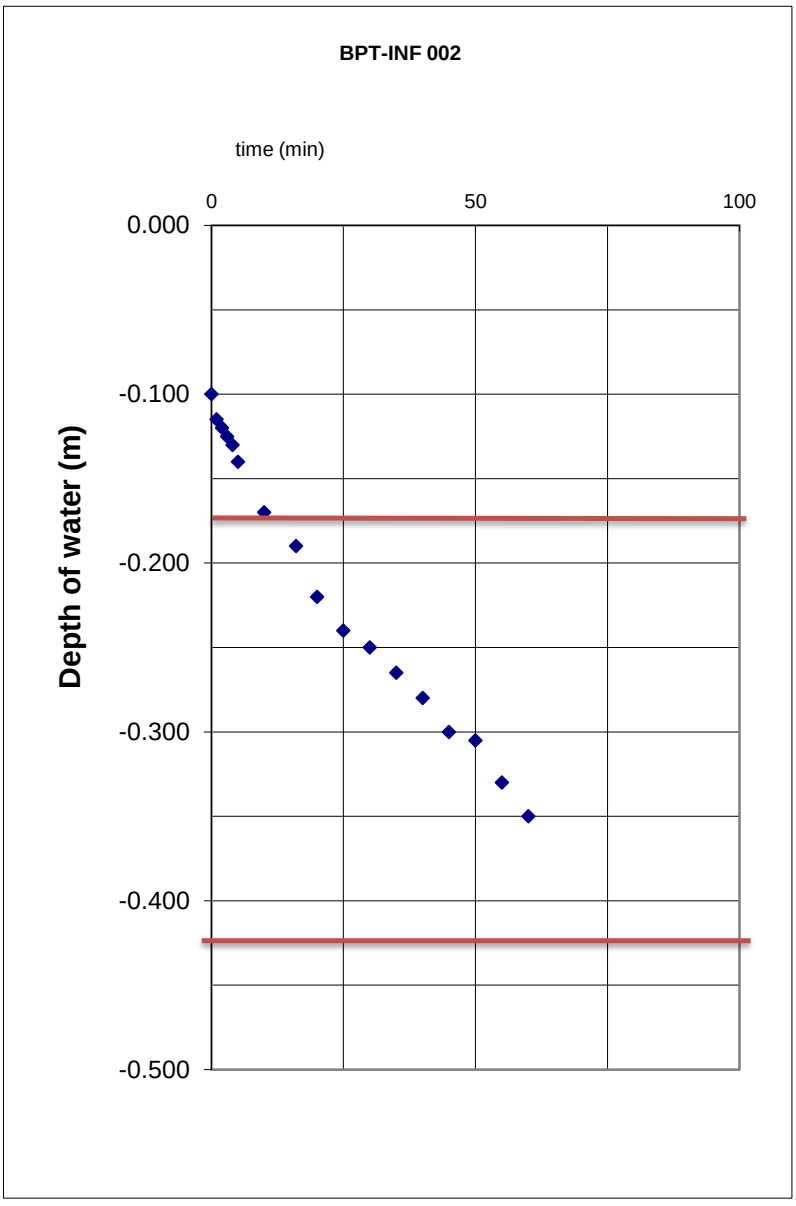
INFILTRATION TEST - to BRE 365

BPT-INF 002

1st FILL

Top of water level: 0.10 m
Base of trial pit: 0.40 m
Dims. of trial pit: 1.6 x 0.6

time min	WL m
0	-0.100
1	-0.115
2	-0.120
3	-0.125
4	-0.130
5	-0.140
10	-0.170
16	-0.190
20	-0.220
25	-0.240
30	-0.250
35	-0.265
40	-0.280
45	-0.300
50	-0.305
55	-0.330
60	-0.350



Result:
Soil Infiltration Rate = 8.46 x 10^{-5} m/s

Co-Ordinates:
Easting: 597240.5
Northing: 689825.9
R.L. 145.9mOD

IRISH DRILLING LTD.
Loughrea Co. Galway

Tel: (091) 841274 info@irishdrilling.ie

Contract:	WSP Lot 2 BPS SITE
Client:	Irish Water
Engineer:	Mott Macdonald
Date:	19/05/2022
Tested by:	PC

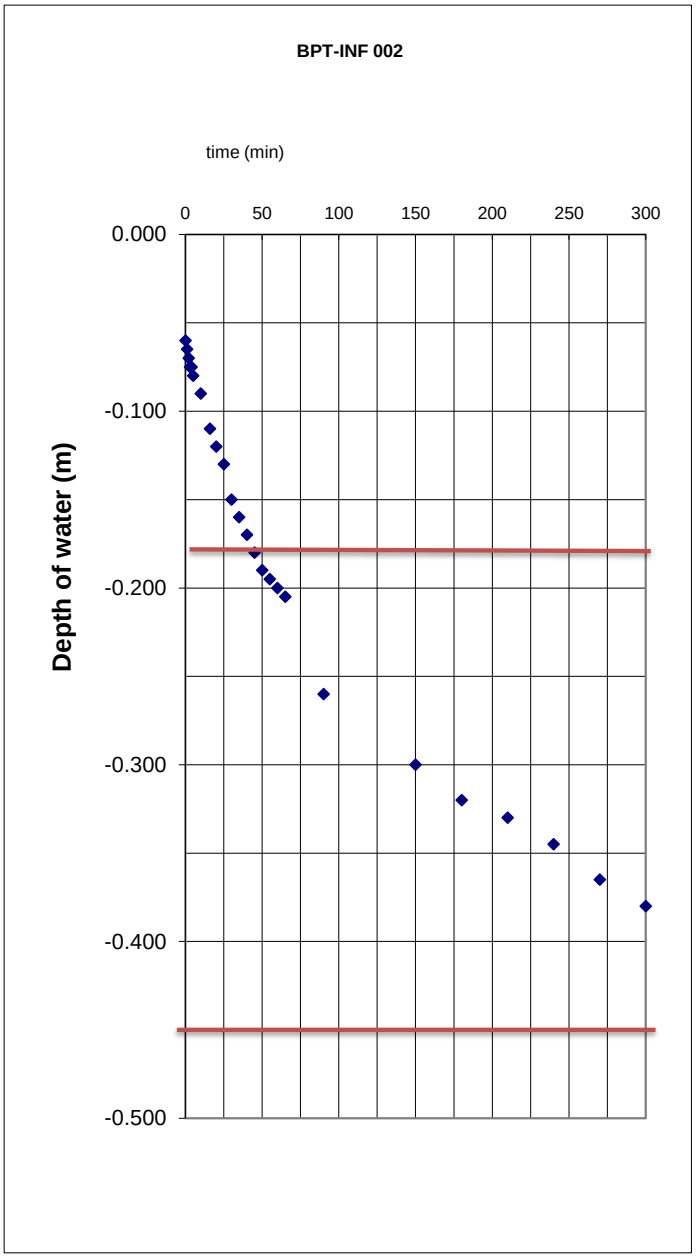
INFILTRATION TEST - to BRE 365

BPT-INF 002

2nd FILL

Top of water level: 0.06 m
Base of trial pit: 0.40 m
Dims. of trial pit: 1.6 x 0.6

time min	WL m
0	-0.060
1	-0.065
2	-0.070
3	-0.075
4	-0.075
5	-0.080
10	-0.090
16	-0.110
20	-0.120
25	-0.130
30	-0.150
35	-0.160
40	-0.170
45	-0.180
50	-0.190
55	-0.195
60	-0.200
65	-0.205
90	-0.260
150	-0.300
180	-0.320
210	-0.330
240	-0.345
270	-0.365
300	-0.380



Result:
Soil Infiltration Rate = 7.91 x 10^{-5} m/s

Co-Ordinates:
Easting: 597240.5
Northing: 689825.9
R.L. 145.9mOD

IRISH DRILLING LTD.
Loughrea Co. Galway

Tel: (091) 841274 info@irishdrilling.ie

Contract:	WSP Lot 2 BPS SITE
Client:	Irish Water
Engineer:	Mott Macdonald
Date:	19/05/2022
Tested by:	PC

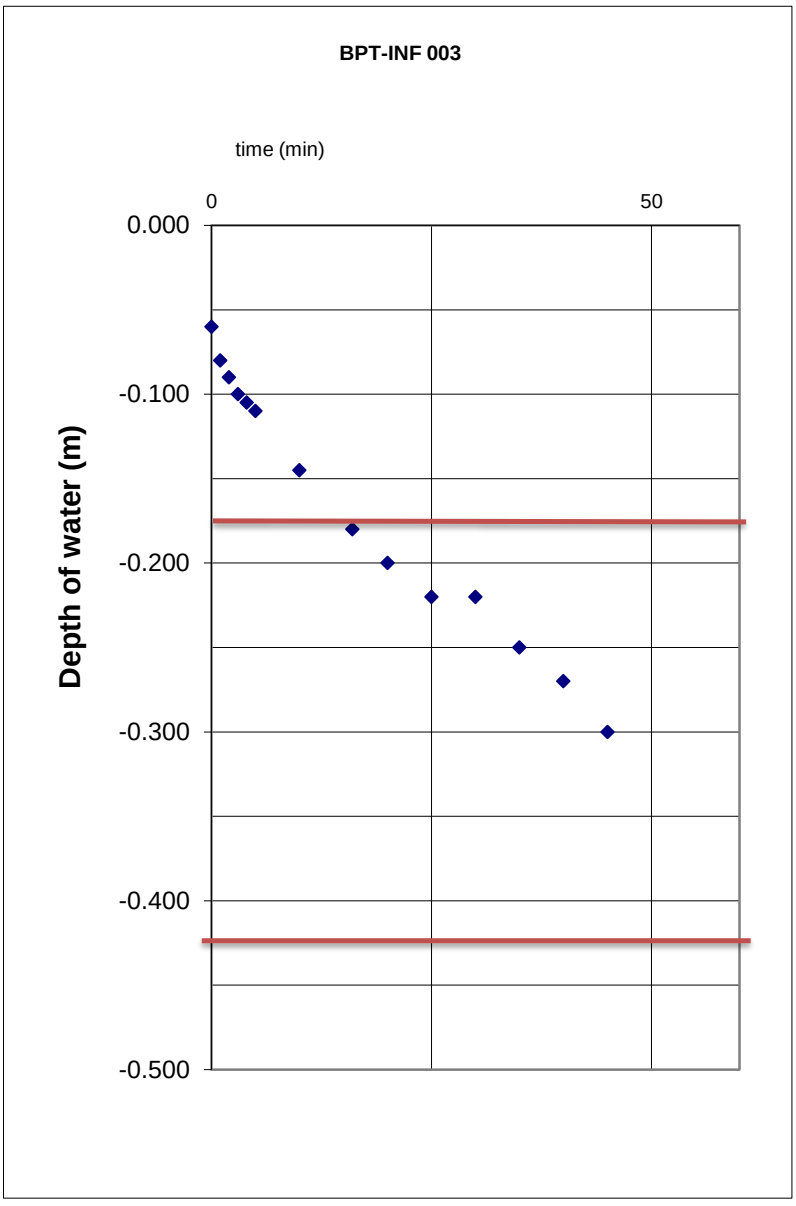
INFILTRATION TEST - to BRE 365

BPT-INF 003

1st FILL

Top of water level: 0.06 m
Base of trial pit: 0.30 m
Dims. of trial pit: 1.9 x 0.6

time min	WL m
0	-0.060
1	-0.080
2	-0.090
3	-0.100
4	-0.105
5	-0.110
10	-0.145
16	-0.180
20	-0.200
25	-0.220
30	-0.220
35	-0.250
40	-0.270
45	-0.300



Result:
Soil Infiltration Rate = 1.74 x 10^{-4} m/s
Test carried out at BPT TP026.

Co-Ordinates:
Easting: 597241.1
Northing: 689843.2
R.L. 146.06mOD

IRISH DRILLING LTD. Loughrea Co. Galway Tel: (091) 841274 info@irishdrilling.ie	*Contract:* WSP Lot 2 BPS SITE *Client:* Irish Water *Engineer:* Mott Macdonald *Date:* 19/05/2022 *Tested by:* PC

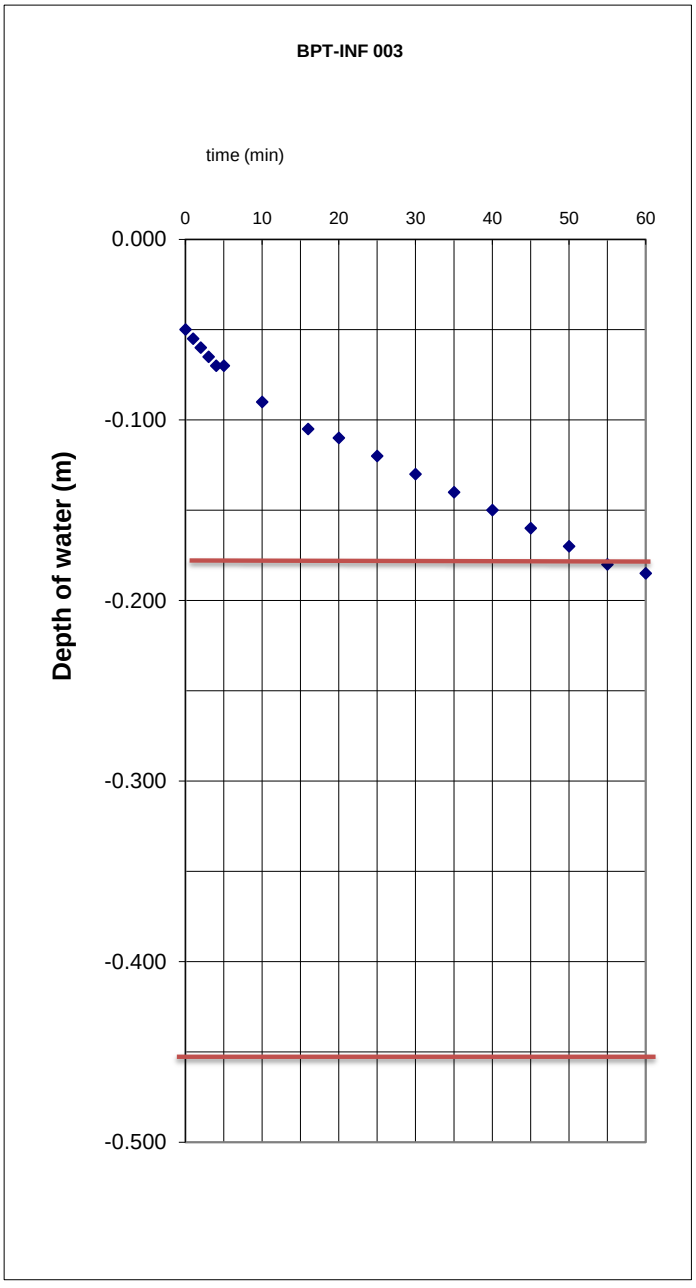
INFILTRATION TEST - to BRE 365

BPT-INF 003

2nd FILL

Top of water level: 0.05 m
Base of trial pit: 0.30 m
Dims. of trial pit: 1.9 x 0.6

time min	WL m
0	-0.050
1	-0.055
2	-0.060
3	-0.065
4	-0.070
5	-0.070
10	-0.090
16	-0.105
20	-0.110
25	-0.120
30	-0.130
35	-0.140
40	-0.150
45	-0.160
50	-0.170
55	-0.180
60	-0.185
65	-0.190
75	-0.215
80	-0.230
90	-0.250
105	-0.270
120	-0.290



Result:
Soil Infiltration Rate = 4.81 x 10^{-5} m/s

Test carried out at BPT TP026.

Co-Ordinates:
Easting: 597241.1
Northing: 689843.2
R.L. 146.06mOD

IRISH DRILLING LTD. Loughrea Co. Galway Tel: (091) 841274 info@irishdrilling.ie	*Contract:* WSP Lot 2 BPS SITE *Client:* Irish Water *Engineer:* Mott Macdonald *Date:* 19/05/2022 *Tested by:* PC

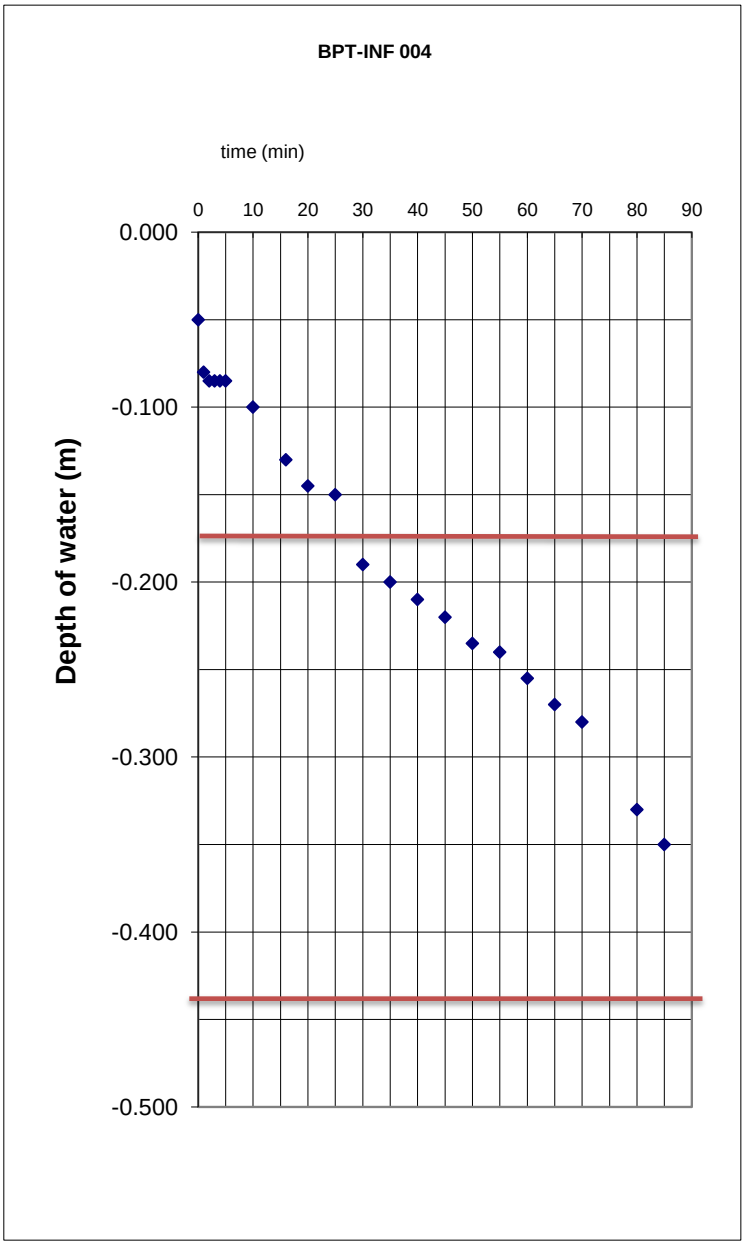
INFILTRATION TEST - to BRE 365

BPT-INF 004

1st FILL

Top of water level: 0.05 m
Base of trial pit: 0.40 m
Dims. of trial pit: 2 x 0.6

time min	WL m
0	-0.050
1	-0.080
2	-0.085
3	-0.085
4	-0.085
5	-0.085
10	-0.100
16	-0.130
20	-0.145
25	-0.150
30	-0.190
35	-0.200
40	-0.210
45	-0.220
50	-0.235
55	-0.240
60	-0.255
65	-0.270
70	-0.280
80	-0.330
85	-0.350



Result:
Soil Infiltration Rate = 6.70 x 10^{-5} m/s

Test carried out at BPT TP027.

Co-Ordinates:
Easting: 597267.3
Northing: 689848.8
R.L. 146.55mOD

IRISH DRILLING LTD. Loughrea Co. Galway Tel: (091) 841274 info@irishdrilling.ie	*Contract:* WSP Lot 2 BPS SITE *Client:* Irish Water *Engineer:* Mott Macdonald *Date:* 19/05/2022 *Tested by:* PC

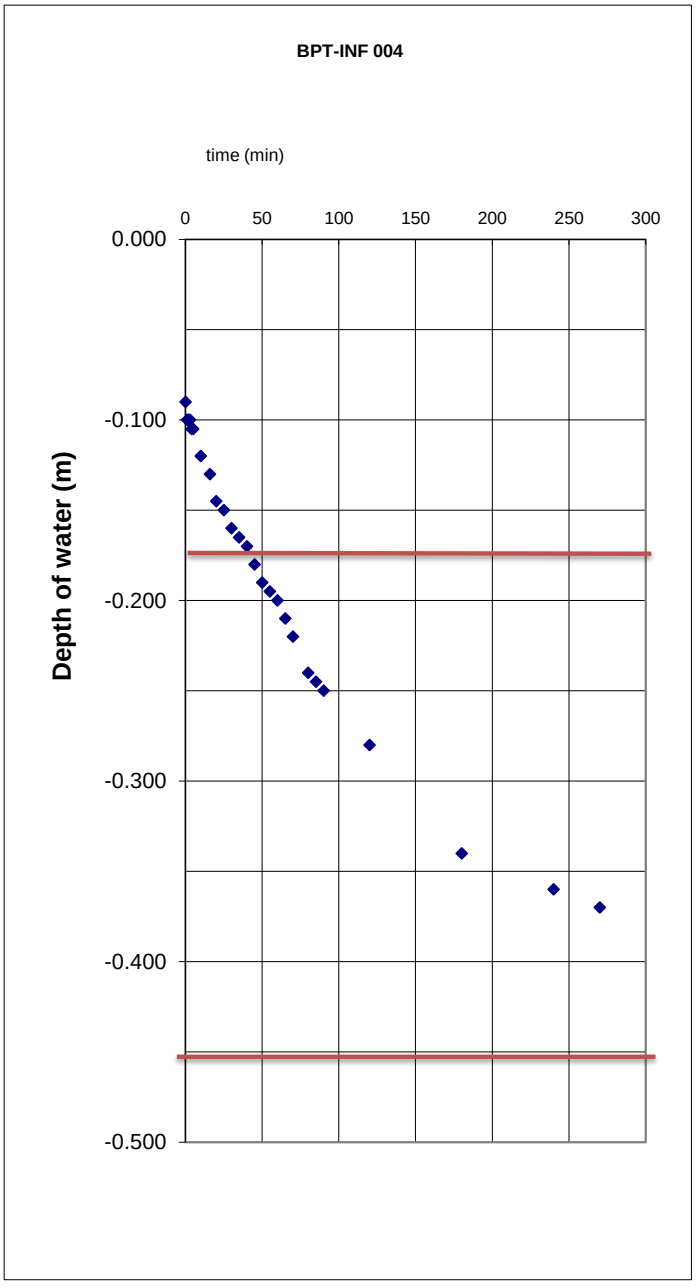
INFILTRATION TEST - to BRE 365

BPT-INF 004

2nd FILL

Top of water level: 0.09 m
Base of trial pit: 0.40 m
Dims. of trial pit: 2 x 0.6

time min	WL m
0	-0.090
1	-0.100
2	-0.100
3	-0.100
4	-0.105
5	-0.105
10	-0.120
16	-0.130
20	-0.145
25	-0.150
30	-0.160
35	-0.165
40	-0.170
45	-0.180
50	-0.190
55	-0.195
60	-0.200
65	-0.210
70	-0.220
80	-0.240
85	-0.245
90	-0.250
120	-0.280
180	-0.340
240	-0.360
270	-0.370



Result:
Soil Infiltration Rate = 3.27 x 10^{-5} m/s

Test carried out at BPT TP027.

Co-Ordinates:
Easting: 597267.3
Northing: 689848.8
R.L. 146.55mOD

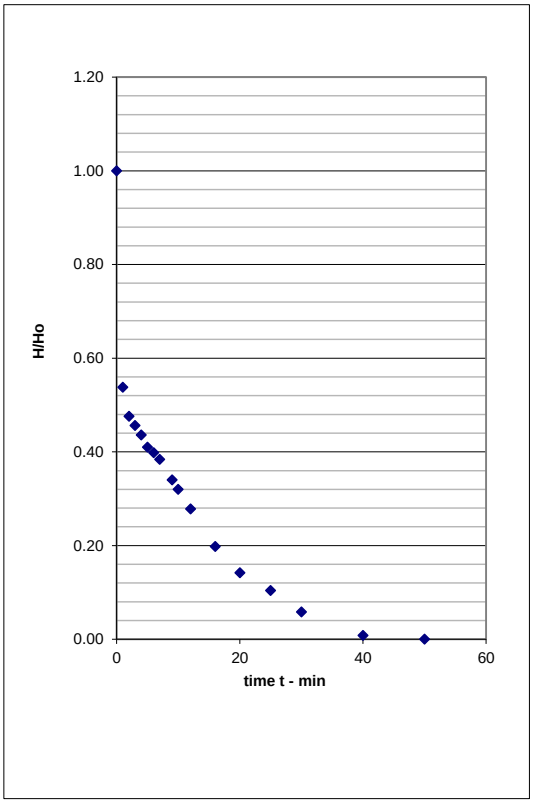
Appendix 5E
Field / In-Situ Test Results
Part 2: Permeability

IRISH DRILLING LTD. Loughrea Co. Galway Tel: (091) 841274 Fax: (091) 680110	**Contract:**	WSP Lot 2 Pipeline	**Borehole:** **BPT-BH004**
	Date:	14.07.2022	Revision:
	Eng.:	Mott MacDonald	Operators: BT

Bottom of borehole (below G.L.)	25.00m	Weather	Fair
Bottom of solid casing (below g.L.)	N/A	Type of test	Falling Head
Top of filter material (m O.D.)	1.50m	Diameter of borehole	145mm
Initial water level (m bgl)	Dry	Length of filter	4.00m
Ground level (m O.D.)	136.48	Diameter of filter	0.145
Response Zone:	1.50-5.50m BGL	Type of piezometer	
Co-ordinates 597164E	689962.6N		

Falling HEAD TEST

time min	water level m	H	H/Ho
0	0.000	5.000	1.00
1	2.310	2.690	0.54
2	2.620	2.380	0.48
3	2.720	2.280	0.46
4	2.820	2.180	0.44
5	2.950	2.050	0.41
6	3.010	1.990	0.40
7	3.080	1.920	0.38
9	3.300	1.700	0.34
10	3.400	1.600	0.32
12	3.610	1.390	0.28
16	4.010	0.990	0.20
20	4.290	0.710	0.14
25	4.480	0.520	0.10
30	4.710	0.290	0.06
40	4.960	0.040	0.01
50	5.000	0.000	0.00



L	4.000	m
D	0.145	m
F	6.270	
A	0.021	m^2
$t_2 - t_1$	50	min

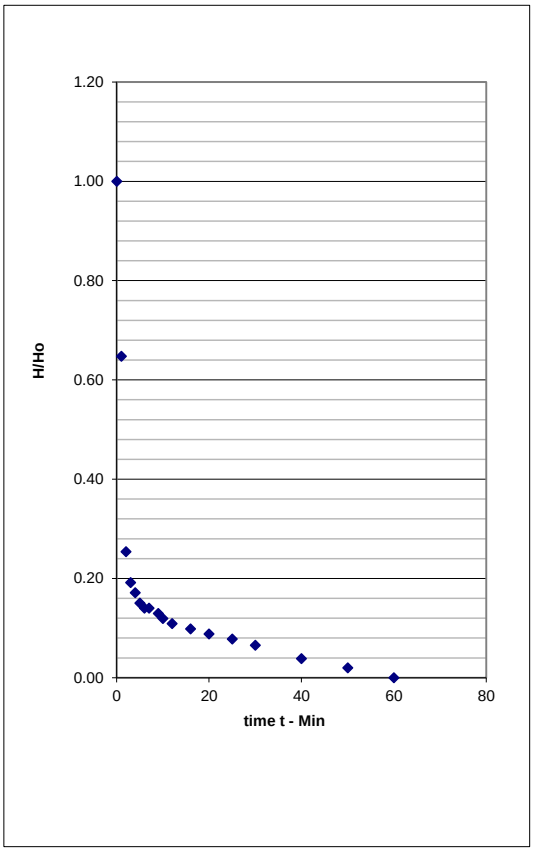
k (permeability) = 6.94E-07 m/sec

IRISH DRILLING LTD. Loughrea Co. Galway Tel: (091) 841274 Fax: (091) 680110	**Contract:**	WSP Lot 2 Pipeline	**Borehole:** **BPT-BH007**
	Date:	14.07.2022	Revision:
	Eng.:	Mott MacDonald	Operators: DOR

Bottom of borehole (below G.L.)	25.00m	Weather	Fair
Bottom of solid casing (below g.L.)	N/A	Type of test	Falling Head
Top of filter material (m O.D.)	9.50m	Diameter of borehole	145mm
Initial water level (m bgl)	Dry	Length of filter	6.00m
Ground level (m O.D.)	145.33	Diameter of filter	0.145
Response Zone:	9.50-15.50m BGL	Type of piezometer	50mm
Co-ordinates 597227.5E	689970.1N		

Falling HEAD TEST

time min	water level m	H	H/Ho
0	0.000	9.650	1.00
1	3.400	6.250	0.65
2	7.200	2.450	0.25
3	7.800	1.850	0.19
4	8.000	1.650	0.17
5	8.200	1.450	0.15
6	8.300	1.350	0.14
7	8.300	1.350	0.14
9	8.400	1.250	0.13
10	8.500	1.150	0.12
12	8.600	1.050	0.11
16	8.700	0.950	0.10
20	8.800	0.850	0.09
25	8.900	0.750	0.08
30	9.020	0.630	0.07
40	9.280	0.370	0.04
50	9.460	0.190	0.02
60	9.650	0.000	0.00



L	6.000	m
D	0.145	m
F	11.490	
A	0.021	m^2
$t_2 - t_1$	60	min

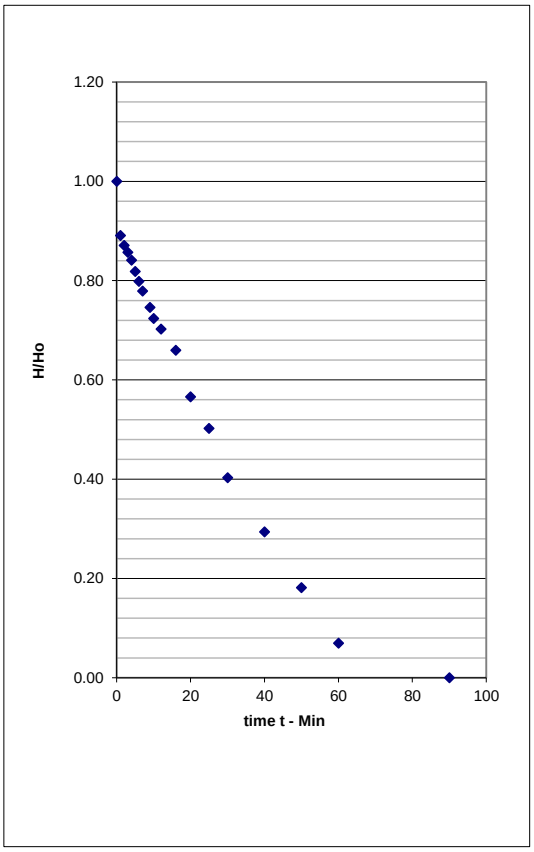
k (permeability) = 2.24E-07 m/sec

IRISH DRILLING LTD. Loughrea Co. Galway Tel: (091) 841274 Fax: (091) 680110	**Contract:**	WSP Lot 2 Pipeline	**Borehole:** **BPT-BH008**
	Date:	14.07.2022	Revision:
	Eng.:	Mott MacDonald	Operators: DOR

Bottom of borehole (below G.L.)	26.10m	Weather	Fair
Bottom of solid casing (below g.L.)	N/A	Type of test	Falling Head
Top of filter material (m O.D.)	1.50m	Diameter of borehole	145mm
Initial water level (m bgl)	Dry	Length of filter	7.00m
Ground level (m O.D.)	138.64	Diameter of filter	0.145
Response Zone:	1.50-8.50m BGL	Type of piezometer	50mm
Co-ordinates 597185.6E	689920.7N		

Falling HEAD TEST

time min	water level m	H	H/Ho
0	0.000	7.050	1.00
1	0.770	6.280	0.89
2	0.910	6.140	0.87
3	1.010	6.040	0.86
4	1.120	5.930	0.84
5	1.280	5.770	0.82
6	1.420	5.630	0.80
7	1.560	5.490	0.78
9	1.790	5.260	0.75
10	1.950	5.100	0.72
12	2.100	4.950	0.70
16	2.400	4.650	0.66
20	3.060	3.990	0.57
25	3.510	3.540	0.50
30	4.210	2.840	0.40
40	4.980	2.070	0.29
50	5.770	1.280	0.18
60	6.560	0.490	0.07
90	7.050	0.000	0.00



L	7.000	m
D	0.145	m
F	9.620	
A	0.021	m^2
$t_2 - t_1$	90	min

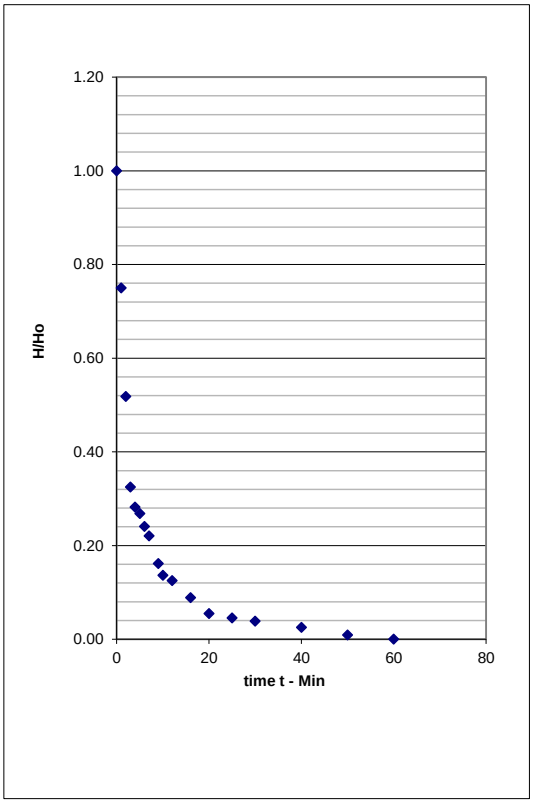
k (permeability) = 2.07E-07 m/sec

IRISH DRILLING LTD. Loughrea Co. Galway Tel: (091) 841274 Fax: (091) 680110	**Contract:**	WSP Lot 2 Pipeline	**Borehole:** **BPT-BH011**
	Date:	15.07.2022	Revision:
	Eng.:	Mott MacDonald	Operators: BT

Bottom of borehole (below G.L.)	10.20m	Weather	Fair
Bottom of solid casing (below g.L.)	N/A	Type of test	Falling Head
Top of filter material (m O.D.)	2.50m	Diameter of borehole	100mm
Initial water level (m bgl)	Dry	Length of filter	2.50m
Ground level (m O.D.)	144.15	Diameter of filter	0.1
Response Zone:	2.50-5.00m BGL	Type of piezometer	50mm
Co-ordinates 597232.8E	689901.8N		

Falling HEAD TEST

time min	water level m	H	H/Ho
0	0.000	4.400	1.00
1	1.100	3.300	0.75
2	2.120	2.280	0.52
3	2.970	1.430	0.33
4	3.120	1.240	0.28
5	3.220	1.180	0.27
6	3.340	1.060	0.24
7	3.430	0.970	0.22
9	3.690	0.710	0.16
10	3.800	0.600	0.14
12	3.850	0.550	0.13
16	4.010	0.390	0.09
20	4.160	0.240	0.05
25	4.200	0.200	0.05
30	4.230	0.170	0.04
40	4.290	0.110	0.03
50	4.360	0.040	0.01
60	4.400	0.000	0.00



L	2.500	m
D	0.100	m
F	4.010	
A	0.0079	m^2
$t_2 - t_1$	60	min

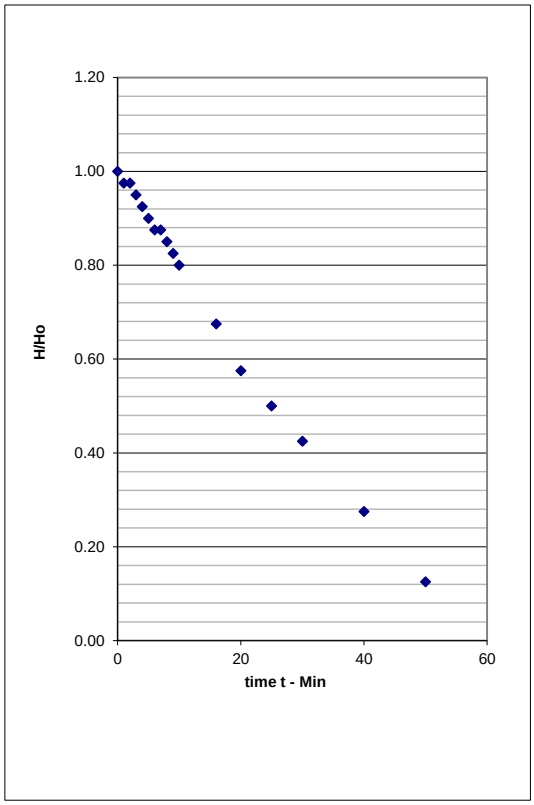
k (permeability) = 3.69E-07 m/sec

IRISH DRILLING LTD. Loughrea Co. Galway Tel: (091) 841274 Fax: (091) 680110	**Contract:**	WSP Lot 2 Pipeline	**Borehole:** **BPT-BH011**
	Date:	18.05.2022	Revision:
	Eng.:	Mott MacDonald	Operators: BT

Bottom of borehole (below G.L.)	0.60m	Weather	Fair
Bottom of solid casing (below g.L.)	0.60m	Type of test	Falling Head
Top of filter material (m O.D.)	NA	Diameter of borehole	200mm
Initial water level (m bgl)	Dry	Length of filter	0.60m BGL
Ground level (m O.D.)	144.15m	Diameter of filter	0.2
Co-ordinates 597232.8E	689901.8N	Type of piezometer	NA

Falling HEAD TEST

time min	water level m	H	H/Ho
0	0.000	0.400	1.00
1	0.010	0.390	0.98
2	0.010	0.390	0.98
3	0.020	0.380	0.95
4	0.030	0.370	0.93
5	0.040	0.360	0.90
6	0.050	0.350	0.88
7	0.050	0.350	0.88
8	0.060	0.340	0.85
9	0.070	0.330	0.83
10	0.080	0.320	0.80
16	0.130	0.270	0.68
20	0.170	0.230	0.58
25	0.200	0.200	0.50
30	0.230	0.170	0.43
40	0.290	0.110	0.28
50	0.350	0.050	0.13
60	0.400	0.000	0.00



L	0.000	m
D	0.200	m
F	2.750	
A	0.0316	m^2
$t_2 - t_1$	60	min

k (permeability) = 3.48E-06 m/sec

Appendix 5E
Field / In-Situ Test Results
Part 3: Plate Tests

IRISH DRILLING LTD.
Loughrea Co. Galway

Tel: (091) 841274
Lab@IrishDrilling.ie

Contract:	WSP Eastern & Midlands Region,Lot 2			21OY102
Client:	Irish Water			
Engineer:	Mott MacDonald			
Date:	12/05/2022			
Tested by:	PC	Checked:	DCD	

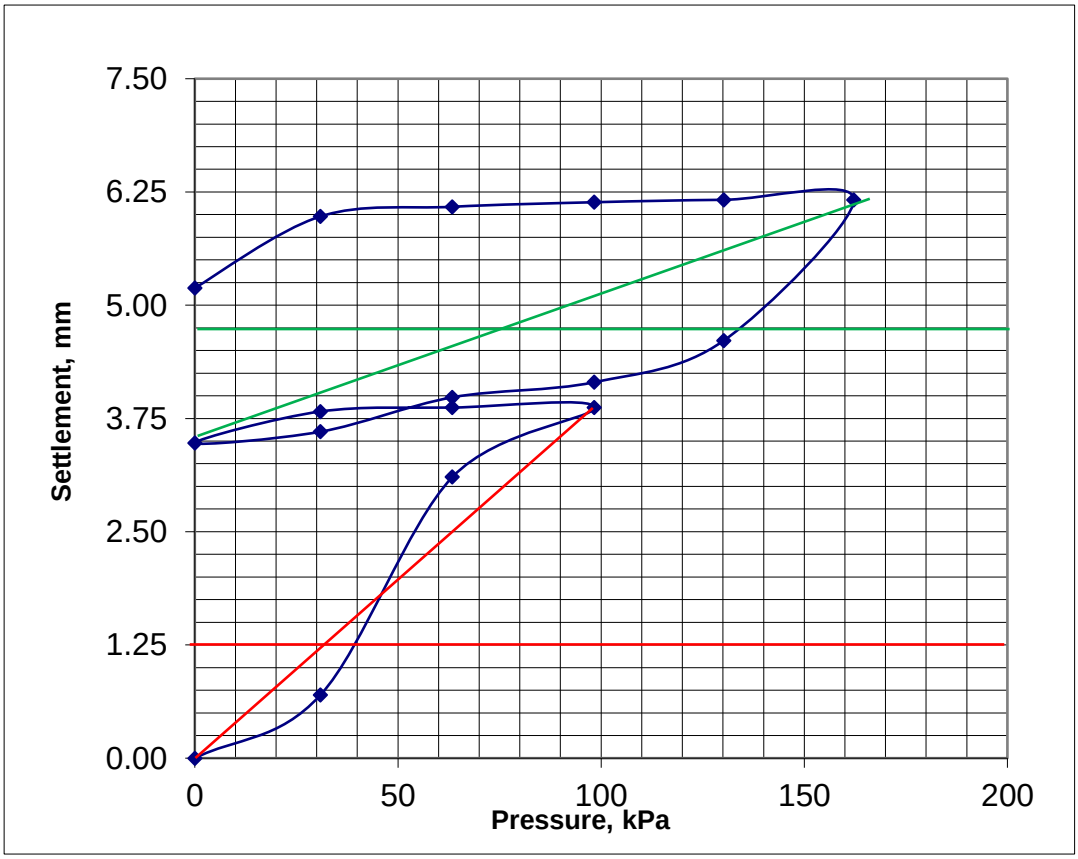
Plate Bearing Test: BS 1377:Part 9: 1990

Plate diameter (mm) **600**
Pump D

Test Location Number: (Pump Station)	BPT-TP004	Depth / Level:	0.5m

PLATE TEST

Pressure kN/m^2	Settlement mm
0	0.00
30.9	0.70
63.4	3.10
98.3	3.87
63.4	3.87
30.9	3.83
0	3.48
30.9	3.60
63.4	3.98
98.3	4.15
130.2	4.61
162.2	6.16
130.2	6.16
98.3	6.14
63.4	6.09
30.9	5.98
0	5.19



Pressures to give 1.25mm settlement

Cycle 1		Cycle 2
1.25	(y) Settlement mm	1.25
30	(p) Pressure kN/m^2	75
24.00	Gradient (p/y)	60.00
0.829	Correction factor (to 762mm plate)	0.829
19.90	(k_s) Modulus of subgrade reaction kPa/mm	49.74
1.7	Approximate CBR (%) Approximation of CBR from HD 25/94 Design Manual for Roads and Bridges.	8.4

IRISH DRILLING LTD.
Loughrea Co. Galway

Tel: (091) 841274
Lab@IrishDrilling.ie

Contract:	WSP Eastern & Midlands Region,Lot 2			21OY102
Client:	Irish Water			
Engineer:	Mott MacDonald			
Date:	12/05/2022			
Tested by:	PC	Checked:	DCD	

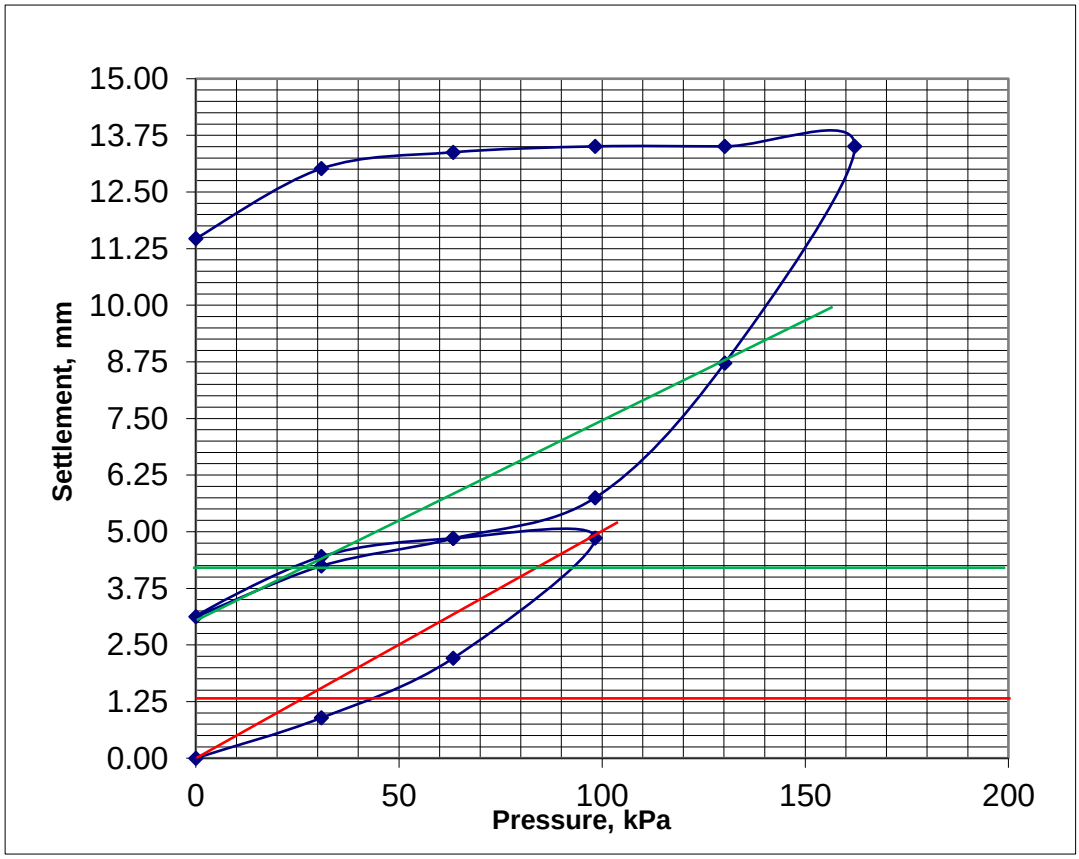
Plate Bearing Test: BS 1377:Part 9: 1990

Plate diameter (mm) **600**
Pump D

Test Location Number: (Pump Station)	BPT-TP015	Depth / Level:	0.4m

PLATE TEST

Pressure kN/m^2	Settlement mm
0	0.00
30.9	0.89
63.4	2.21
98.3	4.86
63.4	4.85
30.9	4.45
0	3.13
30.9	4.24
63.4	4.85
98.3	5.75
130.2	8.72
162.2	13.51
130.2	13.51
98.3	13.51
63.4	13.38
30.9	13.02
0	11.47



Pressures to give 1.25mm settlement

Cycle 1		Cycle 2
1.25	(y) Settlement mm	1.25
25	(p) Pressure kN/m^2	28
20.00	Gradient (p/y)	22.40
0.829	Correction factor (to 762mm plate)	0.829
16.58	(k_s) Modulus of subgrade reaction kPa/mm	18.57
1.3	Approximate CBR (%) Approximation of CBR from HD 25/94 Design Manual for Roads and Bridges.	1.5

IRISH DRILLING LTD. Loughrea Co. Galway Tel: (091) 841274 Lab@IrishDrilling.ie	Contract:	WSP Eastern & Midlands Region,Lot 2		21OY102
	Client:	Irish Water		
	Engineer:	Mott MacDonald		
	Date:	25/05/2022		
	Tested by:	PC	Checked:	DCD

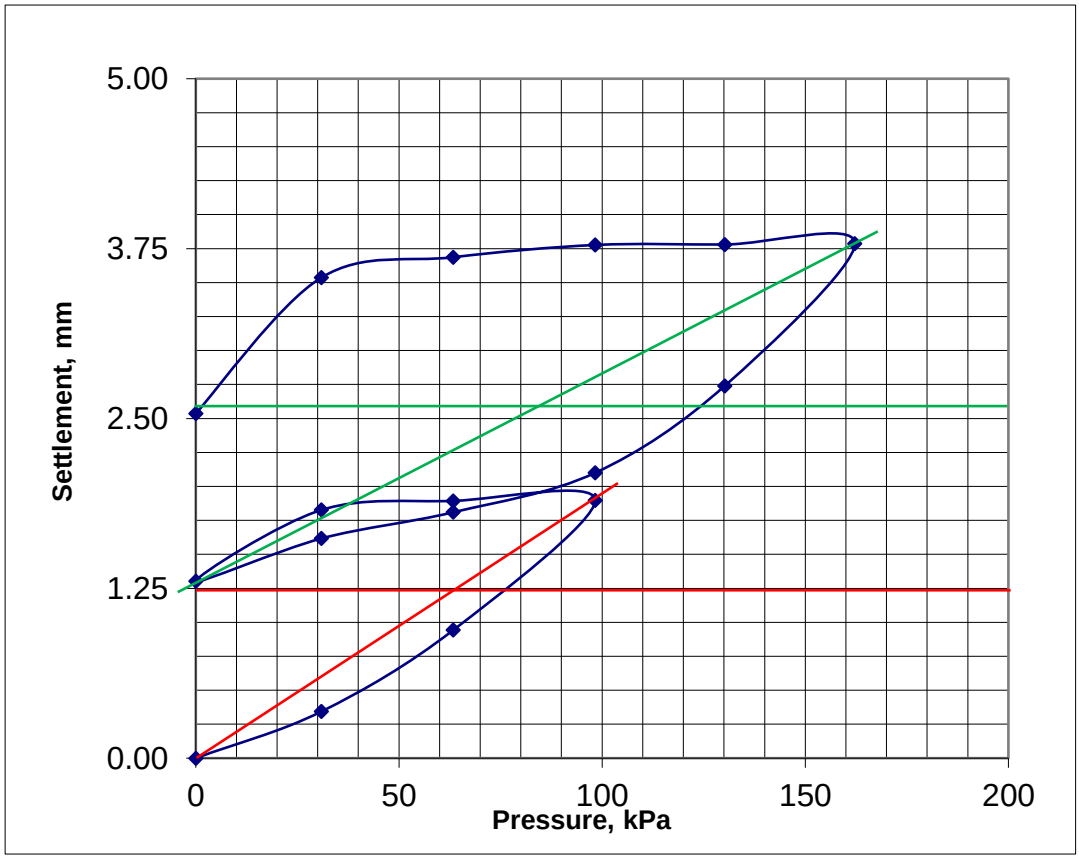
Plate Bearing Test: BS 1377:Part 9: 1990

Plate diameter (mm) **600**
Pump D

Test Location Number: (Pump Station)	BPT-TP036	Depth / Level:	0.4m

PLATE TEST

Pressure kN/m^2	Settlement mm
0	0.00
30.9	0.34
63.4	0.94
98.3	1.90
63.4	1.89
30.9	1.83
0	1.30
30.9	1.62
63.4	1.81
98.3	2.10
130.2	2.74
162.2	3.79
130.2	3.78
98.3	3.78
63.4	3.69
30.9	3.54
0	2.54



Pressures to give 1.25mm settlement

Cycle 1		Cycle 2
1.25	(y) Settlement mm	1.25
65	(p) Pressure kN/m^2	85
52.00	Gradient (p/y)	68.00
0.829	Correction factor (to 762mm plate)	0.829
43.11	(k_s) Modulus of subgrade reaction kPa/mm	56.37
6.6	Approximate CBR (%) Approximation of CBR from HD 25/94 Design Manual for Roads and Bridges.	10.5

IRISH DRILLING LTD.
Loughrea Co. Galway

Tel: (091) 841274
Lab@IrishDrilling.ie

Contract:	WSP Eastern & Midlands Region,Lot 2		21OY102
Client:	Irish Water		
Engineer:	Mott MacDonald		
Date:	25/05/2022		
Tested by:	PC	Checked:	DCD

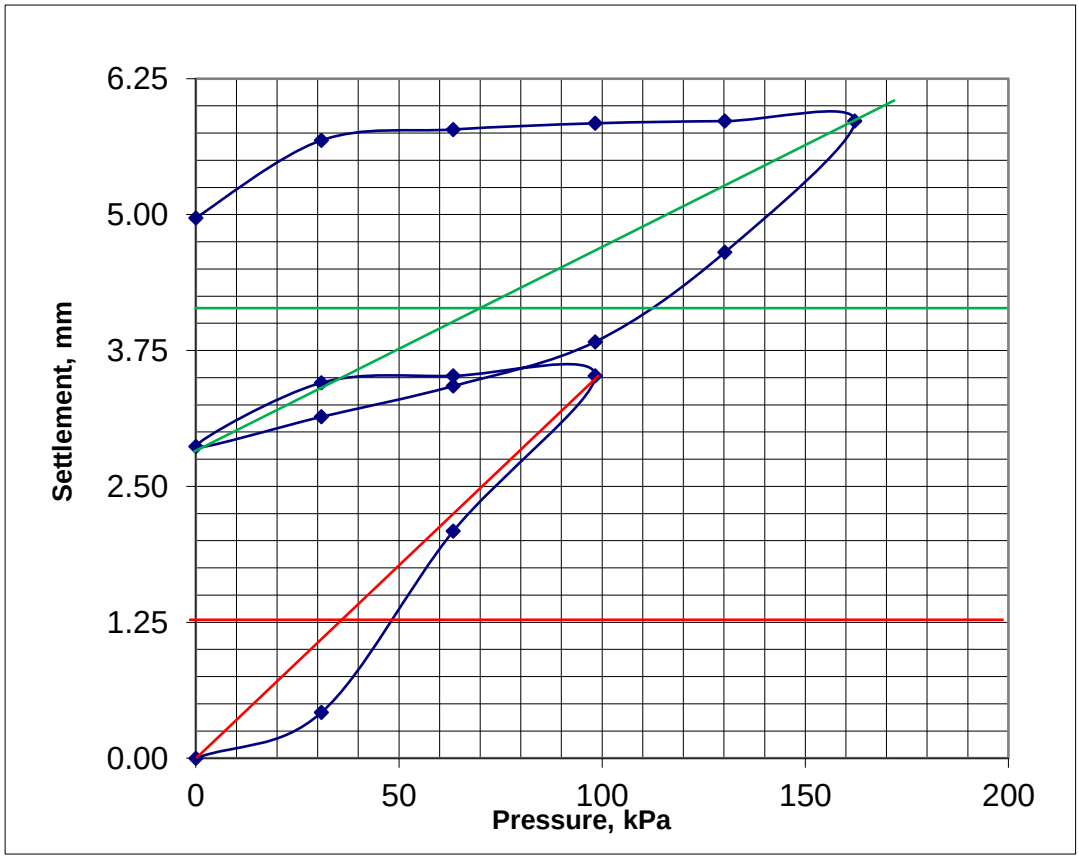
Plate Bearing Test: BS 1377:Part 9: 1990

Plate diameter (mm) **600**
Pump D

Test Location Number: (Pump Station)	BPT-TP039	Depth / Level:	0.4m

PLATE TEST

Pressure kN/m^2	Settlement mm
0	0.00
30.9	0.42
63.4	2.09
98.3	3.52
63.4	3.52
30.9	3.45
0	2.87
30.9	3.14
63.4	3.42
98.3	3.83
130.2	4.65
162.2	5.86
130.2	5.86
98.3	5.84
63.4	5.78
30.9	5.68
0	4.97



Pressures to give 1.25mm settlement

Cycle 1		Cycle 2
1.25	(y) Settlement mm	1.25
35	(p) Pressure kN/m^2	70
28.00	Gradient (p/y)	56.00
0.829	Correction factor (to 762mm plate)	0.829
23.21	(k_s) Modulus of subgrade reaction kPa/mm	46.42
2.3	Approximate CBR (%)	7.5

Approximation of CBR from HD 25/94 Design Manual for Roads and Bridges.

Appendix 5E
Field / In-Situ Test Results
Part 4: Packer Tests

WSP Lot 2, BPT Site
Ground Investigation Contract

PACKER PERMEABILITY TEST RESULTS

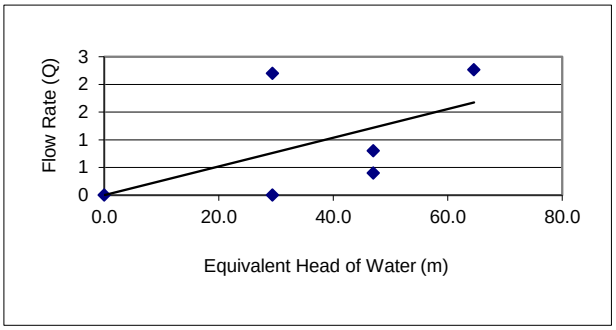
Contract:	WSP Lot 2 BPT Site	Top of test section (m bgl)	18
Client:	Irish Water	Bottom of test section (m bgl)	21
Engineer:	Mott MacDonald	Centre of test section (m bgl)	19.5
Borehole:	**BPT-BH007**	Length of test section (m bgl)	3
Bh. size:	HQ	Pressure gauge height (m agl)	0.2
Date:	09.06.02	Initial depth to G.W. (m bgl)	11.6
Packer Type:	Single	Packer inflation pressure (psi)	203

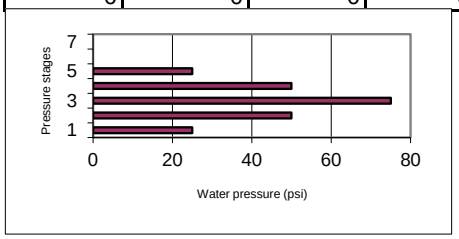
1. Site Records

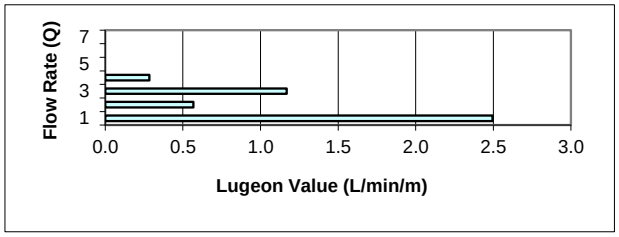
Pressure stage	Water pressure (psi)	Flow meter readings				Water taken over time period (litres)			
		start	5 min	10 min	15 min	0-5 min cubic m	5-10 min cubic m	10-15 min cubic m	0-15 min litres
1	25	8.747	8.78	8.78	8.78	0.033	0	0	33
2	50	8.784	8.789	8.793	8.796	0.005	0.004	0.003	12
3	75	8.796	8.806	8.818	8.83	0.01	0.012	0.012	34
4	50	8.83	8.832	8.834	8.836	0.002	0.002	0.002	6
5	25	8.836	8.836	8.836	8.836	0	0	0	0

2. Calculations

Pressure stage	Equiv. head of water (m)	Flow rate (Q) l/min	Stage Lugeon Value l/min/m
1	29.4	2.2	*2.5*
2	47.0	0.8	*0.6*
3	64.6	2.3	*1.2*
4	47.0	0.4	*0.3*
5	29.4	0.0	*0.0*
6	0	0	0







3. Permeability (k) analysis

Mean Lugeon Value Used: 0.92L

k (m/sec) 9.20E-08

Appendix 5F
Specialist In-Situ Test Results

Project: Water Supply Project Eastern and Midlands Region Ground Investigation Lot 2

Pressuremeter Testing Factual Report

Draft

Client: Irish Drilling Ltd

Contract No.: P1220101

Issue	Date	Description	Prepared	Checked	Approved
01	27/07/2022	Draft	JH	JH	RC

Date: 27th July 2022
Our Ref: P1220101

Hastings Innovation Centre
Highfield Drive
St Leonards on Sea
East Sussex TN38 9UH

Irish Drilling Ltd
Old Galway Road
Loughrea
Co. Galway
Ireland

Attention: Ronan Killeen

Draft

Pressuremeter testing at
Water Supply Project Eastern and Midlands Region Ground Investigation Lot 2

We have pleasure in providing a digital copy of our report for the above project.

We hope that you are satisfied with the performance of our staff, equipment and reporting on this project. If you should have any queries about any aspect of the works carried out, please do not hesitate to contact us. We look forward to being of service to you in the future.

Yours faithfully,
In Situ Site Investigation Limited

Darren Ward
Director

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ABBREVIATIONS

Pressuremeter types	
HPD	High pressure dilatometer
SBP	Self-boring pressuremeter
RPM	Reaming pressuremeter

In situ horizontal stress (σho)	
p_o	Cavity reference pressure
σho (M&R)	In situ horizonal stress from Marsland & Randolph (1977) analysis (where $P_{yield} = P_L - S_u$)
σho (LO)	In situ horizonal stress from lift-off analysis (SBP)
σho (H&W)	In situ horizonal stress from unloading curve (Houlsby & Withers, 1988; RPM)
σho (CM)	In situ horizonal stress from curve modelling (Whittle, 1999; SBP)

Undrained shear strength (kPa)	
S_u (loading)	Shear strength from loading curve, via Gibson & Anderson (1961) analysis
S_u (M&R)	Shear strength from Marsland & Randolph (1977) analysis (where $S_u = P_{yield} - P_L$)
S_u (unloading)	Shear strength from unloading curve, via Jefferies (1988) analysis (RPM & SBP)
S_u (H&W)	Shear strength from unloading curve, via Houlsby & Withers (1988) analysis (RPM)
P_L	Limit pressure via Gibson & Anderson (1961) analysis
P_L (H&W)	Limit pressure via Houlsby & Withers (1988) analysis (RPM)

Shear modulus parameters	
G_i	Initial shear modulus (MPa) derived from steep linear section of loading path, prior to yield
G_{ur}	Shear modulus (MPa) derived from unload-reload loop
ε_c	Cavity strain range over the unload-reload loop
β	Exponent of elasticity, after Bolton & Whittle (1999), where 1 is linear elastic
α	Shear stress constant (MPa), after Bolton & Whittle (1999)

Other	
P_{max}	Maximum test pressure reached prior to instrument unloading (MPa)
P_{yield}	Pressure at which material yield is assessed, defined as end of linear loading curve

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1.0 INTRODUCTION

1.1 Site Details

At the request of Irish Drilling Ltd, In Situ Site Investigation Limited (In Situ S.I.) carried out pressuremeter testing as part of the Water Supply Project – Eastern and Midlands Region project. The works form part of the proposed scheme to transport water from the Parteen Basin in North Tipperary to Peamount Reservoir in West Dublin.

The project was split into three separate Lots, with this report presenting pressuremeter testing carried out on Lot 2. Testing was located approximately 15km to the northeast of Nenagh town centre.

The pressuremeter testing was attempted in three boreholes. The fieldwork was carried out from 24th May to 8th June 2022.

This report presents the factual records of the pressuremeter testing, together with an interpretation of the test results to derive material parameters. Further specific details relating to the ground investigation, i.e., borehole locations and exploratory hole logs, are provided in the Irish Drilling Ltd report, Project No. 2021OY102.

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2.0 FIELDWORK

2.1 General

Six pressuremeter tests were carried out in boreholes constructed using rotary drilling rigs, operated by Irish Drilling Ltd. The tests were carried out using a high-pressure dilatometer (HPD). The testing was conducted in general accordance with BS EN ISO 22476-5 (2012) and BS 5930 (2020). The test depths were scheduled by the Client. A summary table of the tests is presented below.

Table 1. *Summary of pressuremeter tests.*

Borehole Reference	Test Reference	Date	Test Depth (m)	Probe	Operator	Remarks
BPT-BH-003	T01	30/05/2022	6.80	Kylie (HPD06)	A Lewins	
	-	31/05/2022	20.60 - 25.00	Kylie (HPD06)	A Lewins	Minimal / partial core recovery, multiple test pockets attempted
BPT-BH-007	T01	07/06/2022	11.00	Kylie (HPD06)	A Lewins	
	T02	08/06/2022	14.00	Kylie (HPD06)	A Lewins	No material yield observed
BPT-BH-010	T01	24/05/2022	6.70	Kylie (HPD06)	A Lewins	
	T02	25/05/2022	12.30	Kylie (HPD06)	A Lewins	No material yield observed
	T03	26/05/2022	17.00	Kylie (HPD06)	A Lewins	No material yield observed

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2.2 High Pressure Dilatometer (HPD)

The HPD is a cylindrical 95mm diameter probe which is inserted into a cored 99 diameter test pocket, drilled using a T6-H core barrel. The HPD is therefore termed a pre-bored type instrument. The probe, approximately 1.5m in length, has a central section which is covered by a rubber membrane. Pressure applied to the inside of the instrument, via compressed air, forces the membrane to expand against the test pocket wall. The radial displacement of the inside boundary of the membrane is measured at six points equally distributed around the centre of the expanding section, by free moving arms. This displacement, and the pressure necessary to cause the movement, is continuously monitored by transducers contained within the instrument. The HPD is linked to the ground surface via a combined pressure hose and electrical power/communication umbilical cable which connects the instrument to the pressure source and readout unit.

Analogue to digital conversion of the displacement and pressure transducers is carried out within the pressuremeter electronics package. The pressuremeter output comprises a multiplexed signal which connects through the pressuremeter interface unit to the USB port of a laptop computer. Software, supplied by Cambridge Insitu Ltd, is used to record the data, convert the received signals to engineering units (using the pressure and displacement transducer calibrations) and display these in real time on the laptop computer during testing to allow control of the test by the operator. Plotting these readings of displacement against pressure produces a loading curve for the material being tested. A number of mathematical analyses are applied to translate this loading curve into material strength and stiffness parameters.

The testing on this project was undertaken using probes manufactured by Cambridge Insitu Ltd. Details of the instruments are provided below. Corrections measured for membrane stiffness (essentially resistance to inflation in air) were carried out during the testing program.

Table 2. *Pressuremeter instrument details.*

Instrument	Diameter (mm)	Pressure Capacity (MPa)	Displacement Measurement	ID & Serial No.
HPD	95	20	6 arms at 60° 3 opposite pairs	Kylie (HPD06)

2.3 HPD Testing Procedure

The boreholes were constructed using a rotary drilling rig by conventional rotary coring at nominal 146mm diameter, using water flush, to approximately 1.5m above the scheduled pressuremeter test depth. A 2 to 3m long section was then drilled using a T6-H size core barrel to provide a test pocket of nominal diameter 99.2mm. The HPD was inserted into the test pocket as soon as practicably possible using 2⅜ API drill rods, lowered in via the drilling rig winch.

The pressuremeter tests were carried out in a stress-controlled manner using a manually operated gas control box to pressurise the HPD at an appropriate rate for the ground conditions. During the tests a number of unload-reload loops were performed. Before carrying out the loops, a short holding period was maintained to allow reduction of creep on the ground. The loading was continued until either the ground had failed, maximum arm displacement had occurred, or if at lower pressure, expansion around the probe was uneven, such that in the opinion of the operator, continuation of the loading would result in risk of damage to the probe. Upon unloading and deflation of the membrane, the instrument was withdrawn.

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3.0 TEST INTERPRETATION

3.1 Introduction

The pressure / cavity strain curve has been analysed to determine various material parameters, as appropriate, including:

Cavity reference pressure	p_o
Initial shear modulus	G_i
Yield	P_{yield}
Unload-reload shear modulus	G_{ur}
Undrained shear strength	s_u
Limit Pressure	P_L

The analysis methodologies used have followed the industry accepted practice for interpretation of pressuremeter tests (e.g., Clarke, 1996; Mair & Wood, 1987). The nature of the material tested can result in some limitations in the application and appropriateness of the interpretation methods. Any such limitations, if present, are discussed below and should be considered when selecting material parameters for engineering design purposes.

3.2 Description of Material Tested

An indication of the geology at the depth of each test completed is provided on the plots in Appendix A. The ground conditions encountered in the boreholes were typically very strong apparently massive fine and coarse grained LIMESTONE. For more detail refer to the Irish Drilling Ltd report, Project No. 2021OY102.

3.3 Cavity Reference Pressure

The act of drilling into undisturbed ground relieves the in situ horizontal stress, which is then effectively restored as the instrument membrane is initially pressurised. During this initial loading, a linear pressure / displacement response is anticipated as the pressure is increased and then exceeds the cavity reference pressure. With the HPD instrument, the direct correlation between the cavity reference pressure and in situ horizontal stress is problematic and should be treated with caution. This is due to the large potential for disturbance during test pocket formation and probable relaxation or stress relief of the ground following drilling of the open test pocket.

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Marsland and Randolph (1977) proposed that in the vicinity of in situ horizontal stress, soil behaves elastically and therefore the initial loading curve is linear. This elastic behaviour will cease when the undrained shear strength of the soil in the cavity wall is reached, and hence the loading curve will then begin to curve away from linearity. The point at which the loading curve becomes non-linear (or the onset of yield, P_{yield}), represents the in situ horizontal stress plus the undrained shear strength at this point:

$$P_{yield} = \sigma_{ho} + s_u.$$

The tests performed at the site were in LIMESTONE rock. However, the analysis method used to determine the undrained shear strength assumes the material is a perfectly elastic prior to failure and perfectly plastic post failure. For a rock this analysis may not be valid as the material may behave as a brittle material and fail in tension, or in triaxial compression, depending on the strength of the material and in situ stress conditions.

3.4 Shear Modulus

A pressuremeter test, in an elastic, perfectly plastic material, imparts a pure shear failure, hence it is normal to report shear modulus in preference to an elastic modulus. Shear modulus is determined from the initial loading curve, and from unload reload loops, performed at intervals during the test progression. The relationship used to determine shear modulus (G) is below, where ε_c is the cavity strain range:

$$G = \frac{1}{2}\frac{dp}{d\varepsilon c}$$

Haberfield and Johnson (1993) have suggested that the unload-reload modulus is the most reliable parameter from a pressuremeter test in rock. It is noted that the nature and spacing of fissures in the rock mass will affect the result. Widely spaced fissures may result in the test giving the intact modulus of the rock, rather than a mass modulus, and / or open fissures may be closed as the test progresses and give a modulus which is higher than the mass modulus.

Note is made that often in clays and sands some hysteresis is generally evident, and it is possible to determine a secant shear modulus from the reloading portion of an unload reload loop. A high degree of consistency is often possible when plotting secant shear modulus results from individual tests. This may be further extended to a series of tests in a geological formation by normalising via undrained shear strength, or in situ stress. The various plots for both initial loading shear modulus (G_i) and the shear modulus derived from unload reload loops (G_{ur}) are presented graphically in the test results.

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Individual unload reload loops can also be analysed to determine small strain stiffness parameters. This is achieved by taking a secant modulus from the base of the loop, to the individual points on the reloading curve. Plotting the cavity strain range against modulus, gives an indication of how stiffness varies with strain. Further, a Bolton and Whittle (1999) analysis can be performed to investigate the non-linear elastic / plastic behaviour.

The secant modulus (G) can be converted to an undrained elastic (Youngs) modulus (E_u) by use of the following relationship:

$$E_u = 2.G(1 + \upsilon) \qquad \text{Where } \upsilon = \text{Poisson's ratio}$$

The Poisson's ratio can be either undrained (υ_u) or drained (υ'). For undrained elastic soil (clay) a υ_u value of 0.5 can be taken. For drained conditions in any soil, the value of υ' is typically 0.1 to 0.3. The Poisson's ratio for weak rocks is also generally taken as 0.1 to 0.3, with the difference between drained or undrained behaviour being relatively insignificant (Mair and Wood, 1987).

Plots of calculated secant modulus values at varying shear strain % are provided within the analysis results. It is noted that any user of this analysis should satisfy themselves that it is appropriate to the material tested.

3.5 Strength

Undrained shear strength has been determined using Gibson and Anderson (1961) for the loading portion of the test curve. This is the generally accepted method for the determination of strength and are based on the assumption of an elastic - perfectly plastic material. The analysis of Gibson and Anderson (1961) also provides a Limit Pressure (P_L). This is a limiting pressure defined as the pressure at which the change in volume (ΔV) divided by the current volume (V) is equal to one. While this is not achieved in practice, it can be determined by extrapolation. Note is also made that the definition of P_L is different to that associated with a Ménard Limit Pressure, and the two should not be interchanged.

3.6 Summary of Results

Summary tables of the analysis results for each borehole location are presented in Appendix A, followed by the individual full graphical analyses for the tests completed.

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4.0 REFERENCES

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APPENDIX A

Test Data Analysis

Description	Figure No.
Pressuremeter Results Summary	BPT-BH-003, BPT-BH-007, BPT-BH-010
Pressuremeter Shear Modulus Plot & Undrained Shear Strength Plot	Figure 1
Pressuremeter In Situ Horizontal Stress, Yield & Maximum Pressure Plot	Figure 2
Pressuremeter Test Analysis	
BPT-BH-003	T01
BPT-BH-007	T01 & T02
BPT-BH-010	T01 - T03

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Pressuremeter Results Summary

IN SITU
SITE INVESTIGATION

Test ID	Depth (m)	Material description from borehole log	Max. test pressure (kPa)	s_{hO} (kPa)	Undrained strength S_u (M&R) (kPa)	Undrained strength S_u (loading) (kPa)	Undrained strength P_L (kPa)	G_i (MPa)	Loop No.	G_{ur} (MPa)	e_c (%)	Non linear stiffness α (MPa)	Non linear stiffness β	Secant shear modulus Shear strain 1% (MPa)	Secant shear modulus Shear strain 0.1% (MPa)	Secant shear modulus Shear strain 0.01% (MPa)	Secant shear modulus Shear strain 0.001% (MPa)
BPT-BH-003																	
1	6.80	Very strong apparently massive grey 'marbled' light grey and white fine and coarse grained LIMESTONE.	8722	1300	6333	6333	37800	836.5	1	3372.0	0.008	429.9	0.788	1143	1865	3041	4959
									2	3913.0	0.016	904.4	0.848	1823	2589	3675	5218
-		Test pockets attemped bewteen 20.60m and 25.00m. Minimal to partial recovery, light orangish brown slightly sandy gravelly silty CLAY.															
BPT-BH-007																	
1	11.00	Very strong apparently massive grey 'marbled' brownish grey and white fine and coarse grained LIMESTONE.	12869	2253	8714	8514	56953	1984.8	1	4131.1	0.010	1270.8	0.875	2260	3014	4020	5361
									2	6728.1	0.006	1452.2	0.844	2975	4259	6097	8727
									3	6015.5	0.012	1221.1	0.819	2812	4268	6476	9828
									4	5673.4	0.019	1145.2	0.819	2639	4006	6082	9233
2	14.00	as above	6508	2661	No material yield			2744.1	1	6504.0	0.009	1447.7	0.848	2911	4127	5851	8296
BPT-BH-010																	
1	6.70	very strong apparently massive grey 'marbled' dark grey brownish white and white slightly bioclastic fine and coarse grained LIMESTONE	5225	1686	2575	2575	17345	461.1	1	1705.3	0.013	314.1	0.825	703	1053	1576	2358
									2	1889.5	0.013	380.0	0.827	844	1258	1875	2795
2	12.30	as above	3918	1898	No material yield			1009.5	1	5192.1	0.008	1234.6	0.854	2416	3381	4730	6617
3	17.00	as above	8736	3186	No material yield			3305.2	1	6465.4	0.006	1247.5	0.834	2681	3930	5762	8446

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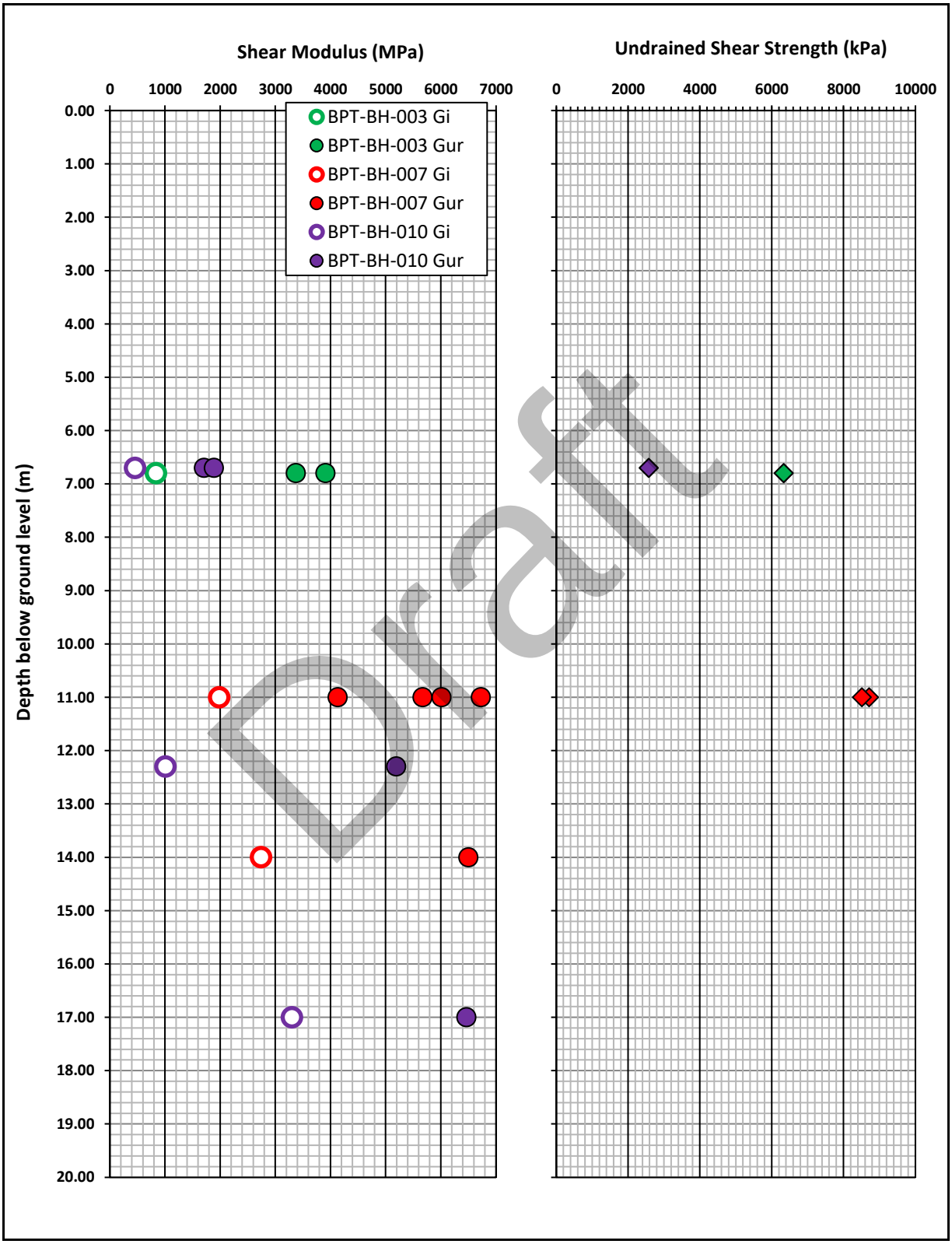
Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-003** **BPT-BH-007** **BPT-BH-010**
Client	Irish Drilling Ltd		
Project No.	P1220101		

Pressuremeter Shear Modulus & Undrained Shear Strength Plot

IN SITU SITE INVESTIGATION



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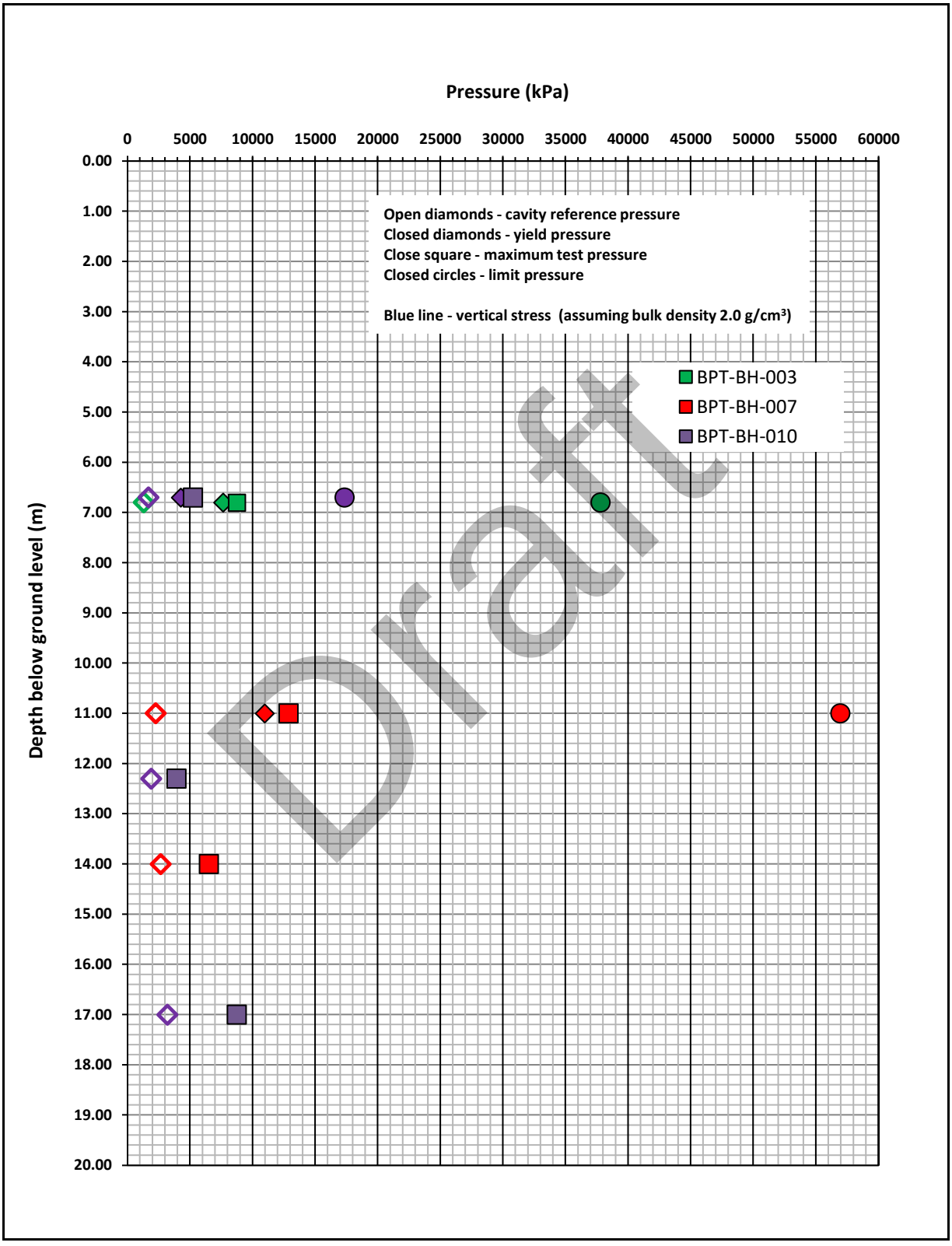
Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**1**
Client	Irish Drilling Ltd		
Project No.	P1220101		

Pressuremeter Cavity Reference Pressure, Yield, Limit & Max Pressure Plot

IN SITU SITE INVESTIGATION

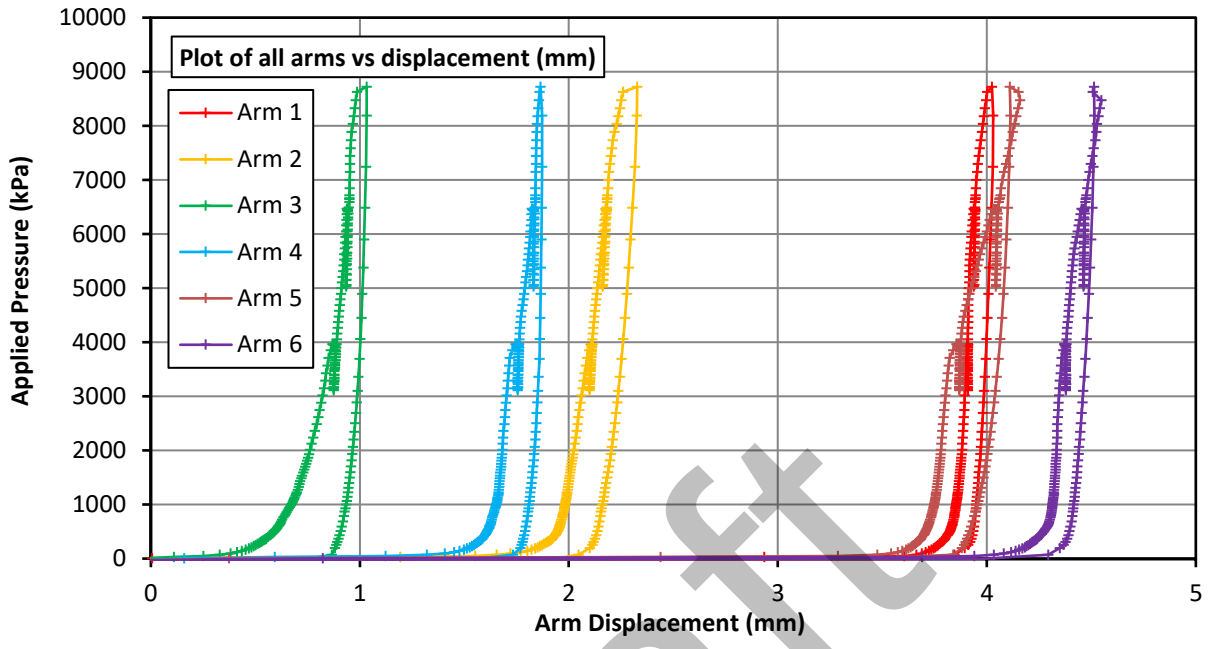


Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**2**
Client	Irish Drilling Ltd		
Project No.	P1220101		

Pressuremeter Test Overview
High Pressure Dilatometer (HPD)

IN SITU SITE INVESTIGATION

Test Date	30/05/2022		**Test No.**	1
Borehole	BPT-BH-003		**Test Depth (m)**	6.80
Coordinates (m)	597216.3 (E)	689990.4 (N)	**Elevation (m)**	145.64



Material description from borehole log:

Very strong apparently massive grey 'marbled' light grey and white fine and coarse grained LIMESTONE.

Test pocket conditions:

Total core recovery:	100 %	Test pocket depth range:	
Solid core recovery:	96 %	From: 5.60 m	to: 7.60 m
Rock quality designation:	58 %	Flush: Water	

Test comment:

The test pocket was slightly oversize with arms lifting off at 1.7 to 4.3mm. The po was estimated to be at 1300kPa, with the following loading section being long. Some movement and onset of possible material yield was interpreted at 7633kPa, with the test taken to a maximum pressure of 8722kPa, where it was terminated due to a jump in arm expansion. The displacement-pressure response shown by the arms was reasonably consistent, albeit at varying expansion. Analysis of two unload reload loops provides high modulus values of 3372 to 3913MPa. Derived undrained shear strength analysis provides a tentative value of 6333kPa.

Test details: **Instrument:** Kylie (HPD06)

			mV	mV/mm		mV	mV/MPa
Drilling method:	Rotary coring						
Casing depth:	5.50 m	Arm 1:	-2427.4	132.4	TPC A:	-2374.7	111.3
Water level:	0.00 m	Arm 2:	-2386.5	130.5	TPC B:	-2447.0	120.7
		Arm 3:	-2308.9	133.1	Membrane:		
Test time:		Arm 4:	-2437.3	127.7	Stiffness	38	kPa
Start (probe in):	11:00 hrs	Arm 5:	-2327.7	126.4	Slope	14.2	kPa/mm
Finish (probe out):	12:25 hrs	Arm 6:	-2288.5	131.0	Compliance	1.5	mm/Gpa

Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-003 T01 - 01**
Client	Irish Drilling Ltd		
Project No.	P1220101		

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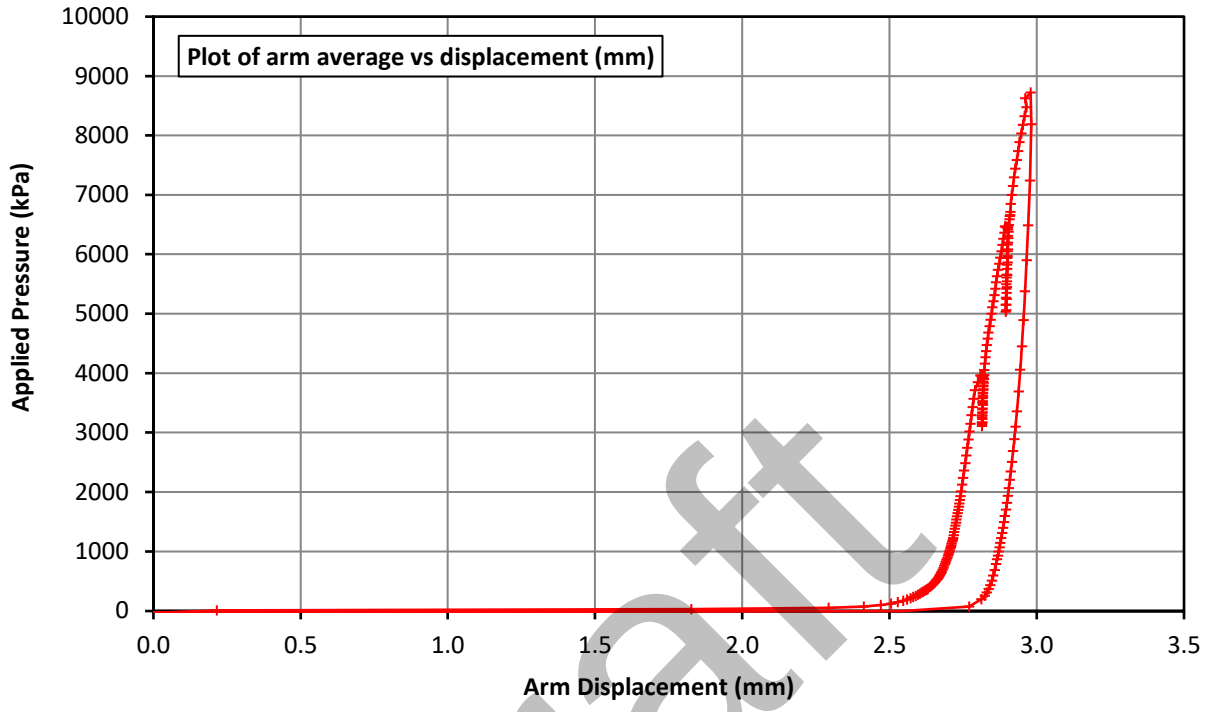
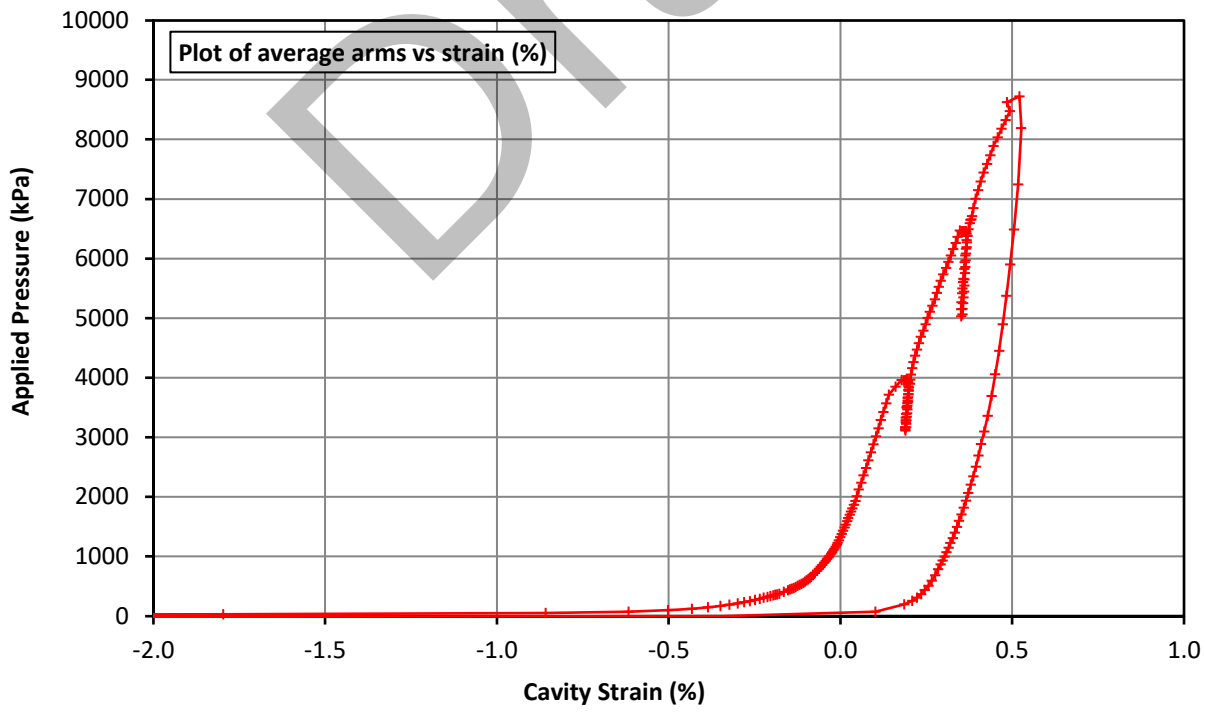
Pressuremeter Test - Average Arm Plots

IN SITU SITE INVESTIGATION

Test Date	30/05/2022	**Test No.**	1
Borehole	BPT-BH-003	**Test Depth (m)**	6.80





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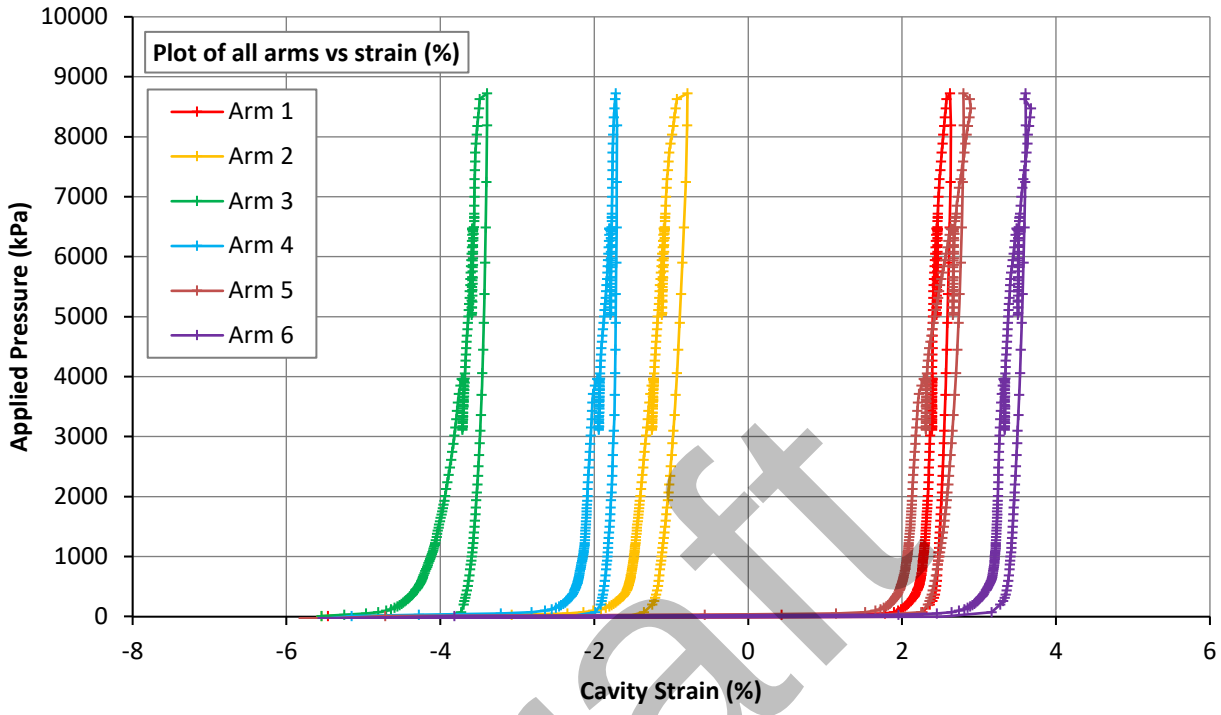
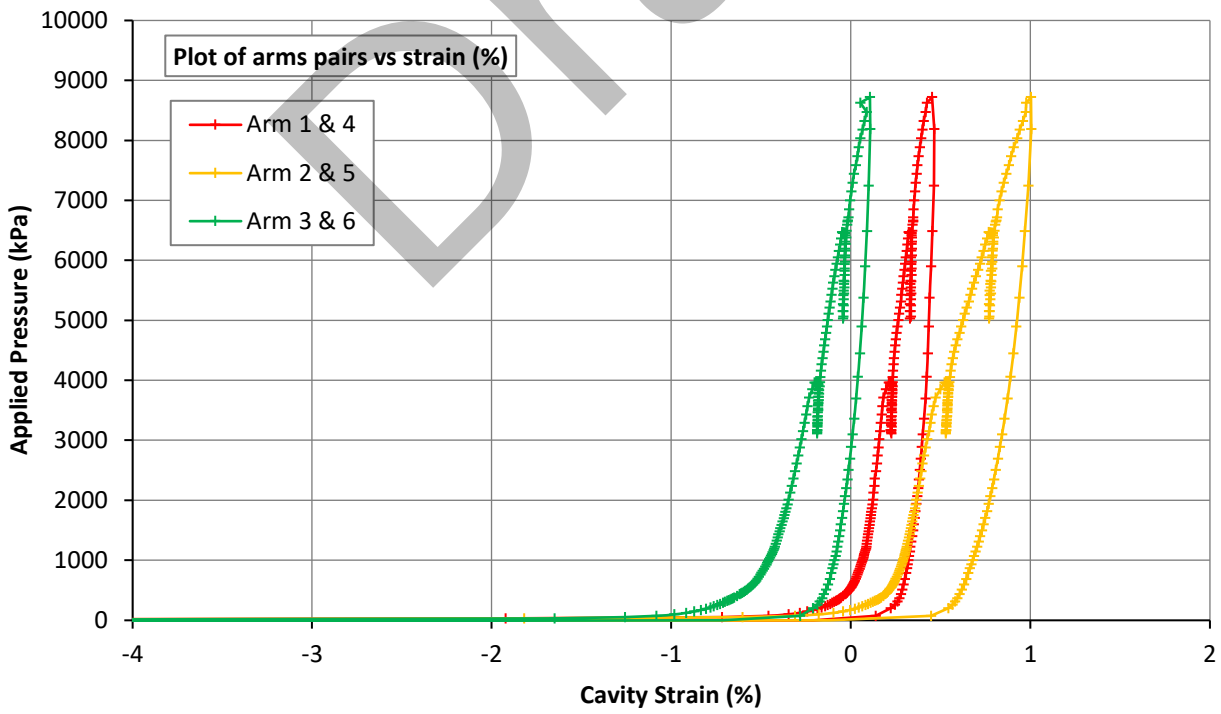
Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-003 T01 - 02**
Client	Irish Drilling Ltd		
Project No.	P1220101		

Pressuremeter Test - Arm Displacement vs Strain (%)

IN SITU SITE INVESTIGATION

Test Date	30/05/2022	**Test No.**	1
Borehole	BPT-BH-003	**Test Depth (m)**	6.80





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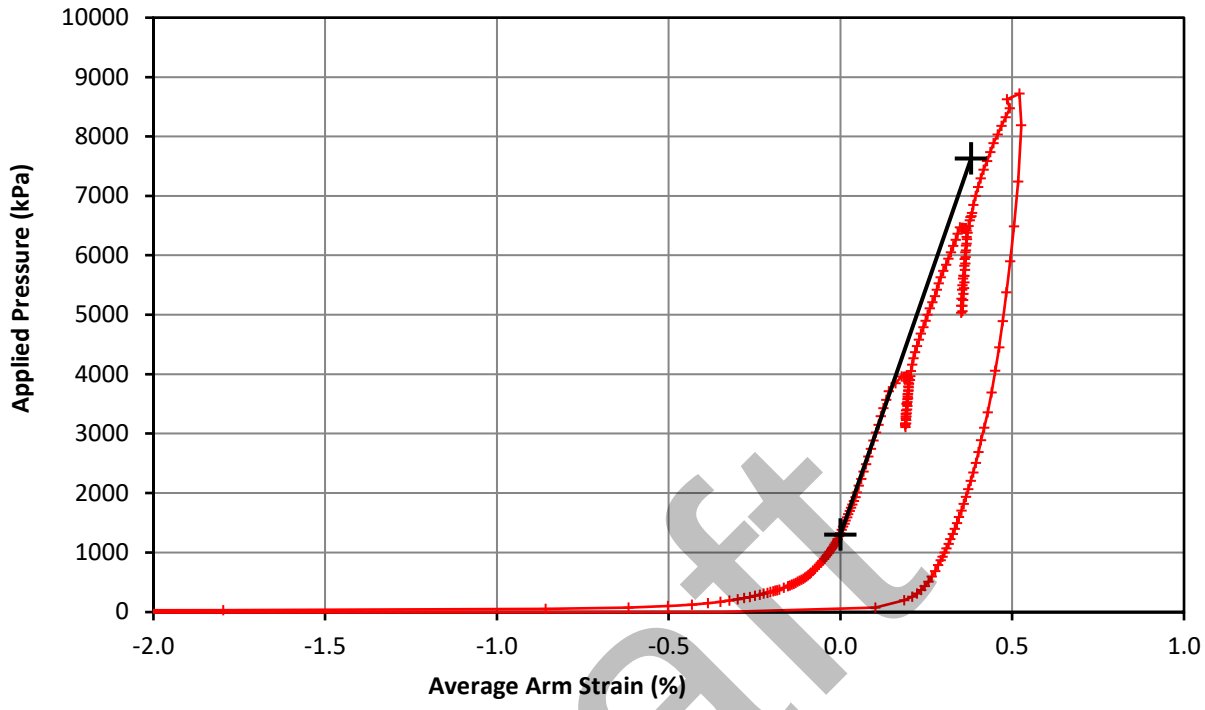
Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-003 T01 - 03**
Client	Irish Drilling Ltd		
Project No.	P1220101		

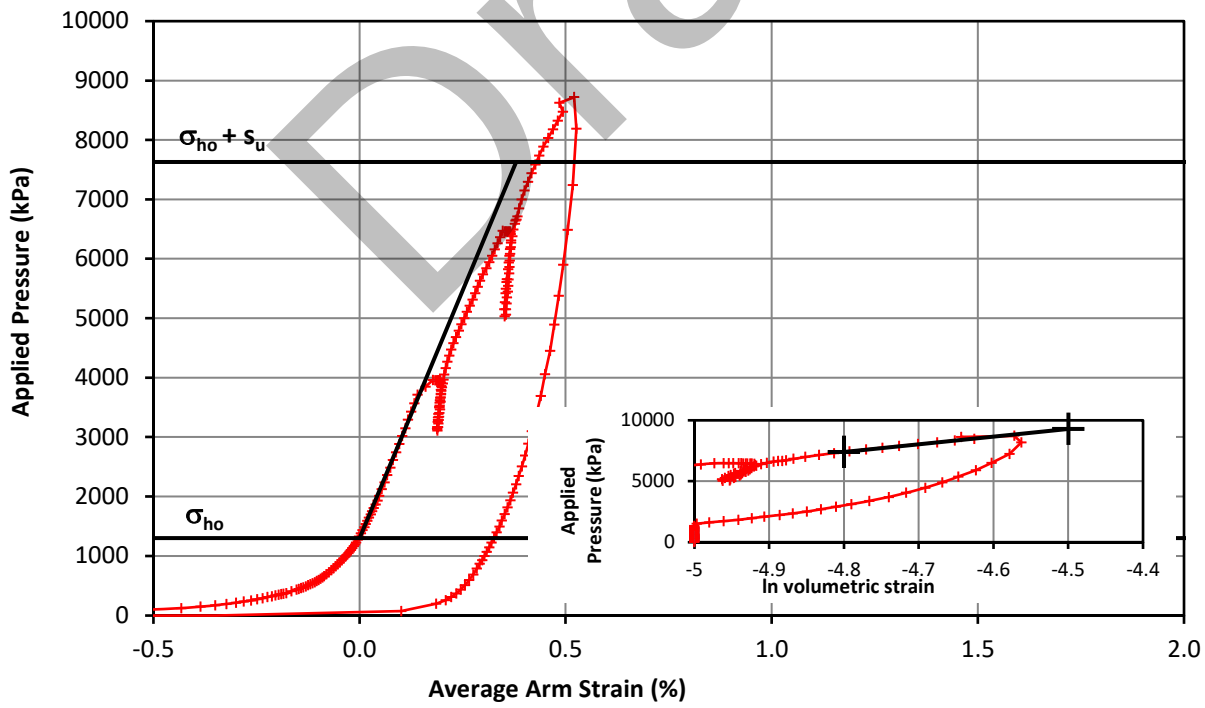
Pressuremeter Analysis - Initial Modulus & In Situ Horizontal Stress

IN SITU SITE INVESTIGATION

Test Date	30/05/2022	**Test No.**	1
Borehole	BPT-BH-003	**Test Depth (m)**	6.80



Initial Modulus	Shear Modulus	836.5 MPa



Marsland & Randolph	In situ horizontal stress	1300 kPa
	Undrained Strength	6333 kPa

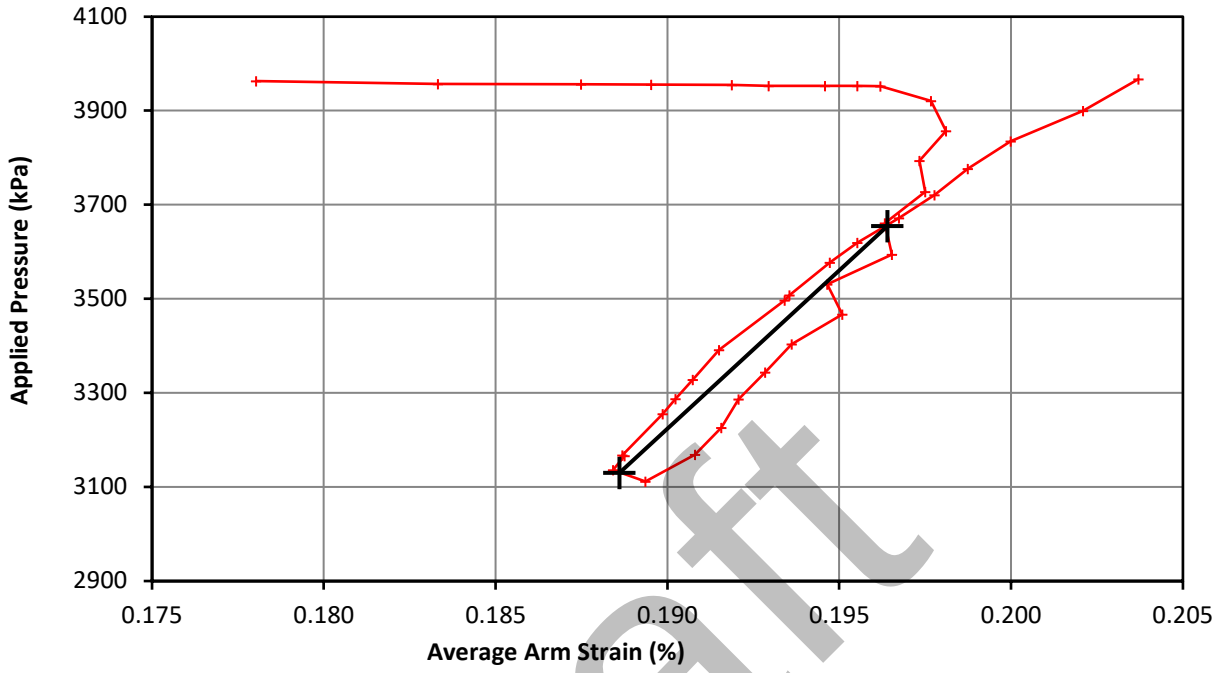
Draft

Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-003 T01 - 04**
Client	Irish Drilling Ltd		
Project No.	P1220101		

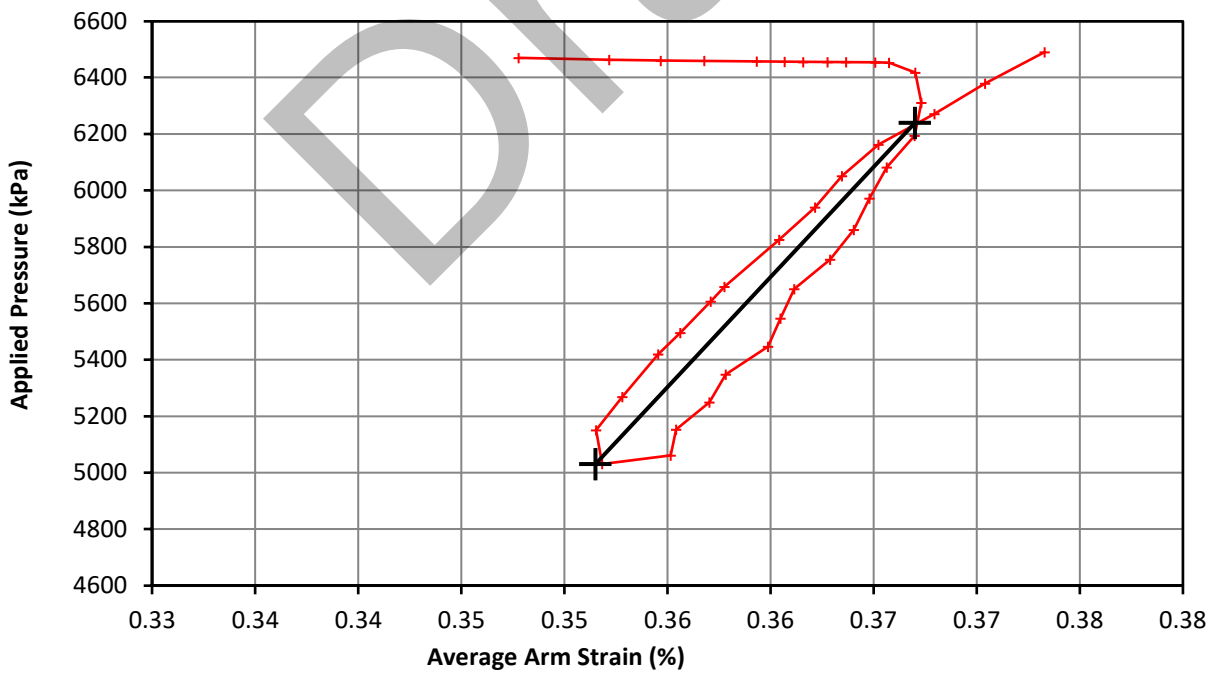
Pressuremeter Analysis - Unload Reload Loop

IN SITU SITE INVESTIGATION

Test Date	30/05/2022	**Test No.**	1
Borehole	BPT-BH-003	**Test Depth (m)**	6.80



Loop 1	Shear Modulus	3372.0	MPa
	Cavity Strain Range	0.008	%



Loop 2	Shear Modulus	3913.0	MPa
	Cavity Strain Range	0.016	%

Draft

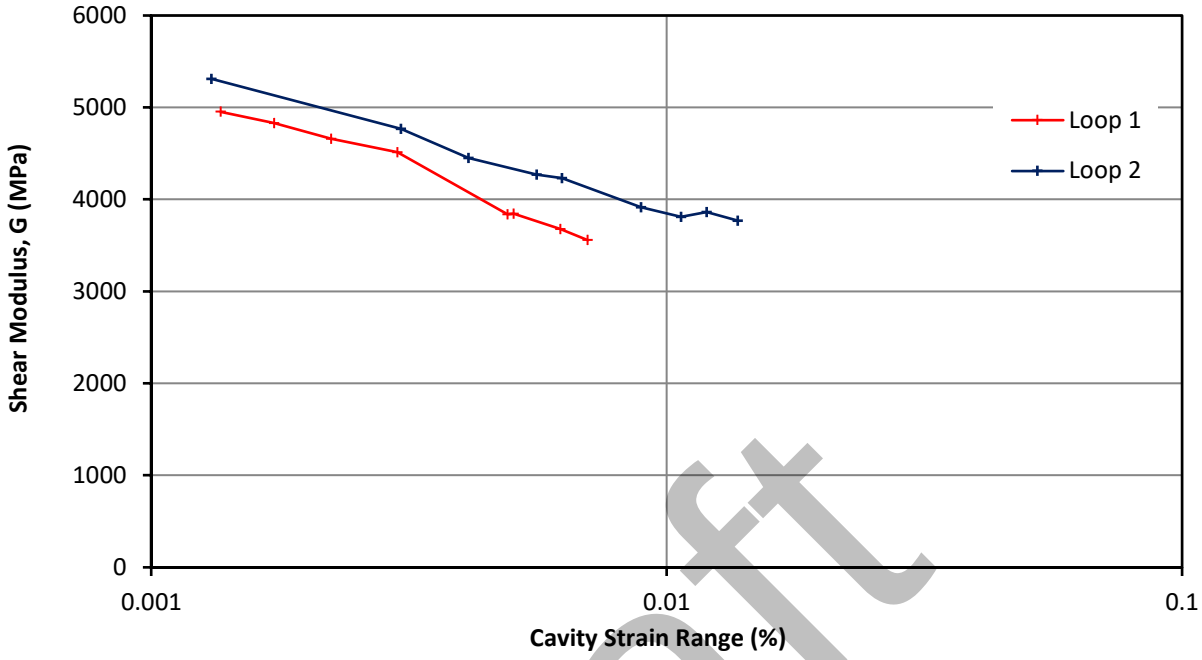
Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-003 T01 - 05**
Client	Irish Drilling Ltd		
Project No.	P1220101		

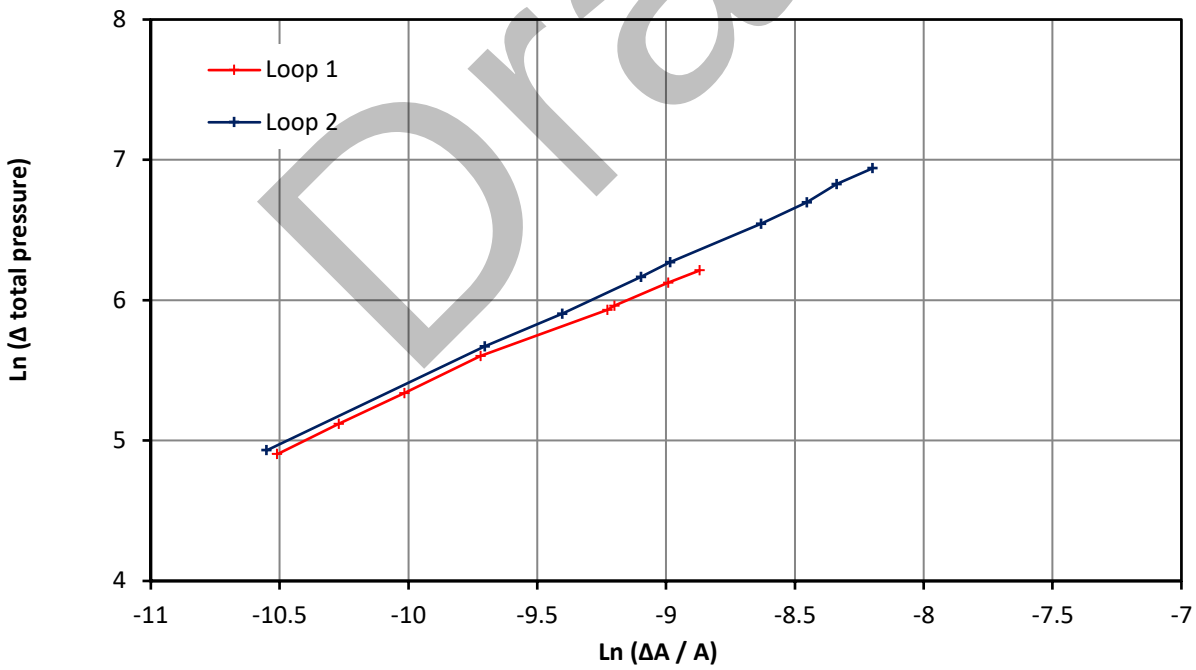
Pressuremeter Analysis

Small Strain Stiffness and Bolton & Whittle (1999)

IN SITU SITE INVESTIGATION

Test Date	30/05/2022	**Test No.**	1
Borehole	BPT-BH-003	**Test Depth (m)**	6.80





Draft

Loop 1		Loop 2	
Gradient(β)	Intercept	Gradient(β)	Intercept
0.788	545.831 (MPa)	0.848	1066.786 (MPa)

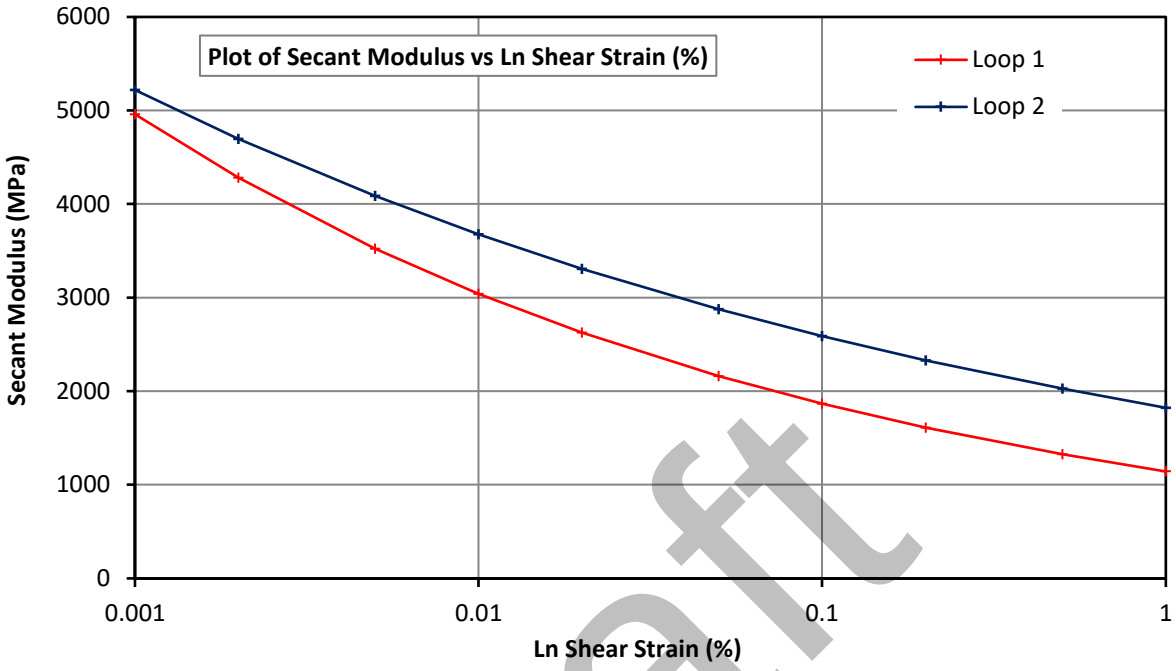
Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-003 T01 - 06**
Client	Irish Drilling Ltd		
Project No.	P1220101		

Pressuremeter Analysis

Secant Modulus - Shear Strain (%)

IN SITU SITE INVESTIGATION

Test Date	30/05/2022	**Test No.**	1
Borehole	BPT-BH-003	**Test Depth (m)**	6.80



Draft

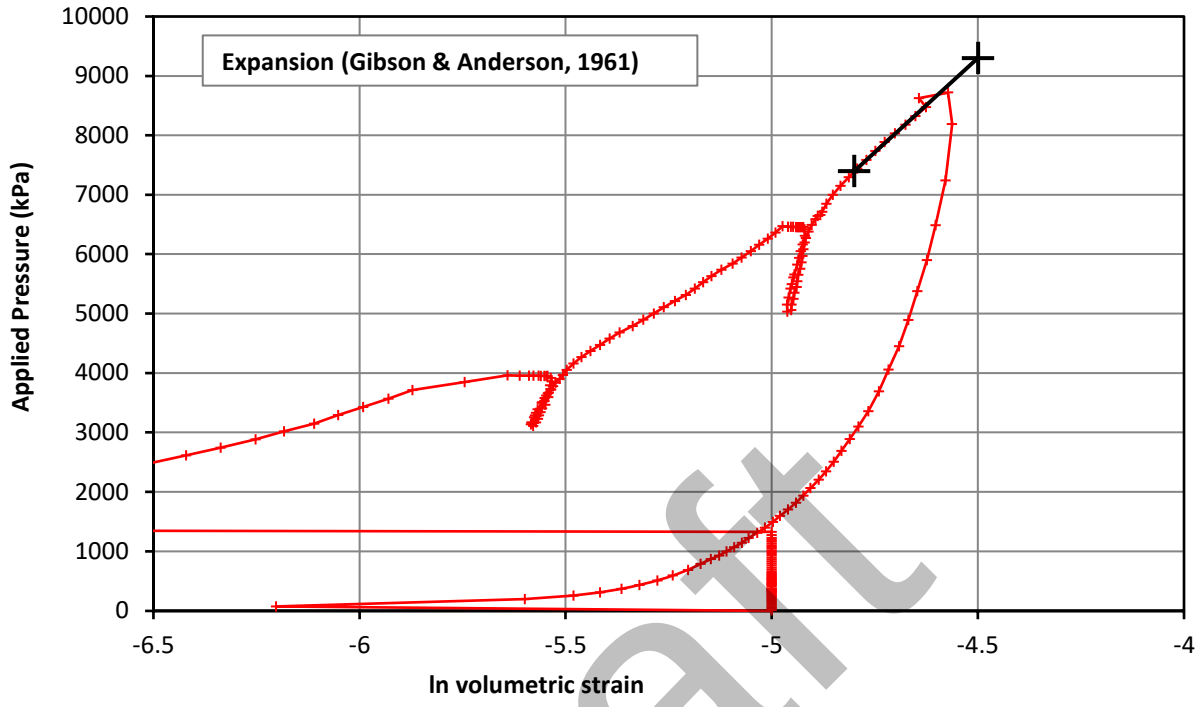
Shear Strain	Loop 1	Loop 2
0.001%	**4959**	**5218**
0.002%	4280	4696
0.005%	3523	4084
0.010%	**3041**	**3675**
0.020%	2625	3307
0.050%	2160	2877
0.100%	**1865**	**2589**
0.200%	1609	2329
0.500%	1325	2026
1.000%	**1143**	**1823**

Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-003 T01 - 07**
Client	Irish Drilling Ltd		
Project No.	P1220101		

Pressuremeter Analysis - Undrained Strength

IN SITU SITE INVESTIGATION

Test Date	30/05/2022	**Test No.**	1
Borehole	BPT-BH-003	**Test Depth (m)**	6.80



Strength (loading)	Undrained Shear	6333	kPa
	Limit Pressure	37800	kPa

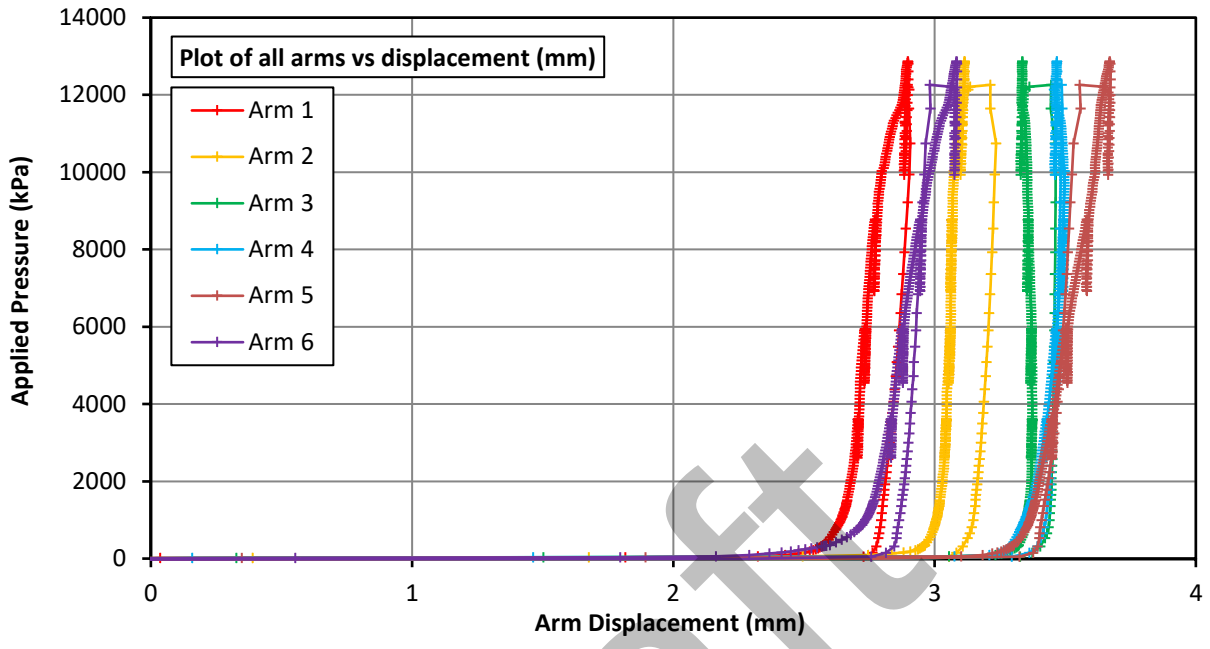
Draft

Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-003 T01 - 08**
Client	Irish Drilling Ltd		
Project No.	P1220101		

Pressuremeter Test Overview
High Pressure Dilatometer (HPD)

IN SITU SITE INVESTIGATION

Test Date	07/06/2022		**Test No.**	1
Borehole	BPT-BH-007		**Test Depth (m)**	11.00
Coordinates (m)	597227.5 (E)	689970.1 (N)	**Elevation (m)**	145.33



Material description from borehole log:

Very strong apparently massive grey 'marbled' brownish grey and white fine and coarse grained LIMESTONE.

Test pocket conditions:

Total core recovery:	100 %	Test pocket depth range:	
Solid core recovery:	88 %	From: 10.00 m	to: 12.00 m
Rock quality designation:	64 %	Flush: Water	

Test comment:

The test pocket was good with arms lifting off at 2.7 to 3.4mm. The po was estimated to be at 2253kPa, with the following loading section being long. The onset of possible material yield was interpreted at 10967kPa, with the test taken to a maximum pressure of 12869kPa, where it was terminated due to a jump in expansion and negative movement. The displacement-pressure response shown by the arms was slightly variable in terms of expansion. Analysis of four unload reload loops provides modulus values of 4131 to 6728MPa. Derived undrained shear strength analysis provides tentative values of 8514 to 8714kPa.

Test details: **Instrument:** Kylie (HPD06)

Drilling method:	Rotary coring	Calibration coefficients:					
Casing depth:	10.00 m		mV	mV/mm		mV	mV/MPa
Water level:	0.00 m	Arm 1:	-2429.6	132.4	TPC A:	-2376.5	111.3
		Arm 2:	-2387.6	130.5	TPC B:	-2449.5	120.7
Test time:		Arm 3:	-2312.2	133.1	Membrane:		
Start (probe in):	12:15 hrs	Arm 4:	-2438.7	127.7	Stiffness	38	kPa
Finish (probe out):	14:00 hrs	Arm 5:	-2345.5	126.4	Slope	14.2	kPa/mm
		Arm 6:	-2293.3	131.0	Compliance	1.5	mm/Gpa

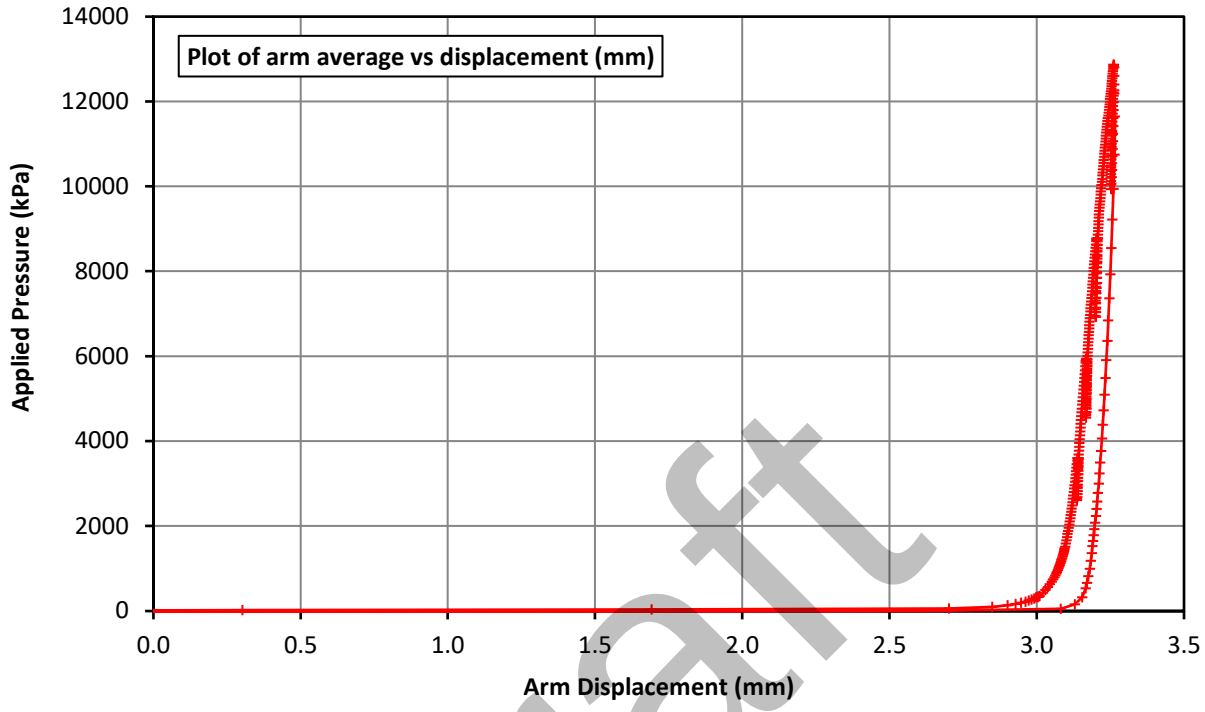
Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-007 T01 - 01**
Client	Irish Drilling Ltd		
Project No.	P1220101		

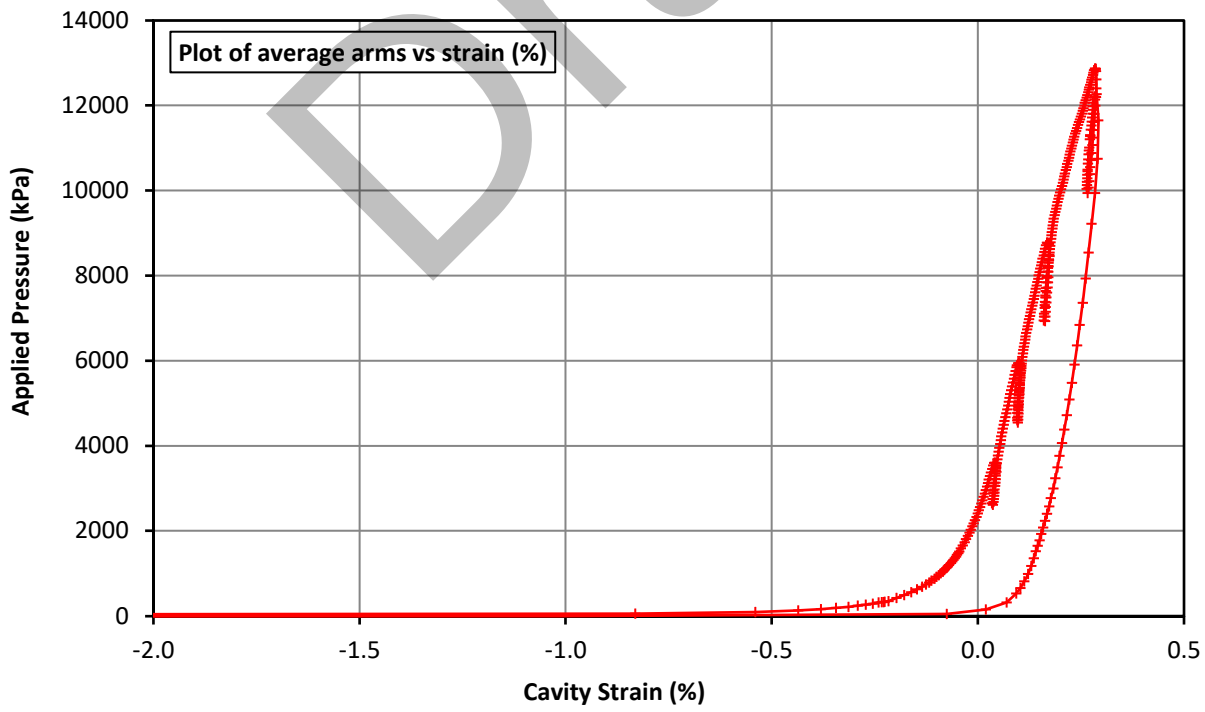
Draft

Pressuremeter Test - Average Arm Plots

IN SITU SITE INVESTIGATION

Test Date	07/06/2022	**Test No.**	1
Borehole	BPT-BH-007	**Test Depth (m)**	11.00





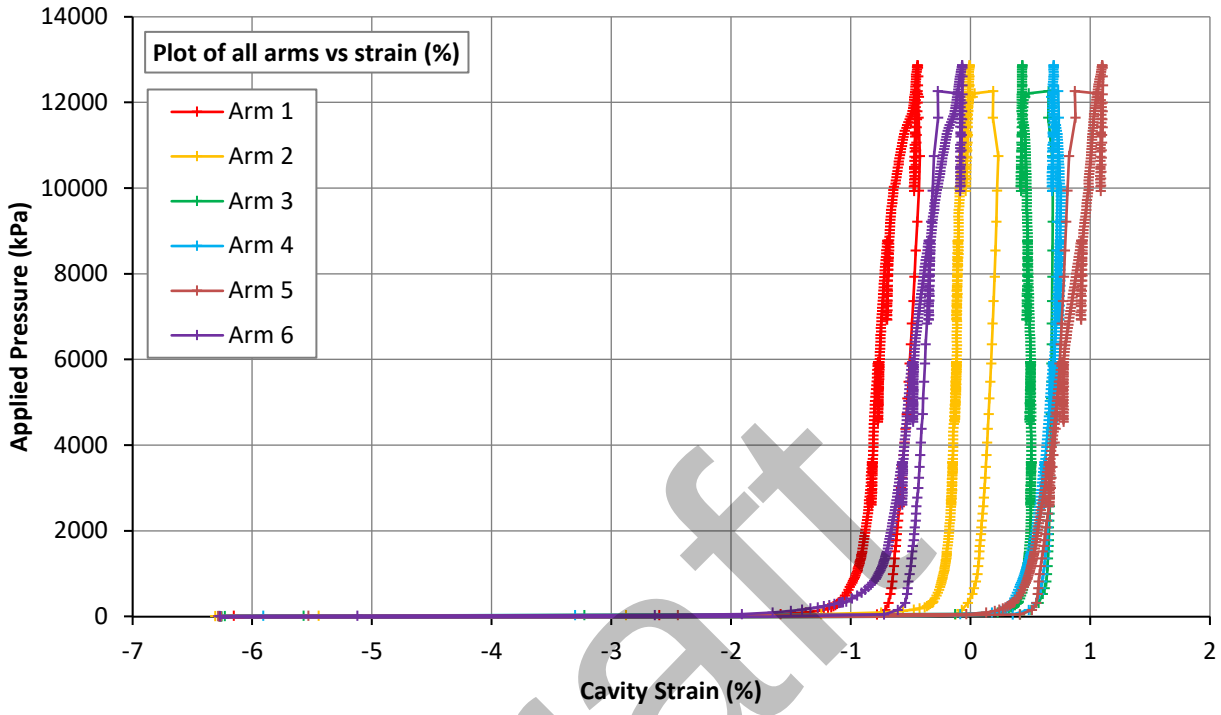
Draft

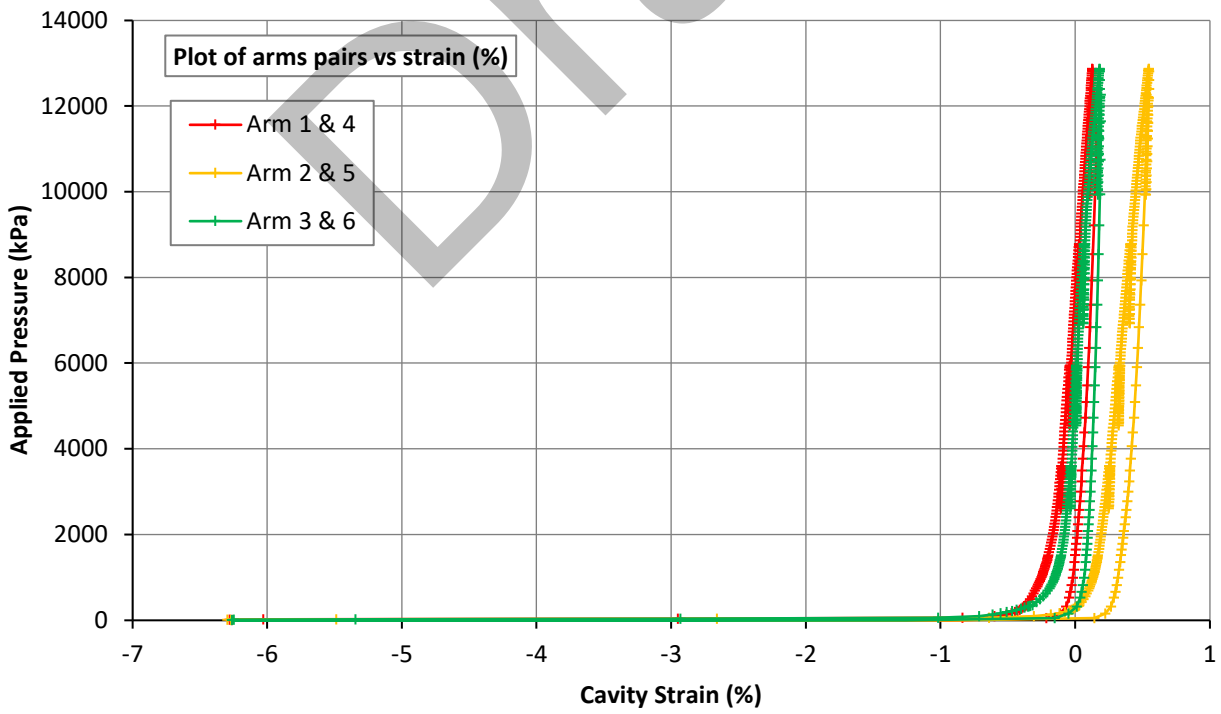
Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-007 T01 - 02**
Client	Irish Drilling Ltd		
Project No.	P1220101		

Pressuremeter Test - Arm Displacement vs Strain (%)

IN SITU SITE INVESTIGATION

Test Date	07/06/2022	**Test No.**	1
Borehole	BPT-BH-007	**Test Depth (m)**	11.00





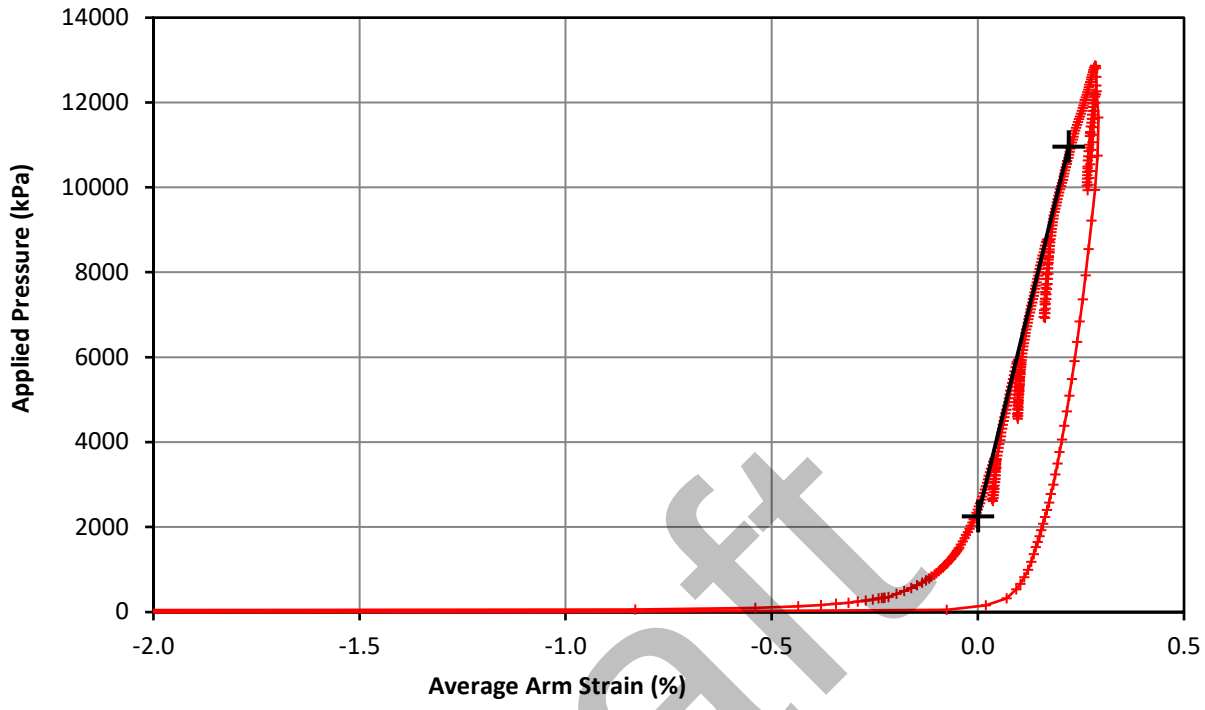
Draft

Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-007 T01 - 03**
Client	Irish Drilling Ltd		
Project No.	P1220101		

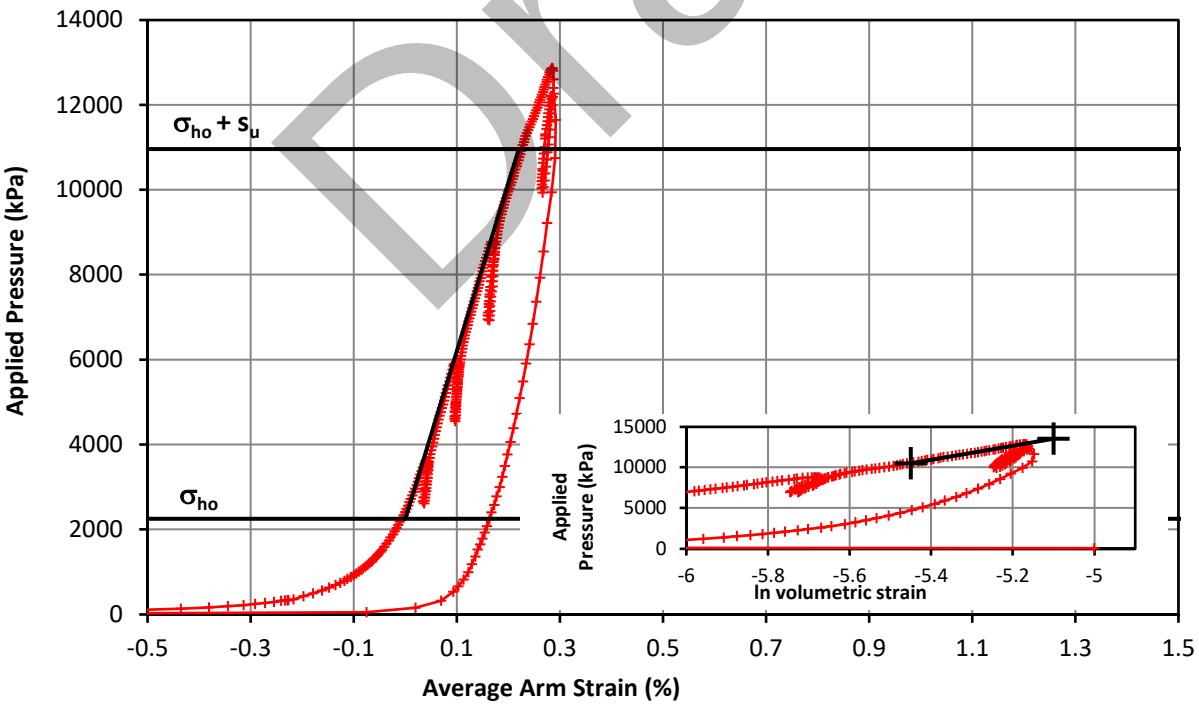
Pressuremeter Analysis - Initial Modulus & In Situ Horizontal Stress

IN SITU SITE INVESTIGATION

Test Date	07/06/2022	**Test No.**	1
Borehole	BPT-BH-007	**Test Depth (m)**	11.00



Initial Modulus	Shear Modulus	1984.8 MPa



Marsland & Randolph	In situ horizontal stress	2253 kPa
	Undrained Strength	8714 kPa

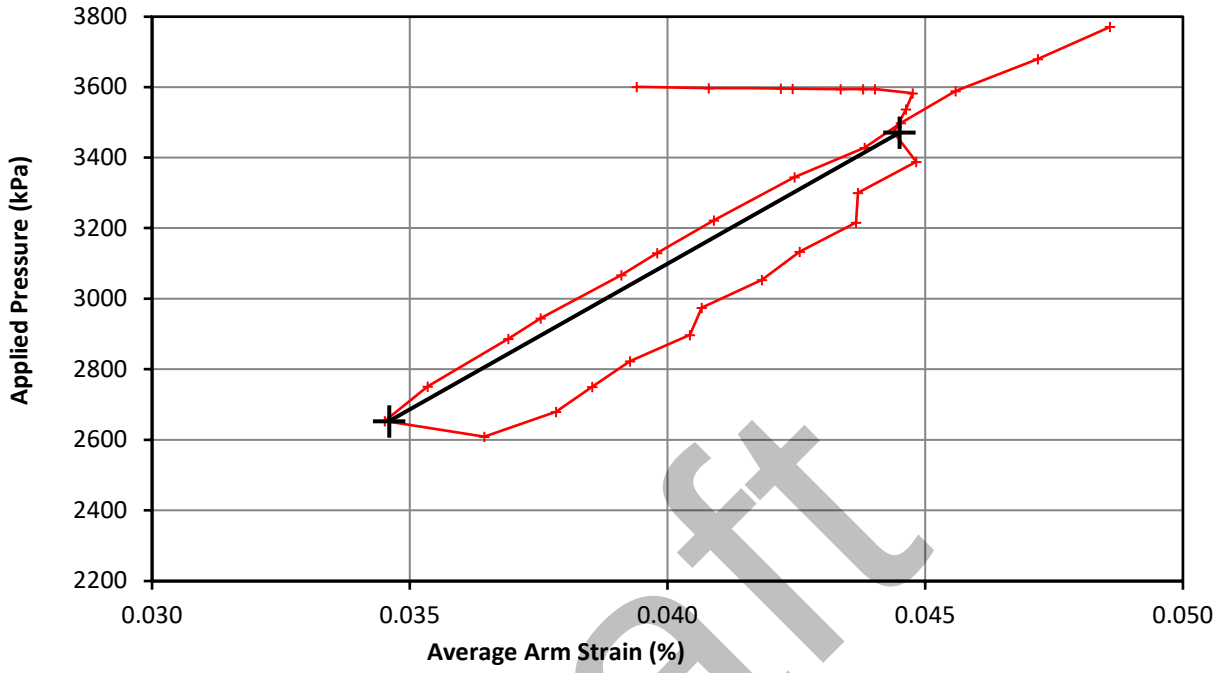
Draft

Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-007 T01 - 04**
Client	Irish Drilling Ltd		
Project No.	P1220101		

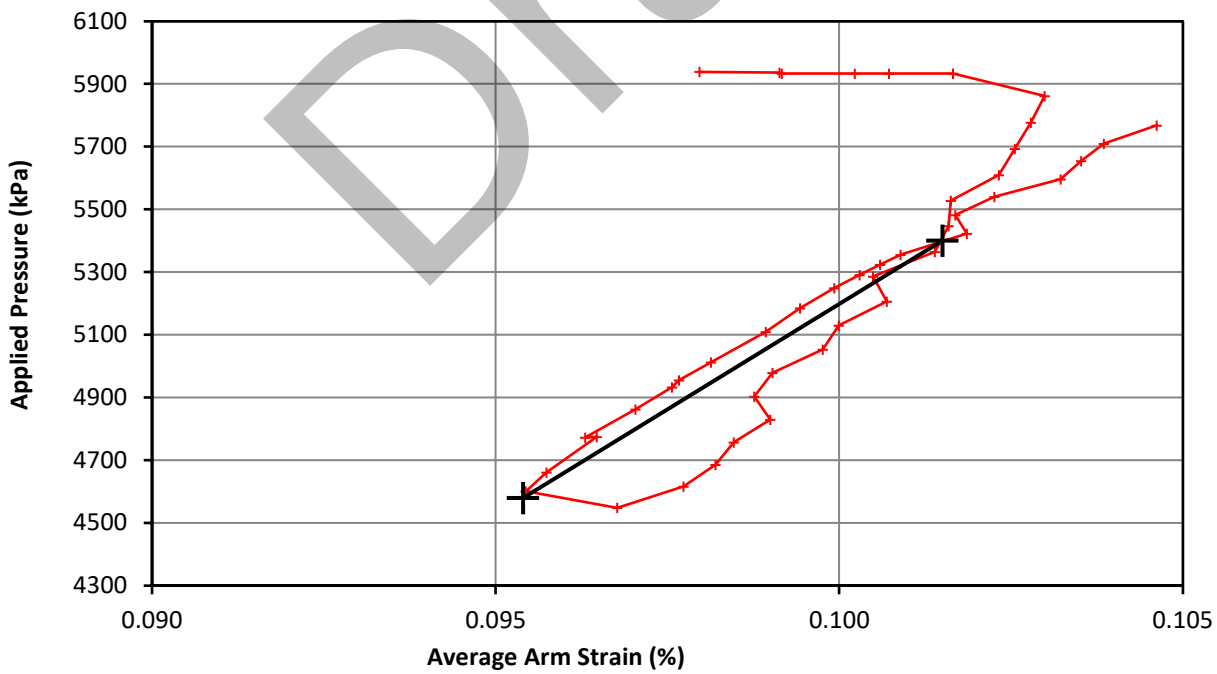
Pressuremeter Analysis - Unload Reload Loop

IN SITU SITE INVESTIGATION

Test Date	07/06/2022	**Test No.**	1
Borehole	BPT-BH-007	**Test Depth (m)**	11.00



Loop 1	Shear Modulus	4131.1 MPa
	Cavity Strain Range	0.010 %



Loop 2	Shear Modulus	6728.1 MPa
	Cavity Strain Range	0.006 %

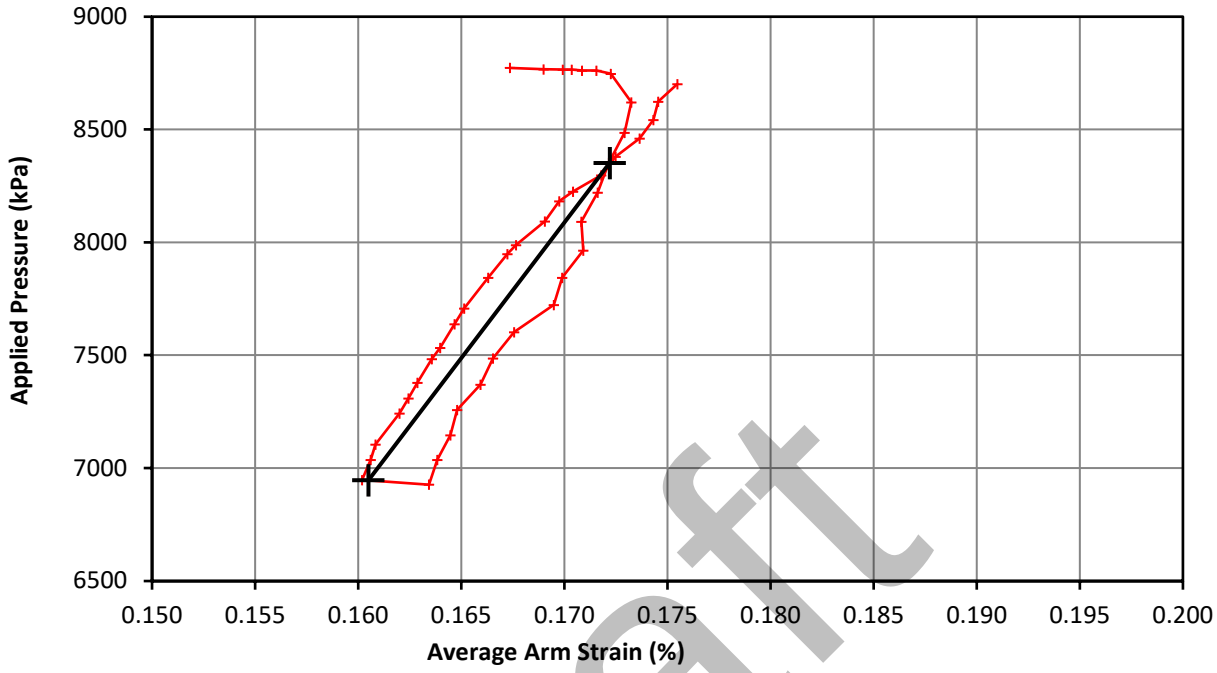
Draft

Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-007 T01 - 05**
Client	Irish Drilling Ltd		
Project No.	P1220101		

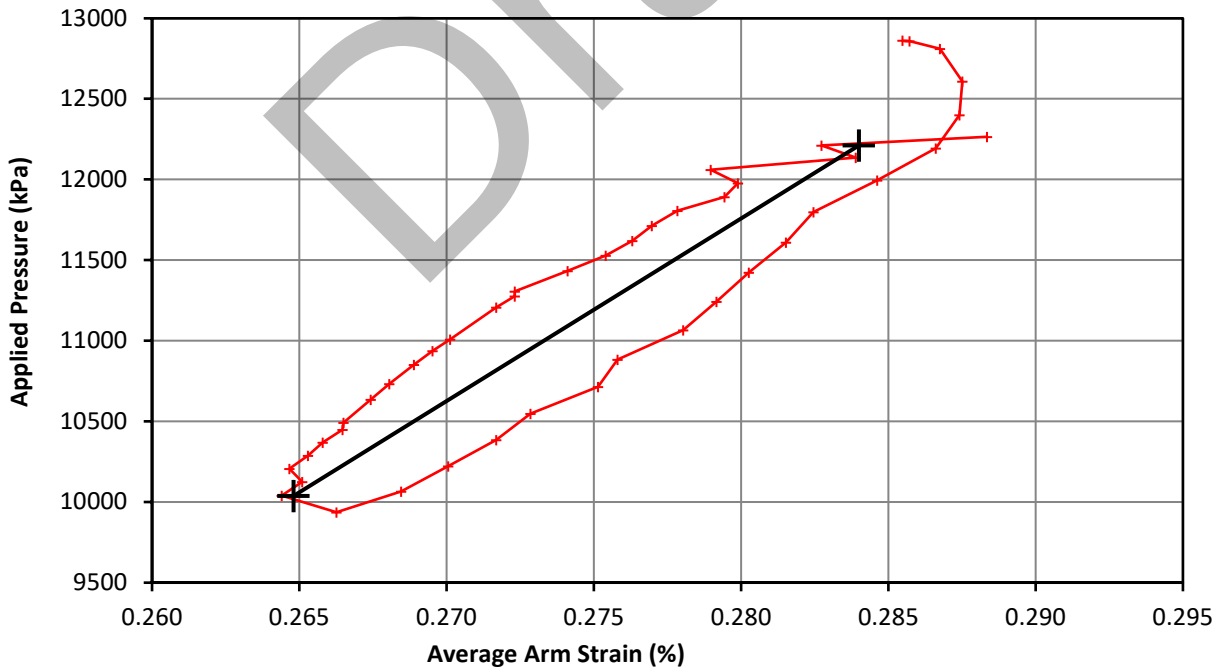
Pressuremeter Analysis - Unload Reload Loop

IN SITU SITE INVESTIGATION

Test Date	07/06/2022	**Test No.**	1
Borehole	BPT-BH-007	**Test Depth (m)**	11.00



Loop 3	Shear Modulus	6015.5 MPa
	Cavity Strain Range	0.012 %



Loop 4	Shear Modulus	5673.4 MPa
	Cavity Strain Range	0.019 %

Draft

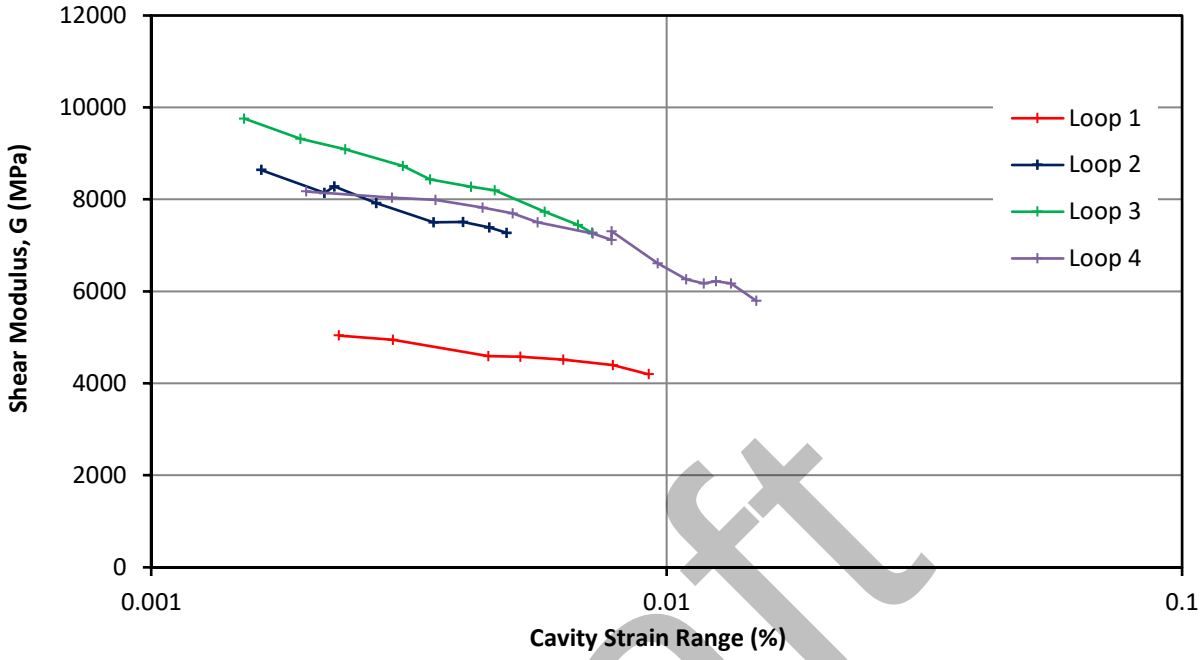
Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-007 T01 - 06**
Client	Irish Drilling Ltd		
Project No.	P1220101		

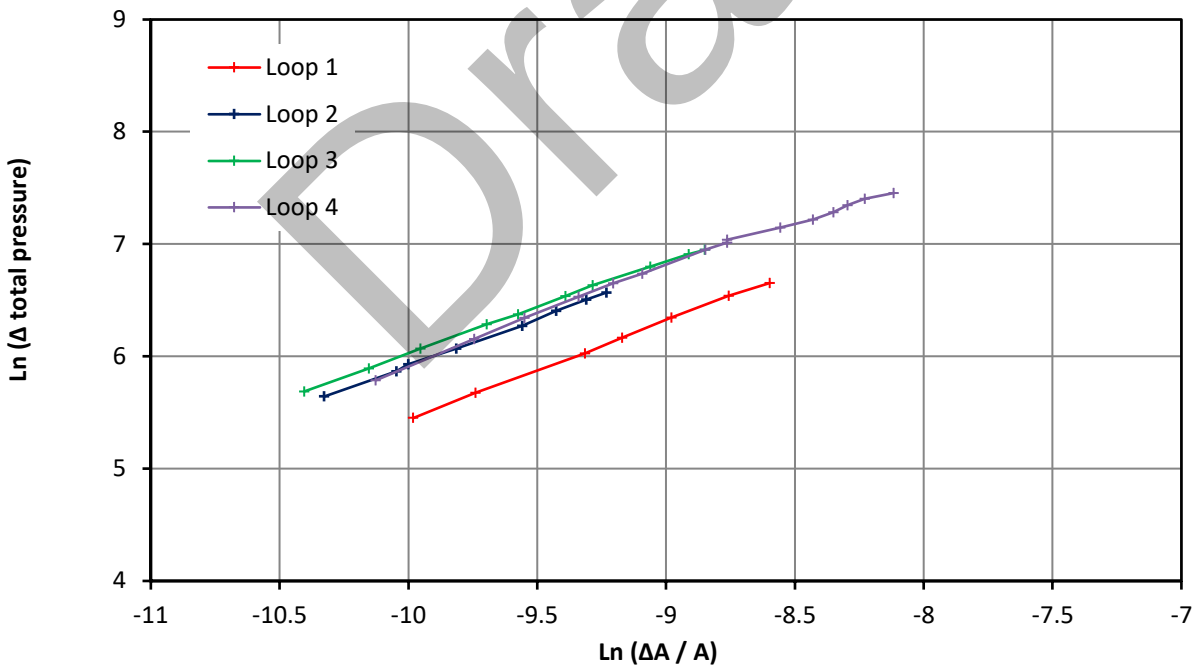
Pressuremeter Analysis

Small Strain Stiffness and Bolton & Whittle (1999)

IN SITU SITE INVESTIGATION

Test Date	07/06/2022	**Test No.**	1
Borehole	BPT-BH-007	**Test Depth (m)**	11.00





Draft

Loop 1		Loop 2		Loop 3		Loop 4	
Gradient(β)	Intercept	Gradient(β)	Intercept	Gradient(β)	Intercept	Gradient(β)	Intercept
0.875	1452.387 (MPa)	0.844	1720.110 (MPa)	0.819	1491.218 (MPa)	0.819	1398.825 (MPa)

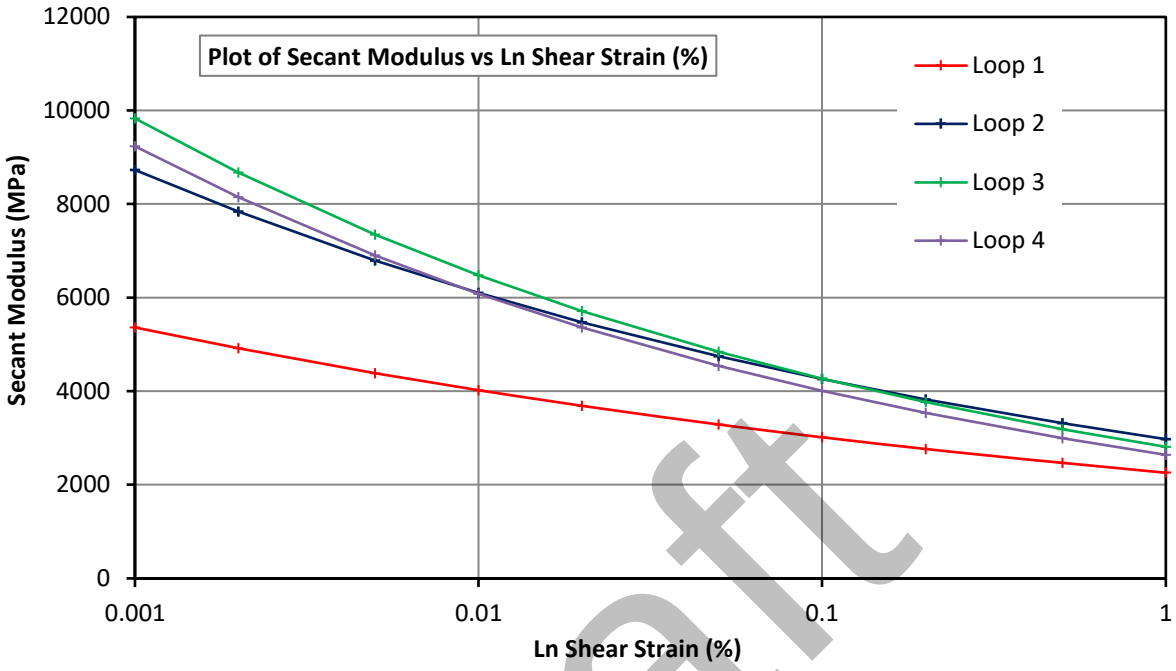
Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-007 T01 - 07**
Client	Irish Drilling Ltd		
Project No.	P1220101		

Pressuremeter Analysis

Secant Modulus - Shear Strain (%)

IN SITU SITE INVESTIGATION

Test Date	07/06/2022	**Test No.**	1
Borehole	BPT-BH-007	**Test Depth (m)**	11.00



Draft

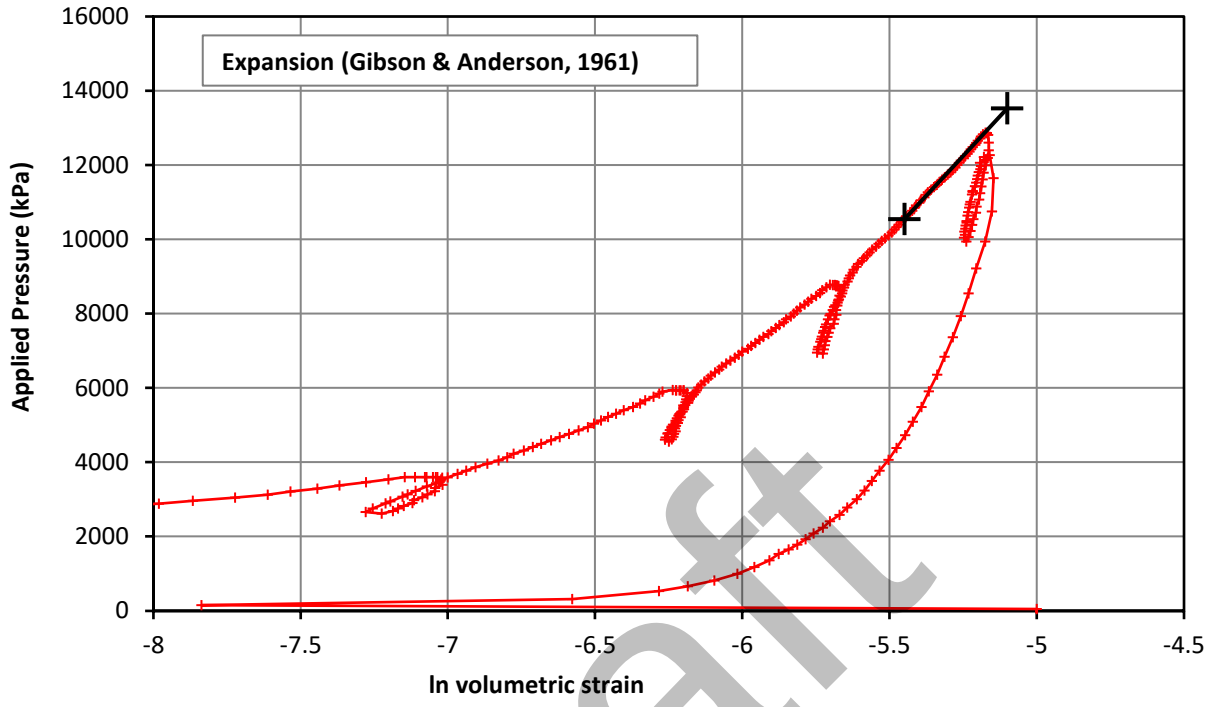
Shear Strain	Loop 1	Loop 2	Loop 3	Loop 4
0.001%	**5361**	**8727**	**9828**	**9233**
0.002%	4916	7834	8669	8142
0.005%	4384	6792	7343	6896
0.010%	**4020**	**6097**	**6476**	**6082**
0.020%	3686	5473	5712	5364
0.050%	3287	4745	4839	4543
0.100%	**3014**	**4259**	**4268**	**4006**
0.200%	2764	3823	3764	3533
0.500%	2465	3315	3188	2993
1.000%	**2260**	**2975**	**2812**	**2639**

Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-007 T01 - 08**
Client	Irish Drilling Ltd		
Project No.	P1220101		

Pressuremeter Analysis - Undrained Strength

IN SITU SITE INVESTIGATION

Test Date	07/06/2022	**Test No.**	1
Borehole	BPT-BH-007	**Test Depth (m)**	11.00



Strength (loading)	Undrained Shear	8514	kPa
	Limit Pressure	56953	kPa

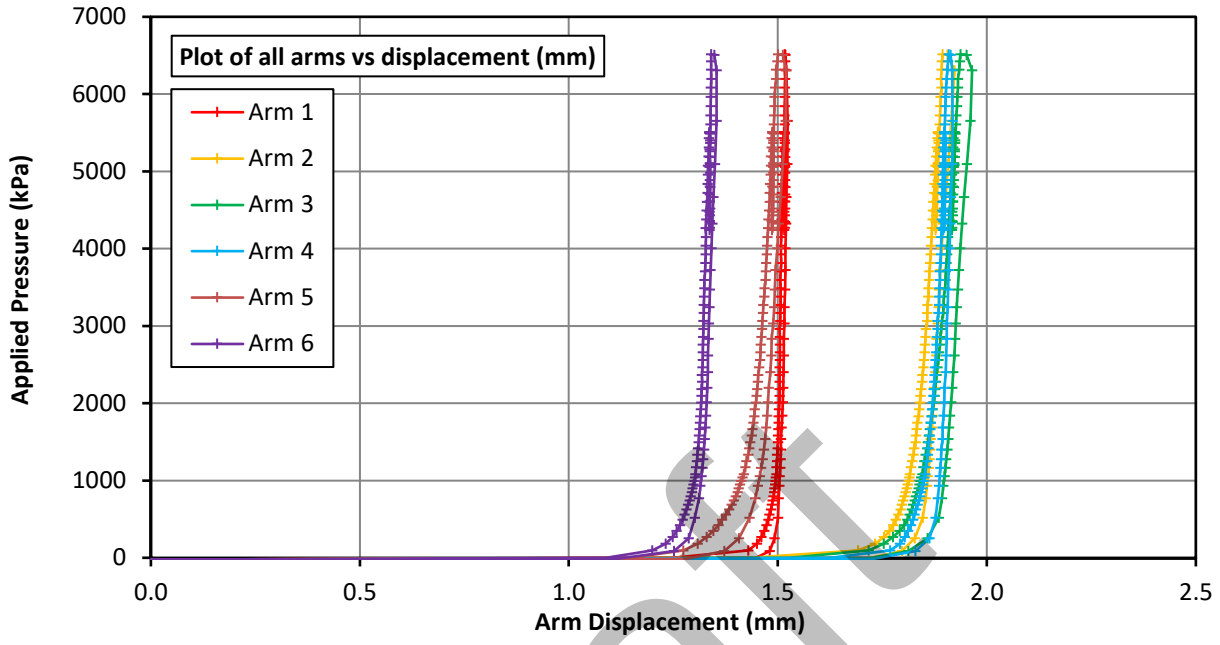
Draft

Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-007 T01 - 09**
Client	Irish Drilling Ltd		
Project No.	P1220101		

Pressuremeter Test Overview
High Pressure Dilatometer (HPD)

IN SITU SITE INVESTIGATION

Test Date	08/06/2022		**Test No.**	2
Borehole	BPT-BH-007		**Test Depth (m)**	14.00
Coordinates (m)	597227.5 (E)	689970.1 (N)	**Elevation (m)**	145.33



Material description from borehole log:

Very strong apparently massive grey 'marbled' brownish grey and white fine and coarse grained LIMESTONE.

Test pocket conditions:

Total core recovery:	100 %	Test pocket depth range:	
Solid core recovery:	97 %	From: 13.00 m	to: 15.00 m
Rock quality designation:	96 %	Flush: Water	

Test comment:

The test pocket was tight with arms lifting off at 1.3 to 1.9mm. The po was estimated to be at 2661kPa, with the following loading section being relatively long. The test was taken to a maximum pressure of 6508kPa where a sudden jump in expansion resulted in the test being terminated due to potential membrane burst. The displacement-pressure response shown by the arms was consistent. Analysis of a single unload reload loop provides a modulus value of 6504MPa.

Test details: **Instrument:** Kylie (HPD06)

Drilling method:	Rotary coring	Calibration coefficients:					
Casing depth:	13.00 m		mV	mV/mm		mV	mV/MPa
Water level:	0.00 m	Arm 1:	-2230.3	132.4	TPC A:	-2370.9	111.3
		Arm 2:	-2234.8	130.5	TPC B:	-2442.4	120.7
Test time:		Arm 3:	-2147.6	133.1	Membrane:		
Start (probe in):	09:20 hrs	Arm 4:	-2229.6	127.7	Stiffness	38	kPa
Finish (probe out):	10:00 hrs	Arm 5:	-2067.1	126.4	Slope	14.2	kPa/mm
		Arm 6:	-2045.7	131.0	Compliance	1.5	mm/Gpa

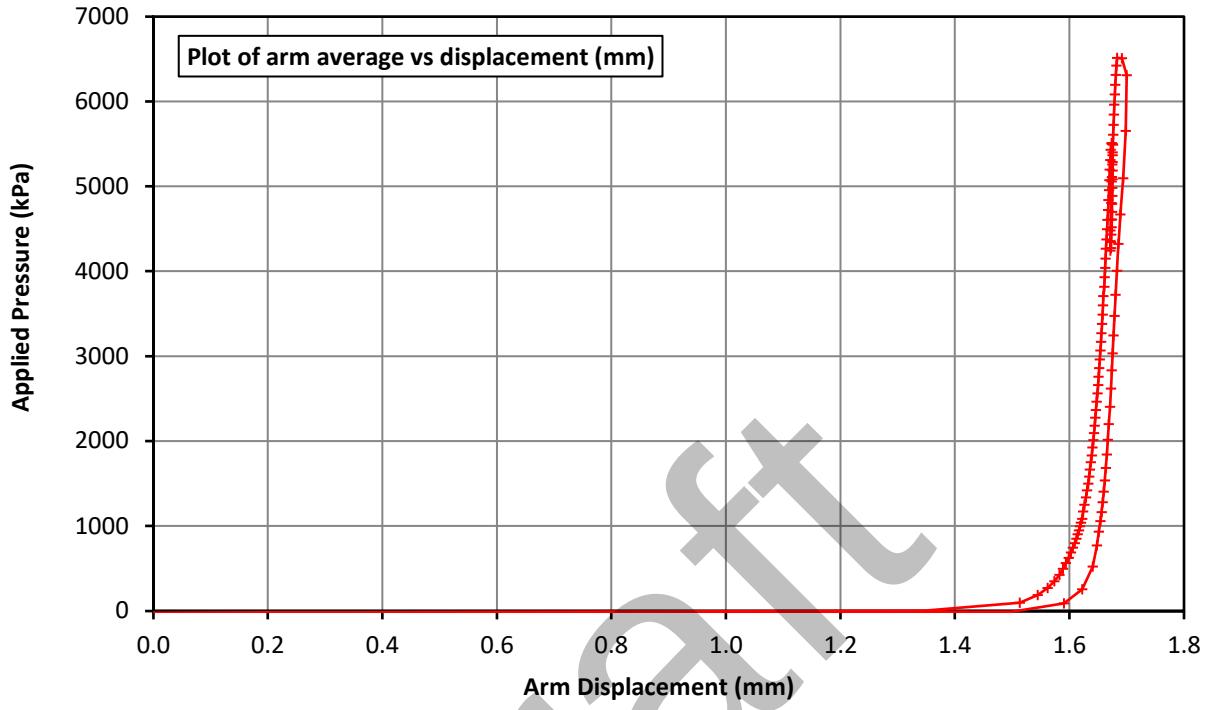
Project	Water Supply Project Lot 2	**Figure No.**	**BPT-BH-007 T02 - 01**
Client	Irish Drilling Ltd		
Project No.	P1220109		

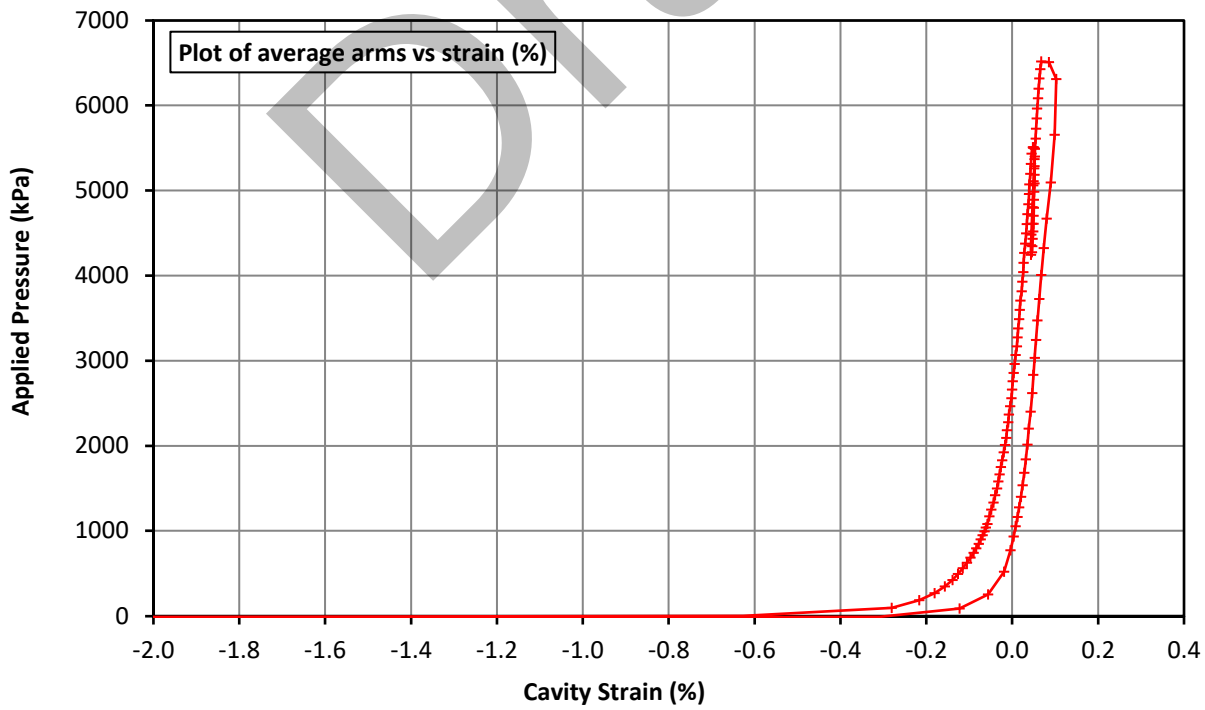
Draft

Pressuremeter Test - Average Arm Plots

IN SITU SITE INVESTIGATION

Test Date	08/06/2022	**Test No.**	2
Borehole	BPT-BH-007	**Test Depth (m)**	14.00





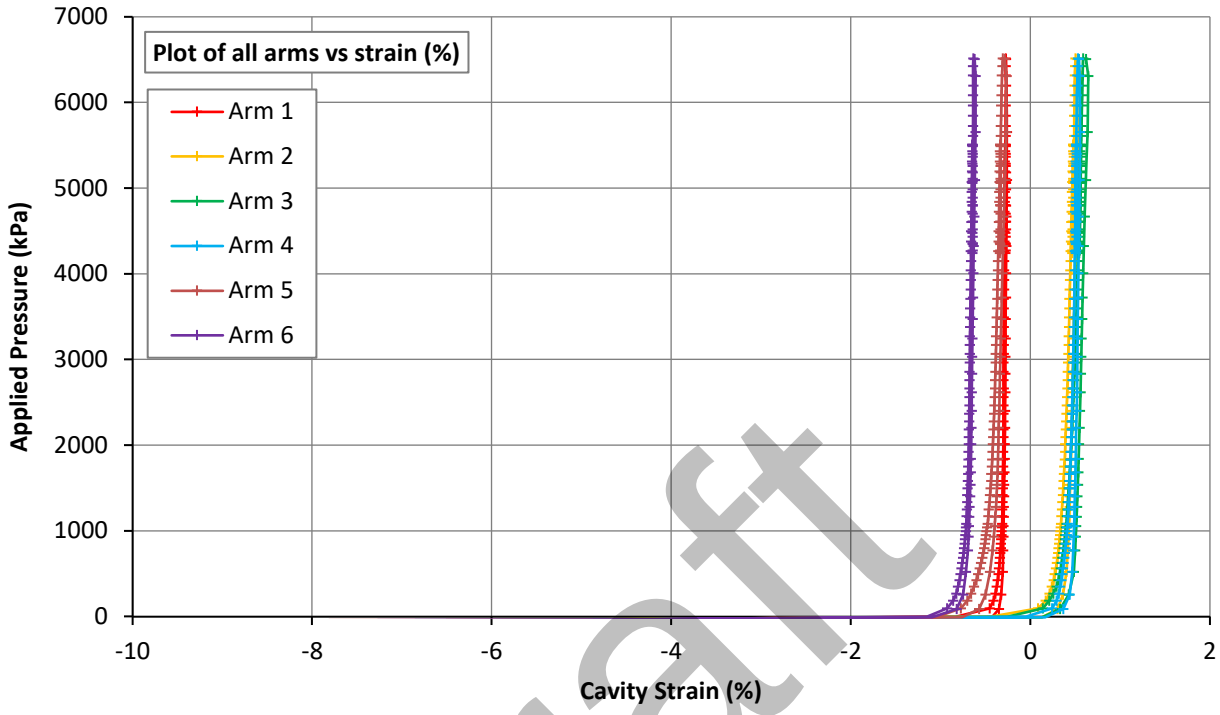
Draft

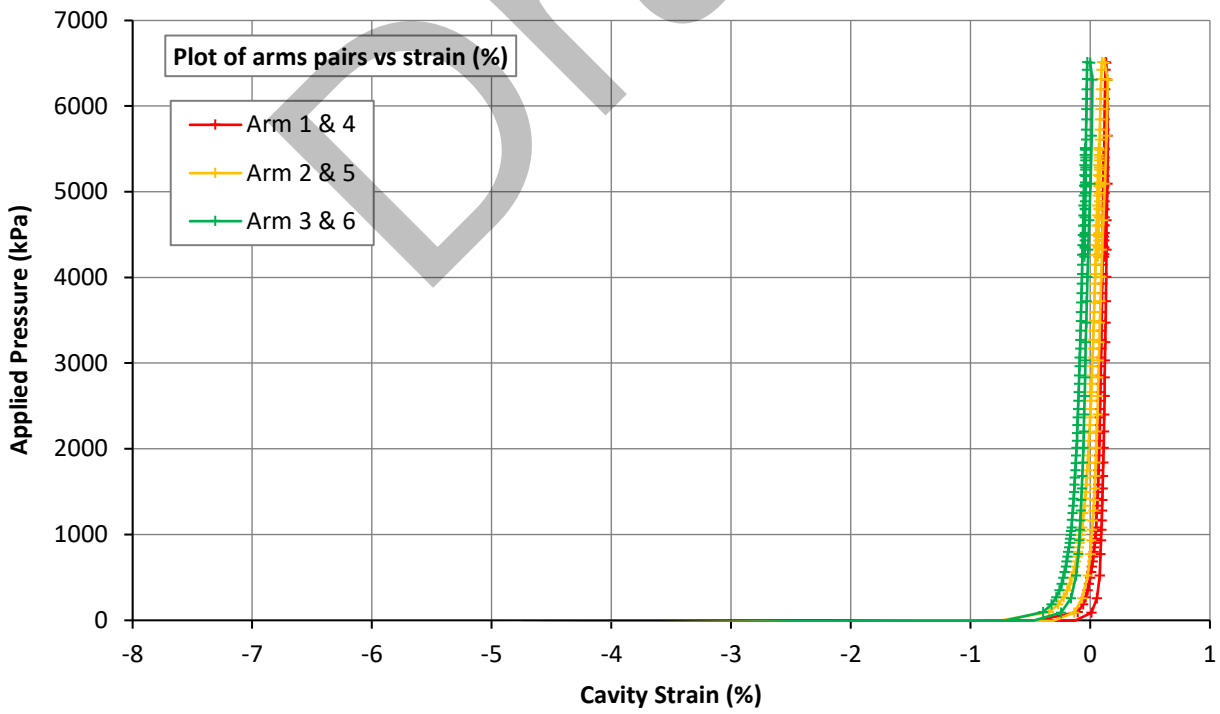
Project	Water Supply Project Lot 2	**Figure No.**	**BPT-BH-007 T02 - 02**
Client	Irish Drilling Ltd		
Project No.	P1220109		

Pressuremeter Test - Arm Displacement vs Strain (%)

IN SITU SITE INVESTIGATION

Test Date	08/06/2022	**Test No.**	2
Borehole	BPT-BH-007	**Test Depth (m)**	14.00





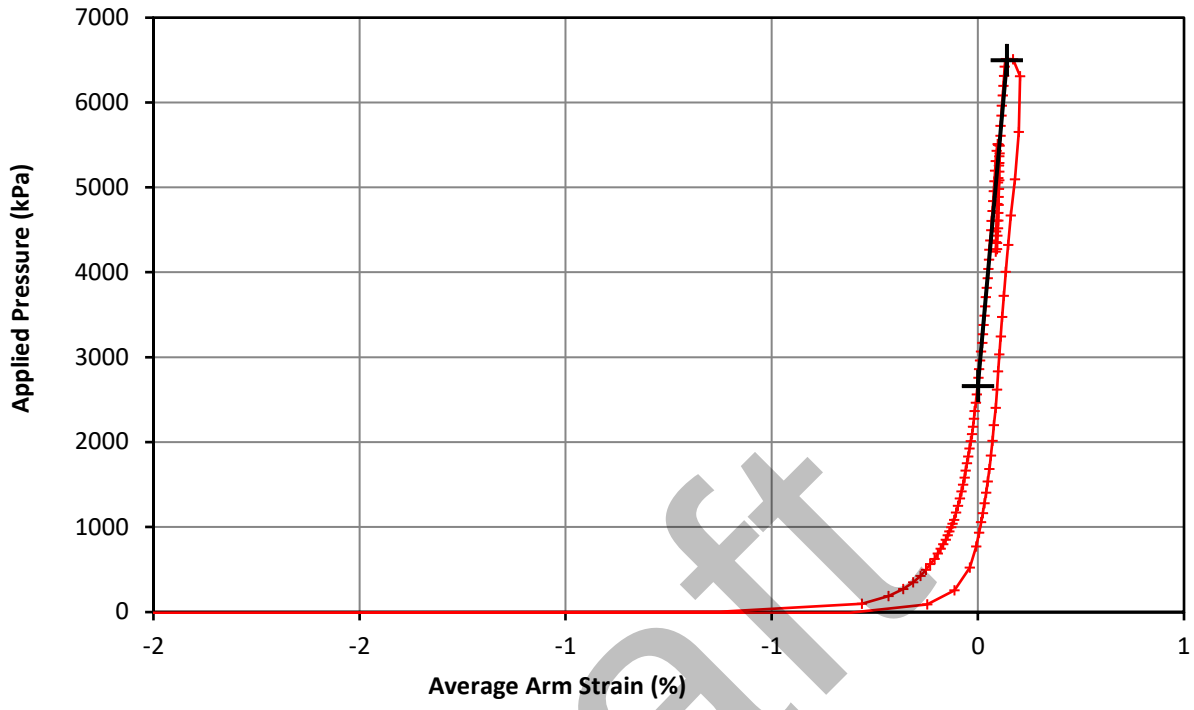
Draft

Project	Water Supply Project Lot 2	**Figure No.**	**BPT-BH-007 T02 - 03**
Client	Irish Drilling Ltd		
Project No.	P1220109		

Pressuremeter Analysis - Initial Modulus & In Situ Horizontal Stress

IN SITU SITE INVESTIGATION

Test Date	08/06/2022	**Test No.**	2
Borehole	BPT-BH-007	**Test Depth (m)**	14.00



Initial Modulus	Shear Modulus	2744.1 MPa

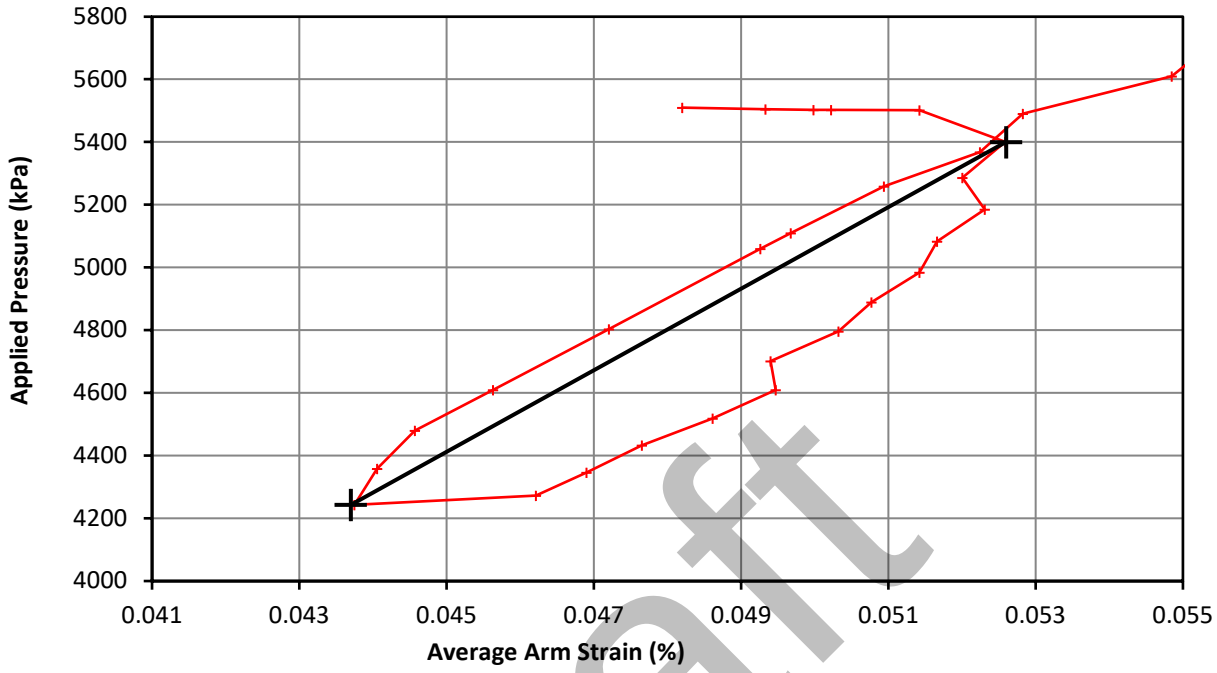
Draft

Project	Water Supply Project Lot 2	**Figure No.**	**BPT-BH-007 T02 - 04**
Client	Irish Drilling Ltd		
Project No.	P1220109		

Pressuremeter Analysis - Unload Reload Loop

IN SITU SITE INVESTIGATION

Test Date	08/06/2022	**Test No.**	2
Borehole	BPT-BH-007	**Test Depth (m)**	14.00



Loop 1	Shear Modulus	6504.0	MPa
	Cavity Strain Range	0.009	%

Draft

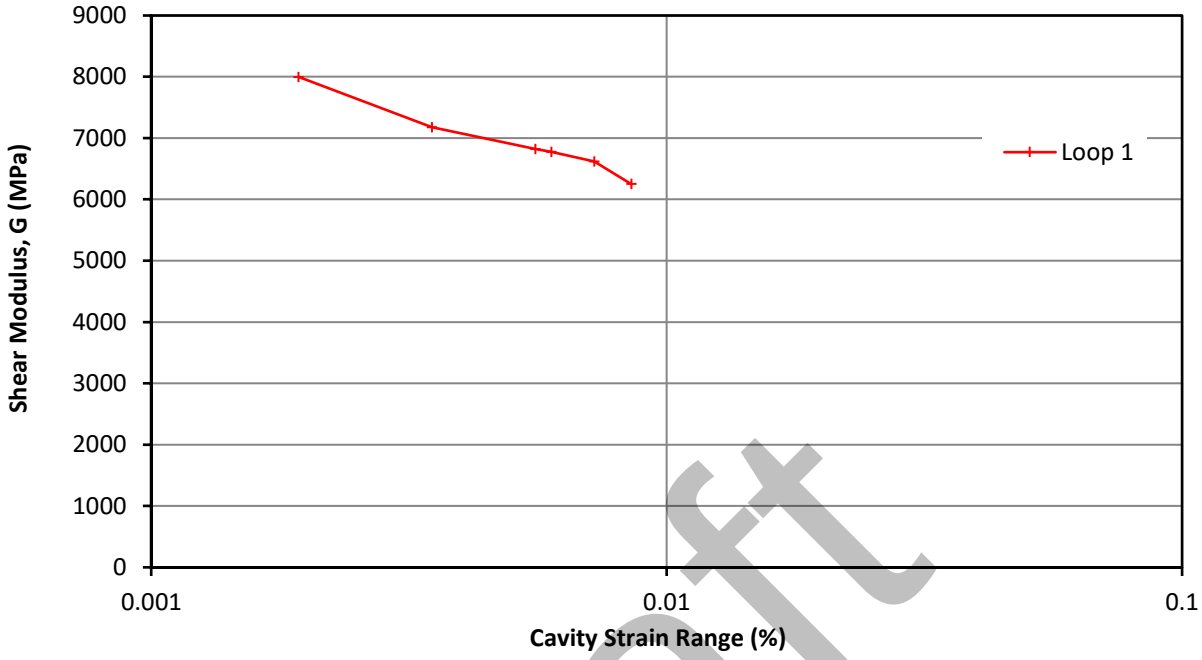
Project	Water Supply Project Lot 2	**Figure No.**	**BPT-BH-007 T02 - 05**
Client	Irish Drilling Ltd		
Project No.	P1220109		

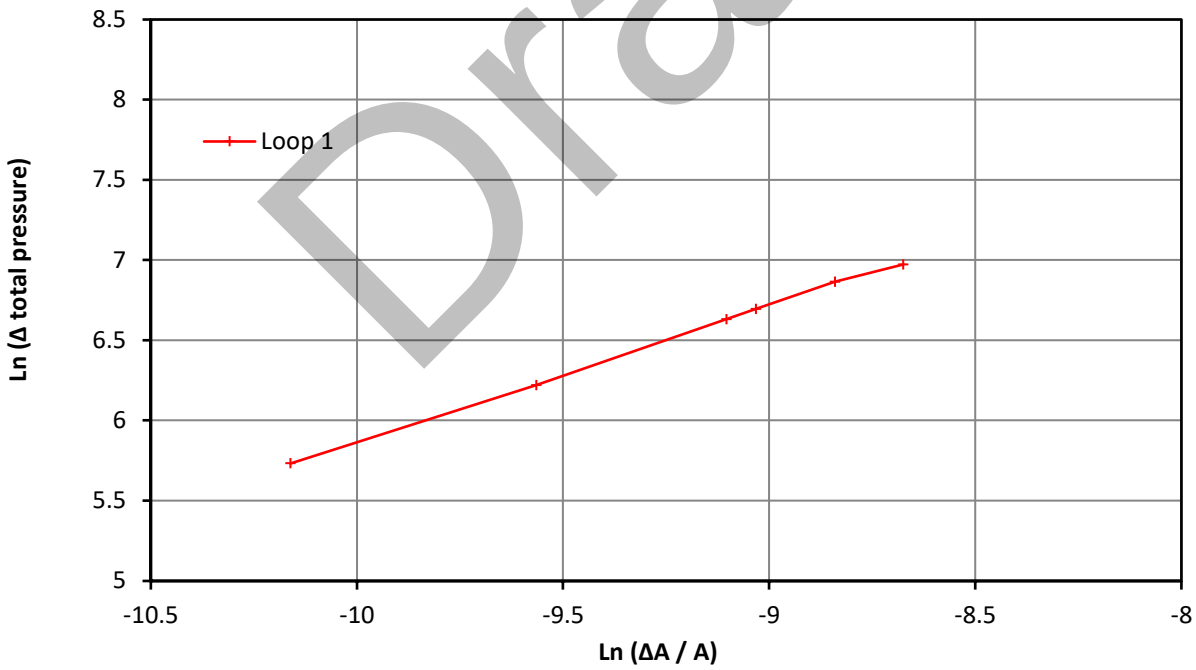
Pressuremeter Analysis

Small Strain Stiffness and Bolton & Whittle (1999)

IN SITU SITE INVESTIGATION

Test Date	08/06/2022	**Test No.**	2
Borehole	BPT-BH-007	**Test Depth (m)**	14.00





Draft

Loop 1	
Gradient(β)	Intercept
0.848	1706.520 (MPa)

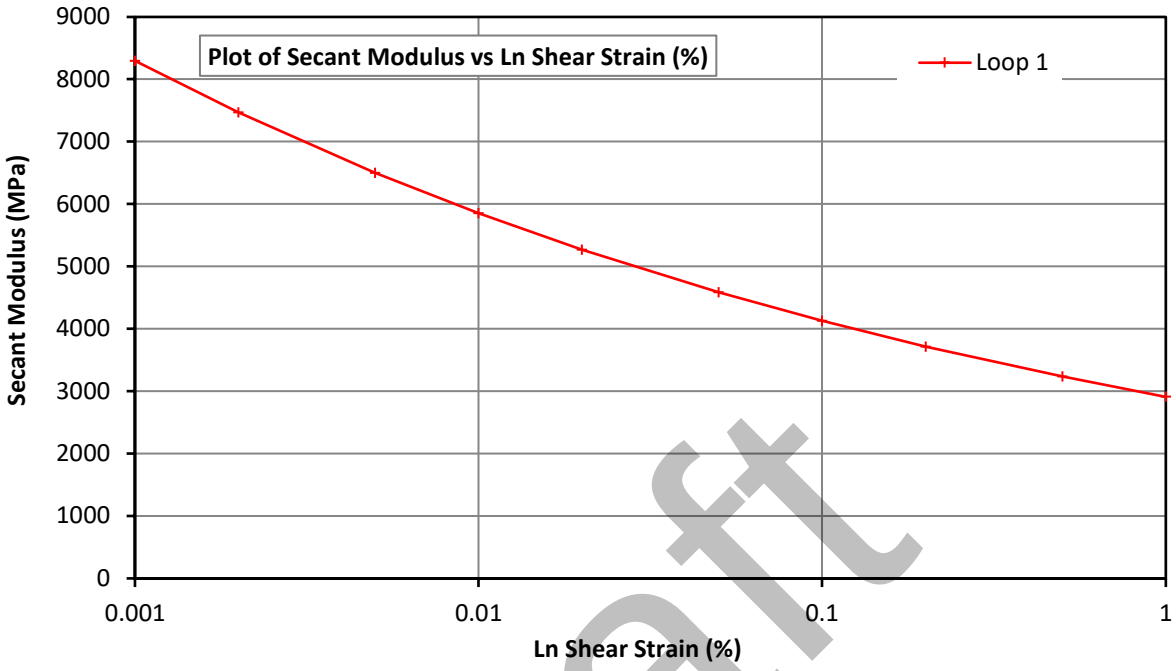
Project	Water Supply Project Lot 2	**Figure No.**	**BPT-BH-007 T02 - 06**
Client	Irish Drilling Ltd		
Project No.	P1220109		

Pressuremeter Analysis

Secant Modulus - Shear Strain (%)

IN SITU SITE INVESTIGATION

Test Date	08/06/2022	**Test No.**	2
Borehole	BPT-BH-007	**Test Depth (m)**	14.00



Draft

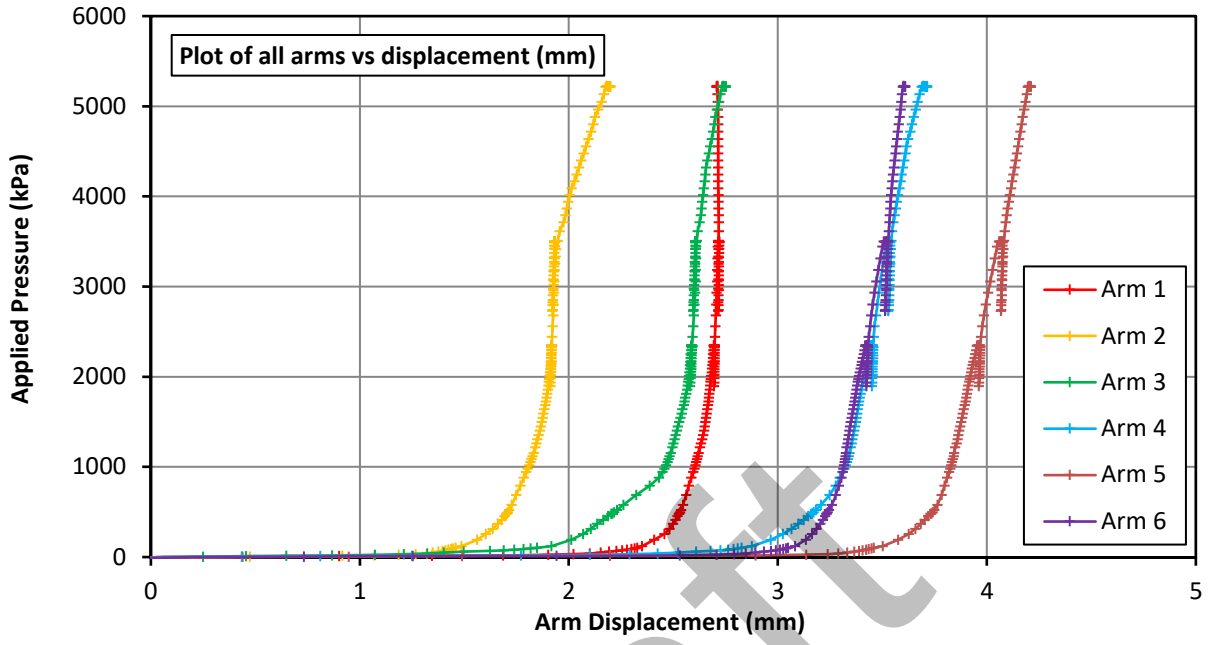
Shear Strain	Loop 1
0.001%	**8296**
0.002%	7469
0.005%	6500
0.010%	**5851**
0.020%	5267
0.050%	4584
0.100%	**4127**
0.200%	3715
0.500%	3233
1.000%	**2911**

Project	Water Supply Project Lot 2	**Figure No.**	**BPT-BH-007 T02 - 07**
Client	Irish Drilling Ltd		
Project No.	P1220109		

Pressuremeter Test Overview
High Pressure Dilatometer (HPD)

IN SITU SITE INVESTIGATION

Test Date	24/05/2022		**Test No.**	1
Borehole	BPT-BH-010		**Test Depth (m)**	6.70
Coordinates (m)	597240.2 (E)	689949.8 (N)	**Elevation (m)**	145.10



Material description from borehole log:

Very strong apparently massive grey 'marbled' dark grey brownish white and white slightly bioclastic fine and coarse grained LIMESTONE.

Test pocket conditions:

Total core recovery:	100 %	Test pocket depth range:	
Solid core recovery:	92 %	From: 6.00 m	to: 7.50 m
Rock quality designation:	49 %	Flush: Water	

Test comment:

The test pocket was reasonable with arms lifting off at 1.9 to 3.9mm. The po was estimated to be at 1686kPa, with the following loading section being relatively long. The onset of possible material yield with fracture movement was interpreted at 4261kPa, with the test taken to a maximum pressure of 5225kPa, where the membrane burst. The displacement-pressure response shown by the arms was reasonably consistent, albeit at varying expansion. Analysis of two unload reload loops provides modulus values of 1705 to 1890MPa. Derived undrained shear strength analysis provides a tentative value of 2575kPa, altrhough this should be treated with caution due to the nature of the tested material and possible fracture movement.

Test details: **Instrument:** Kylie (HPD06)

Drilling method:	Rotary coring	Calibration coefficients:					
Casing depth:	6.00 m		mV	mV/mm		mV	mV/MPa
Water level:	0.00 m	Arm 1:	-2430.9	132.4	TPC A:	-2373.6	111.3
		Arm 2:	-2377.8	130.5	TPC B:	-2445.9	120.7
Test time:		Arm 3:	-2317.9	133.1	Membrane:		
Start (probe in):	13:00 hrs	Arm 4:	-2446.0	127.7	Stiffness	25.7	kPa
Finish (probe out):	13:50 hrs	Arm 5:	-2335.3	126.4	Slope	12.2	kPa/mm
		Arm 6:	-2296.1	131.0	Compliance	1.5	mm/Gpa

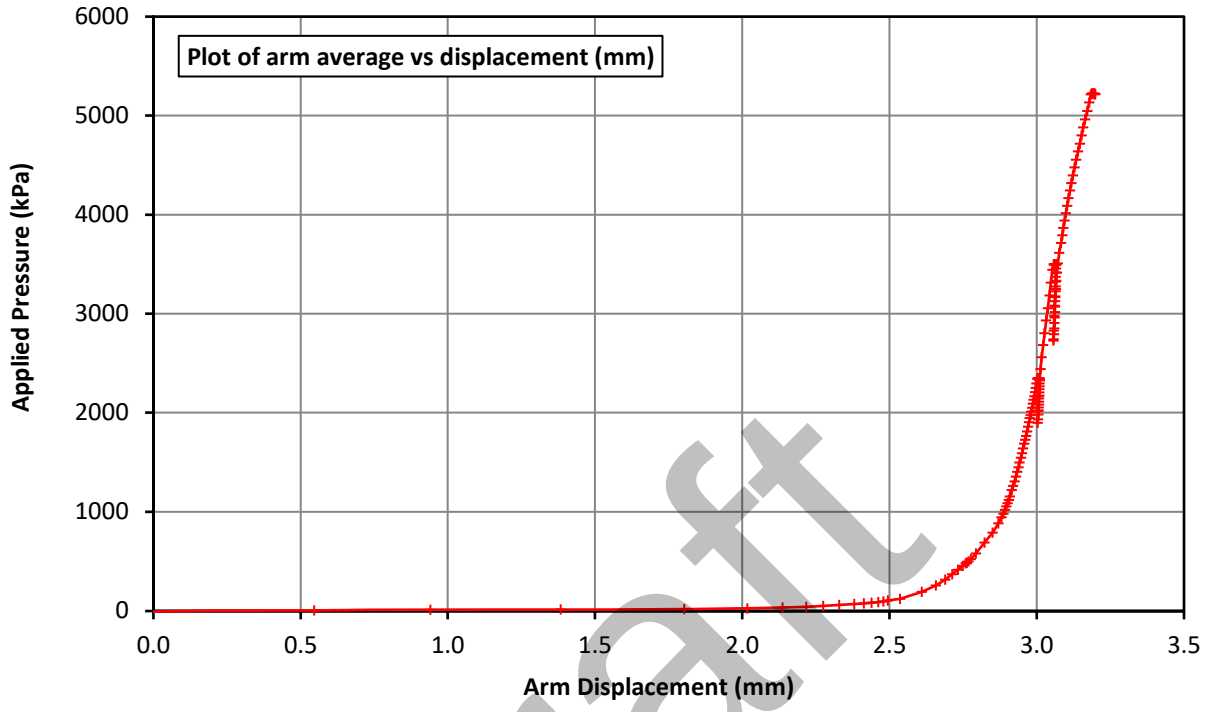
Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-010 T01 - 01**
Client	Irish Drilling Ltd		
Project No.	P1220101		

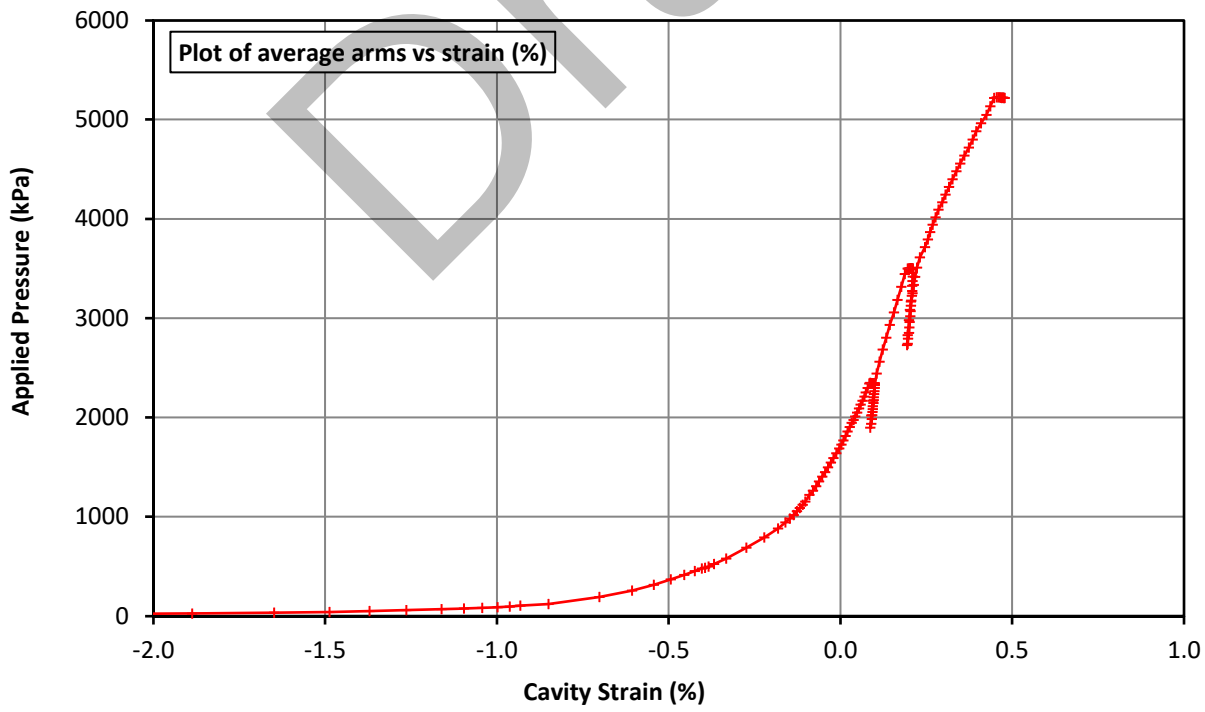
Draft

Pressuremeter Test - Average Arm Plots

IN SITU SITE INVESTIGATION

Test Date	24/05/2022	**Test No.**	1
Borehole	BPT-BH-010	**Test Depth (m)**	6.70





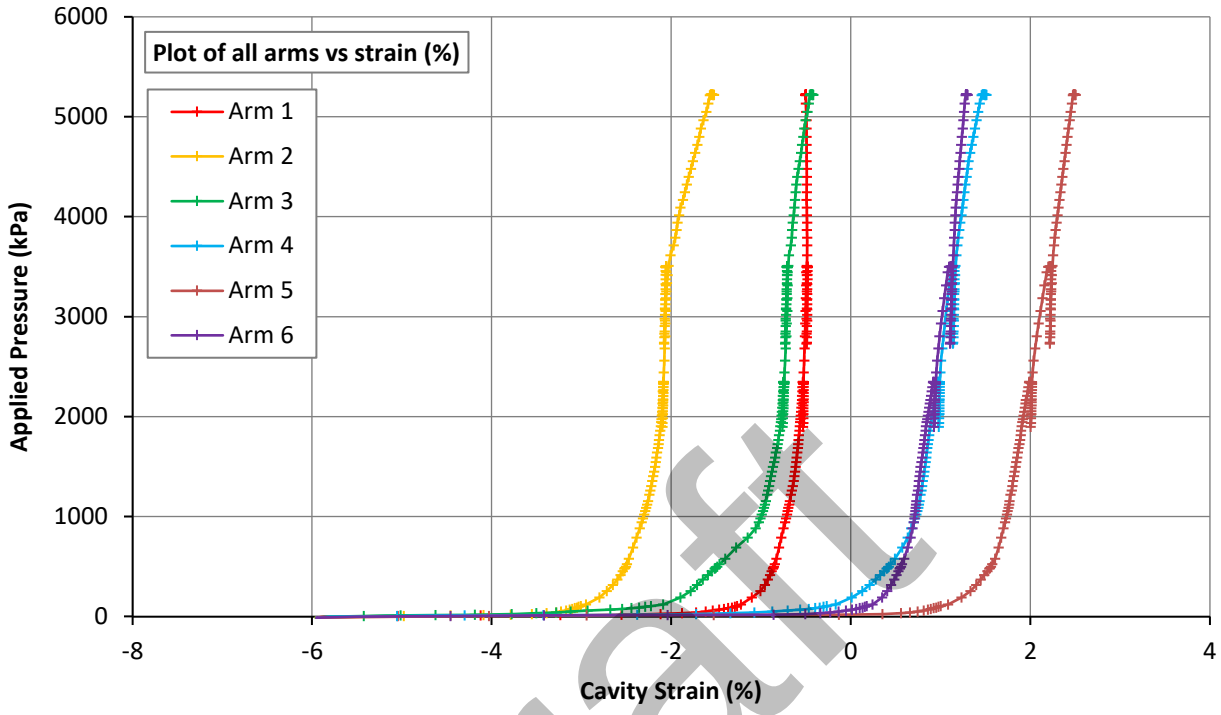
Draft

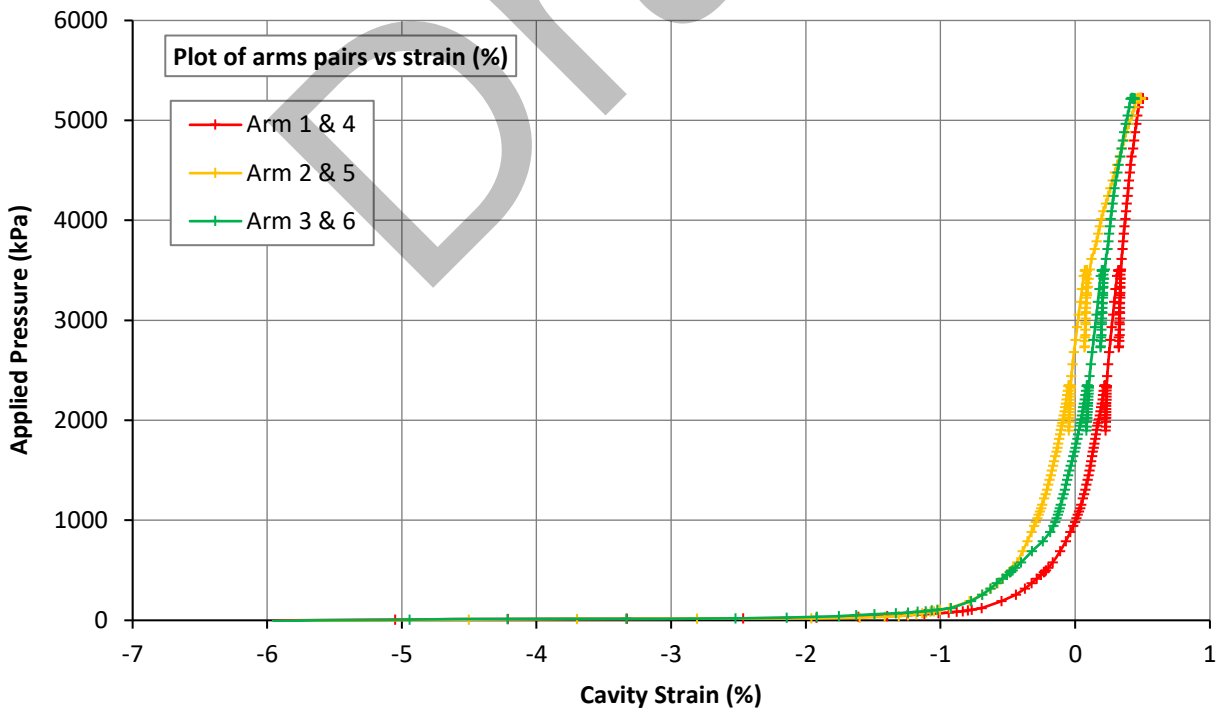
Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-010 T01 - 02**
Client	Irish Drilling Ltd		
Project No.	P1220101		

Pressuremeter Test - Arm Displacement vs Strain (%)

IN SITU SITE INVESTIGATION

Test Date	24/05/2022	**Test No.**	1
Borehole	BPT-BH-010	**Test Depth (m)**	6.70





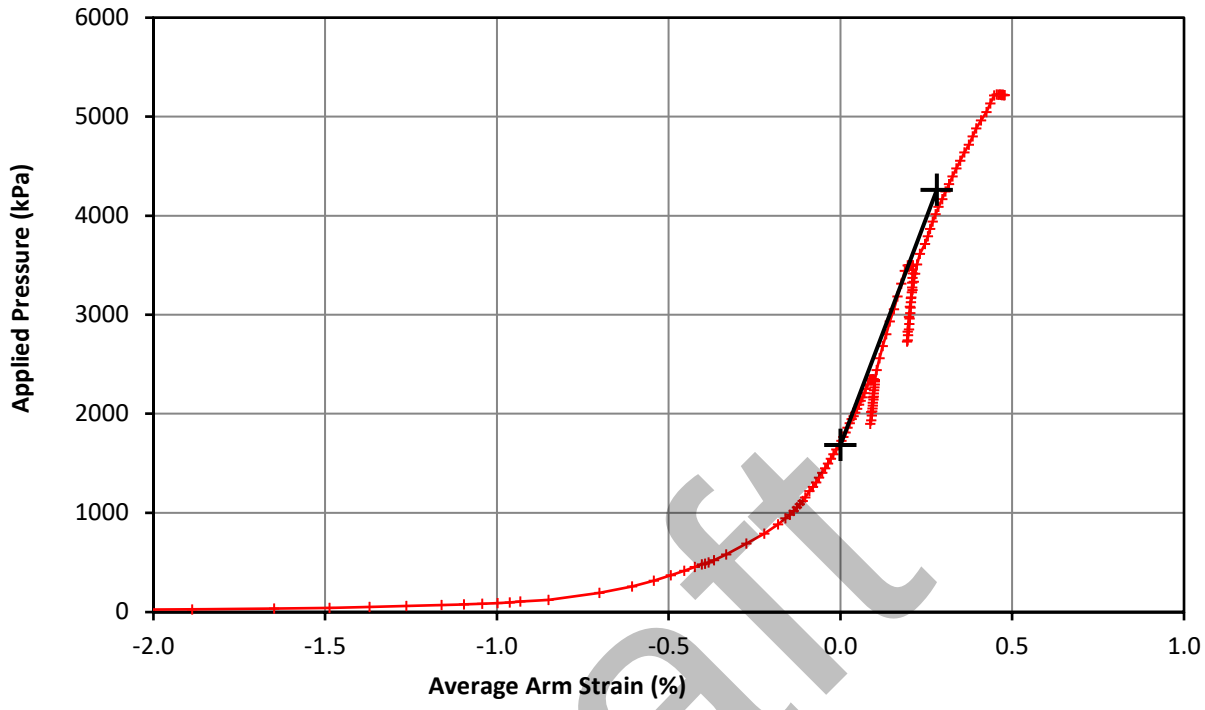
Draft

Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-010 T01 - 03**
Client	Irish Drilling Ltd		
Project No.	P1220101		

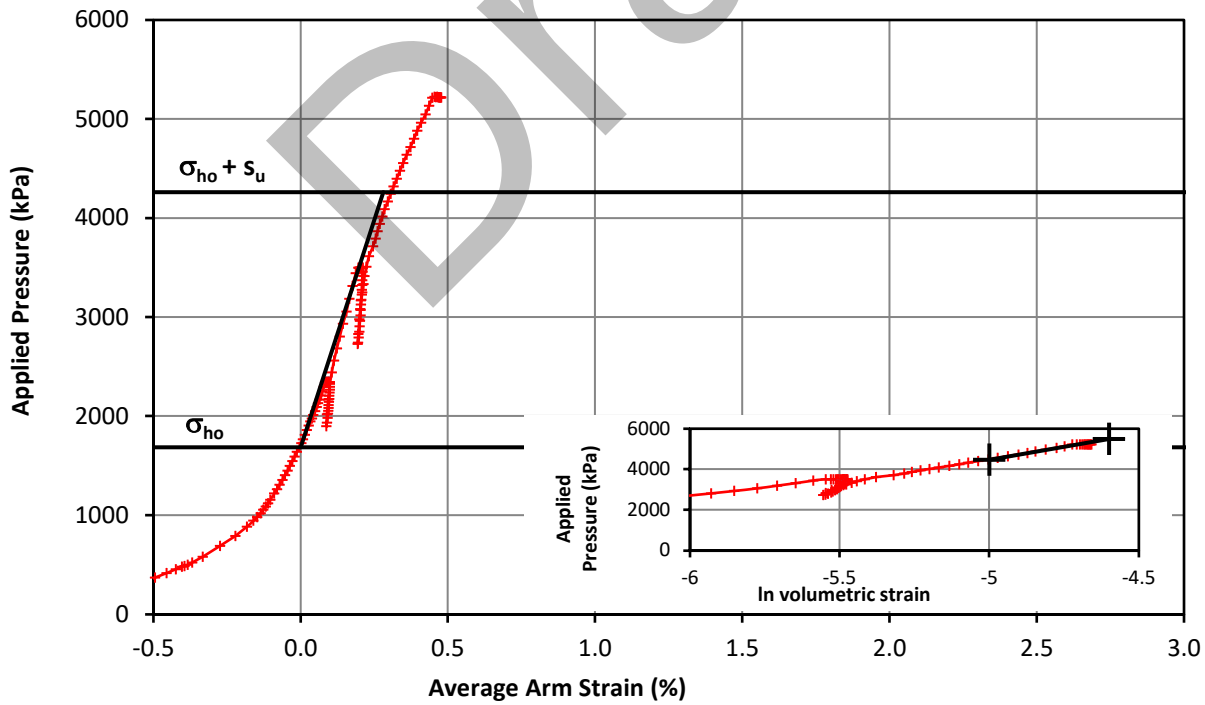
Pressuremeter Analysis - Initial Modulus & In Situ Horizontal Stress

IN SITU SITE INVESTIGATION

Test Date	24/05/2022	**Test No.**	1
Borehole	BPT-BH-010	**Test Depth (m)**	6.70



Initial Modulus	Shear Modulus	461.1 MPa



Marsland & Randolph	In situ horizontal stress	1686 kPa
	Undrained Strength	2575 kPa

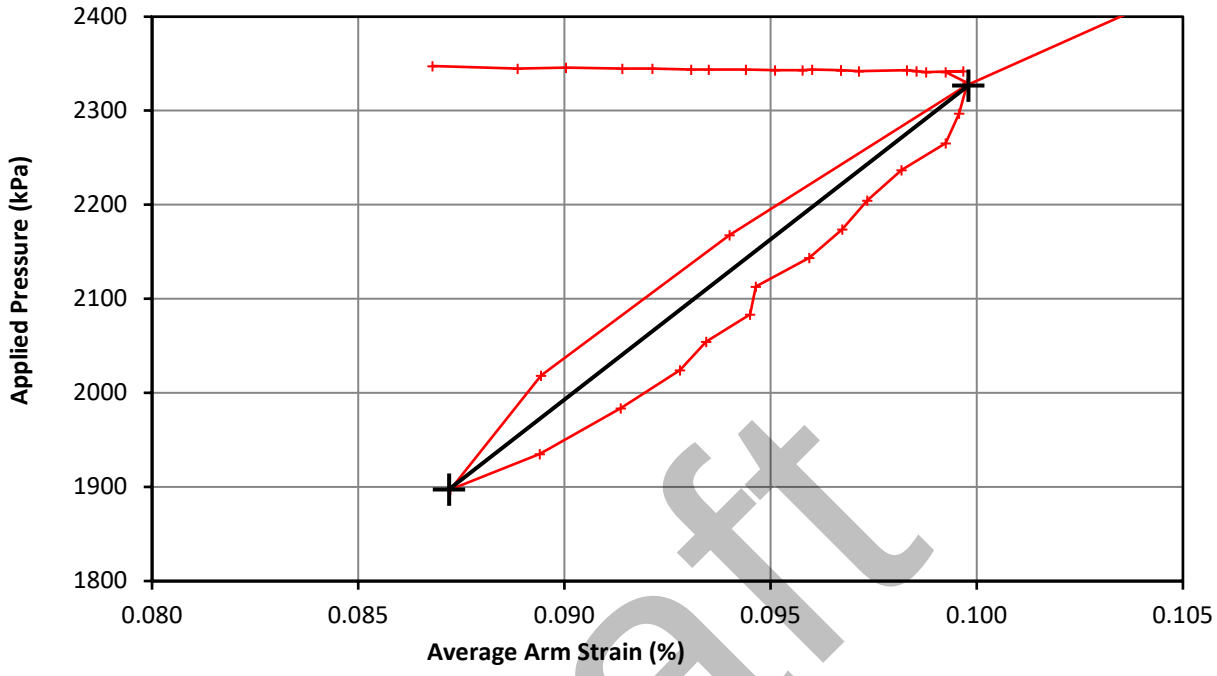
Draft

Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-010 T01 - 04**
Client	Irish Drilling Ltd		
Project No.	P1220101		

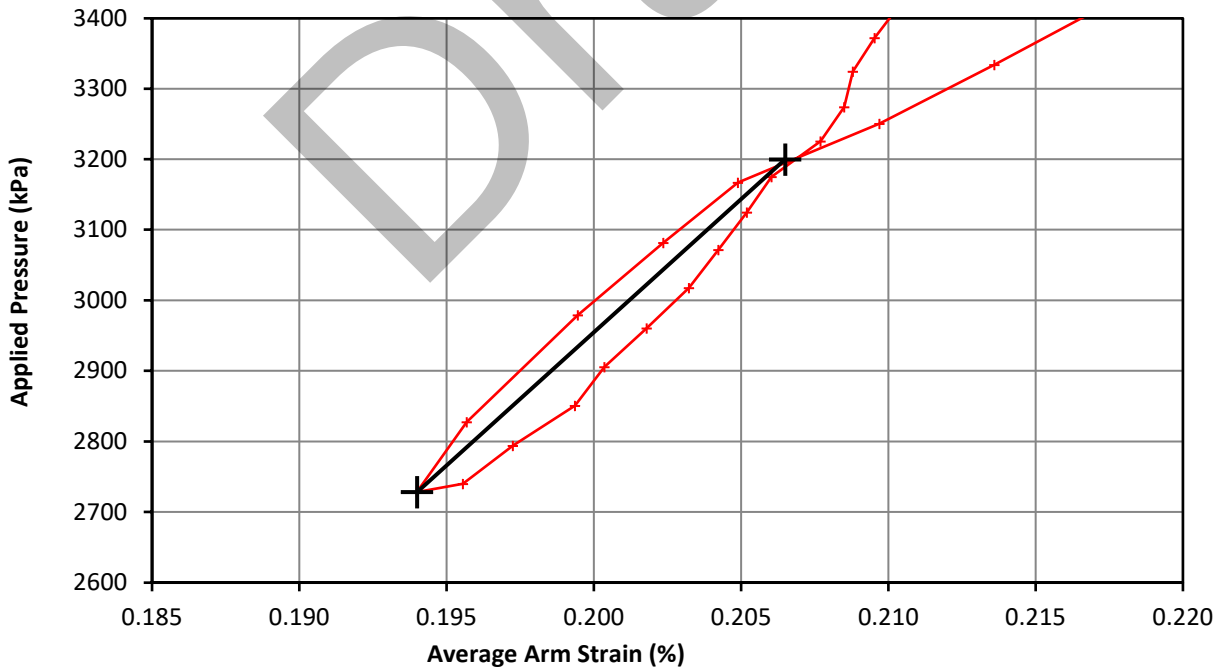
Pressuremeter Analysis - Unload Reload Loop

IN SITU SITE INVESTIGATION

Test Date	24/05/2022	**Test No.**	1
Borehole	BPT-BH-010	**Test Depth (m)**	6.70



Loop 1	Shear Modulus	1705.3	MPa
	Cavity Strain Range	0.013	%



Loop 2	Shear Modulus	1889.5	MPa
	Cavity Strain Range	0.013	%

Draft

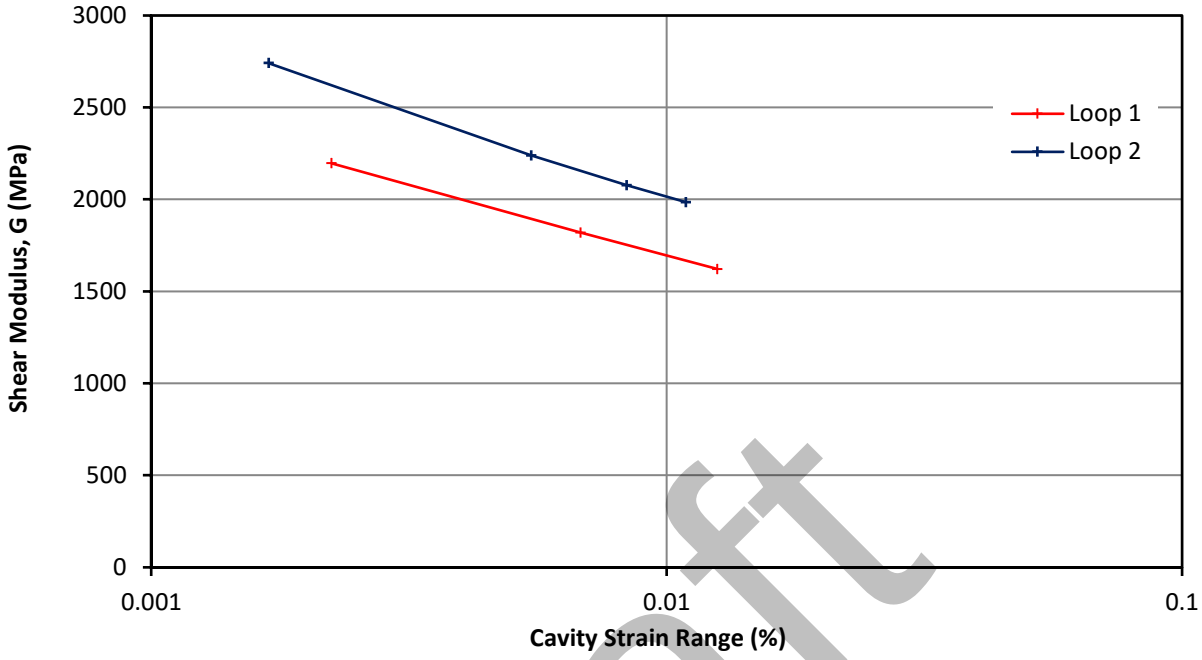
Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-010 T01 - 05**
Client	Irish Drilling Ltd		
Project No.	P1220101		

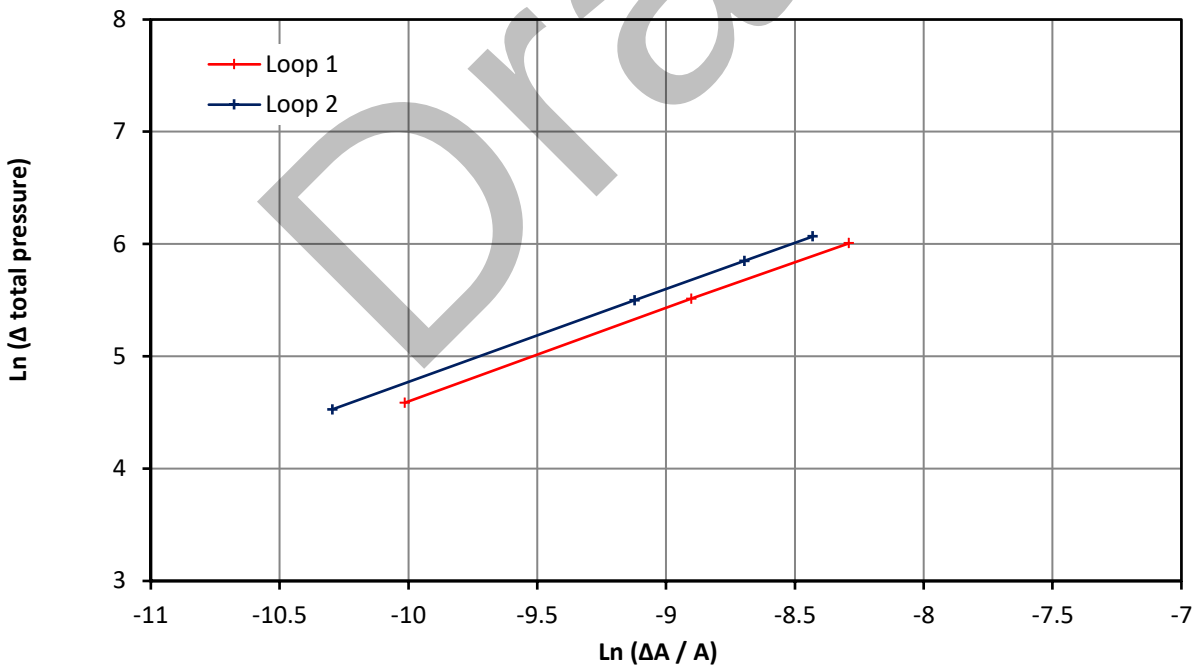
Pressuremeter Analysis

Small Strain Stiffness and Bolton & Whittle (1999)

IN SITU SITE INVESTIGATION

Test Date	24/05/2022	**Test No.**	1
Borehole	BPT-BH-010	**Test Depth (m)**	6.70





Draft

Loop 1		Loop 2	
Gradient(β)	Intercept	Gradient(β)	Intercept
0.825	380.732 (MPa)	0.827	459.693 (MPa)

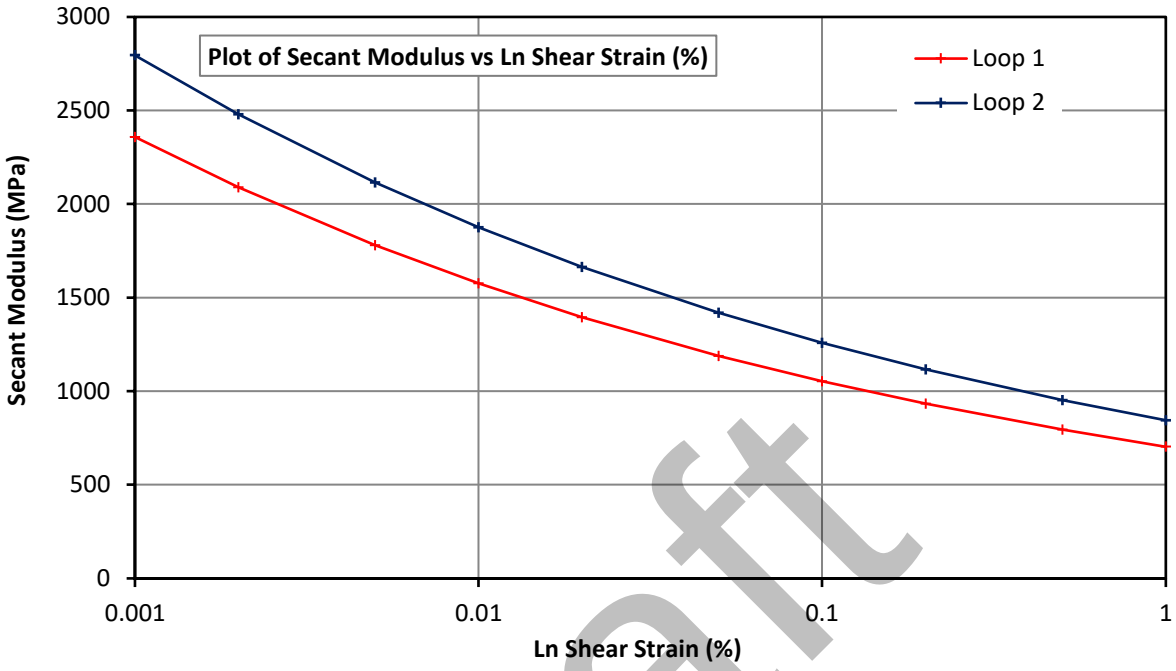
Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-010 T01 - 06**
Client	Irish Drilling Ltd		
Project No.	P1220101		

Pressuremeter Analysis

Secant Modulus - Shear Strain (%)

IN SITU SITE INVESTIGATION

Test Date	24/05/2022	**Test No.**	1
Borehole	BPT-BH-010	**Test Depth (m)**	6.70



Draft

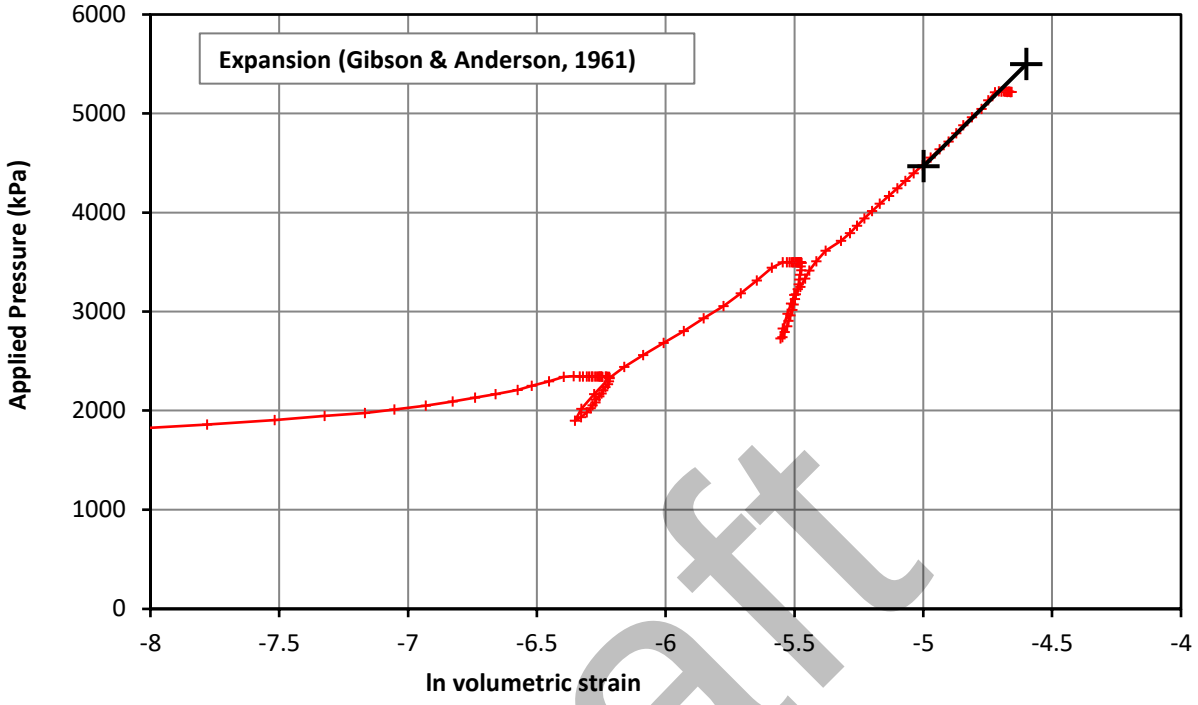
Shear Strain	Loop 1	Loop 2
0.001%	**2358**	**2795**
0.002%	2088	2478
0.005%	1779	2114
0.010%	**1576**	**1875**
0.020%	1395	1663
0.050%	1189	1419
0.100%	**1053**	**1258**
0.200%	932	1116
0.500%	794	952
1.000%	**703**	**844**

Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-010 T01 - 07**
Client	Irish Drilling Ltd		
Project No.	P1220101		

Pressuremeter Analysis - Undrained Strength

IN SITU SITE INVESTIGATION

Test Date	24/05/2022	**Test No.**	1
Borehole	BPT-BH-010	**Test Depth (m)**	6.70



Strength (loading)	Undrained Shear	2575 kPa
	Limit Pressure	17345 kPa

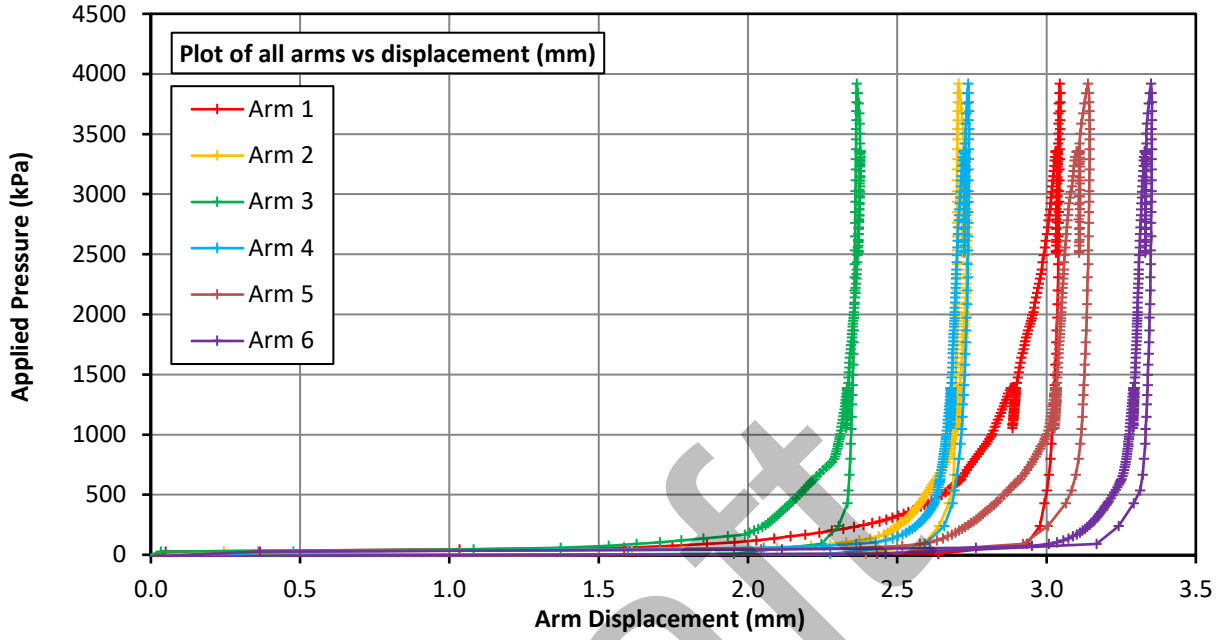
Draft

Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-010 T01 - 08**
Client	Irish Drilling Ltd		
Project No.	P1220101		

Pressuremeter Test Overview
High Pressure Dilatometer (HPD)

IN SITU SITE INVESTIGATION

Test Date	25/05/2022		**Test No.**	2
Borehole	BPT-BH-010		**Test Depth (m)**	12.30
Coordinates (m)	597240.2 (E)	689949.8 (N)	**Elevation (m)**	145.10



Material description from borehole log:

Very strong apparently massive grey 'marbled' dark grey brownish white and white slightly bioclastic fine and coarse grained LIMESTONE.

Test pocket conditions:

Total core recovery:	100 %	Test pocket depth range:	
Solid core recovery:	96 %	From: 11.60 m	to: 13.10 m
Rock quality designation:	90 %	Flush:	Water

Test comment:

The test pocket was reasonable, with arms lifting off at 2.3 to 3.3mm. The po was estimated to be at 1898kPa, with the following loading section being relatively long. Negative arm movement was noted on arms 2 & 3 and the test was terminated at 3918kPa, due to the risk of a membrane burst. The displacement-pressure response shown by the arms was slightly variable during loading. Analysis of a single unload reload loop provides a modulus value of 5192MPa.

Test details: **Instrument:** Kylie (HPD06)

Drilling method:	Rotary coring	Calibration coefficients:					
Casing depth:	11.50 m		mV	mV/mm		mV	mV/MPa
Water level:	11.00 m	Arm 1:	-2427.2	132.4	TPC A:	-2373.9	111.3
		Arm 2:	-2384.2	130.5	TPC B:	-2430.8	120.7
Test time:		Arm 3:	-2304.0	133.1	Membrane:		
Start (probe in):	12:30 hrs	Arm 4:	-2434.6	127.7	Stiffness	38	kPa
Finish (probe out):	13:30 hrs	Arm 5:	-2323.8	126.4	Slope	14.2	kPa/mm
		Arm 6:	-2288.9	131.0	Compliance	1.5	mm/Gpa

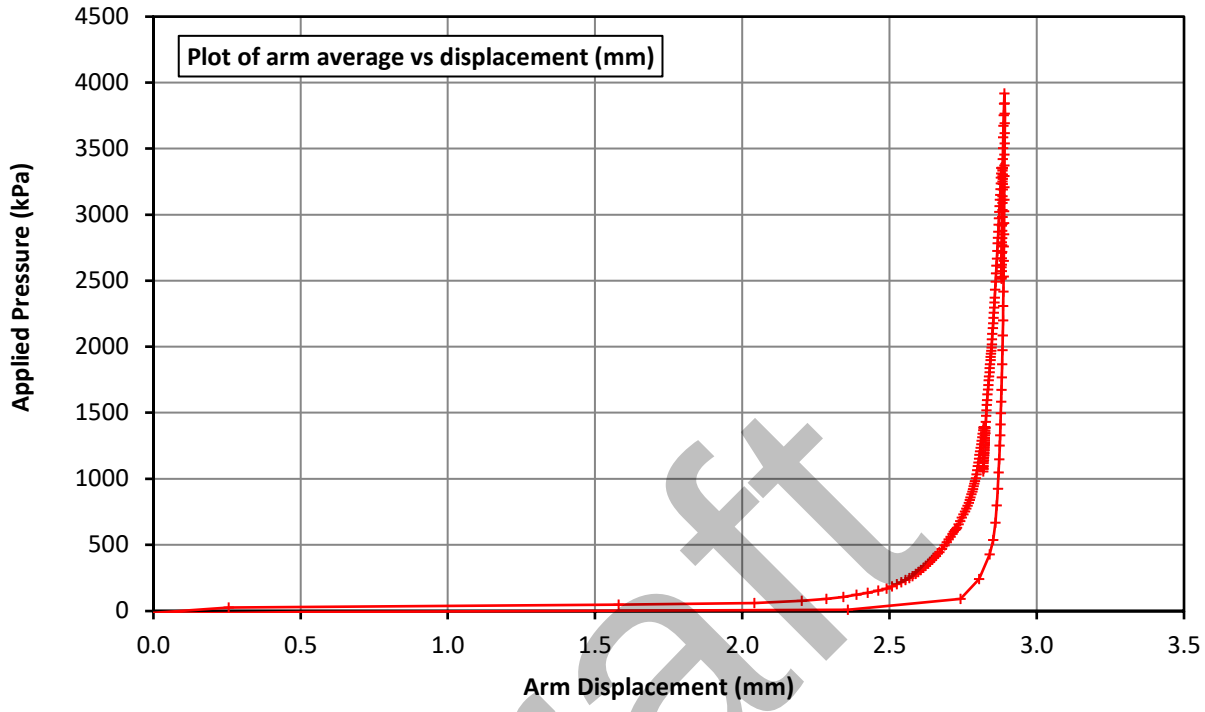
Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-010 T02 - 01**
Client	Irish Drilling Ltd		
Project No.	P1220101		

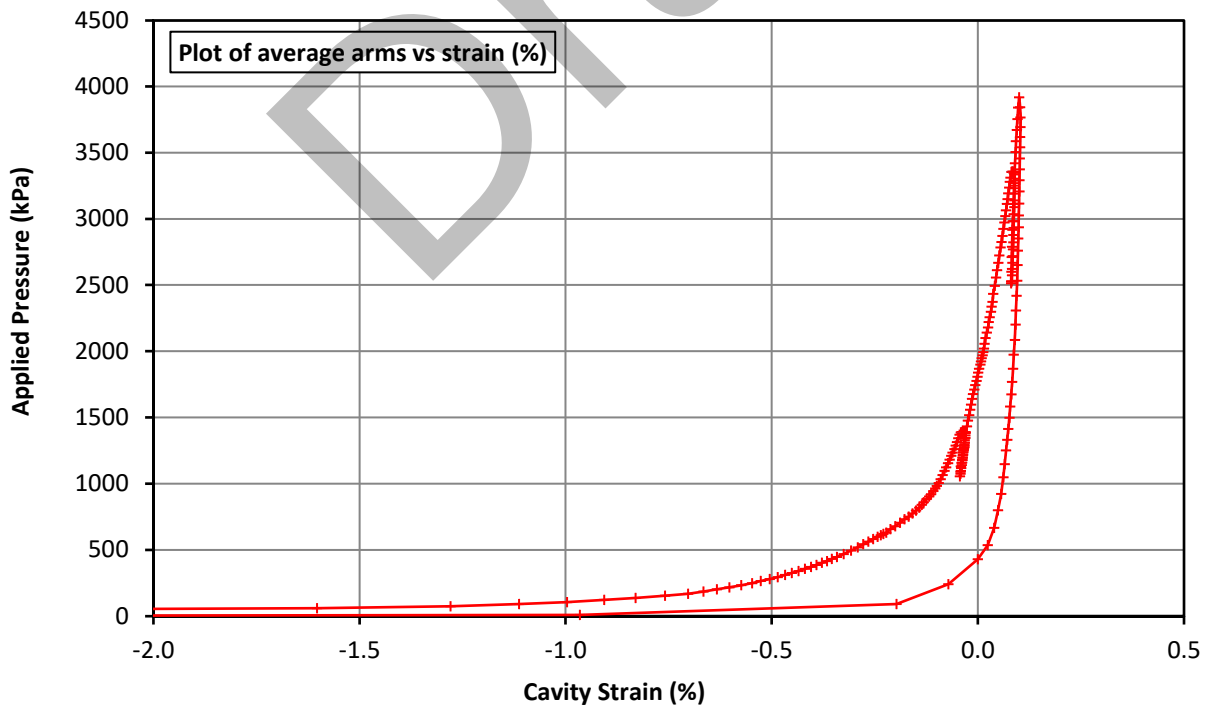
Draft

Pressuremeter Test - Average Arm Plots

IN SITU SITE INVESTIGATION

Test Date	25/05/2022	**Test No.**	2
Borehole	BPT-BH-010	**Test Depth (m)**	12.30





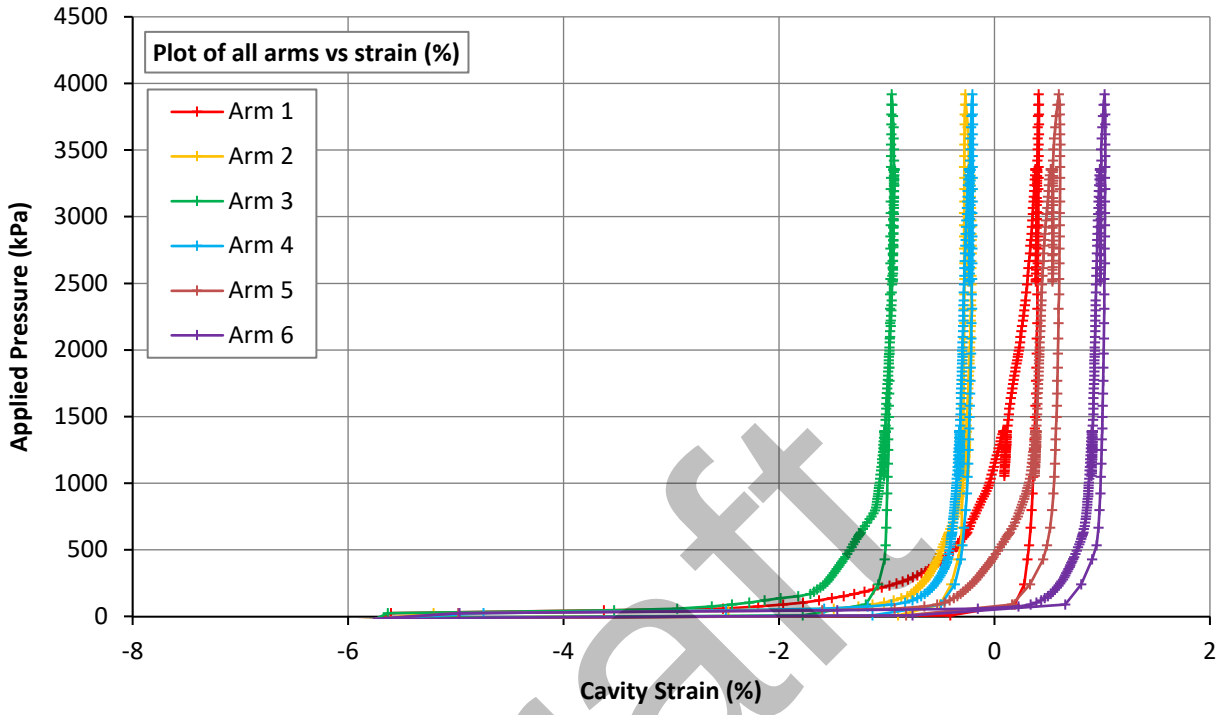
Draft

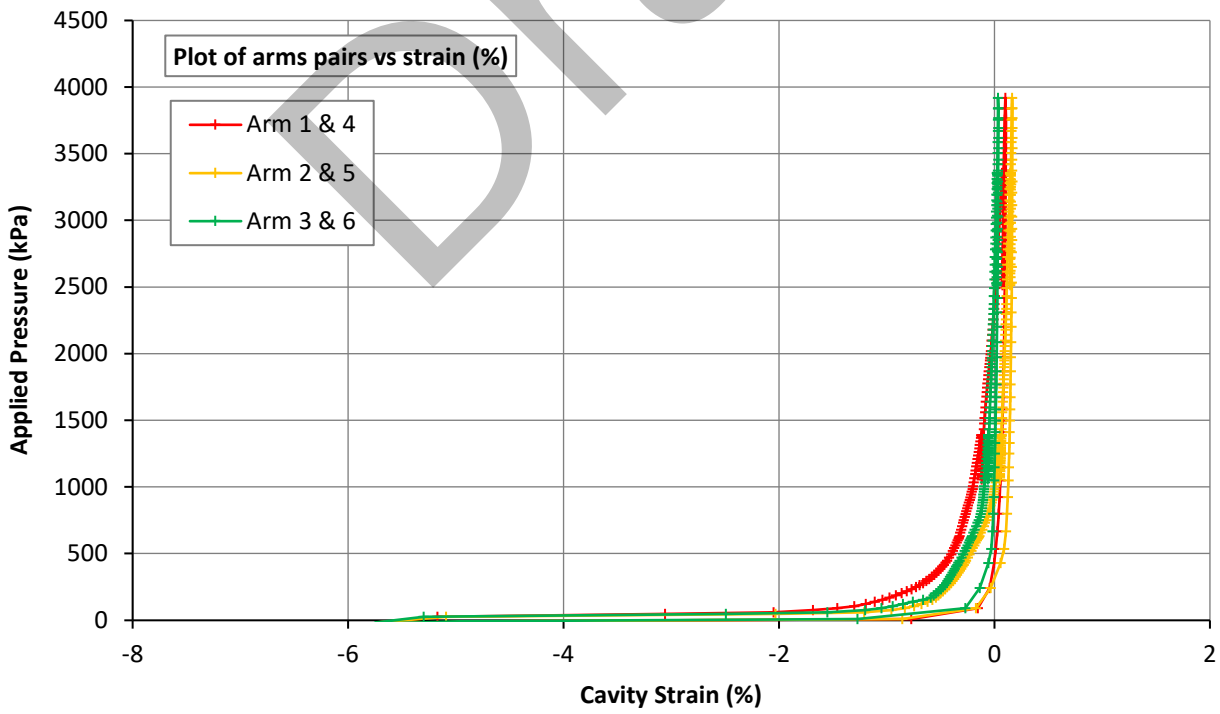
Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-010 T02 - 02**
Client	Irish Drilling Ltd		
Project No.	P1220101		

Pressuremeter Test - Arm Displacement vs Strain (%)

IN SITU SITE INVESTIGATION

Test Date	25/05/2022	**Test No.**	2
Borehole	BPT-BH-010	**Test Depth (m)**	12.30





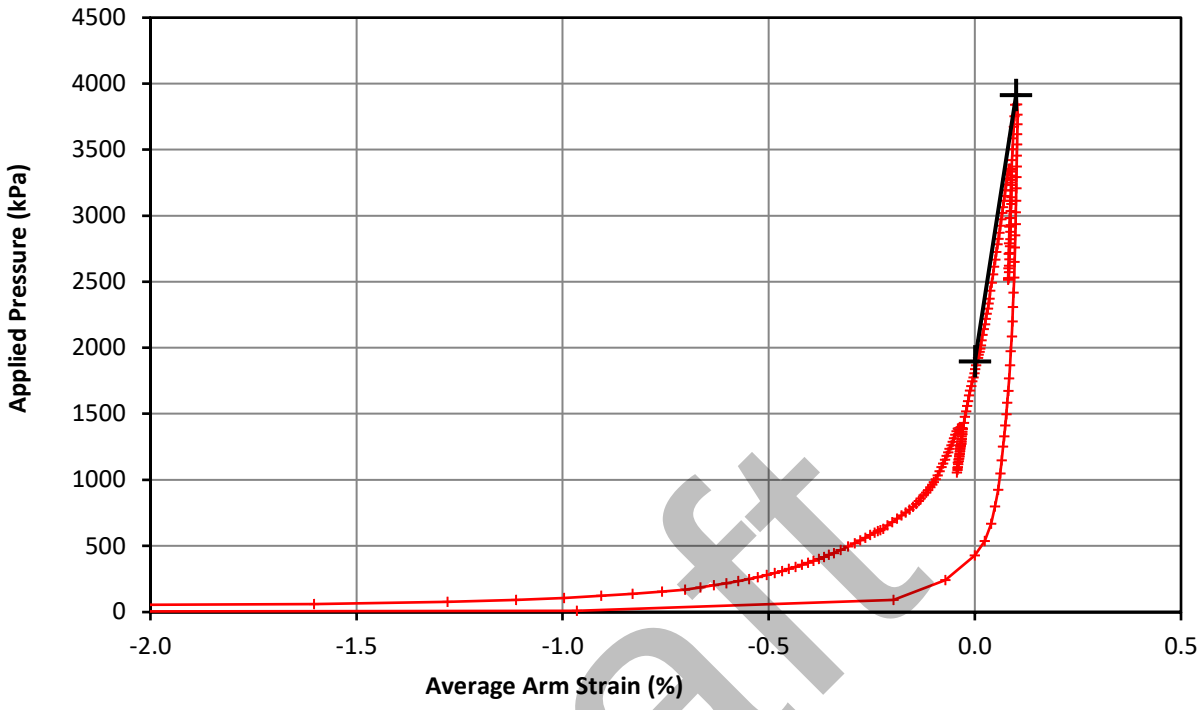
Draft

Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-010 T02 - 03**
Client	Irish Drilling Ltd		
Project No.	P1220101		

Pressuremeter Analysis - Initial Modulus & In Situ Horizontal Stress

IN SITU SITE INVESTIGATION

Test Date	25/05/2022	**Test No.**	2
Borehole	BPT-BH-010	**Test Depth (m)**	12.30



Initial Modulus	Shear Modulus	1009.5 MPa

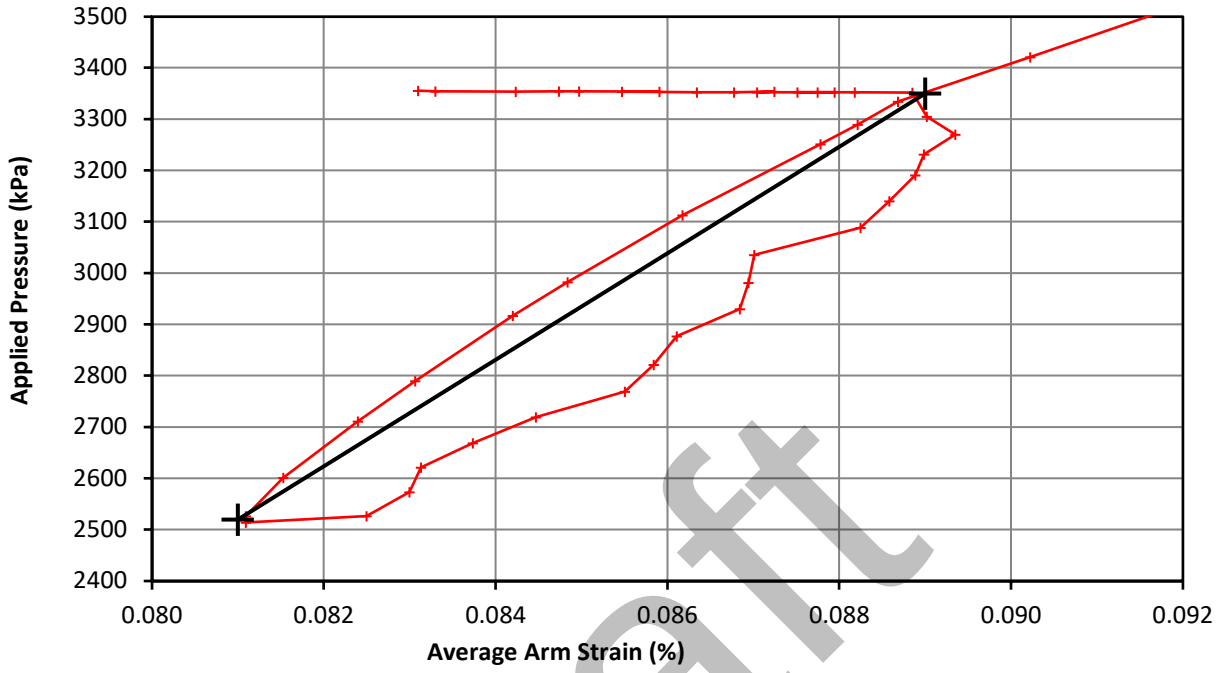
Draft

Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-010 T02 - 04**
Client	Irish Drilling Ltd		
Project No.	P1220101		

Pressuremeter Analysis - Unload Reload Loop

IN SITU SITE INVESTIGATION

Test Date	25/05/2022	**Test No.**	2
Borehole	BPT-BH-010	**Test Depth (m)**	12.30



Loop 1	Shear Modulus	5192.1 MPa
	Cavity Strain Range	0.008 %

Draft

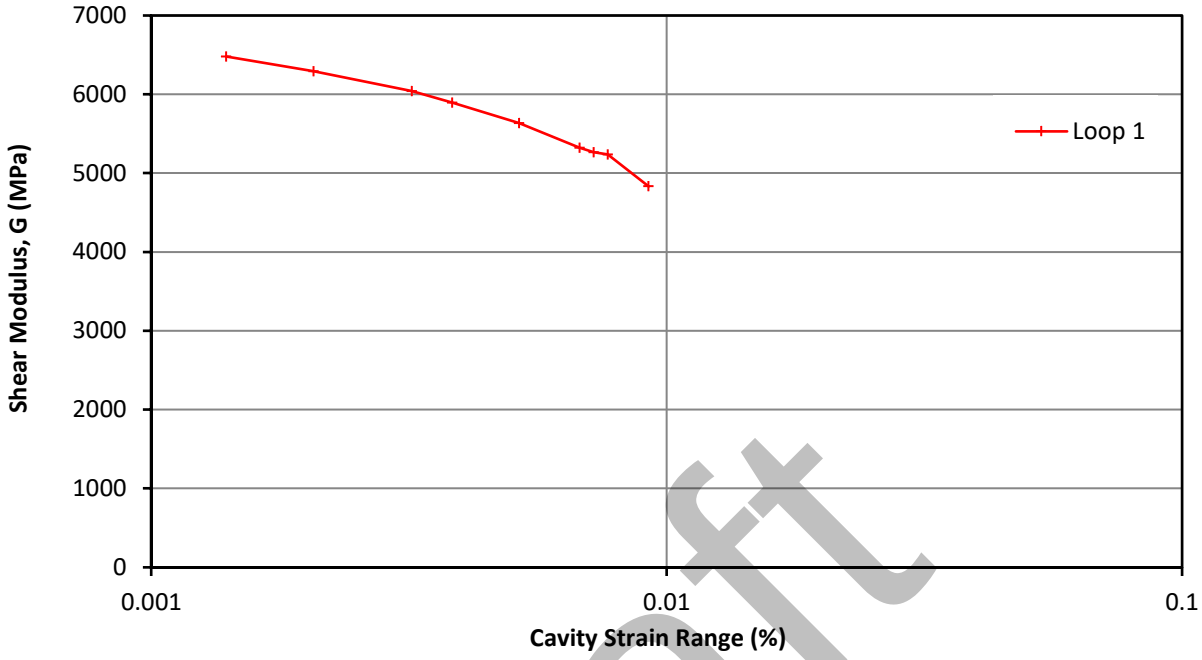
Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-010 T02 - 05**
Client	Irish Drilling Ltd		
Project No.	P1220101		

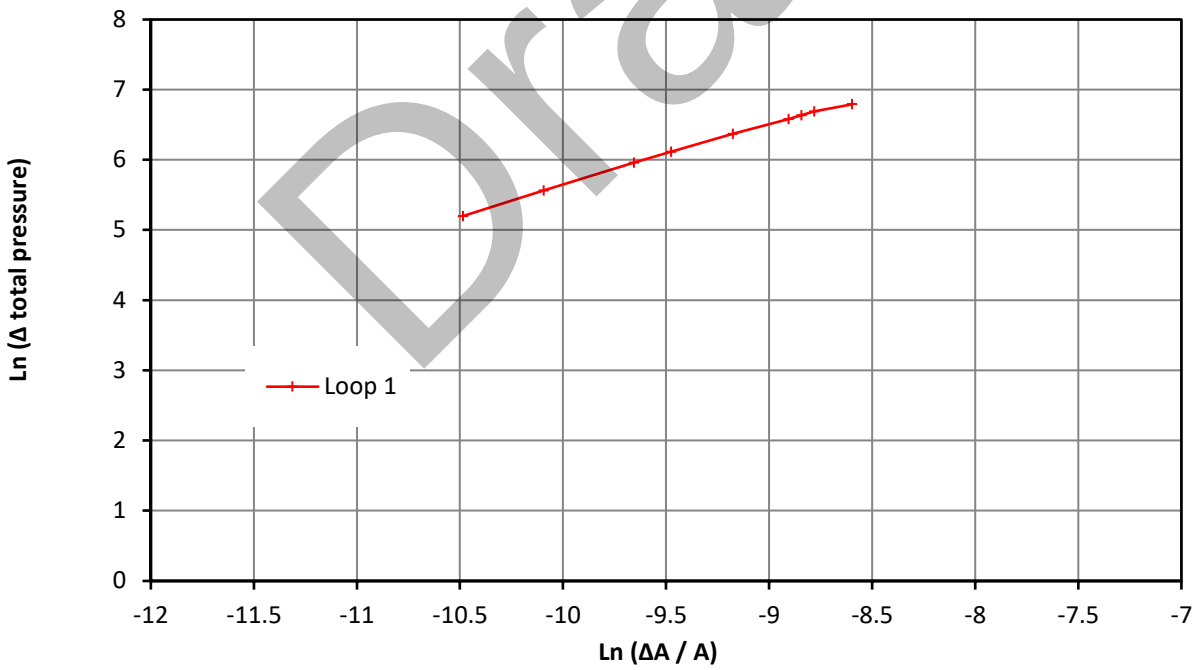
Pressuremeter Analysis

Small Strain Stiffness and Bolton & Whittle (1999)

IN SITU SITE INVESTIGATION

Test Date	25/05/2022	**Test No.**	2
Borehole	BPT-BH-010	**Test Depth (m)**	12.30





Draft

Loop 1	
Gradient(β)	Intercept
0.854	1445.387 (MPa)

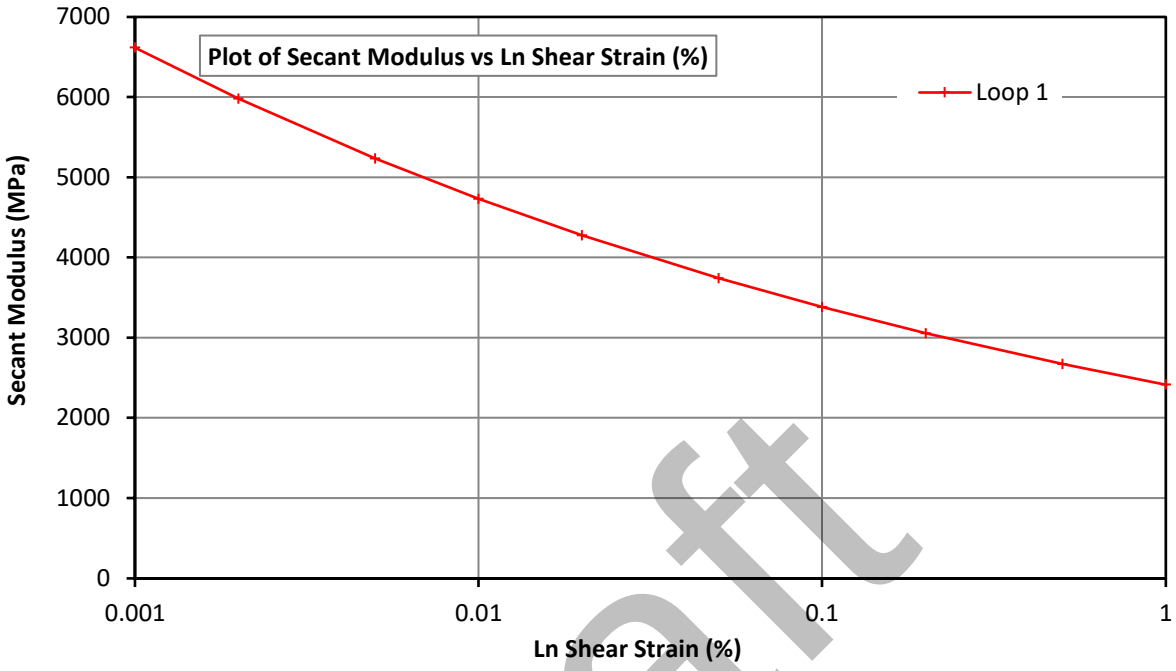
Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-010 T02 - 06**
Client	Irish Drilling Ltd		
Project No.	P1220101		

Pressuremeter Analysis

Secant Modulus - Shear Strain (%)

IN SITU SITE INVESTIGATION

Test Date	25/05/2022	**Test No.**	2
Borehole	BPT-BH-010	**Test Depth (m)**	12.30



Draft

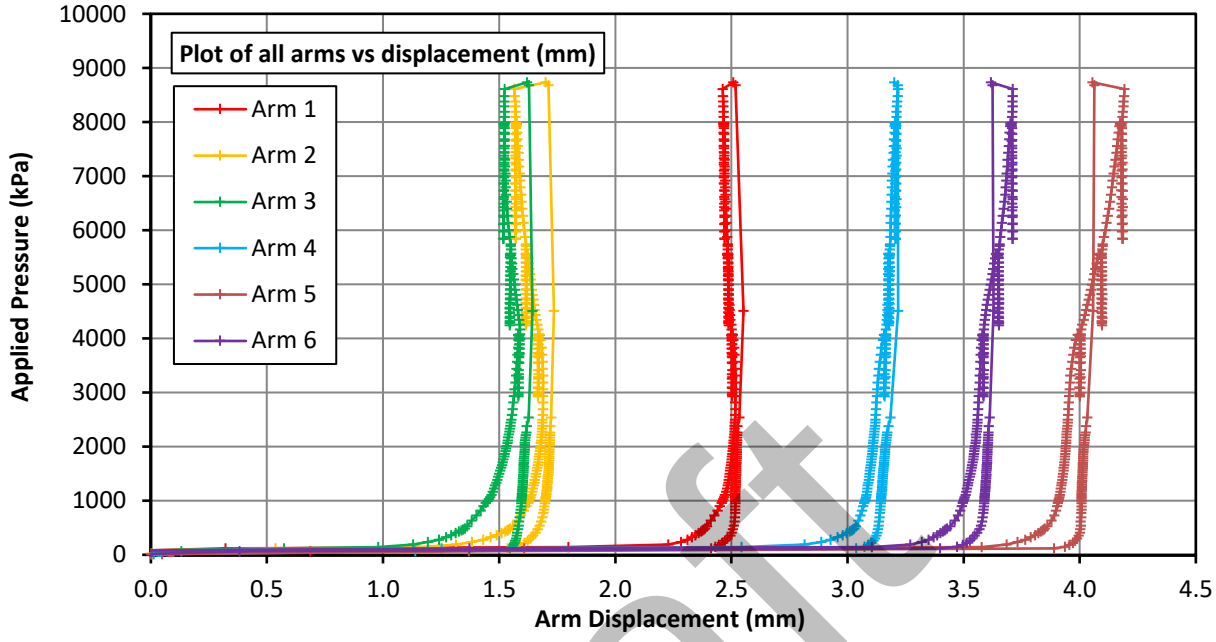
Shear Strain	Loop 1
0.001%	**6617**
0.002%	5981
0.005%	5233
0.010%	**4730**
0.020%	4275
0.050%	3740
0.100%	**3381**
0.200%	3056
0.500%	2673
1.000%	**2416**

Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-010 T02 - 07**
Client	Irish Drilling Ltd		
Project No.	P1220101		

Pressuremeter Test Overview
High Pressure Dilatometer (HPD)

IN SITU SITE INVESTIGATION

Test Date	26/05/2022		**Test No.**	3
Borehole	BPT-BH-010		**Test Depth (m)**	17.00
Coordinates (m)	597240.2 (E)	689949.8 (N)	**Elevation (m)**	145.10



Material description from borehole log:

Very strong apparently massive grey 'marbled' dark grey brownish white and white slightly bioclastic fine and coarse grained LIMESTONE.

Test pocket conditions:

Total core recovery:	100 %	Test pocket depth range:	
Solid core recovery:	98 %	From: 16.10 m	to: 17.60 m
Rock quality designation:	98 %	Flush:	Water

Test comment:

The test pocket was slightly oversize, with arms lifting off at 1.6 to 4.0mm. The po was estimated to be at 3186kPa, with the following loading section being relatively long. Some possible fracture movement is noted on arm 3 at 4100kPa. No material yield was observed and the test taken to a maximum pressure of 8736kPa where the test was terminated due to sudden probe movement in the test pocket. The displacement-pressure response shown by the arms was slightly variable. Analysis of a single unload reload loop provides a modulus value of 6465MPa. Loops 2 & 3 were disturbed by small scale probe movement and could not be analysed.

Test details: **Instrument:** Kylie (HPD06)

Drilling method:	Rotary coring	Calibration coefficients:					
Casing depth:	16.10 m		mV	mV/mm		mV	mV/MPa
Water level:	0.00 m	Arm 1:	-2423.9	132.4	TPC A:	-2374.5	111.3
		Arm 2:	-2384.9	130.5	TPC B:	-2430.9	120.7
Test time:		Arm 3:	-2301.6	133.1	Membrane:		
Start (probe in):	09:00 hrs	Arm 4:	-2433.2	127.7	Stiffness	38	kPa
Finish (probe out):	11:00 hrs	Arm 5:	-2326.0	126.4	Slope	14.2	kPa/mm
		Arm 6:	-2283.5	131.0	Compliance	1.5	mm/Gpa

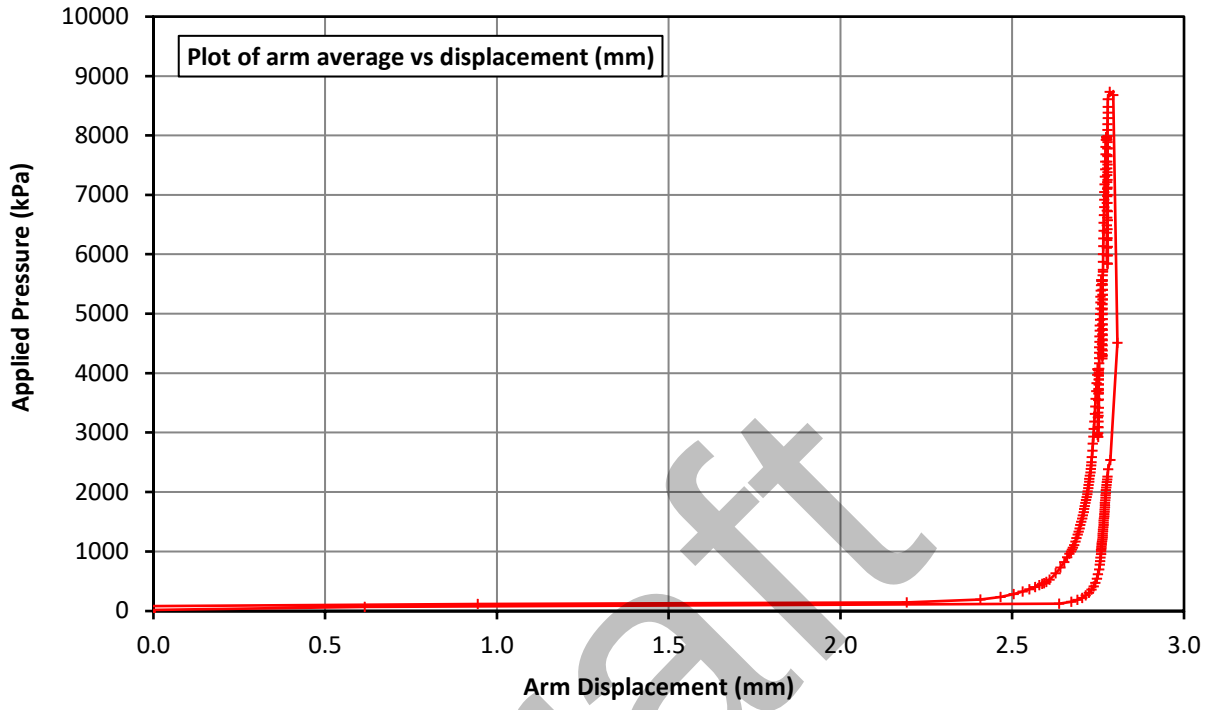
Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-010 T03 - 01**
Client	Irish Drilling Ltd		
Project No.	P1220101		

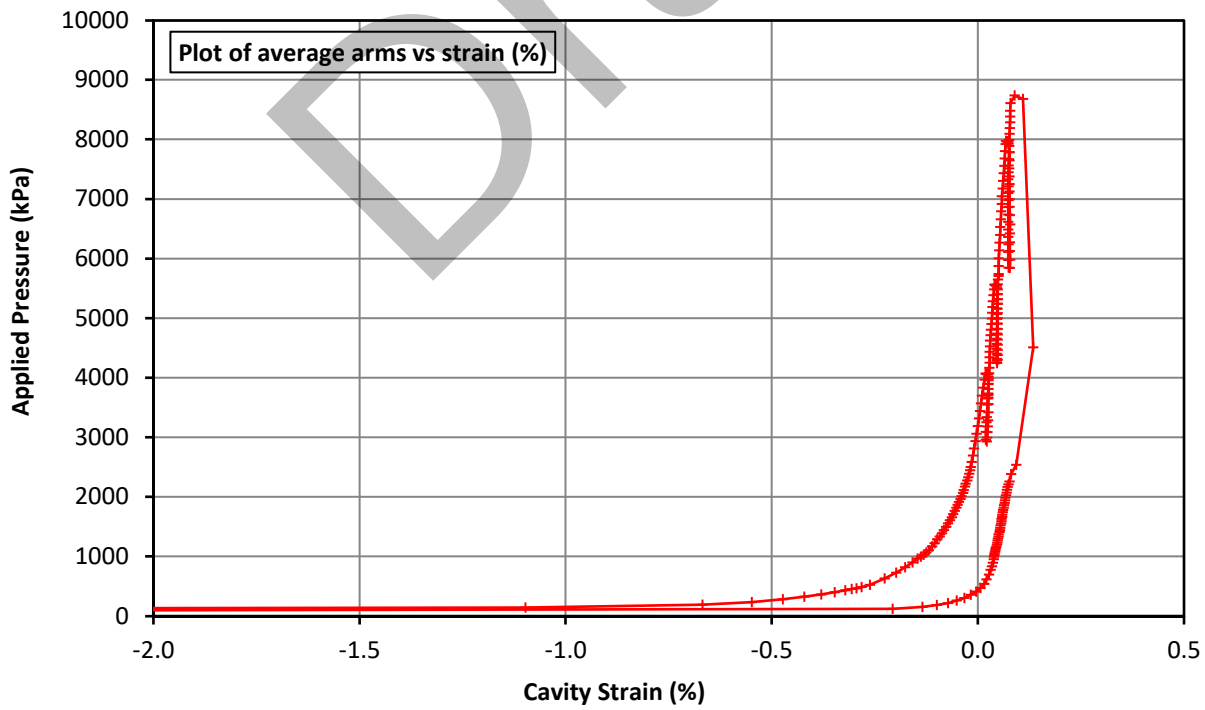
Draft

Pressuremeter Test - Average Arm Plots

IN SITU SITE INVESTIGATION

Test Date	26/05/2022	**Test No.**	3
Borehole	BPT-BH-010	**Test Depth (m)**	17.00





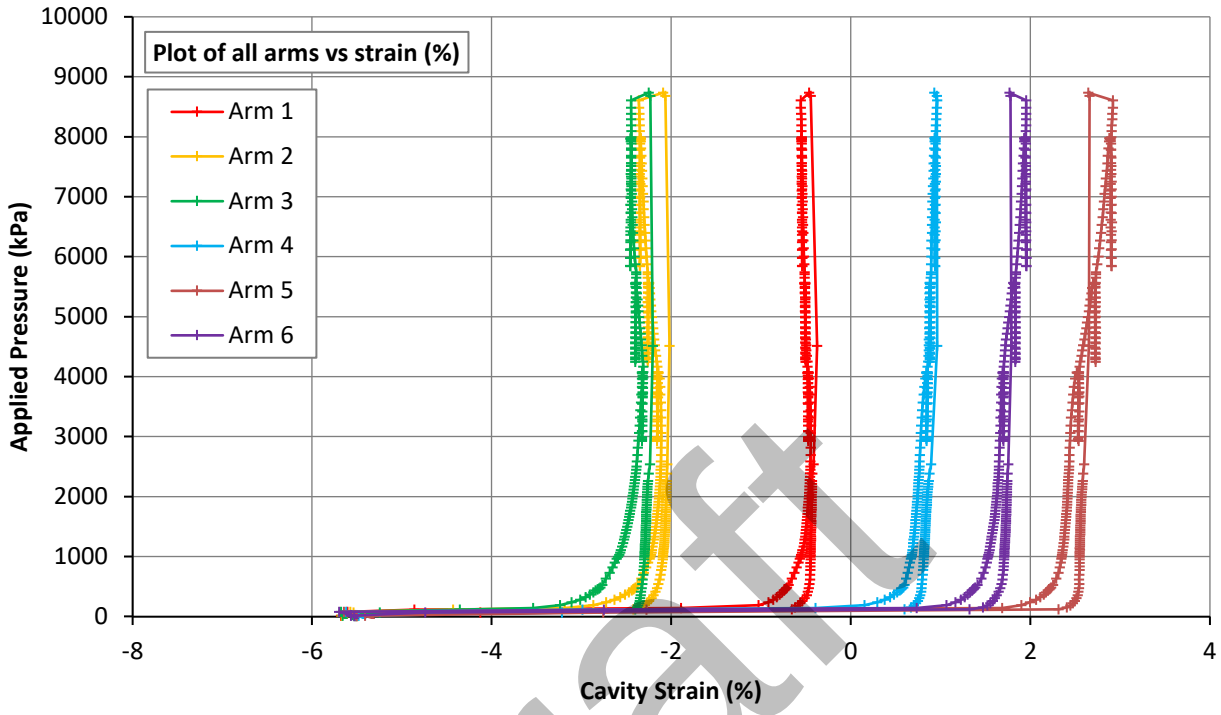
Draft

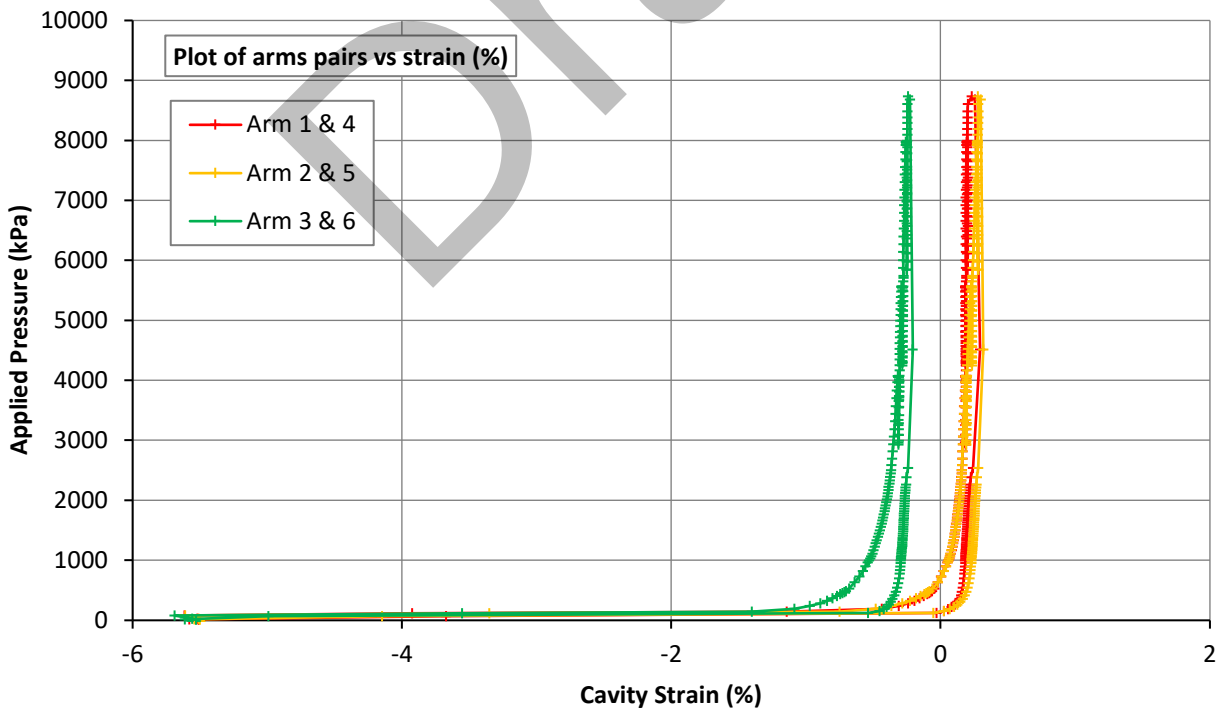
Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-010 T03 - 02**
Client	Irish Drilling Ltd		
Project No.	P1220101		

Pressuremeter Test - Arm Displacement vs Strain (%)

IN SITU SITE INVESTIGATION

Test Date	26/05/2022	**Test No.**	3
Borehole	BPT-BH-010	**Test Depth (m)**	17.00





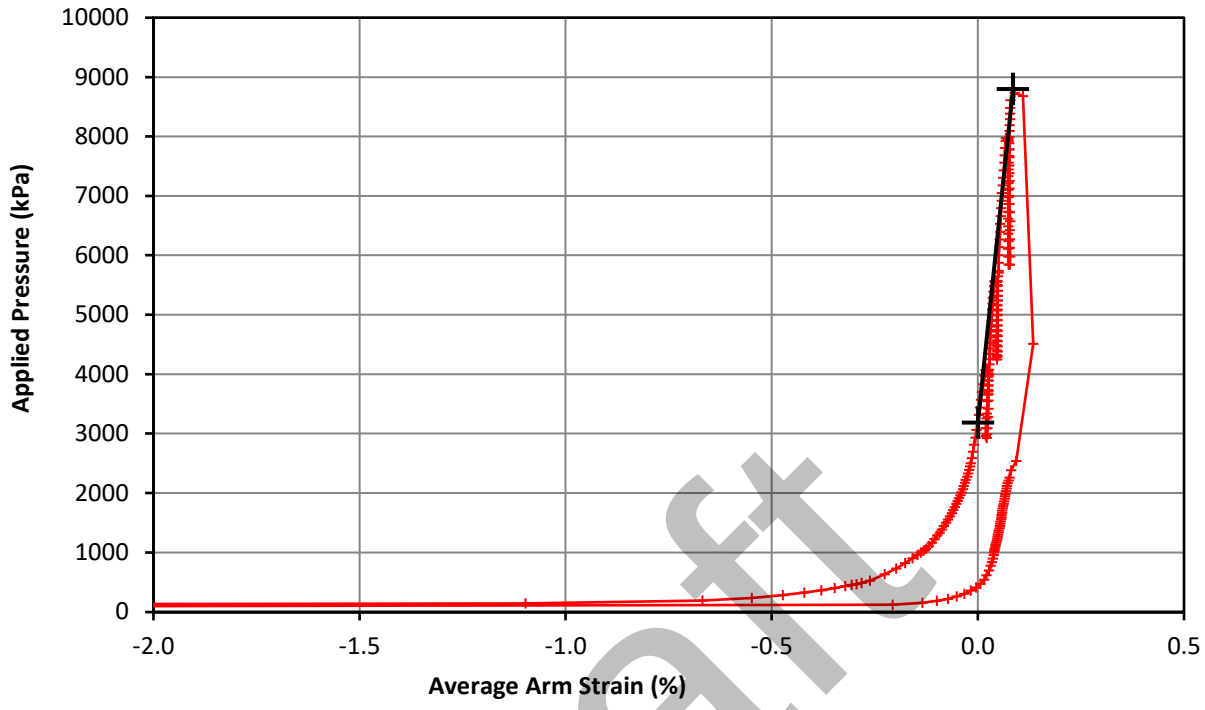
Draft

Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-010 T03 - 03**
Client	Irish Drilling Ltd		
Project No.	P1220101		

Pressuremeter Analysis - Initial Modulus & In Situ Horizontal Stress

IN SITU SITE INVESTIGATION

Test Date	26/05/2022	**Test No.**	3
Borehole	BPT-BH-010	**Test Depth (m)**	17.00



Initial Modulus	Shear Modulus	3305.2 MPa

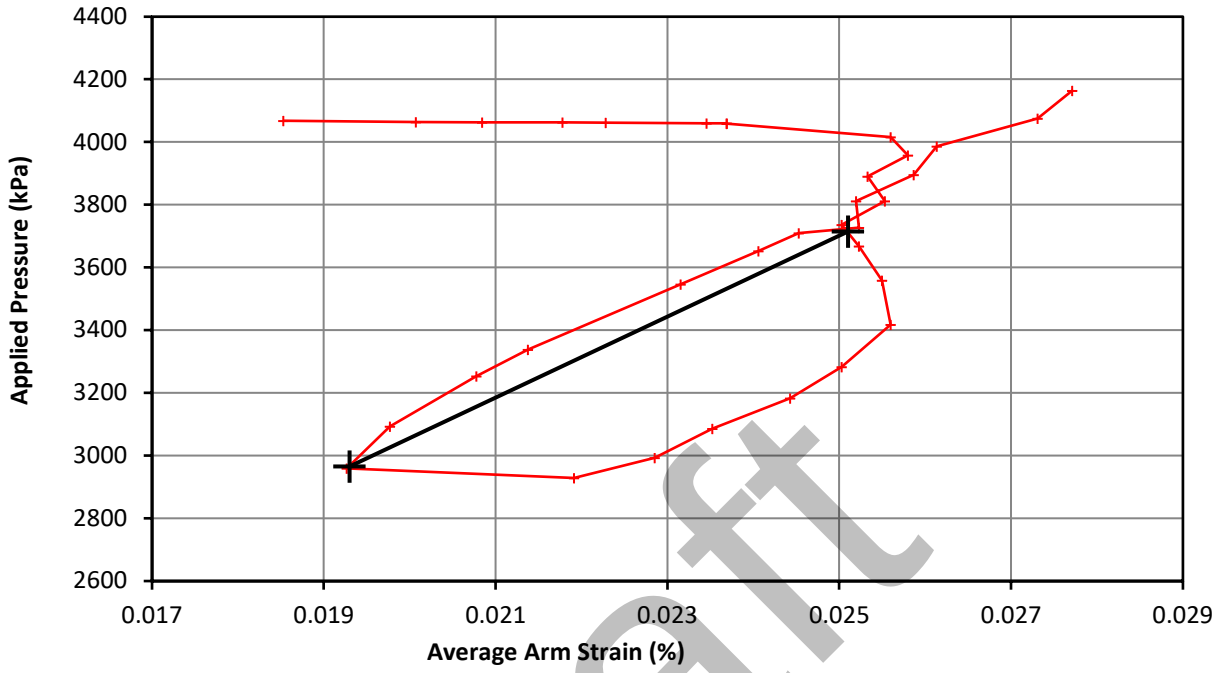
Draft

Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-010 T03 - 04**
Client	Irish Drilling Ltd		
Project No.	P1220101		

Pressuremeter Analysis - Unload Reload Loop

IN SITU SITE INVESTIGATION

Test Date	26/05/2022	**Test No.**	3
Borehole	BPT-BH-010	**Test Depth (m)**	17.00



Loop 1	Shear Modulus	6465.4	MPa
	Cavity Strain Range	0.006	%

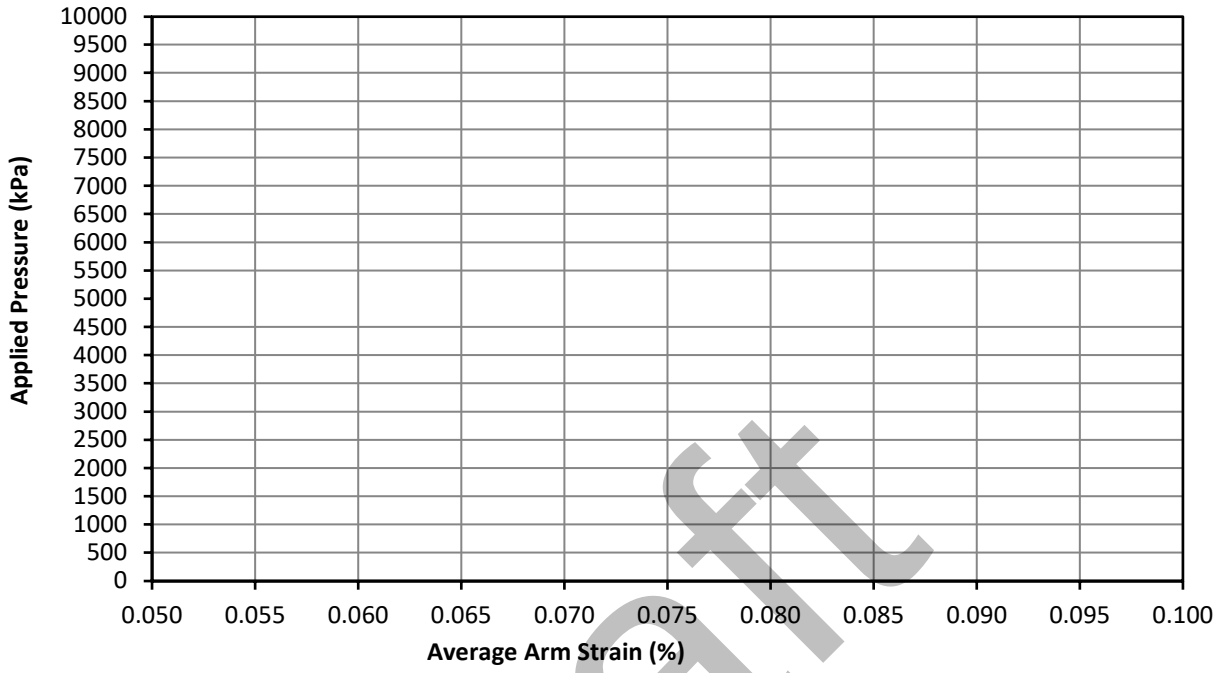
Draft

Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-010 T03 - 05**
Client	Irish Drilling Ltd		
Project No.	P1220101		

Pressuremeter Analysis - Unload Reload Loop

IN SITU SITE INVESTIGATION

Test Date	26/05/2022	**Test No.**	3
Borehole	BPT-BH-010	**Test Depth (m)**	17.00



Loop 3	Shear Modulus	0.0 MPa
	Cavity Strain Range	0.000 %

Draft

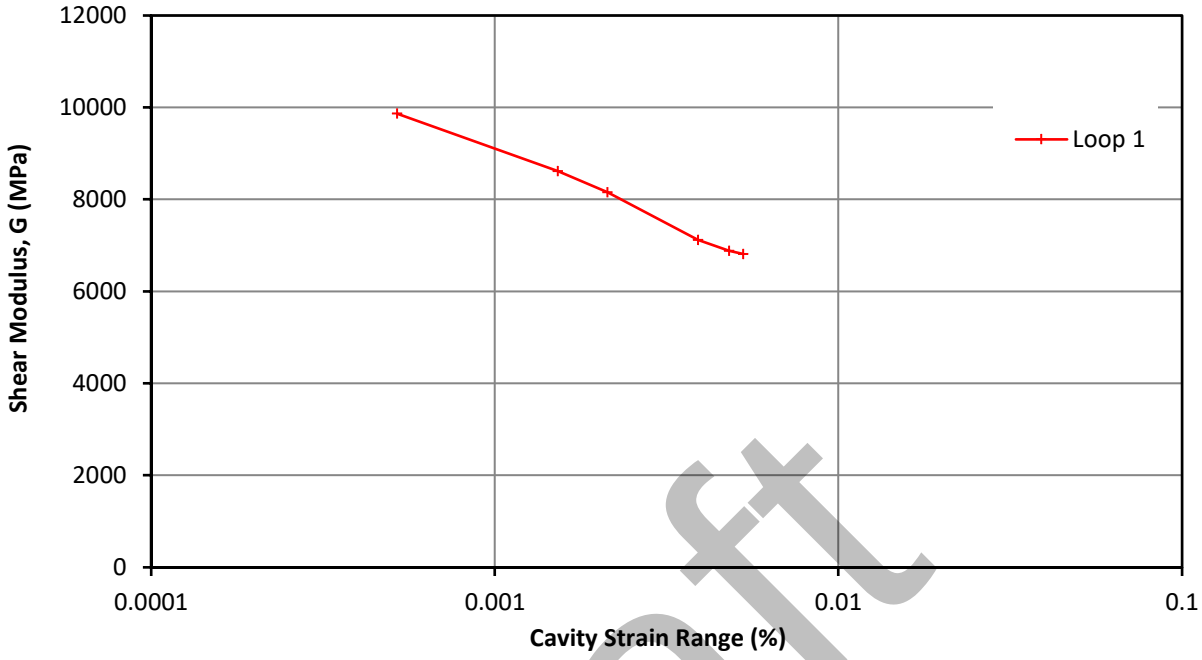
Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-010 T03 -**
Client	Irish Drilling Ltd		
Project No.	P1220101		

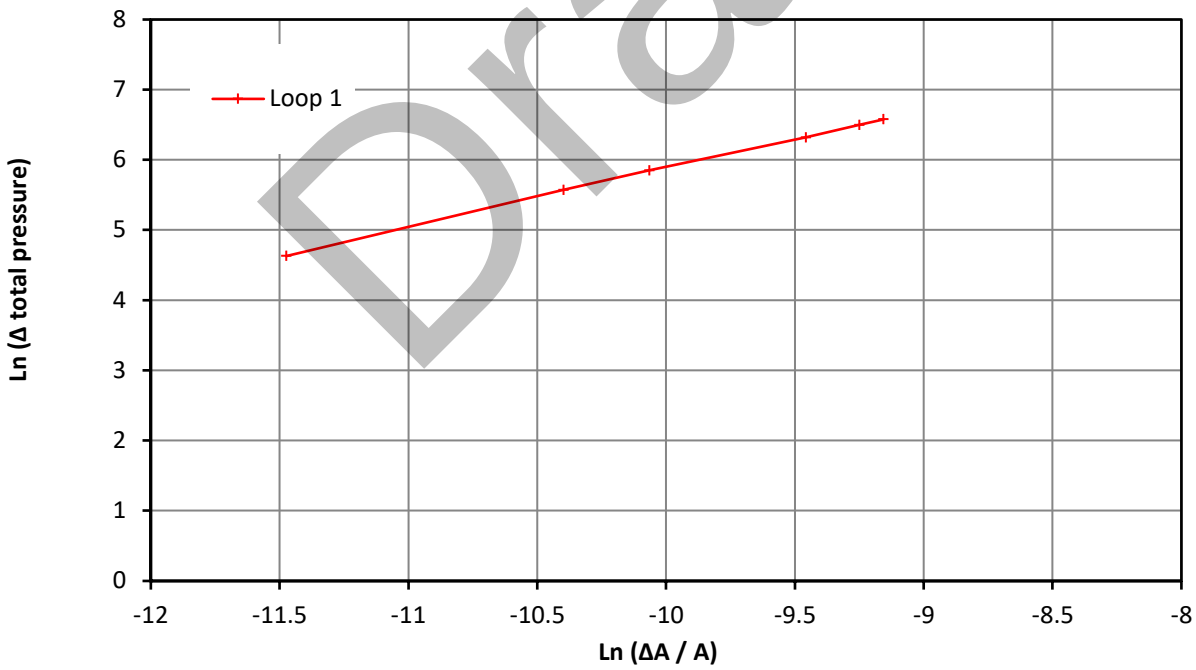
Pressuremeter Analysis

Small Strain Stiffness and Bolton & Whittle (1999)

IN SITU SITE INVESTIGATION

Test Date	26/05/2022	**Test No.**	3
Borehole	BPT-BH-010	**Test Depth (m)**	17.00





Draft

Loop 1	
Gradient(β)	Intercept
0.834	1496.013 (MPa)

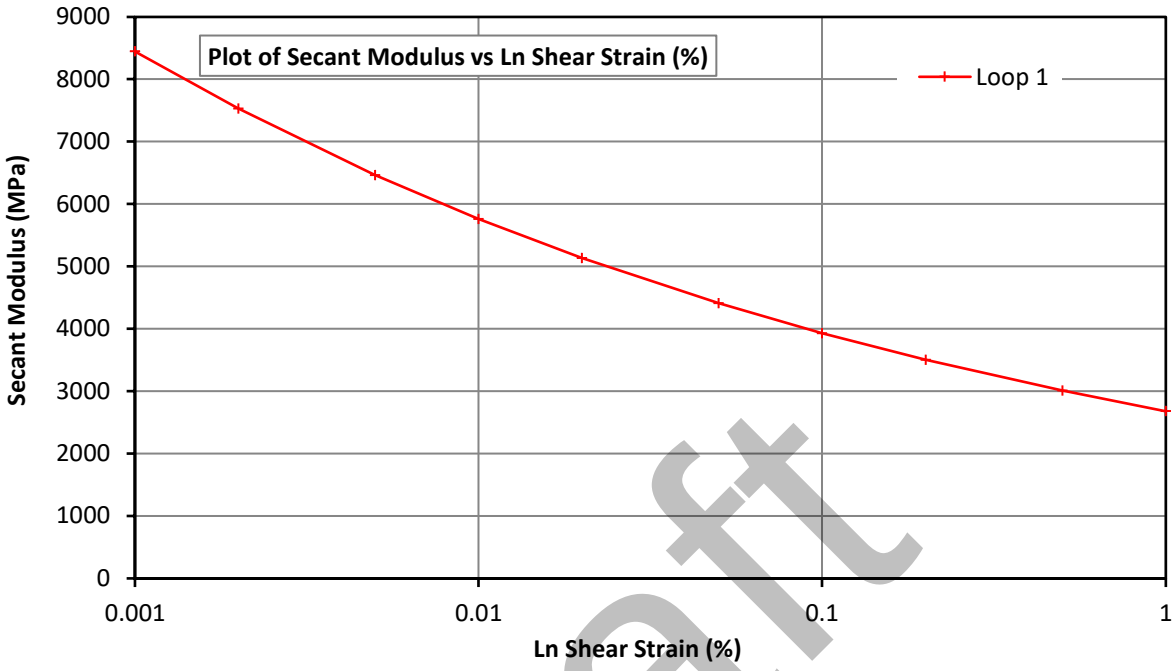
Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-010 T03 - 06**
Client	Irish Drilling Ltd		
Project No.	P1220101		

Pressuremeter Analysis

Secant Modulus - Shear Strain (%)

IN SITU SITE INVESTIGATION

Test Date	26/05/2022	**Test No.**	3
Borehole	BPT-BH-010	**Test Depth (m)**	17.00



Shear Strain	Loop 1
0.001%	**8446**
0.002%	7528
0.005%	6465
0.010%	**5762**
0.020%	5135
0.050%	4410
0.100%	**3930**
0.200%	3503
0.500%	3008
1.000%	**2681**

Draft

Project	Lot 2, Eastern & Midlands WSP	**Figure No.**	**BPT-BH-010 T03 - 07**
Client	Irish Drilling Ltd		
Project No.	P1220101		

APPENDIX B

Calibrations

Description
Kylie (HPD06)

Draft

HPD-95 ISSI

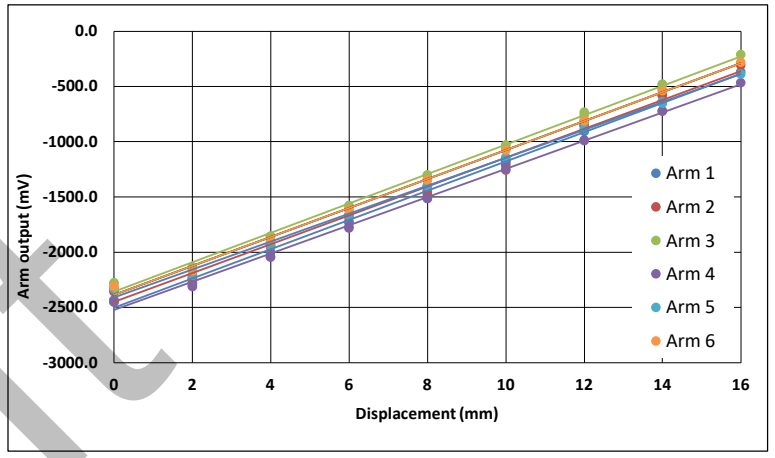
HPD06 - Kylie

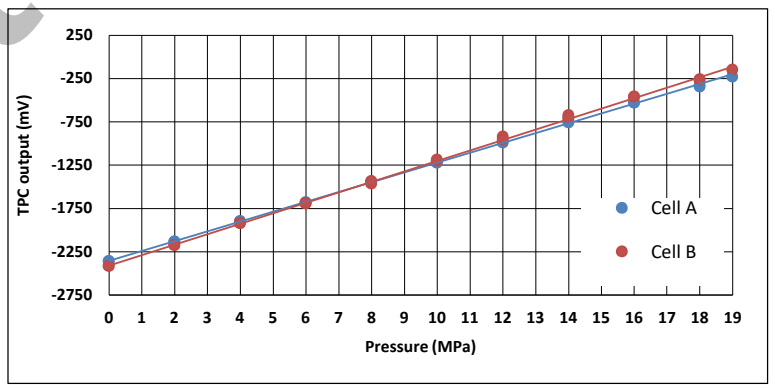
IN SITU
SITE INVESTIGATION

Arms	11/03/2022					
Displacement	Arm 1	Arm 2	Arm 3	Arm 4	Arm 5	Arm 6
mm	mV	mV	mV	mV	mV	mV
0	-2432.0	-2357.3	-2276.9	-2451.1	-2333.0	-2310.8
2	-2276.9	-2232.2	-2136.4	-2311.6	-2207.4	-2167.9
4	-2000.1	-1946.0	-1853.9	-2040.0	-1934.5	-1893.1
6	-1728.4	-1669.0	-1577.5	-1770.5	-1665.0	-1618.5
8	-1449.7	-1403.2	-1299.9	-1513.5	-1400.8	-1347.2
10	-1173.5	-1257.9	-1031.1	-1214.1	-1143.3	-1076.9
12	-904.7	-853.5	-759.6	-984.4	-887.3	-815.2
14	-642.3	-582.7	-481.0	-722.6	-650.4	-537.7
16	-367.1	-307.6	-212.2	-465.5	-388.5	-279.8
14	-636.5	-577.3	-480.4	-722.1	-636.7	-530.1
12	-906.8	-852.8	-732.2	-989.4	-825.2	-802.4
10	-1177.1	-1195.7	-1030.6	-1251.5	-1144.3	-1070.0
8	-1450.0	-1477.4	-1305.9	-1516.0	-1402.9	-1343.0
6	-1724.5	-1681.8	-1580.6	-1780.2	-1666.1	-1615.2
4	-2002.3	-1942.0	-1859.0	-2045.6	-1939.3	-1890.5
2	-2281.1	-2235.8	-2138.9	-2300.9	-2210.5	-2167.7
0	-2432.9	-2344.8	-2280.1	-2452.1	-2334.7	-2311.1
Slope (mV/mm)	132.4	130.5	133.1	127.7	126.4	131.0
Zero (mV)	-2502.0	-2448.3	-2357.4	-2522.1	-2408.5	-2384.8

Pressure Cells	11/03/2022			
Pressure	Cell A		Cell B	
MPa	V	mV	V	mV
0	-2.35860	-2358.60	-2.41450	-2414.50
2	-2.13530	-2135.30	-2.17600	-2176.00
4	-1.89650	-1896.50	-1.91480	-1914.80
6	-1.68750	-1687.50	-1.69450	-1694.50
8	-1.44530	-1445.30	-1.46470	-1464.70
10	-1.22590	-1225.90	-1.20270	-1202.70
12	-0.97450	-974.50	-0.92114	-921.14
14	-0.71650	-716.50	-0.67460	-674.60
16	-0.52950	-529.50	-0.46230	-462.30
18	-0.32770	-327.70	-0.26060	-260.60
19	-0.22850	-228.50	-0.14950	-149.50
18	-0.34350	-343.50	-0.26670	-266.70
16	-0.53120	-531.20	-0.46060	-460.60
14	-0.76000	-760.00	-0.70410	-704.10
12	-0.99320	-993.20	-0.95380	-953.80
10	-1.21340	-1213.40	-1.18820	-1188.20
8	-1.43760	-1437.60	-1.43560	-1435.60
6	-1.67870	-1678.70	-1.69010	-1690.10
4	-1.90020	-1900.20	-1.92345	-1923.45
2	-2.13450	-2134.50	-2.17450	-2174.50
0	-2.35870	-2358.70	-2.41490	-2414.90
Slope (mV/MPa)		113.4		120.7
Zero (mV)		-2354.3		-2408.4

System Complaince	1.5 mm/Gpa





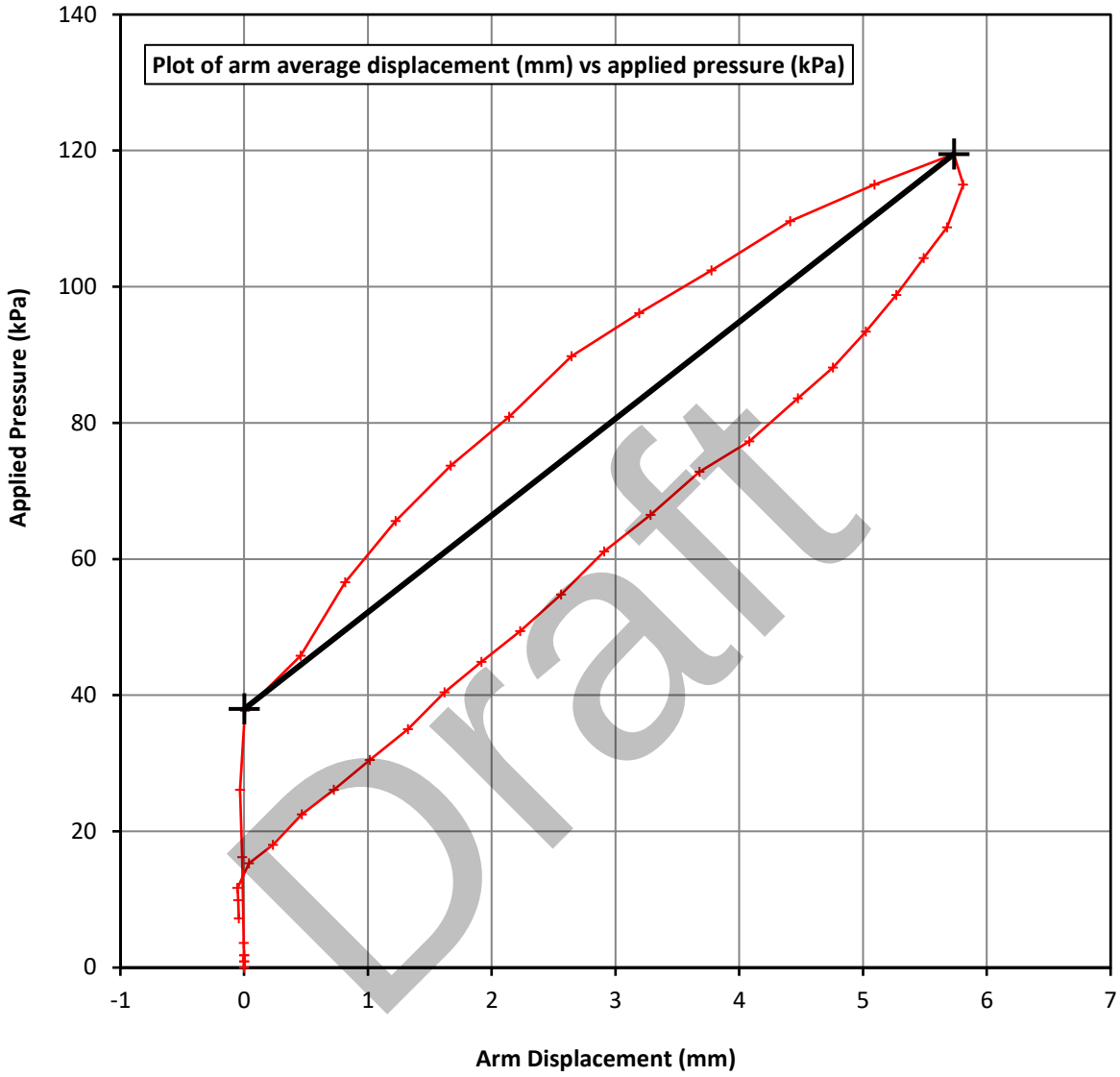
Calibrated by:	D Cooper
Calibrated at:	Rotherham
Checked by:	J Holt
Date:	11/03/2022

Draft

Membrane Stiffness Calibration

IN SITU SITE INVESTIGATION

Test Date	25/05/2022	Instrument	Kylie (HPD06)



Draft

Membrane Stiffness	Zero:	38.0 kPa
	Slope:	14.2 kPa/mm

Project	Lot 2, Eastern & Midlands WSP	Figure No.	Mem Cal 01
Client	Irish Drilling Ltd		
Project No.	P1220101		

Appendix 5G
Geophysics Report

Water Supply Project – Contract 2
Break Pressure Tank
Eastern and Midlands Region

Geophysical Survey

Report Status: Final

MGX Project Number: 6653

MGX File Ref: 6653f-005.doc

21st December 2022

Confidential Report To:

Irish Drilling Ltd.
Old Galway Road
Loughrea
Co. Galway

Mott Macdonald
South Block
Rockfield
Dundrum
Dublin 16

Report submitted by:
Minerex Geophysics Limited

Unit F4, Maynooth Business Campus
Maynooth, Co. Kildare, W23X7Y5
Ireland
Tel.: 01-6510030
Email: info@mgx.ie

Issued by:

Author: John Connaughton (Geophysicist)

Reviewer: Hartmut Krahn (Senior Geophysicist)

Minerex
Geophysics Limited

Subsurface Geophysical Investigations

EXECUTIVE SUMMARY

1. Minerex Geophysics Ltd. (MGX) carried out a geophysical survey consisting of 2D-Resistivity, seismic refraction (p-wave) and Microgravity at the Break Pressure Tank site for the Water Supply Project – Contract 2 in Knocknacree, Co. Tipperary.
2. The main objectives of the survey were to determine the depth to rock and the overburden thickness, detect possible karstified rock and to delineate karstified rock. The survey was proposed after boreholes encountered significant weathering and variations within the rock throughout the site.
3. The 2D-Resistivity and seismic refraction were done in June 2022 and the microgravity survey in October 2022.
4. The map of microgravity values (Map 2) matches very well with the interpretation of the first survey (Map 3).
5. The first survey showed a thick shallow weathered rock (Layer 5d) layer throughout most of the site. This weathered limestone may contain small cavities or voids within it.
6. There is an area with thick overburden material (Layer 4b, sandy gravelly clay and silt) noted in the south of the larger microgravity grid.
7. There are two linear areas of shallow infilled limestone (Layer 5b) along S-N and SW-NE striking channels. They connect to the area of Layer 4b in the SW.
8. Within the deep good limestone layer, areas in the west of the site are interpreted as good infilled limestone (Layer 7c). Some of this area is overlain by the shallower infilled limestone (Layer 5b) while some is overlain by very weathered limestone (Layer 5d).
9. Boreholes carried out on the site are shown on the maps and figures and tie in well with the geophysical survey results. Several boreholes encountered the infilled limestone or deep clay and silt.
10. Notable in the interpretation map are two linear features (Layer 5b) striking in S-N and SW-NE direction through both microgravity grids. These are karst solution features in the limestone that are infilled with sandy gravelly clay and silt material.
11. Both linear features join in the SW where an area of thicker overburden is interpreted (Layer 4b).
12. The deep good infilled limestone (Layer 7e) is interpreted to have less infilling than the layers above it but there can be karst conduits here that would allow overburden material to move downward and lead to subsidence.
13. The poor very weathered limestone (Layer 5d) is not interpreted as infilled limestone but rather as a weathered rock layer with epikarst layer and small voids.

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1.2 Objectives 1
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List of Tables, Maps and Figures:

Title	Pages	Document Reference
Table 1: Geophysical Survey Locations and Acquisition Parameters	In text	In text
Table 2: Summary of Interpretation	In text	In text
Map 1: Geophysical Survey Location Map	1 x A3	6653f_Drawings.dwg
Map 2: Microgravity Survey Contour Map	1 x A3	6653f_Drawings.dwg
Map 3: Geophysical Survey Microgravity and Interpretation Map	1 x A3	6653f_Drawings.dwg
Map 4: Geophysical Survey Interpretation Map	1 x A3	6653f_Drawings.dwg
Figure 1a: Models of Geophysical Survey	1 x A3	6653f_Drawings.dwg
Figure 1b: Models of Geophysical Survey	1 x A3	6653f_Drawings.dwg
Figure 2a: Interpretation of Geophysical Survey	1 x A3	6653f_Drawings.dwg
Figure 2b: Interpretation of Geophysical Survey	1 x A3	6653f_Drawings.dwg

1. INTRODUCTION

1.1 Background

Minerex Geophysics Ltd. (MGX) carried out a geophysical survey at the Break Pressure Tank site for the Water Supply Project – Contract 2. The first survey consisted of 2D-Resistivity and seismic refraction (p-wave) measurements in June 2022. The second survey, microgravity, was carried out in October 2022. The survey was commissioned by Irish Drilling Ltd.

The survey was aimed both at investigating the ground conditions under the site and in particular identifying karstified rock. The survey was proposed after boreholes found large variations in the depth to rock and rock quality across the site. A previous survey was carried out at locations along the pipeline route and the interpretation and layer naming conventions are compatible in both reports.

This survey utilized three complimentary geophysical methods to improve final interpretations. The role of geophysics as a non-destructive fast method is to provide a geological interpretation over a wide area to complement direct ground investigations at specific locations. The direct ground investigation results were provided and are used to improve the initial geophysical results and interpretation.

The proposed development is a Break Pressure Tank as part of the Shannon to Dublin Water Supply Project.

1.2 Objectives

The main objectives of the geophysical survey were:

- To determine the ground conditions under the site
- To determine the depth to rock and the overburden thickness
- To estimate the strength or stiffness or compaction of overburden materials and the rock quality
- To determine the type of overburden and rock
- To detect lateral changes within the geological layers
- To determine the presence of possible faults and fracture zones
- To detect possible karstified zones within the rock and karst features

1.3 Site Description

The site is located north of Cloughjordan in the townland of Knocknacree. The site consisted of one large agricultural field used for grazing cattle. The north part of the site is overgrown and there is a derelict house

in the NE corner. Elevations on site rose to the east. Knocknacree wood is to the south and there is farm land bounding the site to the north, east and west. Access was from the L5020 local road to the east of the site.

1.4 Geology

Rotary coreholes were carried out before the survey and found significant variations in the rock. The overburden is generally described as silt with some clay and gravel in places. Throughout the site the rock is described as fine and coarse grained limestone. Weathered rock was identified as shallow as 0.2m (BH007) and good limestone was as shallow as 1.6mn (BH001) below ground level (bgl) while BH004 found no rock to a depth of 15m bgl. Some boreholes noted overburden materials underlying limestone or weathered limestone underlying clean limestone indicating karstification.

The online bedrock geological map of Ireland (GSI, 2022) described the overburden as till derived from limestone and bedrock outcrop or subcrop. The map indicates that the survey area is underlain by Waulsortian Limestone, described as massive unbedded lime-mudstone. There is an NNE-SSW fault close to the west side of the site and shallow rock noted in the north. Waulsortian limestone is karstifiable and the nearest karst features are 2.5km to the NW.

1.5 Report

This report includes the results and interpretation of the geophysical survey. Maps, figures and tables are included to illustrate the results of the survey. More detailed descriptions of geophysical methods and measurements can be found in GSEG (2002), Milsom (1989) and Reynolds (1997).

The description of soil, rock and the use of geotechnical terms (soft, stiff, dense etc) follows Eurocode (2007) and BSI (2015) standards. The terms are defined in the standards and the physical parameters are related from experience. This geophysical survey has been acquired, processed, interpreted and reported in accordance with these guidelines.

The client provided maps of the site and the digital version was used as the background map in this report. Elevations were surveyed on site and are used in the vertical sections.

The interpretative nature and the non-invasive survey methods must be taken into account when considering the results of this survey and Minerex Geophysics Limited, while using appropriate practice to execute, interpret and present the data, give no guarantees in relation to the existing subsurface.

2. GEOPHYSICAL SURVEY

2.1 Methodology

The methodology consisted of using 2D-Resistivity and Seismic Refraction surveying in a grid across the site to achieve good coverage and gain a strong understanding of the bedrock geology

The survey locations are indicated on Map 1. The lines and parameters are tabulated in Table 1.

Table 1: Geophysical Survey Locations and Acquisition Parameters

Resistivity Line	**Electrode Spacing/m**	**Number of Electrodes**	**Line Length/m**
R1	3	42	123
R2	3	64	189
R3	3	64	189
R4	3	32	93
R5	3	60	177
R6	3	60	177
R7	3	60	177
SUM			**1,125**
Seismic Line	**Geophone Spacing/m**	**Number of Geophones**	**Line Length/m**
S1	3	42	123
S2	3	64	189
S3	3	64	189
S4	3	32	93
S5	3	60	177
S6	3	60	177
S7	3	24	69
S8	3	31	90
SUM			**1,107**
Microgravity	Station Spacing/m	Base Stations	**Total Stations**

Two Grids	3 x 3	3	**782**

2.2 2D-Resistivity (ERT)

2D-Resistivity lines were surveyed with electrode spacing of 3m, up to 64 electrodes per set-up and a maximum length of 189m per set-up. The readings were taken with a Tigre Resistivity Meter, Imager Cables, stainless steel electrodes and a laptop with ImagerPro acquisition software. All survey was done to the maximum possible depth for each line length.

During 2D-Resistivity surveying, data is acquired in the form of linear arrays using a suite of metal electrodes. A current is induced into the ground via a pair of electrodes whilst a potential difference is measured across a second pair of electrodes. This allows for the recording of the apparent resistivity in a two-dimensional arrangement below the line. The data is inverted after the survey to obtain a model of subsurface resistivities. The generated model resistivity values and their spatial distribution can then be related to typical values for different geological materials.

The penetration depth of a resistivity set-up increases towards the centre where it reaches an approx. value of $1/6^{th}$ of the array length. 2D-Resistivity has previously proven zones of anomalous or karstified rock with lateral extents of 5m and more.

2.3 Seismic Refraction

Seismic refraction lines were surveyed with geophone spacing of 3m and 24 geophones per set-up resulting in a 69m length per set-up. The recording equipment consisted of a 24 Channel GEOMETRICS ES-3000 engineering seismograph with 4.5Hz vertical geophones. The seismic energy source consisted of a hammer and plate. A zero-delay trigger was used to start the recording. Normally 7 shot points per p-wave set-up were used.

Set-ups were acquired in longer continuous lines using common shot points between set-ups and concatenating into longer lines at the processing stage.

The seismic refraction survey method focuses on propagating p-waves travelling through the subsurface, which are generated by hitting a hammer on a plate or other source. As the wave propagates through the subsurface, its velocity varies as it travels through overburden, rock with different elastic properties, and along geological boundaries. Velocity data is recorded via the surveying equipment, which is then processed, allowing geological layer thicknesses and boundaries to be established.

Seismic Refraction generally determines the depth to horizontal or near horizontal layers where the compaction or strength or rock quality changes with an accuracy of around 20% of the depth to that layer. Where the layers are shallower than the geophone spacing depth deviations of +- 1m to top of layers can

occur. Where low velocity layers or shadow zones are present (e.g., below solid ground surface) or where layers dip with more than 20 degree angle the accuracy becomes much less.

The seismic refraction set-ups with 69m individual length have a reasonable penetration depth of around 15m. An internationally accepted maximum depth estimate for a seismic refraction set-up is 1/6 of the set-up length including offshots. The depth penetration varies according to the velocity structure of the subsurface.

2.4 Microgravity

The microgravity survey was done over two grid areas with the outlines given by the engineers. The grid spacing for the individual measurement points is 3 x 3m and the total number of stations is 782. Three base stations were established at the beginning of the survey.

The micro-gravity readings were recorded as relative measurements as they were related to locally established base stations. All field stations were measured as a single-loop measurement with two immediate repeat readings. The data were collected using a Scintrex CG-6 Autograv gravimeter.

All locations were surveyed to Irish Transverse Mercator (ITM) and Ordnance Datum Malin Head (mOD). The setting out of stations and the surveying in of elevation was done with a Carlsson NR3 RTK-GPS. A windshield was used for all readings.

The two immediate repeat readings are a quality control measure. Further control measures are built into the gravity meter to track background noise levels.

Microgravity readings are extremely accurate measurements and they aim at resolving tiny differences in the gravity field from station to station. They are sensitive to external influences like wind, wave action, vibrations and earthquakes. Twice the measurements had to be paused because of remote earthquakes. During some heavy rainfalls the measurements were also postponed.

The gravity field measured at the ground surface depends mainly on the density and extent of geological layers and features below the survey area. The field will be smaller or negative when the density is lower and the field will be higher or positive when the density is larger. Negative values and anomalies show areas where there is a lack of gravitational mass, or where the density is lower, compared to neighbouring areas around it.

Typical densities for materials are:

Air	0 gr/cm^3
Water	1 gr/cm^3
Soil, overburden, clay, silt, sand, gravel	2 gr/cm^3
Weathered Limestone	2.5 gr/cm^3
Compact Limestone	2.7 gr/cm^3

A lower density material (e.g. a water filled cave) within compact limestone will cause a negative gravity anomaly above it. A larger contrast in densities will cause a larger anomaly, e.g. an air-filled cavity will have a lower gravity anomaly than a same-size water-filled cavity. A larger body of the same low density will then cause a larger anomaly (e.g. a larger cave will cause a more negative anomaly than a smaller cave).

2.5 Site Work

The data acquisition for 2D-Resistivity and seismic refraction was carried out on the 28th and 29th of June 2022. The microgravity survey was carried out between the 18th and 27th October 2022. The weather conditions were fair throughout the acquisition period. Health and safety standards were adhered to at all times. The locations and elevations were surveyed with a Carlson NR3 RTK-GPS to accuracy < 0.05m (and < 0.02m for the microgravity).

3. RESULTS AND INTERPRETATION

The interpretation of geophysical data was executed utilizing the known response of geophysical measurements, typical physical parameters for subsurface features that may underlay the site, and the experience of the authors.

Ground investigation results were available before and after the survey and the abbreviated borehole logs are indicated on the sections. The overburden was abbreviated as clay, silt, sand and gravel. The rock was generally divided into weathered limestone (based on RQD value < 50%) and limestone (> 50%). This can be done only to a certain extend as the rock can be very variable. RQD values, fracture indices and non-intact zones often change rapidly with depth. The small size of a borehole only represents a very small volume of ground while the geophysical survey on the other end of the scale averages over a large volume of ground.

3.1 2D-Resistivity (ERT)

The 2D-Resistivity data was positioned and inverted with the RES2DINV inversion package. The programme uses a smoothness constrained least-squares inversion method to produce a 2D model of the subsurface resistivities from the recorded apparent resistivity values. Three variations of the least squares method are available and for this project the Jacobian Matrix was recalculated for the first three iterations, then a Quasi-Newton approximation was used for subsequent iterations. Each dataset was inverted using seven iterations resulting in a typical RMS error of <3.0%. The resulting models were colour contoured with the same resistivity scale for all lines and they are displayed as cross sections (Figures 1a and 1b).

The models are drawn as a ‘visual stack’ to allow cross-correlation by eye between them.

Resistivities are characteristic for certain overburden and rock types. If there is a high content of clay minerals (which are electrically conductive) then the overburden resistivity will be lower than as if there is a high content of clastic grains like sand or gravel. The purer the clay and the lower the sand and gravel content, the lower the resistivity. Water content in overburden layers can influence the resistivities, but generally clay content has a more dominating effect.

In limestone areas, karstified rock is defined in this report as a formerly intact clean limestone rock, liable to karstification, that has been partially dissolved by water over long geological time scales and where the cavities and voids have either remained empty (filled by air) or became filled by overburden sediment (clay, silt, sand), weathering product of the broken rock itself or water. This process would lead to a reduction of the resistivity of the overall rock and therefore karstified rock has a lower resistivity than intact clean limestone rock. This is generally indicated by lower resistivities embedded within high resistivity at depth.

The resistivities cover a range typical for materials from clay rich overburden (low resistivities) to fresh strong unweathered bedrock (high resistivities). The ranges have been taken into the consideration for the

interpretation. Low resistivity values (<1400 Ohmm) typically indicate sandy gravelly clay and silt or infill within limestone layers. High resistivities (>1400 Ohmm) indicate limestone.

3.2 Seismic Refraction

The seismic refraction data was positioned and processed with the SEISIMAGER software package to give a layered model of the subsurface. The number of layers has been determined by analysing the seismic traces and 3 layers were used in the models. All seismic lines were subject to a standardised processing sequence which consisted of a topographic correction which was based on integrated elevation data, first break picking, tomographic inversion, travel-time computation via ray-tracing and velocity modelling. Residual deviations of typically 0.4 to 1.8 msec RMS have been obtained for each line. Following each processing stage QC procedures were adhered to. The resulting layer boundaries are shown as thick lines overlaid on the 2D-Resistivity cross sections (Figure 1a and 1b). The average seismic velocities obtained within the layers are annotated on the sections as bold black numbers.

The p-wave seismic velocity is closely linked to the density of subsurface materials and to parameters like compaction, stiffness, strength and rock quality. The higher the density of the subsurface materials the higher the seismic velocity. More compacted, stiffer, denser and stronger material will have a higher seismic velocity. For rock, the seismic velocity is higher when the rock is stronger, less weathered and has a higher quality. If the rock is more weathered, broken, fractured, fissured or karstified then the seismic velocity will be reduced compared to that of intact fresh rock.

Because of the above relationship, the seismic refraction method and seismic velocities are suitable to investigate ground where the layers get denser, more compacted and stronger with depth. A disadvantage is that some materials may have the same seismic velocity: Very stiff to hard or very dense highly consolidated overburden and a weathered rock can have the same seismic velocity range (as is the case in the layer 5 below).

The modelled seismic data has created the following layered ground model (which is compatible with the WSP pipeline reports):

Layer 2 has a thickness of 0.5 - 2.5m and seismic velocities of 250 - 350m/s. This overburden would be soil with a soft or loose stiffness or compaction.

Layer 4 was modelled with a velocity of 1200m/s. This layer is only found at the deep overburden areas along lines S1 and S5 and has a extends to thickness of over 10m. This layer is interpreted as overburden with a stiff strength or compaction.

Layer 5 was modelled with a velocity 1600m/s and is modelled everywhere except where layer 4 is present. The thickness of this layer varies between 2 and 15m. The velocity indicates overburden material with a very stiff strength or compaction or a poor very weathered limestone.

Strong rock (Layer 7) is indicated by seismic velocities of 5000m/s and the top of this strong rock varies between 4 and over 15m below ground level.

3.3 Interpretation of Resistivity and Seismic Refraction

Table 2 summarises the interpretation. This table is a the same as the interpretation table used for the whole water supply project scheme with only the relevant layers shown. The stiffness or compaction and the rock strength or quality have been estimated from the seismic velocity. The estimation of the excavatability for the bedrock has been made according to the caterpillar chart published in Reynolds (1997). The geotechnical assessment for rippability will have to take factors like rock type and jointing into account and the estimation in this report is solely based on the seismic velocities.

Interpreted cross sections are shown in Figure 2a and 2b. The interpretation has been made from all available information. For overburden layers and the top of the rock the seismic refraction data has been used as seismic refraction is the best method to delineate layer boundaries. Resistivity data is better suited to show rock types and features within the rock while seismic refraction velocities are indicating the change of compaction, stiffness or rock quality with depth.

Table 2: Summary of Results and Interpretation

Layer	General Seismic Velocity Range (m/sec)	General Resistivity Range (Ohmm)	Stiffness or Compaction or Rock Quality	Interpretation	Estimated Excavation Method
2	170 – 400	N/A	Soft or loose	Soil	Diggable
4B	1000 – 1500	<1400	Stiff	Sandy gravelly Clay or Silt	Diggable
5B	1600 – 2000	<1400	Very Stiff or Poor	Sandy gravelly Clay or Silt or infilled Limestone	Diggable/Rippable
5D	1600 – 2000	>1400	Poor	Very weathered Limestone	Diggable/Rippable
7C	>3000	<1400	Good	Infilled Limestone	Breaking or Blasting
7E	>3000	>1400	Good	Clean Limestone	Breaking or Blasting

3.4 Microgravity

The microgravity measurements are subject to a detailed processing workflow with drift corrections, reductions and filters which creates a tangible result as a contour map of microgravity values seen in Map 2. The scale is in the physical unit of milliGal.

<u>The processing workflow in detail:</u>

The tide correction is done in the gravity meter during the survey.

A drift correction was calculated by repeated measurements at the base station at an interval of ~60 minutes.

The field station numbers are combined with ITM coordinates and elevations.

The next step is the free air reduction which uses the surveyed elevation.

Then the Bouguer-Reduction was applied with an average density of 2.5 g/cm^3.

After this, topographical corrections were applied by using all station elevations and by applying the digital elevation model (DEM) purchased from the Ordnance Survey of Ireland (OSI).

Then a homogenous regional field was removed that was computed form the Bouguer gravity field.

Finally, a local residual field was computed by using a Griffin filter with a 16m radius. This results in a contour map that shows a gravity field relevant for underground features under the site.

Data Quality and repeat error:

The error of the repeatedly 62 measured stations is calculated with

$$m_{\Delta g} = \pm\sqrt{\frac{\Sigma d^2}{2n}}$$

with d - difference of repeated observations

n - number of repeated stations.

A low error of 0.006 milliGal was obtained and this indicates the good data quality of the surveys.

The resulting contour map:

The contour map of microgravity values (Map 2) has a range from -0.100 to +0.60 milliGal. The lower values are represented by yellow to red colours while the higher values are blue. Yellow to red therefore indicates the lowest densities in the ground, the most weathered rock, overburden material within the rock or cavities. These lowest values indicate the 'worst' ground in terms of stability, compactness or rock quality.

The map shows a larger area of lower values in the SW of the larger survey grid. From there two linear trends are striking north and NE, the last one into the smaller survey grid.

Map 3 shows the gravity contours overlaid over the previous interpretation of the 2D-Resistivity and Seismic Refraction data. The contours show an excellent match with the anomalous zones previously found.

Map 4 shows the interpretation displayed without the microgravity field.

4. CONCLUSIONS

The following conclusions are made:

- The geophysical surveys carried out at the Break Pressure Tank site consisted of NW-SE and SW-NE seismic refraction and 2D-Resistivity lines covering the site, followed by a targeted microgravity survey across the area.
- The resistivities were very high in most places near the surface except at the start of R5 and end of R1 in the SW corner of the site. The high resistivities indicate shallow rock with lower resistivities indicating deeper overburden. There are some low resistivities embedded within high resistivities which indicates infilled limestone.
- The seismic refraction data was modelled with a total of four layers (named 2, 4, 5 and 7).
- The microgravity contour map indicates low density material by lower values and higher density material by higher microgravity values. The shape of the microgravity contour map matches the interpretation map of the resistivity and seismic survey very well.
- The top layer (Layer 2) is interpreted as soft or loose soil and is 0.5 – 2.5m thick across the survey area.
- Below this layer there are two layers modelled across the site with velocities of 1200 and 1600m/s. The 1200m/s velocity (Layer 4b) is concentrated at the low resistivity areas on R1 and R5, extends to a thickness of over 10m and is interpreted as stiff sandy gravelly clay. The extent of this layer occurs in the SW corner of the larger microgravity grid (Map3).
- All other areas are having a velocity of 1600m/s (Layer 5). The thickness of these layers varies significantly throughout the survey area indicating weathering or infilling within the limestone throughout the site.
- This layer has been subdivided in two using the variations in resistivities with layer 5b described as very stiff sandy gravelly clay and silt or poor infilled limestone and Layer 5d described as very weathered limestone. There may be small voids or cavities within layer 5d.
- The full extent of Layer 5b is shown on Map 4 and is mainly concentrated along two channels striking in S to N and SW to NE direction across the site. These two channels are also indicated by low microgravity values and these indicate a lower density of the material in Layer 5b.
- There is a small area shown at the start of R7 which may show an additional area of deeper overburden or infilled limestone.
- Layer 7 is subdivided into two layers. High resistivities within layer 7e are described as good clean limestone. Low resistivities within Layer 7c are interpreted as areas of infilled limestone and are shown on Map 4.

- Map 4 shows the interpreted extent of the deep overburden (Layer 4b), the sandy gravelly clay or silt or poor infilled Limestone (Layer 5b) and the good infilled limestone (Layer 7c). There are some 3D-Effects in the data leading to some small differences at line intersections.
- Boreholes were provided after the survey and tie in well with the survey results showing significant weathering within the limestone in some areas and good fresh limestone in others.
- The interpretation and the boreholes show that the survey area is affected by karst in the limestone bedrock. There are different forms and features of karst.
- Most striking are the two linear features (Layer 5b) with low density and low resistivity that strike in S-N and SW-NE direction through both microgravity grids. These are karst solution features in the limestone that are infilled with sandy gravelly clay and silt material.
- Both linear features join in the SW where an area of thicker overburden is interpreted (Layer 4b). This overburden could have been deposited be in a large karst solution depression or consists of a large amount of infill material in limestone.
- The deep good infilled limestone (Layer 7e) is interpreted to have less infilling than the layers above it but there can be karst conduits here that would allow overburden material to move downward and lead to subsidence.
- The poor very weathered limestone (Layer 5d) has high resistivities therefore it is not interpreted as infilled limestone. Weathering in this limestone may have included small scale solution of limestone but it is not expected to have large solution features that were subsequently filed with clay and silt. This weathered limestone could contain an epikarst layer and small voids.

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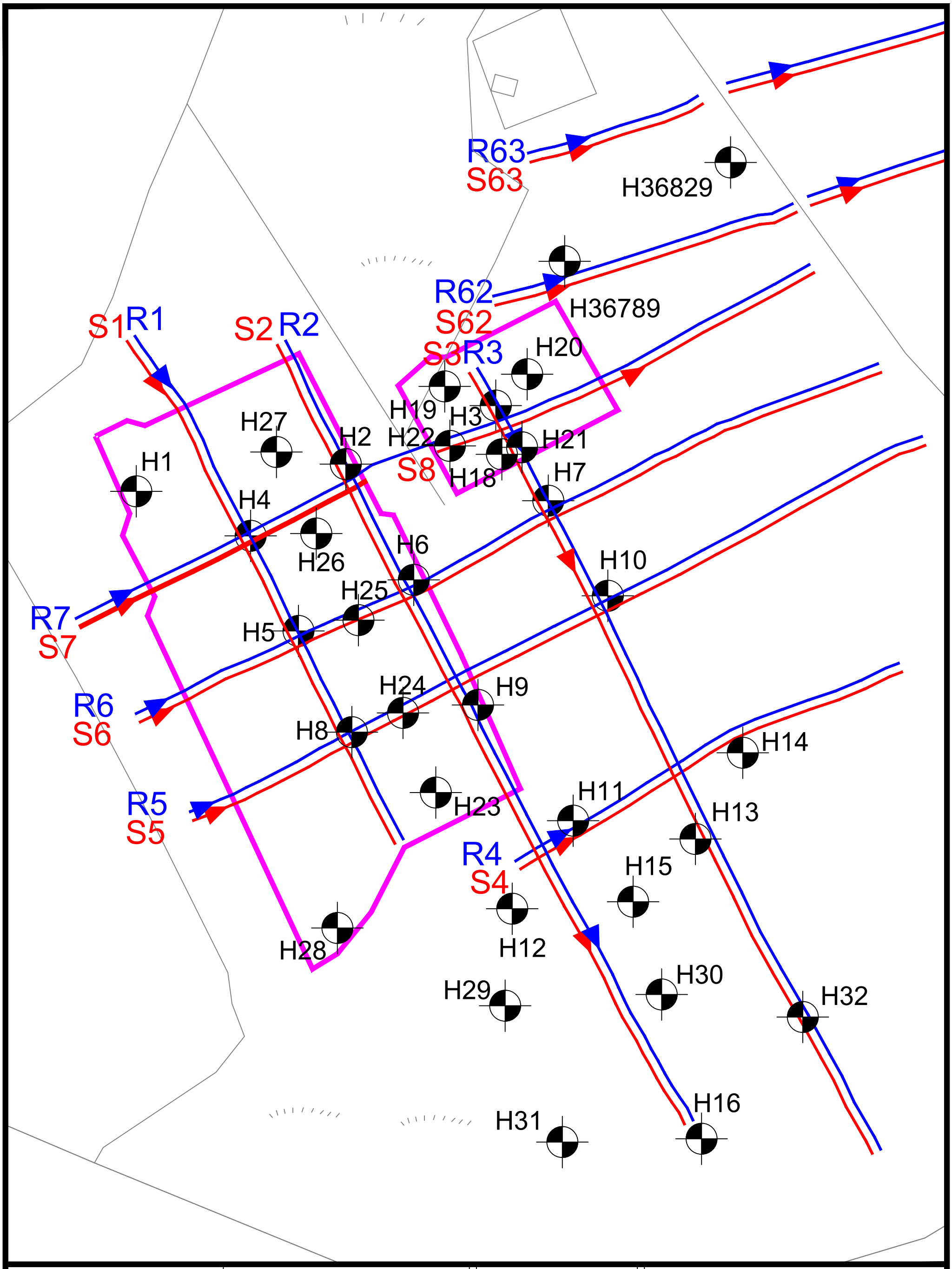

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CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project, Lot 2, BPT Geophysical Survey
TITLE	Map 1: Geophysical Survey Location Map

SCALE:	1:750 @ A3
PROJECT:	6653
DRAWN:	JS
DATE:	02/11/2022
MGX FILE:	6653f_Drawings.dwg
STATUS:	Final

Geophysical Survey Locations

R2 — 2D-Resistivity Line

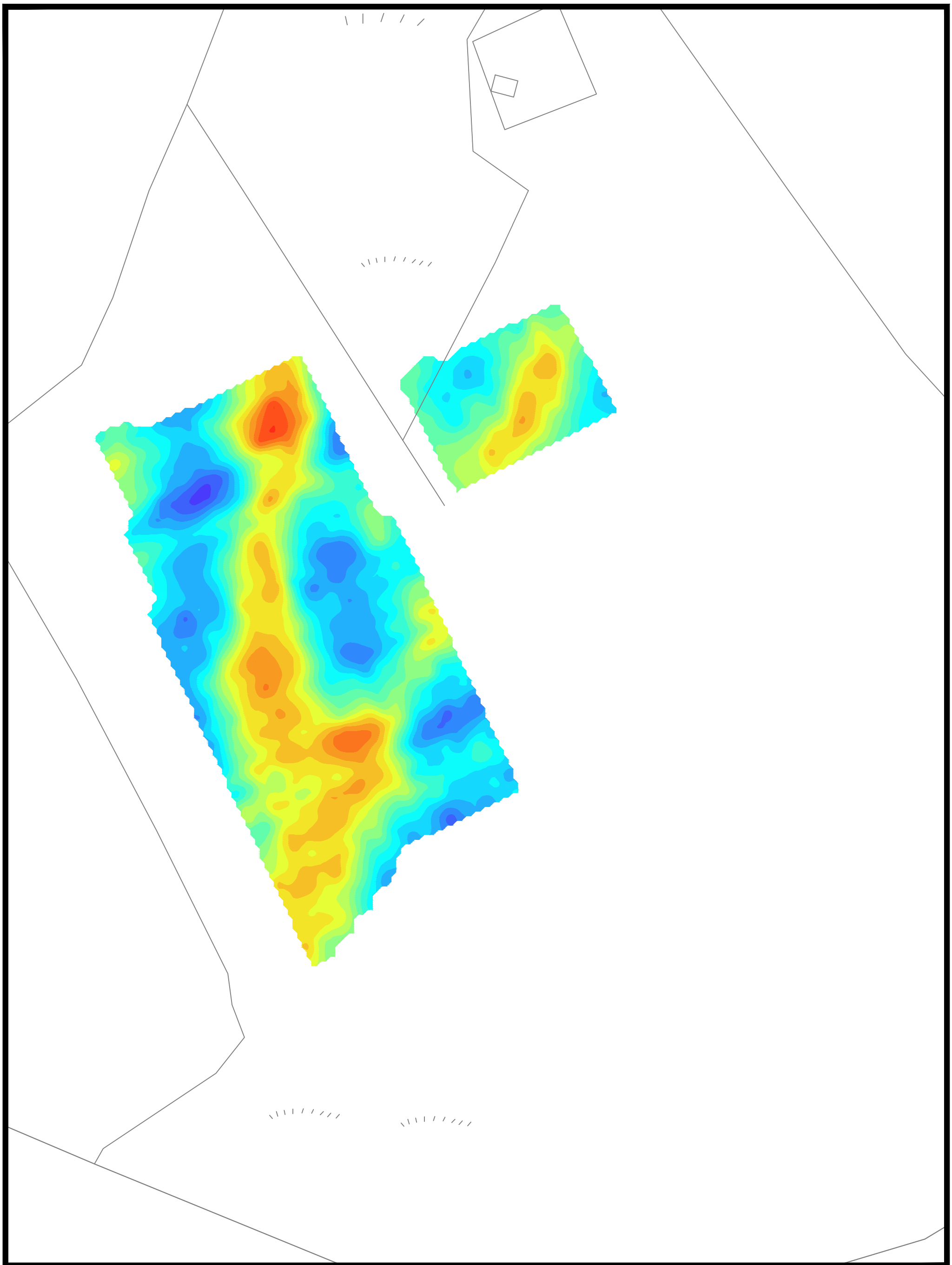
S1 — Seismic Refraction Line

Microgravity Survey Area

Direct Ground Investigation Locations:

H2 — Borehole Location BPT-BH-002

Locations are in Irish Transverse Mercator (ITM), Elevations are in mOD (Malin Head)



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CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project, Lot 2, BPT Geophysical Survey
TITLE	Map 2: Microgravity Survey Contour Map

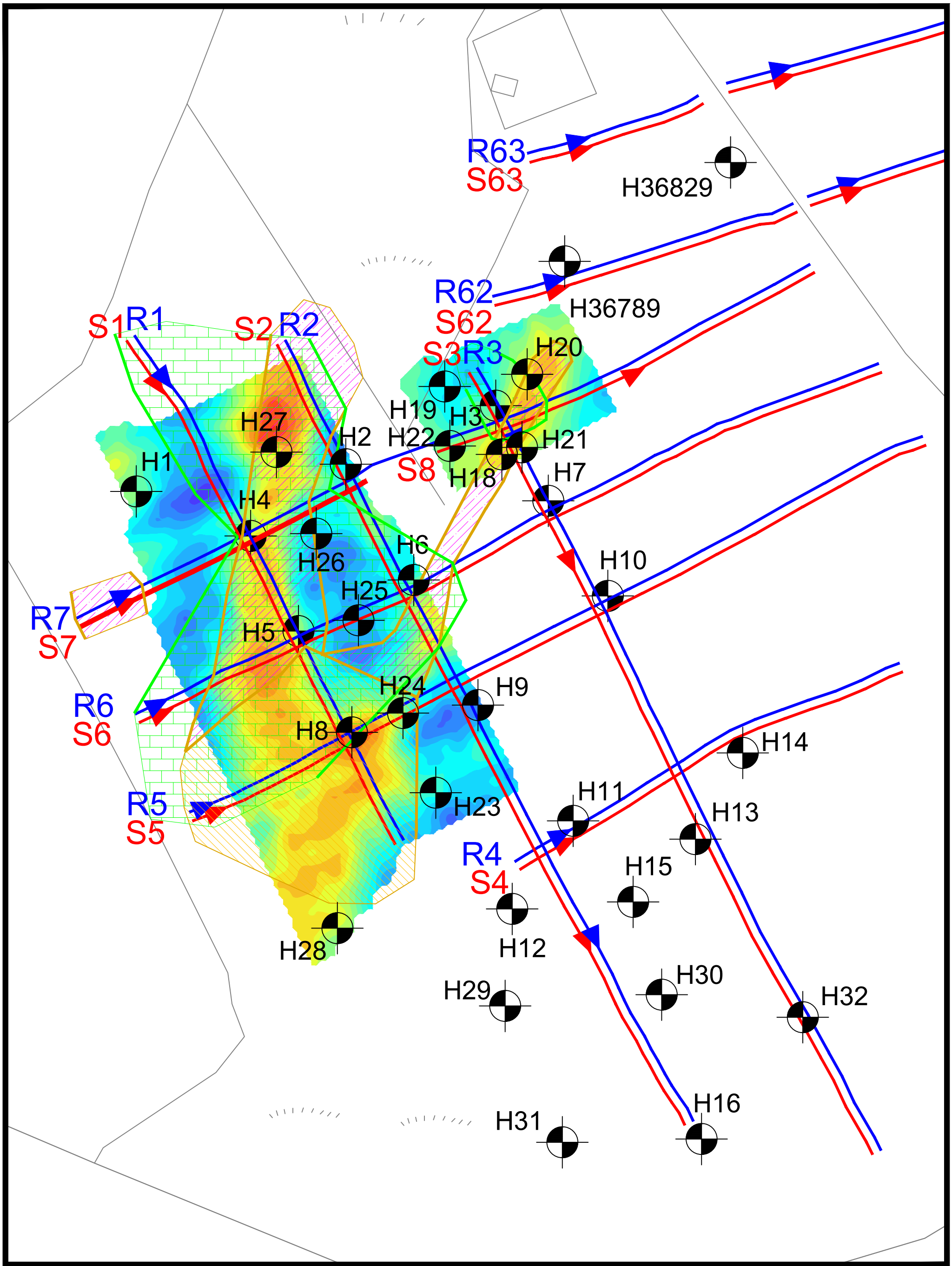
SCALE:	1:750 @ A3
PROJECT:	6653
DRAWN:	JS
DATE:	02/11/2022
MGX FILE:	6653f_Drawings.dwg
STATUS:	Final

Microgravity Survey Contour Map (mGal)

-0.10 -0.06 -0.02 0.02 0.06

The contours show the residual gravity values. Negative values (yellow to red) show a lower gravity field indicating a lower density in the ground below. Positive values (cyan-blue) indicate a higher gravity field that shows a higher density below.

Locations are in Irish Transverse Mercator (ITM), Elevations are in mOD (Malin Head)



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CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project, Lot 2, BPT Geophysical Survey
TITLE	Map 3: Geophysical Survey Microgravity and Interpretation Map

SCALE:	1:750 @ A3
PROJECT:	6653
DRAWN:	JS
DATE:	02/11/2022
MGX FILE:	6653f_Drawings.dwg
STATUS:	Final

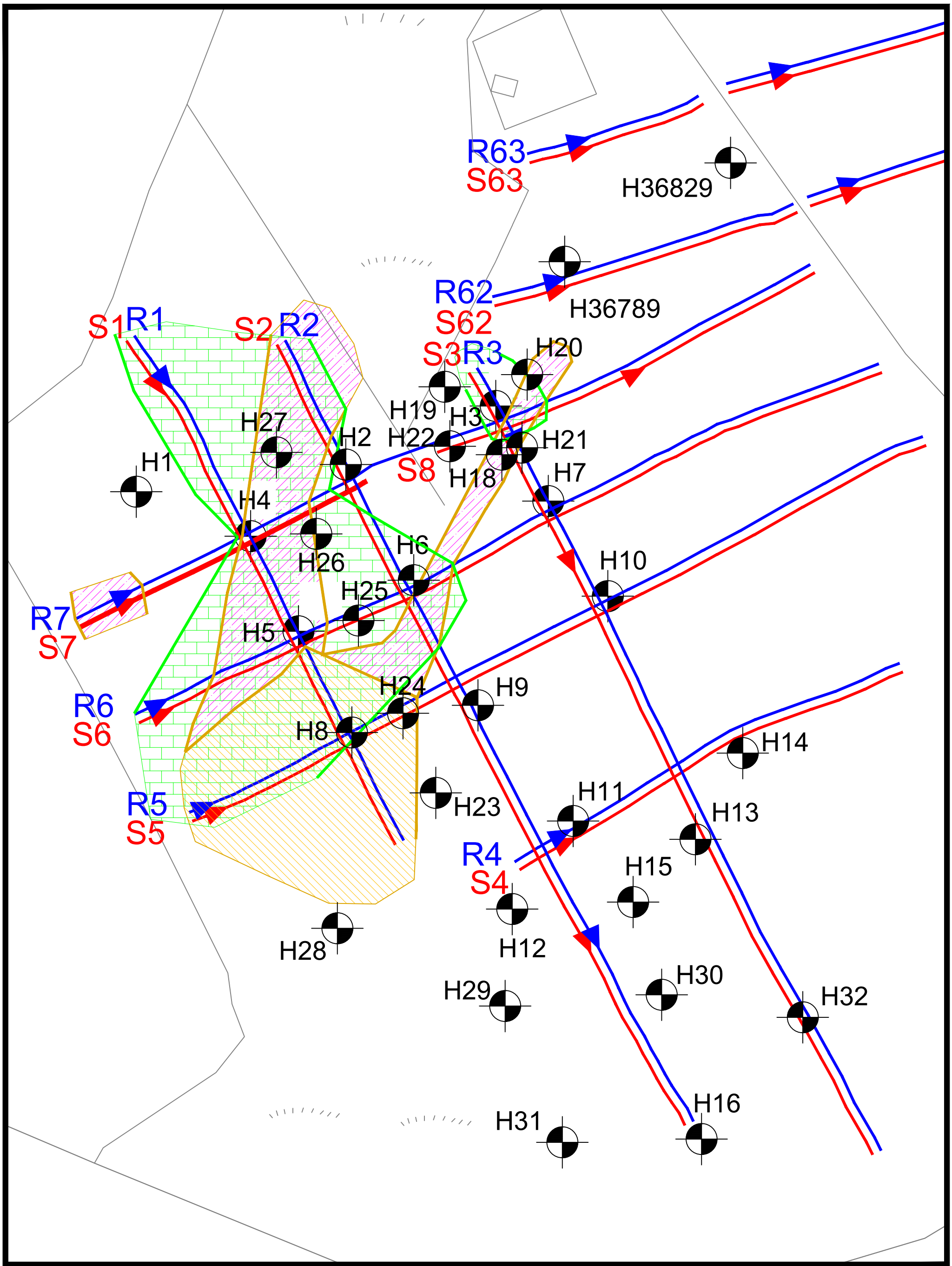
Geophysical Survey Locations

R2 — 2D-Resistivity Line
S1 — Seismic Refraction Line

Geophysical Survey Interpretation:

Full extent of Layer 4B
Full Extent of Layer 5B
Full Extent of Layer 7C

Locations are in Irish Transverse Mercator (ITM), Elevations are in mOD (Malin Head)



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CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project, Lot 2, BPT Geophysical Survey
TITLE	Map 4: Geophysical Survey Interpretation Map

SCALE:	1:750 @ A3
PROJECT:	6653
DRAWN:	JS
DATE:	02/11/2022
MGX FILE:	6653f_Drawings.dwg
STATUS:	Final

Geophysical Survey Locations

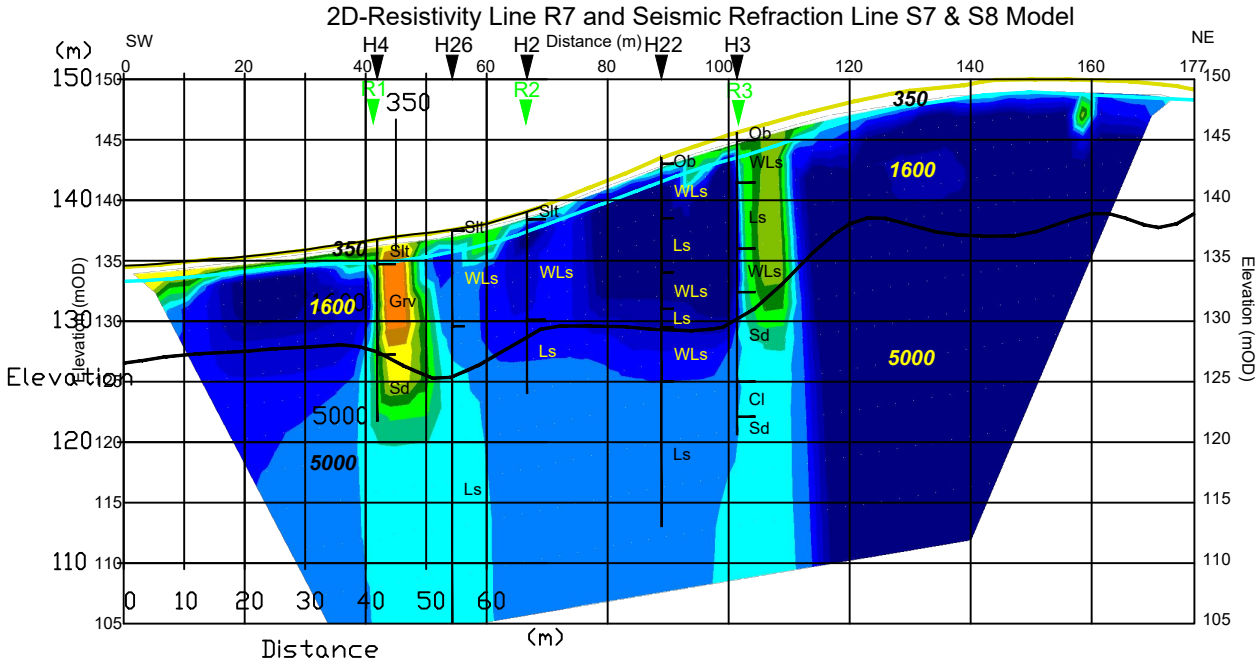
R2 — 2D-Resistivity Line
S1 — Seismic Refraction Line

Geophysical Survey Interpretation:

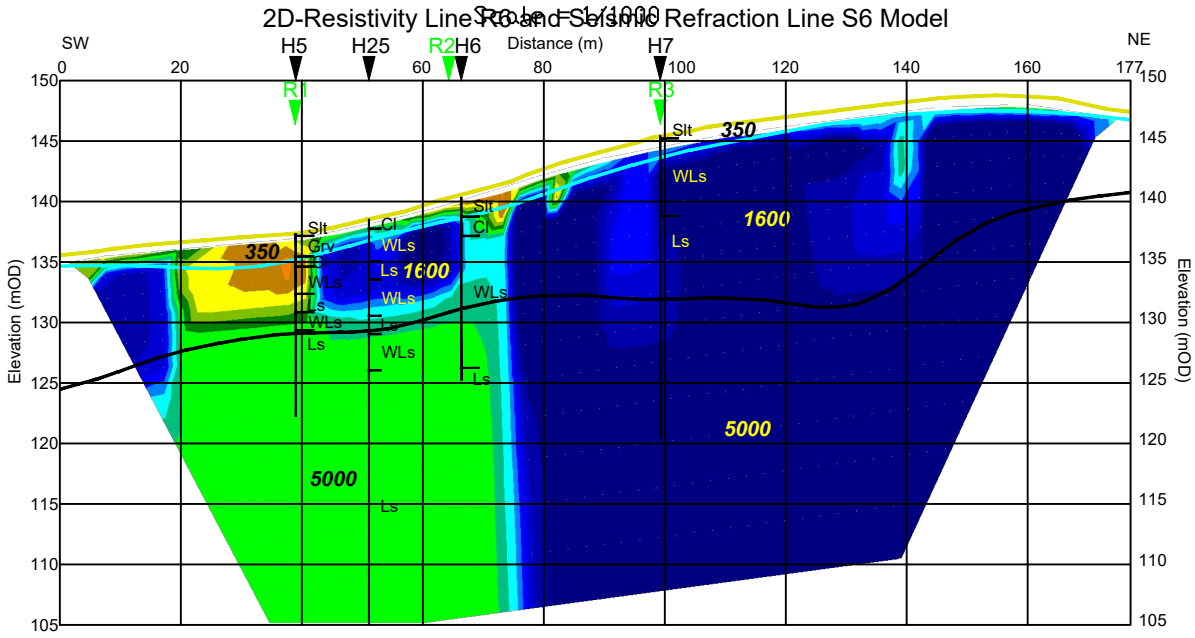
Full extent of Layer 4B
Full Extent of Layer 5B
Full Extent of Layer 7C

Locations are in Irish Transverse Mercator (ITM), Elevations are in mOD (Malin Head)

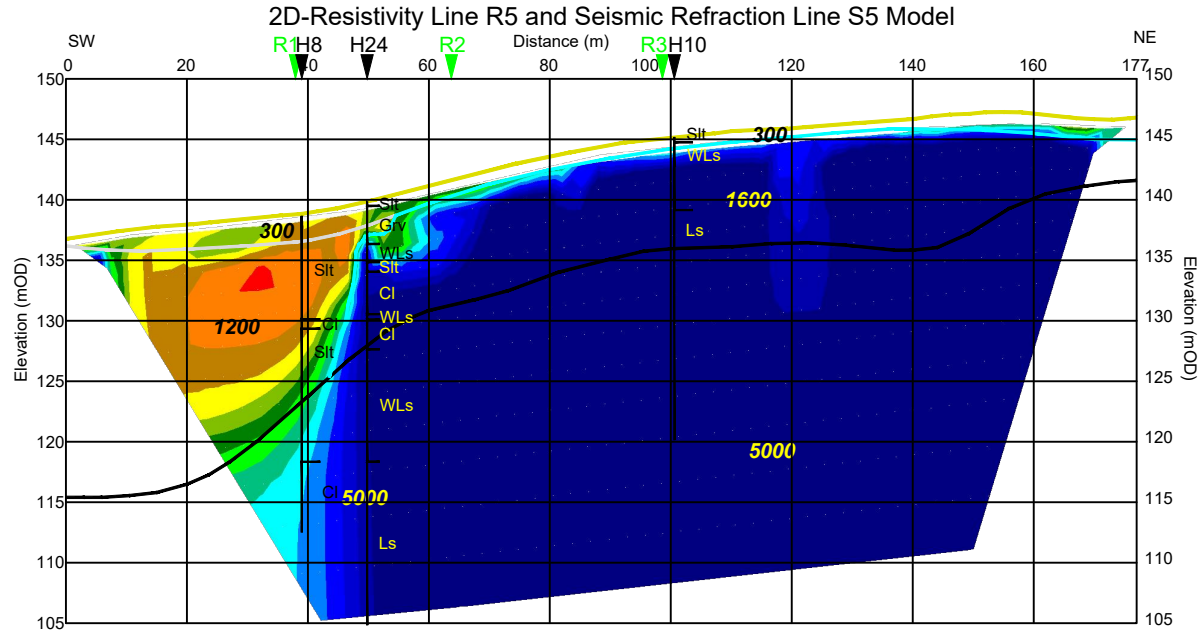
2D-Resistivity Line R7 and Seismic Refraction Line S7 & S8 Model



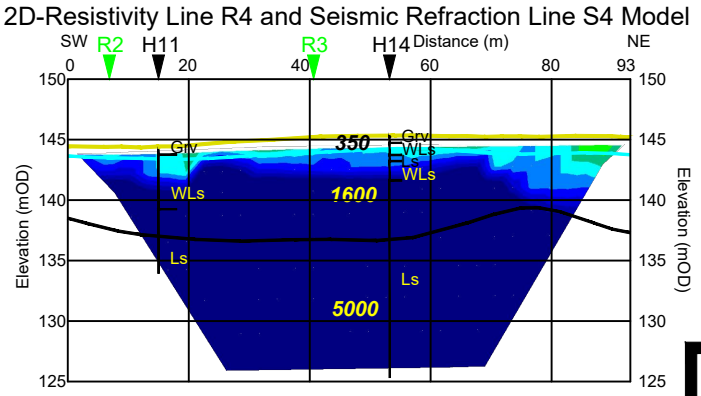
2D-Resistivity Line R6 and Seismic Refraction Line S6 Model



2D-Resistivity Line R5 and Seismic Refraction Line S5 Model



2D-Resistivity Line R4 and Seismic Refraction Line S4 Model



Drawn as 'Visual Stack' looking from SE

Abbreviated GI Logs:

H1 ▼ Borehole Name and Location

Ob	Overburden	Slt	Silt
Cl	Clay	Ls	Limestone
Grv	Gravel	WLs	Weathered Ls
Sd	Sand		

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CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project, Lot 2, BPT Geophysical Survey
TITLE	Figure 1a: Models of Geophysical Survey

SCALE:	1:1250 @ A3
PROJECT:	6653
DRAWN:	JS
DATE:	18/08/2022
MGX FILE:	6653f_Drawings.dwg
STATUS:	Final

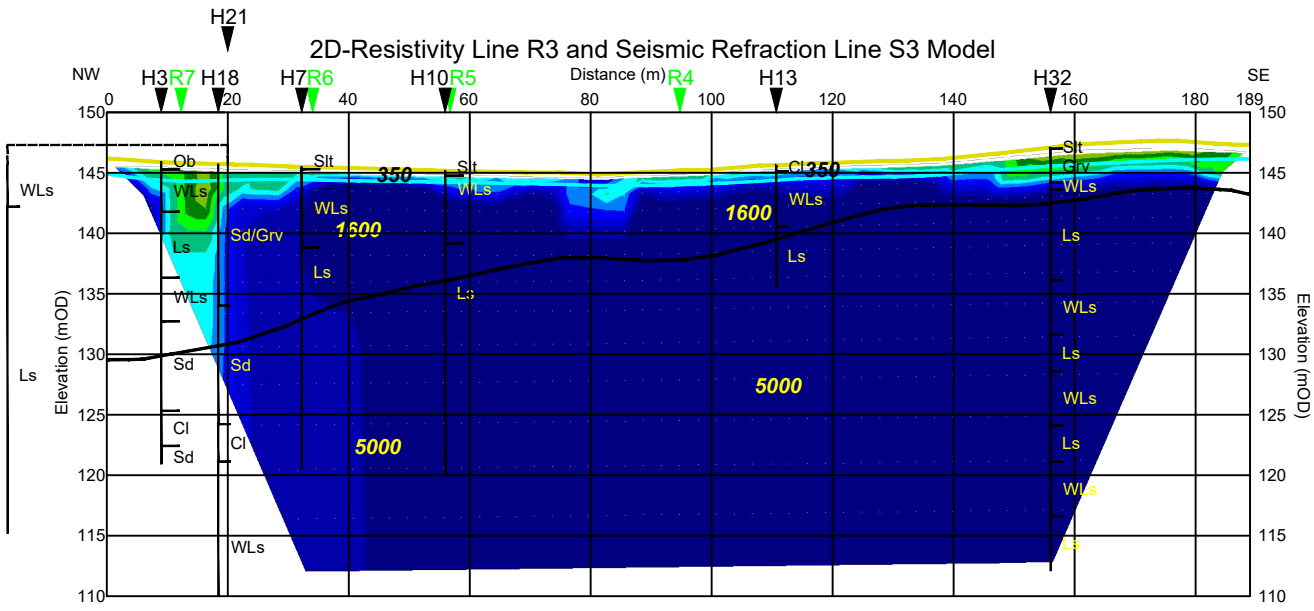
Layers from Seismic Refraction Model:

- Ground Surface/Top of Layer 1 (<150 m/s)
- Ground Surface/Top of Layer 2 (200 - 400 m/s)
- Top of Layer 3 (500 - 900 m/s)
- Top of Layer 4 (1000 - 1500 m/s)
- Top of Layer 5 (1600 - 2000 m/s)
- Top of Layer 6 (2100 - 2900 m/s)
- Top of Layer 7 (>3000 m/s)

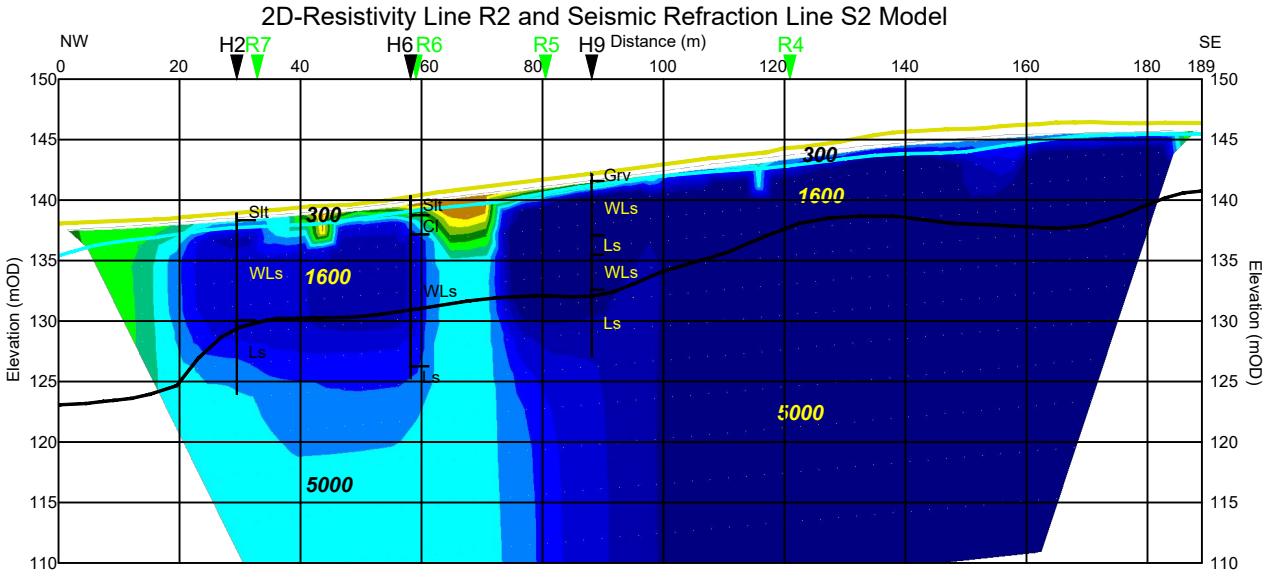
Resistivities (Ohmm) for 2D-Resistivity Model

31.2 62.5 125 250 500 1000 2000 4000

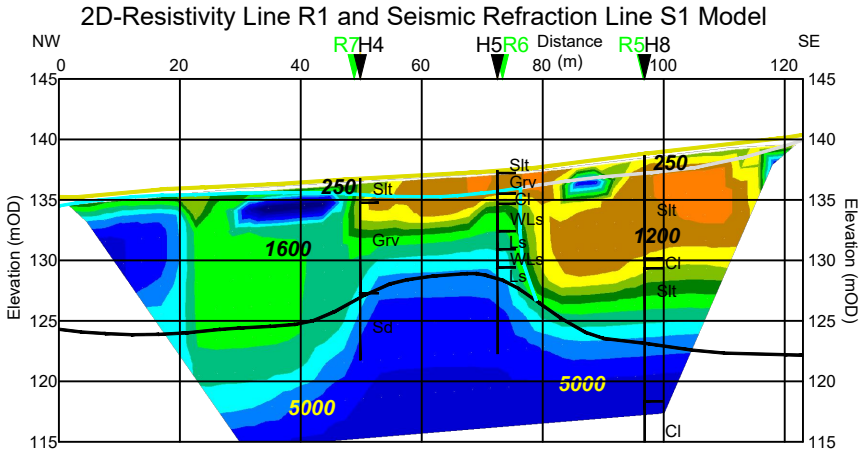
2D-Resistivity Line R3 and Seismic Refraction Line S3 Model



2D-Resistivity Line R2 and Seismic Refraction Line S2 Model



2D-Resistivity Line R1 and Seismic Refraction Line S1 Model



Drawn as 'Visual Stack' looking from SW

Abbreviated GI Logs:

H1 ▼ Borehole Name and Location

Ob	Overburden	Slt	Silt
Cl	Clay	Ls	Limestone
Grv	Gravel	WLs	Weathered Ls
Sd	Sand		

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CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project, Lot 2, BPT Geophysical Survey
TITLE	Figure 1b: Models of Geophysical Survey

SCALE:	1:1250 @ A3
PROJECT:	6653
DRAWN:	JS
DATE:	18/08/2022
MGX FILE:	6653f_Drawings.dwg
STATUS:	Final

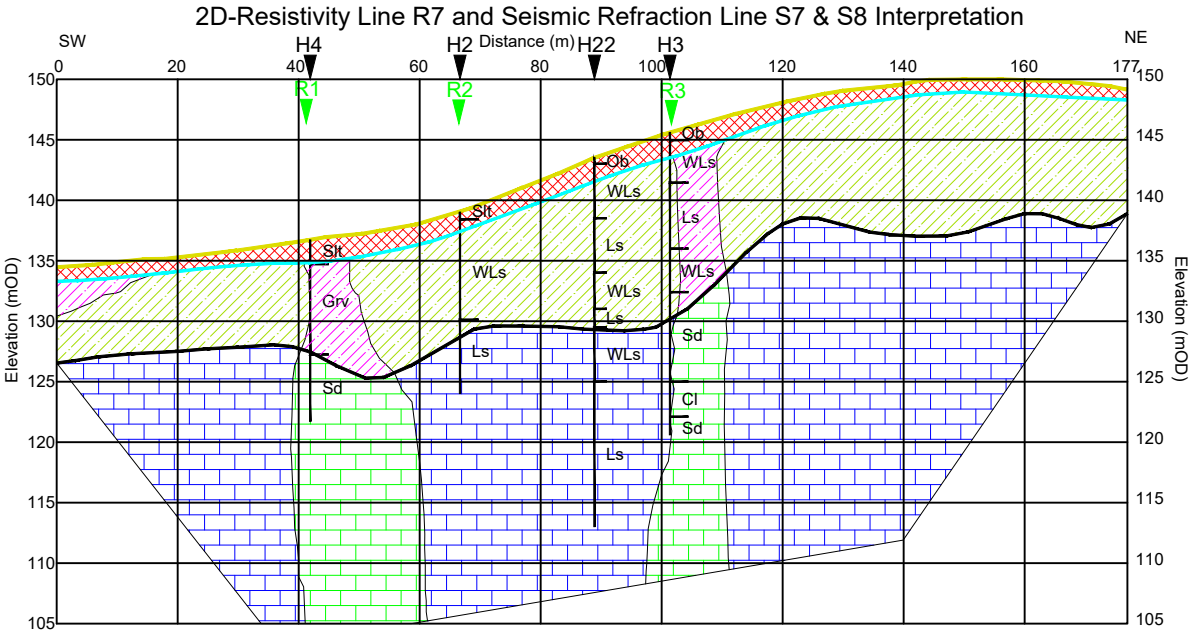
Layers from Seismic Refraction Model:

- Ground Surface/Top of Layer 1 (<150 m/s)
- Ground Surface/Top of Layer 2 (200 - 400 m/s)
- Top of Layer 3 (500 - 900 m/s)
- Top of Layer 4 (1000 - 1500 m/s)
- Top of Layer 5 (1600 - 2000 m/s)
- Top of Layer 6 (2100 - 2900 m/s)
- Top of Layer 7 (>3000 m/s)

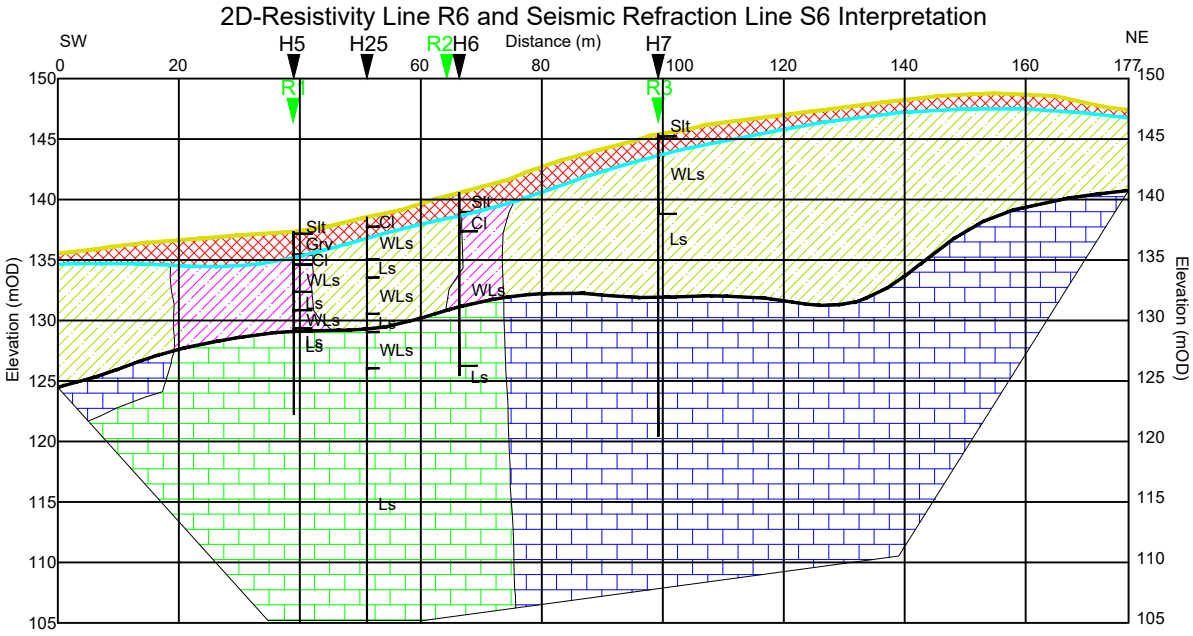
Resistivities (Ohmm) for 2D-Resistivity Model

31.2 62.5 125 250 500 1000 2000 4000

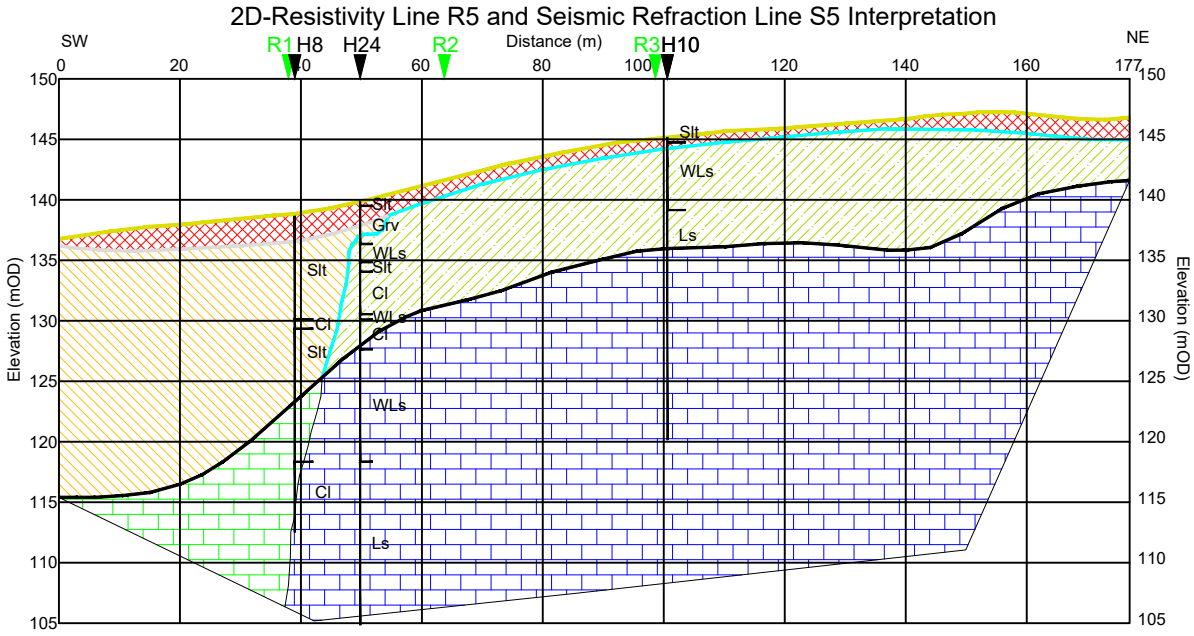
2D-Resistivity Line R7 and Seismic Refraction Line S7 & S8 Interpretation



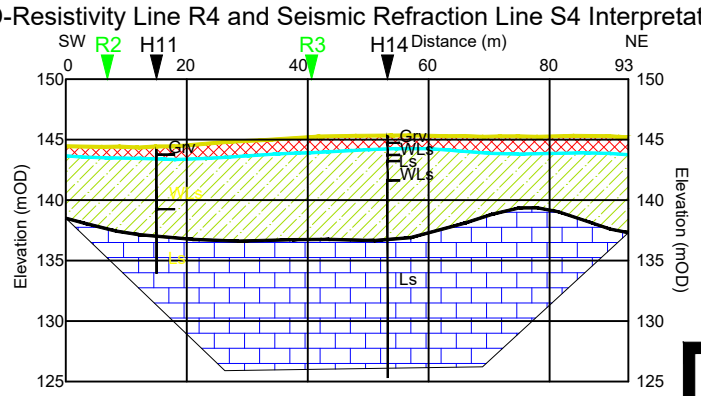
2D-Resistivity Line R6 and Seismic Refraction Line S6 Interpretation



2D-Resistivity Line R5 and Seismic Refraction Line S5 Interpretation



2D-Resistivity Line R4 and Seismic Refraction Line S4 Interpretation



Drawn as 'Visual Stack' looking from SE

Abbreviated GI Logs:

H1 Borehole Name and Location

Ob	Overburden	Slt	Silt
Cl	Clay	Ls	Limestone
Grv	Gravel	WLs	Weathered Ls
Sd	Sand		

Minerex Geophysics Limited
Unit F4, Maynooth Business Campus
Maynooth, Co. Kildare
Tel. (01) 6510030
Email: info@mgx.ie
Web: www.mgx.ie

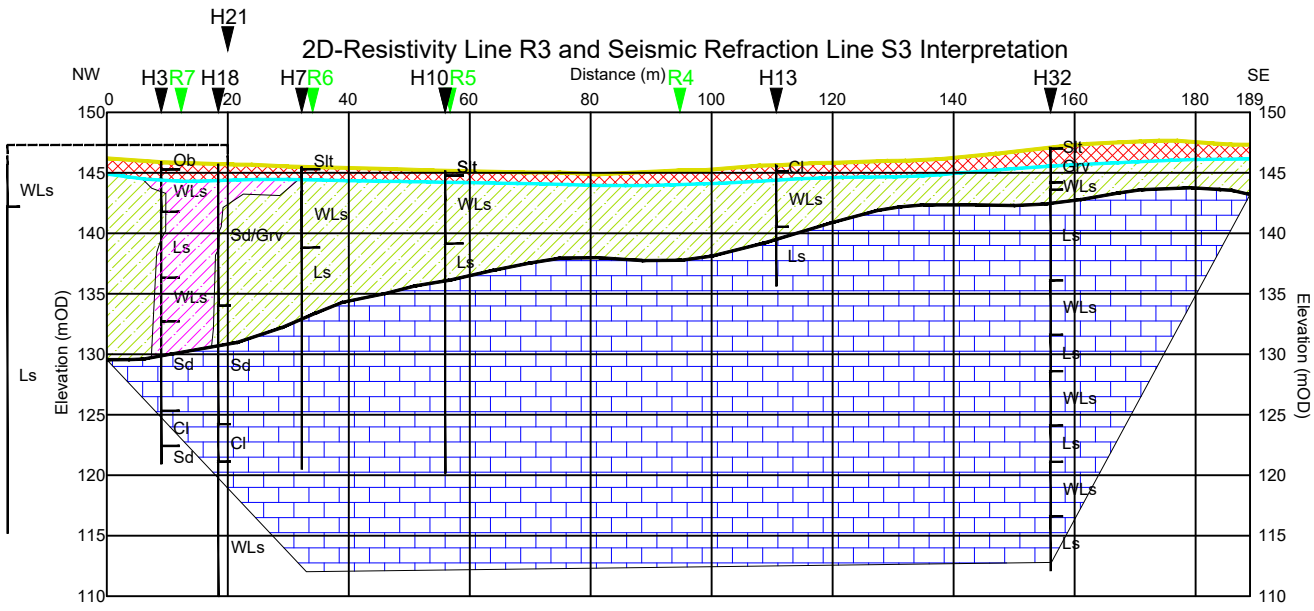
CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project, Lot 2, BPT Geophysical Survey
TITLE	Figure 2a: Interpretation of Geophysical Survey

SCALE:	1:1250 @ A3
PROJECT:	6653
DRAWN:	JS
DATE:	18/08/2022
MGX FILE:	6653f_Drawings.dwg
STATUS:	Final

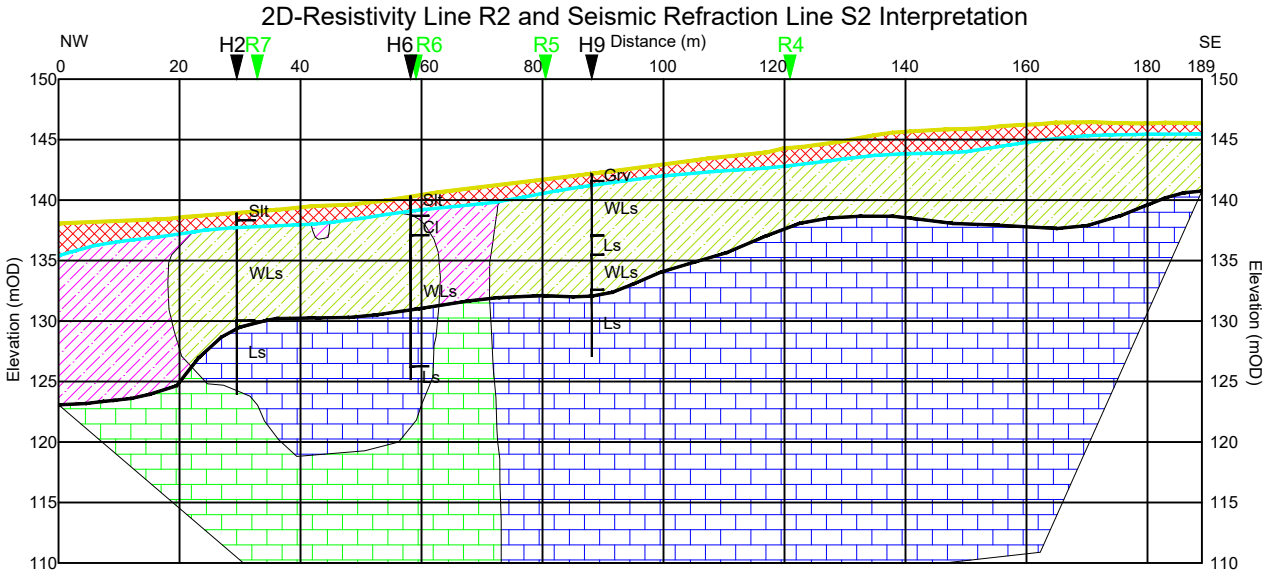
Interpretation:

- 2 Soft or loose Soil
- 4B Stiff sandy gravelly Clay or Silt
- 5B Very stiff sandy gravelly Clay or Silt or poor infilled Limestone
- 5D Poor very weathered Limestone
- 7C Good infilled Limestone
- 7E Good clean Limestone

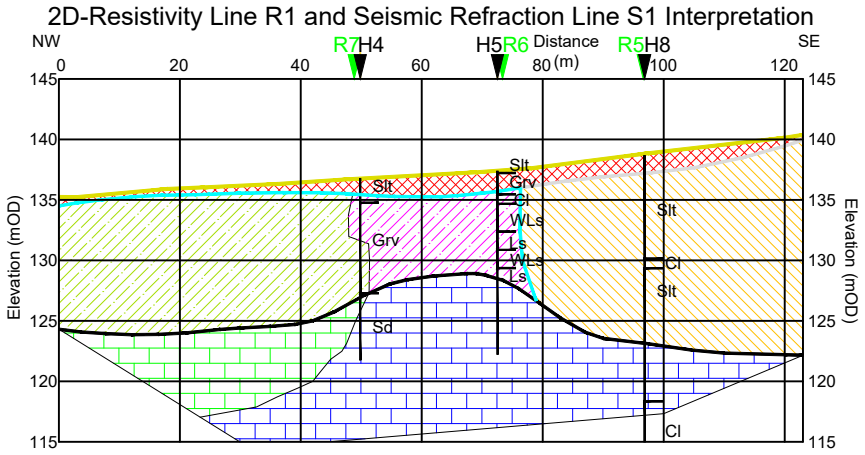
2D-Resistivity Line R3 and Seismic Refraction Line S3 Interpretation



2D-Resistivity Line R2 and Seismic Refraction Line S2 Interpretation



2D-Resistivity Line R1 and Seismic Refraction Line S1 Interpretation



Drawn as 'Visual Stack' looking from SW

Abbreviated GI Logs:

H1 Borehole Name and Location

Ob	Overburden	Slt	Silt
Cl	Clay	Ls	Limestone
Grv	Gravel	WLs	Weathered Ls
Sd	Sand		

Minerex Geophysics Limited
Unit F4, Maynooth Business Campus
Maynooth, Co. Kildare
Tel. (01) 6510030
Email: info@mgx.ie
Web: www.mgx.ie

CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project, Lot 2, BPT Geophysical Survey
TITLE	Figure 2b: Interpretation of Geophysical Survey

SCALE:	1:1250 @ A3
PROJECT:	6653
DRAWN:	JS
DATE:	18/08/2022
MGX FILE:	6653f_Drawings.dwg
STATUS:	Final

Interpretation:

- 2 Soft or loose Soil
- 4B Stiff sandy gravelly Clay or Silt
- 5B Very stiff sandy gravelly Clay or Silt or poor infilled Limestone
- 5D Poor very weathered Limestone
- 7C Good infilled Limestone
- 7E Good clean Limestone

Appendix 5H
Laboratory Test Results

Project ID	2021OY102	Client	Irish Water
Project Name	WSP Eastern & Midlands Region	Report Date	03/04/2023 11:26
Schedule ID	2021OY102_1-29	Scheduled Date	from 14/10/2021
Start	01/10/21		
Today	03/04/23		

Sample Details							Classification						Chemical / Concrete								Compaction					Impressi	Other	
Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Density by Gas	Particle Density by Sma	Particle Size Distributio	Hydrometer	Organic Content	Loss On Ignition	Sulphate Total	Sulphate Water Gravim	Carbonate Titration	ph	Chloride Content	Chloride Content Acid	Compaction Light	Compaction Heavy	Compaction Vibrating H	Moisture Condition Valu	Moisture Condition Relatio	CBR	BRE Suite B	comment
Completed	BPT soil only						36	36	0	0	32	28		0	0	5	0	5	0	0	3		0	1	0	6	6	0
BPT-BH001	**0.00**	**1.00**	**B**	**1**	16/05/22																							
BPT-BH001	1.00		D	2	16/05/22		1	1																				
BPT-BH001	1.00	1.70	B	4	16/05/22						1																	
BPT-BH001	1.70		D	5	16/05/22																							
BPT-BH002	**0.00**	**0.50**	**B**	**1**	17/05/22																							
BPT-BH002	0.50		D	2	17/05/22																							
BPT-BH005	**0.00**	**1.00**	**B**	**1**	16/05/22																							
BPT-BH005	1.00		D	2	16/05/22		1	1																				
BPT-BH005	1.00	2.00	B	4	16/05/22						1																	
BPT-BH005	2.00		D	5	16/05/22																							
BPT-BH009	**0.00**	**0.70**	**B**	**1**	17/05/22																							
BPT-BH009	0.70		D	2	17/05/22		1	1																				
BPT-BH011	**0.00**	**0.60**	**B**	**1**	17/05/22																							
BPT-BH011	0.60		D	2	17/05/22																							
BPT-BH012	**0.00**	**0.40**	**B**	**1**	18/05/22																							
BPT-BH012	0.40		D	2	18/05/22																							
BPT-BH013	**0.00**	**0.20**	**B**	**1**	18/05/22																							
BPT-BH013	0.20		D	2	18/05/22																							
BPT-BH014	**0.00**	**0.30**	**B**	**1**	18/05/22																							
BPT-BH014	0.30		D	2	18/05/22																							
BPT-INF001	**0.50**	**0.80**	**B**	**1**	19/05/22						1	1																
BPT-INF001	0.80		D	2	19/05/22		1	1																				
BPT-INF001	1.50	1.80	B	3	19/05/22						1	0*																
BPT-INF002	**0.20**	**0.40**	**B**	**1**	19/05/22																							
BPT-INF002	0.40		D	2	19/05/22																							
BPT-INF002	0.40		D	2	19/05/22																							
BPT-TP001	**0.50**	**0.80**	**B**	**1**	13/05/22	AW55					**1**	**1**									**1**							

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

Project ID	2021OY102	Client	Irish Water
Project Name	WSP Eastern & Midlands Region	Report Date	03/04/2023 11:26
Schedule ID	2021OY102_1-29	Scheduled Date	from 14/10/2021
Start	01/10/21		
Today	03/04/23		

Sample Details							Classification					Chemical / Concrete								Compaction					Other		
Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Density by Gas	Particle Density by Sma	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	Sulphate Total	Sulphate Water Gravim	Carbonate Titration	ph	Chloride Content	Chloride Content Acid	Compaction Light	Compaction Heavy	Compaction Vibrating H	Moisture Condition Valu	Moisture Condition Relatio	CBR	BRE Suite B	comment
BPT-TP001	0.80		D	2	13/05/22	AW55	1	1																				
BPT-TP002	**0.40**	**0.70**	**B**	**1**	11/05/22	AW55																				1		
BPT-TP002	0.70		D	2	11/05/22	AW55	1	1																				
BPT-TP002	1.40	1.70	B	3	11/05/22	AW55					1	1																
BPT-TP002	1.70		D	4	11/05/22	AW55	1	1																				
BPT-TP003	**0.30**	**0.60**	**B**	**1**	17/05/22	AW55					1	0*																*COBBLES
BPT-TP004	**0.50**	**0.80**	**B**	**1**	18/05/22						1	1																
BPT-TP004	0.80		D	2	18/05/22		1	1																			1	ALS 220718-33
BPT-TP005	**0.40**	**0.70**	**B**	**1**	13/05/22	AW55																						
BPT-TP005	0.70		D	2	13/05/22	AW55	1	1																				
BPT-TP005	1.70	2.00	B	3	13/05/22	AW55					1	1																
BPT-TP005	2.00		D	4	13/05/22	AW55	1	1																			1	**EnviroLab 22-12428**
BPT-TP006	**0.40**	**0.70**	**B**	**1**	12/05/22	AW55					1	1									1							
BPT-TP006	0.70		D	2	12/05/22	AW55	1	1																				
BPT-TP007	**0.30**	**0.60**	**B**	**1**	17/05/22	AW55																						
BPT-TP007	0.50		D	2	17/05/22	AW55	1	1																				
BPT-TP008	**0.30**	**0.60**	**B**	**1**	17/05/22	AW55																						
BPT-TP009	**0.40**	**0.70**	**B**	**1**	12/05/22	AW55																						
BPT-TP009	0.70		D	2	12/05/22	AW55	1	1																				
BPT-TP009	2.00	2.30	B	3	12/05/22	AW55					1	1																
BPT-TP009	2.30		D	4	12/05/22	AW55	1	1								1		1										**EnviroLab 22-12428**
BPT-TP010	**0.50**	**0.80**	**B**	**1**	17/05/22	AW55																				1		
BPT-TP010	0.80		D	2	17/05/22	AW55	1	1																				
BPT-TP011	**0.30**	**0.60**	**B**	**1**	18/05/22						0*	0*																*NOT SUITABLE
BPT-TP012	**0.30**	**0.60**	**B**	**1**	13/05/22	AW55																						
BPT-TP012	0.60		D	2	13/05/22	AW55	1	1																				
BPT-TP012	1.30	1.60	B	3	13/05/22	AW55					1	1												1				
BPT-TP012	1.60		D	4	13/05/22	AW55	1	1																			1	**EnviroLab 22-12428**
BPT-TP013	**0.40**	**0.70**	**B**	**1**	13/05/22	AW55																						
BPT-TP014	**0.50**	**0.80**	**B**	**1**	13/05/22	AW55																						
BPT-TP014	0.80		D	2	13/05/22	AW55	1	1																				

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

Project ID	2021OY102	Client	Irish Water
Project Name	WSP Eastern & Midlands Region	Report Date	03/04/2023 11:26
Schedule ID	2021OY102_1-29	Scheduled Date	from 14/10/2021
Start	01/10/21		
Today	03/04/23		

Sample Details							Classification						Chemical / Concrete								Compaction					Other		
Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Density by Gas	Particle Density by Sma	Particle Size Distributio	Hydrometer	Organic Content	Loss On Ignition	Sulphate Total	Sulphate Water Gravim	Carbonate Titration	ph	Chloride Content	Chloride Content Acid	Compaction Light	Compaction Heavy	Compaction Vibrating H	Moisture Condition Valu	Moisture Condition Relatio	CBR	BRE Suite B	comment
BPT-TP014	1.80	2.10	B	3	13/05/22	AW55					1	1																
BPT-TP014	2.10		D	4	13/05/22	AW55	1	1								1		1										**EnviroLab 22-12428**
BPT-TP015	**0.50**	**0.80**	**B**	**1**	12/05/22	AW55																						
BPT-TP015	0.80		D	2	12/05/22	AW55	1	1																				
BPT-TP015	1.50	1.80	B	3	12/05/22	AW55					1	1									1							
BPT-TP015	1.80		D	4	12/05/22	AW55	1	1																				
BPT-TP015	2.00	2.30	B	5	12/05/22	AW55					1	1																
BPT-TP015	2.30		D	6	12/05/22	AW55																						
BPT-TP016	**0.20**	**0.40**	**B**	**1**	17/05/22	AW55																						
BPT-TP016	0.40		D	2	17/05/22	AW55	1	1																				
BPT-TP017	**0.30**	**0.50**	**B**	**1**	18/05/22						0*	0*																*NOT SUITABLE
BPT-TP018	no testing scheduled																											
BPT-TP019	no testing scheduled																											
BPT-TP020	no testing scheduled																											
BPT-TP021	**0.30**	**0.60**	**B**	**1**	18/05/22						0*	0*																*NOT SUITABLE
BPT-TP022	**0.20**	**0.50**	**B**	**1**	20/05/22						0*	0*																*NOT SUITABLE
BPT-TP023	**0.50**	**0.80**	**B**	**1**	18/05/22						1	1																
BPT-TP023	0.80		D	2	18/05/22		1	1																			1	ALS 220718-33
BPT-TP024	**0.30**	**0.60**	**B**	**1**	20/05/22						0*	0*																*NOT SUITABLE
BPT-TP025	no testing scheduled																											
BPT-TP026	no testing scheduled																											
BPT-TP027	**0.25**	**0.40**	**B**	**1**	19/05/22						1	1																
BPT-TP027	0.40		D	2	19/05/22		1	1																				
BPT-TP028	**0.20**	**0.40**	**B**	**1**	20/05/22						1	1																
BPT-TP028	0.30		D	2	20/05/22																							
BPT-TP028	0.50	0.80	B	3	20/05/22						1	1																
BPT-TP029	**0.20**	**0.40**	**B**	**1**	23/05/22	AW55																						
BPT-TP029	0.30		D	2	23/05/22	AW55																						
BPT-TP029	0.60	0.90	B	3	23/05/22	AW55					1	1																
BPT-TP029	0.90		D	4	23/05/22	AW55	1	1																				
BPT-TP030	**0.60**	**0.90**	**B**	**1**	23/05/22	AW55					1	1														1		

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Project ID	2021OY102	Client	Irish Water
Project Name	WSP Eastern & Midlands Region	Report Date	03/04/2023 11:26
Schedule ID	2021OY102_1-29	Scheduled Date	from 14/10/2021
Start	01/10/21		
Today	03/04/23		

Sample Details							Classification					Chemical / Concrete								Compaction					Other		
Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Density by Gas	Particle Density by Sma	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	Sulphate Total	Sulphate Water Gravim	Carbonate Titration	ph	Chloride Content	Chloride Content Acid	Compaction Light	Compaction Heavy	Compaction Vibrating H	Moisture Condition Valu	Moisture Condition Relatio	CBR	BRE Suite B	comment
BPT-TP030	0.90		D	2	23/05/22	AW55	1	1																			1	**EnviroLab 22-12428**
BPT-TP031	**0.50**	**0.80**	**B**	**1**	16/05/22	AW55																						
BPT-TP031	1.70	2.00	B	2	16/05/22	AW55					**1**	**1**																
BPT-TP031	2.00		D	3	16/05/22	AW55	**1**	**1**																				
BPT-TP032	**0.30**	**0.60**	**B**	**1**	23/05/22	AW55					1	1														1		
BPT-TP032	0.60		D	2	23/05/22	AW55	1	1																				
BPT-TP032	1.30	1.60	B	3	23/05/22	AW55					1	1																
BPT-TP032	1.60		D	4	23/05/22	AW55	1	1																			1	**EnviroLab 22-12428**
BPT-TP033	**0.60**	**0.90**	**B**	**1**	23/05/22	AW55					1	1																
BPT-TP033	0.90		D	2	23/05/22	AW55	1	1																				
BPT-TP034	**0.70**	**1.00**	**B**	**1**	24/05/22	AW55					1	1																
BPT-TP034	1.00		D	2	24/05/22	AW55	1	1								1		1										**EnviroLab 22-12428**
BPT-TP035	**0.70**	**1.00**	**B**	**1**	24/05/22	AW55					1	1																
BPT-TP035	1.00		D	2	24/05/22	AW55	0*	0*																				move to bag sample
BPT-TP036	**0.40**	**0.70**	**B**	**1**	24/05/22	AW55					1	1														1		
BPT-TP036	0.70		D	2	24/05/22	AW55	1	1																				
BPT-TP036	1.40	1.70	B	3	24/05/22	AW55					1	1																
BPT-TP036	1.70		D	4	24/05/22	AW55	1	1																				
BPT-TP037	**0.70**	**1.00**	**B**	**1**	25/05/22	AW55					1	1																
BPT-TP037	1.00		D	2	25/05/22	AW55	1	1								1		1										**EnviroLab 22-12428**
BPT-TP038	**0.70**	**1.00**	**B**	**1**	25/05/22	AW55					1	1																
BPT-TP038	1.00		D	2	25/05/22	AW55	1	1																				
BPT-TP039	**0.20**	**0.50**	**B**	**1**	25/05/22	AW55																						
BPT-TP039	0.50		D	2	25/05/22	AW55										1		1										**EnviroLab 22-12428**
BPT-TP039	1.00	1.30	B	3	25/05/22	AW55					1	1														1		
BPT-TP039	1.30		D	4	25/05/22	AW55	1	1																				

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Project ID	2021OY102	Client	Irish Water
Project Name	WSP Eastern & Midlands Region	Report Date	03/04/2023 11:26
Schedule ID	2021OY102_1-29	Scheduled Date	from 14/10/2021
	Start 01/10/21		
	Today 03/04/23		

Sample Details							Classification						Chemical / Concrete								Compaction					Other		
Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Density by Gas	Particle Density by Sma	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	Sulphate Total	Sulphate Water Gravim	Carbonate Titration	ph	Chloride Content	Chloride Content Acid	Compaction Light	Compaction Heavy	Compaction Vibrating H	Moisture Condition Valu	Moisture Condition Relatio	CBR	BRE Suite B	comment

Notes

For all PSDs & hydrometer tests scheduled: Hydrometer required if more than 10% passing for last sieve.
MCV tests: 1p test at natural moisture content.
Moisture content tests to be undertaken as part of all Atterberg / PI testing as well as any other test which tyhis forms an integral part of the test i.e. MCV, Compactions.
Testing of cross-strata samples shall be avoided.
Please advise if additional information is required to inform sample preparation and testing conditions.

0 = test scheduled,
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0* = sample not suitable for scheduled test

Project ID	2021OY102	Client	Irish Water
Project Name	WSP Eastern & Midlands Region	Report Date	03/04/23
Schedule ID	2021OY102_1-29	Scheduled Date	from 14/10/2021

2021OY102: WSP - BPT section core schedule

Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Size Distribution	Hydrometer	Sulphate Water Gravimetric	ph	BRE Suite B	Consolidation	Swelling Pressure	Laboratory Vane	Small Direct Shearbox	Ring shear Test	Triaxial Quick Undrained	(Specify Cell Pressure)	Triaxial UU Multi Stage	Triaxial UU Multi Specimen	Rock Uniaxial compression	Rock Uniaxial compression with measurement of Youngs Modulus and Poisson's ratio	Point Load	Mohr Hardness	Particle Density & Water absorption	Mag Sulphate Soundness	Los Angeles	Slake Durability	Flakiness Index	Simplified Petrography	Chemical Analysis	Brazilian Tensile Rock Test	Direct shear strength of rock discontinuity	Comment
BPT core scheduled							44	36	28	28	15	15	12	1	0	0	4	0	2	2	1	2	23	2	113	10	3	2	14	5	3	2	2	1	3	
Completed to date				03 April 2023			44	36	28	27	13	13	12	1	0	0	4	0	2		1	2	23	1	185	9	2	0	14	5	2	2	1	1	3	
To do (In Structural Soils)							0	0	0	1	2	2	0	0	0	0	0	0	0	2	0	0	0	1	0	1	1	2	0	0	1	0	1	0	0	
BPT-BH-001	**0.00**	**2.00**	**C**		30/5/22								1																							BRE @ 1.8m: Envirolab 22/11464
BPT-BH-001	*1.6*	*15.4*				*Very strong apparently massive grey 'marbled' light grey and white fine and coarse grained LIMESTONE.*																															
BPT-BH-001	2.00	3.50	C		30/5/22																		1		2											PL (single on iregular lump, axial and diametral) and UCS on first core run from 2m
BPT-BH-001	3.50	5.00	C		30/5/22																				1											PL (axial) at 3.5m and 4.5m, Brasilian (tensile)
BPT-BH-001	3.50	5.00	C		30/5/22																													0*		* Brasilian (tensile) NOT POSSIBLE
BPT-BH-001	5.00	6.50	C		30/5/22																															
BPT-BH-001	6.50	8.00	C		30/5/22																														1	Shear: 6.65-6.75m
BPT-BH-001	8.00	9.50	C		30/5/22																															
BPT-BH-001	9.50	11.00	C		30/5/22																															
BPT-BH-001	11.00	12.50	C		30/5/22																															
BPT-BH-001	12.50	14.00	C		30/5/22																															
BPT-BH-001	14.00	15.40	C		30/5/22																															
BPT-BH002	**0.00**	**1.00**	**C**		16/6/22																															
BPT-BH002	1.00	2.10	C		16/6/22																															
BPT-BH002	2.10	2.70	C		16/6/22																		0*		2											at 2.1 - 2.7m PL axial and diametral. *No suitable core for UCS
BPT-BH002	2.70	4.00	C		16/6/22																															
BPT-BH002	4.00	5.10	C		16/6/22																				1											PL axial at 4.5m
BPT-BH002	5.10	6.10	C		16/6/22																															
BPT-BH002	6.10	7.00	C		16/6/22																															
BPT-BH002	7.00	8.10	C		16/6/22																															
BPT-BH002	8.10	9.70	C		16/6/22																				7											PL set of 10 at 9m
BPT-BH002	*8.9*	*15*				*Very strong apparently massive grey 'marbled' white and grey fine and coarse grained LIMESTONE.*																															
BPT-BH002	9.70	11.10	C		16/6/22																															
BPT-BH002	11.10	12.70	C		16/6/22																															
BPT-BH002	12.70	14.10	C		16/6/22																															
BPT-BH002	14.10	15.00	C		16/6/22																															
BPT-BH-003	**0.00**	**2.10**	**C**		30/5/22																															
BPT-BH-003	2.10	3.60	C		30/5/22																				2											PL (axial and diametral)
BPT-BH-003	3.60	5.10	C		30/5/22								1													1			1							rock testing and BRE @ 3.6-5.1. (add 2.0-3.6) Envirolab 22-11464
BPT-BH-003	*4.1*	*9.6*				*Very strong apparently massive grey 'marbled' light grey and white fine and coarse grained LIMESTONE.*																															

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Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Size Distribution	Hydrometer	Sulphate Water Gravimetric	ph	BRE Suite B	Consolidation	Swelling Pressure	Laboratory Vane	Small Direct Shearbox	Ring shear Test	Triaxial Quick Undrained	(Specify Cell Pressure)	Triaxial UU Multi Stage	Triaxial UU Multi Specimen	Rock Uniaxial compression	Rock Uniaxial compression with measurement of Youngs Modulus and Poisson's ratio	Point Load	Mohr Hardness	Particle Density & Water absorption	Mag Sulphate Soundness	Los Angeles	Slake Durability	Flakiness Index	Simplified Petrography	Chemical Analysis	Brazilian Tensile Rock Test	Direct shear strength of rock discontinuity	Comment
BPT-BH-003	5.10	5.60	C		30/5/22																		1		1												PL (single on iregular lump) @5.1-5.6
BPT-BH-003	5.10	5.60	C		30/5/22																															
BPT-BH-003	5.60	6.70	C		30/5/22																															
BPT-BH-003	6.70	7.60	C		30/5/22																															
BPT-BH-003	7.60	8.10	C		30/5/22																															
BPT-BH-003	8.10	9.60	C		30/5/22																															
BPT-BH-003	9.60	11.10	C		30/5/22																															
BPT-BH-003	11.10	13.10	C		31/5/22																															
BPT-BH-003	13.10	14.10	C		31/5/22																															
BPT-BH-003	14.10	16.10	C		31/5/22		1		1	1							1			150, 300, 600 kPa																at 15m
BPT-BH-003	16.10	18.10	C		31/5/22		1		1	1																										at 16.5m
BPT-BH-003	18.10	20.60	C		31/5/22																															
BPT-BH-003	20.60	22.00	C		31/5/22		1	1	1	0																										at 20.6m
BPT-BH-003	22.00	23.50	C		31/5/22																															
BPT-BH-003	23.50	25.00	C		31/5/22																															
BPT-BH-004	**0.00**	**2.00**	**C**		18/5/22		1	1	1	1	1	1																									At 1-2m. Envirolab 22-11464
BPT-BH-004	2.00	3.50	C		18/5/22																															
BPT-BH-004	3.50	5.00	C		18/5/22																															
BPT-BH-004	5.00	6.50	C		18/5/22		1		1	1							1			50, 100, 200kpa																at 5m.
BPT-BH-004	6.50	8.00	C		18/5/22								1																							BRE at 6.5m. Envirolab 22-11464
BPT-BH-004	8.00	9.50	C		19/5/22																															
BPT-BH-004	9.50	11.00	C		19/5/22																															
BPT-BH-004	11.00	12.50	C		19/5/22																															
BPT-BH-004	12.50	14.00	C		19/5/22		1		1	1																											At 14m
BPT-BH-004	14.00	15.00	C		19/5/22																															
BPT-BH-005	**0.00**	**2.00**	**C**		31/5/22																															
BPT-BH-005	2.00	3.50	C		31/5/22																					1	0	0*	1	1	0	1	1			(all 2.0-9.5m) Envirolab 22-11464
BPT-BH-005	2.00	3.50	C		31/5/22																				9											at 3m PL set of 10
BPT-BH-005	*2.7*	*15*				*Very strong apparently massive grey 'marbled' light grey and white fine and coarse grained LIMESTONE.*																															
BPT-BH-005	3.50	5.00	C		31/5/22								1																							at 5m, envirolab 23-00120
BPT-BH-005	5.00	6.50	C		31/5/22																			0												at 6.1 - 6.5m PL irregular lump. UCS sub'd
BPT-BH-005	5.00	6.50	C		31/5/22																				1											at 6.1 - 6.5m PL irregular lump. UCS sub'd
BPT-BH-005	6.50	8.00	C		31/5/22																				9											at 7.8m PL set of 10
BPT-BH-005	8.00	9.50	C		31/5/22																															
BPT-BH-005	9.50	11.00	C		31/5/22																				10											at 10.5m PL set of 10
BPT-BH-005	11.00	12.50	C		31/5/22																															
BPT-BH-005	12.50	14.00	C		31/5/22																															
BPT-BH-005	14.00	15.00	C		31/5/22																															
BPT-BH006	**0.00**	**1.80**	**C**		17/6/22																															
BPT-BH006	1.80	2.50	C		17/6/22		1	1	1	1																										
BPT-BH006	2.50	3.20	C		17/6/22						0	0																									at 3m
BPT-BH006	3.20	3.60	C		17/6/22																															
BPT-BH006	*3.2*	*15*				*Very strong apparently massive grey 'marbled' white and grey fine and coarse grained LIMESTONE.*																															

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Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Size Distribution	Hydrometer	Sulphate Water Gravimetric	ph	BRE Suite B	Consolidation	Permeability	Swelling Pressure	Laboratory Vane	Small Direct Shearbox	Ring shear Test	Triaxial Quick Undrained	(Specify Cell Pressure)	Triaxial UU Multi Stage	Triaxial UU Multi Specimen	Rock Uniaxial compression	Rock Uniaxial compression with measurement of Youngs Modulus and Poisson's ratio	Point Load	Mohr Hardness	Particle Density & Water absorption	Mag Sulphate Soundness	Los Angeles	Slake Durability	Flakiness Index	Simplified Petrography	Chemical Analysis	Brazilian Tensile Rock Test	Direct shear strength of rock discontinuity	Comment
BPT-BH006	3.60	4.90	C		17/6/22																			0*		1											at 4.5m PL axial and diametral. * No UCS
BPT-BH006	4.90	6.50	C		17/6/22																					1											at 5.5 PL axial, Brasilian (tensile)
BPT-BH006	4.90	6.50	C		17/6/22																													0*			* Brasilian (tensile) NOT POSSIBLE
BPT-BH006	6.50	8.10	C		17/6/22																																
BPT-BH006	8.10	9.60	C		17/6/22																					1											at 9.2 PL axial
BPT-BH006	9.60	11.10	C		17/6/22																																
BPT-BH006	11.10	12.60	C		17/6/22																																
BPT-BH006	12.60	14.10	C		17/6/22																																
BPT-BH006	14.10	15.00	C		17/6/22																																
BPT-BH-007	**0.00**	**0.60**	**C**		2/6/22																																
BPT-BH-007	0.60	2.10	C		2/6/22								1																								BRE at 1.9m. Envirolab 22-11464
BPT-BH-007	0.60	2.10	C		2/6/22																					1											PL (axial) and BRE at 1.9m
BPT-BH-007	*2*	*25*				*Very strong apparently massive grey 'marbled' brownish grey and white fine and coarse grained LIMESTONE.*																																
BPT-BH-007	2.10	3.60	C		2/6/22																																
BPT-BH-007	3.60	5.10	C		2/6/22																																
BPT-BH-007	5.10	6.60	C		3/6/22																					1											PL (axial) at 6m
BPT-BH-007	6.60	8.10	C		3/6/22																						1	1	0	1	1	1		0			Aggregate at 6.6-8.1m
BPT-BH-007	8.10	9.60	C		3/6/22																																
BPT-BH-007	9.60	10.10	C		3/6/22																																
BPT-BH-007	10.10	11.10	C		3/6/22																																
BPT-BH-007	11.10	12.00	C		3/6/22																																
BPT-BH-007	12.00	13.00	C		7/6/22																					6											PL set of 10 at 12.5m
BPT-BH-007	13.00	15.00	C		7/6/22																																
BPT-BH-007	15.00	16.60	C		8/6/22								1																								BRE. Envirolab 22-11464
BPT-BH-007	15.00	16.60	C		8/6/22																			1		1											BRE and single PL (axial) At 15m
BPT-BH-007	16.60	18.20	C		8/6/22																														*		Shear 17.4-17.5m *Cancelled
BPT-BH-007	18.20	19.80	C		8/6/22																					1											PL single (axial) at 18.3m
BPT-BH-007	19.80	21.40	C		8/6/22																																
BPT-BH-007	21.40	23.00	C		9/6/22																																
BPT-BH-007	23.00	24.50	C		9/6/22																																
BPT-BH-007	24.50	25.00	C		9/6/22																																
BPT-BH008	**0.00**	**1.30**	**C**		20/6/22		1	1	1	1																											at 1.0m
BPT-BH008	1.30	1.70	C		20/6/22																																
BPT-BH008	1.70	2.70	C		20/6/22																																
BPT-BH008	2.70	4.10	C		20/6/22		1	1																													at 3.5m
BPT-BH008	4.10	5.10	C		20/6/22																																
BPT-BH008	5.10	6.60	C		20/6/22								1																								at 5.1m. Envirolab 22-11464
BPT-BH008	6.60	8.10	C		20/6/22		1	1	1	1																											at 7.1m
BPT-BH008	8.10	9.60	C		20/6/22		1	1	1	1																											at 9m
BPT-BH008	9.60	11.10	C		20/6/22		1	1	1	1																											at 10.2m
BPT-BH008	11.10	12.60	C		21/6/22																																
BPT-BH008	12.60	13.40	C		21/6/22																																
BPT-BH008	13.40	13.60	C		21/6/22																																
BPT-BH008	13.60	15.10	C		21/6/22																																
BPT-BH008	15.10	16.60	C		21/6/22																																
BPT-BH008	16.60	17.90	C		21/6/22																																

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Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Size Distribution	Hydrometer	Sulphate Water Gravimetric	ph	BRE Suite B	Consolidation	Swelling Pressure	Laboratory Vane	Small Direct Shearbox	Ring shear Test	Triaxial Quick Undrained	(Specify Cell Pressure)	Triaxial UU Multi Stage	Triaxial UU Multi Specimen	Rock Uniaxial compression	Rock Uniaxial compression with measurement of Youngs Modulus and Poisson's ratio	Point Load	Mohr Hardness	Particle Density & Water absorption	Mag Sulphate Soundness	Los Angeles	Slake Durability	Flakiness Index	Simplified Petrography	Chemical Analysis	Brazilian Tensile Rock Test	Direct shear strength of rock discontinuity	Comment
BPT-BH008	17.90	19.40	C		21/6/22		1	1																												at 19m
BPT-BH008	19.40	20.00	C		21/6/22																															
BPT-BH008	20.00	20.60	C		22/6/22																															
BPT-BH008	20.60	21.60	C		22/6/22		1	1																												at 21.2m
BPT-BH008	21.60	23.10	C		22/6/22		1	1												200, 400, 600		1														Triaxial at 21.9m, MC and atterberg at 22.5m
BPT-BH008	23.10	24.60	C		22/6/22		1	1	1	1																										at 23.6m
BPT-BH008	24.60	26.10	C		22/6/22																															
BPT-BH009	**0.00**	**2.00**	**C**		23/6/22																				2											at 1m PL axial and diametral
BPT-BH009	*0.5*	*15.1*				*Very strong apparently massive grey 'marbled' grey and white fine and coarse grained LIMESTONE.*																																
BPT-BH009	2.00	3.60	C		23/6/22																					1			1							(all 2.0-7.9)
BPT-BH009	3.60	5.10	C		23/6/22																															
BPT-BH009	5.10	6.70	C		23/6/22																		1		3											at 5.5m PL axial and diametal at 6.7m PL axial
BPT-BH009	5.10	6.70	C		23/6/22																															
BPT-BH009	6.70	8.10	C		23/6/22																															
BPT-BH009	8.10	9.60	C		23/6/22																															
BPT-BH009	9.60	11.10	C		23/6/22																				1											at 9.6m PL axial
BPT-BH009	11.10	12.60	C		23/6/22																															
BPT-BH009	12.60	14.10	C		23/6/22																															
BPT-BH009	14.10	15.10	C		23/6/22																															
BPT-BH010	**0.00**	**1.10**	**C**		**23/5/22**																															
BPT-BH010	1.10	2.30	C		**23/5/22**								1																							at 1.5m. Envirolab 22-11464
BPT-BH010	2.30	3.30	C		**23/5/22**																				1											PL at 2.5m axial and diametral
BPT-BH010	*2.4*	*25*				*Very strong apparently massive grey 'marbled' dark grey brownish white and white slightly bioclastic fine and coarse grained LIMESTONE.*																																
BPT-BH010	3.30	4.80	C		**23/5/22**																															
BPT-BH010	4.80	6.00	C		**23/5/22**																													**0***		* Brasilian (tensile) NOT POSSIBLE
BPT-BH010	6.00	7.50	C		**23/5/22**																															
BPT-BH010	7.50	9.10	C		**24/5/22**																					1	0*	0*	1	1	0*	1	0*			(all 7.5-11.6)
BPT-BH010	7.50	9.10	C		**24/5/22**																				7											PL set of 10 .
BPT-BH010	9.10	10.50	C		**24/5/22**																															
BPT-BH010	10.50	11.60	C		**24/5/22**																															
BPT-BH010	11.60	13.10	C		**24/5/22**																															
BPT-BH010	13.10	14.10	C		**24/5/22**																		1		1											UCS and PL (irregular lump) at 13.5 - 14.1m
BPT-BH010	14.10	14.60	C		**24/5/22**																															
BPT-BH010	14.60	16.10	C		**24/5/22**																															
BPT-BH010	16.10	17.80	C		**26/5/22**																				1											PL axial at 16.5
BPT-BH010	17.80	19.40	C		**27/5/22**																															
BPT-BH010	19.40	20.10	C		**27/5/22**																															
BPT-BH010	20.10	21.70	C		**27/5/22**																															
BPT-BH010	21.70	23.20	C		**27/5/22**																															
BPT-BH010	23.20	25.00	C		**27/5/22**																															
BPT-BH011	**0.00**	**2.00**	**C**		24/6/22																		0*		2											PL Axial and dia at 1m and UCS at 1.9m. * UCS not possible
BPT-BH011	*0.4*	*10.2*				*Very strong apparently massive grey 'marbled' light grey white and brownish white fine and coarse grained LIMESTONE.*																																
BPT-BH011	2.00	3.60	C		24/6/22								1													1	0*	0*	1	1	0*		0*			(all 2.0-10.2)Envirolab 22-11888
BPT-BH011	3.60	4.90	C		24/6/22																															

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Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Size Distribution	Hydrometer	Sulphate Water Gravimetric	ph	BRE Suite B	Consolidation	Swelling Pressure	Laboratory Vane	Small Direct Shearbox	Ring shear Test	Triaxial Quick Undrained	(Specify Cell Pressure)	Triaxial UU Multi Stage	Triaxial UU Multi Specimen	Rock Uniaxial compression	Rock Uniaxial compression with measurement of Youngs Modulus and Poisson's ratio	Point Load	Mohr Hardness	Particle Density & Water absorption	Mag Sulphate Soundness	Los Angeles	Slake Durability	Flakiness Index	Simplified Petrography	Chemical Analysis	Brazilian Tensile Rock Test	Direct shear strength of rock discontinuity	Comment
BPT-BH011	4.90	6.50	C		24/6/22																															
BPT-BH011	6.50	8.10	C		24/6/22																				8											PL set of 10 at 7.15
BPT-BH011	6.50	8.10	C		24/6/22																															
BPT-BH011	8.10	9.70	C		24/6/22																															
BPT-BH011	9.70	10.20	C		24/6/22																															
BPT-BH012	**0.00**	**1.50**	**C**		27/6/22								1																							Envirolab 22-11464
BPT-BH012	1.50	2.10	C		27/6/22																				2											at 2m axial and diametral
BPT-BH012	2.10	3.60	C		27/6/22																															
BPT-BH012	3.60	5.10	C		27/6/22																															
BPT-BH012	5.10	6.70	C		27/6/22																															
BPT-BH012	*6.4*	*10*				*Very strong apparently massive dark grey 'marbled' light grey white and brownish white fine and coarse grained LIMESTONE.*																																	
BPT-BH012	6.70	8.10	C		27/6/22																		1		1											at 7.6m PL axial
BPT-BH012	8.10	9.50	C		27/6/22																															
BPT-BH012	9.50	10.00	C		27/6/22																															
BPT-BH013	**0.00**	**1.10**	**C**		28/6/22						1	1																								at 1.1m. Envirolab 22-11464
BPT-BH013	*0.4*	*10*				*Very strong locally strong apparently massive light brownish grey 'marbled' grey and brownish white slightly bioclastic fine and coarse grained LIMESTONE.*																																	
BPT-BH013	1.10	2.10	C		28/6/22																		0*		2											UCS and PL axial and diametral at 1.5m, PL axial at 2m. *UCS not possible
BPT-BH013	2.10	3.70	C		28/6/22																															
BPT-BH013	3.70	5.10	C		28/6/22																															
BPT-BH013	5.10	6.50	C		28/6/22																			1												
BPT-BH013	5.10	6.50	C		28/6/22																				1											At 5.1m PL axial
BPT-BH013	6.50	8.10	C		28/6/22																															
BPT-BH013	8.10	9.50	C		28/6/22																				1											at 8.4m PL axial
BPT-BH013	9.50	10.00	C		28/6/22																															
BPT-BH014	**0.00**	**1.60**	**C**		29/6/22																															
BPT-BH014	*0.5*	*20*				*Very strong apparently massive grey 'marbled' light grey and white slightly bioclastic fine and coarse grained LIMESTONE.*																																	
BPT-BH014	1.60	2.10	C		29/6/22																															
BPT-BH014	2.10	3.70	C		29/6/22						1	1																								Envirolab 22-11464
BPT-BH014	2.10	3.70	C		29/6/22																				2											at 2.5m PL axial and diametral
BPT-BH014	3.70	5.10	C		29/6/22																															
BPT-BH014	5.10	6.70	C		29/6/22																															
BPT-BH014	6.70	8.10	C		29/6/22																															
BPT-BH014	8.10	9.70	C		29/6/22																					1			1							(all 5.7-11.2)
BPT-BH014	8.10	9.70	C		29/6/22																				1											At 9.5m PL axial
BPT-BH014	9.70	11.10	C		29/6/22																															
BPT-BH014	11.10	12.70	C		29/6/22																															
BPT-BH014	12.70	14.10	C		29/6/22																		1		2											at 13.8m, PL axial and diametral
BPT-BH014	14.10	15.50	C		29/6/22																															
BPT-BH014	15.50	17.10	C		29/6/22																															
BPT-BH014	17.10	18.70	C		29/6/22																															
BPT-BH014	18.70	20.00	C		29/6/22																															
BPT-BH015	**0.00**	**2.00**	**C**		30/6/22																				1											at 1m Pl axial and diametral
BPT-BH015	*0.5*	*15*				*Very strong apparently massive grey 'marbled' light grey and white slightly bioclastic fine and coarse grained LIMESTONE.*																																	
BPT-BH015	2.00	3.50	C		30/6/22																															
BPT-BH015	3.50	5.00	C		30/6/22																				1											at 4.9m PL axial
BPT-BH015	5.00	6.50	C		30/6/22																		1		0*											at 6.0 PL axial, PL missed.
BPT-BH015	6.50	8.00	C		30/6/22																															
BPT-BH015	8.00	9.50	C		30/6/22																				1											at 8.3m PL axial
BPT-BH015	9.50	11.00	C		30/6/22																															

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Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Size Distribution	Hydrometer	Sulphate Water Gravimetric	ph	BRE Suite B	Consolidation	Swelling Pressure	Laboratory Vane	Small Direct Shearbox	Ring shear Test	Triaxial Quick Undrained	(Specify Cell Pressure)	Triaxial UU Multi Stage	Triaxial UU Multi Specimen	Rock Uniaxial compression	Rock Uniaxial compression with measurement of Youngs Modulus and Poisson's ratio	Point Load	Mohr Hardness	Particle Density & Water absorption	Mag Sulphate Soundness	Los Angeles	Slake Durability	Flakiness Index	Simplified Petrography	Chemical Analysis	Brazilian Tensile Rock Test	Direct shear strength of rock discontinuity	Comment
BPT-BH015	11.00	12.50	C		1/7/22																															
BPT-BH015	12.50	14.00	C		1/7/22																															
BPT-BH015	14.00	15.00	C		1/7/22																															
BPT-BH016	**0.00**	**2.00**	**C**		4/7/22						**1**	**1**																								pH and SO4 at 0.5m, Envirolab 22-11464
BPT-BH016	**0.00**	**2.00**	**C**		4/7/22																				**2**											pH and SO4 at 0.5m, PL axial and diametral at 1.7m
BPT-BH016	*1*	*13*				*Very strong apparently massive grey 'marbled' light grey and white fine and coarse grained LIMESTONE.*																															
BPT-BH016	2.00	3.60	C		4/7/22																															
BPT-BH016	3.60	5.10	C		4/7/22																				**1**											at 4.9m PL axial
BPT-BH016	5.10	6.60	C		4/7/22																															
BPT-BH016	6.60	8.10	C		4/7/22																															
BPT-BH016	8.10	9.60	C		4/7/22																		**1**		**1**											at 8.2m, PL axial
BPT-BH016	9.60	11.10	C		4/7/22																															
BPT-BH016	11.10	12.60	C		4/7/22																															
BPT-BH016	12.60	13.00	C		4/7/22																				**1**											at 12.8m PL axial
BPT-BH018	**0.00**	**2.00**	**C**		8/7/22		**1**		**1**	**1**																										at 1m
BPT-BH018	2.00	3.50	C		8/7/22																															at 2m
BPT-BH018	3.50	5.00	C		8/7/22		**1**		**1**	**1**	**1**	**1**																								at 4.5m. Envirolab 22-11464
BPT-BH018	5.00	6.50	C		15/7/22																															
BPT-BH018	6.50	8.00	C		15/7/22																															
BPT-BH018	8.00	9.50	C		15/7/22																		**1**		**2**											at 8m PL axial, at 9m UCS and PL axial and diametral
BPT-BH018	9.50	10.00	C		15/7/22																															
BPT-BH018	10.00	11.50	C		15/7/22		**1**		**1**	**1**																										at 11.3m
BPT-BH018	11.50	13.00	C		18/7/22																															
BPT-BH018	13.00	14.50	C		18/7/22						**1**	**1**																								at 14m. Envirolab 22-11888
BPT-BH018	14.50	17.00	C		18/7/22		**1**		**1**	**1**							**1**			Normal load 150, 300, 600																at 15m
BPT-BH018	17.00	18.50	C		18/7/22																															
BPT-BH018	18.50	19.00	C		18/7/22																															
BPT-BH018	19.00	20.00	C		18/7/22																															
BPT-BH018	20.00	21.50	C		19/7/22																															
BPT-BH018	21.50	23.00	C		19/7/22																															
BPT-BH018	23.00	24.50	C		19/7/22		**1**	**1**																												at 24.5m
BPT-BH018	24.50	26.00	C		19/7/22																															
BPT-BH018	24.60	26.10	C		19/7/22																															
BPT-BH018	26.00	27.50	C		19/7/22																		**1**		**2**											at 27m, PL axial and diametral
BPT-BH018	27.50	29.00	C		19/7/22																															
BPT-BH018	29.00	30.50	C		19/7/22																															
BPT-BH018	30.50	32.00	C		19/7/22																															
BPT-BH018	32.00	33.50	C		19/7/22																															
BPT-BH018	33.50	35.00	C		19/7/22																															
BPT-BH018	35.00	36.50	C		20/7/22																															
BPT-BH018	36.50	38.00	C		20/7/22																															
BPT-BH018	38.00	40.00	C		20/7/22																															
BPT-BH018	*38.8*	*43*				*Strong apparently massive grey 'marbled' light grey and white fine grained LIMESTONE.*																															
BPT-BH018	40.00	41.30	C		20/7/22																															
BPT-BH018	41.30	43.00	C		20/7/22																															
BPT-BH019	**0.00**	**2.00**	**C**		28/7/22																															
BPT-BH019	2.00	3.50	C		28/7/22																				**1**											at 2.5m PL axial and diametral

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Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Size Distribution	Hydrometer	Sulphate Water Gravimetric	ph	BRE Suite B	Consolidation	Swelling Pressure	Laboratory Vane	Small Direct Shearbox	Ring shear Test	Triaxial Quick Undrained	(Specify Cell Pressure)	Triaxial UU Multi Stage	Triaxial UU Multi Specimen	Rock Uniaxial compression	Rock Uniaxial compression with measurement of Youngs Modulus and Poisson's ratio	Point Load	Mohr Hardness	Particle Density & Water absorption	Mag Sulphate Soundness	Los Angeles	Slake Durability	Flakiness Index	Simplified Petrography	Chemical Analysis	Brazilian Tensile Rock Test	Direct shear strength of rock discontinuity	Comment
BPT-BH019	2.00	3.50	C		28/7/22																			0*												* ucs not possible
BPT-BH019	*2.4*	*30.5*				*Very strong apparently massive grey 'marbled' dark grey and white fine grained LIMESTONE.*																																
BPT-BH019	3.50	5.00	C		29/7/22																															
BPT-BH019	5.00	6.50	C		29/7/22																					1	1	0	1	1	1		0*			at 5.5m
BPT-BH019	6.50	8.00	C		29/7/22																															
BPT-BH019	8.00	9.50	C		29/7/22																					1										at 8m PL axial
BPT-BH019	8.00	9.50	C		29/7/22																															
BPT-BH019	9.50	11.00	C		29/7/22																														1	Shear: 10.7-10.85m
BPT-BH019	11.00	12.50	C		29/7/22																					1										at 11.75 PL axial
BPT-BH019	12.50	14.00	C		29/7/22																															
BPT-BH019	14.00	15.50	C		29/7/22																						0			1						at 14.5m. (Send all 14-17m)
BPT-BH019	15.50	17.00	C		29/7/22																					1										at 15.9m PL axial
BPT-BH019	15.50	17.00	C		29/7/22																															
BPT-BH019	17.00	18.50	C		29/7/22																															
BPT-BH019	18.50	20.00	C		29/7/22																					1										at 18.5 PL axial
BPT-BH019	20.00	21.50	C		2/8/22																															
BPT-BH019	21.50	23.00	C		2/8/22																															
BPT-BH019	23.00	24.50	C		2/8/22																															
BPT-BH019	24.50	26.00	C		2/8/22																															
BPT-BH019	26.00	27.50	C		2/8/22																															
BPT-BH019	27.50	29.00	C		2/8/22																															
BPT-BH019	29.00	30.50	C		2/8/22																															
BPT-BH020	**0.00**	**2.00**	**C**		26/7/22																															
BPT-BH020	2.00	3.50	C		26/7/22																															
BPT-BH020	3.50	5.00	C		26/7/22		1	1	1	1	1	1				0*																				at 3.7m PSD MC and atterberg, at 4.5m pH and sulphate. * lab vane at 4.9m not possible. Envirolab 22-11464
BPT-BH020	5.00	6.50	C		26/7/22																															
BPT-BH020	6.50	8.00	C		26/7/22		1	1	1	1																											at 7.5m
BPT-BH020	8.00	9.50	C		26/7/22																															
BPT-BH020	9.50	11.00	C		26/7/22																															
BPT-BH020	11.00	12.50	C		27/7/22																															
BPT-BH020	12.50	14.00	C		27/7/22		1	1								0*																				*Vane at 13.75m not possible
BPT-BH020	14.00	15.50	C		27/7/22				1	1																											at 14.8m
BPT-BH020	*15*	*17.1*				*Very strong apparently massive grey 'marbled' light grey and white fine and coarse grained LIMESTONE.*																																
BPT-BH020	15.50	17.00	C		27/7/22																					1										at 16.5m PL axial
BPT-BH020	17.00	18.50	C		27/7/22		1	1												150, 300, 600		1														at 17.5m
BPT-BH020	18.50	20.00	C		27/7/22											0*																				*Vane at 18.5m not possible
BPT-BH020	20.00	21.50	C		27/7/22																															
BPT-BH020	21.50	23.00	C		27/7/22																					1										at 22.6m PL axial
BPT-BH020	23.00	24.50	C		27/7/22																															
BPT-BH020	24.50	26.00	C		27/7/22																															
BPT-BH020	26.00	27.50	C		27/7/22																		1			1										at 26.5m PL axial
BPT-BH020	*26*	*35*				*Very strong apparently massive grey 'marbled' light grey and brownish white fine grained LIMESTONE.*																																
BPT-BH020	27.50	29.00	C		27/7/22																															
BPT-BH020	29.00	30.50	C		28/7/22																															
BPT-BH020	30.50	32.00	C		28/7/22																															
BPT-BH020	32.00	33.50	C		28/7/22																															
BPT-BH020	33.50	35.00	C		28/7/22																															

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Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Size Distribution	Hydrometer	Sulphate Water Gravimetric	ph	BRE Suite B	Consolidation	Swelling Pressure	Laboratory Vane	Small Direct Shearbox	Ring shear Test	Triaxial Quick Undrained	(Specify Cell Pressure)	Triaxial UU Multi Stage	Triaxial UU Multi Specimen	Rock Uniaxial compression	Rock Uniaxial compression with measurement of Youngs Modulus and Poisson's ratio	Point Load	Mohr Hardness	Particle Density & Water absorption	Mag Sulphate Soundness	Los Angeles	Slake Durability	Flakiness Index	Simplified Petrography	Chemical Analysis	Brazilian Tensile Rock Test	Direct shear strength of rock discontinuity	Comment
BPT-BH021	**0.00**	**2.00**	**C**		21/7/22																				1											at 1.75m PL axial
BPT-BH021	2.00	3.50	C		21/7/22																															
BPT-BH021	*2.5*	*30.5*				*Very strong apparently massive grey 'marbled' dark grey and brownish orangish white fine grained LIMESTONE.*																																
BPT-BH021	3.50	5.00	C		21/7/22																														1	
BPT-BH021	3.50	5.00	C		21/7/22																		1		1											first available core run PL axial and dia
BPT-BH021	5.00	6.50	C		21/7/22						1	1																								Envirolab 22-11464
BPT-BH021	5.00	6.50	C		21/7/22																				1											at 6m PL axial
BPT-BH021	6.50	8.00	C		21/7/22																															
BPT-BH021	8.00	9.50	C		21/7/22																															
BPT-BH021	9.50	11.00	C		21/7/22																				1											at 10m PL axial
BPT-BH021	9.50	11.00	C		21/7/22																															
BPT-BH021	11.00	12.50	C		22/7/22																					1			1							at 11.5m (send all 11-14m)
BPT-BH021	12.50	14.00	C		22/7/22						0	0																								
BPT-BH021	12.50	14.00	C		22/7/22																				1											at 13m PL axial
BPT-BH021	14.00	15.50	C		22/7/22																															
BPT-BH021	15.50	17.00	C		22/7/22																				1											at 16m PL axial
BPT-BH021	17.00	18.50	C		22/7/22																															
BPT-BH021	18.50	20.00	C		22/7/22																															
BPT-BH021	20.00	21.50	C		22/7/22																															
BPT-BH021	21.50	23.00	C		22/7/22																															
BPT-BH021	23.00	24.50	C		22/7/22																															
BPT-BH021	24.50	26.00	C		22/7/22																															
BPT-BH021	26.00	27.50	C		22/7/22																															
BPT-BH021	27.50	29.00	C		22/7/22																															
BPT-BH021	29.00	30.50	C		22/7/22																															
BPT-BH022	**0.00**	**2.00**	**C**		3/8/22																															
BPT-BH022	2.00	3.50	C		3/8/22						1	1																								pH and sulphate @ 2.4m. Envirolab 22-12071
BPT-BH022	2.00	3.50	C		3/8/22																				2											pH and sulphate @ 2.4m. PL (A&D) @ 3m
BPT-BH022	*2.5*	*30.5*				*Very strong apparently massive light grey 'marbled' dark grey and white fine grained LIMESTONE.*																														
BPT-BH022	3.50	5.00	C		3/8/22																				1											PL(A) @ 4.5m
BPT-BH022	5.00	6.50	C		3/8/22																								1					1		Tensile and LA @ 6.2-6.5m
BPT-BH022	5.00	6.50	C		3/8/22																															
BPT-BH022	6.50	8.00	C		3/8/22																		1		1											7-7.5 UCS and PL axial
BPT-BH022	6.50	8.00	C		3/8/22																															
BPT-BH022	8.00	9.50	C		3/8/22																															
BPT-BH022	9.50	11.00	C		3/8/22																															
BPT-BH022	11.00	12.50	C		3/8/22																				1											PL axial at 11.5m
BPT-BH022	12.50	14.00	C		3/8/22																				1											PL axial at 13.5m
BPT-BH022	14.00	15.50	C		4/8/22																															
BPT-BH022	15.50	17.00	C		4/8/22																															
BPT-BH022	17.00	18.50	C		4/8/22																															
BPT-BH022	18.50	20.00	C		4/8/22																															
BPT-BH022	20.00	21.50	C		4/8/22																				1											PL axial at 20m
BPT-BH022	21.50	23.00	C		4/8/22																															
BPT-BH022	23.00	24.50	C		4/8/22																															
BPT-BH022	24.50	26.00	C		4/8/22																															
BPT-BH022	26.00	27.50	C		4/8/22																															
BPT-BH022	27.50	29.00	C		4/8/22																															
BPT-BH022	29.00	30.50	C		4/8/22																															
BPT-BH023	**0.00**	**2.00**	**C**		6/7/22				1	1																										PSD at 1.9m

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Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Size Distribution	Hydrometer	Sulphate Water Gravimetric	ph	BRE Suite B	Consolidation	Swelling Pressure	Laboratory Vane	Small Direct Shearbox	Ring shear Test	Triaxial Quick Undrained	(Specify Cell Pressure)	Triaxial UU Multi Stage	Triaxial UU Multi Specimen	Rock Uniaxial compression	Rock Uniaxial compression with measurement of Youngs Modulus and Poisson's ratio	Point Load	Mohr Hardness	Particle Density & Water absorption	Mag Sulphate Soundness	Los Angeles	Slake Durability	Flakiness Index	Simplified Petrography	Chemical Analysis	Brazilian Tensile Rock Test	Direct shear strength of rock discontinuity	Comment
BPT-BH023	2.00	3.50	C		6/7/22		1	1								0*																				* Vane at 2.5m Not possible
BPT-BH023	3.50	5.00	C		6/7/22		1	1	1	1						0*																				at 3.7m, PSD. * vane at 4.5m NOT POSSIBLE
BPT-BH023	5.00	6.50	C		6/7/22																															
BPT-BH023	6.50	8.00	C		6/7/22		1	1																												at 7.4m
BPT-BH023	*7.4*	*25*				*Very strong apparently massive grey 'marbled' light grey and white fine and coarse grained LIMESTONE.*																																
BPT-BH023	8.00	9.50	C		6/7/22																				2											PL axial at 8m, PL axial at 9m
BPT-BH023	9.50	11.00	C		6/7/22																		1		1											at 9.5m, PL axial and diametral
BPT-BH023	11.00	12.50	C		7/7/22																															
BPT-BH023	12.50	14.00	C		7/7/22																															
BPT-BH023	14.00	15.50	C		7/7/22																				1											at 15m PL axial
BPT-BH023	15.50	17.00	C		7/7/22																															
BPT-BH023	17.00	18.50	C		7/7/22																															
BPT-BH023	18.50	20.00	C		7/7/22																															
BPT-BH023	20.00	21.50	C		7/7/22																															
BPT-BH023	21.50	23.00	C		7/7/22																															
BPT-BH023	23.00	24.50	C		7/7/22																															
BPT-BH023	24.50	25.00	C		7/7/22																															
BPT-BH024	**0.00**	**1.50**	**C**		18/8/22																															
BPT-BH024	1.50	2.00	C		18/8/22																															
BPT-BH024	2.00	3.50	C		18/8/22																				1											PL(A) at 2.8m
BPT-BH024	3.50	5.00	C		18/8/22						1	1																								pH, SO4 at 4.5m, envirolab 23-00120
BPT-BH024	5.00	6.50	C		18/8/22		1	1	1	1																										PSD and LL at 5.3-5.8m
BPT-BH024	6.50	7.50	C		18/8/22		1	1																												MC and LL at 6.5m and 7.5m
BPT-BH024	7.50	8.00	C		18/8/22		1	1																												MC and LL at 6.5m and 7.5m
BPT-BH024	8.00	9.50	C		18/8/22									1	160, 320, 640, 1280, 320, 160, 80					80, 160, 320	1															Consolidation and UUT at 8.0-8.5m
BPT-BH024	*9.3*	*9.75*				*Very strong apparently massive grey 'marbled' white fine grained LIMESTONE.*																																
BPT-BH024	9.50	11.00	C		18/8/22																				1											PL (A) at 9.7m
BPT-BH024	11.00	12.50	C		18/8/22		1	1																												MT and LL at 11m
BPT-BH024	12.50	14.00	C		18/8/22																				1											PL (A) at 13.5m
BPT-BH024	14.00	15.50	C		18/8/22																															
BPT-BH024	15.50	17.00	C		19/8/22																				0*											PL (A) at 16.0m. *not possible
BPT-BH024	17.00	18.50	C		19/8/22		1	1																												MC and LL at 17.2m
BPT-BH024	18.50	20.00	C		19/8/22																															
BPT-BH024	20.00	21.50	C		19/8/22																				1											PL (A) at 20.5m
BPT-BH024	*20*	*35*				*Very strong apparently massive grey 'marbled' light grey brownish white and white fine grained LIMESTONE.*																																
BPT-BH024	21.50	23.00	C		19/8/22																		1		2											UCS and PL (A) + (D) at 22.0m
BPT-BH024	23.00	24.50	C		19/8/22																															
BPT-BH024	24.50	26.00	C		19/8/22																															
BPT-BH024	26.00	27.50	C		19/8/22																															
BPT-BH024	27.50	29.00	C		19/8/22																															
BPT-BH024	29.00	30.50	C		22/8/22																															
BPT-BH024	30.50	32.00	C		22/8/22																															
BPT-BH024	32.00	33.50	C		22/8/22																															

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Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Size Distribution	Hydrometer	Sulphate Water Gravimetric	ph	BRE Suite B	Consolidation	Swelling Pressure	Laboratory Vane	Small Direct Shearbox	Ring shear Test	Triaxial Quick Undrained	(Specify Cell Pressure)	Triaxial UU Multi Stage	Triaxial UU Multi Specimen	Rock Uniaxial compression	Rock Uniaxial compression with measurement of Youngs Modulus and Poisson's ratio	Point Load	Mohr Hardness	Particle Density & Water absorption	Mag Sulphate Soundness	Los Angeles	Slake Durability	Flakiness Index	Simplified Petrography	Chemical Analysis	Brazilian Tensile Rock Test	Direct shear strength of rock discontinuity	Comment
BPT-BH024	33.50	35.00	C		22/8/22																															
BPT-BH025	**0.00**	**2.00**	**C**		15/8/22																															
BPT-BH025	2.00	3.50	C		15/8/22																				1											PL axial and dia @ 2m
BPT-BH025	*2*	*35*				*Very strong apparently massive grey 'marbled' orangish white grey and white fine grained LIMESTONE.*																																
BPT-BH025	3.50	5.00	C		15/8/22								1																							BRE @ 3.5m Envirolab 22-12071
BPT-BH025	3.50	5.00	C		15/8/22																				1											BRE @ 3.5m PL axial at 4.8m
BPT-BH025	5.00	6.50	C		15/8/22																		1		2											UCS and PL axial and dia @ 5.5-6.0m
BPT-BH025	6.50	8.00	C		15/8/22																															
BPT-BH025	8.00	9.50	C		15/8/22																				1											PL (A) at 9.3m
BPT-BH025	9.50	11.00	C		15/8/22																															
BPT-BH025	11.00	12.50	C		15/8/22																				1											PL axial at 11.5m
BPT-BH025	12.50	14.00	C		15/8/22																															
BPT-BH025	14.00	15.50	C		15/8/22																															
BPT-BH025	15.50	17.00	C		15/8/22																				1											PL axial at 16m
BPT-BH025	17.00	18.50	C		15/8/22																															
BPT-BH025	18.50	20.00	C		16/8/22																															
BPT-BH025	20.00	21.50	C		16/8/22																															
BPT-BH025	21.50	23.00	C		16/8/22																															
BPT-BH025	23.00	24.50	C		16/8/22																															
BPT-BH025	24.50	26.00	C		16/8/22																															
BPT-BH025	26.00	27.50	C		16/8/22																															
BPT-BH025	27.50	29.00	C		16/8/22																															
BPT-BH025	29.00	30.50	C		17/8/22																															
BPT-BH025	30.50	32.00	C		17/8/22																															
BPT-BH025	32.00	33.50	C		17/8/22																															
BPT-BH025	33.50	35.00	C		17/8/22																															
BPT-BH026	**0.00**	**1.50**	**C**		11/8/22																															
BPT-BH026	*0.1*	*8*				*Weathered rock. Recovered as angular fine to coarse gravel and cobble sized clasts of very strong apparently massive grey 'marbled' dark grey and white fine grained limestone with some orangish brown clay.*																																
BPT-BH026	1.50	2.00	C		11/8/22																				2											PL axial and dia at 2.7m
BPT-BH026	2.00	3.50	C		11/8/22																															
BPT-BH026	3.50	5.00	C		11/8/22																															
BPT-BH026	5.00	6.50	C		11/8/22																		1		1											PL axial and UCS at 6-6.5m
BPT-BH026	6.50	8.00	C		11/8/22																															
BPT-BH026	8.00	9.50	C		11/8/22																								1							LA at 8-8.5m
BPT-BH026	8.00	9.50	C		11/8/22																				1											PL axial and LA at 8-8.5m
BPT-BH026	*8*	*35*				*Very strong apparently massive grey 'marbled' light grey and white fine grained LIMESTONE.*																																
BPT-BH026	9.50	11.00	C		11/8/22																															
BPT-BH026	11.00	12.50	C		11/8/22																															
BPT-BH026	12.50	14.00	C		11/8/22																															
BPT-BH026	14.00	15.50	C		11/8/22																				1											PL axial at 13.5m
BPT-BH026	15.50	17.00	C		12/8/22																															
BPT-BH026	17.00	18.50	C		12/8/22																															
BPT-BH026	18.50	20.00	C		12/8/22																				1											PL axial at 18.5m
BPT-BH026	20.00	21.50	C		12/8/22																															
BPT-BH026	21.50	23.00	C		12/8/22																															
BPT-BH026	23.00	24.50	C		12/8/22																															
BPT-BH026	24.50	26.00	C		12/8/22																															
BPT-BH026	26.00	27.50	C		12/8/22																															
BPT-BH026	27.50	29.00	C		12/8/22																															
BPT-BH026	29.00	30.50	C		12/8/22																															
BPT-BH026	30.50	32.00	C		12/8/22																															

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Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Size Distribution	Hydrometer	Sulphate Water Gravimetric	ph	BRE Suite B	Consolidation	Swelling Pressure	Laboratory Vane	Small Direct Shearbox	Ring shear Test	Triaxial Quick Undrained	(Specify Cell Pressure)	Triaxial UU Multi Stage	Triaxial UU Multi Specimen	Rock Uniaxial compression	Rock Uniaxial compression with measurement of Youngs Modulus and Poisson's ratio	Point Load	Mohr Hardness	Particle Density & Water absorption	Mag Sulphate Soundness	Los Angeles	Slake Durability	Flakiness Index	Simplified Petrography	Chemical Analysis	Brazilian Tensile Rock Test	Direct shear strength of rock discontinuity	Comment
BPT-BH026	32.00	33.50	C		12/8/22																															
BPT-BH026	33.50	35.00	C		12/8/22																															
BPT-BH027	**0.00**	**2.00**	**C**		5/8/22																															
BPT-BH027	2.00	3.50	C		5/8/22																															
BPT-BH027	3.50	5.00	C		5/8/22				1	1																										PSD at 3.5m
BPT-BH027	5.00	6.50	C		5/8/22						1	1					1			50, 100, 200															Shear at 5-5.5m. SO4 and pH at 5.5-6m. Envirolab 22-12071
BPT-BH027	6.50	8.00	C		5/8/22																															
BPT-BH027	8.00	9.50	C		5/8/22																															
BPT-BH027	9.50		C		5/8/22				1	1																										PSD at 9.5-10m
BPT-BH027	11.00	12.50	C		8/8/22																															
BPT-BH027	12.50	14.00	C		8/8/22																															
BPT-BH027	14.00	15.50	C		8/8/22																															
BPT-BH027	15.50	17.00	C		8/8/22																															
BPT-BH027	17.00	18.50	C		8/8/22				1	1																										PSD at 17-17.5m
BPT-BH027	18.50	20.60	C		8/8/22																															
BPT-BH027	20.60	21.50	C		9/8/22																															
BPT-BH027	21.50	23.00	C		9/8/22																															
BPT-BH027	23.00	24.50	C		9/8/22																															
BPT-BH027	24.50	26.00	C		9/8/22																															
BPT-BH027	26.00	27.50	C		9/8/22																															
BPT-BH027	27.50	29.00	C		9/8/22		1	1	1	1																										PSD and LL at 27.5-29m
BPT-BH027	29.00	30.50	C		9/8/22																															
BPT-BH027	30.50	32.00	C		10/8/22																				1											PL axial at 31.5m
BPT-BH027	32.00	33.50	C		10/8/22																															
BPT-BH027	33.50	35.00	C		10/8/22																		1		1											PL axial and UCS @ 33.6-34.2m
BPT-BH027	*33.5*	*37*				*Very strong apparently massive light grey 'marbled' grey and white fine grained LIMESTONE.*																															
BPT-BH027	35.00	37.00	C		10/8/22																				1											PL axial at 35.5m
BPT-BH028	**0.00**	**2.00**	**C**		23/08/22																															
BPT-BH028	2.00	3.50	C		23/08/22						1	1																									chem at 3m envirolab 22-12071
BPT-BH028	3.50	5.00	C		23/08/22		1	1	1	1																										PSD and LL at 3.5-4.0m
BPT-BH028	5.00	6.50	C		23/08/22																															
BPT-BH028	6.50	8.00	C		23/08/22																															
BPT-BH028	8.00	9.50	C		23/08/22		1	1																												LL at 9m
BPT-BH028	9.50	11.00	C		23/08/22		1	1											1	200	*															Full tube at 9.5-10.0
BPT-BH028	11.00	12.50	C		23/08/22		1	1											1	250	*															Full Tube: MC and ATT at 11m, UUT single at 11.8m
BPT-BH028	*12.1*	*15.1*				*Very strong apparently massive dark grey 'marbled' grey and white fine grained LIMESTONE.*																															
BPT-BH028	12.50	14.00	C		24/08/22																				1											PL axial at 12.5m
BPT-BH028	14.00	15.50	C		24/08/22																															
BPT-BH028	15.50	17.00	C		24/08/22		1	1	1	1																										LL and PSD at 16.0-16.5m
BPT-BH028	17.00	18.50	C		24/08/22																															
BPT-BH028	18.50	20.60	C		24/08/22		1	1																												LL at 19.5m
BPT-BH028	20.60	21.50	C		24/08/22																															
BPT-BH028	21.50	23.00	C		24/08/22																															
BPT-BH028	23.00	24.50	C		24/08/22																															
BPT-BH028	24.50	26.00	C		25/08/22																															
BPT-BH028	26.00	27.50	C		25/08/22		1	1																												LL at 27m
BPT-BH028	27.50	29.00	C		25/08/22																															
BPT-BH028	29.00	30.50	C		25/08/22																															
BPT-BH028	30.50	32.00	C		25/08/22																															
BPT-BH028	32.00	33.50	C		25/08/22		1	1																												LL at 33m

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Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Size Distribution	Hydrometer	Sulphate Water Gravimetric	ph	BRE Suite B	Consolidation	Swelling Pressure	Laboratory Vane	Small Direct Shearbox	Ring shear Test	Triaxial Quick Undrained	(Specify Cell Pressure)	Triaxial UU Multi Stage	Triaxial UU Multi Specimen	Rock Uniaxial compression	Rock Uniaxial compression with measurement of Youngs Modulus and Poisson's ratio	Point Load	Mohr Hardness	Particle Density & Water absorption	Mag Sulphate Soundness	Los Angeles	Slake Durability	Flakiness Index	Simplified Petrography	Chemical Analysis	Brazilian Tensile Rock Test	Direct shear strength of rock discontinuity	Comment
BPT-BH028	33.50	35.00	C		25/08/22																															
BPT-BH028	35.00	36.50	C		25/08/22																				1											PL axial at 35.9m
BPT-BH028	*35.5*	*41*				*Very strong apparently massive dark grey 'marbled' grey and white fine grained LIMESTONE.*																															
BPT-BH028	36.50	38.00	C		25/08/22																		1		1											PL axial and UCS at 37.7m
BPT-BH028	38.00	39.50	C		25/08/22																															
BPT-BH028	39.50	41.00	C		25/08/22																															
BPT-BH029	**0.00**	**2.00**	**C**		26/08/22						1	1																								Chem at 1m envirolab 22-12071
BPT-BH029	2.00	3.50	C		26/08/22																								1							LA at 2.5m
BPT-BH029	2.00	3.50	C		26/08/22																				2											PL axial and dia, LA at 2.5m
BPT-BH029	*2*	*20*				*Very strong apparently massive dark grey 'marbled' grey and white slightly bioclastic fine grained LIMESTONE.*																															
BPT-BH029	3.50	5.00	C		26/08/22																				1											PL axial at 3.5m
BPT-BH029	3.50	5.00	C		26/08/22																															
BPT-BH029	5.00	6.50	C		26/08/22																															
BPT-BH029	6.50	8.00	C		26/08/22																		1		1											UCS and PL axial at 7.5m
BPT-BH029	8.00	9.50	C		26/08/22																															
BPT-BH029	9.50	11.00	C		29/08/22																															
BPT-BH029	11.00	12.50	C		29/08/22																				1											PL axial at 11m
BPT-BH029	12.50	14.00	C		29/08/22																															
BPT-BH029	14.00	15.50	C		29/08/22																															
BPT-BH029	15.50	17.00	C		29/08/22																				1											PL axial at 16.5m
BPT-BH029	17.00	18.50	C		29/08/22																															
BPT-BH029	18.50	20.00	C		29/08/22																															
BPT-BH030	**0.00**	**2.00**	**C**		30/08/22																				2											PL axial and dia at 1.3m
BPT-BH030	*0.3*	*20*				*Very strong apparently massive grey 'marbled' light grey and white fine grained LIMESTONE.*																															
BPT-BH030	2.00	3.50	C		30/08/22																								1							LA at 3m
BPT-BH030	2.00	3.50	C		30/08/22																				1											PL axial and LA at 3m
BPT-BH030	2.00	3.50	C		30/08/22																															
BPT-BH030	3.50	5.00	C		30/08/22																															
BPT-BH030	5.00	6.50	C		30/08/22																		1		1											UCS and PL axial at 5.8-6.3m
BPT-BH030	5.00	6.50	C		30/08/22																															
BPT-BH030	6.50	8.00	C		30/08/22																															
BPT-BH030	8.00	9.50	C		30/08/22																				1											PL axial at 8m
BPT-BH030	9.50	11.00	C		30/08/22																															
BPT-BH030	11.00	12.50	C		30/08/22																															
BPT-BH030	12.50	14.00	C		31/08/22																															
BPT-BH030	14.00	15.50	C		31/08/22																															
BPT-BH030	15.50	17.00	C		31/08/22																															
BPT-BH030	17.00	18.50	C		31/08/22																															
BPT-BH030	18.50	20.00	C		31/08/22																															
BPT-BH031	**0.00**	**2.00**	**C**		01/09/22																															
BPT-BH031	*0.4*	*20*				*Very strong apparently massive dark grey 'marbled' light grey brownish white and white fine grained LIMESTONE.*																															
BPT-BH031	2.00	3.50	C		01/09/22																				2											PL Axial and dia at 2.5m
BPT-BH031	3.50	5.00	C		01/09/22																				1											PL axial at 4m
BPT-BH031	5.00	6.50	C		01/09/22																				1											PL axial at 6m
BPT-BH031	6.50	8.00	C		01/09/22																		1		1											UCS and PL axial 7m
BPT-BH031	8.00	9.50	C		01/09/22																				1											PL axial at 9m
BPT-BH031	9.50	11.00	C		01/09/22																															
BPT-BH031	11.00	12.50	C		01/09/22																															
BPT-BH031	12.50	14.00	C		02/09/22																				1											PL axial at 13.5m
BPT-BH031	14.00	15.50	C		02/09/22																															
BPT-BH031	15.50	17.00	C		02/09/22																															
BPT-BH031	17.00	18.50	C		02/09/22																				1											PL axial at 17m

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Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Size Distribution	Hydrometer	Sulphate Water Gravimetric	ph	BRE Suite B	Consolidation	Swelling Pressure	Laboratory Vane	Small Direct Shearbox	Ring shear Test	Triaxial Quick Undrained	(Specify Cell Pressure)	Triaxial UU Multi Stage	Triaxial UU Multi Specimen	Rock Uniaxial compression	Rock Uniaxial compression with measurement of Youngs Modulus and Poisson's ratio	Point Load	Mohr Hardness	Particle Density & Water absorption	Mag Sulphate Soundness	Los Angeles	Slake Durability	Flakiness Index	Simplified Petrography	Chemical Analysis	Brazilian Tensile Rock Test	Direct shear strength of rock discontinuity	Comment
BPT-BH031	18.50	20.00	C		02/09/22																															
BPT-BH032	**0.00**	**2.00**	**C**		05/09/22																															
BPT-BH032	2.00	2.60	C		05/09/22																															
BPT-BH032	2.60	3.50	C		05/09/22								1																							Chem BRE 2.6-3.5m envirolab 22-12071
BPT-BH032	*2.9*	*14.65*				*Very strong apparently massive brownish grey 'marbled' grey and white slightly bioclastic fine grained LIMESTONE.*																																
BPT-BH032	3.50	5.00	C		05/09/22																				2											PL axial and dia at 3.8m
BPT-BH032	5.00	6.50	C		05/09/22																		0*		1											PL axial and UCS at 5.7-6.2m. *UCS broke during prep
BPT-BH032	6.50	8.00	C		05/09/22																															
BPT-BH032	8.00	9.50	C		05/09/22																				1											PL axial at 8m
BPT-BH032	9.50	11.00	C		05/09/22																				1											PL axial at 10m
BPT-BH032	11.00	12.50	C		06/09/22																															
BPT-BH032	12.50	14.00	C		06/09/22		1	1																												MC and LL on clay infill roughly at 13m
BPT-BH032	14.00	15.50	C		06/09/22																				1											PL axial at 15m
BPT-BH032	*14.65*	*15.4*				*Very strong apparently massive brownish grey 'marbled' grey and white slightly bioclastic fine grained LIMESTONE.*																																
BPT-BH032	*15.4*	*29*				*Very strong apparently massive brownish grey 'marbled' grey and white slightly bioclastic fine grained LIMESTONE.*																																
BPT-BH032	15.50	17.00	C		06/09/22																															
BPT-BH032	17.00	18.50	C		06/09/22																				1											PL axial at 18m
BPT-BH032	18.50	20.60	C		06/09/22																															
BPT-BH032	20.60	21.50	C		06/09/22																															
BPT-BH032	21.50	23.00	C		06/09/22																				1											PL axial at 21.5m
BPT-BH032	23.00	24.50	C		07/09/22																															
BPT-BH032	24.50	26.00	C		07/09/22																															
BPT-BH032	26.00	27.50	C		07/09/22																															
BPT-BH032	27.50	29.00	C		07/09/22		1	1																												MC and LL on infill roughly at 28.5m
BPT-BH032	29.00	30.50	C		07/09/22																															
BPT-BH032	*29*	*35*				*Extremely strong apparently massive light grey 'marbled' grey and white fine grained LIMESTONE.*																																
BPT-BH032	30.50	32.00	C		07/09/22																															
BPT-BH032	32.00	33.50	C		07/09/22																															
BPT-BH032	33.50	35.00	C		07/09/22																															

Summary of Classification Test Results

Project No.	Project Name
2021OY102	WSP Eastern & Midlands Region

Hole No.	Sample Ref	Top	Base	Type		Soil Description	Density bulk Mg/m3	Density dry Mg/m3	w %	Passing 425µm %	LL %	PL %	PI %	Particle density Mg/m3	Remarks
BPT-BH001	2	1.00		D		Light brown slightly sandy slightly gravelly SILT.			11.0	63	21	13	8		CL
BPT-BH001	4	1.00	1.70	B		Light brown slightly sandy slightly gravelly SILT.			9.5	57					
BPT-BH005	2	1.00		D		Light brown slightly gravelly slightly sandy SILT.			19.0	65	38	23	15		MI
BPT-BH005	4	1.00	2.00	B		Light brown slightly gravelly slightly sandy SILT.			29.0	78					
BPT-BH009	2	0.70		D		Light brown slightly gravelly slightly sandy SILT.			13.0	49	38	24	14		CI
BPT-INF001	1	0.50	0.80	B		Light brown slightly gravelly slightly sandy SILT.			11.0	65					
BPT-INF001	2	0.80		D		Light brown slightly gravelly slightly sandy SILT.			9.4	66	20	13	7		CL.
BPT-INF001	3	1.50	1.80	B		Light brown slighlty silty very sandy medium GRAVEL.			7.8	18					
BPT-TP004	1	0.50	0.80	B		Light brown slightly gravelly sandy SILT.			11.0	60					
BPT-TP004	2	0.80		D		Light brown slightly gravelly sandy SILT.			11.0	65	21	14	7		CL
BPT-TP023	1	0.50	0.80	B		Light brown silty SAND and medium GRAVEL.			8.6	41					
BPT-TP023	2	0.80		D		Light brown silty SAND and medium GRAVEL.			6.6	32					NP
BPT-TP027	1	0.25	0.40	B		Light brown slightly gravelly slightly sandy SILT.			11.0	60					
BPT-TP027	2	0.40		D		Light brown slightly gravelly slightly sandy SILT.			12.0	58	28	21	7		CL
BPT-TP028	1	0.20	0.40	B		Slightly gravelly sandy SILT.			19.0	71					
BPT-TP028	3	0.50	0.80	B		Light brown slightly gravelly sandy SILT.			18.0	55					

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

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

Density test | Liquid Limit | Particle density

Linear measurement unless : | 4pt cone unless : | sp - small pyknometer

wd - water displacement | 1pt - single point test | gj - gas jar

wi - immersion in water | NP - Non Plastic

Date Printed: Feb 9th 2023 02/09/2023 00:00

QC From No: R1

Approved By: Administrator

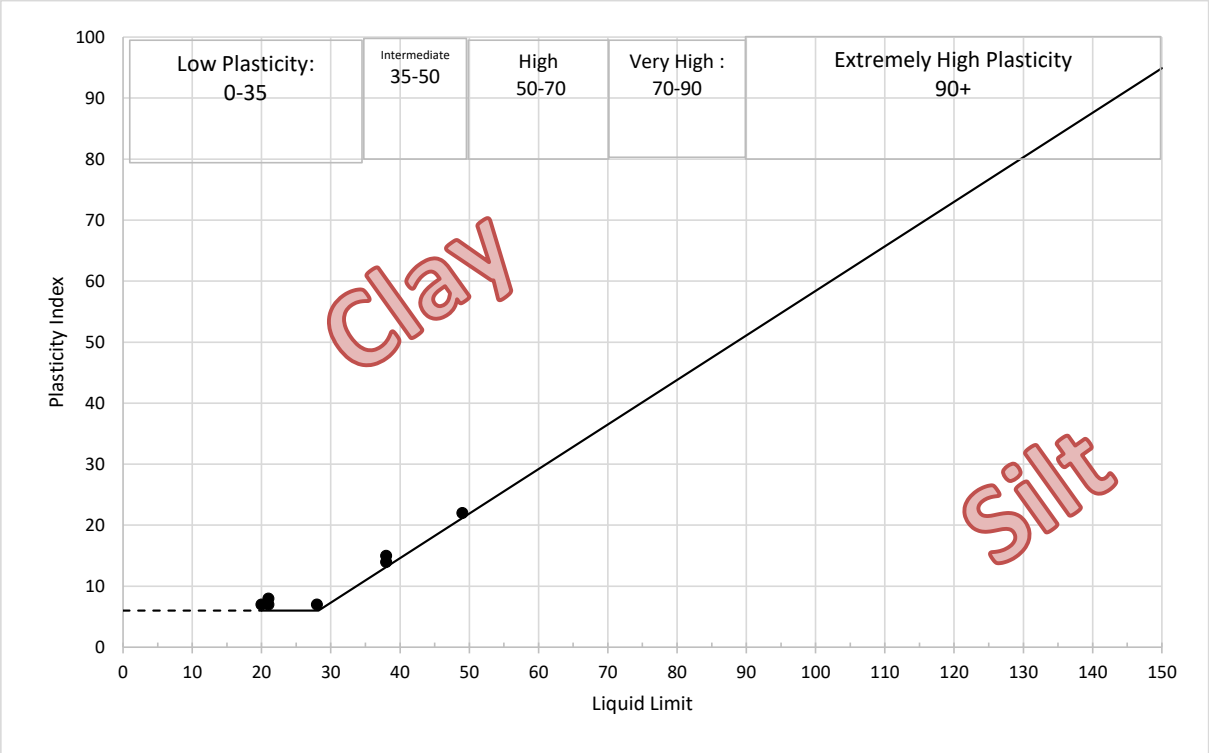
Table 1

sheet 1

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

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

	Plasticity (A-Line) Chart	Project Number
Project Name:	**WSP Eastern & Midlands Region**	
Location:		2021OY102



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

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

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

Chart taken from BS5930: 2010

QC Form: R1

SUMMARY OF SOIL CLASSIFICATION TESTS

In accordance with Part 1,Part 12 of BS EN ISO 17892

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Water Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425um	Description of Sample
BPT-TP001	2	D	0.80	10.4	22	14	8	43	Brown slightly gravelly slightly sandy CLAY
BPT-TP002	2	D	0.70	7.9	59	15	44	41	Brown slightly gravelly slightly sandy CLAY
BPT-TP002	4	D	1.70	13.7	28	20	8	27	Brown slightly gravelly sandy CLAY
BPT-TP005	2	D	0.70	8.4	21	13	8	46	Brown slightly gravelly sandy CLAY
BPT-TP005	4	D	2.00	9.5	NP	NP	NP	43	Brown slightly gravelly sandy SILT
BPT-TP006	2	D	0.70	9.8	NP	NP	NP	46	Brown slightly gravelly silty SAND
BPT-TP007	2	D	0.50	8.2	30	18	12	22	Brown slightly gravelly clayey SAND
BPT-TP009	2	D	0.70	9.0	21	13	8	41	Brown slightly gravelly slightly sandy CLAY

SYMBOLS: * denotes BS 1377

STRUCTURAL SOILS LTD

Contract:

Lot 3 Eastern & Midlands WSP

Contract Ref:

785305

AGS

SUMMARY OF SOIL CLASSIFICATION TESTS

In accordance with Part 1,Part 12 of BS EN ISO 17892

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Water Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425um	Description of Sample
BPT-TP009	4	D	2.30	12.0	26	18	8	33	Brownish white gravelly CLAY with chalk
BPT-TP010	2	D	0.80	12.7	25	19	6	32	Brown slightly gravelly sandy CLAY
BPT-TP012	2	D	0.60	9.7	19	12	7	46	Grey brown slightly gravelly sandy CLAY
BPT-TP012	4	D	1.60	8.2	20	13	7	40	Brown slightly gravelly sandy CLAY
BPT-TP014	2	D	0.80	9.1	21	13	8	50	Brown slightly gravelly sandy CLAY
BPT-TP014	4	D	2.10	10.5	22	12	10	46	Brown slightly gravelly sandy CLAY
BPT-TP015	2	D	0.80	11.5	26	16	10	44	Brown slightly gravelly sandy CLAY
BPT-TP015	4	D	1.80	22.6	38	25	13	60	Brown slightly gravelly slightly sandy clayey SILT

SYMBOLS: * denotes BS 1377

STRUCTURAL SOILS LTD

Contract:

Lot 3 Eastern & Midlands WSP

Contract Ref:

785305

AGS

SUMMARY OF SOIL CLASSIFICATION TESTS

In accordance with Part 1,Part 12 of BS EN ISO 17892

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Water Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425um	Description of Sample
BPT-TP016	2	D	0.40	17.2	40	18	22	35	Brown slightly gravelly slightly sandy CLAY
BPT-TP029	4	D	0.90	9.8	26	18	8	34	Grey brown slightly gravelly sandy CLAY
BPT-TP030	2	D	0.90	12.2	25	15	10	42	Grey slightly gravelly sandy CLAY
BPT-TP031	3	D	2.00	9.3	18	14	4	44	Brown slightly gravelly sandy CLAY
BPT-TP032	2	D	0.60	19.8	30	18	12	40	Brown gravelly slightly sandy CLAY
BPT-TP032	4	D	1.60	7.8	29	16	13	37	Brown slightly gravelly sandy CLAY
BPT-TP033	2	D	0.90	6.6	18	13	5	27	Grey slightly gravelly sandy CLAY
BPT-TP034	2	D	1.00	9.2	23	15	8	39	Grey slightly gravelly sandy CLAY

SYMBOLS: * denotes BS 1377

SUMMARY OF SOIL CLASSIFICATION TESTS

In accordance with Part 1,Part 12 of BS EN ISO 17892

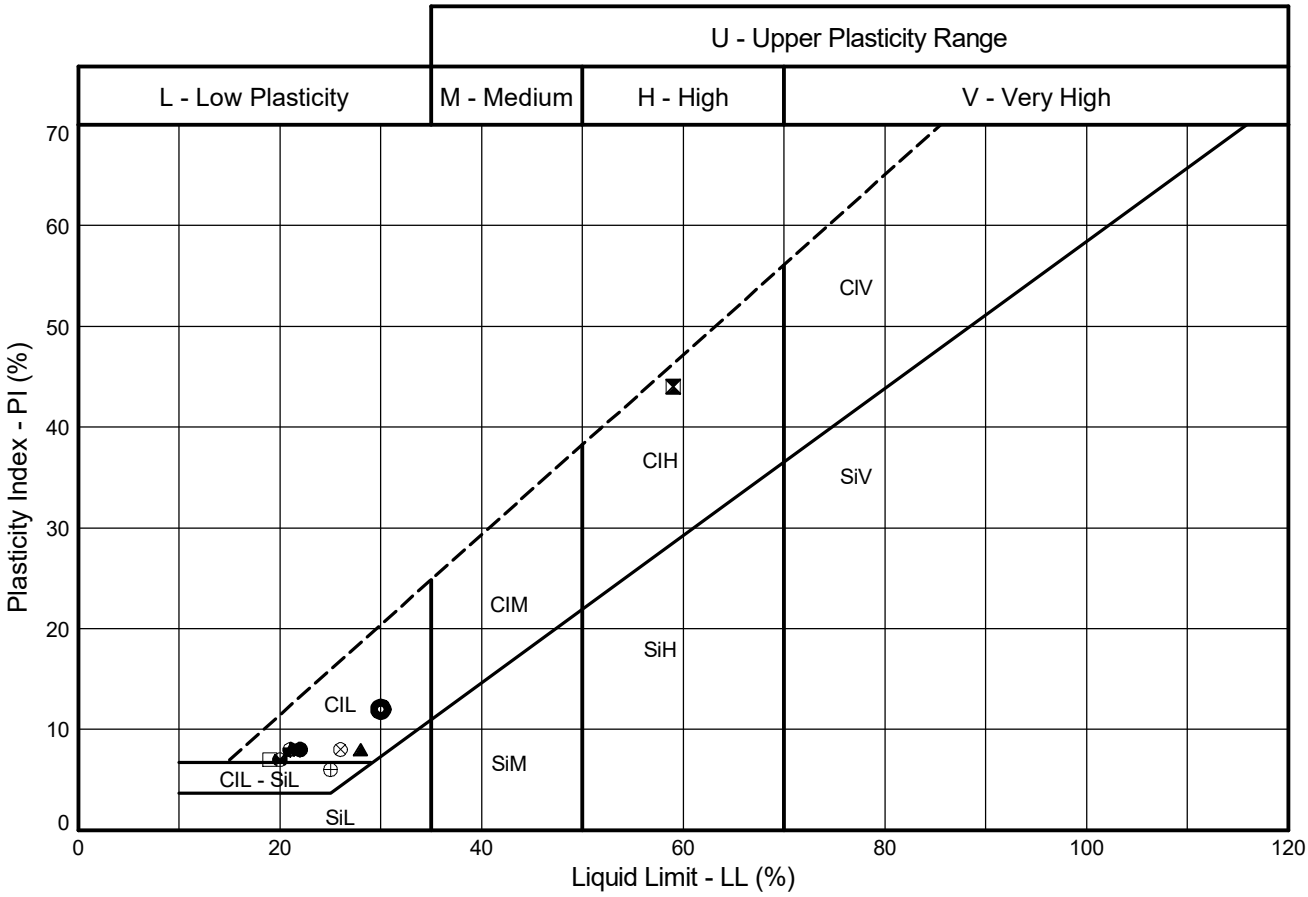
Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Water Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425um	Description of Sample
BPT-TP036	2	D	0.70	9.2	43	21	22	54	Brown slightly gravelly slightly sandy CLAY
BPT-TP036	4	D	1.70	9.4	20	13	7	44	Brown slightly gravelly sandy CLAY
BPT-TP037	2	D	1.00	7.7	21	14	7	35	Brown slightly gravelly sandy CLAY
BPT-TP038	2	D	1.00	6.7	22	15	7	39	Light brown slightly gravelly sandy CLAY
BPT-TP039	4	D	1.30	7.9	21	15	6	47	Brown slightly gravelly sandy clayey SILT

SYMBOLS: * denotes BS 1377

STRUCTURAL SOILS LTD	Contract: **Lot 3 Eastern & Midlands WSP**	Contract Ref: **785305**

PI vs LL CHART

According to BS EN 14688-2:2018
Testing in accordance with BS EN ISO 17892-12:2018+A1:2021



Sample Identification				Test Method #	Preparation Method +	WC	LL	PL	PI	<425µm	Lab location	Notes
	Exploratory Position ID	Sample	Depth (m)			%	%	%	%	%		
●	BPT-TP001	2D	0.80	5.3/5.5/6.5	5.2.7	10.4	22	14	8	43	C	
⊠	BPT-TP002	2D	0.70	5.3.14/5.5/6.5	5.2.7	7.9	59	15	44	41	C	
▲	BPT-TP002	4D	1.70	5.3.14/5.5/6.5	5.2.7	13.7	28	20	8	27	C	
★	BPT-TP005	2D	0.70	5.3/5.5/6.5	5.2.7	8.4	21	13	8	46	C	
	BPT-TP005	4D	2.00	5.3/5.5/6.5	5.2.7	9.5	NP	NP	NP	43	C	
	BPT-TP006	2D	0.70	5.3/5.5/6.5	5.2.7	9.8	NP	NP	NP	46	C	
◘	BPT-TP007	2D	0.50	5.3.14/5.5/6.5	5.2.7	8.2	30	18	12	22	C	
△	BPT-TP009	2D	0.70	5.3.14/5.5/6.5	5.2.7	9.0	21	13	8	41	C	
⊗	BPT-TP009	4D	2.30	5.3.14/5.5/6.5	5.2.7	12.0	26	18	8	33	C	
⊕	BPT-TP010	2D	0.80	5.3/5.5/6.5	5.2.7	12.7	25	19	6	32	C	
□	BPT-TP012	2D	0.60	5.3.14/5.5/6.5	5.2.7	9.7	19	12	7	46	C	
⊠	BPT-TP012	4D	1.60	5.3.14/5.5/6.5	5.2.7	8.2	20	13	7	40	C	
◓	BPT-TP014	2D	0.80	5.3/5.5/6.5	5.2.7	9.1	21	13	8	50	C	

Tested in accordance with the following clauses of BS EN ISO 17892-12:2018+A1:2021
5.3 - Cone Penetrometer Method; 5.3.14 - One-Point Cone Penetrometer Method; 5.4 - Casagrande Method; 5.5 - Plastic Limit Method; 6.5 - Plasticity Index

Water Content (WC) tested in accordance with BS EN ISO 17892-1:2014

+ Tested in accordance with the following clauses of BS EN ISO 17892-12:2018+A1:2021
5.2.1 - Natural State and 5.2.7 - Wet Sieved

Key: * = Non-standard test, NP = Non plastic, I = Increasing WC, D = Decreasing WC.

Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

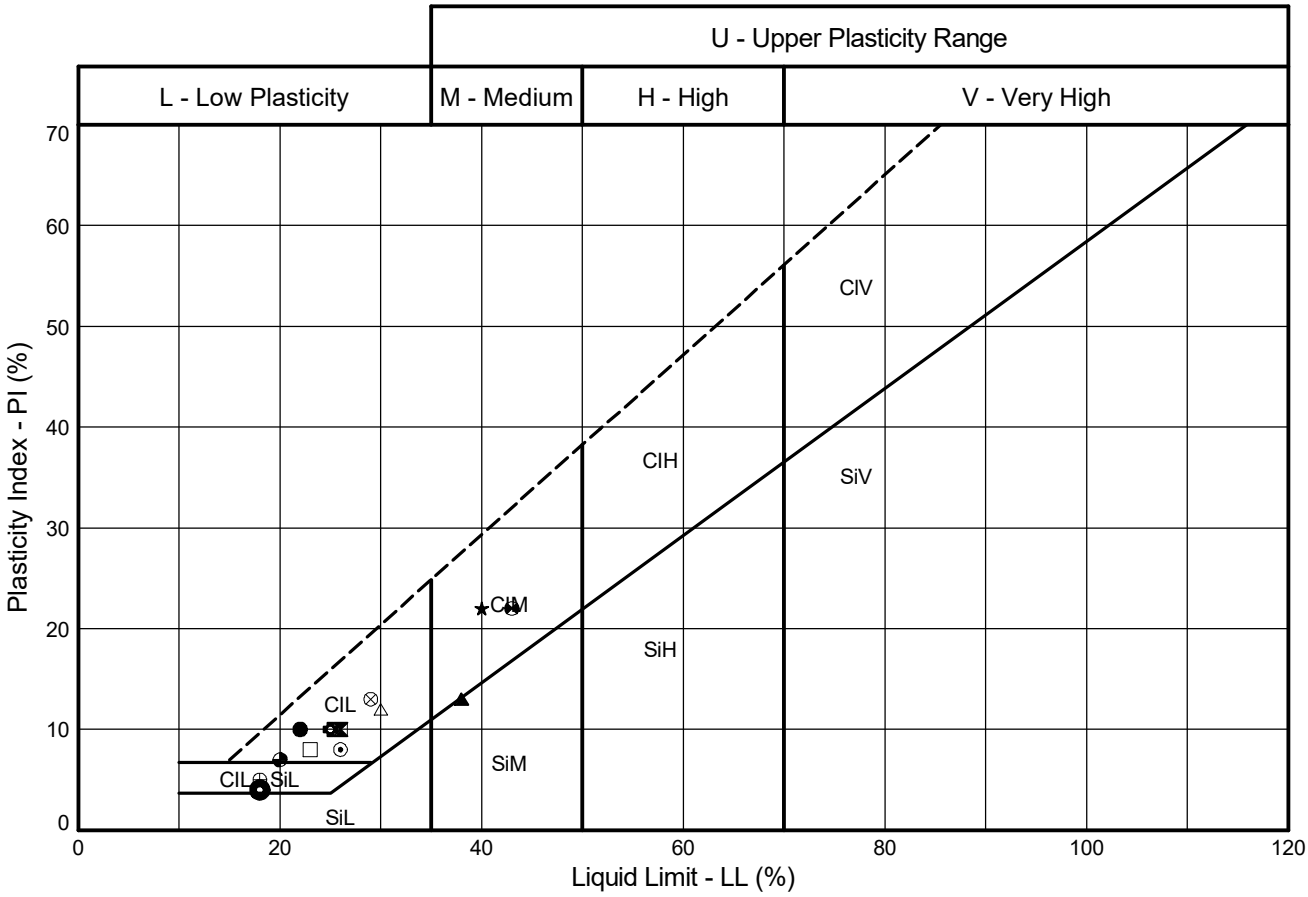
Compiled By		Date
	LAURA SCHRAMM	06/02/23

Contract	Contract Ref:
Lot 3 Eastern & Midlands WSP	**785305**

GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Graph L - ALINE STANDARD - 17892 - A4P - W | 785305 - LOT 3 EASTERN & MIDLANDS WSP.GPJ - v10_01.
Structural Soils Ltd, Branch Office - Castleford: The Potteries, Pottery Street, Castleford, West Yorkshire, WF10 1NJ. Tel: 01977-552299, Fax: 01977-552255, Web: www.soils.co.uk, Email: ask@soils.co.uk. | 06/02/23 - 15:22 | LS5 |

PI vs LL CHART

According to BS EN 14688-2:2018
Testing in accordance with BS EN ISO 17892-12:2018+A1:2021



Sample Identification				Test Method #	Preparation Method +	WC	LL	PL	PI	<425µm	Lab location	Notes
	Exploratory Position ID	Sample	Depth (m)			%	%	%	%	%		
●	BPT-TP014	4D	2.10	5.3/5.5/6.5	5.2.7	10.5	22	12	10	46	C	
⊠	BPT-TP015	2D	0.80	5.3.14/5.5/6.5	5.2.7	11.5	26	16	10	44	C	
▲	BPT-TP015	4D	1.80	5.3/5.5/6.5	5.2.7	22.6	38	25	13	60	C	
★	BPT-TP016	2D	0.40	5.3.14/5.5/6.5	5.2.7	17.2	40	18	22	35	C	
⊙	BPT-TP029	4D	0.90	5.3.14/5.5/6.5	5.2.7	9.8	26	18	8	34	C	
✿	BPT-TP030	2D	0.90	5.3.14/5.5/6.5	5.2.7	12.2	25	15	10	42	C	
◉	BPT-TP031	3D	2.00	5.3/5.5/6.5	5.2.7	9.3	18	14	4	44	C	
△	BPT-TP032	2D	0.60	5.3/5.5/6.5	5.2.7	19.8	30	18	12	40	C	
⊗	BPT-TP032	4D	1.60	5.3.14/5.5/6.5	5.2.7	7.8	29	16	13	37	C	
⊕	BPT-TP033	2D	0.90	5.3.14/5.5/6.5	5.2.7	6.6	18	13	5	27	C	
□	BPT-TP034	2D	1.00	5.3.14/5.5/6.5	5.2.7	9.2	23	15	8	39	C	
⊠	BPT-TP036	2D	0.70	5.3/5.5/6.5	5.2.7	9.2	43	21	22	54	C	
◕	BPT-TP036	4D	1.70	5.3.14/5.5/6.5	5.2.7	9.4	20	13	7	44	C	

Tested in accordance with the following clauses of BS EN ISO 17892-12:2018+A1:2021
5.3 - Cone Penetrometer Method; 5.3.14 - One-Point Cone Penetrometer Method; 5.4 - Casagrande Method; 5.5 - Plastic Limit Method; 6.5 - Plasticity Index

Water Content (WC) tested in accordance with BS EN ISO 17892-1:2014

+ Tested in accordance with the following clauses of BS EN ISO 17892-12:2018+A1:2021
5.2.1 - Natural State and 5.2.7 - Wet Sieved

Key: * = Non-standard test, NP = Non plastic, I = Increasing WC, D = Decreasing WC.

Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

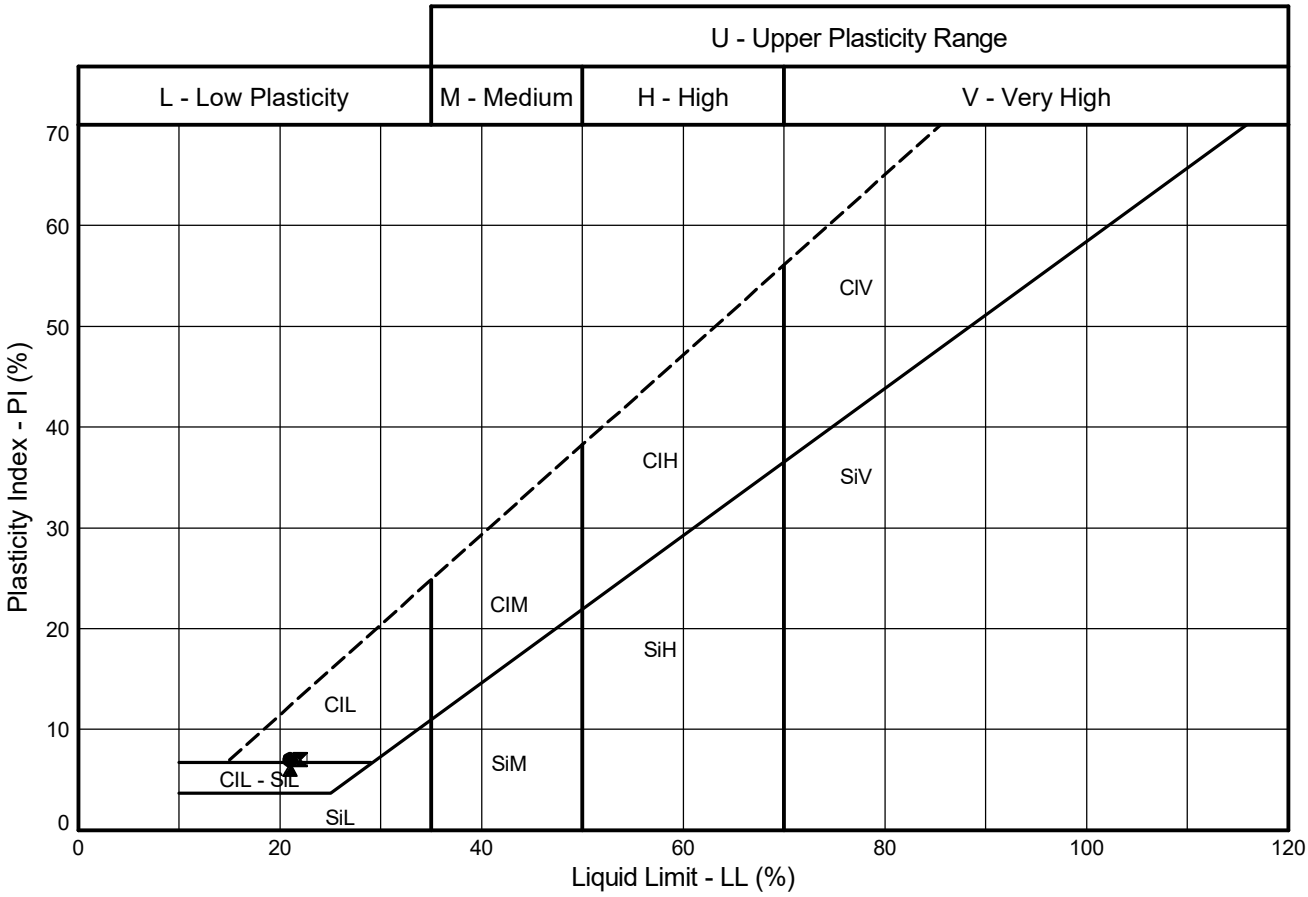
Compiled By		Date
	LAURA SCHRAMM	06/02/23

Contract	Contract Ref:
Lot 3 Eastern & Midlands WSP	**785305**

GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Graph L - ALINE STANDARD - 17892 - A4P - W | 785305 - LOT 3 EASTERN & MIDLANDS WSP.GPJ - v10_01.
Structural Soils Ltd, Branch Office - Castleford: The Potteries, Pottery Street, Castleford, West Yorkshire, WF10 1NJ. Tel: 01977-552299, Fax: 01977-552255, Web: www.soils.co.uk, Email: ask@soils.co.uk. | 06/02/23 - 15:22 | LS5 |

PI vs LL CHART

According to BS EN 14688-2:2018
Testing in accordance with BS EN ISO 17892-12:2018+A1:2021



Sample Identification				Test Method #	Preparation Method +	WC %	LL %	PL %	PI %	<425µm %	Lab location	Notes
	Exploratory Position ID	Sample	Depth (m)									
●	BPT-TP037	2D	1.00	5.3.14/5.5/6.5	5.2.7	7.7	21	14	7	35	C	
⊠	BPT-TP038	2D	1.00	5.3.14/5.5/6.5	5.2.7	6.7	22	15	7	39	C	
▲	BPT-TP039	4D	1.30	5.3/5.5/6.5	5.2.7	7.9	21	15	6	47	C	

Tested in accordance with the following clauses of BS EN ISO 17892-12:2018+A1:2021
5.3 - Cone Penetrometer Method; 5.3.14 - One-Point Cone Penetrometer Method; 5.4 - Casagrande Method; 5.5 - Plastic Limit Method; 6.5 - Plasticity Index

Water Content (WC) tested in accordance with BS EN ISO 17892-1:2014

+ Tested in accordance with the following clauses of BS EN ISO 17892-12:2018+A1:2021
5.2.1 - Natural State and 5.2.7 - Wet Sieved

Key: * = Non-standard test, NP = Non plastic, I = Increasing WC, D = Decreasing WC.

Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)

STRUCTURAL SOILS
The Potteries
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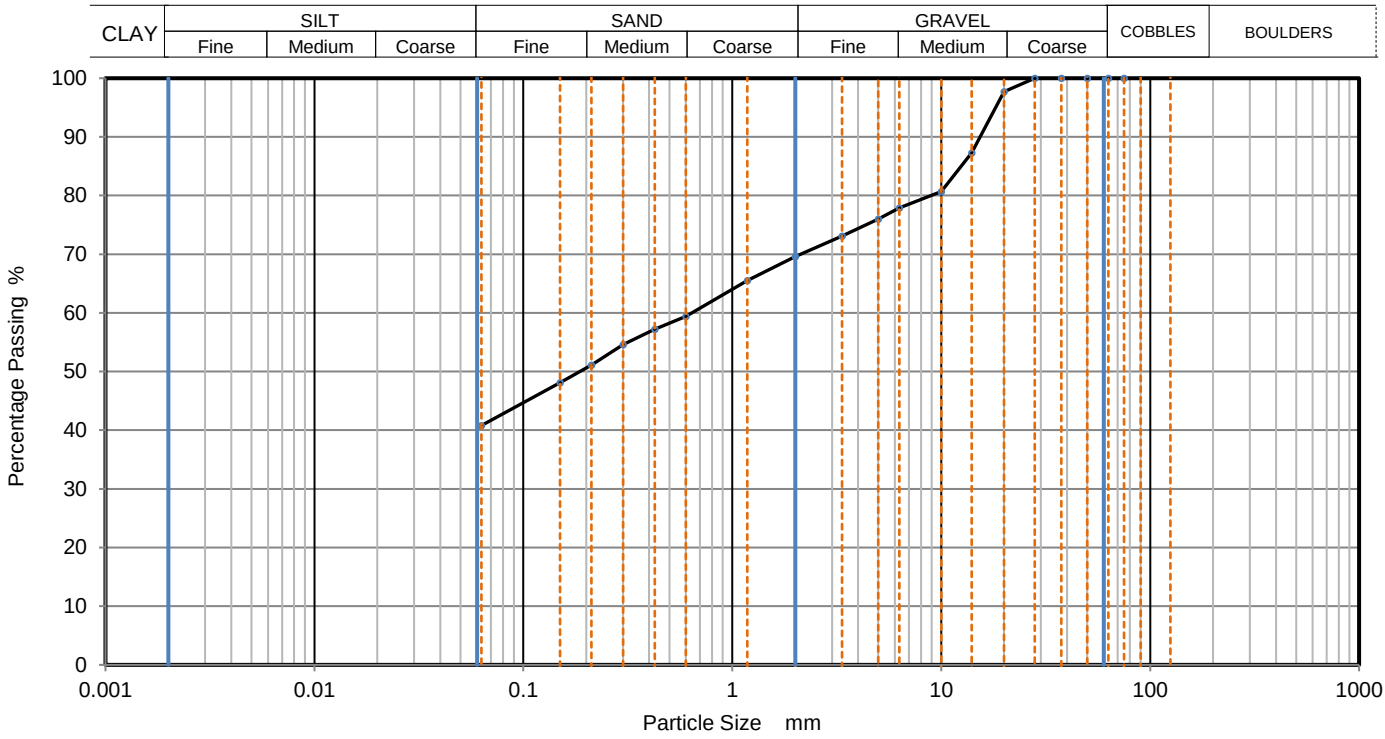
W. Yorkshire WF10 1NJ

Compiled By		Date
	LAURA SCHRAMM	06/02/23

Contract	Contract Ref:
Lot 3 Eastern & Midlands WSP	**785305**

GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Graph L - ALINE STANDARD - 17892 - A4P - W | 785305 - LOT 3 EASTERN & MIDLANDS WSP.GPJ - v10_01.
Structural Soils Ltd, Branch Office - Castleford: The Potteries, Pottery Street, Castleford, West Yorkshire, WF10 1NJ. Tel: 01977-552299, Fax: 01977-552255, Web: www.soils.co.uk, Email: ask@soils.co.uk. | 06/02/23 - 15:22 | LS5 |

IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2021OY102**
				Borehole/Pit No.	BPT-BH001
Site Name	WSP Eastern & Midlands Region			Sample No.	4
Soil Description	Light brown slightly sandy slightly gravelly SILT.			Depth, m	1.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL12022053010



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	98		
14	87		
10	81		
6.3	78		
5	76		
3.35	73		
2	70		
1.18	66		
0.6	59		
0.425	57		
0.3	55		
0.212	51		
0.15	48		
0.063	41		

Dry Mass of sample, g	638

Sample Proportions	% dry mass
Very coarse	0
Gravel	30
Sand	29
Fines <0.063mm	41

Grading Analysis		
D100	mm	
D60	mm	0.643
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

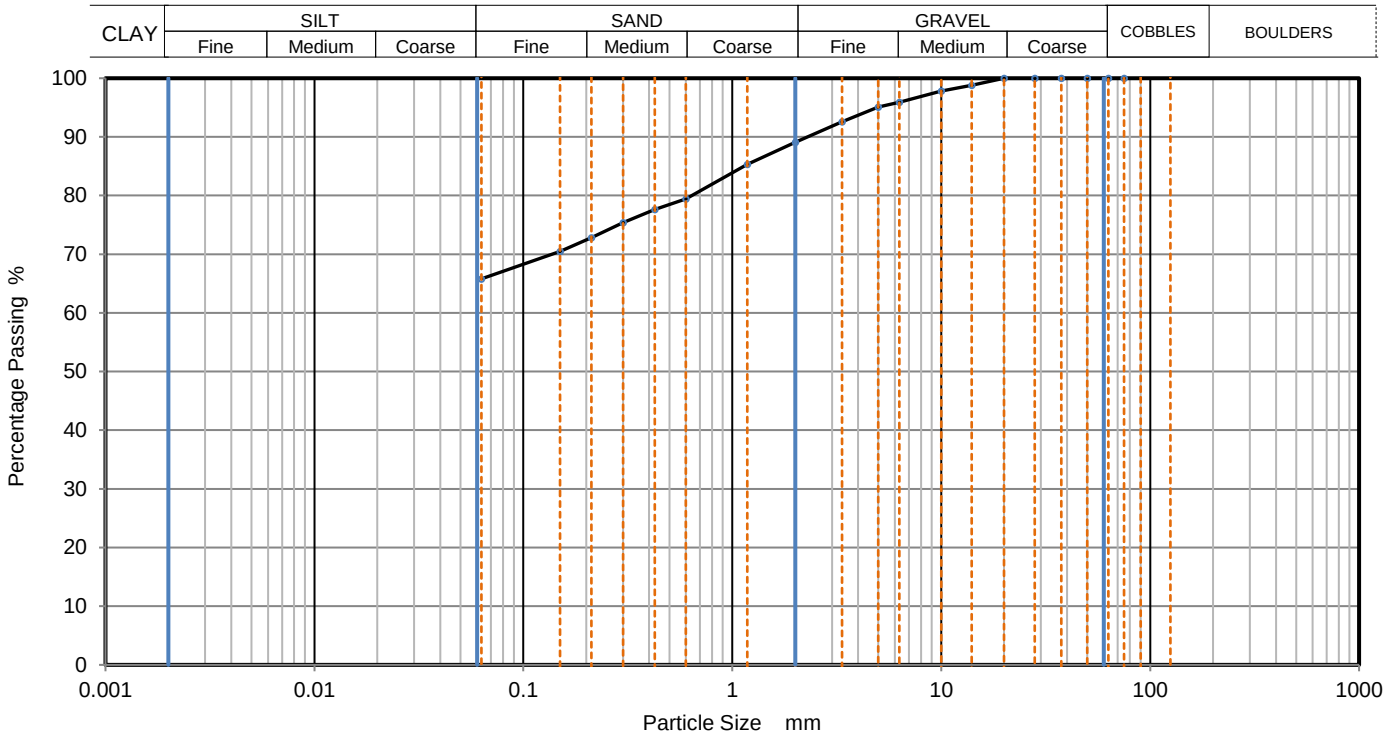
Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	
		Dympna Darcy B.Sc.	25/10/2022 16:39	**1**
				QC From No:R2

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

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

IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2021OY102**
				Borehole/Pit No.	BPT-BH005
Site Name	WSP Eastern & Midlands Region			Sample No.	4
Soil Description	Light brown slightly gravelly slightly sandy SILT.			Depth, m	1.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL12022053019



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	99		
10	98		
6.3	96		
5	95		
3.35	93		
2	89		
1.18	85		
0.6	79		
0.425	78		
0.3	75		
0.212	73		
0.15	71		
0.063	66		

Dry Mass of sample, g	516

Sample Proportions	% dry mass
Very coarse	0
Gravel	11
Sand	23
Fines <0.063mm	66

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

Remarks

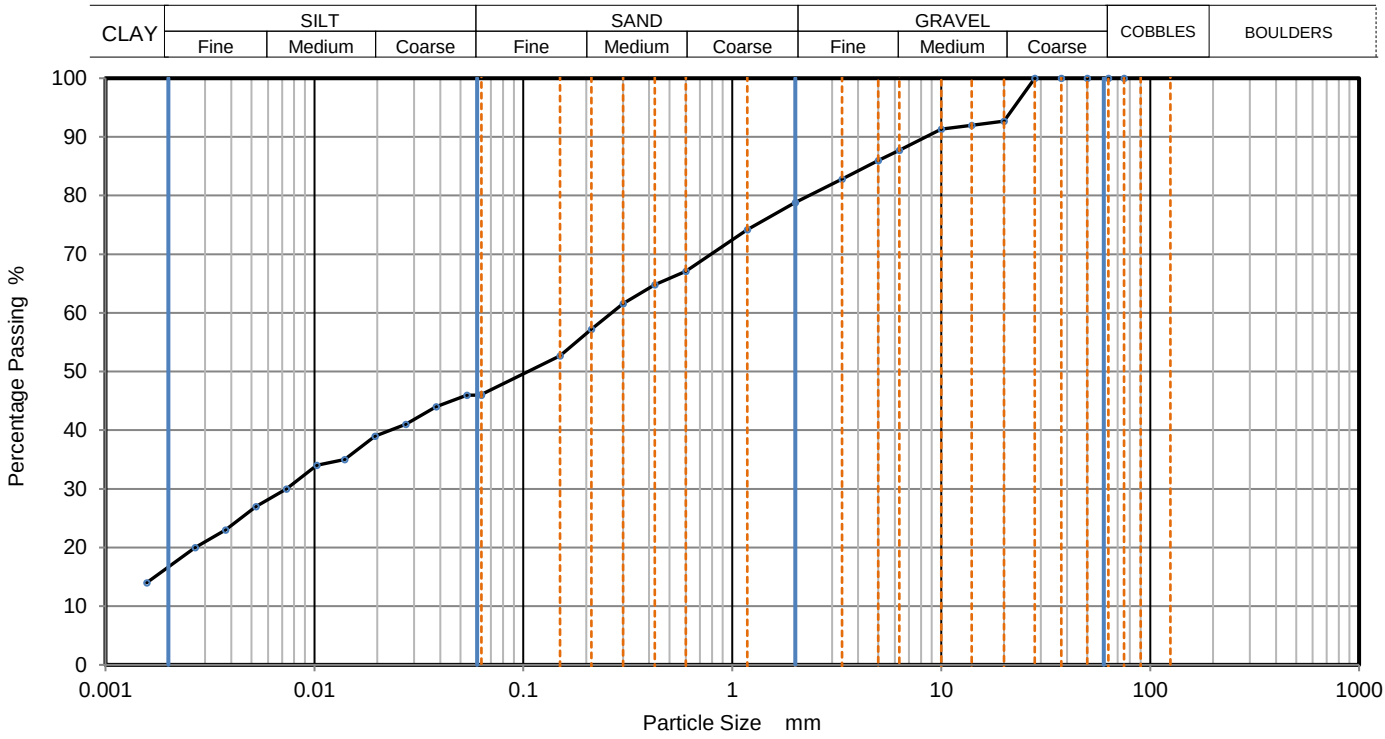
Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	
		Dympna Darcy B.Sc.	25/10/2022 16:39	**1**
				QC From No:R2

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

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

IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2021OY102**
				Borehole/Pit No.	BPT-INF001
Site Name	WSP Eastern & Midlands Region			Sample No.	1
Soil Description	Light brown slightly gravelly slightly sandy SILT.			Depth, m	0.50
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	IDL12022053037



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0630	46
		0.0538	46
75	100	0.0383	44
63	100	0.0274	41
50	100	0.0195	39
37.5	100	0.0140	35
28	100	0.0103	34
20	93	0.0073	30
14	92	0.0053	27
10	91	0.0038	23
6.3	88	0.0027	20
5	86	0.0016	14
3.35	83		
2	79		
1.18	74		
0.6	67	Particle density (assumed)	
0.425	65	2.65	Mg/m3
0.3	62		
0.212	57		
0.15	53		
0.063	46		

Dry Mass of sample, g	907

Sample Proportions	% dry mass
Very coarse	0
Gravel	21
Sand	33
Silt	30
Clay	17

Grading Analysis		
D100	mm	
D60	mm	0.265
D30	mm	0.00724
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

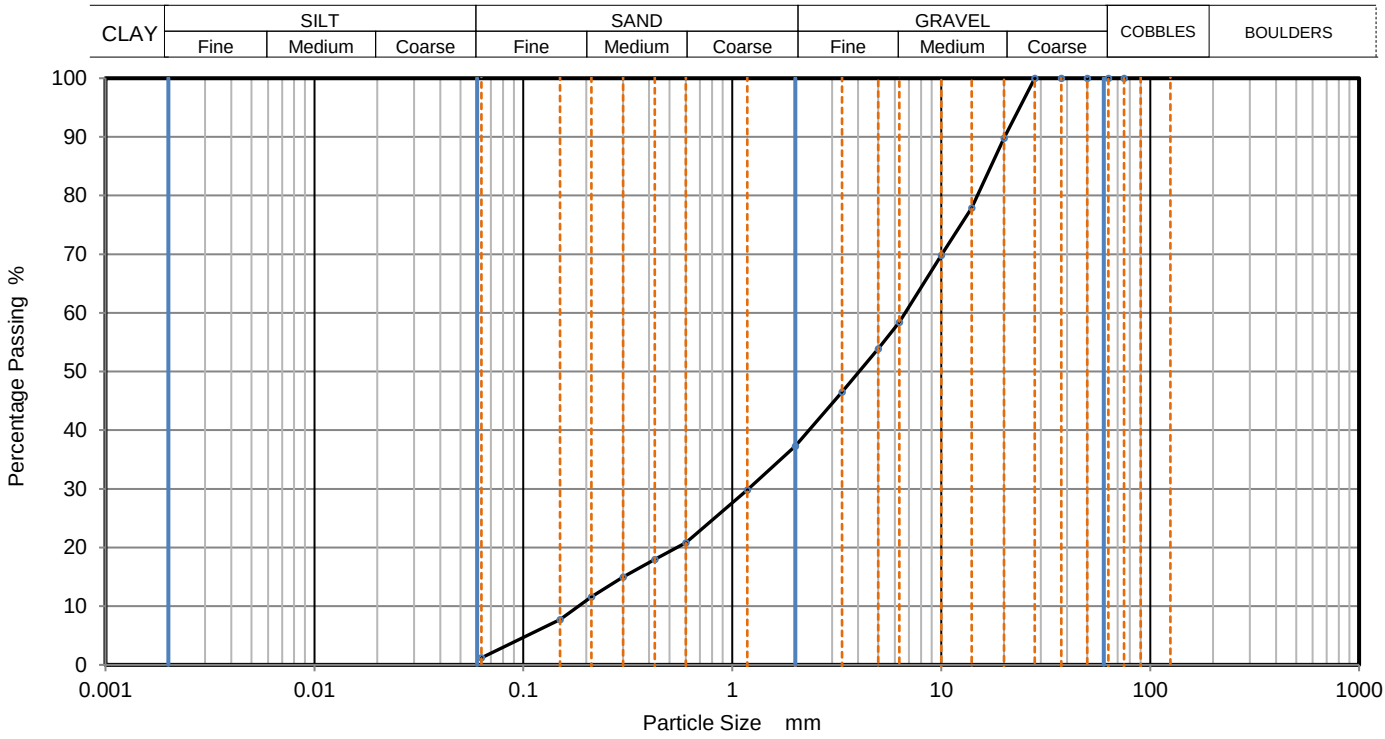
Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	
		Dympna Darcy B.Sc.	25/10/2022 16:39	**1** QC From No:R2

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

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

IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2021OY102**
				Borehole/Pit No.	BPT-INF001
Site Name	WSP Eastern & Midlands Region			Sample No.	3
Soil Description	Light brown slighlty silty very sandy medium GRAVEL.			Depth, m	1.50
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL12022053039



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	90		
14	78		
10	70		
6.3	58		
5	54		
3.35	47		
2	37		
1.18	30		
0.6	21	Particle density (assumed)	
0.425	18	2.65	Mg/m3
0.3	15		
0.212	12		
0.15	8		
0.063	1		

Dry Mass of sample, g	1164

Sample Proportions	% dry mass
Very coarse	0
Gravel	63
Sand	36
Fines <0.063mm	1

Grading Analysis		
D100	mm	
D60	mm	6.72
D30	mm	1.2
D10	mm	0.184
Uniformity Coefficient		37
Curvature Coefficient		1.2

Remarks

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		Dympna Darcy B.Sc.	25/10/2022 16:39	**1** QC From No:R2

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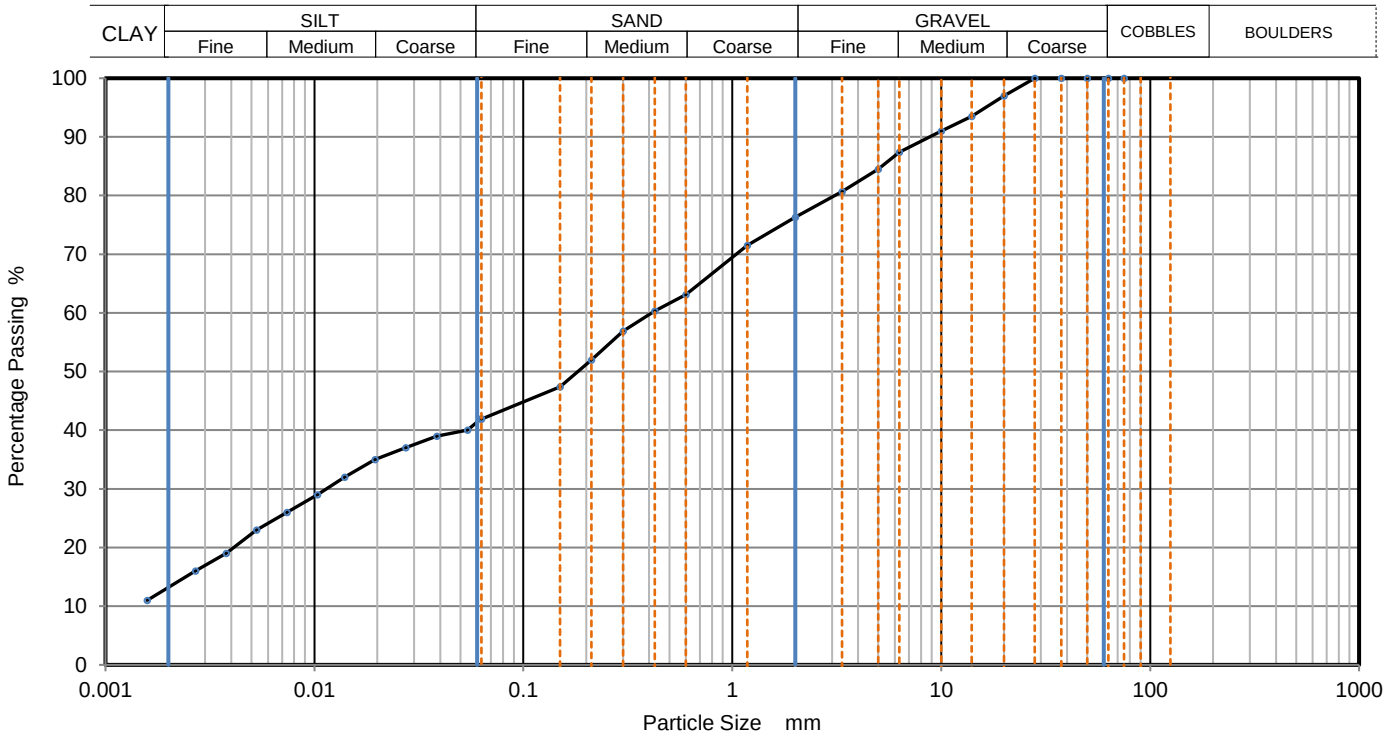
Approved Signatures: Dympna Darcy (DCD) Lab Manager, Declan Joyce (DJ) Chartered Geotechnical Engineer, Ronan Killeen (RK) Quality Manager.

IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2021OY102**
				Borehole/Pit No.	BPT-TP004
Site Name	WSP Eastern & Midlands Region			Sample No.	1
Soil Description	Light brown slightly gravelly sandy SILT.			Depth, m	0.50
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	IDL12022053043



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0630	42
		0.0541	40
75	100	0.0385	39
63	100	0.0274	37
50	100	0.0195	35
37.5	100	0.0140	32
28	100	0.0103	29
20	97	0.0074	26
14	94	0.0053	23
10	91	0.0038	19
6.3	87	0.0027	16
5	85	0.0016	11
3.35	81		
2	76		
1.18	72		
0.6	63	Particle density (assumed)	
0.425	60	2.65	Mg/m3
0.3	57		
0.212	52		
0.15	47		
0.063	42		

Dry Mass of sample, g	958

Sample Proportions	% dry mass
Very coarse	0
Gravel	24
Sand	34
Silt	29
Clay	13

Grading Analysis		
D100	mm	
D60	mm	0.413
D30	mm	0.0113
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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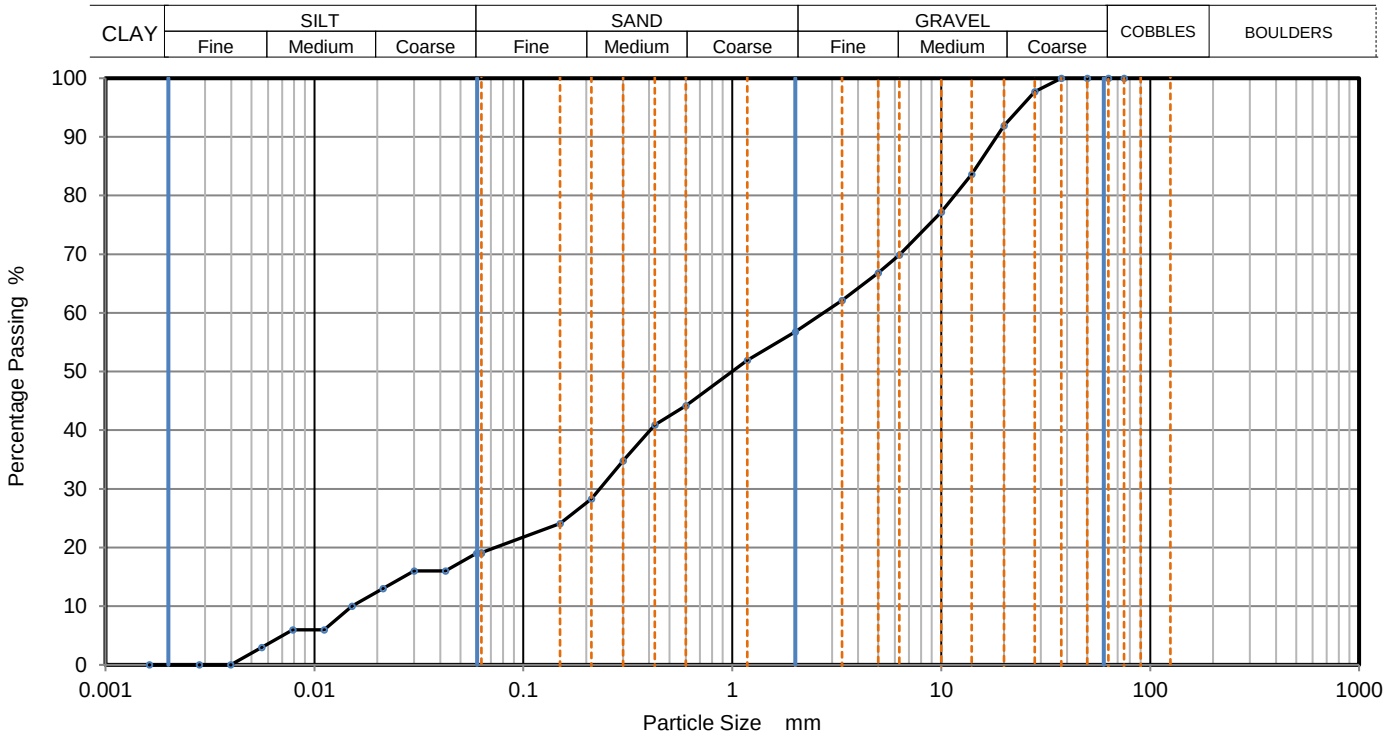
Approved Signatures: Dympna Darcy (DCD) Lab Manager, Declan Joyce (DJ) Chartered Geotechnical Engineer, Ronan Killeen (RK) Quality Manager.

IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2021OY102**
				Borehole/Pit No.	BPT-TP023
Site Name	WSP Eastern & Midlands Region			Sample No.	1
Soil Description	Light brown silty SAND and medium GRAVEL.			Depth, m	0.50
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	IDL12022053049



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0630	19
		0.0597	19
75	100	0.0424	16
63	100	0.0300	16
50	100	0.0213	13
37.5	100	0.0152	10
28	98	0.0111	6
20	92	0.0079	6
14	84	0.0056	3
10	77	0.0040	0
6.3	70	0.0028	0
5	67	0.0016	0
3.35	62		
2	57		
1.18	52		
0.6	44	Particle density (assumed)	
0.425	41	2.65	Mg/m3
0.3	35		
0.212	28		
0.15	24		
0.063	19		

Dry Mass of sample, g	1297

Sample Proportions	% dry mass
Very coarse	0
Gravel	43
Sand	38
Silt	19
Clay	0

Grading Analysis		
D100	mm	
D60	mm	2.73
D30	mm	0.232
D10	mm	0.0159
Uniformity Coefficient		170
Curvature Coefficient		1.2

Remarks

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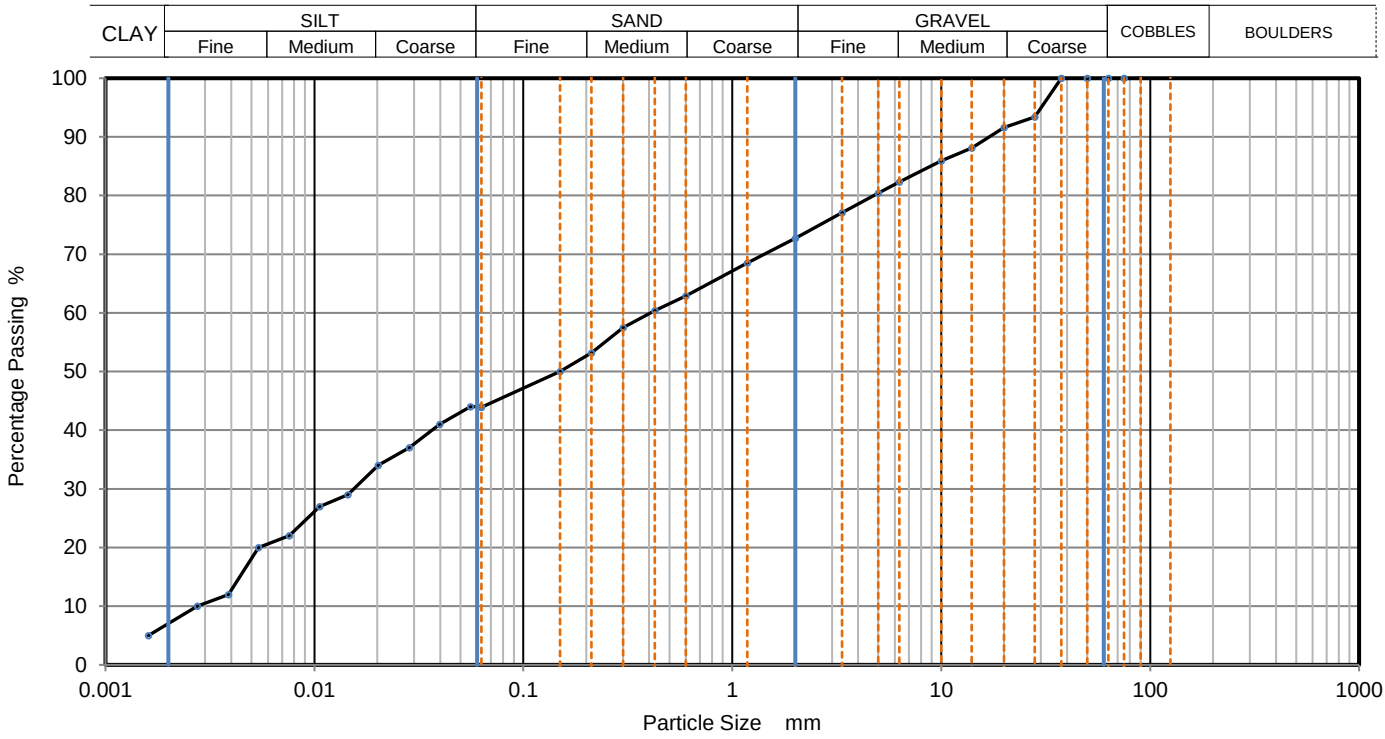
PARTICLE SIZE DISTRIBUTION

				Job Ref	**2021OY102**
				Borehole/Pit No.	BPT-TP027
Site Name	WSP Eastern & Midlands Region			Sample No.	1
Soil Description	Light brown slightly gravelly slightly sandy SILT.			Depth, m	0.25
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	IDL12022053052



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0630	44
		0.0558	44
75	100	0.0397	41
63	100	0.0284	37
50	100	0.0202	34
37.5	100	0.0144	29
28	93	0.0106	27
20	92	0.0076	22
14	88	0.0054	20
10	86	0.0039	12
6.3	82	0.0028	10
5	80	0.0016	5
3.35	77		
2	73		
1.18	69		
0.6	63	Particle density (assumed)	
0.425	60	2.65	Mg/m3
0.3	58		
0.212	53		
0.15	50		
0.063	44		

Dry Mass of sample, g: 739

Sample Proportions	% dry mass
Very coarse	0
Gravel	27
Sand	29
Silt	37
Clay	7

Grading Analysis		
D100	mm	
D60	mm	0.405
D30	mm	0.0152
D10	mm	0.00285
Uniformity Coefficient		140
Curvature Coefficient		0.2

Remarks

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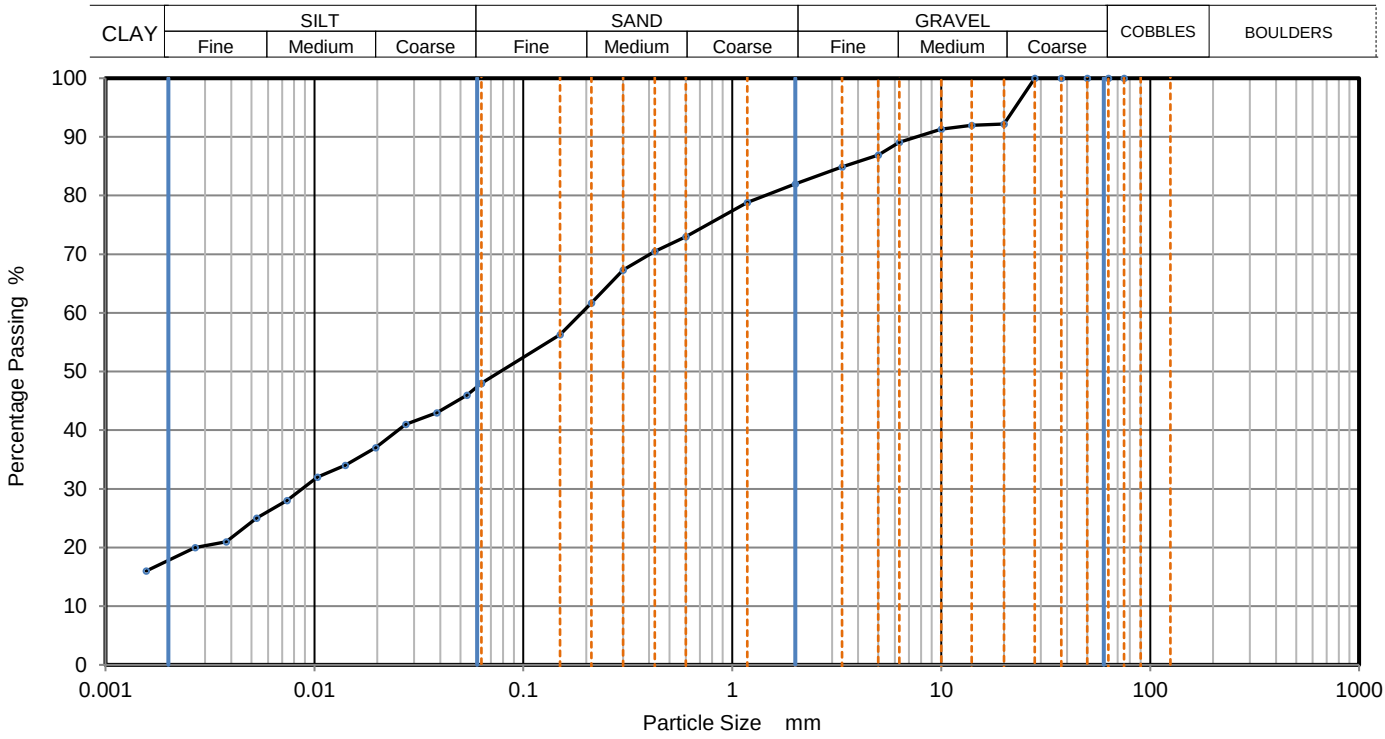
PARTICLE SIZE DISTRIBUTION

				Job Ref	**2021OY102**
				Borehole/Pit No.	BPT-TP028
Site Name	WSP Eastern & Midlands Region			Sample No.	1
Soil Description	Slightly gravelly sandy SILT.			Depth, m	0.20
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	IDL12022053054



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0630	48
		0.0538	46
75	100	0.0385	43
63	100	0.0274	41
50	100	0.0196	37
37.5	100	0.0140	34
28	100	0.0103	32
20	92	0.0074	28
14	92	0.0053	25
10	91	0.0038	21
6.3	89	0.0027	20
5	87	0.0016	16
3.35	85		
2	82		
1.18	79		
0.6	73	Particle density (assumed)	
0.425	71	2.65 Mg/m3	
0.3	67		
0.212	62		
0.15	56		
0.063	48		

Dry Mass of sample, g	801

Sample Proportions	% dry mass
Very coarse	0
Gravel	18
Sand	34
Silt	30
Clay	18

Grading Analysis		
D100	mm	
D60	mm	0.19
D30	mm	0.00855
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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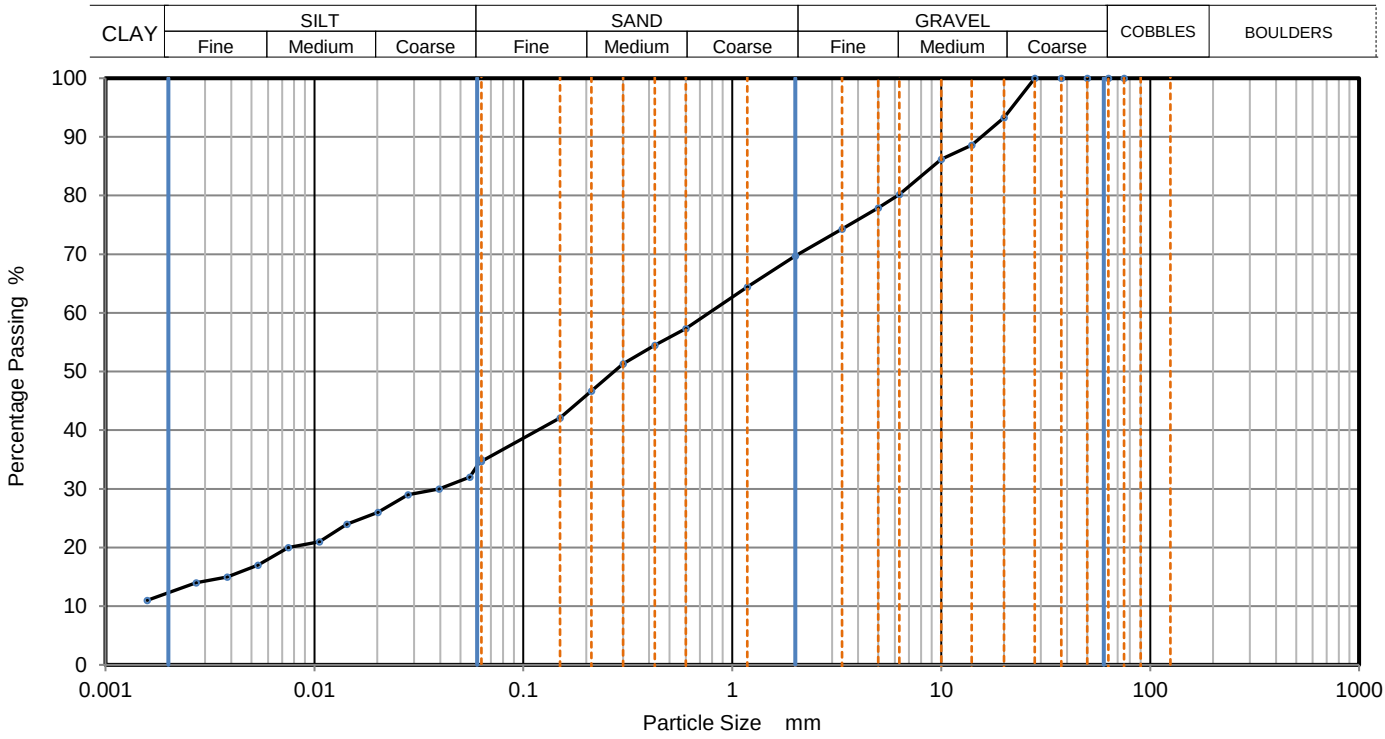
IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2021OY102**
				Borehole/Pit No.	BPT-TP028
Site Name	WSP Eastern & Midlands Region			Sample No.	3
Soil Description	Light brown slightly gravelly sandy SILT.			Depth, m	0.50
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	IDL12022053057



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0630	35
		0.0555	32
75	100	0.0395	30
63	100	0.0281	29
50	100	0.0201	26
37.5	100	0.0143	24
28	100	0.0106	21
20	93	0.0075	20
14	89	0.0054	17
10	86	0.0038	15
6.3	80	0.0027	14
5	78	0.0016	11
3.35	74		
2	70		
1.18	64		
0.6	57	Particle density (assumed)	
0.425	55	2.65 Mg/m3	
0.3	51		
0.212	47		
0.15	42		
0.063	35		

Dry Mass of sample, g	816

Sample Proportions	% dry mass
Very coarse	0
Gravel	30
Sand	35
Silt	23
Clay	12

Grading Analysis		
D100	mm	
D60	mm	0.778
D30	mm	0.038
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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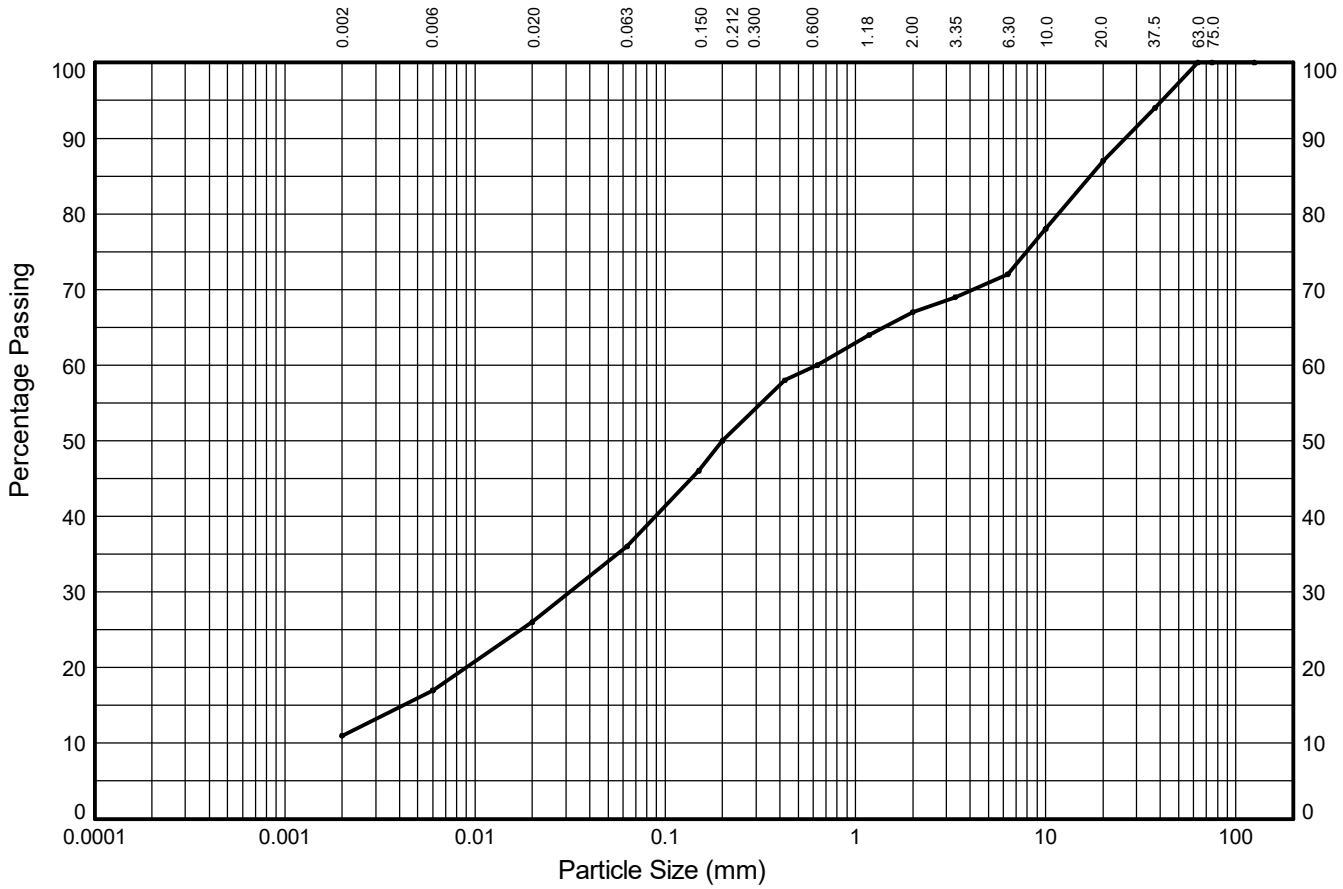
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.4 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-TP001** Sample Ref: **1** Sample Type: **B** Depth (m): **0.50**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	6%	9%	10%	14%	10%	7%	5%	15%	13%	
	SILT			SAND			GRAVEL			
11%	25%			31%			33%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**94**
20.0	**87**
10.0	**78**
6.30	**72**
3.35	**69**
2.00	**67**
1.18	**64**
0.630	**60**
0.425	**58**
0.200	**50**
0.150	**46**
0.063	**36**

Particle Diameter (mm)	Percent Passing (%)
0.02	**26**
0.006	**17**
0.002	**11**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**0.004**
D_{30} (mm)	**0.032**
D_{50} (mm)	**0.200**
D_{60} (mm)	**0.630**
D_{85} (mm)	**17.145**
D_{90} (mm)	**26.184**
C_U	**NA**
C_C	**NA**

Soil Description:

Brown clayey very silty very sandy GRAVEL

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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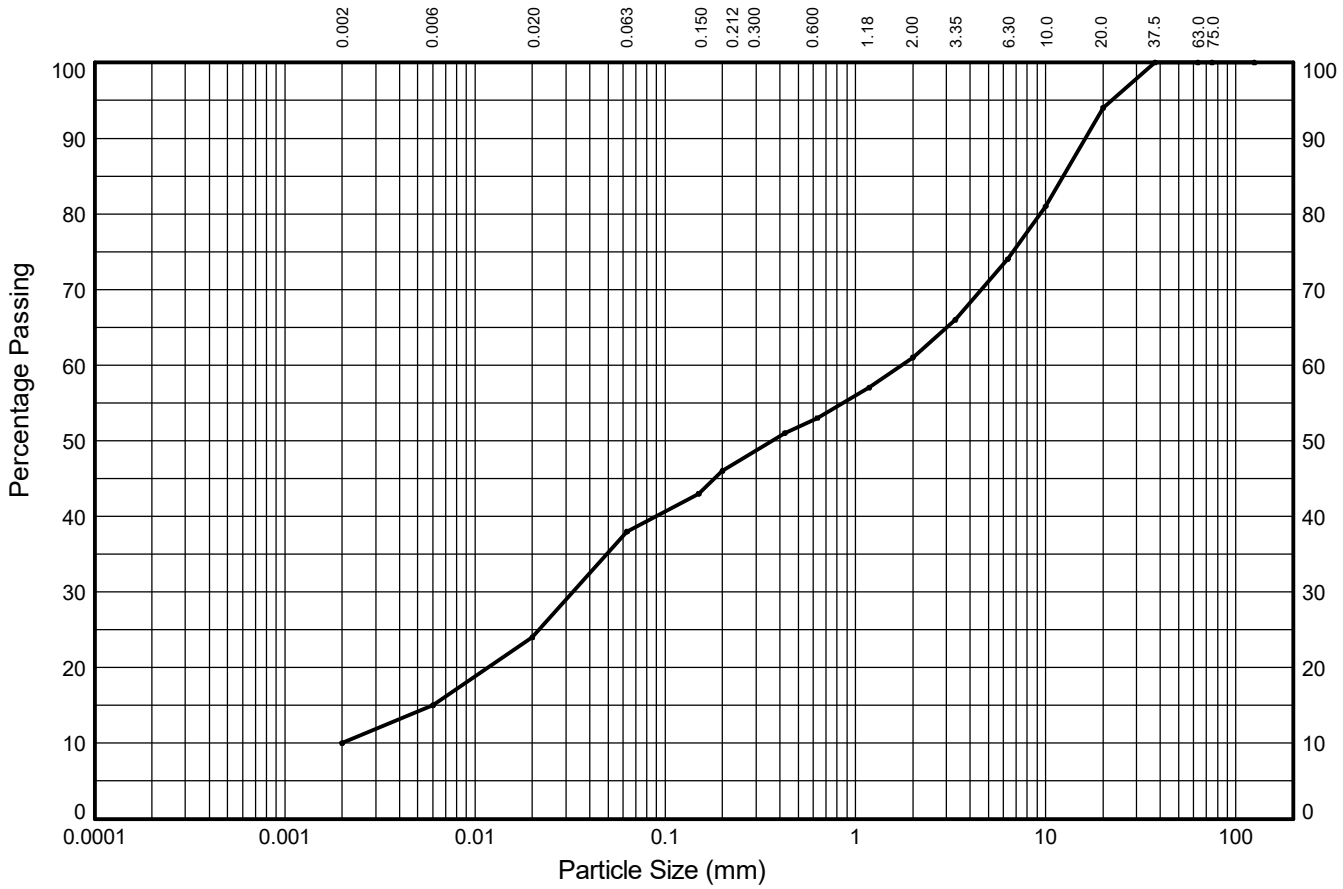
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.4 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-TP002** Sample Ref: **3** Sample Type: **B** Depth (m): **1.40**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	5%	9%	14%	8%	7%	8%	13%	20%	6%	
	SILT			SAND			GRAVEL			
10%	28%			23%			39%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**94**
10.0	**81**
6.30	**74**
3.35	**66**
2.00	**61**
1.18	**57**
0.630	**53**
0.425	**51**
0.200	**46**
0.150	**43**
0.063	**38**

Particle Diameter (mm)	Percent Passing (%)
0.02	**24**
0.006	**15**
0.002	**10**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**0.002**
D_{15} (mm)	**0.006**
D_{30} (mm)	**0.033**
D_{50} (mm)	**0.366**
D_{60} (mm)	**1.753**
D_{85} (mm)	**12.377**
D_{90} (mm)	**16.159**
C_U	**876**
C_C	**0.31**

Soil Description:

Light brown clayey very silty very sandy GRAVEL

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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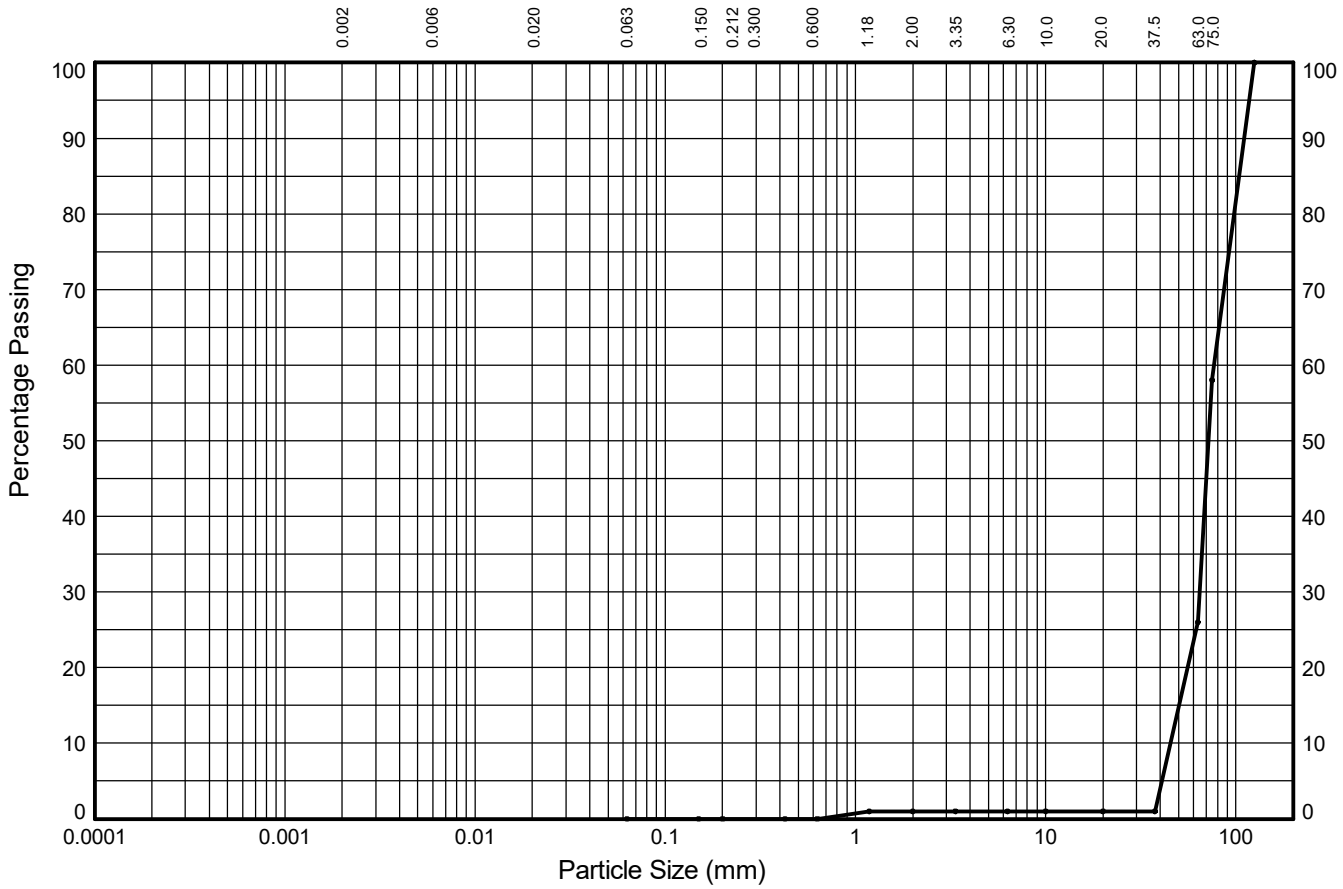
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2 of BS EN ISO 17892:Part 4:2016
NON-STANDARD TEST

Position ID: **BPT-TP003** Sample Ref: **1** Sample Type: **B** Depth (m): **0.30**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	-	-	-	0%	0%	1%	0%	0%	25%	
	SILT			SAND			GRAVEL			
0%				1%			25%			74%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**58**
63.0	**26**
37.5	**1**
20.0	**1**
10.0	**1**
6.30	**1**
3.35	**1**
2.00	**1**
1.18	**1**
0.630	**0**
0.425	**0**
0.200	**0**
0.150	**0**
0.063	**0**

Particle Diameter (mm)	Percent Passing (%)

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**45.200**
D_{15} (mm)	**50.142**
D_{30} (mm)	**64.388**
D_{50} (mm)	**71.801**
D_{60} (mm)	**76.847**
D_{85} (mm)	**104.155**
D_{90} (mm)	**110.685**
C_U	**1.7**
C_C	**1.2**

Soil Description:

Brown COBBLES with much slightly sandy GRAVEL

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.4 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-TP005** Sample Ref: **3** Sample Type: **B** Depth (m): **1.70**

CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	7%	8%	15%	10%	10%	9%	11%	13%	6%	
	SILT			SAND			GRAVEL			
11%	30%			29%			30%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**94**
10.0	**86**
6.30	**81**
3.35	**74**
2.00	**70**
1.18	**66**
0.630	**61**
0.425	**58**
0.200	**51**
0.150	**48**
0.063	**41**

Particle Diameter (mm)	Percent Passing (%)
0.02	**26**
0.006	**18**
0.002	**11**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**0.004**
D_{30} (mm)	**0.027**
D_{50} (mm)	**0.182**
D_{60} (mm)	**0.553**
D_{85} (mm)	**9.117**
D_{90} (mm)	**14.142**
C_U	**NA**
C_C	**NA**

Soil Description:

Brown slightly sandy slightly gravelly clayey SILT

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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Contract	Contract Ref:
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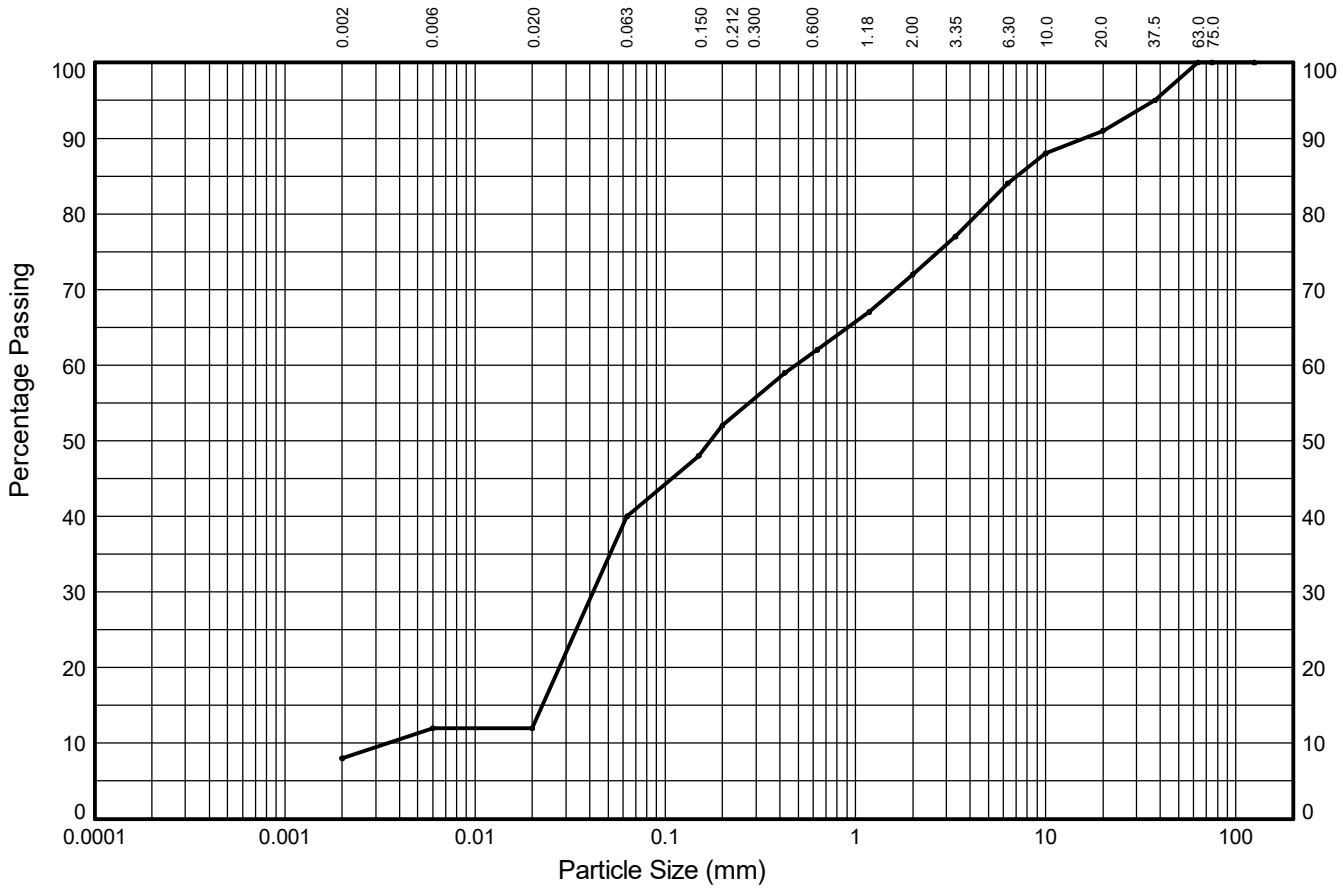
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.4 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-TP006** Sample Ref: **1** Sample Type: **B** Depth (m): **0.40**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	4%	0%	28%	12%	10%	10%	12%	7%	9%	
	SILT			SAND			GRAVEL			
8%	32%			32%			28%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**95**
20.0	**91**
10.0	**88**
6.30	**84**
3.35	**77**
2.00	**72**
1.18	**67**
0.630	**62**
0.425	**59**
0.200	**52**
0.150	**48**
0.063	**40**

Particle Diameter (mm)	Percent Passing (%)
0.02	**12**
0.006	**12**
0.002	**8**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**0.003**
D_{15} (mm)	**0.023**
D_{30} (mm)	**0.042**
D_{50} (mm)	**0.173**
D_{60} (mm)	**0.485**
D_{85} (mm)	**7.071**
D_{90} (mm)	**15.874**
C_U	**140**
C_C	**1**

Soil Description:

Grey brown slightly gravelly slightly sandy clayey SILT

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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Contract	Contract Ref:
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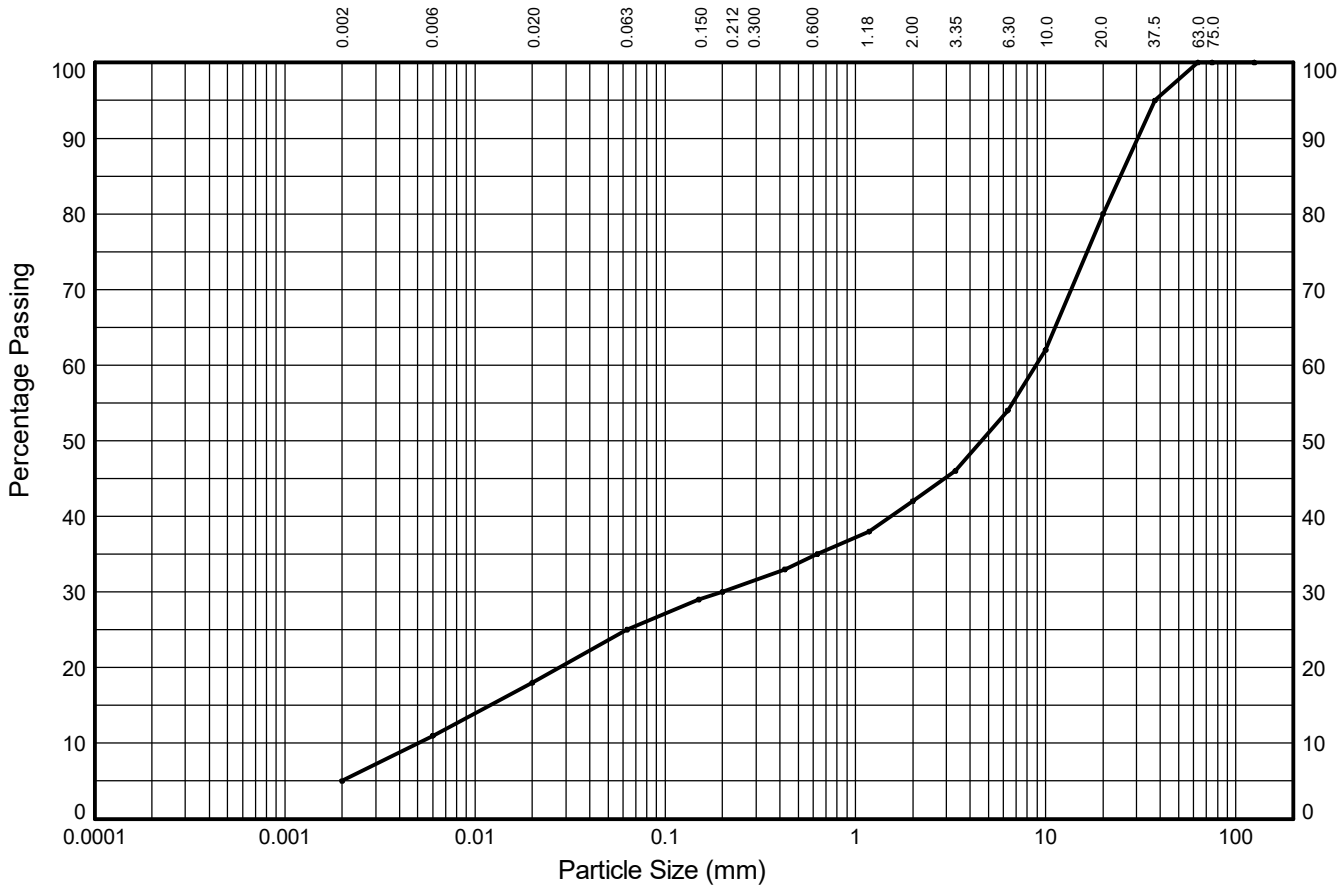
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.4 of BS EN ISO 17892:Part 4:2016
NON-STANDARD TEST

Position ID: **BPT-TP009** Sample Ref: **3** Sample Type: **B** Depth (m): **2.00**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	6%	7%	7%	5%	5%	7%	12%	26%	20%	
	SILT			SAND			GRAVEL			
5%	20%			17%			58%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**95**
20.0	**80**
10.0	**62**
6.30	**54**
3.35	**46**
2.00	**42**
1.18	**38**
0.630	**35**
0.425	**33**
0.200	**30**
0.150	**29**
0.063	**25**

Particle Diameter (mm)	Percent Passing (%)
0.02	**18**
0.006	**11**
0.002	**5**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**0.005**
D_{15} (mm)	**0.012**
D_{30} (mm)	**0.200**
D_{50} (mm)	**4.594**
D_{60} (mm)	**8.909**
D_{85} (mm)	**24.662**
D_{90} (mm)	**30.411**
C_U	**1783**
C_C	**0.90**

Soil Description:

White brown sandy clayey silty GRAVEL

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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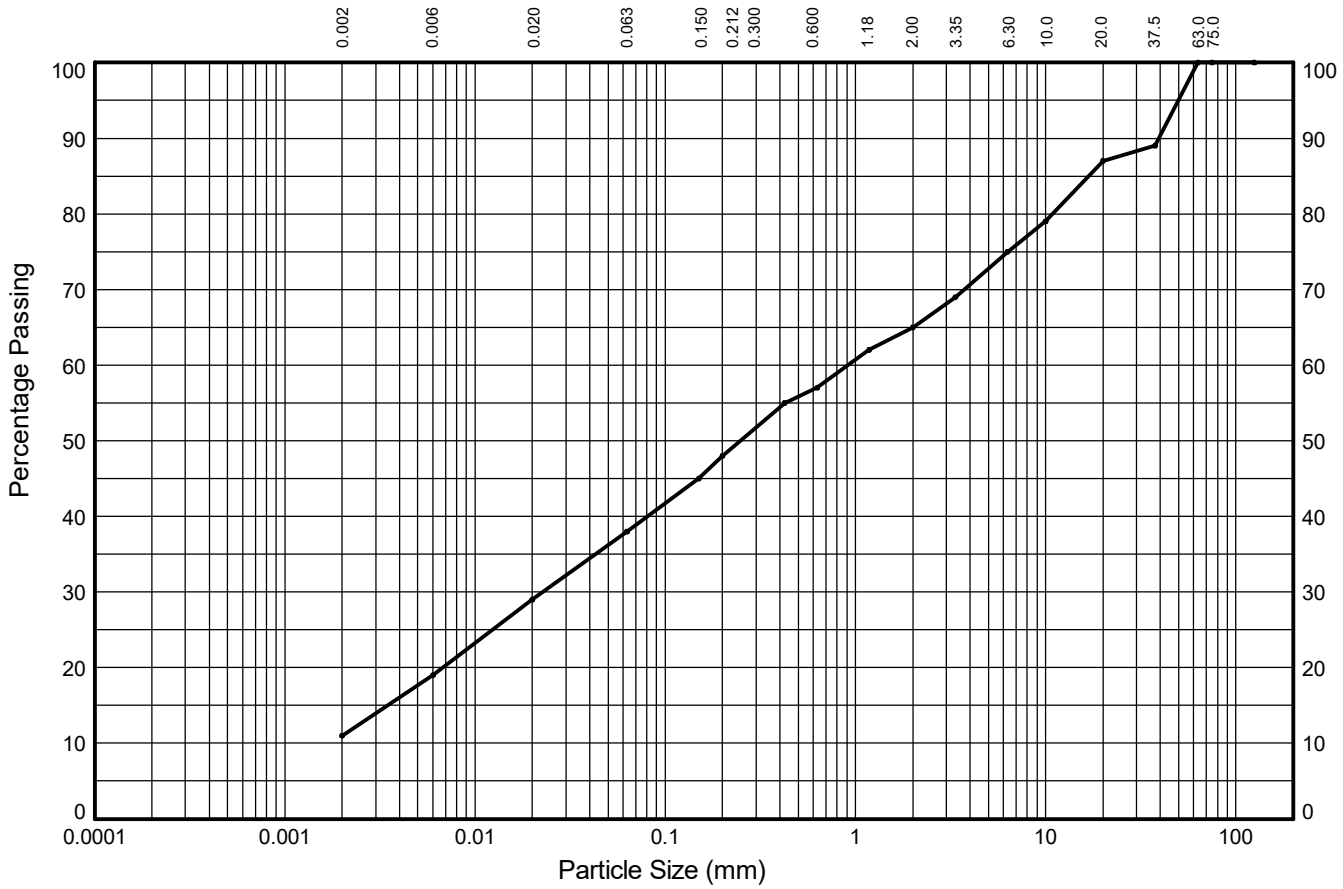
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.4 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-TP012** Sample Ref: **3** Sample Type: **B** Depth (m): **1.30**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	8%	10%	9%	10%	9%	8%	10%	12%	13%	
	SILT			SAND			GRAVEL			
11%	27%			27%			35%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**89**
20.0	**87**
10.0	**79**
6.30	**75**
3.35	**69**
2.00	**65**
1.18	**62**
0.630	**57**
0.425	**55**
0.200	**48**
0.150	**45**
0.063	**38**

Particle Diameter (mm)	Percent Passing (%)
0.02	**29**
0.006	**19**
0.002	**11**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**0.003**
D_{30} (mm)	**0.023**
D_{50} (mm)	**0.248**
D_{60} (mm)	**0.918**
D_{85} (mm)	**16.818**
D_{90} (mm)	**39.311**
C_U	**NA**
C_C	**NA**

Soil Description:

Brown slightly gravelly sandy clayey SILT

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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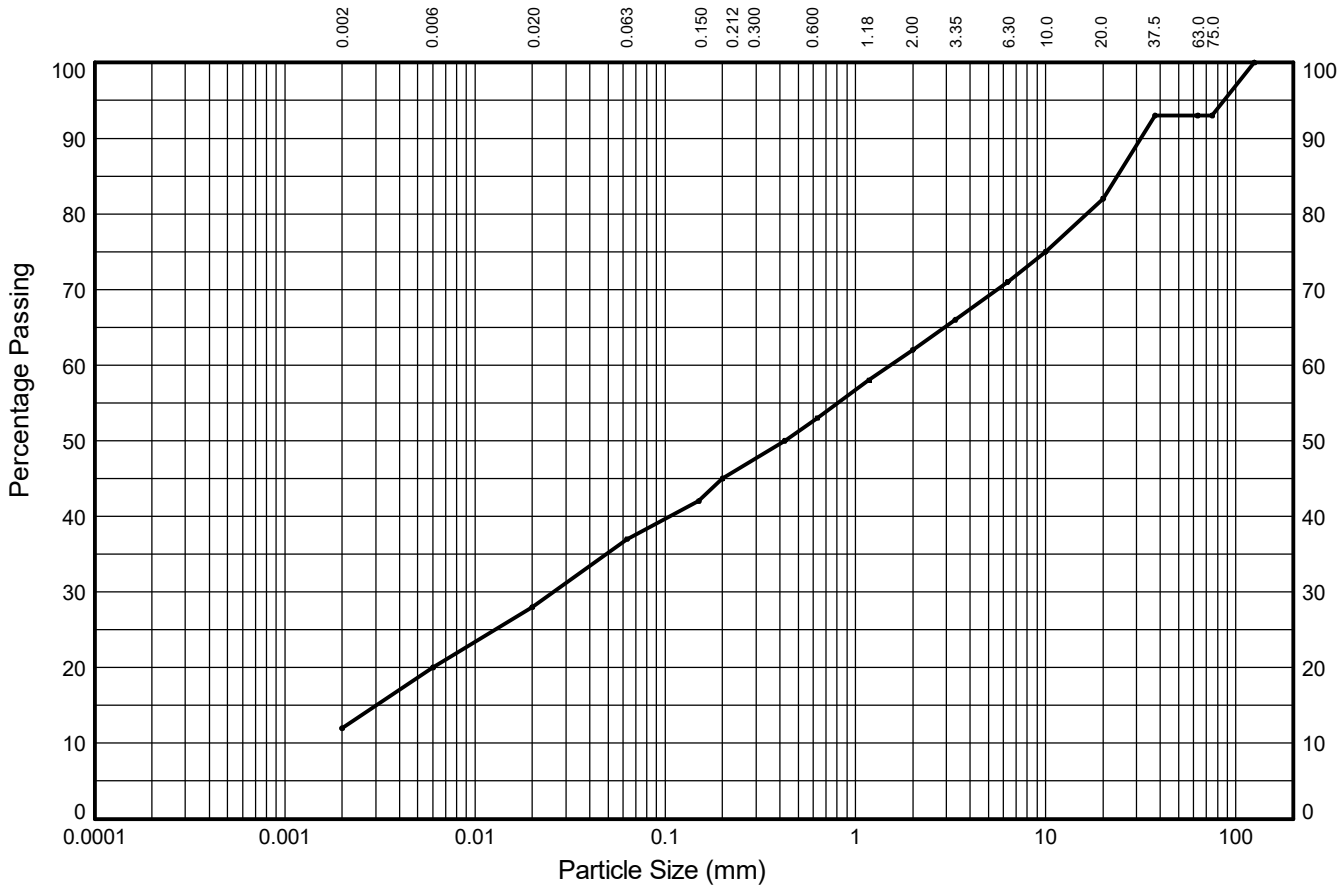
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.4 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-TP014** Sample Ref: **3** Sample Type: **B** Depth (m): **1.80**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	8%	8%	9%	8%	8%	9%	9%	11%	11%	
	SILT			SAND			GRAVEL			
12%	25%			25%			31%			7%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**93**
63.0	**93**
37.5	**93**
20.0	**82**
10.0	**75**
6.30	**71**
3.35	**66**
2.00	**62**
1.18	**58**
0.630	**53**
0.425	**50**
0.200	**45**
0.150	**42**
0.063	**37**

Particle Diameter (mm)	Percent Passing (%)
0.02	**28**
0.006	**20**
0.002	**12**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**0.003**
D_{30} (mm)	**0.026**
D_{50} (mm)	**0.425**
D_{60} (mm)	**1.536**
D_{85} (mm)	**23.740**
D_{90} (mm)	**31.592**
C_U	**NA**
C_C	**NA**

Soil Description:

Brown clayey very sandy very silty with medium cobble content

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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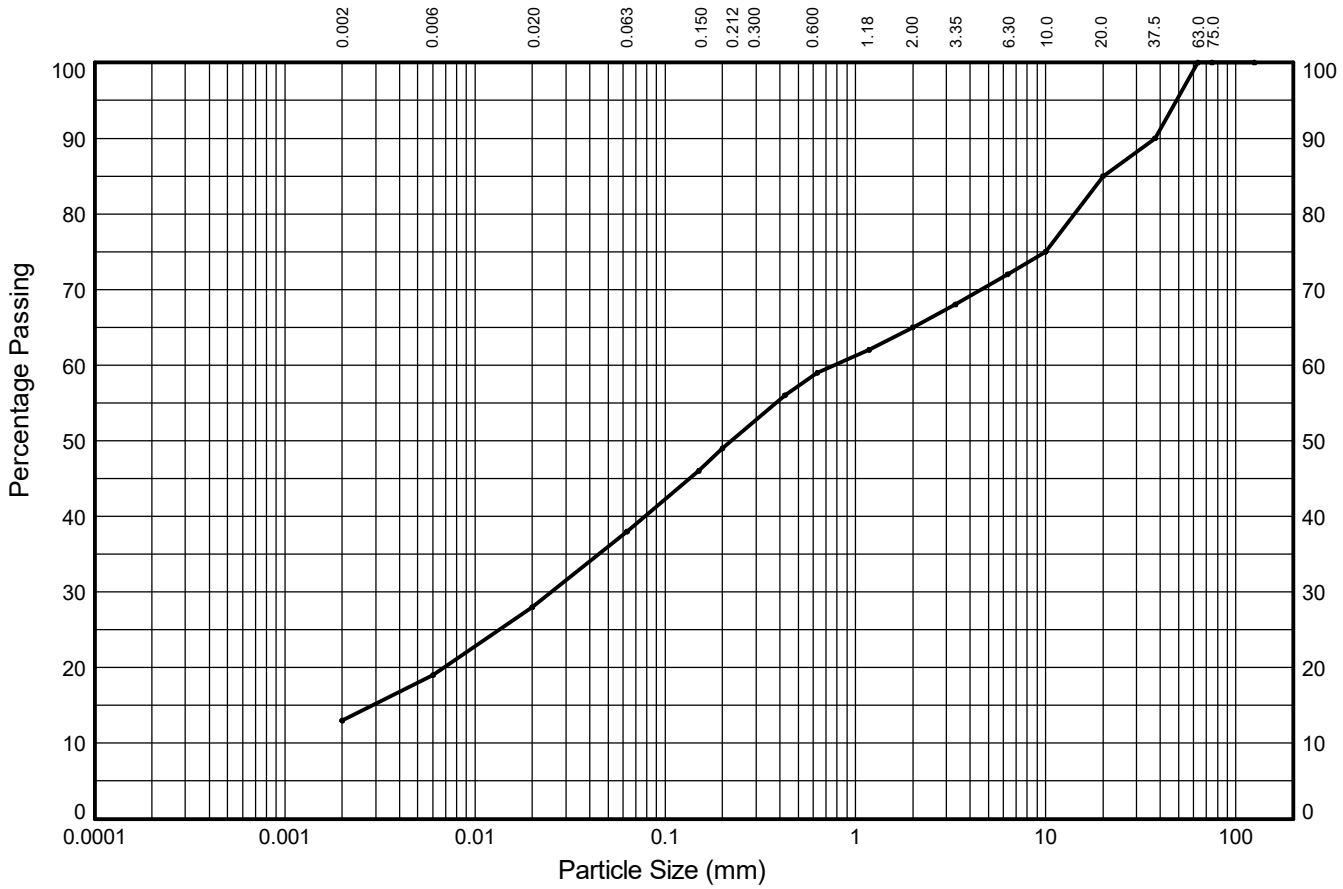
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.4 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-TP015** Sample Ref: **3** Sample Type: **B** Depth (m): **1.50**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	6%	9%	10%	11%	10%	6%	7%	13%	15%	
	SILT			SAND			GRAVEL			
13%	25%			27%			35%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**90**
20.0	**85**
10.0	**75**
6.30	**72**
3.35	**68**
2.00	**65**
1.18	**62**
0.630	**59**
0.425	**56**
0.200	**49**
0.150	**46**
0.063	**38**

Particle Diameter (mm)	Percent Passing (%)
0.02	**28**
0.006	**19**
0.002	**13**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**0.003**
D_{30} (mm)	**0.025**
D_{50} (mm)	**0.223**
D_{60} (mm)	**0.777**
D_{85} (mm)	**20.000**
D_{90} (mm)	**37.500**
C_U	**NA**
C_C	**NA**

Soil Description:

Brown clayey very silty very sandy GRAVEL

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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Contract	Contract Ref:
Lot 3 Eastern & Midlands WSP	**785305**

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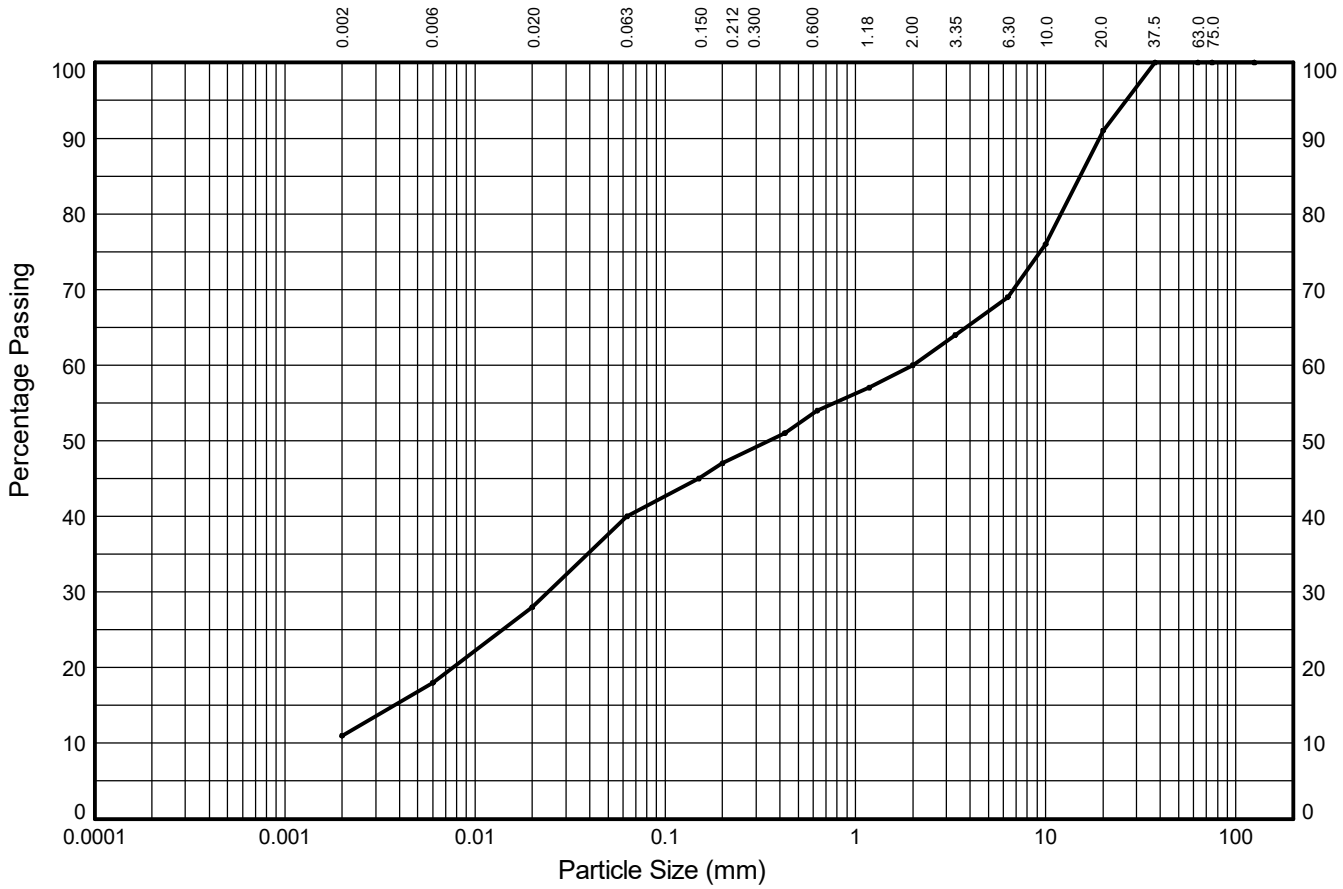
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.4 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-TP015** Sample Ref: **5** Sample Type: **B** Depth (m): **2.00**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	7%	10%	12%	7%	7%	6%	9%	22%	9%	
	SILT			SAND			GRAVEL			
11%	29%			20%			40%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**91**
10.0	**76**
6.30	**69**
3.35	**64**
2.00	**60**
1.18	**57**
0.630	**54**
0.425	**51**
0.200	**47**
0.150	**45**
0.063	**40**

Particle Diameter (mm)	Percent Passing (%)
0.02	**28**
0.006	**18**
0.002	**11**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**0.004**
D_{30} (mm)	**0.024**
D_{50} (mm)	**0.352**
D_{60} (mm)	**2.000**
D_{85} (mm)	**15.157**
D_{90} (mm)	**19.097**
C_U	**NA**
C_C	**NA**

Soil Description:

Brown clayey very sandy very silty GRAVEL

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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Lot 3 Eastern & Midlands WSP	**785305**

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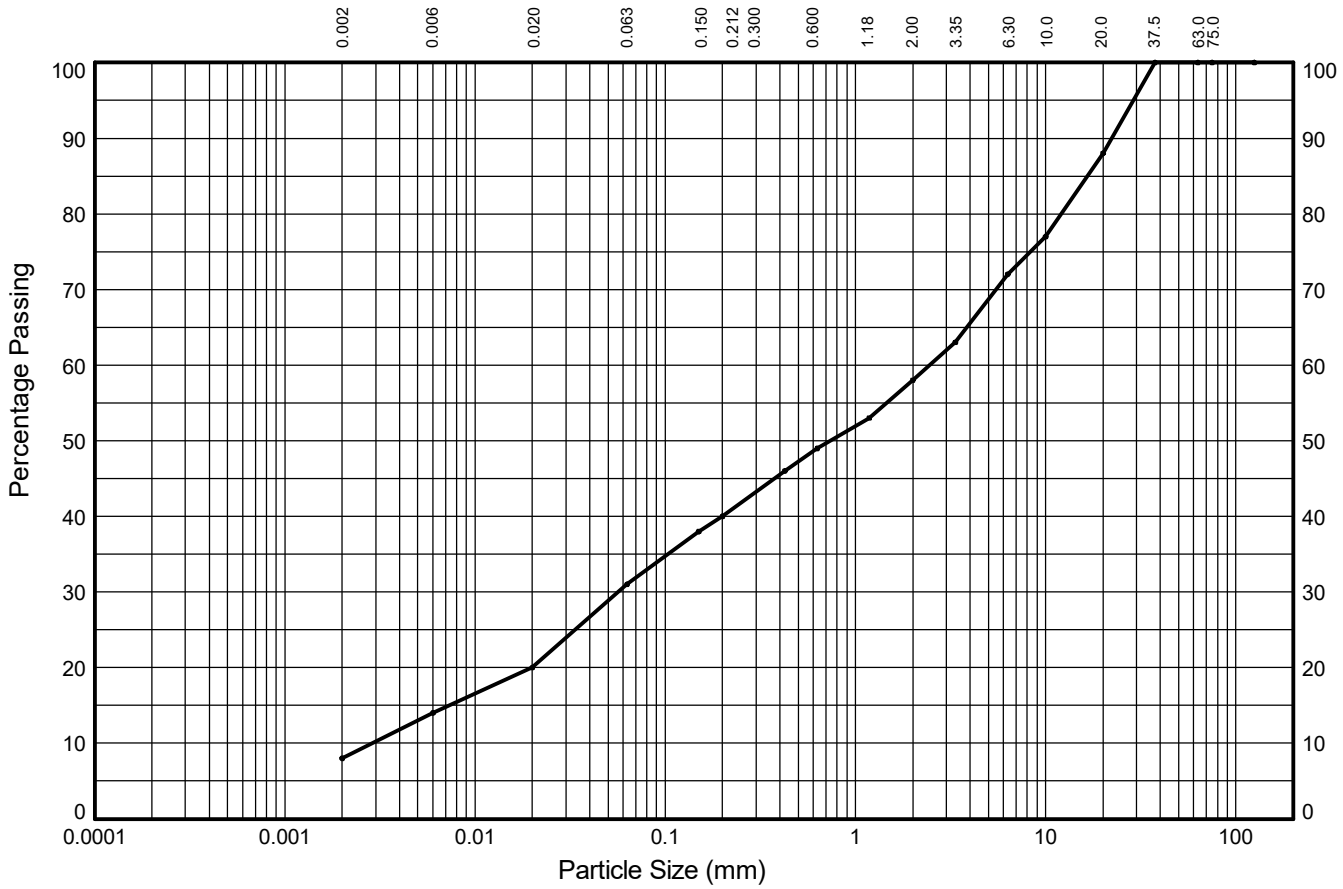
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.4 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-TP029** Sample Ref: **3** Sample Type: **B** Depth (m): **0.60**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	6%	6%	11%	9%	9%	9%	14%	16%	12%	
	SILT			SAND			GRAVEL			
8%	23%			27%			42%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**88**
10.0	**77**
6.30	**72**
3.35	**63**
2.00	**58**
1.18	**53**
0.630	**49**
0.425	**46**
0.200	**40**
0.150	**38**
0.063	**31**

Particle Diameter (mm)	Percent Passing (%)
0.02	**20**
0.006	**14**
0.002	**8**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**0.003**
D_{15} (mm)	**0.007**
D_{30} (mm)	**0.057**
D_{50} (mm)	**0.737**
D_{60} (mm)	**2.458**
D_{85} (mm)	**16.555**
D_{90} (mm)	**22.209**
C_U	**852**
C_C	**0.45**

Soil Description:

Grey brown very sandy clayey very silty GRAVEL

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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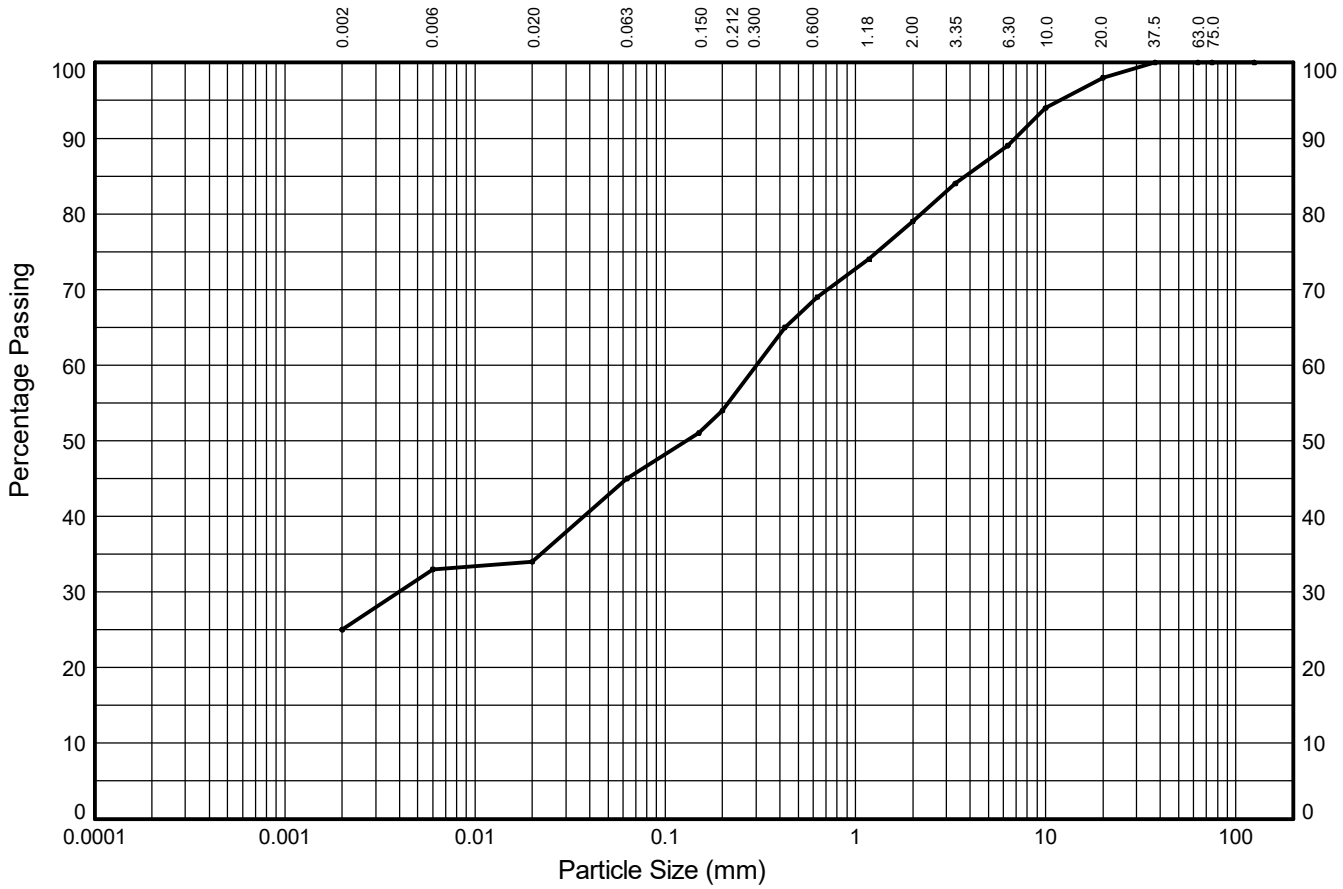
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.4 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-TP030** Sample Ref: **1** Sample Type: **B** Depth (m): **0.60**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	8%	1%	11%	9%	15%	10%	10%	9%	2%	
	SILT			SAND			GRAVEL			
25%	20%			34%			21%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**98**
10.0	**94**
6.30	**89**
3.35	**84**
2.00	**79**
1.18	**74**
0.630	**69**
0.425	**65**
0.200	**54**
0.150	**51**
0.063	**45**

Particle Diameter (mm)	Percent Passing (%)
0.02	**34**
0.006	**33**
0.002	**25**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**NA**
D_{30} (mm)	**0.004**
D_{50} (mm)	**0.130**
D_{60} (mm)	**0.302**
D_{85} (mm)	**3.801**
D_{90} (mm)	**6.910**
C_U	**NA**
C_C	**NA**

Soil Description:

Brown slightly sandy slightly gravelly CLAY

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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Compiled By	Date
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Contract	Contract Ref:
2021OY102, WSP Eastern & Midlands Region - Lot 2	**785305**

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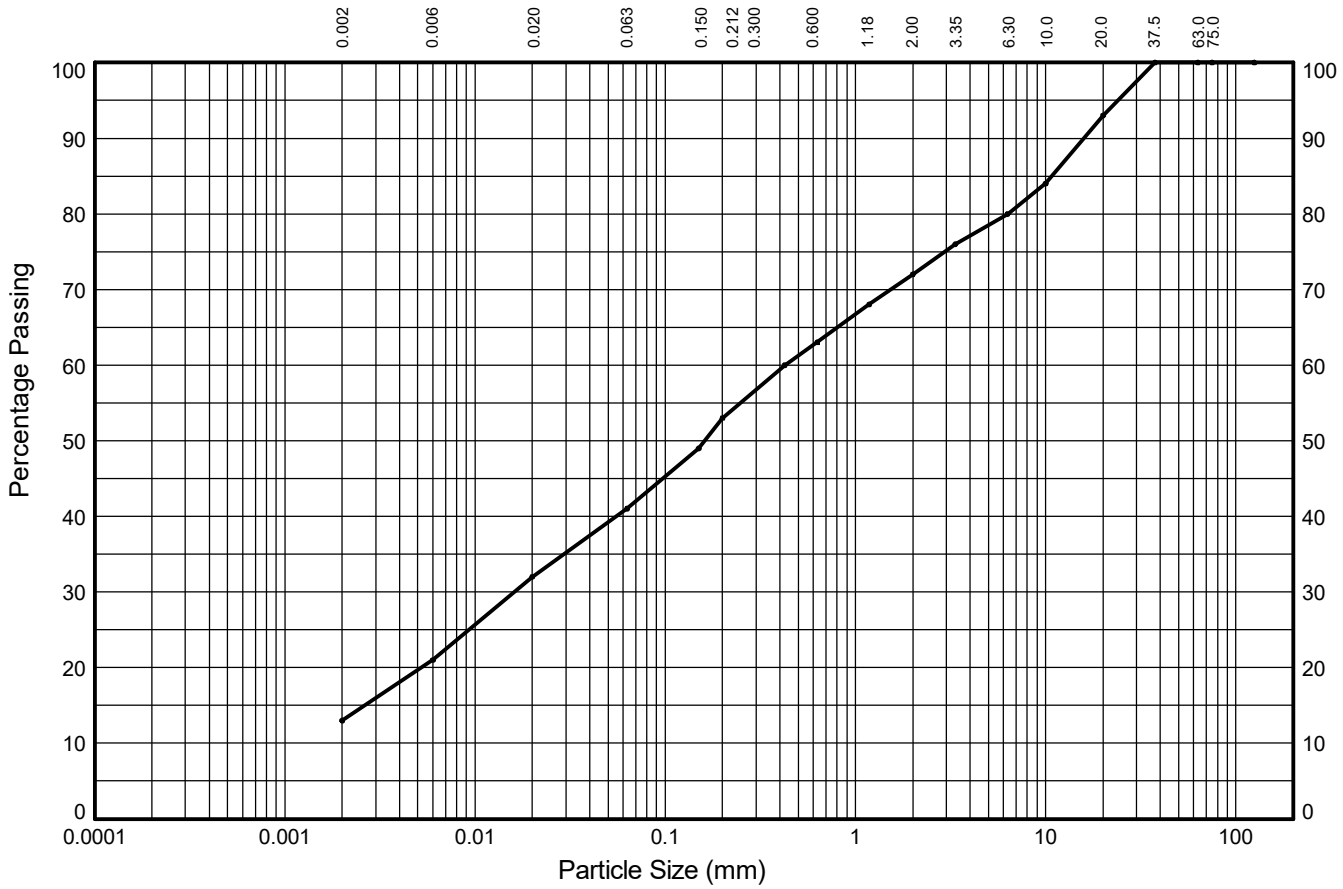
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.4 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-TP031** Sample Ref: **2** Sample Type: **B** Depth (m): **1.70**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	8%	11%	9%	12%	10%	9%	8%	13%	7%	
	SILT			SAND			GRAVEL			
13%	28%			31%			28%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**93**
10.0	**84**
6.30	**80**
3.35	**76**
2.00	**72**
1.18	**68**
0.630	**63**
0.425	**60**
0.200	**53**
0.150	**49**
0.063	**41**

Particle Diameter (mm)	Percent Passing (%)
0.02	**32**
0.006	**21**
0.002	**13**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**0.003**
D_{30} (mm)	**0.016**
D_{50} (mm)	**0.161**
D_{60} (mm)	**0.425**
D_{85} (mm)	**10.801**
D_{90} (mm)	**15.874**
C_U	**NA**
C_C	**NA**

Soil Description:

Brown clayey very silty very gravelly SAND

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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Contract	Contract Ref:
Lot 3 Eastern & Midlands WSP	**785305**

GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Graph L - PSD - A4P | 785305 - LOT 3 EASTERN & MIDLANDS WSP.GPJ - v10_01.
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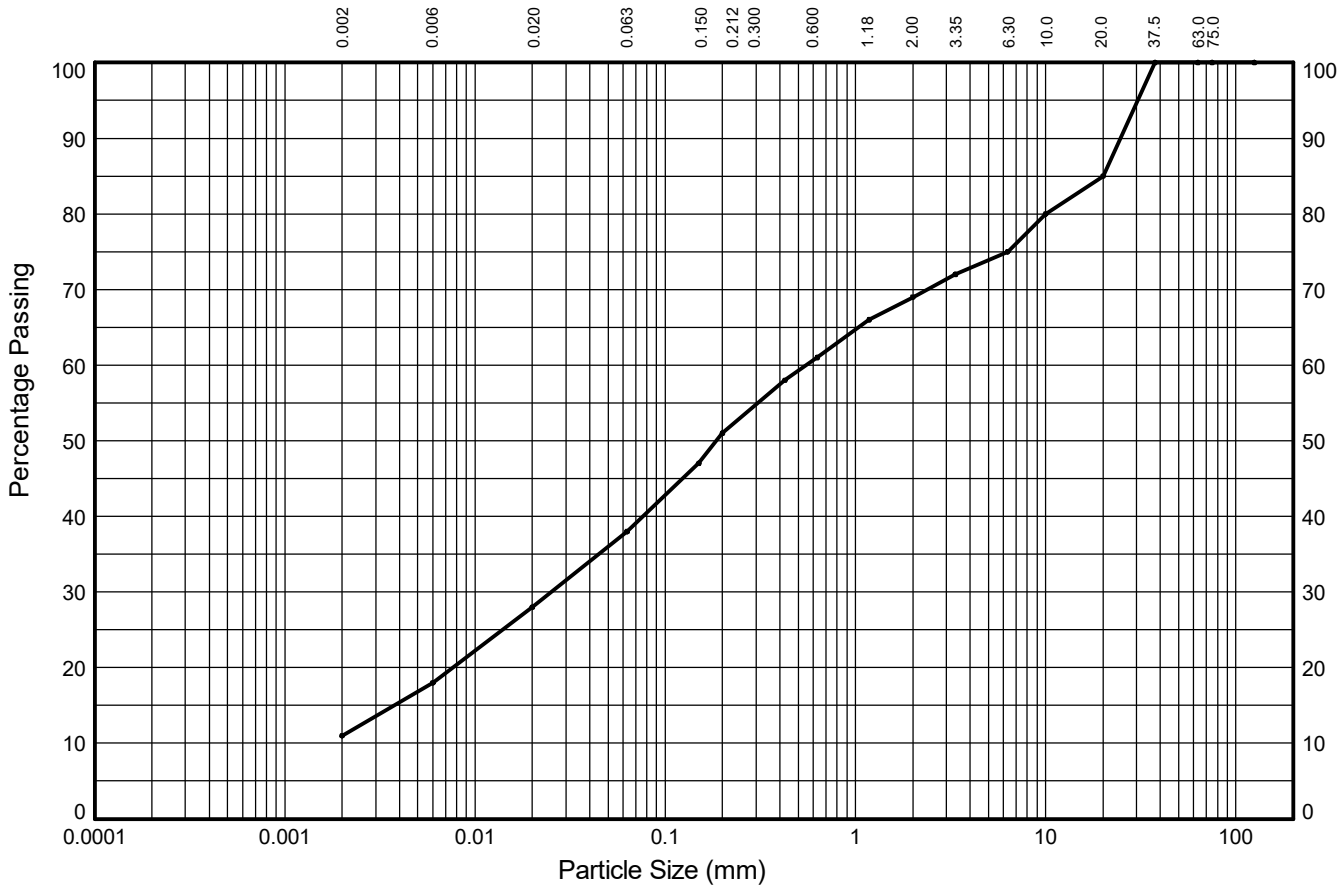
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.4 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-TP032** Sample Ref: **1** Sample Type: **B** Depth (m): **0.30**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	7%	10%	10%	13%	10%	8%	6%	10%	15%	
	SILT			SAND			GRAVEL			
11%	27%			31%			31%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**85**
10.0	**80**
6.30	**75**
3.35	**72**
2.00	**69**
1.18	**66**
0.630	**61**
0.425	**58**
0.200	**51**
0.150	**47**
0.063	**38**

Particle Diameter (mm)	Percent Passing (%)
0.02	**28**
0.006	**18**
0.002	**11**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**0.004**
D_{30} (mm)	**0.025**
D_{50} (mm)	**0.186**
D_{60} (mm)	**0.553**
D_{85} (mm)	**20.000**
D_{90} (mm)	**24.662**
C_U	**NA**
C_C	**NA**

Soil Description:

Light brown clayey very silty GRAVEL & SAND

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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Compiled By	Date
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Contract	Contract Ref:
Lot 3 Eastern & Midlands WSP	**785305**

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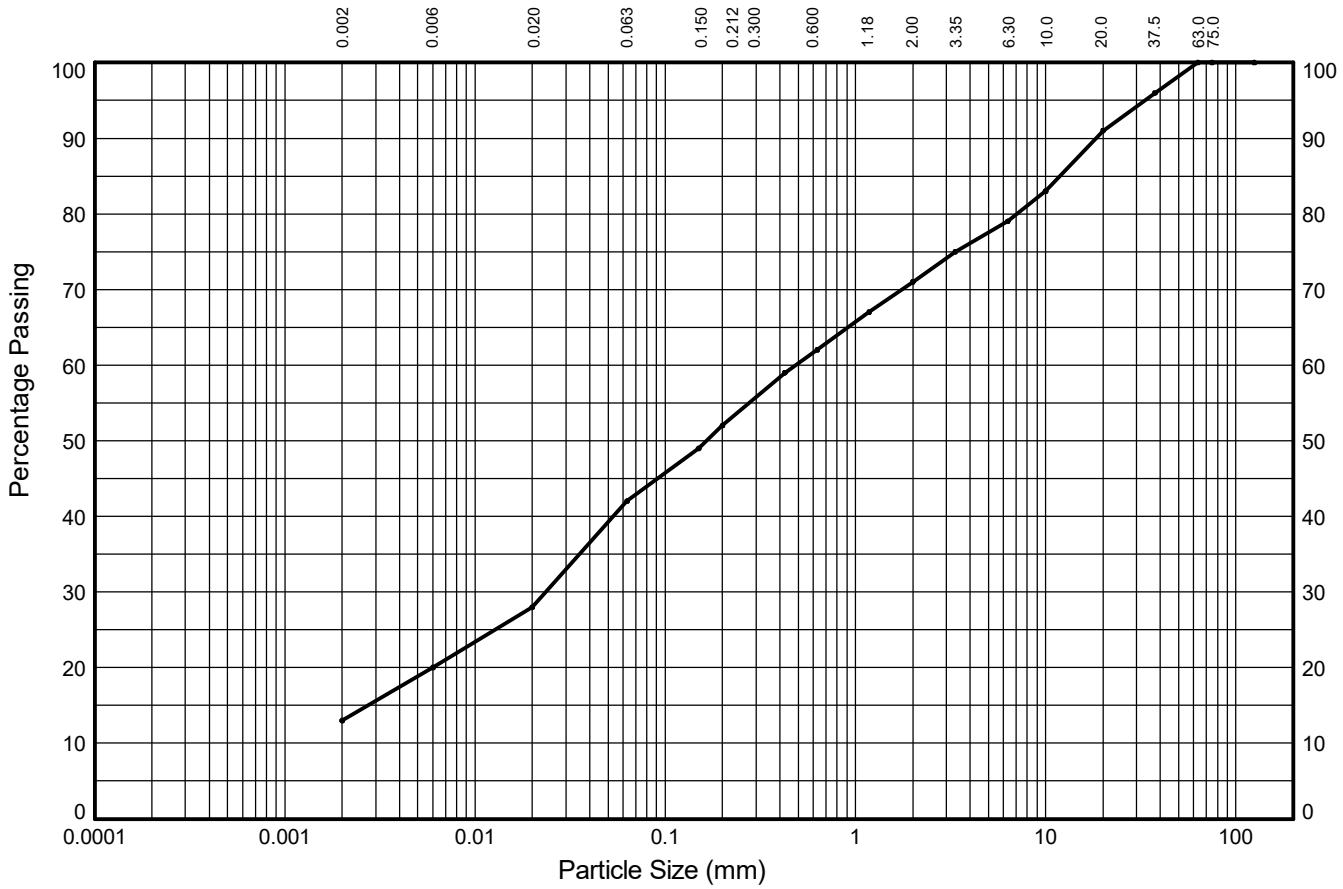
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.4 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-TP032** Sample Ref: **3** Sample Type: **B** Depth (m): **1.30**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	7%	8%	14%	10%	10%	9%	8%	12%	9%	
	SILT			SAND			GRAVEL			
13%	29%			29%			29%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**96**
20.0	**91**
10.0	**83**
6.30	**79**
3.35	**75**
2.00	**71**
1.18	**67**
0.630	**62**
0.425	**59**
0.200	**52**
0.150	**49**
0.063	**42**

Particle Diameter (mm)	Percent Passing (%)
0.02	**28**
0.006	**20**
0.002	**13**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**0.003**
D_{30} (mm)	**0.024**
D_{50} (mm)	**0.165**
D_{60} (mm)	**0.485**
D_{85} (mm)	**11.892**
D_{90} (mm)	**18.340**
C_U	**NA**
C_C	**NA**

Soil Description:

Brown slightly gravelly slightly sandy clayey SILT

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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Compiled By	Date
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Contract	Contract Ref:
Lot 3 Eastern & Midlands WSP	**785305**

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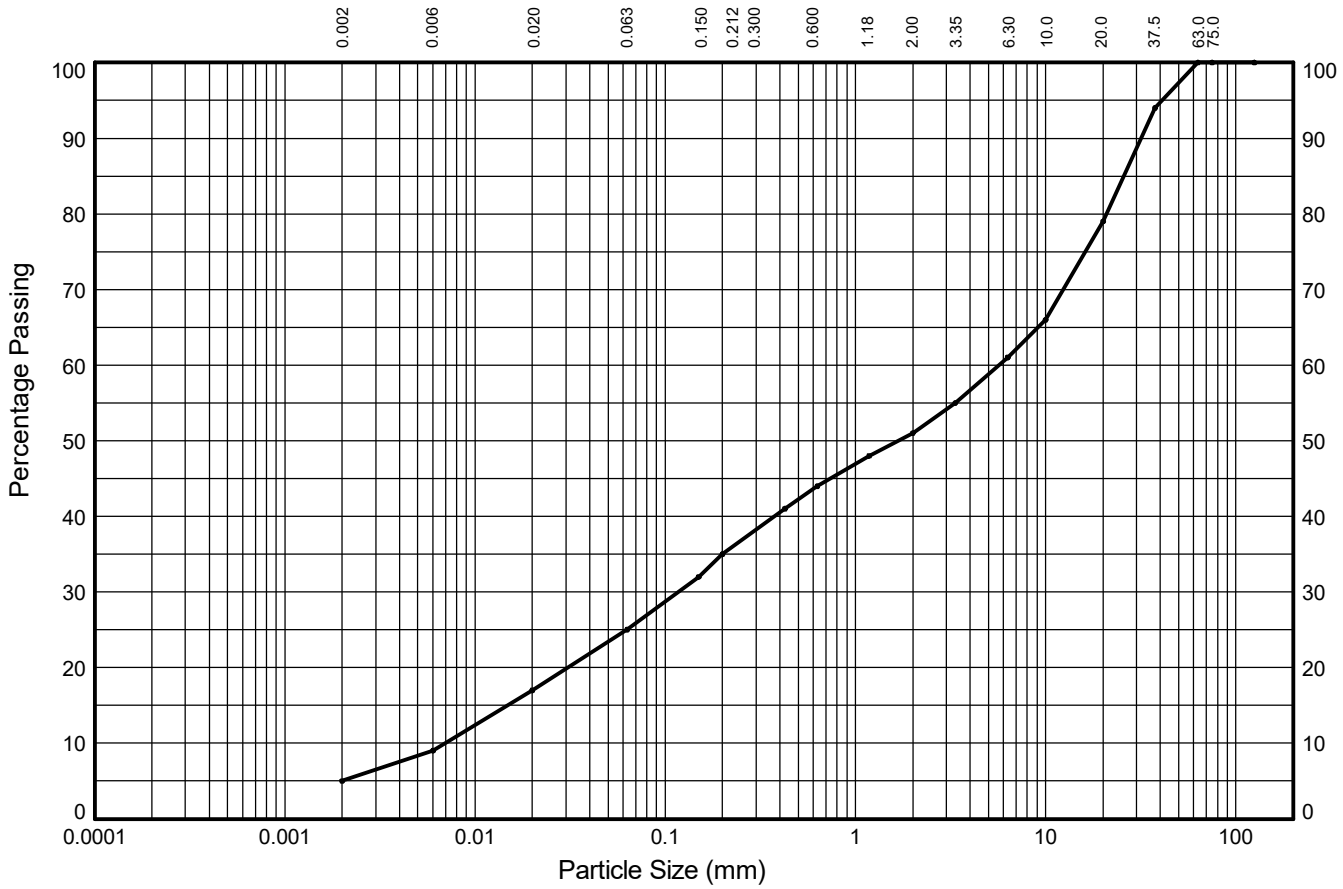
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.4 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-TP033** Sample Ref: **1** Sample Type: **B** Depth (m): **0.60**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	4%	8%	8%	10%	9%	7%	10%	18%	21%	
	SILT			SAND			GRAVEL			
5%	20%			26%			49%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**94**
20.0	**79**
10.0	**66**
6.30	**61**
3.35	**55**
2.00	**51**
1.18	**48**
0.630	**44**
0.425	**41**
0.200	**35**
0.150	**32**
0.063	**25**

Particle Diameter (mm)	Percent Passing (%)
0.02	**17**
0.006	**9**
0.002	**5**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**0.007**
D_{15} (mm)	**0.015**
D_{30} (mm)	**0.117**
D_{50} (mm)	**1.677**
D_{60} (mm)	**5.671**
D_{85} (mm)	**25.718**
D_{90} (mm)	**31.713**
C_U	**813**
C_C	**0.35**

Soil Description:

Grey very sandy clayey silty GRAVEL

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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LAURA SCHRAMM	06/02/23

Contract	Contract Ref:
Lot 3 Eastern & Midlands WSP	**785305**

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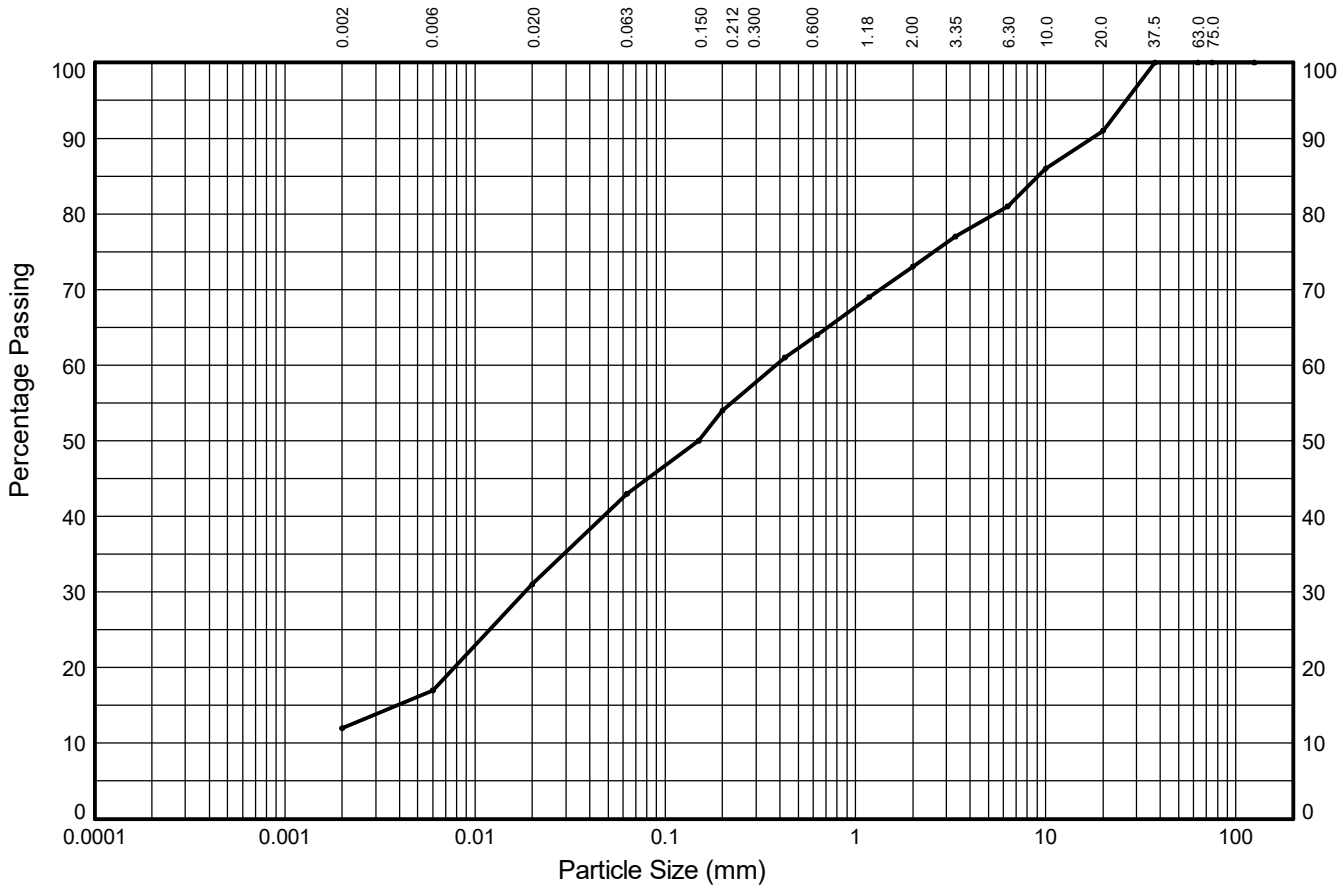
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.4 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-TP034** Sample Ref: **1** Sample Type: **B** Depth (m): **0.70**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	5%	14%	12%	11%	10%	9%	8%	10%	9%	
	SILT			SAND			GRAVEL			
12%	31%			30%			27%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**91**
10.0	**86**
6.30	**81**
3.35	**77**
2.00	**73**
1.18	**69**
0.630	**64**
0.425	**61**
0.200	**54**
0.150	**50**
0.063	**43**

Particle Diameter (mm)	Percent Passing (%)
0.02	**31**
0.006	**17**
0.002	**12**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**0.004**
D_{30} (mm)	**0.018**
D_{50} (mm)	**0.150**
D_{60} (mm)	**0.382**
D_{85} (mm)	**9.117**
D_{90} (mm)	**17.411**
C_U	**NA**
C_C	**NA**

Soil Description:

Grey slightly gravelly slightly sandy clayey SILT

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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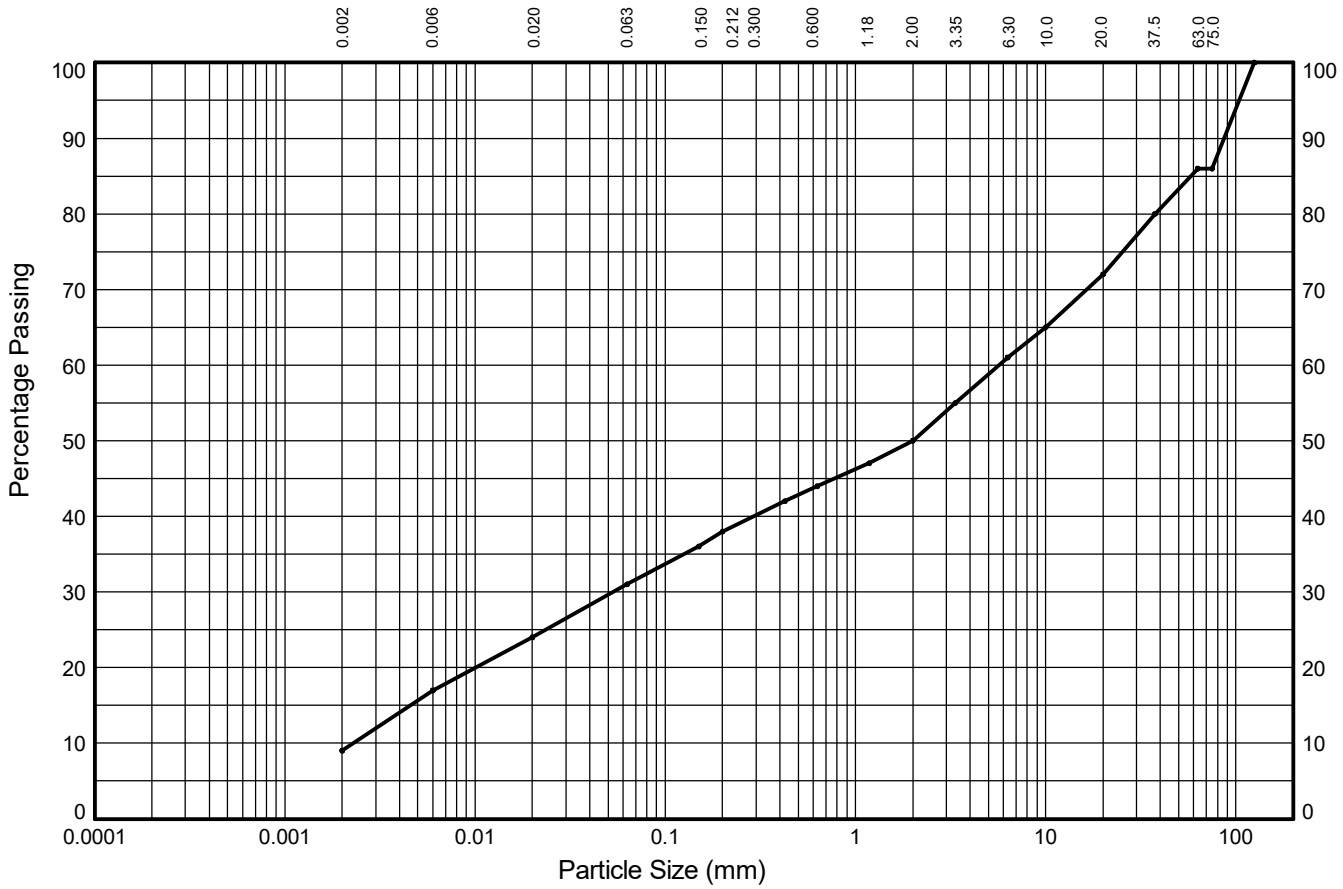
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.4 of BS EN ISO 17892:Part 4:2016
NON-STANDARD TEST

Position ID: **BPT-TP035** Sample Ref: **1** Sample Type: **B** Depth (m): **0.70**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	8%	7%	7%	7%	6%	6%	11%	11%	14%	
	SILT			SAND			GRAVEL			
9%	22%			19%			36%			14%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**86**
63.0	**86**
37.5	**80**
20.0	**72**
10.0	**65**
6.30	**61**
3.35	**55**
2.00	**50**
1.18	**47**
0.630	**44**
0.425	**42**
0.200	**38**
0.150	**36**
0.063	**31**

Particle Diameter (mm)	Percent Passing (%)
0.02	**24**
0.006	**17**
0.002	**9**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**0.002**
D_{15} (mm)	**0.005**
D_{30} (mm)	**0.053**
D_{50} (mm)	**2.000**
D_{60} (mm)	**5.671**
D_{85} (mm)	**57.782**
D_{90} (mm)	**86.785**
C_U	**2471**
C_C	**0.22**

Soil Description:

Brown claye sandy very silty GRAVEL with medium cobble content

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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Compiled By	Date
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Contract	Contract Ref:
Lot 3 Eastern & Midlands WSP	**785305**

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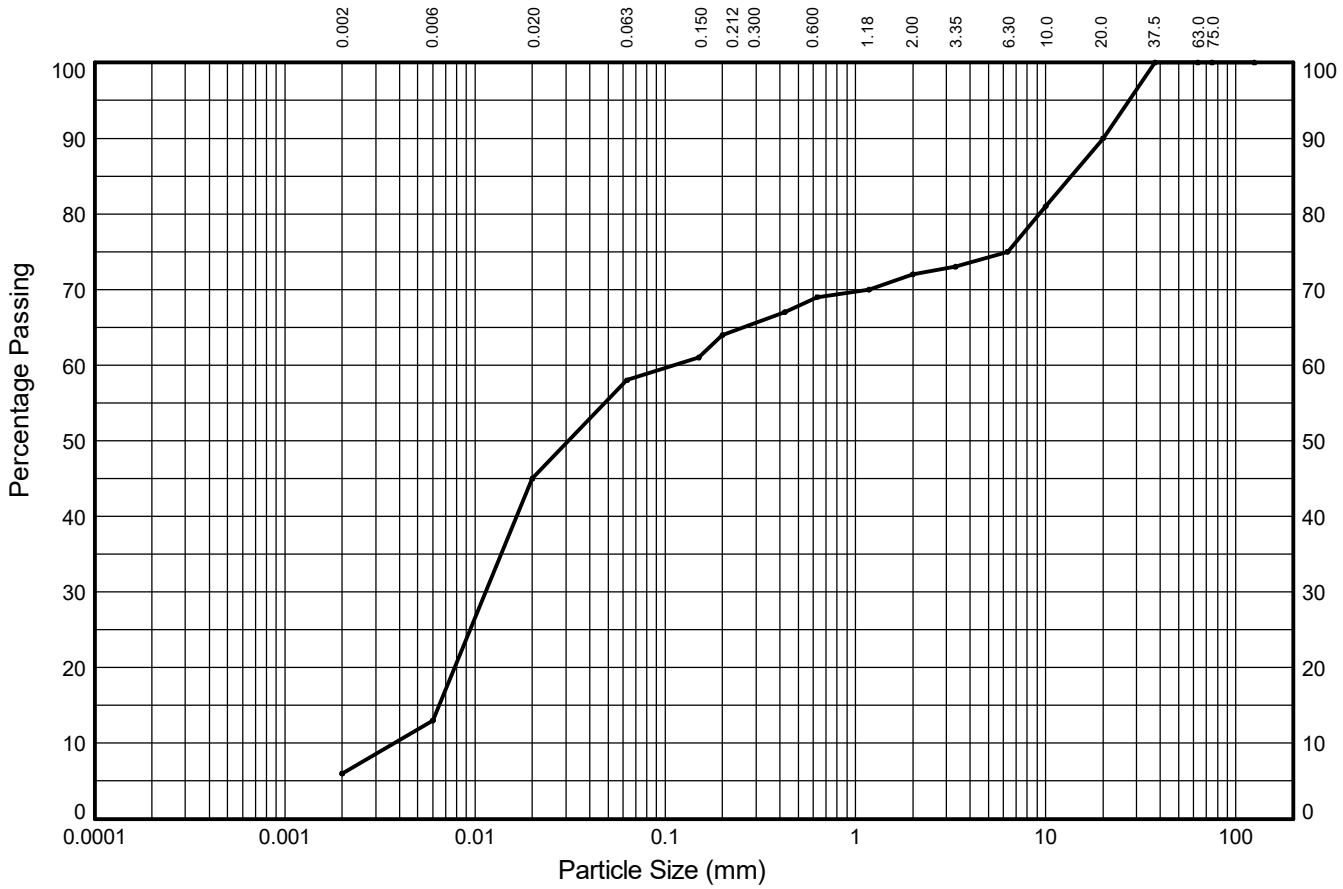
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.4 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-TP036** Sample Ref: **1** Sample Type: **B** Depth (m): **0.40**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	8%	31%	13%	6%	5%	3%	3%	15%	10%	
	SILT			SAND			GRAVEL			
6%	52%			14%			28%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**90**
10.0	**81**
6.30	**75**
3.35	**73**
2.00	**72**
1.18	**70**
0.630	**69**
0.425	**67**
0.200	**64**
0.150	**61**
0.063	**58**

Particle Diameter (mm)	Percent Passing (%)
0.02	**45**
0.006	**13**
0.002	**6**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**0.004**
D_{15} (mm)	**0.006**
D_{30} (mm)	**0.011**
D_{50} (mm)	**0.031**
D_{60} (mm)	**0.112**
D_{85} (mm)	**13.608**
D_{90} (mm)	**20.000**
C_U	**30**
C_C	**0.31**

Soil Description:

Brown slightly sandy slightly gravelly CLAY

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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Compiled By		Date
	LAURA SCHRAMM	**17/03/23**

Contract	Contract Ref:
2021OY102, WSP Eastern & Midlands Region - Lot 2	**785305**

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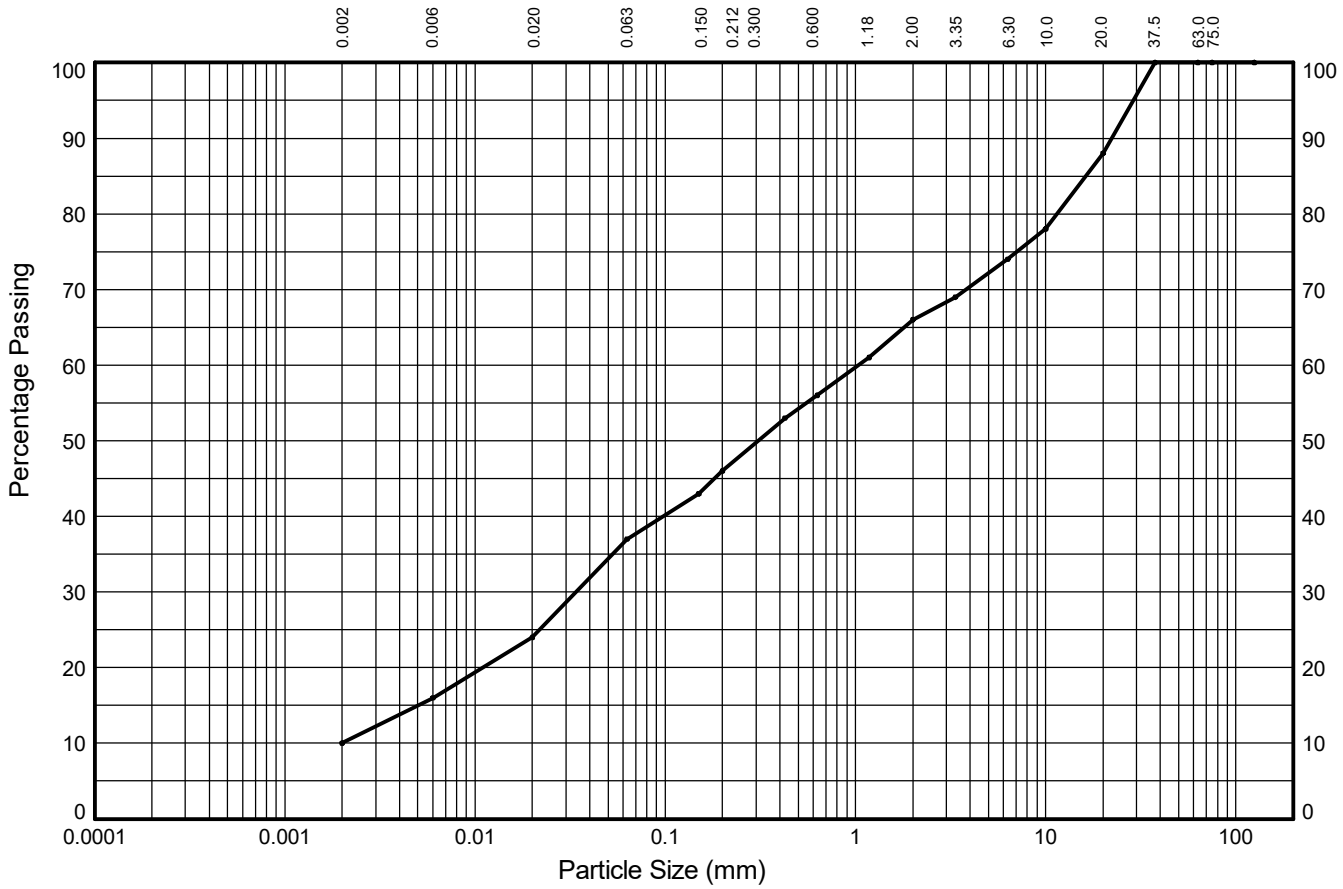
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.4 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-TP036** Sample Ref: **3** Sample Type: **B** Depth (m): **1.40**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	6%	8%	13%	9%	10%	10%	8%	14%	12%	
	SILT			SAND			GRAVEL			
10%	27%			29%			34%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**88**
10.0	**78**
6.30	**74**
3.35	**69**
2.00	**66**
1.18	**61**
0.630	**56**
0.425	**53**
0.200	**46**
0.150	**43**
0.063	**37**

Particle Diameter (mm)	Percent Passing (%)
0.02	**24**
0.006	**16**
0.002	**10**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**0.002**
D_{15} (mm)	**0.005**
D_{30} (mm)	**0.034**
D_{50} (mm)	**0.308**
D_{60} (mm)	**1.041**
D_{85} (mm)	**16.245**
D_{90} (mm)	**22.209**
C_U	**520**
C_C	**0.55**

Soil Description:

Light brown slightly sandy slightly gravelly clayey SILT

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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Compiled By	Date
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Contract	Contract Ref:
Lot 3 Eastern & Midlands WSP	**785305**

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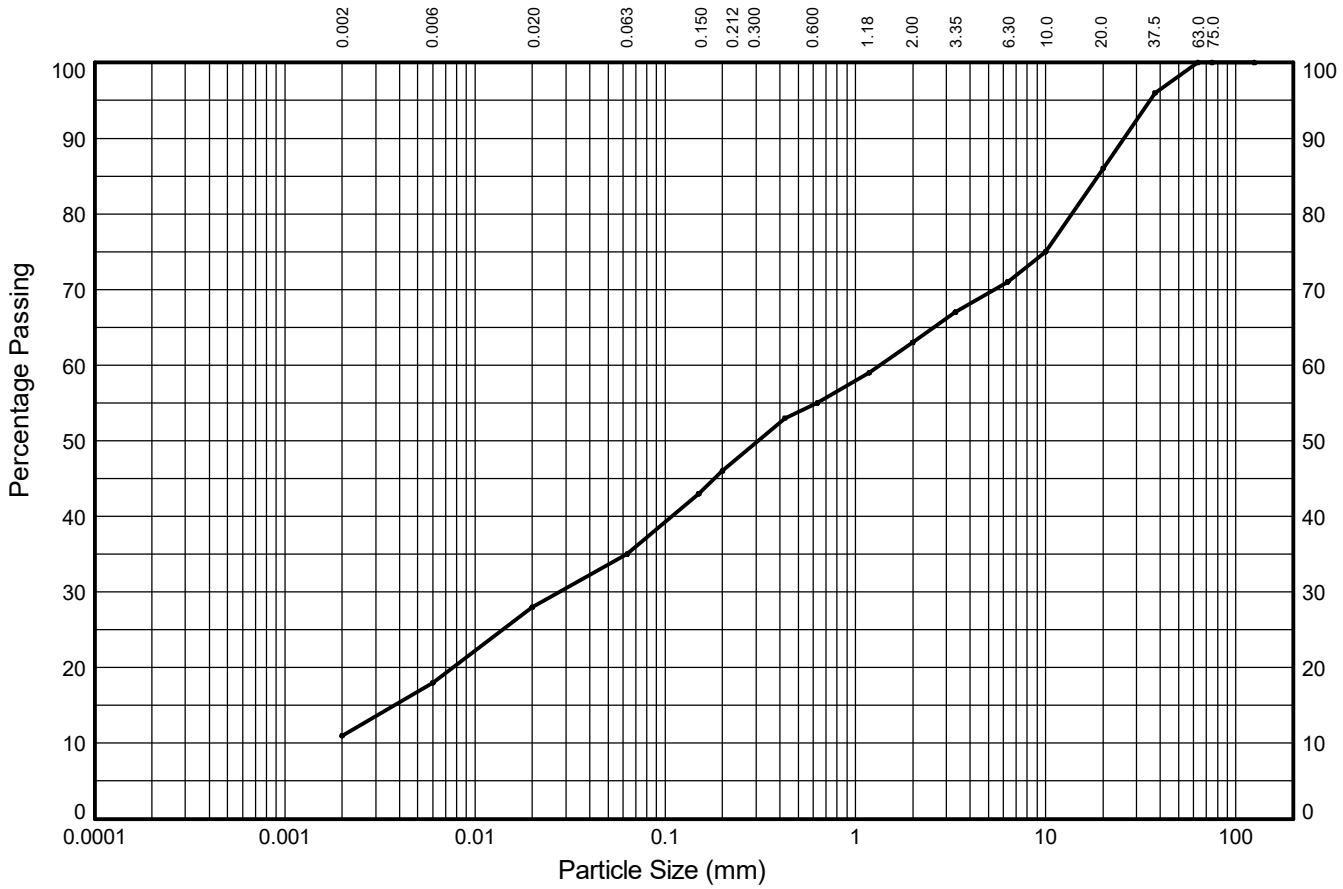
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.4 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-TP037** Sample Ref: **1** Sample Type: **B** Depth (m): **0.70**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	7%	10%	7%	11%	9%	8%	8%	15%	14%	
	SILT			SAND			GRAVEL			
11%	24%			28%			37%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**96**
20.0	**86**
10.0	**75**
6.30	**71**
3.35	**67**
2.00	**63**
1.18	**59**
0.630	**55**
0.425	**53**
0.200	**46**
0.150	**43**
0.063	**35**

Particle Diameter (mm)	Percent Passing (%)
0.02	**28**
0.006	**18**
0.002	**11**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**0.004**
D_{30} (mm)	**0.028**
D_{50} (mm)	**0.308**
D_{60} (mm)	**1.346**
D_{85} (mm)	**18.779**
D_{90} (mm)	**25.718**
C_U	**NA**
C_C	**NA**

Soil Description:

Brown grey slightly sandy gravelly clayey SILT

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

STRUCTURAL SOILS
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Compiled By		Date
	LAURA SCHRAMM	**06/02/23**

Contract	Contract Ref:
Lot 3 Eastern & Midlands WSP	**785305**

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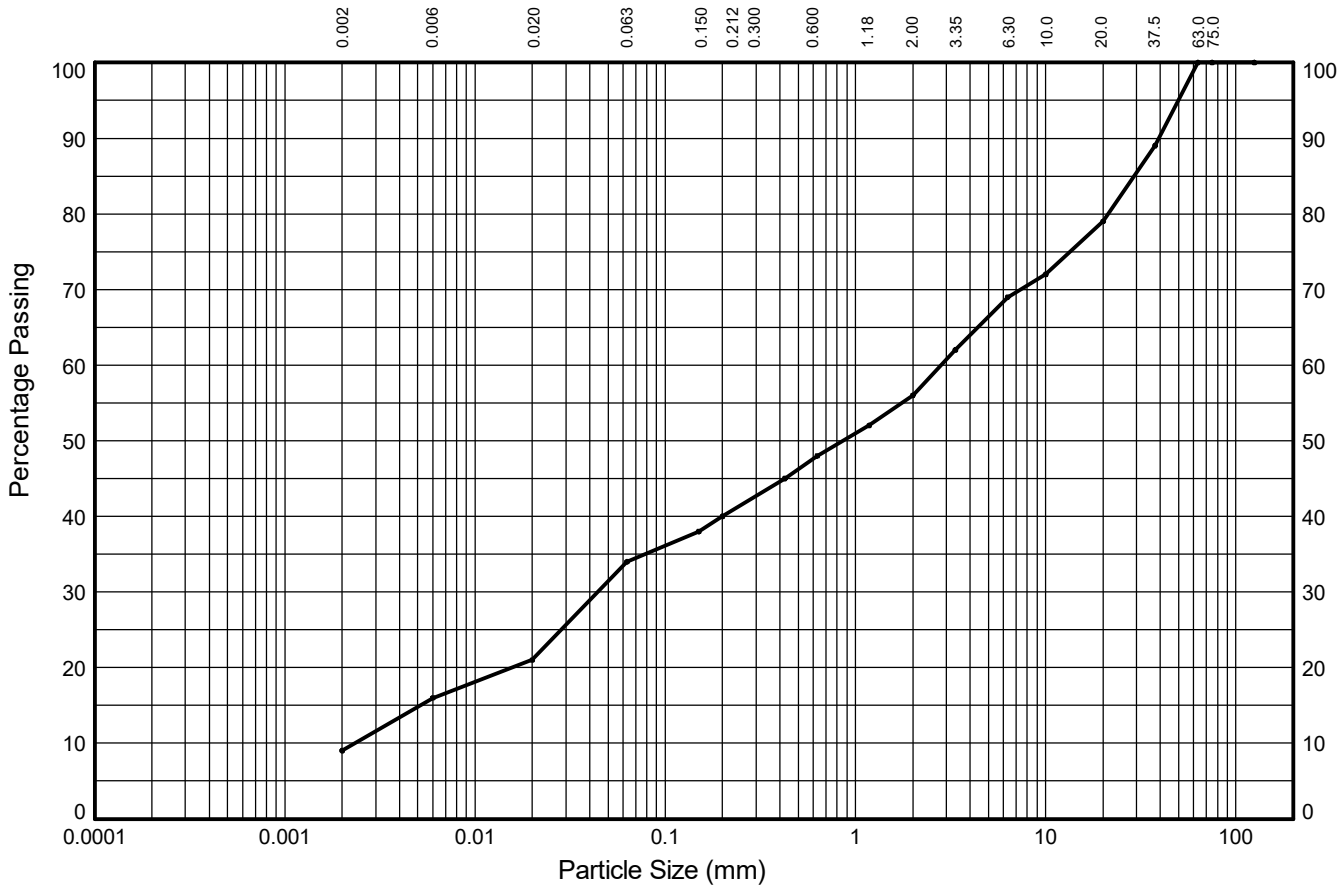
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.4 of BS EN ISO 17892:Part 4:2016
NON-STANDARD TEST

Position ID: **BPT-TP038** Sample Ref: **1** Sample Type: **B** Depth (m): **0.70**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	7%	5%	13%	6%	8%	8%	13%	10%	21%	
	SILT			SAND			GRAVEL			
9%	25%			22%			44%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**89**
20.0	**79**
10.0	**72**
6.30	**69**
3.35	**62**
2.00	**56**
1.18	**52**
0.630	**48**
0.425	**45**
0.200	**40**
0.150	**38**
0.063	**34**

Particle Diameter (mm)	Percent Passing (%)
0.02	**21**
0.006	**16**
0.002	**9**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**0.002**
D_{15} (mm)	**0.005**
D_{30} (mm)	**0.044**
D_{50} (mm)	**0.862**
D_{60} (mm)	**2.821**
D_{85} (mm)	**29.163**
D_{90} (mm)	**39.311**
C_U	**1206**
C_C	**0.30**

Soil Description:

Light grey very sandy clayey very silty GRAVEL

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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LAURA SCHRAMM	**08/02/23**

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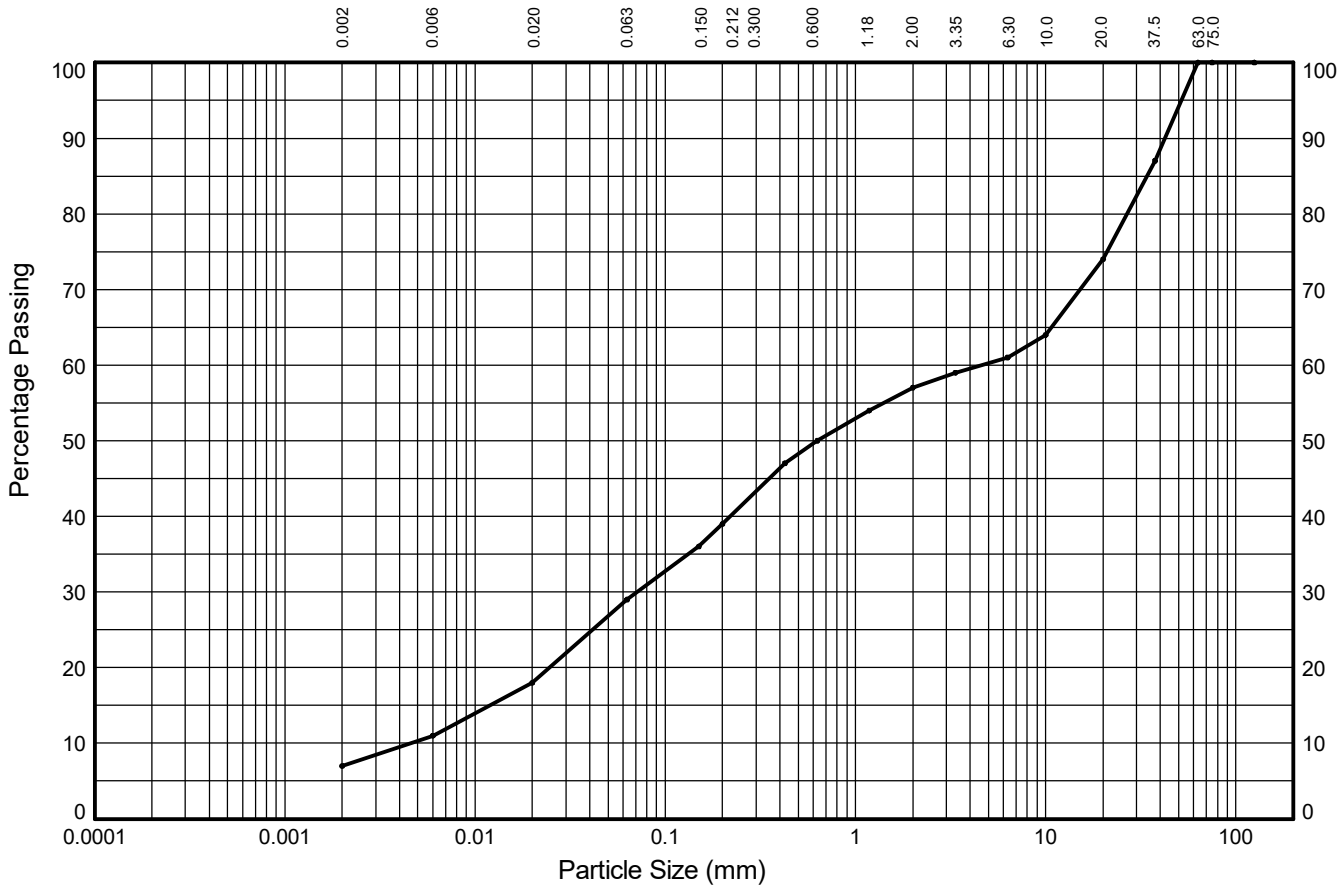
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.4 of BS EN ISO 17892:Part 4:2016
NON-STANDARD TEST

Position ID: **BPT-TP039** Sample Ref: **3** Sample Type: **B** Depth (m): **1.00**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	4%	7%	11%	10%	11%	7%	4%	13%	26%	
	SILT			SAND			GRAVEL			
7%	22%			28%			43%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**87**
20.0	**74**
10.0	**64**
6.30	**61**
3.35	**59**
2.00	**57**
1.18	**54**
0.630	**50**
0.425	**47**
0.200	**39**
0.150	**36**
0.063	**29**

Particle Diameter (mm)	Percent Passing (%)
0.02	**18**
0.006	**11**
0.002	**7**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**0.005**
D_{15} (mm)	**0.012**
D_{30} (mm)	**0.071**
D_{50} (mm)	**0.630**
D_{60} (mm)	**4.594**
D_{85} (mm)	**34.043**
D_{90} (mm)	**42.269**
C_U	**1008**
C_C	**0.24**

Soil Description:

Brown very sandy clayey very silty GRAVEL

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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Contract	Contract Ref:
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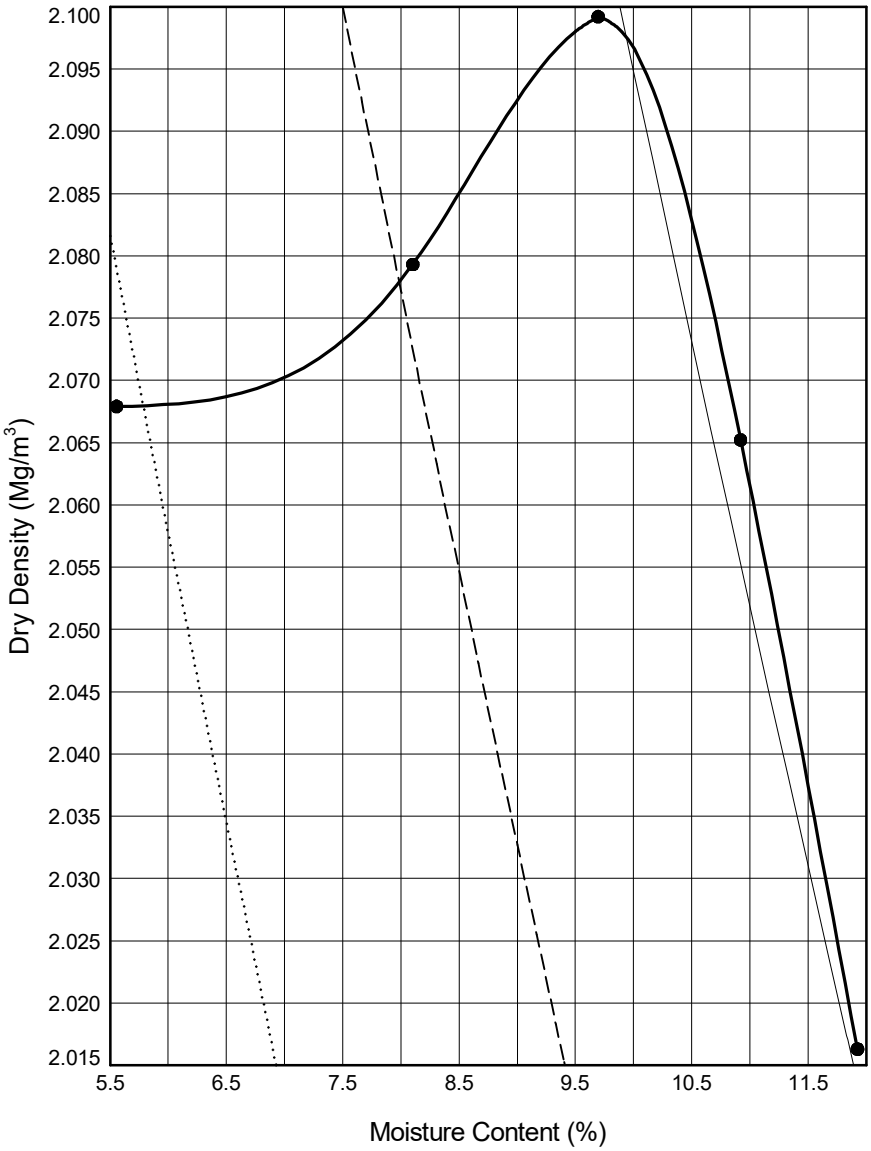
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP TEST

In accordance with clauses 3.3,3.4,3.5,3.6,3.7 of BS1377:Part 4:1990
NON-STANDARD TEST

Position ID: **BPT-TP001** Sample Ref: **1** Sample Type: **B** Depth (m): **0.50**



Initial Sample Conditions			Test Details			Test Results		
Initial Moisture Content (%)	:	**8.1**	Compaction Type	:	**Light**	Maximum Dry Density (Mg/m^3)	:	**2.10**
% Retained on 37.5mm BS Sieve	:	**2**	Mass of Rammer (kg):		**2.5**	Optimum Moisture Content (%)	:	**9.7**
% Retained on 20.0mm BS Sieve	:	**4**	Type of Mould	:	**CBR**	Method Used: **Clause 3.4**		
Particle Density - assumed (Mg/m^3)	:	**2.65**				Remarks: **Non Standard due to insufficient material**		
Size of Soil Pieces	:	**<20mm**	Single sample was used.					

Sample Description	Key to Air Voids Lines		
Brown slightly sandy slightly gravelly CLAY	——— 0%	– – – – 5%	····· 10%

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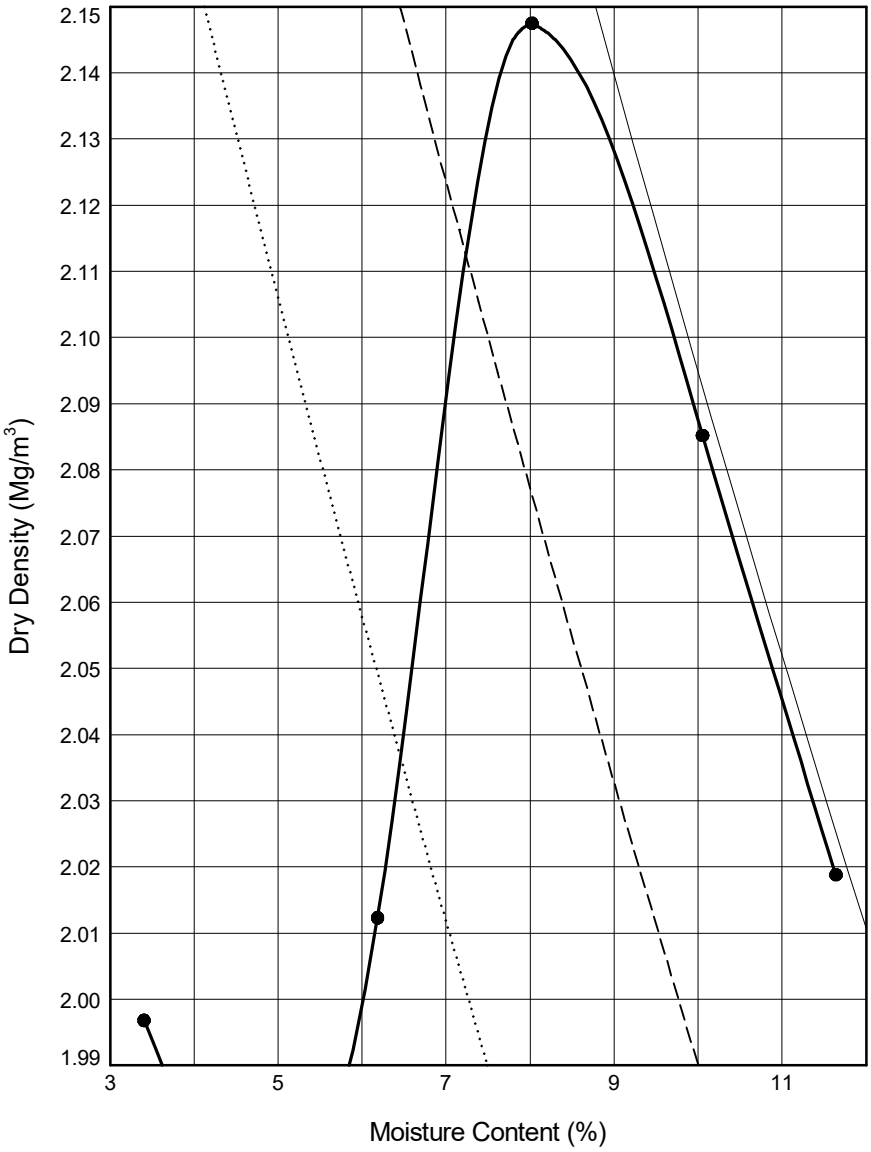
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP TEST

In accordance with clauses 3.3,3.4,3.5,3.6,3.7 of BS1377:Part 4:1990
NON-STANDARD TEST

Position ID: **BPT-TP006** Sample Ref: **1** Sample Type: **B** Depth (m): **0.40**



Initial Sample Conditions			Test Details		Test Results		
Initial Moisture Content (%)	:	**8.0**	Compaction Type	: **Light**	Maximum Dry Density (Mg/m^3)	:	**2.15**
% Retained on 37.5mm BS Sieve	:	**0**	Mass of Rammer (kg):	**2.5**	Optimum Moisture Content (%)	:	**8.00**
% Retained on 20.0mm BS Sieve	:	**8**	Type of Mould	: **1 LITRE**	Method Used: **Clause 3.3**		
Particle Density - assumed (Mg/m^3)	:	**2.65**			Remarks: **Non Standard due to insufficient material**		
Size of Soil Pieces	:	**<20mm**	Separate samples were used.				

Sample Description	Key to Air Voids Lines		
Grey brown slightly gravelly slightly sandy CLAY	——— 0%	– – – – 5%	····· 10%

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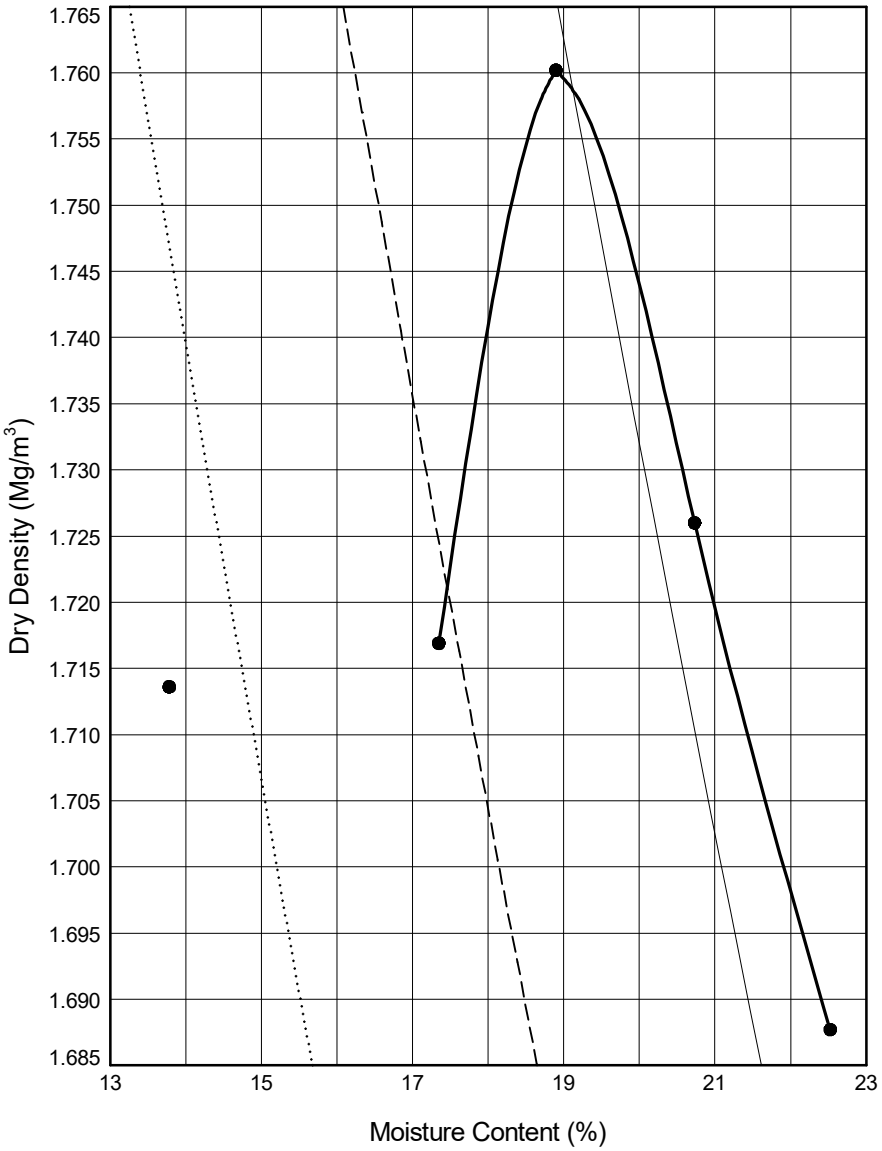
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP TEST

In accordance with clauses 3.3,3.4,3.5,3.6,3.7 of BS1377:Part 4:1990
NON-STANDARD TEST

Position ID: **BPT-TP015** Sample Ref: **3** Sample Type: **B** Depth (m): **1.50**



Initial Sample Conditions			Test Details			Test Results		
Initial Moisture Content (%)	:	**19**	Compaction Type	:	**Light**	Maximum Dry Density (Mg/m^3)	:	**1.76**
% Retained on 37.5mm BS Sieve	:	**0**	Mass of Rammer (kg):		**2.5**	Optimum Moisture Content (%)	:	**19**
% Retained on 20.0mm BS Sieve	:	**13**	Type of Mould	:	**CBR**	Method Used: **Clause 3.4**		
Particle Density - assumed (Mg/m^3)	:	**2.65**				Remarks: **Non Standard due to insufficient material**		
Size of Soil Pieces	:	**<20mm**	Single sample was used.					

Sample Description	Key to Air Voids Lines		
Brown slightly sandy gravelly CLAY	——— 0%	– – – – 5%	····· 10%

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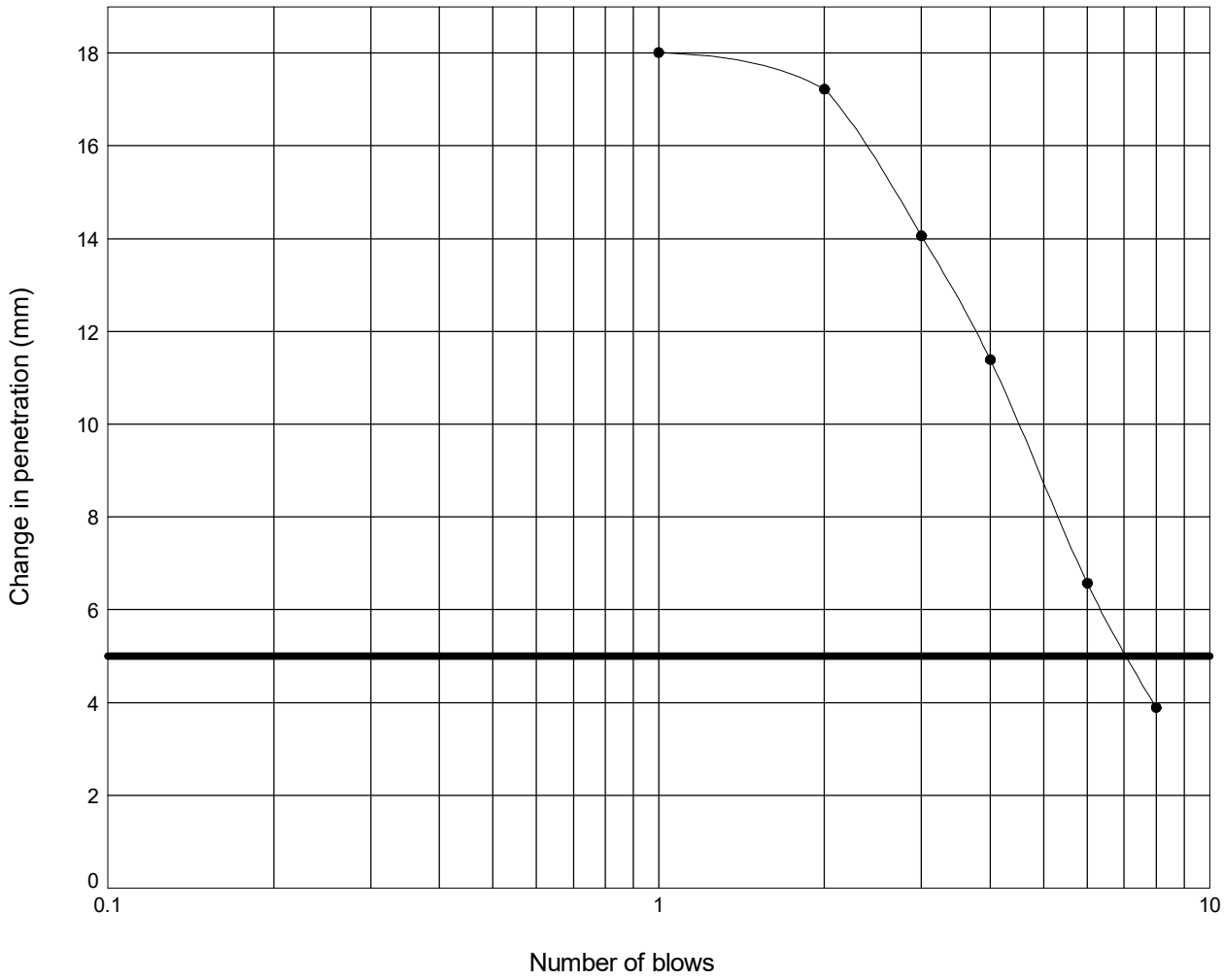
MOISTURE CONDITION VALUE

In accordance with clause 5 of BS1377:Part 4:1990

Position ID: **BPT-TP012** Sample Ref: **3** Sample Type: **B** Depth (m): **1.30**

Description : **Brown slightly gravelly sandy CLAY**



Moisture Content :	=	8.8	%
Percentage retained on 20 mm sieve :	=	14	%
Moisture Condition Value :	=	8.4	
Interpretation of curve:	=	Steepest straight line - Fig 9	

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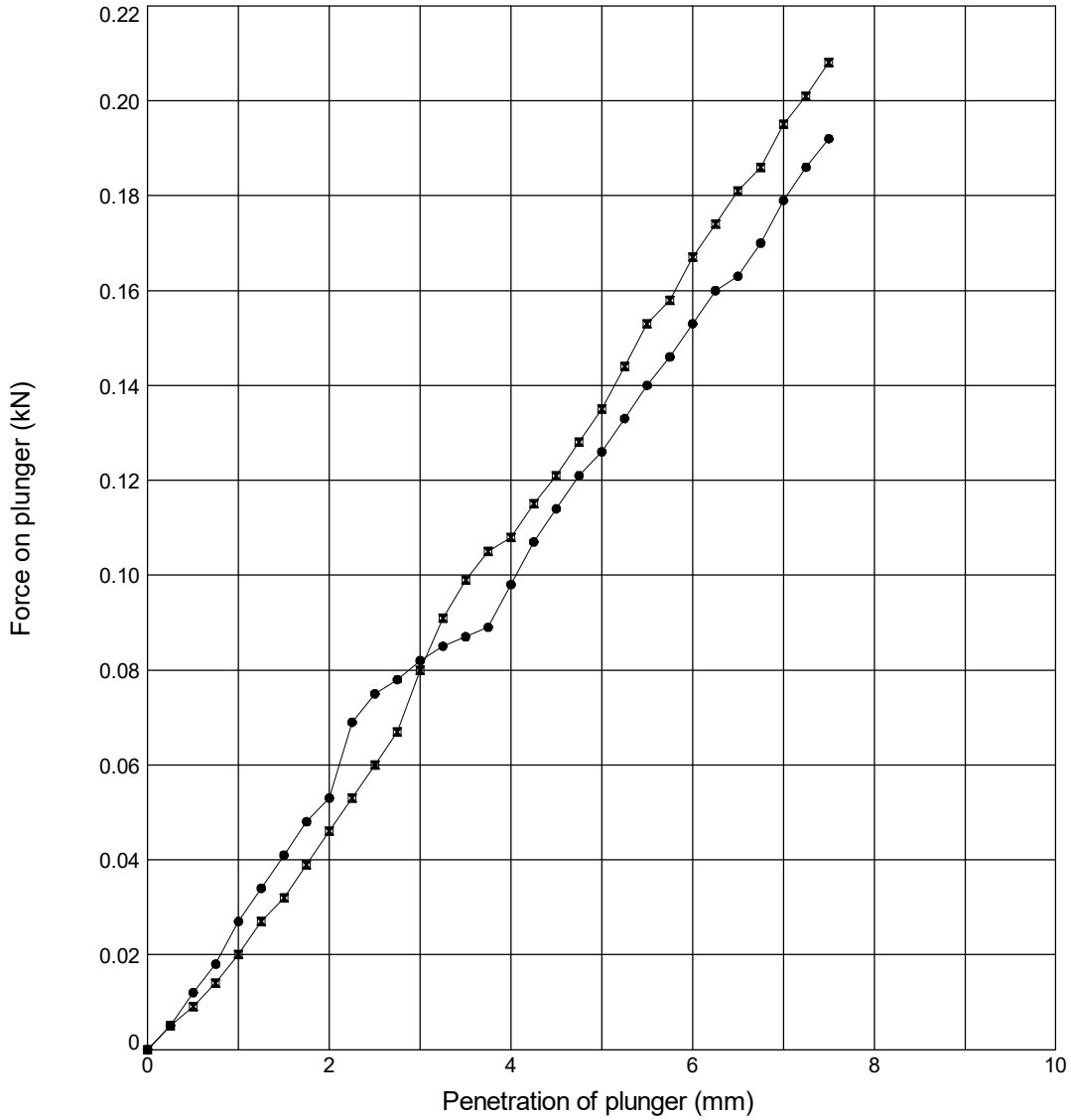
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990

Position ID: **BPT-TP002** Sample Ref: **1** Sample Type: **B** Depth (m): **0.40**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**11**	Compaction Type	:	**2.5 kg Dynamic**	Moisture Content (%)	**11**	**11**
Initial Bulk Density (Mg/m^3)	:	**2.27**	Surcharge (kg)	:	**4.0**	CBR value (%)	**0.63**	**0.70**
Initial Dry Density (Mg/m^3)	:	**2.04**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**17**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown slightly sandy gravelly CLAY	● **Top** ⧓ **Base**

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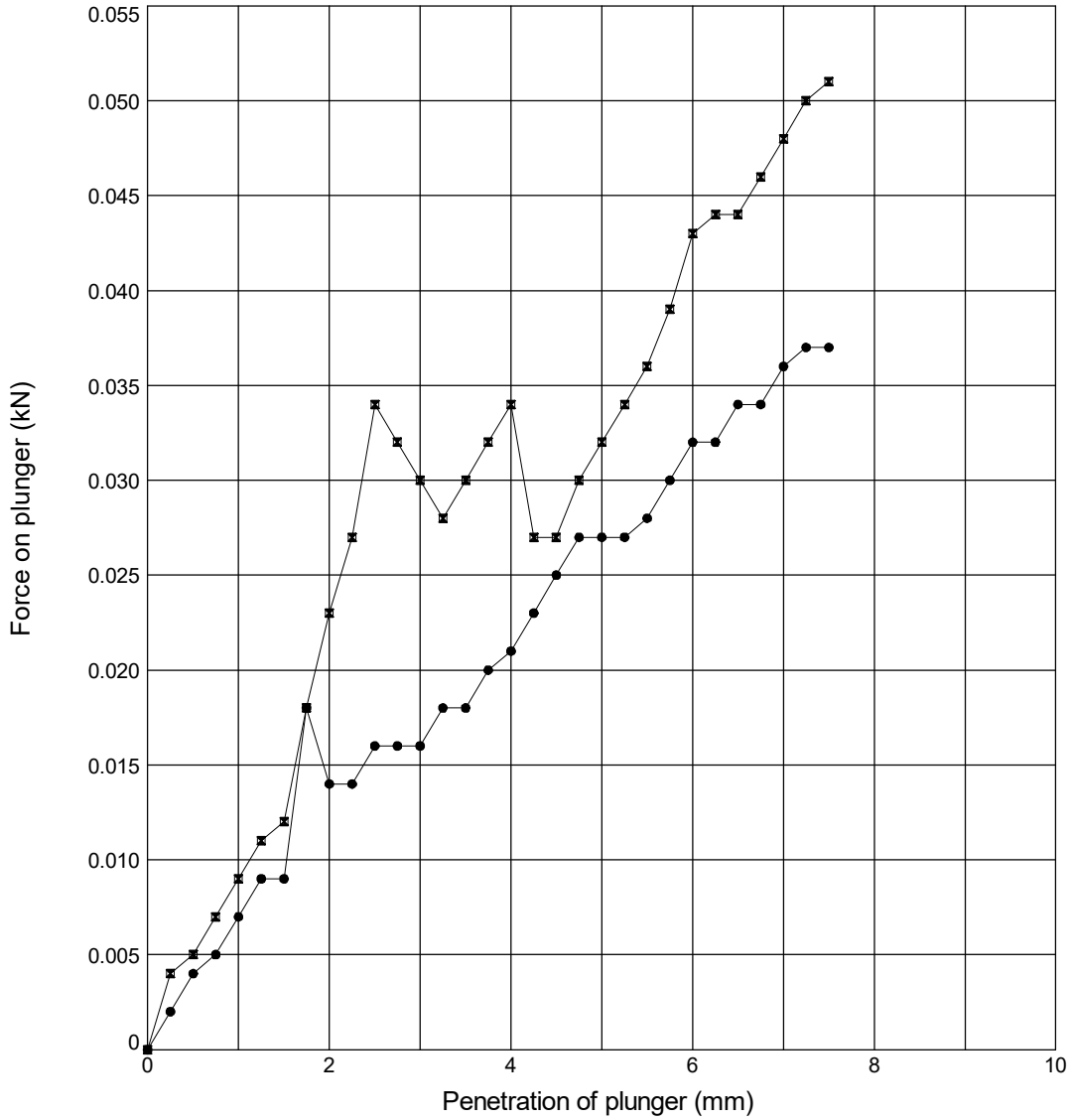
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990

Position ID: **BPT-TP010** Sample Ref: **1** Sample Type: **B** Depth (m): **0.50**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**16**	Compaction Type	:	**2.5 kg Dynamic**	Moisture Content (%)	**16**	**15**
Initial Bulk Density (Mg/m^3)	:	**2.15**	Surcharge (kg)	:	**4.0**	CBR value (%)	**0.13**	**0.30**
Initial Dry Density (Mg/m^3)	:	**1.85**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**12**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown slightly gravelly sandy CLAY	● **Top** ⧓ **Base**

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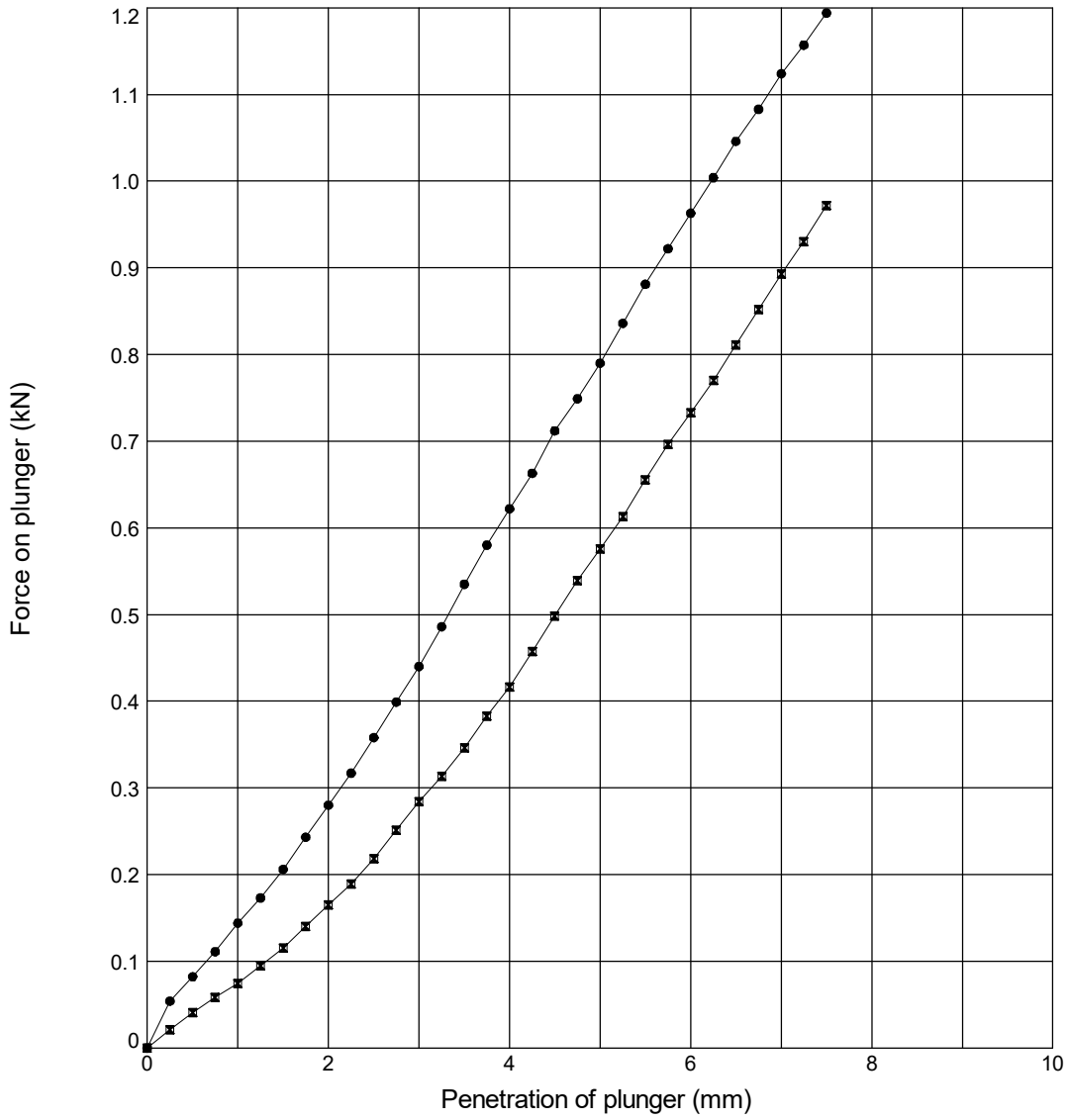
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990

Position ID: **BPT-TP030** Sample Ref: **1** Sample Type: **B** Depth (m): **0.60**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**8.8**	Compaction Type	:	**2.5 kg Dynamic**	Moisture Content (%)	**8.9**	**8.6**
Initial Bulk Density (Mg/m^3)	:	**2.28**	Surcharge (kg)	:	**4.0**	CBR value (%)	**4.0**	**2.9**
Initial Dry Density (Mg/m^3)	:	**2.10**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**22**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown slightly sandy slightly gravelly silty CLAY	● **Top** ⧓ **Base**

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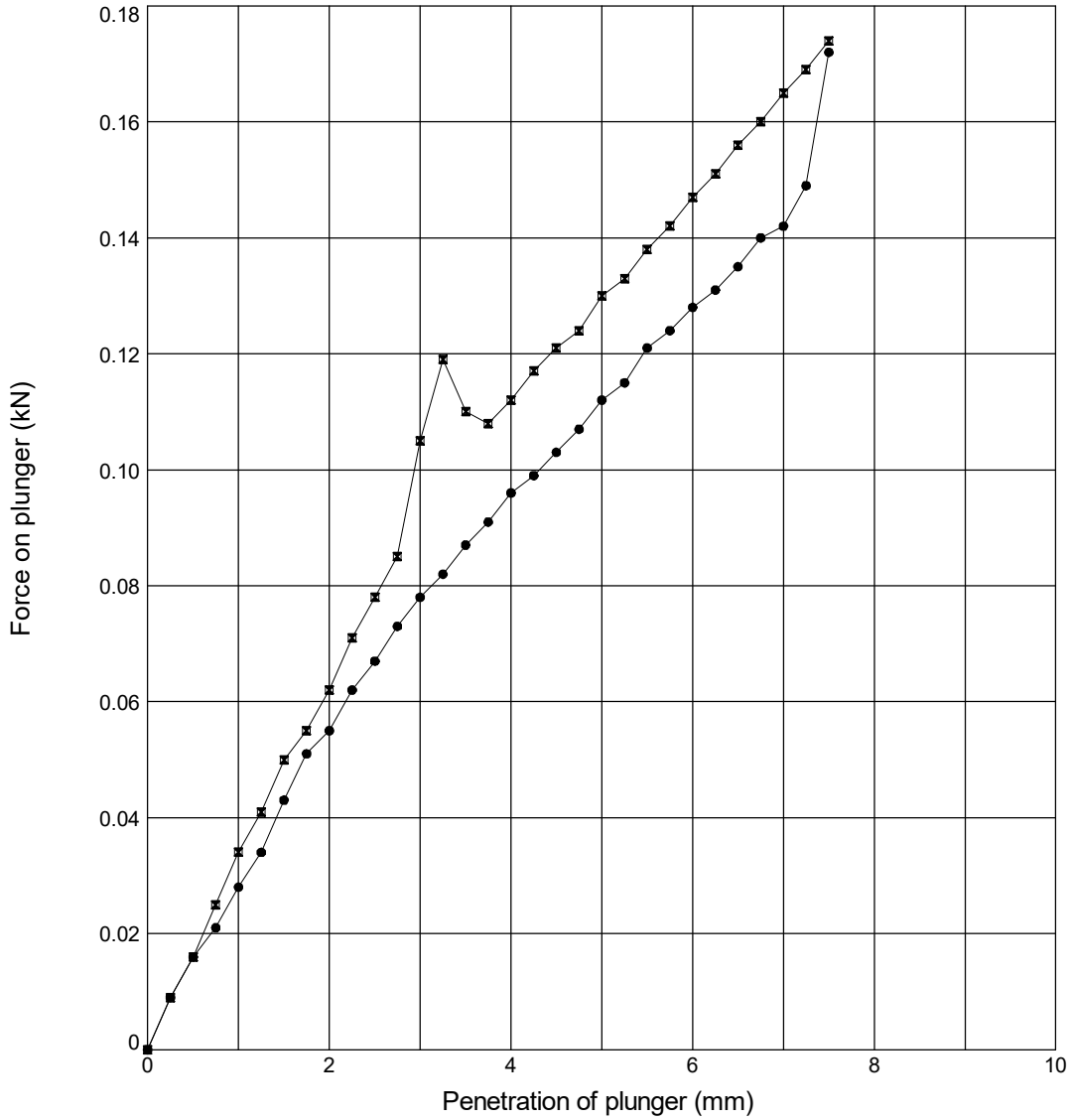
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990

Position ID: **BPT-TP032** Sample Ref: **1** Sample Type: **B** Depth (m): **0.30**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**15**	Compaction Type	:	**2.5 kg Dynamic**	Moisture Content (%)	**15**	**15**
Initial Bulk Density (Mg/m^3)	:	**2.15**	Surcharge (kg)	:	**4.0**	CBR value (%)	**0.56**	**0.60**
Initial Dry Density (Mg/m^3)	:	**1.87**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**5**	Swelling (mm)	:	**-**			

Sample Description	Key
Light brown clayey very silty GRAVEL & SAND	● **Top** ⧓ **Base**

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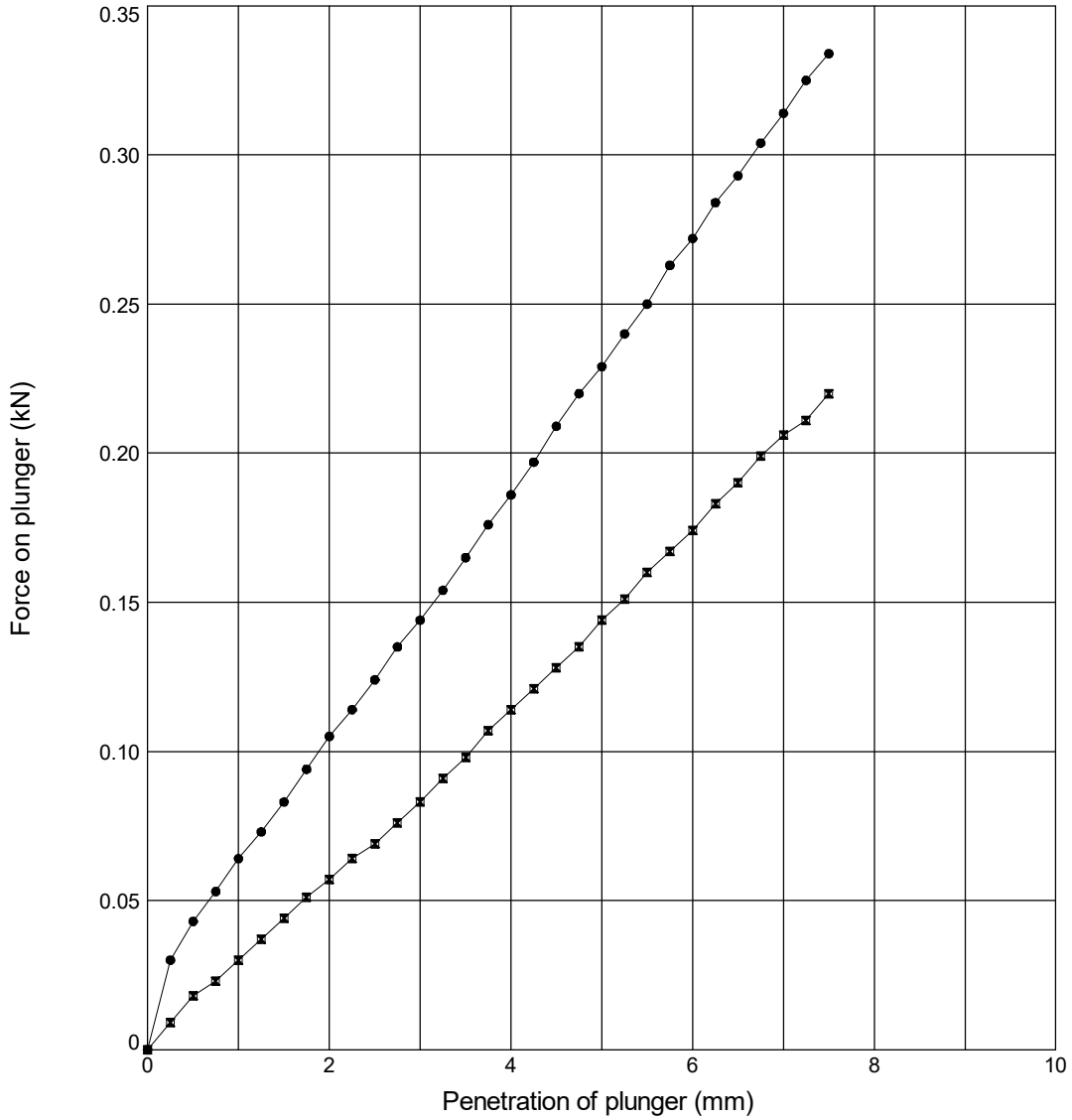
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990

Position ID: **BPT-TP036** Sample Ref: **1** Sample Type: **B** Depth (m): **0.40**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**11**	Compaction Type	:	**2.5 kg Dynamic**	Moisture Content (%)	**11**	**11**
Initial Bulk Density (Mg/m^3)	:	**2.24**	Surcharge (kg)	:	**4.0**	CBR value (%)	**1.1**	**0.70**
Initial Dry Density (Mg/m^3)	:	**2.02**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**23**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown slightly sandy slightly gravelly clayey SILT	● **Top** ⧓ **Base**

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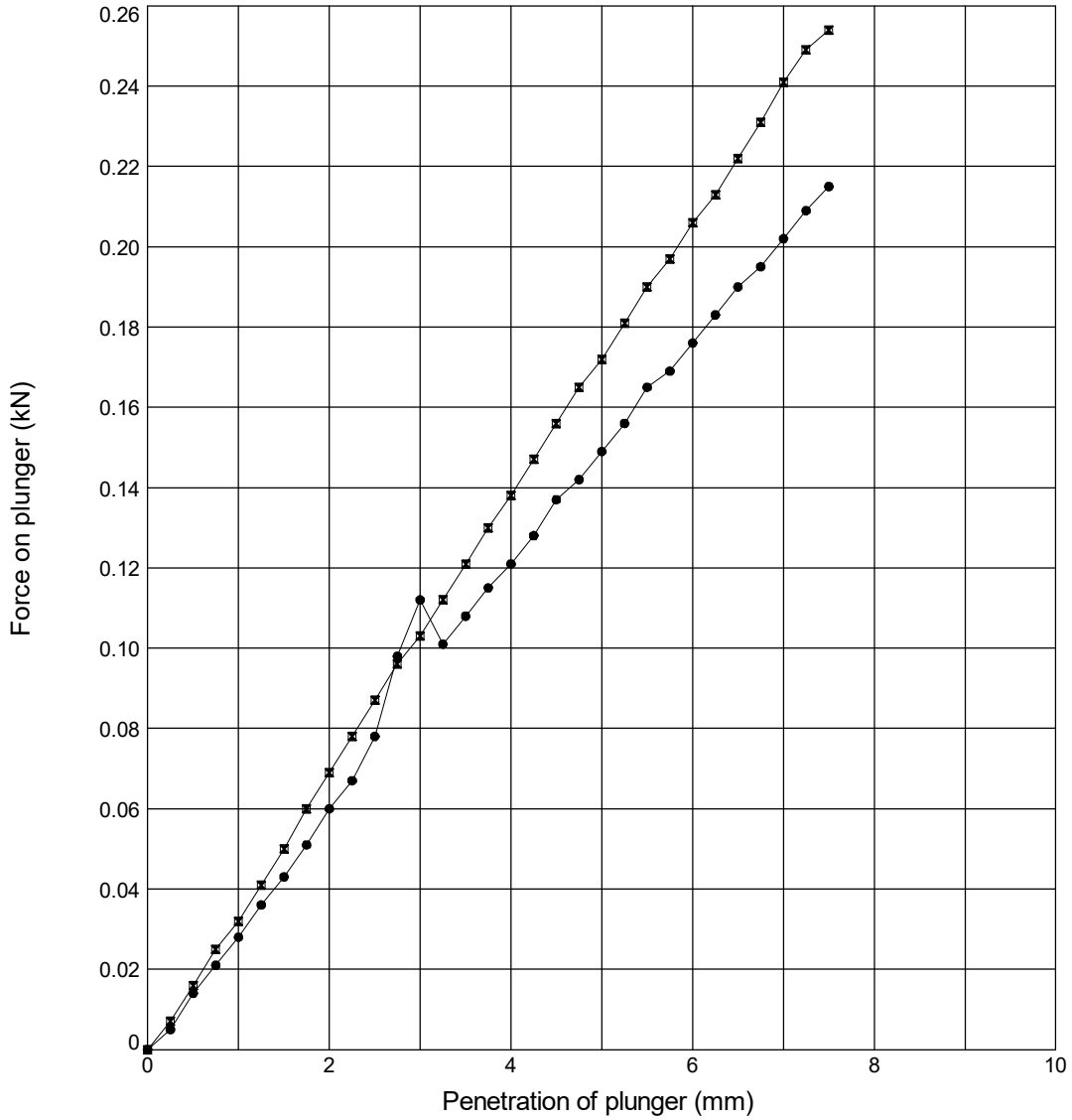
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990

Position ID: **BPT-TP039** Sample Ref: **3** Sample Type: **B** Depth (m): **1.00**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**9.5**	Compaction Type	:	**2.5 kg Dynamic**	Moisture Content (%)	**9.6**	**9.4**
Initial Bulk Density (Mg/m^3)	:	**2.33**	Surcharge (kg)	:	**4.0**	CBR value (%)	**0.75**	**0.90**
Initial Dry Density (Mg/m^3)	:	**2.12**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**26**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown very sandy clayey silty coarse GRAVEL.	● **Top** ⧓ **Base**

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Attention: Dympna Darcy

CERTIFICATE OF ANALYSIS

Date of report Generation:	22 July 2022
Customer:	Irish Drilling Limited
Sample Delivery Group (SDG):	220718-33
Your Reference:	2021OY102
Location:	WSP Lot2: Eastern and Midlands
Report No:	655222
Order Number:	10808

We received 2 samples on Monday July 18, 2022 and 2 of these samples were scheduled for analysis which was completed on Friday July 22, 2022. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

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

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden.

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.
Incorrect sampling dates and/or sample information will affect the validity of results.
The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

Sonia McWhan

Operations Manager

CERTIFICATE OF ANALYSIS

SDG: 220718-33 **Report Number:** 655222 **Superseded Report:**
Client Ref.: 2021OY102 **Location:** WSP Lot2: Eastern and Midlands

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
26603528	BPT-TP004	D2	0.50 - 0.80	18/05/2022
26603530	BPT-TP023	D2	0.50 - 0.80	18/05/2022

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

CERTIFICATE OF ANALYSIS

SDG: 220718-33 **Report Number:** 655222 **Superseded Report:**
Client Ref.: 2021OY102 **Location:** WSP Lot2: Eastern and Midlands

Results Legend

X **Test**

N **No Determination Possible**

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

Lab Sample No(s)			26603528	26603530
Customer Sample Reference			BPT-TP004	BPT-TP023
AGS Reference			D2	D2
Depth (m)			0.50 - 0.80	0.50 - 0.80
Container			250g Amber Jar (ALE210)	250g Amber Jar (ALE210)
Sample Type			S	S
Anions by Kone (soil)	All	NDPs: 0 Tests: 2	X	X
pH	All	NDPs: 0 Tests: 2	X	X
Sample description	All	NDPs: 0 Tests: 2	X	X
Total Sulphate	All	NDPs: 0 Tests: 2	X	X
Total Sulphur	All	NDPs: 0 Tests: 2	X	X

CERTIFICATE OF ANALYSIS

SDG: 220718-33 **Report Number:** 655222 **Superseded Report:**
Client Ref.: 2021OY102 **Location:** WSP Lot2: Eastern and Midlands

Sample Descriptions

Grain Sizes

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

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
26603528	BPT-TP004	0.50 - 0.80	Light Brown	Sandy Clay Loam	Stones	None
26603530	BPT-TP023	0.50 - 0.80	Light Brown	Loamy Sand	Stones	None

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

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

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

Validated

CERTIFICATE OF ANALYSIS

SDG: 220718-33 **Report Number:** 655222 **Superseded Report:**
Client Ref.: 2021OY102 **Location:** WSP Lot2: Eastern and Midlands

Results Legend

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

Component	LOD/Units	Method	Customer Sample Ref.	BPT-TP004	BPT-TP023				
			Depth (m)	0.50 - 0.80	0.50 - 0.80				
			Sample Type	Soil/Solid (S)	Soil/Solid (S)				
			Date Sampled	18/05/2022	18/05/2022				
			Sample Time	-	-				
			Date Received	18/07/2022	18/07/2022				
			SDG Ref	220718-33	220718-33				
			Lab Sample No.(s)	26603528	26603530				
			AGS Reference	D2	D2				
Moisture Content Ratio (% of as received sample)	%	PM024		9.8	4.6				
Sulphur, Total	<0.02 %	TM132		0.0214 @ #	<0.02 @ #				
Sulphate, Total potential	<0.06 %	TM132		0.0642	0.06				
pH	1 pH Units	TM133		8.78 @ M	8.95 @ M				
Sulphate, acid soluble (total)	<0.0048 %	TM221		0.0119 M	0.00871 M				
Soluble Sulphate 2:1 extract as SO4 BRE	<0.004 g/l	TM243		0.0165 @ M	<0.004 @ M				

CERTIFICATE OF ANALYSIS

SDG: 220718-33 **Report Number:** 655222 **Superseded Report:**
Client Ref.: 2021OY102 **Location:** WSP Lot2: Eastern and Midlands

Table of Results - Appendix

Method No	Reference	Description
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM221	Inductively Coupled Plasma - Atomic Emission Spectroscopy. An Atlas of Spectral Information: Winge, Fassel, Peterson and Floyd	Determination of Acid Extractable Sulphate in Soils by ICP OES
TM243		Mixed Anions In Soils By Kone

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM).

CERTIFICATE OF ANALYSIS

SDG: 220718-33 **Report Number:** 655222 **Superseded Report:**
Client Ref.: 2021OY102 **Location:** WSP Lot2: Eastern and Midlands

Test Completion Dates

Lab Sample No(s)	26603528	26603530
Customer Sample Ref.	BPT-TP004	BPT-TP023
AGS Ref.	D2	D2
Depth	0.50 - 0.80	0.50 - 0.80
Type	Soil/Solid (S)	Soil/Solid (S)
Anions by Kone (soil)	21-Jul-2022	21-Jul-2022
pH	22-Jul-2022	21-Jul-2022
Sample description	19-Jul-2022	19-Jul-2022
Total Sulphate	20-Jul-2022	21-Jul-2022
Total Sulphur	21-Jul-2022	21-Jul-2022

Appendix

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

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

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

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

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

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

7. Results relate only to the items tested.

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

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

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

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

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

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

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

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

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

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

General

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

19. **Sample Deviations**

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

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

20. **Asbestos**

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

Identification of Asbestos in Bulk Materials & Soils

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

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

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

Visual Estimation Of Fibre Content

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

Respirable Fibres

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

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

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

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT
SUPPLEMENT TO TEST REPORT 22/12428/1

Amendments: Re-issue following query/investigation

Envirolab Job Number: 22/12428
Issue Number: 2 **Date:** 15 February, 2023

Client:
Structural Soils Limited (Castleford Lab)
The Potteries
Pottery Street
Castleford
West Yorkshire
UK
WF10 1NJ

Project Manager: Jessica Robertson/Luke Fisher; Laura Schramm
Project Name: 785305-3
Project Ref: WSP Eastern & Midlands Region - Lot 2
Order No: N/A
Date Samples Received: 19/12/22
Date Instructions Received: 19/12/22
Date Analysis Completed: 22/12/22

Approved by:

Richard Wong
Client Manager

Envirolab Job Number: 22/12428

Client Project Name: 785305-3

Client Project Ref: WSP Eastern & Midlands Region -

Lot 2

Lab Sample ID	22/12428/1	22/12428/2	22/12428/3	22/12428/4	22/12428/5	22/12428/6	22/12428/7	Units	Limit of Detection	Method ref
Client Sample No	4	4	4	4	2	4	2			
Client Sample ID	BPT-TP005	BPT-TP009	BPT-TP012	BPT-TP014	BPT-TP030	BPT-TP032	BPT-TP034			
Depth to Top	2.00	2.30	1.60	2.10	0.90	1.60	1.00			
Depth To Bottom										
Date Sampled										
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D			
Sample Matrix Code	6A	5A	4A	4A	6A	4A	6A			
% Stones >10mm$_A$	0.8	6.6	<0.1	4.9	<0.1	<0.1	4.0	% w/w	0.1	A-T-044
pH BRE$_D$$^{M\#}$	8.90	8.91	9.02	8.90	8.97	8.91	8.87	pH	0.01	A-T-031s
Sulphate BRE (water sol 2:1)$_D$$^{M\#}$	<10	<10	<10	<10	<10	<10	<10	mg/l	10	A-T-026s
Sulphate BRE (acid sol)$_D$$^{M\#}$	<0.02	-	<0.02	-	0.02	<0.02	-	% w/w	0.02	A-T-028s
Sulphur BRE (total)$_D$	0.02	-	0.01	-	0.01	0.01	-	% w/w	0.01	A-T-024s

Envirolab Job Number: 22/12428

Client Project Name: 785305-3

Client Project Ref: WSP Eastern & Midlands Region -

Lot 2

Lab Sample ID	22/12428/8	22/12428/9						Units	Limit of Detection	Method ref
Client Sample No	2	2								
Client Sample ID	BPT-TP037	BPT-TP039								
Depth to Top	1.00	0.50								
Depth To Bottom										
Date Sampled										
Sample Type	Soil - D	Soil - D								
Sample Matrix Code	4A	6A								
% Stones >10mm$_A$	11.4	<0.1						% w/w	0.1	A-T-044
pH BRE$_D$$^{M\#}$	8.75	9.07						pH	0.01	A-T-031s
Sulphate BRE (water sol 2:1)$_D$$^{M\#}$	<10	<10						mg/l	10	A-T-026s

REPORT NOTES

General

This report shall not be reproduced, except in full, without written approval from Envirolab.
The results reported herein relate only to the material supplied to the laboratory.
The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:

All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:

Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:

Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:

Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:

1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample, 9 = INCINERATOR ASH.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.

Secondary Matrix Codes:

A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,
E = contains roots/twigs.

Key:

IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve
Subscript "^" indicates analysis has dependant options against results. Testing dependant on results appear in the comments area of your sample receipt.
EPH CWG results have humics mathematically subtracted through instrument calculation
TPH results "with Cleanup" indicates results cleaned up with Silica during extraction

EPH CWG GCxGC ID from TPH CWG

Where we have identified humic substances in any ID's from TPH CWG with Clean Up please note that the concentration of these humic substances is not included in the quantified results and are included in the ID for information.

Please contact us if you need any further information.

v2

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: Structural Soils Limited (Castleford Lab), The Potteries, Pottery Street, Castleford, West Yorkshire, UK, WF10 1NJ

Project No: 22/12428

Date Received: 19/12/2022 (am)

Project: 785305-3

Cool Box Temperatures (°C): 6.2

Clients Project No: WSP Eastern & Midlands Region - Lot 2

Lab Sample ID	22/12428/1	22/12428/2	22/12428/3	22/12428/4	22/12428/5	22/12428/6	22/12428/7	22/12428/8	22/12428/9
Client Sample No	4	4	4	4	2	4	2	2	2
Client Sample ID/Depth	BPT-TP005 2.00m	BPT-TP009 2.30m	BPT-TP012 1.60m	BPT-TP014 2.10m	BPT-TP030 0.90m	BPT-TP032 1.60m	BPT-TP034 1.00m	BPT-TP037 1.00m	BPT-TP039 0.50m
Date Sampled									
Deviation Code									
E (no date)	✓	✓	✓	✓	✓	✓	✓	✓	✓

Key
E (no date) *No sampling date provided (all results affected if not provided)*

Note: If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3 (for water samples 5 ± 3°C), ISO 18400-105:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	22/12428/1	22/12428/2	22/12428/3	22/12428/4	22/12428/5	22/12428/6	22/12428/7	22/12428/8	22/12428/9
Client Sample No	4	4	4	4	2	4	2	2	2
Client Sample ID/Depth	BPT-TP005 2.00m	BPT-TP009 2.30m	BPT-TP012 1.60m	BPT-TP014 2.10m	BPT-TP030 0.90m	BPT-TP032 1.60m	BPT-TP034 1.00m	BPT-TP037 1.00m	BPT-TP039 0.50m
Date Sampled									
A-T-024s	22/12/2022		22/12/2022		22/12/2022	22/12/2022			
A-T-026s	22/12/2022	22/12/2022	22/12/2022	22/12/2022	22/12/2022	22/12/2022	22/12/2022	22/12/2022	22/12/2022
A-T-028s	22/12/2022		22/12/2022		22/12/2022	22/12/2022			
A-T-031s	22/12/2022	22/12/2022	22/12/2022	22/12/2022	22/12/2022	22/12/2022	22/12/2022	22/12/2022	22/12/2022
A-T-044	22/12/2022	22/12/2022	22/12/2022	22/12/2022	22/12/2022	22/12/2022	22/12/2022	22/12/2022	22/12/2022

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

End of Report

SUMMARY OF WATER CONTENT TESTS

In accordance with BS EN ISO 17892-1 : 2014

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Water Content (%)	Drying Temperature (degC)	Description	Lab location
BPT-BH003	2	C	14.10	0.7	105	Brown very sandy slightly silty /clayey GRAVEL	C
BPT-BH003	3	C	16.10	0.5	105	Grey white gravelly slightly clayey silty SAND	C
BPT-BH004	2	C	5.00	23.7	105	Brown gravelly silty/clayey SAND	C
BPT-BH004	4	C	12.50	20.5	105	Brown slightly gravelly slightly clayey silty SAND	C
BPT-BH018	1	C	0.00	6.1	105	Brown sandy slightly silty/clayey GRAVEL	C
BPT-BH018	2	C	3.50	21.8	105	Brown very sandy slightly silty/clayey GRAVEL	C
BPT-BH018	3	C	10.00	16.6	105	Brown slightly gravelly silty/clayey SAND	C
BPT-BH018	5	C	14.50	26.2	105	Brown gravelly silty/clayey SAND	C

Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By	Date
LORNA WHITWORTH	31.03.23

Contract: **2021OY102 WSP Eastern & Midlands Region - Lot 2**

Contract Ref: **785325**

SUMMARY OF SOIL CLASSIFICATION TESTS

In accordance with Part 1,Part 12 of BS EN ISO 17892

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Water Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425um	Description of Sample
BPT-BH003	4	C	20.60	18.8	33	20	13	52	Brown slightly sandy gravelly CLAY
BPT-BH004	1	C	0.00	45.0	56	34	22	93	Brown slightly gravelly slightly sandy clayey SILT
BPT-BH006	1	C	1.80	5.6	47	26	21	35	Brown COBBLES with much sandy silty very clayey GRAVEL
BPT-BH008	1	C	0.00	17.6	NP	NP	NP	70	Brown slightly sandy slightly gravelly clayey SILT
BPT-BH008	2	C	2.70	16.9	32	27	5	30	Brown silty/clayey GRAVEL with chalk
BPT-BH008	4	C	6.60	28.5	38	24	14	99	Brown slightly gravelly slightly sandy clayey SILT
BPT-BH008	5	C	8.10	28.6	46	27	19	91	Brown slightly gravelly slightly sandy clayey SILT
BPT-BH008	6	C	9.60	19.4	28	22	6	73	Brown slightly sandy slightly gravelly clayey SILT

SYMBOLS: * denotes BS 1377

STRUCTURAL SOILS LTD

Contract:

2021OY102 WSP Eastern & Midlands Region - Lot 2

Contract Ref:

785325

AGS

SUMMARY OF SOIL CLASSIFICATION TESTS

In accordance with Part 1,Part 12 of BS EN ISO 17892

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Water Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425um	Description of Sample
BPT-BH008	7	C	17.90	15.1	27	18	9	52	Brown slightly sandy slightly gravelly silty CLAY
BPT-BH008	8	C	20.60	28.2	51	33	18	77	Brown slightly sandy slightly gravelly clayey SILT
BPT-BH008	9	C	21.60	34.2	63	40	23	94	Brown slightly sandy slightly gravelly clayey SILT
BPT-BH008	10	C	23.10	18.0	39	24	15	69	Brown slightly sandy slightly gravelly clayey SILT
BPT-BH018	6	C	23.00	6.9	58	34	24	98	Yellowish brown slightly gravelly clayey SILT
BPT-BH020	1	C	3.50	14.8	31	19	12	46	Brown very sandy clayey silty GRAVEL
BPT-BH020	2	C	6.50	17.7	NP	NP	NP	40	Brown very gravelly silty/clayey SAND
BPT-BH020	3	C	12.50	17.0	40	24	16	48	Brown slightly gravelly slightly sandy CLAY

SYMBOLS: * denotes BS 1377

SUMMARY OF SOIL CLASSIFICATION TESTS

In accordance with Part 1,Part 12 of BS EN ISO 17892

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Water Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425um	Description of Sample
BPT-BH020	5	C	17.00	28.9	49	29	20	92	Brown slightly sandy slightly gravelly clayey SILT
BPT-BH023	2	C	2.00	14.4	42	22	20	50	Brown slightly sandy slightly gravelly CLAY
BPT-BH023	3	C	3.50	17.5	45	24	21	54	Brown slightly sandy gravelly clayey SILT
BPT-BH023	4	C	6.50	15.2	45	26	19	54	Brown slightly gravelly CLAY
BPT-BH024	2	C	5.00	28.0	57	31	26	67	Brown slightly gravelly slightly sandy clayey SILT
BPT-BH024	3	C	6.50	28.6	45	29	16	69	Brown slightly gravelly slightly sandy clayey SILT
BPT-BH024		C	7.50	31.2	54	30	24	63	Brown slightly sandy clayey SILT
BPT-BH024	5	C	11.00	29.8	50	21	29	79	Brown slightly gravelly slightly sandy CLAY

SYMBOLS: * denotes BS 1377

SUMMARY OF SOIL CLASSIFICATION TESTS

In accordance with Part 1,Part 12 of BS EN ISO 17892

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Water Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425um	Description of Sample
BPT-BH024	6	C	17.00	23.7	54	31	23	61	Brown slightly gravelly slightly sandy clayey SILT
BPT-BH027	5	C	27.50	3.7	52	27	25	53	Brown slightly sandy gravelly clayey SILT
BPT-BH028	2	C	3.50	33.9	72	42	30	90	Brown slightly gravelly silty CLAY
BPT-BH028	3	C	8.00	40.0	56	36	20	81	Brown slightly gravelly clayey SILT
BPT-BH028	4	C	9.50	46.4	67	45	22	87	Brown slightly gravelly slightly sandy clayey SILT
BPT-BH028	5	C	11.00	31.4	48	36	12	92	Brown slightly gravelly slightly sandy clayey SILT
BPT-BH028	6	C	15.50	20.5	40	20	20	54	Brown slightly sandy slightly gravelly clayey SILT
BPT-BH028	7	C	18.50	24.0	46	25	21	48	Brown slightly gravelly silty CLAY

SYMBOLS: * denotes BS 1377

SUMMARY OF SOIL CLASSIFICATION TESTS

In accordance with Part 1,Part 12 of BS EN ISO 17892

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Water Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425um	Description of Sample
BPT-BH028	8	C	26.00	5.9	29	19	10	14	Brown slightly gravelly silty CLAY
BPT-BH028	9	C	32.00	2.6	NP	NP	NP	11	Brown white sandy GRAVEL
BPT-BH032	2	C	12.50	31.2	49	25	24	62	Brown slightly gravelly slightly sandy CLAY
BPT-BH032	3	C	27.50	40.4	65	31	34	88	Brown slightly gravelly CLAY

SYMBOLS: * denotes BS 1377

STRUCTURAL SOILS LTD

Contract:

2021OY102 WSP Eastern & Midlands Region - Lot 2

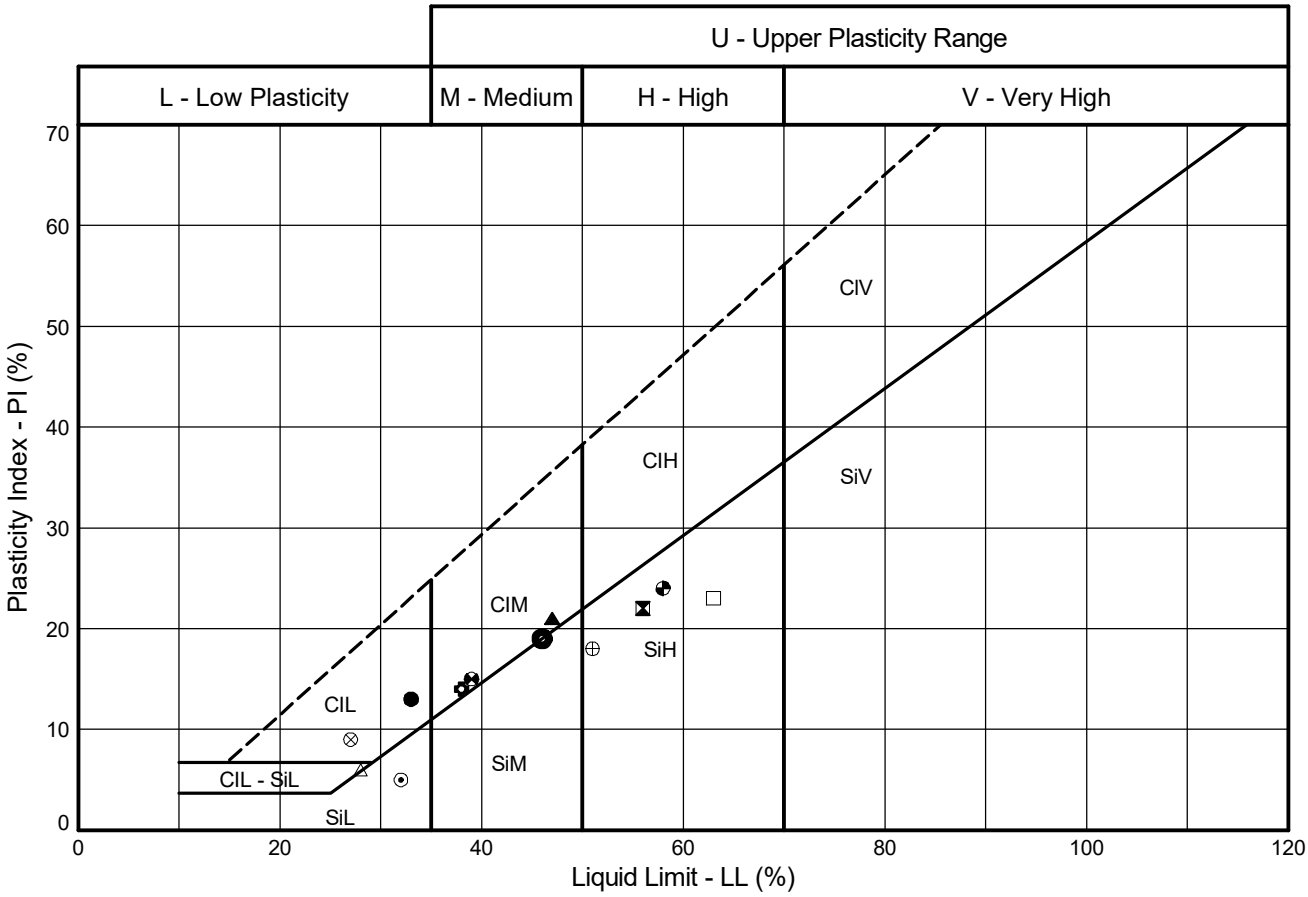
Contract Ref:

785325

AGS

PI vs LL CHART

According to BS EN 14688-2:2018
Testing in accordance with BS EN ISO 17892-12:2018+A1:2021



Sample Identification			Test Method #	Preparation Method +	WC	LL	PL	PI	<425µm	Lab location	Notes
Exploratory Position ID	Sample	Depth (m)			%	%	%	%	%		
BPT-BH003	4C	20.60	5.3/5.5/6.5	5.2.7	18.8	33	20	13	52	C	*
BPT-BH004	1C	0.00	5.3/5.5/6.5	5.2.7	45.0	56	34	22	93	C	
BPT-BH006	1C	1.80	5.3/5.5/6.5	5.2.7	5.6	47	26	21	35	C	
BPT-BH008	1C	0.00	5.3/5.5/6.5	5.2.7	17.6	NP	NP	NP	70	C	
BPT-BH008	2C	2.70	5.3/5.5/6.5	5.2.7	16.9	32	27	5	30	C	
BPT-BH008	4C	6.60	5.3/5.5/6.5	5.2.7	28.5	38	24	14	99	C	
BPT-BH008	5C	8.10	5.3/5.5/6.5	5.2.7	28.6	46	27	19	91	C	
BPT-BH008	6C	9.60	5.3/5.5/6.5	5.2.7	19.4	28	22	6	73	C	
BPT-BH008	7C	17.90	5.3/5.5/6.5	5.2.7	15.1	27	18	9	52	C	
BPT-BH008	8C	20.60	5.3/5.5/6.5	5.2.7	28.2	51	33	18	77	C	
BPT-BH008	9C	21.60	5.3/5.5/6.5	5.2.7	34.2	63	40	23	94	C	
BPT-BH008	10C	23.10	5.3/5.5/6.5	5.2.7	18.0	39	24	15	69	C	
BPT-BH018	6C	23.00	5.3/5.5/6.5	5.2.7	6.9	58	34	24	98	C	

Tested in accordance with the following clauses of BS EN ISO 17892-12:2018+A1:2021
5.3 - Cone Penetrometer Method; 5.3.14 - One-Point Cone Penetrometer Method; 5.4 - Casagrande Method; 5.5 - Plastic Limit Method; 6.5 - Plasticity Index

Water Content (WC) tested in accordance with BS EN ISO 17892-1:2014

+ Tested in accordance with the following clauses of BS EN ISO 17892-12:2018+A1:2021
5.2.1 - Natural State and 5.2.7 - Wet Sieved

Key: * = Non-standard test, NP = Non plastic, I = Increasing WC, D = Decreasing WC.

Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
	LORNA WHITWORTH	31/03/23

Contract	Contract Ref:
2021OY102 WSP Eastern & Midlands Region - Lot 2	**785325**

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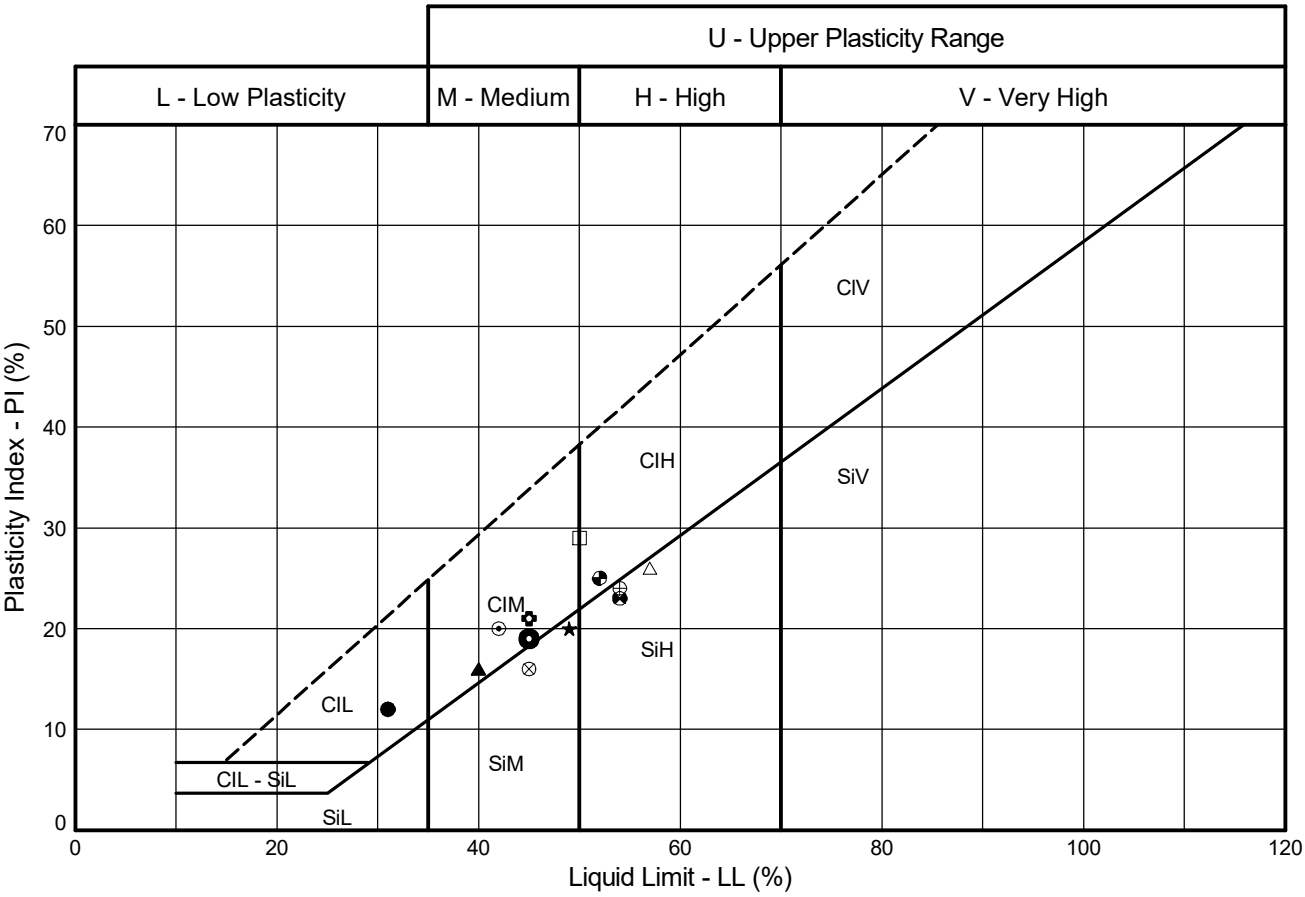
PI vs LL CHART

According to BS EN 14688-2:2018
Testing in accordance with BS EN ISO 17892-12:2018+A1:2021



Sample Identification				Test Method #	Preparation Method +	WC	LL	PL	PI	<425µm	Lab location	Notes
	Exploratory Position ID	Sample	Depth (m)			%	%	%	%	%		
●	BPT-BH020	1C	3.50	5.3/5.5/6.5	5.2.7	14.8	31	19	12	46	C	
	BPT-BH020	2C	6.50	5.3/5.5/6.5	5.2.7	17.7	NP	NP	NP	40	C	
▲	BPT-BH020	3C	12.50	5.3/5.5/6.5	5.2.7	17.0	40	24	16	48	C	
★	BPT-BH020	5C	17.00	5.3/5.5/6.5	5.2.7	28.9	49	29	20	92	C	
⊙	BPT-BH023	2C	2.00	5.3/5.5/6.5	5.2.7	14.4	42	22	20	50	C	
✿	BPT-BH023	3C	3.50	5.3/5.5/6.5	5.2.7	17.5	45	24	21	54	C	
◉	BPT-BH023	4C	6.50	5.3/5.5/6.5	5.2.7	15.2	45	26	19	54	C	
△	BPT-BH024	2C	5.00	5.3/5.5/6.5	5.2.7	28.0	57	31	26	67	C	
⊗	BPT-BH024	3C	6.50	5.3/5.5/6.5	5.2.7	28.6	45	29	16	69	C	
⊕	BPT-BH024	C	7.50	5.3/5.5/6.5	5.2.7	31.2	54	30	24	63	C	
□	BPT-BH024	5C	11.00	5.3/5.5/6.5	5.2.7	29.8	50	21	29	79	C	
⊠	BPT-BH024	6C	17.00	5.3/5.5/6.5	5.2.7	23.7	54	31	23	61	C	
◓	BPT-BH027	5C	27.50	5.3/5.5/6.5	5.2.7	3.7	52	27	25	53	C	

Tested in accordance with the following clauses of BS EN ISO 17892-12:2018+A1:2021
5.3 - Cone Penetrometer Method; 5.3.14 - One-Point Cone Penetrometer Method; 5.4 - Casagrande Method; 5.5 - Plastic Limit Method; 6.5 - Plasticity Index

Water Content (WC) tested in accordance with BS EN ISO 17892-1:2014

+ Tested in accordance with the following clauses of BS EN ISO 17892-12:2018+A1:2021
5.2.1 - Natural State and 5.2.7 - Wet Sieved

Key: * = Non-standard test, NP = Non plastic, I = Increasing WC, D = Decreasing WC.

Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
	LORNA WHITWORTH	31/03/23

Contract	Contract Ref:
2021OY102 WSP Eastern & Midlands Region - Lot 2	**785325**

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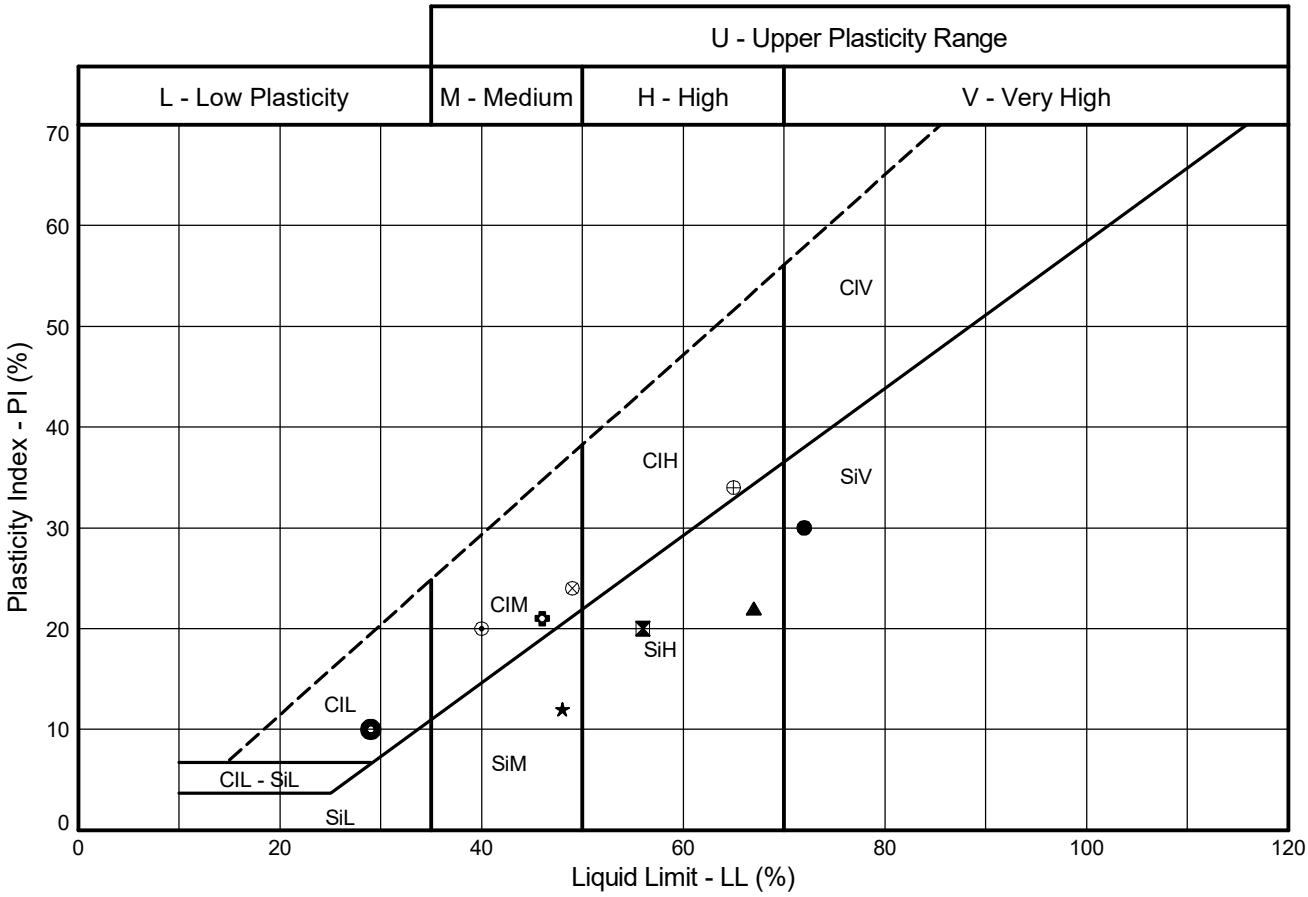
PI vs LL CHART

According to BS EN 14688-2:2018
Testing in accordance with BS EN ISO 17892-12:2018+A1:2021



Sample Identification				Test Method #	Preparation Method +	WC	LL	PL	PI	<425µm	Lab location	Notes
	Exploratory Position ID	Sample	Depth (m)			%	%	%	%	%		
●	BPT-BH028	2C	3.50	5.3/5.5/6.5	5.2.7	33.9	72	42	30	90	C	
⊠	BPT-BH028	3C	8.00	5.3/5.5/6.5	5.2.7	40.0	56	36	20	81	C	
▲	BPT-BH028	4C	9.50	5.3/5.5/6.5	5.2.7	46.4	67	45	22	87	C	
★	BPT-BH028	5C	11.00	5.3/5.5/6.5	5.2.1	31.4	48	36	12	92	C	
⊙	BPT-BH028	6C	15.50	5.3/5.5/6.5	5.2.7	20.5	40	20	20	54	C	
✿	BPT-BH028	7C	18.50	5.3/5.5/6.5	5.2.7	24.0	46	25	21	48	C	
◉	BPT-BH028	8C	26.00	5.3.14/5.5/6.5	5.2.7	5.9	29	19	10	14	C	
	BPT-BH028	9C	32.00	5.3/5.5/6.5	5.2.7	2.6	NP	NP	NP	11	C	
⊗	BPT-BH032	2C	12.50	5.3/5.5/6.5	5.2.7	31.2	49	25	24	62	C	
⊕	BPT-BH032	3C	27.50	5.3/5.5/6.5	5.2.7	40.4	65	31	34	88	C	

Tested in accordance with the following clauses of BS EN ISO 17892-12:2018+A1:2021
5.3 - Cone Penetrometer Method; 5.3.14 - One-Point Cone Penetrometer Method; 5.4 - Casagrande Method; 5.5 - Plastic Limit Method; 6.5 - Plasticity Index

Water Content (WC) tested in accordance with BS EN ISO 17892-1:2014

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5.2.1 - Natural State and 5.2.7 - Wet Sieved

Key: * = Non-standard test, NP = Non plastic, I = Increasing WC, D = Decreasing WC.

Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
	LORNA WHITWORTH	31/03/23

Contract	Contract Ref:
2021OY102 WSP Eastern & Midlands Region - Lot 2	**785325**

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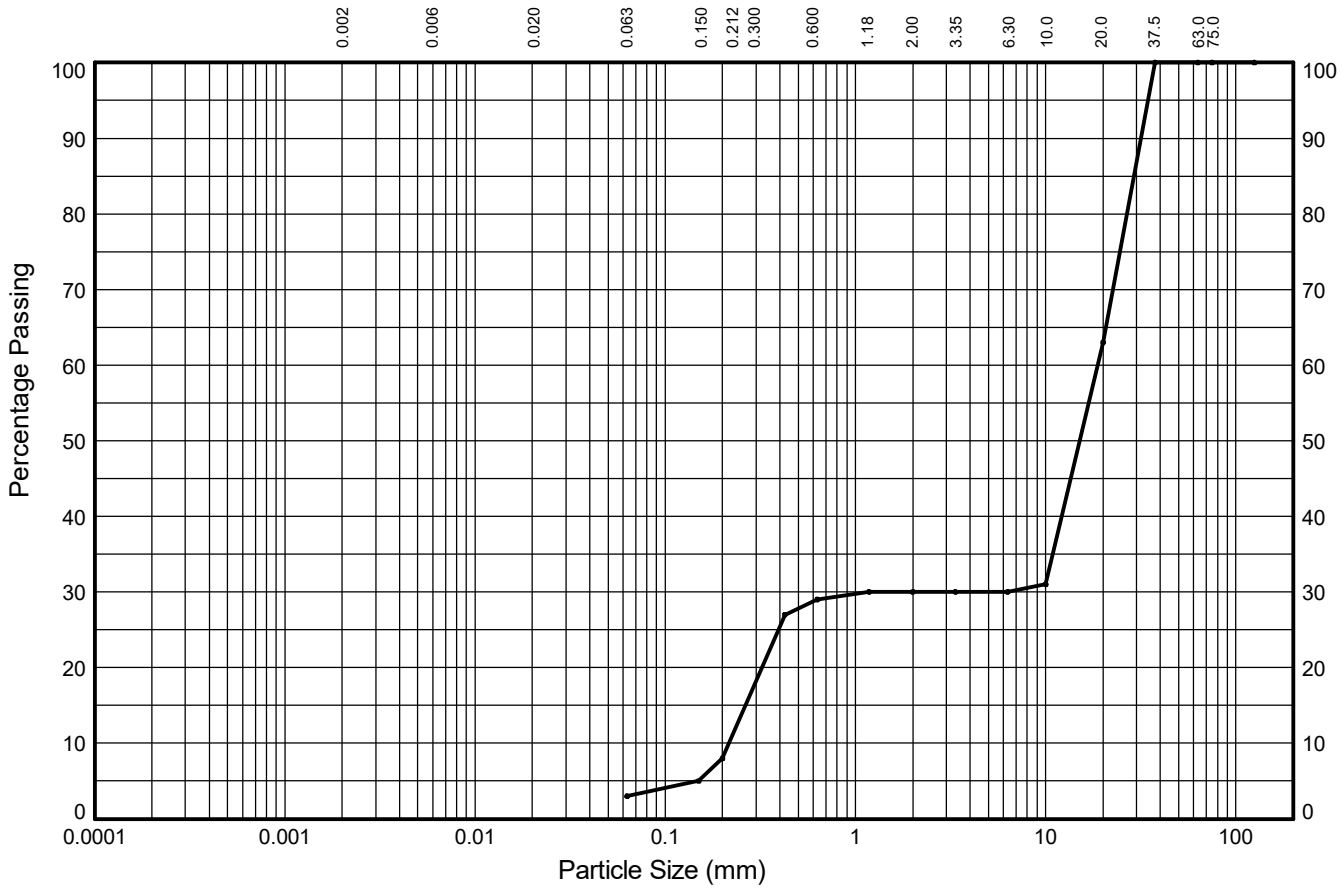
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2 of BS EN ISO 17892:Part 4:2016
NON-STANDARD TEST

Position ID: **BPT-BH003** Sample Ref: **2** Sample Type: **C** Depth (m): **14.10**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	-	-	-	5%	21%	1%	0%	33%	37%	
	SILT			SAND			GRAVEL			
3%				27%			70%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**63**
10.0	**31**
6.30	**30**
3.35	**30**
2.00	**30**
1.18	**30**
0.630	**29**
0.425	**27**
0.200	**8**
0.150	**5**
0.063	**3**

Particle Diameter (mm)	Percent Passing (%)

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**0.217**
D_{15} (mm)	**0.264**
D_{30} (mm)	**1.180**
D_{50} (mm)	**15.092**
D_{60} (mm)	**18.742**
D_{85} (mm)	**29.064**
D_{90} (mm)	**31.641**
C_U	**87**
C_C	**0.34**

Soil Description:

Brown very sandy slightly silty /clayey GRAVEL

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By	Date
LAURA SCHRAMM	17/03/23

Contract	Contract Ref:
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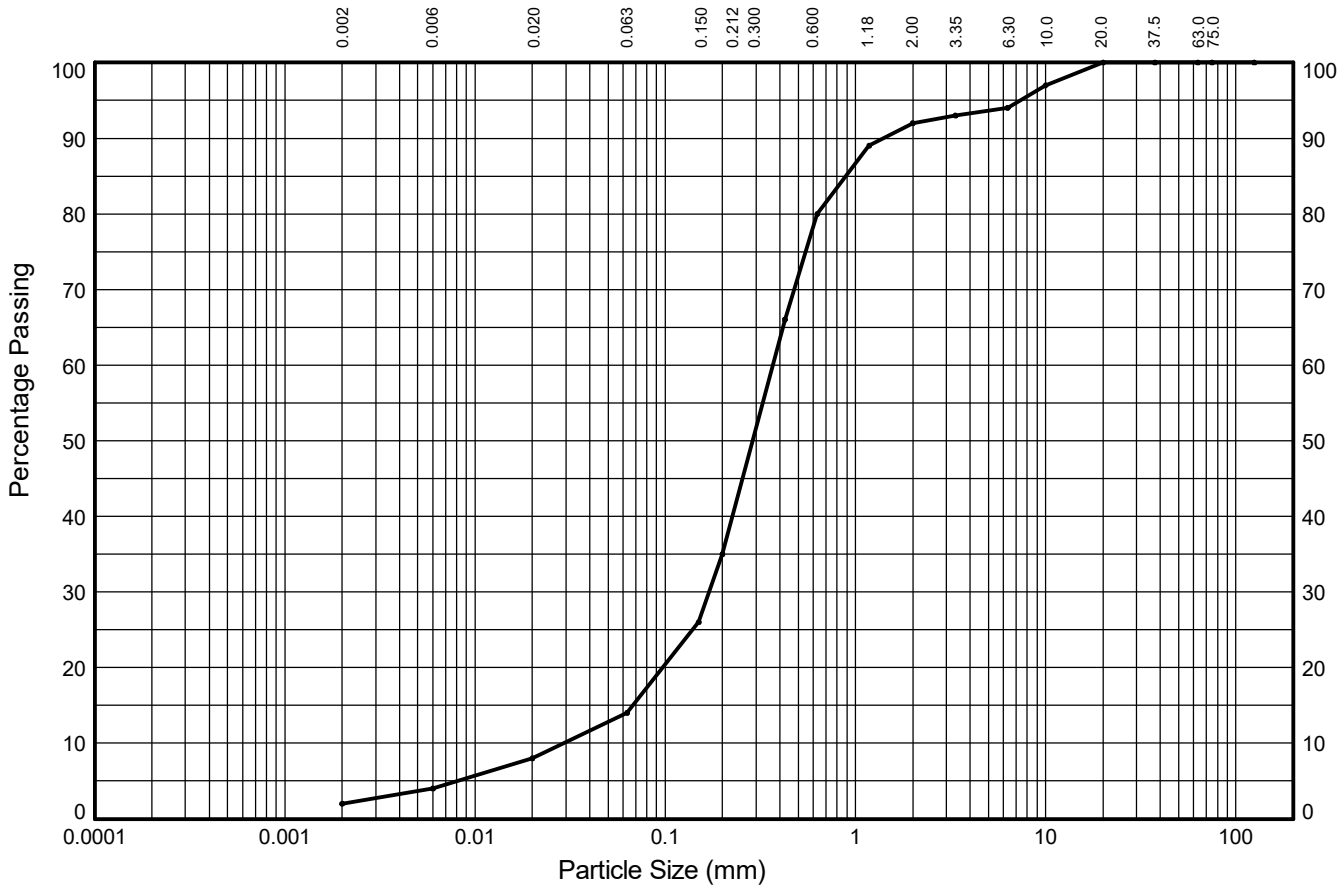
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.3 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-BH-003** Sample Ref: **3** Sample Type: **C** Depth (m): **16.10**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	2%	4%	6%	21%	45%	12%	2%	6%	0%	
	SILT			SAND			GRAVEL			
2%	12%			78%			8%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**100**
10.0	**97**
6.30	**94**
3.35	**93**
2.00	**92**
1.18	**89**
0.630	**80**
0.425	**66**
0.200	**35**
0.150	**26**
0.063	**14**

Particle Diameter (mm)	Percent Passing (%)
0.02	**8**
0.006	**4**
0.002	**2**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**0.029**
D_{15} (mm)	**0.068**
D_{30} (mm)	**0.170**
D_{50} (mm)	**0.288**
D_{60} (mm)	**0.367**
D_{85} (mm)	**0.893**
D_{90} (mm)	**1.407**
C_U	**13**
C_C	**3**

Soil Description:

Grey white gravelly slightly clayey silty SAND

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By	Date
LORNA WHITWORTH	03/02/23

Contract	Contract Ref:
2021OY102WSP2-BPT section	**785325**

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PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2 of BS EN ISO 17892:Part 4:2016
NON-STANDARD TEST

Position ID: **BPT-BH003** Sample Ref: **4** Sample Type: **C** Depth (m): **20.60**

CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	-	-	-	8%	9%	7%	10%	14%	10%	
	SILT			SAND			GRAVEL			
42%				24%			34%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**95**
20.0	**90**
10.0	**83**
6.30	**76**
3.35	**71**
2.00	**66**
1.18	**62**
0.630	**59**
0.425	**56**
0.200	**50**
0.150	**48**
0.063	**42**

Particle Diameter (mm)	Percent Passing (%)

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**NA**
D_{30} (mm)	**NA**
D_{50} (mm)	**0.200**
D_{60} (mm)	**0.777**
D_{85} (mm)	**12.190**
D_{90} (mm)	**20.000**
C_U	**NA**
C_C	**NA**

Soil Description:

Brown slightly sandy gravelly CLAY

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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The Potteries
Pottery Street
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W. Yorkshire WF10 1NJ

Compiled By	Date
LORNA WHITWORTH	31/03/23

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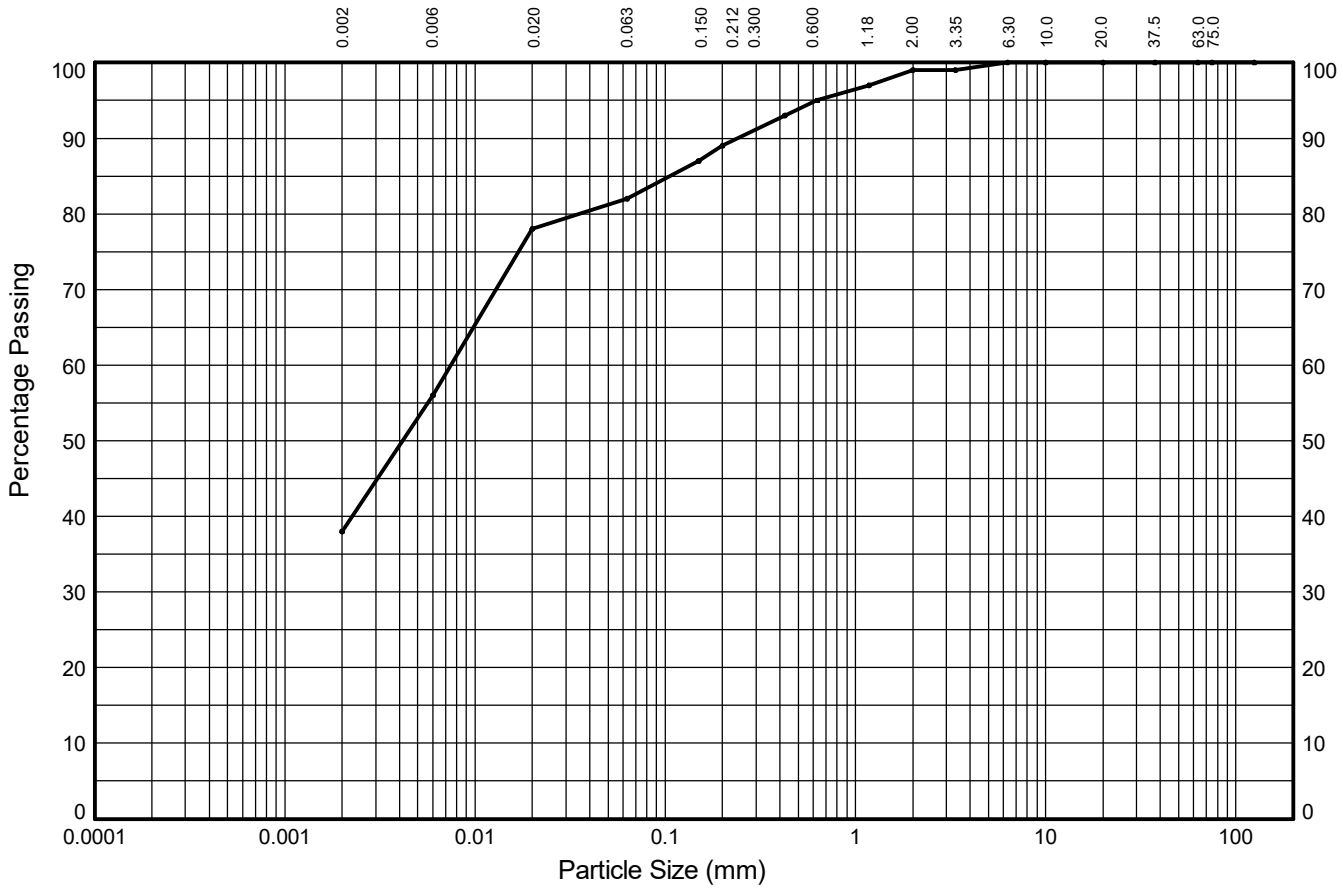
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.3 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-BH-004** Sample Ref: **1** Sample Type: **C** Depth (m): **0.00**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	18%	22%	4%	7%	6%	4%	1%	0%	0%	
	SILT			SAND			GRAVEL			
38%	44%			17%			1%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**100**
10.0	**100**
6.30	**100**
3.35	**99**
2.00	**99**
1.18	**97**
0.630	**95**
0.425	**93**
0.200	**89**
0.150	**87**
0.063	**82**

Particle Diameter (mm)	Percent Passing (%)
0.02	**78**
0.006	**56**
0.002	**38**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**NA**
D_{30} (mm)	**NA**
D_{50} (mm)	**0.004**
D_{60} (mm)	**0.007**
D_{85} (mm)	**0.106**
D_{90} (mm)	**0.241**
C_U	**NA**
C_C	**NA**

Soil Description:

Brown slightly gravelly slightly sandy clayey SILT

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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Compiled By		Date
	LAURA SCHRAMM	**01/03/23**

Contract	Contract Ref:
2021OY102 WSP Eastern & Midlands Region - Lot 2	**785325**

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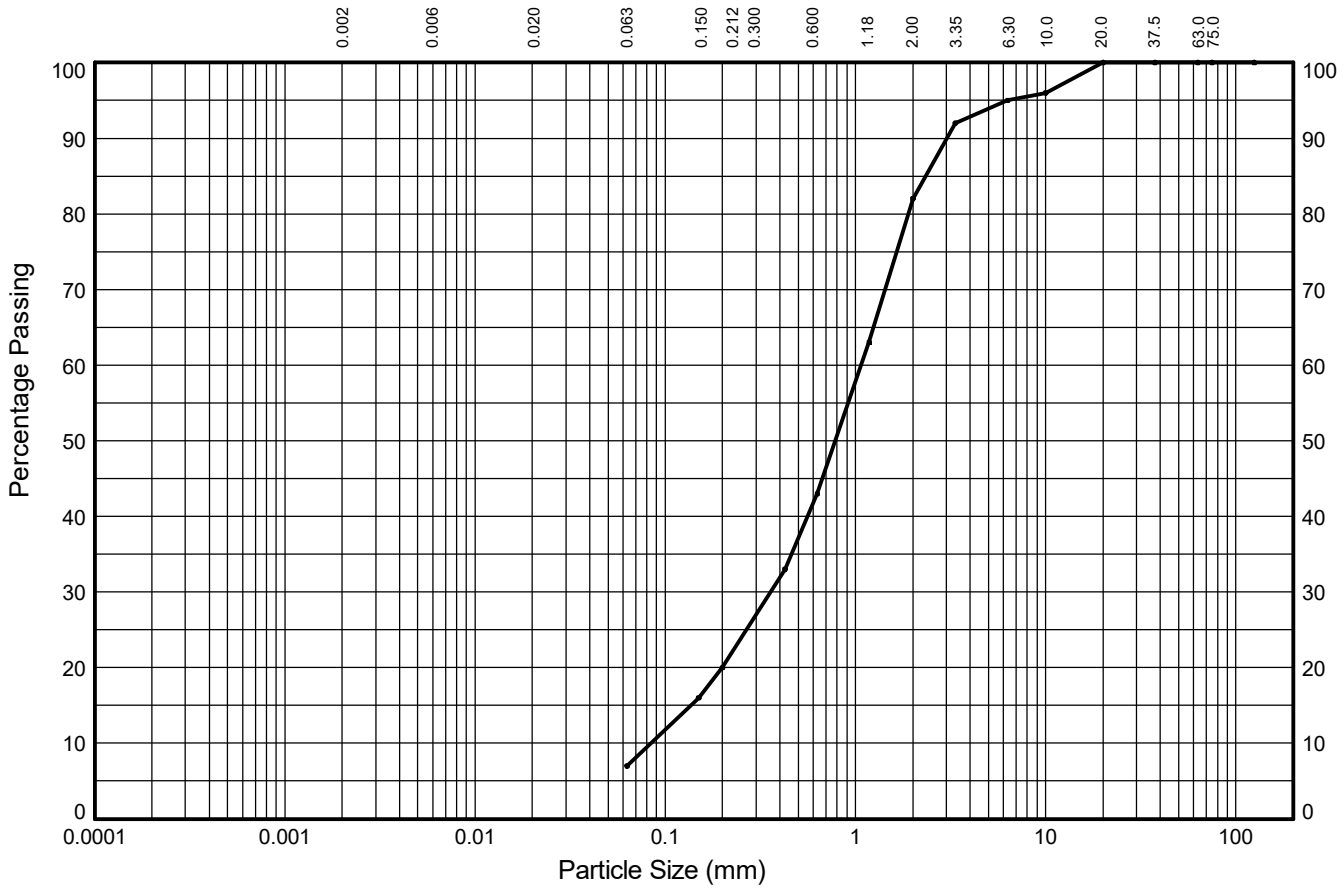
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-BH-004** Sample Ref: **2** Sample Type: **C** Depth (m): **5.00**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	-	-	-	13%	23%	39%	13%	5%	0%	
	SILT			SAND			GRAVEL			
7%				75%			18%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**100**
10.0	**96**
6.30	**95**
3.35	**92**
2.00	**82**
1.18	**63**
0.630	**43**
0.425	**33**
0.200	**20**
0.150	**16**
0.063	**7**

Particle Diameter (mm)	Percent Passing (%)

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**0.084**
D_{15} (mm)	**0.136**
D_{30} (mm)	**0.357**
D_{50} (mm)	**0.785**
D_{60} (mm)	**1.074**
D_{85} (mm)	**2.335**
D_{90} (mm)	**3.022**
C_U	**13**
C_C	**1**

Soil Description:

Brown gravelly silty/clayey SAND

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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Compiled By	Date
LORNA WHITWORTH	03/02/23

Contract	Contract Ref:
2021OY102WSP2-BPT section	**785325**

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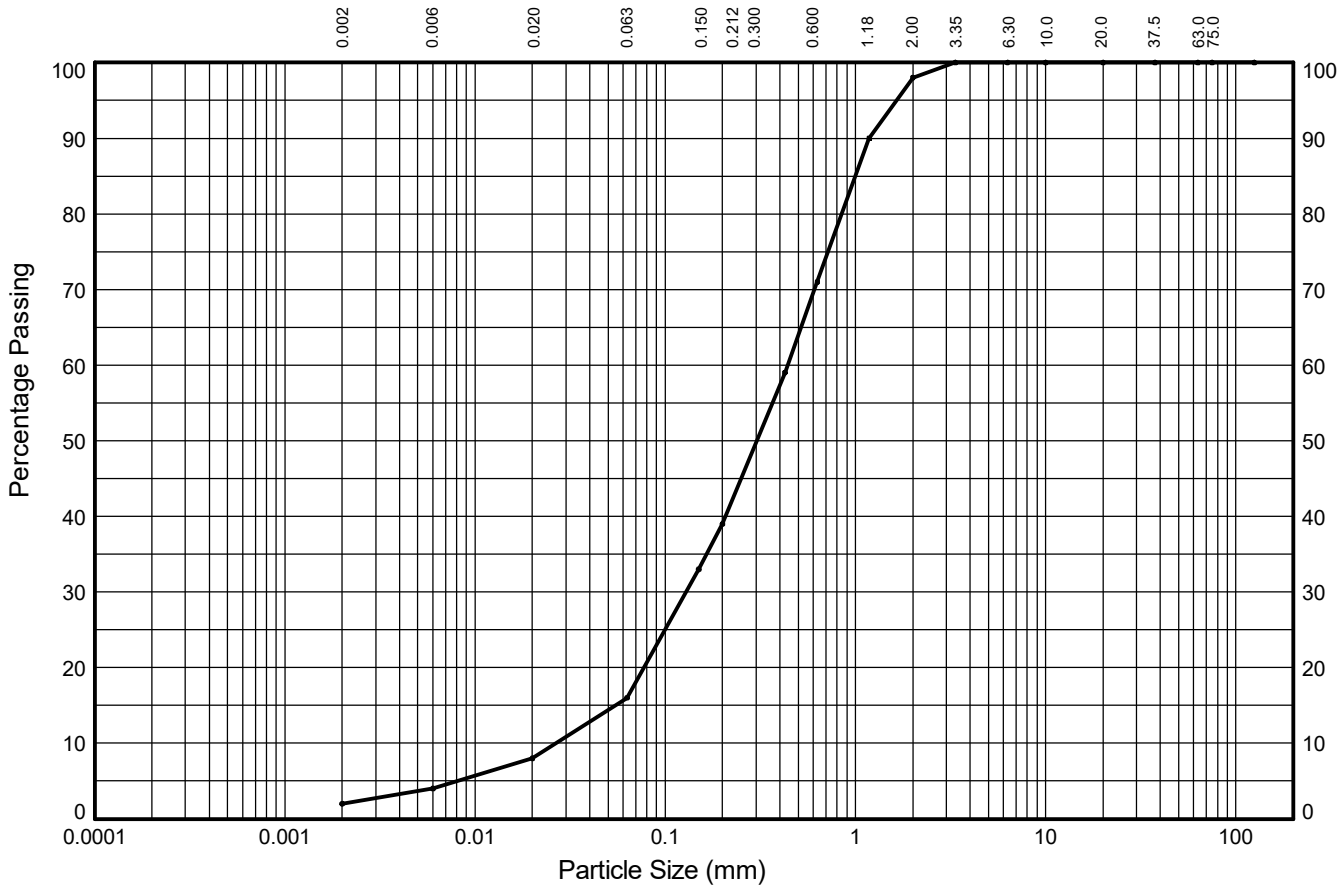
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.3 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-BH-004** Sample Ref: **4** Sample Type: **C** Depth (m): **12.50**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	2%	4%	8%	23%	32%	27%	2%	0%	0%	
	SILT			SAND			GRAVEL			
2%	14%			82%			2%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**100**
10.0	**100**
6.30	**100**
3.35	**100**
2.00	**98**
1.18	**90**
0.630	**71**
0.425	**59**
0.200	**39**
0.150	**33**
0.063	**16**

Particle Diameter (mm)	Percent Passing (%)
0.02	**8**
0.006	**4**
0.002	**2**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**0.027**
D_{15} (mm)	**0.055**
D_{30} (mm)	**0.129**
D_{50} (mm)	**0.303**
D_{60} (mm)	**0.439**
D_{85} (mm)	**1.000**
D_{90} (mm)	**1.180**
C_U	**16**
C_C	**1**

Soil Description:

Brown slightly gravelly slightly clayey silty SAND

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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Compiled By	Date
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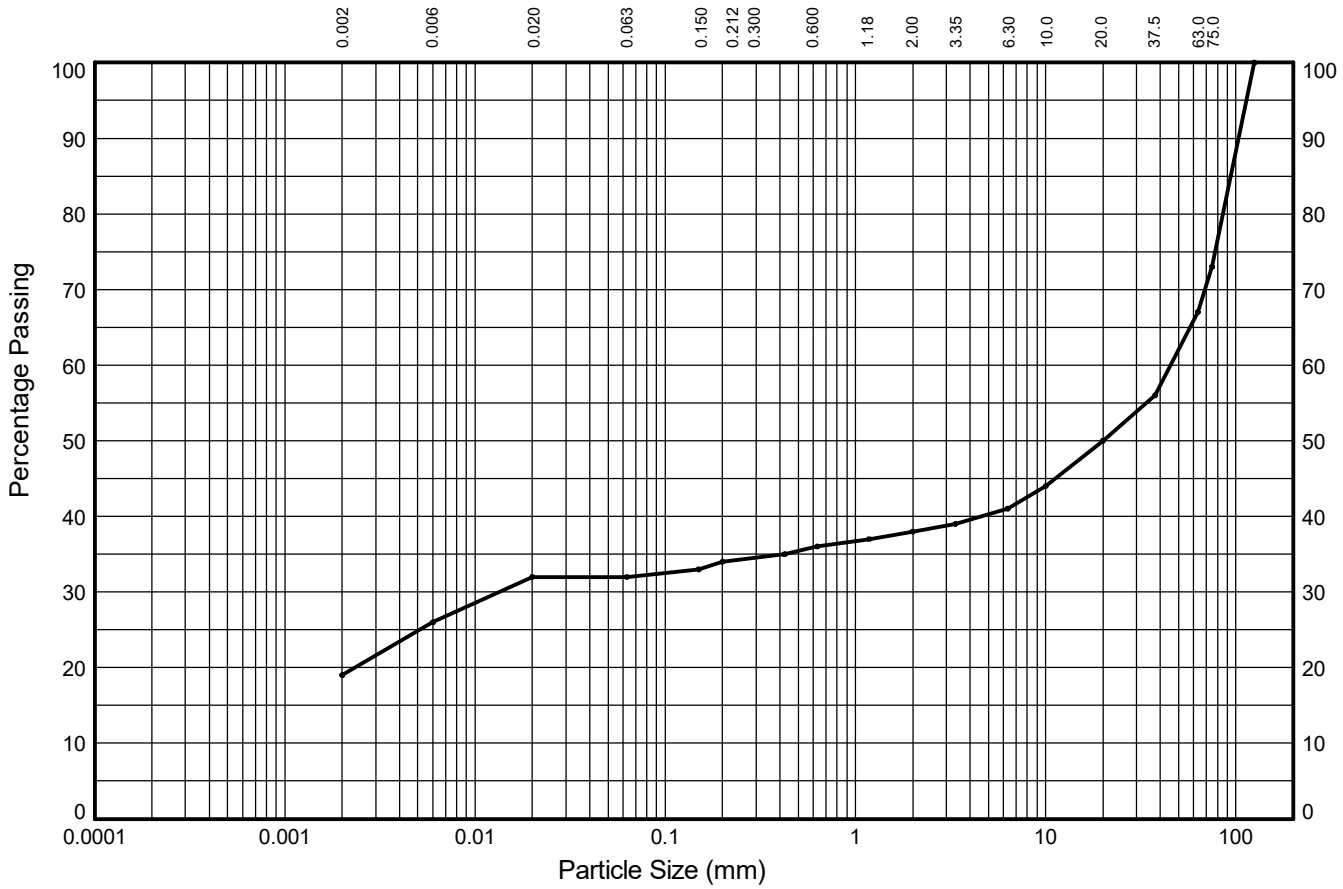
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.3 of BS EN ISO 17892:Part 4:2016
NON-STANDARD TEST

Position ID: **BPT-BH-006** Sample Ref: Sample Type: **C** Depth (m): **1.80**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	7%	6%	0%	2%	2%	2%	3%	9%	17%	
	SILT			SAND			GRAVEL			
19%	13%			6%			29%			33%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**73**
63.0	**67**
37.5	**56**
20.0	**50**
10.0	**44**
6.30	**41**
3.35	**39**
2.00	**38**
1.18	**37**
0.630	**36**
0.425	**35**
0.200	**34**
0.150	**33**
0.063	**32**

Particle Diameter (mm)	Percent Passing (%)
0.02	**32**
0.006	**26**
0.002	**19**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**NA**
D_{30} (mm)	**0.013**
D_{50} (mm)	**20.000**
D_{60} (mm)	**45.286**
D_{85} (mm)	**94.115**
D_{90} (mm)	**103.453**
C_U	**NA**
C_C	**NA**

Soil Description:
Brown white

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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Compiled By	Date
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Contract: **2021OY102 WSP Eastern & Midlands Region - Lot 2**

Contract Ref: **785325**

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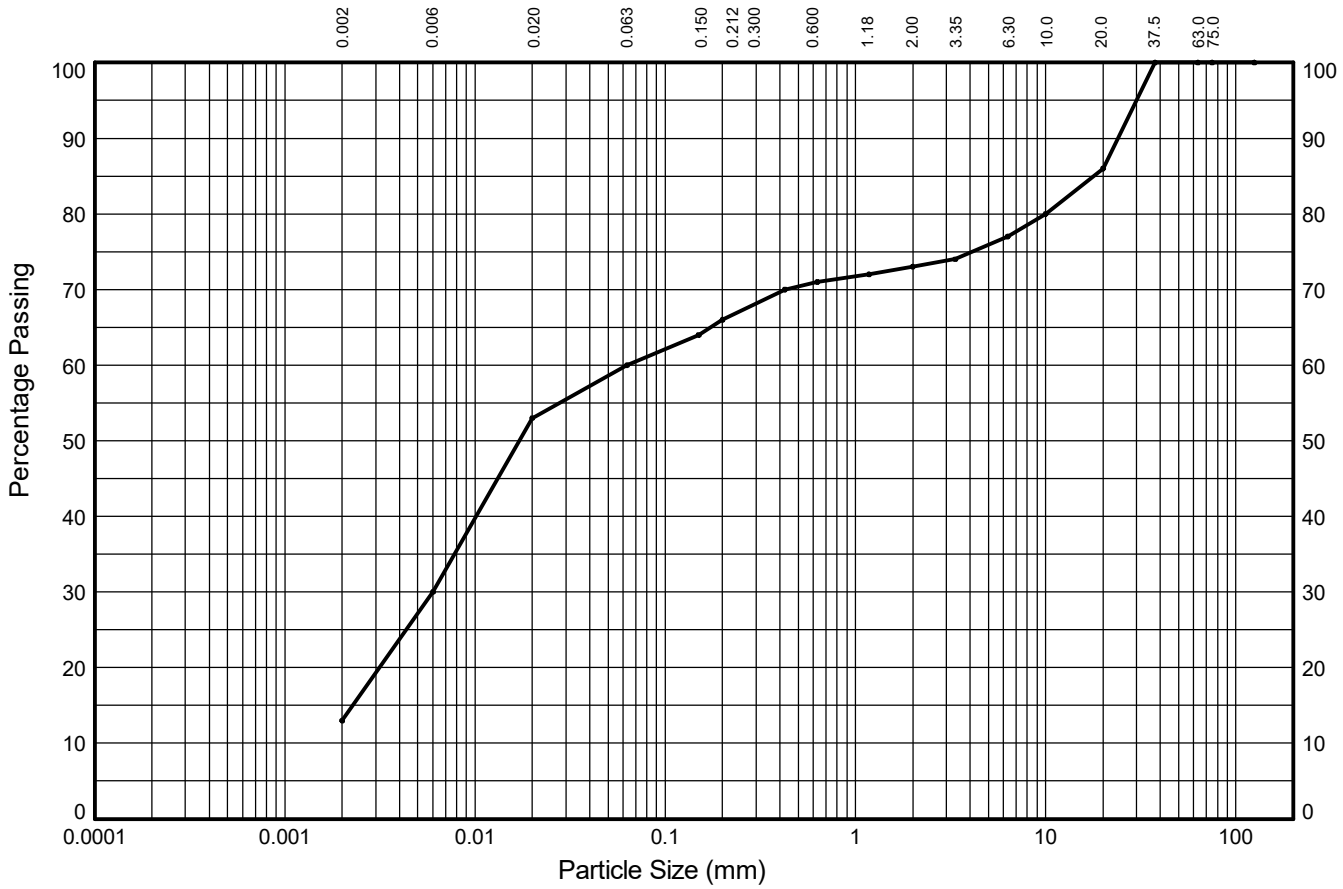
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.3 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-BH008** Sample Ref: **1** Sample Type: **C** Depth (m): **0.00**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	17%	23%	7%	6%	5%	2%	4%	9%	14%	
	SILT			SAND			GRAVEL			
13%	47%			13%			27%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**86**
10.0	**80**
6.30	**77**
3.35	**74**
2.00	**73**
1.18	**72**
0.630	**71**
0.425	**70**
0.200	**66**
0.150	**64**
0.063	**60**

Particle Diameter (mm)	Percent Passing (%)
0.02	**53**
0.006	**30**
0.002	**13**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**0.002**
D_{30} (mm)	**0.006**
D_{50} (mm)	**0.017**
D_{60} (mm)	**0.063**
D_{85} (mm)	**17.818**
D_{90} (mm)	**23.935**
C_U	**NA**
C_C	**NA**

Soil Description:

Brown slightly sandy slightly gravelly clayey SILT

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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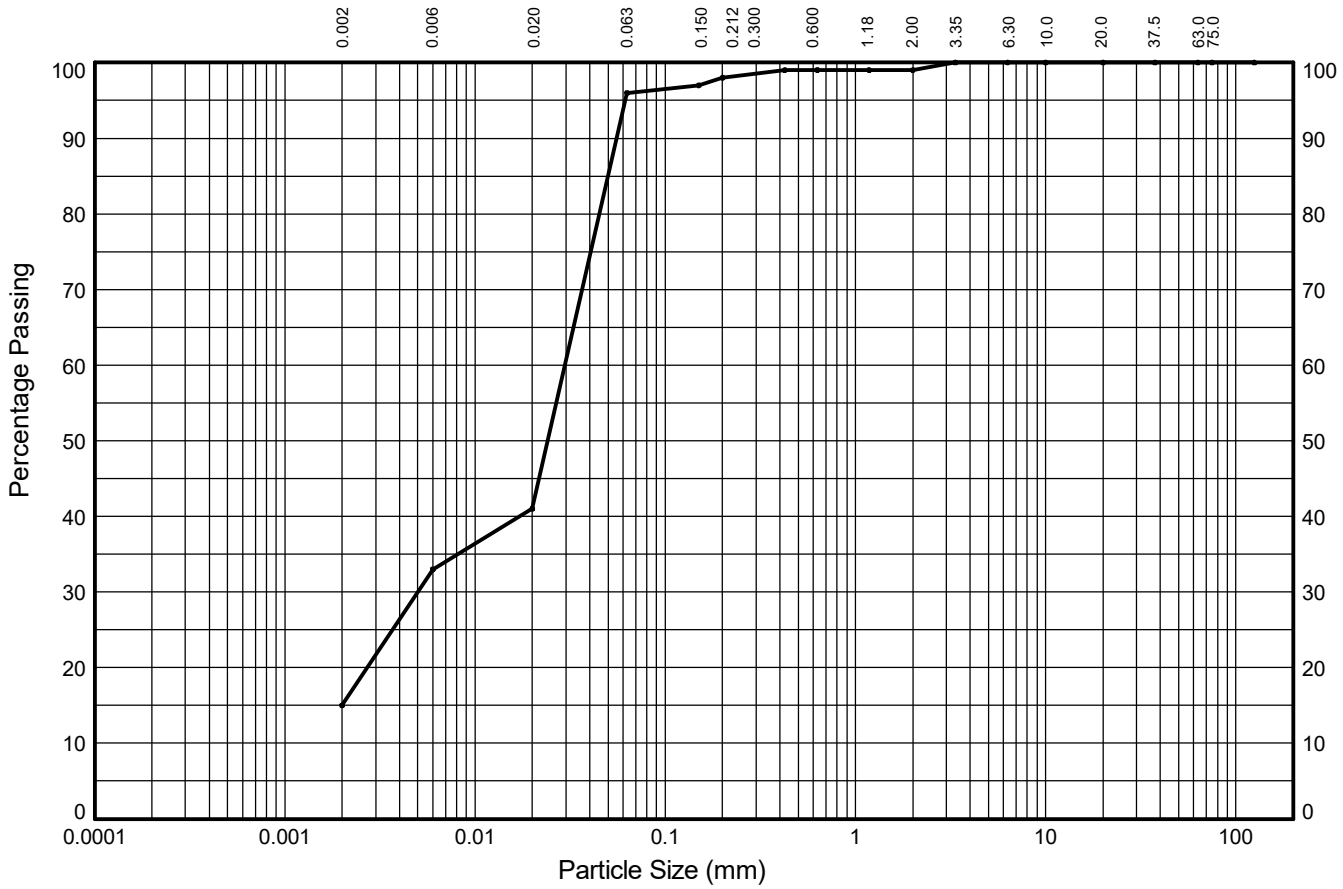
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.3 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-BH008** Sample Ref: **4** Sample Type: **C** Depth (m): **6.60**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	18%	8%	55%	2%	1%	0%	1%	0%	0%	
	SILT			SAND			GRAVEL			
15%	81%			3%			1%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**100**
10.0	**100**
6.30	**100**
3.35	**100**
2.00	**99**
1.18	**99**
0.630	**99**
0.425	**99**
0.200	**98**
0.150	**97**
0.063	**96**

Particle Diameter (mm)	Percent Passing (%)
0.02	**41**
0.006	**33**
0.002	**15**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**0.002**
D_{30} (mm)	**0.005**
D_{50} (mm)	**0.024**
D_{60} (mm)	**0.030**
D_{85} (mm)	**0.050**
D_{90} (mm)	**0.056**
C_U	**NA**
C_C	**NA**

Soil Description:

Brown slightly gravelly slightly sandy clayey SILT

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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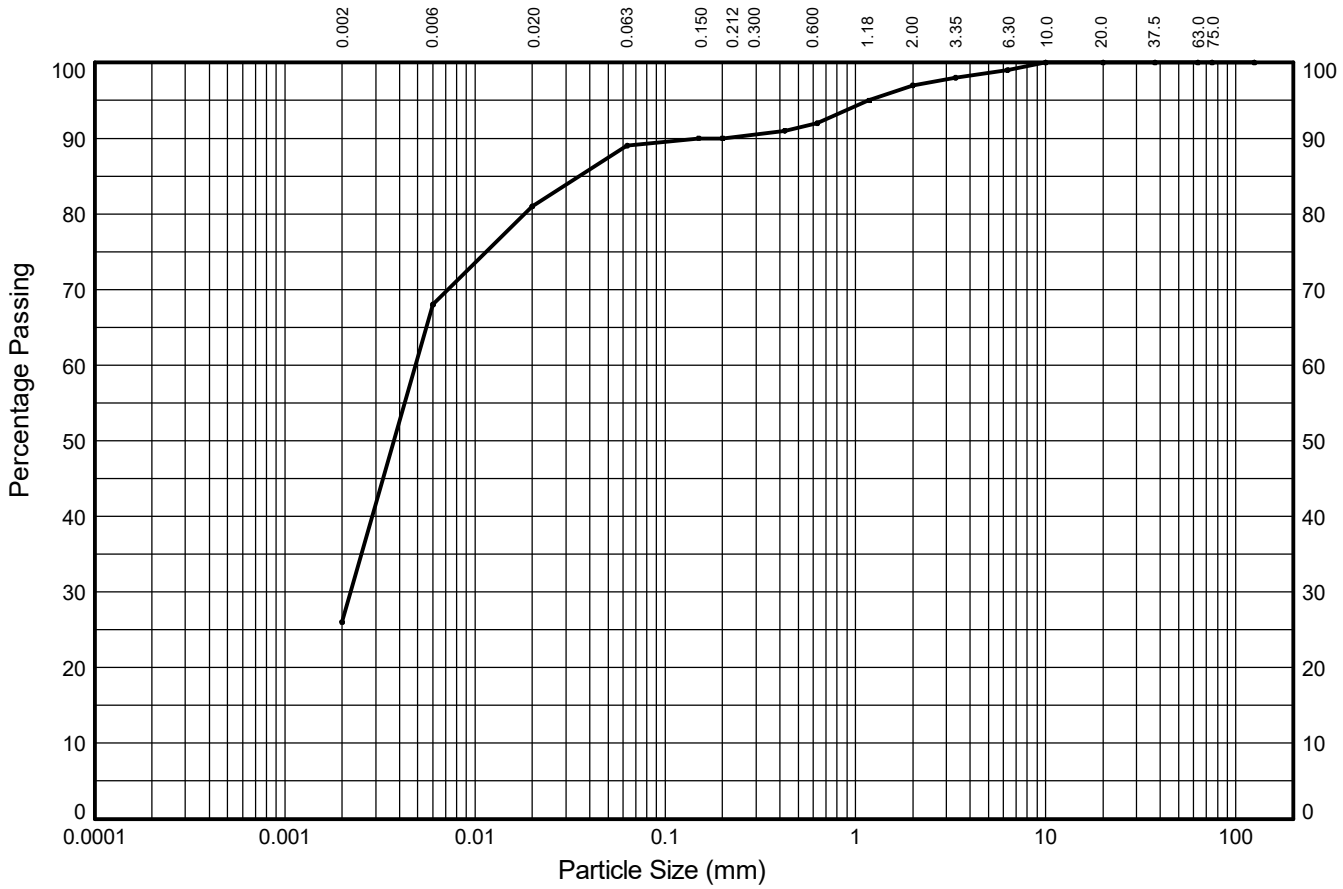
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.3 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-BH008** Sample Ref: **5** Sample Type: **C** Depth (m): **8.10**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	42%	13%	8%	1%	2%	5%	2%	1%	0%	
	SILT			SAND			GRAVEL			
26%	63%			8%			3%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**100**
10.0	**100**
6.30	**99**
3.35	**98**
2.00	**97**
1.18	**95**
0.630	**92**
0.425	**91**
0.200	**90**
0.150	**90**
0.063	**89**

Particle Diameter (mm)	Percent Passing (%)
0.02	**81**
0.006	**68**
0.002	**26**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**NA**
D_{30} (mm)	**0.002**
D_{50} (mm)	**0.004**
D_{60} (mm)	**0.005**
D_{85} (mm)	**0.035**
D_{90} (mm)	**0.150**
C_U	**NA**
C_C	**NA**

Soil Description:

Brown slightly gravelly slightly sandy clayey SILT

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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LORNA WHITWORTH	03/02/23

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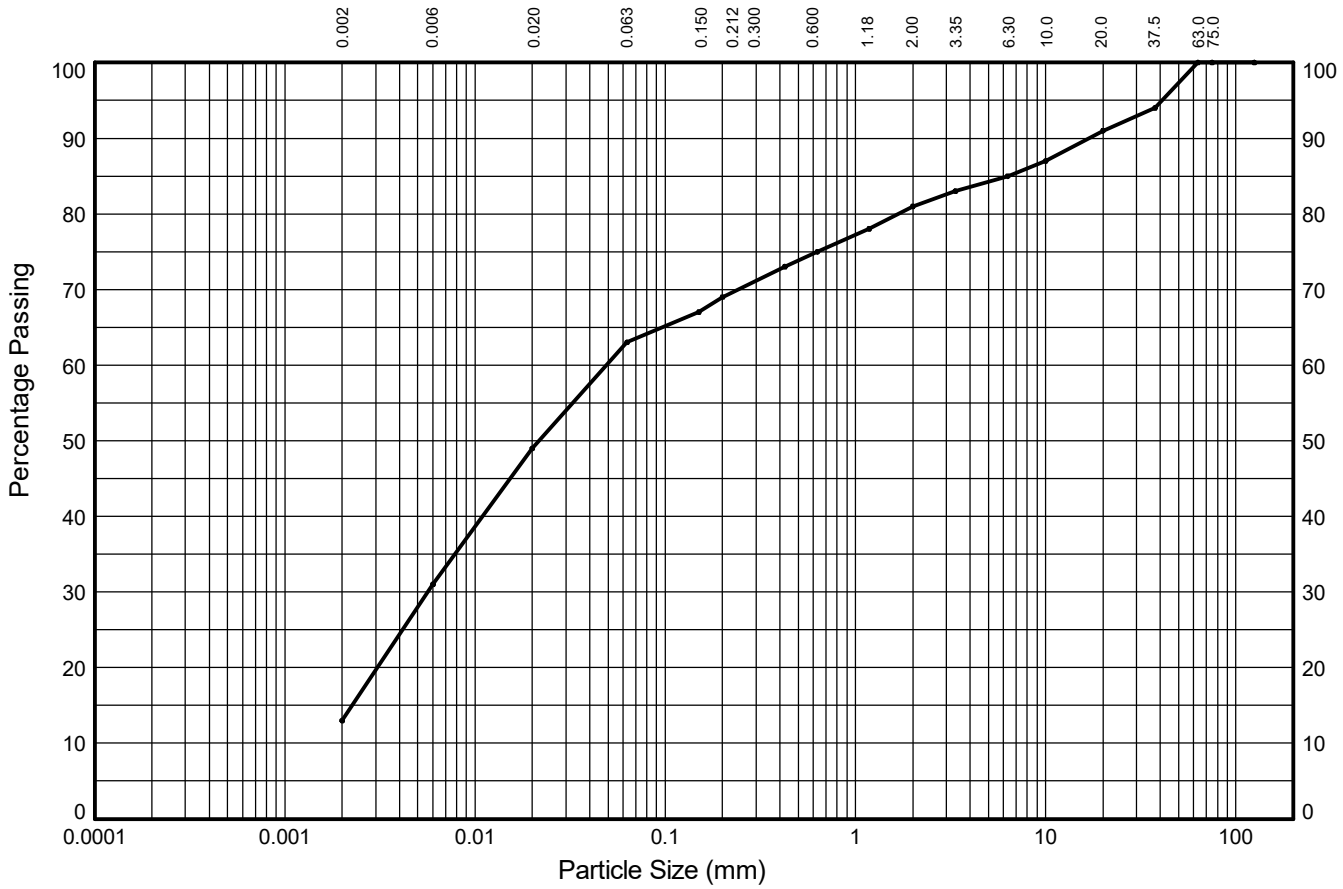
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.3 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-BH008** Sample Ref: **6** Sample Type: **C** Depth (m): **9.60**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	18%	18%	14%	6%	6%	6%	4%	6%	9%	
	SILT			SAND			GRAVEL			
13%	50%			18%			19%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**94**
20.0	**91**
10.0	**87**
6.30	**85**
3.35	**83**
2.00	**81**
1.18	**78**
0.630	**75**
0.425	**73**
0.200	**69**
0.150	**67**
0.063	**63**

Particle Diameter (mm)	Percent Passing (%)
0.02	**49**
0.006	**31**
0.002	**13**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**0.002**
D_{30} (mm)	**0.006**
D_{50} (mm)	**0.022**
D_{60} (mm)	**0.049**
D_{85} (mm)	**6.300**
D_{90} (mm)	**16.818**
C_U	**NA**
C_C	**NA**

Soil Description:

Brown slightly sandy slightly gravelly clayey SILT

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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Compiled By	Date
LORNA WHITWORTH	03/02/23

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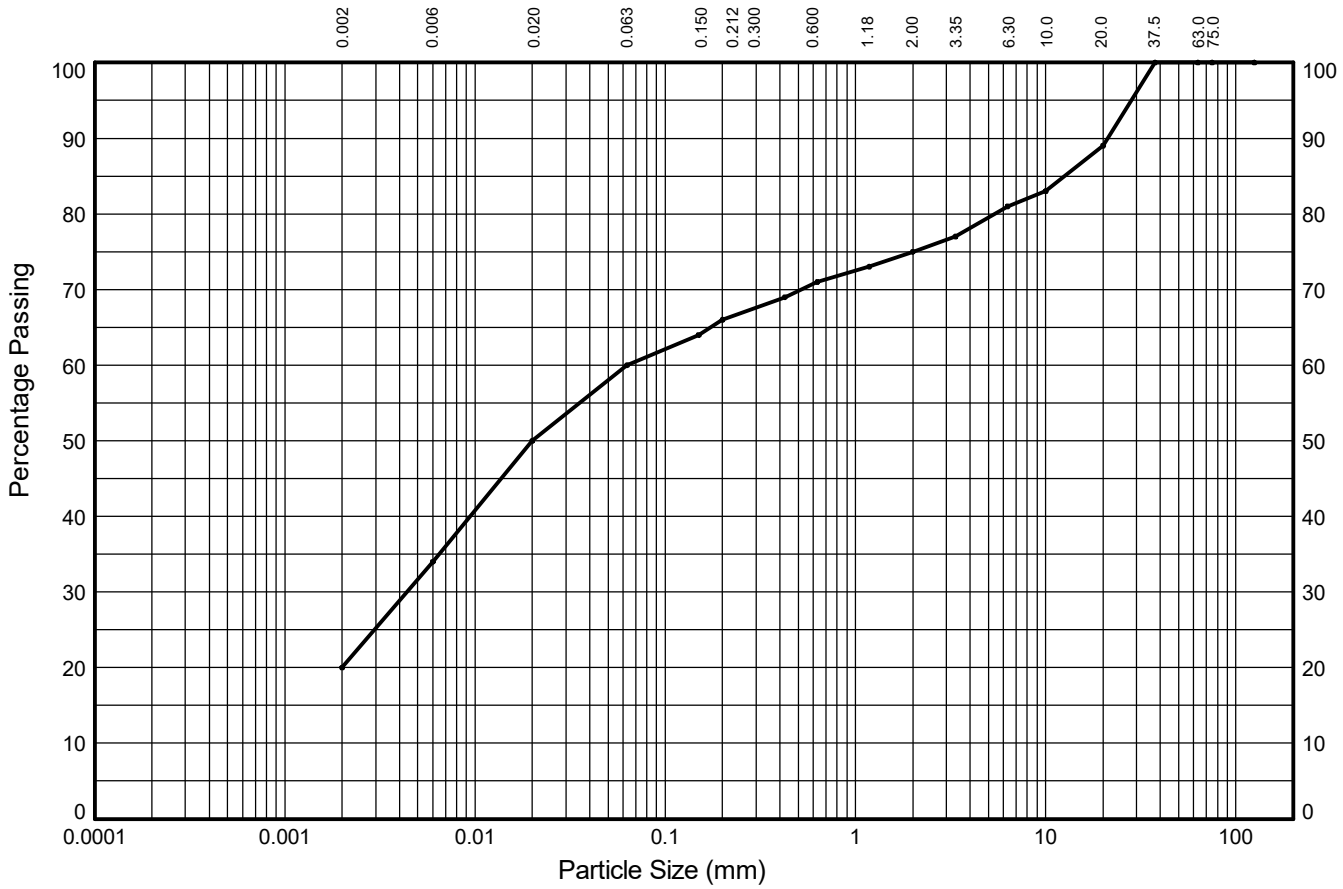
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.3 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-BH008** Sample Ref: **10** Sample Type: **C** Depth (m): **23.10**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	14%	16%	10%	6%	5%	4%	6%	8%	11%	
	SILT			SAND			GRAVEL			
20%	40%			15%			25%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**89**
10.0	**83**
6.30	**81**
3.35	**77**
2.00	**75**
1.18	**73**
0.630	**71**
0.425	**69**
0.200	**66**
0.150	**64**
0.063	**60**

Particle Diameter (mm)	Percent Passing (%)
0.02	**50**
0.006	**34**
0.002	**20**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**NA**
D_{30} (mm)	**0.004**
D_{50} (mm)	**0.020**
D_{60} (mm)	**0.063**
D_{85} (mm)	**12.599**
D_{90} (mm)	**21.176**
C_U	**NA**
C_C	**NA**

Soil Description:

Brown slightly sandy slightly gravelly clayey SILT

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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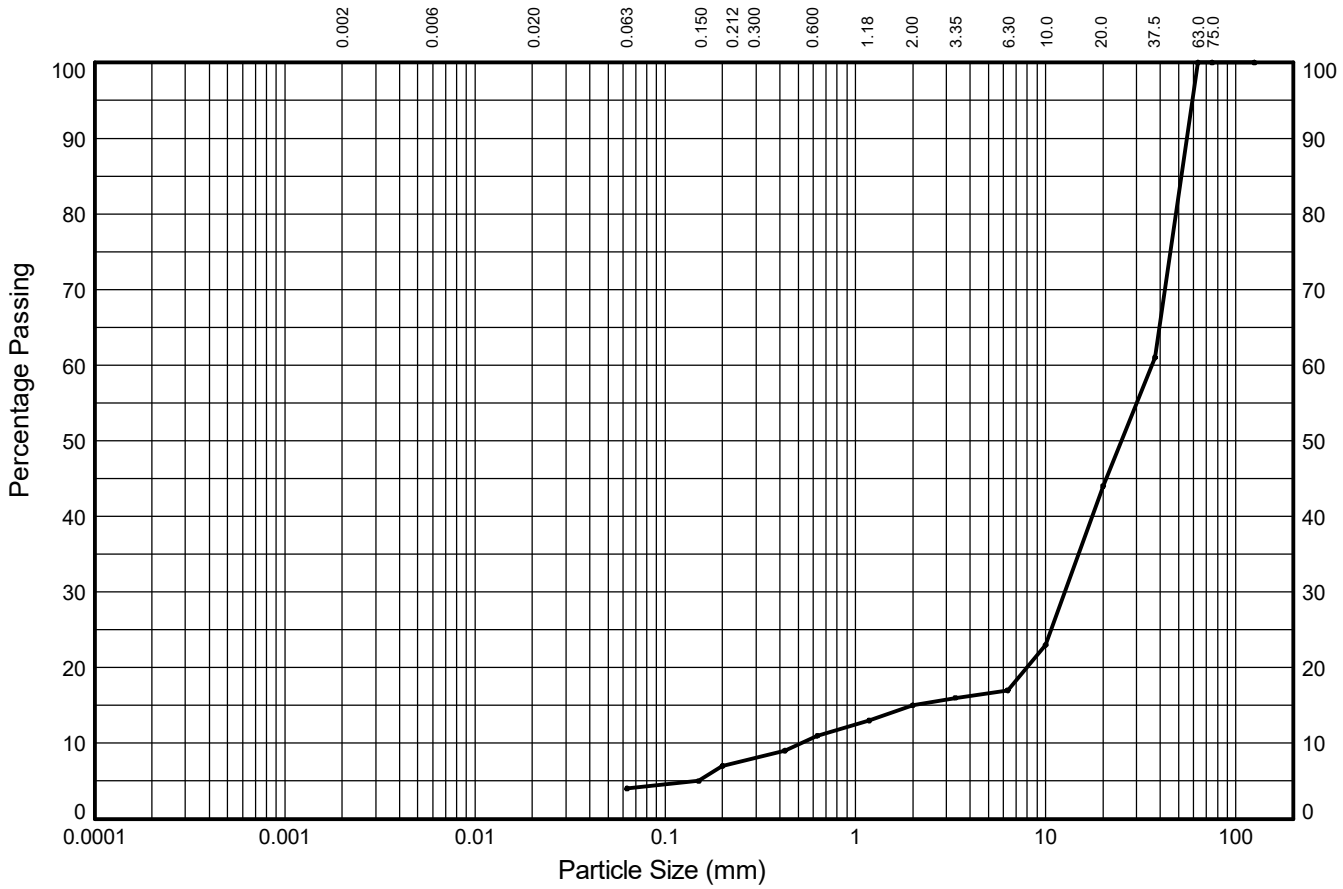
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-BH018** Sample Ref: **1** Sample Type: **C** Depth (m): **0.00**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	-	-	-	3%	4%	4%	2%	27%	56%	
	SILT			SAND			GRAVEL			
4%				11%			85%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**61**
20.0	**44**
10.0	**23**
6.30	**17**
3.35	**16**
2.00	**15**
1.18	**13**
0.630	**11**
0.425	**9**
0.200	**7**
0.150	**5**
0.063	**4**

Particle Diameter (mm)	Percent Passing (%)

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**0.517**
D_{15} (mm)	**2.000**
D_{30} (mm)	**12.599**
D_{50} (mm)	**24.968**
D_{60} (mm)	**36.139**
D_{85} (mm)	**51.604**
D_{90} (mm)	**55.153**
C_U	**70**
C_C	**8**

Soil Description:

Brown sandy slightly silty/clayey GRAVEL

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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LORNA WHITWORTH	03/02/23

Contract	Contract Ref:
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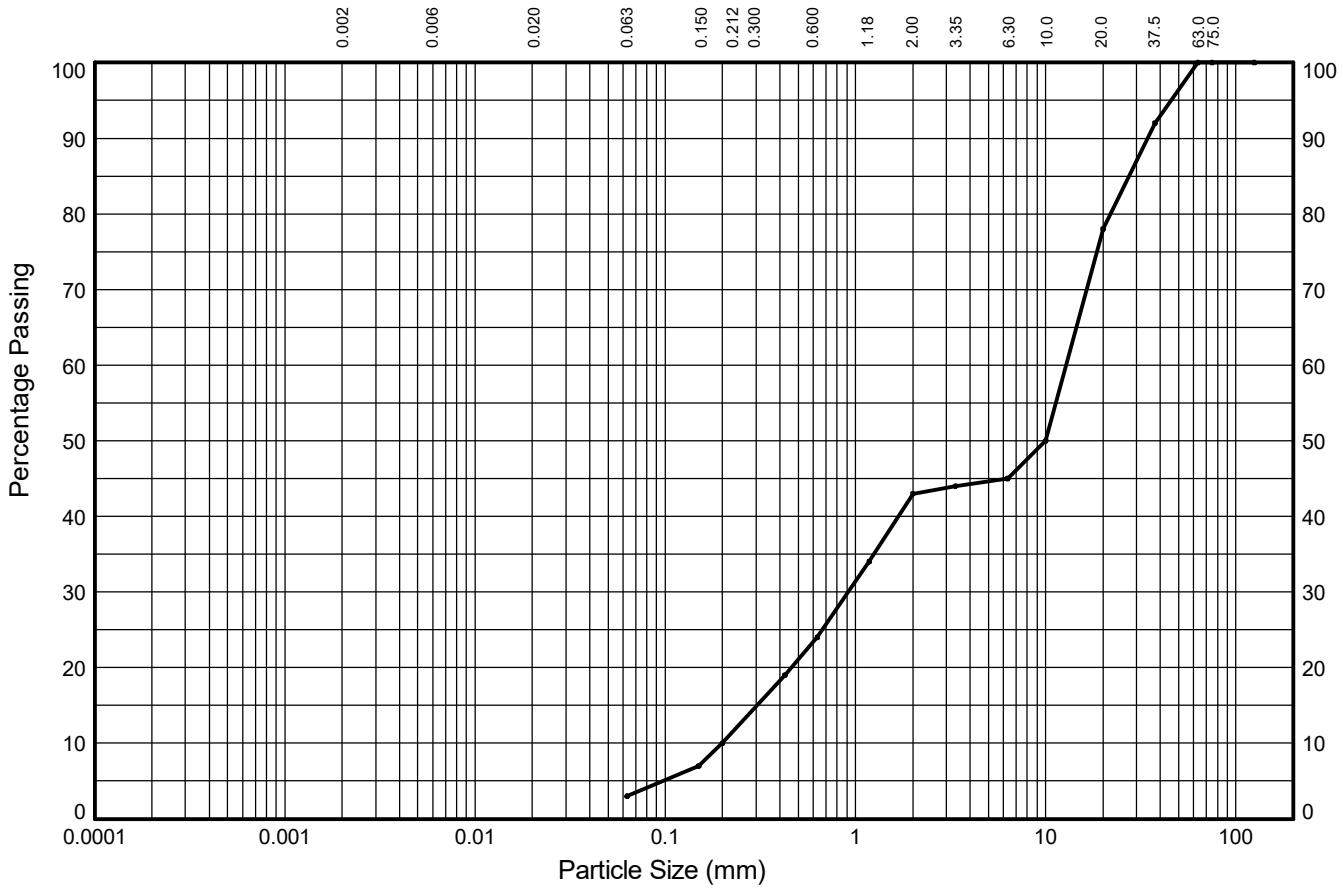
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-BH018** Sample Ref: **2** Sample Type: **C** Depth (m): **3.50**



CLAY										COBBLES
	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	
	-	-	-	7%	14%	19%	2%	33%	22%	
	SILT			SAND			GRAVEL			
3%				40%			57%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**92**
20.0	**78**
10.0	**50**
6.30	**45**
3.35	**44**
2.00	**43**
1.18	**34**
0.630	**24**
0.425	**19**
0.200	**10**
0.150	**7**
0.063	**3**

Particle Diameter (mm)	Percent Passing (%)

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**0.200**
D_{15} (mm)	**0.304**
D_{30} (mm)	**0.918**
D_{50} (mm)	**10.000**
D_{60} (mm)	**12.809**
D_{85} (mm)	**27.386**
D_{90} (mm)	**34.279**
C_U	**64**
C_C	**0.33**

Soil Description:

Brown very sandy slightly silty/clayey GRAVEL

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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Compiled By	Date
LORNA WHITWORTH	03/02/23

Contract	Contract Ref:
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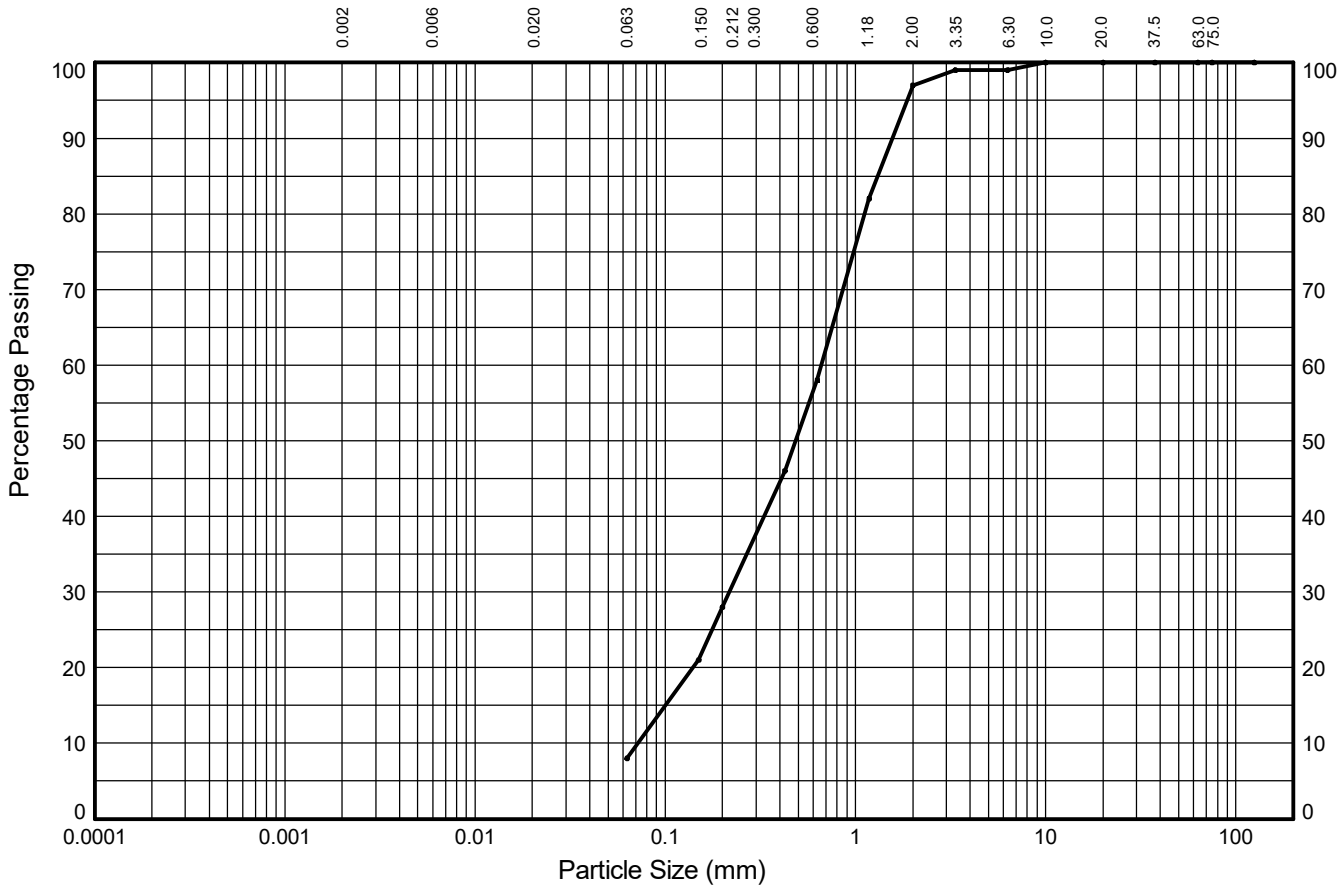
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-BH018** Sample Ref: **3** Sample Type: **C** Depth (m): **10.00**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	-	-	-	20%	30%	39%	2%	1%	0%	
	SILT			SAND			GRAVEL			
8%				89%			3%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**100**
10.0	**100**
6.30	**99**
3.35	**99**
2.00	**97**
1.18	**82**
0.630	**58**
0.425	**46**
0.200	**28**
0.150	**21**
0.063	**8**

Particle Diameter (mm)	Percent Passing (%)

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**0.072**
D_{15} (mm)	**0.101**
D_{30} (mm)	**0.217**
D_{50} (mm)	**0.485**
D_{60} (mm)	**0.664**
D_{85} (mm)	**1.311**
D_{90} (mm)	**1.563**
C_U	**9.2**
C_C	**0.99**

Soil Description:

Brown slightly gravelly silty/clayey SAND

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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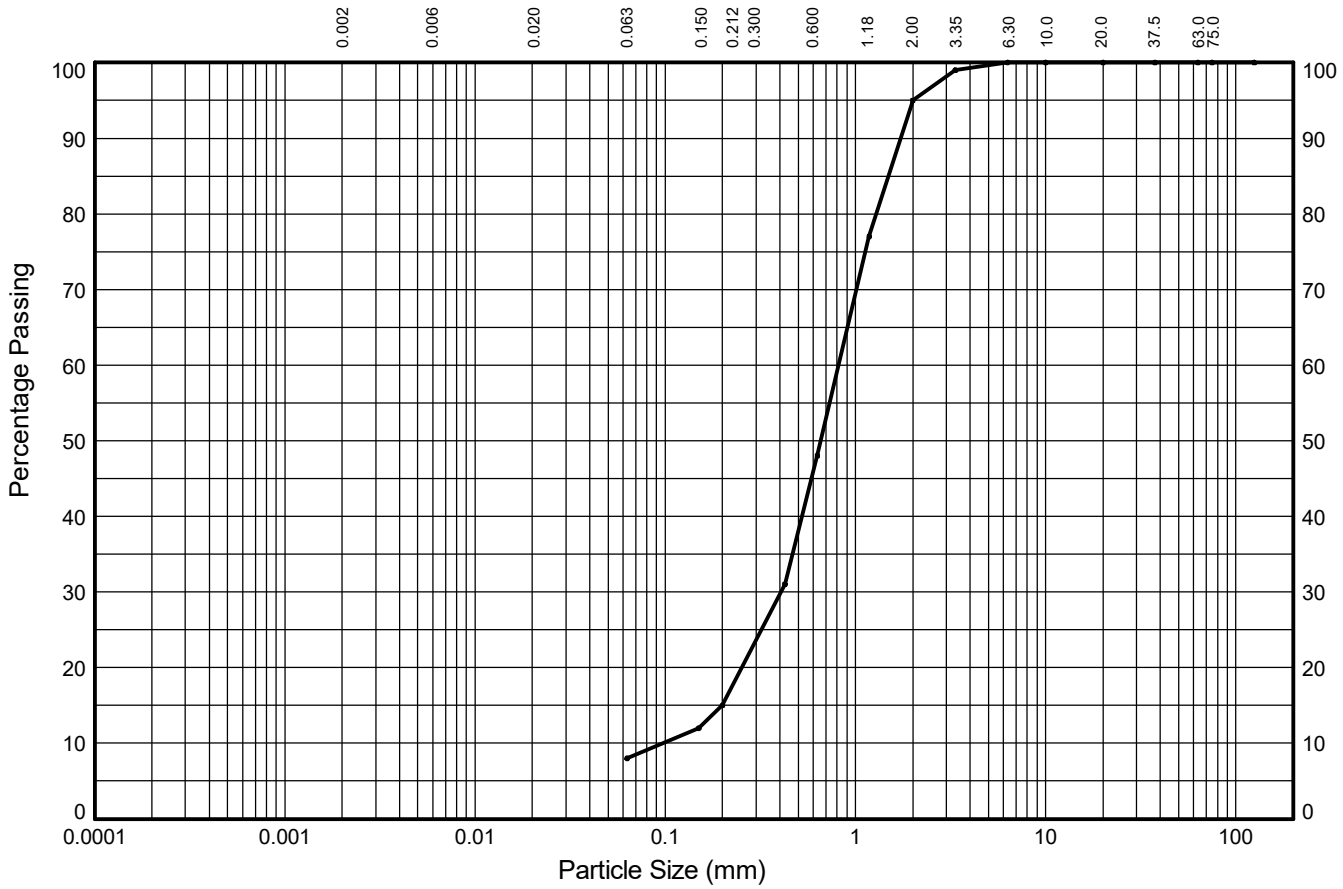
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-BH018** Sample Ref: **5** Sample Type: **C** Depth (m): **14.50**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	-	-	-	7%	33%	47%	5%	0%	0%	
	SILT			SAND			GRAVEL			
8%				87%			5%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**100**
10.0	**100**
6.30	**100**
3.35	**99**
2.00	**95**
1.18	**77**
0.630	**48**
0.425	**31**
0.200	**15**
0.150	**12**
0.063	**8**

Particle Diameter (mm)	Percent Passing (%)

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**0.097**
D_{15} (mm)	**0.200**
D_{30} (mm)	**0.405**
D_{50} (mm)	**0.658**
D_{60} (mm)	**0.817**
D_{85} (mm)	**1.492**
D_{90} (mm)	**1.727**
C_U	**8.4**
C_C	**2.1**

Soil Description:

Brown gravelly silty/clayey SAND

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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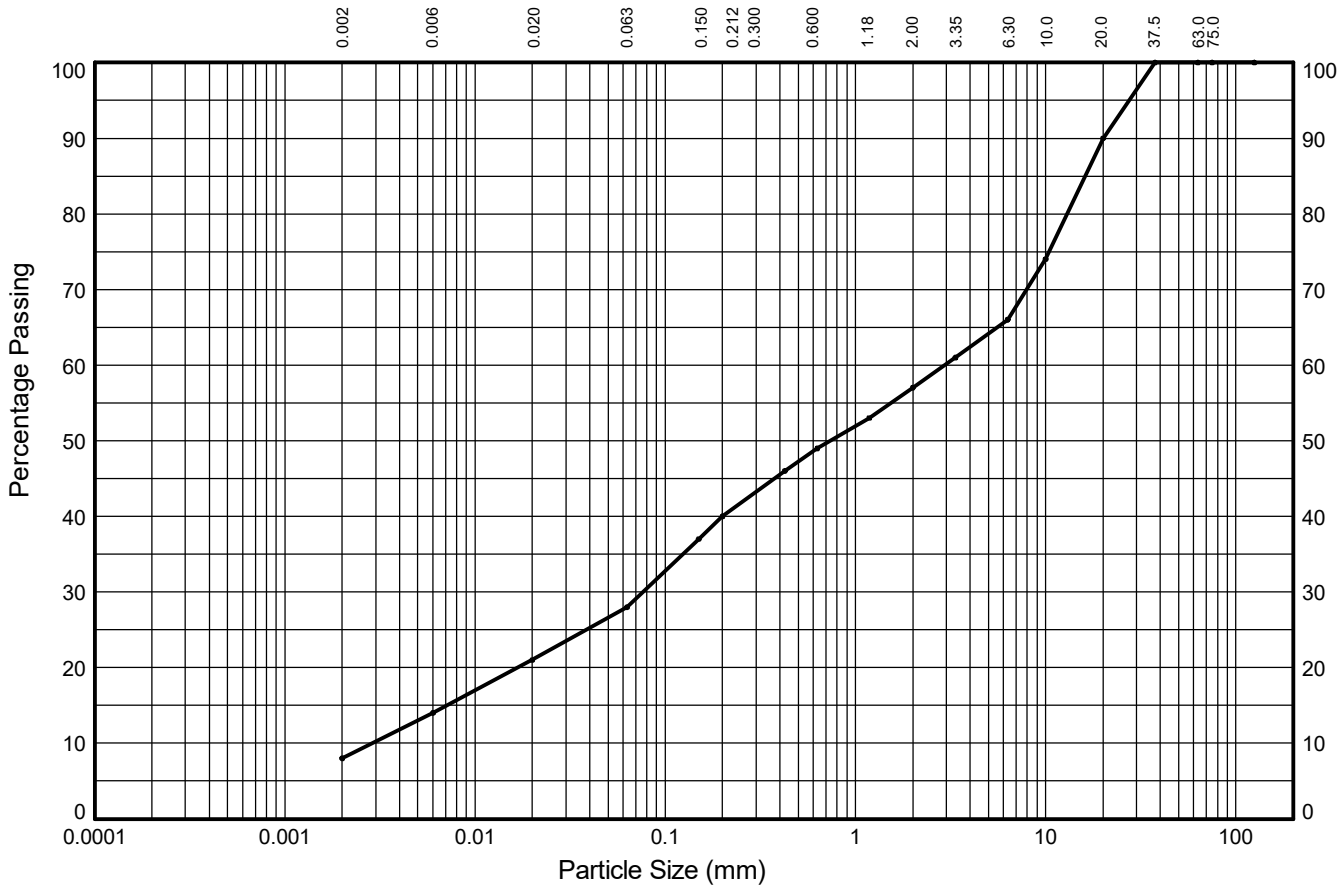
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.3 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-BH020** Sample Ref: **1** Sample Type: **C** Depth (m): **3.50**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	6%	7%	7%	12%	9%	8%	9%	24%	10%	
	SILT			SAND			GRAVEL			
8%	20%			29%			43%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**90**
10.0	**74**
6.30	**66**
3.35	**61**
2.00	**57**
1.18	**53**
0.630	**49**
0.425	**46**
0.200	**40**
0.150	**37**
0.063	**28**

Particle Diameter (mm)	Percent Passing (%)
0.02	**21**
0.006	**14**
0.002	**8**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**0.003**
D_{15} (mm)	**0.007**
D_{30} (mm)	**0.076**
D_{50} (mm)	**0.737**
D_{60} (mm)	**2.945**
D_{85} (mm)	**16.105**
D_{90} (mm)	**20.000**
C_U	**1021**
C_C	**0.69**

Soil Description:

Brown very sandy clayey silty GRAVEL

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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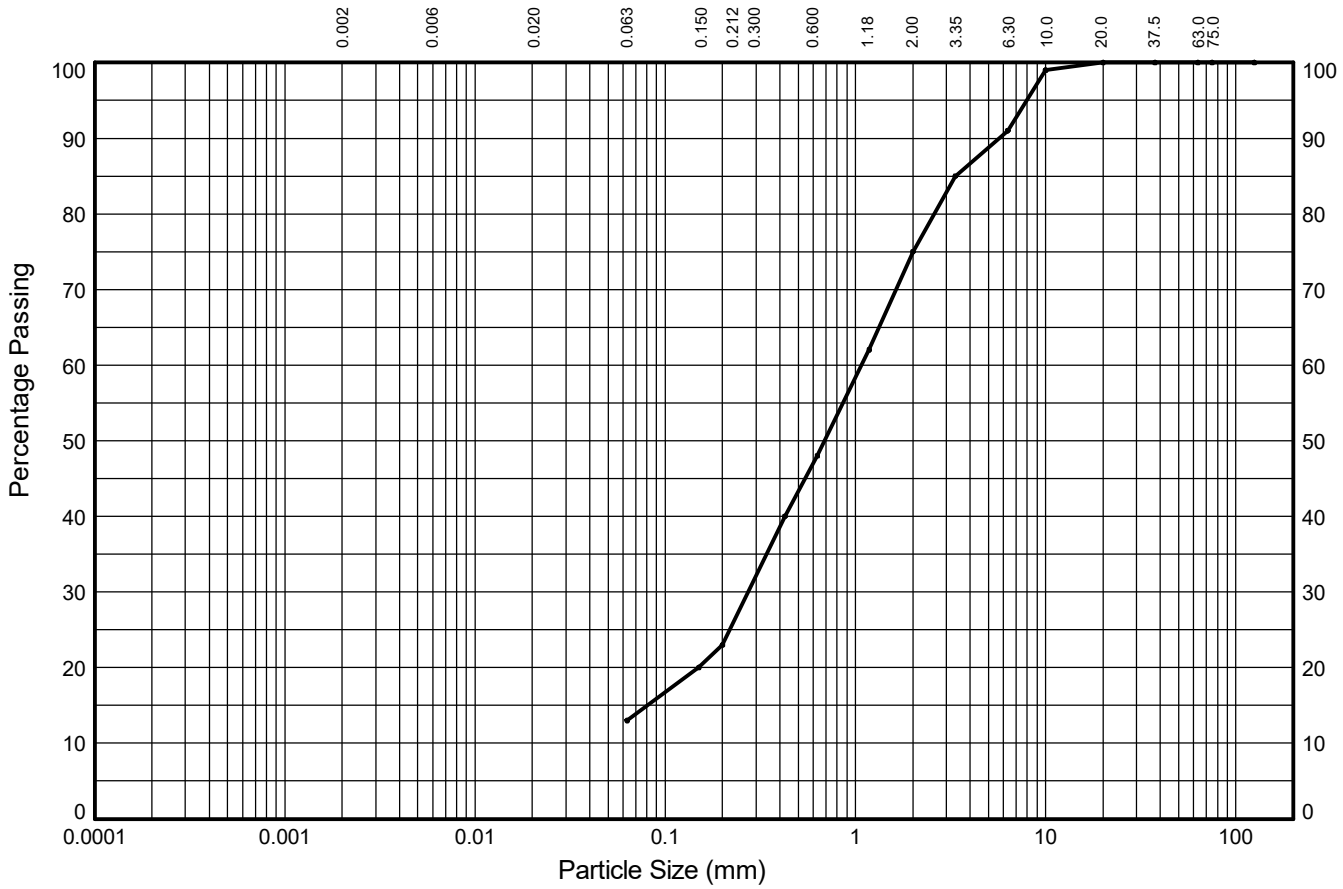
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-BH020** Sample Ref: **2** Sample Type: **C** Depth (m): **6.50**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	-	-	-	10%	25%	27%	16%	9%	0%	
	SILT			SAND			GRAVEL			
13%				62%			25%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**100**
10.0	**99**
6.30	**91**
3.35	**85**
2.00	**75**
1.18	**62**
0.630	**48**
0.425	**40**
0.200	**23**
0.150	**20**
0.063	**13**

Particle Diameter (mm)	Percent Passing (%)

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**0.081**
D_{30} (mm)	**0.273**
D_{50} (mm)	**0.689**
D_{60} (mm)	**1.079**
D_{85} (mm)	**3.350**
D_{90} (mm)	**5.671**
C_U	**NA**
C_C	**NA**

Soil Description:

Brown very gravelly silty/clayey SAND

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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Compiled By	Date
LORNA WHITWORTH	03/02/23

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PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-BH020** Sample Ref: **4** Sample Type: **C** Depth (m): **14.00**

CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	-	-	-	10%	11%	23%	18%	14%	12%	
	SILT			SAND			GRAVEL			
12%				44%			44%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**88**
10.0	**83**
6.30	**74**
3.35	**65**
2.00	**56**
1.18	**44**
0.630	**33**
0.425	**29**
0.200	**22**
0.150	**20**
0.063	**12**

Particle Diameter (mm)	Percent Passing (%)

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**0.087**
D_{30} (mm)	**0.469**
D_{50} (mm)	**1.536**
D_{60} (mm)	**2.515**
D_{85} (mm)	**13.195**
D_{90} (mm)	**22.209**
C_U	**NA**
C_C	**NA**

Soil Description:

Brown silty/clayey SAND & GRAVEL

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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Compiled By	Date
LORNA WHITWORTH	03/02/23

Contract	Contract Ref:
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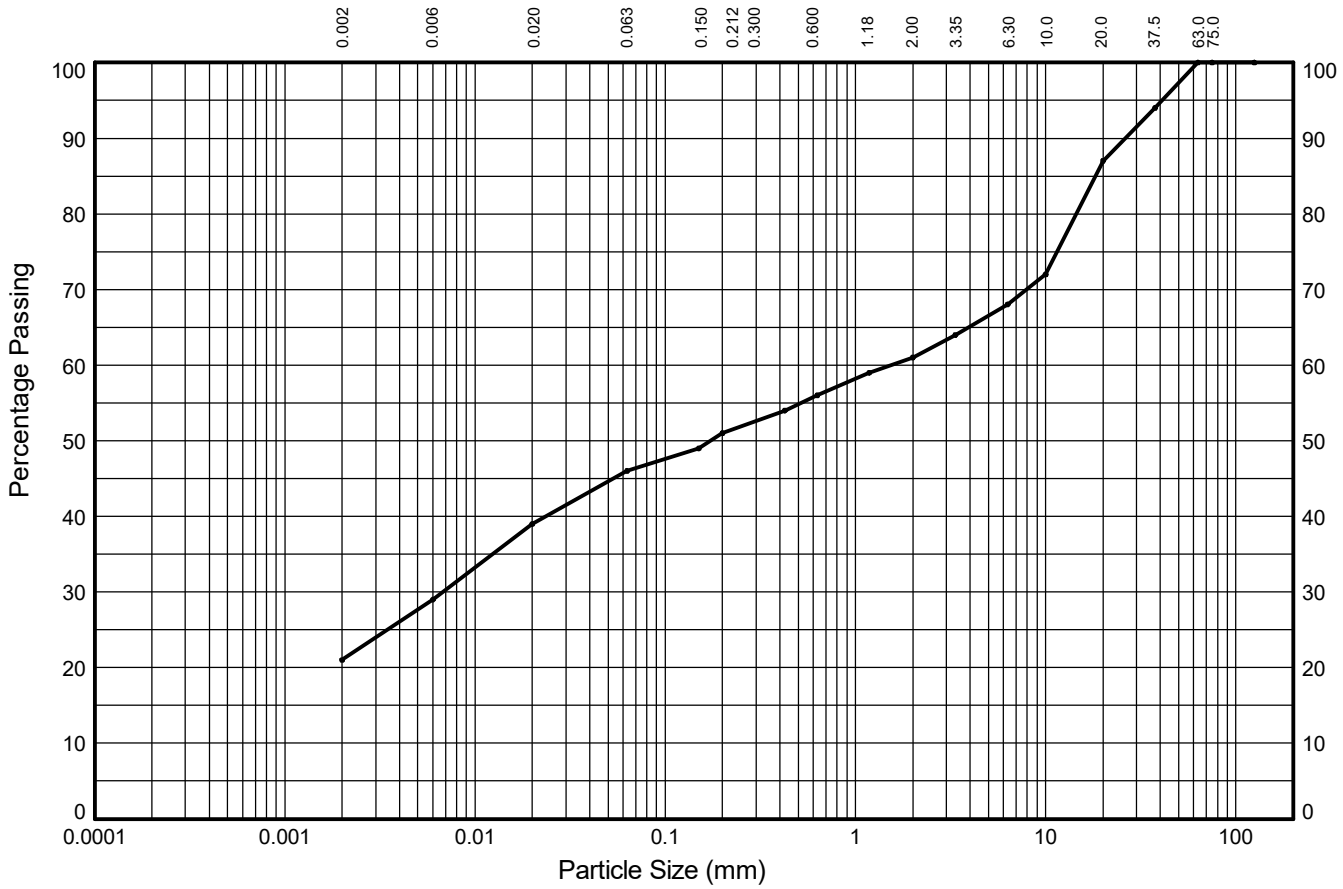
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.3 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-BH023** Sample Ref: **1** Sample Type: **C** Depth (m): **0.00**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	8%	10%	7%	5%	5%	5%	7%	19%	13%	
	SILT			SAND			GRAVEL			
21%	25%			15%			39%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**94**
20.0	**87**
10.0	**72**
6.30	**68**
3.35	**64**
2.00	**61**
1.18	**59**
0.630	**56**
0.425	**54**
0.200	**51**
0.150	**49**
0.063	**46**

Particle Diameter (mm)	Percent Passing (%)
0.02	**39**
0.006	**29**
0.002	**21**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**NA**
D_{30} (mm)	**0.007**
D_{50} (mm)	**0.173**
D_{60} (mm)	**1.536**
D_{85} (mm)	**18.234**
D_{90} (mm)	**26.184**
C_U	**NA**
C_C	**NA**

Soil Description:

Brown slightly sandy gravelly clayey SILT

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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Compiled By	Date
LAURA SCHRAMM	01/03/23

Contract: **2021OY102 WSP Eastern & Midlands Region - Lot 2**

Contract Ref: **785325**

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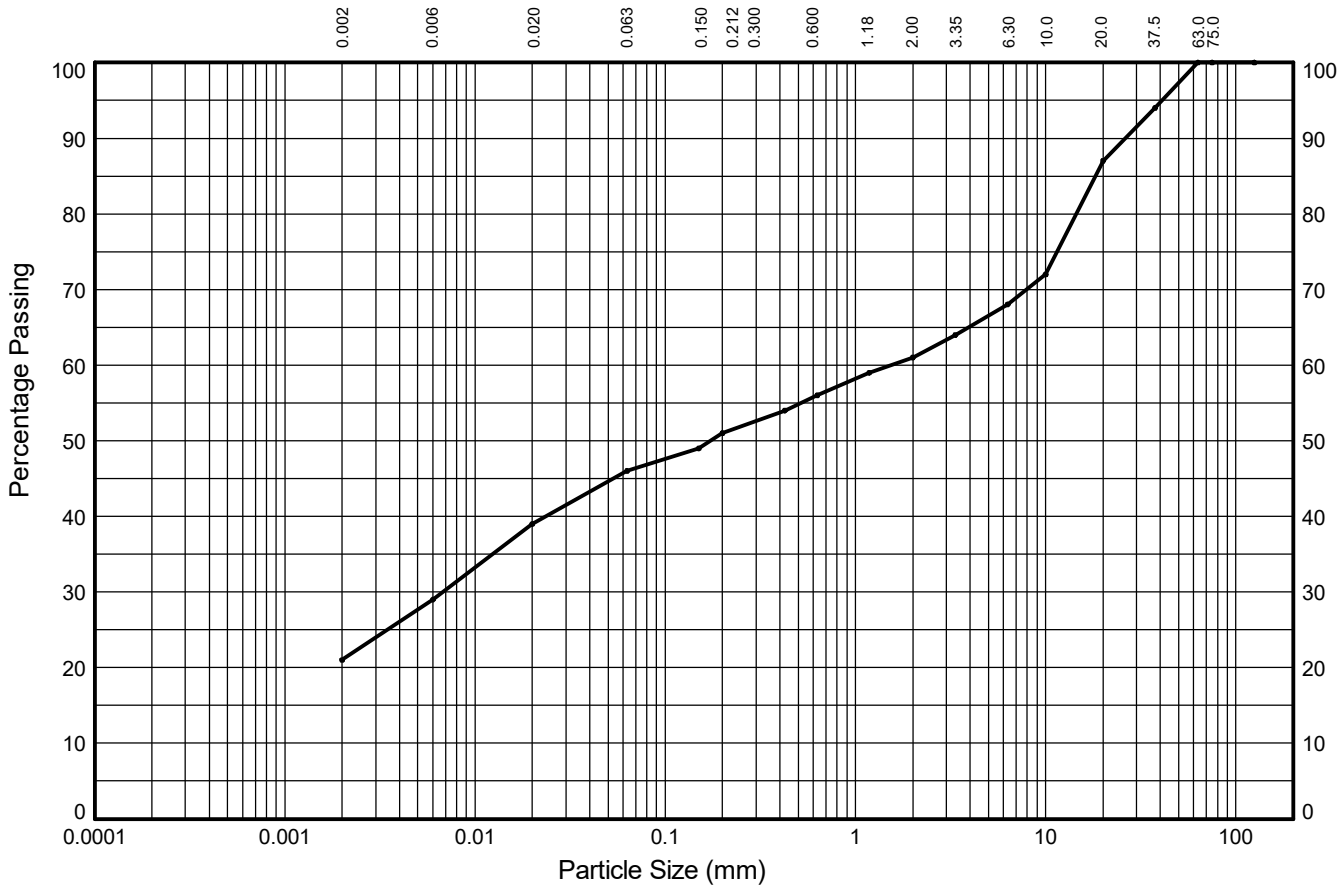
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.3 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-BH023** Sample Ref: **3** Sample Type: **C** Depth (m): **3.50**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	8%	10%	7%	5%	5%	5%	7%	19%	13%	
	SILT			SAND			GRAVEL			
21%	25%			15%			39%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**94**
20.0	**87**
10.0	**72**
6.30	**68**
3.35	**64**
2.00	**61**
1.18	**59**
0.630	**56**
0.425	**54**
0.200	**51**
0.150	**49**
0.063	**46**

Particle Diameter (mm)	Percent Passing (%)
0.02	**39**
0.006	**29**
0.002	**21**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**NA**
D_{30} (mm)	**0.007**
D_{50} (mm)	**0.173**
D_{60} (mm)	**1.536**
D_{85} (mm)	**18.234**
D_{90} (mm)	**26.184**
C_U	**NA**
C_C	**NA**

Soil Description:

Brown slightly sandy gravelly clayey SILT

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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Compiled By	Date
LORNA WHITWORTH	03/02/23

Contract	Contract Ref:
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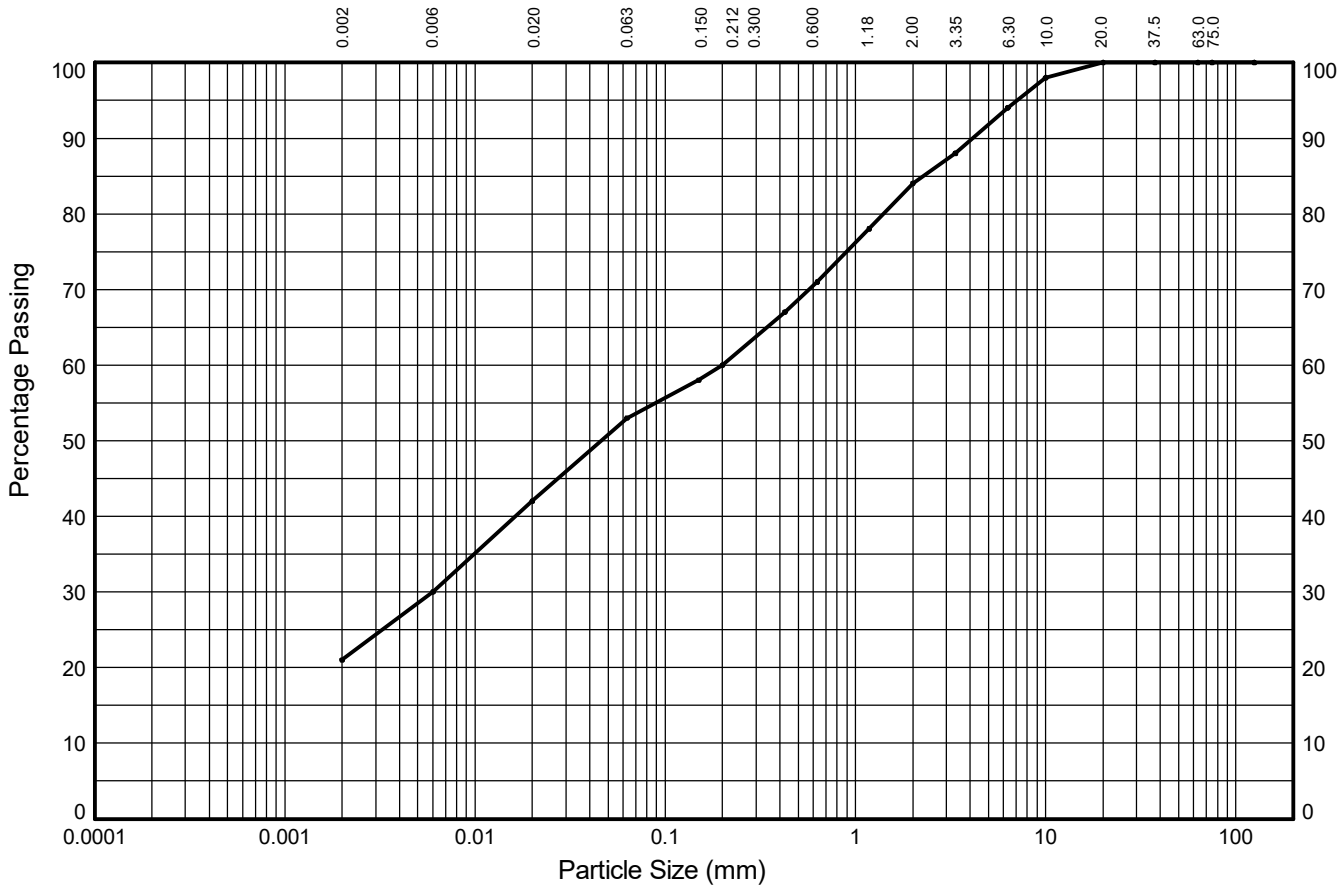
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.3 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-BH024** Sample Ref: **2** Sample Type: **C** Depth (m): **5.00**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	9%	12%	11%	7%	11%	13%	10%	6%	0%	
	SILT			SAND			GRAVEL			
21%	32%			31%			16%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**100**
10.0	**98**
6.30	**94**
3.35	**88**
2.00	**84**
1.18	**78**
0.630	**71**
0.425	**67**
0.200	**60**
0.150	**58**
0.063	**53**

Particle Diameter (mm)	Percent Passing (%)
0.02	**42**
0.006	**30**
0.002	**21**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**NA**
D_{30} (mm)	**0.006**
D_{50} (mm)	**0.046**
D_{60} (mm)	**0.200**
D_{85} (mm)	**2.275**
D_{90} (mm)	**4.135**
C_U	**NA**
C_C	**NA**

Soil Description:

Brown slightly gravelly slightly sandy clayey SILT

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By	Date
LORNA WHITWORTH	03/02/23

Contract	Contract Ref:
2021OY102WSP2-BPT section	**785325**

AGS

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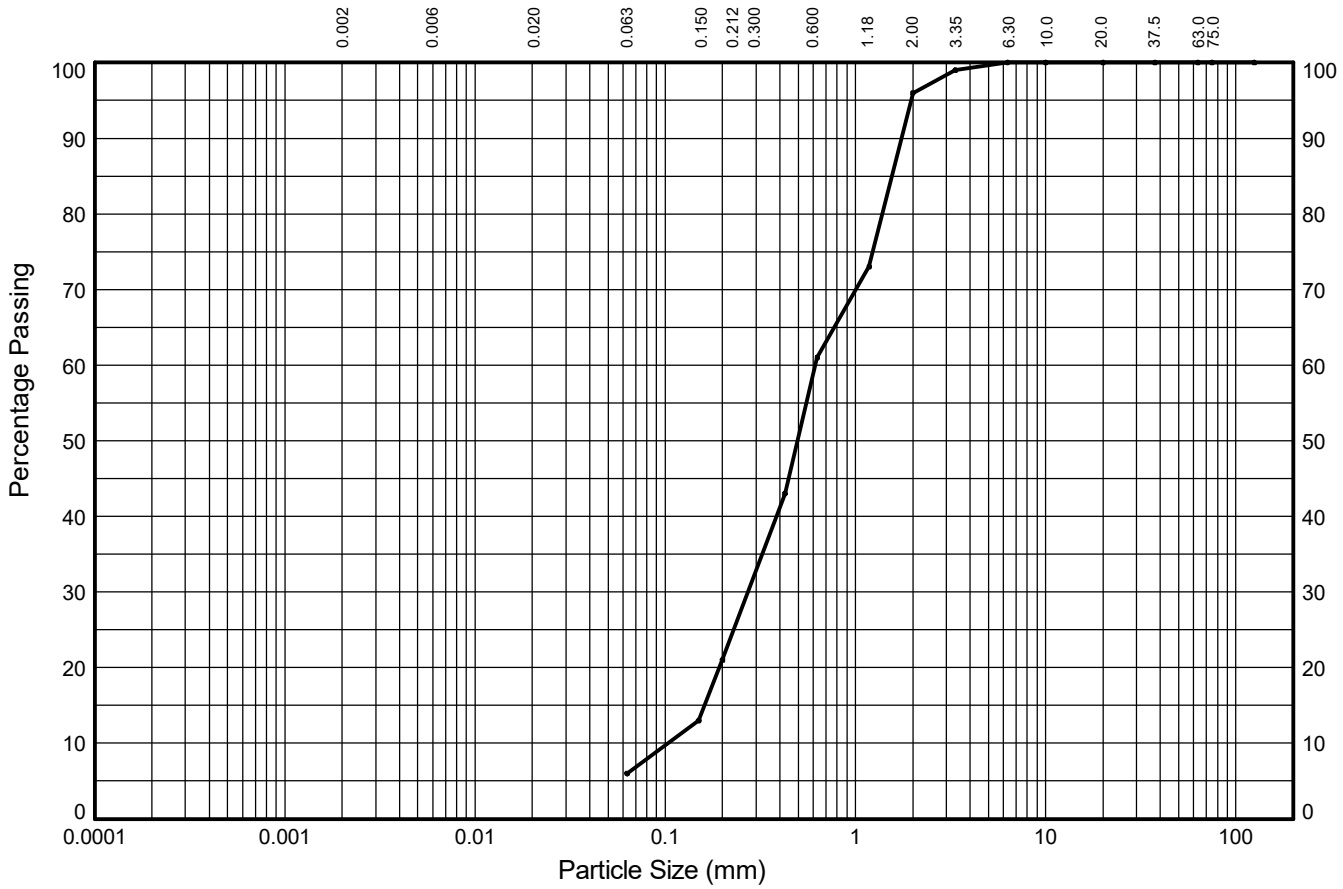
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-BH027** Sample Ref: **1** Sample Type: **C** Depth (m): **3.50**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	-	-	-	15%	40%	35%	4%	0%	0%	
	SILT			SAND			GRAVEL			
6%				90%			4%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**100**
10.0	**100**
6.30	**100**
3.35	**99**
2.00	**96**
1.18	**73**
0.630	**61**
0.425	**43**
0.200	**21**
0.150	**13**
0.063	**6**

Particle Diameter (mm)	Percent Passing (%)

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**0.103**
D_{15} (mm)	**0.161**
D_{30} (mm)	**0.272**
D_{50} (mm)	**0.495**
D_{60} (mm)	**0.616**
D_{85} (mm)	**1.554**
D_{90} (mm)	**1.743**
C_U	**6.0**
C_C	**1.2**

Soil Description:

Brown slightly gravelly silty/clayey SAND

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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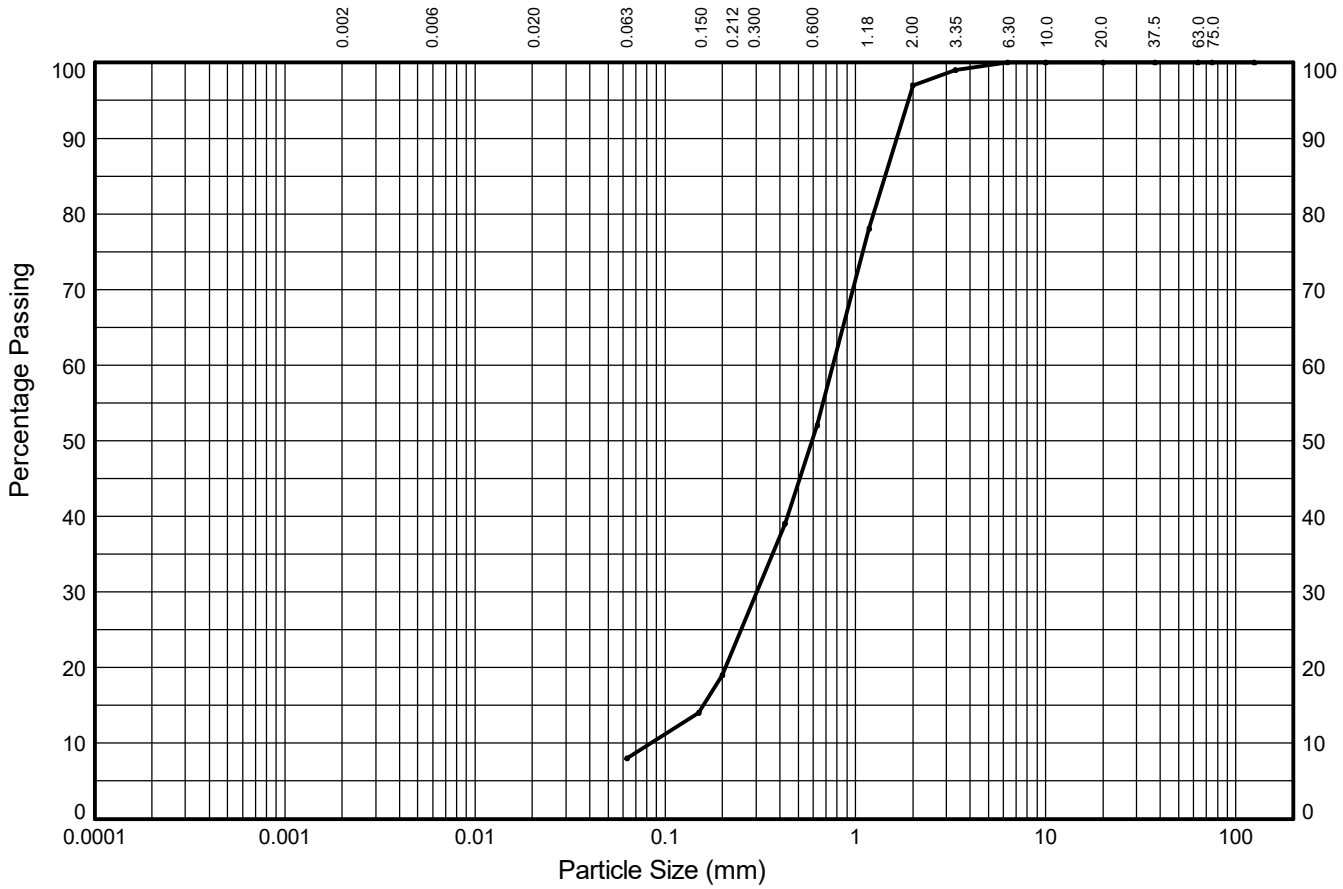
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-BH027** Sample Ref: **3** Sample Type: **C** Depth (m): **9.50**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	-	-	-	11%	33%	45%	3%	0%	0%	
	SILT			SAND			GRAVEL			
8%				89%			3%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**100**
10.0	**100**
6.30	**100**
3.35	**99**
2.00	**97**
1.18	**78**
0.630	**52**
0.425	**39**
0.200	**19**
0.150	**14**
0.063	**8**

Particle Diameter (mm)	Percent Passing (%)

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**0.084**
D_{15} (mm)	**0.159**
D_{30} (mm)	**0.303**
D_{50} (mm)	**0.593**
D_{60} (mm)	**0.764**
D_{85} (mm)	**1.433**
D_{90} (mm)	**1.647**
C_U	**9.1**
C_C	**1.4**

Soil Description:

Brown slightly gravelly silty/clayey SAND

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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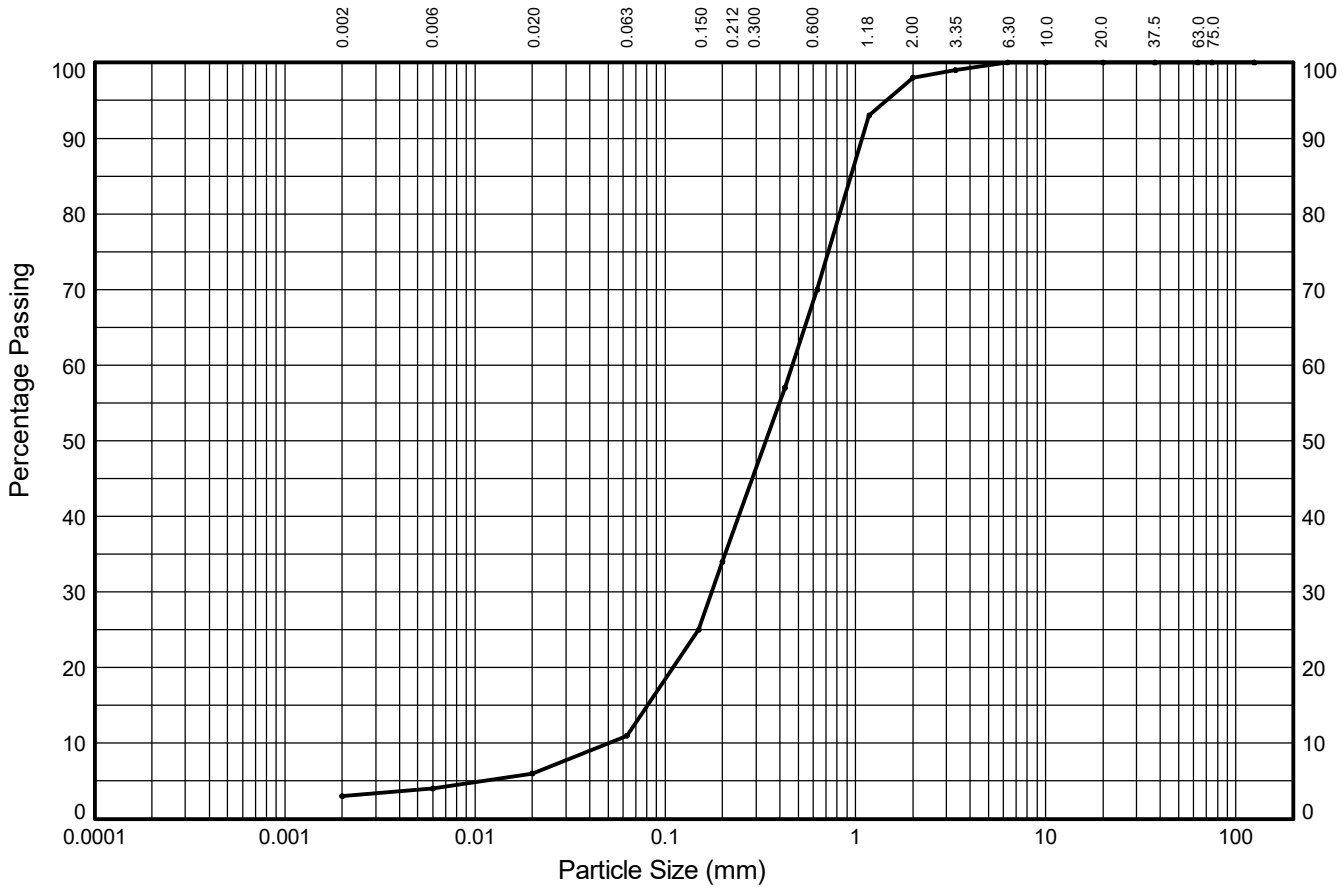
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.4 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-BH027** Sample Ref: **4** Sample Type: **C** Depth (m): **17.00**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	1%	2%	5%	23%	36%	28%	2%	0%	0%	
	SILT			SAND			GRAVEL			
3%	8%			87%			2%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**100**
10.0	**100**
6.30	**100**
3.35	**99**
2.00	**98**
1.18	**93**
0.630	**70**
0.425	**57**
0.200	**34**
0.150	**25**
0.063	**11**

Particle Diameter (mm)	Percent Passing (%)
0.02	**6**
0.006	**4**
0.002	**3**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**0.050**
D_{15} (mm)	**0.081**
D_{30} (mm)	**0.176**
D_{50} (mm)	**0.338**
D_{60} (mm)	**0.465**
D_{85} (mm)	**0.949**
D_{90} (mm)	**1.087**
C_U	**9.3**
C_C	**1.3**

Soil Description:

Brown slightly gravelly slightly clayey silty SAND

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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Compiled By	Date
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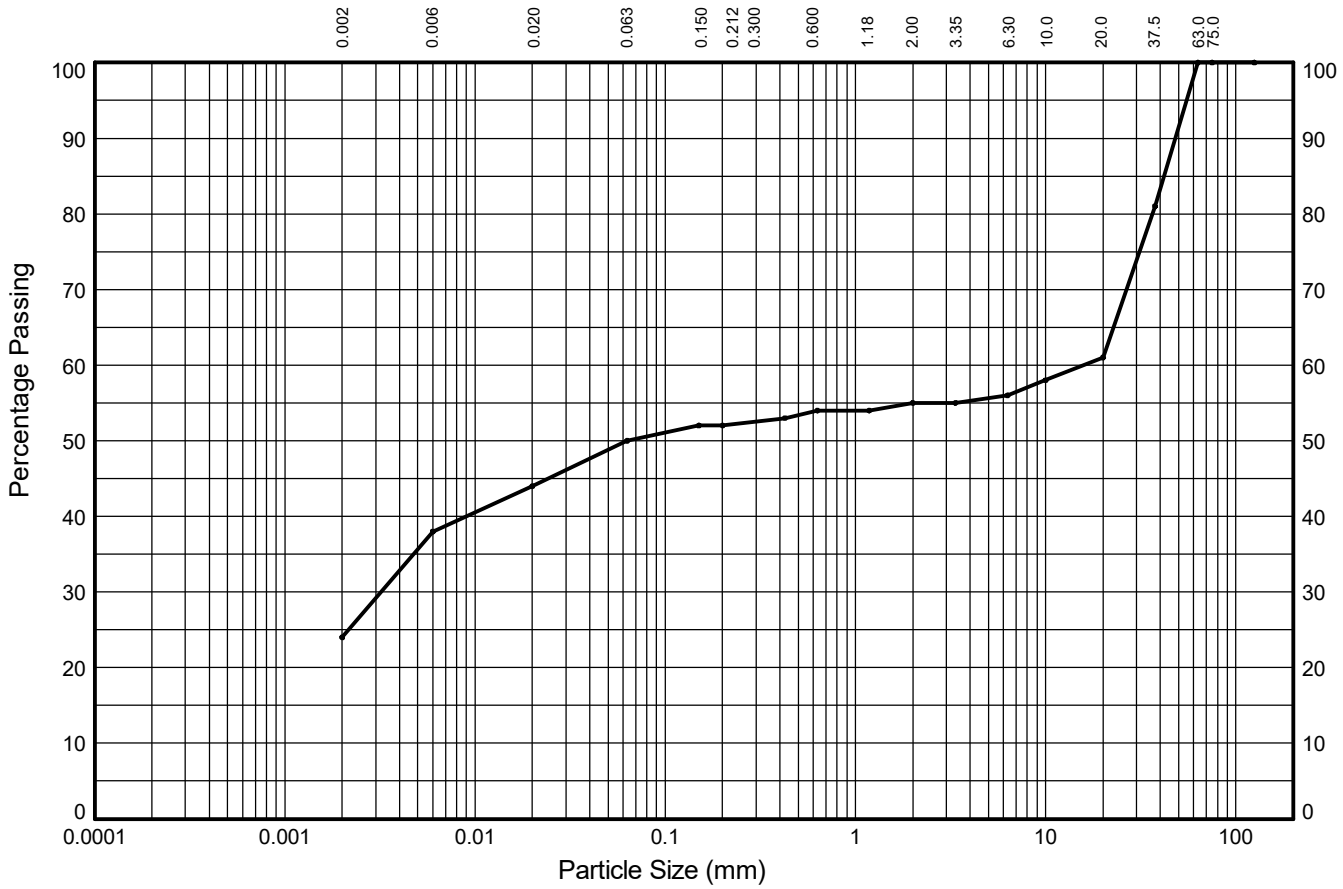
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.4 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-BH027** Sample Ref: **5** Sample Type: **C** Depth (m): **27.50**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	14%	6%	6%	2%	2%	1%	1%	5%	39%	
	SILT			SAND			GRAVEL			
24%	26%			5%			45%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**81**
20.0	**61**
10.0	**58**
6.30	**56**
3.35	**55**
2.00	**55**
1.18	**54**
0.630	**54**
0.425	**53**
0.200	**52**
0.150	**52**
0.063	**50**

Particle Diameter (mm)	Percent Passing (%)
0.02	**44**
0.006	**38**
0.002	**24**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**NA**
D_{30} (mm)	**0.003**
D_{50} (mm)	**0.063**
D_{60} (mm)	**15.874**
D_{85} (mm)	**41.828**
D_{90} (mm)	**47.946**
C_U	**NA**
C_C	**NA**

Soil Description:

Brown slightly sandy gravelly clayey SILT

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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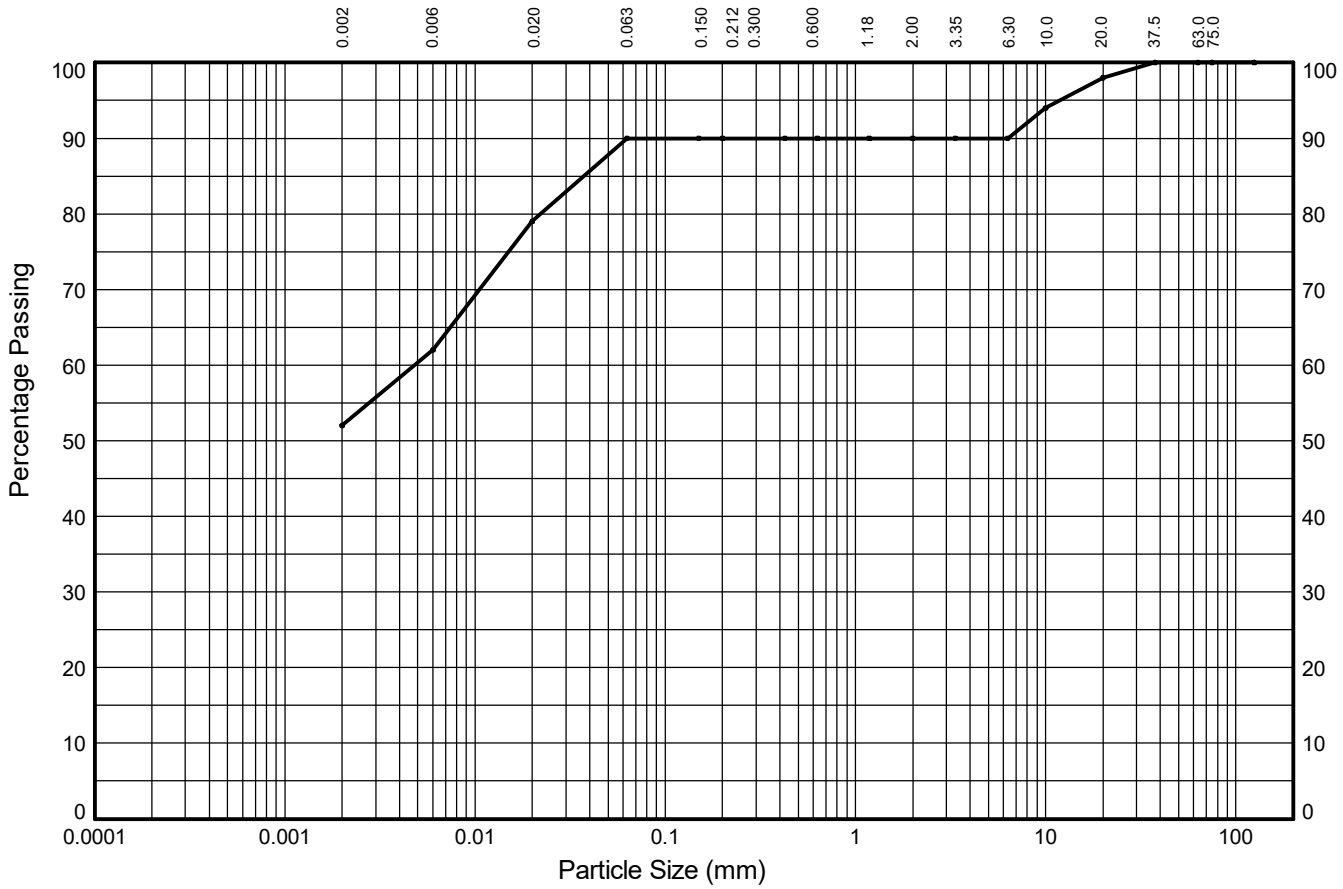
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.4 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-BH028** Sample Ref: **2** Sample Type: **C** Depth (m): **3.50**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	10%	17%	11%	0%	0%	0%	0%	8%	2%	
	SILT			SAND			GRAVEL			
52%	38%			0%			10%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**100**
20.0	**98**
10.0	**94**
6.30	**90**
3.35	**90**
2.00	**90**
1.18	**90**
0.630	**90**
0.425	**90**
0.200	**90**
0.150	**90**
0.063	**90**

Particle Diameter (mm)	Percent Passing (%)
0.02	**79**
0.006	**62**
0.002	**52**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**NA**
D_{30} (mm)	**NA**
D_{50} (mm)	**NA**
D_{60} (mm)	**0.005**
D_{85} (mm)	**0.037**
D_{90} (mm)	**0.063**
C_U	**NA**
C_C	**NA**

Soil Description:

Brown slightly gravelly silty CLAY

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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Pottery Street
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Compiled By	Date
LORNA WHITWORTH	03/02/23

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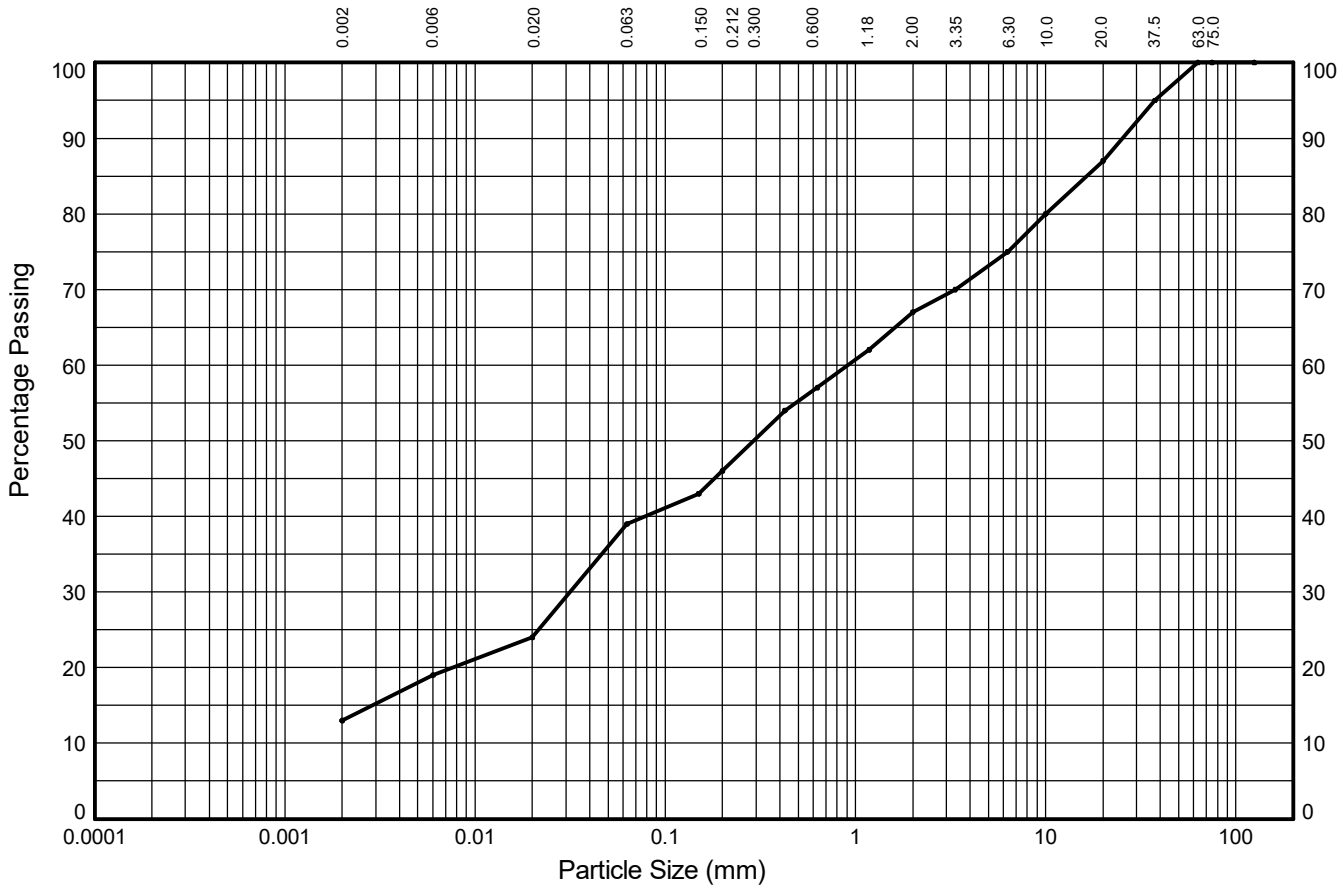
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 5.2, 5.4 of BS EN ISO 17892:Part 4:2016

Position ID: **BPT-BH028** Sample Ref: **6** Sample Type: **C** Depth (m): **15.50**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	6%	5%	15%	7%	11%	10%	8%	12%	13%	
	SILT			SAND			GRAVEL			
13%	26%			28%			33%			0%

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**100**
63.0	**100**
37.5	**95**
20.0	**87**
10.0	**80**
6.30	**75**
3.35	**70**
2.00	**67**
1.18	**62**
0.630	**57**
0.425	**54**
0.200	**46**
0.150	**43**
0.063	**39**

Particle Diameter (mm)	Percent Passing (%)
0.02	**24**
0.006	**19**
0.002	**13**

Sedimentation sample was not pre-treated

Coefficients	
D_{10} (mm)	**NA**
D_{15} (mm)	**0.003**
D_{30} (mm)	**0.032**
D_{50} (mm)	**0.292**
D_{60} (mm)	**0.918**
D_{85} (mm)	**16.407**
D_{90} (mm)	**25.317**
C_U	**NA**
C_C	**NA**

Soil Description:

Brown slightly sandy slightly gravelly clayey SILT

Key: C_U = Uniformity coefficient. C_C = Coefficient of curvature as defined in BS EN ISO 14688-2:2018

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envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

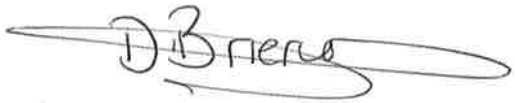
FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 22/11888
Issue Number: 1 **Date:** 09 December, 2022

Client:
Structural Soils Limited (Castleford Lab)
The Potteries
Pottery Street
Castleford
West Yorkshire
UK
WF10 1NJ

Project Manager: Jessica Robertson/Luke Fisher; Laura Schramm
Project Name: 2021OY102:WSP2-BPT Section
Project Ref: 785325
Order No: N/A
Date Samples Received: 02/12/22
Date Instructions Received: 05/12/22
Date Analysis Completed: 09/12/22

Approved by:



Danielle Brierley
Deputy Client Services Supervisor

Envirolab Job Number: 22/11888

Client Project Name: 2021OY102:WSP2-BPT Section

Client Project Ref: 785325

Lab Sample ID	22/11888/1	22/11888/2						Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	BPT-BH011	BPT-BH018								
Depth to Top	2.00	13.00								
Depth To Bottom	3.60	14.50								
Date Sampled										
Sample Type	Soil	Soil								
Sample Matrix Code	4A	4A								
% Stones >10mm$_A$	<0.1	<0.1						% w/w	0.1	A-T-044
pH BRE$_D$$^{M\#}$	8.89	8.95						pH	0.01	A-T-031s
Sulphate BRE (water sol 2:1)$_D$$^{M\#}$	<10	<10						mg/l	10	A-T-026s
Sulphate BRE (acid sol)$_D$$^{M\#}$	<0.02	-						% w/w	0.02	A-T-028s
Sulphur BRE (total)$_D$	<0.01	-						% w/w	0.01	A-T-024s

REPORT NOTES

General

This report shall not be reproduced, except in full, without written approval from Envirolab.
The results reported herein relate only to the material supplied to the laboratory.
The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample, 9 = INCINERATOR ASH.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.
Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,
E = contains roots/twigs.

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve
Subscript "^" indicates analysis has dependant options against results. Testing dependant on results appear in the comments area of your sample receipt.
EPH CWG results have humics mathematically subtracted through instrument calculation
TPH results "with Cleanup" indicates results cleaned up with Silica during extraction

EPH CWG GCxGC ID from TPH CWG

Where we have identified humic substances in any ID's from TPH CWG with Clean Up please note that the concentration of these humic substances is not included in the quantified results and are included in the ID for information.

Please contact us if you need any further information.

v2

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: Structural Soils Limited (Castleford Lab), The Potteries, Pottery Street, Castleford, West Yorkshire, UK, WF10 1NJ

Project: 2021OY102:WSP2-BPT Section

Clients Project No: 785325

Project No: 22/11888

Date Received: 05/12/2022 (am)

Cool Box Temperatures (°C): 9.9

Lab Sample ID	22/11888/1	22/11888/2
Client Sample No		
Client Sample ID/Depth	BPT-BH011 2.00-3.60m	BPT-BH018 13.00-14.50m
Date Sampled		
Deviation Code		
E (no date)	✓	✓

Key
E (no date) *No sampling date provided (all results affected if not provided)*

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	22/11888/1	22/11888/2
Client Sample No		
Client Sample ID/Depth	BPT-BH011 2.00-3.60m	BPT-BH018 13.00-14.50m
Date Sampled		
A-T-024s	08/12/2022	
A-T-026s	08/12/2022	08/12/2022
A-T-028s	09/12/2022	
A-T-031s	08/12/2022	08/12/2022
A-T-044	08/12/2022	08/12/2022

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

End of Report

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 22/12071
Issue Number: 1 **Date:** 15 December, 2022

Client:
Structural Soils Limited (Castleford Lab)
The Potteries
Pottery Street
Castleford
West Yorkshire
UK
WF10 1NJ

Project Manager: Jessica Robertson/Luke Fisher; Laura Schramm
Project Name: 2021OY102:WSP2-BPT Section
Project Ref: 785325
Order No: N/A
Date Samples Received: 08/12/22
Date Instructions Received: 09/12/22
Date Analysis Completed: 15/12/22

Approved by:

Gemma Berrisford
Client Manager

mCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME
UKAS TESTING 1247

Envirolab Job Number: 22/12071

Client Project Name: 2021OY102:WSP2-BPT Section

Client Project Ref: 785325

Lab Sample ID	22/12071/1	22/12071/2	22/12071/3	22/12071/4	22/12071/5	22/12071/6		Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	BPT-BH022	BPT-BH025	BPT-BH027	BPT-BH028	BPT-BH029	BPT-BH032				
Depth to Top	2.00	3.50	5.00	2.00	0.00	2.60				
Depth To Bottom	3.50	5.00	6.50	3.50	2.00	3.50				
Date Sampled										
Sample Type	Solid	Solid	Soil	Soil	Solid	Solid				
Sample Matrix Code	7	7	4A	4A	7	7				
% Stones >10mm$_A$	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		% w/w	0.1	A-T-044
pH BRE$_D^{M\#}$	9.21	9.27	8.78	8.67	9.40	9.40		pH	0.01	A-T-031s
Sulphate BRE (water sol 2:1)$_D^{M\#}$	<10	<10	<10	<10	<10	<10		mg/l	10	A-T-026s
Sulphate BRE (acid sol)$_D^{M\#}$	-	<0.02	-	-	-	<0.02		% w/w	0.02	A-T-028s
Sulphur BRE (total)$_D$	-	<0.01	-	-	-	0.01		% w/w	0.01	A-T-024s

REPORT NOTES

General

This report shall not be reproduced, except in full, without written approval from Envirolab.
The results reported herein relate only to the material supplied to the laboratory.
The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample, 9 = INCINERATOR ASH.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.
Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,
E = contains roots/twigs.

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve
Subscript "^" indicates analysis has dependant options against results. Testing dependant on results appear in the comments area of your sample receipt.
EPH CWG results have humics mathematically subtracted through instrument calculation
TPH results "with Cleanup" indicates results cleaned up with Silica during extraction

EPH CWG GCxGC ID from TPH CWG

Where we have identified humic substances in any ID's from TPH CWG with Clean Up please note that the concentration of these humic substances is not included in the quantified results and are included in the ID for information.

Please contact us if you need any further information.

v2

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: Structural Soils Limited (Castleford Lab), The Potteries, Pottery Street, Castleford, West Yorkshire, UK, WF10 1NJ

Project: 2021OY102:WSP2-BPT Section

Clients Project No: 785325

Project No: 22/12071

Date Received: 09/12/2022 (am)

Cool Box Temperatures (°C): 6.2

Lab Sample ID	22/12071/1	22/12071/2	22/12071/3	22/12071/4	22/12071/5	22/12071/6
Client Sample No						
Client Sample ID/Depth	BPT-BH022 2.00-3.50m	BPT-BH025 3.50-5.00m	BPT-BH027 5.00-6.50m	BPT-BH028 2.00-3.50m	BPT-BH029 0.00-2.00m	BPT-BH032 2.60-3.50m
Date Sampled						
Deviation Code						
E (no date)	✓	✓	✓	✓	✓	✓

Key
E (no date) *No sampling date provided (all results affected if not provided)*

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	22/12071/1	22/12071/2	22/12071/3	22/12071/4	22/12071/5	22/12071/6
Client Sample No						
Client Sample ID/Depth	BPT-BH022 2.00-3.50m	BPT-BH025 3.50-5.00m	BPT-BH027 5.00-6.50m	BPT-BH028 2.00-3.50m	BPT-BH029 0.00-2.00m	BPT-BH032 2.60-3.50m
Date Sampled						
A-T-024s		14/12/2022				14/12/2022
A-T-026s	14/12/2022	14/12/2022	14/12/2022	14/12/2022	14/12/2022	14/12/2022
A-T-028s		15/12/2022				15/12/2022
A-T-031s	14/12/2022	14/12/2022	14/12/2022	14/12/2022	14/12/2022	14/12/2022
A-T-044	15/12/2022	15/12/2022	15/12/2022	15/12/2022	15/12/2022	15/12/2022

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

End of Report

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 23/00120
Issue Number: 1 **Date:** 16 January, 2023

Client:
Structural Soils Limited (Castleford)
The Potteries
Pottery Street
Castleford
West Yorkshire
UK
WF10 1NJ

Project Manager: Jessica Robertson/Luke Fisher
Project Name: 2021OY102:WSP2-BPT SECTION
Project Ref: 785325
Order No: N/A
Date Samples Received: 09/01/23
Date Instructions Received: 10/01/23
Date Analysis Completed: 16/01/23

Approved by:

Gemma Berrisford
Client Manager

Envirolab Job Number: 23/00120

Client Project Name: 2021OY102:WSP2-BPT SECTION

Client Project Ref: 785325

Lab Sample ID	23/00120/1	23/00120/2						Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	BPT-BH005	BPT-BH024								
Depth to Top	3.50	3.50								
Depth To Bottom	5.00	5.00								
Date Sampled										
Sample Type	Soil - B	Soil - B								
Sample Matrix Code	3A	4A								
% Stones >10mm$_A$	13.2	4.5						% w/w	0.1	A-T-044
pH BRE$_D$$^{M\#}$	8.60	7.99						pH	0.01	A-T-031s
Sulphate BRE (water sol 2:1)$_D$$^{M\#}$	<10	<10						mg/l	10	A-T-026s
Sulphate BRE (acid sol)$_D$$^{M\#}$	<0.20	-						% w/w	0.02	A-T-028s
Sulphur BRE (total)$_D$	<0.01	-						% w/w	0.01	A-T-024s

REPORT NOTES

General

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The results reported herein relate only to the material supplied to the laboratory.
The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample, 9 = INCINERATOR ASH.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.
Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,
E = contains roots/twigs.

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve
Subscript "^" indicates analysis has dependant options against results. Testing dependant on results appear in the comments area of your sample receipt.
EPH CWG results have humics mathematically subtracted through instrument calculation
TPH results "with Cleanup" indicates results cleaned up with Silica during extraction

EPH CWG GCxGC ID from TPH CWG

Where we have identified humic substances in any ID's from TPH CWG with Clean Up please note that the concentration of these humic substances is not included in the quantified results and are included in the ID for information.

Please contact us if you need any further information.

v2

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: Structural Soils Limited (Castleford), The Potteries, Pottery Street, Castleford, West Yorkshire, UK, WF10 1NJ

Project: 2021OY102:WSP2-BPT SECTION

Clients Project No: 785325

Project No: 23/00120

Date Received: 10/01/2023 (am)

Cool Box Temperatures (°C): 6.0

Lab Sample ID	23/00120/1	23/00120/2
Client Sample No		
Client Sample ID/Depth	BPT-BH005 3.50-5.00m	BPT-BH024 3.50-5.00m
Date Sampled		
Deviation Code		
E (no date)	✓	✓

Key
E (no date) *No sampling date provided (all results affected if not provided)*

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	23/00120/1	23/00120/2
Client Sample No		
Client Sample ID/Depth	BPT-BH005 3.50-5.00m	BPT-BH024 3.50-5.00m
Date Sampled		
A-T-024s	16/01/2023	
A-T-026s	12/01/2023	12/01/2023
A-T-028s	13/01/2023	
A-T-031s	13/01/2023	13/01/2023
A-T-044	12/01/2023	12/01/2023

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

End of Report

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 22/11464
Issue Number: 1 **Date:** 30 November, 2022

Client:
Structural Soils Limited (Castleford Lab)
The Potteries
Pottery Street
Castleford
West Yorkshire
UK
WF10 1NJ

Project Manager: Castleford Lab/Jessica Robertson/Luke Fisher; Laur
Project Name: 2021OY102:WSP2-BPT section
Project Ref: 785325
Order No: N/A
Date Samples Received: 21/11/22
Date Instructions Received: 22/11/22
Date Analysis Completed: 30/11/22

Approved by:

Gemma Berrisford
Client Manager

mCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME
UKAS TESTING 1247

Envirolab Job Number: 22/11464

Client Project Name: 2021OY102:WSP2-BPT section

Client Project Ref: 785325

Lab Sample ID	22/11464/1	22/11464/2	22/11464/3	22/11464/4	22/11464/5	22/11464/6	22/11464/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	BPT-BH-001	BPT-BH-004	BPT-BH-004	BPT-BH-005	BPT-BH-007	BPT-BH-007	BPT-BH-008			
Depth to Top	0.00	0.00	6.50	2.50	0.60	15.00	5.10			
Depth To Bottom	2.00	2.00	8.00	3.20	2.10	16.60	6.60			
Date Sampled		18-May-22	18-May-22	17-Jun-22			20-Jun-22			
Sample Type	Solid	Soil - B	Soil - B	Solid	Solid	Solid	Soil - B			
Sample Matrix Code	7	6A	4A	7	7	7	6			
% Stones >10mm$_A$	<0.1	9.8	<0.1	<0.1	<0.1	<0.1	<0.1	% w/w	0.1	A-T-044
pH BRE$_D^{M\#}$	10.98	8.78	9.17	9.32	9.58	9.19	9.11	pH	0.01	A-T-031s
Sulphate BRE (water sol 2:1)$_D^{M\#}$	<10	<10	<10	<10	<10	<10	<10	mg/l	10	A-T-026s
Sulphate BRE (acid sol)$_D^{M\#}$	<0.02	-	<0.02	-	<0.02	<0.02	<0.02	% w/w	0.02	A-T-028s
Sulphur BRE (total)$_D$	0.01	-	<0.01	-	<0.01	<0.01	<0.01	% w/w	0.01	A-T-024s

Envirolab Job Number: 22/11464

Client Project Name: 2021OY102:WSP2-BPT section

Client Project Ref: 785325

Lab Sample ID	22/11464/8	22/11464/9	22/11464/10	22/11464/11	22/11464/12	22/11464/13	22/11464/14	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	BPT-BH-010	BPT-BH-012	BPT-BH-013	BPT-BH-014	BPT-BH-016	BPT-BH-018	BPT-BH-020			
Depth to Top	1.10	0.00	0.00	2.10	0.00	3.50	3.50			
Depth To Bottom	2.30	1.50	1.10	3.70	2.00	5.00	5.00			
Date Sampled	23-May-22	27-Jun-22	28-Jun-22	29-Jun-22	11-Jul-22	12-Oct-22				
Sample Type	Solid	Solid	Solid	Solid	Soil - B	Soil - B	Soil - B			
Sample Matrix Code	7	7	7	7	4AE	4A	6A			
% Stones >10mm$_A$	<0.1	<0.1	<0.1	<0.1	8.4	<0.1	13.3	% w/w	0.1	A-T-044
pH BRE$_D^{M\#}$	9.41	9.27	9.59	9.59	6.24	8.54	8.81	pH	0.01	A-T-031s
Sulphate BRE (water sol 2:1)$_D^{M\#}$	<10	<10	<10	<10	<10	<10	<10	mg/l	10	A-T-026s
Sulphate BRE (acid sol)$_D^{M\#}$	<0.02	-	-	-	-	-	-	% w/w	0.02	A-T-028s
Sulphur BRE (total)$_D$	<0.01	-	-	-	-	-	-	% w/w	0.01	A-T-024s

Envirolab Job Number: 22/11464

Client Project Name: 2021OY102:WSP2-BPT section

Client Project Ref: 785325

Lab Sample ID	22/11464/15		22/11464/19			Units	Limit of Detection	Method ref
Client Sample No								
Client Sample ID	BPT-BH-021		BPT-BH-003					
Depth to Top	5.00		3.60					
Depth To Bottom	6.60		5.10					
Date Sampled	05-Oct-22		11-Oct-22					
Sample Type	Solid		Solid					
Sample Matrix Code	7		7					
% Stones >10mm$_A$	<0.1		<0.1			% w/w	0.1	A-T-044
pH BRE$_D$$^{M\#}$	9.34		9.58			pH	0.01	A-T-031s
Sulphate BRE (water sol 2:1)$_D$$^{M\#}$	<10		10			mg/l	10	A-T-026s
Sulphate BRE (acid sol)$_D$$^{M\#}$	-		<0.02			% w/w	0.02	A-T-028s
Sulphur BRE (total)$_D$	-		0.01			% w/w	0.01	A-T-024s

REPORT NOTES

General

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A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample, 9 = INCINERATOR ASH.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.
Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,
E = contains roots/twigs.

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve
Subscript "^" indicates analysis has dependant options against results. Testing dependant on results appear in the comments area of your sample receipt.
EPH CWG results have humics mathematically subtracted through instrument calculation
TPH results "with Cleanup" indicates results cleaned up with Silica during extraction

EPH CWG GCxGC ID from TPH CWG

Where we have identified humic substances in any ID's from TPH CWG with Clean Up please note that the concentration of these humic substances is not included in the quantified results and are included in the ID for information.

Please contact us if you need any further information.

v2

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: Structural Soils Limited (Castleford Lab), The Potteries, Pottery Street, Castleford, West Yorkshire, UK, WF10 1NJ

Project: 2021OY102:WSP2-BPT section

Clients Project No: 785325

Project No: 22/11464

Date Received: 22/11/2022 (am)

Cool Box Temperatures (°C): 7.9 & 8.1

Lab Sample ID	22/11464/1	22/11464/2	22/11464/3	22/11464/4	22/11464/5	22/11464/6	22/11464/7	22/11464/8	22/11464/9	22/11464/10	22/11464/11
Client Sample No											
Client Sample ID/Depth	BPT-BH-001 0.00-2.00m	BPT-BH-004 0.00-2.00m	BPT-BH-004 6.50-8.00m	BPT-BH-005 2.50-3.20m	BPT-BH-007 0.60-2.10m	BPT-BH-007 15.00-16.60m	BPT-BH-008 5.10-6.60m	BPT-BH-010 1.10-2.30m	BPT-BH-012 0.00-1.50m	BPT-BH-013 0.00-1.10m	BPT-BH-014 2.10-3.70m
Date Sampled		18/05/22	18/05/22	17/06/22			20/06/22	23/05/22	27/06/22	28/06/22	29/06/22
Deviation Code											
E (no date)	✓				✓	✓					
F		✓	✓	✓			✓	✓	✓	✓	✓

Lab Sample ID	22/11464/12	22/11464/13	22/11464/14	22/11464/15	22/11464/16	22/11464/17	22/11464/18	22/11464/19
Client Sample No								
Client Sample ID/Depth	BPT-BH-016 0.00-2.00m	BPT-BH-018 3.50-5.00m	BPT-BH-020 3.50-5.00m	BPT-BH-021 5.00-6.60m	BH36789 9.50-11.00m	BH36789 18.60-20.00m	BH36789 15.70-17.10m	BPT-BH-003 3.60-5.10m
Date Sampled	11/07/22	12/10/22		05/10/22	11/10/22		11/10/22	11/10/22
Deviation Code								
E (no date)			✓			✓		
F	✓	✓		✓	✓		✓	✓

Key

E (no date) *No sampling date provided (all results affected if not provided)*

F *Maximum holding time exceeded between sampling date and analysis for analytes listed below*

HOLDING TIME EXCEEDANCES

Lab Sample ID	22/11464/2	22/11464/3	22/11464/4	22/11464/7	22/11464/8	22/11464/9	22/11464/10	22/11464/11	22/11464/12	22/11464/13	22/11464/15
Client Sample No											
Client Sample ID/Depth	BPT-BH-004 0.00-2.00m	BPT-BH-004 6.50-8.00m	BPT-BH-005 2.50-3.20m	BPT-BH-008 5.10-6.60m	BPT-BH-010 1.10-2.30m	BPT-BH-012 0.00-1.50m	BPT-BH-013 0.00-1.10m	BPT-BH-014 2.10-3.70m	BPT-BH-016 0.00-2.00m	BPT-BH-018 3.50-5.00m	BPT-BH-021 5.00-6.60m
Date Sampled	18/05/22	18/05/22	17/06/22	20/06/22	23/05/22	27/06/22	28/06/22	29/06/22	11/07/22	12/10/22	05/10/22
pH BRE	✓	✓			✓						

Lab Sample ID	22/11464/2	22/11464/3	22/11464/4	22/11464/7	22/11464/8	22/11464/9	22/11464/10	22/11464/11	22/11464/12	22/11464/13	22/11464/15
Client Sample No											
Client Sample ID/Depth	BPT-BH-004 0.00-2.00m	BPT-BH-004 6.50-8.00m	BPT-BH-005 2.50-3.20m	BPT-BH-008 5.10-6.60m	BPT-BH-010 1.10-2.30m	BPT-BH-012 0.00-1.50m	BPT-BH-013 0.00-1.10m	BPT-BH-014 2.10-3.70m	BPT-BH-016 0.00-2.00m	BPT-BH-018 3.50-5.00m	BPT-BH-021 5.00-6.60m
Date Sampled	18/05/22	18/05/22	17/06/22	20/06/22	23/05/22	27/06/22	28/06/22	29/06/22	11/07/22	12/10/22	05/10/22
Sulphate BRE (water sol 2:1)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sulphate BRE (acid sol)		✓		✓	✓						
Sulphur BRE (total)		✓			✓						

Lab Sample ID	22/11464/16	22/11464/18	22/11464/19
Client Sample No			
Client Sample ID/Depth	BH36789 9.50-11.00m	BH36789 15.70-17.10m	BPT-BH-003 3.60-5.10m
Date Sampled	11/10/22	11/10/22	11/10/22
pH BRE			
Sulphate BRE (water sol 2:1)	✓	✓	✓
Sulphate BRE (acid sol)			✓
Sulphur BRE (total)			

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	22/11464/1	22/11464/2	22/11464/3	22/11464/4	22/11464/5	22/11464/6	22/11464/7	22/11464/8	22/11464/9	22/11464/10	22/11464/11
Client Sample No											
Client Sample ID/Depth	BPT-BH-001 0.00-2.00m	BPT-BH-004 0.00-2.00m	BPT-BH-004 6.50-8.00m	BPT-BH-005 2.50-3.20m	BPT-BH-007 0.60-2.10m	BPT-BH-007 15.00-16.60m	BPT-BH-008 5.10-6.60m	BPT-BH-010 1.10-2.30m	BPT-BH-012 0.00-1.50m	BPT-BH-013 0.00-1.10m	BPT-BH-014 2.10-3.70m
Date Sampled		18/05/22	18/05/22	17/06/22			20/06/22	23/05/22	27/06/22	28/06/22	29/06/22
A-T-024s	28/11/2022		28/11/2022		28/11/2022	28/11/2022	30/11/2022	28/11/2022			
A-T-026s	28/11/2022	28/11/2022	28/11/2022	28/11/2022	28/11/2022	28/11/2022	28/11/2022	28/11/2022	28/11/2022	28/11/2022	28/11/2022
A-T-028s	29/11/2022		29/11/2022		29/11/2022	29/11/2022	29/11/2022	29/11/2022			
A-T-031s	29/11/2022	29/11/2022	29/11/2022	29/11/2022	29/11/2022	29/11/2022	29/11/2022	29/11/2022	29/11/2022	29/11/2022	29/11/2022
A-T-044	25/11/2022	25/11/2022	25/11/2022	25/11/2022	25/11/2022	25/11/2022	25/11/2022	25/11/2022	25/11/2022	25/11/2022	25/11/2022

Lab Sample ID	22/11464/12	22/11464/13	22/11464/14	22/11464/15	22/11464/16	22/11464/17	22/11464/18	22/11464/19
Client Sample No								
Client Sample ID/Depth	BPT-BH-016 0.00-2.00m	BPT-BH-018 3.50-5.00m	BPT-BH-020 3.50-5.00m	BPT-BH-021 5.00-6.60m	BH36789 9.50-11.00m	BH36789 18.60-20.00m	BH36789 15.70-17.10m	BPT-BH-003 3.60-5.10m
Date Sampled	11/07/22	12/10/22		05/10/22	11/10/22		11/10/22	11/10/22
A-T-024s						29/11/2022		30/11/2022
A-T-026s	28/11/2022	28/11/2022	28/11/2022	28/11/2022	28/11/2022	28/11/2022	28/11/2022	29/11/2022
A-T-028s						30/11/2022		30/11/2022
A-T-031s	29/11/2022	29/11/2022	29/11/2022	29/11/2022	29/11/2022	29/11/2022	29/11/2022	29/11/2022
A-T-044	25/11/2022	25/11/2022	25/11/2022	25/11/2022	25/11/2022	25/11/2022	25/11/2022	28/11/2022

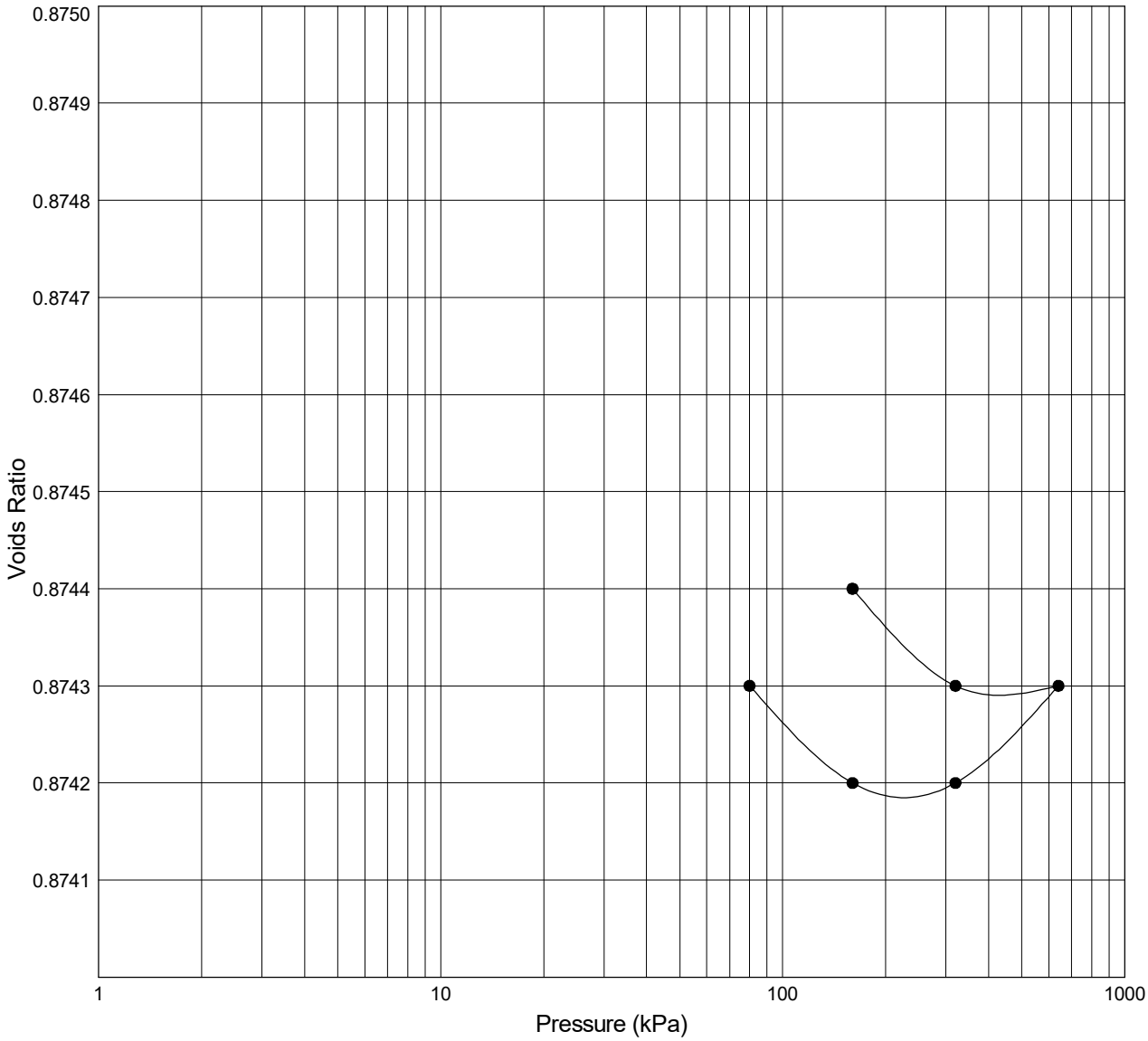
The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

End of Report

ONE DIMENSIONAL CONSOLIDATION TEST

In accordance with BS1377:Part 5:1990

Position ID: **BPT-BH024** Sample Ref: **4** Sample Type: **C** Depth (m): **8.00**



Initial Specimen Condition			Final Specimen Condition		
Moisture Content (%)	:	**36**	Moisture Content (%)	:	**35**
Bulk Density (Mg/m^3)	:	**1.93**	Bulk Density (Mg/m^3)	:	**1.90**
Dry Density (Mg/m^3)	:	**1.41**	Dry Density (Mg/m^3)	:	**1.41**
Void Ratio	:	**0.8745**	Void Ratio	:	**0.8743**

Specimen Details			
Description	Height (mm)	:	**19.40**
	Diameter (mm)	:	**75.06**
Brown	Particle Density (Mg/m^3) (assumed)	:	**2.65**
	Swelling Pressure (kPa)	:	**NA**

Test Results			
Pressure Range (kPa)	Mv (m^2/MN)	Cv (m^2/yr)	Voids Ratio
0 - 160	**0.000**	**28**	**0.8744**
160 - 320	**0.000**	**0.57**	**0.8743**
320 - 640	**0.000**	**0.90**	**0.8743**
1280 - 320	**0.000**	**0.71**	**0.8742**
320 - 160	**0.000**	**0.71**	**0.8742**
160 - 80	**0.000**	**0.71**	**0.8743**

Notes: Method of time-setting used (min): **T90.**

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By	Date
LORNA WHITWORTH	**31/03/23**

Contract	Contract Ref:
2021OY102 WSP Eastern & Midlands Region - Lot 2	**785325**

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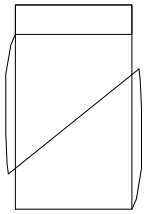
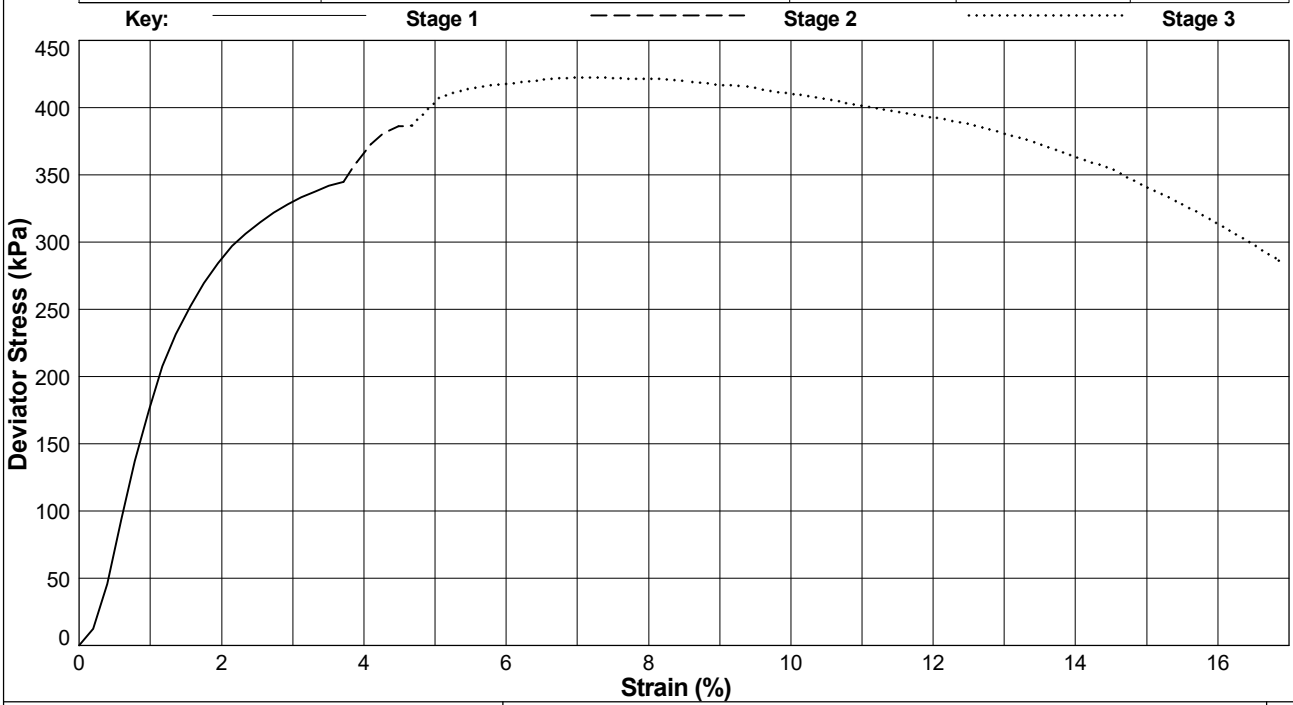
UNCONSOLIDATED UNDRAINED (QUICK) TRIAXIAL COMPRESSION TEST

In accordance with BS EN ISO 17892 Part 8

Position ID: **BPT-BH008** Sample Ref: Sample Type: **C** Depth (m): **21.92**

Description : **Brown CLAY**

STAGE/SPECIMEN NUMBER			1	2	3
SPECIMEN DETAILS	Sample Condition		**Undisturbed**		
	Orientation of sample		**Vertical**		
	Diameter	(mm)	**102.11**		
	Height	(mm)	**199.78**		
	Water Content	(%)	**37.3**		
	Bulk Density	(Mg/m^3)	**1.97**		
	Dry Density	(Mg/m^3)	**1.44**		
	Void Ratio		**0.8447**		
TEST DETAILS	Membrane Type		**Rubber**	**Rubber**	**Rubber**
	Membrane Thickness	(mm)	**0.58**	**0.58**	**0.58**
	Rate of Axial Displacement	(%/min)	**1.00**	**1.00**	**1.00**
	Cell Pressure	(kPa)	**200**	**400**	**600**
	Membrane Correction	(kPa)	**0.58**	**0.72**	**0.99**
	Corrected Deviator Stress	(kPa)	**345**	**386**	**422**
	Undrained Shear Strength	(kPa)	**172**	**193**	**211**
FAILURE DETAILS	Strain at Failure	(%)	**3.7**	**4.7**	**7.0**
	Mode of Failure **Brittle (shear plane)**				



STRUCTURAL SOILS
1a Princess Street
Bedminster
Bristol
BS3 4AG

Compiled By		Date
Francesca Bennett	**FRANCESCA BENNETT**	**01/03/23**

Contract	Contract Ref:
2021OY102 WSP Eastern & Midlands Region - Lot 2	**785325**

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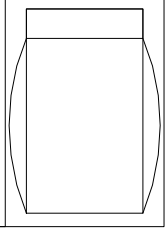
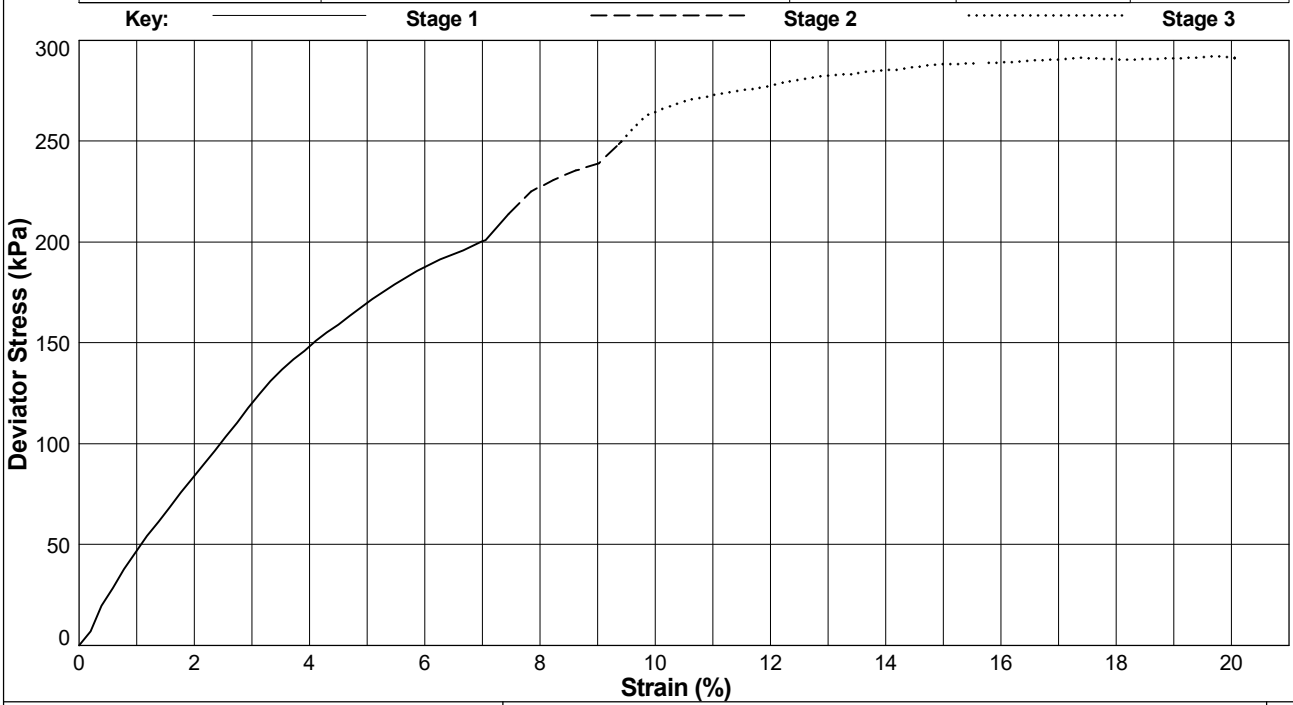
UNCONSOLIDATED UNDRAINED (QUICK) TRIAXIAL COMPRESSION TEST

In accordance with BS EN ISO 17892 Part 8

Position ID: **BPT-BH020** Sample Ref: **5** Sample Type: **C** Depth (m): **17.69**

Description : **Brown slightly gravelly slightly silty CLAY**

STAGE/SPECIMEN NUMBER			1	2	3
SPECIMEN DETAILS	Sample Condition		**Undisturbed**		
	Orientation of sample		**Vertical**		
	Diameter	(mm)	**101.59**		
	Height	(mm)	**199.19**		
	Water Content	(%)	**31.0**		
	Bulk Density	(Mg/m^3)	**2.02**		
	Dry Density	(Mg/m^3)	**1.54**		
	Void Ratio		**0.7214**		
TEST DETAILS	Membrane Type		**Rubber**	**Rubber**	**Rubber**
	Membrane Thickness	(mm)	**0.58**	**0.58**	**0.58**
	Rate of Axial Displacement	(%/min)	**1.00**	**1.00**	**1.00**
	Cell Pressure	(kPa)	**150**	**300**	**600**
	Membrane Correction	(kPa)	**1.04**	**1.25**	**1.75**
	Corrected Deviator Stress	(kPa)	**214**	**250**	**288**
	Undrained Shear Strength	(kPa)	**107**	**125**	**144**
FAILURE DETAILS	Strain at Failure	(%)	**7.4**	**9.4**	**15.0**
	Mode of Failure **Plastic (Barrelling)**				



STRUCTURAL SOILS
1a Princess Street
Bedminster
Bristol
BS3 4AG

Compiled By		Date
Francesca Bennett	**FRANCESCA BENNETT**	**01/03/23**

Contract	Contract Ref:
2021OY102 WSP Eastern & Midlands Region - Lot 2	**785325**

GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Graph L - TRIAXIAL - BS - A4P | 785325 - 2021OY102WSP2-BPT SECTION.GPJ - v10_01.
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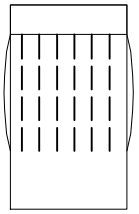
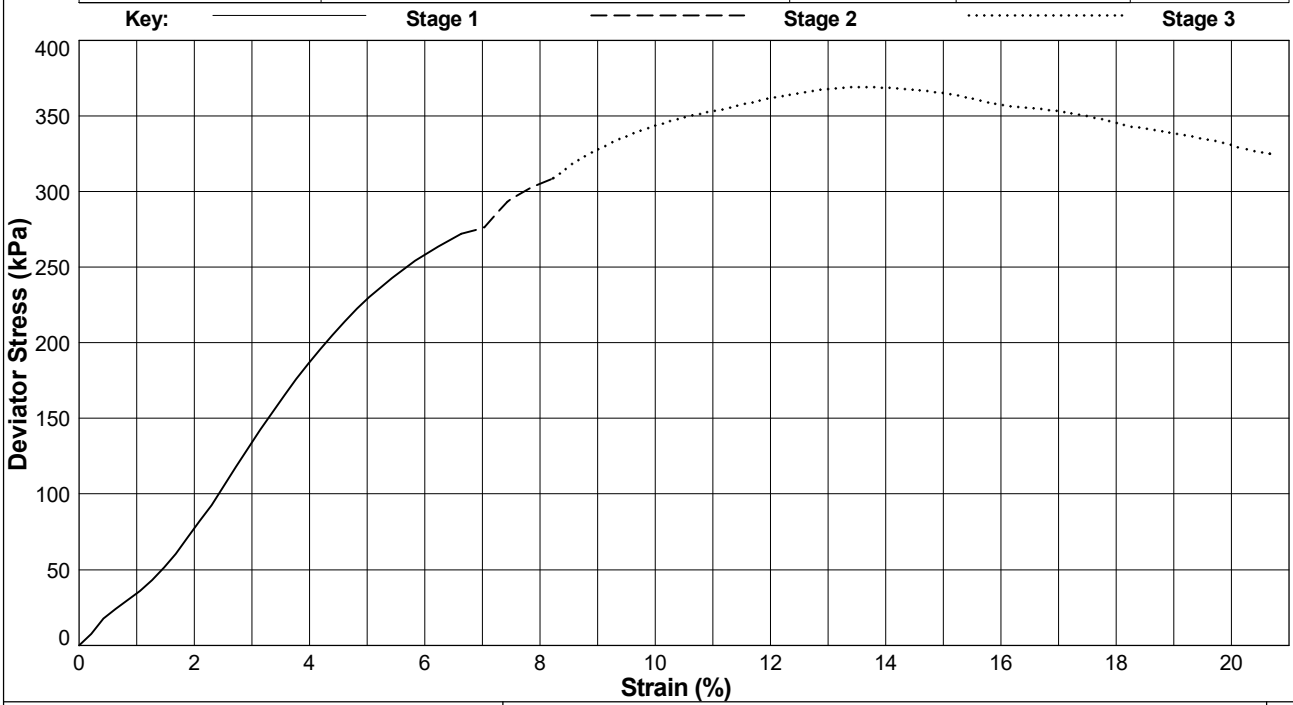
UNCONSOLIDATED UNDRAINED (QUICK) TRIAXIAL COMPRESSION TEST

In accordance with BS EN ISO 17892 Part 8

Position ID: **BPT-BH024** Sample Ref: Sample Type: **C** Depth (m): **8.02**

Description : **Light brown silty CLAY**

STAGE/SPECIMEN NUMBER			1	2	3
SPECIMEN DETAILS	Sample Condition		**Undisturbed**		
	Orientation of sample		**Vertical**		
	Diameter	(mm)	**103.43**		
	Height	(mm)	**206.78**		
	Water Content	(%)	**33.9**		
	Bulk Density	(Mg/m^3)	**2.00**		
	Dry Density	(Mg/m^3)	**1.49**		
	Void Ratio		**0.7734**		
TEST DETAILS	Membrane Type		**Rubber**	**Rubber**	**Rubber**
	Membrane Thickness	(mm)	**0.42**	**0.42**	**0.42**
	Rate of Axial Displacement	(%/min)	**0.97**	**0.97**	**0.97**
	Cell Pressure	(kPa)	**80**	**160**	**320**
	Membrane Correction	(kPa)	**0.68**	**0.80**	**1.17**
	Corrected Deviator Stress	(kPa)	**272**	**309**	**369**
	Undrained Shear Strength	(kPa)	**136**	**155**	**185**
FAILURE DETAILS	Strain at Failure	(%)	**6.6**	**8.2**	**13.8**
	Mode of Failure **Semi-plastic (axial splitting with bulging)**				



STRUCTURAL SOILS
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Bedminster
Bristol
BS3 4AG

Compiled By		Date
Daria Ignaczak	DARIA IGNACZAK	31/03/23

Contract	Contract Ref:
2021OY102 WSP Eastern & Midlands Region - Lot 2	**785325**

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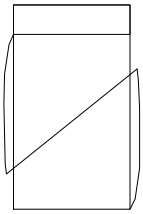
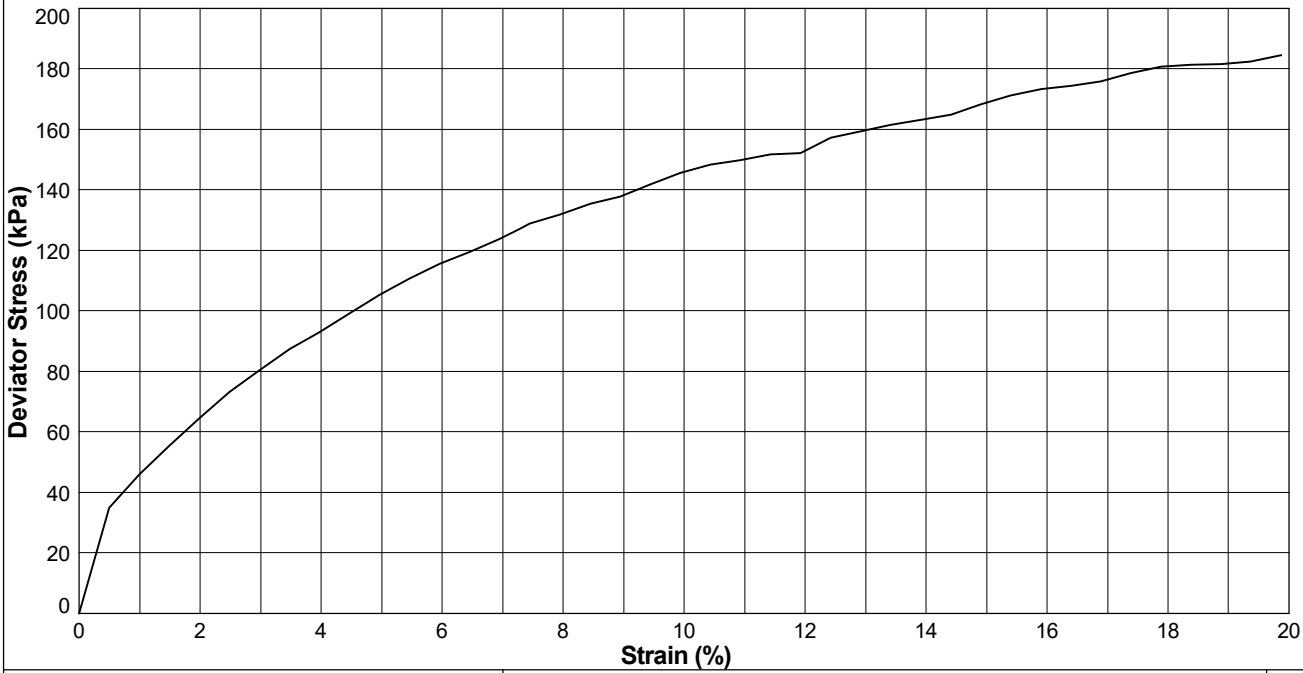
UNCONSOLIDATED UNDRAINED (QUICK) TRIAXIAL COMPRESSION TEST

In accordance with BS EN ISO 17892 Part 8

Position ID: **BPT-BH028** Sample Ref: **4** Sample Type: **C** Depth (m): **9.50**

Description : **Brown slightly gravelly slightly sandy clayey SILT**

STAGE/SPECIMEN NUMBER			1	2	3
SPECIMEN DETAILS	Sample Condition		**Undisturbed**		
	Orientation of sample		**Vertical**		
	Diameter	(mm)	**100.69**		
	Height	(mm)	**201.30**		
	Water Content	(%)	**47.2**		
	Bulk Density	(Mg/m^3)	**1.95**		
	Dry Density	(Mg/m^3)	**1.33**		
	Void Ratio		**0.9976**		
TEST DETAILS	Membrane Type		**Rubber**		
	Membrane Thickness	(mm)	**0.50**		
	Rate of Axial Displacement	(%/min)	**2.00**		
	Cell Pressure	(kPa)	**200**		
	Membrane Correction	(kPa)	**1.52**		
	Corrected Deviator Stress	(kPa)	**169**		
	Undrained Shear Strength	(kPa)	**84**		
FAILURE DETAILS	Strain at Failure	(%)	**15.0**		
	Mode of Failure 1 : **Brittle (shear plane)**				



STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By	Date
LORNA WHITWORTH	03/02/23

Contract	Contract Ref:
2021OY102WSP2-BPT section	**785325**

AGS

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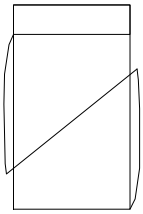
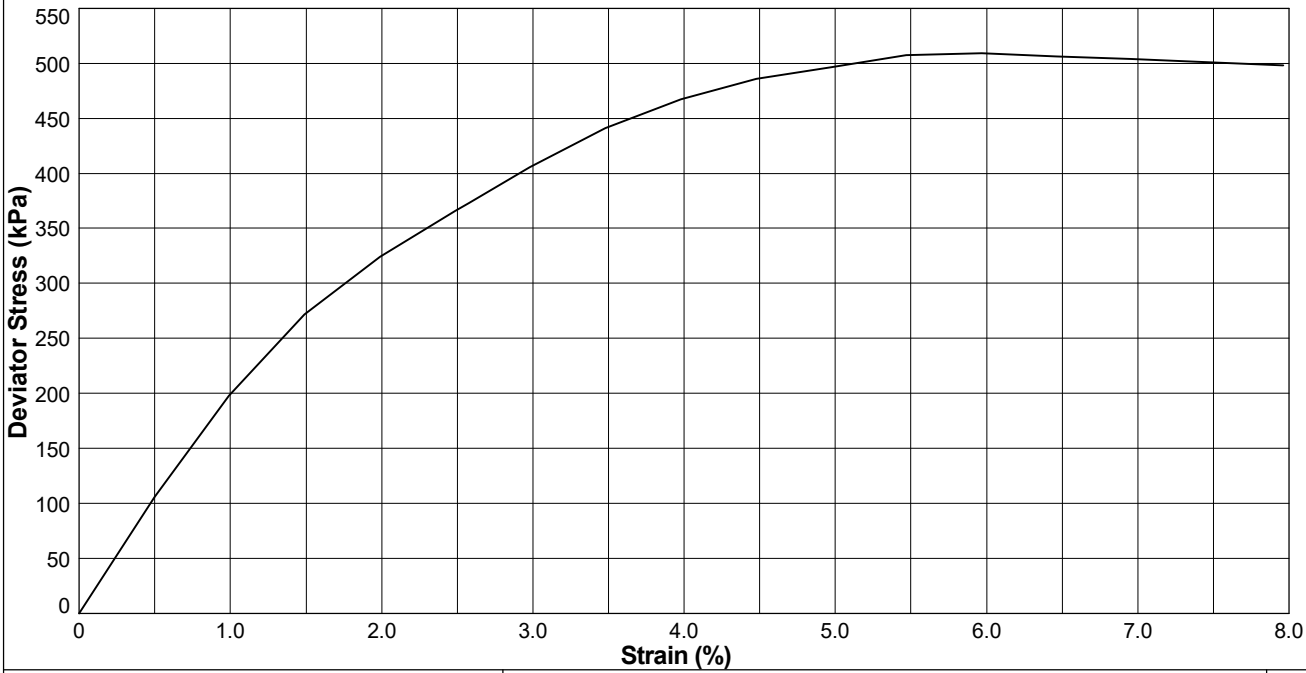
UNCONSOLIDATED UNDRAINED (QUICK) TRIAXIAL COMPRESSION TEST

In accordance with BS EN ISO 17892 Part 8

Position ID: **BPT-BH028** Sample Ref: **5** Sample Type: **C** Depth (m): **11.00**

Description : **Brown slightly gravelly slightly sandy clayey SILT**

STAGE/SPECIMEN NUMBER			1	2	3
SPECIMEN DETAILS	Sample Condition		**Undisturbed**		
	Orientation of sample		**Vertical**		
	Diameter	(mm)	**101.60**		
	Height	(mm)	**201.11**		
	Water Content	(%)	**32.5**		
	Bulk Density	(Mg/m^3)	**2.11**		
	Dry Density	(Mg/m^3)	**1.59**		
	Void Ratio		**0.6632**		
TEST DETAILS	Membrane Type		**Rubber**		
	Membrane Thickness	(mm)	**0.50**		
	Rate of Axial Displacement	(%/min)	**2.00**		
	Cell Pressure	(kPa)	**250**		
	Membrane Correction	(kPa)	**0.76**		
	Corrected Deviator Stress	(kPa)	**509**		
	Undrained Shear Strength	(kPa)	**255**		
FAILURE DETAILS	Strain at Failure	(%)	**6.0**		
	Mode of Failure 1 : **Brittle (shear plane)**				



STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By	Date
LORNA WHITWORTH	**03/02/23**

Contract	Contract Ref:
2021OY102WSP2-BPT section	**785325**

AGS

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DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (SMALL SHEAR BOX APPARATUS)

In accordance with BS EN ISO 17892-10

Position ID: **BPT-BH003** Sample Ref: **2** Sample Type: **C** Depth (m): **14.10**

Description: **Brown very sandy slightly silty /clayey GRAVEL**

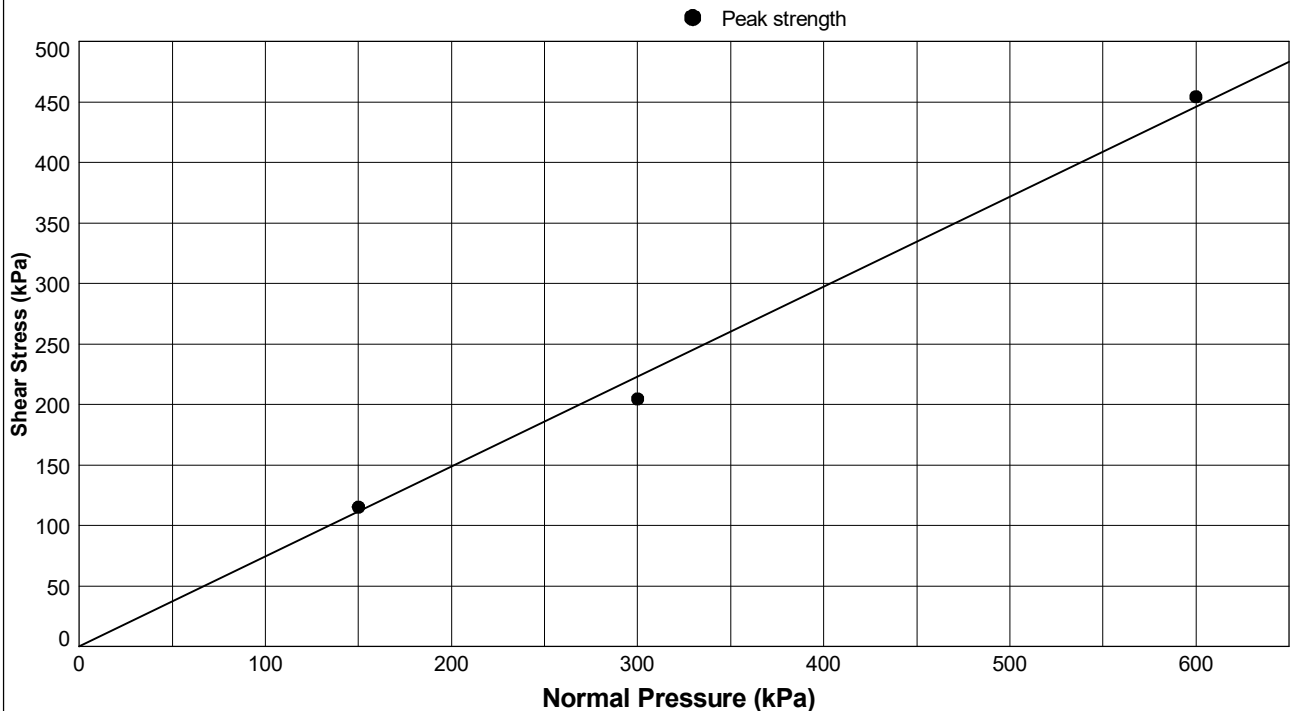
Sample Condition: **Recompacted**

Start Date: **21/03/2023**

End Date: **21/03/2023**

	SPECIMEN NUMBER		1	2	3
PROPERTIES	Initial Water Content	(%)	**20.4**	**18.8**	**18.4**
	Initial Length (L_1)	(mm)	**60.0**	**60.0**	**60.0**
	Initial Width (L_2)	(mm)	**60.0**	**60.0**	**60.0**
	Initial Height	(mm)	**23.0**	**23.0**	**23.0**
	Initial Bulk Density	(Mg/m^3)	**1.61**	**1.61**	**1.61**
	Initial Dry Density	(Mg/m^3)	**1.33**	**1.35**	**1.36**
	Particle Density	(Mg/m^3)	**2.65**$_{(Assumed)}$	**2.65**$_{(Assumed)}$	**2.65**$_{(Assumed)}$
	Initial Voids Ratio		**0.9880**	**0.9566**	**0.9536**
	Initial Degree of Saturation	(%)	**55**	**52**	**51**
TEST CONDITIONS	Specimen Conditions				
	Test Duration	(days)			
CONSOLIDATION	Normal Pressure	(kPa)	**150**	**300**	**600**
	Consolidated Height	(mm)	**22.5**	**22.3**	**21.3**
SHEAR	Shearing Rate	(mm/min)	**0.4000**	**0.4000**	**0.4000**
	Horiz. Displacement at Peak Shear Stress	(mm)	**3.2**	**3.1**	**4.0**
	Peak Shear Stress	(kPa)	**115**	**205**	**454**

PEAK STRENGTH	Effective Cohesion (C ')	**0**	(kPa)	Effective Angle of Friction (ϕ ')	**36.5** (deg)



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Compiled By	Date
LORNA WHITWORTH	31/03/23

Contract	Contract Ref:
2021OY102 WSP Eastern & Midlands Region - Lot 2	**785325**

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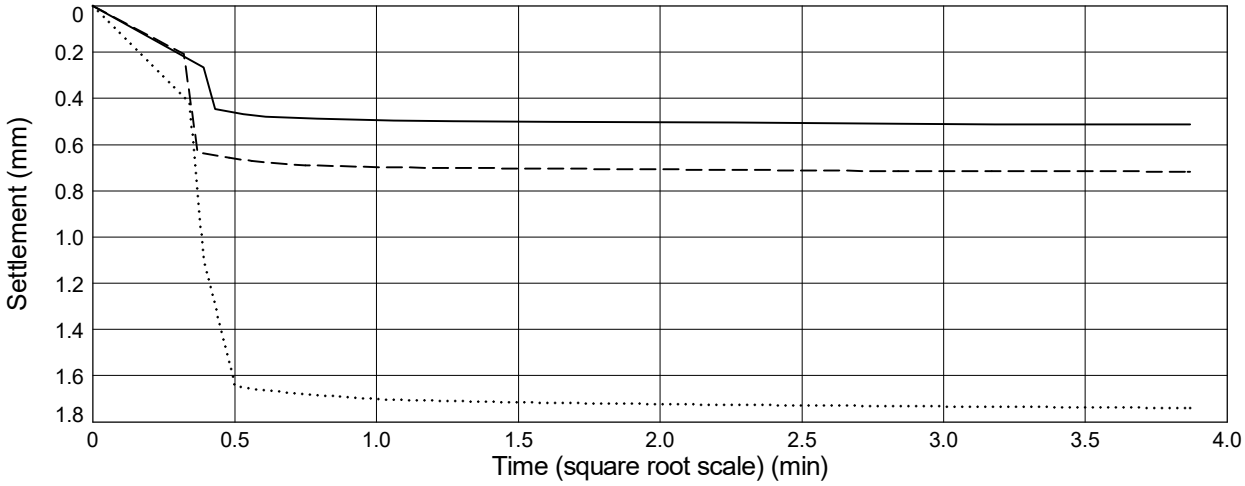
DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (SMALL SHEAR BOX APPARATUS)

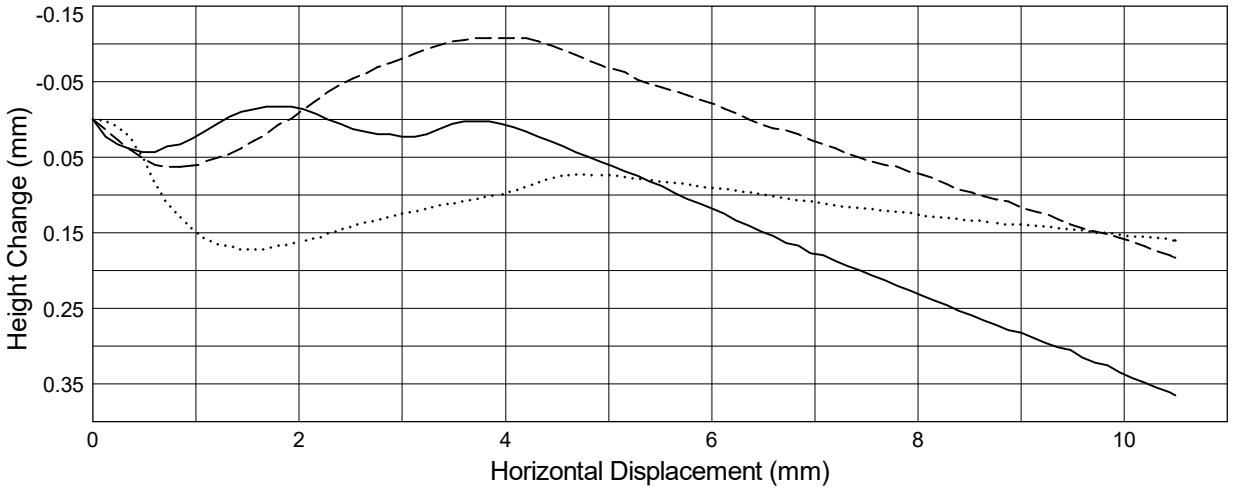
In accordance with BS EN ISO 17892-10

Position ID: **BPT-BH003** Sample Ref: **2** Sample Type: **C** Depth (m): **14.10**

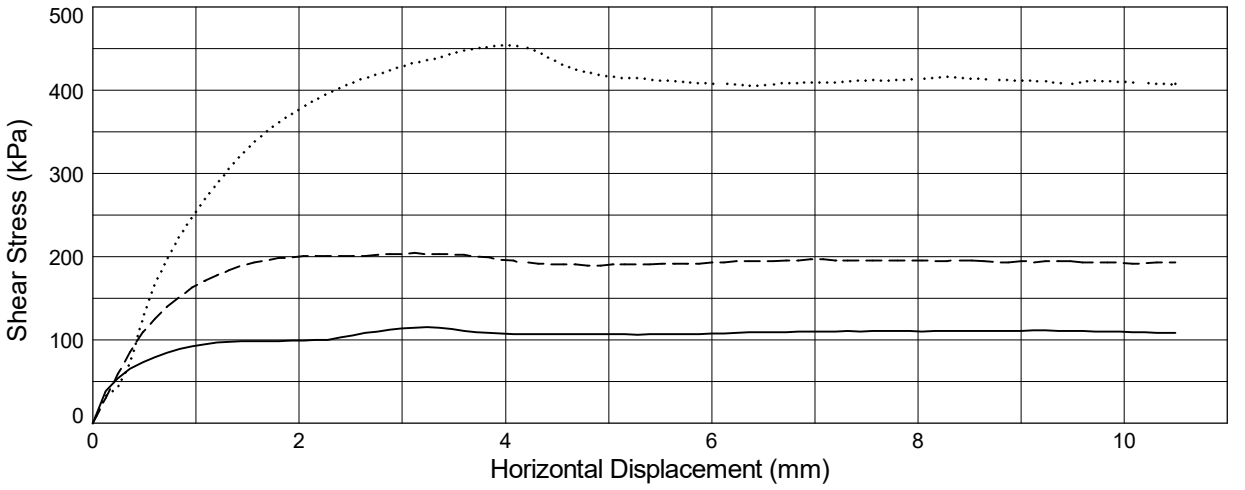
Consolidation Stage



Shear Stage



Shear Stage



Solid Line = Specimen 1 (**150** kPa) *Dashed Line* = Specimen 2 (**300** kPa) *Dotted Line* = Specimen 3 (**600** kPa)

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Compiled By	Date
LORNA WHITWORTH	**31/03/23**

Contract	Contract Ref:
2021OY102 WSP Eastern & Midlands Region - Lot 2	**785325**

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DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (SMALL SHEAR BOX APPARATUS)

In accordance with BS EN ISO 17892-10

Position ID: **BPT-BH004** Sample Ref: **2** Sample Type: **C** Depth (m): **5.00**

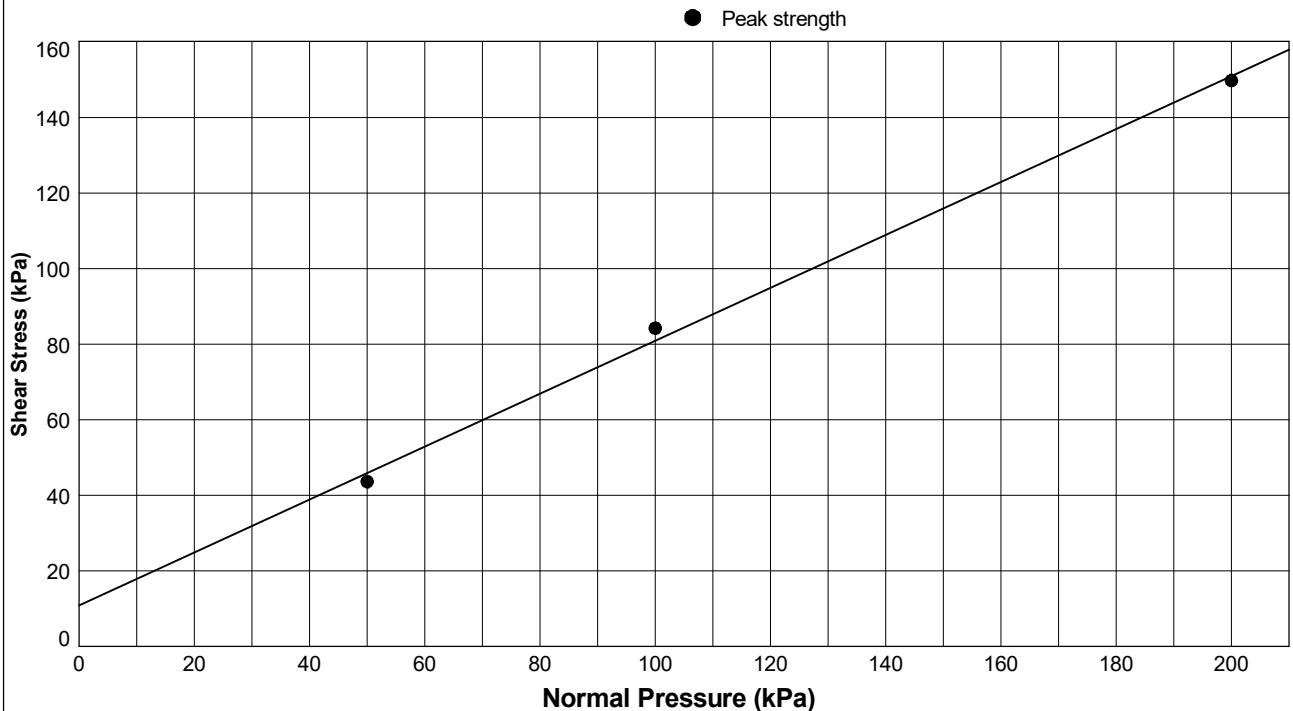
Description: **Brown gravelly silty/clayey SAND**

Sample Condition: **Recompacted**

Start Date: **21/03/2023**

End Date: **23/03/2023**

	SPECIMEN NUMBER		1	2	3
PROPERTIES	Initial Water Content	(%)	**11.3**	**10.7**	**10.5**
	Initial Length (L_1)	(mm)	**60.0**	**60.0**	**60.0**
	Initial Width (L_2)	(mm)	**60.0**	**60.0**	**60.0**
	Initial Height	(mm)	**23.1**	**22.7**	**23.0**
	Initial Bulk Density	(Mg/m^3)	**2.25**	**2.25**	**2.25**
	Initial Dry Density	(Mg/m^3)	**2.03**	**2.03**	**2.04**
	Particle Density	(Mg/m^3)	**2.65**$_{(Assumed)}$	**2.65**$_{(Assumed)}$	**2.65**$_{(Assumed)}$
	Initial Voids Ratio		**0.3082**	**0.3036**	**0.3008**
	Initial Degree of Saturation	(%)	**97**	**93**	**93**
TEST CONDITIONS	Specimen Conditions		**Submerged**	**Submerged**	**Submerged**
	Test Duration	(days)			
CONSOLIDATION	Normal Pressure	(kPa)	**50**	**100**	**200**
	Consolidated Height	(mm)		**21.7**	**21.3**
SHEAR	Shearing Rate	(mm/min)	**0.0134**	**0.0143**	**0.0363**
	Horiz. Displacement at Peak Shear Stress	(mm)	**2.4**	**2.3**	**2.8**
	Peak Shear Stress	(kPa)	**44**	**84**	**150**
PEAK STRENGTH	Effective Cohesion (C ') **11**	(kPa)	Effective Angle of Friction (ϕ ')	**35**	(deg)



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LORNA WHITWORTH	31/03/23

Contract	Contract Ref:
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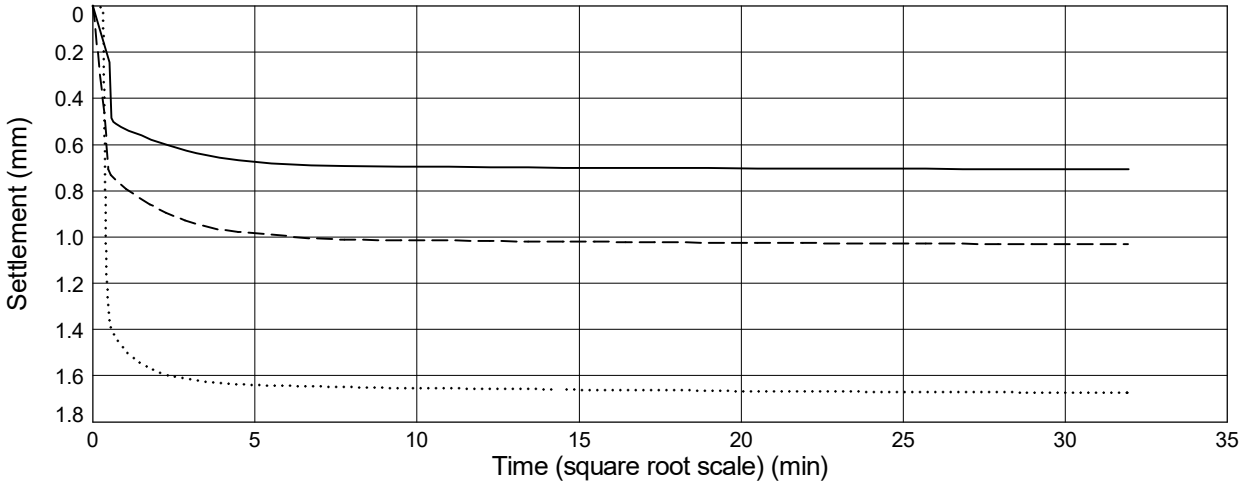
DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (SMALL SHEAR BOX APPARATUS)

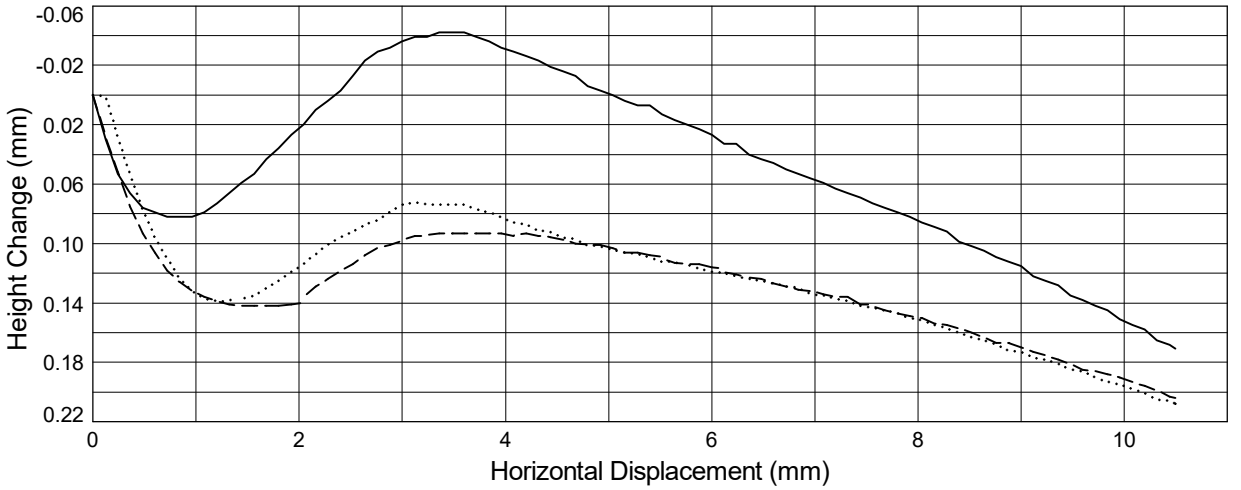
In accordance with BS EN ISO 17892-10

Position ID: **BPT-BH004** Sample Ref: **2** Sample Type: **C** Depth (m): **5.00**

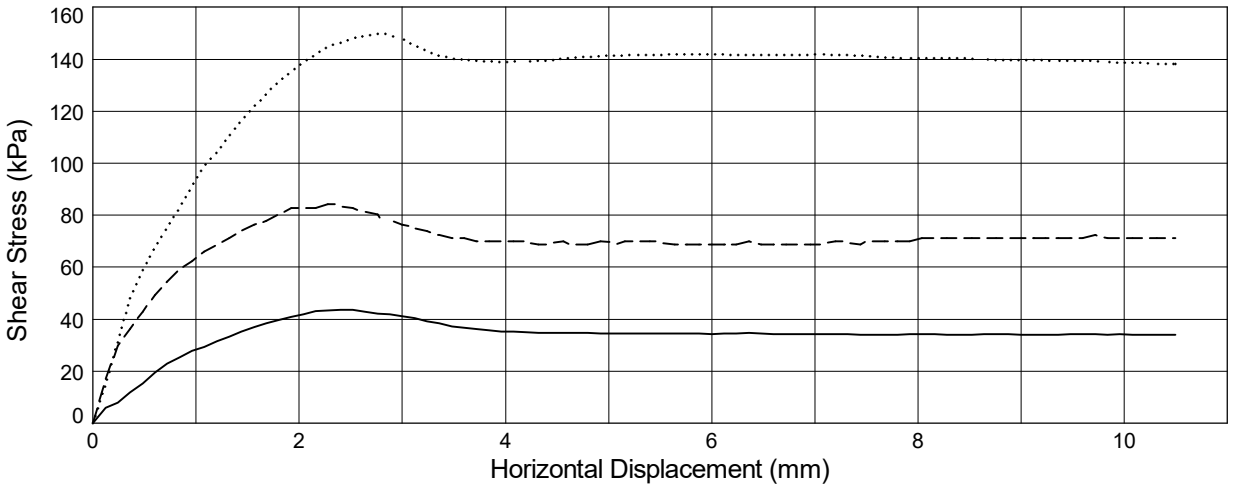
Consolidation Stage



Shear Stage



Shear Stage



Solid Line = Specimen 1 (**50** kPa) *Dashed Line* = Specimen 2 (**100** kPa) *Dotted Line* = Specimen 3 (**200** kPa)

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Compiled By	Date
LORNA WHITWORTH	**31/03/23**

Contract	Contract Ref:
2021OY102 WSP Eastern & Midlands Region - Lot 2	**785325**

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DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (SMALL SHEAR BOX APPARATUS)

In accordance with BS EN ISO 17892-10

Position ID: **BPT-BH018** Sample Ref: **5** Sample Type: **C** Depth (m): **14.50**

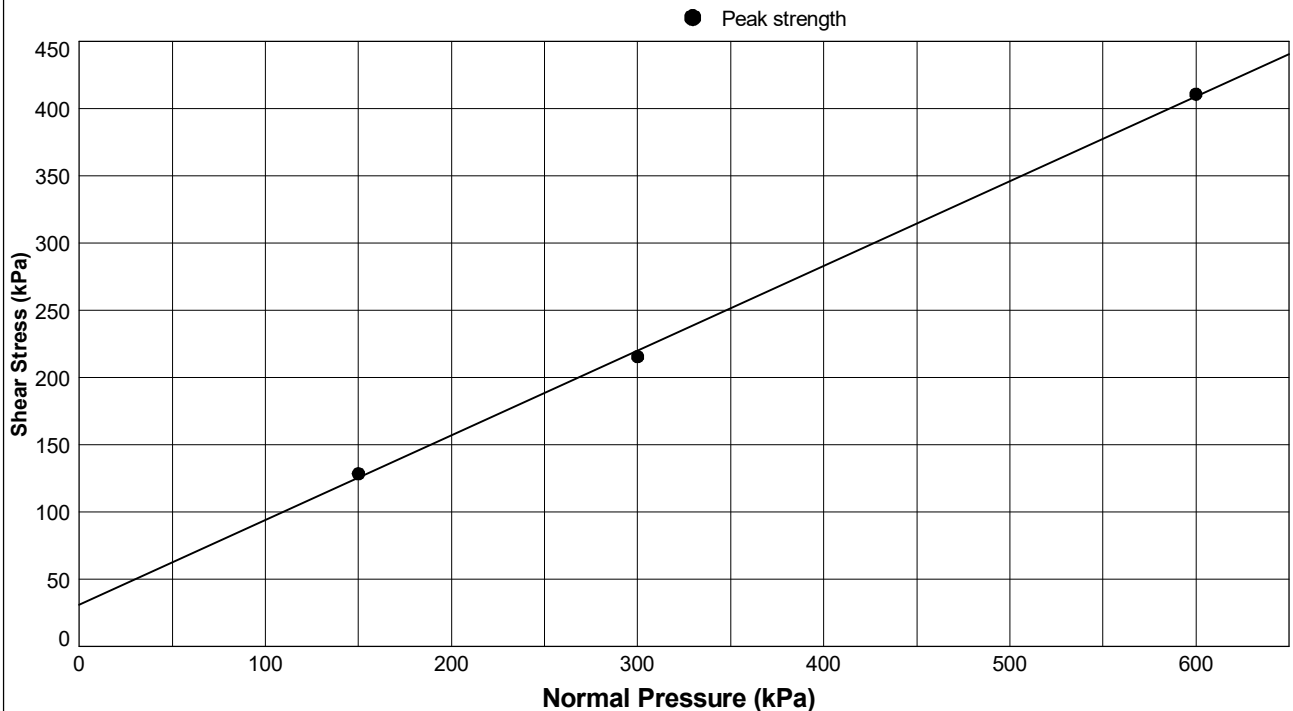
Description: **Brown gravelly silty/clayey SAND**

Sample Condition: **Recompacted**

Start Date: **09/11/2022**

End Date: **09/11/2022**

	SPECIMEN NUMBER		1	2	3
PROPERTIES	Initial Water Content	(%)	**32.7**	**31.5**	**29.8**
	Initial Length (L_1)	(mm)	**60.0**	**60.0**	**60.0**
	Initial Width (L_2)	(mm)	**60.0**	**60.0**	**60.0**
	Initial Height	(mm)	**23.6**	**23.8**	**24.1**
	Initial Bulk Density	(Mg/m^3)	**1.62**	**1.62**	**1.62**
	Initial Dry Density	(Mg/m^3)	**1.22**	**1.23**	**1.24**
	Particle Density	(Mg/m^3)	**2.65**$_{(Assumed)}$	**2.65**$_{(Assumed)}$	**2.65**$_{(Assumed)}$
	Initial Voids Ratio		**1.1711**	**1.1563**	**1.1286**
	Initial Degree of Saturation	(%)	**74**	**72**	**70**
TEST CONDITIONS	Specimen Conditions		**Submerged**	**Submerged**	**Submerged**
	Test Duration	(days)	**1**	**1**	**1**
CONSOLIDATION	Normal Pressure	(kPa)	**150**	**300**	**600**
	Consolidated Height	(mm)	**22.9**	**22.5**	**22.1**
SHEAR	Shearing Rate	(mm/min)	**0.4000**	**0.4000**	**0.4000**
	Horiz. Displacement at Peak Shear Stress	(mm)	**4.6**	**5.8**	**6.4**
	Peak Shear Stress	(kPa)	**129**	**216**	**411**
PEAK STRENGTH	Effective Cohesion (C ') **31**	(kPa)	Effective Angle of Friction (ϕ ')	**32**	(deg)



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Compiled By	Date
LORNA WHITWORTH	17/03/23

Contract: **2021OY102 WSP Eastern & Midlands Region - Lot 2**

Contract Ref: **785325**

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DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (SMALL SHEAR BOX APPARATUS)

In accordance with BS EN ISO 17892-10

Position ID: **BPT-BH027** Sample Ref: **2** Sample Type: **C** Depth (m): **5.00**

Description: **Brown gravelly clayey SAND**

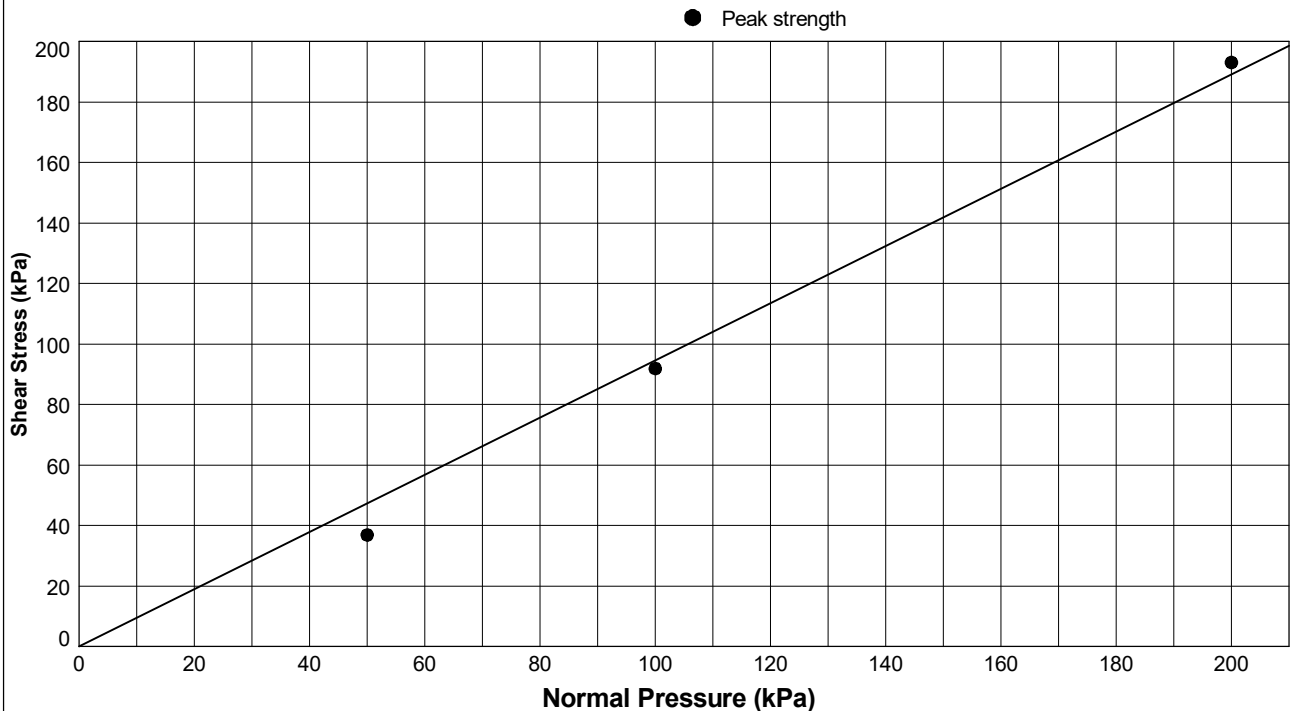
Sample Condition: **Recompacted**

Start Date: **04/01/2023**

End Date: **06/01/2023**

	SPECIMEN NUMBER		1	2	3
PROPERTIES	Initial Water Content	(%)	**21.9**	**22.2**	**22.1**
	Initial Length (L_1)	(mm)	**60.0**	**60.0**	**60.0**
	Initial Width (L_2)	(mm)	**60.0**	**60.0**	**60.0**
	Initial Height	(mm)	**23.2**	**23.2**	**23.2**
	Initial Bulk Density	(Mg/m^3)	**1.90**	**1.90**	**1.90**
	Initial Dry Density	(Mg/m^3)	**1.56**	**1.55**	**1.55**
	Particle Density	(Mg/m^3)	**2.65**$_{(Assumed)}$	**2.65**$_{(Assumed)}$	**2.65**$_{(Assumed)}$
	Initial Voids Ratio		**0.6971**	**0.7063**	**0.7065**
	Initial Degree of Saturation	(%)	**83**	**83**	**83**
TEST CONDITIONS	Specimen Conditions		**Submerged**	**Submerged**	**Submerged**
	Test Duration	(days)	**3**	**3**	**3**
CONSOLIDATION	Normal Pressure	(kPa)	**50**	**100**	**200**
	Consolidated Height	(mm)	**22.7**	**22.7**	**22.6**
SHEAR	Shearing Rate	(mm/min)	**0.0262**	**0.0235**	**0.0347**
	Horiz. Displacement at Peak Shear Stress	(mm)	**6.2**	**2.5**	**3.6**
	Peak Shear Stress	(kPa)	**37**	**92**	**193**

PEAK STRENGTH	Effective Cohesion (C ')	**0**	(kPa)	Effective Angle of Friction (ϕ ')	**43.5** (deg)



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Compiled By	Date
LAURA SCHRAMM	31/03/23

Contract: **2021OY102 WSP Eastern & Midlands Region - Lot 2**

Contract Ref: **785325**

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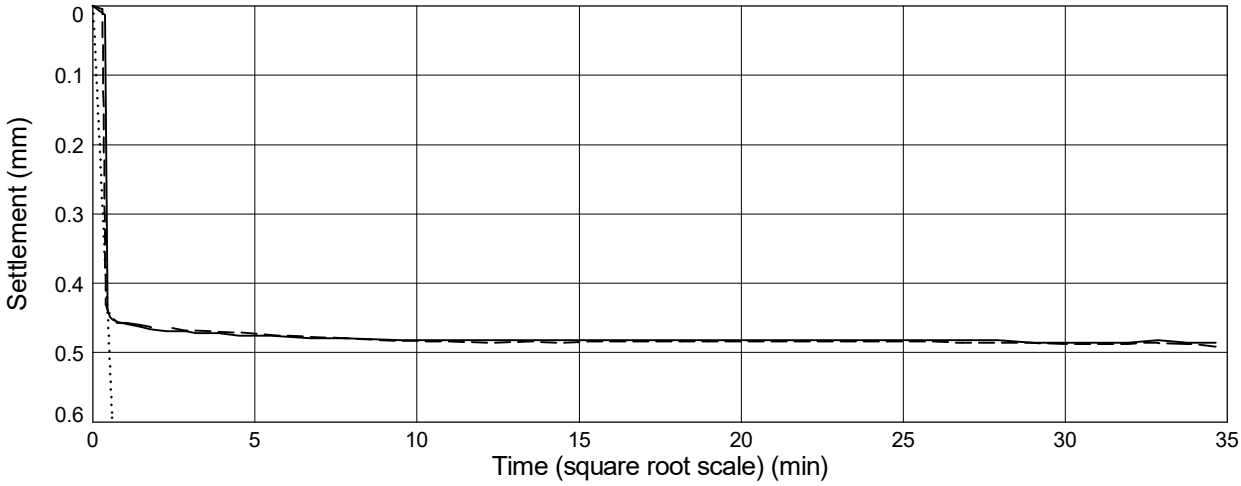
DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (SMALL SHEAR BOX APPARATUS)

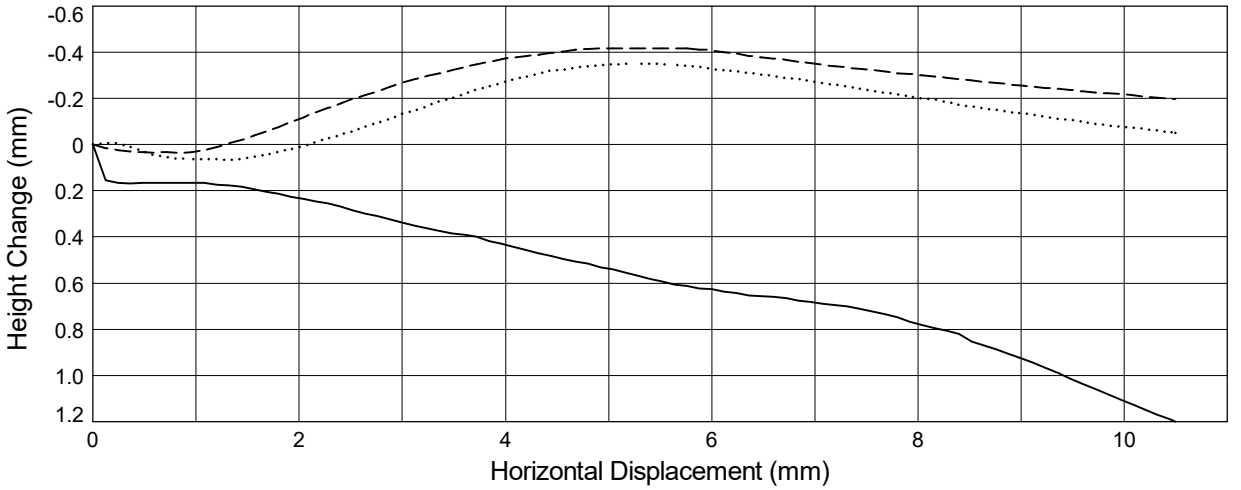
In accordance with BS EN ISO 17892-10

Position ID: **BPT-BH027** Sample Ref: **2** Sample Type: **C** Depth (m): **5.00**

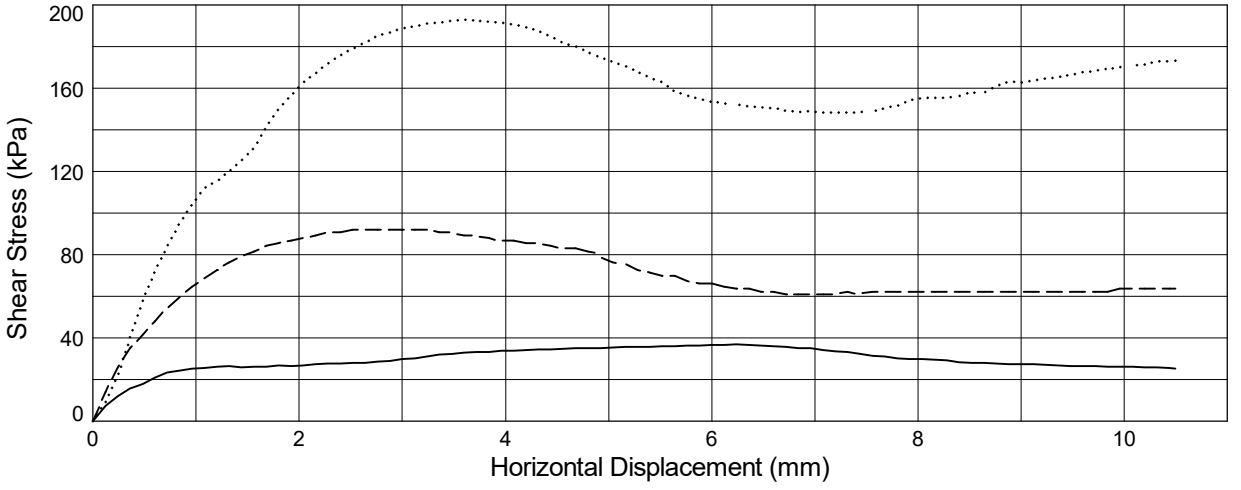
Consolidation Stage



Shear Stage



Shear Stage



Solid Line = Specimen 1 (**50** kPa) *Dashed Line* = Specimen 2 (**100** kPa) *Dotted Line* = Specimen 3 (**200** kPa)

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Compiled By		Date
	LAURA SCHRAMM	**31/03/23**

Contract	Contract Ref:
2021OY102 WSP Eastern & Midlands Region - Lot 2	**785325**

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IDL

Point Load Strength Index Tests
Summary of Results

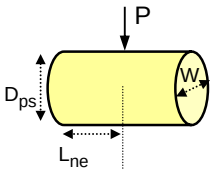
Project No.: 2021OY102a

Project Name: WSP Eastern & Midlands Region

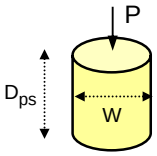
Borehole No.	Sample			Specimen		Rock Type and Test condition	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P	Equivalent diameter, De	Point Load Strength Index		Remarks (including water content if measured)
	Top Depth	Base Depth	Type	Top	Base		Type (D, A, I, B)	Direction (L, P or U)		Lne	W	Dps	Dps'			Is	Is(50)	
	m	m		m	m					mm	mm	mm	mm	kN	mm	MPa	MPa	
BPT-BH001	2.00	3.5	C	2.6	2.80		D	U	YES		63.4		63.4	8.9	63.4	2.2	2.5	Strong
BPT-BH001	2.00	3.5	C	3.3	3.40		A	U	YES		63.4		51.2	14.6	64.3	3.5	4.0	Very Strong
BPT-BH001	3.50	5	C	3.5	3.90		D	U	YES		63.4		63.4	17.7	63.4	4.4	4.9	Very Strong
BPT-BH002	2.10	2.7	C	2.25	2.37		A	U	YES		63.4		95.2	21.2	87.7	2.8	3.6	Strong
BPT-BH002	2.10	2.7	C	2.62	2.83		D	U	YES		63.4		63.4	6.7	63.4	1.7	1.8	Medium Strong
BPT-BH002	4.00	5.1	C	4.5	4.60		A	U	YES		63.4		87.0	16.6	83.8	2.4	3.0	Strong
BPT-BH002	8.10	9.7	C	9	9.10		D	U	YES		63.4		63.4	14.0	63.4	3.5	3.9	Strong
BPT-BH002	8.10	9.7	C	9.1	9.20		D	U	YES		63.4		63.4	18.3	63.4	4.5	5.1	Very Strong
BPT-BH002	8.10	9.7	C	9.2	9.30		D	U	YES		63.4		63.4	18.6	63.4	4.6	5.1	Very Strong
BPT-BH002	8.10	9.7	C	9.3	9.40		D	U	YES		63.4		63.4	17.6	63.4	4.4	4.9	Very Strong
BPT-BH002	8.10	9.7	C	9.4	9.50		D	U	YES		63.4		63.4	15.4	63.4	3.8	4.2	Very Strong
BPT-BH002	8.10	9.7	C	9.5	9.60		D	U	YES		63.4		63.4	15.9	63.4	4.0	4.4	Very Strong
BPT-BH002	8.10	9.7	C	9.6	9.70		D	U	YES		63.4		63.4	19.3	63.4	4.8	5.3	Very Strong
BPT-BH003	2.10	3.6	C	2.3	2.50		D	U	YES		101.5		101.5	8.6	101.5	0.8	1.2	Medium Strong
BPT-BH003	2.10	3.6	C	2.5	2.60		A	U	YES		101.5		84.0	6.3	104.2	0.6	0.8	Weak
BPT-BH003	5.10	5.6	C	5.1	5.25		D	U	YES		101.5		101.5	22.6	101.5	2.2	3.0	Strong
BPT-BH005	2.00	3.5	C	2.6	2.70		D	U	YES		63.4		63.4	23.6	63.4	5.9	6.5	Very Strong
BPT-BH005	2.00	3.5	C	2.7	2.80		D	U	YES		63.4		63.4	25.1	63.4	6.3	7.0	Very Strong
BPT-BH005	2.00	3.5	C	2.8	2.93		D	U	YES		63.4		63.4	9.8	63.4	2.4	2.7	Strong
BPT-BH005	2.00	3.5	C	2.93	3.00		D	U	YES		63.4		63.4	6.9	63.4	1.7	1.9	Medium Strong

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

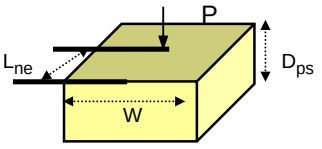
Diametral



Axial



Block/irregular lump



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

Date Printed: 15/02/2023

Approved By: Administrator

Table 1 sheet 1

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

IDL

Point Load Strength Index Tests
Summary of Results

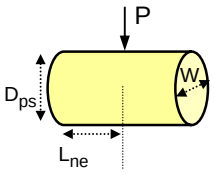
Project No.: 2021OY102a

Project Name: WSP Eastern & Midlands Region

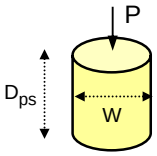
Borehole No.	Sample			Specimen		Rock Type and Test condition	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P	Equivalent diameter, De	Point Load Strength Index		Remarks (including water content if measured)
	Top Depth	Base Depth	Type	Top	Base		Type (D, A, I, B)	Direction (L, P or U)		Lne	W	Dps	Dps'			Is	Is(50)	
	m	m		m	m					mm	mm	mm	mm	kN	mm	MPa	MPa	
BPT-BH005	2.00	3.5	C	3	3.06		D	U	YES		63.4		63.4	5.3	63.4	1.3	1.5	Medium Strong
BPT-BH005	2.00	3.5	C	3.06	3.16		D	U	YES		63.4		63.4	16.9	63.4	4.2	4.7	Very Strong
BPT-BH005	2.00	3.5	C	3.16	3.22		D	U	YES		63.4		63.4	20.5	63.4	5.1	5.7	Very Strong
BPT-BH005	2.00	3.5	C	3.22	3.32		D	U	YES		63.4		63.4	20.9	63.4	5.2	5.8	Very Strong
BPT-BH005	5.00	6.5	C	6.1	6.20		D	U	YES		63.4		63.4	15.1	63.4	3.8	4.2	Very Strong
BPT-BH005	6.50	8	C	6.5	6.55		D	U	YES		63.4		63.4	2.7	63.4	0.7	0.8	Weak
BPT-BH005	6.50	8	C	6.55	6.68		D	U	YES		63.4		63.4	12.7	63.4	3.2	3.5	Strong
BPT-BH005	6.50	8	C	6.68	6.84		D	U	YES		63.4		63.4	15.9	63.4	3.9	4.4	Very Strong
BPT-BH005	6.50	8	C	6.9	7.00		D	U	YES		63.4		63.4	15.5	63.4	3.8	4.3	Very Strong
BPT-BH005	6.50	8	C	7	7.20		D	U	YES		63.4		63.4	16.4	63.4	4.1	4.5	Very Strong
BPT-BH005	6.50	8	C	7.25	7.35		D	U	YES		63.4		63.4	12.2	63.4	3.0	3.4	Strong
BPT-BH005	6.50	8	C	7.7	7.80		D	U	YES		63.4		63.4	17.4	63.4	4.3	4.8	Very Strong
BPT-BH005	6.50	8	C	7.8	7.90		D	U	YES		63.4		63.4	18.4	63.4	4.6	5.1	Very Strong
BPT-BH005	6.50	8	C	7.9	8.00		D	U	YES		63.4		63.4	13.1	63.4	3.3	3.6	Strong
BPT-BH005	9.50	11	C	10.26	10.40		D	U	YES		63.4		63.4	16.6	63.4	4.1	4.6	Very Strong
BPT-BH005	9.50	11	C	10.4	10.62		D	U	YES		63.4		63.4	15.5	63.4	3.9	4.3	Very Strong
BPT-BH005	9.50	11	C	10.62	10.69		D	U	YES		63.4		63.4	13.2	63.4	3.3	3.7	Strong
BPT-BH005	9.50	11	C	10.69	10.77		D	U	YES		63.4		63.4	11.8	63.4	2.9	3.3	Strong
BPT-BH005	9.50	11	C	10.77	10.88		D	U	YES		63.4		63.4	11.4	63.4	2.8	3.2	Strong
BPT-BH005	9.50	11	C	10.88	11.00		D	U	YES		63.4		63.4	14.1	63.4	3.5	3.9	Strong

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

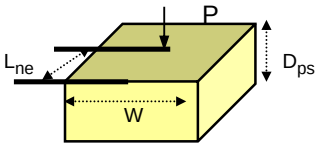
Diametral



Axial



Block/irregular lump



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

Date Printed: 15/02/2023

Approved By: Administrator

Table 1 sheet 2

IDL

Point Load Strength Index Tests
Summary of Results

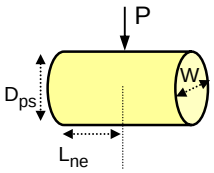
Project No.: 2021OY102a

Project Name: WSP Eastern & Midlands Region

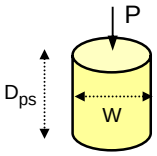
Borehole No.	Sample			Specimen		Rock Type and Test condition	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P	Equivalent diameter, De	Point Load Strength Index		Remarks (including water content if measured)
	Top Depth	Base Depth	Type	Top	Base		Type (D, A, I, B)	Direction (L, P or U)		Lne	W	Dps	Dps'			Is	Is(50)	
	m	m		m	m					mm	mm	mm	mm	kN	mm	MPa	MPa	
BPT-BH005	9.50	11	C	9.5	9.60		D	U	YES		63.4		63.4	14.5	63.4	3.6	4.0	Very Strong
BPT-BH005	9.50	11	C	9.6	9.68		D	U	YES		63.4		63.4	14.4	63.4	3.6	4.0	Very Strong
BPT-BH005	9.50	11	C	9.68	9.83		D	U	YES		63.4		63.4	14.6	63.4	3.6	4.0	Very Strong
BPT-BH005	9.50	11	C	9.83	9.92		D	U	YES		63.4		63.4	15.4	63.4	3.8	4.3	Very Strong
BPT-BH006	3.20	3.6	C	4.23	4.48		D	U	YES		100.0		100.0	36.1	100.0	3.6	4.9	Very Strong
BPT-BH006	3.60	4.9	C	5.1	5.30		D	U	YES		100.0		100.0	32.3	100.0	3.2	4.4	Very Strong
BPT-BH006	8.10	9.6	C	8.35	8.45		D	U	YES		100.0		100.0	13.5	100.0	1.3	1.8	Medium Strong
BPT-BH007	0.60	2.1	C	1.83	2.00		A	U	YES		101.5		94.0	24.4	110.2	2.0	2.9	Strong
BPT-BH007	5.10	6.6	C	5.6	5.80		A	U	YES		101.5		140.0	31.1	134.5	1.7	2.7	Strong
BPT-BH007	12.00	13	C	12	12.10		D	U	YES		101.5		101.5	38.2	101.5	3.7	5.1	Very Strong
BPT-BH007	12.00	13	C	12.27	12.40		D	U	YES		101.5		101.5	35.0	101.5	3.4	4.7	Very Strong
BPT-BH007	12.00	13	C	12.4	12.60		D	U	YES		101.5		101.5	38.2	101.5	3.7	5.1	Very Strong
BPT-BH007	12.00	13	C	12.6	12.74		D	U	YES		101.5		101.5	27.5	101.5	2.7	3.7	Strong
BPT-BH007	12.00	13	C	12.74	12.93		D	P	YES		101.5		101.5	28.3	101.5	2.7	3.8	Strong
BPT-BH007	12.00	13	C	12.93	13.00		D	U	YES		101.5		101.5	25.5	101.5	2.5	3.4	Strong
BPT-BH007	15.00	16.6	C	15.2	15.38		A	U	YES		63.4		94.0	10.2	87.1	1.3	1.7	Medium Strong
BPT-BH007	18.20	19.8	C	18.3	18.40		A	U	YES		63.4		50.0	19.1	63.5	4.7	5.3	Very Strong
BPT-BH009	0.00	2	C	1	1.10		A	U	YES		63.4		75.0	10.5	77.8	1.7	2.1	Strong
BPT-BH009	0.00	2	C	1.1	1.20		D	U	YES		63.4		63.4	6.2	63.4	1.5	1.7	Medium Strong
BPT-BH009	5.10	6.7	C	5.5	5.60		A	U	YES		63.4		50.0	7.1	63.5	1.8	2.0	Strong

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

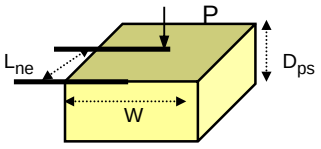
Diametral



Axial



Block/irregular lump



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

Date Printed: 15/02/2023

Approved By: Administrator

Table 1 sheet 3

IDL

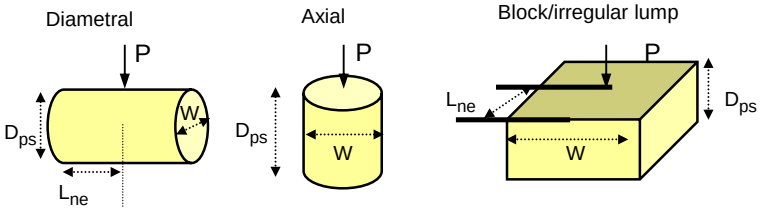
Point Load Strength Index Tests
Summary of Results

Project No.: 2021OY102a

Project Name: WSP Eastern & Midlands Region

Borehole No.	Sample			Specimen		Rock Type and Test condition	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P	Equivalent diameter, De	Point Load Strength Index		Remarks (including water content if measured)
	Top Depth	Base Depth	Type	Top	Base		Type (D, A, I, B)	Direction (L, P or U)		Lne	W	Dps	Dps'			Is	Is(50)	
	m	m		m	m					mm	mm	mm	mm	kN	mm	MPa	MPa	
BPT-BH009	5.10	6.7	C	5.6	5.70		D	U	YES		63.4		63.4	18.0	63.4	4.5	5.0	Very Strong
BPT-BH009	5.10	6.7	C	6.8	6.90		A	U	YES		63.4		81.0	2.6	80.9	0.4	0.5	Weak
BPT-BH009	9.60	11.1	C	9.6	9.70		D	U	YES		63.4		63.4	16.2	63.4	4.0	4.5	Very Strong
BPT-BH010	2.30	3.3	C	2.5	2.70		D	U	YES		100.0		100.0	9.4	100.0	0.9	1.3	Medium Strong
BPT-BH010	7.50	9.1	C	7.5	7.70		D	U	YES		100.0		100.0	14.5	100.0	1.5	2.0	Strong
BPT-BH010	7.50	9.1	C	7.7	7.80		D	U	YES		100.0		100.0	16.1	100.0	1.6	2.2	Strong
BPT-BH010	7.50	9.1	C	7.8	8.00		D	U	YES		100.0		100.0	12.3	100.0	1.2	1.7	Medium Strong
BPT-BH010	7.50	9.1	C	8	8.27		D	U	YES		100.0		100.0	7.7	100.0	0.8	1.1	Medium Strong
BPT-BH010	7.50	9.1	C	8.27	8.50		D	U	YES		100.0		100.0	18.7	100.0	1.9	2.6	Strong
BPT-BH010	7.50	9.1	C	8.5	8.80		D	U	YES		100.0		100.0	21.1	100.0	2.1	2.9	Strong
BPT-BH010	7.50	9.1	C	8.8	9.00		D	U	YES		100.0		100.0	32.7	100.0	3.3	4.5	Very Strong
BPT-BH010	13.10	14.1	C	13.1	13.30		D	U	YES		100.0		100.0	38.0	100.0	3.8	5.2	Very Strong
BPT-BH010	16.10	17.8	C	16.5	16.80		D	U	YES		63.4		63.4	17.4	63.4	4.3	4.8	Very Strong
BPT-BH011	0.00	2	C	0.9	1.00		D	U	YES		63.4		63.4	6.5	63.4	1.6	1.8	Medium Strong
BPT-BH011	0.00	2	C	1	1.23		D	U	YES		63.4		63.4	7.6	63.4	1.9	2.1	Strong
BPT-BH011	6.50	8.1	C	7.2	7.30		D	U	YES		63.4		63.4	2.8	63.4	0.7	0.8	Weak
BPT-BH011	6.50	8.1	C	7.3	7.45		D	U	YES		63.4		63.4	14.4	63.4	3.6	4.0	Very Strong
BPT-BH011	6.50	8.1	C	7.45	7.53		D	U	YES		63.4		63.4	10.4	63.4	2.6	2.9	Strong
BPT-BH011	6.50	8.1	C	7.53	7.62		D	U	YES		63.4		63.4	11.4	63.4	2.8	3.1	Strong
BPT-BH011	6.50	8.1	C	7.62	7.72		D	U	YES		63.4		63.4	10.8	63.4	2.7	3.0	Strong

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



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

Date Printed: 15/02/2023

Approved By: Administrator

Table 1 sheet 4

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

IDL

Point Load Strength Index Tests
Summary of Results

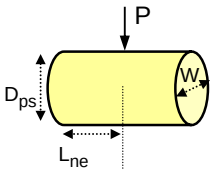
Project No.: 2021OY102a

Project Name: WSP Eastern & Midlands Region

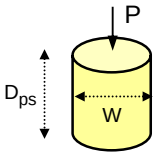
Borehole No.	Sample			Specimen		Rock Type and Test condition	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P	Equivalent diameter, De	Point Load Strength Index		Remarks (including water content if measured)
	Top Depth	Base Depth	Type	Top	Base		Type (D, A, I, B)	Direction (L, P or U)		Lne	W	Dps	Dps'			Is	Is(50)	
	m	m		m	m					mm	mm	mm	mm	kN	mm	MPa	MPa	
BPT-BH011	6.50	8.1	C	7.72	7.82		D	U	YES		63.4		63.4	17.6	63.4	4.4	4.9	Very Strong
BPT-BH011	6.50	8.1	C	7.82	7.87		D	U	YES		63.4		63.4	15.2	63.4	3.8	4.2	Very Strong
BPT-BH011	6.50	8.1	C	7.87	8.07		D	U	YES		63.4		63.4	9.6	63.4	2.4	2.7	Strong
BPT-BH012	1.50	2.1	C	2	2.10		D	U	YES		63.4		63.4	5.1	63.4	1.3	1.4	Medium Strong
BPT-BH012	1.50	2.1	C	2.05	2.10		A	U	YES		63.4		50.0	4.4	63.5	1.1	1.2	Medium Strong
BPT-BH012	6.70	8.1	C	7.6	7.80		D	U	YES		63.4		63.4	17.1	63.4	4.2	4.7	Very Strong
BPT-BH013	1.10	2.1	C	1.5	1.60		A	U	YES		63.4		56.0	9.8	67.2	2.2	2.5	Strong
BPT-BH013	1.10	2.1	C	2	2.10		A	U	YES		63.4		110.0	16.2	94.2	1.8	2.4	Strong
BPT-BH013	5.10	6.5	C	5.1	5.20		D	U	YES		63.4		63.4	27.4	63.4	6.8	7.6	Very Strong
BPT-BH013	8.10	9.5	C	8.4	8.60		D	U	YES		63.4		63.4	19.2	63.4	4.8	5.3	Very Strong
BPT-BH014	2.10	3.7	C	2.5	2.60		D	U	YES		63.4		63.4	10.6	63.4	2.6	2.9	Strong
BPT-BH014	2.10	3.7	C	2.6	2.70		D	U	YES		63.4		63.4	12.1	63.4	3.0	3.4	Strong
BPT-BH014	8.10	9.7	C	9.5	9.60		D	U	YES		63.4		63.4	26.4	63.4	6.6	7.3	Very Strong
BPT-BH014	12.70	14.1	C	13.7	13.80		D	U	YES		63.4		63.4	18.1	63.4	4.5	5.0	Very Strong
BPT-BH014	12.70	14.1	C	13.75	13.80		A	U	YES		63.4		72.0	23.5	76.2	4.0	4.9	Very Strong
BPT-BH015	0.00	2	C	1	1.20		D	U	YES		100.0		100.0	18.3	100.0	1.8	2.5	Strong
BPT-BH015	3.50	5	C	4.8	5.00		D	U	YES		100.0		100.0	19.1	100.0	1.9	2.6	Strong
BPT-BH015	8.00	9.5	C	8.3	8.50		D	U	YES		100.0		100.0	25.8	100.0	2.6	3.5	Strong
BPT-BH016	0.00	2	C	1.5	1.60		D	U	YES		100.0		100.0	19.6	100.0	2.0	2.7	Strong
BPT-BH016	0.00	2	C	1.6	1.70		D	U	YES		100.0		100.0	16.3	100.0	1.6	2.2	Strong

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

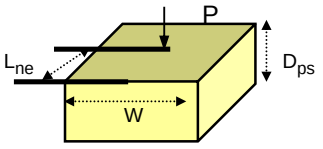
Diametral



Axial



Block/irregular lump



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

Date Printed: 15/02/2023

Approved By: Administrator

Table 1 sheet 5

IDL

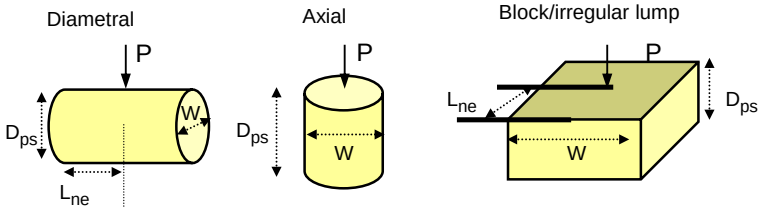
Point Load Strength Index Tests
Summary of Results

Project No.: 2021OY102a

Project Name: WSP Eastern & Midlands Region

Borehole No.	Sample			Specimen		Rock Type and Test condition	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P	Equivalent diameter, De	Point Load Strength Index		Remarks (including water content if measured)
	Top Depth	Base Depth	Type	Top	Base		Type (D, A, I, B)	Direction (L, P or U)		Lne	W	Dps	Dps'			Is	Is(50)	
	m	m		m	m					mm	mm	mm	mm	kN	mm	MPa	MPa	
BPT-BH016	3.60	5.1	C	4.5	4.60		A	U	YES		100.0		95.0	10.4	110.0	0.9	1.2	Medium Strong
BPT-BH016	8.10	9.6	C	8.2	8.30		D	U	YES		100.0		100.0	14.7	100.0	1.5	2.0	Strong
BPT-BH016	12.60	13	C	12.8	12.90		A	U	YES		100.0		80.0	31.4	100.9	3.1	4.2	Very Strong
BPT-BH018	8.00	9.5	C	8	8.10		D	U	YES		100.0		100.0	23.9	100.0	2.4	3.3	Strong
BPT-BH018	8.00	9.5	C	9	9.10		D	U	YES		100.0		100.0	18.7	100.0	1.9	2.6	Strong
BPT-BH018	26.00	27.5	C	27	27.10		D	P	YES		63.4		63.4	10.2	63.4	2.5	2.8	Strong
BPT-BH018	26.00	27.5	C	27.05	27.10		A	U	YES		63.4		50.0	13.4	63.5	3.3	3.7	Strong
BPT-BH019	2.00	3.5	C	2.4	2.50		D	U	YES		100.0		100.0	21.1	100.0	2.1	2.9	Strong
BPT-BH019	8.00	9.5	C	8	8.10		D	U	YES		100.0		85.0	13.7	92.2	1.6	2.1	Strong
BPT-BH019	11.00	12.5	C	11.6	11.80		D	U	YES		100.0		100.0	19.5	100.0	1.9	2.7	Strong
BPT-BH019	15.50	17	C	15.9	16.00		D	U	YES		100.0		100.0	17.4	100.0	1.7	2.4	Strong
BPT-BH019	18.50	20	C	18.5	18.70		D	U	YES		100.0		100.0	24.9	100.0	2.5	3.4	Strong
BPT-BH020	15.50	17	C	16.5	16.60		A	U	YES		100.0		60.0	7.5	87.4	1.0	1.3	Medium Strong
BPT-BH020	21.50	23	C	22.6	22.70		D	U	YES		100.0		100.0	41.0	100.0	4.1	5.6	Very Strong
BPT-BH020	26.00	27.5	C	26.5	26.60		D	U	YES		100.0		100.0	33.9	100.0	3.4	4.6	Very Strong
BPT-BH021	0.00	2	C	1.6	2.00		D	U	YES		100.0		100.0	21.1	100.0	2.1	2.9	Strong
BPT-BH021	3.50	5	C	4.1	4.25		D	U	YES		100.0		100.0	25.5	100.0	2.5	3.5	Strong
BPT-BH021	5.00	6.5	C	5.9	6.10		D	U	YES		100.0		100.0	48.5	100.0	4.8	6.6	Very Strong
BPT-BH021	9.50	11	C	9.9	10.20		D	U	YES		100.0		100.0	41.9	100.0	4.2	5.7	Very Strong
BPT-BH021	12.50	14	C	12.9	13.00		D	U	YES		100.0		100.0	51.9	100.0	5.2	7.1	Very Strong

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



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

Date Printed: 15/02/2023

Approved By: Administrator

Table 1 sheet 6

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

IDL

Point Load Strength Index Tests
Summary of Results

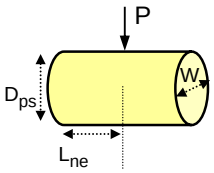
Project No.: 2021OY102a

Project Name: WSP Eastern & Midlands Region

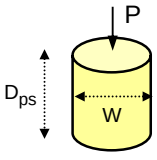
Borehole No.	Sample			Specimen		Rock Type and Test condition	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P	Equivalent diameter, De	Point Load Strength Index		Remarks (including water content if measured)
	Top Depth	Base Depth	Type	Top	Base		Type (D, A, I, B)	Direction (L, P or U)		Lne	W	Dps	Dps'			Is	Is(50)	
	m	m		m	m					mm	mm	mm	mm	kN	mm	MPa	MPa	
BPT-BH021	15.50	17	C	15.7	16.00		D	U	YES		100.0		100.0	47.2	100.0	4.7	6.5	Very Strong
BPT-BH022	2.00	3.5	C	3.3	3.50		D	U	YES		101.0		101.0	32.5	101.0	3.2	4.4	Very Strong
BPT-BH022	2.00	3.5	C	3.4	3.50		A	U	YES		101.0		111.5	26.4	119.7	1.8	2.7	Strong
BPT-BH022	3.50	5	C	4.5	4.60		I	U	YES		68.0		101.0	11.6	93.5	1.3	1.8	Medium Strong
BPT-BH022	6.50	8	C	7	7.20		D	U	YES		101.0		101.0	46.8	101.0	4.6	6.3	Very Strong
BPT-BH022	11.00	12.5	C	11.5	11.60		D	U	YES		101.0		101.0	31.6	101.0	3.1	4.3	Very Strong
BPT-BH022	12.50	14	C	13.4	13.50		D	U	YES		101.0		101.0	24.9	101.0	2.4	3.4	Strong
BPT-BH022	20.00	21.5	C	20	20.10		D	U	YES		101.0		101.0	38.7	101.0	3.8	5.2	Very Strong
BPT-BH023	8.00	9.5	C	8	8.20		D	U	YES		100.0		100.0	18.9	100.0	1.9	2.6	Strong
BPT-BH023	8.00	9.5	C	9	9.10		D	U	YES		85.0		100.0	26.2	92.2	3.1	4.1	Very Strong
BPT-BH023	9.50	11	C	9.5	9.60		A	U	YES		100.0		75.0	29.2	97.7	3.1	4.1	Very Strong
BPT-BH023	14.00	15.5	C	14.9	15.00		A	U	YES		100.0		100.0	18.4	112.8	1.4	2.1	Strong
BPT-BH024	2.00	3.5	C	2.6	2.80		A	U	YES		101.0		105.0	11.7	116.2	0.9	1.3	Medium Strong
BPT-BH024	9.50	11	C	9.5	9.70		A	U	YES		101.0		96.0	3.6	111.1	0.3	0.4	Weak
BPT-BH024	12.50	14	C	13.4	13.50		A	U	YES		101.0		119.0	21.3	123.7	1.4	2.1	Strong
BPT-BH024	20.00	21.5	C	20.3	20.50		D	U	YES		101.0		101.0	18.5	101.0	1.8	2.5	Strong
BPT-BH024	21.50	23	C	20.3	20.50		A	U	YES		101.0		116.0	10.7	122.1	0.7	1.1	Medium Strong
BPT-BH024	21.50	23	C	21.9	22.00		D	U	YES		101.0		101.0	8.2	101.0	0.8	1.1	Medium Strong
BPT-BH025	2.00	3.5	C	2	2.10		D	U	YES		101.0		101.0	4.1	101.0	0.4	0.6	Weak
BPT-BH025	3.50	5	C	4.8	5.00		D	U	YES		101.0		101.0	37.9	101.0	3.7	5.1	Very Strong

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

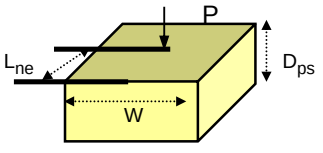
Diametral



Axial



Block/irregular lump



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

Date Printed: 15/02/2023

Approved By: Administrator

Table 1 sheet 7

IDL

Point Load Strength Index Tests
Summary of Results

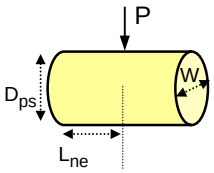
Project No.: 2021OY102a

Project Name: WSP Eastern & Midlands Region

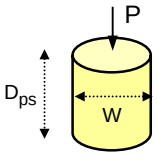
Borehole No.	Sample			Specimen		Rock Type and Test condition	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P	Equivalent diameter, De	Point Load Strength Index		Remarks (including water content if measured)
	Top Depth	Base Depth	Type	Top	Base		Type (D, A, I, B)	Direction (L, P or U)		Lne	W	Dps	Dps'			Is	Is(50)	
	m	m		m	m					mm	mm	mm	mm	kN	mm	MPa	MPa	
BPT-BH025	5.00	6.5	C	5.1	5.30		D	U	YES		101.0		101.0	16.7	101.0	1.6	2.2	Strong
BPT-BH025	5.00	6.5	C	5.3	5.50		A	U	YES		101.0		141.0	24.0	134.7	1.3	2.1	Strong
BPT-BH025	8.00	9.5	C	9.3	9.40		D	U	YES		101.0		101.0	43.8	101.0	4.3	5.9	Very Strong
BPT-BH025	11.00	12.5	C	11.3	11.50		A	U	YES		101.0		115.0	21.3	121.6	1.4	2.1	Strong
BPT-BH025	15.50	17	C	15.8	16.00		D	U	YES		101.0		101.0	27.4	101.0	2.7	3.7	Strong
BPT-BH026	1.50	2	C	2.6	2.80		D	U	YES		101.0		101.0	17.6	101.0	1.7	2.4	Strong
BPT-BH026	1.50	2	C	2.7	2.80		A	U	YES		101.0		108.0	16.5	117.8	1.2	1.7	Medium Strong
BPT-BH026	5.00	6.5	C	5.8	6.00		D	U	YES		101.0		101.0	28.9	101.0	2.8	3.9	Strong
BPT-BH026	8.00	9.5	C	9.3	9.50		D	U	YES		101.0		101.0	34.2	101.0	3.3	4.6	Very Strong
BPT-BH026	14.00	15.5	C	14.5	14.70		A	U	YES		101.0		65.0	12.1	91.4	1.4	1.9	Medium Strong
BPT-BH026	18.50	20	C	18.5	18.60		D	U	YES		101.0		101.0	37.9	101.0	3.7	5.1	Very Strong
BPT-BH027	30.50	32	C	31.4	31.50		A	U	YES		63.4		70.0	9.6	75.2	1.7	2.0	Strong
BPT-BH027	33.50	35	C	34.8	34.95		A	U	YES		63.4		104.0	17.1	91.6	2.0	2.7	Strong
BPT-BH027	35.00	37	C	35.51	35.20		A	U	YES		63.4		101.0	13.0	90.3	1.6	2.1	Strong
BPT-BH028	12.50	14	C	12.3	12.50		D	U	YES		101.0		101.0	26.4	101.0	2.6	3.5	Strong
BPT-BH028	35.00	36.5	C	35.9	36.00		A	U	YES		101.0		95.0	18.6	110.5	1.5	2.2	Strong
BPT-BH028	36.50	38	C	37	37.10		A	U	YES		101.0		88.0	20.1	106.4	1.8	2.5	Strong
BPT-BH029	2.00	3.5	C	2.9	3.00		A	U	YES		101.0		130.0	8.6	129.3	0.5	0.8	Weak
BPT-BH029	2.00	3.5	C	3	3.14		D	U	YES		101.0		101.0	18.8	101.0	1.8	2.5	Strong
BPT-BH029	3.50	5	C	3.5	3.70		A	U	YES		101.0		136.0	2.5	132.2	0.1	0.2	Weak

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

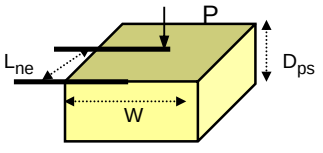
Diametral



Axial



Block/irregular lump



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

Date Printed: 15/02/2023

Approved By: Administrator

Table 1 sheet 8

IDL

Point Load Strength Index Tests
Summary of Results

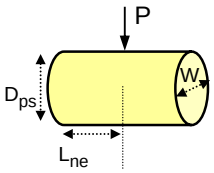
Project No.: 2021OY102a

Project Name: WSP Eastern & Midlands Region

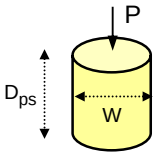
Borehole No.	Sample			Specimen		Rock Type and Test condition	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P	Equivalent diameter, De	Point Load Strength Index		Remarks (including water content if measured)
	Top Depth	Base Depth	Type	Top	Base		Type (D, A, I, B)	Direction (L, P or U)		Lne	W	Dps	Dps'			Is	Is(50)	
	m	m		m	m					mm	mm	mm	mm	kN	mm	MPa	MPa	
BPT-BH029	6.50	8	C	7.6	7.70		A	U	YES		101.0		106.0	25.9	116.8	1.9	2.8	Strong
BPT-BH029	11.00	12.5	C	11	11.10		D	U	YES		101.0		101.0	36.2	101.0	3.6	4.9	Very Strong
BPT-BH029	15.50	17	C	16.5	16.70		D	U	YES		101.0		101.0	31.2	101.0	3.1	4.2	Very Strong
BPT-BH030	0.00	2	C	1.6	1.80		D		YES		101.0		101.0	5.4	101.0	0.5	0.7	Weak
BPT-BH030	0.00	2	C	1.8	2.00		A		YES		101.0		94.0	13.4	109.9	1.1	1.6	Medium Strong
BPT-BH030	2.00	3.5	C	2.8	3.00		A		YES		101.0		76.0	3.7	98.9	0.4	0.5	Weak
BPT-BH030	5.00	6.5	C	5.6	5.70		A		YES		101.0		97.0	8.4	111.7	0.7	1.0	Medium Strong
BPT-BH030	8.00	9.5	C	8	8.30		D		YES		101.0		101.0	26.5	101.0	2.6	3.6	Strong
BPT-BH031	2.00	3.5	C	2.5	2.60		D	U	YES		101.0		101.0	12.9	101.0	1.3	1.7	Medium Strong
BPT-BH031	2.00	3.5	C	2.6	2.70		A	U	YES		101.0		104.0	12.4	115.6	0.9	1.3	Medium Strong
BPT-BH031	3.50	5	C	3.8	4.00		A	U	YES		101.0		62.0	16.2	89.3	2.0	2.6	Strong
BPT-BH031	5.00	6.5	C	6	6.10		A	U	YES		101.0		128.0	15.8	128.3	1.0	1.5	Medium Strong
BPT-BH031	6.50	8	C	6.9	7.00		A	U	YES		101.0		95.0	9.4	110.5	0.8	1.1	Medium Strong
BPT-BH031	8.00	9.5	C	9	9.10		A	U	YES		101.0		97.0	16.8	111.7	1.3	1.9	Medium Strong
BPT-BH031	12.50	14	C	13.4	13.50		A	U	YES		101.0		74.0	19.4	97.6	2.0	2.7	Strong
BPT-BH031	17.00	18.5	C	17	17.20		A	U	YES		101.0		68.0	15.9	93.5	1.8	2.4	Strong
BPT-BH032	3.50	5	C	3.3	3.50		A		YES		101.0		122.0	15.0	125.3	1.0	1.4	Medium Strong
BPT-BH032	3.50	5	C	3.5	5.00		D		YES		101.0		101.0	23.5	101.0	2.3	3.2	Strong
BPT-BH032	5.00	6.5	C	5.25	5.35		A		YES		101.0		82.0	20.6	102.7	2.0	2.7	Strong
BPT-BH032	8.00	9.5	C	7.8	8.00		D		YES		101.0		101.0	41.6	101.0	4.1	5.6	Very Strong

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

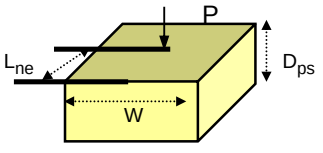
Diametral



Axial



Block/irregular lump



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

Date Printed: 15/02/2023

Approved By: Administrator

Table 1 sheet 9

IDL

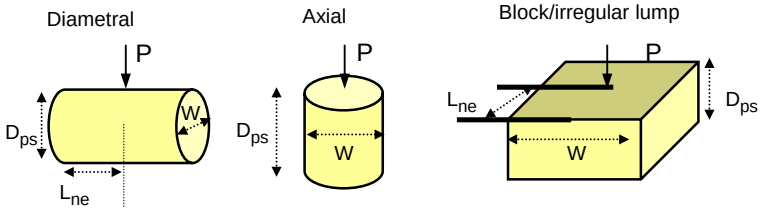
Point Load Strength Index Tests
Summary of Results

Project No.: 2021OY102a

Project Name: WSP Eastern & Midlands Region

Borehole No.	Sample			Specimen		Rock Type and Test condition	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P	Equivalent diameter, De	Point Load Strength Index		Remarks (including water content if measured)
	Top Depth	Base Depth	Type	Top	Base		Type (D, A, I, B)	Direction (L, P or U)		Lne	W	Dps	Dps'			Is	Is(50)	
	m	m		m	m					mm	mm	mm	mm	kN	mm	MPa	MPa	
BPT-BH032	9.50	11	C	9.9	10.00		D		YES		101.0		101.0	25.8	101.0	2.5	3.5	Strong
BPT-BH032	14.00	15.5	C	15	15.10		D		YES		101.0		101.0	38.5	101.0	3.8	5.2	Very Strong
BPT-BH032	17.00	18.5	C	18	18.10		D		YES		101.0		101.0	25.0	101.0	2.4	3.4	Strong
BPT-BH032	21.50	23	C	21.4	21.50		D		YES		101.0		101.0	17.3	101.0	1.7	2.3	Strong

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



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

Date Printed: 15/02/2023

Approved By: Administrator

Table 1 sheet 10

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

IDL

UNIAXIAL COMPRESSION TEST ON ROCK - SUMMARY OF RESULTS

Project No.: 2021OY102a

Project Name: WSP Eastern & Midlands Region

Hole No.	Sample				Specimen Depth (m)	Specimen Dimensions2			Bulk Density2	Water Content 1	Uniaxial Compression3				Remarks
	Ref	Top	Base	Type		Dia. mm	Length mm	H/D	Mg/m3	%	Condition	Stress Rate MPa/s	Mode of failure	UCS MPa	
BPT-BH001		2.00	3.50	C	2.1-2.24	63.4	169.1	2.7	2.62		as received	0.4198	AC	74.3	Strong
BPT-BH003		5.10	5.60	C	5.26-5.6	101.0	238.6	2.4	2.68		as received	0.2738	AC	71.7	Strong
BPT-BH007		15.00	16.60	C	15.55-15.85	63.4	169.6	2.7	2.73		as received	0.3755	AC	108.0	Very Strong
BPT-BH009		5.10	6.70	C	5.5-5.75	63.4	167.5	2.6	2.70		as received	0.5120	AC	69.1	Strong
BPT-BH010		13.10	14.10	C	13.3-14.1	101.0	258.9	2.6	2.75		as received	0.2913	AC	70.8	Strong
BPT-BH012		6.70	8.10	C	7.55-7.79	63.4	173.9	2.7	2.68		as received	0.4035	AC	57.3	Strong
BPT-BH014		12.70	14.10	C	13.2-13.47	63.4	169.5	2.7	2.70		as received	0.5404	AC	88.6	Strong
BPT-BH015		5.00	6.50	C	5.6-6.2	101.0	257.6	2.6	2.62		as received	0.1520	AC	43.6	Medium Strong
BPT-BH016		8.10	9.60	C	8.6-9.2	101.0	246.4	2.4	2.65		as received	0.2029	AC	27.4	Medium Strong
BPT-BH018		8.00	9.50	C	9.0-9.3	101.0	258.5	2.6	2.62		as received	0.2718	AC	40.8	Medium Strong
BPT-BH018		26.00	27.50	C	26.3-26.45	63.4	168.3	2.7	2.67		as received	0.5396	AC	80.4	Strong
BPT-BH020		26.00	27.50	C	27.0-27.5	101.0	260.2	2.6	2.66		as received	0.2830	AC	46.4	Medium Strong
BPT-BH021		3.50	5.00	C	4.3-4.65	101.0	260.5	2.6	2.75		as received	0.3015	AC	57.0	Strong
BPT-BH022		6.50	8.00	C	7.2-7.6	101.0	260.9	2.6	2.73		as received	0.2261	AC	57.9	Strong
BPT-BH023		9.50	11.00	C	9.6-9.9	101.0	260.1	2.6	2.72		as received	0.3535	AC	114.0	Very Strong
BPT-BH024		21.50	23.00	C	22.0-22.45	101.0	259.3	2.6	2.70		as received	0.2212	MS + AC	52.0	Strong
BPT-BH025		5.00	6.50	C	5.7-6.1	101.0	261.5	2.6	2.71		as received	0.2429	F	53.4	Strong
BPT-BH026		5.00	6.50	C	6.2-6.65	101.0	262.8	2.6	2.73		as received	0.2929	F	85.5	Strong
BPT-BH027		33.50	35.00	C	34.0-34.4	63.4	168.6	2.7	2.63		as received	0.1831	AC	47.6	Medium Strong
BPT-BH028		36.50	38.00	C	37.7-38.0	101.0	259.2	2.6	2.69		as received	0.2365	MS	57.7	Strong
BPT-BH029		6.50	8.00	C	7.1-7.6	101.0	260.7	2.6	2.72		as received	0.3128	F	66.6	Strong
BPT-BH030		5.00	6.50	C	5.7-6.3	101.0	237.3	2.3	2.72		as received	0.1813	F	50.8	Strong
BPT-BH031		6.50	8.00	C	7.3-7.7	101.0	268.8	2.7	2.66		as received	0.1443	AC	41.1	Medium Strong

Notes

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

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

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

above notes apply unless annotated otherwise in the remarks

Mode of failure :

S - Single shear MS - multiple shear

AC - Axial cleavage F - Fragmented

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

Date Printed: 12/09/2022 00:00

Dec 9th 2022

Approved By: Administrator

Table 1 sheet 1

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

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

DETERMINATION OF FLAKINESS INDEX (FI)

In accordance with BS EN 933-3:2012

Sample Details

Description: **Grey Limestone**

Sample Location: **BPT-BH-007** Sample Ref: Sample Type: **C** Depth (m): **6.60**

Date Received by the Lab: **11/11/2022**

Test Details

Mass of Test Portion: **1246.9**

Test Results

Flakiness Index: **19**

Particle Size Fraction (mm)	Flakiness Index
80/100	0
63/80	0
50/63	0
40/50	0
31.5/40	0
25/31.5	0
20/25	0
16/20	0
12.5/16	21
10/12.5	17
8/10	6
6.3/8	25
5/6.3	0
4/5	0

STRUCTURAL SOILS
The Potteries
Pottery Street
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Compiled By		Date
	LUKE FISHER	27/01/23

Contract	Job No
2021OY102WSP2-BPT section	**785325**

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DETERMINATION OF FLAKINESS INDEX (FI)

In accordance with BS EN 933-3:2012

Sample Details

Description: **Grey Limestone**

Sample Location: **BPT-BH019** Sample Ref: Sample Type: **C** Depth (m): **5.00**

Date Received by the Lab: **11/11/2022**

Test Details

Mass of Test Portion: **1236.4**

Test Results

Flakiness Index: **14**

Particle Size Fraction (mm)	Flakiness Index
80/100	0
63/80	0
50/63	0
40/50	0
31.5/40	0
25/31.5	0
20/25	0
16/20	0
12.5/16	16
10/12.5	12
8/10	23
6.3/8	23
5/6.3	23
4/5	23

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PARTICLE DENSITY & WATER ABSORPTION

In accordance with BS EN 1097-6:2000 Method 8

Sample Details

Sample Description: **Grey Limestone**

Sample Location: **BPT-BH007**

Sample ID

Sample Ref:

Sample Type: **C**

Sample Depth (m): **6.60**

Test Details

Test Start Date: **16/12/2022**

Test End Date: **19/12/2022**

Size Fraction Tested: **4 mm - 31.5 mm**

Test Result

Oven-dried particle density (Mg/m^3): **2.65**

Saturated surface-dried particle density (Mg/m^3): **2.67**

Apparent particle density (Mg/m^3): **2.7**

Water absorption (%): **0.8**

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Compiled By		Date
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PARTICLE DENSITY & WATER ABSORPTION

In accordance with BS EN 1097-6:2000 Method 8

Sample Details

Sample Description: **Grey LIMESTONE**

Sample Location: **BPT-BH019**

Sample ID

Sample Ref: **1**

Sample Type: **C**

Sample Depth (m): **5.00**

Test Details

Test Start Date: **16/12/2022**

Test End Date: **19/12/2022**

Size Fraction Tested: **4 mm - 31.5 mm**

Test Result

Oven-dried particle density (Mg/m^3): **2.66**

Saturated surface-dried particle density (Mg/m^3): **2.68**

Apparent particle density (Mg/m^3): **2.7**

Water absorption (%): **0.7**

STRUCTURAL SOILS
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Compiled By		Date
	LAURA SCHRAMM	31/03/23

Contract	Job No
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LOS ANGELES COEFFICIENT (LA)

In accordance with BS EN 1097-2:2020

Sample Details

Sample Description: **Grey Limestone**

Sample Location: **BPT-BH-003**

Sample ID

Sample Ref: **1**

Sample Type: **C**

Sample Depth (m): **3.60**

Test Details

Size fractions from which the portion was obtained: **10/11.2mm 11.2/14mm**

Test Result

Los Angeles Value (LAV): **26**

Remarks

Non-standard notes: **Non-Standard Test due to insufficient material**

STRUCTURAL SOILS
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Pottery Street
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Compiled By		Date
	LAURA SCHRAMM	06/02/23

Contract	Job No
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LOS ANGELES COEFFICIENT (LA)

In accordance with BS EN 1097-2:2020

Sample Details

Sample Description: **Grey LIMESTONE**

Sample Location: **BPT-BH005**

Sample ID

Sample Ref:

Sample Type: **C**

Sample Depth (m): **2.00**

Test Details

Size fractions from which the portion was obtained: **10/11.2mm 11.2/14mm**

Test Start Date: **27/03/2023**

Test Result

Los Angeles Value (LAV): **23**

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Compiled By		Date
	LORNA WHITWORTH	31/03/23

Contract	Job No
2021OY102 WSP Eastern & Midlands Region - Lot 2	**785325**

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LOS ANGELES COEFFICIENT (LA)

In accordance with BS EN 1097-2:2020

Sample Details

Sample Description: **Grey Limestone**

Sample Location: **BPT-BH007**

Sample ID

Sample Ref:

Sample Type: **C**

Sample Depth (m): **6.60**

Test Details

Size fractions from which the portion was obtained: **10/11.2mm 11.2/14mm**

Test Result

Los Angeles Value (LAV): **24**

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Compiled By		Date
	LAURA SCHRAMM	31/03/23

Contract	Job No
2021OY102 WSP Eastern & Midlands Region - Lot 2	**785325**

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LOS ANGELES COEFFICIENT (LA)

In accordance with BS EN 1097-2:2020

Sample Details

Sample Description: **Grey LIMESTONE**

Sample Location: **BPT-BH009**

Sample ID

Sample Ref: **1**

Sample Type: **C**

Sample Depth (m): **2.00**

Test Details

Size fractions from which the portion was obtained: **10/11.2mm 11.2/14mm**

Test Result

Los Angeles Value (LAV): **24**

Remarks

Non-standard notes: **Non-Standard Test due to insufficient material**

STRUCTURAL SOILS
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Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
	LAURA SCHRAMM	31/03/23

Contract	Job No
2021OY102 WSP Eastern & Midlands Region - Lot 2	**785325**

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LOS ANGELES COEFFICIENT (LA)

In accordance with BS EN 1097-2:2020

Sample Details

Sample Description: **Grey Limestone**

Sample Location: **BPT-BH010**

Sample ID

Sample Ref:

Sample Type: **C**

Sample Depth (m): **7.50**

Test Details

Size fractions from which the portion was obtained: **10/11.2mm 11.2/14mm**

Test Result

Los Angeles Value (LAV): **24**

Remarks

Non-standard notes: **Non-Standard Test due to insufficient material**

STRUCTURAL SOILS
The Potteries
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Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
	LAURA SCHRAMM	06/02/23

Contract	Job No
2021OY102WSP2-BPT section	785325

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LOS ANGELES COEFFICIENT (LA)

In accordance with BS EN 1097-2:2020

Sample Details

Sample Description: **Grey LIMESTONE**

Sample Location: **BPT-BH011**

Sample ID

Sample Ref: **1**

Sample Type: **C**

Sample Depth (m): **2.00**

Test Details

Size fractions from which the portion was obtained: **10/11.2mm 11.2/14mm**

Test Result

Los Angeles Value (LAV): **24**

Remarks

Non-standard notes: **Non-Standard Test due to insufficient material**

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
	LAURA SCHRAMM	06/02/23
Contract: 2021OY102WSP2-BPT section		Job No: 785325

GINT_LIBRARY_V10_01.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | GrfcText L - AGG - LA - A4P | 785325 - 2021OY102WSP2-BPT SECTION.GPJ - v10_01.
Structural Soils Ltd, Branch Office - Castleford: The Potteries, Pottery Street, Castleford, West Yorkshire, WF10 1NJ. Tel: 01977-552255, Fax: 01977-552299, Web: www.soils.co.uk, Email: ask@soils.co.uk. | 06/02/23 - 14:42 | LS5 |

LOS ANGELES COEFFICIENT (LA)

In accordance with BS EN 1097-2:2020

Sample Details

Sample Description: **Grey Limestone**

Sample Location: **BPT-BH014**

Sample ID

Sample Ref: **1**

Sample Type: **C**

Sample Depth (m): **8.10**

Test Details

Size fractions from which the portion was obtained: **10/11.2mm 11.2/14mm**

Test Result

Los Angeles Value (LAV): **24**

Remarks

Non-standard notes: **Non-Standard Test due to insufficient material**

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
	LAURA SCHRAMM	06/02/23
Contract: 2021OY102WSP2-BPT section		Job No: 785325

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LOS ANGELES COEFFICIENT (LA)

In accordance with BS EN 1097-2:2020

Sample Details

Sample Description: **Grey Limestone**

Sample Location: **BPT-BH019**

Sample ID

Sample Ref:

Sample Type: **C**

Sample Depth (m): **5.00**

Test Details

Size fractions from which the portion was obtained: **10/11.2mm 11.2/14mm**

Test Result

Los Angeles Value (LAV): **25**

Remarks

Non-standard notes: **Non-Standard Test due to insufficient material**

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The Potteries
Pottery Street
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W. Yorkshire WF10 1NJ

Compiled By		Date
	LAURA SCHRAMM	06/02/23
Contract: 2021OY102WSP2-BPT section		Job No: 785325

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LOS ANGELES COEFFICIENT (LA)

In accordance with BS EN 1097-2:2020

Sample Details

Sample Description: **Grey Limestone**

Sample Location: **BPT-BH019**

Sample ID

Sample Ref:

Sample Type: **C**

Sample Depth (m): **14.00**

Test Details

Size fractions from which the portion was obtained: **10/11.2mm 11.2/14mm**

Test Result

Los Angeles Value (LAV): **26**

Remarks

Non-standard notes: **Non-Standard Test due to insufficient material**

STRUCTURAL SOILS
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W. Yorkshire WF10 1NJ

Compiled By		Date
	LAURA SCHRAMM	06/02/23

Contract	Job No
2021OY102WSP2-BPT section	785325

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LOS ANGELES COEFFICIENT (LA)

In accordance with BS EN 1097-2:2020

Sample Details

Sample Description: **Grey Limestone**

Sample Location: **BPT-BH021**

Sample ID

Sample Ref:

Sample Type: **C**

Sample Depth (m): **11.00**

Test Details

Size fractions from which the portion was obtained: **10/11.2mm 11.2/14mm**

Test Result

Los Angeles Value (LAV): **25**

Remarks

Non-standard notes: **Non-Standard Test due to insufficient material**

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Compiled By		Date
	LAURA SCHRAMM	06/02/23
Contract: 2021OY102WSP2-BPT section	Job No: 785325	

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LOS ANGELES COEFFICIENT (LA)

In accordance with BS EN 1097-2:2020

Sample Details

Sample Description: **Grey Limestone**

Sample Location: **BPT-BH022**

Sample ID

Sample Ref:

Sample Type: **C**

Sample Depth (m): **5.00**

Test Details

Size fractions from which the portion was obtained: **10/11.2mm 11.2/14mm**

Test Result

Los Angeles Value (LAV): **26**

STRUCTURAL SOILS
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W. Yorkshire WF10 1NJ

Compiled By		Date
	LAURA SCHRAMM	**06/02/23**
Contract: **2021OY102WSP2-BPT section**	Job No: **785325**	

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LOS ANGELES COEFFICIENT (LA)

In accordance with BS EN 1097-2:2020

Sample Details

Sample Description: **Grey Limestone**

Sample Location: **BPT-BH026**

Sample ID

Sample Ref: **C1**

Sample Type: **C**

Sample Depth (m): **8.00**

Test Details

Size fractions from which the portion was obtained: **10/11.2mm 11.2/14mm**

Test Result

Los Angeles Value (LAV): **24**

Remarks

Non-standard notes: **Non-Standard Test due to insufficient material**

STRUCTURAL SOILS
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Compiled By		Date
	LAURA SCHRAMM	06/02/23

Contract	Job No
2021OY102WSP2-BPT section	785325

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LOS ANGELES COEFFICIENT (LA)

In accordance with BS EN 1097-2:2020

Sample Details

Sample Description: **Grey Limestone**

Sample Location: **BPT-BH029**

Sample ID

Sample Ref: **2**

Sample Type: **C**

Sample Depth (m): **2.00**

Test Details

Size fractions from which the portion was obtained: **10/11.2mm 11.2/14mm**

Test Result

Los Angeles Value (LAV): **25**

Remarks

Non-standard notes: **Non-Standard Test due to insufficient material**

STRUCTURAL SOILS
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Compiled By		Date
	LAURA SCHRAMM	06/02/23

Contract	Job No
2021OY102WSP2-BPT section	**785325**

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LOS ANGELES COEFFICIENT (LA)

In accordance with BS EN 1097-2:2020

Sample Details

Sample Description: **Grey Limestone**

Sample Location: **BPT-BH030**

Sample ID

Sample Ref: **1**

Sample Type: **C**

Sample Depth (m): **2.00**

Test Details

Size fractions from which the portion was obtained: **10/11.2mm 11.2/14mm**

Test Result

Los Angeles Value (LAV): **25**

Remarks

Non-standard notes: **Non-Standard Test due to insufficient material**

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Compiled By		Date
	LAURA SCHRAMM	06/02/23
Contract: **2021OY102WSP2-BPT section**	Job No: **785325**	

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TEST REPORT

SLAKE DURABILITY INDEX

In accordance with ISRM 2007

Location ID: **BPT-BH005**

Sample Ref:

Sample Type: **C**

Depth (m): **2.00**

Sample Description: **Grey LIMESTONE**

Slaking Fluid Used: **Tap water**

Slaking Fluid Temperature (°C): **20**

First Cycle

Slake Durability (%): **99.5**

Description of Fragments in Drum: **Sub-angular**

Description of Material Passing Drum: **Fine sand and silt**

Second Cycle

Slake Durability (%): **99.1**

Description of Fragments in Drum: **Sub-angular**

Description of Material Passing Drum: **Fine sand and silt**

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Francesca Bennett	**FRANCESCA BENNETT**	**17/03/23**

Contract	Job No
2021OY102 WSP Eastern & Midlands Region - Lot 2	**785325**

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TEST REPORT

SLAKE DURABILITY INDEX

In accordance with ISRM 2007

Location ID: **BPT-BH007**

Sample Ref:

Sample Type: **C**

Depth (m): **6.60**

Sample Description: **Grey LIMESTONE**

Slaking Fluid Used: **Tap water**

Slaking Fluid Temperature (°C): **20**

First Cycle

Slake Durability (%): **99.4**

Description of Fragments in Drum: **Angular**

Description of Material Passing Drum: **Fine sand and silt**

Second Cycle

Slake Durability (%): **99.0**

Description of Fragments in Drum: **Sub-angular**

Description of Material Passing Drum: **Fine sand and silt**

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Francesca Bennett	**FRANCESCA BENNETT**	**05/02/23**

Contract	Job No
2021OY102WSP2-BPT section	**785325**

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TEST REPORT

SLAKE DURABILITY INDEX

In accordance with ISRM 2007

Location ID: **BPT-BH010**

Sample Ref:

Sample Type: **C**

Depth (m): **7.50**

Sample Description: **Grey LIMESTONE**

Slaking Fluid Used: **Tap water**

Slaking Fluid Temperature (°C): **20**

First Cycle

Slake Durability (%): **99.8**

Description of Fragments in Drum: **Sub-angular**

Description of Material Passing Drum: **Fine sand and silt**

Second Cycle

Slake Durability (%): **99.3**

Description of Fragments in Drum: **Sub-angular**

Description of Material Passing Drum: **Fine sand and silt**

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Contract	Job No
2021OY102 WSP Eastern & Midlands Region - Lot 2	**785325**

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TEST REPORT

SLAKE DURABILITY INDEX

In accordance with ISRM 2007

Location ID: **BPT-BH011**

Sample Ref:

Sample Type: **C**

Depth (m): **2.00**

Sample Description: **Grey LIMESTONE**

Slaking Fluid Used: **Tap water**

Slaking Fluid Temperature (°C): **20**

First Cycle

Slake Durability (%): **98.9**

Description of Fragments in Drum: **Sub-angular**

Description of Material Passing Drum: **Fine sand and silt**

Second Cycle

Slake Durability (%): **98.6**

Description of Fragments in Drum: **Sub-angular**

Description of Material Passing Drum: **Fine sand and silt**

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TEST REPORT

SLAKE DURABILITY INDEX

In accordance with ISRM 2007

Location ID: **BPT-BH019**

Sample Ref:

Sample Type: **C**

Depth (m): **5.00**

Sample Description: **Grey LIMESTONE**

Slaking Fluid Used: **Tap water**

Slaking Fluid Temperature (°C): **20**

First Cycle

Slake Durability (%): **99.6**

Description of Fragments in Drum: **Angular**

Description of Material Passing Drum: **Fine sand and silt**

Second Cycle

Slake Durability (%): **99.3**

Description of Fragments in Drum: **Angular**

Description of Material Passing Drum: **Fine sand and silt**

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Compiled By		Date
Francesca Bennett	**FRANCESCA BENNETT**	**17/03/23**

Contract	Job No
2021OY102 WSP Eastern & Midlands Region - Lot 2	**785325**

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DEFORMABILITY OF ROCK IN UNIAXIAL COMPRESSION

Preparation in accordance with ASTM D4543-19
Testing in accordance with ISRM 1974-2006

Borehole: **BPT-BH013** Sample Ref: Sample Type: **C** Depth (m): **5.10**

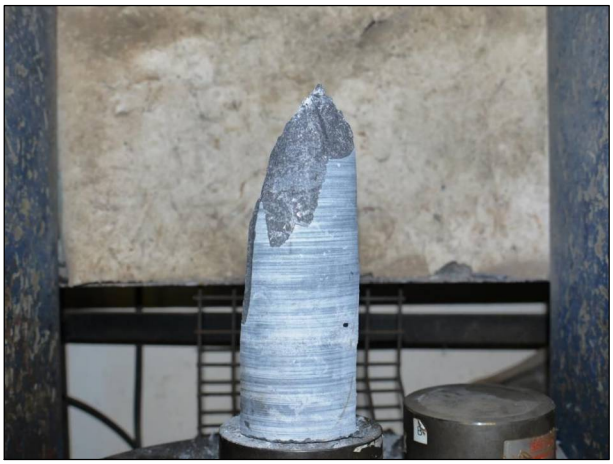
Bulk Density (Mg/m^3): **2.73** Dry Density (Mg/m^3): **2.73** Moisture Content (%): **0.06**
Length (mm): **168.72** Diameter (mm): **63.42** Length/Diameter Ratio: **2.66**
Test Duration (mins:secs): **11:08** Stress Rate (MPa/s): **0.1900** Load at Failure (kN): **423.6**
UCS (MPa): **134.1** Failure Type: **Multiple fracture**

Note: **Axis of loading parallel to core axis**
Description: **Grey LIMESTONE**
Specimen Preparation: **Specimen was not recored.**
Sample tolerance checks: Straightness: **PASS**. Flatness: **PASS**. Perpendicularity: **PASS**.

Front view (pre-test)

Rear view (pre-test)

Front view (post-test)



Rear view (post-test)

Samples delivered from site to storage facility. Samples are stored in a frost free environment, at temperatures >4°C
Compression machine: Impact CT340 2000kN Auto Compression Machine Serial No. CT340-22. SSL No. 011076

STRUCTURAL SOILS
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Compiled By		Date
Francesca Bennett	FRANCESCA BENNETT	05/02/23

Contract	Job No
2021OY102WSP2-BPT section	**785325**

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STRUCTURAL SOILS
1A Princess Street
Bristol BS3 4AG

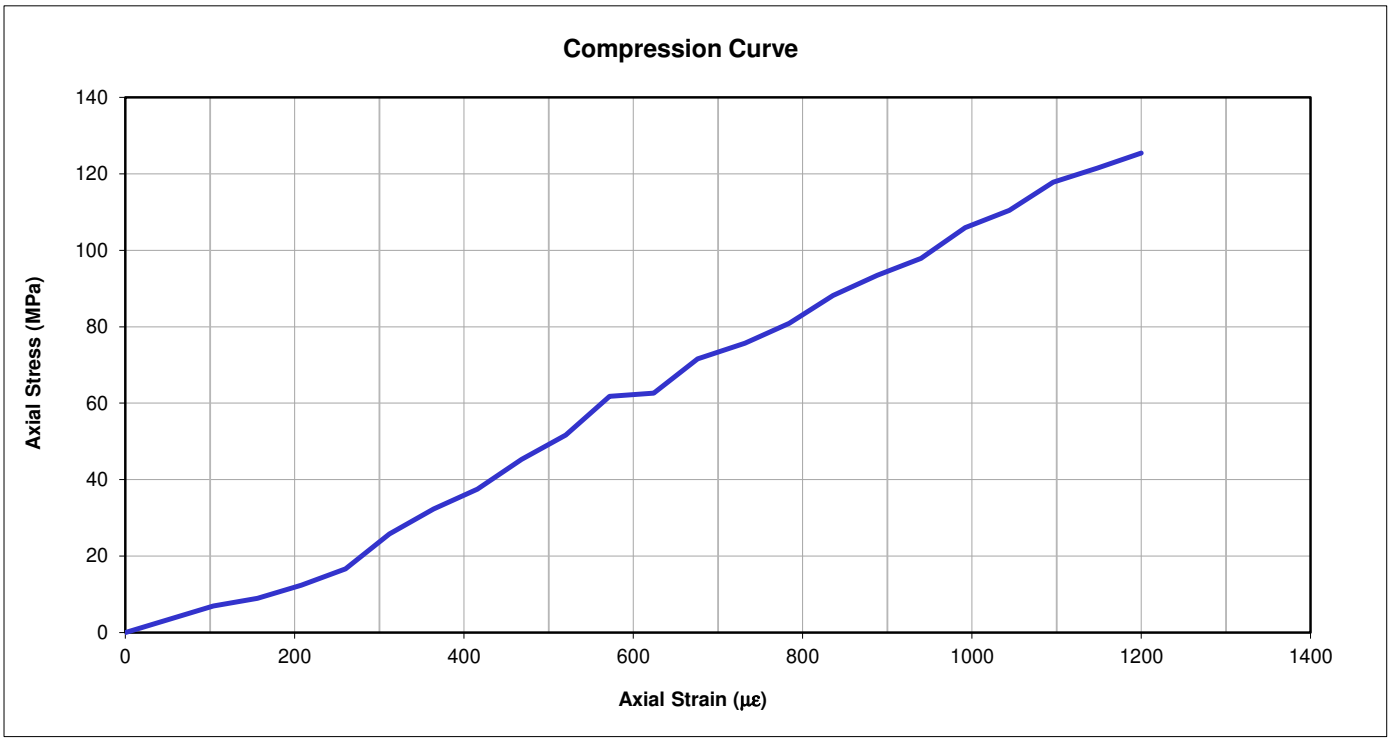
Test Date 06/12/2022

UNIAXIAL COMPRESSION TEST with DEFORMATION

In accordance with ISRM 1974-2006

Job No	765325	Cross section area	31.59 cm^2
Site	2021OY102WSP2-BPT Section	Height	168.72 mm
BH No	BPT-BH013	Max logged strength	125.42 MPa
Specimen Depth	5.10 - 6.50m	E_{tan} (*)	15.83 GPa
Specimen Type	C	E_{sec} (^)	100.35 GPa
(*) Calculated for axial σ =	62.71 MPa		
(^) Calculated for axial σ =	62.71 MPa		

NB 'Max logged strength' is the maximum value captured by the data logging process for the Youngs/Poissons measurement portion of the test. It is often less than the final strength of the specimen



STRUCTURAL SOILS
1A Princess Street
Bristol BS3 4AG

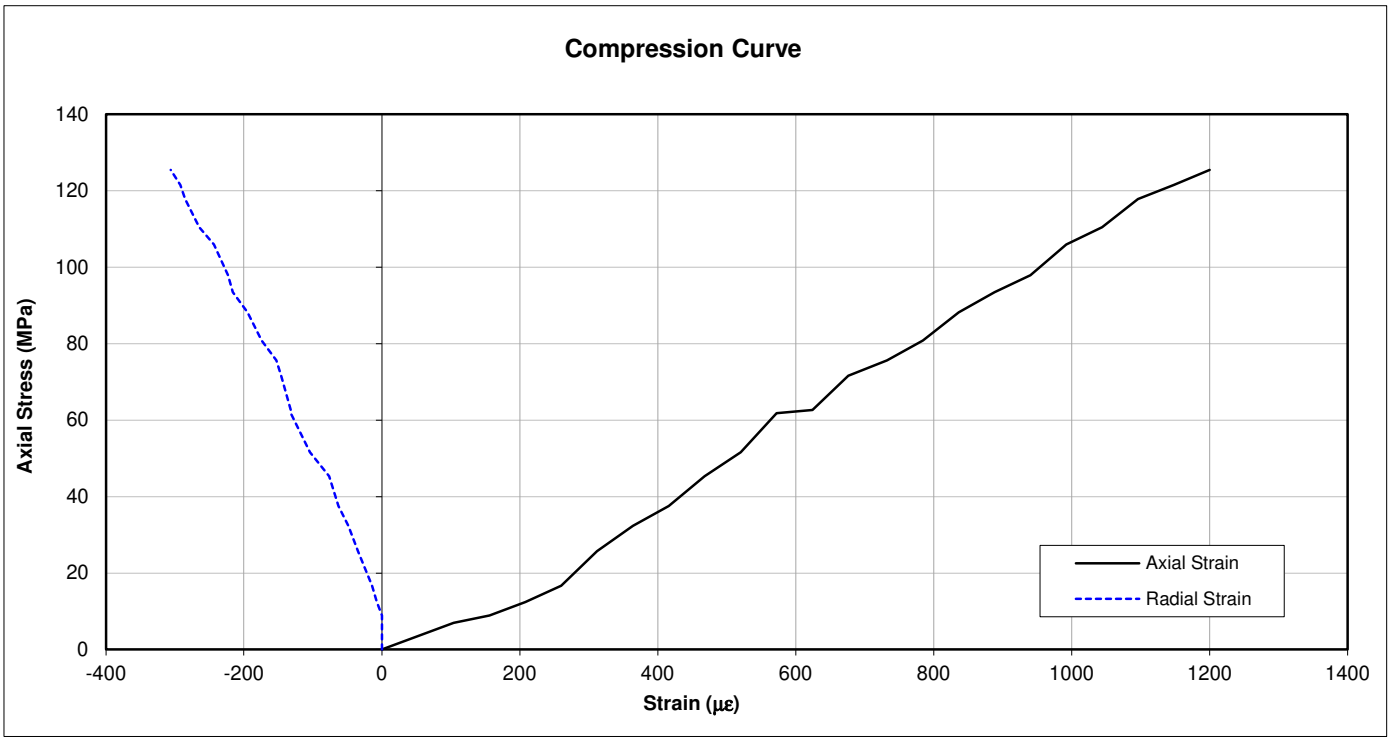
Test Date 06/12/2022

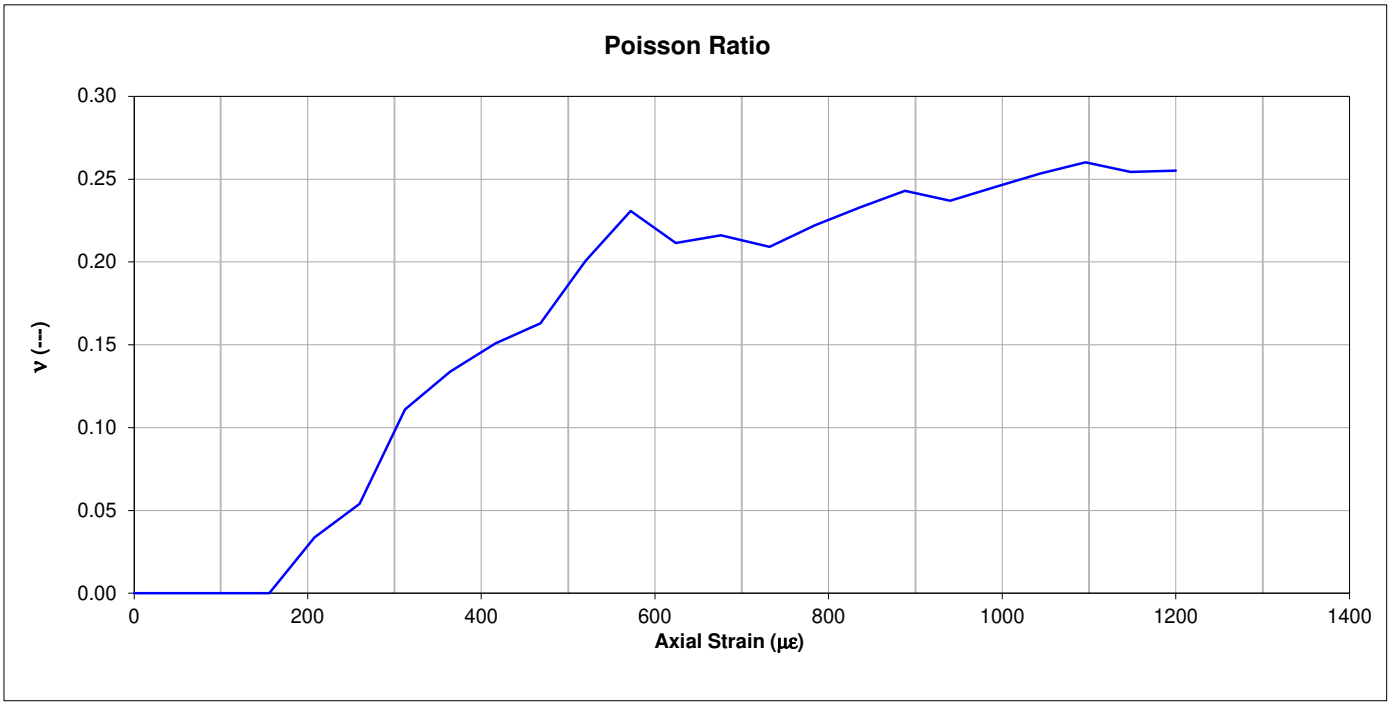
UNIAXIAL COMPRESSION TEST with DEFORMATION

In accordance with ISRM 1974-2006 and ASTM D4543-08

Job No	765325	Cross section area	31.59 cm^2
Site	2021OY102WSP2-BPT Section	Height	168.72 mm
BH No	BPT-BH013	Max logged strength	125.42 MPa
Specimen Depth	5.10 - 6.50m	Poisson at failure	0.255
Specimen Type	C	Poisson (*)	0.212
(*) Calculated for axial σ =	62.71 MPa		

NB 'Max logged strength' is the maximum value captured by the data logging process for the Youngs/Poissons measurement portion of the test. It is often less than the final strength of the specimen





SUMMARY OF INDIRECT TENSILE STRENGTH BY THE BRAZIL TEST

In accordance with ISRM Suggested Methods

Borehole: **BPT-BH022** Sample Type: **C** Depth (m): **5.00**

Bulk Density (Mg/m^3): **2.66** Dry Density (Mg/m^3): **2.66** Moisture Content (%): **0.06**

Sample Diameter (mm): **63.52** Sample Thickness (mm): **25.87** Thickness/Diameter Ratio: **0.41**

Orientation of loading: **Diametral** Load Rate (kN/s): **0.30** Test duration (secs): **47**

Load at Failure (kN): **21.9** Tensile Strength (MPa): **8.48**

Description: **Grey LIMESTONE**

Loading / Foliation relationship: **NA**

Failure notes: **None**

Post-test photo

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	A.D. Frost	**ALAN FROST**	**17/03/23**
	Contract **2021OY102 WSP Eastern & Midlands Region - Lot 2**	Job No **785325**	

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DIRECT SHEAR STRENGTH TEST OF ROCK UNDER CONSTANT NORMAL STRESS

In house method based on ASTM D5607-95, and Rock Slope Engineering, Revised 3rd edition (1981).

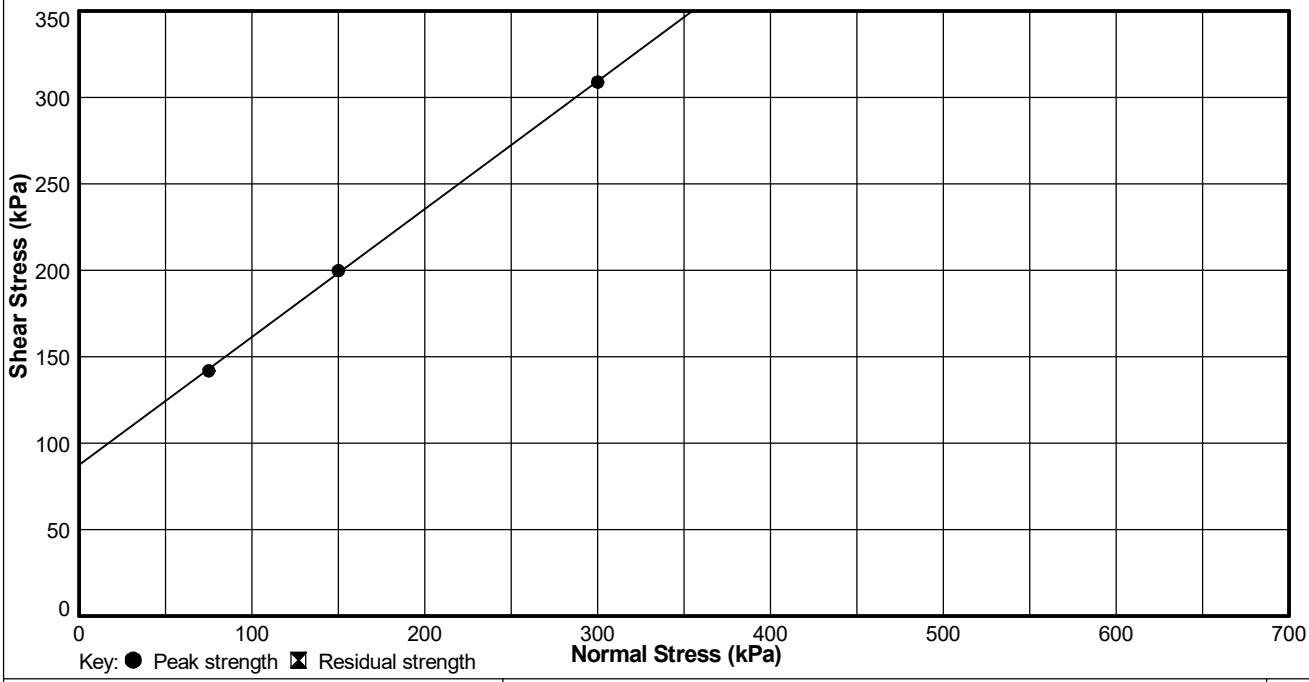
SAMPLE DETAILS	
Borehole :	BPT-BH001
Sample Ref :	
Depth (m) :	6.65
Type of Discontinuity :	Saw cut
Initial Cross Sectional Area (m^2) :	0.00311
Type of Encapsulating Material :	Gypsum Plaster
Description :	Grey LIMESTONE
Remarks :	None

JOINT ROUGHNESS COEFFICIENT		
	Pre-test	Post-test
Upper Surface of Discontinuity :	0-2	0-2
Lower Surface of Discontinuity :	0-2	0-2

LOADING DETAILS	1	2	3	4	5
Normal Stress (kPa) :	75	150	300	NA	NA
Shear Stress (kPa) :	142	200	309	NA	NA
Residual Stress (kPa) :	NA	NA	NA	NA	NA
Normal Displacement (mm) :	0.1	0.1	0.1	NA	NA
Shear Displacement at Peak Load (mm) :	14.2	14.8	15.6	NA	NA

APPARENT FRICTION ANGLE	
Peak Stress (degrees) :	**36.5**
Residual Stress (degrees) :	**NA**

SHEAR STRESS COHESION	
Peak Stress (kPa) :	**87.5**
Residual Stress (kPa) :	**NA**



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1a Princess Street
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Compiled By	Date
DAISY RICHARDS	17/03/23

Contract	Contract Ref:
2021OY102 WSP Eastern & Midlands Region - Lot 2	**785325**

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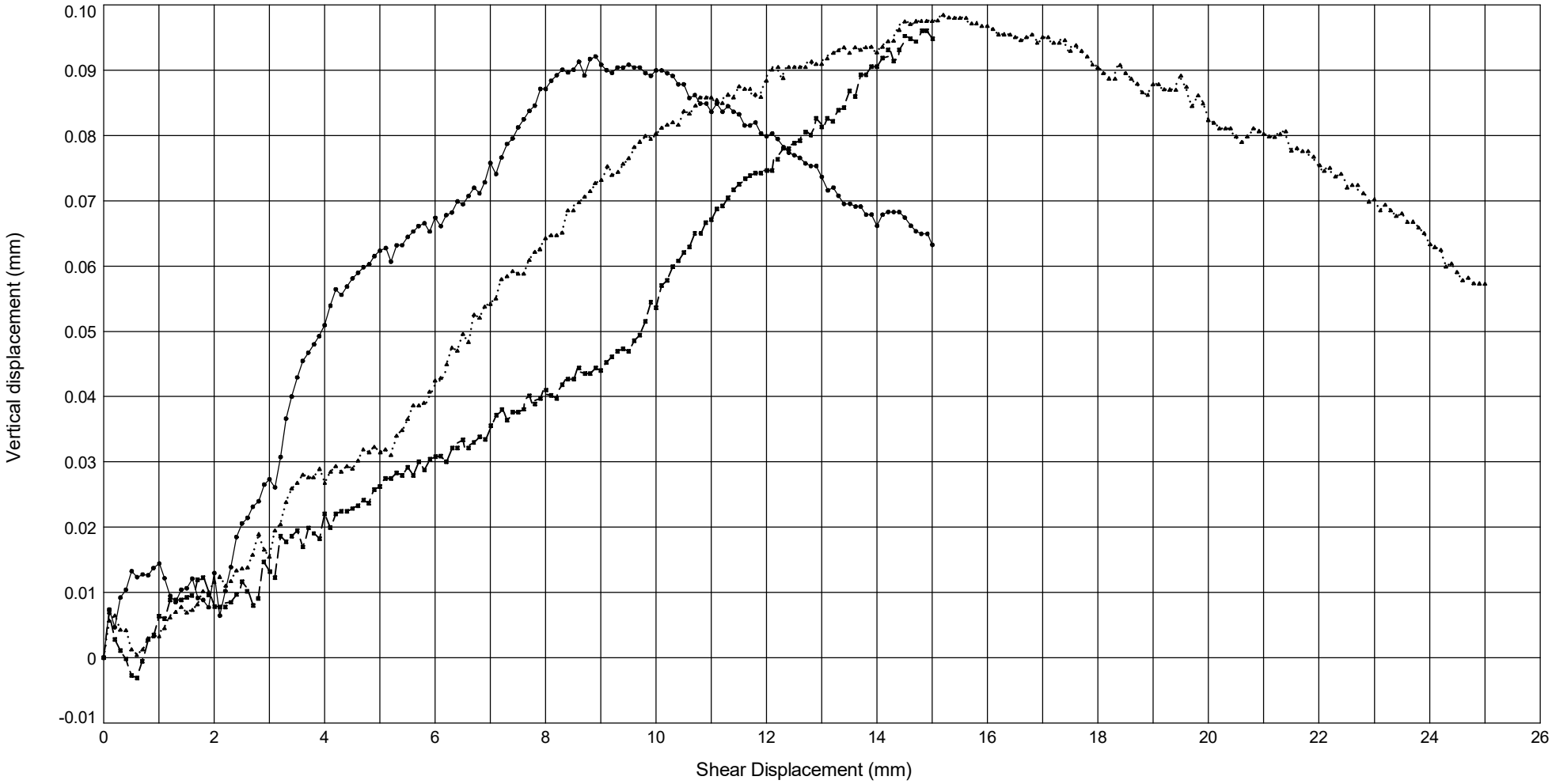
DIRECT SHEAR STRENGTH OF ROCK UNDER CONSTANT NORMAL STRESS

In house method based on ASTM D5607-95, and Rock Slope Engineering, Revised 3rd edition (1981).

Hole ID : **BPT-BH001** Sample Ref : Sample Type : **C** Depth (m) : **6.65**



Legend: ● Stage 1, ⧓ Stage 2, ▲ Stage 3, ★ Stage 4

STRUCTURAL SOILS
1a Princess Street
Bedminster
Bristol
BS3 4AG

Compiled By		Date	Contract Ref:
D. Richards	**DAISY RICHARDS**	**17.03.23**	**785325**

Contract

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AGS

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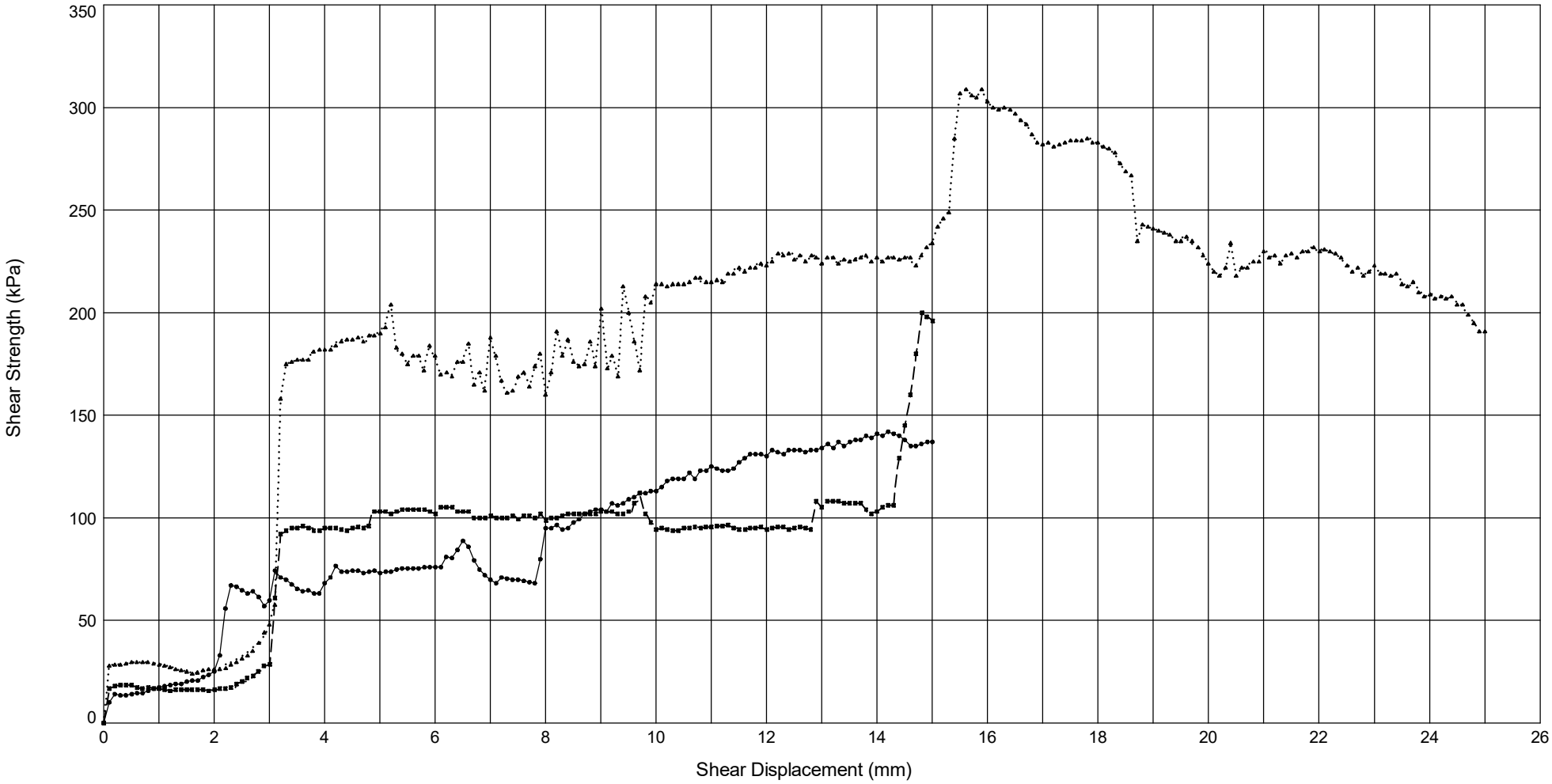
DIRECT SHEAR STRENGTH OF ROCK UNDER CONSTANT NORMAL STRESS

In house method based on ASTM D5607-95, and Rock Slope Engineering, Revised 3rd edition (1981).

Hole ID : **BPT-BH001** Sample Ref : Sample Type : **C** Depth (m) : **6.65**



Legend: ● Stage 1, ⧓ Stage 2, ▲ Stage 3, ★ Stage 4

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Compiled By		Date
D. Richards	**DAISY RICHARDS**	**17.03.23**

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DIRECT SHEAR STRENGTH TEST OF ROCK UNDER CONSTANT NORMAL STRESS

In house method based on ASTM D5607-95, and Rock Slope Engineering, Revised 3rd edition (1981).

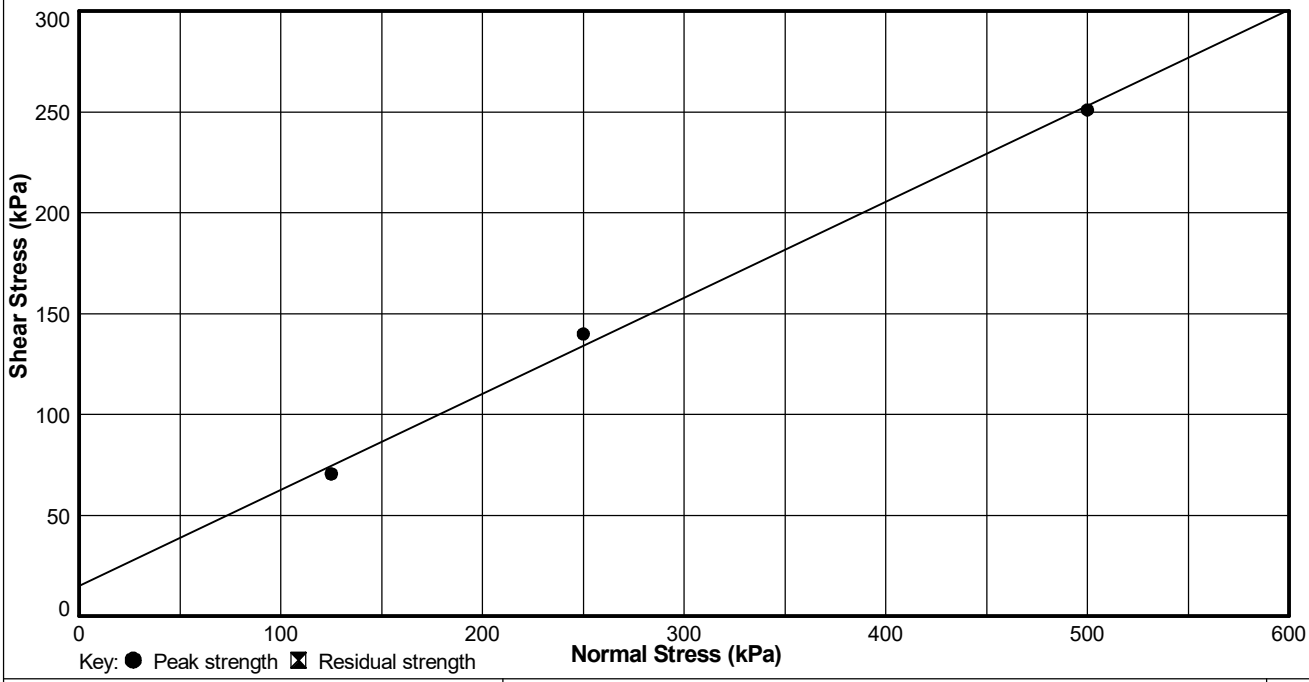
SAMPLE DETAILS	
Borehole :	BPT-BH019
Sample Ref :	
Depth (m) :	9.50
Type of Discontinuity :	Saw cut
Initial Cross Sectional Area (m^2) :	0.00807
Type of Encapsulating Material :	Gypsum Plaster
Description :	Grey LIMESTONE
Remarks :	None

JOINT ROUGHNESS COEFFICIENT		
	Pre-test	Post-test
Upper Surface of Discontinuity :	0-2	0-2
Lower Surface of Discontinuity :	0-2	0-2

LOADING DETAILS	1	2	3	4	5
Normal Stress (kPa) :	125	250	500	NA	NA
Shear Stress (kPa) :	71	140	251	NA	NA
Residual Stress (kPa) :	NA	NA	NA	NA	NA
Normal Displacement (mm) :	0.0	0.1	0.1	NA	NA
Shear Displacement at Peak Load (mm) :	14.8	29.8	44.2	NA	NA

APPARENT FRICTION ANGLE	
Peak Stress (degrees) :	**25.4**
Residual Stress (degrees) :	**NA**

SHEAR STRESS COHESION	
Peak Stress (kPa) :	**15.1**
Residual Stress (kPa) :	**NA**



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Francesca Bennett	FRANCESCA BENNETT	05/02/23
Contract: **2021OY102WSP2-BPT section**	Contract Ref: **785325**	

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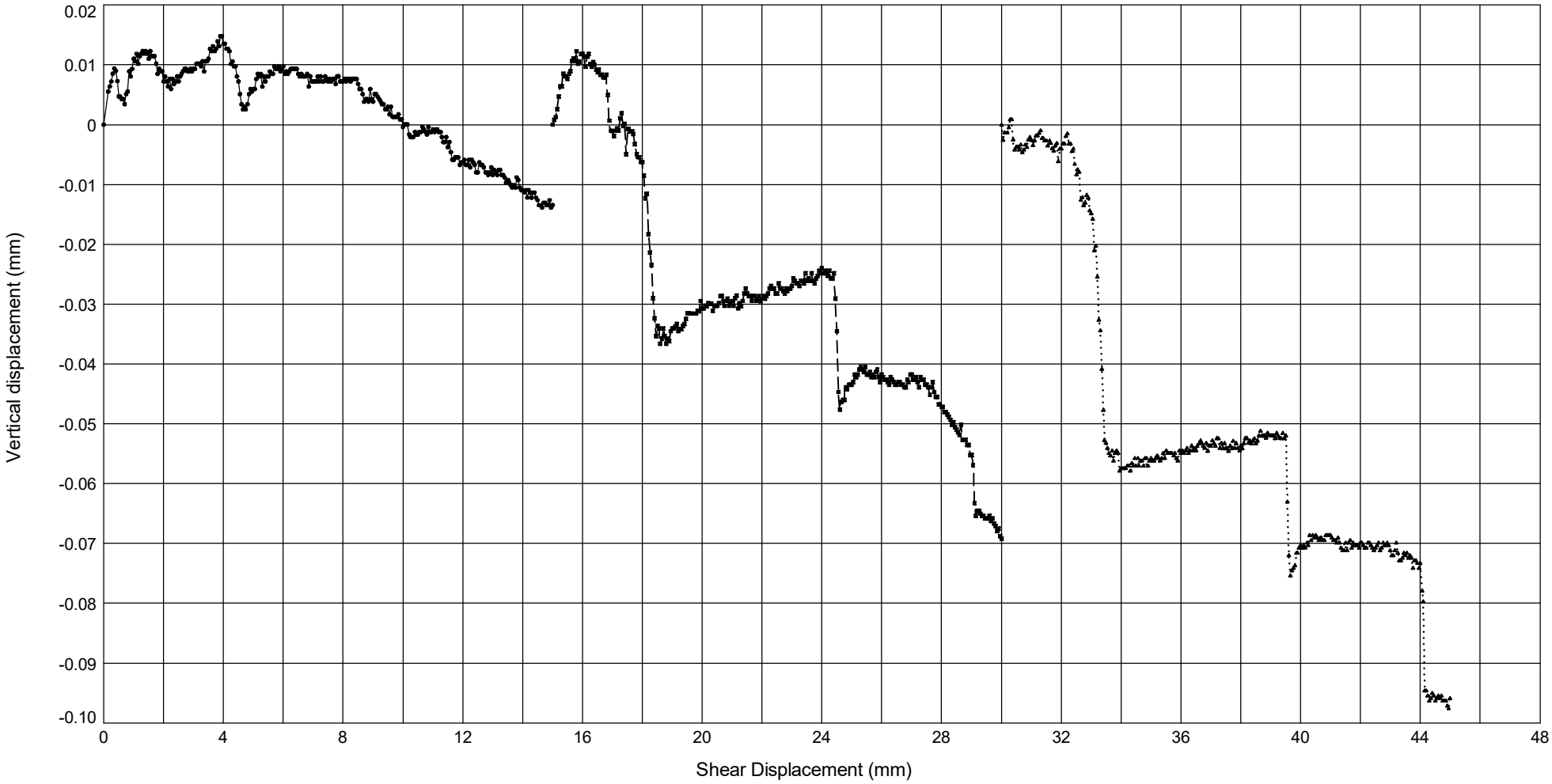
DIRECT SHEAR STRENGTH OF ROCK UNDER CONSTANT NORMAL STRESS

In house method based on ASTM D5607-95, and Rock Slope Engineering, Revised 3rd edition (1981).

Hole ID : **BPT-BH019** Sample Ref : Sample Type : **C** Depth (m) : **9.50**



Legend: ● Stage 1, ⧓ Stage 2, ▲ Stage 3, ★ Stage 4

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Bedminster
Bristol
BS3 4AG

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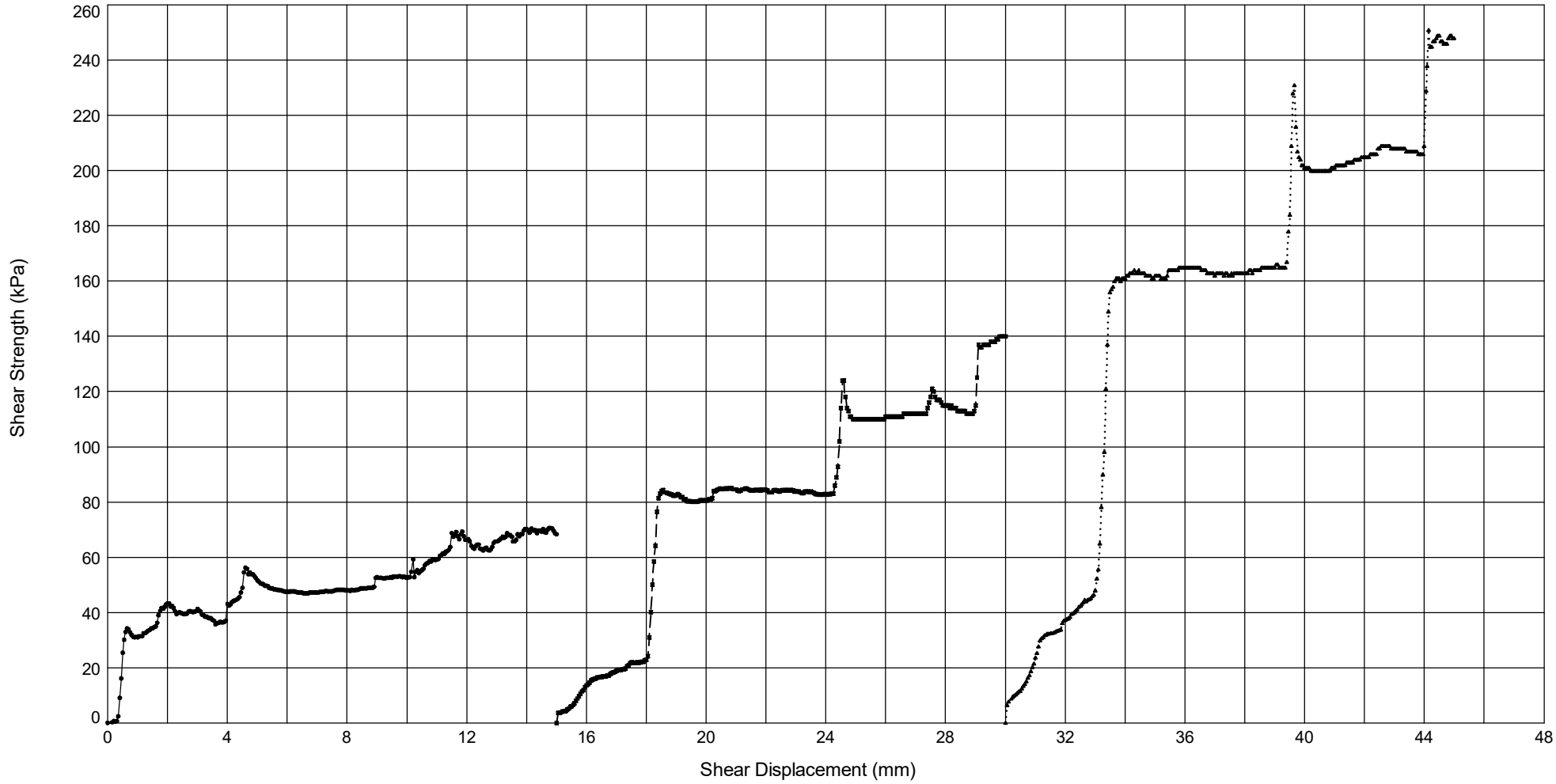
DIRECT SHEAR STRENGTH OF ROCK UNDER CONSTANT NORMAL STRESS

In house method based on ASTM D5607-95, and Rock Slope Engineering, Revised 3rd edition (1981).

Hole ID : **BPT-BH019** Sample Ref : Sample Type : **C** Depth (m) : **9.50**



Legend: ● Stage 1, ⧓ Stage 2, ▲ Stage 3, ★ Stage 4

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DIRECT SHEAR STRENGTH TEST OF ROCK UNDER CONSTANT NORMAL STRESS

In house method based on ASTM D5607-95, and Rock Slope Engineering, Revised 3rd edition (1981).

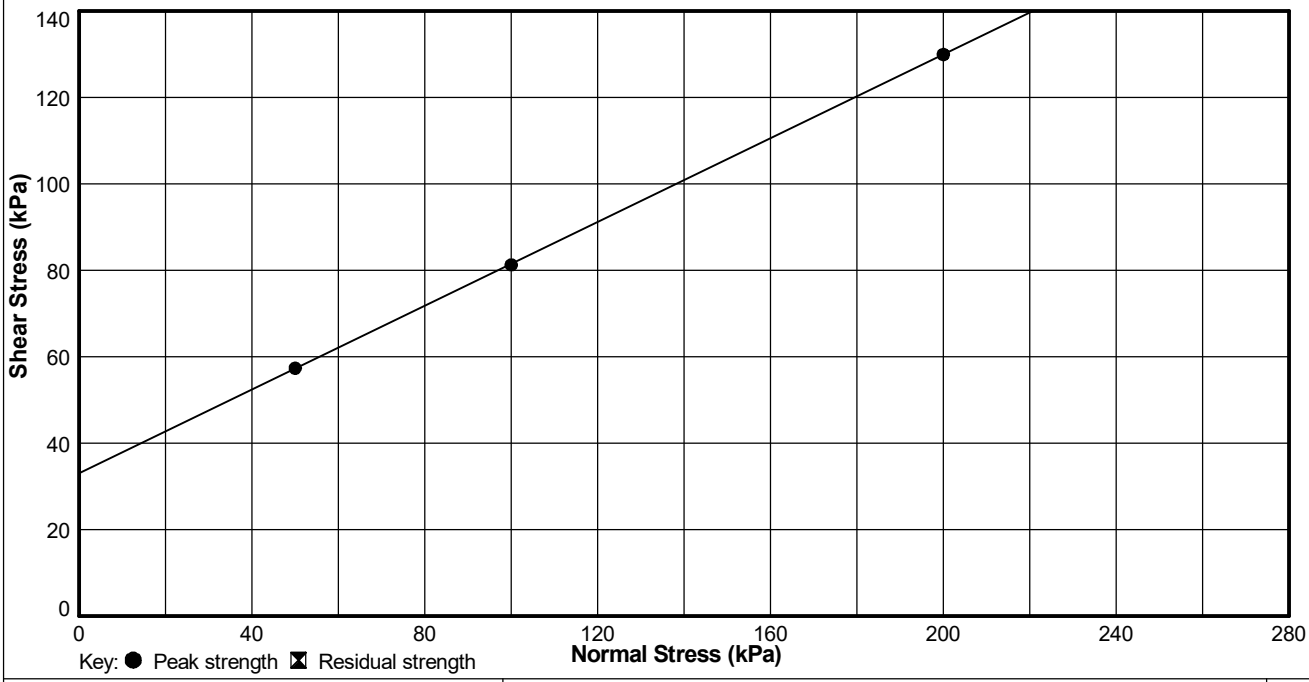
SAMPLE DETAILS	
Borehole :	BPT-BH021
Sample Ref :	
Depth (m) :	3.50
Type of Discontinuity :	Saw cut
Initial Cross Sectional Area (m^2) :	0.00814
Type of Encapsulating Material :	Gypsum Plaster
Description :	Grey LIMESTONE
Remarks :	None

JOINT ROUGHNESS COEFFICIENT	Pre-test	Post-test
Upper Surface of Discontinuity :	0-2	0-2
Lower Surface of Discontinuity :	0-2	0-2

LOADING DETAILS	1	2	3	4	5
Normal Stress (kPa) :	50	100	200	NA	NA
Shear Stress (kPa) :	57	81	130	NA	NA
Residual Stress (kPa) :	NA	NA	NA	NA	NA
Normal Displacement (mm) :	0.0	0.1	0.1	NA	NA
Shear Displacement at Peak Load (mm) :	8.1	28.5	43.5	NA	NA

APPARENT FRICTION ANGLE	
Peak Stress (degrees) :	**25.8**
Residual Stress (degrees) :	**NA**

SHEAR STRESS COHESION	
Peak Stress (kPa) :	**33.1**
Residual Stress (kPa) :	**NA**



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Bedminster
Bristol
BS3 4AG

Compiled By		Date
Francesca Bennett	FRANCESCA BENNETT	05/02/23

Contract	Contract Ref:
2021OY102WSP2-BPT section	**785325**

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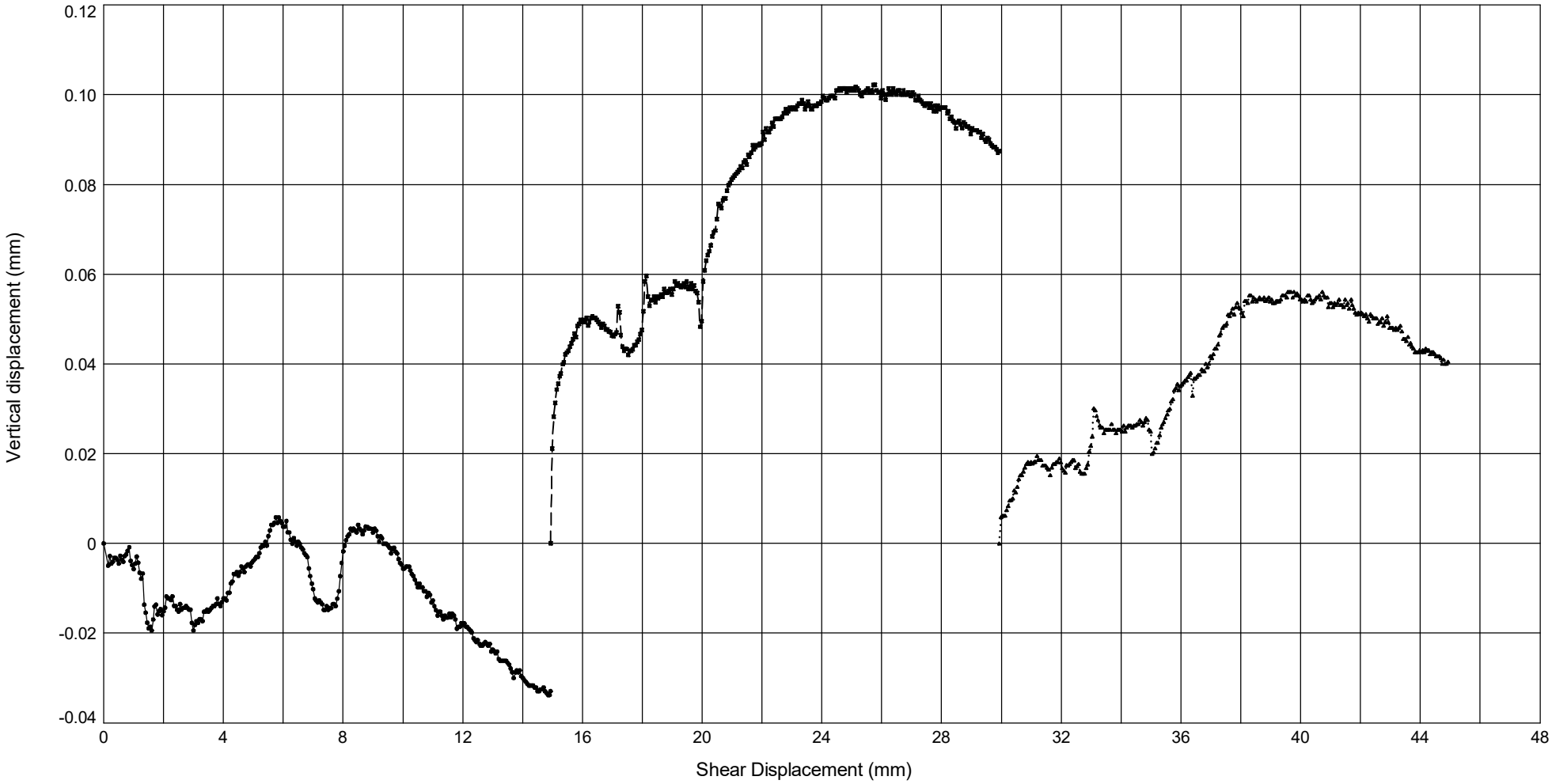
Structural Soils Ltd, Branch Office - Bristol Lab: 1a Princess Street, Bedminster, Bristol, BS3 4AG. Tel: 0117-947-1000, Fax: 0117-947-1004, Web: www.soils.co.uk, Email: ask@soils.co.uk. | 05/02/23 - 10:10 | AF3 |

DIRECT SHEAR STRENGTH OF ROCK UNDER CONSTANT NORMAL STRESS

In house method based on ASTM D5607-95, and Rock Slope Engineering, Revised 3rd edition (1981).

Hole ID : **BPT-BH021** Sample Ref : Sample Type : **C** Depth (m) : **3.50**



Legend: ● Stage 1, ⧓ Stage 2, ▲ Stage 3, ★ Stage 4

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Bedminster
Bristol
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Contract Ref:

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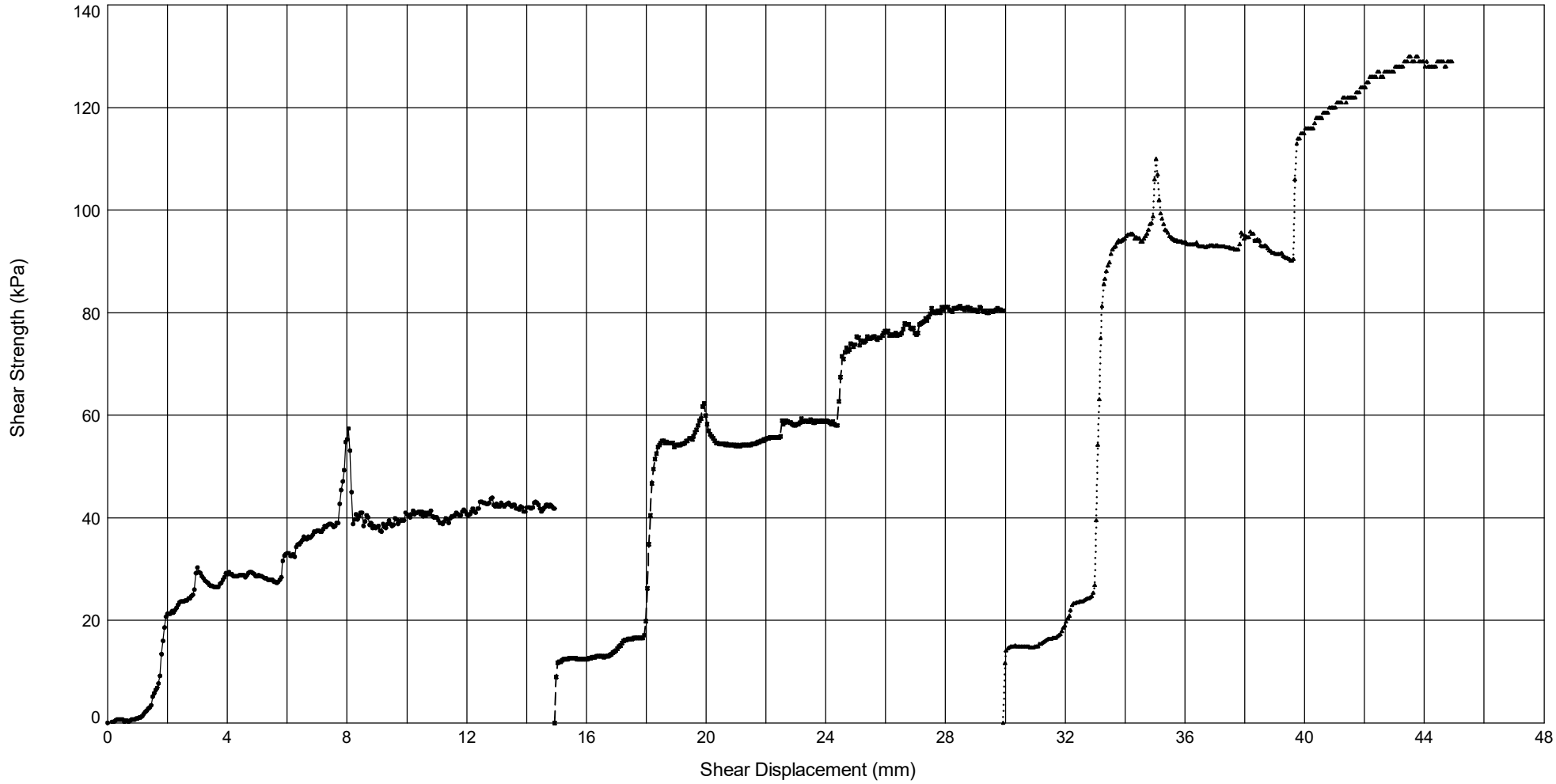
DIRECT SHEAR STRENGTH OF ROCK UNDER CONSTANT NORMAL STRESS

In house method based on ASTM D5607-95, and Rock Slope Engineering, Revised 3rd edition (1981).

Hole ID : **BPT-BH021** Sample Ref : Sample Type : **C** Depth (m) : **3.50**



Legend: ● Stage 1, ⧗ Stage 2, ▲ Stage 3, ★ Stage 4

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2021OY102WSP2-BPT section

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SUMMARY OF MOHS HARDNESS TESTS

Exploratory Position ID	Sample Ref	Depth (m)	Sample Type	Mohs Hardness	Lab	
BPT-BH009		**2.00**	**C**	**4**	**C**	
BPT-BH010		**7.50**	**C**	**4**	**C**	
BPT-BH011		**2.00**	**C**	**3**	**C**	
BPT-BH014		**8.10**	**C**	**4**	**C**	
BPT-BH019		**5.00**	**C**	**4**	**C**	
BPT-BH021		**11.00**	**C**	**4**	**C**	
BPT-BH-003		**3.60**	**C**	**3**	**C**	
BPT-BH-005		**2.00**	**C**	**3**	**C**	
BPT-BH-007		**6.60**	**C**	**4**	**C**	

Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By	Date
LAURA SCHRAMM	**09/03/23**

Contract:	Contract Ref:
2021OY102 WSP Eastern & Midlands Region - Lot 2	**785325**

Structural Soils Ltd, Branch Office - Castleford: The Potteries, Pottery Street, Castleford, West Yorkshire, WF10 1NJ. Tel: 01977-552255, Fax: 01977-552299, Web: www.soils.co.uk, Email: ask@soils.co.uk. | 09/03/23 - 13:39 | LS5 |

RSK Environment Ltd
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Fax: +44 (0) 1442 437550
Email: info2@rsk.co.uk
Web: www.rsk.co.uk

Materials & Structures
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT

UKAS TESTING 0278

Certificate of Examination
BS EN 932-3: 1997
Simplified Petrographic Description of Rock

Your Ref.	785325-R	**RSK Sample Ref.**	20366/ST1
Client	Structural Soils Limited The Potteries Pottery Street Castleford West Yorkshire WF10 1NJ	**Client Ref./Site Mark**	BPT-BH-005 2.00-3.50 C
		Sampled By/Date	Client/Not advised
		Date Received	13.01.2023
		Condition	Dry rock core section
		Examined by/Date	AS/02.02.2023
		Advised Source	Not advised
		Advised Rock Name	Not advised

SAMPLE

One tub totalling approximately 755 g in mass, which contained a 60 mm diameter, 120 mm long rock core, was received in our laboratory for examination. The mass of the material received in the laboratory was smaller than the minimum mass requirement of 5 kg stated in BS EN 932-3: 1997 for rock samples.

METHODS OF EXAMINATION

The submitted sample was subjected to simplified petrographic description following methods given in BS EN 932-3: 1997, Procedure and Terminology for Simplified Petrographic Description.

SUMMARY OF FINDINGS

Aggregate Property	Observations
Rock type	Carbonate rock
Rock Description	Moderately hard, greenish grey, very pale to dark orangish brown coloured, crystalline, carbonate sedimentary rock that exhibited blocky fracture and very little effervescence with dilute HCl. The rock displayed stylolites and dendritic veins infilled with iron oxide/hydroxide and clay material (<1 %). Other dark bluish grey veins appeared to be composed of crystalline calcite. The rock appeared to be primarily composed of carbonate (calcite/dolomite). Estimated carbonate content was) 90-98 %. Sporadic to common crystalline calcite and iron oxide/hydroxide (2 %) veins were randomly orientated. Pore space was estimated to be <1 %. Slightly altered/weathered state observed.

NOTE

We would advise further investigation through more detailed thin section examination to clarify and expand on petrographic details.

Certificate prepared by

Alex Smith
Principal Geomaterials Scientist

Certificate reviewed and authorised by

Kathleen Smith
Senior Geomaterials Scientist

Date of issue: 17 February 2023

RSK Environment Ltd
Tel: +44 (0) 1442 437500
Fax: +44 (0) 1442 437550
Email: info2@rsk.co.uk
Web: www.rsk.co.uk

Materials & Structures
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT

UKAS TESTING 0278

Certificate of Examination
BS EN 932-3: 1997
Simplified Petrographic Description of Rock

Your Ref.	785325-R	**RSK Sample Ref.**	20366/ST2
Client	Structural Soils Limited The Potteries Pottery Street Castleford West Yorkshire WF10 1NJ	**Client Ref./Site Mark**	BPT-BH-010 7.50-9.10 C
		Sampled By/Date	Client/Not advised
		Date Received	13.01.2023
		Condition	Dry rock core fragment
		Examined by/Date	AS/02.02.2023
		Advised Source	Not advised
		Advised Rock Name	Not advised

SAMPLE

One tub totalling approximately 630 g in mass, which contained a 60 mm diameter, 85 mm long rock core, was received in our laboratory for examination. The mass of the material received in the laboratory was smaller than the minimum mass requirement of 5 kg stated in BS EN 932-3: 1997 for rock samples.

METHODS OF EXAMINATION

The submitted sample was subjected to simplified petrographic description following methods given in BS EN 932-3: 1997, Procedure and Terminology for Simplified Petrographic Description.

SUMMARY OF FINDINGS

Aggregate Property	Observations
Rock type	Carbonate rock
Rock Description	Moderately hard, greenish grey, very pale brown to pale orange coloured, crystalline, carbonate sedimentary rock that exhibited blocky fracture and very little effervescence with dilute HCl. The rock displayed stylolites infilled with iron oxide/hydroxide and clay material (<1 %). Other dark blueish grey veins appeared to be composed of crystalline calcite. The rock appeared to be primarily composed of carbonate (calcite/dolomite content), Estimated carbonate content was 90-98 %. Sporadic to common crystalline calcite and iron oxide/hydroxide (2 %) veins were randomly orientated. Pore space was estimated to be <1 %. Slightly altered/weathered state observed.

NOTE

We would advise further investigation through more detailed thin section examination to clarify and expand on petrographic details.

Certificate prepared by

Alex Smith
Principal Geomaterials Scientist

Certificate reviewed and authorised by

Kathleen Smith
Senior Geomaterials Scientist

Date of issue: 17 February 2023

Appendix 5I
Photographs
Part 1: Trial Pits

Figure 1 BPT-INF001 (1).JPG

Figure 2 BPT-INF001 (3).JPG

Figure 3 BPT-INF001 (4).JPG

Figure 4 BPT-INF001 (5).JPG

Figure 5 BPT-INF002 (1).JPG

Figure 6 BPT-INF002 (3).JPG

Figure 7 BPT-INF002 (4).JPG

Figure 8 BPT-INF002 (5).JPG

Figure 9 BPT-TP001 (1).JPG

Figure 10 BPT-TP001 (3).JPG

Figure 11 BPT-TP001 (4).JPG

Figure 12 BPT-TP001 (5).JPG

Figure 13 BPT-TP002 (1).JPG

Figure 14 BPT-TP002 (3).JPG

Figure 15 BPT-TP002 (5).JPG

Figure 16 BPT-TP002 (6).JPG

Figure 17 BPT-TP003 (1).JPG

Figure 18 BPT-TP003 (3).JPG

Figure 19 BPT-TP003 (4).JPG

Figure 20 BPT-TP003 (5).JPG

Figure 21 BPT-TP004 (1).JPG

Figure 22 BPT-TP004 (3).JPG

Figure 23 BPT-TP004 (4).JPG

Figure 24 BPT-TP004.JPG

Figure 25 BPT-TP005 (1).JPG

Figure 26 BPT-TP005 (3).JPG

Figure 27 BPT-TP005 (4).JPG

Figure 28 BPT-TP005 (5).JPG

Figure 29 BPT-TP006 (1).JPG

Figure 30 BPT-TP006 (3).JPG

Figure 31 BPT-TP006 (4).JPG

Figure 32 BPT-TP006 (5).JPG

Figure 33 BPT-TP007 (1).JPG

Figure 35 BPT-TP007 (4).JPG

Figure 34 BPT-TP007 (3).JPG

Figure 36 BPT-TP007 (5).JPG

Figure 37 BPT-TP008 (1).JPG

Figure 39 BPT-TP008 (4).JPG

Figure 38 BPT-TP008 (3).JPG

Figure 40 BPT-TP008 (5).JPG

Figure 41 BPT-TP009 (1).JPG

Figure 42 BPT-TP009 (3).JPG

Figure 43 BPT-TP009 (4).JPG

Figure 44 BPT-TP009 (5).JPG

Figure 45 BPT-TP010 (1).JPG

Figure 46 BPT-TP010 (3).JPG

Figure 47 BPT-TP010 (4).JPG

Figure 48 BPT-TP010.JPG

Figure 49 BPT-TP011 (2).jpg

Figure 51 BPT-TP011 (4).jpg

Figure 50 BPT-TP011 (3).jpg

Figure 52 BPT-TP011 (5).jpg

Figure 53 BPT-TP012 (1).JPG

Figure 54 BPT-TP012 (3).JPG

Figure 55 BPT-TP012 (4).JPG

Figure 56 BPT-TP012 (5).JPG

Figure 57 BPT-TP013 (1).JPG

Figure 58 BPT-TP013 (3).JPG

Figure 59 BPT-TP013 (5).JPG

Figure 60 BPT-TP013 (6).JPG

Figure 61 BPT-TP013 (7).JPG

Figure 62 BPT-TP014 (1).JPG

Figure 63 BPT-TP014 (6).JPG

Figure 64 BPT-TP014 (3).JPG

Figure 65 BPT-TP014 (5).JPG

Figure 66 BPT-TP015 (1).JPG

Figure 67 BPT-TP015 (2).JPG

Figure 68 BPT-TP015 (4).JPG

Figure 69 BPT-TP015 (5).JPG

Figure 70 BPT-TP016 (1).JPG

Figure 71 BPT-TP016 (3).JPG

Figure 72 BPT-TP016 (4).JPG

Figure 73 BPT-TP016 (5).JPG

Figure 74 BPT-TP017 (2).jpg

Figure 76 BPT-TP017 (4).jpg

Figure 75 BPT-TP017 (3).jpg

Figure 77 BPT-TP017 (5).jpg

Figure 78 BPT-TP018 (1).JPG

Figure 79 BPT-TP018 (3).JPG

Figure 80 BPT-TP018 (4).JPG

Figure 81 BPT-TP018 (5).JPG

Figure 82 BPT-TP019 (1).JPG

Figure 83 BPT-TP019 (3).JPG

Figure 84 BPT-TP019 (4).JPG

Figure 85 BPT-TP019 (5).JPG

Figure 86 BPT-TP020 (1).jpg

Figure 88 BPT-TP020 (4).jpg

Figure 87 BPT-TP020 (3).jpg

Figure 89 BPT-TP020 (5).jpg

Figure 90 BPT-TP021 (2).jpg

Figure 92 BPT-TP021 (4).jpg

Figure 91 BPT-TP021 (3).jpg

Figure 93 BPT-TP021 (5).jpg

Figure 94 BPT-TP022 (2).jpg

Figure 96 BPT-TP022 (4).jpg

Figure 95 BPT-TP022 (3).jpg

Figure 97 BPT-TP022 (5).jpg

Figure 98 BPT-TP023 (2).jpg

Figure 100 BPT-TP023 (4).jpg

Figure 99 BPT-TP023 (3).jpg

Figure 101 BPT-TP023 (5).jpg

Figure 102 BPT-TP024 (3).JPG

Figure 103 BPT-TP024 (4).JPG

Figure 104 BPT-TP024 (5).JPG

Figure 105 BPT-TP024 (1).JPG

Figure 106 BPT-TP025 (1).JPG

Figure 107 BPT-TP025 (3).JPG

Figure 108 BPT-TP025 (4).JPG

Figure 109 BPT-TP025 (5).JPG

Figure 110 BPT-TP026 (1).JPG

Figure 111 BPT-TP026 (3).JPG

Figure 112 BPT-TP026 (4).JPG

Figure 113 BPT-TP026 (5).JPG

Figure 114 BPT-TP027 (1).JPG

Figure 115 BPT-TP027 (3).JPG

Figure 116 BPT-TP028 (1).jpg

Figure 117 BPT-TP028 (3).jpg

Figure 118 BPT-TP028 (4).jpg

Figure 119 BPT-TP028 (5).jpg

Figure 120 BPT-TP029 (1).JPG

Figure 121 BPT-TP029 (3).JPG

Figure 122 BPT-TP029 (5).JPG

Figure 123 BPT-TP029 (6).JPG

Figure 124 BPT-TP030 (1).JPG

Figure 125 BPT-TP030 (3).JPG

Figure 126 BPT-TP030 (5).JPG

Figure 127 BPT-TP030 (6).JPG

Figure 128 BPT-TP031 (1).JPG

Figure 129 BPT-TP031 (4).JPG

Figure 130 BPT-TP031 (5).JPG

Figure 131 BPT-TP031 (6).JPG

Figure 132 BPT-TP032 (1).JPG

Figure 133 BPT-TP032 (3).JPG

Figure 134 BPT-TP033 (1).JPG

Figure 135 BPT-TP033 (3).JPG

Figure 136 BPT-TP033 (4).JPG

Figure 137 BPT-TP033 (5).JPG

Figure 138 BPT-TP034 (1).JPG

Figure 139 BPT-TP034 (3).JPG

Figure 140 BPT-TP034 (4).JPG

Figure 141 BPT-TP034 (5).JPG

Figure 142 BPT-TP035 (1).JPG

Figure 143 BPT-TP035 (3).JPG

Figure 144 BPT-TP035 (4).JPG

Figure 145 BPT-TP035 (5).JPG

Figure 146 BPT-TP036 (1).JPG

Figure 147 BPT-TP036 (3).JPG

Figure 148 BPT-TP036 (4).JPG

Figure 149 BPT-TP036 (5).JPG

Figure 150 BPT-TP037 (1).JPG

Figure 151 BPT-TP037 (4).JPG

Figure 152 BPT-TP037 (5).JPG

Figure 153 BPT-TP038 (1).JPG

Figure 154 BPT-TP038 (3).JPG

Figure 155 BPT-TP038 (5).JPG

Figure 156 BPT-TP038 (6).JPG

Figure 157 BPT-TP039 (1).JPG

Figure 158 BPT-TP039 (3).JPG

Figure 159 BPT-TP039 (4).JPG

Figure 160 BPT-TP039 (5).JPG

Appendix 5I
Photographs
Part 2: Rotary Core

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT- BH001
Box
1.2.3.
2M
3.5
5M
6.5
8M

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT- BH001
Box
4 5 6.
9.5M
11M
12.5
14M
15.5
EOH

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT 002
Box
1. 2. 3.
1/m
2.1/m
4/m
5.1/m
6.1/m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT 002
Box
4. 5.
7/m
8.1/m
9.7/m
11.1/m

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT 002
Box
6. 7.
12.7 m
4.1 m
15 m
EOH
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 003
Box
1. 2. 3.
G.L START
21
2.1
3.6
5.1

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH003
Box 4. 5. 6.
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH003
Box 7. 8. 9.
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH004
Box 1. 2.

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH004
Box
3.4
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH005
Box
1.2.3.
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH005
Box
4.5

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT 0 0 6
Box
1. 2. 3. 4.
1.8 m
3.2 m
4.9 m
6.5 m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT 0 0 6
Box
5. 6. 7.
8.1 m
9.5 m
11.1 m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT 0 0 6
Box
8. 9. 10.
12.6m
14.1 m
15 m

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH007
Box
1.2.3.
0.6m
2.1m
3.6m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH007
Box
4.5.6.
5.1m
6.6m
8.1m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH007
Box
7.8.9.
9.6m
10.1m
11.1m
12m

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 0 0 7
Box
10.11.12
13
15
16.6
18.2
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 0 0 7
Box
13.14.15
19.8
21.4
23
24.5
25
25m EOH

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH008
Box
1.2.3.
1.3 m
1.7 m
2.7 m
4.1 m
5.1 m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH008
Box
4.5.6.
6.6 m
8.1 m
9.6 m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH008
Box
7.8.9.
11.1 m
12.6 m
13.4 m
13.6 m

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH008
Box
10.11.12
16.6 m
17.9
19.4 m
20 m
20.6 m
21.6 m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH008
Box
13 14 15
23.1 m
24.6 m
26.1m EOH
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH009
Box
1.2.3.
2m
3.2
5.1m
6.7m

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH009
Box
4.5.6
8.1/m
9.6/m
11.1/m
12.6/m
14.1/m
15.1m EOH
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT- BH010
Box
1.2.3.
1.1/m
2.3/m
3.3/m

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH010
Box
4.5.6.
4.8 m
6m
7.5 m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH010
Box
7.8.9.
9.1 m
10.5 m
11.6 m

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH010
Box 10.11.12
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH010
Box 13 14
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH010
Box 15.16.
25m E.O.H

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 11
Box 1. 2. 3.
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 11
Box 3. 4.
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 12
Box 1. 2.

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 12
Box 3.4
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 013
Box 1.2
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 013
Box 3.4

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 0 1 4
Box
1. 2. 3.
1.6 m
2.1 m
3.7 m
5.1 m
6.7 m
8.1 m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 0 1 4
Box
4. 5.
9.7 m
11.1 m
12.7 m
14.1 m

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 014
Box
6 7
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 15
Box
1 2 3
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 15
Box
4 5 6

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 15
Box
7 8
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 15
Box
9 10
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 16
Box
1 2 3

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 16
Box
4 5 6
8.1m
9.6m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 16
Box
7 8 9
10.1m
12.6m
13m EOH

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 018
Box
1. 2. 3. 4
2m
3.5m
5m
6.5m
8m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 018
Box
5. 6. 7. 8
9.5m
11.5m
13m
14.5m
17m
18.5m
19m

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH018
Box
9. 10.11.
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH018
Box
12.13.

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 018
Box
14. 15.
38 m
40 m
43 m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 19
Box
1. 2. 3.
START GL
2m
3.5m
5m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 19
Box
4. 5. 6.
6.5m
8m
9.5m

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 19
Box
7. 8. 9.
11m
12·5m
14m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 19
Box
10. 11. 12.
15·5m
17m
18·5m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 19
Box
13. 14. 15.
20m
21·5m
23m

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 19
Box
16 17 18
24.5m
26m
27.5m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 19
Box
19. 20
29m
30.5m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 020
Box
1. 2. 3.
20m
3.5m
5.0m

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH020
Box
4.5.6
6.5m
8.0m
9.5m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH020
Box
7.8.9.
11m
14m
15.5
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH020
Box
10.11.12.
17m
18.5
20.m

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH020
Box
13 14 15
21.5
23
24.5
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH020
Box
16 17 18
26m
27.5m
29m

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 020
Box
19. 2021. 22
30.5
32m
33.5
35m EOH

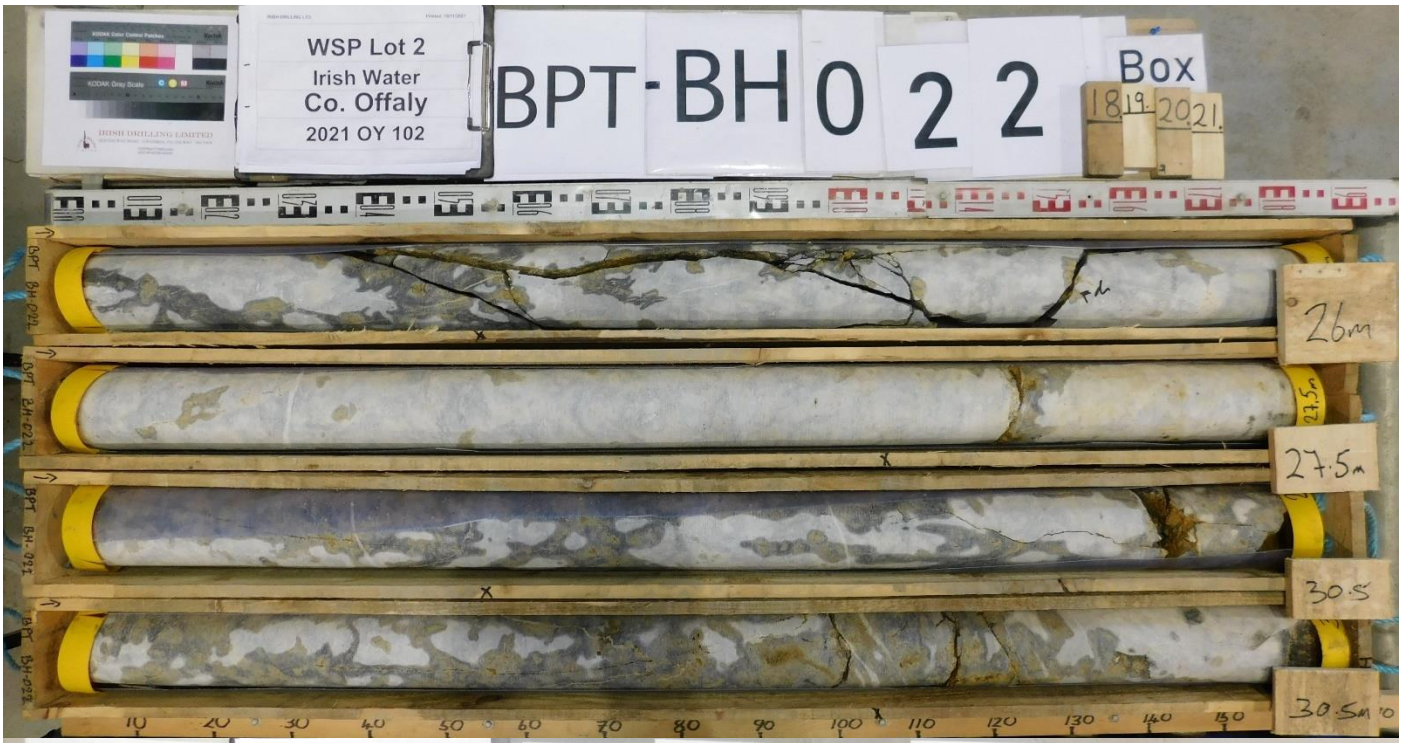
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 21
Box
1. 2. 3. 4
START
0m
2m
3.5m
5m
BPT

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH21
Box
5 6 7 8
6.5m
8.0m
9.5m
11m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH21
Box
9 10 11 12
12.5m
14m
15.5
17m

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 21
Box
13 14 15 16
18.5m
20m
21.5m
23m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 21
Box
17 18 19
24.5m
26m
27.5m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 21
Box
2021
29m
30.5m

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH022
Box
1.2.3
START GL
1M
2M
3.5M
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH022
Box
4.5.6
5M
6.5M
8M
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH022
Box
7.8.9
9.5M
11M
12.5M

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH022
Box
10 11 12 13
14m
15.5
17m
18.5m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH022
Box
14 15 16 17
20m
21.5m
23m
24.5


WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH022
Box
18.19.2021.
26m
27.5m
30.5
30.5m

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH023
Box
1.2.3.
2m
3.5m
5m
6.5m

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 023
Box
4. 5. 6.
8/M
9.5/M
11/M
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 023
Box
7. 8 9.
12.5/M
15.5/M
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 023
Box
10. 11. 12.
17/M
20/M

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 0 2 3
Box
15.16
25m EOH
WSP - Lot 3
Irish Water
Co. Offaly
2021 OY 102A
BPT-BH 0 2 4
Box
1.2.3.
START
WSP - Lot 3
Irish Water
Co. Offaly
2021 OY 102A
BPT-BH 0 2 4
Box
4.5.6

WSP - Lot 3
Irish Water
Co. Offaly
2021 OY 102A
BPT-BH024
7.8.9
WSP - Lot 3
Irish Water
Co. Offaly
2021 OY 102A
BPT-BH024
Box
10.11.12
WSP - Lot 3
Irish Water
Co. Offaly
2021 OY 102A
BPT-BH024
Box
13.15.14

WSP - Lot 3
Irish Water
Co. Offaly
2021 OY 102A
BPT-BH024
Box
16 17 18
WSP - Lot 3
Irish Water
Co. Offaly
2021 OY 102A
BPT-BH024
Box
19 2021
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH025
Box
1. 2. 3. 4
2.0m
3.5m
5.0m

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH025
Box
5 6 7
6.5m
8m
9.5m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH025
Box
8 9 10
11m
12.5m
14m

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH025
Box
11.12.13.14.
15.5m
17m
18.5m
20m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH025
Box
15.16.17.18.
21.5m
23m
24.5
26m

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH025
Box
19.
2021.
27.5m
29
30.5m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH025
Box
22
23
24
32m
33.5
35m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH026
Box
1.2.3
1.5m
2m
3.5m

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 026
Box
4. 5. 6.
5m
6.5m
8m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 026
Box
7. 8. 9
9.5m
11m
12.5m

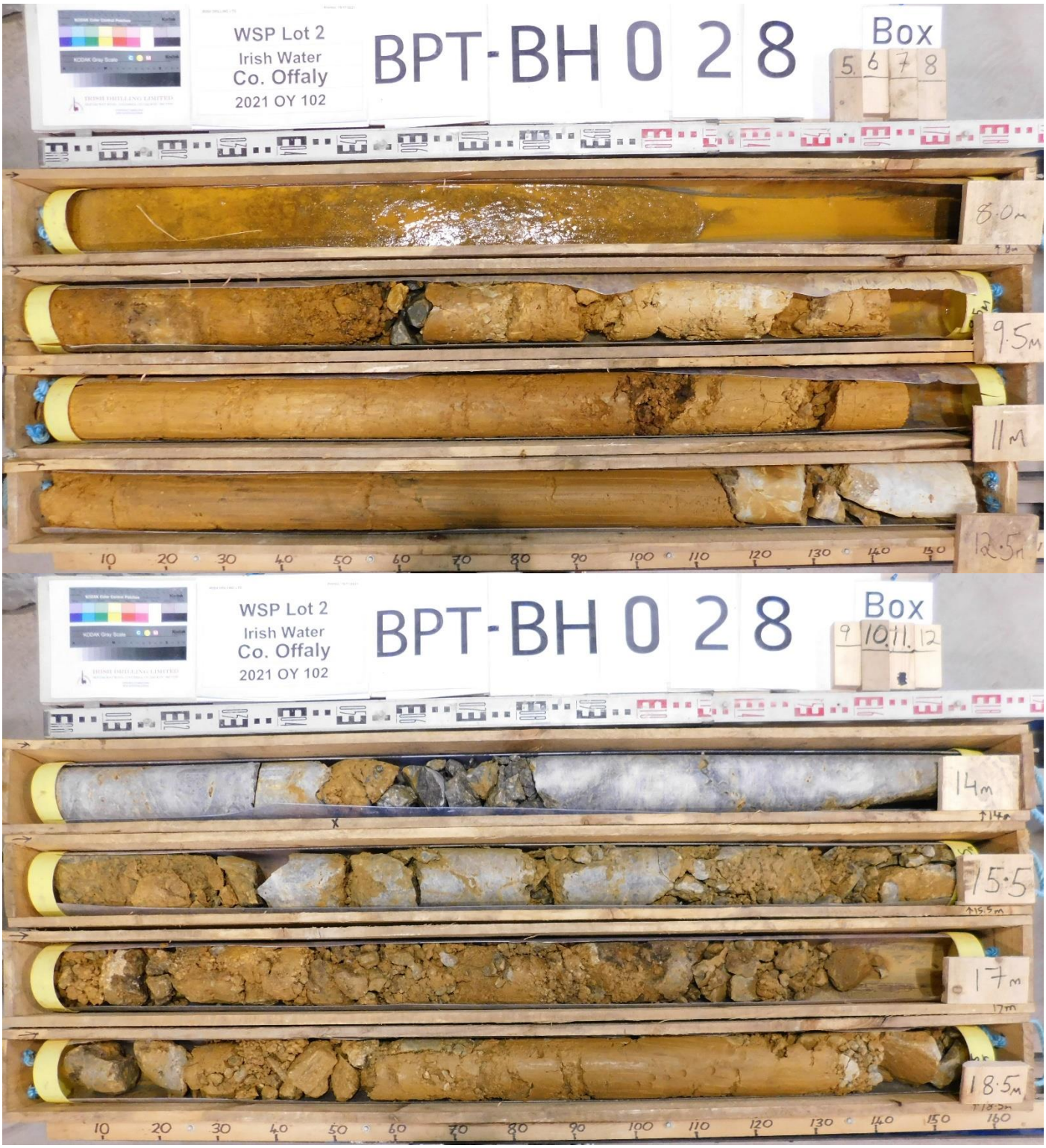
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 026
Box
10.11.12.13.
14m
15.5
17m
18.5m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 026
Box
14.15.16.17
20m
21.5m
23m
24.5m

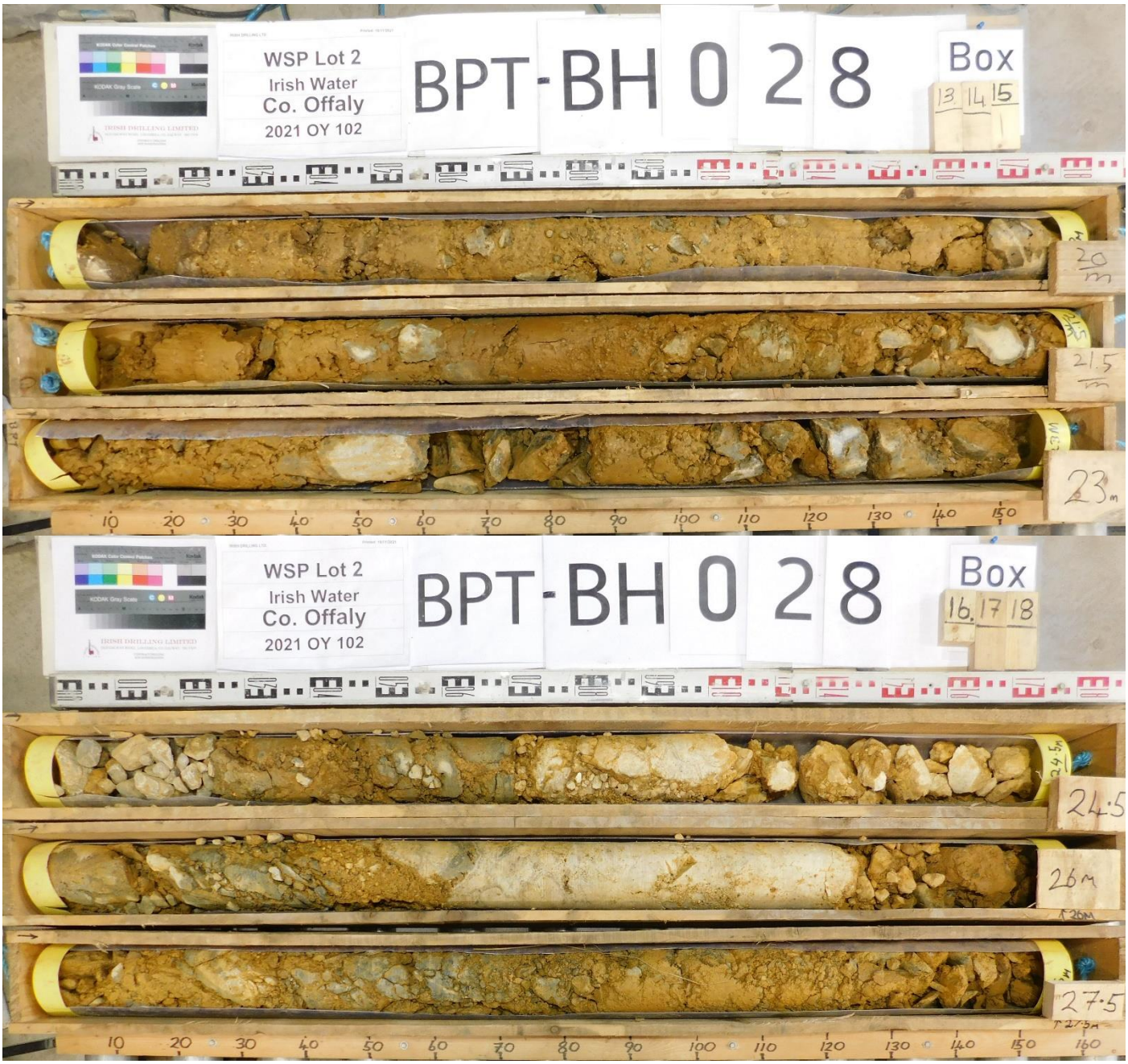
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 026
Box
18.19.20
26m
27.5m
29m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 026
Box
21.22.23
30.5m
32m
33.5
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 027
Box
1.2.3.
2m
3.5m
5m

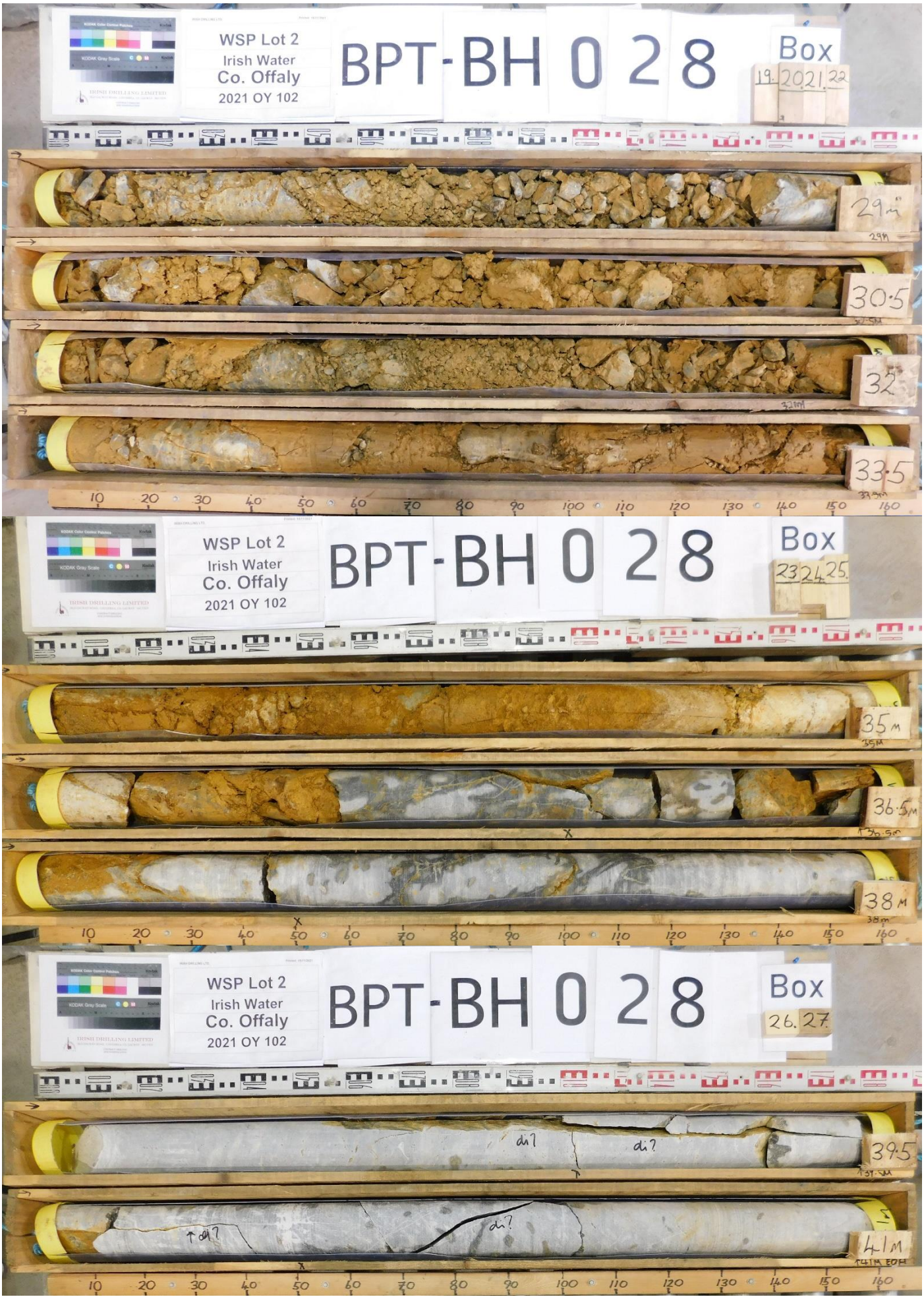
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 027
Box
4 5 6
6.5m
8.0m
9.5m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 027
Box
7 8 9
11m
12.5m
14m

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 027
Box
10.11.12.13.
15.5m
17m
18.5m
20.6m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 027
Box
14.15.16
21.5m
23m
24.5m
26m
27.5m
29m
30.5m
32m

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 027
Box
17 18
33.5 m
37 m
EOH
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 028
Box
1. 2 3 4.
2M
3.5M
5M
6.5M


WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 0 2 8
Box
5 6 7 8
8.0m
9.5m
11m
12.5m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 0 2 8
Box
9 10 11 12
14m
15.5
17m
18.5m


WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 0 2 8
Box
13 14 15
20 m
21.5 m
23m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 0 2 8
Box
16 17 18
24.5
26m
27.5


WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 028
Box
19. 20. 21. 22
29m
30·5
32
33·5
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 028
Box
23 24 25
35m
36·5m
38m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 028
Box
26. 27
39·5
41m EOH

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 0 29
Box
1 2 3
0m
1·5m
2m
3·5m
10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 0 29
Box
4 5 6
5m
6·5m
8m
10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 0 2 9
Box
7 8 9 10
9.5m
11m
12.5m
14m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 0 2 9
Box
11. 12 13 14.
15.5
17.m.
18.5m
20m

WSP - Lot 3
Irish Water
Co. Offaly
2021 OY 102A
BPT-BH 30
Box
1.2.3
2M
3.5
WSP - Lot 3
Irish Water
Co. Offaly
2021 OY 102A
BPT-BH 30
Box
4.5.6.
5M
6.5M
8M
WSP - Lot 3
Irish Water
Co. Offaly
2021 OY 102A
BPT-BH 30
Box
7.8.9
9.5M
11M
12.5M

WSP - Lot 3
Irish Water
Co. Offaly
2021 OY 102A
BPT-BH 30
Box
10.11.12
14m
15.5m
17.m
WSP - Lot 3
Irish Water
Co. Offaly
2021 OY 102A
BPT-BH 30
Box
13.14.
18.5m
20.0m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 031
Box
1.2.3.4.
2m
3.5m
5m
6.5m

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH031
Box
5 6 7
8m
9.5m
11m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH031
Box
8 9 10
12.5m
14m
15.5
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH031
Box
11 12 13
17m
18.5m
20m EOH

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 0 3 2
Box
1.2.3
START
2M
2.6m
3.5M
5M
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH 0 3 2
Box
4.5.6.
6.5M
8M
9.5M

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH032
Box
7 8 9 10
11m
12.5m
14m
15.5
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH032
Box
11 12 13 14
17m
18.5m
20m
21.5

WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH032
Box
15 16 17
23m
24.5
26m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH032
Box
18 19 20
27.5
29m
30.5m
WSP Lot 2
Irish Water
Co. Offaly
2021 OY 102
BPT-BH032
Box
21 22 23
32m
33.5
35m EOH

Appendix 5J
Groundwater Level Data

Groundwater Levels

Contract:	WSP Lot 2 BPT SITE	*Test carried out by:*	**Irish Drilling Ltd.**
Location:	BPT SITE	*Operators:*	DOR
Client:	Irish Water		
Engineer:	Mott MacDonald	*Date:*	21/10/2022

Standpipes	07/07/2022 m +/-(gl)	04/08/2022 m +/-(gl)	02/09/2022 m +/-(gl)	05/10/2022 m +/-(gl)		O.D. Ground Level
BPT BH003	DRY	DRY	DRY	DRY		145.64m
BPT BH004	DRY	DRY	DRY	DRY		136.48m
BPT BH006	DRY	DRY	DRY	DRY		140.35m
BPT BH007	DRY	DRY	DRY	DRY		145.33m
BPT BH008	DRY	DRY	DRY	DRY		138.64m
BPT BH011	DRY	DRY	DRY	DRY		144.15m
BPT BH012	DRY	DRY	DRY	DRY		144.63m
BPT BH014	DRY	DRY	DRY	DRY		145.15m
BPT BH031				-9.40m (136.54m O.D.)		145.94m
BPT BH032				-10.18m (136.45m O.D.)		146.63m

Remarks:

Data Loggers installed in boreholes on BPT BH031 and BPT BH032 on 05/10/2022.

Appendix 5K
Drawings

BH-36789
(CP/RC)
BPTTP003
BPTBH020
(RC)
BPTBH019(RC)
BPTTP002
BPTBH003
(RC)
BPTTP008
BPTBH027
(RC)
BPTBH022
(RC)
BPTBH021
(RC)
BPTTP007
BPTBH018
(RC)
BPTTP031
BPTBH001
(CP/RC)
BPTBH002
(CP/RC)
BPTBH007
(RC)
BPTTP004
BPTBH026
(RC)
BPTTP011
BPTTP001
BPTBH004
(RC)
BPTTP032
BPTBH006
(RC)
BPTBH010
(RC)
BPTTP006
BPTBH025
(RC)
BPTTP010
BPTBH005
(CP/RC)
BPTTP005
BPTBH024
(RC)
BPTBH009
(CP/RC)
BPTTP021
BPTTP009
BPTBH008
(RC)
BPTTP013
BPTTP017
BPTBH014
(CP/RC)
BPTBH023
(RC)
BPTTP016
BPTBH011
(CP/RC)
BPTBH013
(CP/RC)
BPTTP012
BPTTP020
BPTTP015
BPTBH012
(CP/RC)
BPTBH015
(RC)
BPTTP023
BPTTP019
BPTBH028
(RC)
BPTTP028
BPTTP018
BPTBH030
(RC)
BPTTP014
BPTBH029
(RC)
BPTTP022
BPTBH032
(RC)
BPTTP027
BPTTP026
BPTINF001
BPTBH031
(RC)
BPTBH016
(RC)
BPTTP025
BPTINF002
BPTTP030
BPTTP024
BPTTP029

LEGEND

SOILS/ROTARY CORE BOREHOLE LOCATION
RC= Rotary Core
CP=Cable Percussion

BPTBH

Trial Pits

BPTTP

Infiltration Tests

BPTTINF

	REVISION	By	Date	Chk'd
IDL1		MM	20/10/22	RK
IDL2		MM	03/04/23	RK

Client: IRISH WATER

Title: Eastern and Midlands Water Supply Project(Lot 1)
1 of 4

Dimensions in: mm
Scale: 1:500 @ A1
Drawn By: MM 03/04/2023
Checked By: RK 03/04/2023
Approved By:

IRISH DRILLING LIMITED
OLD GALWAY ROAD, LOUGHREA, CO. GALWAY
Tel. 091 841274. info@irishdrilling.ie

Drawing No. IDL-BPT-01
Revision. 1
Sheet 1 of 4

BH-36829
(CP/RC)

BH-36789
(CP/RC)

BPTTP003

BPTBH020
(RC)

BPTBH019(RC)

BPTTP002

BPTBH003
(RC)

BPTTP008

BPTBH022
(RC)

BPTBH027
(RC)

BPTBH021
(RC)

BPTTP007

BPTBH018
(RC)

BPTTP031

BPTBH001
(CP/RC)

BPTBH002
(CP/RC)

BPTBH007
(RC)

BPTTP004

BPTBH026
(RC)

BPTTP011

BPTTP001

BPTBH004
(RC)

BPTTP032

BPTBH006
(RC)

BPTBH010
(RC)

BPTTP006

BPTBH025
(RC)

BPTTP010

BPTBH005
(CP/RC)

BPTTP005

BPTBH024
(RC)

BPTBH009
(CP/RC)

BPTTP021

BPTTP009

BPTBH014
(CP/RC)

BPTBH008
(RC)

BPTTP017

BPTTP013

BPTBH023
(RC)

BPTTP016

BPTBH011
(CP/RC)

BPTBH013
(CP/RC)

BPTTP012

BPTTP020

BPTTP015

BPTTP023

BPTBH012
(CP/RC)

BPTBH015
(RC)

BPTTP019

BPTBH028
(RC)

BPTTP028

BPTTP018

BPTBH030
(RC)

BPTTP014

BPTBH029
(RC)

BPTTP022

BPTBH032
(RC)

BPTTP027

BPTTP026

BPTINF001

LEGEND

SOILS/ROTARY CORE BOREHOLE LOCATION
RC= Rotary Core
CP=Cable Percussion

BPTBH

Trial Pits

BPTTP

Infiltration Tests

BPTTINF

	REVISION	By	Date	Chk'd
IDL1		MM	20/10/22	RK
IDL2		MM	03/04/23	RK

Client: IRISH WATER

Title: Eastern and Midlands Water Supply Project(Lot 1)
2 of 4

Dimensions in. mm

Scale. 1:500 @ A1

Drawn By. MM 28/09/2022

Checked By. RK 28/09/2022

Approved By.

IRISH DRILLING LIMITED
OLD GALWAY ROAD, LOUGHREA, CO. GALWAY
Tel. 091 841274. info@irishdrilling.ie

Drawing No. IDL-BPT-01

Revision. 1

Sheet 2 of 4

BPTTP035

BPTTP034

BPTTP033

BPTTP032

BPTTP031

BPTBH001
(CP/RC)

BPTTP004

BPTTP001

BPTTP005

LEGEND

SOILS/ROTARY CORE BOREHOLE LOCATION
RC= Rotary Core
CP=Cable Percussion

BPTBH

Trial Pits

BPTTP

Infiltration Tests

BPTTINF

	REVISION	By	Date	Chk'd
IDL1		MM	20/10/22	RK
IDL2		MM	03/04/23	RK

Client: IRISH WATER

Title: Eastern and Midlands Water Supply Project(Lot 1)
3 of 4

Dimensions in. mm

Scale. 1:500 @ A1

Drawn By. MM 28/09/2022

Checked By. RK 28/09/2022

Approved By.

IRISH DRILLING LIMITED
OLD GALWAY ROAD, LOUGHREA, CO. GALWAY
Tel. 091 841274. info@irishdrilling.ie

Drawing No. IDL-BPT-01

Revision. 1

Sheet 2 of 3

BPTTP039

BPTTP038

BPTTP037

BPTTP036

BPTTP035

LEGEND

SOILS/ROTARY CORE BOREHOLE LOCATION
RC= Rotary Core
CP=Cable Percussion

BPTBH

Trial Pits

BPTTP

Infiltration Tests

BPTTINF

	REVISION	By	Date	Chk'd
IDL1		MM	20/10/22	RK
IDL2		MM	03/04/23	RK

Client: IRISH WATER

Title: Eastern and Midlands Water Supply Project(Lot 1)
4 of 4

Dimensions in.	mm	
Scale.	1:500 @ A1	
Drawn By.	MM	28/09/2022
Checked By.	RK	28/09/2022
Approved By.		

IRISH DRILLING LIMITED
OLD GALWAY ROAD, LOUGHREA, CO. GALWAY
Tel. 091 841274. info@irishdrilling.ie

Drawing No.	Revision.	Sheet
IDL-BPT-01	1	3 of 4