



Environmental Impact

Assessment Report (EIAR)

Volume 6 of 6: Appendices

(Appendix 10.4) RWI&PS Ground Investigations 2022

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IRISH DRILLING LIMITED

LOUGHREA, CO. GALWAY, IRELAND



CONTRACT DRILLING
SITE INVESTIGATION

Phone: (091) 841 274
Fax: (091) 847 687

email: info@irishdrilling.ie

WSP LOT 1, RAW WATER INTAKE

GROUND INVESTIGATION CONTRACT FACTUAL REPORT

FINAL

Irish Water,
Covill House,
24-26 Talbot Street,
Dublin 1.

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

	Prepared by	Approved by	Rev. Issue Date:	Revision No.
	Ronan Killeen	Declan Joyce	30 th September 2022	21_T_102/05
<u>Signature</u>	RK	DJ		

FOREWORD

The borehole 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 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.

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.

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1.1 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 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).

Irish Drilling Ltd. (IDL) was instructed by Mott Macdonald Ireland, Consulting Engineers, on behalf of Irish Water to carry out a site investigation at the location of the proposed Raw Water Intake Site.

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

The fieldwork commenced on November 30th 2021 and was completed on January 18th 2022.

1.2 Site & Geology

The site is located at Parteen Basin, County Tipperary. The site is located immediately adjacent to the River Shannon on ESB lands that form part of the existing Parteen Weir Site.

The fieldwork was carried out predominantly on forested lands. Clearance of forested lands and/or dense vegetation was carried out by others prior to mobilisation and commencement of fieldwork activities.

Weather conditions in general were quite variable with the majority of the fieldwork carried out over a typical winter period in Ireland. Prior to commencement on site timber bogmats were laid over an existing embankment to allow access to the site and in order to cause minimum disruption to the site due to rutting and/or trafficking of heavy plant.

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

The following were the main published information sources used:
Geological Map of Ireland: 1:500,000 scale map series.

Site investigation data is available as point source data along the proposed route, and the majority of the ground in between the points can only be assumed to follow the characteristics of the nearest available data.

Overview of Subsoil Geology

Estuarine Deposits:

These comprise of estuarine sands, gravels and silts from water borne deposits.

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 sandstones giving rise to a high proportion of sand sized grains in the till matrix.

Solid Geology

The Geological Map of Ireland: 1:500,000 scale map series indicate that the site is underlain by the Carboniferous Limestone rock formation of the Ballysteen Formation.

Ground conditions encountered during the completion of the fieldwork were typical and as expected for this region and predominantly consisted of Glacial Till overlying Bedrock. The Glacial Tills in general consisted of slightly sandy slightly gravelly silt with cobbles and boulders and/or silty sands and/or gravels with cobbles and boulders.

Intact bedrock was encountered in the rotary core boreholes at depths varying from 8.40m to 15.00m below ground level.

Bedrock is predominantly described as very strong, thinly-bedded, grey, fine and medium grained Limestone.

1.3 Fieldwork.

1.3.1 General Summary:

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 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.

1.3.2 Fieldwork Plant:

The following plant was mobilised to site by IDL to carry out fieldwork operations:

- 1nr. Commacchio Geo602 Soil/Rock Rotary Core Drilling Rig.
- 1nr. Yanmarr All-Terrain Support Vehicle.
- 1nr. GeoboreS Drill String.
- 1nr. HQ Rotary Core Drill String.
- 1nr. HQ Packer Permeability Test Equipment.
- 1nr. Honda Water Supply Pump.
- 1nr. Drilling Water Recirculation Tank System.

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.

1.3.3 Fieldwork Operations:

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

- Ecological Survey prior to mobilisation to site.
- Completion of 8nr GeoboreS/Rotary Core Boreholes.
- Completion of Standard Penetration Tests in overburden at eight borehole locations.
- Completion of 2nr Single Packer Tests in bedrock at two borehole locations.
- Completion of 4nr Rising Head Permeability Tests at three borehole locations.
- Completion of 6nr Pressuremeter Tests (HPD) at two borehole locations.
- Installation of 4nr 50mm diameter standpipes at four borehole locations.
- Installation of 2nr 19mm diameter standpipe piezometers at two borehole locations.
- Groundwater Sampling.
- Groundwater Readings using dip meter.
- Installation of 4nr Data Loggers at four borehole locations.
- Return Visits (2nr) to download Data Logger readings.

1.3.4 Ecological Survey:

Prior to mobilisation of plant and personnel to site an ecological survey was commissioned by IDL. The survey was carried out by MKO Ireland, Planning and 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.

1.3.5 Soils/Rock Rotary Core Boreholes (GeoboreS):

Eight rotary core boreholes were carried out to establish overburden conditions and rockhead and to establish the nature and integrity of the underlying rock.

The eight boreholes completed are identified as follows:

- RWI-BH007A
- RWI-BH008

RWI-BH010
RWI-BH013
RWI-BH014
RWI-BH015
RWI-BH016
RWI-BH017

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 and once intact bedrock was encountered the drill string was reduced to HQ size (64mm core diameter, 96mm hole diameter) to recover rock 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 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 in a number of the boreholes.

The rotary core boreholes were carried out to a depth of 30.00m below ground level.

Detailed engineering logs for the rotary core boreholes completed are included with this report in Appendix 1A.

1.3.6 Standpipe Installations:

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: RWI-BH008, RWI-BH010, RWI-BH013 and RWI-BH016.

A 19mm diameter standpipe piezometer 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: RWI BH 007A and RWI BH017.

Manual Readings have been recorded to date as follows:

MR1: January 10th 2022
MR2: January 17th 2022
MR3: January 18th 2022
MR4: April 4th 2022
MR5: June 9th 2022
MR6: July 6th 2022

Groundwater readings recorded during the completion of fieldwork activities are included with this report as Appendix 1J.

1.3.7 Permeability Tests:

A single packer permeability test was carried out in the bedrock at the following borehole locations and the records of same are included as Appendix 1E.1: RWI BH007A and RWI-BH013.

Variable Head Permeability (Rising Head) Tests were also carried out at the following borehole locations: RWI-BH0007A, RWI-BH008 and RWI-BH016.

The tests were carried out on the following dates:
RWI-BH0016 (test 1): 05/01/2022

RWI-BH0007A: 13/01/2022
RWI-BH0008: 13/01/2022
RWI-BH0016 (test 2): 14/01/2022

The variable head permeability tests were carried out in the overburden during the drilling of the boreholes and/or in the borehole standpipe on completion of the and the records of same are included as Appendix 1E.2.

1.3.8 Groundwater Sampling:

Groundwater samples were also recovered from the following boreholes and presented to the laboratory for testing: RWI-BH008, RWI-BH010, RWI-BH013 and RWI-BH016. The results of the laboratory tests carried out on the water samples are included in Appendix 1H.

1.3.9 Pressuremeter Tests:

Pressuremeter testing was carried out by In-Situ Site Investigations Limited at the following borehole locations: RWI-BH008 and RWI-BH010.

The testing consisted of six 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 1F as a 'stand-alone' report.

1.3.10 Data Loggers:

A data logger was installed in the 50mm diameter standpipes at the following four borehole locations: RWI-BH008, RWI-BH010, RWI-BH013 and RWI-BH016.

The loggers were installed on April 5th 2022. To date two return visits have been completed in order to download the data logger readings.

The return visits were carried out on the following dates:

RV1: June 9th 2022

RV2: July 6th 2022.

The records of these return visits are included in Appendix 1J.

Further return visits are scheduled as follows

RV3: October 5th 2022

RV4: January 5th 2023

RV5: April 5th 2023

The records of these downloads will be issued as Addendums to this factual report in due course.

1.4 Laboratory Testing

Representative samples recovered from the boreholes were scheduled for testing in the laboratory.

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

Test Type:	Number of Tests
Moisture Content	16
Atterberg Limits	16
Particle Size Distribution	22
Hydrometer	12
BRE, Suite B	31
Moisture Condition Value	2
CBR	1
Consolidation	5
Small Direct Shearbox	5
Quick Undrained Triaxial	8
Triaxial UU Multi-Stage	6
CU Triaxial Test	5
CU Triaxial Test Multi-Stage	2

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

Test Type	Number of Tests
Uniaxial Compression Strength (UCS)	37
Point Load	61

The test schedules also included the following tests on groundwater samples:

Test Type	Number
Mott MacDonald Groundwater Suite	4
Maximum Allowable LODs	4

The test schedules were carried out predominantly at the IDL Laboratory located at Loughrea, County Galway.

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

Laboratory chemical tests (BRE Suite) were carried out by Alcontrol Laboratories Ltd., UK.

Shear Strength, Triaxial and Shear Box Tests were carried out by NMTL, County Carlow.

Groundwater samples tests (Mott MacDonald Groundwater Suite and Maximum Allowable LODs) were also carried out by Alcontrol Laboratories Ltd., UK.

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

The records of groundwater, soil and rock core laboratory test results carried out on are reported in Appendix 1H.

The soil and rock descriptions as noted on the borehole 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.

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

The records of all fieldwork, laboratory test results and photographs are included in the appendices of this Factual Report.

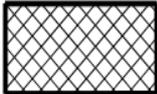
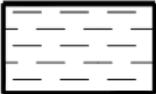
Ronan Killeen
Ronan Killeen
Chartered Engineer
Irish Drilling Limited
September 30th 2022



Appendix 1A

Borehole Records

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

Legend:	
	Made ground=mg
	Clay=cl
	Boulders and cobbles=b/c
	Gravel=g
	Peat=p
	Silty sand=s/si
	Silt=si
	Rock=r



DRILLHOLE LOG

Project WSP Lot 1 - Raw Water Intake				Location Parteen, Co Tipperary		DRILLHOLE No RWI-BH007A	
Job No 2021T102		Date 13-01-22 17-01-22		Ground Level (m OD) 31.33		Co-Ordinates () E 569,975.9 N 670,241.1	
Engineer Mott MacDonald						Sheet 2 of 4 Rev. FINAL	

RUN DETAILS					STRATA			Geology	Instrument/ Backfill	
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION				
						Discontinuities	Detail	Main		
9.50	80 (-)	9.00(50/294mm)			(6.30)			Very stiff pinkish orangish brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is subrounded to subangular fine to coarse of assorted brown and green sandstone and assorted grey limestone. <i>(continued)</i>		
11.00	73 (-)	NA								
12.10	27 (27) 26		19.53		11.80	11.80 - 30.00 Discontinuities, closely spaced to 13.00m, then medium spaced, locally closely spaced, dipping 12 to 14°, stepped, smooth, with 0.5 to 2mm thick orangish brown clay smear.		Very strong thinly bedded black and dark grey bioclastic fine to medium grained LIMESTONE.		
13.60	100 (96) 80	2								
14.00	100 (99) 98	3						13.40m to 15.60m: Packer test.		
15.60	100 (98) 96	2								

IDL AGS UK DH (SPTS) RK REV2 FINAL REPORT PDFWSP LOT1 PARTEEN GPJ IDL TP TEMPLATE.GDT 21/09/22

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 (%)	
13-01-21	14.00	12.10	4.50	146	101		g/l					GBS to 12.10m bgl, HQ to 30.00m bgl. 19mm piezometer installed - tip at 2.50m bgl.
13-01-21	16.00	15.60	4.50	96	64		g/l					
14-01-21	08.30	15.60	4.50	96	64		g/l					

All dimensions in metres Scale 1:50		Client: Irish Water		Method/ Plant Used Commacchio Geo602		Bit Design GBS/HQ		Driller BD		Logged By EAT	
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DRILLHOLE LOG

Project WSP Lot 1 - Raw Water Intake			Location Parteen, Co Tipperary		DRILLHOLE No RWI-BH007A
Job No 2021T102	Date 13-01-22 17-01-22	Ground Level (m OD) 31.33	Co-Ordinates () E 569,975.9 N 670,241.1		
Engineer Mott MacDonald				Sheet 3 of 4 Rev. FINAL	

RUN DETAILS					STRATA			Geology	Instrument/ Backfill	
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION				
						Discontinuities	Detail	Main		
17.00	100 (98) 97	2		(18.20)				Very strong thinly bedded black and dark grey bioclastic fine to medium grained LIMESTONE. <i>(continued)</i> 16.43m to 16.54m: strong.	(18.20)	
18.60	100 (98) 96	2								22.20m to 22.24m: medium strong thinly laminated dark grey fissile silty fine grained.
20.00	100 (98) 96	2								
21.60	100 (98) 96	4								
23.00	100 (98) 97	2								
	100 (98) 97	3								

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Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Depth	Casing Dia	Core Dia mm	Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
												GBS to 12.10m bgl, HQ to 30.00m bgl. 19mm piezometer installed - tip at 2.50m bgl.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used	Commacchio Geo602	Bit Design	GBS/HQ BD	Driller BD	Logged By EAT
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DRILLHOLE LOG

Project WSP Lot 1 - Raw Water Intake			Location Parteen, Co Tipperary		DRILLHOLE No RWI-BH007A
Job No 2021T102	Date 13-01-22 17-01-22	Ground Level (m OD) 31.33	Co-Ordinates () E 569,975.9 N 670,241.1		
Engineer Mott MacDonald				Sheet 4 of 4 Rev. FINAL	

RUN DETAILS					STRATA			Geology	Instrument/ Backfill	
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION				
						Discontinuities	Detail	Main		
24.60		1		[Brick pattern legend]				Very strong thinly bedded black and dark grey bioclastic fine to medium grained LIMESTONE. <i>(continued)</i>	[Brick pattern legend]	
	100 (98) 97	2								
26.00										
	100 (98) 97	2								
27.50										
	100 (98) 97	2								
29.00										
	100 (98) 97	2								
30.00			1.33		30.00					
						BH terminated at 30.00m bgl on REs instruction.				

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Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing g/l	From (m)	To (m)	Type	Return (%)	
14-01-21	16.00	30.00	4.50	96	64							GBS to 12.10m bgl, HQ to 30.00m bgl. 19mm piezometer installed - tip at 2.50m bgl.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used Commacchio Geo602	Bit Design GBS/HQ	Driller BD	Logged By EAT
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DRILLHOLE LOG

Project WSP Lot 1 - Raw Water Intake				Location Parteen, Co Tipperary		DRILLHOLE No RWI-BH008	
Job No 2021T102		Date 09-12-21 14-12-21		Ground Level (m OD) 31.34		Co-Ordinates () E 569,976.1 N 670,271.7	
Engineer Mott MacDonald						Sheet 1 of 4 Rev. FINAL	

RUN DETAILS						STRATA			Geology	Instrument/ Backfill
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION				
						Discontinuities	Detail	Main		
0.00	20 (-)	1.50 (6)			(4.00)	0.00 - 13.00 m: overburden			Grey gravelly silty fine to medium SAND. Gravel is subangular fine of brown sandstone and assorted grey limestone.	
3.00							1.00m: loose.			
4.00	80 (-)	3.00 (14)	27.34					3.00m: becoming medium dense.		
5.00	70 (-)	NA						Very stiff pinkish orangish brown slightly sandy gravelly SILT. Sand is fine to coarse. Gravel is subrounded to subangular fine to medium of assorted brown and green sandstone and assorted grey limestone.		
5.60 <small>09.12 10.12</small>	100 (-)							6.30m: pressuremeter test.		
7.20	94 (-)									
	53 (-)									

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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 (%)	
09-12-21	16.00	5.60	4.50	146	101		g/l	0	30.00	water	100	GBS to 14.00m bgl, HQ to 30.00m bgl. 50mm standpipe installed. Response zone 1.00m to 4.00m bgl. Core diameter size reduced from GBS to HQ in order to create suitable test pockets for pressuremeter testing operations.
10-12-21	08.30	5.60	10.50	146	101		g/l					

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used Commacchio Geo602	Bit Design GBS/HQ	Driller BD	Logged By EAT
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Irish drilling LTD

DRILLHOLE LOG

Project WSP Lot 1 - Raw Water Intake				Location Parteen, Co Tipperary		DRILLHOLE No RWI-BH008	
Job No 2021T102		Date 09-12-21 14-12-21		Ground Level (m OD) 31.34		Co-Ordinates () E 569,976.1 N 670,271.7	
Engineer Mott MacDonald						Sheet 3 of 4 Rev. FINAL	

RUN DETAILS					STRATA			Geology	Instrument/ Backfill	
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION				
						Discontinuities	Detail	Main		
13.12 14.12	100 (97) 93	3		(17.00)				Very strong thinly bedded black and dark grey bioclastic fine to coarse grained LIMESTONE. <i>(continued)</i>		
	100 (98) 94	2			17.25 - 17.40 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick dark grey silt smear, open.					
18.60		1								
20.00	100 (98) 97	1								
21.60	100 (98) 97	1							21.10m to 21.25m: strong.	
23.00	100 (98) 97	1								
	100 (98) 97	2				22.80 - 23.00 Joint, subvertical dip, stepped, smooth, clean, open as drilling induced?				

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Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Depth	Casing Dia	Core Dia mm	Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
13-12-21	16.00	17.00	13.00	146	101		g/l					GBS to 14.00m bgl, HQ to 30.00m bgl. 50mm standpipe installed. Response zone 1.00m to 4.00m bgl. Core diameter size reduced from GBS to HQ in order to create suitable test pockets for pressuremeter testing operations.
14-12-21	08.30	17.00	13.00	96	64		g/l					
All dimensions in metres Scale 1:50		Client: Irish Water			Method/ Plant Used Commacchio Geo602			Bit Design GBS/HQ	Driller BD BD	Logged By EAT		



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DRILLHOLE LOG

Project WSP Lot 1 - Raw Water Intake			Location Parteen, Co Tipperary		DRILLHOLE No RWI-BH008
Job No 2021T102	Date 09-12-21 14-12-21	Ground Level (m OD) 31.34	Co-Ordinates () E 569,976.1 N 670,271.7		
Engineer Mott MacDonald				Sheet 4 of 4 Rev. FINAL	

RUN DETAILS					STRATA			Geology	Instrument/ Backfill	
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION				
						Discontinuities	Detail	Main		
24.60		1				Very strong thinly bedded black and dark grey bioclastic fine to coarse grained LIMESTONE. <i>(continued)</i>				
	100 (98) 97	1								
26.00		2								
	100 (98) 96	2								
27.60		1								
	100 (98) 97	1				BH terminated at 30.00m bgl on REs instruction.				
29.00		1								
30.00			1.34		30.00					

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Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Depth	Casing Dia	Core Dia mm	Strike	Water Standing g/l	From (m)	To (m)	Type	Return (%)	
14-12-21	16.00	30.00	13.00	96	64							GBS to 14.00m bgl, HQ to 30.00m bgl. 50mm standpipe installed. Response zone 1.00m to 4.00m bgl. Core diameter size reduced from GBS to HQ in order to create suitable test pockets for pressuremeter testing operations.
All dimensions in metres Scale 1:50		Client: Irish Water		Method/ Plant Used Commacchio Geo602			Bit Design GBS/HQ	Driller BD	Logged By EAT			



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DRILLHOLE LOG

Project WSP Lot 1 - Raw Water Intake				Location Parteen, Co Tipperary		DRILLHOLE No RWI-BH010	
Job No 2021T102	Date 15-12-21 16-12-21	Ground Level (m OD) 31.54	Co-Ordinates () E 569,982.9 N 670,225.9				
Engineer Mott MacDonald						Sheet 3 of 4 Rev. FINAL	

RUN DETAILS					STRATA			Geology	Instrument/ Backfill			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION						
						Discontinuities	Detail	Main				
17.00	100 (98) 97	1		(18.70)				Very strong thinly bedded black and dark grey bioclastic fine to coarse grained LIMESTONE. <i>(continued)</i>				
18.60	100 (98) 97	2										
20.00	100 (98) 97	1										
23.00	100 (96) 94	6										
	100 (98) 97	1										
		2										
	100 (98) 97	1										
		2										
	100 (98) 97	1										
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DRILLHOLE LOG

Project WSP Lot 1 - Raw Water Intake			Location Parteen, Co Tipperary		DRILLHOLE No RWI-BH013
Job No 2021T102	Date 10-01-22 13-01-22	Ground Level (m OD) 32.04	Co-Ordinates () E 570,001.3 N 670,245.1		
Engineer Mott MacDonald				Sheet 1 of 4 Rev. FINAL	

RUN DETAILS						STRATA			Geology	Instrument/ Backfill
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION				
						Discontinuities	Detail	Main		
0.00	53 (-)					0.00 - 12.80 m: overburden				
1.50					(3.00)					
3.00	43 (-)		29.04		3.00	2.80m to 3.00m: with low cobble content. Cobbles are of green and brown sandstone and grey limestone.				
4.50	53 (-)				(3.00)	Brown slightly gravelly slightly silty fine and medium SAND. Gravel is subangular fine of green sandstone and grey limestone.				
6.00	47 (-)	NA	26.04		6.00					
6.50	100 (-)	6.5Q(25/145mm)	25.54		(0.50) 6.50	Slightly gravelly assorted purple and brown sandstone COBBLES. Gravel is subangular fine and medium of green sandstone and assorted grey limestone.				
8.00	77 (-)		24.04		(1.50)	Very stiff pinkish orangish brown sandy gravelly SILT. Sand is fine to coarse. Gravel is subrounded to subangular fine to medium of assorted brown and green sandstone and assorted grey limestone.				

IDL AGS UK DH (SPTS) RK REV2 FINAL REPORT PDFWSP LOT1 PARTEEN GPJ IDL TP TEMPLATE.GDT 21/09/22

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	30.00	water	100	GBS to 13.00m bgl, HQ to 30.00m bgl. 50mm standpipe installed. Response zone 10.00m to 12.00m bgl.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used Commacchio Geo602	Bit Design GBS/HQ	Driller BD	Logged By EAT
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DRILLHOLE LOG

Project WSP Lot 1 - Raw Water Intake			Location Parteen, Co Tipperary		DRILLHOLE No RWI-BH013
Job No 2021T102	Date 10-01-22 13-01-22	Ground Level (m OD) 32.04	Co-Ordinates () E 570,001.3 N 670,245.1		
Engineer Mott MacDonald				Sheet 3 of 4 Rev. FINAL	

RUN DETAILS					STRATA			Geology	Instrument/ Backfill
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION			
						Discontinuities	Detail	Main	
17.00	100 (98) 97	2						Very strong thinly bedded dark grey and grey sparry bioclastic fine to medium grained LIMESTONE. <i>(continued)</i>	
18.50	100 (98) 97	1							
20.00	100 (98) 97	1							
21.60	100 (98) 92	11			(17.20)	20.80 - 21.20 Joint, subvertical dip, undulating, smooth, with 0.5 to 2mm thick light brown clay smear, open.		20.45m to 20.55m: medium strong thinly laminated dark grey fissile silty fine grained.	
23.00	100 (98) 96	4				21.60 - 21.75 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick light brown clay smear, open.			
	100 (98) 97	2							

IDL AGS UK DH (SPTS) RK REV2 FINAL REPORT PDFWSP LOT1 PARTEEN GPJ IDL TP TEMPLATE.GDT 21/09/22

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 (%)	
												GBS to 13.00m bgl, HQ to 30.00m bgl. 50mm standpipe installed. Response zone 10.00m to 12.00m bgl.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used Commacchio Geo602	Bit Design GBS/HQ	Driller BD	Logged By EAT
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DRILLHOLE LOG

Project WSP Lot 1 - Raw Water Intake			Location Parteen, Co Tipperary		DRILLHOLE No RWI-BH013
Job No 2021T102	Date 10-01-22 13-01-22	Ground Level (m OD) 32.04	Co-Ordinates () E 570,001.3 N 670,245.1		
Engineer Mott MacDonald				Sheet 4 of 4 Rev. FINAL	

RUN DETAILS						STRATA			Geology	Instrument/ Backfill
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION				
						Discontinuities	Detail	Main		
24.60		1						Very strong thinly bedded dark grey and grey sparry bioclastic fine to medium grained LIMESTONE. <i>(continued)</i>		
26.00	100 (98) 96	3				25.50m to 25.58m: medium strong thinly laminated dark grey fissile silty fine grained.				
27.60	100 (98) 96	3								
29.00	100 (98) 97	4				27.55m to 27.65m: strong silty fine grained.				
30.00	100 (98) 97	1								
30.00	100 (98) 97	1	2.04			30.00			BH terminated at 30.00m bgl on REs instruction.	

IDL AGS UK DH (SPTS) RK REV2 FINAL REPORT PDFWSP LOT1 PARTEEN GPJ IDL TP TEMPLATE.GDT 21/09/22

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
11-01-21	16.00	30.00	6.00	96	64		g/l					GBS to 13.00m bgl, HQ to 30.00m bgl. 50mm standpipe installed. Response zone 10.00m to 12.00m bgl.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used Commacchio Geo602	Bit Design GBS/HQ	Driller BD	Logged By EAT
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DRILLHOLE LOG

Project WSP Lot 1 - Raw Water Intake			Location Parteen, Co Tipperary		DRILLHOLE No RWI-BH014
Job No 2021T102	Date 06-12-21 08-12-21	Ground Level (m OD) 32.34	Co-Ordinates () E 570,014.3 N 670,242.1		
Engineer Mott MacDonald				Sheet 3 of 4 Rev. FINAL	

RUN DETAILS					STRATA			Geology	Instrument/ Backfill
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION			
						Discontinuities	Detail	Main	
17.00	100 (96) 56	3		(15.40)	15.70 - 16.05 Joint, subvertical dip, 'V' shaped, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open. 16.40 - 16.48 Joint, vertical dip, undulating, smooth, with 0.5 to 1mm thick light brown silt smear, open.	Very strong thinly bedded black and dark grey bioclastic fine to coarse grained LIMESTONE. <i>(continued)</i>			
18.50	100 (96) 89	3			17.35 - 17.45 Joint, dipping 60°, stepped, smooth, with 0.5 to 1mm thick orangish brown clay smear, open.	17.80m to 17.95m: strong.			
20.00	100 (98) 97	2			18.30 - 18.60 Joint, subvertical dip, undulating, smooth, with 0.5 to 2mm thick orangish brown clay smear, open.				
21.50	100 (98) 97	2							
23.00	100 (98) 94	5				22.50m to 22.58m: medium strong fissile black fine grained.			
	100 (98) 96	3				23.35m to 23.75m: strong thinly laminated black silty fine grained.			

IDL AGS UK DH (SPTS) RK REV2 FINAL REPORT PDFWSP LOT1 PARTEEN GPJ IDL TP TEMPLATE.GDT 21/09/22

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 (%)	
												GBS to 14.60m bgl, HQ to 30.00m bgl. BH backfilled with bentonite.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used Commacchio Geo602	Bit Design GBS/HQ	Driller BD	Logged By EAT
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DRILLHOLE LOG

Project WSP Lot 1 - Raw Water Intake				Location Parteen, Co Tipperary		DRILLHOLE No RWI-BH015	
Job No 2021T102		Date 01-12-21 03-12-21		Ground Level (m OD) 31.90		Co-Ordinates () E 570,008.6 N 670,219.5	
Engineer Mott MacDonald						Sheet 2 of 4 Rev. FINAL	

RUN DETAILS					STRATA			Geology	Instrument/ Backfill	
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION				
						Discontinuities	Detail	Main		
			23.50	x o x x x x x x x	8.40	8.40 - 30.00 Discontinuities, medium spaced, locally closely spaced, dipping 10 to 12°, planar, smooth, with 0.5 to 2mm thick light grey silt smear.		Very strong thinly bedded black and dark grey bioclastic fine to coarse grained LIMESTONE. 8.80m to 9.00m: extremely strong.		
01.12 02.12	100 (66) 64	2								
		1				14.00 - 14.03 Non-intact as light cream silt.		14.00m to 14.03m: light cream silt.		
11.00	100 (98) 97	2								
		4								
	100 (98) 96	3								
14.00		2								
		1								
	100 (98) 94	2								

IDL AGS UK DH (SPTS) RK REV2 FINAL REPORT PDFWSP LOT1 PARTEEN GPJ IDL TP TEMPLATE.GDT 21/09/22

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Depth	Casing Dia	Core Dia mm	Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
01-12-21	16.30	9.30	5.00	146	101		g/l					GBS to 9.30m bgl, HQ to 30.00m bgl. BH backfilled with bentonite.
02-12-21	08.30	9.30	5.00	146	101		g/l					

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used Commacchio Geo602	Bit Design GBS/HQ	Driller BD	Logged By EAT
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Irish drilling LTD

DRILLHOLE LOG

Project WSP Lot 1 - Raw Water Intake				Location Parteen, Co Tipperary		DRILLHOLE No RWI-BH015	
Job No 2021T102	Date 01-12-21 03-12-21	Ground Level (m OD) 31.90	Co-Ordinates () E 570,008.6 N 670,219.5				
Engineer Mott MacDonald						Sheet 3 of 4 Rev. FINAL	

RUN DETAILS					STRATA			Geology	Instrument/ Backfill		
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION					
						Discontinuities	Detail	Main			
17.00		3						Very strong thinly bedded black and dark grey bioclastic fine to coarse grained LIMESTONE. <i>(continued)</i>			
		1									
	100 (98) 96	2									
		2				(21.60)			19.05m to 19.23m: medium strong.		
20.00 02.12 03.12		4					20.60 - 20.90 Joint, subvertical dip, stepped, rough, clean, open as drilling induced?				
	100 (98) 96	3									
		2									
23.00											
		2									

IDL AGS UK DH (SPTS) RK REV2 FINAL REPORT PDFWSP LOT1 PARTEEN GPJ IDL TP TEMPLATE.GDT 21/09/22

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Depth	Casing Dia	Core Dia mm	Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
02-12-21	16.30	20.00	5.00	96	64		g/l					GBS to 9.30m bgl, HQ to 30.00m bgl. BH backfilled with bentonite.
03-12-21	08.30	20.00	5.00	96	64		g/l					

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used Commacchio Geo602	Bit Design GBS/HQ	Driller BD	Logged By EAT
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Irish drilling LTD

DRILLHOLE LOG

Project WSP Lot 1 - Raw Water Intake			Location Parteen, Co Tipperary		DRILLHOLE No RWI-BH015
Job No 2021T102	Date 01-12-21 03-12-21	Ground Level (m OD) 31.90	Co-Ordinates () E 570,008.6 N 670,219.5		
Engineer Mott MacDonald				Sheet 4 of 4 Rev. FINAL	

RUN DETAILS					STRATA			Geology	Instrument/ Backfill
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION			
						Discontinuities	Detail	Main	
26.00	100 (98) 96	3		[Brick pattern]			Very strong thinly bedded black and dark grey bioclastic fine to coarse grained LIMESTONE. <i>(continued)</i>		
	4					25.00m to 25.20m: strong.			
30.00	100 (98) 96	1		[Brick pattern]					
		1							
		2				29.10m to 29.15m: medium strong fissile with white calcitic 1 to 2mm thick laminae.			
30.00			1.90		30.00		BH terminated at 30.00m bgl on REs instruction.		

IDL AGS UK DH (SPTS) RK REV2 FINAL REPORT PDFWSP LOT1 PARTEEN GPJ IDL TP TEMPLATE.GDT 21/09/22

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Depth	Casing Dia	Core Dia mm	Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
03-12-21	15.00	30.00	5.00	96	64		g/l					GBS to 9.30m bgl, HQ to 30.00m bgl. BH backfilled with bentonite.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used Commacchio Geo602	Bit Design GBS/HQ BD	Driller BD	Logged By EAT
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Irish drilling LTD

DRILLHOLE LOG

Project WSP Lot 1 - Raw Water Intake			Location Parteen, Co Tipperary		DRILLHOLE No RWI-BH016
Job No 2021T102	Date 05-01-22 07-01-22	Ground Level (m OD) 32.80	Co-Ordinates () E 570,029.6 N 670,242.5		
Engineer Mott MacDonald				Sheet 1 of 4 Rev. FINAL	

RUN DETAILS					STRATA			Geology	Instrument/ Backfill	
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION				
						Discontinuities	Detail			Main
0.00	47 (-)				(6.30)	0.00 - 15.00 m: overburden				
1.50	47 (-)					Light brown slightly silty fine to medium SAND.				
3.00	47 (-)									
4.50	53 (-)					3.00m: permeability test.				
6.00	47 (-)	NA								
6.50	60 (-)		26.50			Very stiff pinkish orangish brown slightly sandy gravelly SILT. Sand is fine to coarse. Gravel is subrounded to subangular fine to medium of assorted brown and green sandstone and assorted grey limestone.				
8.00	100 (-)									(3.20)

IDL AGS UK DH (SPTS) RK REV2 FINAL REPORT PDFWSP LOT1 PARTEEN GPJ IDL TP TEMPLATE.GDT 21/09/22

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	30.00	water	100	GBS to 15.00m bgl, HQ to 30.00m bgl. 50mm standpipe installed. Response zone 1.20m to 9.50m bgl.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used Commacchio Geo602	Bit Design GBS/HQ	Driller BD	Logged By EAT
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DRILLHOLE LOG

Project WSP Lot 1 - Raw Water Intake			Location Parteen, Co Tipperary		DRILLHOLE No RWI-BH016
Job No 2021T102	Date 05-01-22 07-01-22	Ground Level (m OD) 32.80	Co-Ordinates () E 570,029.6 N 670,242.5		
Engineer Mott MacDonald				Sheet 3 of 4 Rev. FINAL	

RUN DETAILS					STRATA			Geology	Instrument/ Backfill
Depth Date	TCR (SCR) ROD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION			
						Discontinuities	Detail	Main	
17.00	(96) 79	3		(15.00)	(15.00)	stepped, smooth, with 0.5 to 2mm thick light brown clay smear, open. 15.40 - 15.65 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick light brown clay smear, open.		Very strong thinly bedded black and dark grey bioclastic fine to coarse grained LIMESTONE. <i>(continued)</i>	
18.60	100 (98) 97	1							
		2							
20.00	100 (98) 97	1							
		2							
21.60	100 (98) 97	6							
		2							
23.00	100 (93) 79	2						22.80m to 23.00m: strong thinly laminated dark grey fissile silty fine grained.	
	100 (98) 97	0							

IDL AGS UK DH (SPTS) RK REV2 FINAL REPORT PDFWSP LOT1 PARTEEN GPJ IDL TP TEMPLATE.GDT 21/09/22

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
												GBS to 15.00m bgl, HQ to 30.00m bgl. 50mm standpipe installed. Response zone 1.20m to 9.50m bgl.

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used Commacchio Geo602	Bit Design GBS/HQ	Driller BD BD	Logged By EAT
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Irish drilling LTD

DRILLHOLE LOG

Project WSP Lot 1 - Raw Water Intake				Location Parteen, Co Tipperary		DRILLHOLE No RWI-BH016	
Job No 2021T102		Date 05-01-22 07-01-22		Ground Level (m OD) 32.80		Co-Ordinates () E 570,029.6 N 670,242.5	
Engineer Mott MacDonald						Sheet 4 of 4 Rev. FINAL	

RUN DETAILS					STRATA			Geology	Instrument/ Backfill	
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION				
						Discontinuities	Detail	Main		
24.50		1				Very strong thinly bedded black and dark grey bioclastic fine to coarse grained LIMESTONE. (continued)				
	100 (98) 97	0								
26.00										
	100 (98) 96	1								
27.60		2								
	100 (98) 97	1								
29.00						BH terminated at 30.00m bgl on REs instruction.				
	100 (98) 97	2								
30.00			2.80	30.00						
06.01 07.01										

IDL AGS UK DH (SPTS) RK REV2 FINAL REPORT PDFWSP LOT1 PARTEEN GPJ IDL TP TEMPLATE.GDT 21/09/22

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 (%)	
06-01-22	15.30	30.00	1.50	96	64		g/l					GBS to 15.00m bgl, HQ to 30.00m bgl. 50mm standpipe installed. Response zone 1.20m to 9.50m bgl.
07-01-22	08.30	30.00	1.50	96	64		g/l					
07-01-22	11.00	30.00	1.50	96	64		g/l					

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used Commacchio Geo602	Bit Design GBS/HQ	Driller BD	Logged By EAT
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Irish drilling LTD

DRILLHOLE LOG

Project WSP Lot 1 - Raw Water Intake				Location Parteen, Co Tipperary		DRILLHOLE No RWI-BH017	
Job No 2021T102		Date 17-12-21 21-12-21		Ground Level (m OD) 32.46		Co-Ordinates () E 570,025.2 N 670,227.3	
Engineer Mott MacDonald						Sheet 1 of 4 Rev. FINAL	

RUN DETAILS					STRATA			Geology	Instrument/ Backfill	
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION				
						Discontinuities	Detail	Main		
0.00	17 (-)					0.00 - 12.20 m: overburden		Light orangish brown slightly gravelly silty fine to medium SAND. Gravel is subangular fine to coarse of brown sandstone and grey limestone.		
1.50		1.50 (4)			(3.50)		1.50m: loose.			
3.00	13 (-)									
3.50	100 (-)	3.00(50/75mm)	28.96		3.50					
			28.86		3.60			Subrounded to subangular fine to coarse assorted cream sandstone and assorted grey limestone GRAVEL.		
5.00	47 (-)	4.50 (0)						Light orangish brown slightly silty fine to medium SAND.		
		NA			(2.90)			4.50m: very loose.		
6.50	33 (-)	6.00(25/75mm)	25.96		6.50					
8.00	100 (-)							Very stiff pinkish orangish brown slightly sandy gravelly SILT. Sand is fine to coarse. Gravel is subangular fine to medium of assorted brown and green sandstone and assorted grey limestone.		

IDL AGS UK DH (SPTS) RK REV2 FINAL REPORT PDFWSP LOT1 PARTEEN GPJ IDL TP TEMPLATE.GDT 21/09/22

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Depth	Casing Dia	Core Dia mm	Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
17-12-21	16.00	6.50	6.00	146	101		g/l	0	30.00	water	100	GBS to 12.50m bgl, HQ to 30.00m bgl. 19mm piezometer installed - tip at 2.00m bgl.
20-12-21	08.30	6.50	6.00	146	101		g/l					

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used	Commacchio Geo602	Bit Design	GBS/HQ	Driller BD	Logged By EAT
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DRILLHOLE LOG

Project WSP Lot 1 - Raw Water Intake				Location Parteen, Co Tipperary		DRILLHOLE No RWI-BH017	
Job No 2021T102	Date 17-12-21 21-12-21	Ground Level (m OD) 32.46	Co-Ordinates () E 570,025.2 N 670,227.3				
Engineer Mott MacDonald						Sheet 3 of 4 Rev. FINAL	

RUN DETAILS					STRATA			Geology	Instrument/ Backfill	
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION				
						Discontinuities	Detail	Main		
20.12 21.12		4			(17.80)			Very strong locally strong thinly bedded black and dark grey silty bioclastic fine grained LIMESTONE. <i>(continued)</i>		
18.50	100 (95) 85	1								
20.00	100 (98) 97	3								
21.50	100 (98) 92	1								
23.00	100 (98) 97	2							22.20m to 22.34m: strong.	
	100 (98) 96	1								

IDL AGS UK DH (SPTS) RK REV2 FINAL REPORT PDFWSP LOT1 PARTEEN GPJ IDL TP TEMPLATE.GDT 21/09/22

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Depth	Casing Dia	Core Dia mm	Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
20-12-21	16.00	17.00	17.00	96	64		g/l					GBS to 12.50m bgl, HQ to 30.00m bgl. 19mm piezometer installed - tip at 2.00m bgl.
21-12-21	08.30	17.00	17.00	96	64		g/l					

All dimensions in metres Scale 1:50	Client: Irish Water	Method/ Plant Used Commacchio Geo602	Bit Design GBS/HQ	Driller BD	Logged By EAT
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Appendix 1B Dynamic Sampling Records

NOT APPLICABLE

Appendix 1C Trial Pit Records

NOT APPLICABLE

Appendix 1D Peat Probe / Russian Core Records

NOT APPLICABLE

Appendix 1E.1 In-Situ Test Records (Packer Tests)



WSP Lot 1, Raw Water Intake
Ground Investigation Contract

PACKER PERMEABILITY TEST RESULTS

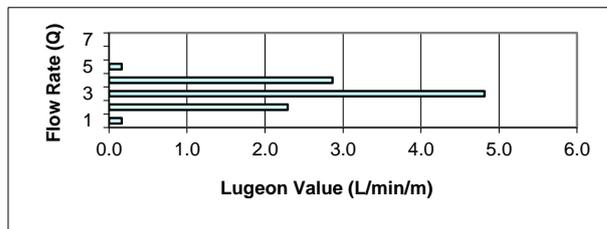
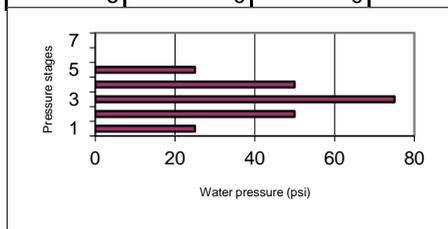
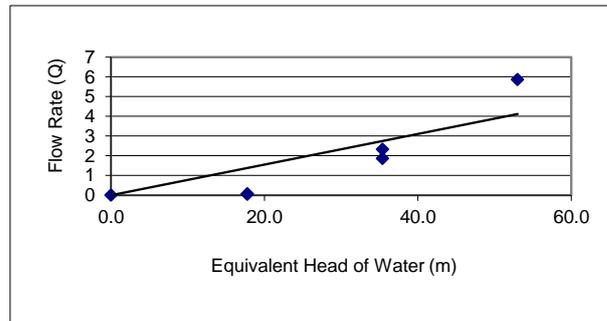
Contract: WSP Lot 1 Parteen	Top of test section (m bgl)	13.3
Client: Irish Water	Bottom of test section (m bgl)	15.6
Engineer: Mott MacDonald	Centre of test section (m bgl)	14.45
Borehole: RWI BH007A	Length of test section (m bgl)	2.3
Bh. size: HQ	Pressure gauge height (m agl)	0.2
Date: 13.01.2022	Initial depth to G.W. (m bgl)	0
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	8.581	8.582	8.582	8.582	0.001	0	0	1
2	50	8.583	8.593	8.603	8.611	0.01	0.01	0.008	28
3	75	8.612	8.635	8.668	8.7	0.023	0.033	0.032	88
4	50	8.7	8.713	8.725	8.735	0.013	0.012	0.01	35
5	25	8.735	8.735	8.735	8.736	0	0	0.001	1

2. Calculations

Pressure stage	Equiv. head of water (m)	Flow rate (Q) l/min	Stage Lugeon Value l/min/m
1	17.8	0.1	0.2
2	35.4	1.9	2.3
3	53.0	5.9	4.8
4	35.4	2.3	2.9
5	17.8	0.1	0.2
6	0	0	0



3. Permeability (k) analysis

Mean Lugeon Value Used: 2.08L

k (m/sec) 2.08E-07



PACKER PERMEABILITY TEST RESULTS

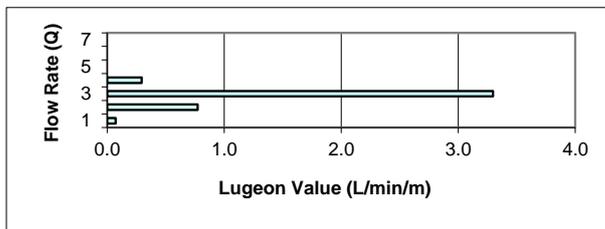
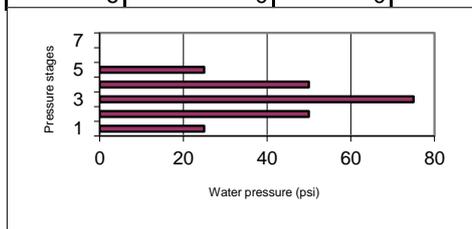
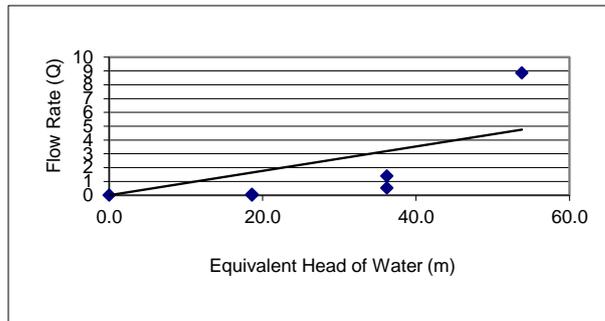
Contract: WSP Lot 1 Parteen	Top of test section (m bgl)	15
Client: Irish Water	Bottom of test section (m bgl)	20
Engineer: Mott MacDonald	Centre of test section (m bgl)	17.5
Borehole: RWI BH013	Length of test section (m bgl)	5
Bh. size: HQ	Pressure gauge height (m agl)	0.2
Date: 11.01.2022	Initial depth to G.W. (m bgl)	0.8
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	8.37	8.371	8.371	8.371	0.001	0	0	1
2	50	8.374	8.382	8.389	8.395	0.008	0.007	0.006	21
3	75	8.397	8.441	8.483	8.53	0.044	0.042	0.047	133
4	50	8.531	8.539	8.539	8.539	0.008	0	0	8
5	25	8.539	8.539	8.539	8.539	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	18.6	0.1	0.1
2	36.2	1.4	0.8
3	53.8	8.9	3.3
4	36.2	0.5	0.3
5	18.6	0.0	0.0
6	0	0	0



3. Permeability (k) analysis

Mean Lugeon Value Used: 0.9L

k (m/sec) 9.00E-08

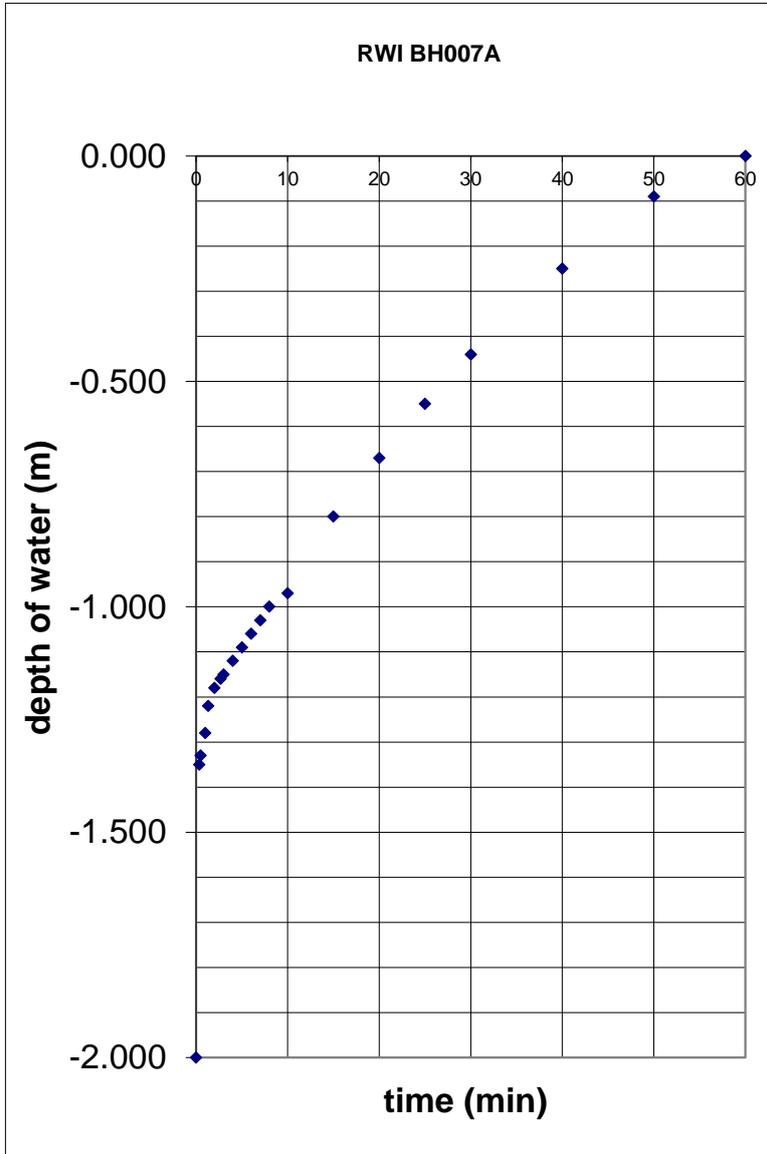
Appendix 1E.2 In-Situ Test Records (Permeability Tests)

IRISH DRILLING LTD. Loughrea Co. Galway Tel: (091) 841274 Fax: (091) 880 861	Contract: WSP Lot 1, Parteen Client: Irish Water Engineer: Mott MacDonald Date: 13/01/2022 Tested by: AG
--	--

Rising Head Permeability Test

Bottom of Borehole (below ground level): 5.00m	Borehole No. RWI BH 007A
Bottom of Casing (below ground level): 4.50m	Ground Level (mOD): 31.33
Diameter of Borehole: 146mm	Co-ordinates:
Diameter of Casing: 150mm	569975.9E
Initial ground water level: Ground Level	670241.1N

time min	WL m
0	-2.000
0.33	-1.350
0.5	-1.330
1	-1.280
1.33	-1.220
2	-1.180
2.66	-1.160
3	-1.150
4	-1.120
5	-1.090
6	-1.060
7	-1.030
8	-1.000
10	-0.970
15	-0.800
20	-0.670
25	-0.550
30	-0.440
40	-0.250
50	-0.090
60	0.000



$k = 5.10 \times 10^{-6} \text{ m/s}$

Remarks:

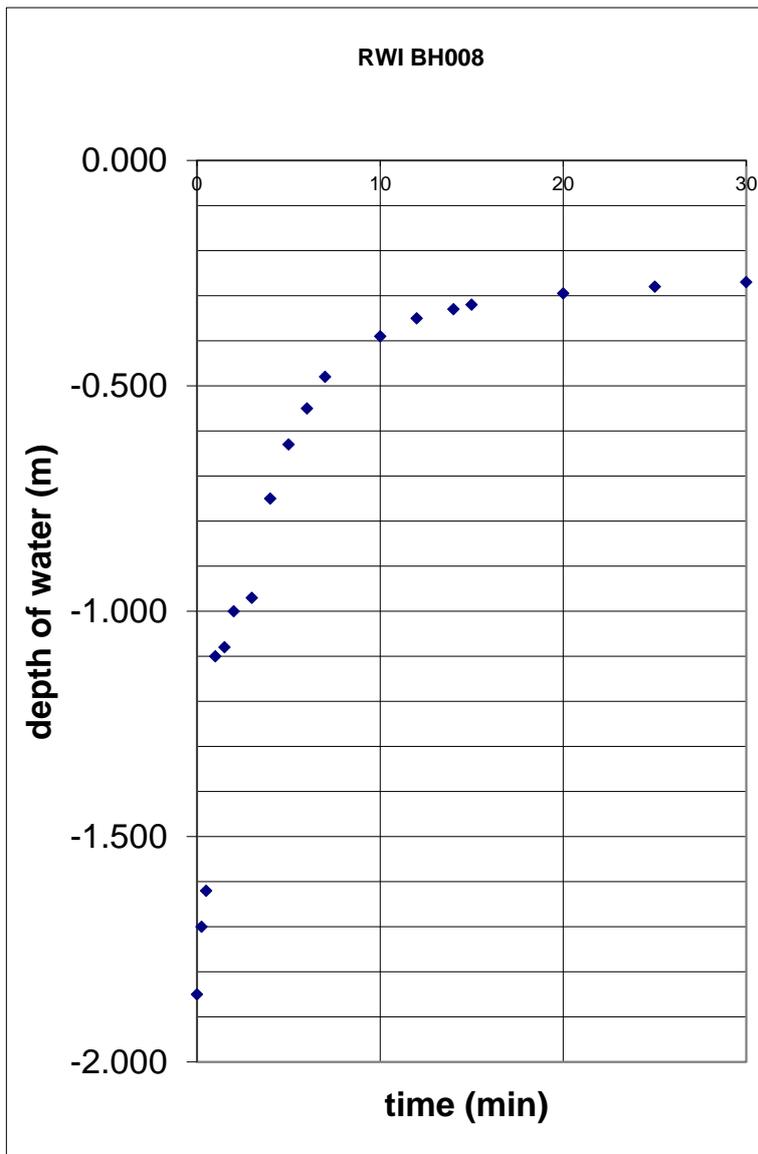
Borehole pumped out prior to commencing test.
Standing for 1hr before commencing test.
Water readings recorded from ground level.

IRISH DRILLING LTD. Loughrea Co. Galway Tel: (091) 841274 Fax: (091) 880 861	Contract: WSP Lot 1, Parteen Client: Irish Water Engineer: Mott MacDonald Date: 13/01/2022 Tested by: AG
--	--

Rising Head Permeability Test

Bottom of Borehole (below ground level): 4.00m	Borehole No. RWI BH 008
Bottom of Casing (below ground level): N/A	Ground Level (mOD): 31.34
Diameter of Borehole: 146mm	Co-ordinates: 569976.1E
Diameter of Standpipe: 50mm	670271.7N
Response Zone: 1.00-400m BGL	
Initial ground water level: -0.27m	

time min	WL m
0	-1.850
0.25	-1.700
0.5	-1.620
1	-1.100
1.5	-1.080
2	-1.000
3	-0.970
4	-0.750
5	-0.630
6	-0.550
7	-0.480
10	-0.390
12	-0.350
14	-0.330
15	-0.320
20	-0.295
25	-0.280
30	-0.270



$k = 2.02 \times 10^{-4} \text{ m/s}$

Remarks:

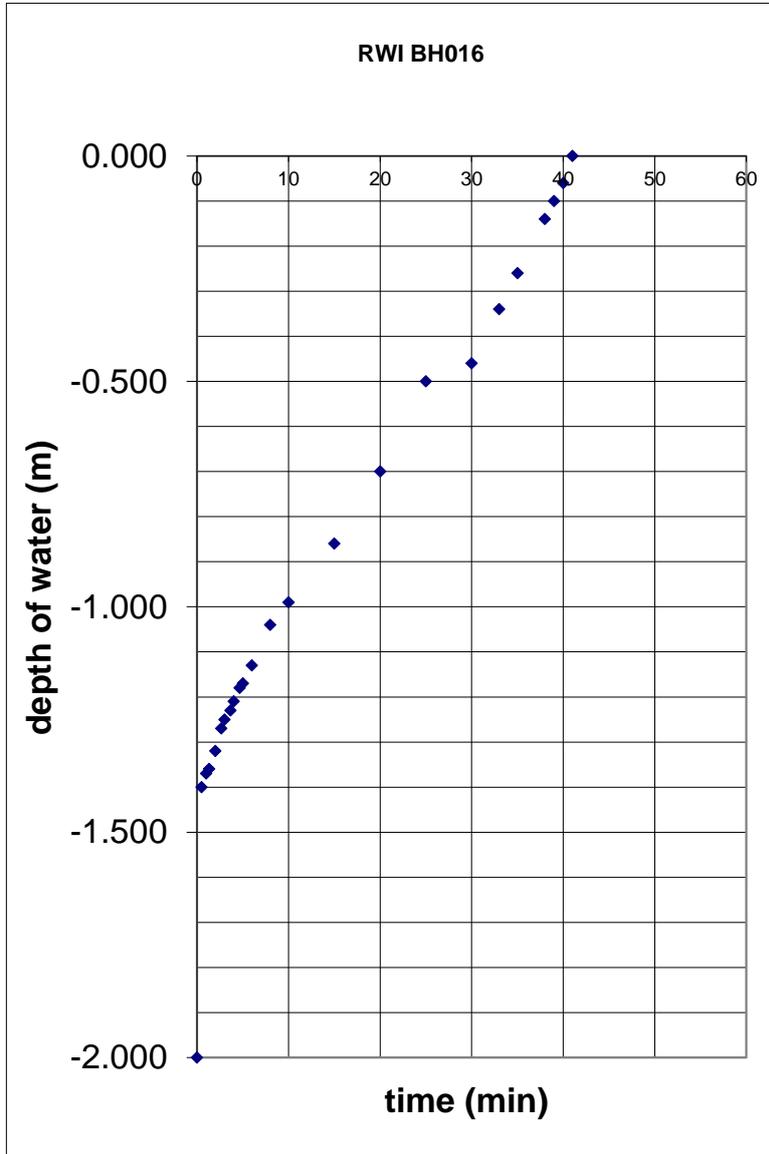
Borehole pumped out prior to commencing test.
 Standing for 1hr before commencing test.
 Test carried out in 50mm diameter standpipe.
 Water readings recorded from ground level.

IRISH DRILLING LTD. Loughrea Co. Galway Tel: (091) 841274 Fax: (091) 880 861	Contract: WSP Lot 1, Parteen Client: Irish Water Engineer: Mott MacDonald Date: 05/01/2022 Tested by: AG
--	--

Rising Head Permeability Test

Bottom of Borehole (below ground level): 3.00m	Borehole No. RWI BH 016
Bottom of Casing (below ground level): 1.50m	Ground Level (mOD): 32.801
Diameter of Borehole: 146mm	Co-ordinates:
Diameter of Casing: 150mm	570029.6E
Initial ground water level: Ground Level	670242.5N

time min	WL m
0	-2.000
0.5	-1.400
1	-1.370
1.33	-1.360
2	-1.320
2.66	-1.270
3	-1.250
3.66	-1.230
4	-1.210
4.66	-1.180
5	-1.170
6	-1.130
8	-1.040
10	-0.990
15	-0.860
20	-0.700
25	-0.500
30	-0.460
33	-0.340
35	-0.260
38	-0.140
39	-0.100
40	-0.060
41	0.000



$k = 4.80 \times 10^{-6} \text{ m/s}$

Remarks:

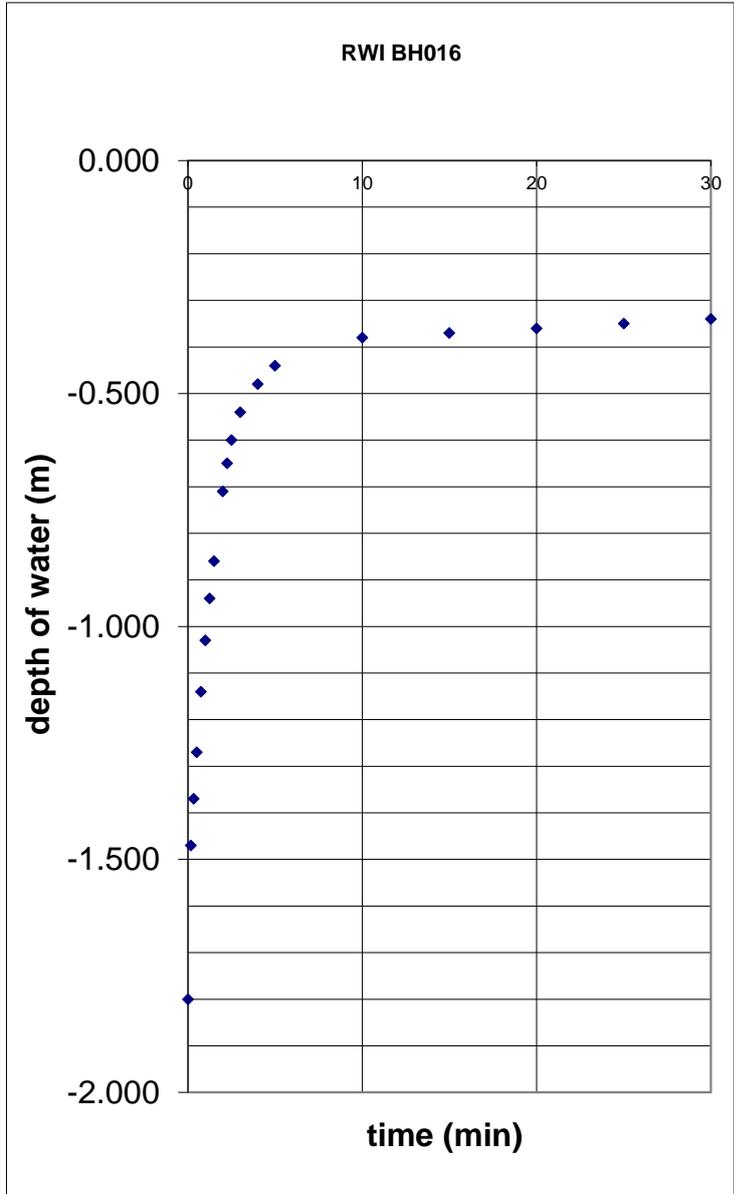
Borehole pumped out prior to commencing test.
 Standing for 1hr before commencing test.
 Water readinbgs recorded from ground level.

IRISH DRILLING LTD. Loughrea Co. Galway Tel: (091) 841274 Fax: (091) 880 861	Contract: WSP Lot 1, Parteen Client: Irish Water Engineer: Mott MacDonald Date: 14/01/2022 Tested by: AG
--	--

Rising Head Permeability Test

Bottom of Borehole (below ground level): 9.50m	Borehole No. RWI BH 016
Bottom of Casing (below ground level): N/A	Ground Level (mOD): 32.801
Diameter of Borehole: 146mm	Co-ordinates:
Diameter of Standpipe: 50mm	570029.6E
Response Zone: 1.20-9.50m BGL	670242.5N
Initial ground water level: -0.30m	

time min	WL m
0	-1.800
0.17	-1.470
0.33	-1.370
0.5	-1.270
0.75	-1.140
1	-1.030
1.25	-0.940
1.5	-0.860
2	-0.710
2.25	-0.650
2.5	-0.600
3	-0.540
4	-0.480
5	-0.440
10	-0.380
15	-0.370
20	-0.360
25	-0.350
30	-0.340
45	-0.330
60	-0.300



$k = 4.70 \times 10^{-4} \text{ m/s}$

Remarks:

Borehole pumped out prior to commencing test.
 Standing for 1hr before commencing test.
 Test carried out in 50mm diameter standpipe.
 Water readings recorded from ground level.

Appendix 1F

Specialist In-Situ Test Records

(Pressuremeter Tests)

Project: Water Supply Project Eastern and Midlands Region Ground Investigation Lot 1

Pressuremeter Testing Factual Report

Client: Irish Drilling Ltd

Contract No.: P1210127

Issue	Date	Description	Prepared	Checked	Approved
01	17/05/2022	Final	JH	JH	RC

Date: 17th May 2022

Our Ref: P1210127

Irish Drilling Ltd

Old Galway Road

Loughrea

Co. Galway

Ireland

Hastings Innovation Centre

Highfield Drive

St Leonards on Sea

East Sussex TN38 9UH

Attention: Ronan Killeen

**Pressuremeter testing at
Water Supply Project Eastern and Midlands Region Ground Investigation Lot 1**

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 (σ_{ho})	
p_o	Cavity reference pressure
σ_{ho} (M&R)	In situ horizontal stress from Marsland & Randolph (1977) analysis (where $P_{yield} = P_L - S_u$)
σ_{ho} (LO)	In situ horizontal stress from lift-off analysis (SBP)
σ_{ho} (H&W)	In situ horizontal stress from unloading curve (Houlsby & Withers, 1988; RPM)
σ_{ho} (CM)	In situ horizontal 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

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 lots, with this report presenting pressuremeter testing carried out as part of works on Lot 1.

The pressuremeter testing was attempted in two boreholes. The fieldwork was carried out on site from 10th to 16th December 2021.

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. 2021T102.

2.0 FIELDWORK

2.1 General

Six pressuremeter tests were attempted in boreholes constructed using a rotary drilling rig, operated by Irish Drilling Ltd. However, in RWI-BH010 the test pockets collapsed for the first two test depths and meant they weren't possible to complete. The tests were carried out using a high-pressure dilatometer (HPD). The testing was carried out 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 2.1. Summary of pressuremeter tests.

Borehole Reference	Test Reference	Date	Test Depth	Probe	Operator	Remarks
RWI-BH008	T01	10/12/2021	8.30	Kylie (HPD06)	D Cooper	Test pocket cored using water flush.
	T02	13/12/2021	11.60	Kylie (HPD06)	D Cooper	Test pocket cored using water flush.
	T03	13/12/2021	15.10	Kylie (HPD06)	D Cooper	Test pocket cored using water flush.
RWI-BH010	-	15/12/2021	7.60	Kylie (HPD06)	D Cooper	Test pocket cored using water flush. Test pocket collapse.
	-	16/12/2021	10.60	Kylie (HPD06)	D Cooper	Test pocket cored using water flush. Test pocket collapse.
	T01	16/12/2021	12.60	Kylie (HPD06)	D Cooper	Test pocket cored using water flush.

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 2.2. 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 2 $\frac{3}{8}$ 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 from the tested section and recovered back to the ground surface. The boreholes were then advanced to the next specified test depth and the sequence repeated, until the testing program was completed.

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 typically comprised loose silty fine to coarse SAND underlain by very stiff slightly sandy gravelly SILT and bedrock of very strong thinly bedded bioclastic LIMESTONE. For more detail refer to the Irish Drilling Ltd report, Project No. 2021T102.

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.

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:

$$P_{\text{yield}} = \sigma_{\text{ho}} + s_u.$$

The tests performed at the site were in either sandy gravelly SILT or LIMESTONE rock. 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.

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:

$$E_u = 2.G(1 + \nu)$$

Where ν = Poisson's ratio

The Poisson's ratio can be either undrained (ν_u) or drained (ν'). For undrained elastic soil (clay) a ν_u value of 0.5 can be taken. For drained conditions in any soil, the value of ν' 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.

4.0 REFERENCES

Bolton, M.D. & Whittle, R.W. (1999) A non-linear elastic/perfectly plastic analysis for plane strain undrained expansion tests. *Géotechnique*, Vol. 49, No. 1, pp. 133-141.

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Gibson, R.E. & Anderson, W.F. (1961) In situ measurement of soil properties with the pressuremeter. *Civil Engineering and Public Works Review*, Vol. 56, No. 658 May, pp. 615-618.

Haberfield, C. M. and Johnston, I.W. (1993) Factors influencing the interpretation of pressuremeter tests in soft rock, Proc. Symp. on Geotechnical Engineering of Hard Soils — Soft Rocks, Athens, Vol. 1, Balkema, Rotterdam, pp. 525-532.

Jefferies, M.G. (1988) Determination of horizontal geostatic stress in clay with self-bored pressuremeter. *Canadian Geotechnical Journal*, 25, No. 3, pp. 63-80.

Mair, R.J. & Wood, D.M. (1987) Pressuremeter testing: methods and interpretation. CIRIA Ground Engineering Report: In-situ Testing. London.

Marsland, A. & Randolph, M.F. (1977) Comparison of the results from pressuremeter tests and large in situ plate tests in London Clay. *Géotechnique*, Vol. 27, No. 2, pp. 217-243.

APPENDIX A

Test Data Analysis

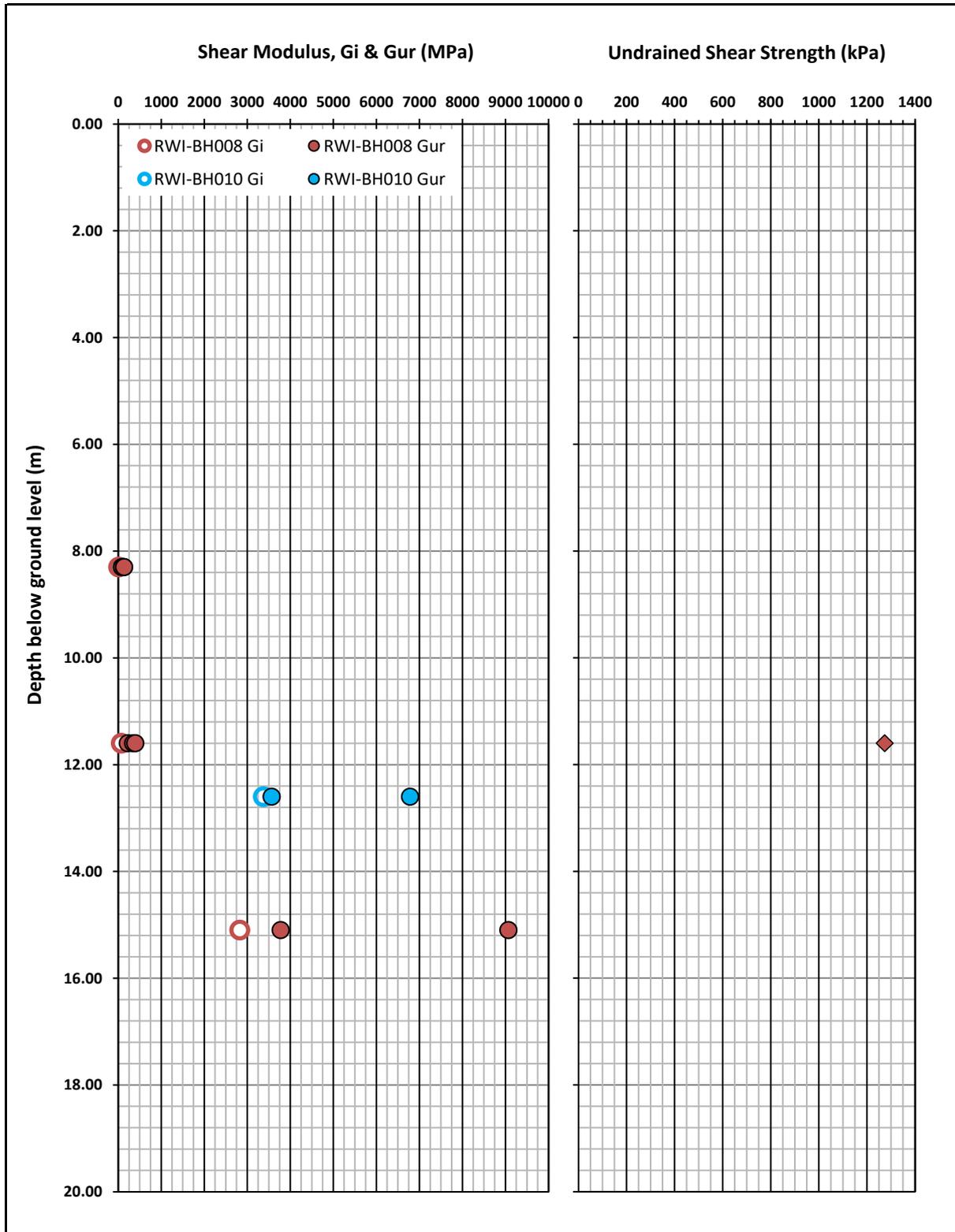
Description	Figure No.
Pressuremeter Results Summary	RWI -BH008 & RWI-BH010
Pressuremeter Shear Modulus Plot & Undrained Shear Strength Plot	Figure 1
Pressuremeter In Situ Horizontal Stress, Yield & Maximum Pressure Plot	Figure 2
Pressuremeter Test Analysis	
RWI-BH008	T01 - T03
RWI-BH010	T01

Pressuremeter Results Summary

Test ID	Depth (m)	Material description from borehole log	Max. test pressure (kPa)	p _o (kPa)	Undrained strength			G _i (MPa)	Loop No.	G _{ur} (MPa)	e _c (%)	Non linear stiffness		Secant shear modulus			
					S _u (M&R)	S _u (loading)	P _L					α (MPa)	β	Shear strain			
														1%	0.1%	0.01%	0.001%
RWI-BH008																	
1	8.30	Very stiff pinkish orangish brown sandy gravelly SILT.	1214	399	Martial yield not observed			10	1	85	0.030	12.809	0.776	36	60	100	168
									2	129	0.032	23.800	0.802	59	93	147	233
									3	138	0.084	37.419	0.826	83	124	186	277
2	11.60	Very stiff pinkish orangish brown sandy gravelly SILT.	2531	859	1274	1274	7215	72	1	225	0.058	58.980	0.832	128	188	276	407
					2	347	0.065		71.449	0.795	184	295	473	759			
					3	399	0.053		88.525	0.811	211	326	504	778			
3	15.10	Very strong thinly bedded black and dark grey bioclastic fine to coarse grained LIMESTONE.	12956	3402	Martial yield not observed			2828	1	3775	0.012	Poor loop definition, full analysis not possible					
									2	9068	0.007						
RWI-BH010																	
-	7.60	Very stiff pinkish orangish brown slightly sandy gravelly SILT.	Material not suitable, test pocket collapsed.														
-	10.60	as above	Material not suitable, test pocket collapsed.														
3	12.60	Very strong thinly bedded black and dark grey bioclastic fine to coarse grained LIMESTONE.	16446	3200	Martial yield not observed			3375	1	3566	0.008	Poor loop definition, full analysis not possible					
									2	6784	0.011						

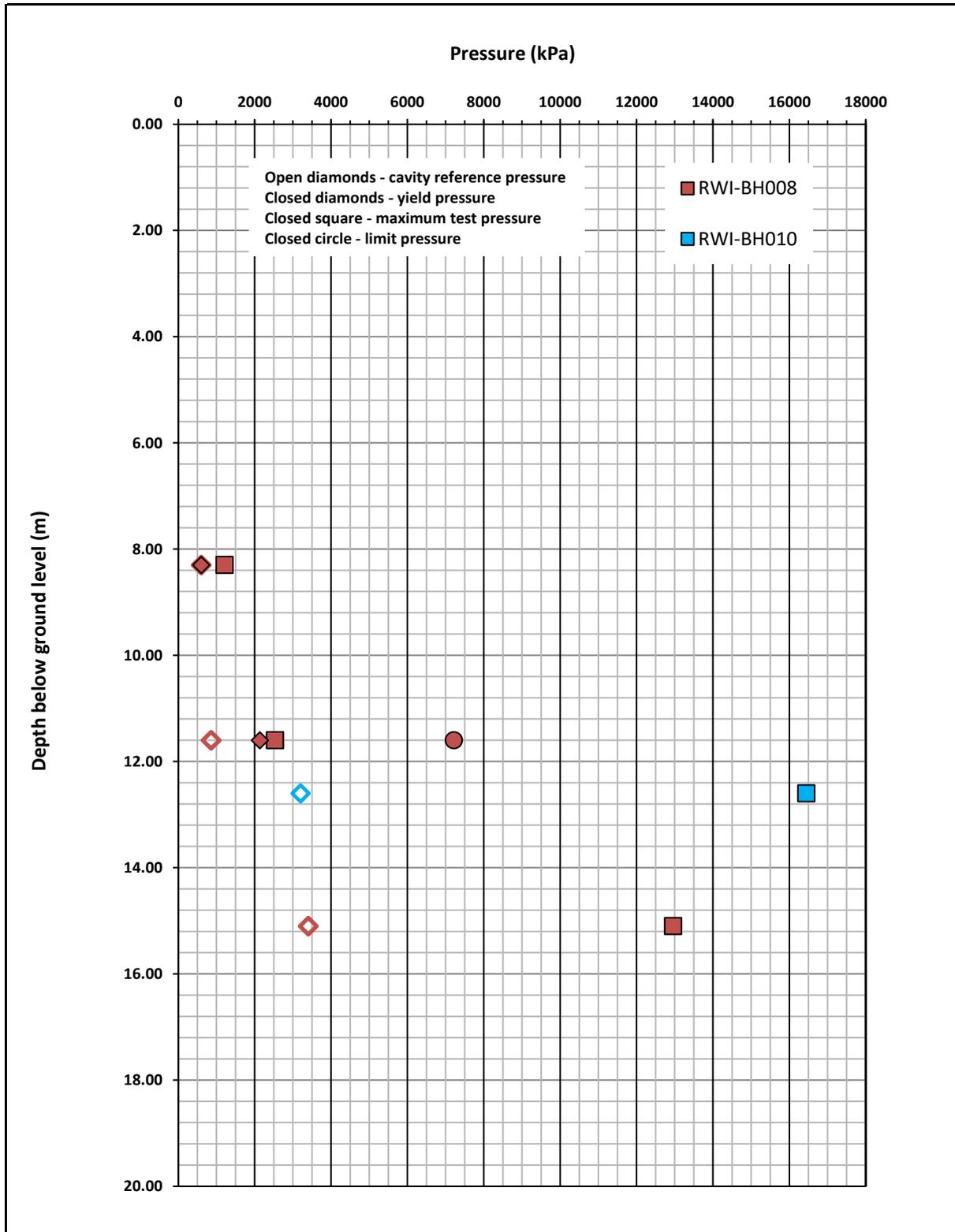
Project No.	Project	Table No.	RWI-BH008 & RWI-BH010
	Client		
P1210127	Irish Drilling Ltd		

Pressuremeter Shear Modulus & Undrained Shear Strength Plot



Project	Water Supply Project GI Lot 1	Figure No.	1
Client	Irish Drilling Ltd		
Project No.	P1210127		

Pressuremeter Cavity Reference Pressure, Yield & Maximum Test Pressure Plot

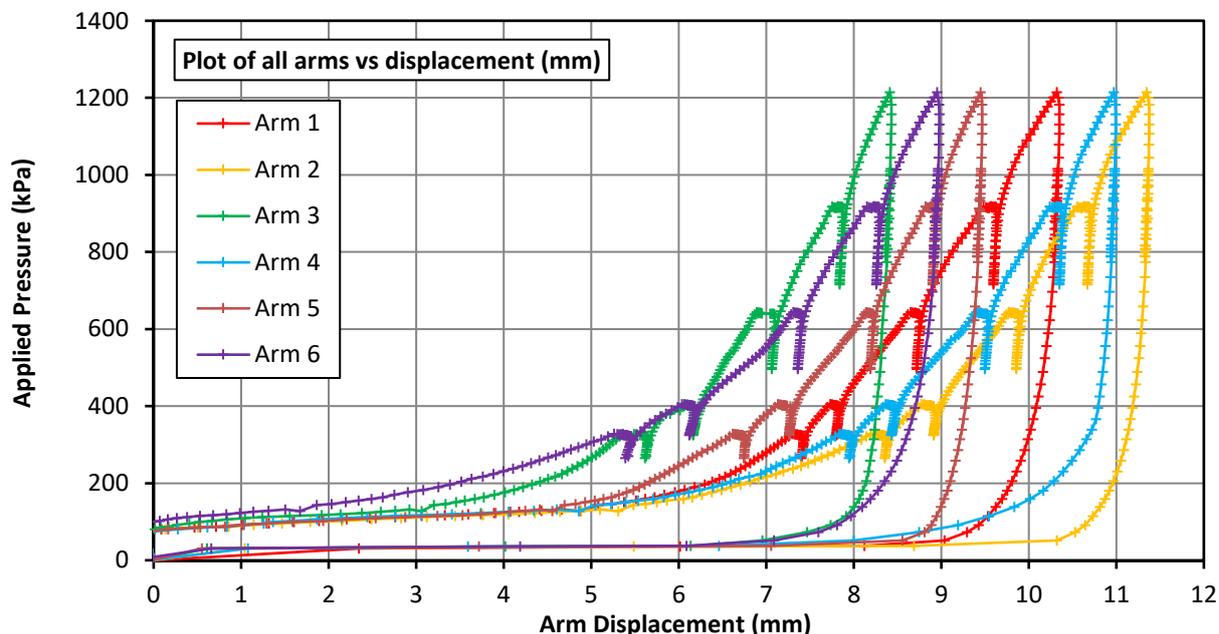


Project	Water Supply Project GI Lot 1	Figure No.	2
Client	Irish Drilling Ltd		
Project No.	P1210127		

Pressuremeter Test Overview High Pressure Dilatometer (HPD)



Test Date	10/12/2021	Test No.	1
Borehole	RWI-BH008	Test Depth (m)	8.30
Coordinates (m)	569976.1 (E)	670271.7 (N)	Elevation (m) 31.34



Material description from borehole log:

Very stiff pinkish orangish brown sandy gravelly SILT.

Test pocket conditions:

Total core recovery:	100 %	Test pocket depth range:
Solid core recovery:	- %	From: 7.20 m to: 8.70 m
Rock quality designation:	- %	Flush: Water

Test comment:

The test pocket was large with arms lifting off at 6.5 to 9.5mm. The p_o was estimated to be at 599kPa, with the following loading section being relatively short. No material yield was observed and the test was terminated at 1214kPa due to the continued expansion in the large pocket. The displacement-pressure response shown by the arms was relatively consistent, albeit at variable expansion. Analysis of three unload reload loops provides increasing modulus values of 85 to 138MPa.

Test details:

Instrument: Kylie (HPD06)

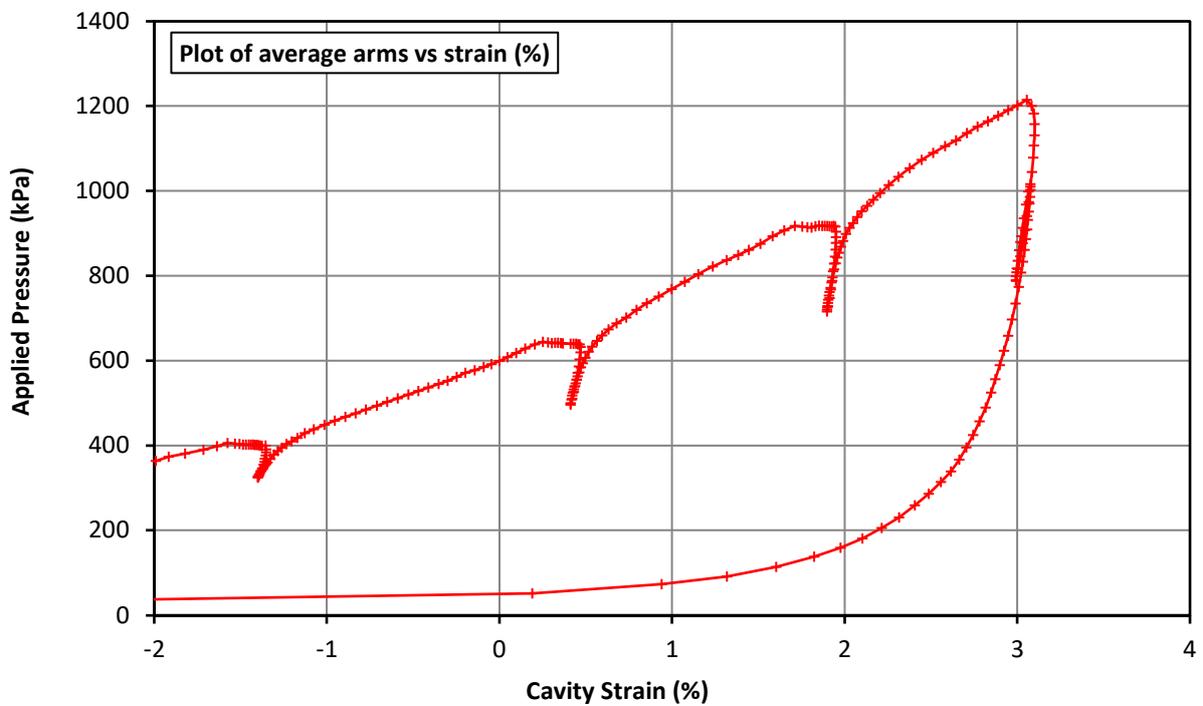
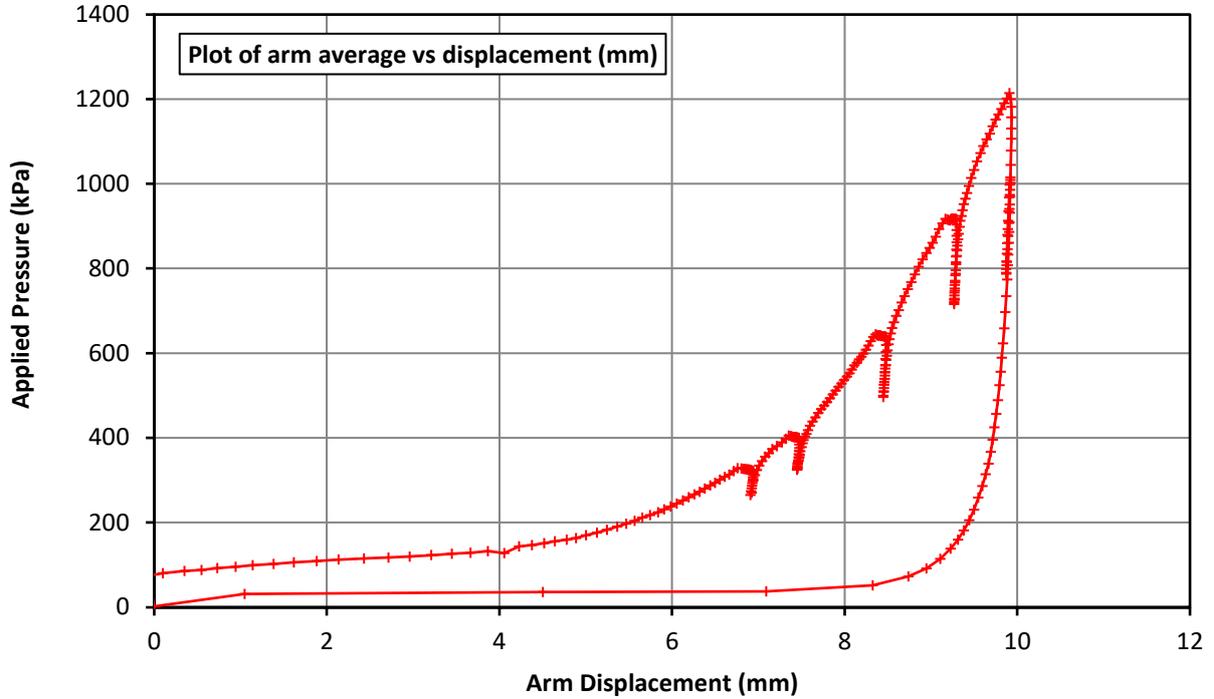
Drilling method:	Rotary coring		mV	mV/mm	mV	mV/MPa
Casing depth:	7.20 m	Arm 1:	-2419.9	136.2	TPC A:	-2359.5 114.3
Water level:	0.00 m	Arm 2:	-2351.9	135.5	TPC B:	-2415.4 122.8
		Arm 3:	-2267.6	137.1		
Test time:		Arm 4:	-2435.5	132.3		
Start (probe in):	12:25 hrs	Arm 5:	-2339.0	130.2		
Finish (probe out):	13:40 hrs	Arm 6:	-2290.9	135.8		

Project	Water Supply Project GI Lot 1	Figure No.	RWI-BH008 T01 - 01
Client	Irish Drilling Ltd		
Project No.	P1200127		

Pressuremeter Test - Average Arm Plots

IN SITU
SITE INVESTIGATION

Test Date	10/12/2021	Test No.	1
Borehole	RWI-BH008	Test Depth (m)	8.30

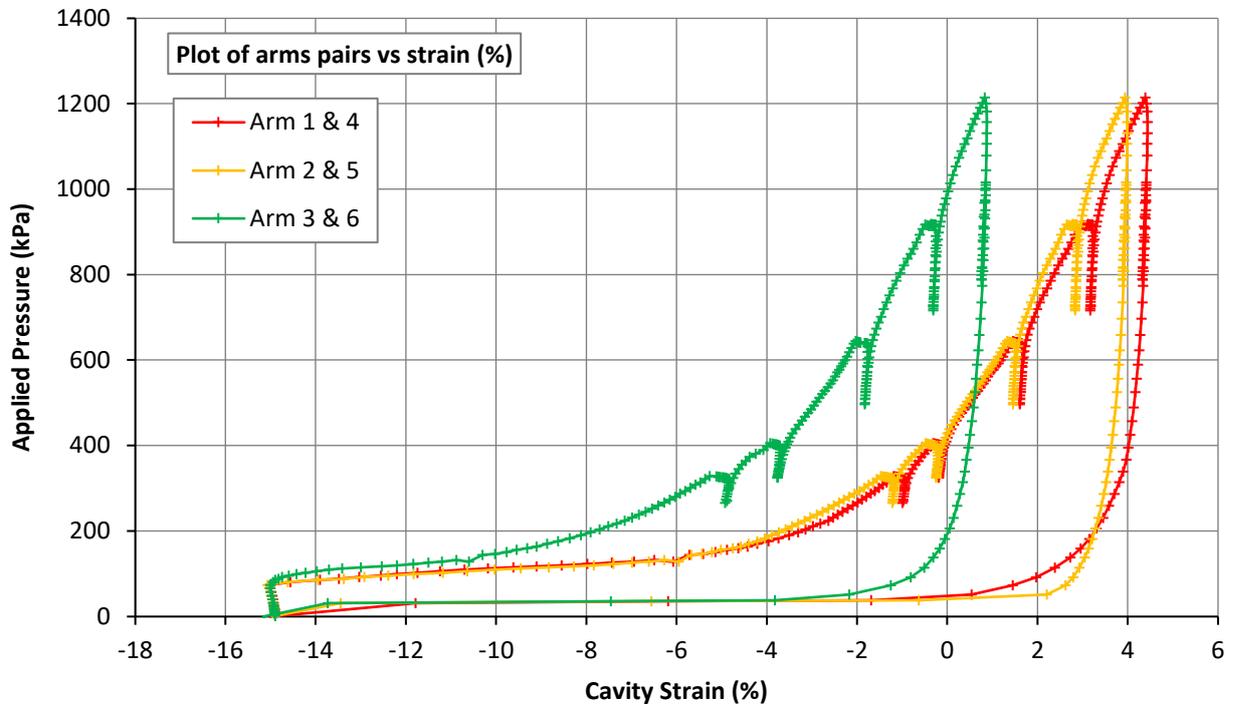
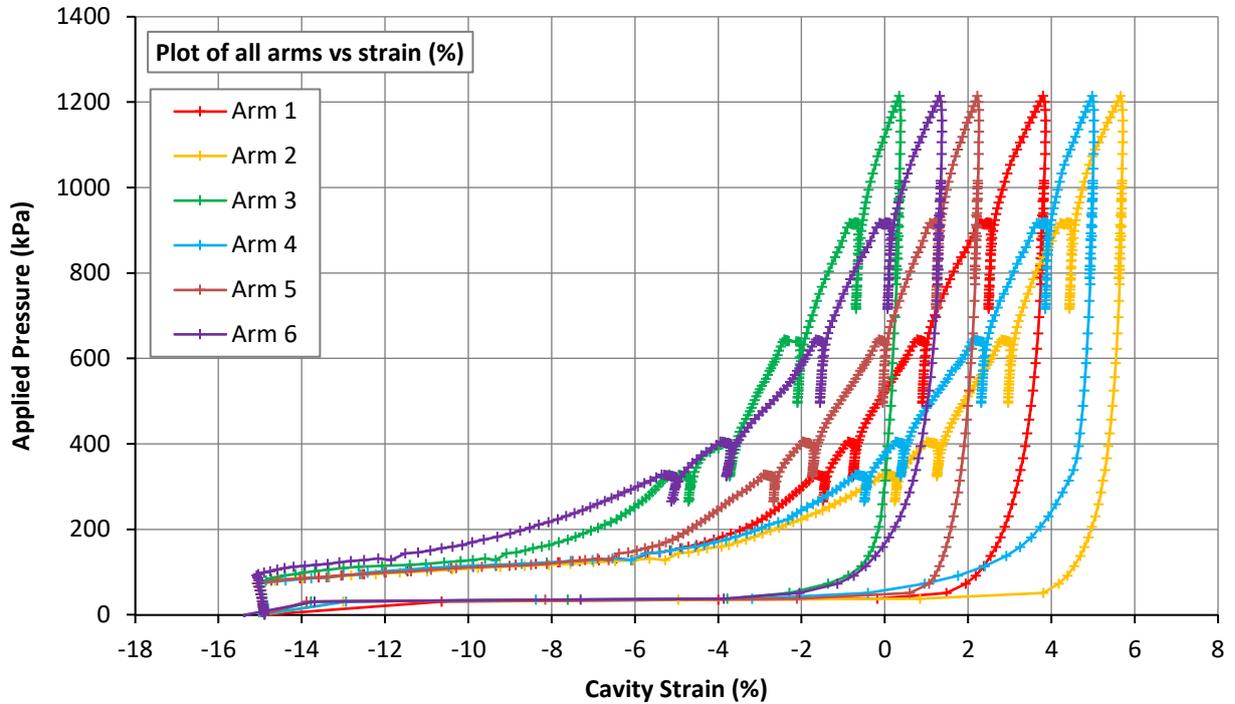


Project	Water Supply Project GI Lot 1	Figure No.	RWI-BH008 T01 - 02
Client	Irish Drilling Ltd		
Project No.	P1200127		

Pressuremeter Test - Arm Displacement vs Strain (%)

IN SITU
SITE INVESTIGATION

Test Date	10/12/2021	Test No.	1
Borehole	RWI-BH008	Test Depth (m)	8.30

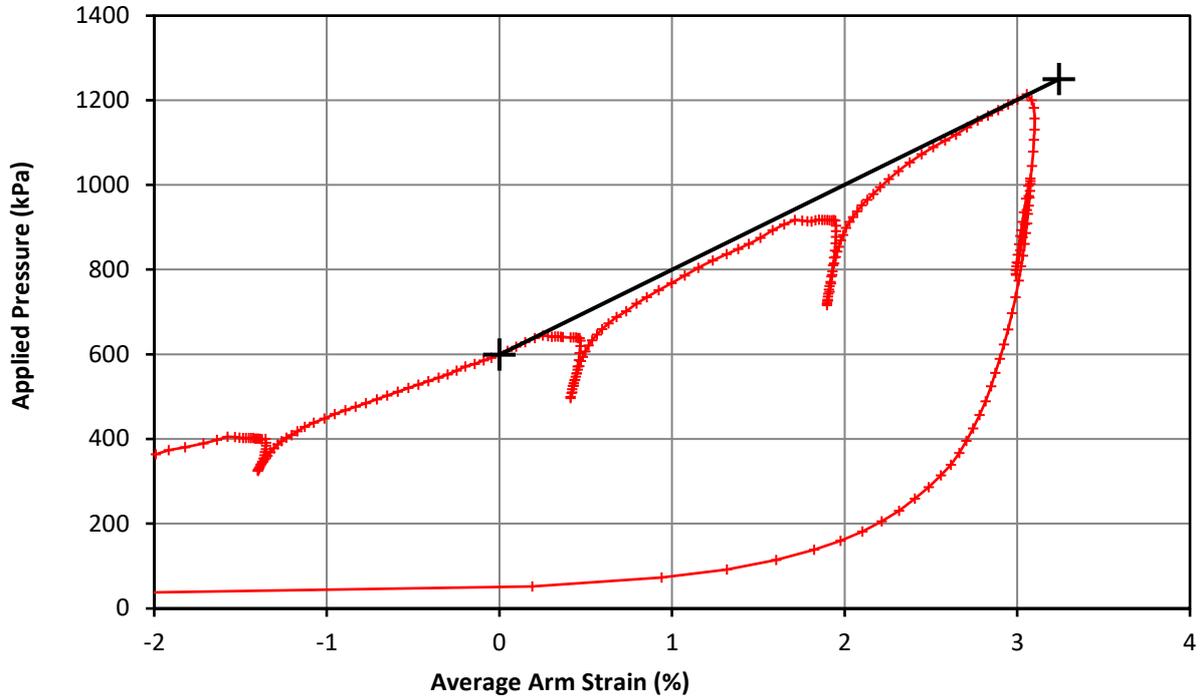


Project	Water Supply Project GI Lot 1	Figure No.	RWI-BH008 T01 - 03
Client	Irish Drilling Ltd		
Project No.	P1200127		

Pressuremeter Analysis - Initial Modulus & In Situ Horizontal Stress



Test Date	10/12/2021	Test No.	1
Borehole	RWI-BH008	Test Depth (m)	8.30



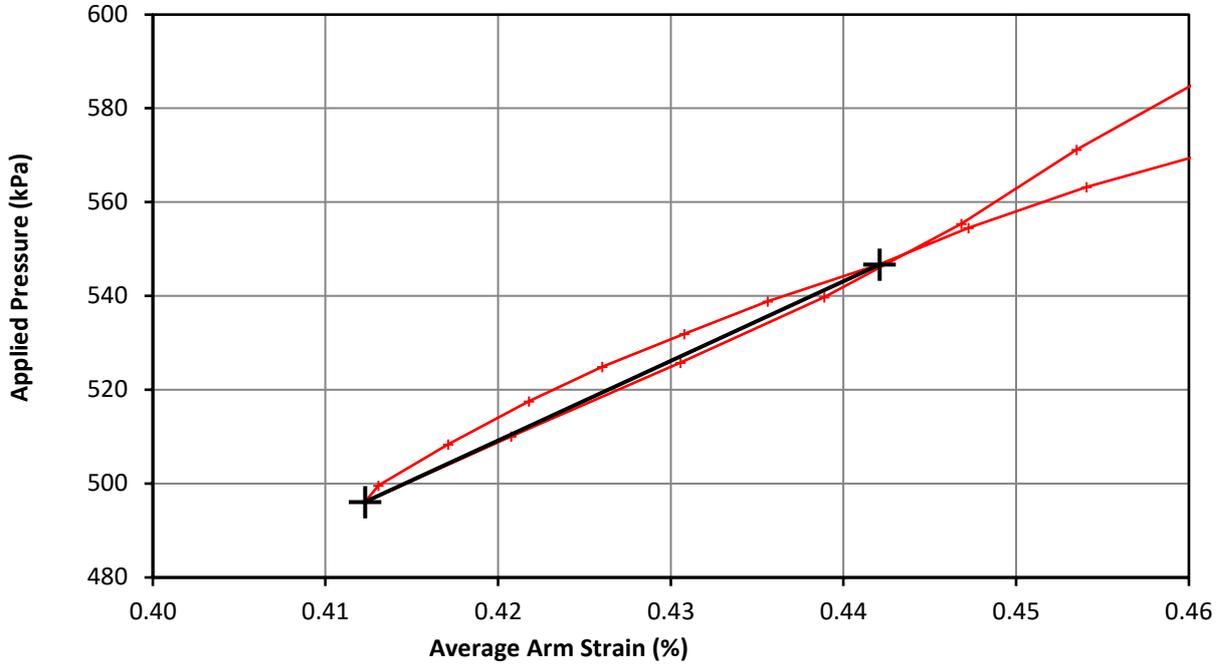
Initial Modulus	Shear Modulus	10.4 MPa
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Project	Water Supply Project GI Lot 1	Figure No.	RWI-BH008 T01 - 04
Client	Irish Drilling Ltd		
Project No.	P1200127		

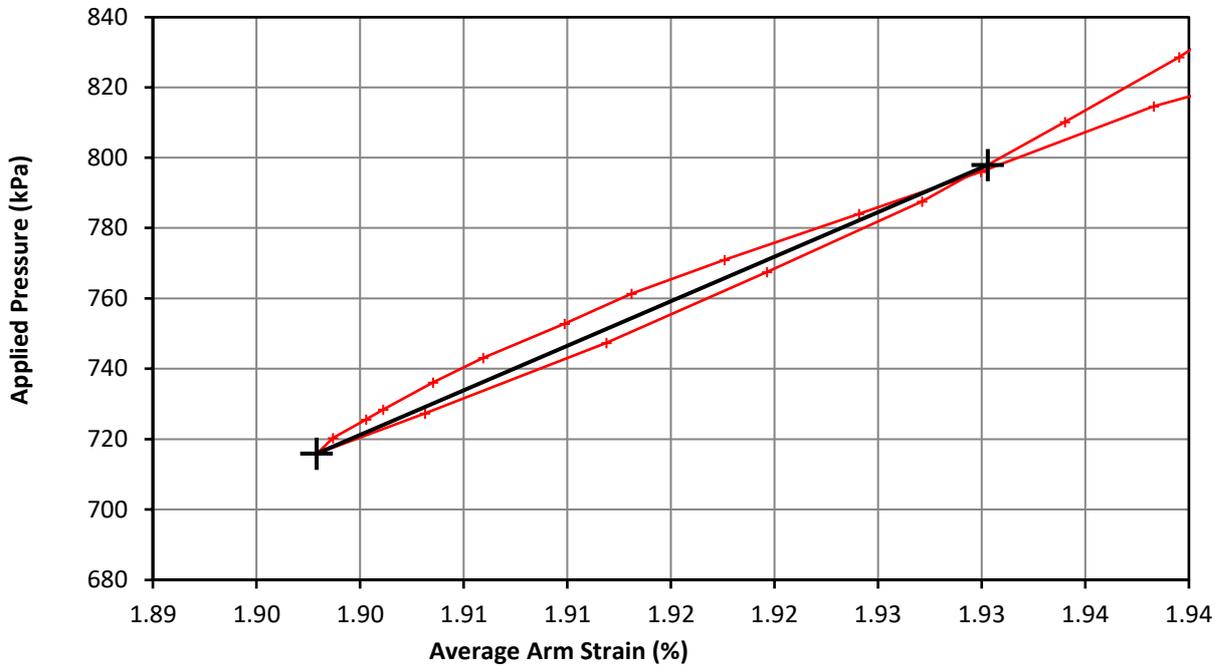
Pressuremeter Analysis - Unload Reload Loop



Test Date	10/12/2021	Test No.	1
Borehole	RWI-BH008	Test Depth (m)	8.30



Loop 1	Shear Modulus	85.3 MPa
	Cavity Strain Range	0.030 %



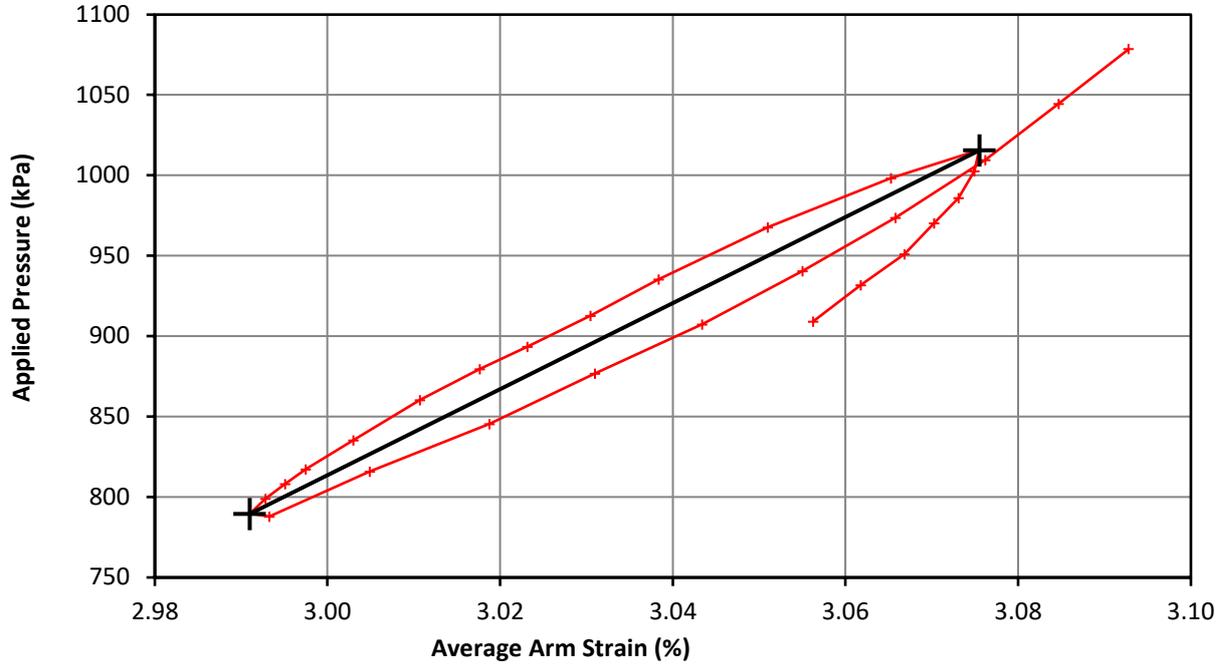
Loop 2	Shear Modulus	129.1 MPa
	Cavity Strain Range	0.032 %

Project	Water Supply Project GI Lot 1	Figure No.	RWI-BH008 T01 - 05
Client	Irish Drilling Ltd		
Project No.	P1200127		

Pressuremeter Analysis - Unload Reload Loop



Test Date	10/12/2021	Test No.	1
Borehole	RWI-BH008	Test Depth (m)	8.30



Loop 3	Shear Modulus	137.8 MPa
	Cavity Strain Range	0.084 %

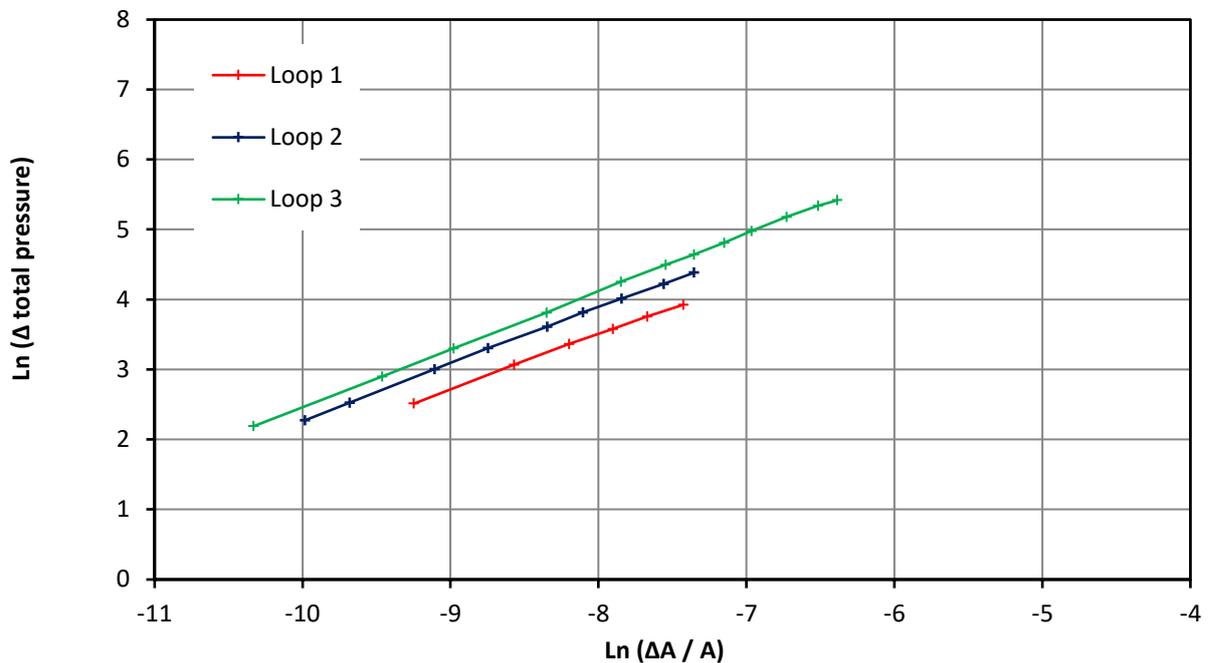
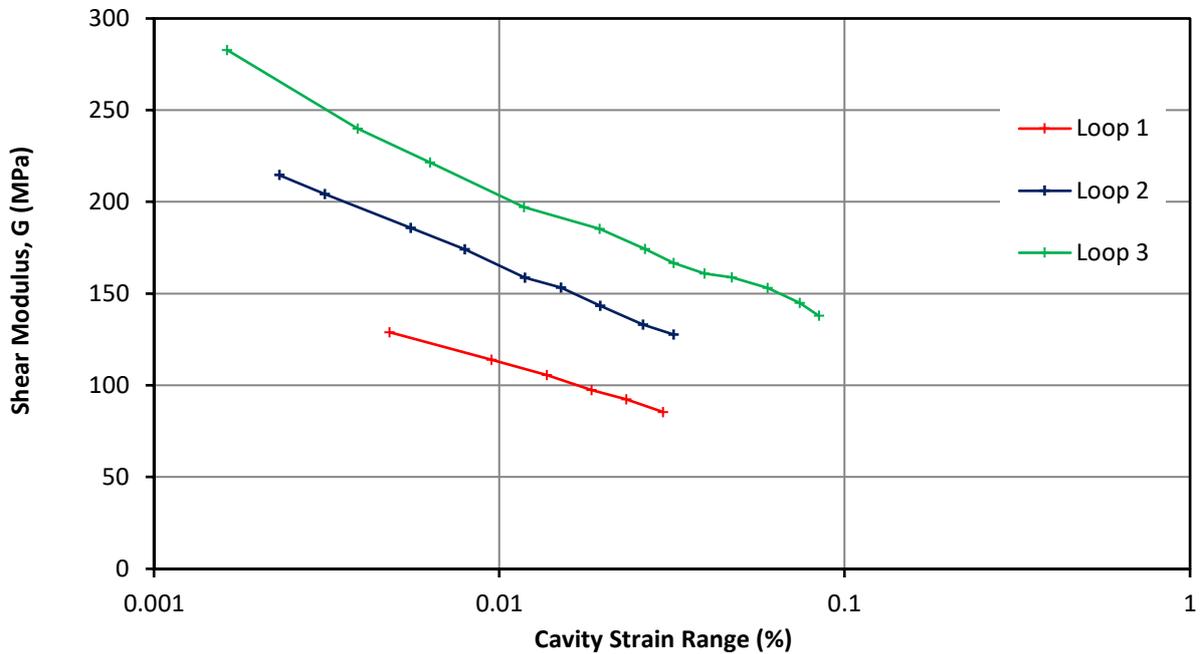
Project	Water Supply Project GI Lot 1	Figure No.	RWI-BH008 T01 - 06
Client	Irish Drilling Ltd		
Project No.	P1200127		

Pressuremeter Analysis

Small Strain Stiffness and Bolton & Whittle (1999)



Test Date	10/12/2021	Test No.	1
Borehole	RWI-BH008	Test Depth (m)	8.30



Loop 1		Loop 2		Loop 3	
Gradient(β)	Intercept	Gradient(β)	Intercept	Gradient(β)	Intercept
0.776	16.498	0.802	29.678	0.826	45.296
	(MPa)		(MPa)		(MPa)

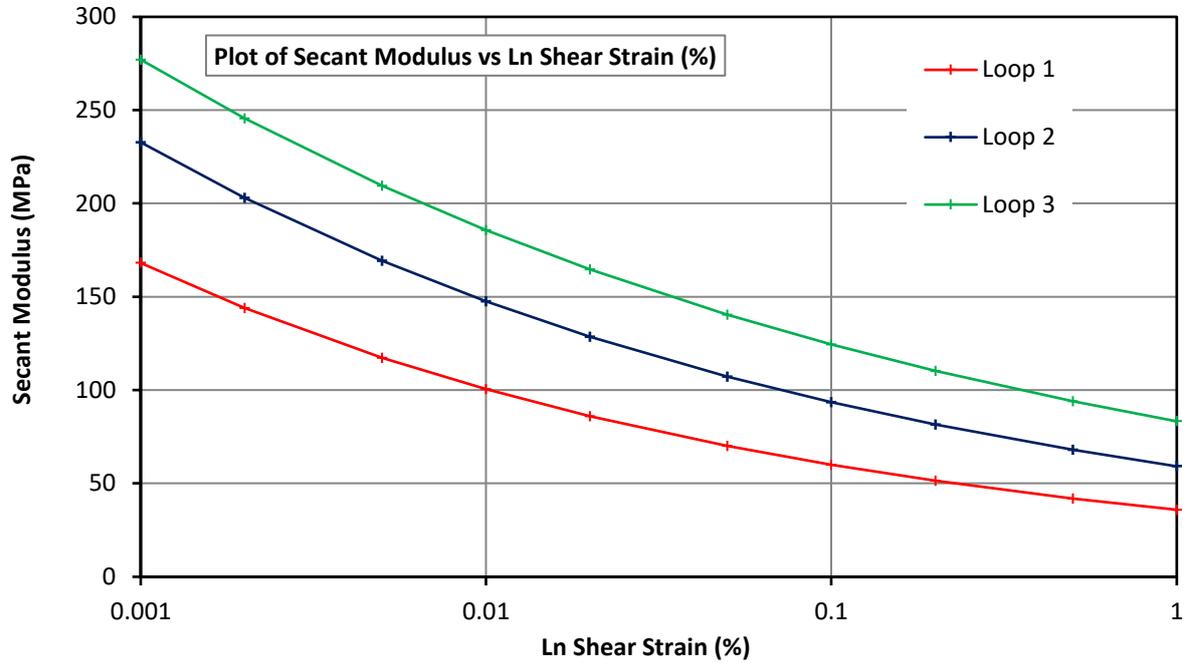
Project	Water Supply Project GI Lot 1	Figure No.	RWI-BH008 T01 - 08
Client	Irish Drilling Ltd		
Project No.	P1200127		

Pressuremeter Analysis

Secant Modulus - Shear Strain (%)



Test Date	10/12/2021	Test No.	1
Borehole	RWI-BH008	Test Depth (m)	8.30



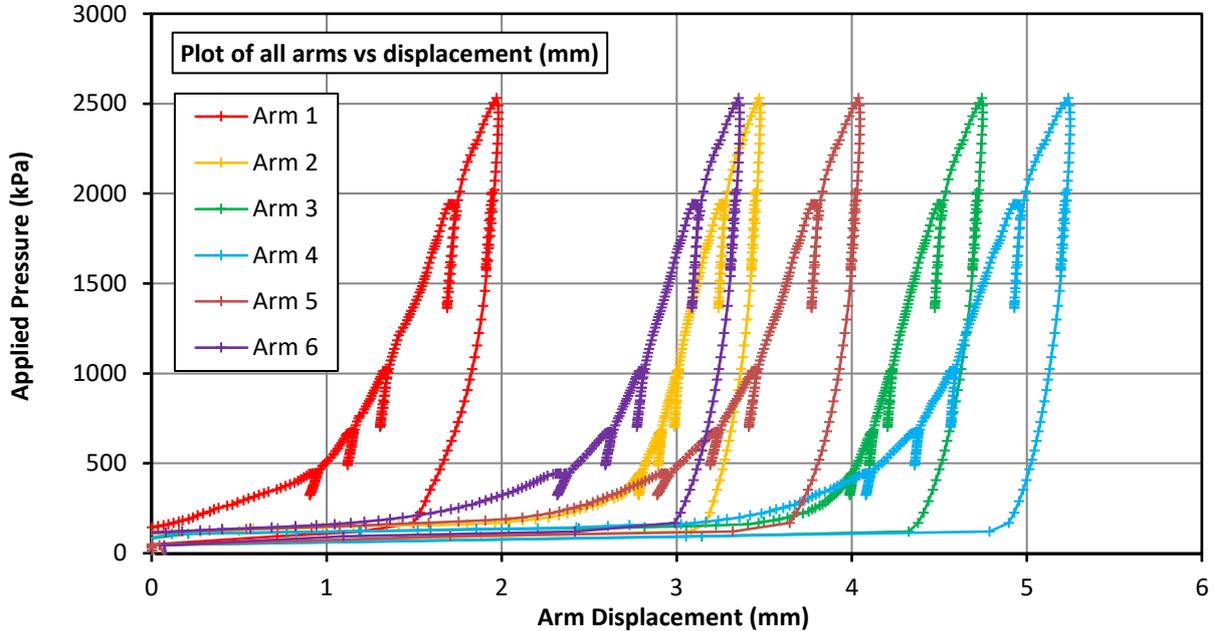
Shear Strain	Loop 1	Loop 2	Loop 3
0.001%	168	233	277
0.002%	144	203	246
0.005%	117	169	209
0.010%	100	147	186
0.020%	86	129	165
0.050%	70	107	140
0.100%	60	93	124
0.200%	51	81	110
0.500%	42	68	94
1.000%	36	59	83

Project	Water Supply Project GI Lot 1	Figure No.	RWI-BH008 T01 - 09
Client	Irish Drilling Ltd		
Project No.	P1200127		

Pressuremeter Test Overview High Pressure Dilatometer (HPD)

IN SITU
SITE INVESTIGATION

Test Date	13/12/2021	Test No.	2
Borehole	RWI-BH008	Test Depth (m)	11.60
Coordinates (m)	569976.1 (E)	670271.7 (N)	Elevation (m) 31.34



Material description from borehole log:

Very stiff pinkish orangish brown sandy gravelly SILT.

Test pocket conditions:

Total core recovery:	100 %	Test pocket depth range:	
Solid core recovery:	- %	From:	10.50 m to: 12.00 m
Rock quality designation:	- %	Flush:	Water

Test comment:

The test pocket was slightly variable with arms lifting off at 1.2 to 4.5mm. The p_0 was estimated to be at 859kPa, with the following loading section being relatively long. Material yield was interpreted at 2133kPa, with the test taken to a maximum pressure of 2531kPa. The displacement-pressure response shown by the arms was variable. Analysis of three unload reload loops provides modulus values of 228 to 399MPa. Derived undrained shear strength analysis provides a value of 1274kPa.

Test details:

Instrument: Kylie (HPD06)

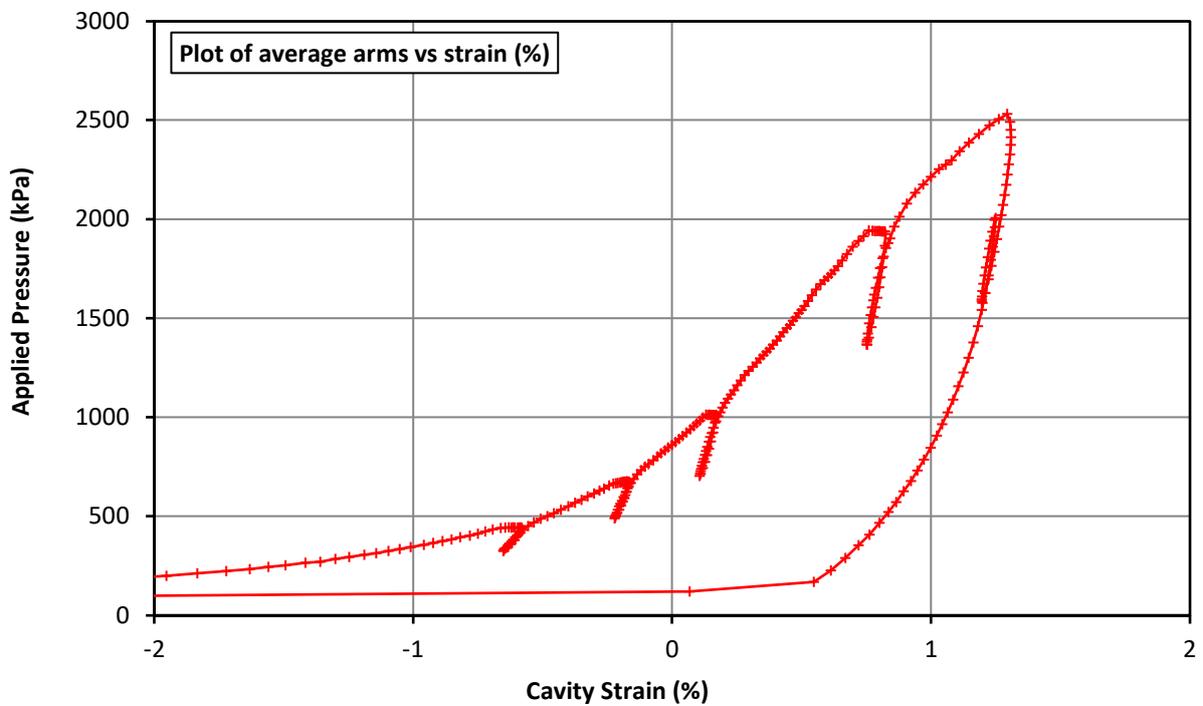
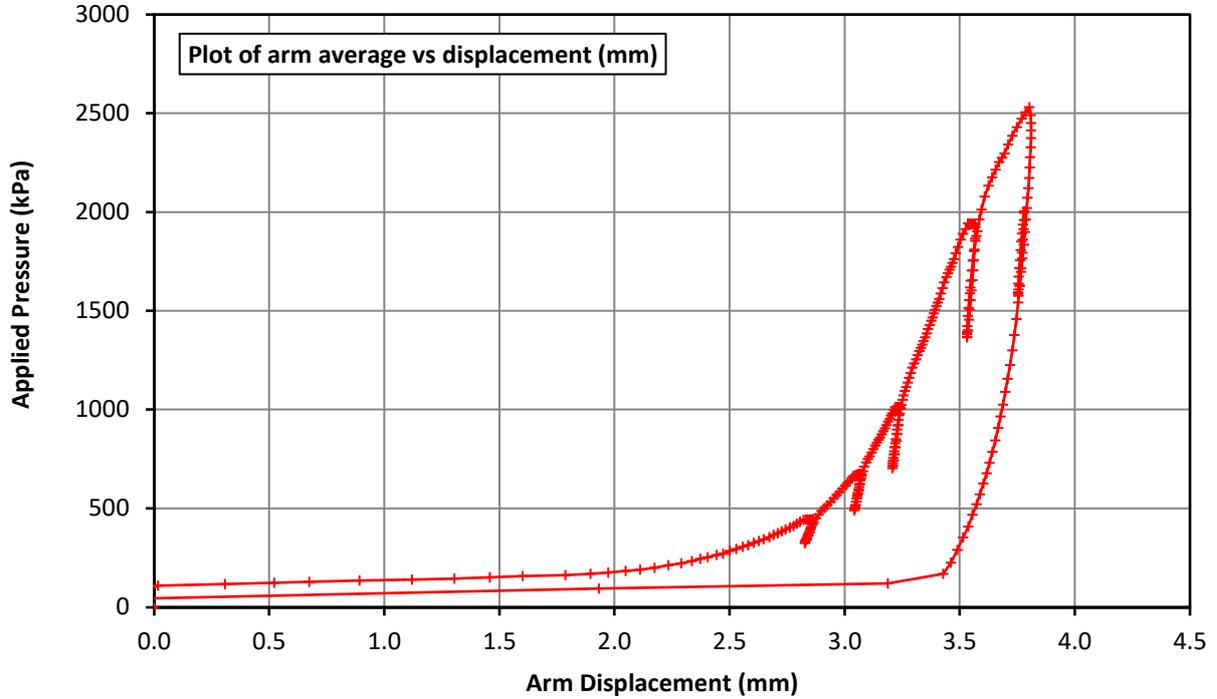
Drilling method:	Rotary coring		mV	mV/mm		mV	mV/MPa
Casing depth:	10.50 m	Arm 1:	-2419.1	136.2	TPC A:	-2359.1	114.3
Water level:	0.00 m	Arm 2:	-2357.6	135.5	TPC B:	-2415.3	122.8
		Arm 3:	-2262.2	137.1			
Test time:		Arm 4:	-2433.9	132.3			
Start (probe in):	10:00 hrs	Arm 5:	-2339.8	130.2			
Finish (probe out):	11:00 hrs	Arm 6:	-2317.7	135.8			

Project	Water Supply Project GI Lot 1	Figure No.	RWI-BH008 T02 - 01
Client	Irish Drilling Ltd		
Project No.	P1200127		

Pressuremeter Test - Average Arm Plots

IN SITU
SITE INVESTIGATION

Test Date	13/12/2021	Test No.	2
Borehole	RWI-BH008	Test Depth (m)	11.60

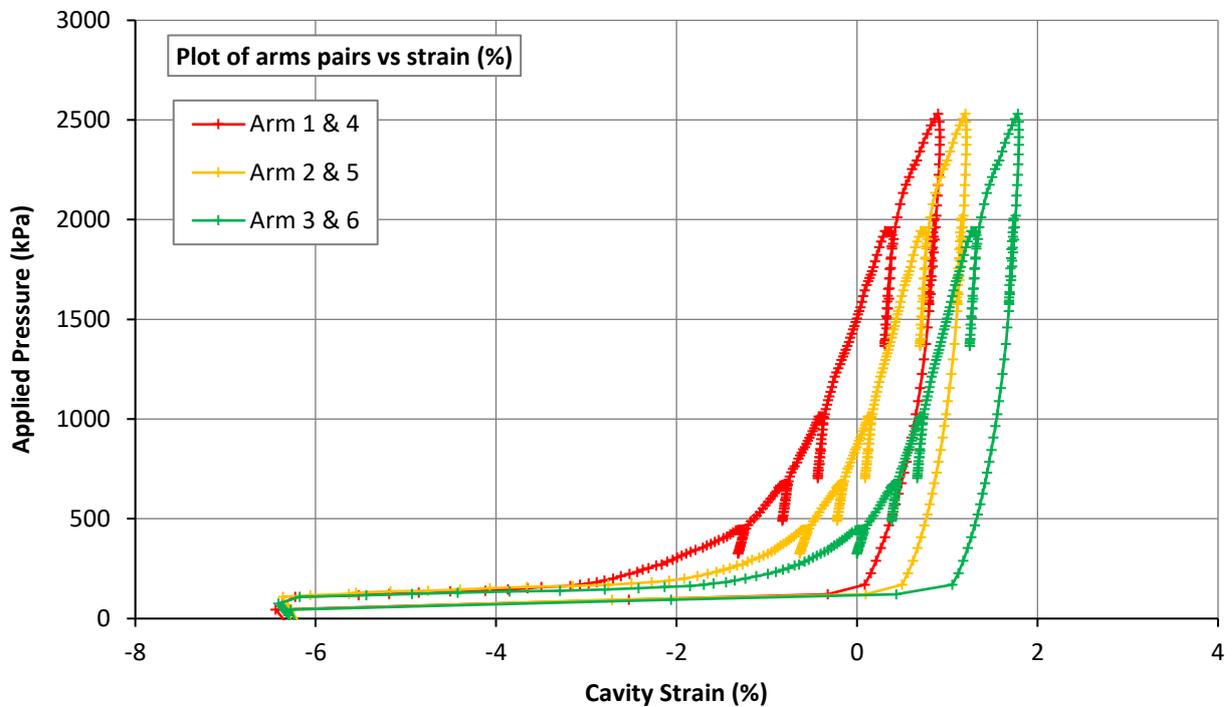
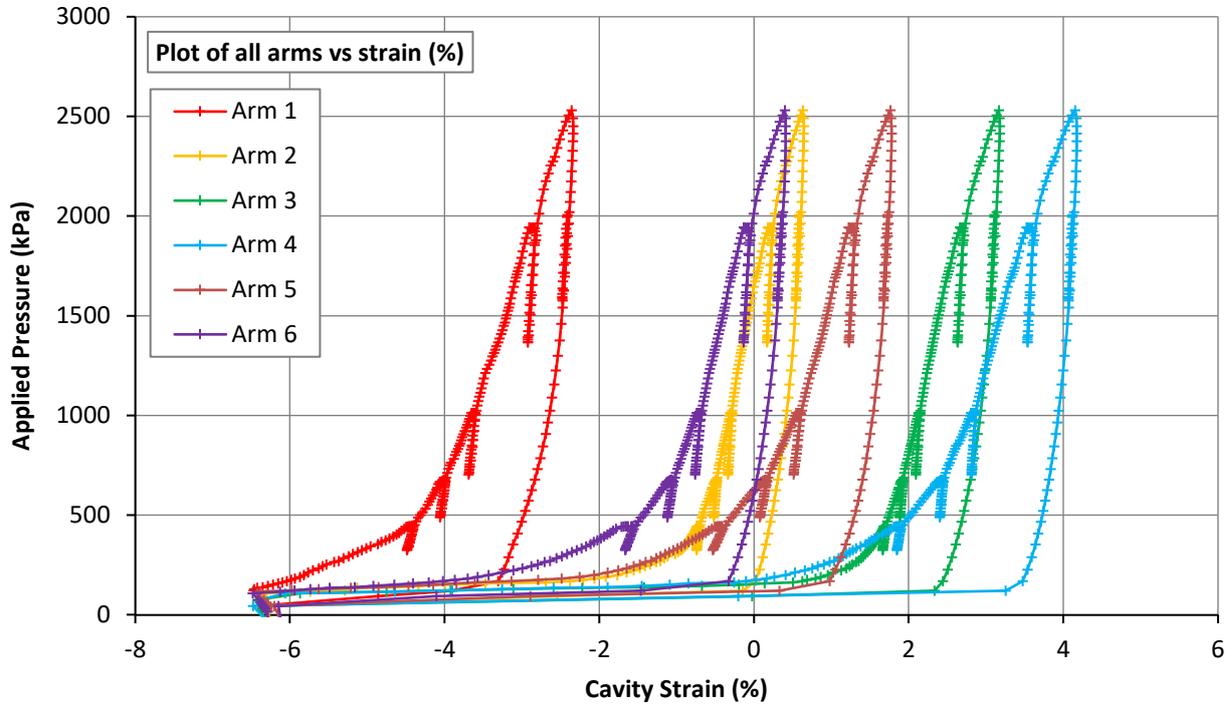


Project	Water Supply Project GI Lot 1	Figure No.	RWI-BH008 T02 - 02
Client	Irish Drilling Ltd		
Project No.	P1200127		

Pressuremeter Test - Arm Displacement vs Strain (%)



Test Date	13/12/2021	Test No.	2
Borehole	RWI-BH008	Test Depth (m)	11.60

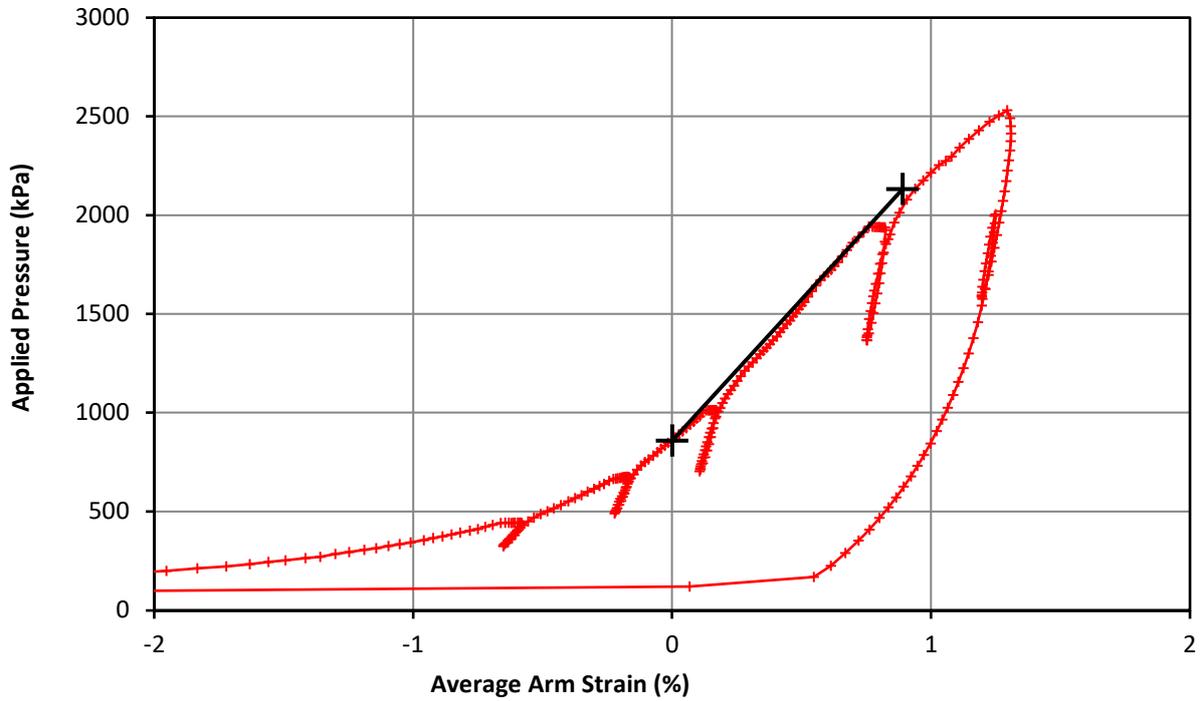


Project	Water Supply Project GI Lot 1	Figure No.	RWI-BH008 T02 - 03
Client	Irish Drilling Ltd		
Project No.	P1200127		

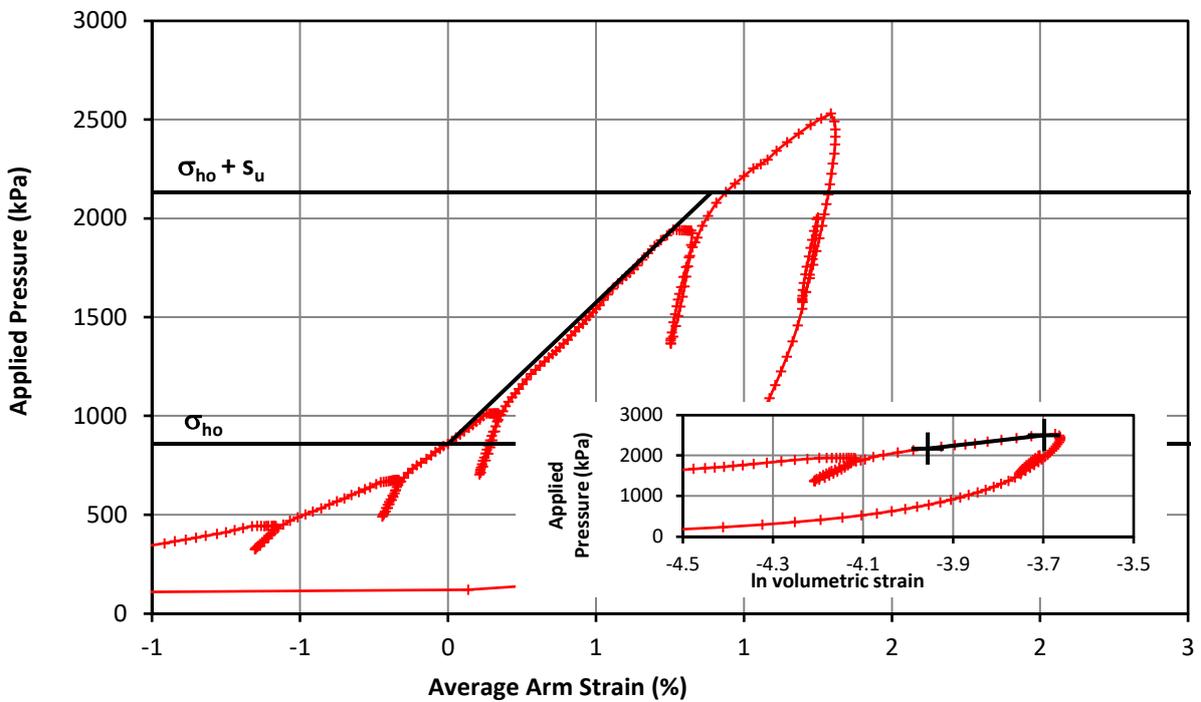
Pressuremeter Analysis - Initial Modulus & In Situ Horizontal Stress



Test Date	13/12/2021	Test No.	2
Borehole	RWI-BH008	Test Depth (m)	11.60



Initial Modulus	Shear Modulus	72.2 MPa
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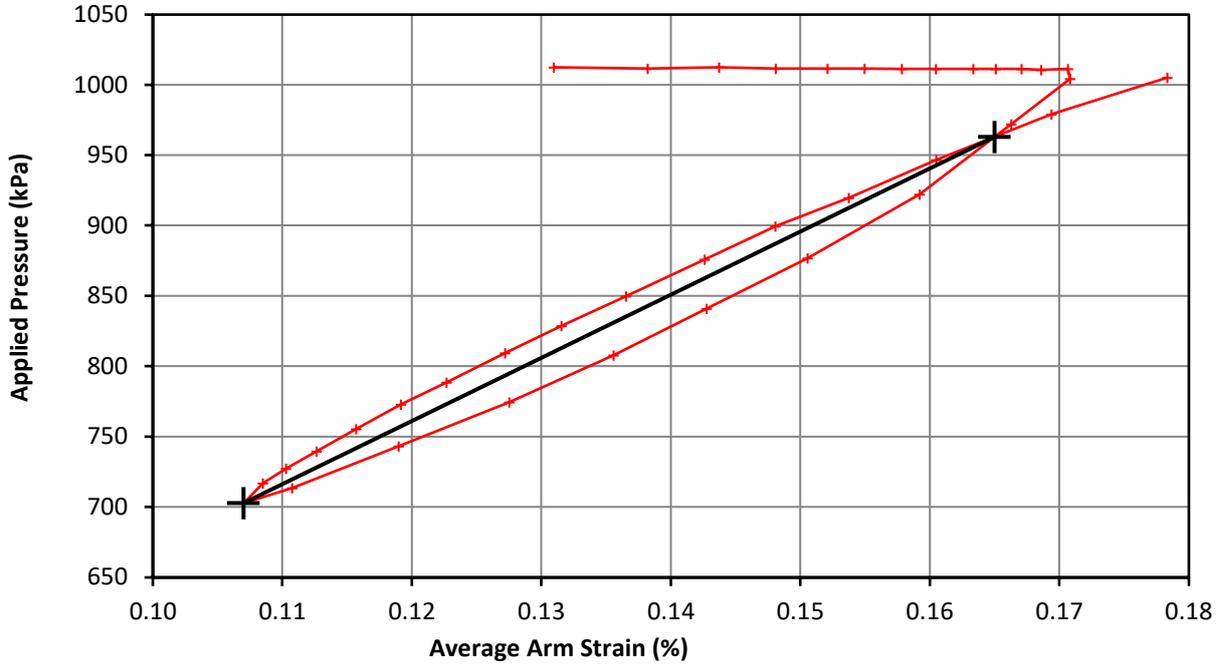
Marsland & Randolph	In situ horizontal stress	859 kPa
	Undrained Strength	1274 kPa

Project	Water Supply Project GI Lot 1	Figure No.	RWI-BH008 T02 - 04
Client	Irish Drilling Ltd		
Project No.	P1200127		

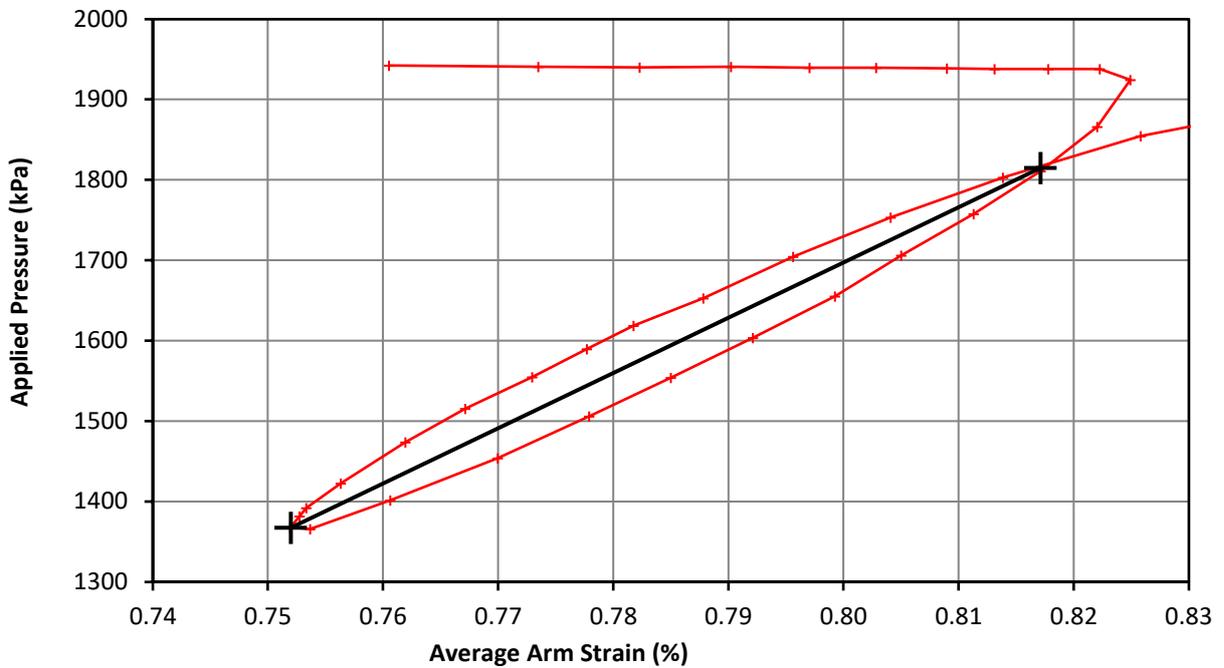
Pressuremeter Analysis - Unload Reload Loop



Test Date	13/12/2021	Test No.	2
Borehole	RWI-BH008	Test Depth (m)	11.60



Loop 1	Shear Modulus	224.7 MPa
	Cavity Strain Range	0.058 %



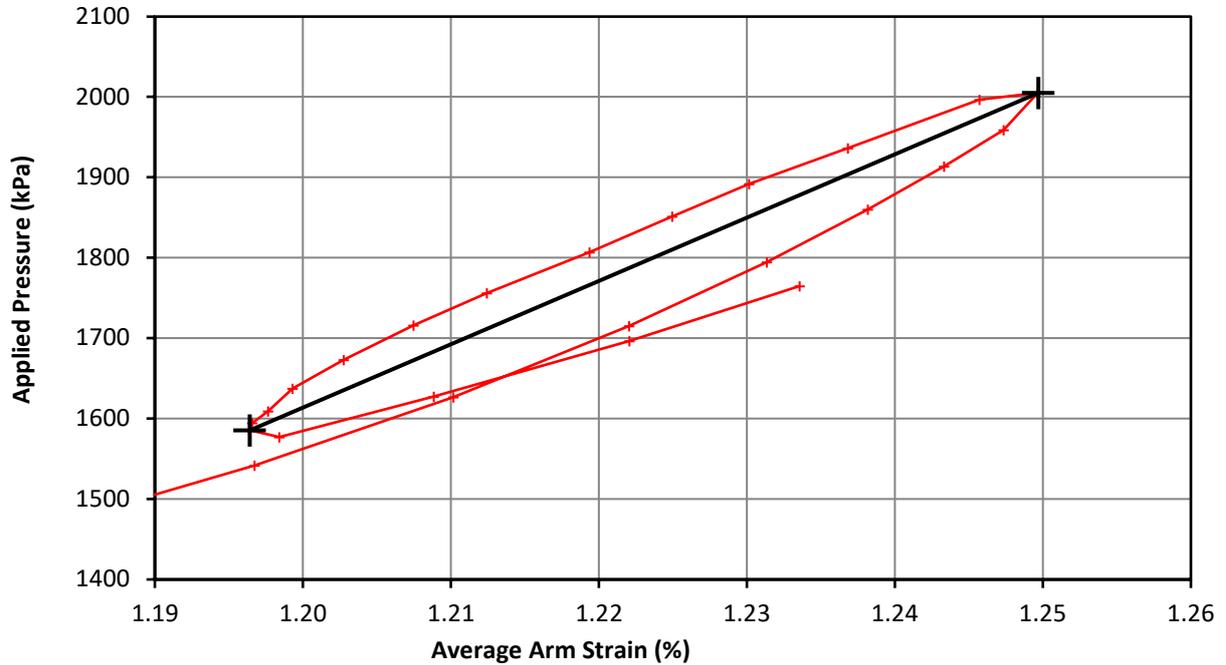
Loop 2	Shear Modulus	346.5 MPa
	Cavity Strain Range	0.065 %

Project	Water Supply Project GI Lot 1	Figure No.	RWI-BH008 T02 - 05
Client	Irish Drilling Ltd		
Project No.	P1200127		

Pressuremeter Analysis - Unload Reload Loop



Test Date	13/12/2021	Test No.	2
Borehole	RWI-BH008	Test Depth (m)	11.60



Loop 3	Shear Modulus	398.5 MPa
	Cavity Strain Range	0.053 %

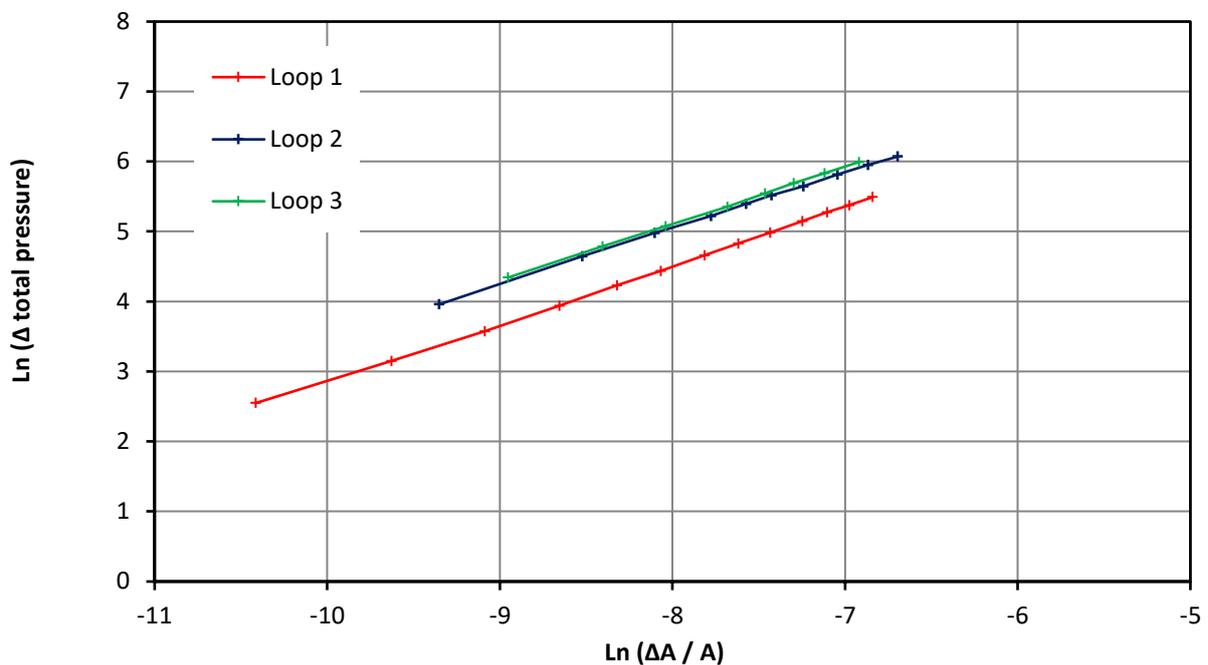
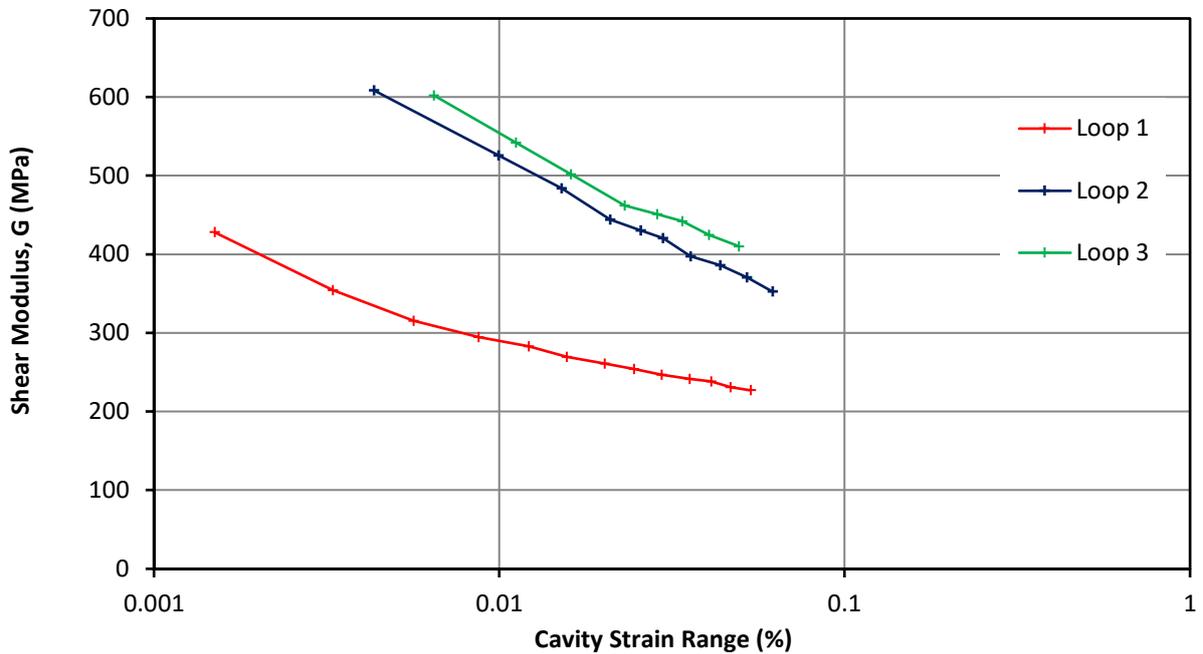
Project	Water Supply Project GI Lot 1	Figure No.	RWI-BH008 T02 - 06
Client	Irish Drilling Ltd		
Project No.	P1200127		

Pressuremeter Analysis

Small Strain Stiffness and Bolton & Whittle (1999)



Test Date	13/12/2021	Test No.	2
Borehole	RWI-BH008	Test Depth (m)	11.60



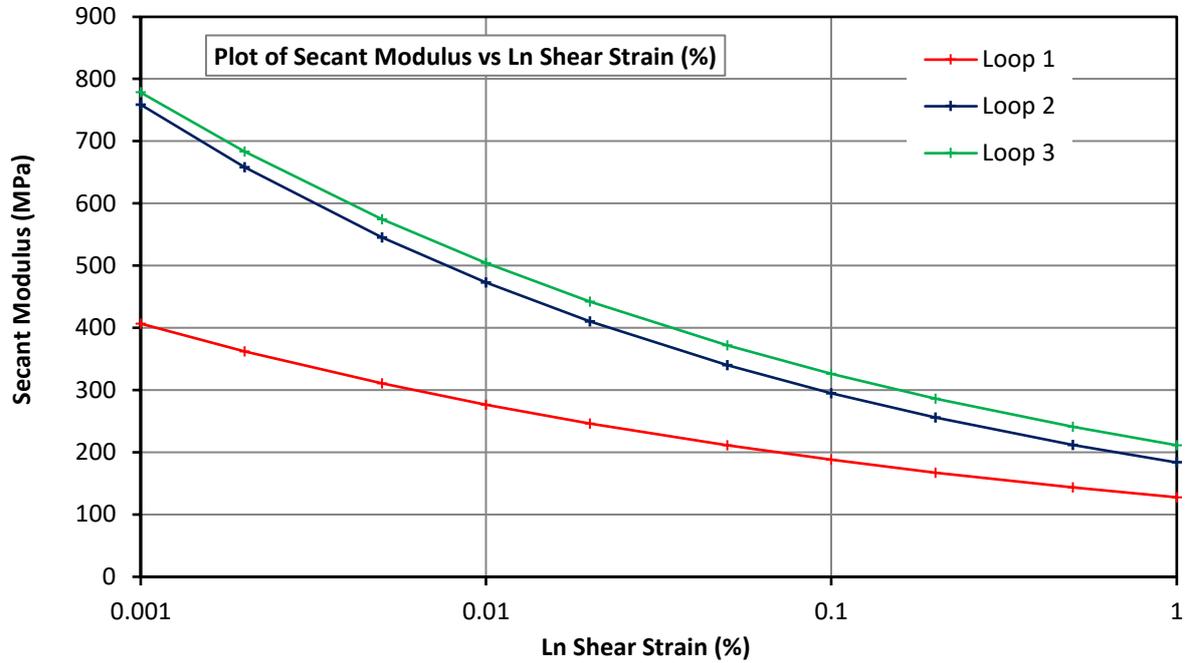
Loop 1		Loop 2		Loop 3	
Gradient(β)	Intercept	Gradient(β)	Intercept	Gradient(β)	Intercept
0.832	70.867	0.795	89.899	0.811	109.133
	(MPa)		(MPa)		(MPa)

Project	Water Supply Project GI Lot 1	Figure No.	RWI-BH008 T02 - 07
Client	Irish Drilling Ltd		
Project No.	P1200127		

Pressuremeter Analysis

Secant Modulus - Shear Strain (%)

Test Date	13/12/2021	Test No.	2
Borehole	RWI-BH008	Test Depth (m)	11.60



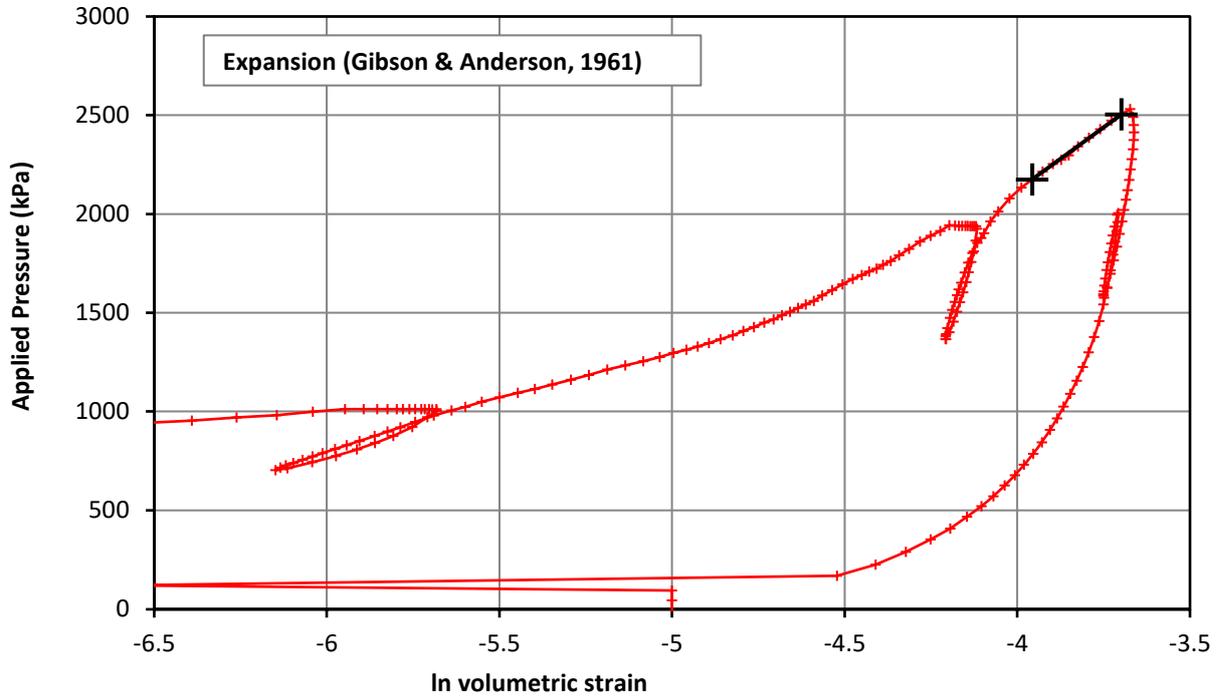
Shear Strain	Loop 1	Loop 2	Loop 3
0.001%	407	759	778
0.002%	362	658	683
0.005%	311	545	574
0.010%	276	473	504
0.020%	246	410	442
0.050%	211	340	372
0.100%	188	295	326
0.200%	167	256	286
0.500%	143	212	241
1.000%	128	184	211

Project	Water Supply Project GI Lot 1	Figure No.	RWI-BH008 T02 - 08
Client	Irish Drilling Ltd		
Project No.	P1200127		

Pressuremeter Analysis - Undrained Strength

IN SITU
SITE INVESTIGATION

Test Date	13/12/2021	Test No.	2
Borehole	RWI-BH008	Test Depth (m)	11.60



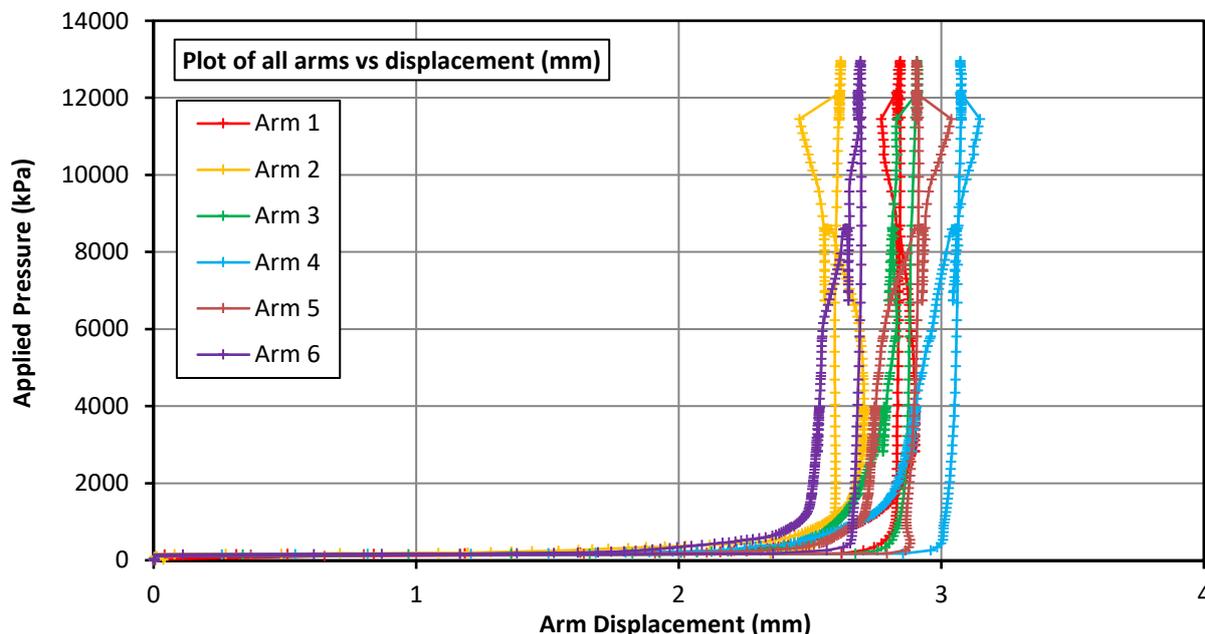
Strength (loading)	Undrained Shear	1274 kPa
	Limit Pressure	7215 kPa

Project	Water Supply Project GI Lot 1	Figure No.	RWI-BH008 T02 - 09
Client	Irish Drilling Ltd		
Project No.	P1200127		

Pressuremeter Test Overview High Pressure Dilatometer (HPD)



Test Date	13/12/2021	Test No.	3
Borehole	RWI-BH008	Test Depth (m)	15.10
Coordinates (m)	569976.1 (E)	670271.7 (N)	Elevation (m) 31.34



Material description from borehole log:

Very strong thinly bedded black and dark grey bioclastic fine to coarse grained LIMESTONE.

Test pocket conditions:

Total core recovery:	100 %	Test pocket depth range:	
Solid core recovery:	- %	From:	14.00 m to: 15.50 m
Rock quality designation:	- %	Flush:	Water

Test comment:

The test pocket was tight with arms lifting off at 2.5 to 3.0mm. The po was estimated to be at 3402kPa, with the following loading section being long. No material yield was observed and the test was terminated at 12956kPa due to a sudden jump in expansion and negative arm movement, possibly related to fracture movement. Analysis of two unload reload loops provides modulus values of 3775 to 9068MPa, although these should be treated with caution due to the difficulty in maintaining loop definition in possibly fractured moving material.

Test details:

Instrument: Kylie (HPD06)

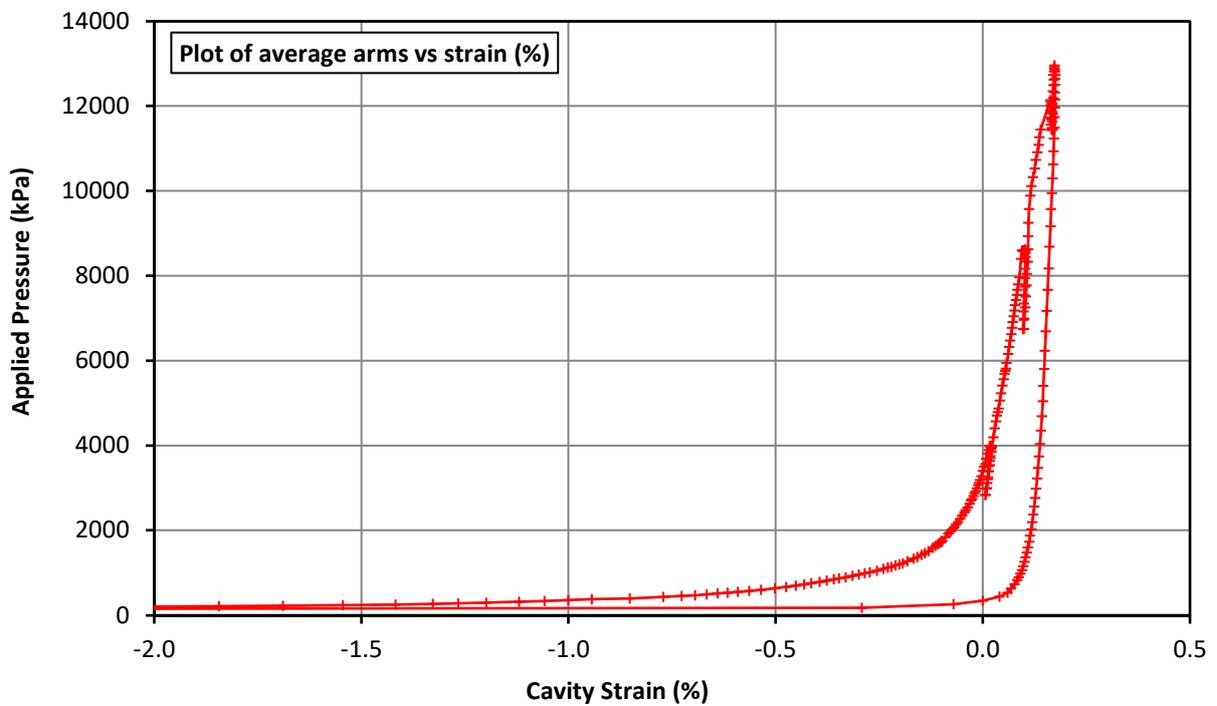
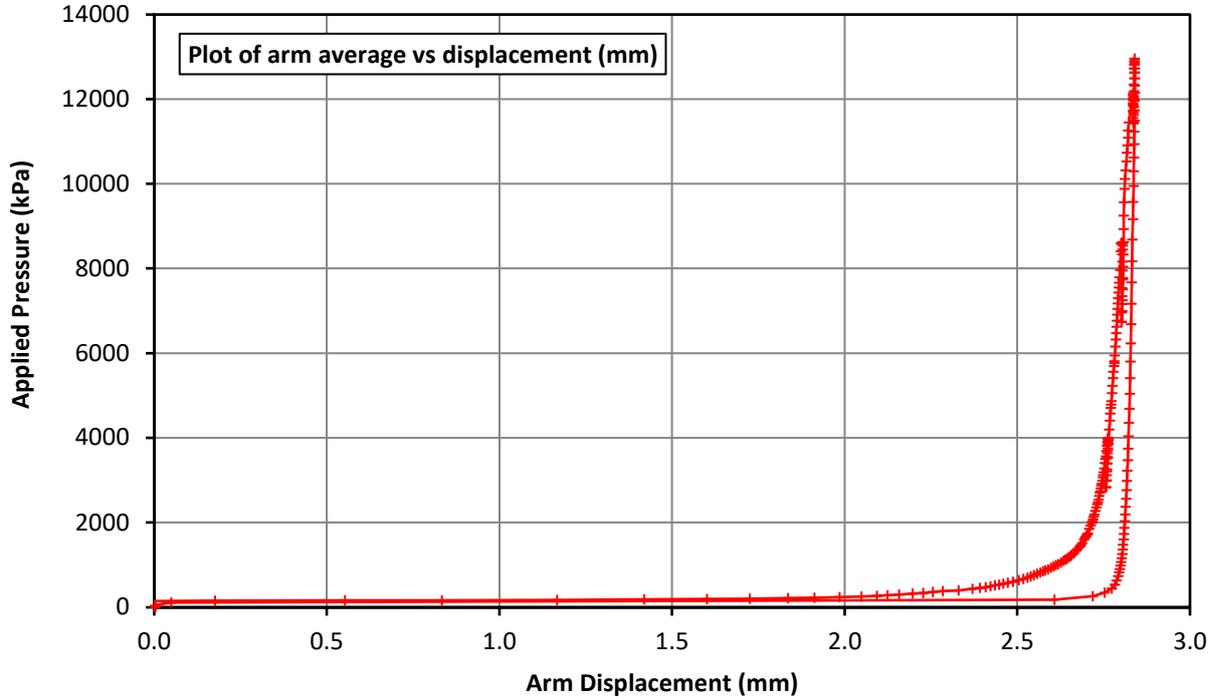
Drilling method:	Rotary coring		mV	mV/mm		mV	mV/MPa
Casing depth:	14.00 m	Arm 1:	-2419.8	136.2	TPC A:	-2359.7	114.3
Water level:	0.00 m	Arm 2:	-2359.7	135.5	TPC B:	-2416.5	122.8
		Arm 3:	-2261.7	137.1			
Test time:		Arm 4:	-2437.3	132.3			
Start (probe in):	13:45 hrs	Arm 5:	-2330.9	130.2			
Finish (probe out):	14:45 hrs	Arm 6:	-2303.2	135.8			

Project	Water Supply Project GI Lot 1	Figure No.	RWI-BH008 T03 - 01
Client	Irish Drilling Ltd		
Project No.	P1200127		

Pressuremeter Test - Average Arm Plots

IN SITU
SITE INVESTIGATION

Test Date	13/12/2021	Test No.	3
Borehole	RWI-BH008	Test Depth (m)	15.10

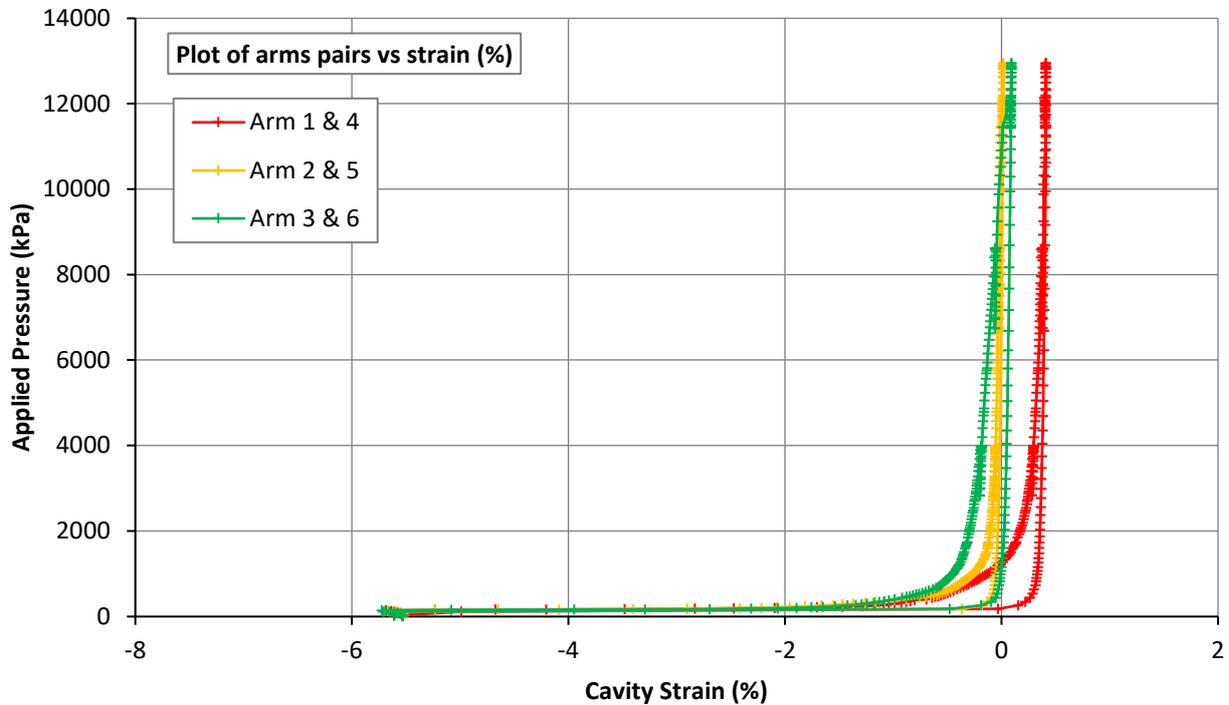
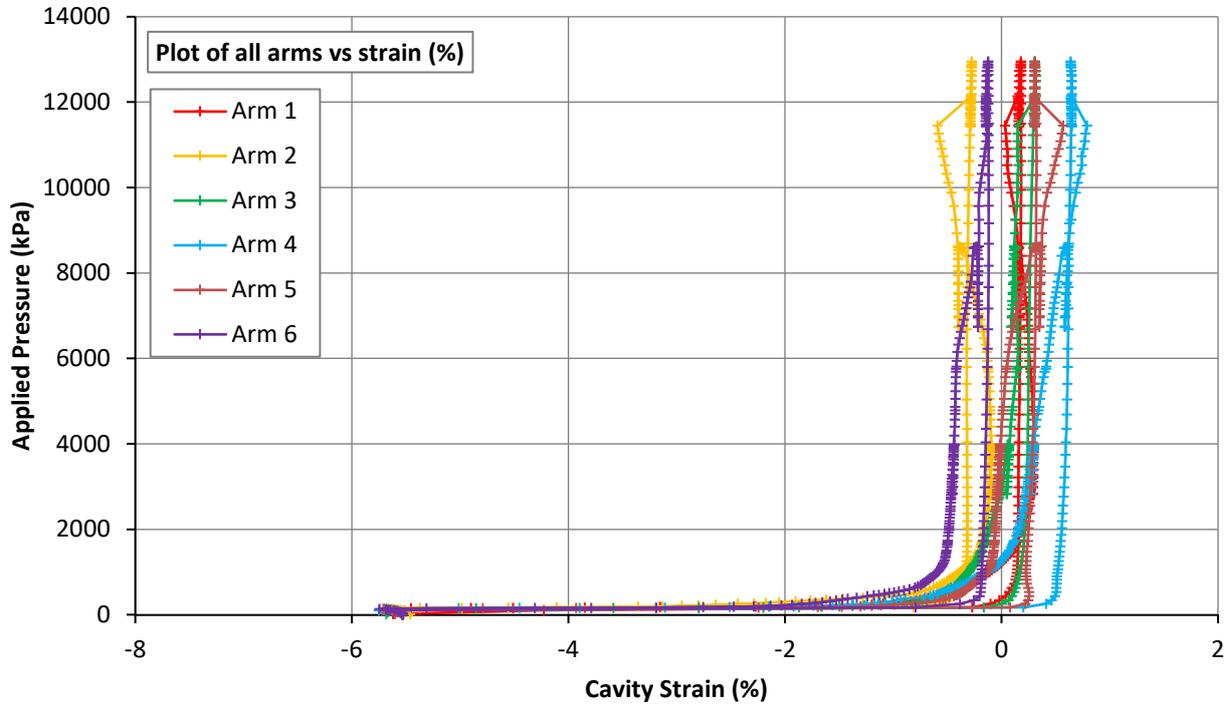


Project	Water Supply Project GI Lot 1	Figure No.	RWI-BH008 T03 - 02
Client	Irish Drilling Ltd		
Project No.	P1200127		

Pressuremeter Test - Arm Displacement vs Strain (%)



Test Date	13/12/2021	Test No.	3
Borehole	RWI-BH008	Test Depth (m)	15.10

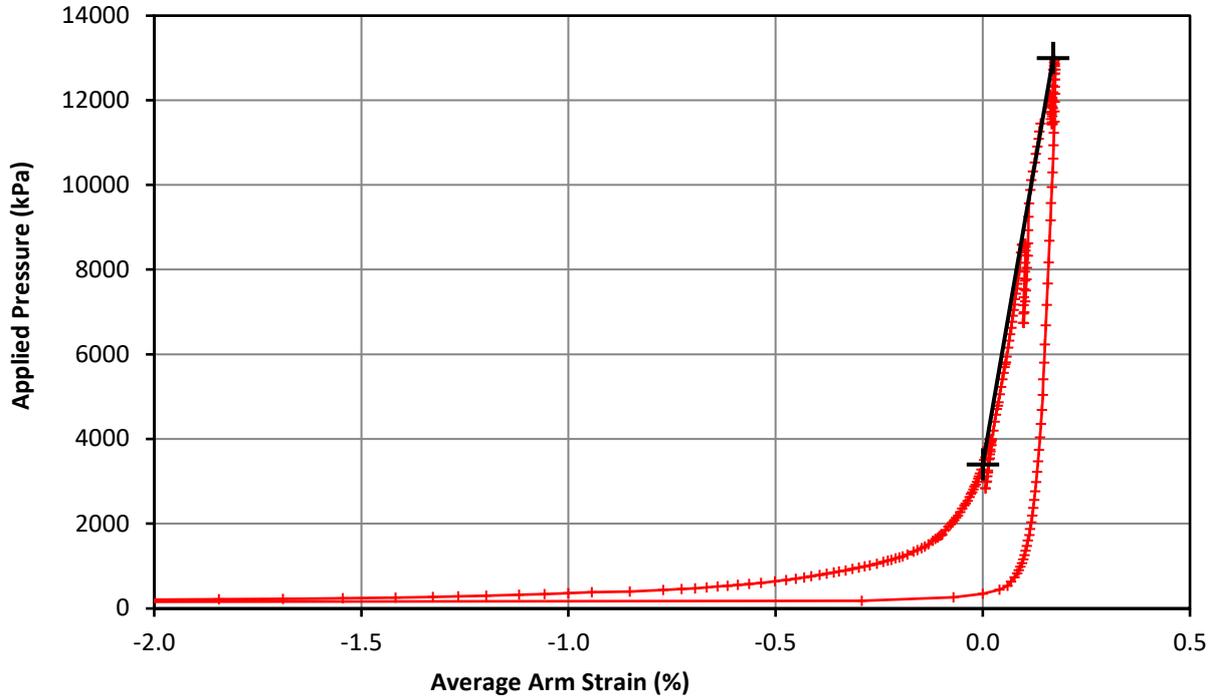


Project	Water Supply Project GI Lot 1	Figure No.	RWI-BH008 T03 - 03
Client	Irish Drilling Ltd		
Project No.	P1200127		

Pressuremeter Analysis - Initial Modulus & In Situ Horizontal Stress



Test Date	13/12/2021	Test No.	3
Borehole	RWI-BH008	Test Depth (m)	15.10

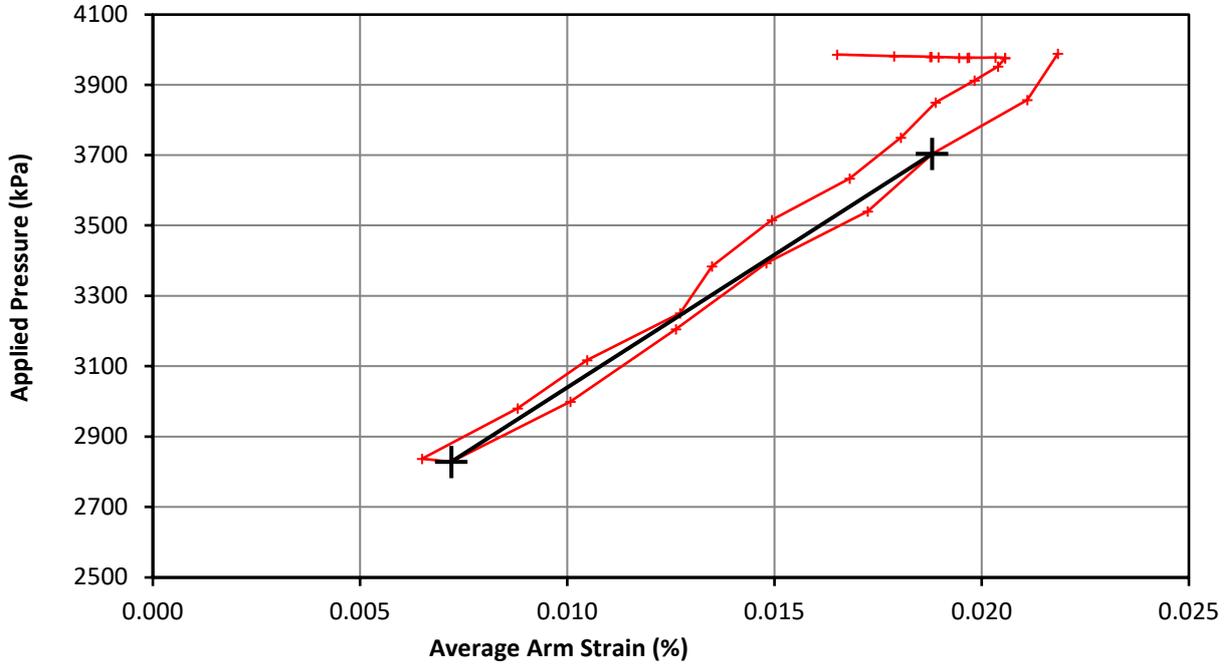


Initial Modulus	Shear Modulus	2827.7 MPa
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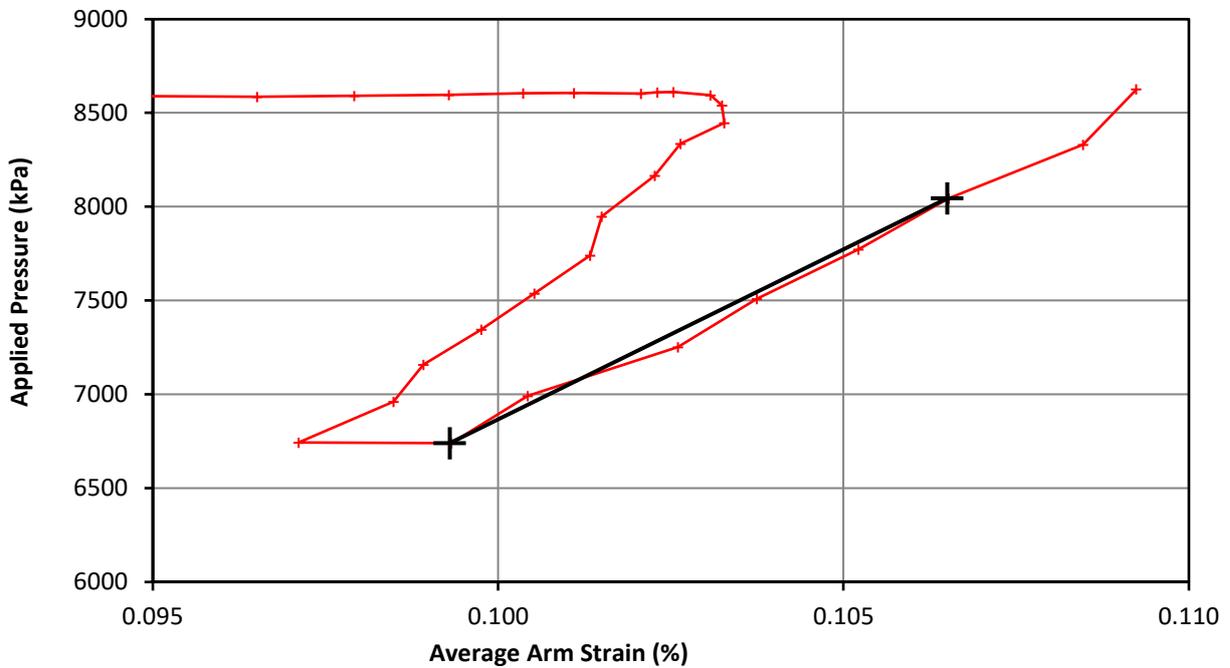
Project	Water Supply Project GI Lot 1	Figure No.	RWI-BH008 T03 - 04
Client	Irish Drilling Ltd		
Project No.	P1200127		

Pressuremeter Analysis - Unload Reload Loop

Test Date	13/12/2021	Test No.	3
Borehole	RWI-BH008	Test Depth (m)	15.10



Loop 1	Shear Modulus	3775.3 MPa
	Cavity Strain Range	0.012 %



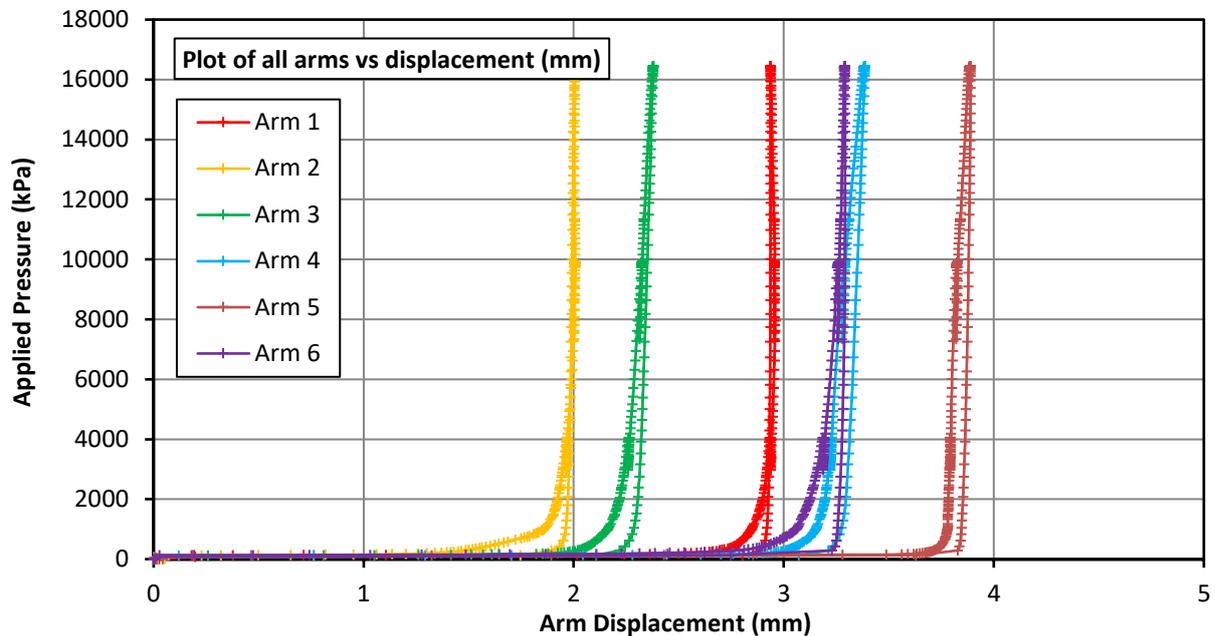
Loop 2	Shear Modulus	9068.0 MPa
	Cavity Strain Range	0.007 %

Project	Water Supply Project GI Lot 1	Figure No.	RWI-BH008 T03 - 05
Client	Irish Drilling Ltd		
Project No.	P1200127		

Pressuremeter Test Overview High Pressure Dilatometer (HPD)

IN SITU
SITE INVESTIGATION

Test Date	16/12/2021	Test No.	1
Borehole	RWI-BH010	Test Depth (m)	12.60
Coordinates (m)	569982.9 (E)	670225.9 (N)	Elevation (m) 31.54



Material description from borehole log:

Very strong thinly bedded black and dark grey bioclastic fine to coarse grained LIMESTONE.

Test pocket conditions:

Total core recovery:	100 %	Test pocket depth range:	
Solid core recovery:	- %	From:	11.30 m to: 13.00 m
Rock quality designation:	- %	Flush:	Air

Test comment:

The test pocket was good with arms lifting off at 2.0 to 3.8mm. The p_0 was estimated to be at 3200kPa, with the following loading section being long. No material yield was observed and the test was taken to a high pressure of 16446kPa. The displacement-pressure response shown by the arms was consistent. Some minor movement is seen at around 12800kPa on arms 4 & 5, although this may be subtle fracture stress relief at that point around the instrument. Analysis of two unload reload loops provides modulus values of 3566 to 6784MPa, although these should be treated with caution due to the difficulty in maintaining loop definition at such low strain levels.

Test details:

Instrument: Kylie (HPD06)

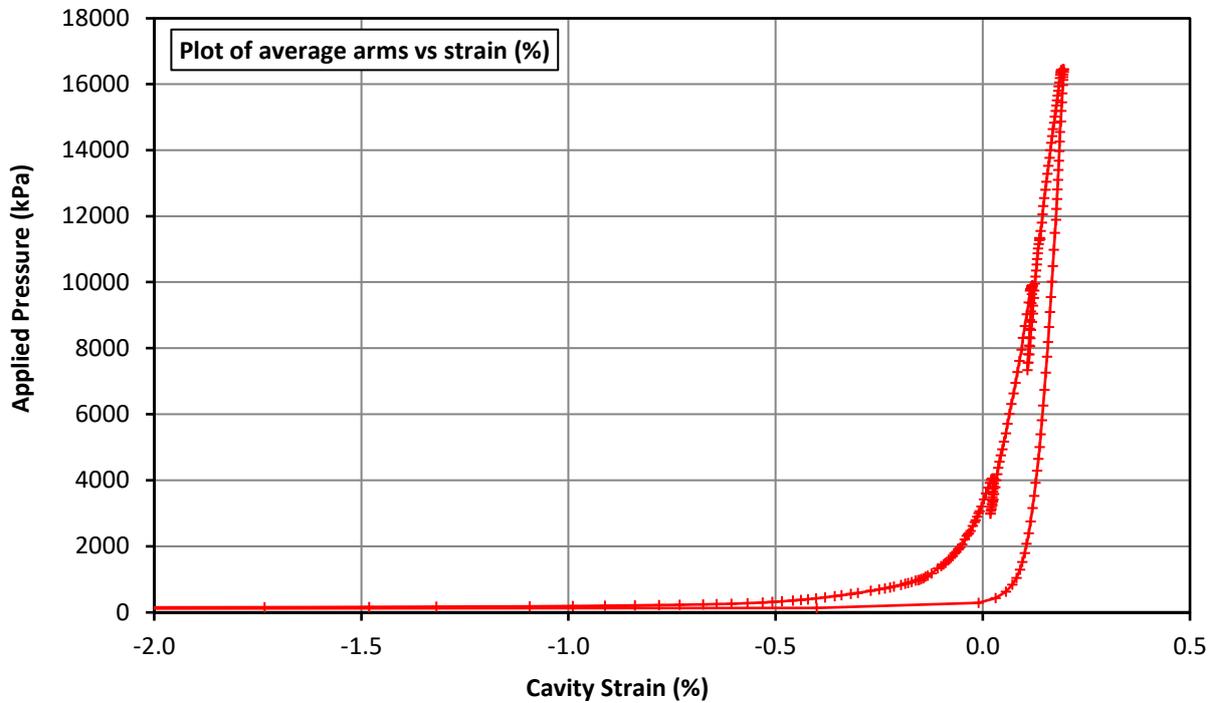
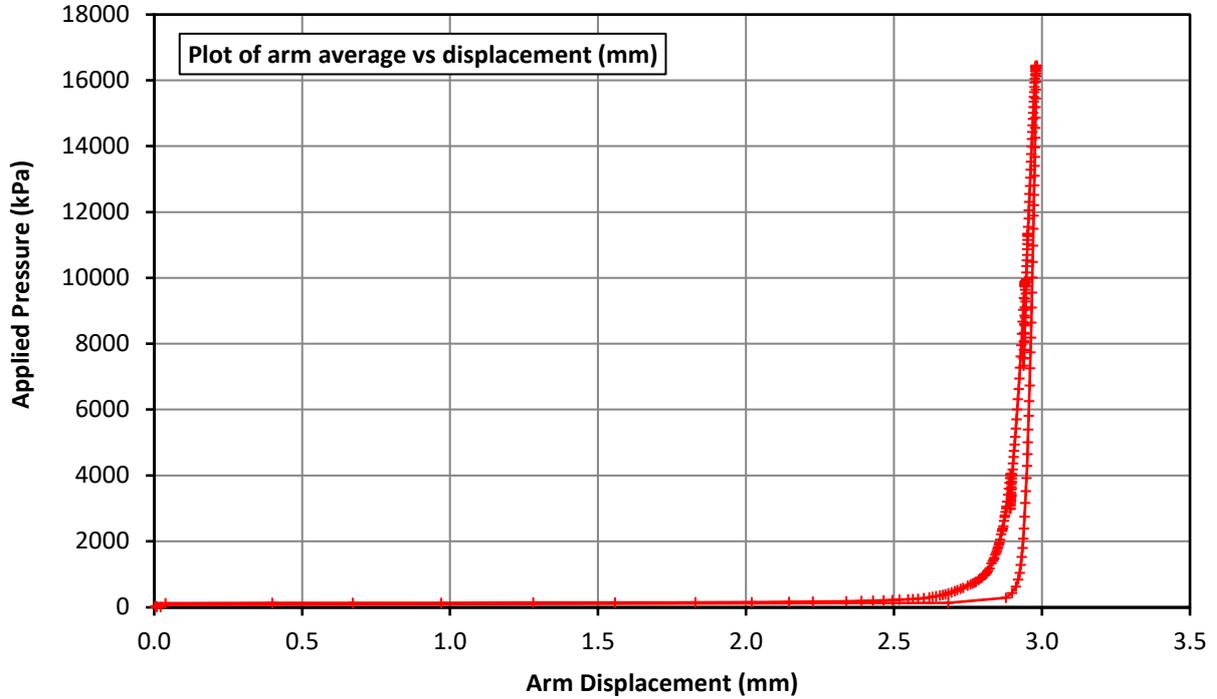
	Rotary coring		mV	mV/mm	mV	mV/MPa
Drilling method:	Rotary coring					
Casing depth:	11.00 m	Arm 1:	-2427.7	136.2	TPC A:	-2358.9 114.3
Water level:	0.00 m	Arm 2:	-2366.8	135.5	TPC B:	-2416.8 122.8
		Arm 3:	-2273.2	137.1		
Test time:		Arm 4:	-2439.4	132.3		
Start (probe in):	08:50 hrs	Arm 5:	-2335.9	130.2		
Finish (probe out):	09:50 hrs	Arm 6:	-2301.1	135.8		

Project	Water Supply Project GI Lot 1	Figure No.	RWI-BH010 T01 - 01
Client	Irish Drilling Ltd		
Project No.	P1200127		

**Pressuremeter Test -
Average Arm Plots**



Test Date	16/12/2021	Test No.	1
Borehole	RWI-BH010	Test Depth (m)	12.60

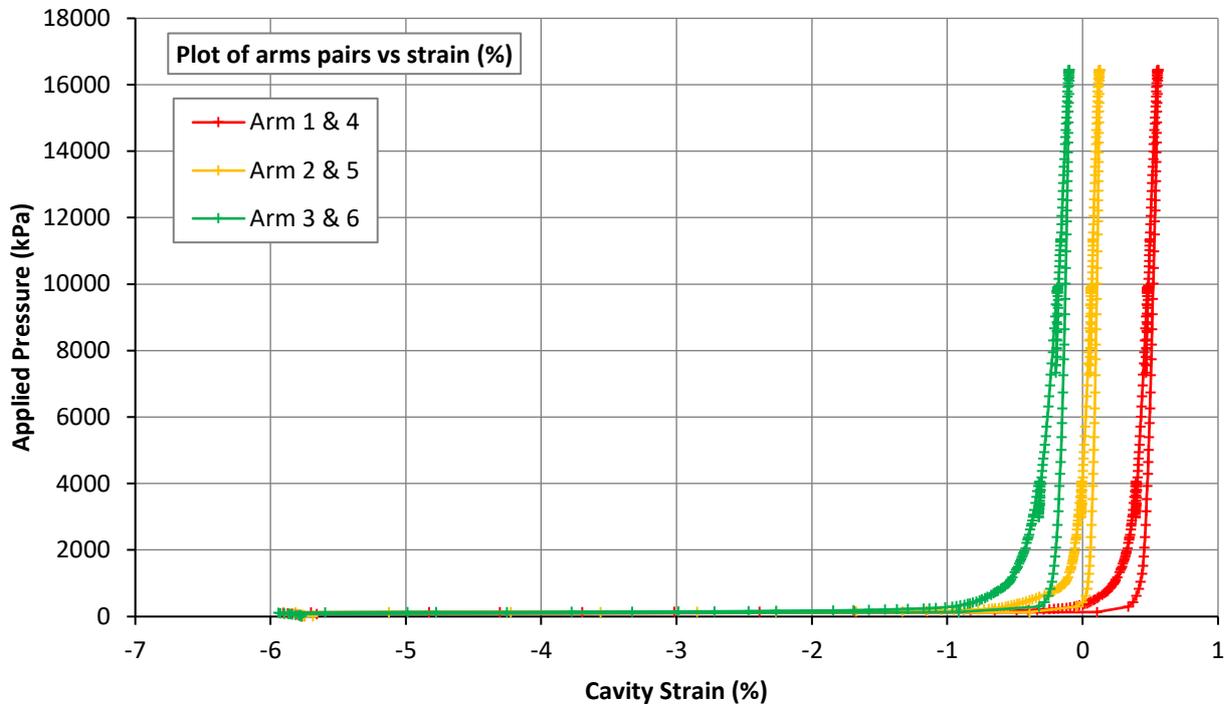
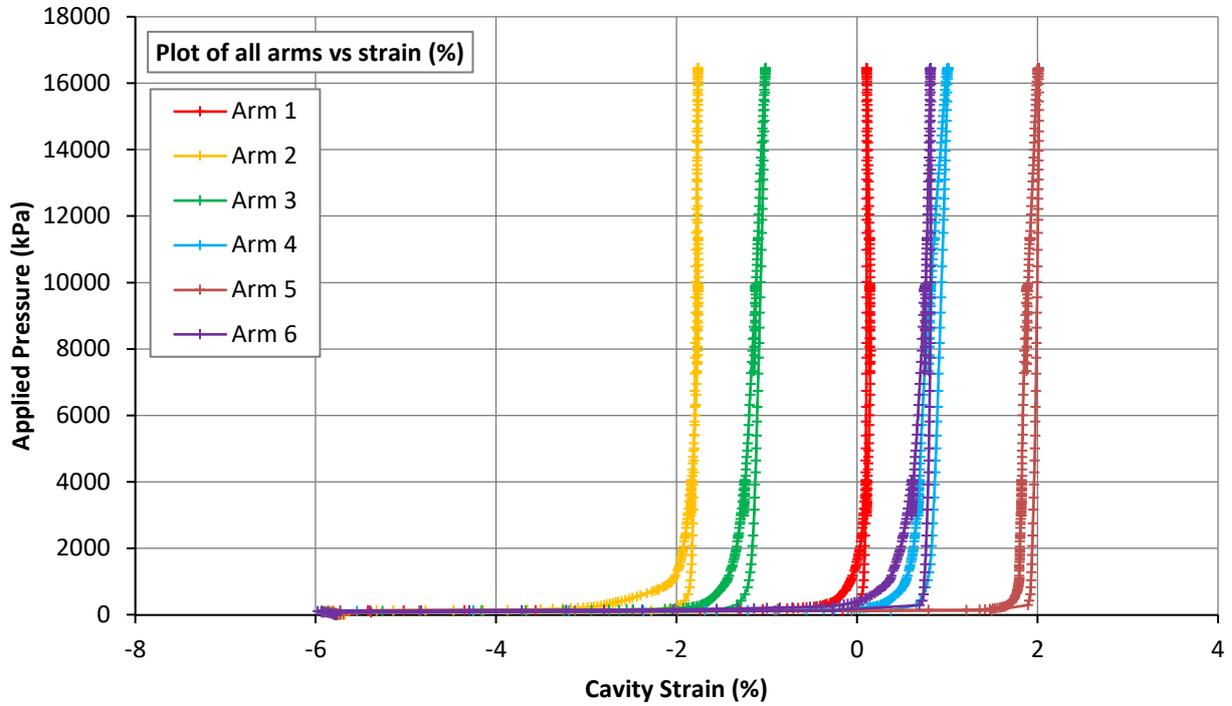


Project	Water Supply Project GI Lot 1	Figure No.	RWI-BH010 T01 - 02
Client	Irish Drilling Ltd		
Project No.	P1200127		

Pressuremeter Test - Arm Displacement vs Strain (%)

IN SITU
SITE INVESTIGATION

Test Date	16/12/2021	Test No.	1
Borehole	RWI-BH010	Test Depth (m)	12.60

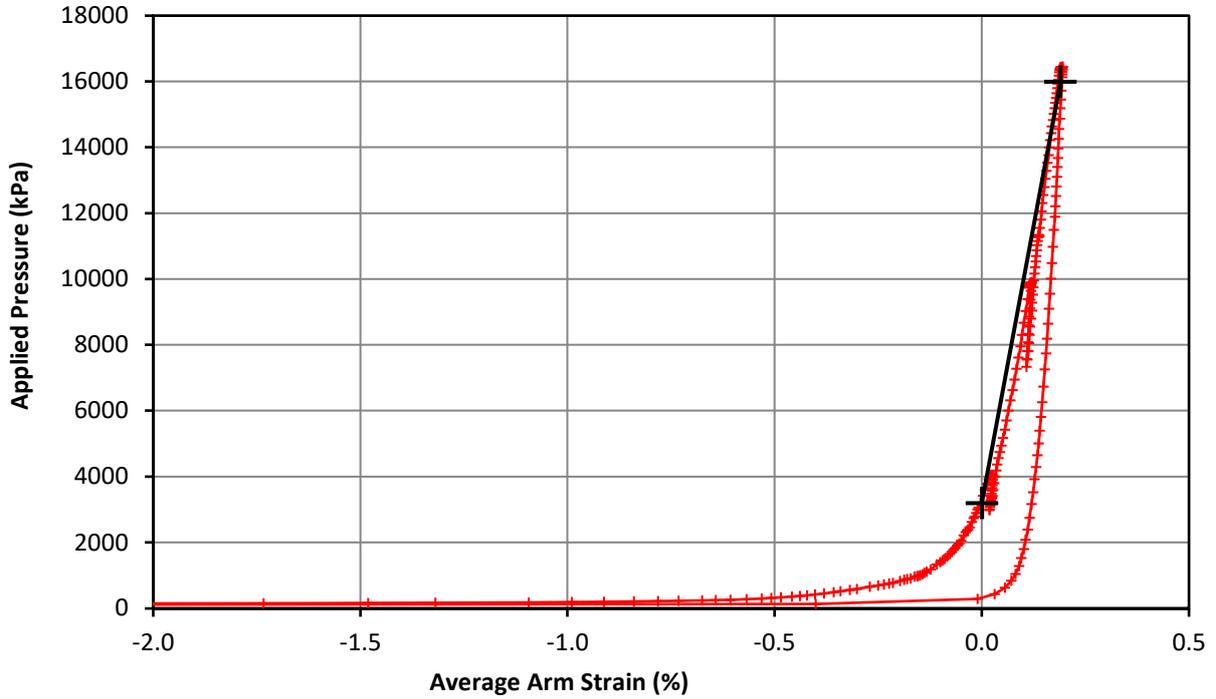


Project	Water Supply Project GI Lot 1	Figure No.	RWI-BH010 T01 - 03
Client	Irish Drilling Ltd		
Project No.	P1200127		

Pressuremeter Analysis - Initial Modulus & In Situ Horizontal Stress



Test Date	16/12/2021	Test No.	1
Borehole	RWI-BH010	Test Depth (m)	12.60

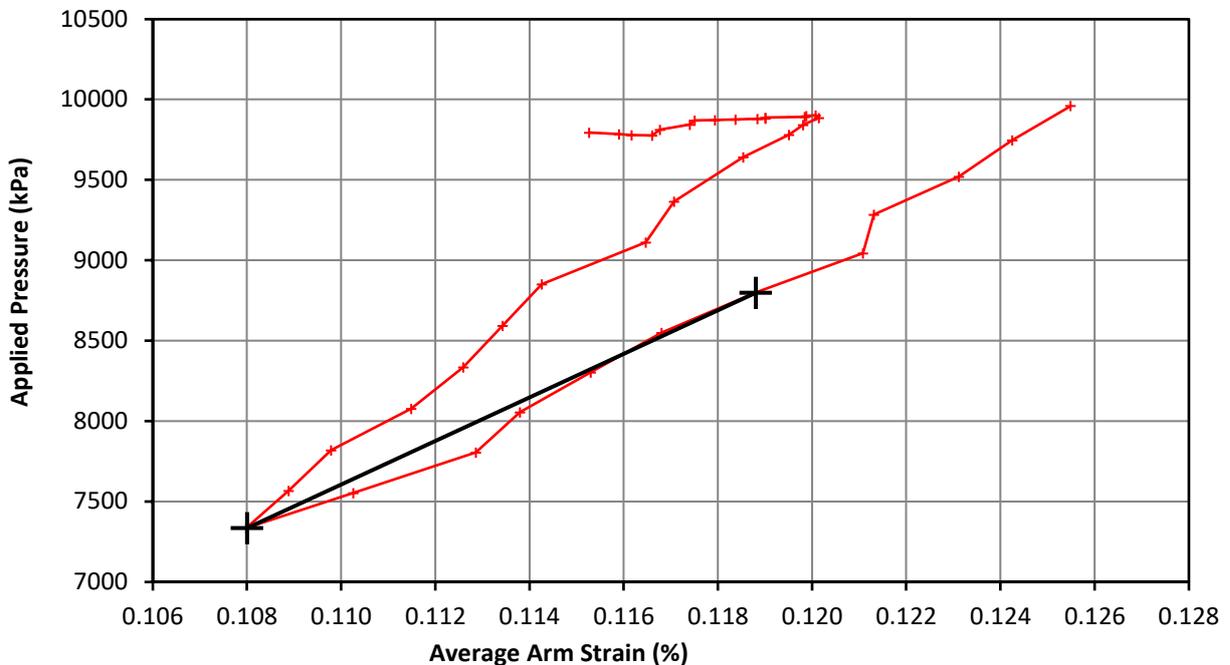
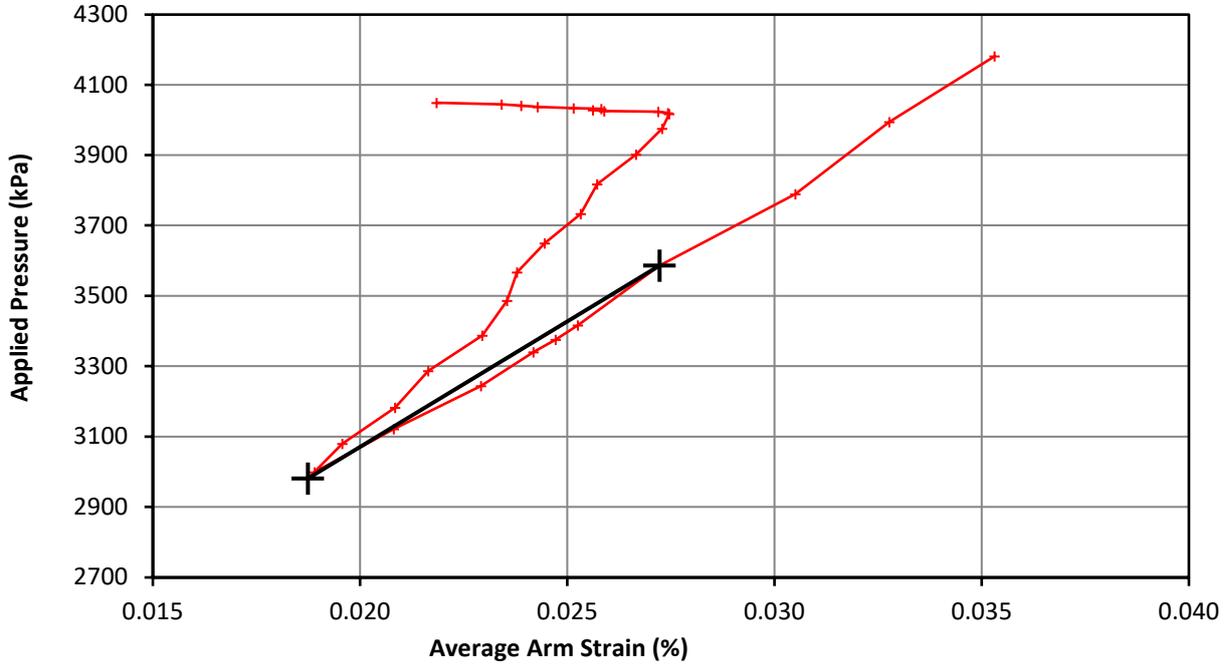


Initial Modulus	Shear Modulus	3374.8 MPa
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Project	Water Supply Project GI Lot 1	Figure No.	RWI-BH010 T01 - 04
Client	Irish Drilling Ltd		
Project No.	P1200127		

Pressuremeter Analysis - Unload Reload Loop

Test Date	16/12/2021	Test No.	1
Borehole	RWI-BH010	Test Depth (m)	12.60



Project	Water Supply Project GI Lot 1	Figure No.	RWI-BH010 T01 - 05
Client	Irish Drilling Ltd		
Project No.	P1200127		

APPENDIX B

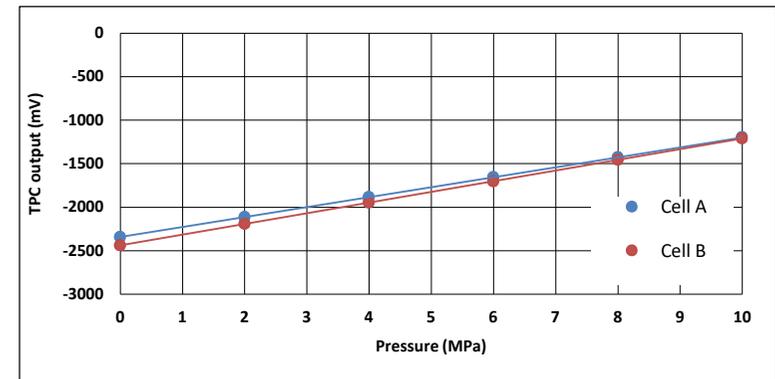
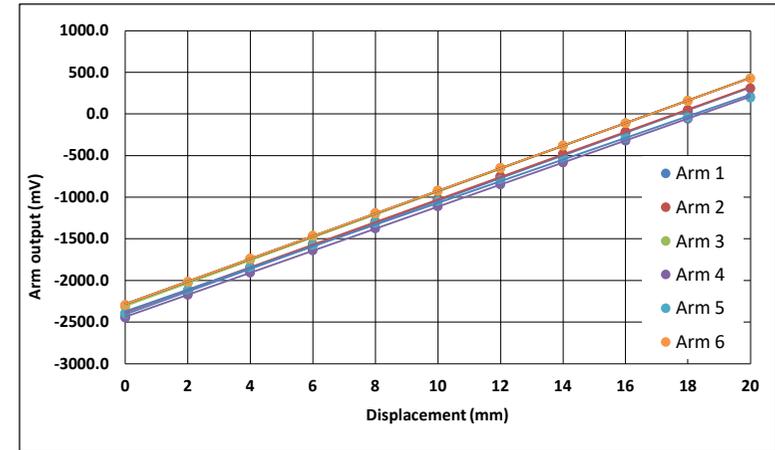
Calibrations

Description
Kylie (HPD06)

Arms		20/09/2021				
Displacement	Arm 1	Arm 2	Arm 3	Arm 4	Arm 5	Arm 6
mm	mV	mV	mV	mV	mV	mV
0	-2421.3	-2393.9	-2314.4	-2444.5	-2396.7	-2292.2
2	-2136.6	-2116.5	-2030.3	-2171.2	-2118.9	-2013.1
4	-1856.5	-1838.4	-1750.2	-1903.2	-1846.1	-1736.3
6	-1579.8	-1562.7	-1472.0	-1636.4	-1575.7	-1461.6
8	-1307.0	-1288.8	-1196.5	-1371.2	-1308.4	-1188.9
10	-1033.9	-1016.9	-922.9	-1107.6	-1047.1	-917.6
12	-762.4	-746.9	-650.4	-844.5	-790.9	-647.2
14	-493.0	-480.1	-378.5	-582.2	-536.7	-379.5
16	-228.0	-214.4	-110.3	-319.0	-287.8	-110.2
18	38.4	48.9	159.4	-58.0	-42.9	156.7
20	306.9	310.4	427.2	204.7	194.0	425.4
18	29.6	46.8	159.4	-58.1	-43.9	155.8
16	-227.0	-216.7	-111.1	-320.8	-285.6	-112.4
14	-494.5	-483.5	-382.4	-583.4	-536.8	-381.6
12	-764.5	-752.3	-654.7	-846.6	-791.0	-649.6
10	-1036.0	-1022.8	-927.3	-1109.8	-1046.0	-920.1
8	-1309.4	-1294.5	-1201.3	-1373.6	-1307.5	-1191.7
6	-1582.5	-1567.8	-1476.6	-1638.9	-1576.1	-1463.9
4	-1859.1	-1842.3	-1753.6	-1905.2	-1847.5	-1738.2
2	-2137.4	-2119.3	-2032.9	-2172.5	-2121.7	-2015.0
0	-2421.5	-2394.6	-2315.9	-2445.3	-2399.5	-2293.4
Slope (mV/mm)	136.2	135.5	137.1	132.3	130.2	135.8
Zero (mV)	-2405.5	-2383.2	-2302.7	-2435.6	-2369.3	-2282.6

Pressure Cells		20/09/2021			
Pressure	Cell A		Cell B		
MPa	V	mV	V	mV	
0.0	-2.34360	-2343.60	-2.44020	-2440.20	
2.0	-2.11410	-2114.10	-2.19300	-2193.00	
4.0	-1.88580	-1885.80	-1.94840	-1948.40	
6.0	-1.65700	-1657.00	-1.70280	-1702.80	
8.0	-1.42860	-1428.60	-1.45690	-1456.90	
10.0	-1.19880	-1198.80	-1.21120	-1211.20	
12.0	-0.97150	-971.50	-0.96550	-965.50	
14.0	-0.74240	-742.40	-0.72010	-720.10	
16.0	-0.51360	-513.60	-0.47490	-474.90	
18.0	-0.28500	-285.00	-0.22920	-229.20	
20.0	-0.05590	-55.90	0.01600	16.00	
18.0	-0.28410	-284.10	-0.22850	-228.50	
16.0	-0.51190	-511.90	-0.47350	-473.50	
14.0	-0.74110	-741.10	-0.71880	-718.80	
12.0	-0.96940	-969.40	-0.96440	-964.40	
10.0	-1.19810	-1198.10	-1.21000	-1210.00	
8.0	-1.42750	-1427.50	-1.45520	-1455.20	
6.0	-1.65620	-1656.20	-1.70220	-1702.20	
4.0	-1.88420	-1884.20	-1.94660	-1946.60	
2.0	-2.11300	-2113.00	-2.19150	-2191.50	
0.0	-2.34200	-2342.00	-2.43780	-2437.80	
Slope (mV/MPa)		114.3		122.8	
Zero (mV)		-2342.5		-2438.4	

System Compliance	1.5 mm/Gpa
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Calibrated by:	Cambridge Insitu
Calibrated at:	Cambridge Insitu
Checked by:	Cambridge Insitu
Date:	20/09/2021

Appendix 1G Geophysics Report

NOT APPLICABLE



Appendix 1H

Laboratory Test Results

Project ID 2021T102
 Project Name WSP Lot 1, Parteen Weir
 Schedule ID 2021T102_1

Client Irish Water
 Report Date 03/08/2022 09:49
 Scheduled Date 14/12/2021 12:25

Remarks

Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Classification				Chemical / Concrete						Compaction				Compressibility			Strength (Total)					Stregth	Rock	Other					
							Moisture Content	Atterberg 4 Point	Particle Density by Gas Jar	Particle Density by Small Pyknometer	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	BRE SUITE B	Sulphate Water Gravimetric	Carbonate Titration	pH	Chloride Content	Chloride Content Acid	Compaction Light	Compaction Heavy	Compaction Vibrating Hammer	Moisture Condition Value	Moisture Condition Relationship	CBR	Consolidation	Pressures	Swelling Pressure Test	Laboratory Vane test		Small Direct Shearbox	Ring shear Test	Triaxial Quick Undrained	(Specify Cell Pressure)	Triaxial UU Multi Stage
RWI-BH008	5.00	5.60	C		09/12/2021		1	1		1	1				1												1	100kpa								Quick UU @ 100kpa, CU Triaxial @ 100kpa, BRE Suite B at 5.5m BGL
RWI-BH008	5.60	7.20	C		10/12/2021		0*	0*																											(*not enough suitable material)	
RWI-BH008	7.20	8.70	C		10/12/2021																															
RWI-BH008	8.70	10.50	C		10/12/2021		1	1														1	100/200/400/800 /1400/400/100kpa			1	200									
RWI-BH008	10.50	12.00	C		13/12/2021		1	1							1																				BRE Suite B @ 11.00m. *not enough	
RWI-BH008	12.00	12.50	C		13/12/2021																															
RWI-BH008	12.50	14.00	C		13/12/2021																															
RWI-BH008	14.00	15.50	C		13/12/2021										1																					
RWI-BH008	15.50	17.00	C		14/12/2021																															
RWI-BH008	17.00	18.60	C		14/12/2021																															
RWI-BH008	18.60	20.00	C		14/12/2021																															
RWI-BH008	20.00	21.60	C		14/12/2021																															
RWI-BH008	21.60	23.00	C		14/12/2021																															
RWI-BH008	23.00	24.60	C		14/12/2021																															
RWI-BH008	24.60	26.00	C		14/12/2021																															
RWI-BH008	26.00	27.60	C		14/12/2021																															
RWI-BH008	27.60	29.00	C		14/12/2021																															
RWI-BH008	29.00	30.00	C		14/12/2021																															
RWI-BH010	0.00	1.50	C		15/12/2021																															
RWI-BH010	1.50	3.00	C		15/12/2021					1					1																					
RWI-BH010	3.00	3.50	C		15/12/2021																															
RWI-BH010	3.50	4.00	C		15/12/2021																															
RWI-BH010	4.00	5.00	C		15/12/2021		1	1																			1	100								4.30 - 5.30 Quick UU @ 100kpa, CU @ 100kpa.
RWI-BH010	5.00	5.60	C		15/12/2021																															
RWI-BH010	5.60	6.50	C		15/12/2021										1																					
RWI-BH010	6.50	8.00	C		15/12/2021																															

0 = test scheduled,

1 = test completed as scheduled,

0* = sample not suitable for scheduled test

Project ID 2021T102
 Project Name WSP Lot 1, Parteen Weir
 Schedule ID 2021T102_1

Client Irish Water
 Report Date 03/08/2022 09:49
 Scheduled Date 14/12/2021 12:25

Remarks

Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Classification				Chemical / Concrete						Compaction				Compressibility		Strength (Total)					Stregth		Rock	Other						
							Moisture Content	Atterberg 4 Point	Particle Density by Gas Jar	Particle Density by Small Pyknometer	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	BRE SUITE B	Sulphate Water Gravimetric	Carbonate Titration	ph	Chloride Content	Chloride Content Acid	Compaction Light	Compaction Heavy	Compaction Vibrating Hammer	Moisture Condition Value	Moisture Condition Relationship	CBR	Consolidation	Pressures	Swelling Pressure Test			Laboratory Vane test	Small Direct Shearbox	Ring shear Test	Triaxial Quick Undrained	(Specify Cell Pressure)	Triaxial UU Multi Stage
RWI-BH015	3.00	3.50	C		01/12/2021																																
RWI-BH015	3.50	5.00	C		01/12/2021																																
RWI-BH015	5.00	6.50	C		01/12/2021																															5.50-6.00m - 1 Dimensional Consolidation. 5.20-5.50m -UU Multistage @100/200/300kpa. BRE Suite B @ 5m BGL. * not enough for all	
RWI-BH015	6.50	8.00	C		01/12/2021																														7.0-7.50 CU Triaxial @ 140kpa. Quick UU @ 140kpa. BRE Suite B @ 8.00m BGL		
RWI-BH015	8.00	9.30	C		01/12/2021																																
RWI-BH015	9.30	11.00	C		02/12/2021																																
RWI-BH015	11.00	14.00	C		02/12/2021																																
RWI-BH015	14.00	17.00	C		02/12/2021																																
RWI-BH015	17.00	20.00	C		02/12/2021																																
RWI-BH015	20.00	23.00	C		03/12/2021																																
RWI-BH015	23.00	26.00	C		03/12/2021																																
RWI-BH015	26.00	30.00	C		03/12/2021																																
RWI-BH016	0.00	1.50	C		05/01/2022																																
RWI-BH016	1.50	3.00	C		05/01/2022																																
RWI-BH016	3.00	4.50	C		05/01/2022																																
RWI-BH016	4.50	6.00	C		05/01/2022																																
RWI-BH016	6.00	6.50	C		05/01/2022																																

Project ID 2021T102
 Project Name WSP Lot 1, Parteen Weir
 Schedule ID 2021T102_1

Client Irish Water
 Report Date 03/08/2022 09:49
 Scheduled Date 14/12/2021 12:25

Remarks

Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Classification				Chemical / Concrete						Compaction				Compressibility			Strength (Total)					Stregth	Rock	Other						
							Moisture Content	Atterberg 4 Point	Particle Density by Gas Jar	Particle Density by Small Pyknometer	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	BRE SUITE B	Sulphate Water Gravimetric	Carbonate Titration	ph	Chloride Content	Chloride Content Acid	Compaction Light	Compaction Heavy	Compaction Vibrating Hammer	Moisture Condition Value	Moisture Condition Relationship	CBR	Consolidation	Pressures	Swelling Pressure Test	Laboratory Vane test		Small Direct Shearbox	Ring shear Test	Triaxial Quick Undrained	(Specify Cell Pressure)	Triaxial UU Multi Stage	Triaxial UU Multi Specimen
RWI-BH016	6.50	8.00	C		05/01/2022																																BRE Suite B at 8m. 6.70 - 7.20m Multistage UU @ 150/300/450kpa 1 D Consolidation @ 75/150/300/600/1200/300/75kpa
RWI-BH016	8.00	9.50	C		05/01/2022		1	1		1	1																										
RWI-BH016	9.50	11.00	C		05/01/2022					1														1													
RWI-BH016	11.00	12.50	C		05/01/2022																																
RWI-BH016	12.50	14.00	C		05/01/2022		1	1																												13.30 - 13.70m Multistage UU @ 300/600/1200kpa Multistage CU @ 300/600/1200kpa	
RWI-BH016	14.00	15.00	C		05/01/2022										1																					Suite B at 14m	
RWI-BH016	15.00	17.00	C		06/01/2022																														1 2	2pl	
RWI-BH016	17.00	18.60	C		06/01/2022																														1		
RWI-BH016	18.60	20.00	C		06/01/2022																															1	
RWI-BH016	20.00	21.60	C		06/01/2022																															1	
RWI-BH016	21.60	23.00	C		06/01/2022																															1	
RWI-BH016	23.00	24.50	C		06/01/2022																															1	
RWI-BH016	24.50	26.00	C		06/01/2022																															1	
RWI-BH016	26.00	27.60	C		06/01/2022																															1	
RWI-BH016	27.60	29.00	C		06/01/2022																															1	
RWI-BH016	29.00	30.00	C		06/01/2022																															1	
RWI-BH017	0.00	1.50	C		17/12/2021																																
RWI-BH017	1.50	3.00	C		17/12/2021																																
RWI-BH017	3.00	3.50	C		17/12/2021					1																											
RWI-BH017	3.50	5.00	C		17/12/2021																																
RWI-BH017	5.00	6.50	C		17/12/2021																																
RWI-BH017	6.50	8.00	C		20/12/2021		1	1							1																						Suite B at 8.0m (* not enough for all tests)
RWI-BH017	8.00	9.50	C		20/12/2021																															8.50 - 9.50m CU Triaxial @ 170kpa	
RWI-BH017	9.50	11.00	C		20/12/2021																																

0 = test scheduled,

1 = test completed as scheduled,

0* = sample not suitable for scheduled test



Plasticity (A-Line) Chart

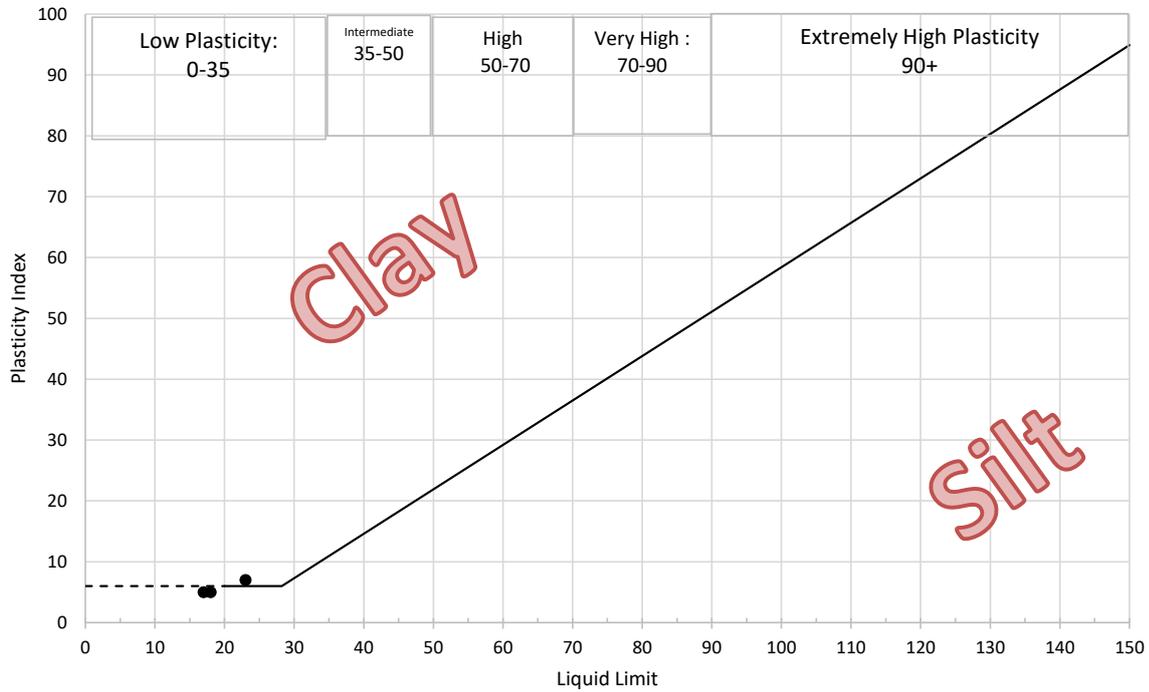
Project Number

Project Name:

WSP Lot 1, Parteen Weir

Location:

2021T102



Abbreviations in the remarks column of the Classification Summary Sheet: C = Clay, M = Silt

Plasticity abbreviations: 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.

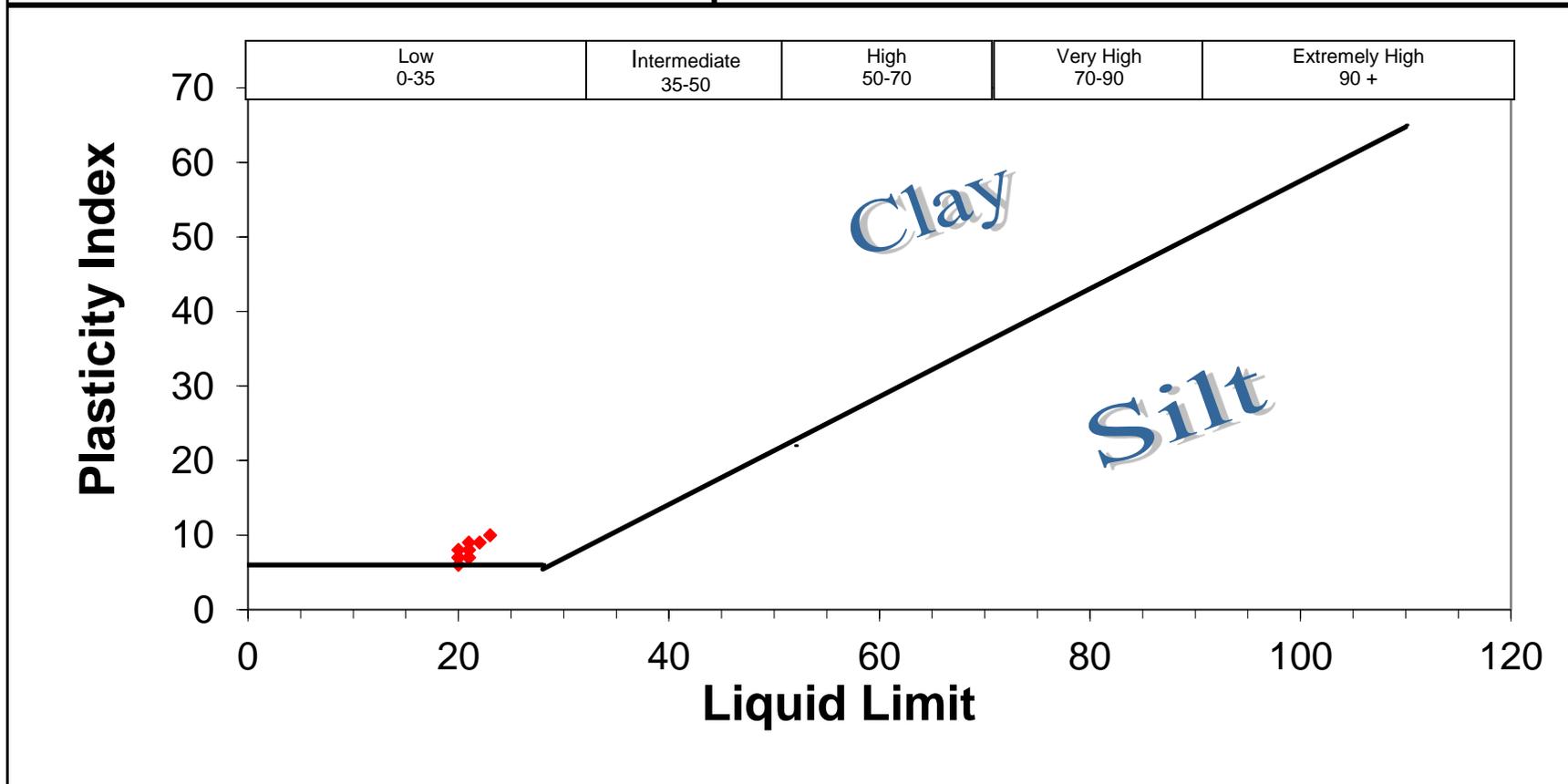
Chart taken from BS5930: 2010

BCS

QC Form: R1

NMTL LTD
Unit 18c, Tullow Industrial Estate
Tullow
County Carlow
Tel: 00353 59 9180822
Mob: 00353 872575508
billa@nmtl.ie

Contract: WSP Lot1, Parteen Weir
Client: Irish Drilling Limited
Engineer:
GII Project ID 2021T102
Date: 16/05/2022
Tested By: Sb **Checked:** Bc
Job ref No. NMTL 3503

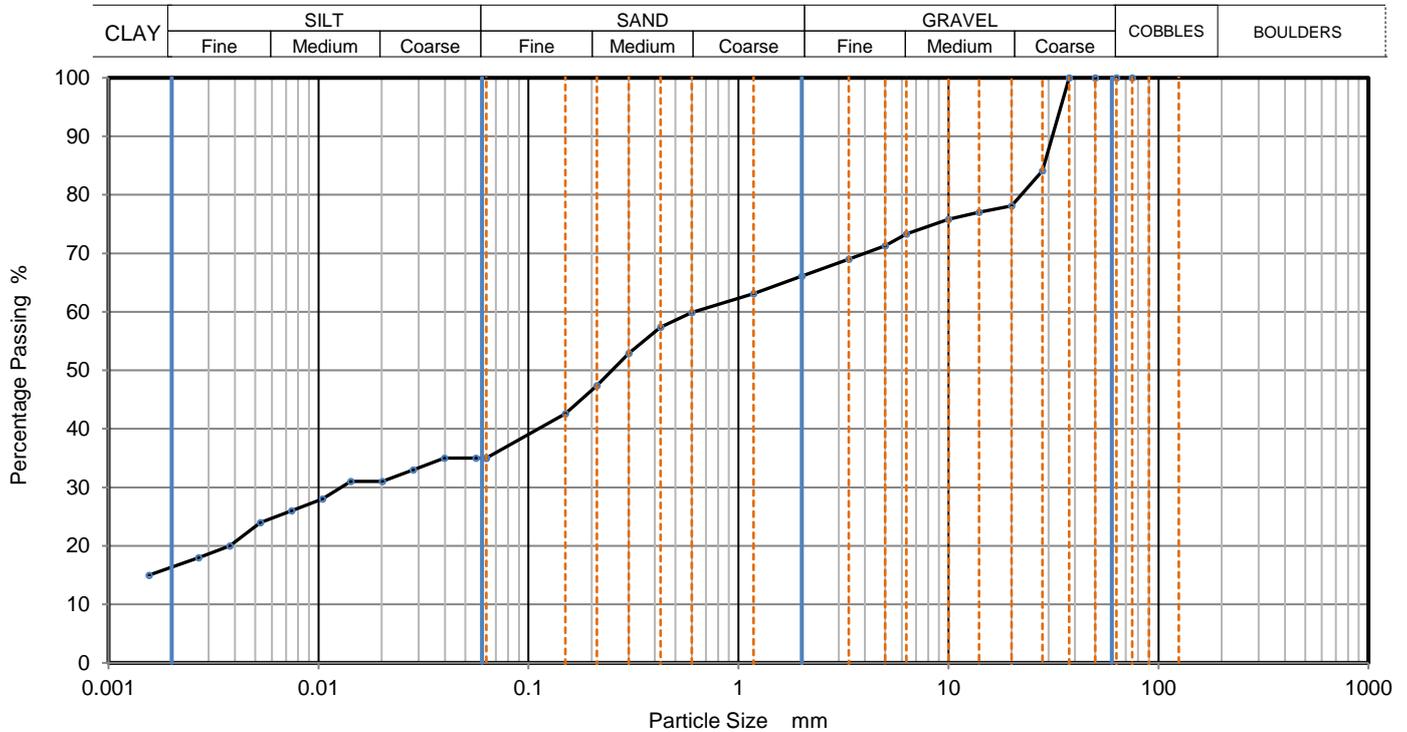




PARTICLE SIZE DISTRIBUTION

Job Ref	2021T102
Borehole/Pit No.	RWI-BH007A
Sample No.	
Depth, m	6.50
Sample Type	C
KeyLAB ID	IDL12022012546

Site Name	WSP Lot 1, Parteen Weir	
Soil Description	Light brown slightly sandy gravelly SILT. Gravel is coarse.	
Specimen Reference	Specimen Depth	6.8 m
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0630	35
		0.0562	35
75	100	0.0398	35
63	100	0.0283	33
50	100	0.0201	31
37.5	100	0.0142	31
28	84	0.0104	28
20	78	0.0074	26
14	77	0.0053	24
10	76	0.0038	20
6.3	73	0.0027	18
5	71	0.0016	15
3.35	69		
2	66		
1.18	63		
0.6	60	Particle density (assumed)	
0.425	57	2.65	Mg/m3
0.3	53		
0.212	47		
0.15	43		
0.063	35		

Dry Mass of sample, g 617

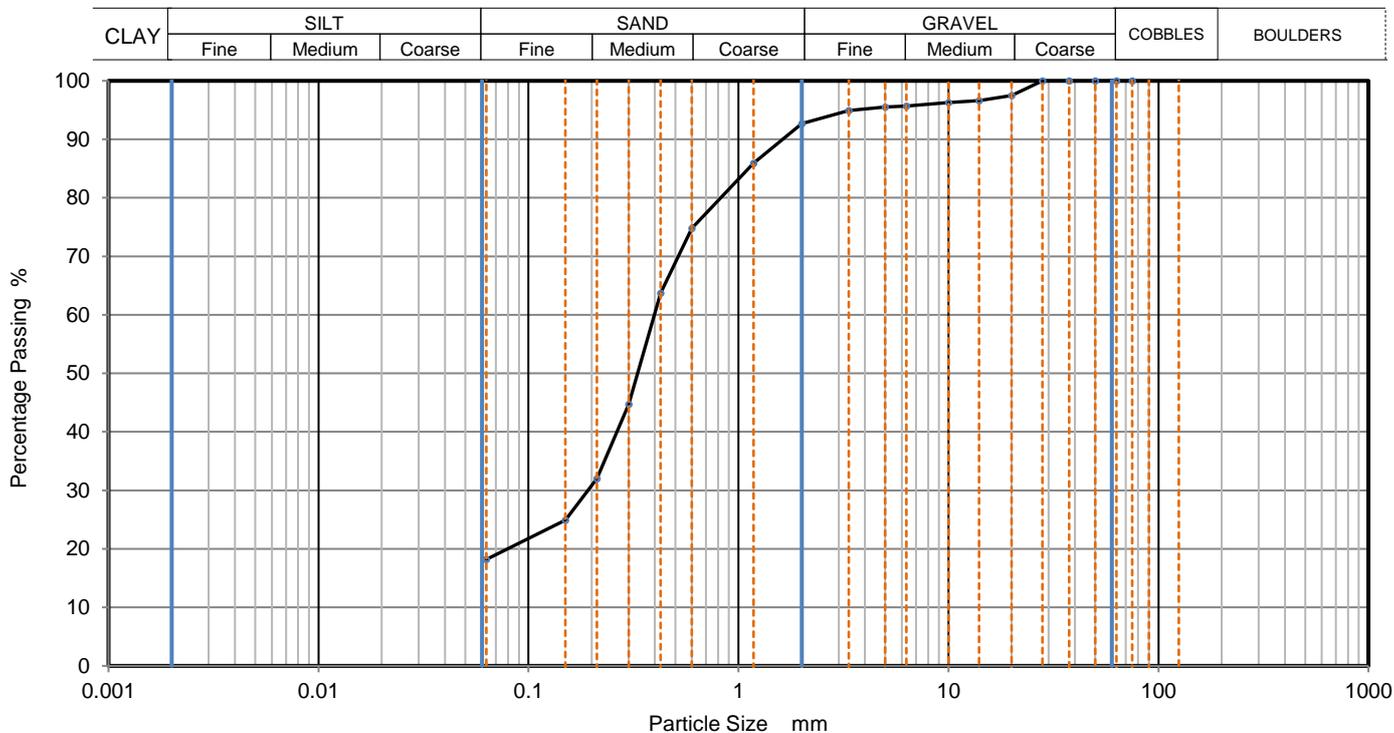
Sample Proportions	% dry mass
Very coarse	0
Gravel	34
Sand	31
Silt	19
Clay	16

Grading Analysis	
D100	mm
D60	mm 0.614
D30	mm 0.013
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks
Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	1
		Dympna Darcy B.Sc.	10/05/2022 16:56	
				QC From No:R2

	PARTICLE SIZE DISTRIBUTION		Job Ref	2021T102	
			Borehole/Pit No.	RWI-BH008	
Site Name	WSP Lot 1, Parteen Weir		Sample No.		
Soil Description	Greyish-brown gravelly silty medium SAND.		Depth, m	0.00	
Specimen Reference		Specimen Depth	2.5 m	Sample Type	C
Test Method	BS1377:Part 2:1990, clause 9.2		KeyLAB ID	IDL1202112160	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	98		
14	97		
10	96		
6.3	96		
5	96		
3.35	95		
2	93		
1.18	86		
0.6	75		
0.425	64		
0.3	45		
0.212	32		
0.15	25		
0.063	18		

Dry Mass of sample, g

1010

Sample Proportions	% dry mass
Very coarse	0
Gravel	7
Sand	75
Fines <0.063mm	18

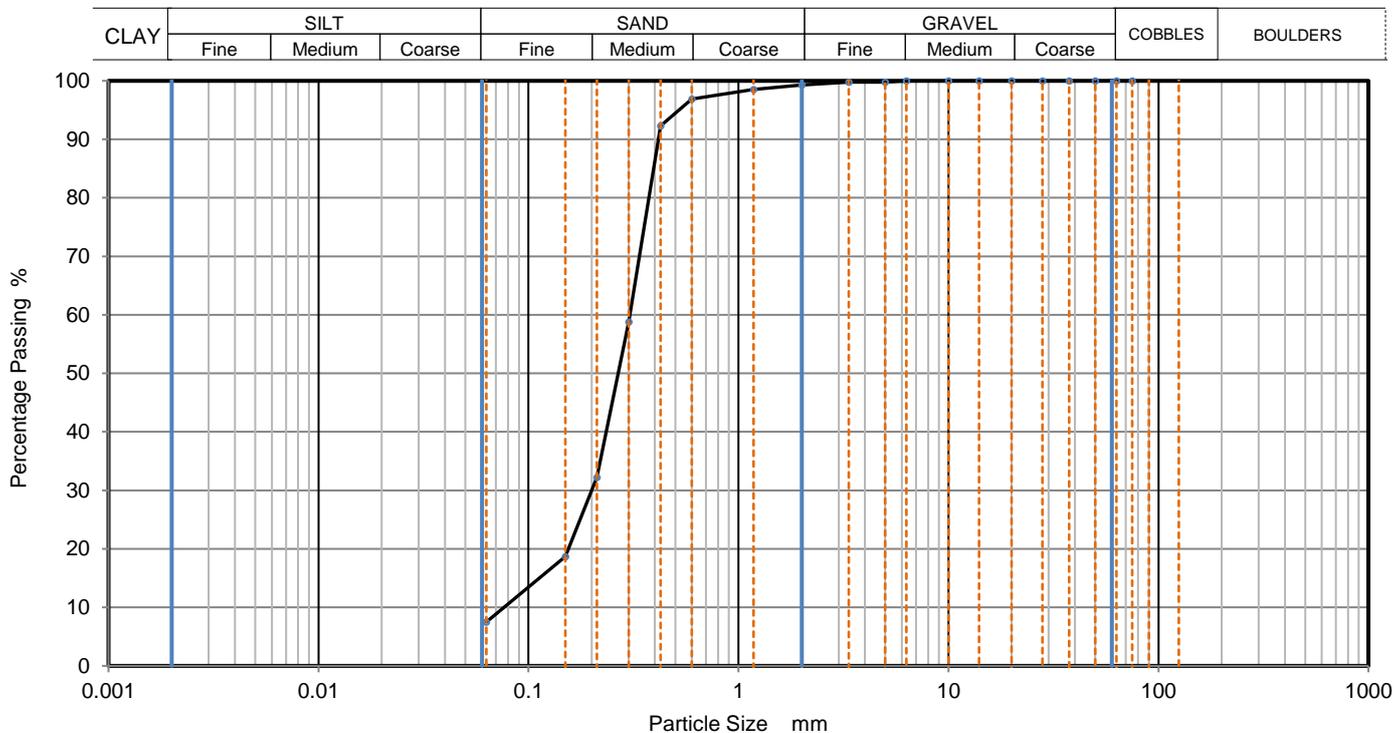
Grading Analysis		
D100	mm	
D60	mm	0.397
D30	mm	0.193
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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	PARTICLE SIZE DISTRIBUTION		Job Ref	2021T102	
			Borehole/Pit No.	RWI-BH010	
Site Name	WSP Lot 1, Parteen Weir		Sample No.		
Soil Description	Grey silty medium SAND.		Depth, m	1.50	
Specimen Reference		Specimen Depth	3 m	Sample Type	C
Test Method	BS1377:Part 2:1990, clause 9.2		KeyLAB ID	IDL1202112221	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	99		
1.18	99		
0.6	97		
0.425	92		
0.3	59		
0.212	32		
0.15	19		
0.063	8		

Dry Mass of sample, g

1028

Sample Proportions	% dry mass
Very coarse	0
Gravel	1
Sand	92
Fines <0.063mm	7

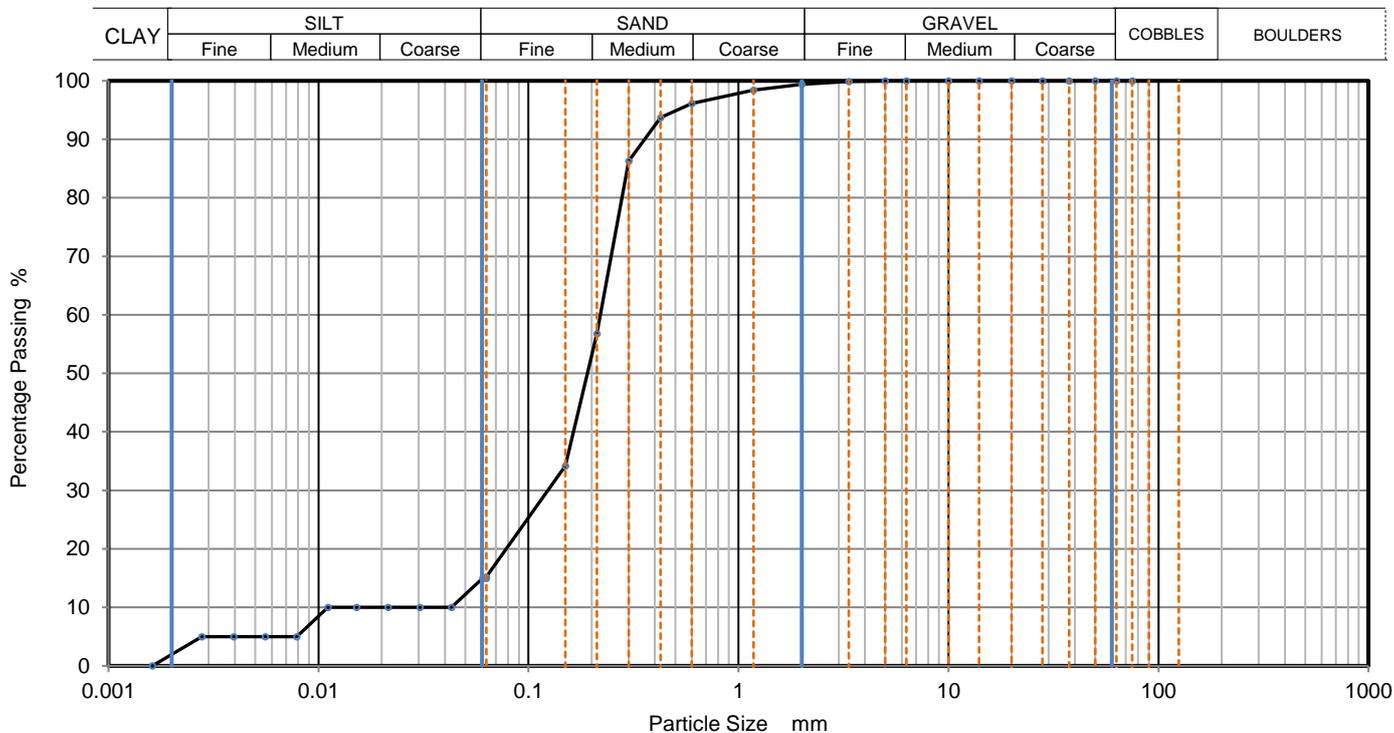
Grading Analysis		
D100	mm	
D60	mm	0.304
D30	mm	0.201
D10	mm	0.0764
Uniformity Coefficient		4
Curvature Coefficient		1.7

Remarks

Preparation and testing in accordance with BS1377 unless noted below

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	PARTICLE SIZE DISTRIBUTION			Job Ref	2021T102
				Borehole/Pit No.	RWI-BH013
Site Name	WSP Lot 1, Parteen Weir			Sample No.	
Soil Description	Light brown silty fine and medium SAND.			Depth, m	8.00
Specimen Reference		Specimen Depth	8.2-8.3 m	Sample Type	C
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	IDL12022012572



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0630	15
		0.0604	15
75	100	0.0429	10
63	100	0.0304	10
50	100	0.0215	10
37.5	100	0.0152	10
28	100	0.0111	10
20	100	0.0079	5
14	100	0.0056	5
10	100	0.0039	5
6.3	100	0.0028	5
5	100	0.0016	0
3.35	100		
2	99		
1.18	98		
0.6	96	Particle density (assumed)	
0.425	94	2.65	Mg/m ³
0.3	86		
0.212	57		
0.15	34		
0.063	15		

Dry Mass of sample, g

611

Sample Proportions	% dry mass
Very coarse	0
Gravel	1
Sand	84
Silt	13
Clay	2

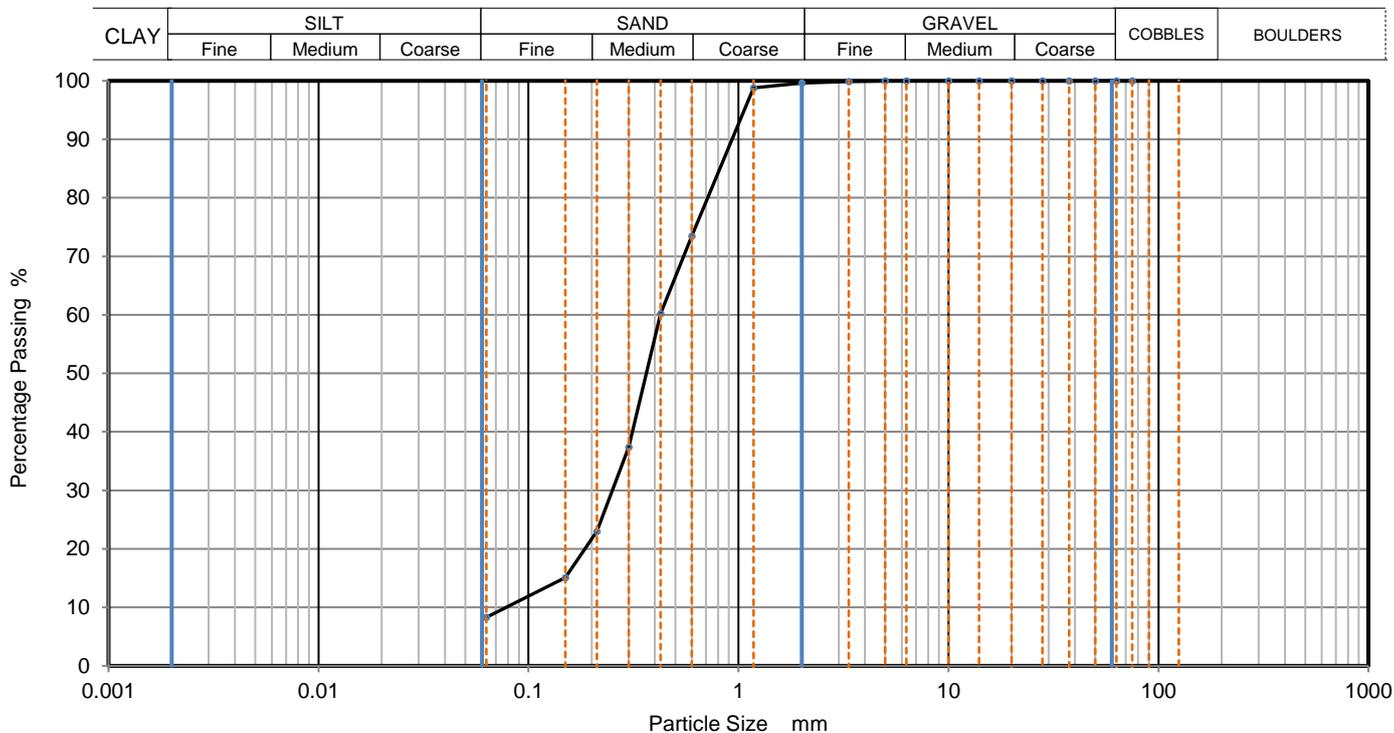
Grading Analysis		
D100	mm	
D60	mm	0.22
D30	mm	0.124
D10	mm	0.011
Uniformity Coefficient		20
Curvature Coefficient		6.3

Remarks

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	PARTICLE SIZE DISTRIBUTION		Job Ref	2021T102	
			Borehole/Pit No.	RWI-BH014	
Site Name	WSP Lot 1, Parteen Weir		Sample No.		
Soil Description	Brown silty medium and coarse SAND.		Depth, m	0.00	
Specimen Reference		Specimen Depth	2.6 m	Sample Type	C
Test Method	BS1377:Part 2:1990, clause 9.2		KeyLAB ID	IDL12021121623	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	99		
0.6	74		
0.425	60		
0.3	37		
0.212	23		
0.15	15		
0.063	8		

Dry Mass of sample, g

955

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	91
Fines <0.063mm	8

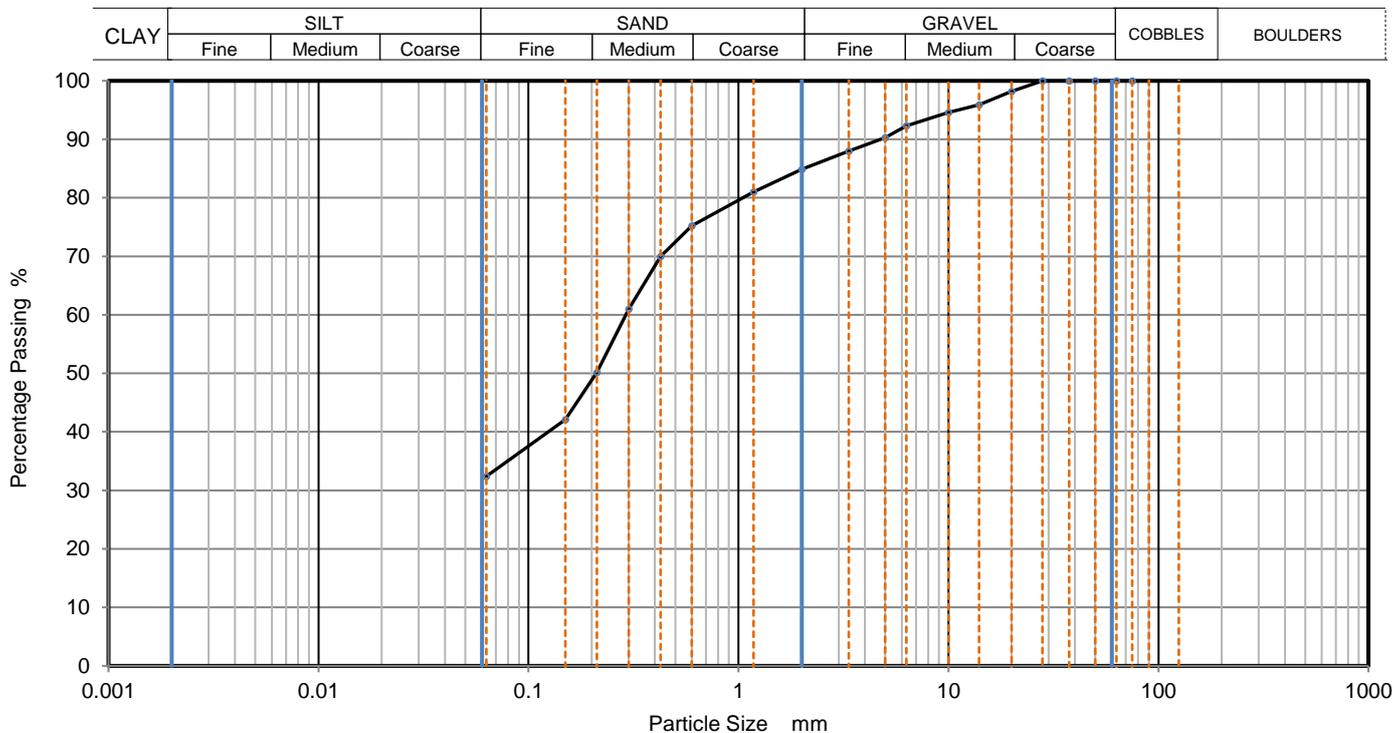
Grading Analysis		
D100	mm	
D60	mm	0.424
D30	mm	0.251
D10	mm	0.0784
Uniformity Coefficient		5.4
Curvature Coefficient		1.9

Remarks

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				QC From No:R2

	PARTICLE SIZE DISTRIBUTION		Job Ref	2021T102	
			Borehole/Pit No.	RWI-BH014	
Site Name	WSP Lot 1, Parteen Weir		Sample No.		
Soil Description	Lumps of red-brown clay in brown gravelly very silty SAND.		Depth, m	3.30	
Specimen Reference		Specimen Depth	4.9 m	Sample Type	C
Test Method	BS1377:Part 2:1990, clause 9.2		KeyLAB ID	IDL12021121626	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	98		
14	96		
10	95		
6.3	92		
5	90		
3.35	88		
2	85		
1.18	81		
0.6	75		
0.425	70		
0.3	61		
0.212	50		
0.15	42		
0.063	32		

Dry Mass of sample, g

892

Sample Proportions	% dry mass
Very coarse	0
Gravel	15
Sand	53
Fines <0.063mm	32

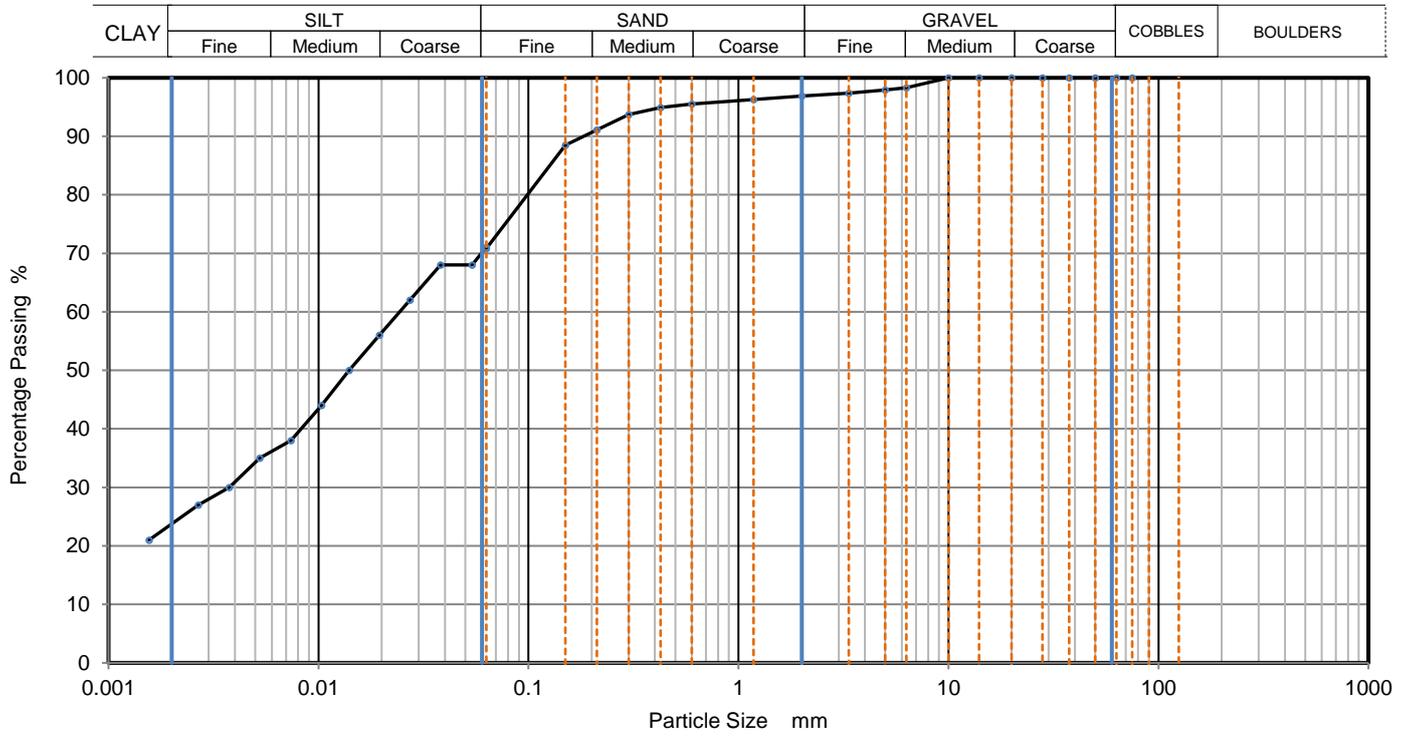
Grading Analysis		
D100	mm	
D60	mm	0.29
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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				QC From No:R2

	PARTICLE SIZE DISTRIBUTION		Job Ref	2021T102	
			Borehole/Pit No.	RWI-BH014	
Site Name	WSP Lot 1, Parteen Weir		Sample No.		
Soil Description	Light brown slightly gravelly slightly sandy SILT. Sand is fine.		Depth, m	8.00	
Specimen Reference		Specimen Depth	10.5-11.0 m	Sample Type	C
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5		KeyLAB ID	IDL12021121632	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0630	71
		0.0539	68
75	100	0.0381	68
63	100	0.0273	62
50	100	0.0195	56
37.5	100	0.0140	50
28	100	0.0103	44
20	100	0.0074	38
14	100	0.0053	35
10	100	0.0038	30
6.3	98	0.0027	27
5	98	0.0016	21
3.35	97		
2	97		
1.18	96		
0.6	96	Particle density (assumed)	
0.425	95	2.65	Mg/m3
0.3	94		
0.212	91		
0.15	89		
0.063	71		

Dry Mass of sample, g 722

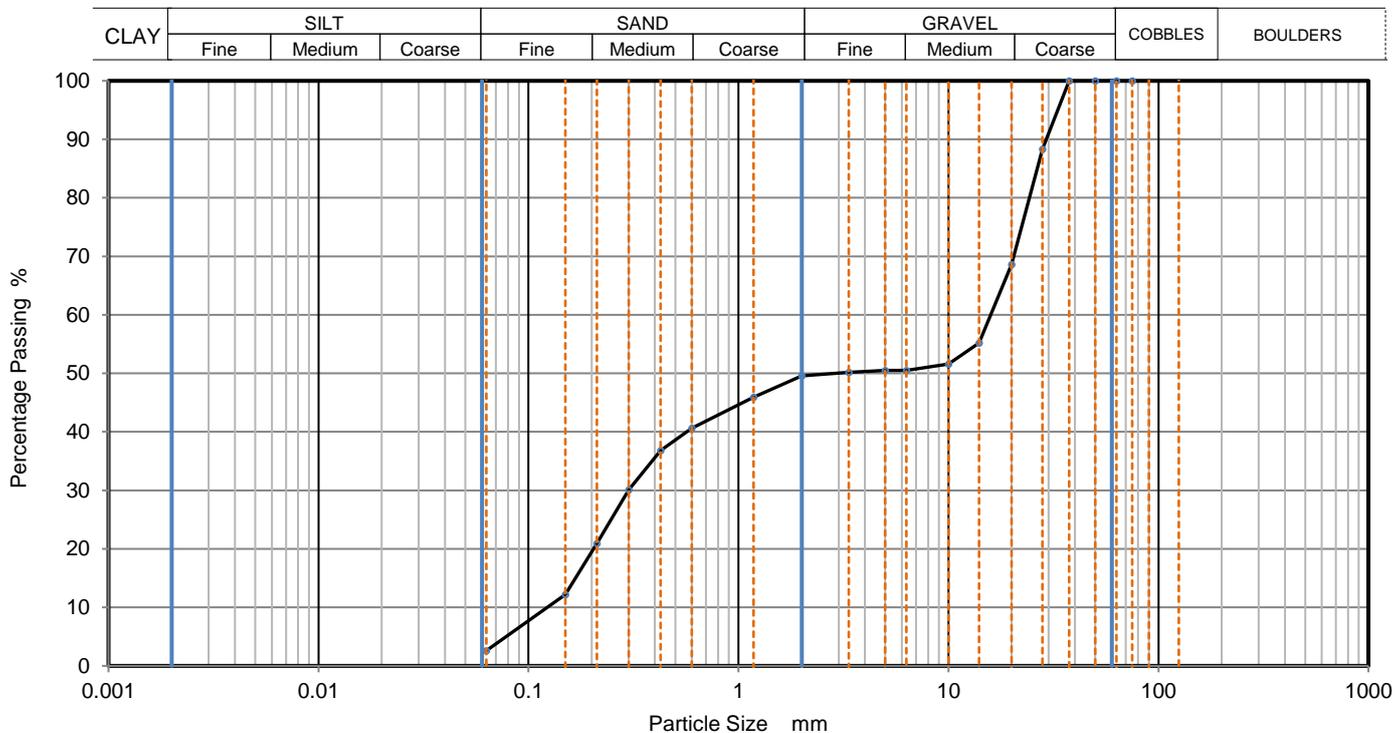
Sample Proportions	% dry mass
Very coarse	0
Gravel	3
Sand	26
Silt	48
Clay	23

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	1
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				QC From No:R2

	PARTICLE SIZE DISTRIBUTION		Job Ref	2021T102	
			Borehole/Pit No.	RWI-BH015	
Site Name	WSP Lot 1, Parteen Weir		Sample No.		
Soil Description	Multicoloured f,m SAND and m, c GRAVEL.		Depth, m	3.50	
Specimen Reference		Specimen Depth	3.5-5.0 m	Sample Type	C
Test Method	BS1377:Part 2:1990, clause 9.2		KeyLAB ID	IDL12021121414	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	88		
20	69		
14	55		
10	52		
6.3	51		
5	51		
3.35	50		
2	50		
1.18	46		
0.6	41		
0.425	37		
0.3	30		
0.212	21		
0.15	12		
0.063	3		

Dry Mass of sample, g

912

Sample Proportions	% dry mass
Very coarse	0
Gravel	50
Sand	47
Fines <0.063mm	3

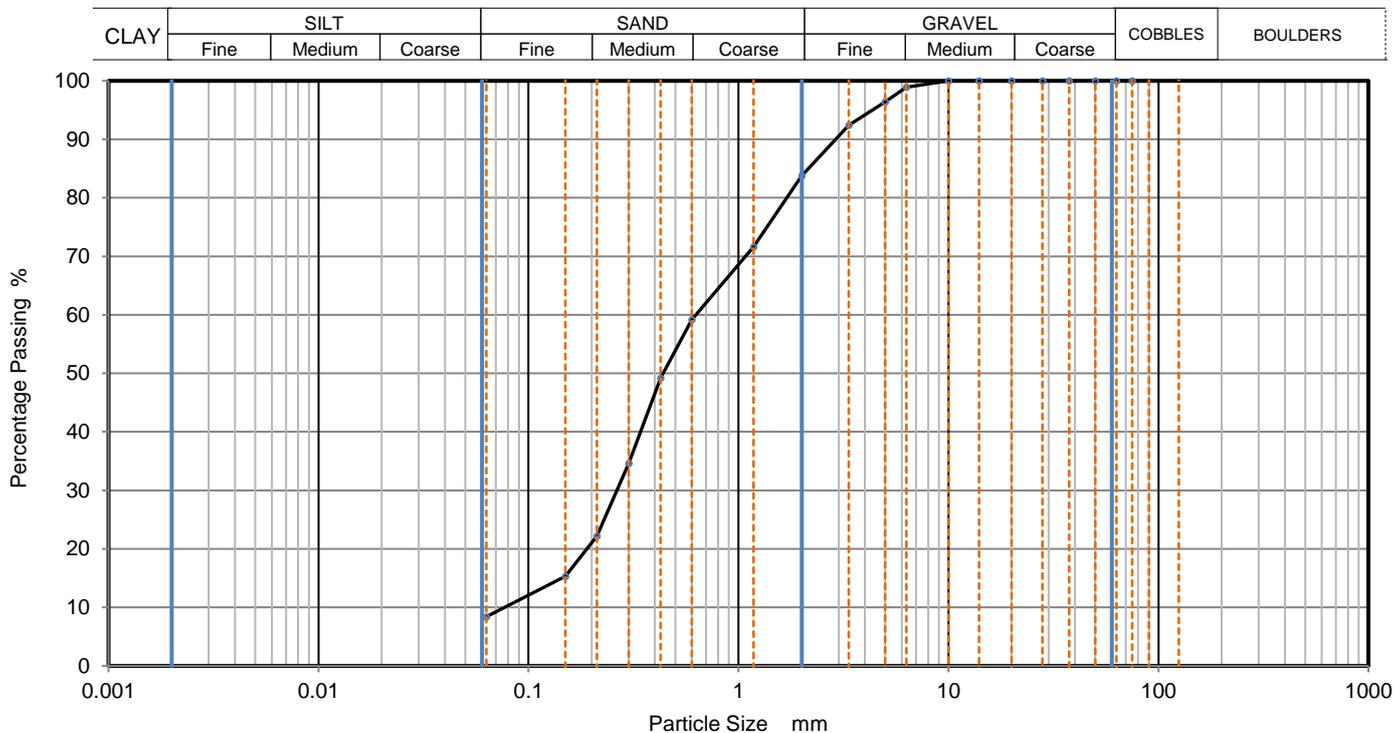
Grading Analysis		
D100	mm	
D60	mm	15.9
D30	mm	0.299
D10	mm	0.123
Uniformity Coefficient		130
Curvature Coefficient		0.046

Remarks

Preparation and testing in accordance with BS1377 unless noted below

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	PARTICLE SIZE DISTRIBUTION		Job Ref	2021T102	
			Borehole/Pit No.	RWI-BH016	
Site Name	WSP Lot 1, Parteen Weir		Sample No.		
Soil Description	Brown silty gravelly medium SAND.		Depth, m	0.00	
Specimen Reference		Specimen Depth	0.0-1.5 m	Sample Type	C
Test Method	BS1377:Part 2:1990, clause 9.2		KeyLAB ID	IDL1202201120	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	99		
5	96		
3.35	92		
2	84		
1.18	72		
0.6	59		
0.425	49		
0.3	35		
0.212	22		
0.15	15		
0.063	8		

Dry Mass of sample, g

759

Sample Proportions	% dry mass
Very coarse	0
Gravel	16
Sand	75
Fines <0.063mm	8

Grading Analysis		
D100	mm	
D60	mm	0.628
D30	mm	0.264
D10	mm	0.077
Uniformity Coefficient		8.2
Curvature Coefficient		1.4

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	1
		Dympna Darcy B.Sc.	10/05/2022 16:57	
				QC From No:R2



PARTICLE SIZE DISTRIBUTION

Job Ref **2021T102**

Borehole/Pit No. **RWI-BH016**

Site Name **WSP Lot 1, Parteen Weir**

Sample No.

Soil Description **Orangish-brown silty medium SAND.**

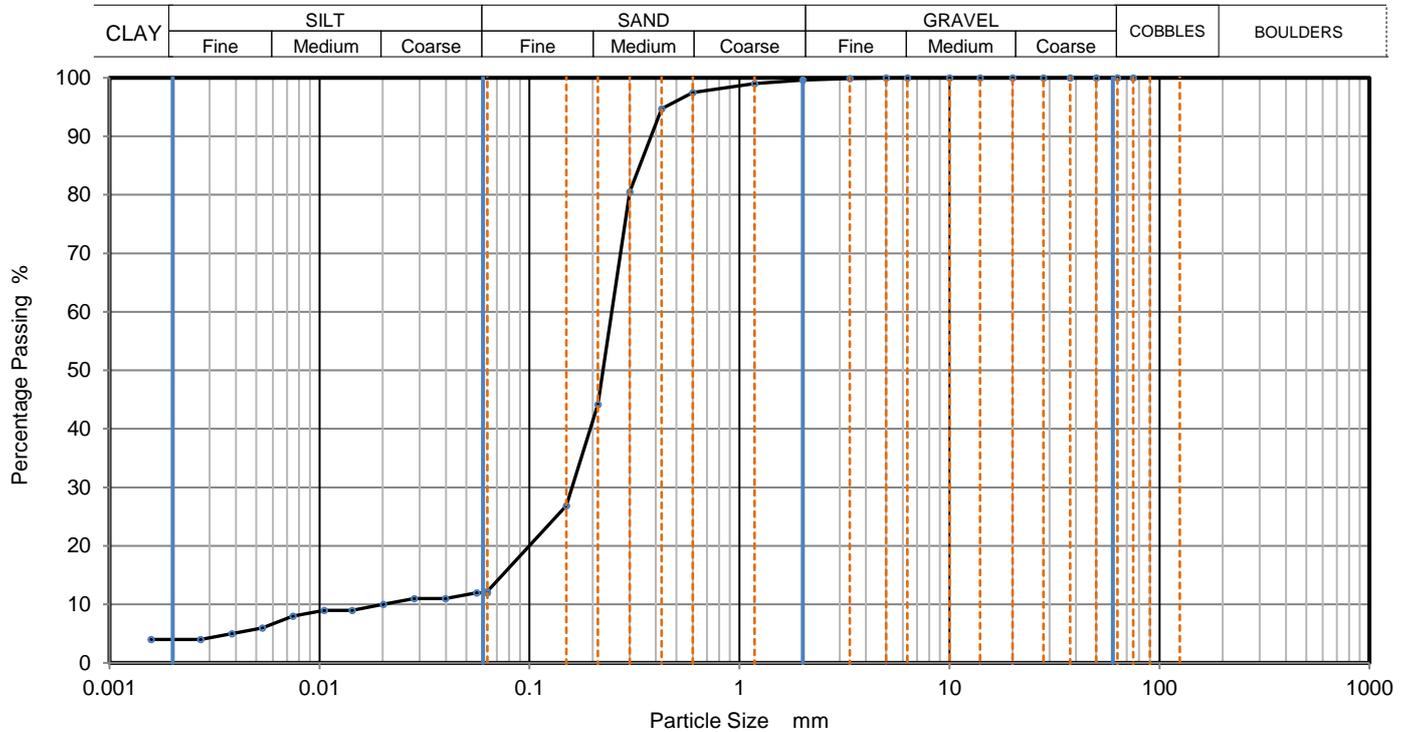
Depth, m **8.00**

Specimen Reference **8.0-9.5 m**

Sample Type **C**

Test Method **BS1377:Part 2:1990, clauses 9.2 and 9.5**

KeyLAB ID **IDL1202201126**



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0630	12
		0.0559	12
75	100	0.0398	11
63	100	0.0283	11
50	100	0.0201	10
37.5	100	0.0143	9
28	100	0.0105	9
20	100	0.0075	8
14	100	0.0053	6
10	100	0.0038	5
6.3	100	0.0027	4
5	100	0.0016	4
3.35	100		
2	100		
1.18	99		
0.6	98	Particle density (assumed)	
0.425	95	2.65	Mg/m3
0.3	81		
0.212	44		
0.15	27		
0.063	12		

Dry Mass of sample, g

456

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	87
Silt	8
Clay	4

Grading Analysis		
D100	mm	
D60	mm	0.247
D30	mm	0.16
D10	mm	0.0197
Uniformity Coefficient		13
Curvature Coefficient		5.3

Remarks

Preparation and testing in accordance with BS1377 unless noted below

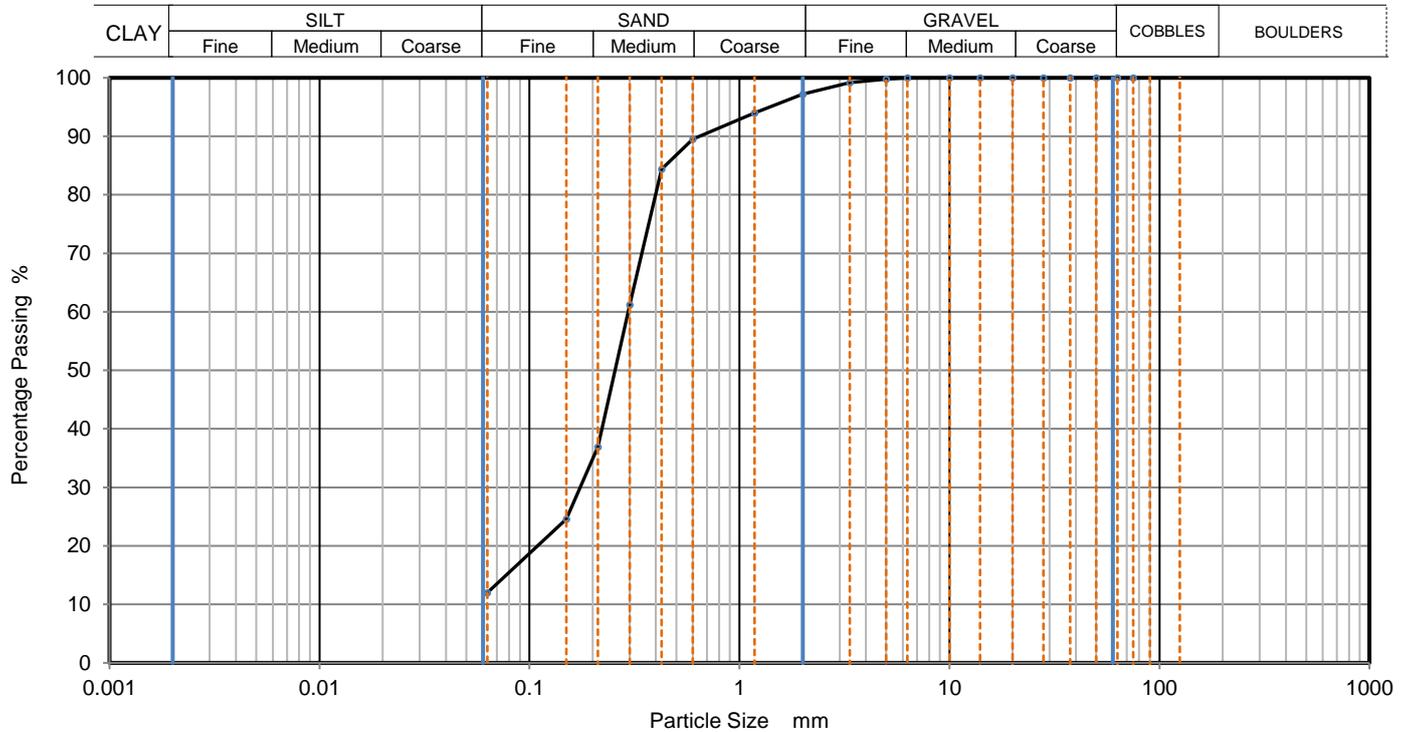
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PARTICLE SIZE DISTRIBUTION

Job Ref	2021T102
Borehole/Pit No.	RWI-BH017
Sample No.	
Depth, m	3.00
Sample Type	C
KeyLAB ID	IDL12022011224

Site Name	WSP Lot 1, Parteen Weir		
Soil Description	Light brown slightly gravelly silty medium SAND.		
Specimen Reference	Specimen Depth	3.0-3.5	m
Test Method	BS1377:Part 2:1990, clause 9.2		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	99		
2	97		
1.18	94		
0.6	90		
0.425	84		
0.3	61		
0.212	37		
0.15	25		
0.063	12		

Dry Mass of sample, g 766

Sample Proportions	% dry mass
Very coarse	0
Gravel	3
Sand	85
Fines <0.063mm	12

Grading Analysis		
D100	mm	
D60	mm	0.295
D30	mm	0.175
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

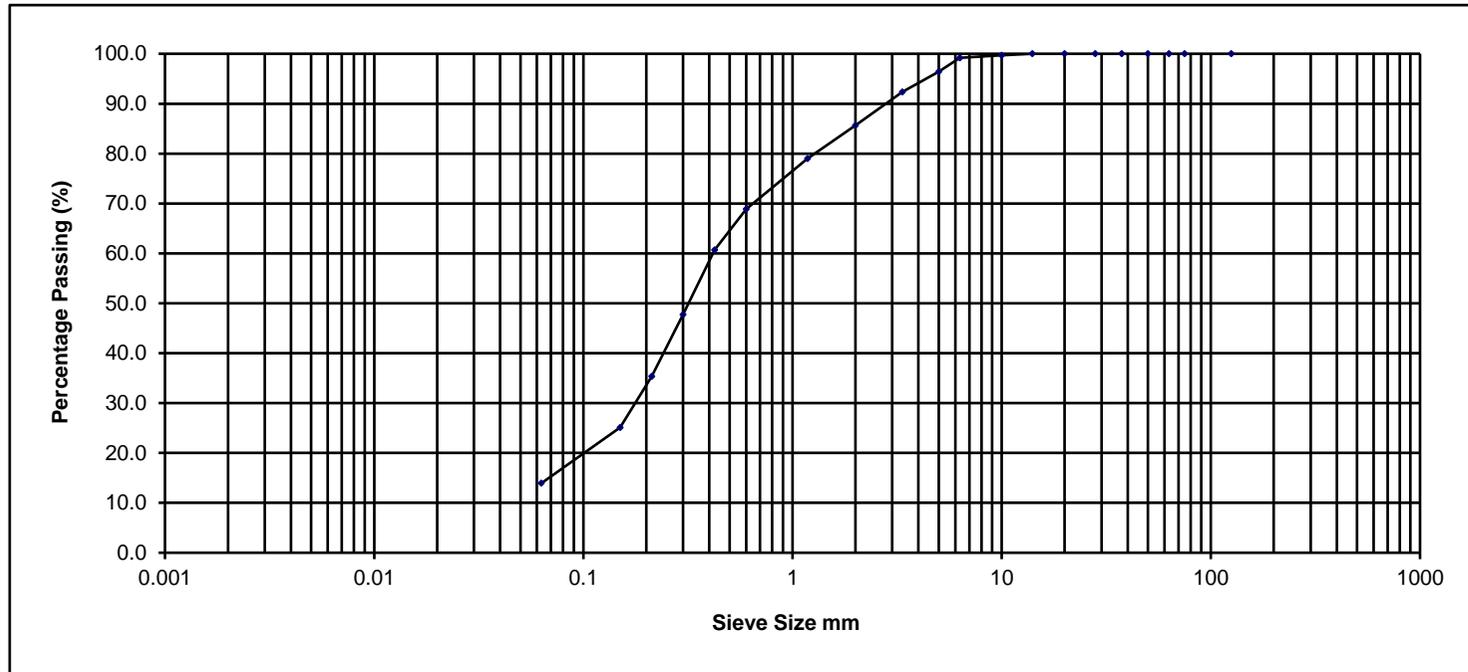
Remarks
Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	Approved	Sheet printed	1
		Dympna Darcy B.Sc.	10/05/2022 16:57	QC From No:R2

NMTL Ltd

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	100.0
37.500	100.0
28.000	100.0
20.000	100.0
14.000	100.0
10.000	99.7
6.300	99.2
5.000	96.4
3.350	92.3
2.000	85.6
1.180	79.0
0.600	68.9
0.425	60.7
0.300	47.7
0.212	35.3
0.150	25.1
0.063	13.9

Determination of Particle Size Distribution BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5



Percentage Particle Size

Clay	Fine			Coarse			Fine			Coarse			Cobbles	Boulder
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse					
	Silt			Sand			Gravel							
	13.9			71.7			14.4			0.0	0.0			

Sample Description Grey/brown silty gravelly fine to coarse SAND.

Project No. NMTL 3503

BH/TP No. RWI-BH007A

Project WSP Lot 1, Parteen Weir

IDL PROJECT ID:2021T102

Sample No. C

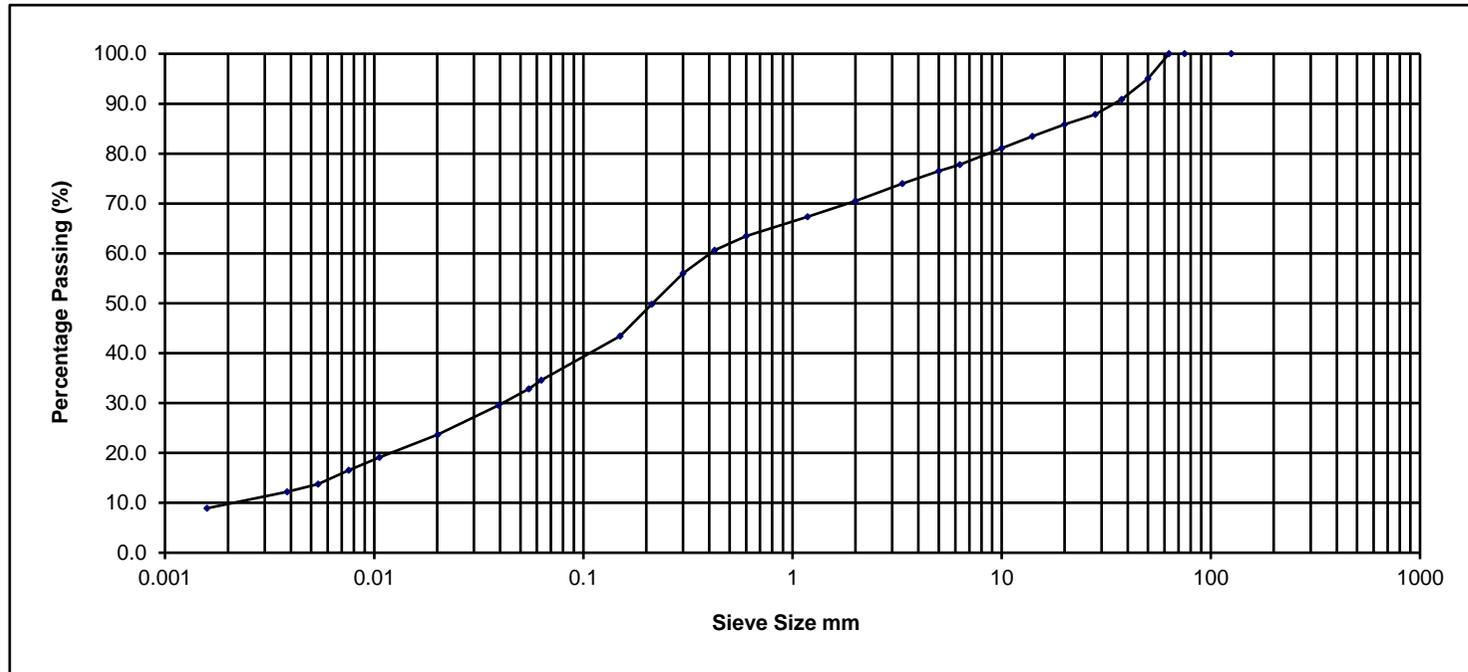
NMTL Ltd

Operator	Sb	Checked	Nc	Approved	Bc	Date sample tested	09/03/2022	Depth	0.0-1.50m
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NMTL Ltd

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	95.0
37.500	90.9
28.000	87.8
20.000	85.8
14.000	83.4
10.000	81.1
6.300	77.8
5.000	76.5
3.350	74.0
2.000	70.5
1.180	67.3
0.600	63.5
0.425	60.7
0.300	56.0
0.212	49.8
0.150	43.4
0.063	34.6
0.055	32.8
0.039	29.5
0.020	23.7
0.011	19.1
0.008	16.5
0.005	13.7
0.004	12.2
0.002	8.9

Determination of Particle Size Distribution BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5



Clay	Percentage Particle Size						Cobbles	Boulder
	Fine	Medium	Coarse	Fine	Medium	Coarse		
	Silt		Sand		Gravel			
8.9	25.7		35.9		29.5		0.0	0.0

Sample Description Red/brown slightly gravelly sandy silty CLAY

Project No. NMTL 3503

BH/TP No. RWI-BH008

Project WSP Lot 1, Parteen Weir

IDL PROJECT ID:2021T102

Sample No. C

NM
TL
Ltd

Operator	Sb	Checked	Nc	Approved	Bc	Date sample tested	10/03/2022	Depth	5.0-5.60m
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NMTL Ltd

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	93.3
50.000	86.2
37.500	80.3
28.000	76.3
20.000	72.1
14.000	70.2
10.000	66.7
6.300	61.7
5.000	59.4
3.350	57.2
2.000	53.9
1.180	50.9
0.600	47.8
0.425	45.7
0.300	42.5
0.212	38.2
0.150	33.9
0.063	27.8
0.055	26.3
0.039	23.4
0.020	19.4
0.011	15.7
0.008	13.0
0.005	11.1
0.004	9.6
0.002	6.9

Determination of Particle Size Distribution BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5



Clay	Percentage Particle Size						Cobbles	Boulder
	Fine	Medium	Coarse	Fine	Medium	Coarse		
	Silt		Sand		Gravel			
6.9	20.9		26.1		39.4		6.7	0.0

Sample Description Brown slightly sandy gravelly silty CLAY

Project No. NMTL 3503

BH/TP No. RWI-BH010

Project WSP Lot 1, Parteen Weir

IDL PROJECT ID:2021T102

Sample No. C

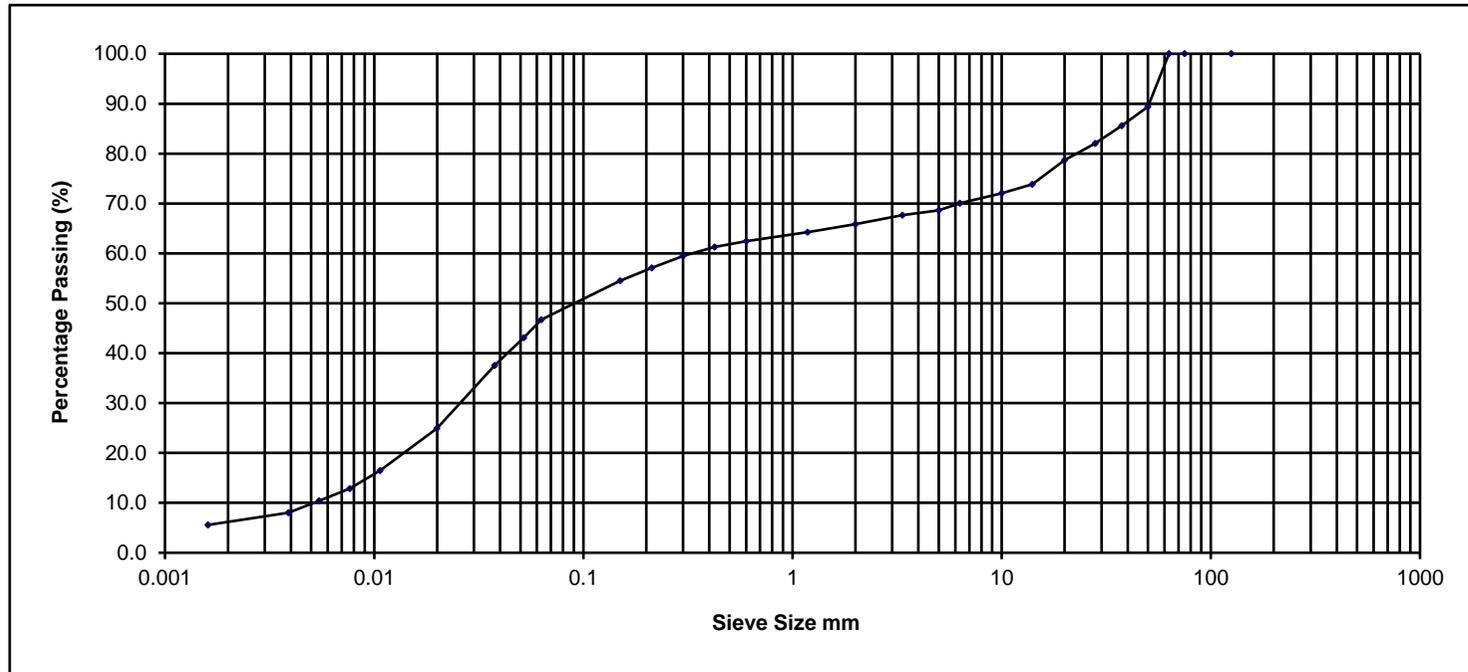
NM
TL
Ltd

Operator	Sb	Checked	Nc	Approved	Bc	Date sample tested	14/03/2022	Depth	4.00-5.00m
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NMTL Ltd

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	89.4
37.500	85.6
28.000	82.0
20.000	78.7
14.000	73.8
10.000	72.1
6.300	70.0
5.000	68.6
3.350	67.6
2.000	65.8
1.180	64.3
0.600	62.5
0.425	61.3
0.300	59.4
0.212	57.1
0.150	54.5
0.063	46.7
0.052	43.1
0.038	37.5
0.020	24.9
0.011	16.5
0.008	12.8
0.005	10.4
0.004	8.0
0.002	5.6

Determination of Particle Size Distribution BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5



Percentage Particle Size

Clay	Silt			Sand			Gravel			Cobbles	Boulder
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse		
5.6	41.2			19.1			34.2			0.0	0.0

Sample Description Brown slightly sandy slightly gravelly clayey SILT.

Project No. NMTL 3503

BH/TP No. RWI-BH010

Project WSP Lot 1, Parteen Weir

IDL PROJECT ID:2021T102

Sample No. C

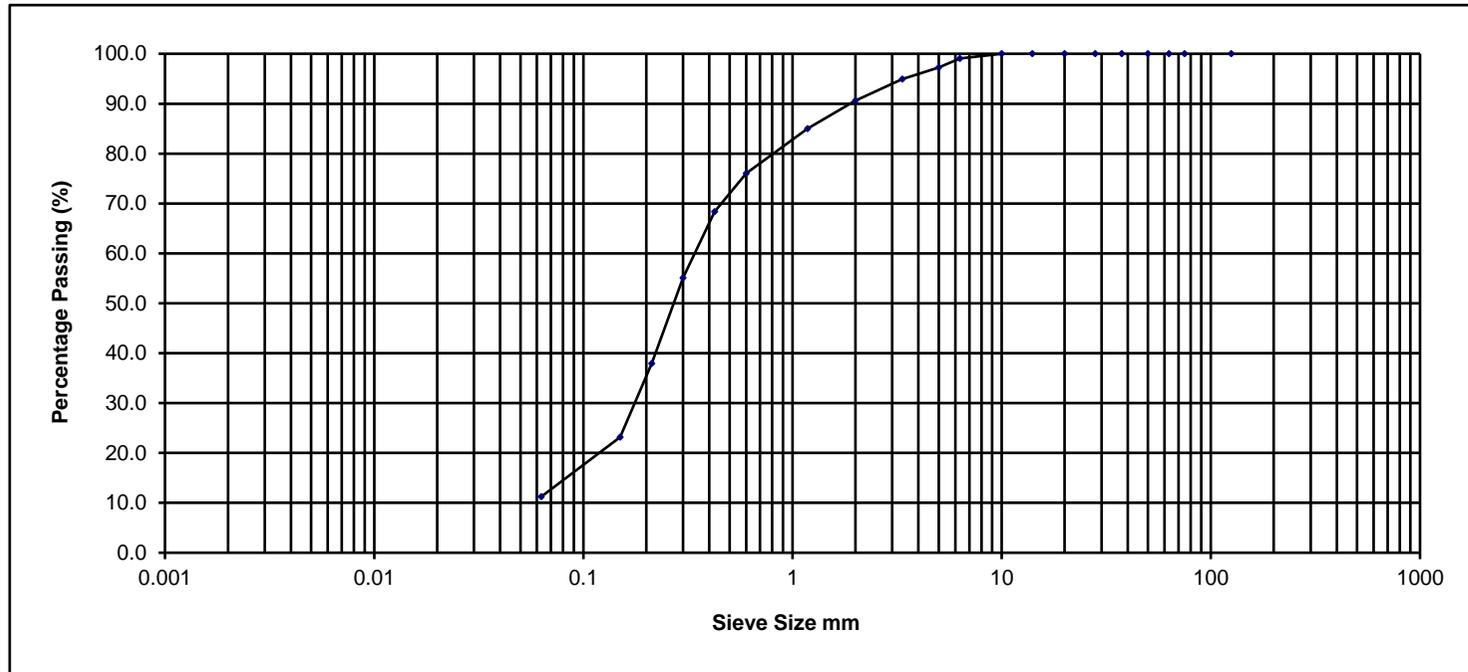
NM
TL
Ltd

Operator	Sb	Checked	Nc	Approved	Bc	Date sample tested	15/03/2022	Depth	8.00-9.50m
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NMTL Ltd

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	100.0
37.500	100.0
28.000	100.0
20.000	100.0
14.000	100.0
10.000	100.0
6.300	99.1
5.000	97.3
3.350	94.9
2.000	90.6
1.180	85.0
0.600	76.1
0.425	68.4
0.300	55.1
0.212	38.0
0.150	23.2
0.063	11.2

Determination of Particle Size Distribution BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5



Percentage Particle Size

Clay	Fine			Medium			Coarse			Cobbles	Boulder
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse		
	Silt			Sand			Gravel				
	11.2			79.4			9.4			0.0	0.0

Sample Description Grey gravelly silty fine to coarse SAND.

Project No. NMTL 3503

BH/TP No. RWI-BH013

Project WSP Lot 1, Parteen Weir

IDL PROJECT ID:2021T102

Sample No. C

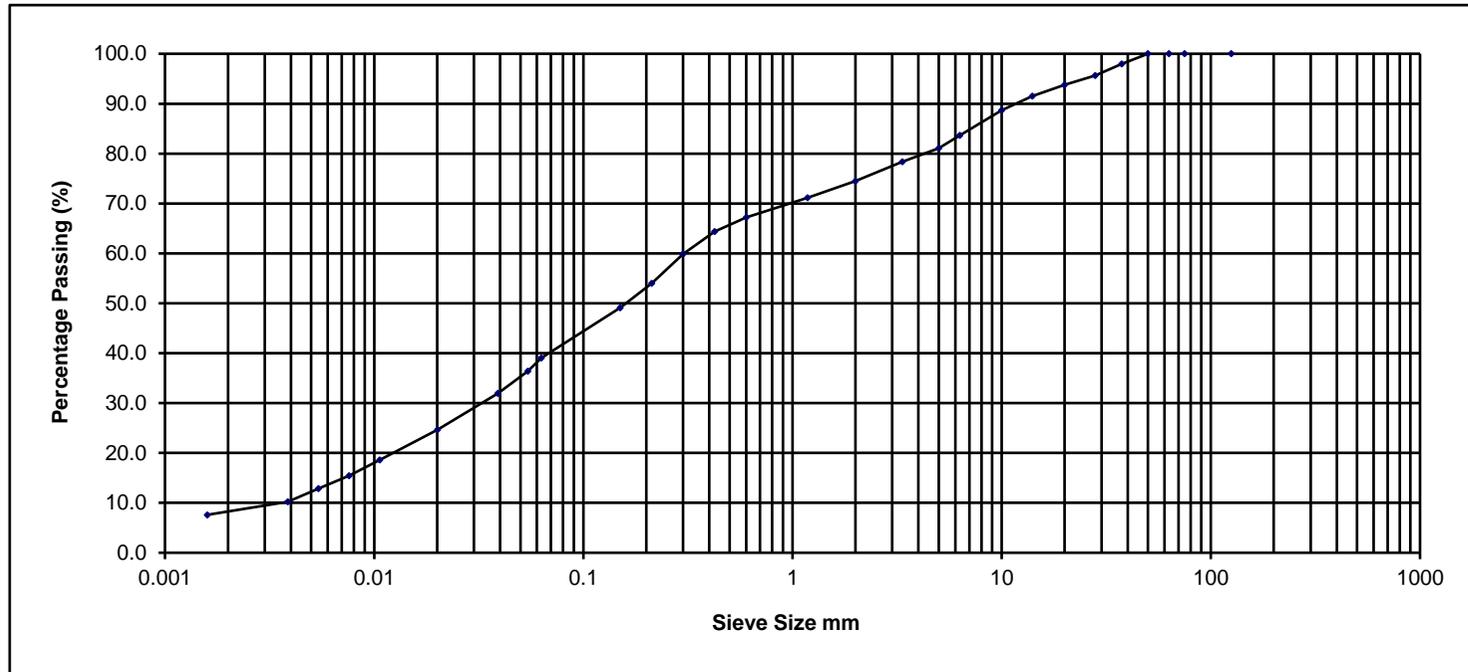
NM
TL
Ltd

Operator	Sb	Checked	Nc	Approved	Bc	Date sample tested	11/03/2022	Depth	0.0-1.50m
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NMTL Ltd

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	100.0
37.500	98.0
28.000	95.7
20.000	93.7
14.000	91.5
10.000	88.7
6.300	83.6
5.000	81.1
3.350	78.4
2.000	74.5
1.180	71.1
0.600	67.2
0.425	64.4
0.300	59.9
0.212	54.0
0.150	49.1
0.063	39.0
0.054	36.4
0.039	32.0
0.020	24.6
0.011	18.6
0.008	15.5
0.005	12.8
0.004	10.2
0.002	7.6

Determination of Particle Size Distribution BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5



Clay	Percentage Particle Size						Cobbles	Boulder
	Fine	Medium	Coarse	Fine	Medium	Coarse		
	Silt		Sand		Gravel			
7.6	31.4		35.5		25.5		0.0	0.0

Sample Description Brown slightly gravelly sandy clayey SILT.

Project No. NMTL 3503

BH/TP No. RWI-BH013

Project WSP Lot 1, Parteen Weir

IDL PROJECT ID:2021T102

Sample No. C

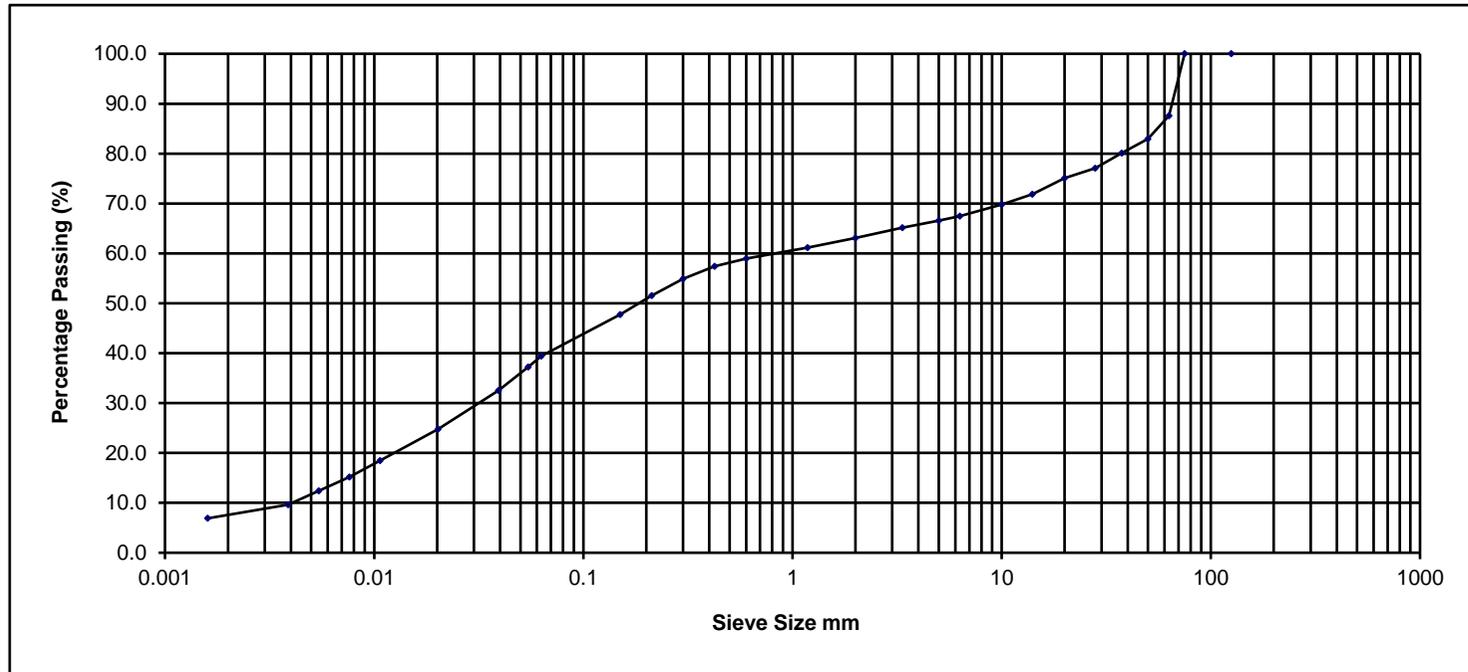
NM
TL
Ltd

Operator	Sb	Checked	Nc	Approved	Bc	Date sample tested	15/03/2022	Depth	6.50-8.00m
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NMTL Ltd

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	87.6
50.000	83.0
37.500	80.1
28.000	77.1
20.000	75.0
14.000	71.8
10.000	69.8
6.300	67.5
5.000	66.6
3.350	65.1
2.000	63.1
1.180	61.2
0.600	59.0
0.425	57.4
0.300	54.9
0.212	51.6
0.150	47.7
0.063	39.4
0.054	37.2
0.039	32.5
0.020	24.8
0.011	18.5
0.008	15.2
0.005	12.4
0.004	9.6
0.002	6.9

Determination of Particle Size Distribution BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5



Percentage Particle Size

Clay	Fine			Medium			Coarse			Cobbles	Boulder
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse		
6.9	Silt			Sand			Gravel			12.4	0.0

Sample Description Brown slightly sandy slightly gravelly clayey SILT.

Project No. NMTL 3503

BH/TP No. RWI-BH014

Project WSP Lot 1, Parteen Weir

IDL PROJECT ID:2021T102

Sample No. C

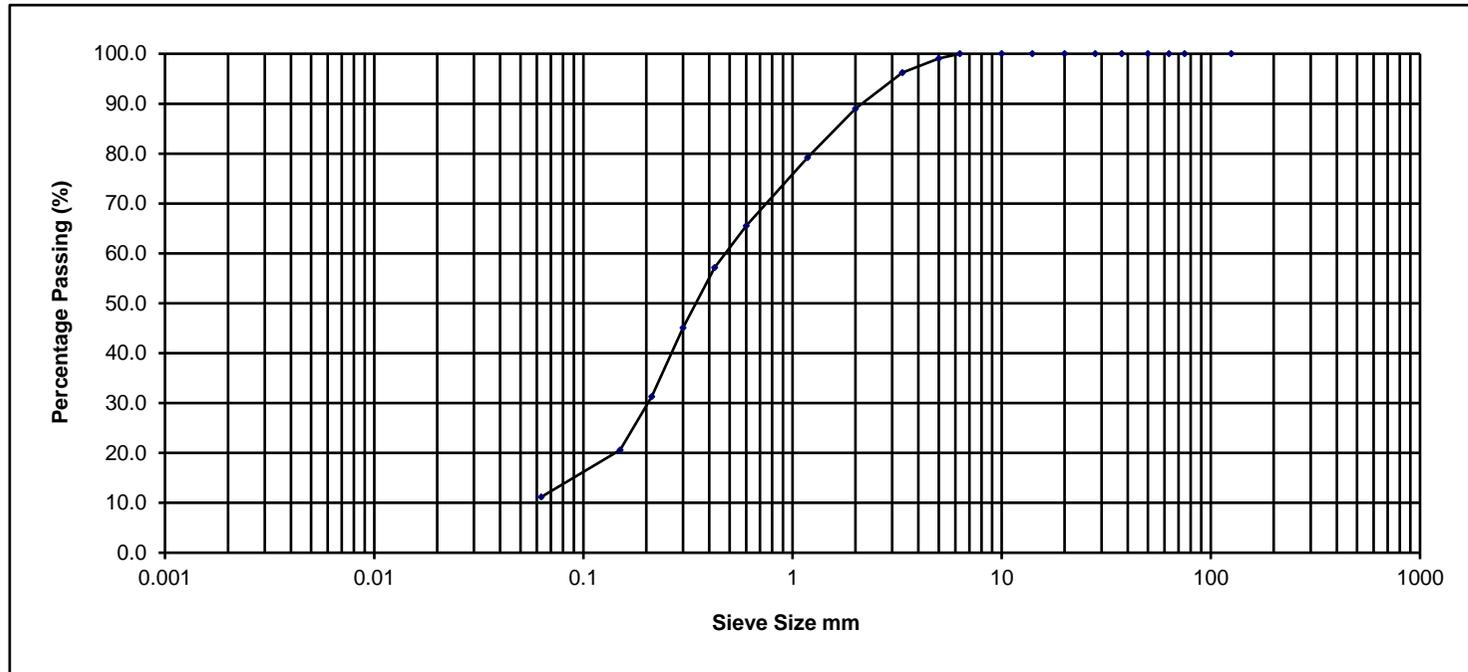
NM
TL
Ltd

Operator	Sb	Checked	Nc	Approved	Bc	Date sample tested	15/03/2022	Depth	11.00-12.50m
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NMTL Ltd

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	100.0
37.500	100.0
28.000	100.0
20.000	100.0
14.000	100.0
10.000	100.0
6.300	100.0
5.000	99.0
3.350	96.2
2.000	89.0
1.180	79.2
0.600	65.6
0.425	57.2
0.300	45.1
0.212	31.3
0.150	20.6
0.063	11.2

Determination of Particle Size Distribution BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5



Percentage Particle Size

Clay	Fine			Coarse			Fine			Coarse			Cobbles	Boulder
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse					
	Silt			Sand			Gravel							
	11.2			77.8			11.0			0.0	0.0			

Sample Description Grey gravelly silty fine to coarse SAND.

Project No. NMTL 3503

BH/TP No. RWI-BH015

Project WSP Lot 1, Parteen Weir

IDL PROJECT ID:2021T102

Sample No. C

NMTL Ltd

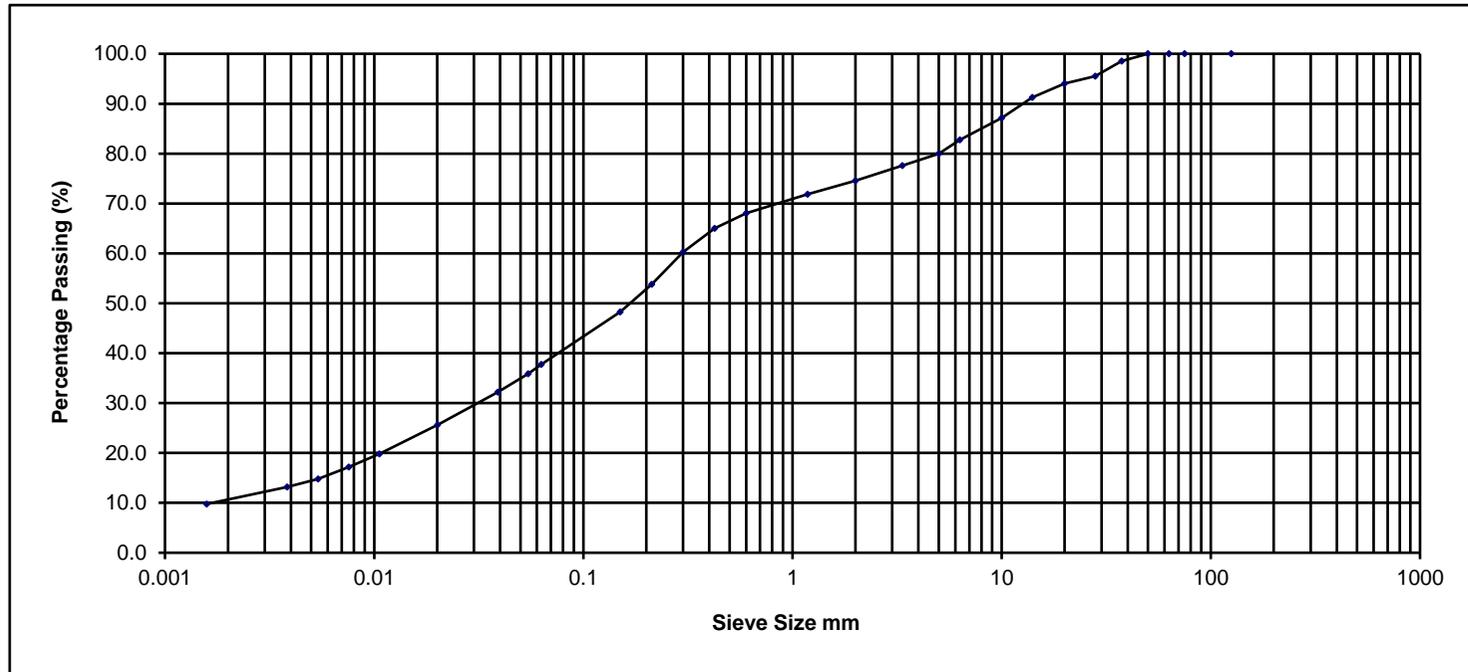
Operator	Sb	Checked	Nc	Approved	Bc	Date sample tested	09/03/2022	Depth	2.0-2.60m
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NMTL Ltd

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	100.0
37.500	98.5
28.000	95.5
20.000	94.0
14.000	91.2
10.000	87.1
6.300	82.7
5.000	80.0
3.350	77.6
2.000	74.6
1.180	71.8
0.600	68.1
0.425	65.0
0.300	60.2
0.212	53.8
0.150	48.2
0.063	37.7
0.054	35.9
0.039	32.2
0.020	25.6
0.011	19.8
0.008	17.1
0.005	14.8
0.004	13.2
0.002	9.8

NM
TL
Ltd

Determination of Particle Size Distribution BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5



Clay	Percentage Particle Size						Cobbles	Boulder
	Fine	Medium	Coarse	Fine	Medium	Coarse		
	Silt		Sand		Gravel			
9.8	28.0		36.8		25.4		0.0	0.0

Sample Description Red/brown slightly gravelly sandy silty CLAY.

Project No. NMTL 3503

BH/TP No. RWI-BH015

Project WSP Lot 1, Parteen Weir

IDL PROJECT ID:2021T102

Sample No. C

Operator Sb

Checked Nc

Approved Bc

Date sample tested

09/03/2022

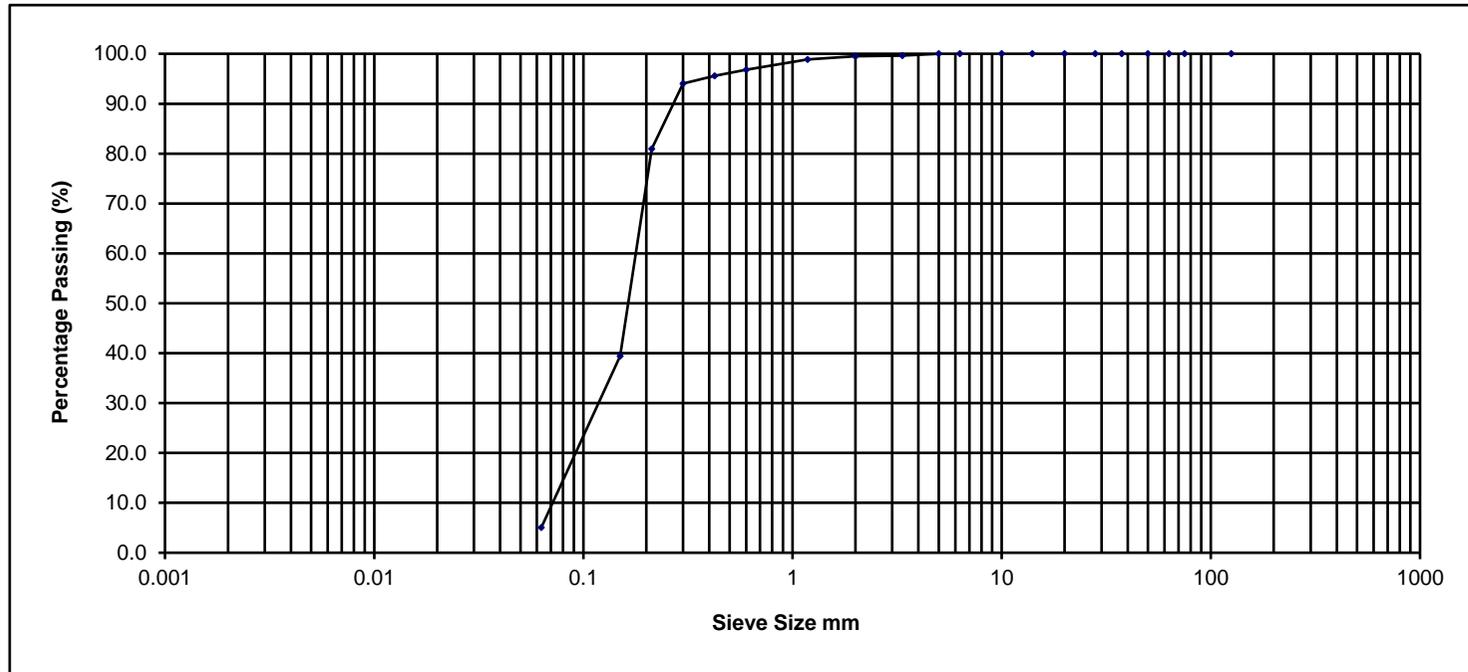
Depth

5.00-6.50m

NMTL Ltd

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	100.0
37.500	100.0
28.000	100.0
20.000	100.0
14.000	100.0
10.000	100.0
6.300	100.0
5.000	100.0
3.350	99.6
2.000	99.5
1.180	98.9
0.600	96.8
0.425	95.6
0.300	94.0
0.212	80.9
0.150	39.4
0.063	5.1

Determination of Particle Size Distribution BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5



Percentage Particle Size

Clay	Fine			Medium			Coarse			Cobbles	Boulder
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse		
	Silt			Sand			Gravel				
	5.1			94.5			0.5			0.0	0.0

Sample Description Grey/brown silty fine to coarse SAND.

Project No. NMTL 3503

BH/TP No. RWI-BH016

Project WSP Lot 1, Parteen Weir

IDL PROJECT ID:2021T102

Sample No. C

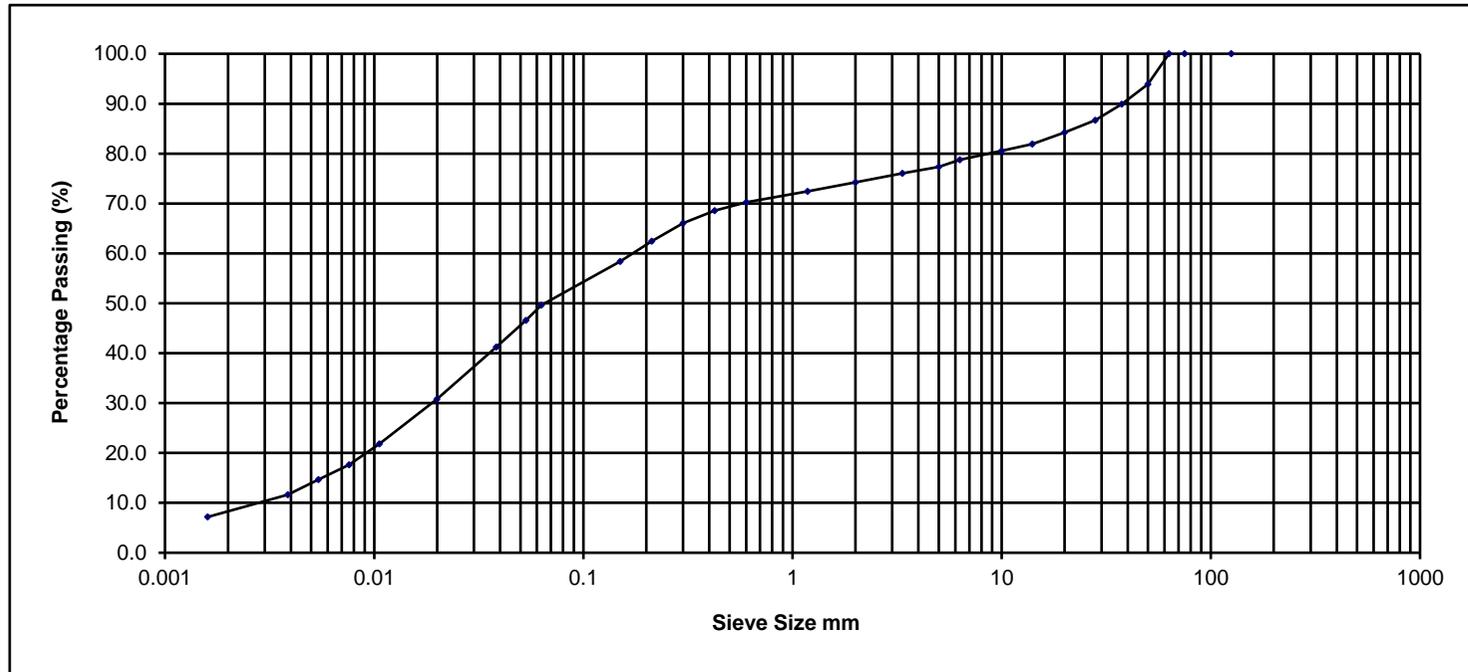
NMTL Ltd

Operator	Sb	Checked	Nc	Approved	Bc	Date sample tested	16/03/2022	Depth	9.50-11.00m
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NMTL Ltd

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	93.9
37.500	89.9
28.000	86.7
20.000	84.2
14.000	81.9
10.000	80.5
6.300	78.8
5.000	77.3
3.350	76.1
2.000	74.2
1.180	72.5
0.600	70.3
0.425	68.6
0.300	66.0
0.212	62.4
0.150	58.4
0.063	49.6
0.053	46.6
0.038	41.2
0.020	30.8
0.011	21.8
0.008	17.6
0.005	14.6
0.004	11.6
0.002	7.2

Determination of Particle Size Distribution BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5



Percentage Particle Size

Clay	Fine			Medium			Coarse			Cobbles	Boulder
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse		
7.2	Silt			Sand			Gravel			0.0	0.0
	42.4			24.6			25.8				

Sample Description Light brown slightly sandy slightly gravelly clayey SILT.

Project No. NMTL 3503

BH/TP No. RWI-BH016

Project WSP Lot 1, Parteen Weir

IDL PROJECT ID:2021T102

Sample No. C

NM
TL
Ltd

Operator	Sb	Checked	Nc	Approved	Bc	Date sample tested	09/03/2022	Depth	12.50-14.00m
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NMTL Ltd

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	93.7
50.000	90.4
37.500	88.0
28.000	85.9
20.000	83.4
14.000	82.0
10.000	79.5
6.300	76.0
5.000	74.9
3.350	72.7
2.000	69.5
1.180	66.6
0.600	63.2
0.425	60.4
0.300	55.9
0.212	49.7
0.150	44.3
0.063	34.0
0.054	32.3
0.038	29.3
0.020	24.8
0.010	20.8
0.007	17.8
0.005	15.4
0.004	13.3
0.002	9.0

Determination of Particle Size Distribution BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5



Clay	Percentage Particle Size						Cobbles	Boulder
	Fine	Medium	Coarse	Fine	Medium	Coarse		
	Silt		Sand		Gravel			
9.0	25.0		35.4		24.2		6.3	0.0

Sample Description Red/brown slightly gravelly sandy silty CLAY.

Project No. NMTL 3503

BH/TP No. RWI-BH017

Project WSP Lot 1, Parteen Weir

IDL PROJECT ID:2021T102

Sample No. C

NM
TL
Ltd

Operator	Sb	Checked	Nc	Approved	Bc	Date sample tested	16/03/2022	Depth	6.50-8.00m
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IDL	Moisture Condition Value / Moisture Content Relationship			Job Ref	2021T102
				Borehole/Pit No.	RWI-BH007A
Site Name	WSP Lot 1, Parteen Weir			Sample No.	
Soil Description	Brown slightly gravelly slightly sandy SILT.			Depth	8
Specimen Reference		Specimen Depth	9.0-9.5 m	Sample Type	C
Specimen Description				KeyLAB ID	IDL12022012548
Test Method	BS1377:Part4:1990:clause 5.5			Date started	25/07/2022

Sample preparation

Amount of material larger than 20mm sieve removed 13 %

Natural Moisture Content of sample 8.9 %

Initial Moisture Content of test sample below 20mm 8.9 %

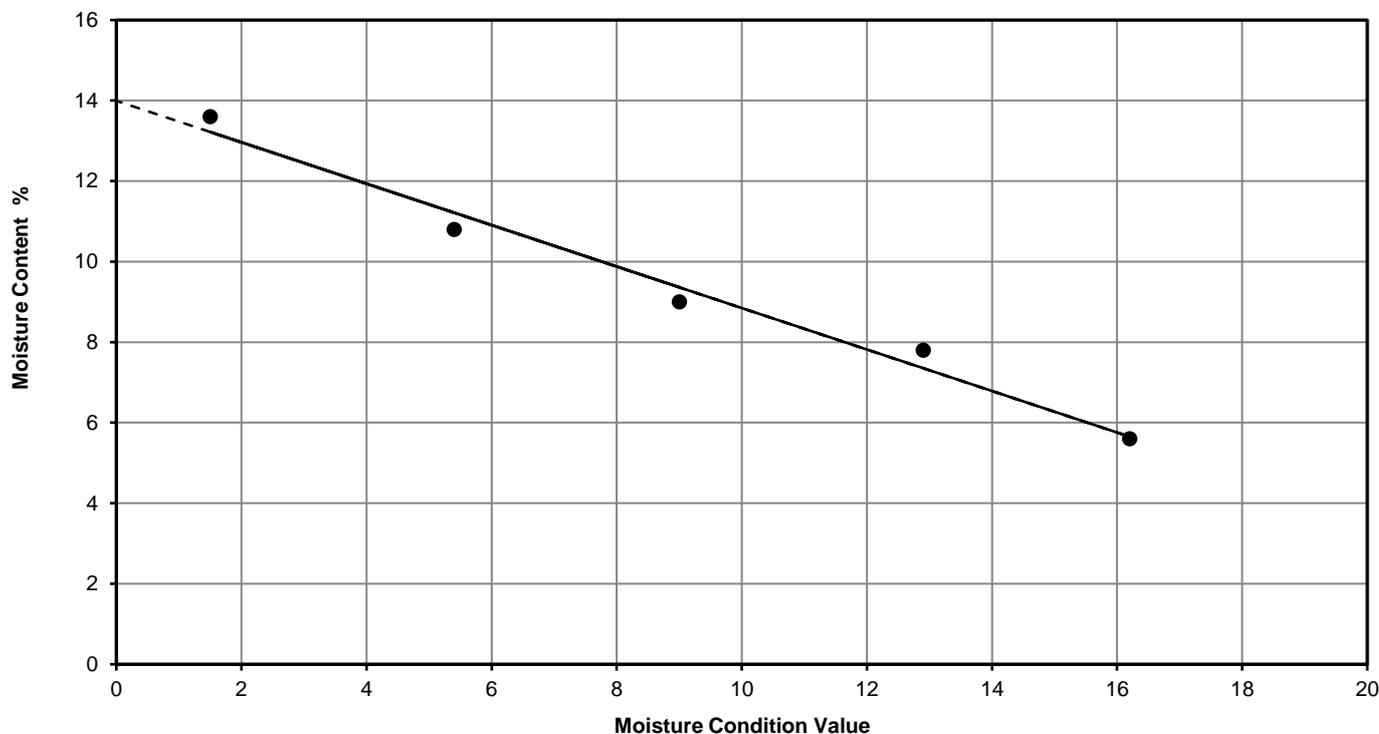
Single sample tested

General remarks Sample had dried somewhat - 5 point MCV gives range of values.

Table of results

MCV Test Number	1	2	3	4	5
Moisture Content, %	9.0	10.8	13.6	7.8	5.6
Moisture Condition Value	9.0	5.4	1.5	12.9	16.2
MCV report	9	5.4	1.5	12.9	16.2
Effective / Valid data point	YES	YES	YES	YES	YES
Method of Interpretation	Best fit				
Specimen remarks					

● valid points × invalid points - - - - extended regression — linear regression



Tested	Checked	Approved
PM	DCD	DCD <i>DCD</i>

Lab Sheet Reference : QC Form R7

IDL	Moisture Condition Value at natural moisture content		Job Ref	2021T102	
			Borehole/Pit No.	RWI-BH008	
Site Name	WSP Lot 1, Parteen Weir		Sample No.		
Soil Description			Depth	5.6	
Specimen Reference	1	Specimen Depth	m	Sample Type	C
Specimen Description	Brown slightly sandy gravelly SILT.		KeyLAB ID	IDL1202112166	
Test Method	BS1377:Part4:1990:clause 5.4		Date started	23/03/2022	

Preparation

Initial mass of sample g
 Mass retained on 20mm sieve g %

Equipment MCV test Number 1
 MCV Apparatus No.
 Vernier No.
 Mass of rammer 7.0 kg
 Drop height 250 mm
 Mould No. / diameter 100 mm

Wet Mass of test specimen 1500 g

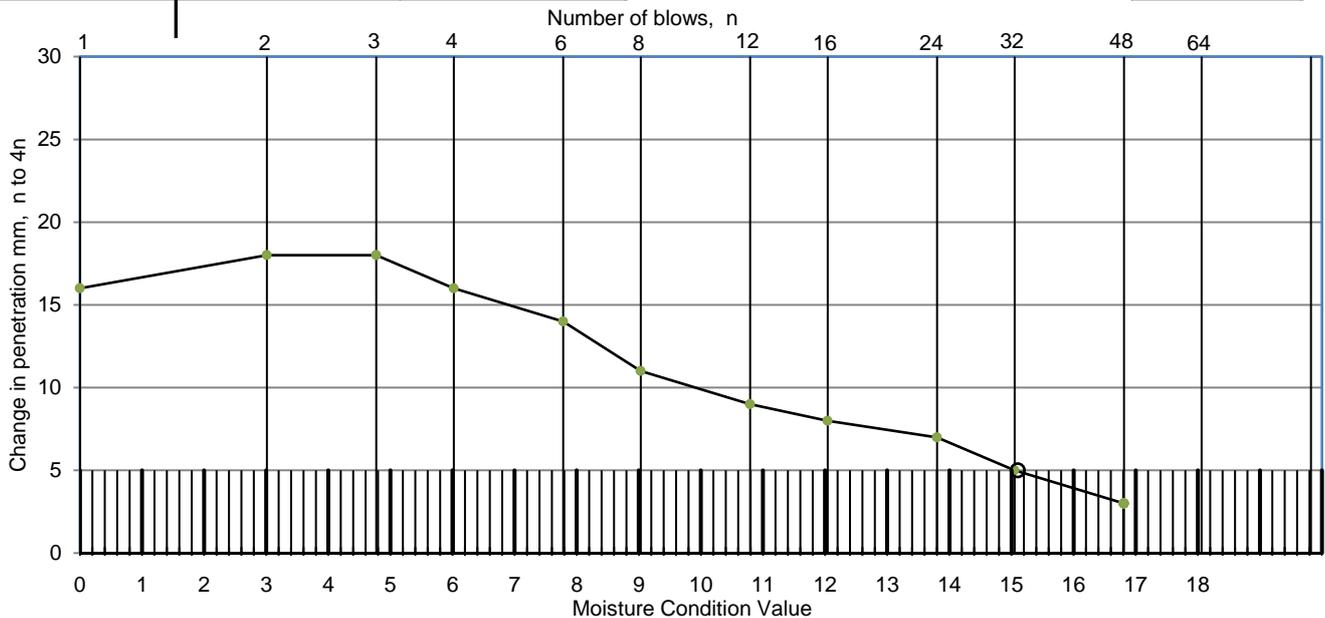
Moisture Content test

Balance No.
 Oven No. Temperature °C
 Container Number
 Mass of container 27.3 g
 Mass of Container and wet soil 116.7 g
 Mass of container and dry soil (1) 112.7 g
 Mass of container and dry soil (2) g
 Moisture Content 4.7 %

Method of interpretation Steepest line
 Best fit

Moisture Condition Value, MCV **15.1**

Number of blows	Penetration or Protrusion mm	Change in Penetration n to 4n
1	-66.0	16.0
2	-74.0	18.0
3	-78.0	18.0
4	-82.0	16.0
6	-87.0	14.0
8	-92.0	11.0
12	-96.0	9.0
16	-98.0	8.0
24	-101.0	7.0
32	-103.0	5.0
48	-105.0	3.0
64	-106.0	
96	-108.0	
128	-108.0	
192	-108.0	
256		



Remarks

Tested	Checked	Approved
Administrator	Administrator	Administrator

BCS

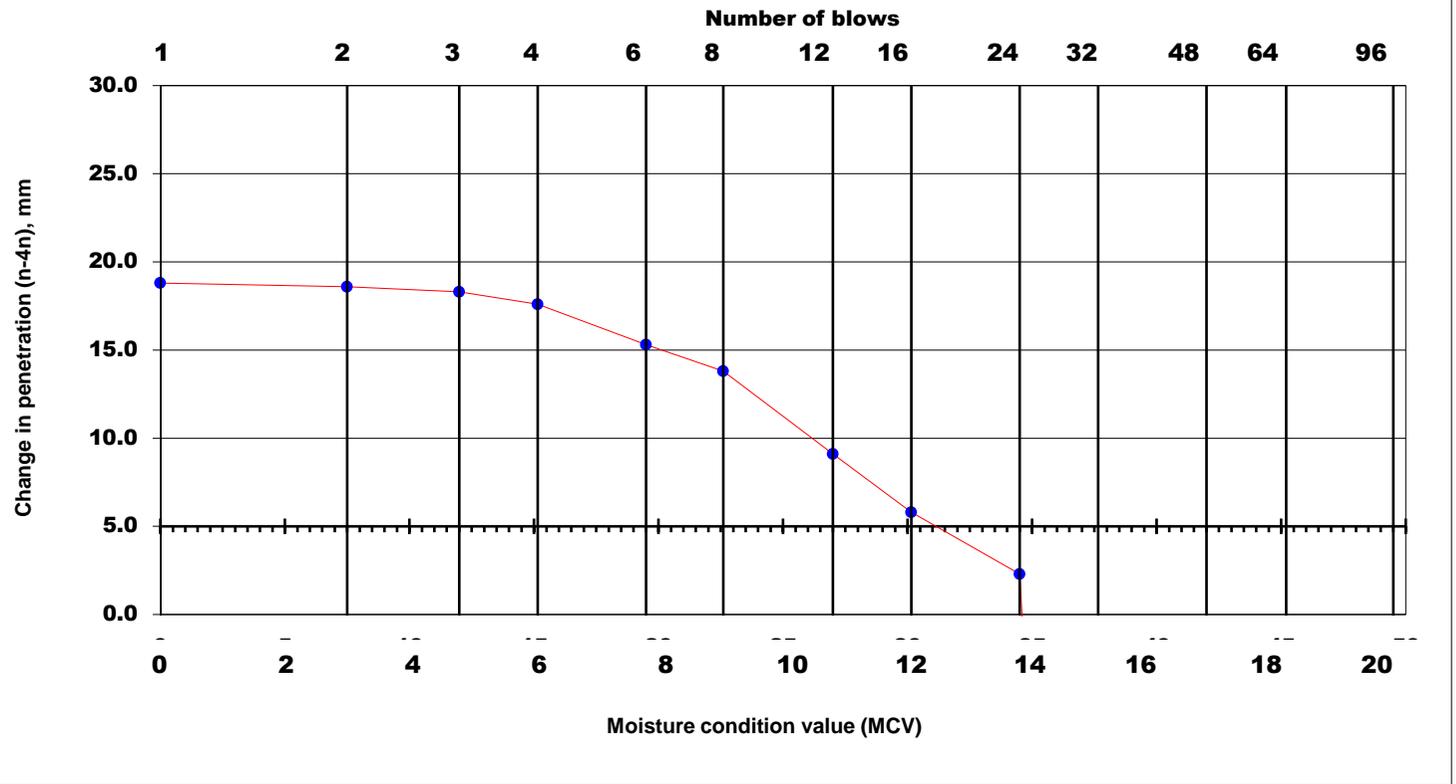
SINGLE POINT MOISTURE CONDITION VALUE TEST

Single sample mass	
Initial sample mass	1560 g
Moisture content	7.5 %
Dry mass	1451.5 g
Mass retained on 20mm sieve	g 18.5 %

Project Name: WSP Lot 1, Parteen Weir	Job ref.	NMTL_3503
	BH/TP	RW1-BH017
Soil description: Red/brown slightly sandy slightly gravelly SILT/CLAY	IDL Project ID	2021T102
	Sample no.	C
Test method BS 1377 : Part 4 : 1990 : 5	Depth	8.50-9.00m
	Date Tested	16/03/2022
	Date Sampled	20/12/2021
	Date Received	04/03/2022

MCV 12.5 Natural

Total number of blows n	Penetration or protrusion mm	Change in penetration n to 4n mm
1	75.9	18.8
2	66.8	18.6
3	61.3	18.3
4	57.1	17.6
6	51.2	15.3
8	48.2	13.8
12	43.0	9.1
16	39.5	5.8
24	35.9	2.3
32	34.4	-78.0
48	33.9	-78.6
64	33.7	
96	33.6	
128	112.4	
192	112.5	
256		

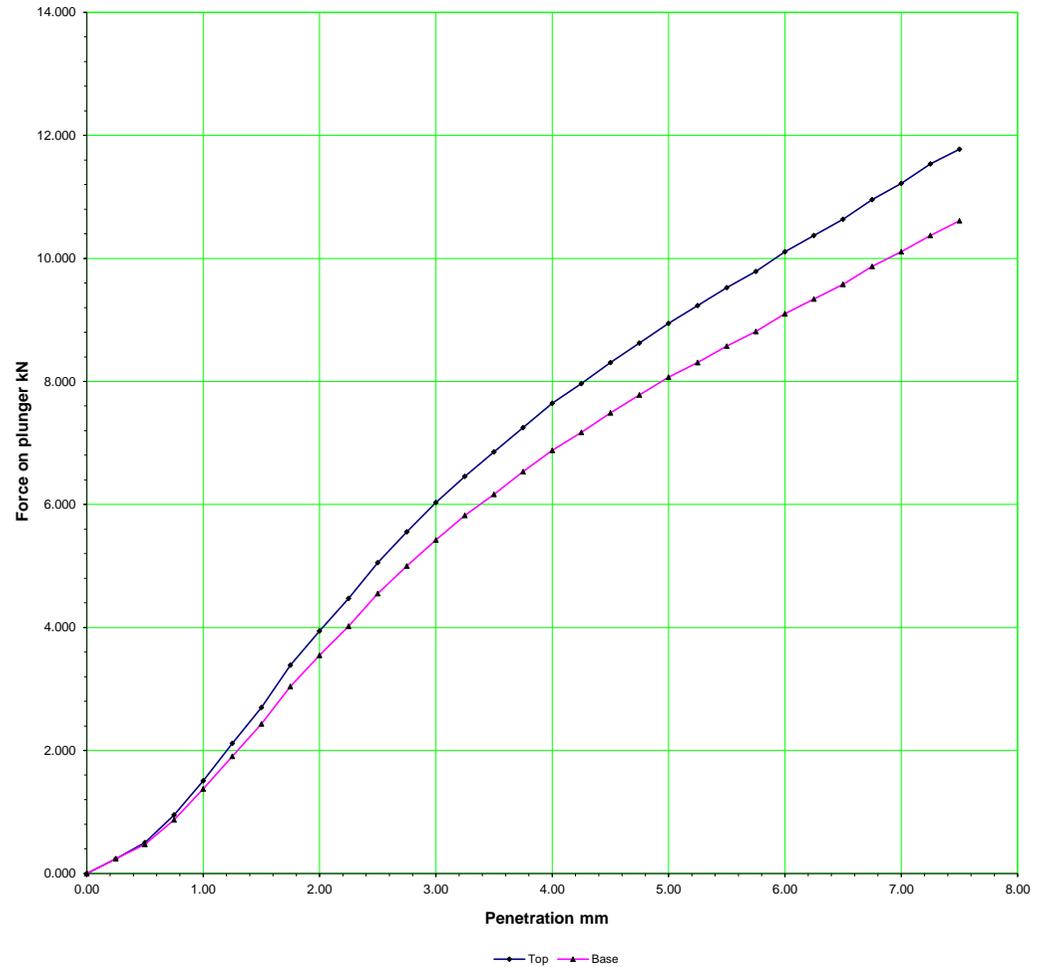


NMTL Ltd

Operator	Checked	Approved
Ms	Nc	Bc

DETERMINATION OF THE CALIFORNIA BEARING RATIO TEST
BS 1377 : PART 4 : CLAUSE 7 : 1990

Soil Description	Red/brown slightly sandy slightly gravelly SILT/CLAY				Date	16-Mar-22	
Test Method	BS 1377: Part 4 : 1990 :7.4				Test 1		
Force Measuring Device	S86-010304				Mean Calibration	26.46 N/Div	
Preparatic	Remoulded with 2.5 kg rammer at natural moisture content				Force on	26.46 N/Div	
Surcharge	10 kPa		Mean Calibration		26.46 N/Div		
Penetration	Force Gauge		Force on		California Bearing Ratio Results		
of plunger	reading		plunger		% %		
mm	divisions		kN				
	Top	Bottom	Top	Bottom	Top	Base	
0.00	0.0	0.0	0.000	0.000			
0.25	9.0	9.0	0.238	0.238			
0.50	19.0	18.0	0.503	0.476			
0.75	36.0	33.0	0.953	0.873			
1.00	57.0	52.0	1.508	1.376			
1.25	80.0	72.0	2.117	1.905			
1.50	102.0	92.0	2.699	2.434			
1.75	128.0	115.0	3.387	3.043			
2.00	149.0	134.0	3.943	3.546			
2.25	169.0	152.0	4.472	4.022			
2.50	191.0	172.0	5.054	4.551	38.29	34.48	
2.75	210.0	189.0	5.557	5.001			
3.00	228.0	205.0	6.033	5.424			
3.25	244.0	220.0	6.456	5.821			
3.50	259.0	233.0	6.853	6.165			
3.75	274.0	247.0	7.250	6.536			
4.00	289.0	260.0	7.647	6.880			
4.25	301.0	271.0	7.964	7.171			
4.50	314.0	283.0	8.308	7.488			
4.75	326.0	294.0	8.626	7.779			
5.00	338.0	305.0	8.943	8.070	44.72	40.35	
5.25	349.0	314.0	9.235	8.308			
5.50	360.0	324.0	9.526	8.573			
5.75	370.0	333.0	9.790	8.811			
6.00	382.0	344.0	10.108	9.102			
6.25	392.0	353.0	10.372	9.340			
6.50	402.0	362.0	10.637	9.579			
6.75	414.0	373.0	10.954	9.870			
7.00	424.0	382.0	11.219	10.108			
7.25	436.0	392.0	11.537	10.372			
7.50	445.0	401.0	11.775	10.610			
Moisture content after test		Top	Middle	Base	Specimen wt g	5126	
Container No.		Tray	Tray	Tray	Diameter mm	152	
Mass of wet soil + container	g	870.00	639.00	1069.00	Length mm	127.0	
Mass of dry soil + container	g	820.28	607.70	1004.80			
Weight of container	g	145.00	190.00	143.00			
Mass of moisture	g	49.72	31.30	64.20	Average MC %	7.44	
Dry weight	g	675.28	417.70	861.80	Density Mg/m3	2.22	
Moisture content	%	7.36	7.49	7.45	Dry Density Mg/m3	2.07	



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Project: WSP Lot 1, Parteen Weir

	Date	Project No.	NMTL3503
Operator	Tch 16-Mar-22	BH/TP	RW1-BH017
Checked	Nc	Sample No.	C
Approved	Bc	Depth	6.50-8.00m

Oedometer Settlement Tests

Test Method: BS1377 : Part 5 : 1990 Clause 3

Sample Details

Soil description:	Red/brown slightly sandy slightly gravelly SILT/CLAY	
Initial height (mm)		20.0
Diameter (mm)		50
Initial wet weight of specimen (gms)		86.69
Bulk density (Mg/m3)		2.21
Particle density	(Assumed)	2.70

Initial conditions

Settlement Channel		1109
Moisture content (%)		9.78
Dry density (Mg/m3)		2.01
Initial Voids Ratio		0.3428
Deg of Saturation (%)		77.0
Swelling pressure (kPa)		n/a

Final conditions

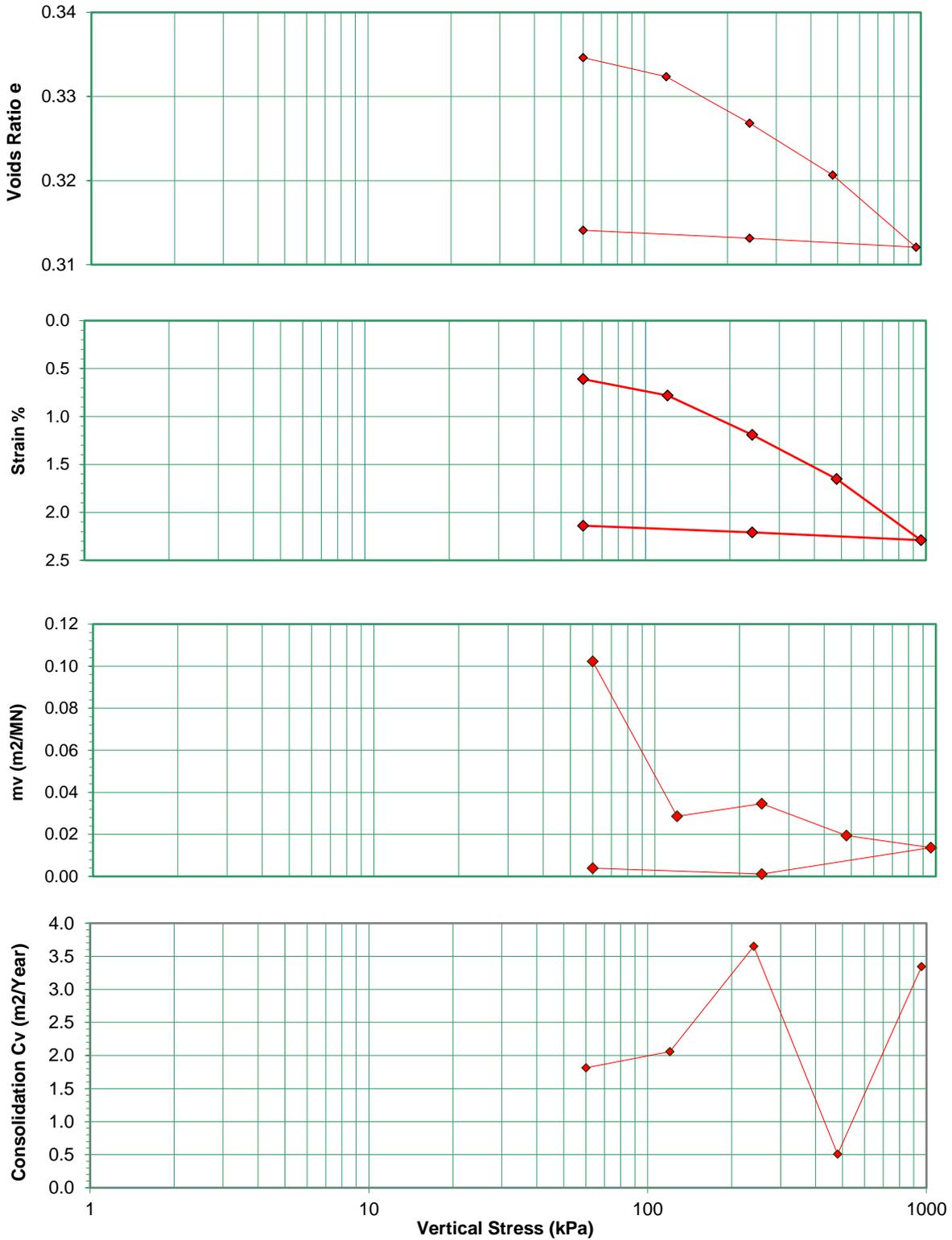
Moisture Content (%)		10.9
Dry Density (Mg/m3)		2.06
Final voids ratio		0.3121
Final degree of saturation (%)		94.5
Final settlement		0.458

Notes: **1) Log time method used for t50 time**
 2) Tested at 20°C

NM TL Ltd Standard	Project	Job No. NMTL-3503
		Borehole No. RWI-BH007A
	WSP Lot 1, Parteen Weir	Sample No. C
		Depth m. 5.0-6.50m

Oedometer settlement Tests

Test Method: BS 1377 : Part 5: 1990 Clause 3



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Project
WSP Lot 1, Parteen Weir

Job No. NMTL-3503
Borehole No. RWI-BH007A
Sample No. C
Depth m. 5.0-6.50m

Oedometer Test

Test Method: BS 1377 : Part 5 1990 Clause 3

Sample Details

Description: Red/brown slightly sandy slightly gravelly SILT/CLAY

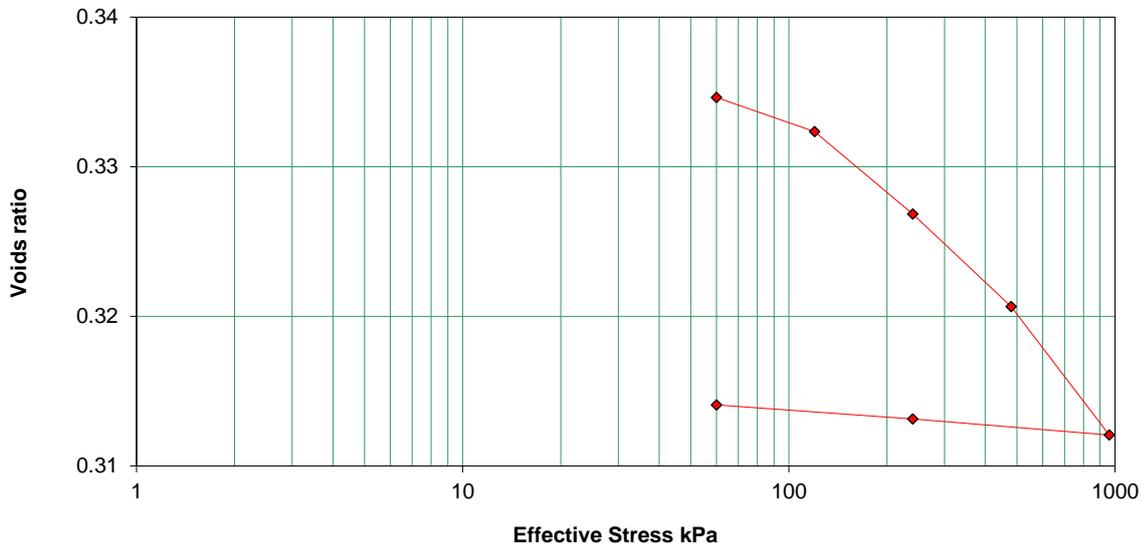
Initial height (mm)	20.00
Diameter (mm)	50.00
Initial weight of specimen (gms)	86.69
Bulk Density (mg/m ³)	2.207
Particle Density	Assumed 2.70

Initial Conditions

Moisture content	9.8
Dry Density	2.011
Initial Voids Ratio	0.3428
Degree of Saturation	76.99

Final Conditions

	10.9	%
	2.058	Mg/m ³
	0.3141	
	94.55	%



Stage No.	Effective Stress kPa	Strain %	Voids Ratio	Mv m ² /MN	CV m ² /Year	Settlement mm
1	60	0.610	0.3346	0.102	1.81	0.122
2	120	0.780	0.3323	0.029	2.057	0.156
3	240	1.190	0.3268	0.035	3.650	0.238
4	480	1.650	0.3207	0.019	0.507	0.330
5	960	2.290	0.3121	0.014	3.345	0.458
6	240	2.210	0.3131	0.001		0.442
7	60	2.140	0.3141	0.004		0.428

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Project

WSP Lot 1, Parteen Weir

Job No. NMTL-3503

Borehole No. RWI-BH007A

Sample No. C

Depth m. 5.0-6.50m

Oedometer Settlement Tests

Test Method: BS1377 : Part 5 : 1990 Clause 3

Sample Details

Soil description:	Red/brown slightly sandy slightly gravelly SILT/CLAY
Initial height (mm)	20.0
Diameter (mm)	50
Initial wet weight of specimen (gms)	91.72
Bulk density (Mg/m3)	2.34
Particle density (Assumed)	2.70

Initial conditions

Settlement Channel	1109
Moisture content (%)	8.26
Dry density (Mg/m3)	2.16
Initial Voids Ratio	0.2517
Deg of Saturation (%)	88.6
Swelling pressure (kPa)	n/a

Final conditions

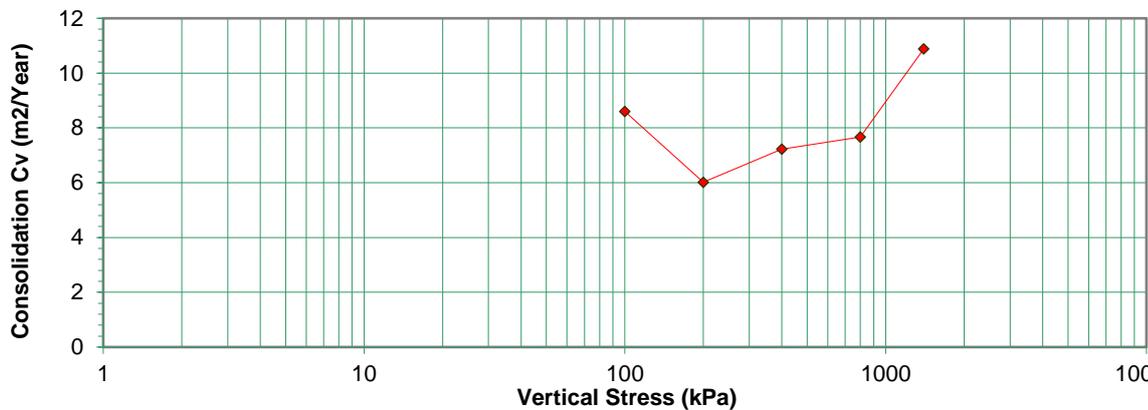
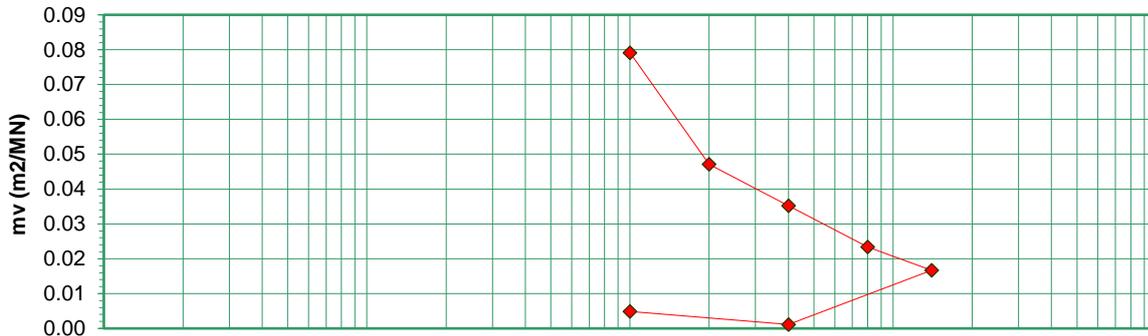
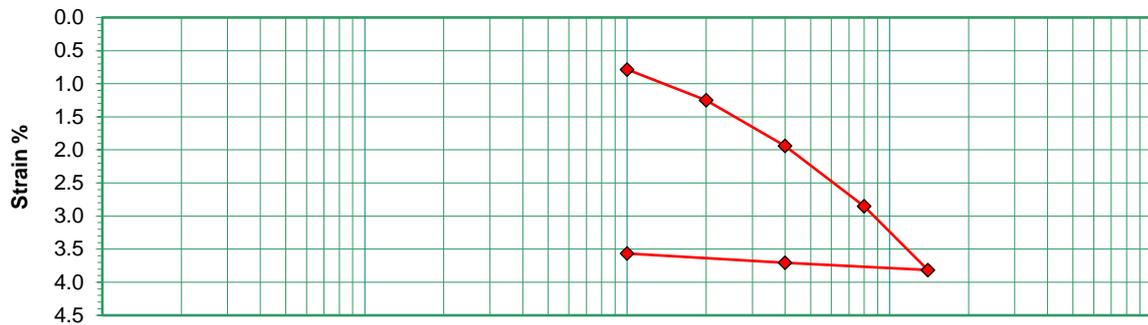
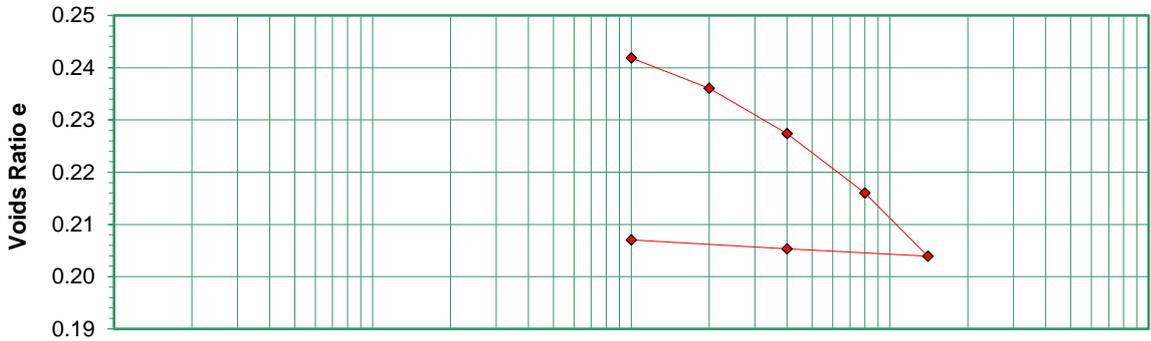
Moisture Content (%)	7.1
Dry Density (Mg/m3)	2.24
Final voids ratio	0.2039
Final degree of saturation (%)	94.2
Final settlement	0.741

Notes: **1) Log time method used for t50 time**
2) Tested at 20°C

NM TL Ltd Standard	Project WSP Lot 1, Parteen Weir	Job No. NMTL-3503 Borehole No. RWI-BH008 Sample No. C Depth m. 8.7-10.50
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Oedometer settlement Tests

Test Method: BS 1377 : Part 5: 1990 Clause 3



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Project
WSP Lot 1, Parteen Weir

Job No. NMTL-3503
Borehole No. RWI-BH008
Sample No. C
Depth m. 8.7-10.50

Oedometer Test

Test Method: BS 1377 : Part 5 1990 Clause 3

Sample Details

Description: Red/brown slightly sandy slightly gravelly SILT/CLAY

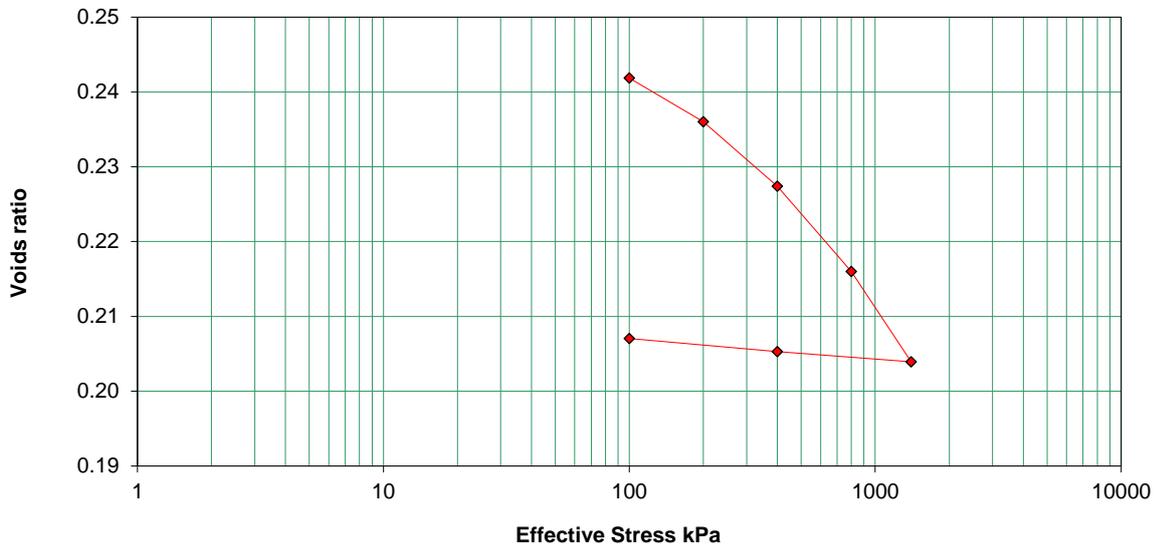
Initial height (mm)	20.00
Diameter (mm)	50.00
Initial weight of specimen (gms)	91.72
Bulk Density (mg/m ³)	2.335
Particle Density	Assumed 2.70

Initial Conditions

Moisture content	8.3
Dry Density	2.157
Initial Voids Ratio	0.2517
Degree of Saturation	88.64

Final Conditions

Moisture content	7.1	%
Dry Density	2.243	Mg/m ³
Initial Voids Ratio	0.2071	
Degree of Saturation	94.24	%



Stage No.	Effective Stress kPa	Strain %	Voids Ratio	Mv m ² /MN	CV m ² /Year	Settlement mm
1	100	0.785	0.2419	0.079	8.60	0.157
2	200	1.250	0.2360	0.047	6.018	0.250
3	400	1.940	0.2274	0.035	7.225	0.388
4	800	2.850	0.2160	0.023	7.665	0.570
5	1400	3.815	0.2039	0.017	10.880	0.763
6	400	3.705	0.2053	0.001		0.741
7	100	3.565	0.2071	0.005		0.713

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Project

WSP Lot 1, Parteen Weir

Job No. NMTL-3503

Borehole No. RWI-BH008

Sample No. C

Depth m. 8.7-10.50

Oedometer Settlement Tests

Test Method: BS1377 : Part 5 : 1990 Clause 3

Sample Details

Soil description:	Red/brown slightly sandy slightly gravelly SILT/CLAY
Initial height (mm)	20.0
Diameter (mm)	50
Initial wet weight of specimen (gms)	92.92
Bulk density (Mg/m3)	2.37
Particle density (Assumed)	2.70

Initial conditions

Settlement Channel	1108
Moisture content (%)	7.63
Dry density (Mg/m3)	2.20
Initial Voids Ratio	0.2283
Deg of Saturation (%)	90.3
Swelling pressure (kPa)	n/a

Final conditions

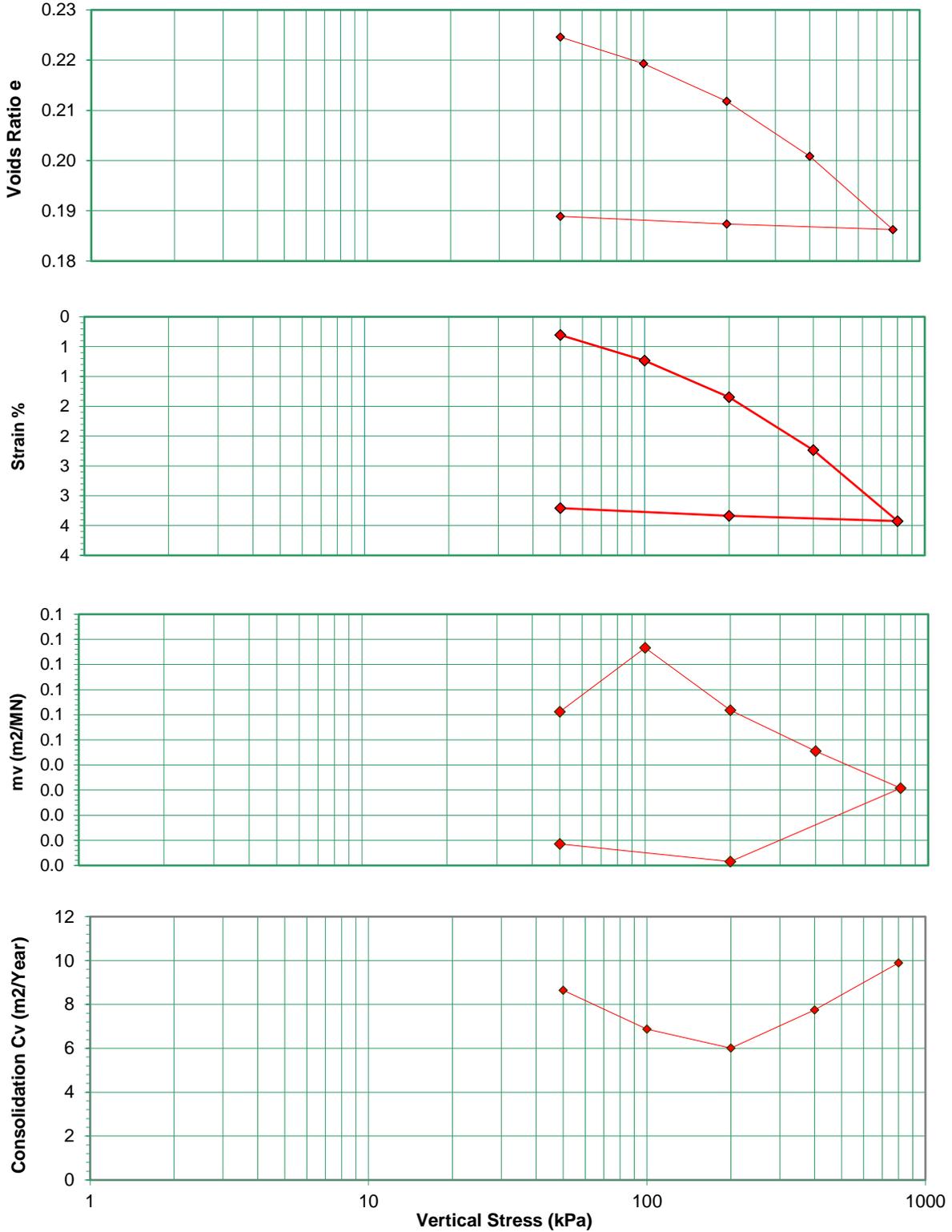
Moisture Content (%)	6.9
Dry Density (Mg/m3)	2.27
Final voids ratio	0.1889
Final degree of saturation (%)	98.8
Final settlement	0.642

Notes: **1) Log time method used for t50 time**
2) Tested at 20°C

NM TL Ltd Standard	Project WSP Lot 1, Parteen Weir	Job No. NMTL-3503 Borehole No. RWI-BH010 Sample No. C Depth m. 5.60-6.50m
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Oedometer settlement Tests

Test Method: BS 1377 : Part 5: 1990 Clause 3



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Project
WSP Lot 1, Parteen Weir

Job No. NMTL-3503
Borehole No. RWI-BH010
Sample No. C
Depth m. 5.60-6.50m

Oedometer Test

Test Method: BS 1377 : Part 5 1990 Clause 3

Sample Details

Description: Red/brown slightly sandy slightly gravelly SILT/CLAY

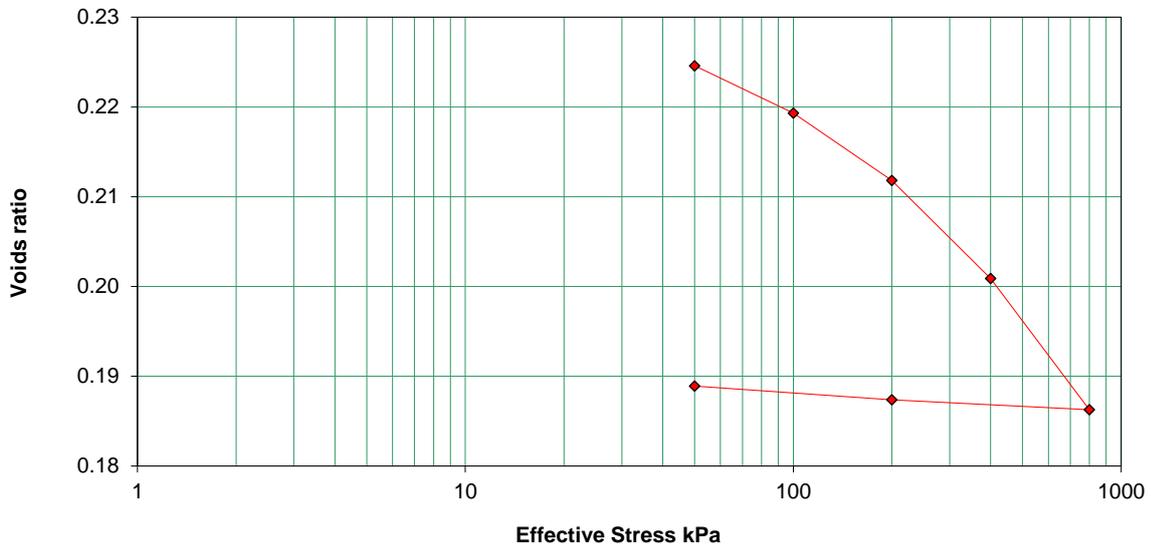
Initial height (mm)	20.00
Diameter (mm)	50.00
Initial weight of specimen (gms)	92.92
Bulk Density (mg/m ³)	2.366
Particle Density	Assumed 2.70

Initial Conditions

Moisture content	7.6
Dry Density	2.198
Initial Voids Ratio	0.2283
Degree of Saturation	90.26

Final Conditions

	6.9	%
	2.271	Mg/m ³
	0.1889	
	98.84	%



Stage No.	Effective Stress kPa	Strain %	Voids Ratio	Mv m ² /MN	CV m ² /Year	Settlement mm
1	50	0.305	0.2246	0.061	8.64	0.061
2	100	0.735	0.2193	0.087	6.872	0.147
3	200	1.345	0.2118	0.062	6.009	0.269
4	400	2.235	0.2009	0.046	7.752	0.447
5	800	3.425	0.1863	0.031	9.888	0.685
6	200	3.335	0.1874	0.002		0.667
7	50	3.210	0.1889	0.009		0.642

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Project
WSP Lot 1, Parteen Weir

Job No. NMTL-3503
Borehole No. RWI-BH010
Sample No. C
Depth m. 5.60-6.50m

Oedometer Settlement Tests

Test Method: BS1377 : Part 5 : 1990 Clause 3

Sample Details

Soil description:	Red/brown slightly sandy slightly gravelly SILT/CLAY.
Initial height (mm)	20.0
Diameter (mm)	50
Initial wet weight of specimen (gms)	93.02
Bulk density (Mg/m3)	2.37
Particle density (Assumed)	2.70

Initial conditions

Settlement Channel	1108
Moisture content (%)	9.41
Dry density (Mg/m3)	2.16
Initial Voids Ratio	0.2473
Deg of Saturation (%)	102.7
Swelling pressure (kPa)	n/a

Final conditions

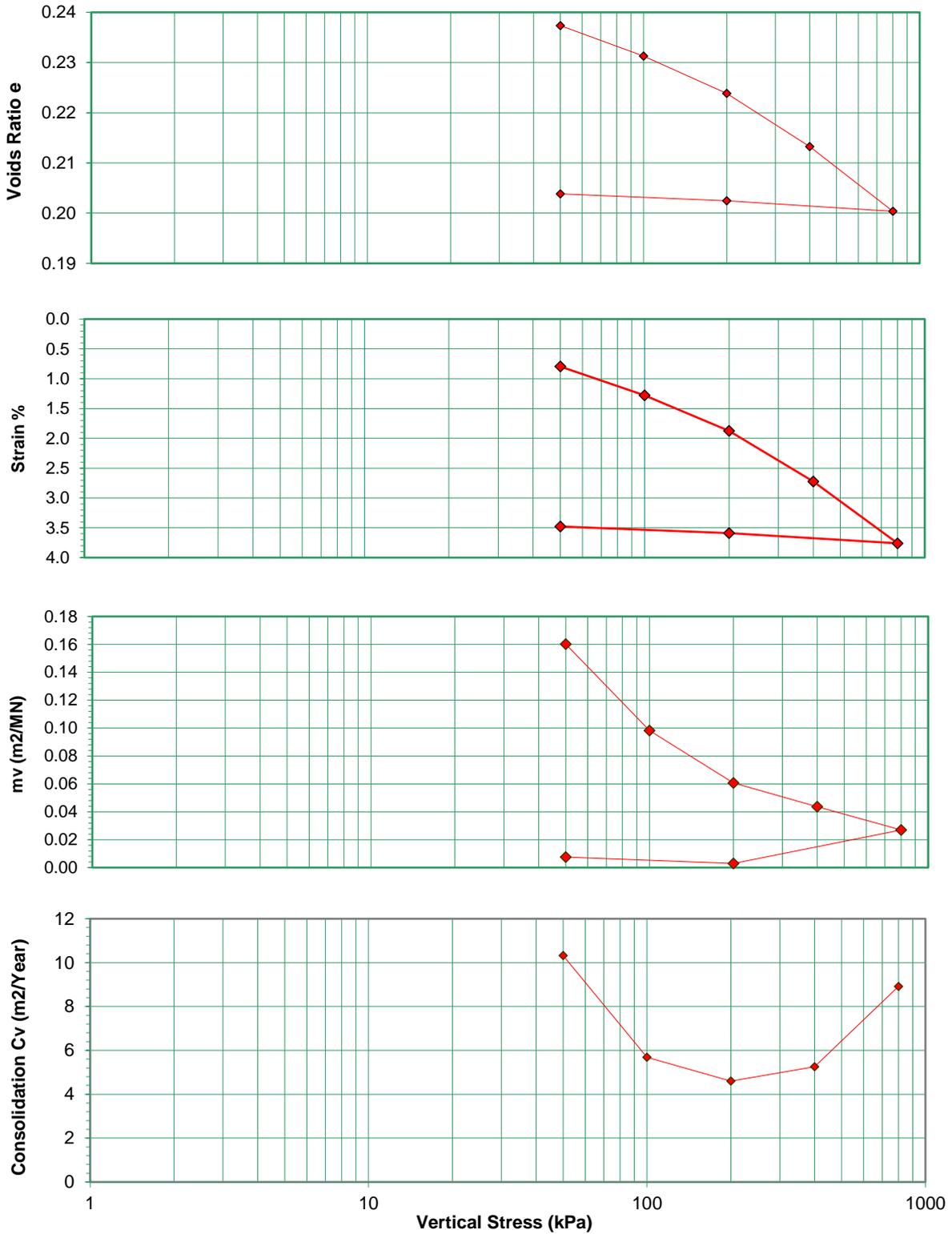
Moisture Content (%)	7.4
Dry Density (Mg/m3)	2.25
Final voids ratio	0.2004
Final degree of saturation (%)	99.5
Final settlement	0.718

Notes: **1) Log time method used for t50 time**
2) Tested at 20°C

NM TL Ltd Standard	Project WSP Lot 1, Parteen Weir	Job No. NMTL-3503 Borehole No. RWI-BH014 Sample No. C Depth m. 5.00-6.50m
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Oedometer settlement Tests

Test Method: BS 1377 : Part 5: 1990 Clause 3



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Project
WSP Lot 1, Parteen Weir

Job No. NMTL-3503
Borehole No. RWI-BH014
Sample No. C
Depth m. 5.00-6.50m

Oedometer Test

Test Method: BS 1377 : Part 5 1990 Clause 3

Sample Details

Description: Red/brown slightly sandy slightly gravelly SILT/CLAY.

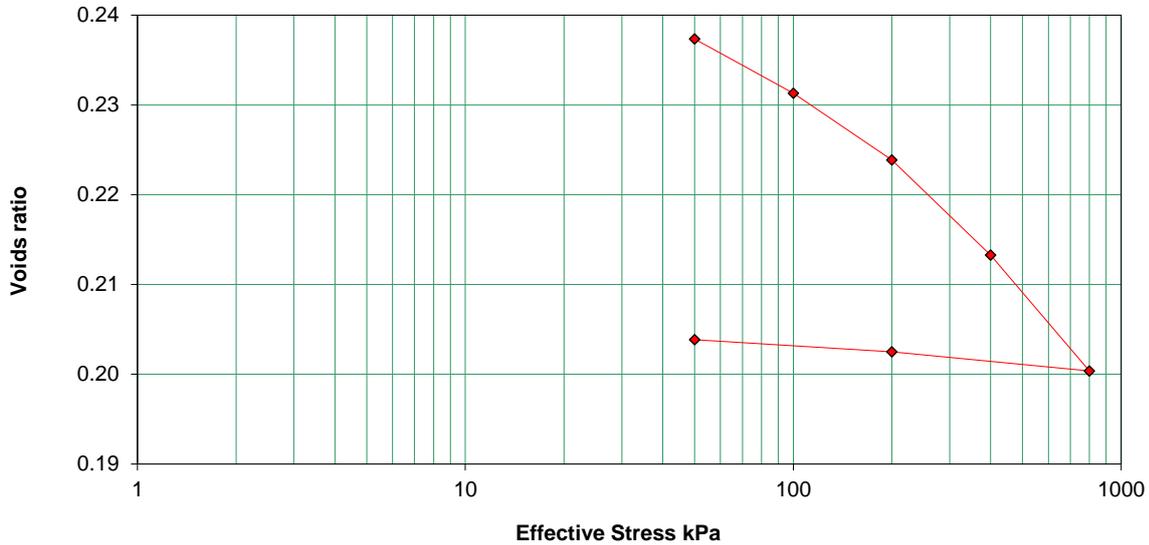
Initial height (mm)	20.00
Diameter (mm)	50.00
Initial weight of specimen (gms)	93.02
Bulk Density (mg/m ³)	2.368
Particle Density	Assumed 2.70

Initial Conditions

Moisture content	9.4
Dry Density	2.165
Initial Voids Ratio	0.2473
Degree of Saturation	102.75

Final Conditions

	7.4	%
	2.249	Mg/m ³
	0.2039	
	99.53	%



Stage No.	Effective Stress kPa	Strain %	Voids Ratio	Mv m ² /MN	CV m ² /Year	Settlement mm
1	50	0.795	0.2373	0.160	10.32	0.159
2	100	1.280	0.2313	0.098	5.681	0.256
3	200	1.875	0.2239	0.061	4.600	0.375
4	400	2.725	0.2133	0.044	5.253	0.545
5	800	3.760	0.2004	0.027		0.752
6	200	3.590	0.2025	0.003		0.718
7	50	3.480	0.2039	0.008		0.696

NM TL Ltd Standard	Project	WSP Lot 1, Parteen Weir	Job No.	NMTL-3503
			Borehole No.	RWI-BH014
			Sample No.	C
			Depth m.	5.00-6.50m

Oedometer Settlement Tests

Test Method: BS1377 : Part 5 : 1990 Clause 3

Sample Details

Soil description:	Brown slightly sandy slightly gravelly silty CLAY.	
Initial height (mm)		20.0
Diameter (mm)		50
Initial wet weight of specimen (gms)		91.3
Bulk density (Mg/m ³)		2.32
Particle density	(Assumed)	2.70

Initial conditions

Settlement Channel		1110
Moisture content (%)		9.12
Dry density (Mg/m ³)		2.13
Initial Voids Ratio		0.2674
Deg of Saturation (%)		92.1
Swelling pressure (kPa)		n/a

Final conditions

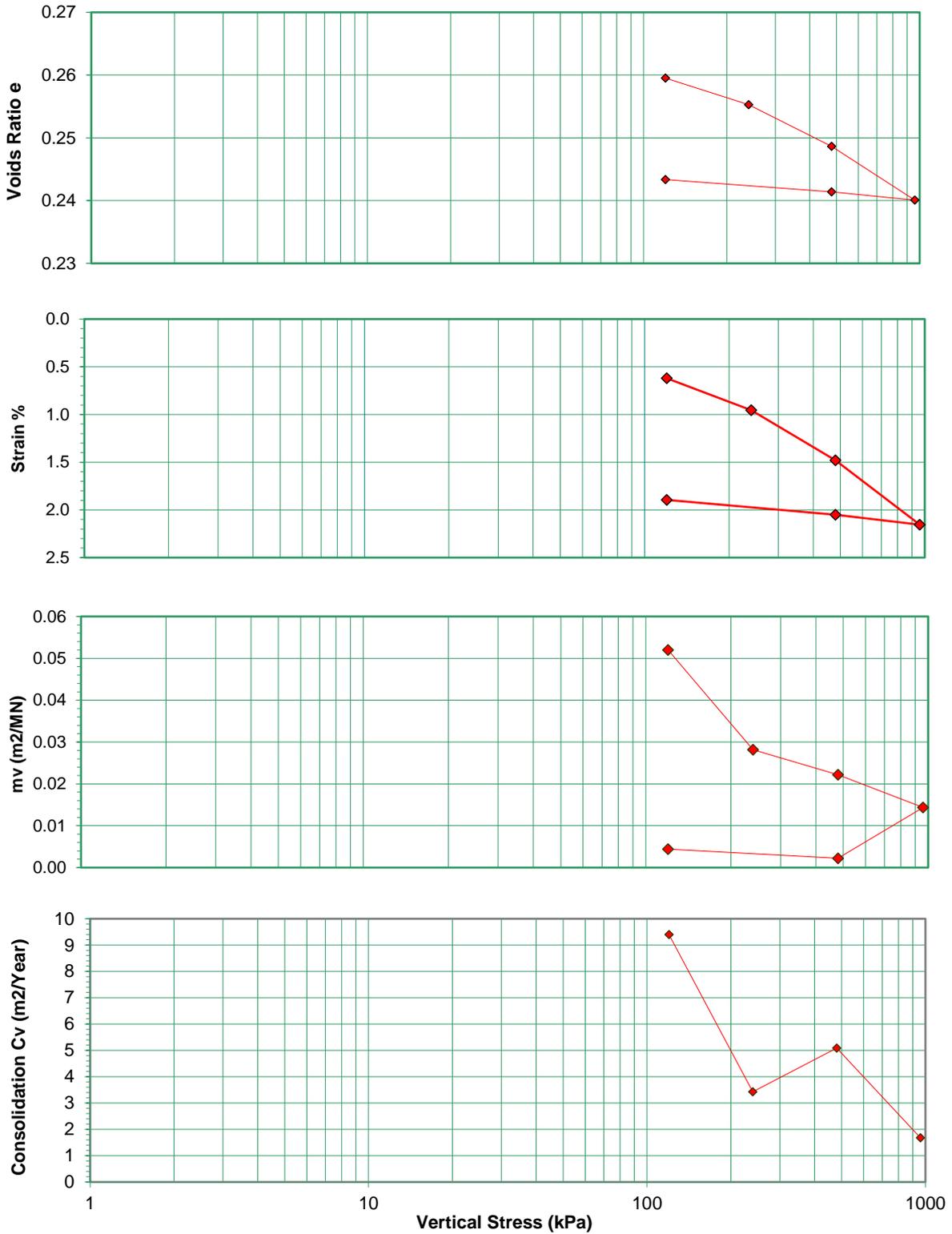
Moisture Content (%)		8.7
Dry Density (Mg/m ³)		2.17
Final voids ratio		0.2414
Final degree of saturation (%)		97.7
Final settlement		0.410

Notes: **1) Log time method used for t50 time**
2) Tested at 20°C

NM TL Ltd Standard	Project WSP Lot 1, Parteen Weir	Job No. NMTL-3503 Borehole No. RWI-BH014 Sample No. C Depth m. 12.0-12.50m
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Oedometer settlement Tests

Test Method: BS 1377 : Part 5: 1990 Clause 3



NM
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Project
WSP Lot 1, Parteen Weir

Job No. NMTL-3503
Borehole No. RWI-BH014
Sample No. C
Depth m. 12.0-12.50m

Oedometer Test

Test Method: BS 1377 : Part 5 1990 Clause 3

Sample Details

Description: Brown slightly sandy slightly gravelly silty CLAY.

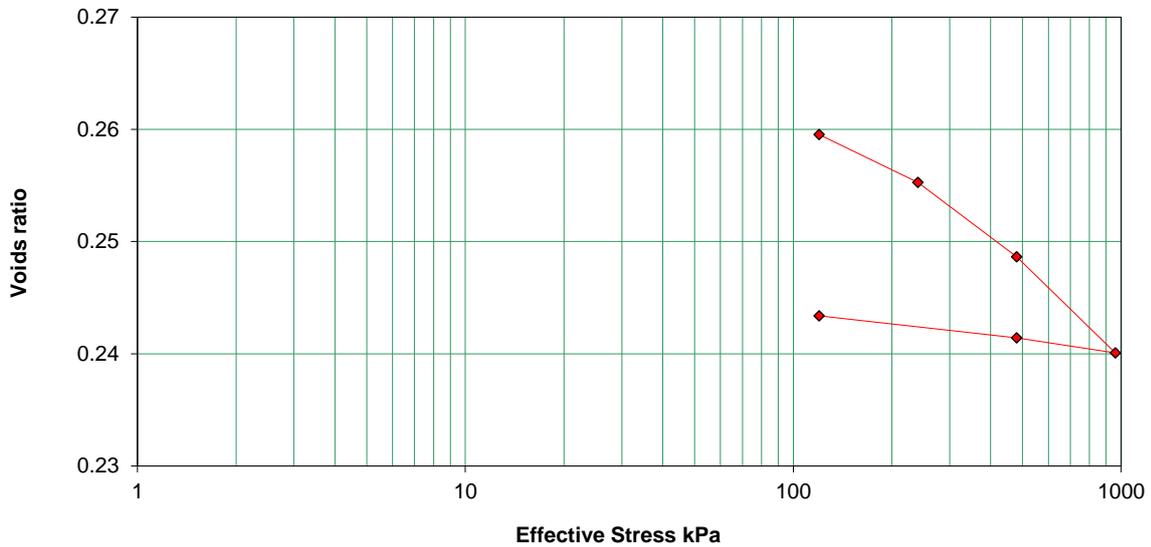
Initial height (mm)	20.00
Diameter (mm)	50.00
Initial weight of specimen (gms)	91.30
Bulk Density (mg/m ³)	2.325
Particle Density	Assumed 2.70

Initial Conditions

Moisture content	9.1
Dry Density	2.130
Initial Voids Ratio	0.2674
Degree of Saturation	92.08

Final Conditions

	8.7	%
	2.175	Mg/m ³
	0.2434	
	97.71	%



Stage No.	Effective Stress kPa	Strain %	Voids Ratio	Mv m ² /MN	CV m ² /Year	Settlement mm
1	120	0.620	0.2595	0.052	9.40	0.124
2	240	0.955	0.2553	0.028	3.423	0.191
3	480	1.480	0.2486	0.022	5.091	0.296
4	960	2.155	0.2401	0.014	1.678	0.431
5	480	2.050	0.2414	0.002		0.410
6	120	1.895	0.2434	0.004		0.379

NM
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Standard

Project
WSP Lot 1, Parteen Weir

Job No. NMTL-3503
Borehole No. RWI-BH014
Sample No. C
Depth m. 12.0-12.50m

SHEAR BOX TEST

Test Method

BS 1377 : Part 7 : 1990 : Method 4

Preparation procedure

Undisturbed

Description

Grey/brown silty gravelly fine to coarse SAND.

Weighings

		Stage 1	Stage 2	Stage 3
Wet soil	gms	324.0	323.5	324.1
Dry soil	gms	133.3	133.1	133.3
Wet soil	gms	169.6	169.1	169.7
Dry soil	gms	133.3	133.1	133.3
Water	gms	36.3	36.0	36.3
Moisture Content (%)		27.2	27.1	27.3

Nominal Dimensions

Length	L1 mm	60
	L2 mm	60
Area	A mm ²	3600
Height	H mm	24.89
Volume	V cm ³	89.604
Particle density	Mg/m ³	2.70

Bulk Density (Mg/m³)

1.89 1.89 1.89

Dry density (Mg/m³)

1.49 1.48 1.49

Void ratio e

0.8149 0.8182 0.8148

Degree of saturation (%)

90.2 89.3 90.3

Final Details

	Stage 1	Stage 2	Stage 3
Normal Loads(kPa)	15	30	60
Shear stress (kPa)	13.9	29.4	53.6
Horizontal Displacement (mm)	2.551	3.339	4.924
Vertical displacement (mm)	-0.249	-0.266	0.168
Rate of displacement (mm/min)		0.0060	

Date sampled

n/a

Peak

Date received

04/03/2022

Cohesion c' (kPa)

1.81

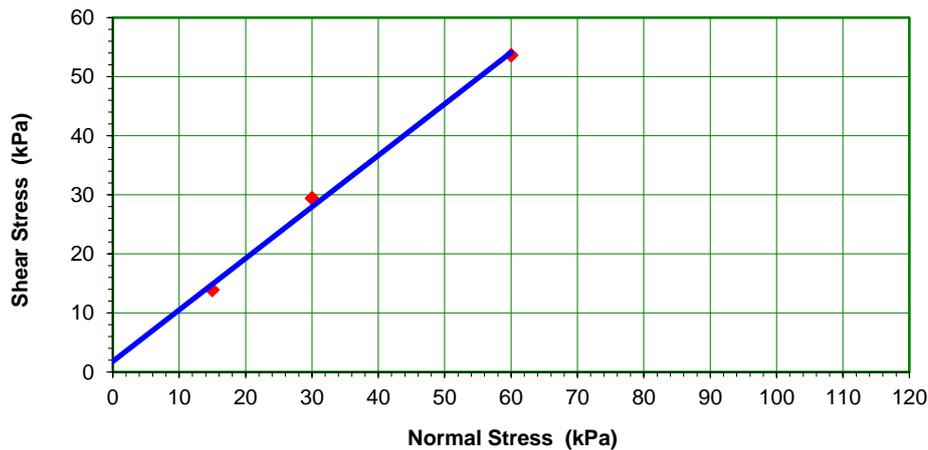
Date tested

09/03/2022

Friction angle phi'

41.1°

Mohr Envelope



NM

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Ltd

Consolidated drained Shear Box Test
in 60 mm square Box

Project WSP Lot 1, Parteen Weir-2021T102

Job No. NMTL_3503
Borehole Nc RWI-BH007A

Sample No. C

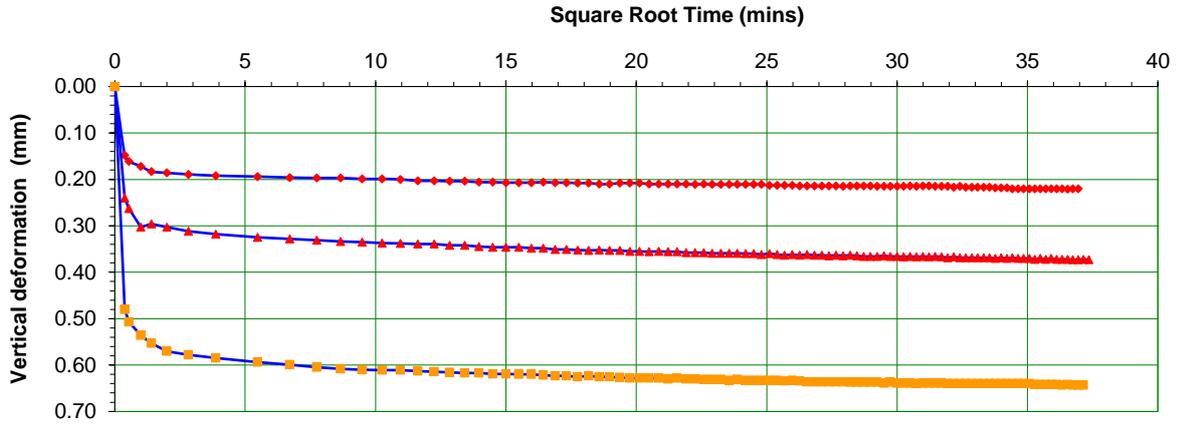
Operator Sb

Checked Nc

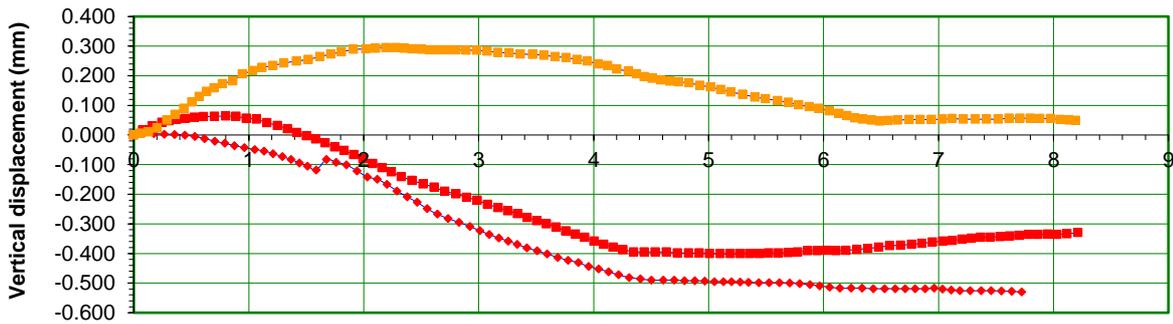
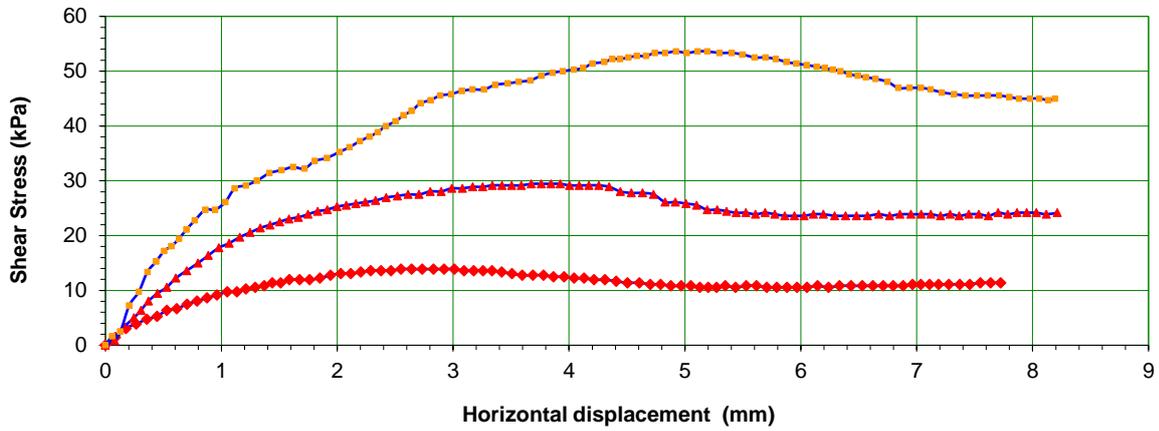
Approved Bc

Depth. 1.0-1.50m

CONSOLIDATION STAGE



SHEAR STAGE



stage 1 Stage 2 Stage 3

NM T L Ltd	Consolidated drained Shear Box Test in 60 mm square Box		Job No. NMTL_3503
	Project WSP Lot 1, Parteen Weir-2021T102		Borehole No. RWI-BH007A
Operator Sb	Checked Nc	Approved Bc	Sample No. C
			Depth. 1.0-1.50m

SHEAR BOX TEST

Test Method BS 1377 : Part 7 : 1990 : Method 4

Preparation procedure Undisturbed

Description Grey slightly gravelly silty fine to coarse SAND.

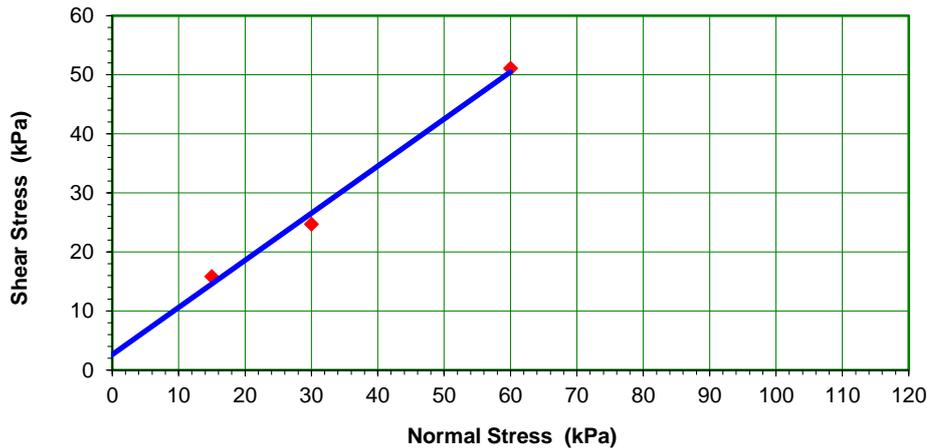
Weighings		Stage 1	Stage 2	Stage 3	Nominal Dimensions		
Wet soil	gms	326.6	326.5	326.5	Length	L1 mm	60
Dry soil	gms	137.5	137.6	137.6		L2 mm	60
					Area	A mm ²	3600
Wet soil	gms	172.2	172.1	172.1	Height	H mm	24.89
Dry soil	gms	137.5	137.6	137.6	Volume	V cm ³	89.604
Water	gms	34.7	34.5	34.5	Particle density	Mg/m ³	2.70
Moisture Content (%)		25.2	25.1	25.1			

Bulk Density (Mg/m ³)	1.92	1.92	1.92
Dry density (Mg/m ³)	1.53	1.54	1.54
Void ratio e	0.7599	0.7587	0.7587
Degree of saturation (%)	89.7	89.4	89.2

Final Details

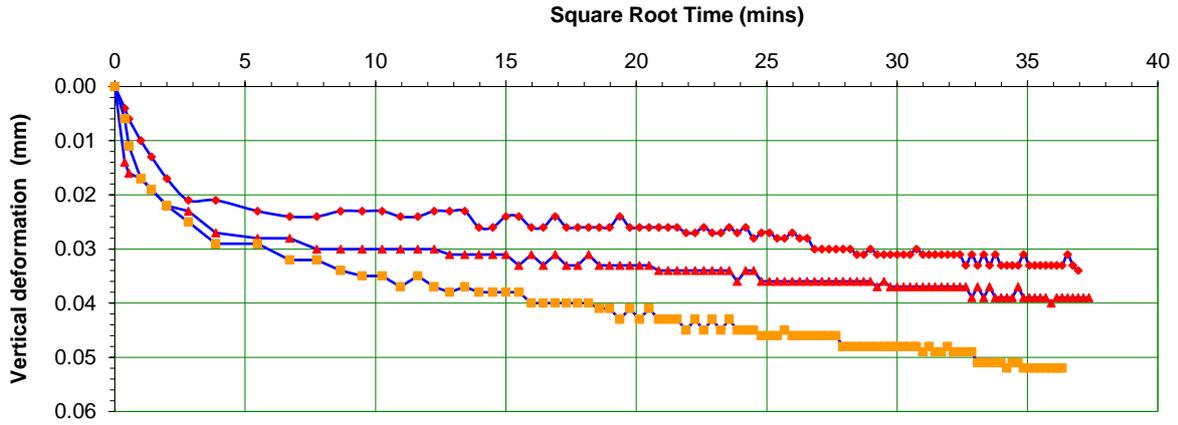
	Stage 1	Stage 2	Stage 3	
Normal Loads(kPa)	15	30	60	
Shear stress (kPa)	15.8	24.7	51.1	
Horizontal Displacement (mm)	2.038	2.701	3.022	
Vertical displacement (mm)	-0.283	-0.139	-0.063	
Rate of displacement (mm/min)		0.0060		
Date sampled	n/a			Peak
Date received	04/03/2022		Cohesion c' (kPa)	2.63
Date tested	11/03/2022		Friction angle phi'	38.6°

Mohr Envelope

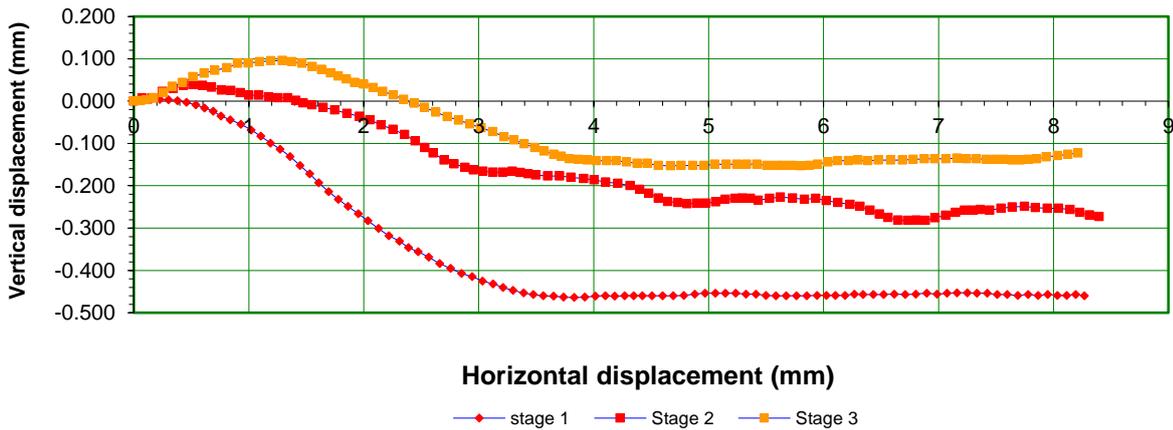
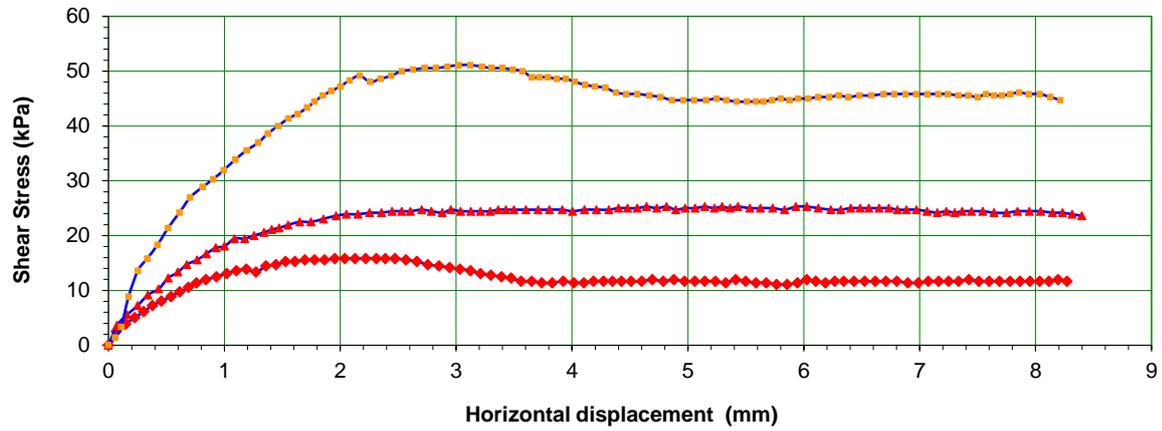


NM T L Ltd	Consolidated drained Shear Box Test in 60 mm square Box		Job No. NMTL_3503
	Project WSP Lot 1, Parteen Weir-2021T102		Borehole Nc RWI-BH013
Operator Sb	Checked Nc	Approved Bc	Sample No. C
			Depth. 1.0-1.50m

CONSOLIDATION STAGE



SHEAR STAGE



NM T L Ltd	Consolidated drained Shear Box Test in 60 mm square Box		Job No. NMTL_3503
	Project WSP Lot 1, Parteen Weir-2021T102		Borehole No. RWI-BH013
Operator Sb	Checked Nc	Approved Bc	Sample No. C
			Depth. 1.0-1.50m

SHEAR BOX TEST

Test Method

BS 1377 : Part 7 : 1990 : Method 4

Preparation procedure

Undisturbed

Description

Grey gravelly silty fine to coarse SAND.

Weighings

		Stage 1	Stage 2	Stage 3
Wet soil	gms	312.5	313.1	312.9
Dry soil	gms	144.3	144.3	144.3
Wet soil	gms	158.1	158.7	158.4
Dry soil	gms	144.3	144.3	144.3
Water	gms	13.9	14.4	14.2
Moisture Content (%)		9.6	10.0	9.8
Bulk Density (Mg/m3)		1.76	1.77	1.77
Dry density (Mg/m3)		1.61	1.61	1.61
Voids ratio e		0.6772	0.6769	0.6768
Degree of saturation (%)		38.3	39.8	39.2

Nominal Dimensions

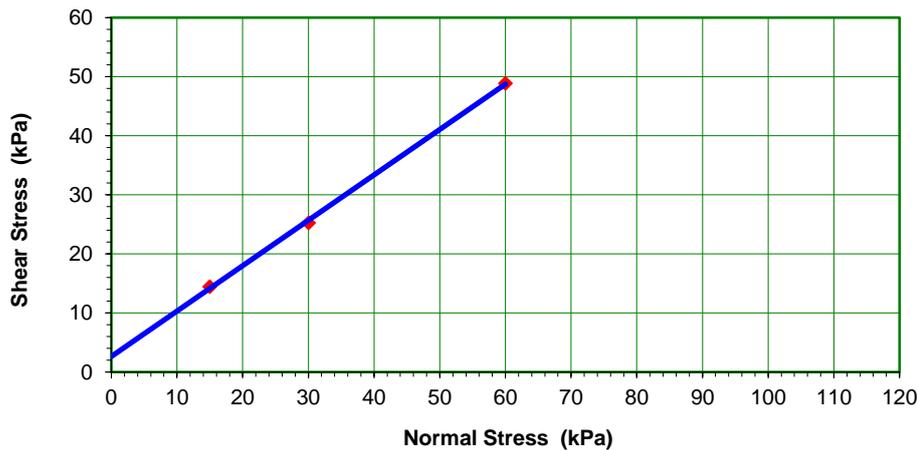
Length	L1 mm	60
	L2 mm	60
Area	A mm2	3600
Height	H mm	24.89
Volume	V cm3	89.604
Particle density	Mg/m3	2.70

Final Details

	Stage 1	Stage 2	Stage 3
Normal Loads(kPa)	15	30	60
Shear stress (kPa)	14.4	25.3	48.9
Horizontal Displacement (mm)	2.124	2.058	3.776
Vertical displacement (mm)	0.127	-0.022	0.213
Rate of displacement (mm/min)		0.0060	

Date sampled	n/a	Peak
Date received	04/03/2022	Cohesion c' (kPa)
Date tested	07/03/2022	Friction angle phi'

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Consolidated drained Shear Box Test
in 60 mm square Box

Project WSP Lot 1, Parteen Weir-2021T102

Job No. NMTL_3503

Borehole No. RWI-BH015

Sample No. C

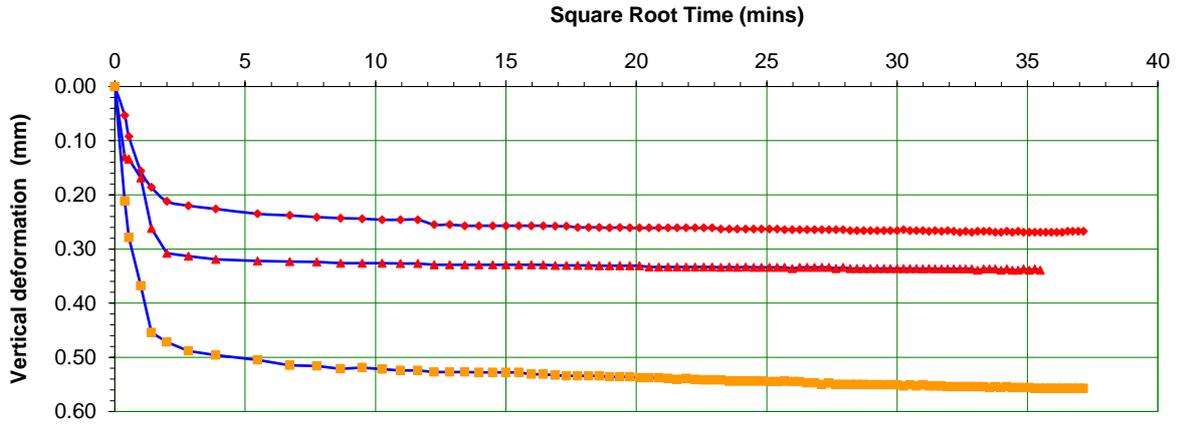
Operator Sb

Checked Nc

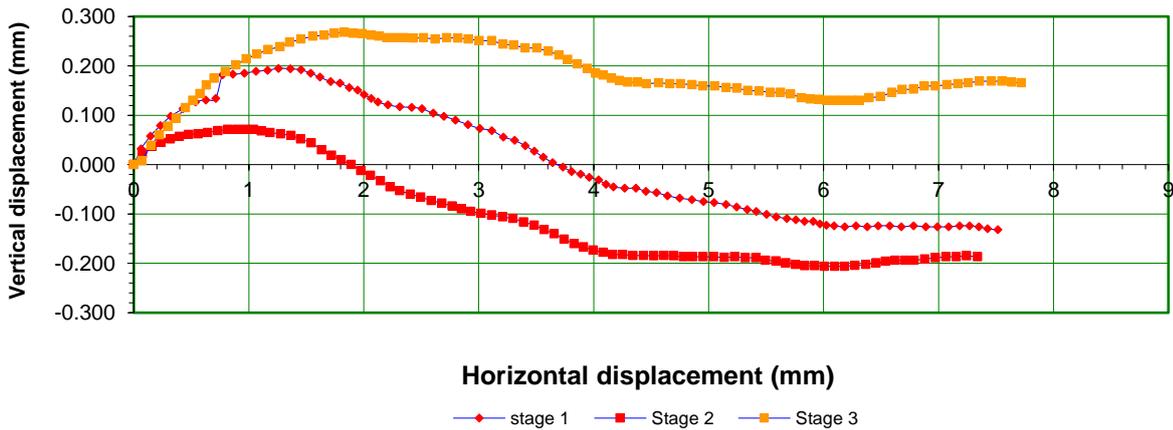
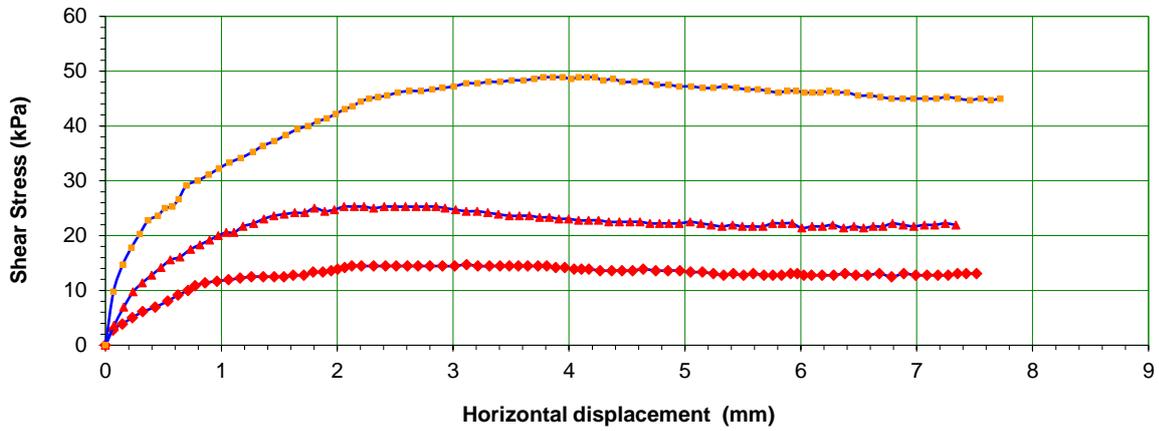
Approved Bc

Depth. 2.0-2.63m

CONSOLIDATION STAGE



SHEAR STAGE



NM T L Ltd	Consolidated drained Shear Box Test in 60 mm square Box		Job No. NMTL_3503
	Project WSP Lot 1, Parteen Weir-2021T102		Borehole No. RWI-BH015
Operator Sb	Checked Nc	Approved Bc	Sample No. C
			Depth. 2.0-2.63m

SHEAR BOX TEST

Test Method

BS 1377 : Part 7 : 1990 : Method 4

Preparation procedure

Undisturbed

Description

Brown silty fine to coarse SAND.

Weighings

		Stage 1	Stage 2	Stage 3
Wet soil	gms	327.6	327.8	327.9
Dry soil	gms	140.3	140.2	140.3
Wet soil	gms	173.1	173.4	173.5
Dry soil	gms	140.3	140.2	140.3
Water	gms	32.8	33.2	33.2
Moisture Content (%)		23.4	23.7	23.6

Nominal Dimensions

Length	L1 mm	60
	L2 mm	60
Area	A mm ²	3600
Height	H mm	24.89
Volume	V cm ³	89.604
Particle density	Mg/m ³	2.70

Bulk Density (Mg/m³)

1.93 1.93 1.94

Dry density (Mg/m³)

1.57 1.56 1.57

Void ratio e

0.7244 0.7256 0.7244

Degree of saturation (%)

87.2 88.1 88.1

Final Details

	Stage 1	Stage 2	Stage 3
Normal Loads(kPa)	50	100	200
Shear stress (kPa)	41.7	75.3	158.3
Horizontal Displacement (mm)	2.037	2.146	3.505
Vertical displacement (mm)	-0.153	-0.031	-0.226
Rate of displacement (mm/min)		0.0060	

Date sampled

n/a

Peak

Date received

04/03/2022

Cohesion c' (kPa)

0.14

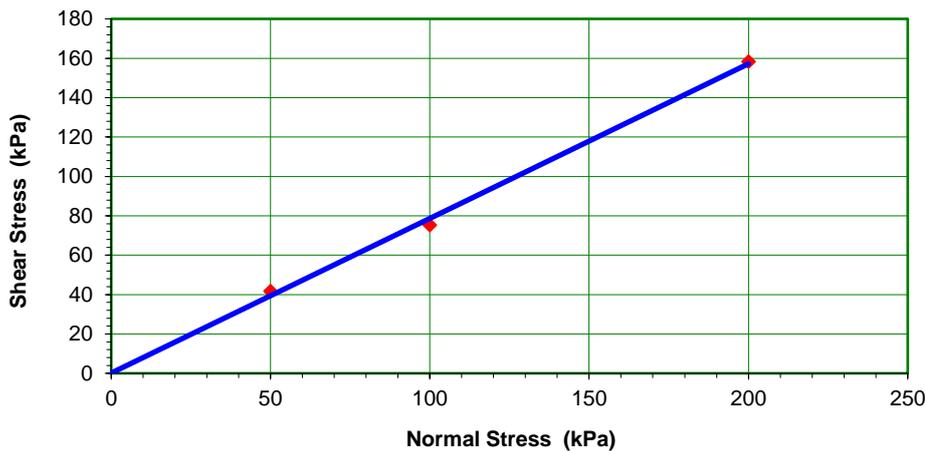
Date tested

16/03/2022

Friction angle phi'

38.1°

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Consolidated drained Shear Box Test
in 60 mm square Box

Project WSP Lot 1, Parteen Weir-2021T102

Job No. NMTL_3503

Borehole Nc RWI-BH016

Sample No. C

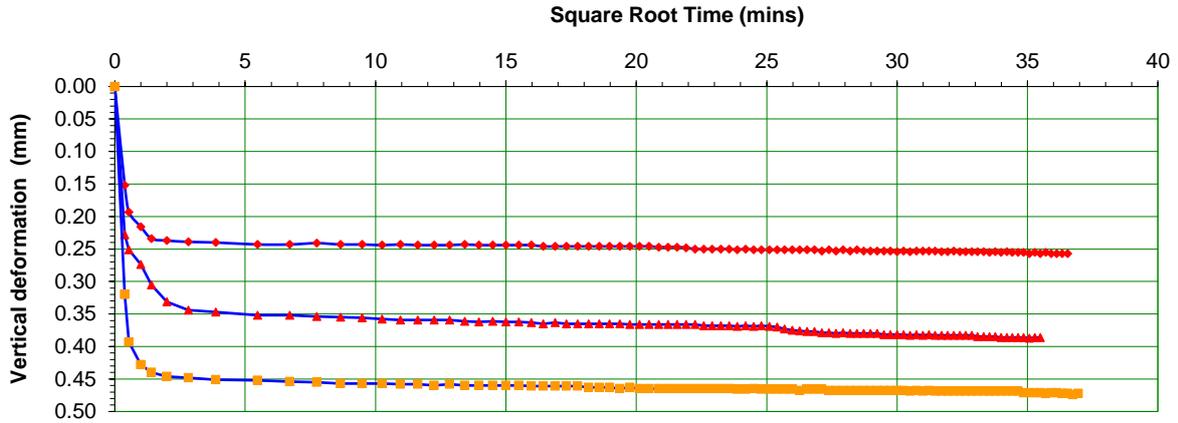
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Checked Nc

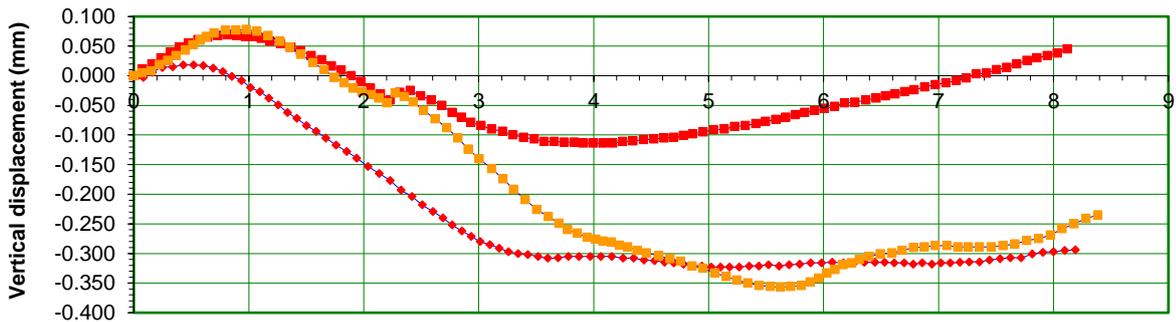
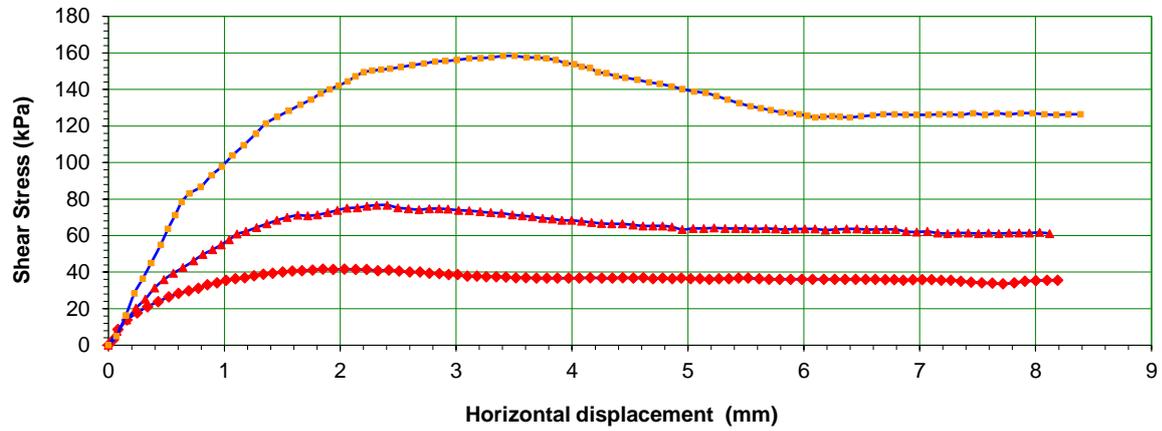
Approved Bc

Depth. 3.00-4.50m

CONSOLIDATION STAGE



SHEAR STAGE



Horizontal displacement (mm)

—◆— stage 1 —■— Stage 2 —□— Stage 3

NM T L Ltd	Consolidated drained Shear Box Test in 60 mm square Box		Job No. NMTL_3503
	Project WSP Lot 1, Parteen Weir-2021T102		Borehole No. RWI-BH016
Operator Sb	Checked Nc	Approved Bc	Sample No. C
			Depth. 3.00-4.50m

SHEAR BOX TEST

Test Method

BS 1377 : Part 7 : 1990 : Method 4

Preparation procedure

Undisturbed

Description

Grey/brown silty fine to coarse SAND.

Weighings

		Stage 1	Stage 2	Stage 3
Wet soil	gms	327.3	325.7	327.2
Dry soil	gms	139.3	135.0	139.3
Wet soil	gms	172.9	171.3	172.7
Dry soil	gms	139.3	135.0	139.3
Water	gms	33.6	36.3	33.5
Moisture Content (%)		24.1	26.9	24.0

Nominal Dimensions

Length	L1 mm	60
	L2 mm	60
Area	A mm ²	3600
Height	H mm	24.89
Volume	V cm ³	89.604
Particle density	Mg/m ³	2.70

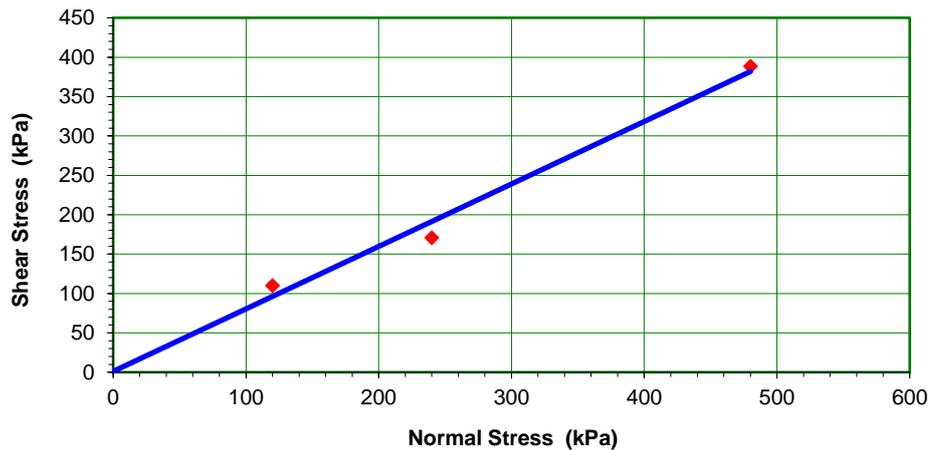
Bulk Density (Mg/m ³)	1.93	1.91	1.93
Dry density (Mg/m ³)	1.55	1.51	1.55
Voids ratio e	0.7373	0.7921	0.7373
Degree of saturation (%)	88.3	91.6	88.0

Final Details

	Stage 1	Stage 2	Stage 3
Normal Loads(kPa)	120	240	480
Shear stress (kPa)	110.0	170.8	388.6
Horizontal Displacement (mm)	2.134	6.185	3.114
Vertical displacement (mm)	-0.220	0.437	-0.083
Rate of displacement (mm/min)		0.0060	

Date sampled	n/a	Peak
Date received	04/03/2022	Cohesion c' (kPa)
Date tested	19/03/2022	Friction angle phi'

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Consolidated drained Shear Box Test
in 60 mm square Box

Project WSP Lot 1, Parteen Weir-2021T102

Job No. NMTL_3503
Borehole Nc RWI-BH016

Sample No. C

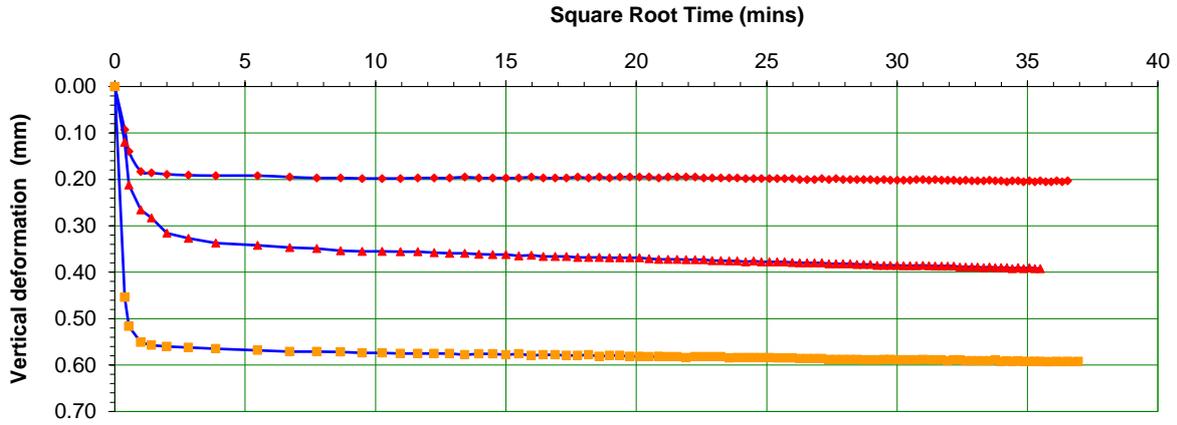
Operator Sb

Checked Nc

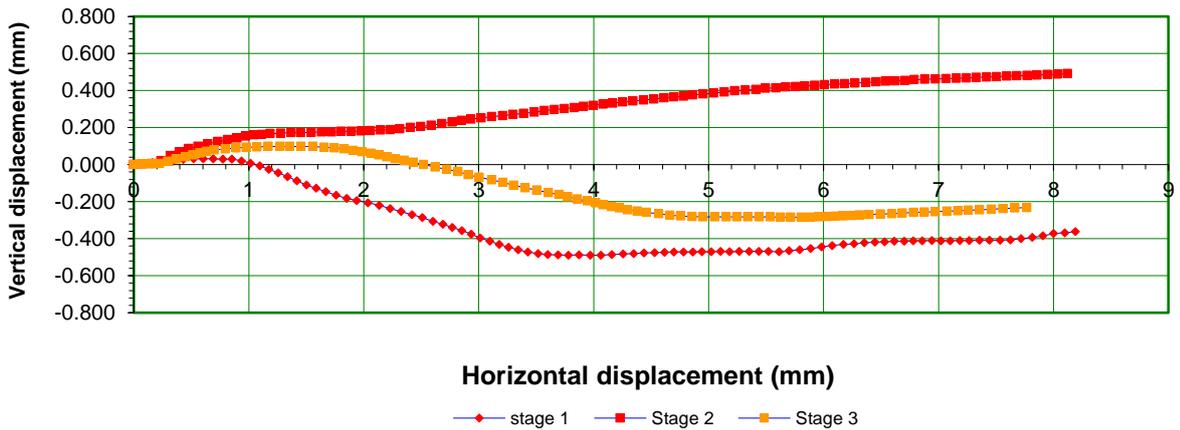
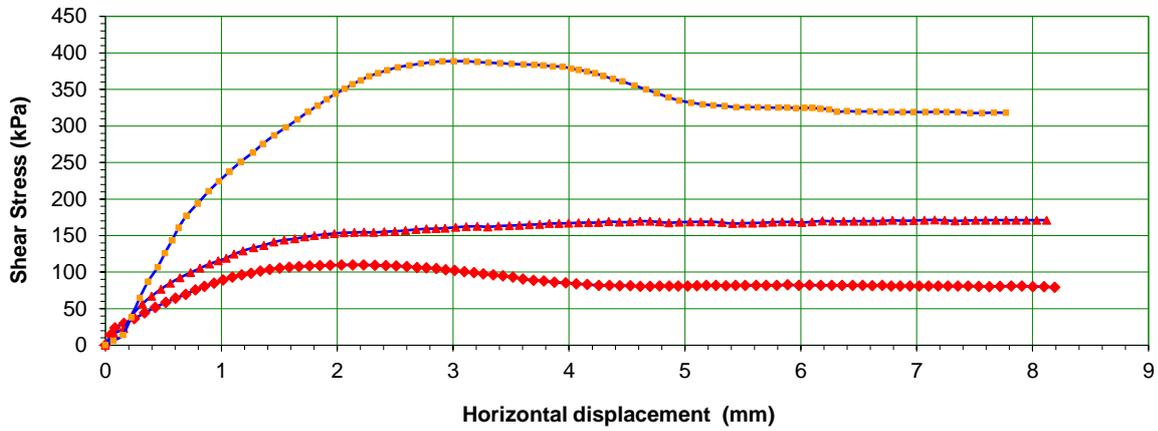
Approved Bc

Depth. 9.50-11.00m

CONSOLIDATION STAGE



SHEAR STAGE



NM T L Ltd	Consolidated drained Shear Box Test in 60 mm square Box		Job No. NMTL_3503
	Project WSP Lot 1, Parteen Weir-2021T102		Borehole No. RWI-BH016
Operator Sb	Checked Nc	Approved Bc	Sample No. C
			Depth. 9.50-11.00m

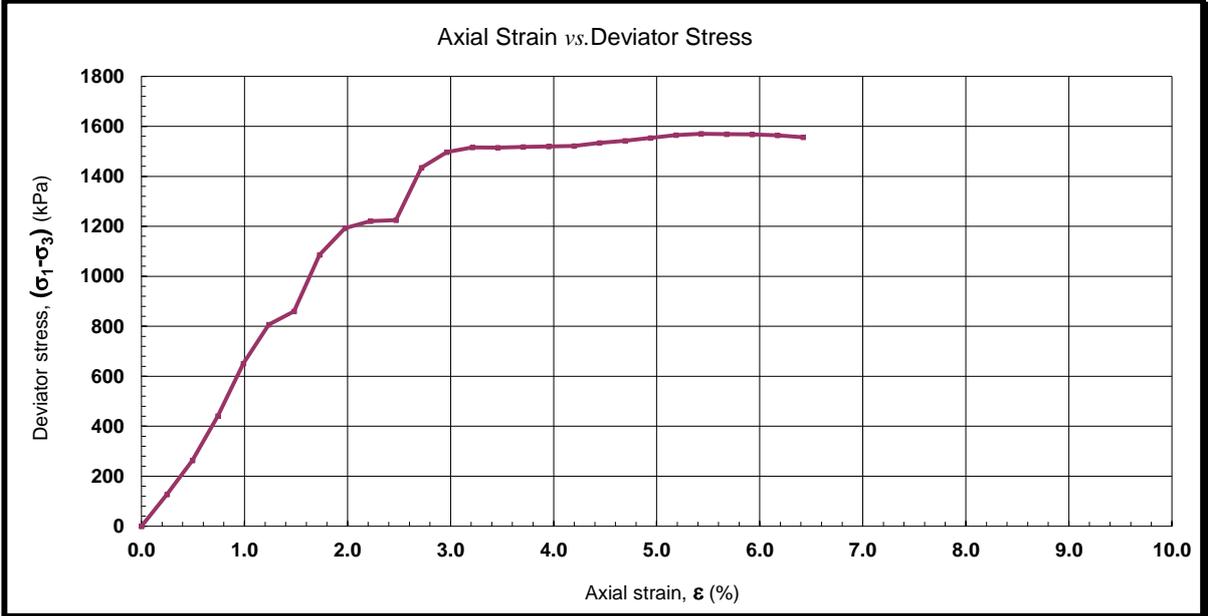
Certificate of Test

Determination of the Multistage Undrained Shear Strength in Triaxial Compression BS 1377 : Part 7 : 1990 Clause 8

Client Name:	Irish Drilling Limited	Contract:	WSP Lot 1, Parteen Weir
Address:	Loughrea Galway Co. Galway	Site Address:	N/A IDL Project ID:2021T102

Sample No.:	RWI-BH007A	Depth:	6.20-6.50m	File Reference:	NMTL 3503
Sample Description: Red/brown slightly gravelly sandy silty CLAY.					
Location:	WSP Lot 1, Parteen Weir		Date Sampled:	N/A	
Sample Type:	Core	Sampled by:	Irish Drilling Ltd		
Client Sample Ref.:	RWI-BH007A-C-6.20-6.50m		Sampling Cert. Recd.:	No	
Source / Supplier:	IDL	Date Received:	04 March 2022		
Specification:	BS 1377: Part 7: 1990 Clause 8	Date Tested:	14 March 2022		

Specimen		Test	
Length:	202.5 mm	Diameter:	101.5 mm
Area:	8091.4 mm ²	Volume:	1638.5 cm ³
Mass:	3884.6 g	Membrane type:	Latex
Moisture content:	6.7 %	Membrane thickness:	0.3 mm
Bulk density:	2.37 Mg m ⁻³	Membrane correction:	0.21 0.35 0.76
Dry density:	2.22 Mg m ⁻³	Sample state:	Undisturbed
Preparation Method:	BS 1377: Part 1: 1990 Clause 8 .3.1	Number of stages:	Multistage
		Rate of strain:	1.0 % min ⁻¹
		Cell pressure: σ_3	120-240-380 kPa



Maximum Corrected Deviator Stress at Failure:	$(\sigma_1 - \sigma_3)_f$	860.0	1224.4	1570.2	kPa
Strain at Failure:	ϵ	1.48	2.47	5.43	%
Maximum Cohesion / Shear Strength:	C_u	430.0	612.2	785.1	kPa
Type of Failure:		Brittle			

Signed	Remarks: Specimen prepared with high speed diamond cutting wheel.
For NMTL Ltd Authorised Signatories <input type="checkbox"/> N Chana <input type="checkbox"/> B Chana 16 May 2022	Original to: Client Rep. Copy 1 to: File copy

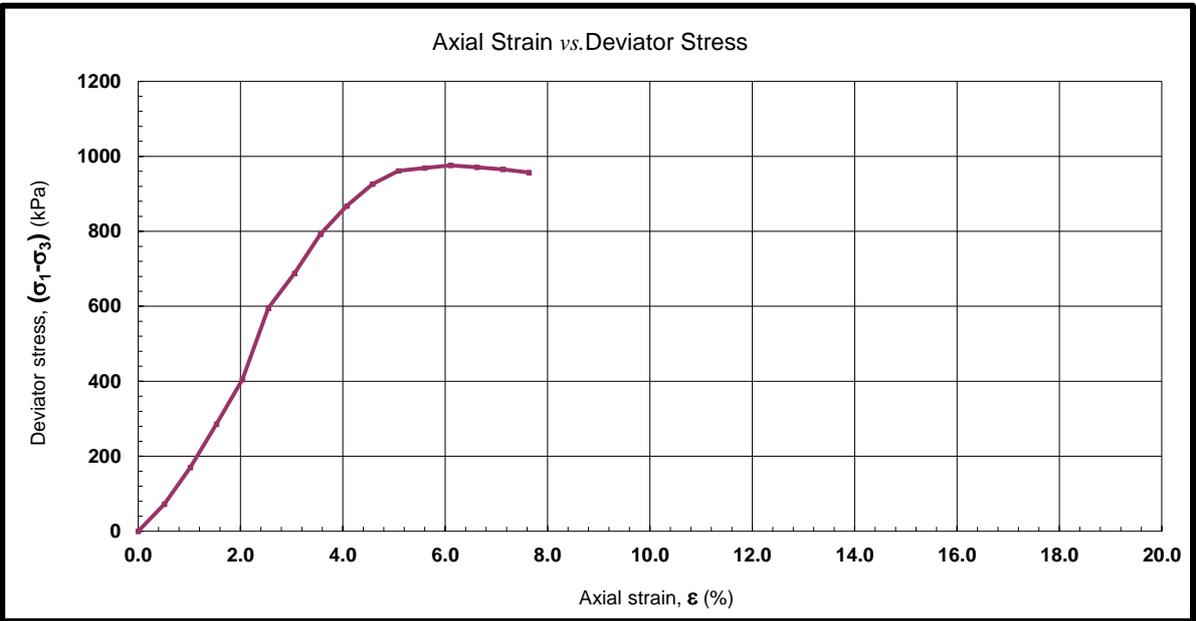
Certificate of Test

Determination of the Undrained Shear Strength in Triaxial Compression BS 1377 : Part 7 : 1990 Clause 8

Client Name:	Irish Drilling Limited	Contract:	WSP Lot 1, Parteen Weir
Address:	Loughrea Galway Co. Galway	Site Address:	N/A IDL Project ID:2021T102

Sample No.:	RWI-BH008	Depth:	5.0-5.60m	File Reference:	NMTL 3503
Sample Description: Red/brown slightly gravelly sandy silty CLAY					
Location:	WSP Lot 1, Parteen Weir	Date Sampled:	N/A		
Sample Type:	Core	Sampled by:	Irish Drilling Ltd		
Client Sample Ref.:	RWI-BH008-C-5.0-5.60m	Sampling Cert. Recd.:	No		
Source / Supplier:	IDL	Date Received:	04 March 2022		
Specification:	BS 1377: Part 7: 1990 Clause 8	Date Tested:	10 March 2022		

Specimen		Test	
Length:	196.5 mm	Diameter:	101.0 mm
Area:	8011.8 mm ²	Volume:	1574.3 cm ³
Mass:	3777.7 g	Membrane type:	Latex
Moisture content:	7.2 %	Membrane thickness:	0.3 mm
Bulk density:	2.40 Mg m ⁻³	Membrane correction:	0.85
Dry density:	2.24 Mg m ⁻³	Sample state:	Undisturbed
Preparation Method:	BS 1377: Part 1: 1990 Clause 8 .3.1	Number of stages:	Single
		Rate of strain:	1.0 % min ⁻¹
		Cell pressure:	σ_3 100 kPa



Maximum Corrected Deviator Stress at Failure:	$(\sigma_1 - \sigma_3)_f$	975.9 kPa
Strain at Failure:	ϵ	6.11 %
Maximum Cohesion / Shear Strength:	C_u	488.0 kPa
Type of Failure:		Brittle

Signed	Remarks: Specimen prepared with high speed diamond cutting wheel.
For NMTL Ltd	Original to: Client Rep. Copy 1 to: File copy
Authorised Signatories <input type="checkbox"/> N Chana <input type="checkbox"/> B Chana	16 May 2022

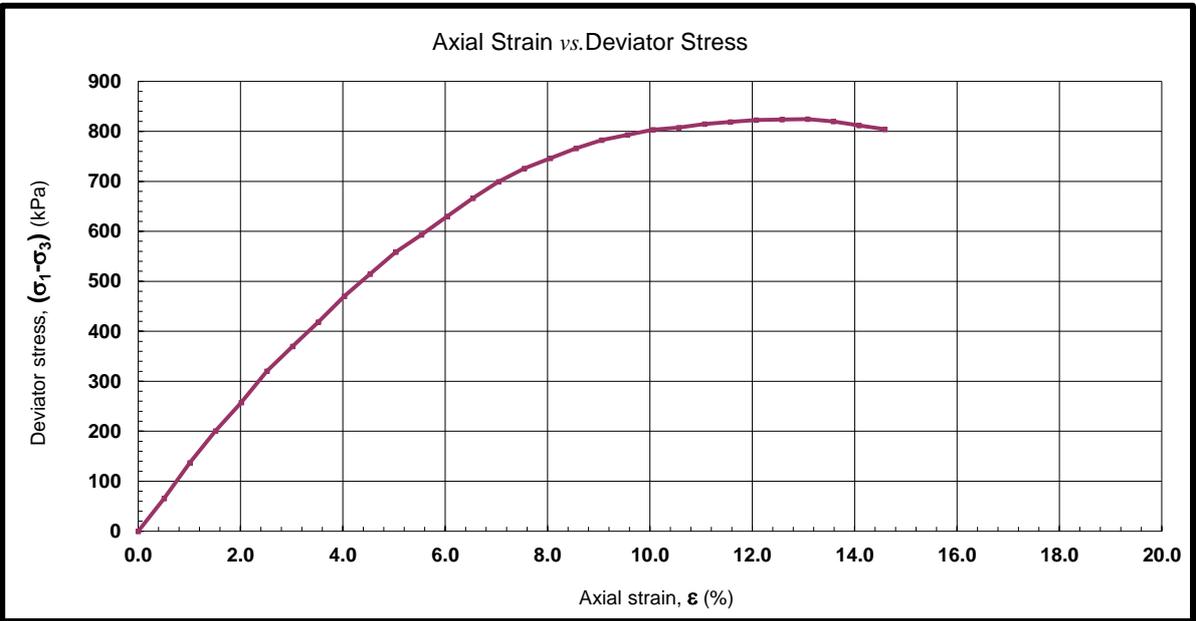
Certificate of Test

Determination of the Undrained Shear Strength in Triaxial Compression BS 1377 : Part 7 : 1990 Clause 8

Client Name:	Irish Drilling Limited	Contract:	WSP Lot 1, Parteen Weir
Address:	Loughrea Galway Co. Galway	Site Address:	N/A IDL Project ID:2021T102

Sample No.:	RWI-BH008	Depth:	8.70-10.50m	File Reference:	NMTL 3503
Sample Description: Red/brown slightly gravelly sandy silty CLAY					
Location:	WSP Lot 1, Parteen Weir	Date Sampled:	N/A		
Sample Type:	Core	Sampled by:	Irish Drilling Ltd		
Client Sample Ref.:	RWI-BH008-C-8.70-10.50m	Sampling Cert. Recd.:	No		
Source / Supplier:	IDL	Date Received:	04 March 2022		
Specification:	BS 1377: Part 7: 1990 Clause 8	Date Tested:	10 March 2022		

Specimen		Test	
Length:	198.8 mm	Diameter:	101.2 mm
Area:	8043.6 mm ²	Volume:	1599.1 cm ³
Mass:	3849.6 g	Membrane type:	Latex
Moisture content:	9.6 %	Membrane thickness:	0.3 mm
Bulk density:	2.41 Mg m ⁻³	Membrane correction:	1.90
Dry density:	2.20 Mg m ⁻³	Sample state:	Undisturbed
Preparation Method:	BS 1377: Part 1: 1990 Clause 8 .3.1	Number of stages:	Single
		Rate of strain:	1.0 % min ⁻¹
		Cell pressure:	σ_3 200 kPa



Maximum Corrected Deviator Stress at Failure:	$(\sigma_1 - \sigma_3)_f$	819.7 kPa
Strain at Failure:	ϵ	13.58 %
Maximum Cohesion / Shear Strength:	C_u	409.8 kPa
Type of Failure:		Plastic

Signed	Remarks: Specimen prepared with high speed diamond cutting wheel.
For NMTL Ltd Authorised Signatories <input type="checkbox"/> N Chana <input type="checkbox"/> B Chana 16 May 2022	Original to: Client Rep. Copy 1 to: File copy

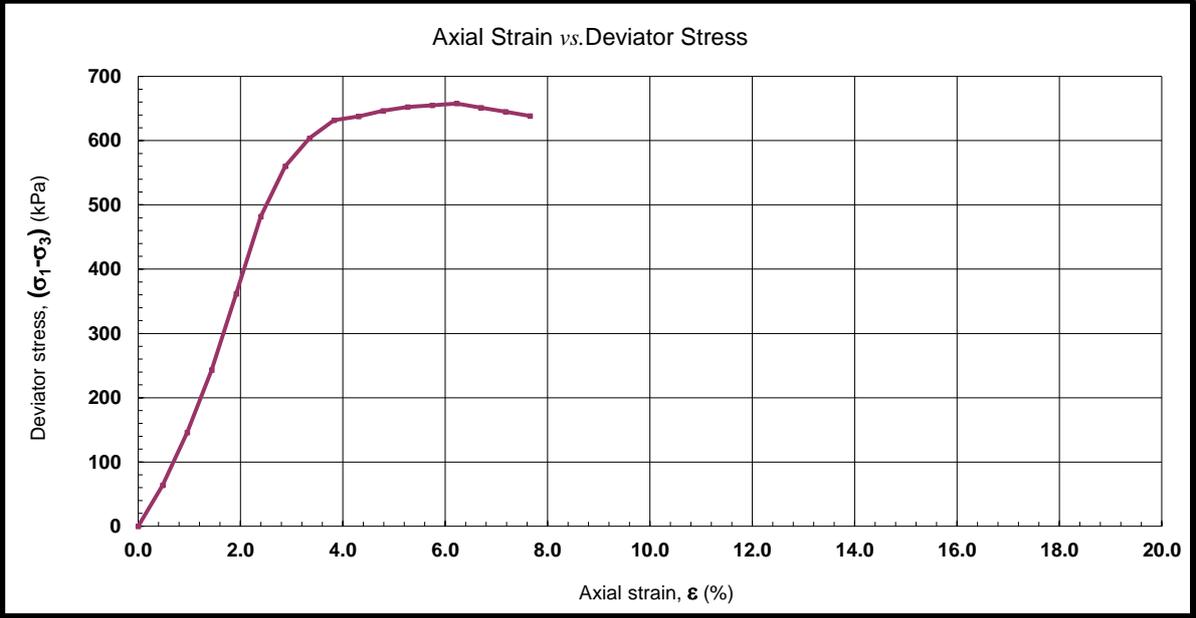
Certificate of Test

Determination of the Undrained Shear Strength in Triaxial Compression BS 1377 : Part 7 : 1990 Clause 8

Client Name: Irish Drilling Limited	Contract: WSP Lot 1, Parteen Weir
Address: Loughrea	Site Address: N/A
Galway	IDL Project ID:2021T102
Co. Galway	

Sample No.:	RWI-BH010	Depth: 4.00-5.00m	File Reference: NMTL 3503
Sample Description: Brown slightly gravelly sandy silty CLAY			
Location:	WSP Lot 1, Parteen Weir	Date Sampled:	N/A
Sample Type:	Core	Sampled by:	Irish Drilling Ltd
Client Sample Ref.:	RWI-BH010-C-4.00-5.00m	Sampling Cert. Recd.:	No
Source / Supplier:	IDL	Date Received:	04 March 2022
Specification:	BS 1377: Part 7: 1990 Clause 8	Date Tested:	14 March 2022

Specimen		Test	
Length:	209.0 mm	Diameter:	102.5 mm
Area:	8251.6 mm ²	Volume:	1724.6 cm ³
Mass:	4192.5 g	Membrane type:	Latex
Moisture content:	7.9 %	Membrane thickness:	0.3 mm
Bulk density:	2.43 Mg m ⁻³	Membrane correction:	0.87
Dry density:	2.25 Mg m ⁻³	Sample state:	Undisturbed
Preparation Method:	BS 1377: Part 1: 1990 Clause 8 .3.1	Number of stages:	Single
		Rate of strain:	1.0 % min ⁻¹
		Cell pressure: σ_3	100 kPa



Maximum Corrected Deviator Stress at Failure:	$(\sigma_1 - \sigma_3)_f$	657.7 kPa	
Strain at Failure:	ϵ	6.22 %	
Maximum Cohesion / Shear Strength:	C_u	328.9 kPa	
Type of Failure:		Brittle	

Signed	Remarks: Specimen prepared with high speed diamond cutting wheel.	
	Authorised Signatories	
	<input type="checkbox"/> N Chana	Original to: Client Rep.
For NMTL Ltd	<input type="checkbox"/> B Chana	Copy 1 to: File copy
	17 May 2022	

Certificate of Test

Determination of the Multistage Undrained Shear Strength in Triaxial Compression BS 1377 : Part 7 : 1990 Clause 8

Client Name:	Irish Drilling Limited	Contract:	WSP Lot 1, Parteen Weir
Address:	Loughrea Galway Co. Galway	Site Address:	N/A IDL Project ID:2021T102

Sample No.:	RWI-BH010	Depth:	9.0-9.50m	File Reference:	NMTL 3503
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Sample Description: **Brown slightly sandy slightly gravelly clayey SILT.**

Location:	WSP Lot 1, Parteen Weir	Date Sampled:	N/A
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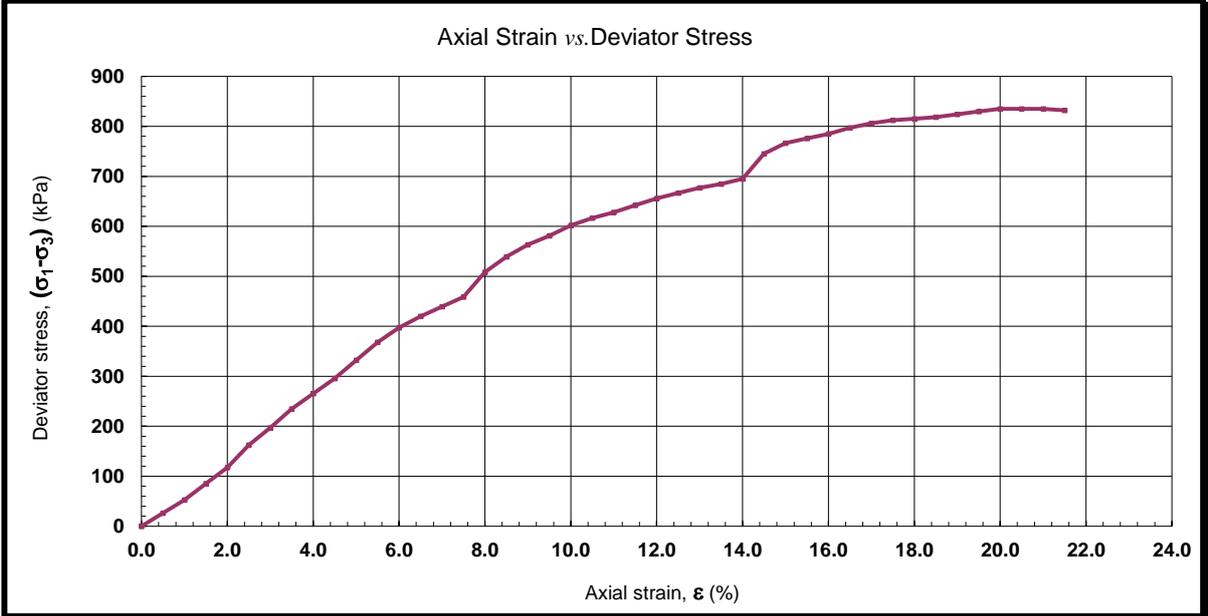
Sample Type:	Core	Sampled by:	Irish Drilling Ltd
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Client Sample Ref.:	RWI-BH010-C-9.0-9.50m	Sampling Cert. Recd.:	No
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Source / Supplier:	IDL	Date Received:	04 March 2022
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Specification:	BS 1377: Part 7: 1990 Clause 8	Date Tested:	14 March 2022
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Specimen		Test	
Length:	200.0 mm	Diameter:	100.5 mm
Area:	7932.7 mm ²	Volume:	1586.5 cm ³
Mass:	3758.9 g	Membrane type:	Latex
Moisture content:	11.1 %	Membrane thickness:	0.3 mm
Bulk density:	2.37 Mg m ⁻³	Membrane correction:	1.05 1.96 2.80
Dry density:	2.13 Mg m ⁻³	Sample state:	Undisturbed
Preparation Method:	BS 1377: Part 1: 1990 Clause 8 .3.1	Number of stages:	Multistage
		Rate of strain:	1.0 % min ⁻¹
		Cell pressure:	σ_3 200-400-600 kPa



Maximum Corrected Deviator Stress at Failure:	$(\sigma_1 - \sigma_3)_f$	458.7	695.1	835.1	kPa
Strain at Failure:	ϵ	7.50	14.00	20.00	%
Maximum Cohesion / Shear Strength:	C_u	229.3	347.6	417.5	kPa
Type of Failure:		Plastic			

Signed	Remarks: Specimen prepared with high speed diamond cutting wheel.
For NMTL Ltd Authorised Signatories <input type="checkbox"/> N Chana <input type="checkbox"/> B Chana 17 May 2022	Original to: Client Rep. Copy 1 to: File copy

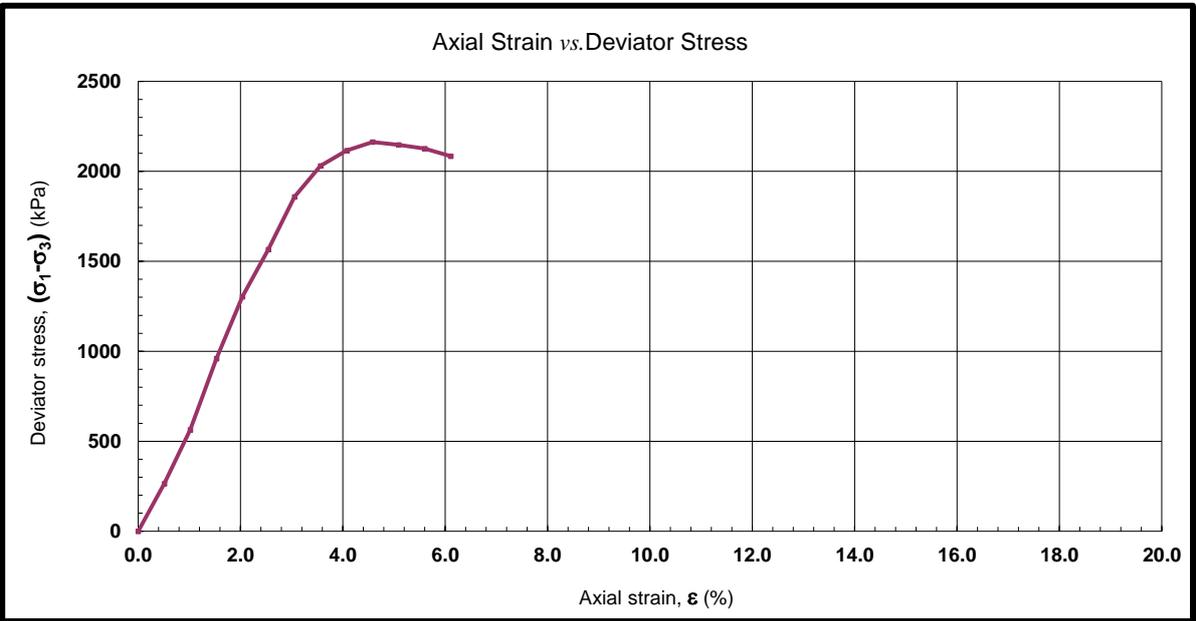
Certificate of Test

Determination of the Undrained Shear Strength in Triaxial Compression BS 1377 : Part 7 : 1990 Clause 8

Client Name: Irish Drilling Limited	Contract: WSP Lot 1, Parteen Weir
Address: Loughrea	Site Address: N/A
Galway	IDL Project ID:2021T102
Co. Galway	

Sample No.:	RWI-BH013	Depth: 6.50-7.00m	File Reference: NMTL 3503
Sample Description: Brown slightly gravelly sandy clayey SILT.			
Location:	WSP Lot 1, Parteen Weir	Date Sampled:	N/A
Sample Type:	Core	Sampled by:	Irish Drilling Ltd
Client Sample Ref.:	RWI-BH013-C-6.50-7.00m	Sampling Cert. Recd.:	No
Source / Supplier:	IDL	Date Received:	04 March 2022
Specification:	BS 1377: Part 7: 1990 Clause 8	Date Tested:	14 March 2022

Specimen		Test	
Length:	196.5 mm	Diameter:	100.0 mm
Area:	7854.0 mm ²	Volume:	1543.3 cm ³
Mass:	3603.6 g	Membrane type:	Latex
Moisture content:	4.5 %	Membrane thickness:	0.3 mm
Bulk density:	2.33 Mg m ⁻³	Membrane correction:	0.64
Dry density:	2.24 Mg m ⁻³	Sample state:	Undisturbed
Preparation Method:	BS 1377: Part 1: 1990 Clause 8 .3.1	Number of stages:	Single
		Rate of strain:	1.0 % min ⁻¹
		Cell pressure: σ_3	130 kPa



Maximum Corrected Deviator Stress at Failure:	$(\sigma_1 - \sigma_3)_f$	2162.8 kPa	
Strain at Failure:	ϵ	4.58 %	
Maximum Cohesion / Shear Strength:	C_u	1081.4 kPa	
Type of Failure:		Brittle	

Signed	Remarks: Specimen prepared with high speed diamond cutting wheel.	Original to: Client Rep.
	Authorised Signatories	Copy 1 to: File copy
	<input type="checkbox"/> N Chana	
For NMTL Ltd	<input type="checkbox"/> B Chana	
	19 July 2022	

Certificate of Test

Determination of the Multistage Undrained Shear Strength in Triaxial Compression BS 1377 : Part 7 : 1990 Clause 8

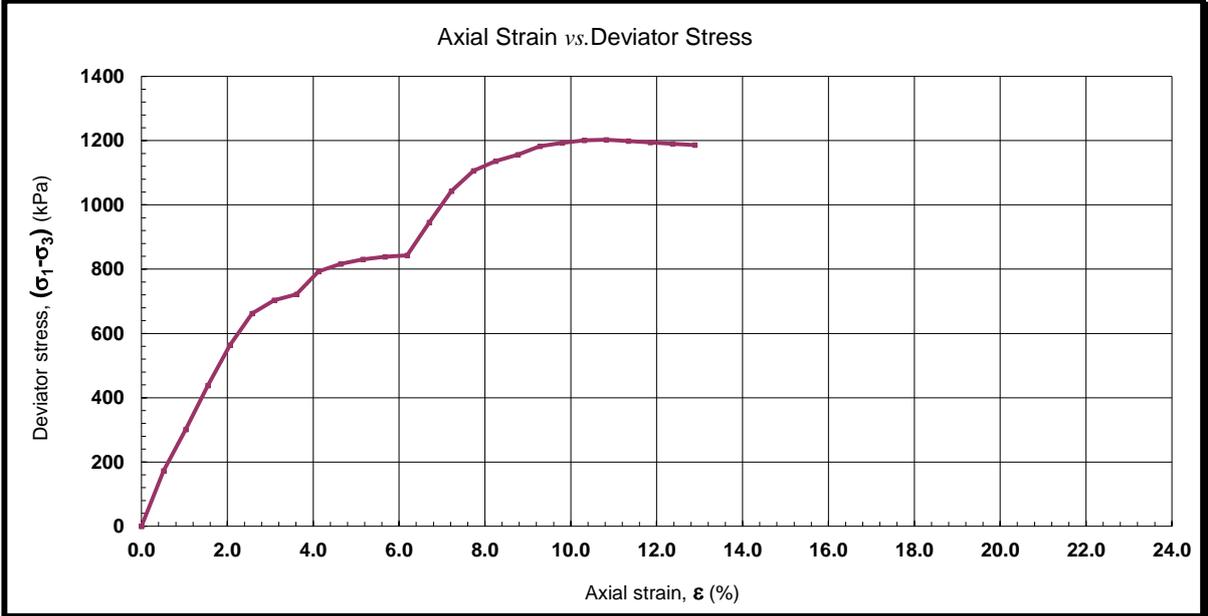
Client Name:	Irish Drilling Limited	Contract:	WSP Lot 1, Parteen Weir
Address:	Loughrea Galway Co. Galway	Site Address:	N/A IDL Project ID:2021T102

Sample No.:	RWI-BH013	Depth:	11.20-11.70m	File Reference:	NMTL 3503
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Sample Description: **Red/brown slightly sandy slightly gravelly SILT/CLAY.**

Location:	WSP Lot 1, Parteen Weir	Date Sampled:	N/A
Sample Type:	Core	Sampled by:	Irish Drilling Ltd
Client Sample Ref.:	RWI-BH013-C-11.20-11.70m	Sampling Cert. Recd.:	No
Source / Supplier:	IDL	Date Received:	04 March 2022
Specification:	BS 1377: Part 7: 1990 Clause 8	Date Tested:	14 March 2022

Specimen		Test	
Length:	194.0 mm	Diameter:	101.5 mm
Area:	8091.4 mm ²	Volume:	1569.7 cm ³
Mass:	3538.9 g	Membrane type:	Latex
Moisture content:	7.5 %	Membrane thickness:	0.3 mm
Bulk density:	2.25 Mg m ⁻³	Membrane correction:	0.51 0.94 1.52
Dry density:	2.10 Mg m ⁻³	Sample state:	Undisturbed
Preparation Method:	BS 1377: Part 1: 1990 Clause 8 .3.1	Number of stages:	Multistage
		Rate of strain:	1.0 % min ⁻¹
		Cell pressure:	σ_3 110-220-440 kPa



Maximum Corrected Deviator Stress at Failure:	$(\sigma_1 - \sigma_3)_f$	721.3	944.9	1202.9	kPa
Strain at Failure:	ϵ	3.61	6.70	10.82	%
Maximum Cohesion / Shear Strength:	C_u	360.7	472.4	601.4	kPa
Type of Failure:		Brittle			

Signed	Remarks: Specimen prepared with high speed diamond cutting wheel.
For NMTL Ltd Authorised Signatories <input type="checkbox"/> N Chana <input type="checkbox"/> B Chana 17 May 2022	Original to: Client Rep. Copy 1 to: File copy

Certificate of Test

Determination of the Multistage Undrained Shear Strength in Triaxial Compression BS 1377 : Part 7 : 1990 Clause 8

Client Name:	Irish Drilling Limited	Contract:	WSP Lot 1, Parteen Weir
Address:	Loughrea Galway Co. Galway	Site Address:	N/A IDL Project ID:2021T102

Sample No.:	RWI-BH014	Depth:	5.00-6.50m	File Reference:	NMTL 3503
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Sample Description: **Red/brown slightly sandy slightly gravelly SILT/CLAY.**

Location:	WSP Lot 1, Parteen Weir	Date Sampled:	N/A
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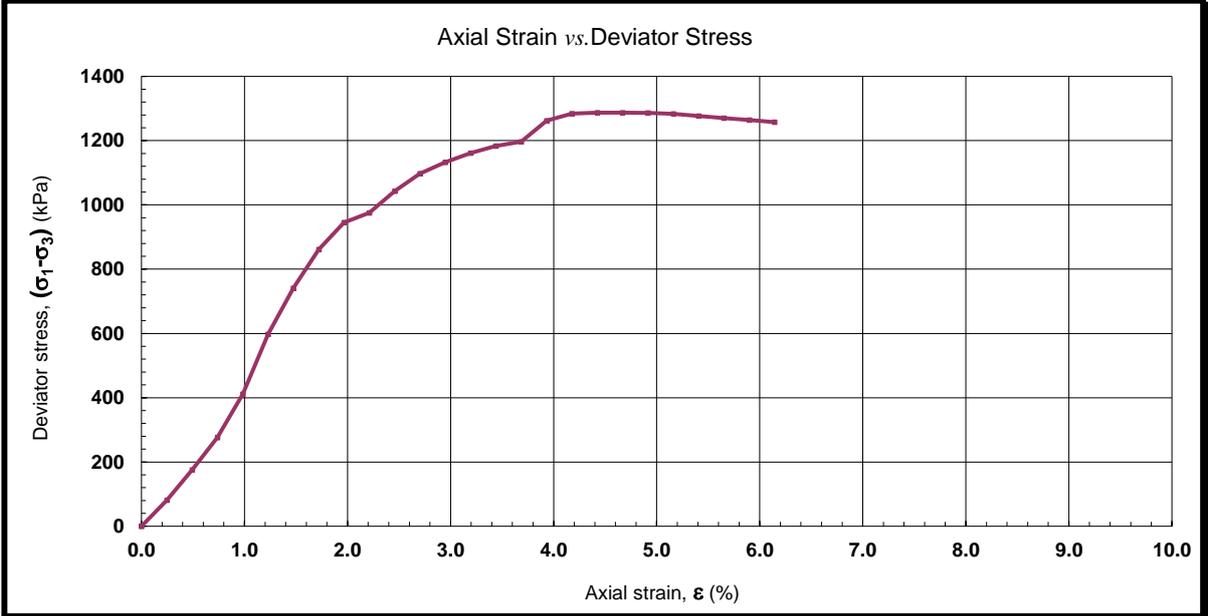
Sample Type:	Core	Sampled by:	Irish Drilling Ltd
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Client Sample Ref.:	RWI-BH014-C-5.00-6.50m	Sampling Cert. Recd.:	No
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Source / Supplier:	IDL	Date Received:	04 March 2022
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Specification:	BS 1377: Part 7: 1990 Clause 8	Date Tested:	15 March 2022
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Specimen		Test	
Length:	203.5 mm	Diameter:	101.5 mm
Area:	8091.4 mm ²	Volume:	1646.6 cm ³
Mass:	3927.1 g	Membrane type:	Latex
Moisture content:	6.5 %	Membrane thickness:	0.3 mm
Bulk density:	2.38 Mg m ⁻³	Membrane correction:	0.31 0.52 0.62
Dry density:	2.24 Mg m ⁻³	Sample state:	Undisturbed
Preparation Method:	BS 1377: Part 1: 1990 Clause 8 .3.1	Number of stages:	Multistage
		Rate of strain:	1.0 % min ⁻¹
		Cell pressure: σ_3	100-200-300 kPa



Maximum Corrected Deviator Stress at Failure:	$(\sigma_1 - \sigma_3)_f$	975.0	1196.3	1287.1	kPa
Strain at Failure:	ϵ	2.21	3.69	4.42	%
Maximum Cohesion / Shear Strength:	C_u	487.5	598.2	643.5	kPa
Type of Failure:		Brittle			

Signed	Remarks: Specimen prepared with high speed diamond cutting wheel.
For NMTL Ltd Authorised Signatories <input type="checkbox"/> N Chana <input type="checkbox"/> B Chana 17 May 2022	Original to: Client Rep. Copy 1 to: File copy

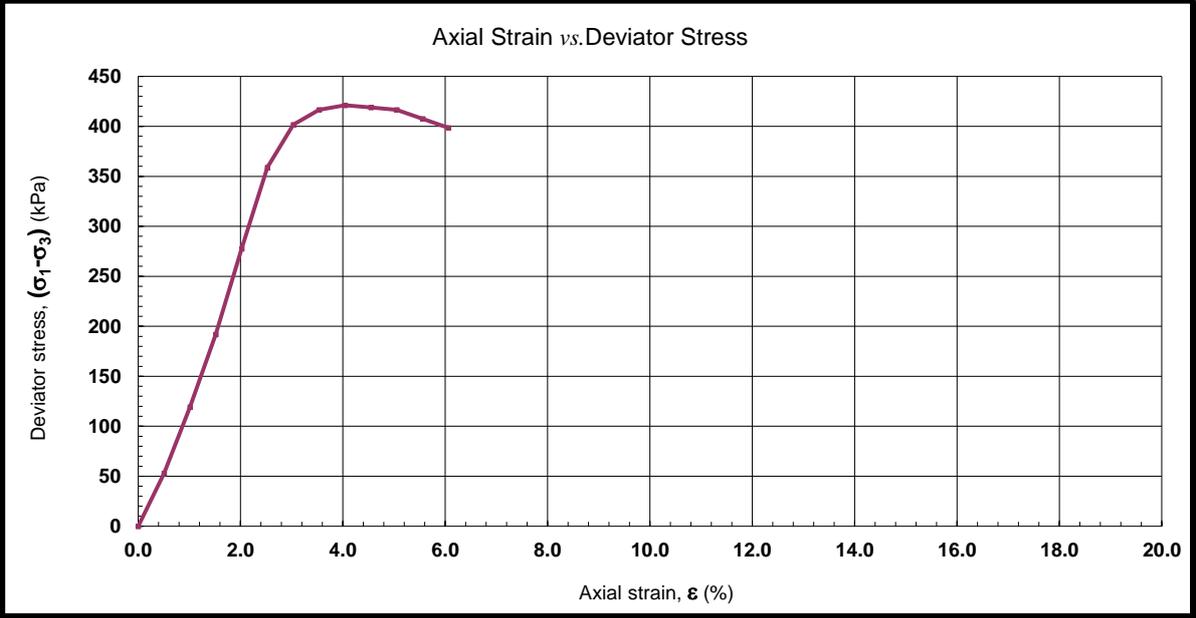
Certificate of Test

Determination of the Undrained Shear Strength in Triaxial Compression BS 1377 : Part 7 : 1990 Clause 8

Client Name: Irish Drilling Limited	Contract: WSP Lot 1, Parteen Weir
Address: Loughrea Galway Co. Galway	Site Address: N/A IDL Project ID:2021T102

Sample No.:	RWI-BH014	Depth:	11.00-11.50m	File Reference:	NMTL 3503
Sample Description:	Brown slightly sandy slightly gravelly clayey SILT.				
Location:	WSP Lot 1, Parteen Weir	Date Sampled:	N/A		
Sample Type:	Core	Sampled by:	Irish Drilling Ltd		
Client Sample Ref.:	RWI-BH014-C-11.00-11.50m	Sampling Cert. Recd.:	No		
Source / Supplier:	IDL	Date Received:	04 March 2022		
Specification:	BS 1377: Part 7: 1990 Clause 8	Date Tested:	14 March 2022		

Specimen		Test	
Length:	198.0 mm	Diameter:	97.5 mm
Area:	7466.2 mm ²	Volume:	1478.3 cm ³
Mass:	3246.8 g	Membrane type:	Latex
Moisture content:	8.1 %	Membrane thickness:	0.3 mm
Bulk density:	2.20 Mg m ⁻³	Membrane correction:	0.57
Dry density:	2.03 Mg m ⁻³	Sample state:	Undisturbed
Preparation Method:	BS 1377: Part 1: 1990 Clause 8 .3.1	Number of stages:	Single
		Rate of strain:	1.0 % min ⁻¹
		Cell pressure:	σ_3 220 kPa



Maximum Corrected Deviator Stress at Failure:	$(\sigma_1 - \sigma_3)_f$	421.1 kPa
Strain at Failure:	ϵ	4.04 %
Maximum Cohesion / Shear Strength:	C_u	210.6 kPa
Type of Failure:		Brittle

Signed	Remarks: Specimen prepared with high speed diamond cutting wheel.
For NMTL Ltd	Original to: Client Rep. Copy 1 to: File copy
Authorised Signatories <input type="checkbox"/> N Chana <input type="checkbox"/> B Chana	17 May 2022

Certificate of Test

Determination of the Multistage Undrained Shear Strength in Triaxial Compression BS 1377 : Part 7 : 1990 Clause 8

Client Name:	Irish Drilling Limited	Contract:	WSP Lot 1, Parteen Weir
Address:	Loughrea Galway Co. Galway	Site Address:	N/A IDL Project ID:2021T102

Sample No.:	RWI-BH015	Depth:	5.50-6.00m	File Reference:	NMTL 3503
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Sample Description: **Red/brown slightly gravelly sandy silty CLAY.**

Location:	WSP Lot 1, Parteen Weir	Date Sampled:	N/A
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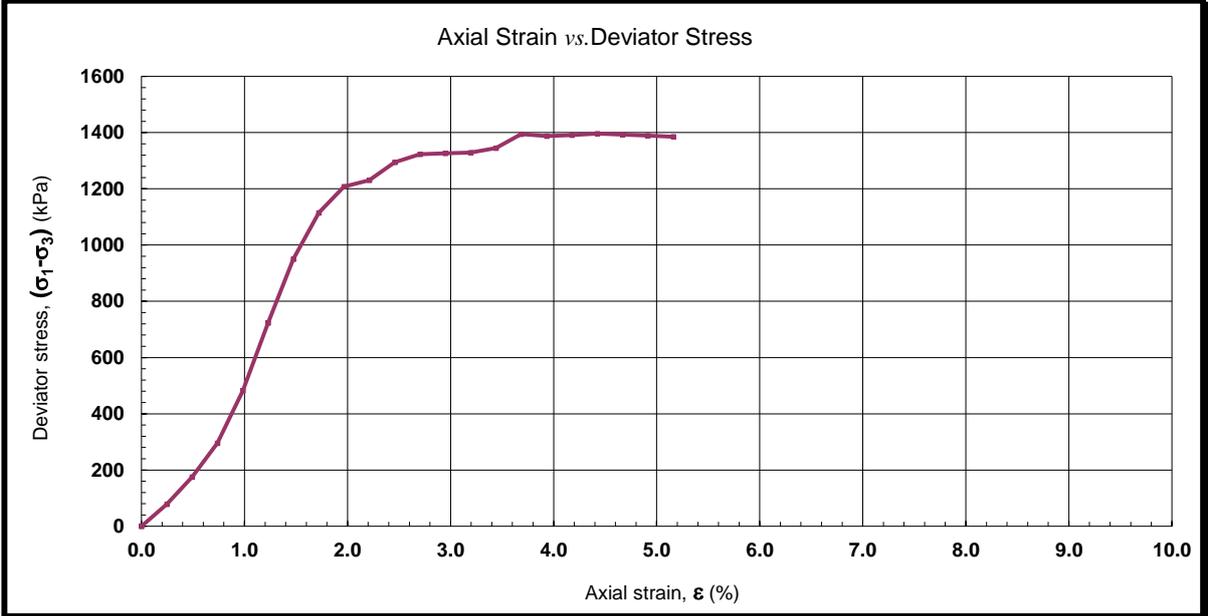
Sample Type:	Core	Sampled by:	Irish Drilling Ltd
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Client Sample Ref.:	RWI-BH015-C-5.50-6.00m	Sampling Cert. Recd.:	No
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Source / Supplier:	IDL	Date Received:	04 March 2022
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Specification:	BS 1377: Part 7: 1990 Clause 8	Date Tested:	15 March 2022
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Specimen		Test	
Length:	203.5 mm	Diameter:	101.5 mm
Area:	8091.4 mm ²	Volume:	1646.6 cm ³
Mass:	3867.9 g	Membrane type:	Latex
Moisture content:	6.0 %	Membrane thickness:	0.3 mm
Bulk density:	2.35 Mg m ⁻³	Membrane correction:	0.31 0.45 0.65
Dry density:	2.22 Mg m ⁻³	Sample state:	Undisturbed
Preparation Method:	BS 1377: Part 1: 1990 Clause 8 .3.1	Number of stages:	Multistage
		Rate of strain:	1.0 % min ⁻¹
		Cell pressure: σ_3	100-200-300 kPa



Maximum Corrected Deviator Stress at Failure:	$(\sigma_1 - \sigma_3)_f$	1230.9	1329.1	1392.9	kPa
Strain at Failure:	ϵ	2.21	3.19	4.67	%
Maximum Cohesion / Shear Strength:	C_u	615.4	664.6	696.4	kPa
Type of Failure:		Brittle			

Signed	Remarks: Specimen prepared with high speed diamond cutting wheel.
For NMTL Ltd Authorised Signatories <input type="checkbox"/> N Chana <input type="checkbox"/> B Chana 19 July 2022	Original to: Client Rep. Copy 1 to: File copy

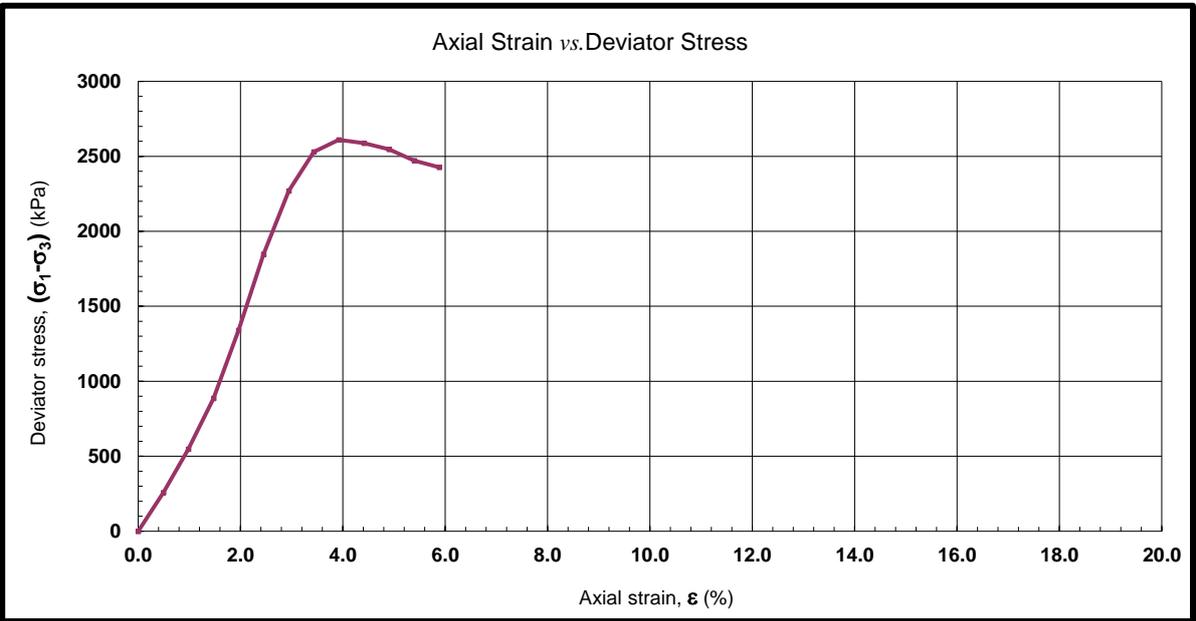
Certificate of Test

Determination of the Undrained Shear Strength in Triaxial Compression BS 1377 : Part 7 : 1990 Clause 8

Client Name:	Irish Drilling Limited	Contract:	WSP Lot 1, Parteen Weir
Address:	Loughrea Galway Co. Galway	Site Address:	N/A IDL Project ID:2021T102

Sample No.:	RWI-BH015	Depth:	6.50-8.00m	File Reference:	NMTL 3503
Sample Description:	Red/brown slightly sandy slightly gravelly SIL/CLAY				
Location:	WSP Lot 1, Parteen Weir	Date Sampled:	N/A		
Sample Type:	Core	Sampled by:	Irish Drilling Ltd		
Client Sample Ref.:	RWI-BH015-C-6.50-8.00m	Sampling Cert. Recd.:	No		
Source / Supplier:	IDL	Date Received:	04 March 2022		
Specification:	BS 1377: Part 7: 1990 Clause 8	Date Tested:	07 March 2022		

Specimen		Test	
Length:	204.0 mm	Diameter:	101.5 mm
Area:	8091.4 mm ²	Volume:	1650.6 cm ³
Mass:	3866.1 g	Membrane type:	Latex
Moisture content:	4.0 %	Membrane thickness:	0.3 mm
Bulk density:	2.34 Mg m ⁻³	Membrane correction:	0.55
Dry density:	2.25 Mg m ⁻³	Sample state:	Undisturbed
Preparation Method:	BS 1377: Part 1: 1990 Clause 8 .3.1	Number of stages:	Single
		Rate of strain:	1.0 % min ⁻¹
		Cell pressure:	σ_3 140 kPa



Maximum Corrected Deviator Stress at Failure:	$(\sigma_1 - \sigma_3)_f$	2610.4 kPa
Strain at Failure:	ϵ	3.92 %
Maximum Cohesion / Shear Strength:	C_u	1305.2 kPa
Type of Failure:		Brittle

Signed	Remarks: Specimen prepared with high speed diamond cutting wheel.
For NMTL Ltd Authorised Signatories <input type="checkbox"/> N Chana <input type="checkbox"/> B Chana 17 May 2022	Original to: Client Rep. Copy 1 to: File copy

Certificate of Test

Determination of the Multistage Undrained Shear Strength in Triaxial Compression BS 1377 : Part 7 : 1990 Clause 8

Client Name:	Irish Drilling Limited	Contract:	WSP Lot 1, Parteen Weir
Address:	Loughrea Galway Co. Galway	Site Address:	N/A IDL Project ID:2021T102

Sample No.:	RWI-BH016	Depth:	13.30-13.70m	File Reference:	NMTL 3503
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Sample Description: **Light brown slightly sandy slightly gravelly clayey SILT.**

Location:	WSP Lot 1, Parteen Weir	Date Sampled:	N/A
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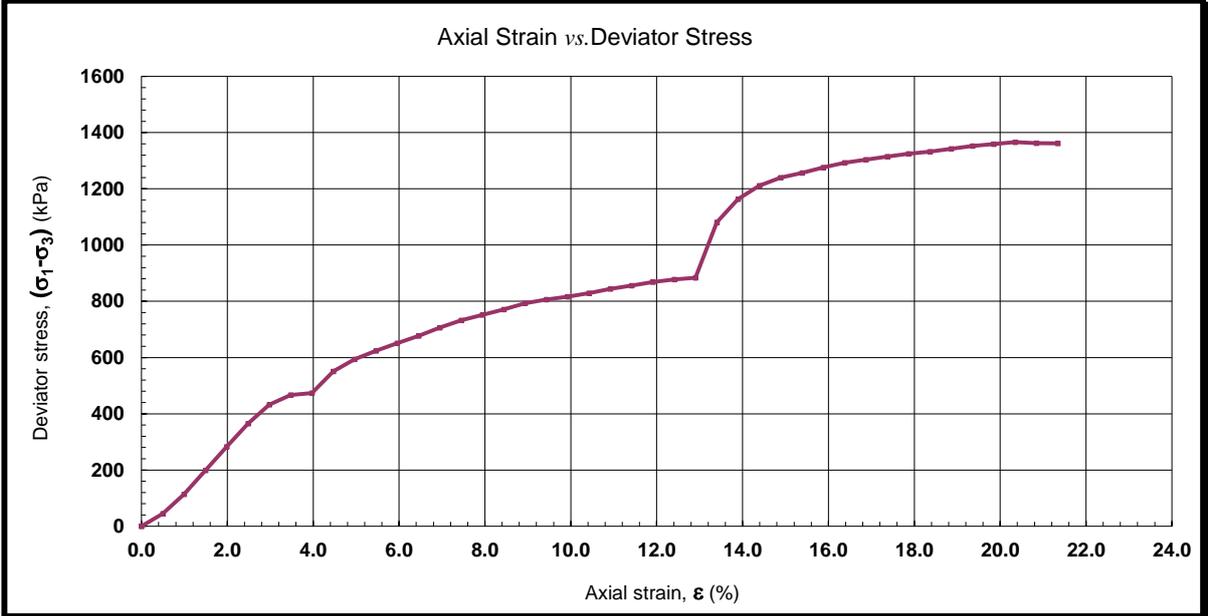
Sample Type:	Core	Sampled by:	Irish Drilling Ltd
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Client Sample Ref.:	RWI-BH016-C-13.30-13.70m	Sampling Cert. Recd.:	No
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Source / Supplier:	IDL	Date Received:	04 March 2022
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Specification:	BS 1377: Part 7: 1990 Clause 8	Date Tested:	15 March 2022
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Specimen		Test	
Length:	201.5 mm	Diameter:	102.5 mm
Area:	8251.6 mm ²	Volume:	1662.7 cm ³
Mass:	3995.1 g	Membrane type:	Latex
Moisture content:	9.3 %	Membrane thickness:	0.3 mm
Bulk density:	2.40 Mg m ⁻³	Membrane correction:	0.56 1.81 2.85
Dry density:	2.20 Mg m ⁻³	Sample state:	Undisturbed
Preparation Method:	BS 1377: Part 1: 1990 Clause 8 .3.1	Number of stages:	Multistage
		Rate of strain:	1.0 % min ⁻¹
		Cell pressure: σ_3	150-300-600 kPa



Maximum Corrected Deviator Stress at Failure:	$(\sigma_1 - \sigma_3)_f$	473.7	883.5	1366.2	kPa
Strain at Failure:	ϵ	3.97	12.90	20.35	%
Maximum Cohesion / Shear Strength:	C_u	236.8	441.8	683.1	kPa
Type of Failure:		Pl;astic			

Signed	Remarks: Specimen prepared with high speed diamond cutting wheel.
For NMTL Ltd Authorised Signatories <input type="checkbox"/> N Chana <input type="checkbox"/> B Chana 17 May 2022	Original to: Client Rep. Copy 1 to: File copy

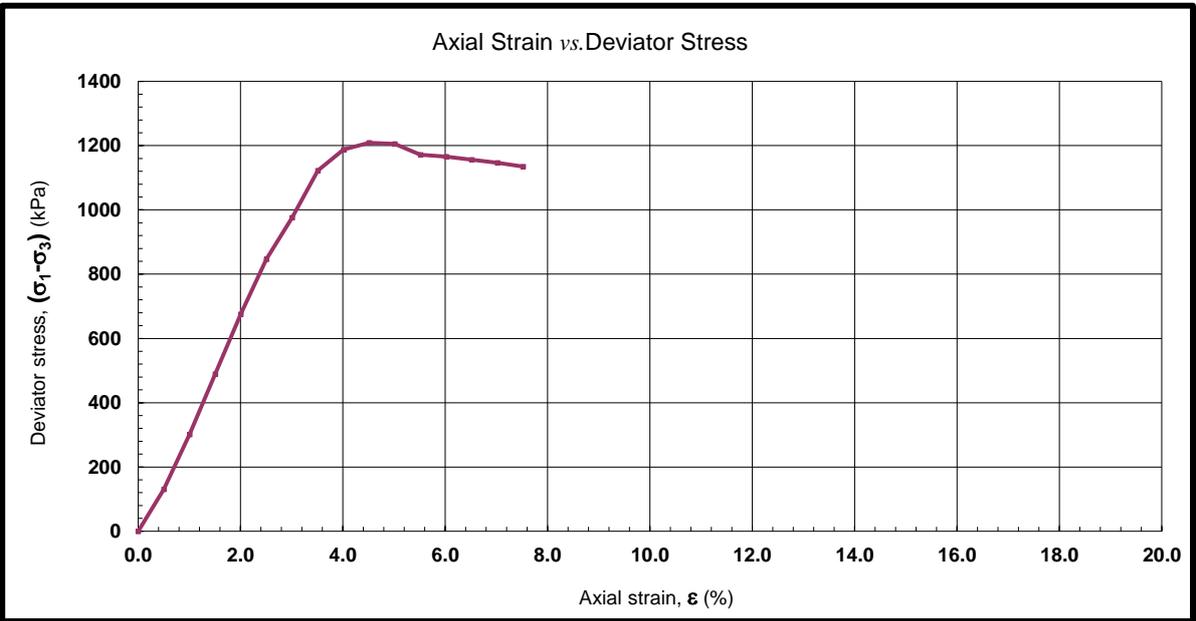
Certificate of Test

Determination of the Undrained Shear Strength in Triaxial Compression BS 1377 : Part 7 : 1990 Clause 8

Client Name:	Irish Drilling Limited	Contract:	WSP Lot 1, Parteen Weir
Address:	Loughrea Galway Co. Galway	Site Address:	N/A IDL Project ID:2021T102

Sample No.:	RWI-BH017	Depth:	6.50-8.00m	File Reference:	NMTL 3503
Sample Description:	Red/brown slightly gravelly sandy silty CLAY.				
Location:	WSP Lot 1, Parteen Weir	Date Sampled:	N/A		
Sample Type:	Core	Sampled by:	Irish Drilling Ltd		
Client Sample Ref.:	RWI-BH017-C-6.50-8.00m	Sampling Cert. Recd.:	No		
Source / Supplier:	IDL	Date Received:	04 March 2022		
Specification:	BS 1377: Part 7: 1990 Clause 8	Date Tested:	16 March 2022		

Specimen		Test	
Length:	199.5 mm	Diameter:	102.5 mm
Area:	8251.6 mm ²	Volume:	1646.2 cm ³
Mass:	3925.7 g	Membrane type:	Latex
Moisture content:	6.8 %	Membrane thickness:	0.3 mm
Bulk density:	2.38 Mg m ⁻³	Membrane correction:	0.63
Dry density:	2.23 Mg m ⁻³	Sample state:	Undisturbed
Preparation Method:	BS 1377: Part 1: 1990 Clause 8 .3.1	Number of stages:	Single
		Rate of strain:	1.0 % min ⁻¹
		Cell pressure:	σ_3 130 kPa



Maximum Corrected Deviator Stress at Failure:	$(\sigma_1 - \sigma_3)_f$	1208.9 kPa
Strain at Failure:	ϵ	4.51 %
Maximum Cohesion / Shear Strength:	C_u	604.4 kPa
Type of Failure:		Brittle

Signed	Remarks: Specimen prepared with high speed diamond cutting wheel.
For NMTL Ltd Authorised Signatories <input type="checkbox"/> N Chana <input type="checkbox"/> B Chana 17 May 2022	Original to: Client Rep. Copy 1 to: File copy

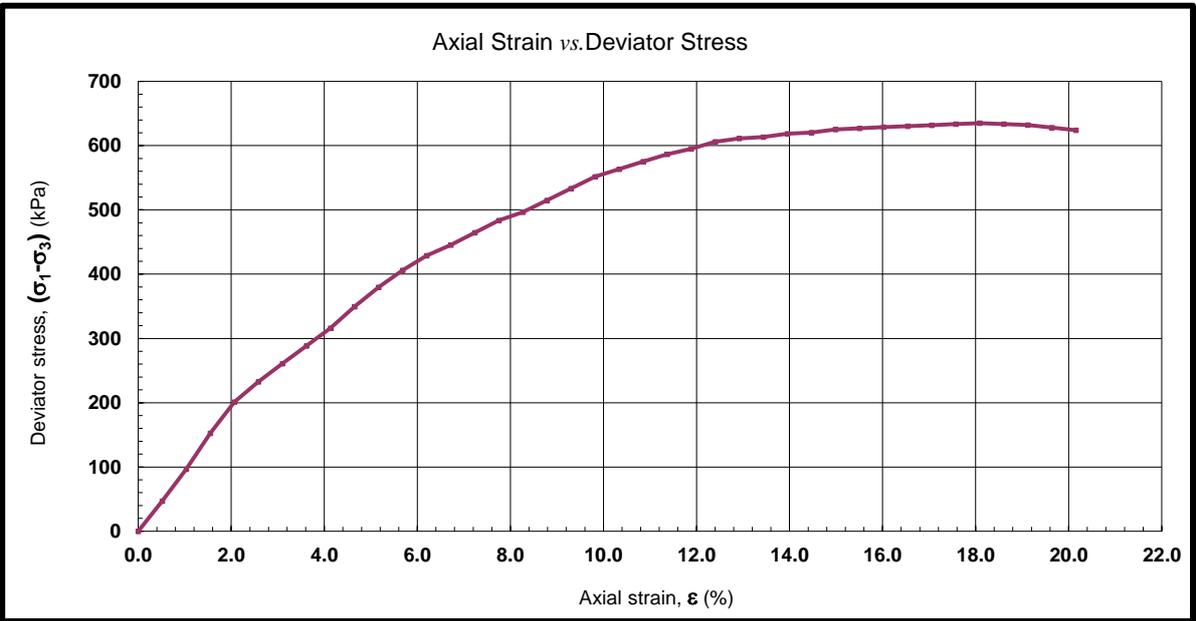
Certificate of Test

Determination of the Undrained Shear Strength in Triaxial Compression BS 1377 : Part 7 : 1990 Clause 8

Client Name:	Irish Drilling Limited	Contract:	WSP Lot 1, Parteen Weir
Address:	Loughrea Galway Co. Galway	Site Address:	N/A IDL Project ID:2021T102

Sample No.:	RWI-BH017	Depth:	12.00-12.50m	File Reference:	NMTL 3503
Sample Description: Brown slightly sandy slightly gravelly SILT/ CLAY.					
Location:	WSP Lot 1, Parteen Weir	Date Sampled:	N/A		
Sample Type:	Core	Sampled by:	Irish Drilling Ltd		
Client Sample Ref.:	RWI-BH017-C-12.00-12.50m	Sampling Cert. Recd.:	No		
Source / Supplier:	IDL	Date Received:	04 March 2022		
Specification:	BS 1377: Part 7: 1990 Clause 8	Date Tested:	16 March 2022		

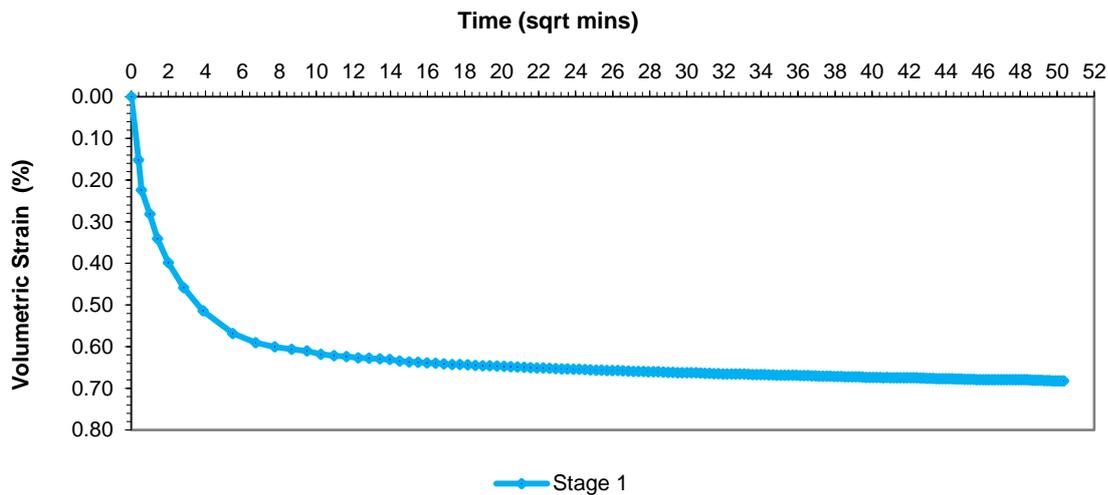
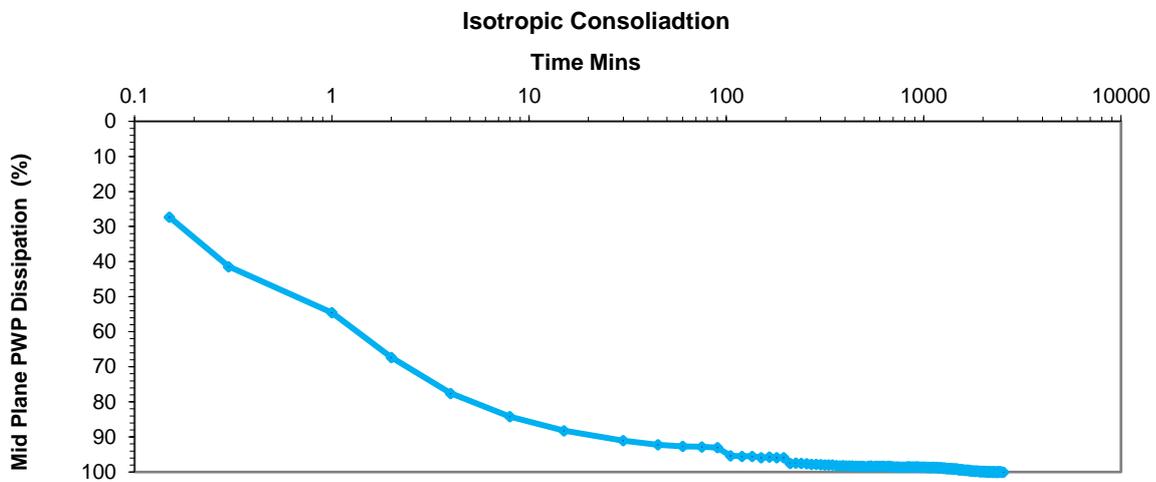
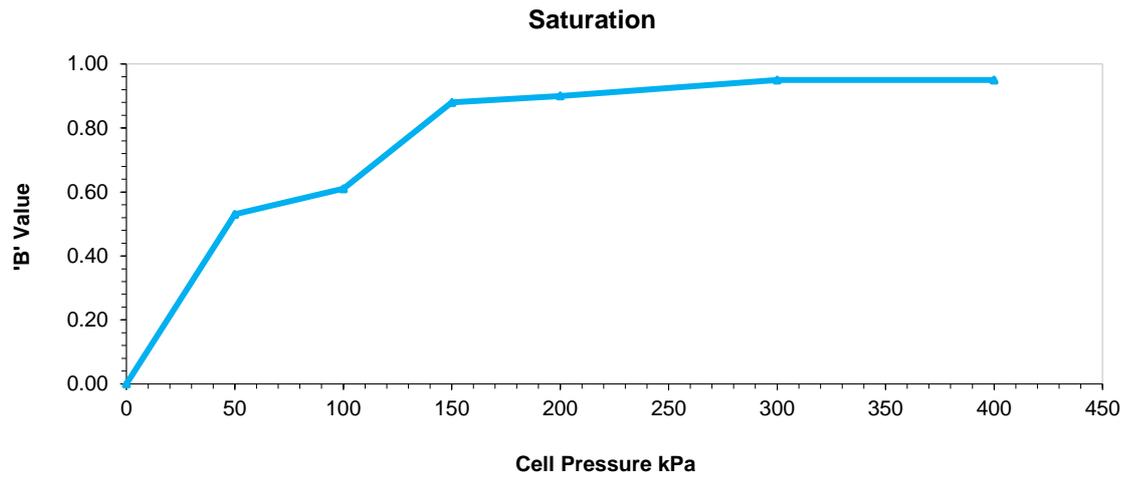
Specimen		Test	
Length:	193.5 mm	Diameter:	100.0 mm
Area:	7854.0 mm ²	Volume:	1519.7 cm ³
Mass:	3438.1 g	Membrane type:	Latex
Moisture content:	10.1 %	Membrane thickness:	0.3 mm
Bulk density:	2.26 Mg m ⁻³	Membrane correction:	2.53
Dry density:	2.06 Mg m ⁻³	Sample state:	Undisturbed
Preparation Method:	BS 1377: Part 1: 1990 Clause 8 .3.1	Number of stages:	Single
		Rate of strain:	1.0 % min ⁻¹
		Cell pressure:	σ_3 240 kPa



Maximum Corrected Deviator Stress at Failure:	$(\sigma_1 - \sigma_3)_f$	634.9 kPa
Strain at Failure:	ϵ	18.09 %
Maximum Cohesion / Shear Strength:	C_u	317.5 kPa
Type of Failure:		Plastic

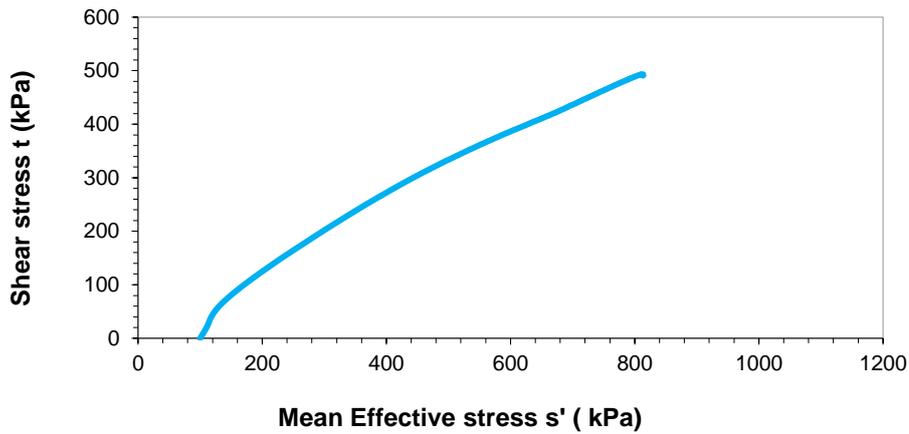
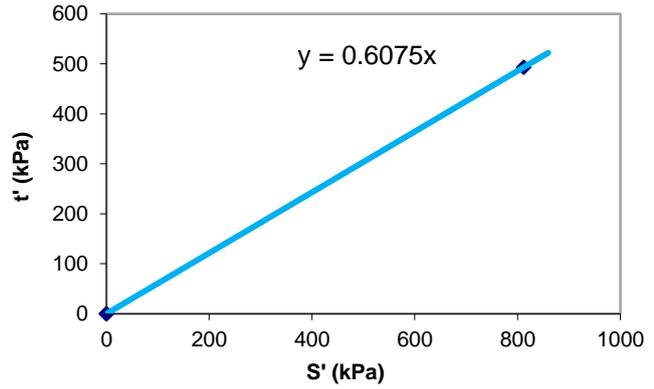
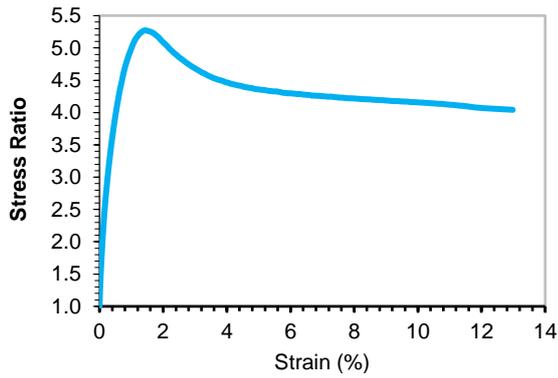
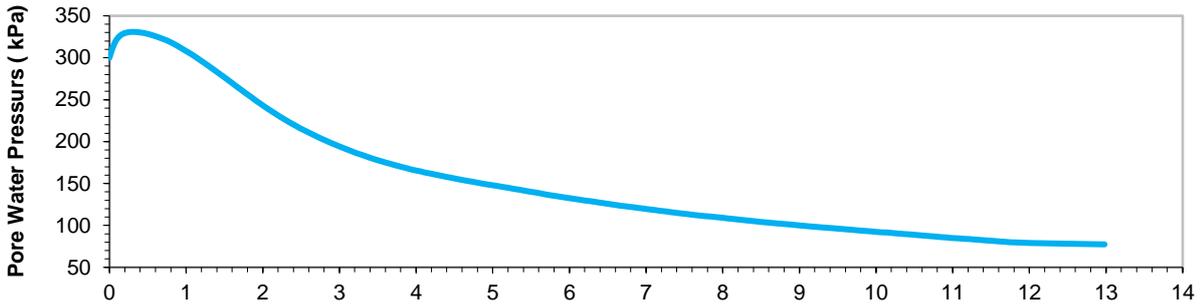
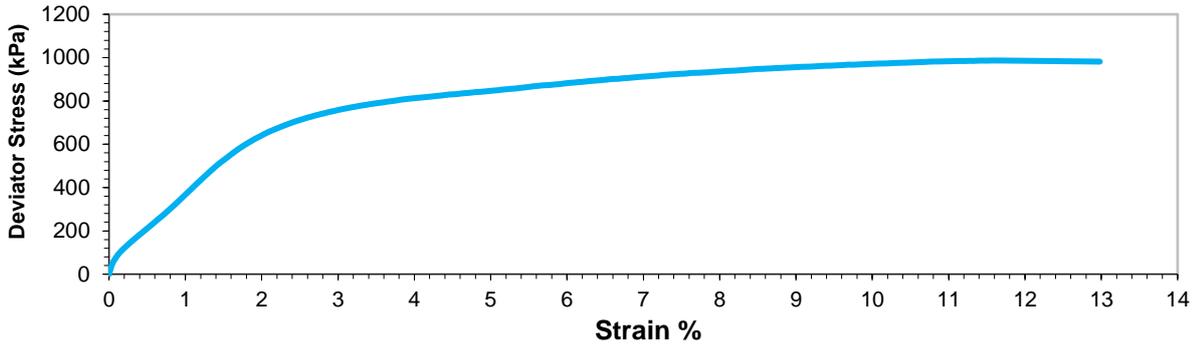
Signed	Remarks: Specimen prepared with high speed diamond cutting wheel.
For NMTL Ltd	Original to: Client Rep. Copy 1 to: File copy
Authorised Signatories <input type="checkbox"/> N Chana <input type="checkbox"/> B Chana	17 May 2022

SUMMARY OF TEST RESULTS						
		Initial			Initial	Final
Hall Effect Gauge length	mm	n/a	Bulk Density	Mg/m3	2.39	2.42
Specimen Length	mm	207.50	Dry Density	Mg/m3	2.23	2.25
Specimen Diameter	mm	101.50	Moisture	%	7.16	7.45
Area	mm2	8091.37	Saturation	%	92.54	100.30
Volume	cc	1678.96	Sg(Assumed)	2.70		
Saturation Stage						
Test Stage	Cell Pressure (kPa)		Pore Pressure Parameter 'B' Base			
0	0		0			
1	50		0.53			
2	100		0.61			
3	150		0.88			
4	200		0.90			
5	300		0.95			
Isotropic Consolidation Stage						
		Stage 1				
Cell Pressure	kPa	400				
Pore Pressure	kPa	383.8				
Back Pressure	kPa	300				
Drainage Method		One End & Radial Boundary				
t100 (min)		27.0				
Coef. Of Consolidation Cv	m2/year	7.766				
Coef. Of Compressibility Mv	m2/MN	0.081				
Permeability k	m/sec	1.96E-10				
		Stage 1				
Deviator Stress (kPa)		986.7				
External Axial Strain (%)		11.57				
Shear Stress (kPa)		493.4				
Peak Stress Ratio		5.27				
Pore Water Pressure (kPa)		-218.7				
Radial Effective Stress (kPa)		318.7				
Axial Effective Stress (kPa)		1305.4				
Effective angle of friction (Degrees)		37.6				
Cohesion c' (kPa)		0				
Rate of strain mm/min		0.0067				
Sample Description		Red/brown slightly sandy slightly gravelly silty CLAY.				
		Plastic Failure				
NM	TL	Consolidated Undrained Single Triaxial test with PWP measurement. Tested in accordance with BS:1377 Part 8			Project No.	NMTL-3503
		Project:			Borehole No.	RWI-BH08
	Ltd	WSP lot 1, Parteen Weir			Sample No.	C
					Depth.	5.0-5.60m



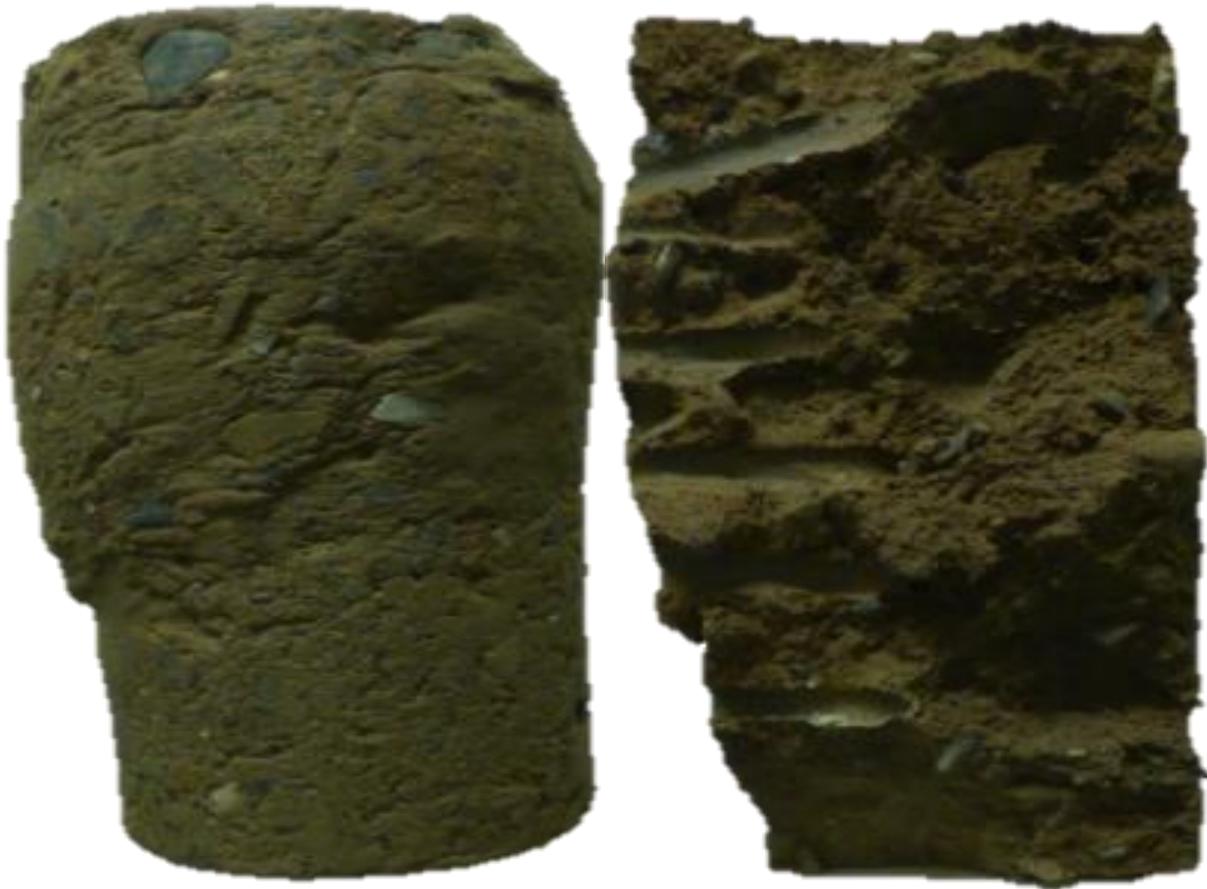
NM TL Ltd	Consolidated Undrained Single Triaxial test with PWP measurement. Tested in accordance with BS:1377 Part 8	Project No. NMTL-3503 Borehole No. RWI-BH08
	Project: WSP lot 1, Parteen Weir	Sample No. C Depth. 5.0-5.60m

Shear Stage



NM TL Ltd	Consolidated Undrained Single Triaxial test with PWP measurement. Tested in accordance with BS:1377 Part 8	Project No. NMTL-3503 Borehole No. RWI-BH08 Sample No. C Depth. 5.0-5.60m
	Project: WSP lot 1, Parteen Weir	

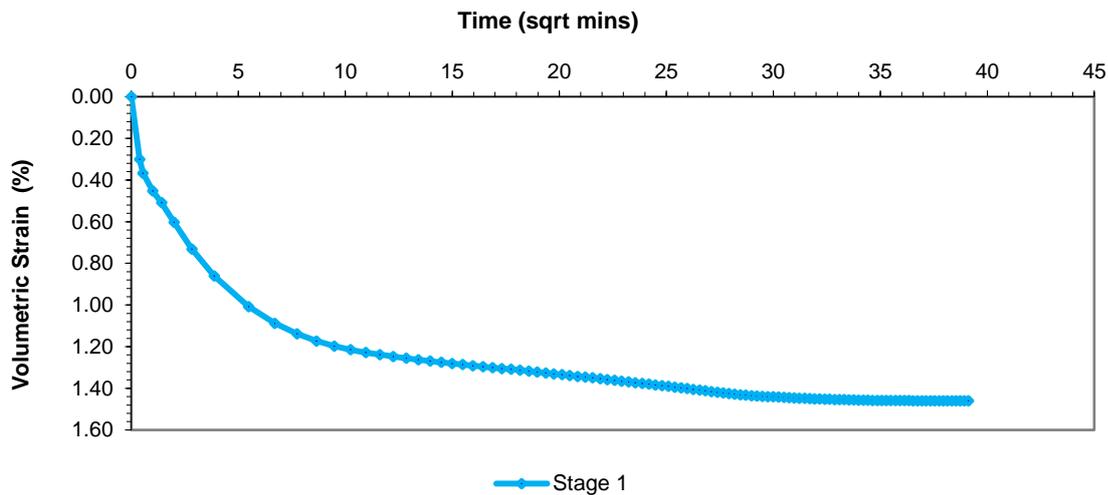
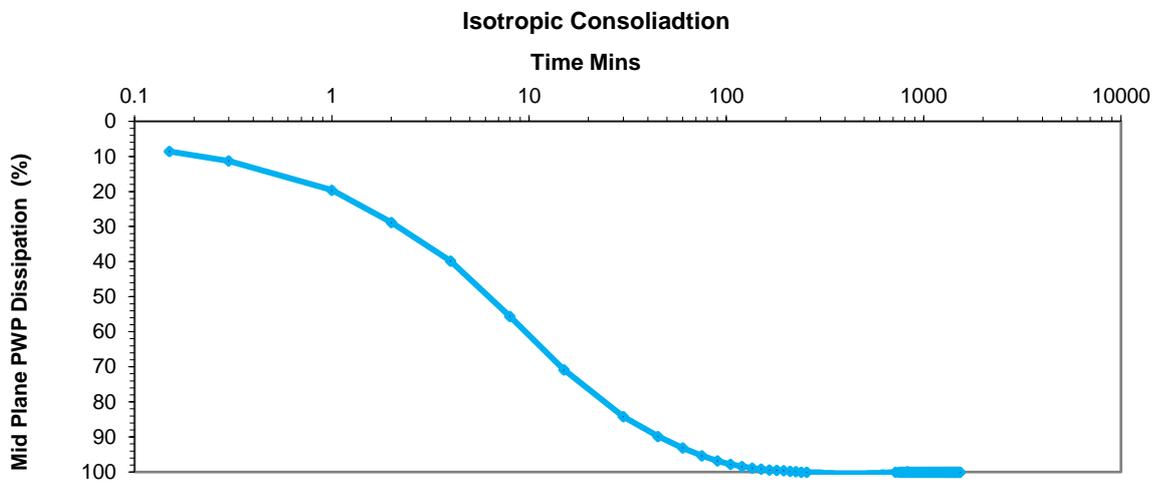
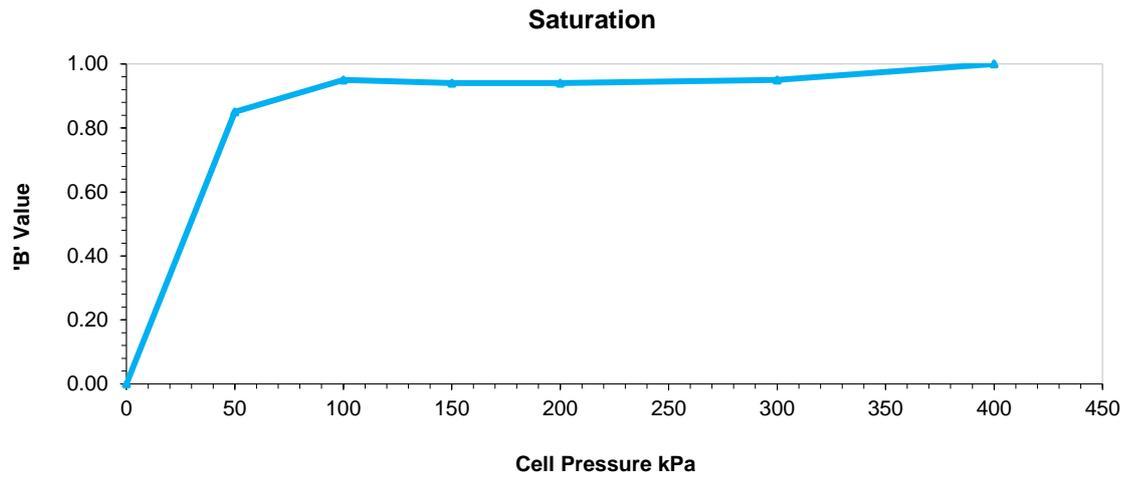
SPECIMEN AFTER TEST



Soil Description Red/brown slightly sandy slightly gravelly silty CLAY.

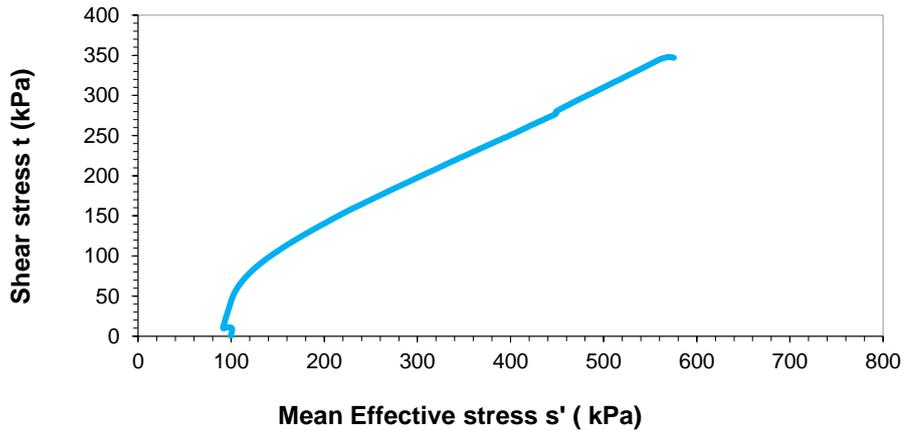
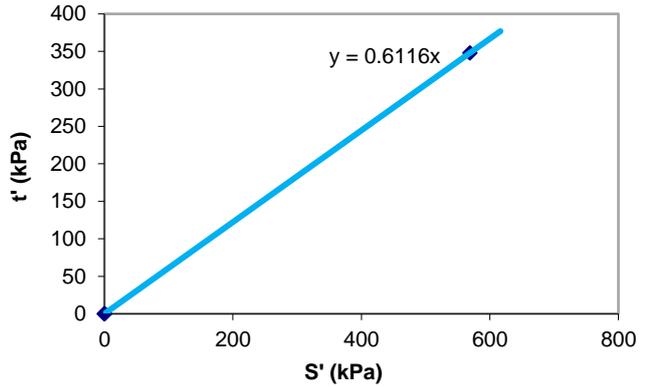
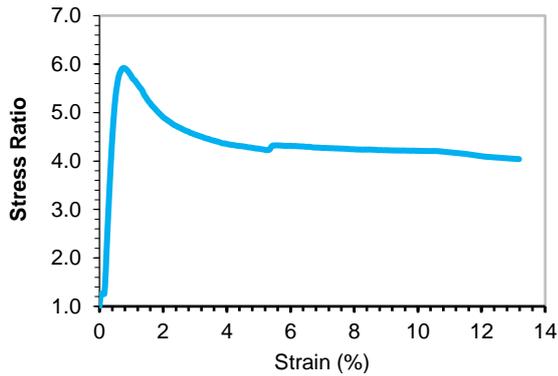
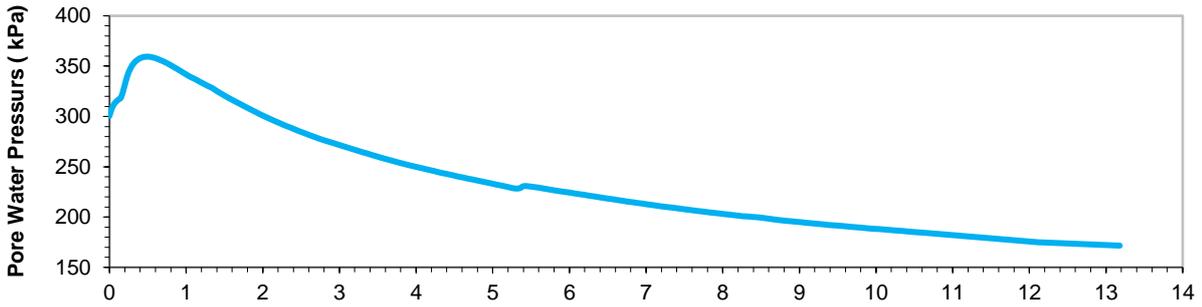
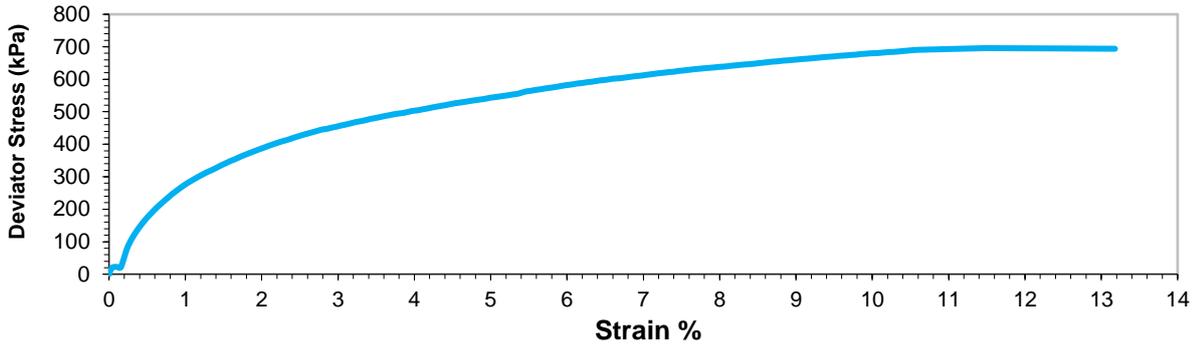
NM TL Ltd	Consolidated Undrained Single Triaxial test with PWP measurement. Tested in accordance with BS:1377 Part 8	Project No. NMTL-3503
	Project: WSP lot 1, Parteen Weir	Borehole No. RWI-BH08 Sample No. C Depth. 5.0-5.60m

SUMMARY OF TEST RESULTS						
		Initial			Initial	Final
Hall Effect Gauge length	mm	n/a	Bulk Density	Mg/m3	2.36	2.40
Specimen Length	mm	194.60	Dry Density	Mg/m3	2.19	2.22
Specimen Diameter	mm	102.50	Moisture	%	7.76	7.87
Area	mm2	8251.59	Saturation	%	90.18	99.21
Volume	cc	1605.76	Sg(Assumed)	2.70		
Saturation Stage						
Test Stage	Cell Pressure (kPa)		Pore Pressure Parameter 'B' Base			
0	0		0			
1	50		0.85			
2	100		0.95			
3	150		0.94			
4	200		0.94			
5	300		0.95			
6	400		1.00			
Isotropic Consolidation Stage						
		Stage 1				
Cell Pressure	kPa	400				
Pore Pressure	kPa	386.1				
Back Pressure	kPa	300				
Drainage Method		One End & Radial Boundary				
t100 (min)		65.6				
Coef. Of Consolidation Cv	m2/year	3.201				
Coef. Of Compressibility Mv	m2/MN	0.170				
Permeability k	m/sec	1.68E-10				
		Stage 1				
Deviator Stress (kPa)		695.9				
External Axial Strain (%)		11.48				
Shear Stress (kPa)		347.9				
Peak Stress Ratio		5.92				
Pore Water Pressure (kPa)		-121				
Radial Effective Stress (kPa)		221				
Axial Effective Stress (kPa)		916.9				
Effective angle of friction (Degrees)		37.7°				
Cohesion c' (kPa)		0				
Rate of strain mm/min		0.0067				
Sample Description		Brown slightly sandy slightly gravelly silty CLAY.				
		Plastic				
NM	TL	Consolidated Undrained Single Triaxial test with PWP measurement. Tested in accordance with BS:1377 Part 8			Project No.	NMTL-3503
		Project:			Borehole No.	RWI-BH010
	Ltd	WSP lot 1, Parteen Weir			Sample No.	C
					Depth.	4.0-5.0m



NM TL Ltd	Consolidated Undrained Single Triaxial test with PWP measurement. Tested in accordance with BS:1377 Part 8	Project No. NMTL-3503 Borehole No. RWI-BH010
	Project: WSP lot 1, Parteen Weir	Sample No. C Depth. 4.0-5.0m

Shear Stage



NM TL Ltd	Consolidated Undrained Single Triaxial test with PWP measurement. Tested in accordance with BS:1377 Part 8	Project No. NMTL-3503 Borehole No. RWI-BH010
	Project: WSP lot 1, Parteen Weir	Sample No. C Depth. 4.0-5.0m

SPECIMEN AFTER TEST

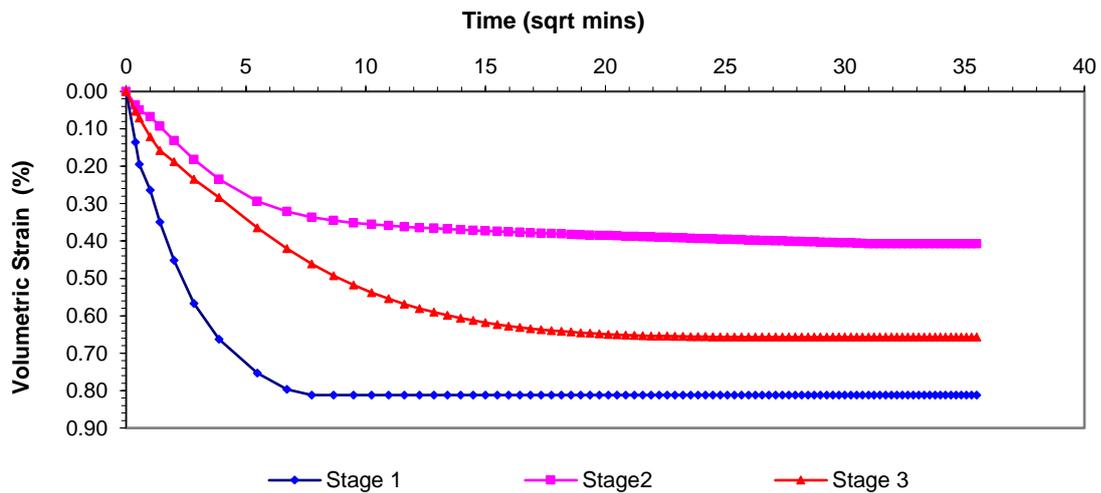
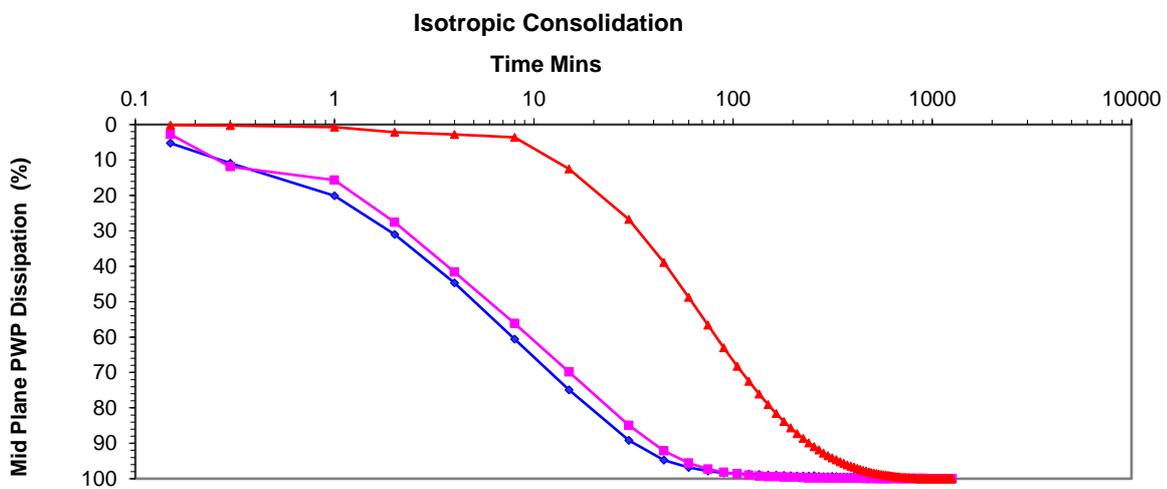
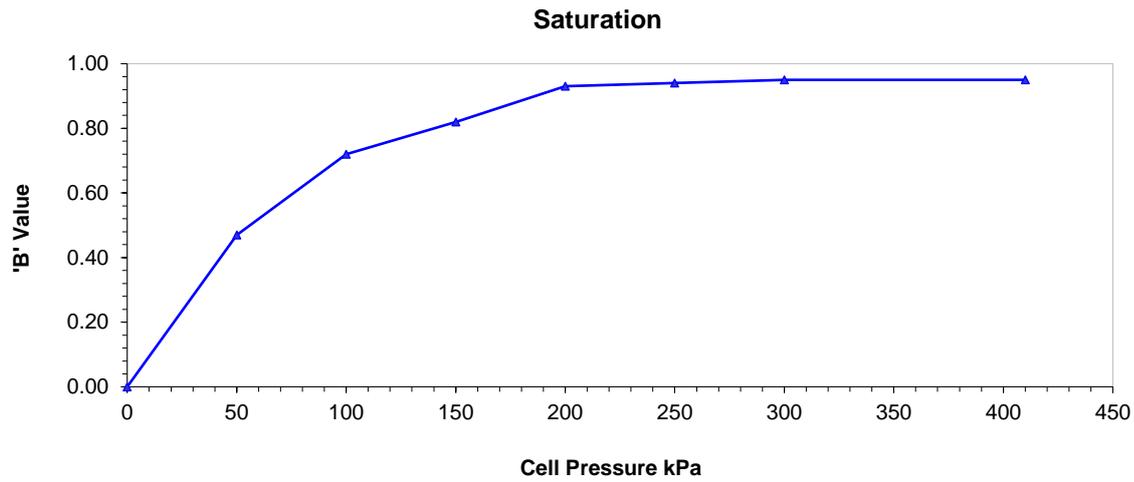


Soil Description

Brown slightly sandy slightly gravelly silty CLAY.

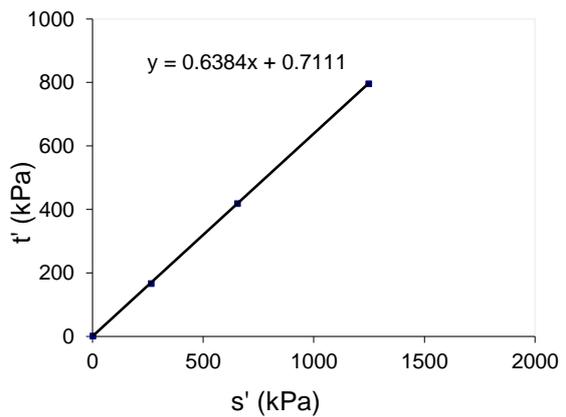
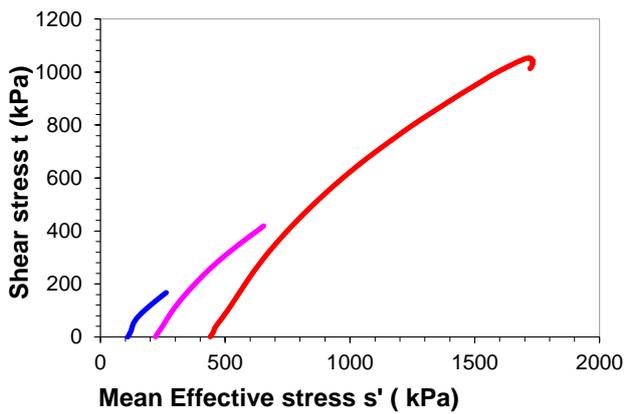
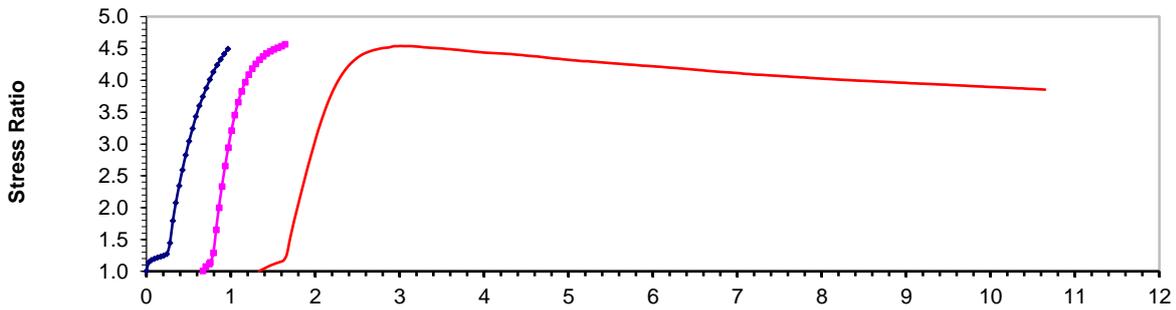
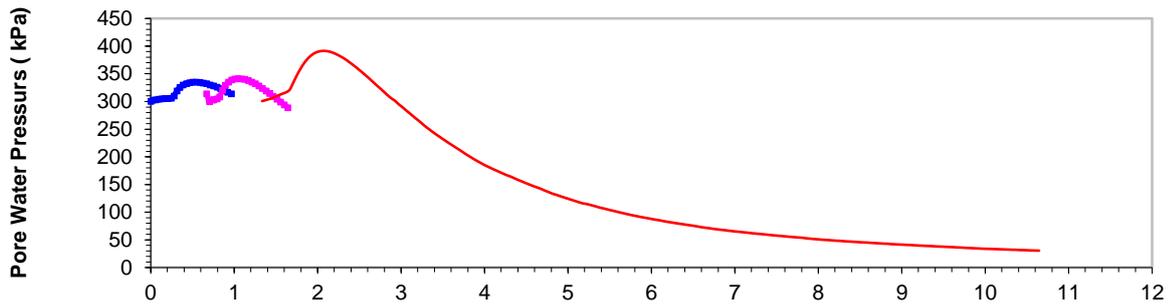
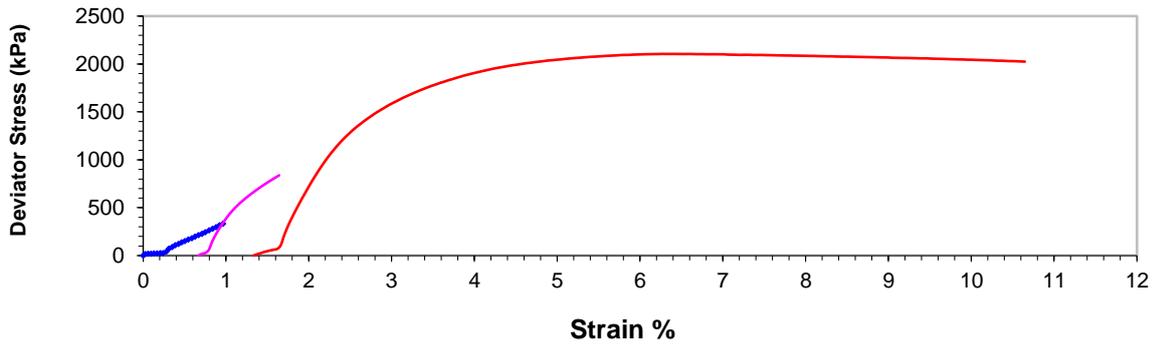
NM TL Ltd	Consolidated Undrained Single Triaxial test with PWP measurement. Tested in accordance with BS:1377 Part 8	Project No. NMTL-3503
	Project: WSP lot 1, Parteen Weir	Borehole No. RWI-BH010 Sample No. C Depth. 4.0-5.0m

SUMMARY OF TEST RESULTS						
		Initial			Initial	Final
Hall Effect Gauge length	mm	n/a	Bulk Density	Mg/m3	2.38	2.43
Specimen Length	mm	196.50	Dry Density	Mg/m3	2.22	2.27
Specimen Diameter	mm	100.00	Moisture	%	7.01	7.18
Area	mm2	7853.98	Saturation	%	88.55	101.33
Volume	cc	1543.31	Sg(Assumed)	2.70		
Saturation Stage						
Test Stage	Cell Pressure (kPa)		Pore Pressure Parameter 'B' Base			
0	0		0			
1	50		0.47			
2	100		0.72			
3	150		0.82			
4	200		0.93			
5	250		0.94			
6	300		0.95			
7	410		0.95			
Isotropic Consolidation Stage						
		Stage 1	Stage 2	Stage 3		
Cell Pressure	kPa	410	520	740		
Pore Pressure	kPa	395.6	436.2	589.4		
Back Pressure	kPa	300	300	300		
Drainage Method		One End and Radial boundary				
t100 (min)		12.3	38.4	121.0		
Coef. Of Consolidation Cv	m2/year	17.143	5.463	1.736		
Coef. Of Compressibility Mv	m2/MN	0.085	0.027	0.022		
Permeability K	m/Sec	4.51E-10	4.65E-11	1.16E-11		
At Peak Stress Ratio						
		Stage 1	Stage 2	Stage 3	At peak deviator stress	
Deviator Stress (kPa)		334.7	838.2	1593.9	2105.2	
External Axial Strain (%)		0.96	1.64	3.02	6.27	
Shear Stress (kPa)		167.4	419.11	797.0	1052.6	
Peak Stress Ratio		4.49	4.56	4.54	4.19	
Pore Water Pressure (kPa)		14.1	-15.2	-10.4	-219.3	
Radial Effective Stress (kPa)		95.9	235.2	450.4	659.3	
Axial Effective Stress (kPa)		430.6	1073.4	2044.3	2764.5	
Effective angle of friction (Degrees)		39.7°			37.9°	
Cohesion c' (kPa)		0.9			0	
Rate of strain mm/min		0.0067				
Sample Description	Brown slightly sandy slightly gravelly SILT/CLAY					
	Brittle Failure					
NM TL Ltd	Consolidated Undrained Multistage Triaxial test with PWP measurement. Tested in accordance with BS:1377 Part 8				Project No.	NMTL-3503
	Project:				Borehole No.	RWI-BH013
	WSP Lot1, Parteen Weir				Sample No.	C
					Depth.	11.00-12.50m



NM TL Ltd	Consolidated Undrained Multistage Triaxial test with PWP measurement. Tested in accordance with BS:1377 Part 8	Project No. NMTL-3503 Borehole No. RWI-BH013
	Project: WSP Lot1, Parteen Weir	Sample No. C Depth. 11.00-12.50m

Shear Stage



NM
TL
Ltd

Consolidated Undrained Multistage Triaxial test with PWP measurement. Tested in accordance with BS:1377 Part 8
Project: WSP Lot1, Parteen Weir

Project No. NMTL-3503
Borehole No. RWI-BH013
Sample No. C
Depth. 11.00-12.50m

SPECIMEN AFTER TEST

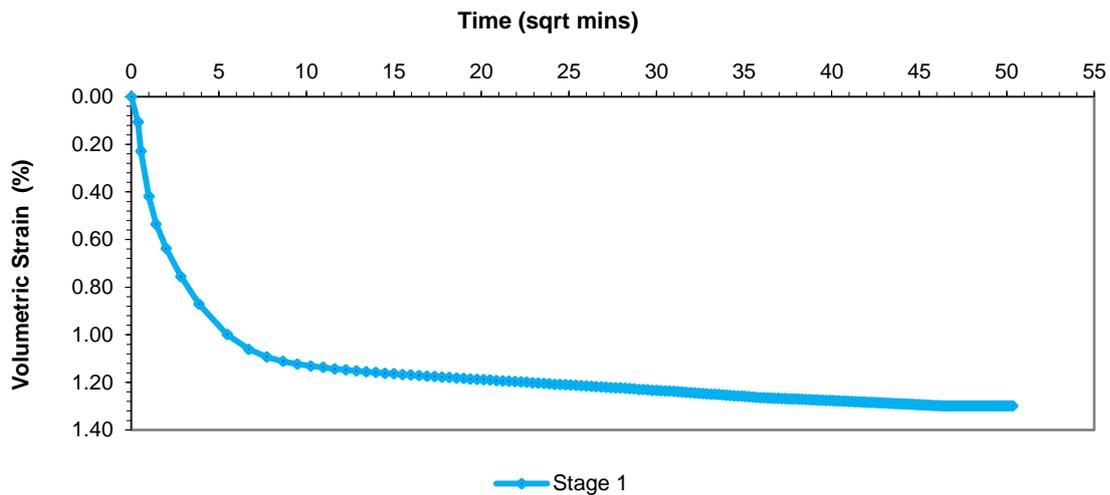
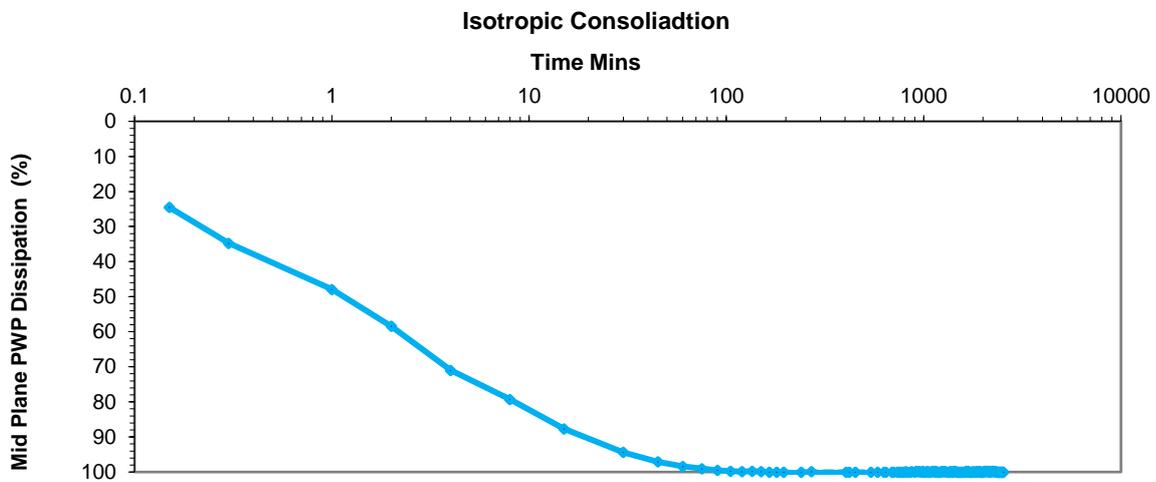
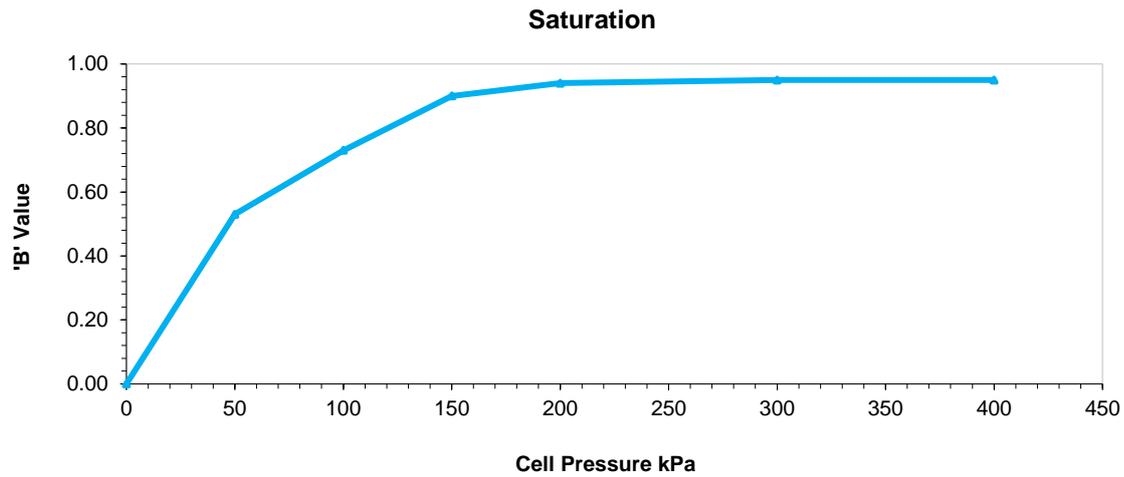


Soil Description

Brown slightly sandy slightly gravelly SILT/CLAY

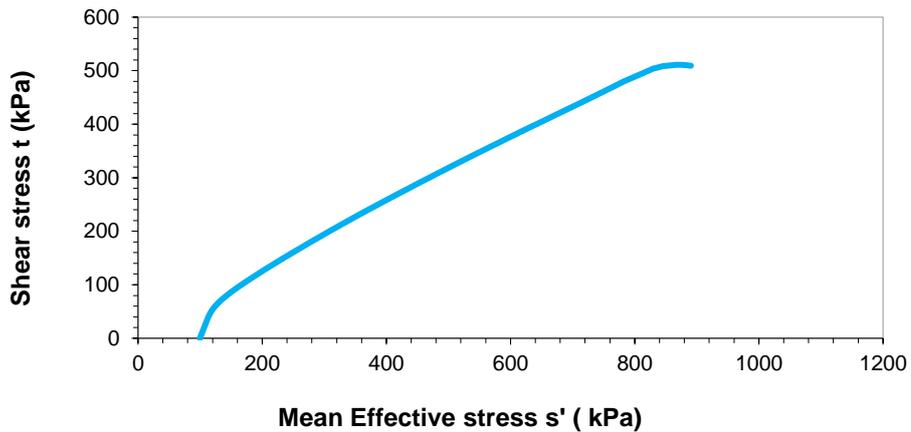
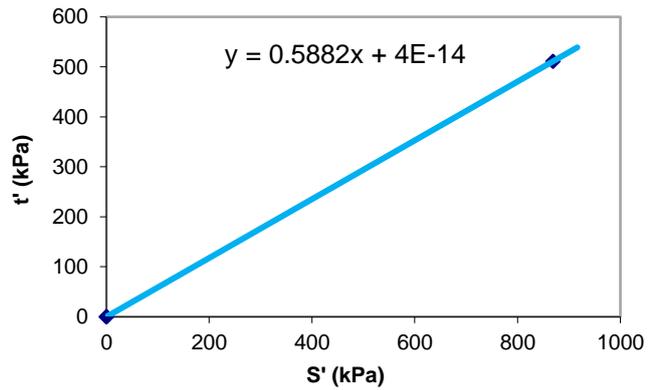
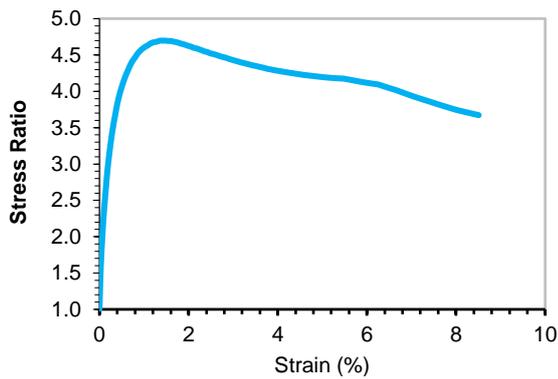
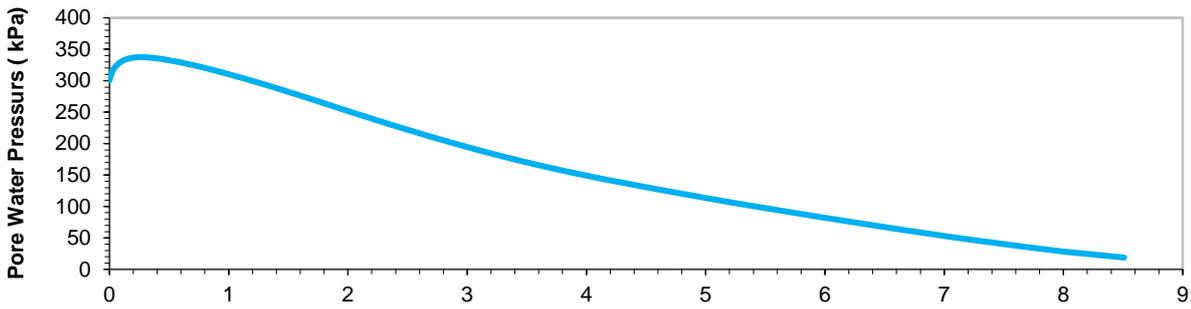
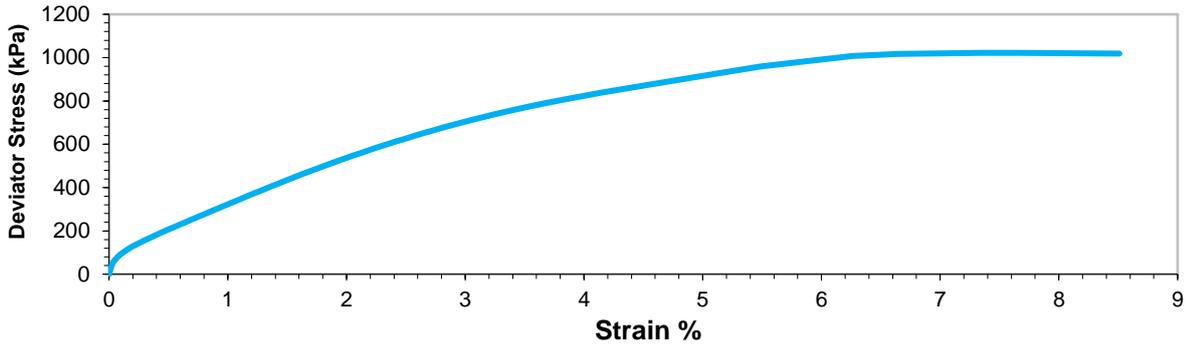
NM TL Ltd	Consolidated Undrained Multistage Triaxial test with PWP measurement. Tested in accordance with BS:1377 Part 8	Project No. NMTL-3503
	Project: WSP Lot1, Parteen Weir	Borehole No. RWI-BH013 Sample No. C Depth. 11.00-12.50m

SUMMARY OF TEST RESULTS						
		Initial			Initial	Final
Hall Effect Gauge length	mm	n/a	Bulk Density	Mg/m3	2.40	2.43
Specimen Length	mm	204.50	Dry Density	Mg/m3	2.23	2.26
Specimen Diameter	mm	101.50	Moisture	%	7.45	7.60
Area	mm2	8091.37	Saturation	%	95.40	105.16
Volume	cc	1654.68	Sg(Assumed)	2.70		
Saturation Stage						
Test Stage	Cell Pressure (kPa)		Pore Pressure Parameter 'B' Base			
0	0		0			
1	50		0.53			
2	100		0.73			
3	150		0.90			
4	200		0.94			
5	300		0.95			
Isotropic Consolidation Stage						
		Stage 1				
Cell Pressure	kPa	400				
Pore Pressure	kPa	383.5				
Back Pressure	kPa	300				
Drainage Method		One End & Radial Boundary				
t100 (min)		30.3				
Coef. Of Consolidation Cv	m2/year	6.942				
Coef. Of Compressibility Mv	m2/MN	0.156				
Permeability k	m/sec	3.35E-10				
		Stage 1				
Deviator Stress (kPa)		1022.0				
External Axial Strain (%)		7.42				
Shear Stress (kPa)		511.0				
Peak Stress Ratio		4.69				
Pore Water Pressure (kPa)		-257.7				
Radial Effective Stress (kPa)		357.7				
Axial Effective Stress (kPa)		1379.7				
Effective angle of friction (Degrees)		36.0°				
Cohesion c' (kPa)		0				
Rate of strain mm/min		0.0067				
Sample Description		Red/brown slightly sandy slightly gravelly silty CLAY.				
		Brittle				
NM	TL	Consolidated Undrained Single Triaxial test with PWP measurement. Tested in accordance with BS:1377 Part 8			Project No.	NMTL-3503
		Project:			Borehole No.	RWI-BH014
	Ltd	WSP lot 1, Parteen Weir			Sample No.	C
					Depth.	5.0-5.60m



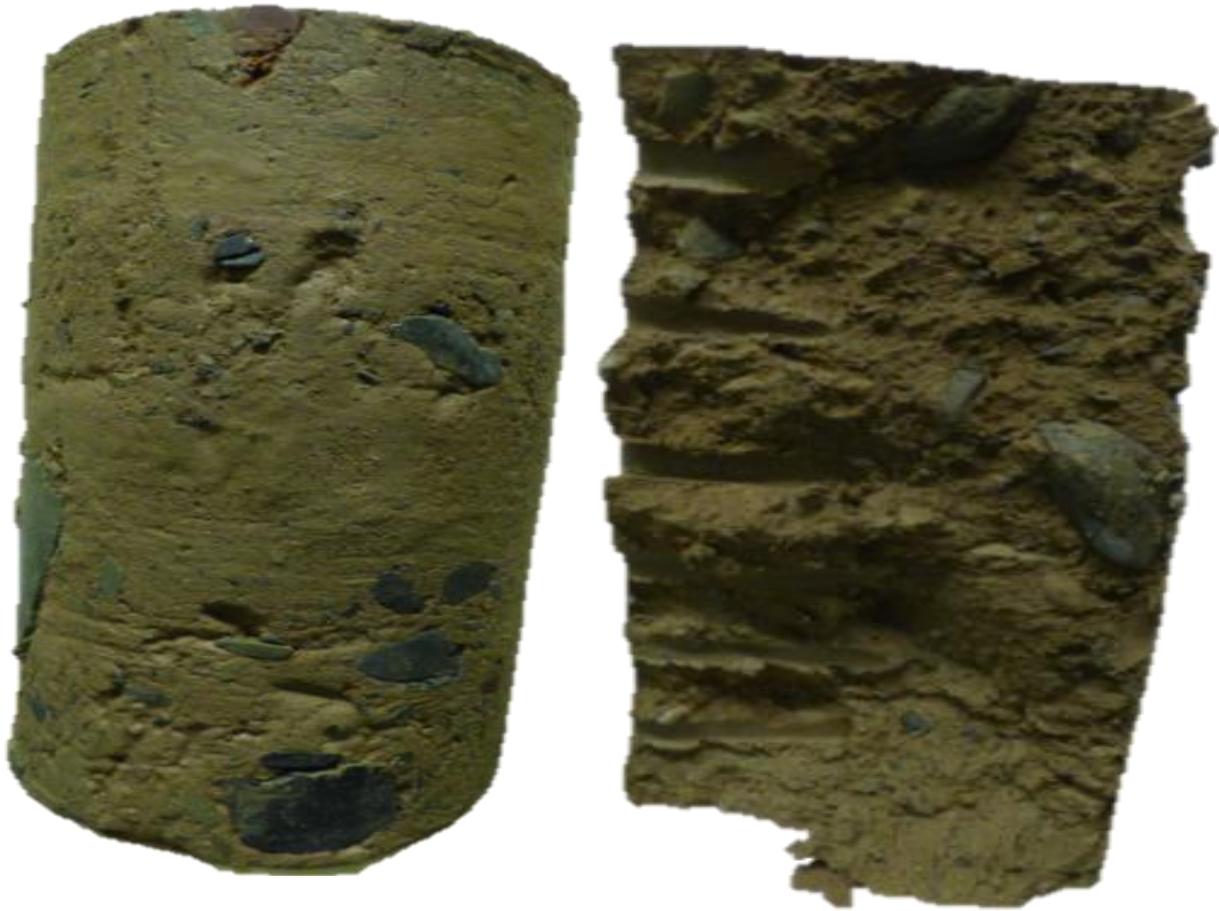
NM TL Ltd	Consolidated Undrained Single Triaxial test with PWP measurement. Tested in accordance with BS:1377 Part 8	Project No. NMTL-3503 Borehole No. RWI-BH014
	Project: WSP lot 1, Parteen Weir	Sample No. C Depth. 5.0-5.60m

Shear Stage



NM TL Ltd	Consolidated Undrained Single Triaxial test with PWP measurement. Tested in accordance with BS:1377 Part 8	Project No. NMTL-3503 Borehole No. RWI-BH014 Sample No. C
	Project: WSP lot 1, Parteen Weir	Depth. 5.0-5.60m

SPECIMEN AFTER TEST



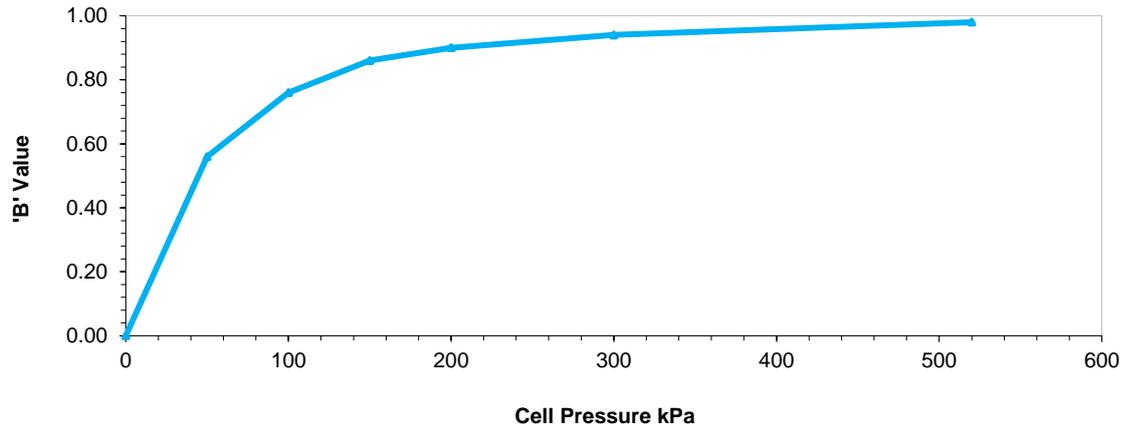
Soil Description

Red/brown slightly sandy slightly gravelly silty CLAY.

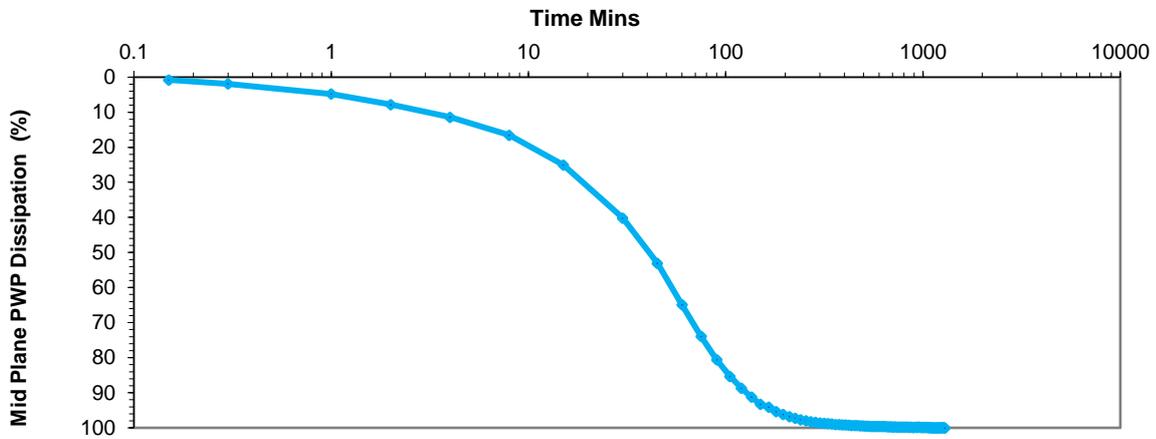
NM TL Ltd	Consolidated Undrained Single Triaxial test with PWP measurement. Tested in accordance with BS:1377 Part 8	Project No. NMTL-3503
	Project: WSP lot 1, Parteen Weir	Borehole No. RWI-BH014 Sample No. C Depth. 5.0-5.60m

SUMMARY OF TEST RESULTS						
		Initial			Initial	Final
Hall Effect Gauge length	mm	n/a	Bulk Density	Mg/m3	2.27	2.30
Specimen Length	mm	204.90	Dry Density	Mg/m3	2.05	2.08
Specimen Diameter	mm	100.50	Moisture	%	11.00	10.50
Area	mm2	7932.72	Saturation	%	92.89	94.80
Volume	cc	1625.41	Sg(Assumed)	2.70		
Saturation Stage						
Test Stage	Cell Pressure (kPa)		Pore Pressure Parameter 'B' Base			
0	0		0			
1	50		0.56			
2	100		0.76			
3	150		0.86			
4	200		0.90			
5	300		0.94			
6	520		0.98			
Isotropic Consolidation Stage						
		Stage 1				
Cell Pressure	kPa	520				
Pore Pressure	kPa	488.4				
Back Pressure	kPa	300				
Drainage Method		One End & Radial Boundary				
t100 (min)		77.4				
Coef. Of Consolidation Cv	m2/year	2.712				
Coef. Of Compressibility Mv	m2/MN	0.083				
Permeability k	m/sec	7.01E-11				
		Stage 1				
Deviator Stress (kPa)		829.7				
External Axial Strain (%)		6.72				
Shear Stress (kPa)		414.9				
Peak Stress Ratio		4.28				
Pore Water Pressure (kPa)		-66.7				
Radial Effective Stress (kPa)		286.7				
Axial Effective Stress (kPa)		1116.4				
Effective angle of friction (Degrees)		36.2°				
Cohesion c' (kPa)		0				
Rate of strain mm/min		0.0067				
Sample Description		Brown slightly sandy slightly gravelly silty CLAY.				
		Brittle				
NM	TL	Consolidated Undrained Single Triaxial test with PWP measurement. Tested in accordance with BS:1377 Part 8			Project No.	NMTL-3503
		Project:			Borehole No.	RWI-BH014
	Ltd	WSP lot 1, Parteen Weir			Sample No.	C
				Depth.	12.0-12.50m	

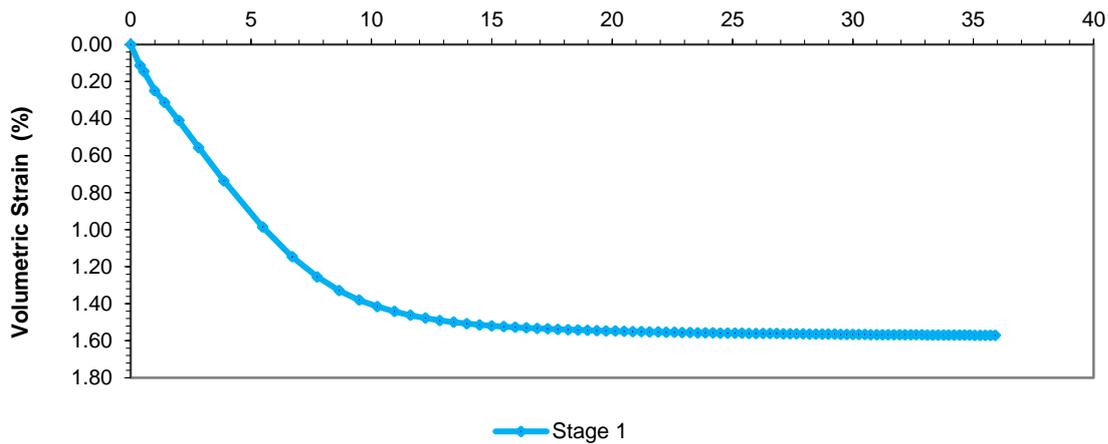
Saturation



Isotropic Consolidation



Time (sqrt mins)



NM

TL

Ltd

Consolidated Undrained Single Triaxial test with PWP measurement. Tested in accordance with BS:1377 Part 8

Project:

WSP lot 1, Parteen Weir

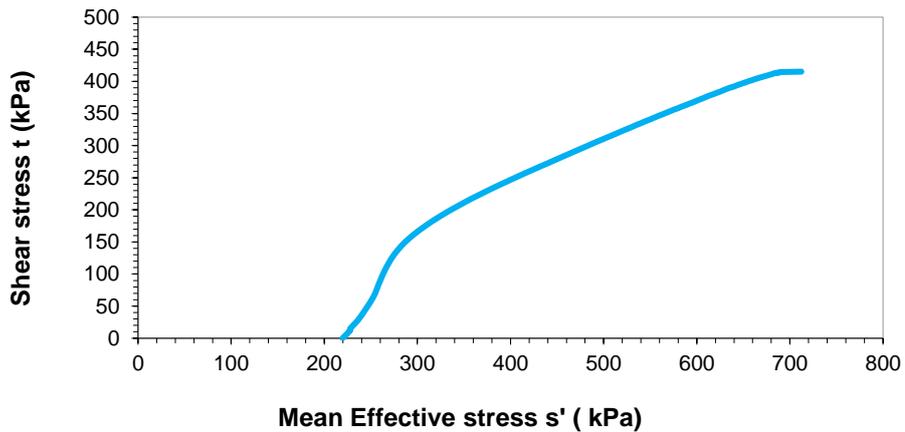
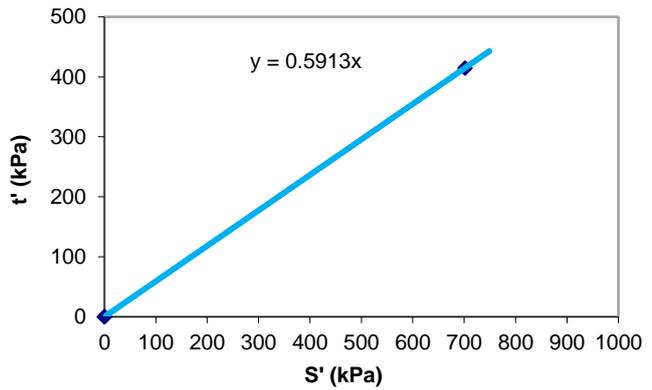
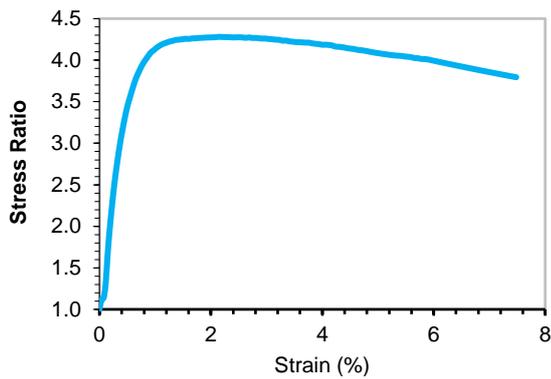
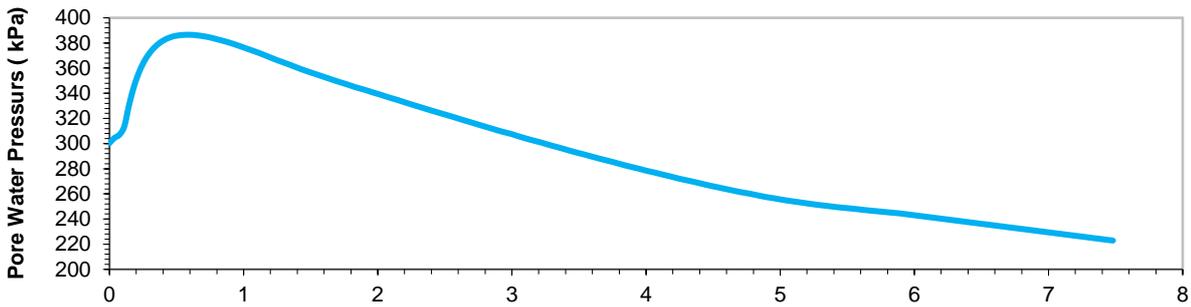
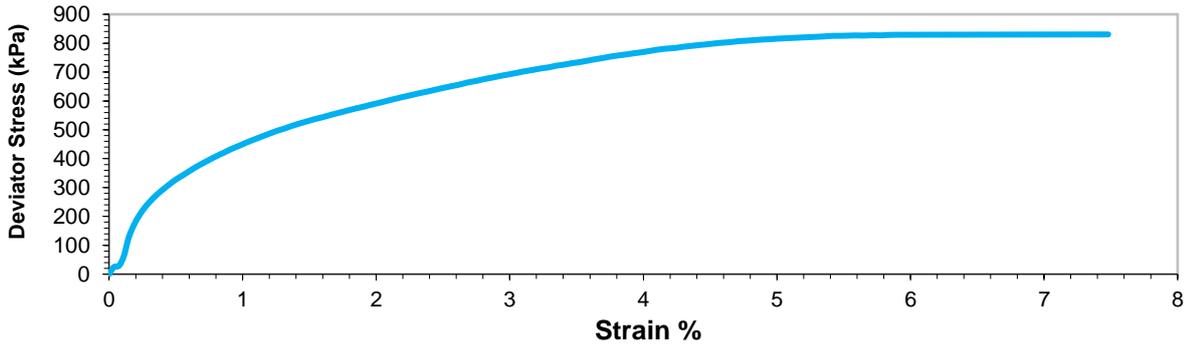
Project No. NMTL-3503

Borehole No RWI-BH014

Sample No. C

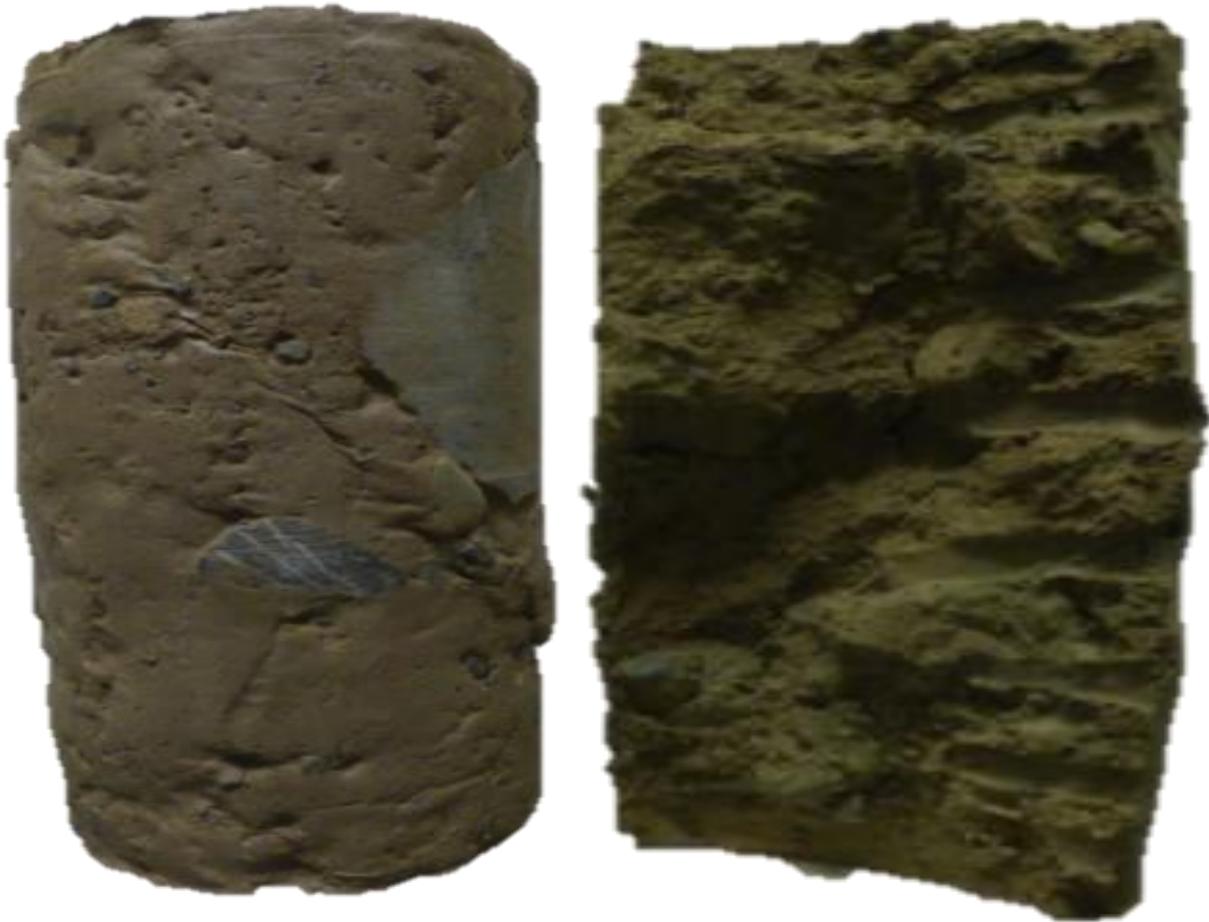
Depth. 12.0-12.50m

Shear Stage



NM TL Ltd	Consolidated Undrained Single Triaxial test with PWP measurement. Tested in accordance with BS:1377 Part 8	Project No. NMTL-3503 Borehole No. RWI-BH014 Sample No. C
	Project: WSP lot 1, Parteen Weir	Depth. 12.0-12.50m

SPECIMEN AFTER TEST

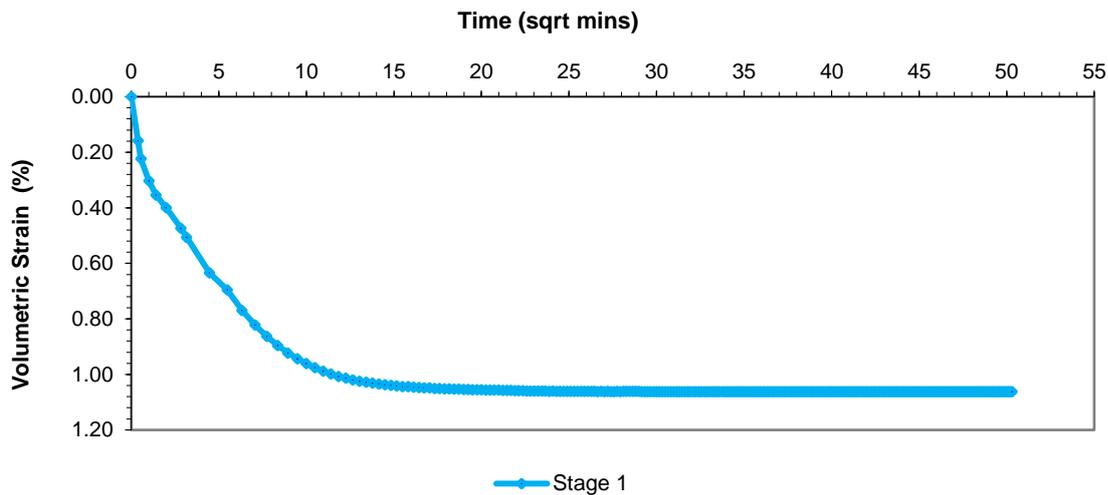
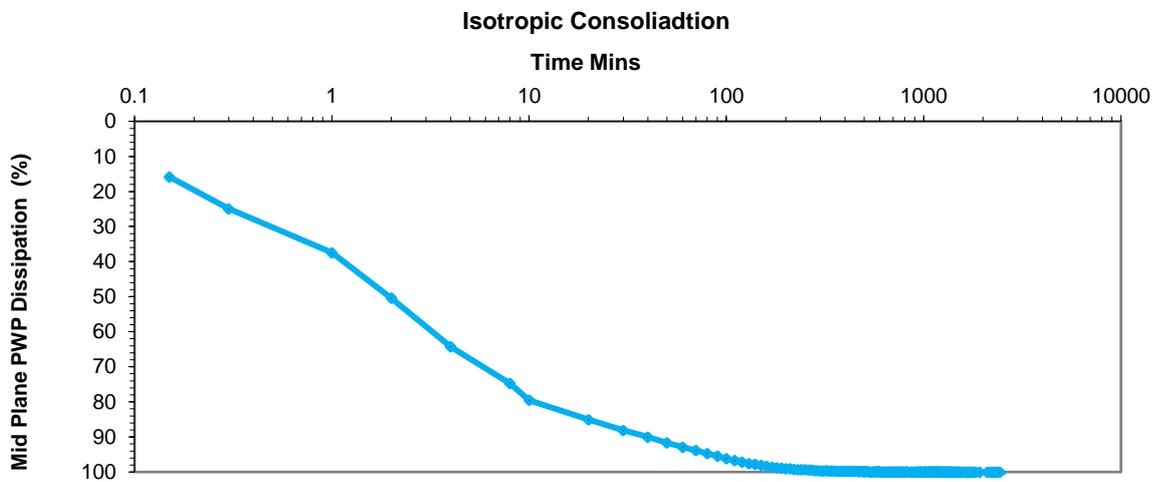
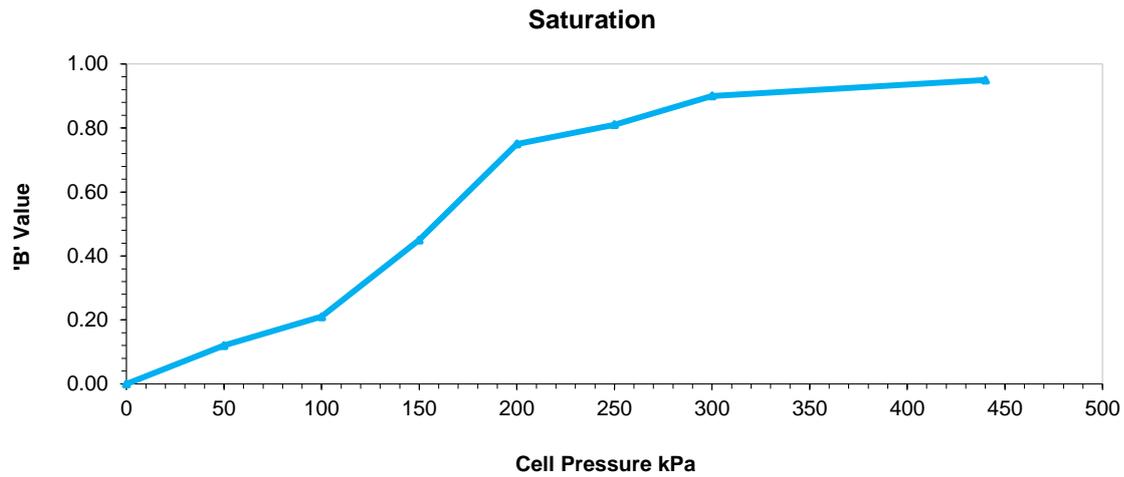


Soil Description

Brown slightly sandy slightly gravelly silty CLAY.

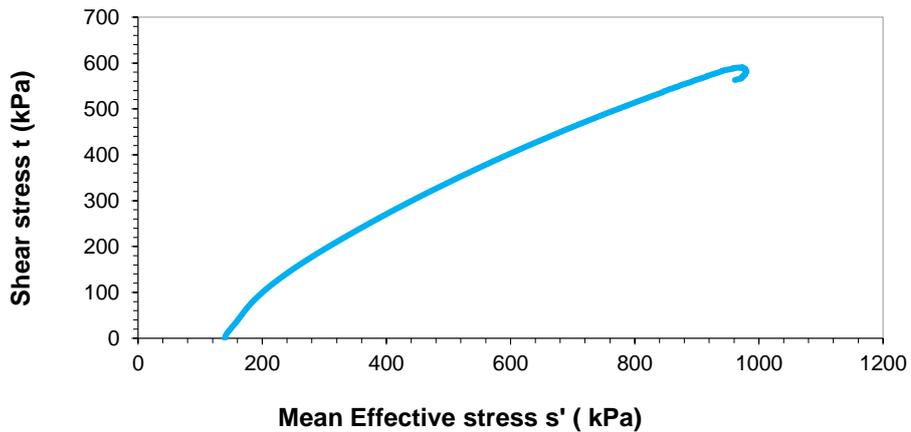
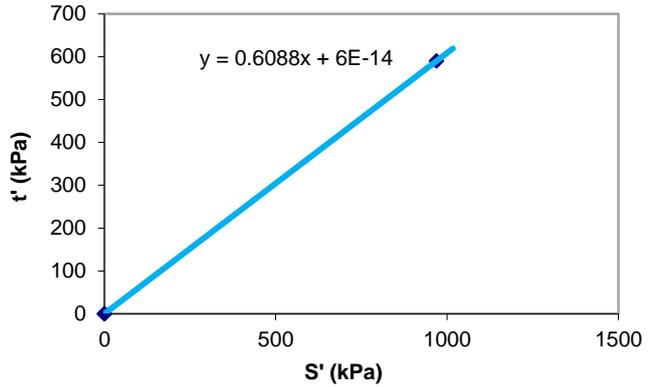
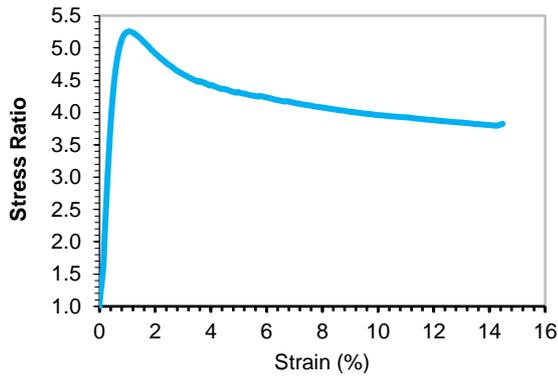
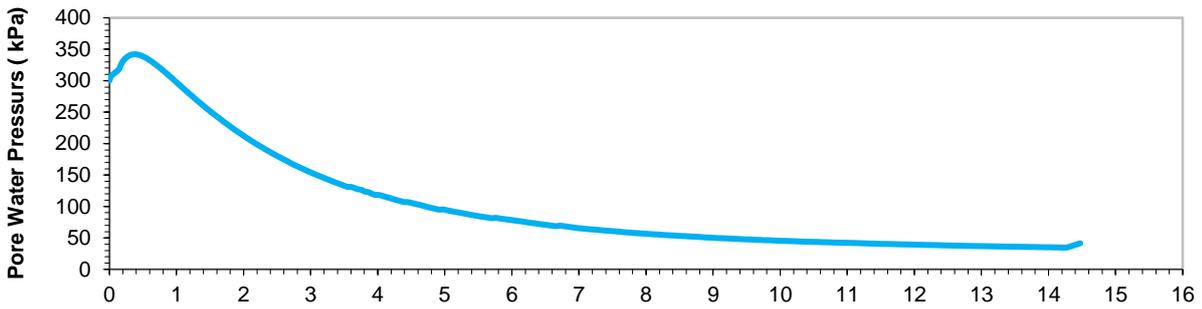
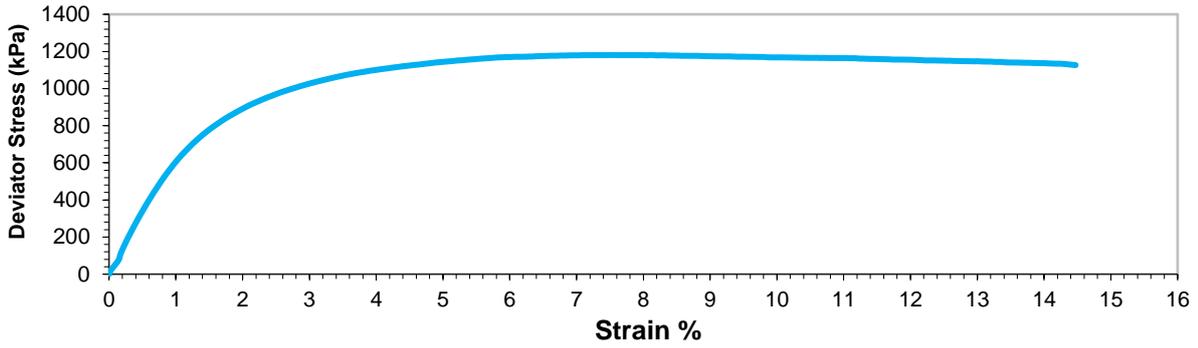
NM TL Ltd	Consolidated Undrained Single Triaxial test with PWP measurement. Tested in accordance with BS:1377 Part 8	Project No. NMTL-3503
	Project: WSP lot 1, Parteen Weir	Borehole No. RWI-BH014 Sample No. C Depth. 12.0-12.50m

SUMMARY OF TEST RESULTS						
		Initial			Initial	Final
Hall Effect Gauge length	mm	n/a	Bulk Density	Mg/m3	2.33	2.43
Specimen Length	mm	203.00	Dry Density	Mg/m3	2.25	2.27
Specimen Diameter	mm	101.50	Moisture	%	3.82	7.07
Area	mm2	8091.37	Saturation	%	50.91	100.73
Volume	cc	1642.55	Sg(Assumed)	2.70		
Saturation Stage						
Test Stage	Cell Pressure (kPa)		Pore Pressure Parameter 'B' Base			
0	0		0			
1	50		0.12			
2	100		0.21			
3	150		0.45			
4	200		0.75			
5	250		0.81			
6	300		0.90			
7	440		0.95			
Isotropic Consolidation Stage						
		Stage 1				
Cell Pressure	kPa	440				
Pore Pressure	kPa	416				
Back Pressure	kPa	300				
Drainage Method		One End & Radial Boundary				
t100 (min)		98.0				
Coef. Of Consolidation Cv	m2/year	2.143				
Coef. Of Compressibility Mv	m2/MN	0.092				
Permeability k	m/sec	6.08E-11				
		Stage 1				
Deviator Stress (kPa)		1180.5				
External Axial Strain (%)		7.51				
Shear Stress (kPa)		590.2				
Peak Stress Ratio		5.25				
Pore Water Pressure (kPa)		-239.2				
Radial Effective Stress (kPa)		379.2				
Axial Effective Stress (kPa)		1559.7				
Effective angle of friction (Degrees)		37.5°				
Cohesion c' (kPa)		0				
Rate of strain mm/min		0.0067				
Sample Description		Brown/red slightly sandy slightly gravelly silty CLAY.				
		Brittle				
NM	TL	Consolidated Undrained Single Triaxial test with PWP measurement. Tested in accordance with BS:1377 Part 8			Project No.	NMTL-3503
		Project:			Borehole No.	RWI-BH015
	Ltd	WSP lot 1, Parteen Weir			Sample No.	C
				Depth.	7.0-7.50m	



NM TL Ltd	Consolidated Undrained Single Triaxial test with PWP measurement. Tested in accordance with BS:1377 Part 8	Project No. NMTL-3503 Borehole No. RWI-BH015
	Project: WSP lot 1, Parteen Weir	Sample No. C Depth. 7.0-7.50m

Shear Stage



NM TL Ltd	Consolidated Undrained Single Triaxial test with PWP measurement. Tested in accordance with BS:1377 Part 8	Project No. NMTL-3503 Borehole No. RWI-BH015 Sample No. C
	Project: WSP lot 1, Parteen Weir	Depth. 7.0-7.50m

SPECIMEN AFTER TEST

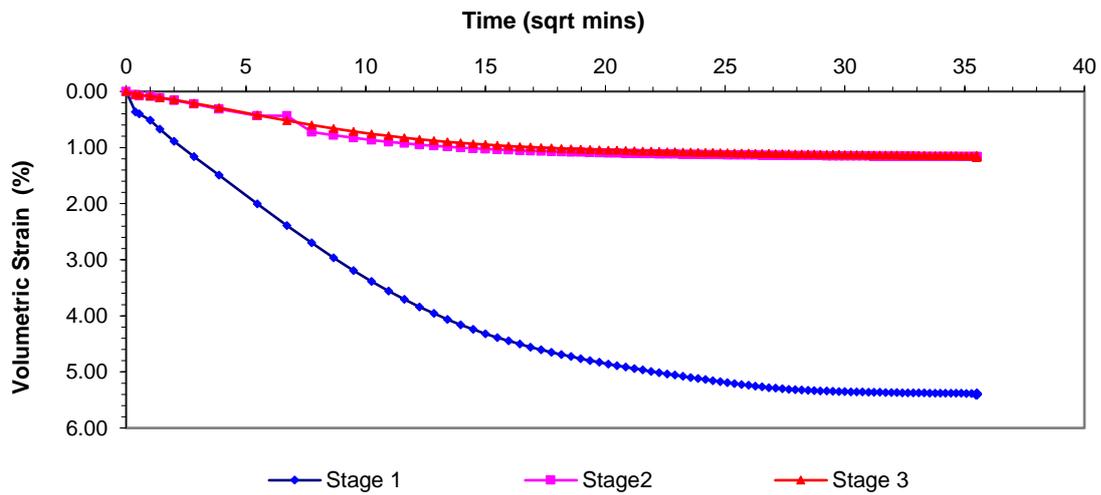
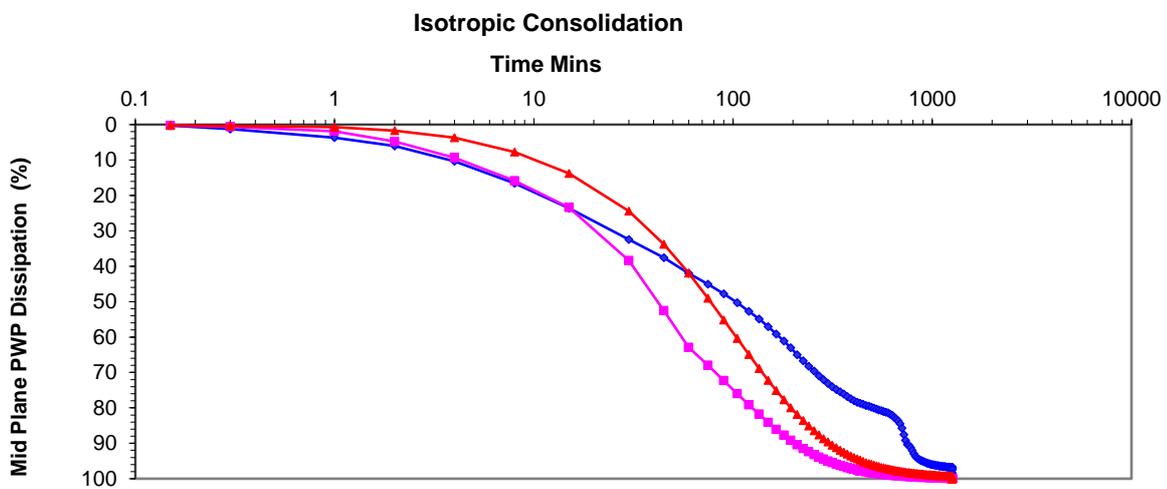
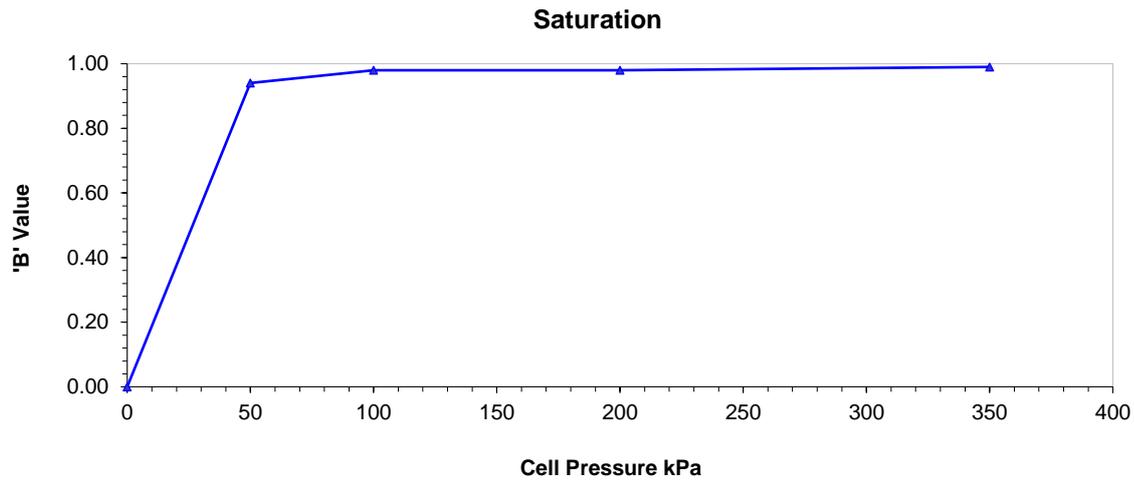


Soil Description

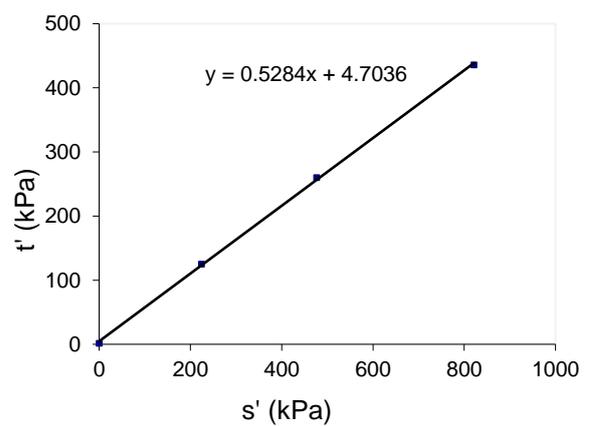
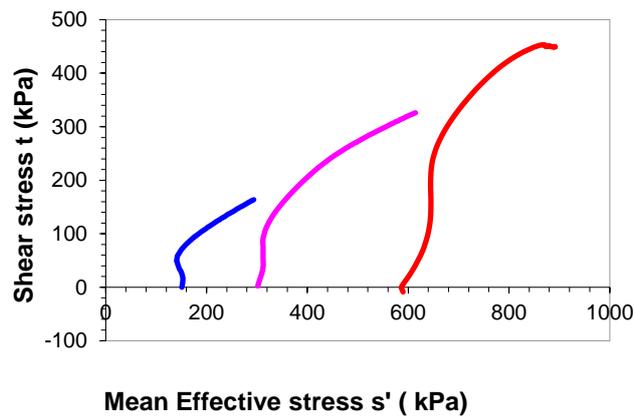
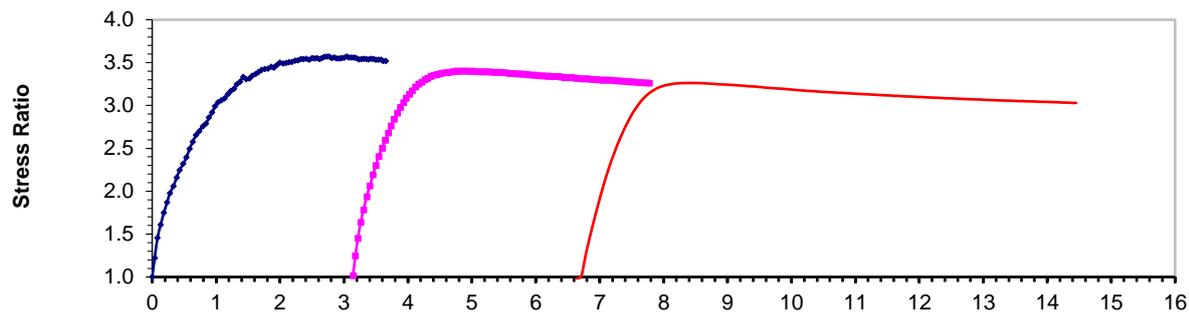
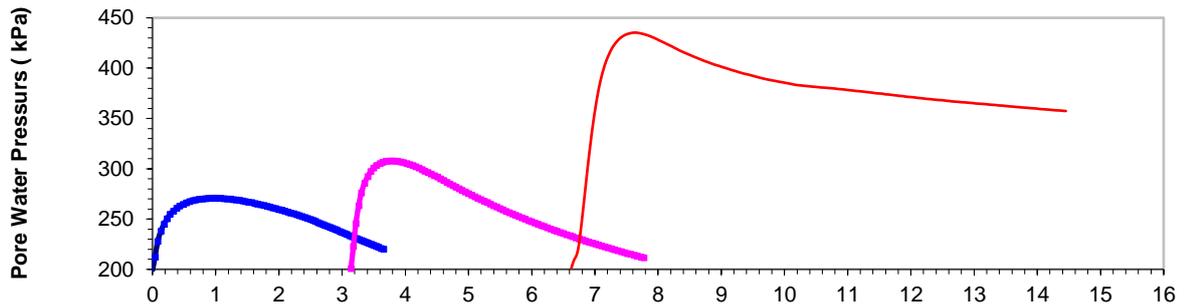
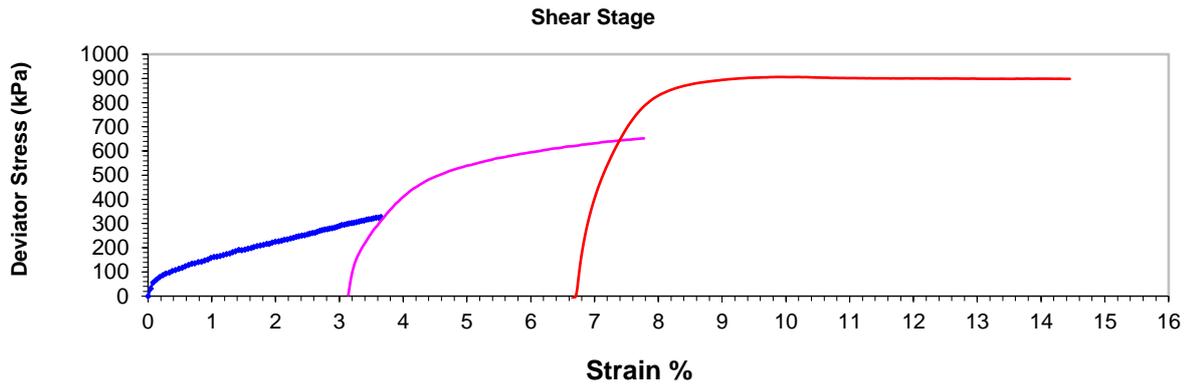
Brown/red slightly sandy slightly gravelly silty CLAY.

NM TL Ltd	Consolidated Undrained Single Triaxial test with PWP measurement. Tested in accordance with BS:1377 Part 8	Project No. NMTL-3503
	Project: WSP lot 1, Parteen Weir	Borehole No. RWI-BH015 Sample No. C Depth. 7.0-7.50m

SUMMARY OF TEST RESULTS						
		Initial			Initial	Final
Hall Effect Gauge length	mm	n/a	Bulk Density	Mg/m ³	2.28	2.39
Specimen Length	mm	198.00	Dry Density	Mg/m ³	2.04	2.21
Specimen Diameter	mm	101.00	Moisture	%	11.54	7.96
Area	mm ²	8011.85	Saturation	%	97.05	97.25
Volume	cc	1586.35	Sg(Assumed)	2.70		
Saturation Stage						
Test Stage	Cell Pressure (kPa)		Pore Pressure Parameter 'B' Base			
0	0		0			
1	50		0.94			
2	100		0.98			
3	200		0.98			
4	350		0.99			
Isotropic Consolidation Stage						
		Stage 1	Stage 2	Stage 3		
Cell Pressure	kPa	350	500	800		
Pore Pressure	kPa	347.2	414	583		
Back Pressure	kPa	200	200	200		
Drainage Method		One End and Radial boundary				
t ₁₀₀ (min)		234.1	169.0	169.0		
Coef. Of Consolidation Cv	m ² /year	0.897	1.243	1.243		
Coef. Of Compressibility Mv	m ² /MN	0.368	0.055	0.031		
Permeability K	m/Sec	1.02E-10	2.10E-11	1.18E-11		
At Peak Stress Ratio						
		Stage 1	Stage 2	Stage 3	At peak deviator stress	
Deviator Stress (kPa)		250.4	520.1	871.9	906.2	
External Axial Strain (%)		2.41	4.76	8.44	10.16	
Shear Stress (kPa)		125.2	260.03	435.9	453.1	
Peak Stress Ratio		3.55	3.40	3.26	3.18	
Pore Water Pressure (kPa)		251.6	83.5	214.7	183.5	
Radial Effective Stress (kPa)		98.4	216.5	385.3	416.5	
Axial Effective Stress (kPa)		348.8	736.6	1257.2	1322.7	
Effective angle of friction (Degrees)		31.9°			31.4°	
Cohesion c' (kPa)		5.5			0	
Rate of strain mm/min		0.0067				
Sample Description	Light brown slightly sandy slightly gravelly clayey SILT.					
	Plactic Failure					
NM TL Ltd	Consolidated Undrained Multistage Triaxial test with PWP measurement. Tested in accordance with BS:1377 Part 8				Project No.	NMTL-3503
	Project:				Borehole No.	RWI-BH016
	WSP Lot1, Parteen Weir				Sample No.	C
					Depth.	12.50-14.00m



NM TL Ltd	Consolidated Undrained Multistage Triaxial test with PWP measurement. Tested in accordance with BS:1377 Part 8	Project No. NMTL-3503
	Project: WSP Lot1, Parteen Weir	Borehole No. RWI-BH016
		Sample No. C
		Depth. 12.50-14.00m



NM
TL
Ltd

Consolidated Undrained Multistage Triaxial test with PWP measurement. Tested in accordance with BS:1377 Part 8
Project:
WSP Lot1, Parteen Weir

Project No. NMTL-3503
Borehole No. RWI-BH016
Sample No. C
Depth. 12.50-14.00m

SPECIMEN AFTER TEST

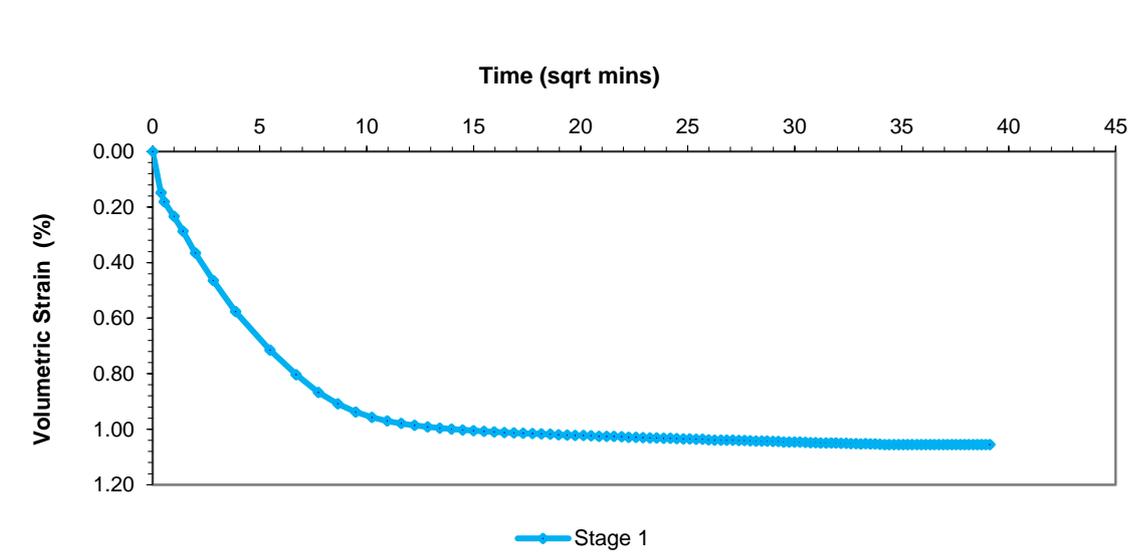
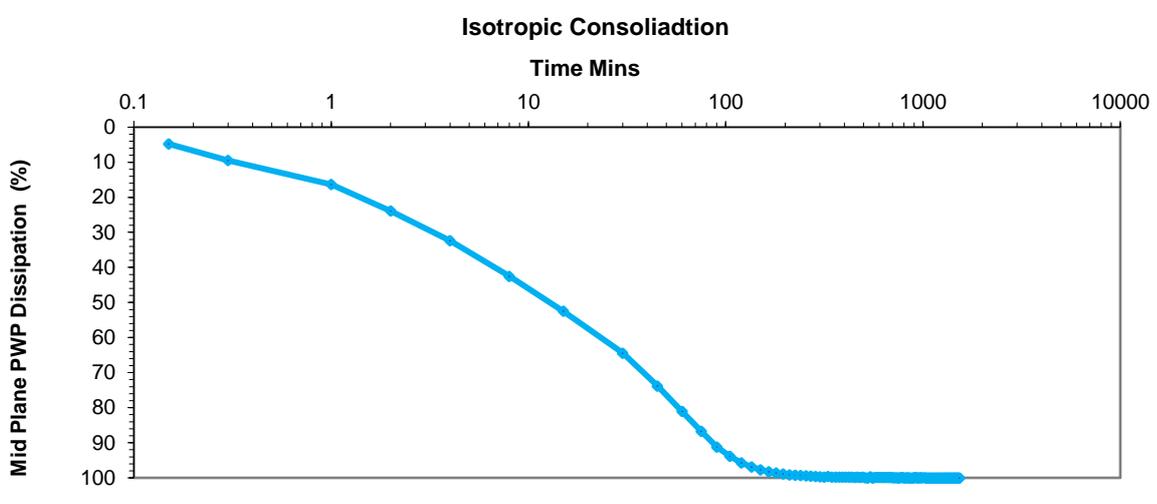
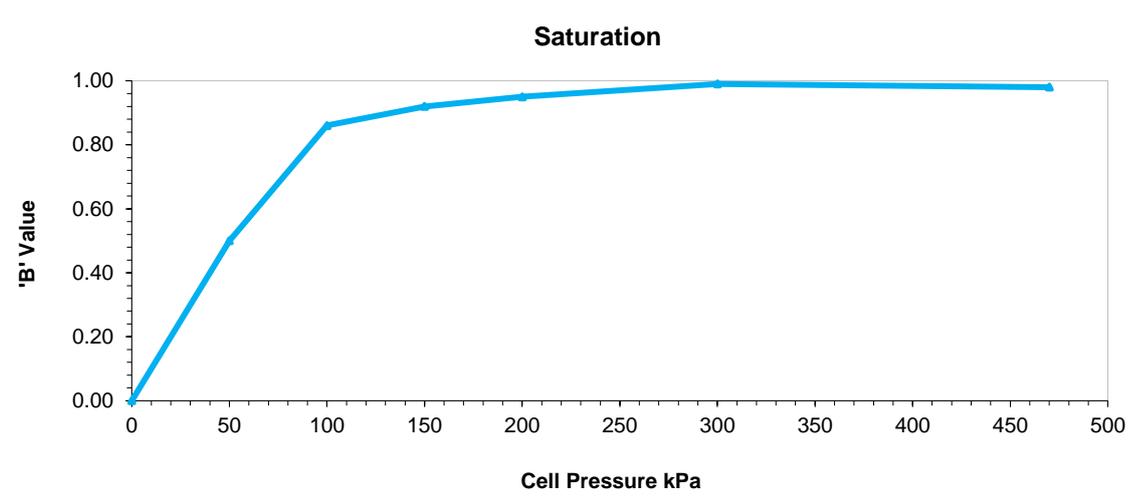


Soil Description

Light brown slightly sandy slightly gravelly clayey SILT.

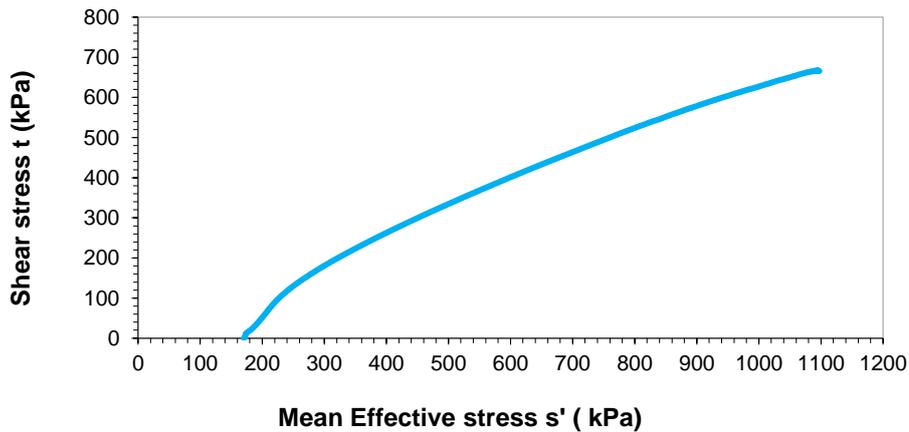
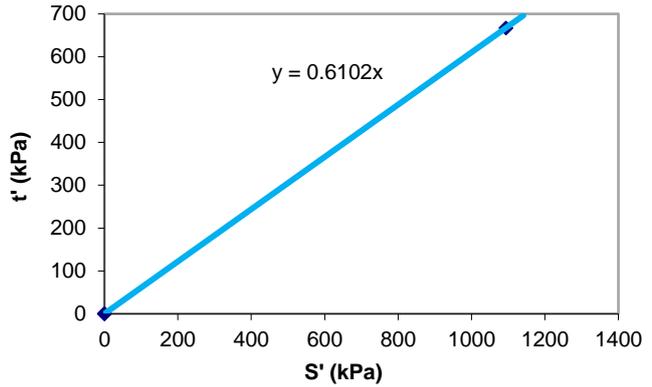
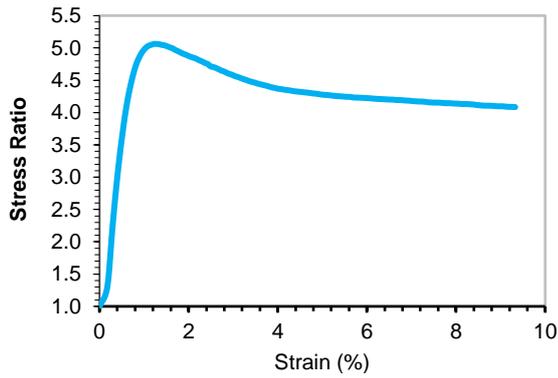
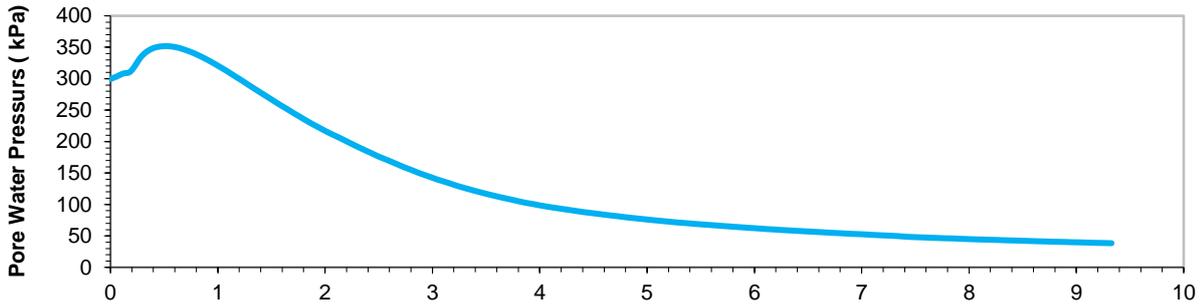
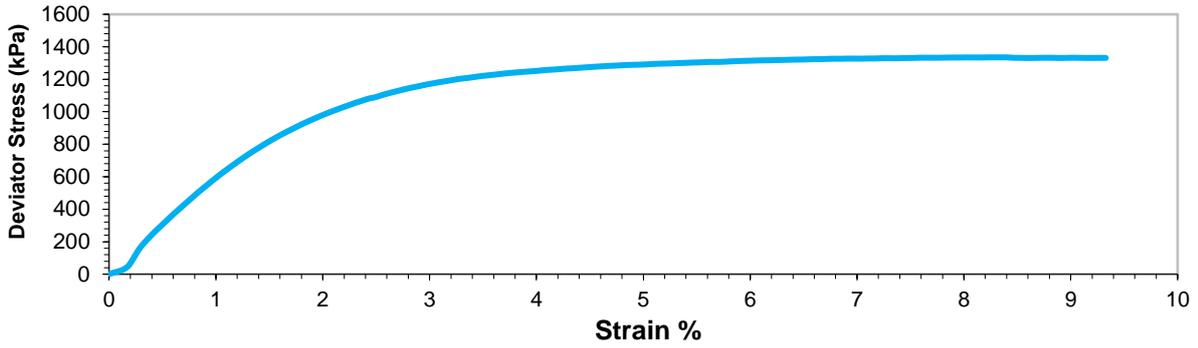
NM TL Ltd	Consolidated Undrained Multistage Triaxial test with PWP measurement. Tested in accordance with BS:1377 Part 8	Project No. NMTL-3503
	Project: WSP Lot1, Parteen Weir	Borehole No. RWI-BH016 Sample No. C Depth. 12.50-14.00m

SUMMARY OF TEST RESULTS						
		Initial			Initial	Final
Hall Effect Gauge length	mm	n/a	Bulk Density	Mg/m3	2.39	2.41
Specimen Length	mm	199.00	Dry Density	Mg/m3	2.22	2.24
Specimen Diameter	mm	102.50	Moisture	%	7.85	7.72
Area	mm2	8251.59	Saturation	%	97.04	101.50
Volume	cc	1642.07	Sg(Assumed)	2.70		
Saturation Stage						
Test Stage	Cell Pressure (kPa)		Pore Pressure Parameter 'B' Base			
0	0		0			
1	50		0.50			
2	100		0.86			
3	150		0.92			
4	200		0.95			
5	300		0.99			
6	470		0.98			
Isotropic Consolidation Stage						
		Stage 1				
Cell Pressure	kPa	470				
Pore Pressure	kPa	451.5				
Back Pressure	kPa	300				
Drainage Method		One End & Radial Boundary				
t100 (min)		65.6				
Coef. Of Consolidation Cv	m2/year	3.201				
Coef. Of Compressibility Mv	m2/MN	0.070				
Permeability k	m/sec	6.91E-11				
		Stage 1				
Deviator Stress (kPa)		1334.6				
External Axial Strain (%)		8.22				
Shear Stress (kPa)		667.3				
Peak Stress Ratio		5.06				
Pore Water Pressure (kPa)		-256.2				
Radial Effective Stress (kPa)		426.2				
Axial Effective Stress (kPa)		1760.8				
Effective angle of friction (Degrees)		37.6°				
Cohesion c' (kPa)		0				
Rate of strain mm/min		0.0067				
Sample Description		Red/brown slightly sandy slightly gravelly silty CLAY				
		Plastic				
NM	TL	Consolidated Undrained Single Triaxial test with PWP measurement. Tested in accordance with BS:1377 Part 8			Project No.	NMTL-3503
		Project:			Borehole No.	RWI-BH017
	Ltd	WSP lot 1, Parteen Weir			Sample No.	C
				Depth.	8.50-9.50m	



NM TL Ltd	Consolidated Undrained Single Triaxial test with PWP measurement. Tested in accordance with BS:1377 Part 8	Project No. NMTL-3503 Borehole No RWI-BH017
	Project: WSP lot 1, Parteen Weir	Sample No. C Depth. 8.50-9.50m

Shear Stage



NM TL Ltd	Consolidated Undrained Single Triaxial test with PWP measurement. Tested in accordance with BS:1377 Part 8	Project No. NMTL-3503 Borehole No. RWI-BH017 Sample No. C
	Project: WSP lot 1, Parteen Weir	Depth. 8.50-9.50m

SPECIMEN AFTER TEST



Soil Description

Red/brown slightly sandy slightly gravelly silty CLAY

NM TL Ltd	Consolidated Undrained Single Triaxial test with PWP measurement. Tested in accordance with BS:1377 Part 8	Project No. NMTL-3503
	Project: WSP lot 1, Parteen Weir	Borehole No. RWI-BH017 Sample No. C Depth. 8.50-9.50m

Point Load Strength Index Tests Summary of Results

Project No. 2021T102 Project Name WSP Lot 1, Parteen Weir

Borehole No.	Sample			Specimen		Rock Type and Test condition	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P kN	Equivalent diameter, De mm	Point Load Strength Index		Remarks (including water content if measured)
	Top Depth m	Base Depth m	Type	Top m	Base m		Type (D, A, I, B)	Direction (L, P or U)		Lne mm	W mm	Dps mm	Dps' mm			Is MPa	Is(50) MPa	
RWI-BH007A	12.10	13.6	C	12.2	12.30		D	U	YES		63.4		63.4	18.4	63.4	4.6	5.1	Very Strong
RWI-BH007A	13.60	14	C	13.75	13.85		D	U	YES		63.4		63.4	18.9	63.4	4.7	5.2	Very Strong
RWI-BH007A	15.60	17	C	16.43	16.54		D	U	YES		63.4		63.4	13.6	63.4	3.4	3.8	Strong
RWI-BH007A	17.00	18.6	C	18.38	18.48		D	U	YES		63.4		63.4	24.3	63.4	6.0	6.7	Very Strong
RWI-BH007A	20.00	21.6	C	21.2	21.34		D	U	YES		63.4		63.4	17.0	63.4	4.2	4.7	Very Strong
RWI-BH007A	23.00	24.6	C	24	24.15		D	U	YES		63.4		63.4	20.0	63.4	5.0	5.5	Very Strong
RWI-BH007A	26.00	27.5	C	26.67	26.83		D	U	YES		63.4		63.4	19.8	63.4	4.9	5.5	Very Strong
RWI-BH007A	29.00	30	C	29.65	29.75		D	U	YES		63.4		63.4	18.1	63.4	4.5	5.0	Very Strong
RWI-BH008	14.00	15.5	C	14.25	14.35		D	U	YES		63.4		63.4	22.1	63.4	5.5	6.1	Very Strong
RWI-BH008	15.50	17	C	16	16.15		D	U	YES		63.4		63.4	24.1	63.4	6.0	6.7	Very Strong
RWI-BH008	17.00	18.6	C	17.7	17.90		D	U	YES		63.4		63.4	3.1	63.4	0.8	0.9	Weak
RWI-BH008	17.00	18.6	C	18.3	18.50		D	U	YES		63.4		63.4	24.2	63.4	6.0	6.7	Very Strong
RWI-BH008	20.00	21.6	C	21.1	21.25		D	U	YES		63.4		63.4	11.6	63.4	2.9	3.2	Strong
RWI-BH008	23.00	24.6	C	23.2	23.40		D	U	YES		63.4		63.4	18.7	63.4	4.6	5.2	Very Strong
RWI-BH008	24.60	26	C	25.45	25.60		D	U	YES		63.4		63.4	24.6	63.4	6.1	6.8	Very Strong
RWI-BH008	27.60	29	C	28.4	28.55		D	U	YES		63.4		63.4	14.7	63.4	3.6	4.1	Very Strong
RWI-BH010	11.80	13.4	C	12.45	12.55		D	U	YES		63.4		63.4	15.9	63.4	4.0	4.4	Very Strong
RWI-BH010	14.00	15.6	C	14.55	14.68		D	U	YES		63.4		63.4	11.6	63.4	2.9	3.2	Strong
RWI-BH010	17.00	18.6	C	17.45	17.65		D	U	YES		63.4		63.4	18.4	63.4	4.6	5.1	Very Strong
RWI-BH010	20.00	23	C	21.56	24.60		D	U	YES		63.4		63.4	21.2	63.4	5.3	5.9	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 18/07/2022	Approved By Administrator	Table 1 sheet 1
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Point Load Strength Index Tests Summary of Results

Project No. 2021T102 Project Name WSP Lot 1, Parteen Weir

Borehole No.	Sample			Specimen		Rock Type and Test condition	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P kN	Equivalent diameter, De mm	Point Load Strength Index		Remarks (including water content if measured)
	Top Depth m	Base Depth m	Type	Top m	Base m		Type (D, A, I, B)	Direction (L, P or U)		Lne mm	W mm	Dps mm	Dps' mm			Is MPa	Is(50) MPa	
RWI-BH010	23.00	24.6	C	24.5	24.60		D	U	YES		63.4		63.4	21.2	63.4	5.3	5.9	Very Strong
RWI-BH010	26.00	27.6	C	27.3	27.44		D	U	YES		63.4		63.4	13.4	63.4	3.3	3.7	Strong
RWI-BH013	13.10	14	C	13.3	13.48		D	U	YES		63.4		63.4	17.0	63.4	4.2	4.7	Very Strong
RWI-BH013	14.00	15.6	C	15.15	15.30		D	U	YES		63.4		63.4	22.1	63.4	5.5	6.1	Very Strong
RWI-BH013	17.00	18.5	C	17.65	17.84		D	U	YES		63.4		63.4	22.8	63.4	5.7	6.3	Very Strong
RWI-BH013	18.50	20	C	119.45	19.68		D	U	YES		63.4		63.4	18.7	63.4	4.7	5.2	Very Strong
RWI-BH013	21.60	23	C	22.25	22.38		D	U	YES		63.4		63.4	17.7	63.4	4.4	4.9	Very Strong
RWI-BH013	24.60	26	C	25.2	25.35		D	U	YES		63.4		63.4	15.6	63.4	3.9	4.3	Very Strong
RWI-BH013	27.60	29	C	28	28.15		D	U	YES		63.4		63.4	23.3	63.4	5.8	6.5	Very Strong
RWI-BH014	14.80	15.5	C	15.15	15.32		D	U	YES		63.4		63.4	9.0	63.4	2.2	2.5	Strong
RWI-BH014	17.00	18.5	C	17.8	17.95		D	U	YES		63.4		63.4	12.7	63.4	3.2	3.5	Strong
RWI-BH014	20.00	21.5	C	20.5	20.65		D	U	YES		63.4		63.4	16.4	63.4	4.1	4.5	Very Strong
RWI-BH014	23.00	24.5	C	23.45	23.55		D	U	YES		63.4		63.4	8.2	63.4	2.0	2.3	Strong
RWI-BH014	26.00	27.5	C	26.4	26.50		D	U	YES		63.4		63.4	17.9	63.4	4.5	5.0	Very Strong
RWI-BH014	29.00	30	C	29.3	29.45		D	U	YES		63.4		63.4	16.6	63.4	4.1	4.6	Very Strong
RWI-BH015	8.00	9.3	C	8.8	9.00		D	U	YES		63.4		63.4	49.4	63.4	12.3	13.7	Extremely Strong
RWI-BH015	9.30	11	C	9.63	9.88		D	U	YES		63.4		63.4	21.8	63.4	5.4	6.0	Very Strong
RWI-BH015	11.00	14	C	11	11.20		D	U	YES		63.4		63.4	21.2	63.4	5.3	5.9	Very Strong
RWI-BH015	11.00	14	C	12.62	12.79		D	U	YES		63.4		63.4	18.3	63.4	4.6	5.1	Very Strong
RWI-BH015	14.00	17	C	15.1	15.35		D	U	YES		63.4		63.4	17.8	63.4	4.4	4.9	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 18/07/2022	Approved By Administrator	Table sheet 1 sheet 2
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Point Load Strength Index Tests Summary of Results

Project No. 2021T102 Project Name WSP Lot 1, Parteen Weir

Borehole No.	Sample			Specimen		Rock Type and Test condition	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P kN	Equivalent diameter, De mm	Point Load Strength Index		Remarks (including water content if measured)
	Top Depth m	Base Depth m	Type	Top m	Base m		Type (D, A, I, B)	Direction (L, P or U)		Lne mm	W mm	Dps mm	Dps' mm			Is MPa	Is(50) MPa	
RWI-BH015	17.00	20	C	17	17.20		D	U	YES		63.4		63.4	20.5	63.4	5.1	5.7	Very Strong
RWI-BH015	17.00	20	C	19.05	19.23		D	U	YES		63.4		63.4	6.7	63.4	1.7	1.8	Medium Strong
RWI-BH015	17.00	20	C	19.32	19.53		D	U	YES		63.4		63.4	17.4	63.4	4.3	4.8	Very Strong
RWI-BH015	23.00	26	C	23	23.25		D	U	YES		63.4		63.4	15.0	63.4	3.7	4.1	Very Strong
RWI-BH015	23.00	26	C	25	25.23		D	U	YES		63.4		63.4	10.8	63.4	2.7	3.0	Strong
RWI-BH015	26.00	30	C	27.8	28.10		D	U	YES		63.4		63.4	23.1	63.4	5.7	6.4	Very Strong
RWI-BH015	26.00	30	C	29.7	30.00		D	U	YES		63.4		63.4	22.7	63.4	5.6	6.3	Very Strong
RWI-BH016	15.00	17	C	15	15.28		D	U	YES		63.4		63.4	11.4	63.4	2.8	3.2	Strong
RWI-BH016	15.00	17	C	15.8	16.20		D	U	YES		63.4		63.4	20.7	63.4	5.2	5.7	Very Strong
RWI-BH016	18.60	20	C	18.6	18.77		D	U	YES		63.4		63.4	6.0	63.4	1.5	1.6	Medium Strong
RWI-BH016	20.00	21.6	C	21.2	21.60		D	U	YES		63.4		63.4	20.8	63.4	5.2	5.7	Very Strong
RWI-BH016	24.50	26	C	24.7	24.95		D	U	YES		63.4		63.4	16.6	63.4	4.1	4.6	Very Strong
RWI-BH016	27.60	29	C	28	28.30		D	U	YES		63.4		63.4	21.5	63.4	5.3	5.9	Very Strong
RWI-BH017	12.50	14	C	12.5	12.65		D	U	YES		63.4		63.4	6.1	63.4	1.5	1.7	Medium Strong
RWI-BH017	14.00	17	C	16	16.25		D	U	YES		63.4		63.4	18.6	63.4	4.6	5.1	Very Strong
RWI-BH017	17.00	18.5	C	18.3	18.45		D	U	YES		63.4		63.4	17.6	63.4	4.4	4.9	Very Strong
RWI-BH017	18.50	20	C	20.8	20.95		D	U	YES		63.4		63.4	15.3	63.4	3.8	4.2	Very Strong
RWI-BH017	21.50	23	C	22.2	22.34		D	U	YES		63.4		63.4	12.5	63.4	3.1	3.4	Strong
RWI-BH017	24.60	26	C	24.9	25.00		D	U	YES		63.4		63.4	15.3	63.4	3.8	4.2	Very Strong
RWI-BH017	27.50	29	C	27.8	27.90		D	U	YES		63.4		63.4	13.0	63.4	3.2	3.6	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 18/07/2022	Approved By Administrator	Table sheet 1 sheet 3
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UNIAXIAL COMPRESSION TEST ON ROCK - SUMMARY OF RESULTS

Project No. 2021T102	Project Name WSP Lot 1, Parteen Weir
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Hole No.	Sample				Specimen Depth (m)	Specimen Dimensions ²			Bulk Density ² Mg/m ³	Water Content ¹ %	Uniaxial Compression ³				Remarks
	Ref	Top	Base	Type		Dia. mm	Length mm	H/D			Condition	Stress Rate MPa/s	Mode of failure	UCS MPa	
RWI-BH007A		12.10	13.60	C	13.0-13.3	63.4	167.9	2.6	2.68		as received	0.5893	AC	98.4	Strong
RWI-BH007A		18.60	20.00	C	18.72-18.97	63.4	172.7	2.7	2.68		as received	0.4689	AC	93.3	Strong
RWI-BH007A		21.60	23.00	C	22.32-22.57	63.4	173.0	2.7	2.69		as received	0.6363	AC	93.5	Strong
RWI-BH007A		24.60	26.00	C	24.66-24.98	63.4	174.9	2.8	2.69		as received	0.3609	AC	67.1	Strong
RWI-BH007A		27.50	29.00	C	27.77-27.96	63.4	165.9	2.6	2.69		as received	0.5354	AC	61.0	Strong
RWI-BH008		12.50	14.00	C	13.4-13.78	101.6	256.7	2.5	2.70		as received	0.2687	F	115.0	Very Strong
RWI-BH008		17.00	18.60	C	17.3-17.57	63.4	163.0	2.6	2.64		as received	0.5344	F	99.9	Very Strong
RWI-BH008		21.60	23.00	C	21.6-21.85	63.4	157.7	2.5	2.87		as received	0.4872	AC	119.0	Very Strong
RWI-BH008		26.00	27.60	C	27.0-27.23	63.4	161.1	2.5	2.69		as received	0.5466	F	100.0	Very Strong
RWI-BH010		11.80	13.40	C	11.9-12.1	63.4	168.2	2.7	2.67		as received	0.6140	AC	134.0	Very Strong
RWI-BH010		15.60	17.00	C	15.6-15.88	63.4	169.9	2.7	2.68		as received	0.5942	AC	130.0	Very Strong
RWI-BH010		18.60	20.00	C	19.5-19.8	63.4	166.1	2.6	2.68		as received	0.4068	F	78.1	Strong
RWI-BH010		23.00	24.60	C	23.85-24.0	63.4	168.7	2.7	2.68		as received	0.3228	F	79.4	Strong
RWI-BH010		29.00	30.00	C	29.0-29.25	63.4	171.7	2.7	2.70		as received	0.6278	S	125.0	Very Strong
RWI-BH013		13.10	14.00	C	13.7-13.92	63.4	167.3	2.6	2.68		as received	0.5200	AC	95.2	Strong
RWI-BH013		14.00	15.60	C	14.8-15.25	63.4	168.6	2.7	2.69		as received	0.4577	F	89.7	Strong
RWI-BH013		18.50	20.00	C	19.1-19.35	63.4	168.2	2.7	2.69		as received	0.6455	F	127.0	Very Strong
RWI-BH013		23.00	24.60	C	23.15-23.33	63.4	166.5	2.6	2.68		as received	0.4882	MS	88.9	Strong
RWI-BH013		26.00	27.60	C	27.1-27.4	63.4	168.7	2.7	2.68		as received	0.6064	AC	113.0	Very Strong
RWI-BH014		15.50	17.00	C	16.55-16.8	63.4	152.4	2.4	2.68		as received	0.5168	AC	93.0	Strong
RWI-BH014		20.00	21.50	C	21.2-21.4	63.4	152.5	2.4	2.69		as received	0.4244	AC	98.0	Strong
RWI-BH014		24.50	26.00	C	25.45-25.74	63.4	155.2	2.4	2.69		as received	0.6177	AC	121.0	Very Strong
RWI-BH014		29.00	30.00	C	29.66-29.88	63.4	153.8	2.4	2.70		as received	0.3835	S	64.8	Strong

Notes

1 ISRM p87 test 1, water content at 105 ± 3 °C, 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 04/07/2022 00:00	Approved By  Administrator	Table sheet 1 1
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Unit 7-8 Hawarden Business Park
Manor Road (off Manor Lane)
Hawarden
Deeside
CH5 3US

Tel: (01244) 528700

Fax: (01244) 528701

email: hawardencustomerservices@alsglobal.com

Website: www.alsenvironmental.co.uk

Irish Drilling Limited
Old Galway Road
Loughrea
Co. Galway

Attention: Dympna Darcy

CERTIFICATE OF ANALYSIS

Date of report Generation: 06 February 2022
Customer: Irish Drilling Limited
Sample Delivery Group (SDG): 220124-37
Your Reference: 2021T102
Location: ParteenWeir, WSP Lot1
Report No: 632432
Order Number: 10791

This report has been revised and directly supersedes 631591 in its entirety.

We received 4 samples on Monday January 24, 2022 and 4 of these samples were scheduled for analysis which was completed on Sunday February 06, 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 Environmental 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

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

Superseded Report: 631591

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
25696094	RWI-BH008	EW1	1.00 - 4.00	17/01/2022
25696103	RWI-BH010	EW1	12.00 - 21.00	17/01/2022
25696113	RWI-BH013	EW1	12.00 - 21.00	17/01/2022
25696122	RWI-BH016	EW1	1.00 - 9.00	17/01/2022

Only received samples which have had analysis scheduled will be shown on the following pages.



CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

Superseded Report: 631591

Results Legend <div style="display: flex; flex-direction: column; gap: 5px;"> <div style="display: flex; align-items: center;">X Test</div> <div style="display: flex; align-items: center;">N No Determination Possible</div> </div> 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)	Customer Sample Reference	AGS Reference	Depth (m)	Container	Sample Type	
		25696094	RW1-BH008	EW1	1.00 - 4.00	H2SO4 (ALE244) 500ml Plastic (ALE208) 1000ml glass bottle (ALE220)	GW
		25696103	RW1-BH010	EW1	12.00 - 21.00	NaOH (ALE245) HNO3 Unfiltered (ALE204) H2SO4 (ALE244) 500ml Plastic (ALE208) 1000ml glass bottle (ALE220)	GW
		25696113	RW1-BH013	EW1	12.00 - 21.00	NaOH (ALE245) HNO3 Unfiltered (ALE204) H2SO4 (ALE244) 500ml Plastic (ALE208) 1000ml glass bottle (ALE220)	GW
		25696122	RW1-BH016	EW1	1.00 - 9.00	H2SO4 (ALE244) 500ml Plastic (ALE208) 1000ml glass bottle (ALE220)	GW
	TOC (Filtered)*	All	NDPs: 1 Tests: 3	N			
	Total Dissolved Solids	All	NDPs: 0 Tests: 4				
Total Metals by ICP-MS	All	NDPs: 0 Tests: 8					
TPH CWG (W)	All	NDPs: 0 Tests: 4					
VOC MS (W)	All	NDPs: 0 Tests: 4					

25696122	RWI-BH016	EW1	1.00 - 9.00	ZnAc (ALE246)	GW															
				NaOH (ALE245)	GW															
				HNO3 Unfiltered (ALE204)	GW															
				HNO3 Filtered (ALE204) with	GW															



CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

Superseded Report: 631591

Results Legend		Customer Sample Ref.	RWI-BH008	RWI-BH010	RWI-BH013	RWI-BH016		
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sampled Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	1.00 - 4.00 Ground Water (GW)	12.00 - 21.00 Ground Water (GW)	12.00 - 21.00 Ground Water (GW)	1.00 - 9.00 Ground Water (GW)		
M	mCERTS accredited.		17/01/2022	17/01/2022	17/01/2022	17/01/2022		
aq	Aqueous / settled sample.		24/01/2022	24/01/2022	24/01/2022	24/01/2022		
diss.filt	Dissolved / filtered sample.		220124-37	220124-37	220124-37	220124-37		
tot.unfilt	Total / unfiltered sample.		25696094	25696103	25696113	25696122		
*	Subcontracted - refer to subcontractor report for accreditation status.		EW1	EW1	EW1	EW1		
**	% 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					
Dissolved Organic Carbon, as C*	<0.7 mg/l	SUB		0.7	0.9	50.2		
Carbon, Organic (diss.filt)	<3 mg/l	TM090	43.6					
Ammoniacal Nitrogen as N (low level)	<0.01 mg/l	TM099	0.239 #	0.042 #	0.035 #	0.059 #		
Sulphide	<0.01 mg/l	TM101	<0.01 #	<0.01 #	<0.01 #	<0.01 #		
Dissolved solids, Total (meter)	<5 mg/l	TM123	1450 #	336 #	352 #	297 #		
Chromium, Trivalent	<0.03 mg/l	TM152		<0.03	<0.03	<0.03		
Arsenic (diss.filt)	<0.5 µg/l	TM152		1.28 2 #	1.16 #	5.85 #		
Barium (diss.filt)	<0.2 µg/l	TM152		62.5 2 #	83.1 #	166 #		
Beryllium (diss.filt)	<0.1 µg/l	TM152		<0.1 2 #	0.147 #	0.958 #		
Boron (diss.filt)	<10 µg/l	TM152		27.6 2 #	14.7 #	200 #		
Cadmium (diss.filt)	<0.08 µg/l	TM152		<0.08 2 #	0.102 #	0.318 #		
Chromium (diss.filt)	<1 µg/l	TM152		<1 2 #	4.05 #	9.56 #		
Copper (diss.filt)	<0.3 µg/l	TM152		<0.3 2 #	10.2 #	59.3 #		
Lead (diss.filt)	<0.2 µg/l	TM152		<0.2 2 #	9.62 #	36.1 #		
Molybdenum (tot.unfilt)	<9 µg/l	TM152	<9 #	<9 #	<9 #	<9 #		
Manganese (diss.filt)	<3 µg/l	TM152		309 2 #	161 #	990 #		
Molybdenum (diss.filt)	<3 µg/l	TM152			<3 #	<3 #		
Nickel (diss.filt)	<0.4 µg/l	TM152		<0.4 2 #	5.08 #	32.8 #		
Selenium (diss.filt)	<1 µg/l	TM152		<1 2 #	<1 #	3.27 #		
Vanadium (diss.filt)	<1 µg/l	TM152		<1 2 #	3.55 #	26 #		
Zinc (diss.filt)	<1 µg/l	TM152		46.9 2 #	72.5 #	338 #		
Magnesium (Dis.Filt)	<0.036 mg/l	TM152		11.1 2 #	7.99 #	8.31 #		
Iron (Dis.Filt)	<0.019 mg/l	TM152		<0.019 2 #	1.61 #	4.65 #		
Hardness, Total as CaCO3 unfiltered	<0.35 mg/l	TM152	829 2	251 2	328 2	233 2		
Mercury (diss.filt)	<0.01 µg/l	TM183		<0.01 2 #	<0.01 2 #	0.308 #		
Sulphate	<2 mg/l	TM184	434 #	16.8 #	15.2 #	20.9 #		
Chloride	<2 mg/l	TM184	93.4 #	14.8 #	16.8 #	16.1 #		
Nitrate as NO3	<0.3 mg/l	TM184	0.491	<0.3	3.71	<0.3		
Chromium, Hexavalent	<0.03 mg/l	TM241	<0.03 #	<0.03 #	<0.03 #	<0.03 #		
Phenol (low level)	<0.5 µg/l	TM255	<0.5	<0.5	<0.5	<0.5		
Cresols (low level)	<0.5 µg/l	TM255	0.53	<0.5	<0.5	<0.5		
Xylenols (low level)	<0.5 µg/l	TM255	<0.5	<0.5	<0.5	<0.5		



CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

Superseded Report: 631591

PAH Spec MS - Aqueous (W)

Results Legend			Customer Sample Ref.	RWI-BH008	RWI-BH010	RWI-BH013	RWI-BH016		
#	ISO17025 accredited.		Depth (m) Sample Type Date Sampled Sampled Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	1.00 - 4.00	12.00 - 21.00	12.00 - 21.00	1.00 - 9.00		
M	mCERTS accredited.			Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)		
aq	Aqueous / settled sample.			17/01/2022	17/01/2022	17/01/2022	17/01/2022		
diss.fit	Dissolved / filtered sample.			24/01/2022	24/01/2022	24/01/2022	24/01/2022		
tot.unfilt	Total / unfiltered sample.			220124-37	220124-37	220124-37	220124-37		
*	Subcontracted - refer to subcontractor report for accreditation status.			25696094	25696103	25696113	25696122		
**	% 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			EW1	EW1	EW1	EW1		
(F)	Trigger breach confirmed								
1-4*§@	Sample deviation (see appendix)								
Component	LOD/Units	Method							
Naphthalene (aq)	<0.01 µg/l	TM178	0.046 #	<0.01 #	<0.01 #	<0.01 #	0.0191 #		
Acenaphthene (aq)	<0.005 µg/l	TM178	<0.005 #	<0.005 #	<0.005 #	<0.005 #	<0.005 #		
Acenaphthylene (aq)	<0.005 µg/l	TM178	<0.005 #	<0.005 #	<0.005 #	<0.005 #	<0.005 #		
Fluoranthene (aq)	<0.005 µg/l	TM178	<0.005 #	<0.005 #	<0.005 #	<0.005 #	<0.005 #		
Anthracene (aq)	<0.005 µg/l	TM178	<0.005 #	<0.005 #	<0.005 #	<0.005 #	<0.005 #		
Phenanthrene (aq)	<0.005 µg/l	TM178	<0.005 #	<0.005 #	<0.005 #	0.0385 #	<0.005 #		
Fluorene (aq)	<0.005 µg/l	TM178	<0.005 #	<0.005 #	<0.005 #	<0.005 #	<0.005 #		
Chrysene (aq)	<0.005 µg/l	TM178	<0.005 #	<0.005 #	<0.005 #	<0.005 #	<0.005 #		
Pyrene (aq)	<0.005 µg/l	TM178	0.0095 #	<0.005 #	0.00607 #	0.0892 #	<0.005 #		
Benzo(a)anthracene (aq)	<0.005 µg/l	TM178	<0.005 #	<0.005 #	<0.005 #	<0.005 #	<0.005 #		
Benzo(b)fluoranthene (aq)	<0.005 µg/l	TM178	<0.005 #	<0.005 #	<0.005 #	<0.005 #	<0.005 #		
Benzo(k)fluoranthene (aq)	<0.005 µg/l	TM178	<0.005 #	<0.005 #	<0.005 #	<0.005 #	<0.005 #		
Benzo(a)pyrene (aq)	<0.002 µg/l	TM178	<0.002 #	<0.002 #	<0.002 #	<0.002 #	<0.002 #		
Dibenzo(a,h)anthracene (aq)	<0.005 µg/l	TM178	<0.005 #	<0.005 #	<0.005 #	<0.005 #	<0.005 #		
Benzo(g,h,i)perylene (aq)	<0.005 µg/l	TM178	<0.005 #	<0.005 #	<0.005 #	<0.005 #	<0.005 #		
Indeno(1,2,3-cd)pyrene (aq)	<0.005 µg/l	TM178	<0.005 #	<0.005 #	<0.005 #	<0.005 #	<0.005 #		
PAH, Total Detected USEPA 16 (aq)	<0.082 µg/l	TM178	<0.082 #	<0.082 #	<0.082 #	0.147 #	<0.082 #		



CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

Superseded Report: 631591

TPH CWG (W)

Results Legend		Customer Sample Ref.	RWI-BH008	RWI-BH010	RWI-BH013	RWI-BH016		
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sampled Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	1.00 - 4.00	12.00 - 21.00	12.00 - 21.00	1.00 - 9.00		
M	mCERTS accredited.		Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)		
aq	Aqueous / settled sample.		17/01/2022	17/01/2022	17/01/2022	17/01/2022		
diss.fit	Dissolved / filtered sample.							
tot.unfit	Total / unfiltered sample.		24/01/2022	24/01/2022	24/01/2022	24/01/2022		
*	Subcontracted - refer to subcontractor report for accreditation status.		220124-37	220124-37	220124-37	220124-37		
**	% 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		25696094	25696103	25696113	25696122		
(F)	Trigger breach confirmed		EW1	EW1	EW1	EW1		
1-4*\$@	Sample deviation (see appendix)							
Component	LOD/Units		Method					
GRO Surrogate % recovery**	%	TM245	111	96	95	113		
			2	2	2	2		
GRO >C5-C12	<50	TM245	<50	<50	<50	<50		
	µg/l		2 #	2 #	2 #	2 #		
Aliphatics >C5-C6	<10	TM245	<10	<10	<10	<10		
	µg/l		2	2	2	2		
Aliphatics >C6-C8	<10	TM245	<10	<10	<10	<10		
	µg/l		2	2	2	2		
Aliphatics >C8-C10	<10	TM245	<10	<10	<10	<10		
	µg/l		2	2	2	2		
Aliphatics >C10-C12	<10	TM245	<10	<10	<10	<10		
	µg/l		2	2	2	2		
Aliphatics >C12-C16 (aq)	<10	TM174	<200	<10	146	61		
	µg/l							
Aliphatics >C16-C21 (aq)	<10	TM174	<200	<10	161	311		
	µg/l							
Aliphatics >C21-C35 (aq)	<10	TM174	<200	<10	565	1030		
	µg/l							
Total Aliphatics >C12-C35 (aq)	<10	TM174	<200	<10	872	1410		
	µg/l							
Aromatics >EC5-EC7	<10	TM245	<10	<10	<10	<10		
	µg/l		2	2	2	2		
Aromatics >EC7-EC8	<10	TM245	<10	<10	<10	<10		
	µg/l		2	2	2	2		
Aromatics >EC8-EC10	<10	TM245	<10	<10	<10	<10		
	µg/l		2	2	2	2		
Aromatics >EC10-EC12	<10	TM245	<10	<10	<10	<10		
	µg/l		2	2	2	2		
Aromatics >EC12-EC16 (aq)	<10	TM174	<200	<10	<10	<10		
	µg/l							
Aromatics >EC16-EC21 (aq)	<10	TM174	<200	<10	<10	<10		
	µg/l							
Aromatics >EC21-EC35 (aq)	<10	TM174	<200	<10	<10	<10		
	µg/l							
Total Aromatics >EC12-EC35 (aq)	<10	TM174	<200	<10	<10	<10		
	µg/l							
Total Aliphatics & Aromatics >C5-35 (aq)	<10	TM174	<10	<10	872	1410		
	µg/l							
Aliphatics >C16-C35 Aqueous	<10	TM174	<200	<10	726	1340		
	µg/l							



CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

Superseded Report: 631591

Notification of NDPs (No determination possible)

Date Received : 24/01/2022 13:31:28

Sample No	Customer Sample Ref.	Depth (m)	Test	Comment
25696094	RWI-BH008 EW1	1.00 - 4.00	TOC (Filtered)*	Sample cannot be filtered
25696094	RWI-BH008 EW1	1.00 - 4.00	Mercury Dissolved	Sample cannot be filtered
25696094	RWI-BH008 EW1	1.00 - 4.00	Dissolved Metals by ICP-MS	Sample cannot be filtered



CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

Superseded Report: 631591

Table of Results - Appendix

Method No	Reference	Description
SUB		Subcontracted Test
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM101	Method 4500B & C, AWWA/APHA, 20th Ed., 1999	Determination of Sulphide in soil and water samples using the Kone Analyser
TM123	BS 2690: Part 121:1981	The Determination of Total Dissolved Solids in Water
TM152	ISO 17294-2:2016 Water quality - Application of inductively coupled plasma mass spectrometry (ICP-MS)	Analysis of Aqueous Samples by ICP-MS
TM174	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Waters by GC-FID
TM178	Modified: US EPA Method 8100	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM208	Modified: US EPA Method 8260b & 624	Determination of Volatile Organic Compounds by Headspace / GC-MS in Waters
TM241	Methods for the Examination of Waters and Associated Materials; Chromium in Raw and Potable Waters and Sewage Effluents 1980.	The Determination of Hexavalent Chromium in Waters and Leachates using the Kone Analyser
TM245	By GC-FID	Determination of GRO by Headspace in waters
TM255		Determination of Low Level Phenols in Waters and Leachates by HPLC
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4, Standard Methods for the examination of waters and wastewaters 20th Edition, PHA, Washington DC, USA. ISBN 0-87553-235-7 and The Determination of Alkalinity and Acidity in water HMSO, 1981, ISBN 0 11 751601 5.	Determination of pH, EC, TDS and Alkalinity in Aqueous samples
TM279		Determination of Low Level Easily Liberatable (Free) Cyanides and Total Cyanides in Waters using the Skalar SANS+ System Segmented Flow Analyser

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).



CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

Superseded Report: 631591

Test Completion Dates

Lab Sample No(s)	25696094	25696103	25696113	25696122
Customer Sample Ref.	RWI-BH008	RWI-BH010	RWI-BH013	RWI-BH016
AGS Ref.	EW1	EW1	EW1	EW1
Depth	1.00 - 4.00	12.00 - 21.00	12.00 - 21.00	1.00 - 9.00
Type	Ground Water	Ground Water	Ground Water	Ground Water
Ammonium Low	31-Jan-2022	31-Jan-2022	31-Jan-2022	31-Jan-2022
Anions by Kone (w)	29-Jan-2022	28-Jan-2022	28-Jan-2022	29-Jan-2022
Chromium III		31-Jan-2022	31-Jan-2022	31-Jan-2022
Dissolved Metals by ICP-MS		31-Jan-2022	31-Jan-2022	31-Jan-2022
Dissolved Organic/Inorganic Carbon	06-Feb-2022			
EPH CWG (Aliphatic) Aqueous GC (W)	01-Feb-2022	01-Feb-2022	01-Feb-2022	01-Feb-2022
EPH CWG (Aromatic) Aqueous GC (W)	01-Feb-2022	01-Feb-2022	01-Feb-2022	01-Feb-2022
GRO by GC-FID (W)	28-Jan-2022	28-Jan-2022	28-Jan-2022	28-Jan-2022
Hexavalent Chromium (w)	28-Jan-2022	28-Jan-2022	28-Jan-2022	28-Jan-2022
Low Level Cyanide (W)	31-Jan-2022	31-Jan-2022	31-Jan-2022	31-Jan-2022
Low Level Phenols by HPLC (W)	31-Jan-2022	31-Jan-2022	31-Jan-2022	31-Jan-2022
Mercury Dissolved		31-Jan-2022	31-Jan-2022	31-Jan-2022
Nitrite by Kone (w)	28-Jan-2022	28-Jan-2022	28-Jan-2022	28-Jan-2022
PAH Spec MS - Aqueous (W)	28-Jan-2022	28-Jan-2022	28-Jan-2022	28-Jan-2022
pH Value	27-Jan-2022	27-Jan-2022	27-Jan-2022	27-Jan-2022
Sulphide	27-Jan-2022	27-Jan-2022	27-Jan-2022	27-Jan-2022
TOC (Filtered)*		28-Jan-2022	28-Jan-2022	28-Jan-2022
Total Dissolved Solids	28-Jan-2022	28-Jan-2022	28-Jan-2022	28-Jan-2022
Total Metals by ICP-MS	03-Feb-2022	31-Jan-2022	31-Jan-2022	31-Jan-2022
TPH CWG (W)	01-Feb-2022	01-Feb-2022	01-Feb-2022	01-Feb-2022
VOC MS (W)	28-Jan-2022	28-Jan-2022	28-Jan-2022	28-Jan-2022



CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

Superseded Report: 631591

Chromatogram

Analysis: EPH CWG (Aliphatic) Aqueous GC (W)

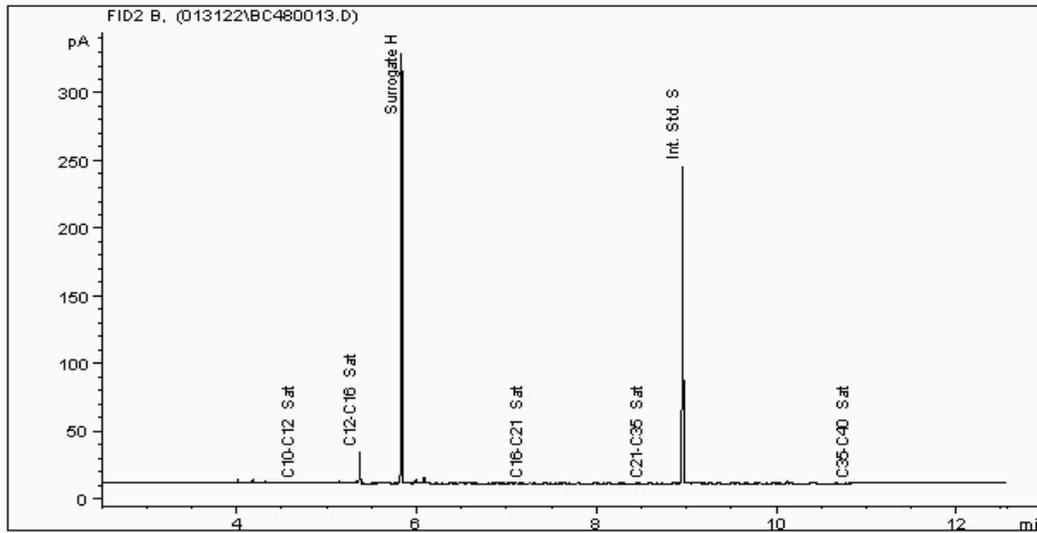
Sample No : 25712338
Sample ID : RWI-BH008

Depth : 1.00 - 4.00

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 23995754-
Date Acquired : 31/01/2022 21:03:36 PM
Units : ppb
Dilution : SE RWI-BH008[1.00 - 4.00] ->
CF : 1
Multiplier : 0.500

#	Compound Name	Main Peak Area	Amount
1	C10-C12 Sat	0.0	0.000
2	C12-C16 Sat	0.0	0.000
3	Surrogate H	233.5	4.552
4	C16-C21 Sat	0.0	0.000
5	C21-C35 Sat	0.0	0.000
6	Int. Std. S	182.2	5.000
7	C35-C40 Sat	0.0	0.000
Total Peak Area		415.7	





CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

Superseded Report: 631591

Chromatogram

Analysis: EPH CWG (Aliphatic) Aqueous GC (W)

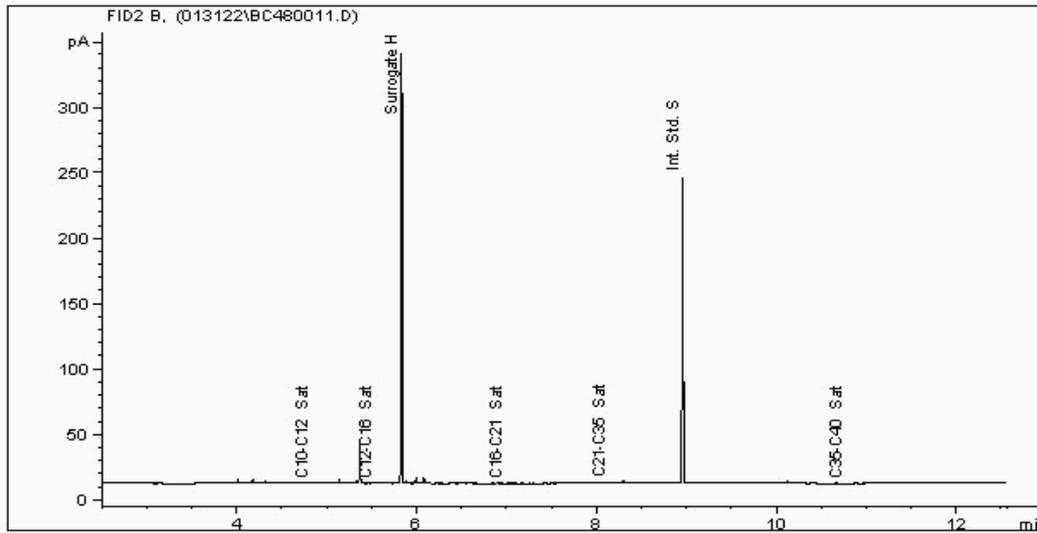
Sample No : 25712382
Sample ID : RWI-BH010

Depth : 12.00 - 21.00

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 23995777-
Date Acquired : 31/01/2022 20:17:38 PM
Units : ppb
Dilution : SE RWI-BH010[12.00 - 21.00->
CF : 1
Multiplier : 0.025

#	Compound Name	Main Peak Area	Amount
1	C10-C12 Sat	0.0	0.000
2	C12-C16 Sat	0.0	0.000
3	Surrogate H	240.3	0.232
4	C16-C21 Sat	0.0	0.000
5	C21-C35 Sat	0.0	0.000
6	Int. Std. S	184.2	0.250
7	C35-C40 Sat	0.0	0.000
Total Peak Area		424.5	





CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

Superseded Report: 631591

Chromatogram

Analysis: EPH CWG (Aliphatic) Aqueous GC (W)

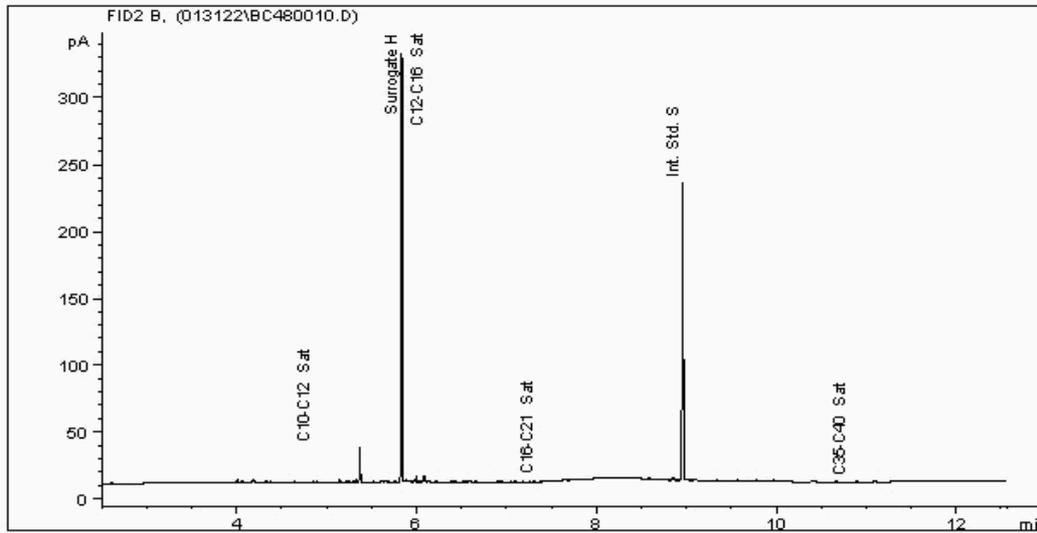
Sample No : 25712383
Sample ID : RWI-BH013

Depth : 12.00 - 21.00

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 23995800-
Date Acquired : 31/01/2022 19:54:17 PM
Units : ppb
Dilution : SE RWI-BH013[12.00 - 21.00->
CF : 1
Multiplier : 0.025

#	Compound Name	Main Peak Area	Amount
1	C10-C12 Sat	143.9	0.123
2	Surrogate H	224.1	0.216
3	C12-C16 Sat	154.1	0.146
4	C16-C21 Sat	152.5	0.161
5	Int. Std. S	184.4	0.250
6	C21-C35 Sat	434.0	0.565
7	C35-C40 Sat	101.4	0.155
Total Peak Area		1394.4	





CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

Superseded Report: 631591

Chromatogram

Analysis: EPH CWG (Aliphatic) Aqueous GC (W)

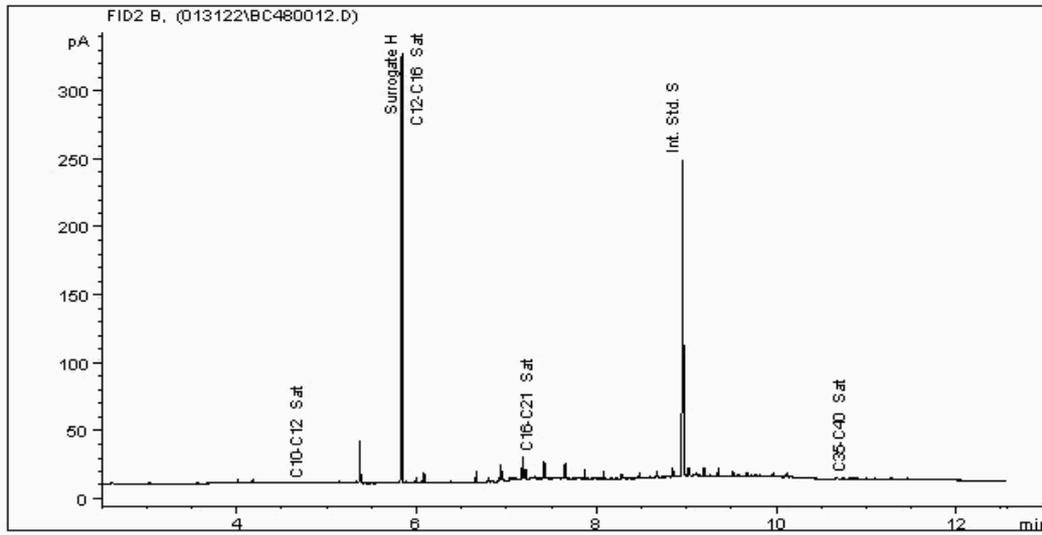
Sample No : 25712384
Sample ID : RWI-BH016

Depth : 1.00 - 9.00

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 23995822-
Date Acquired : 31/01/2022 20:40:40 PM
Units : ppb
Dilution : SE RWI-BH016[1.00 - 9.00] ->
CF : 1
Multiplier : 0.025

#	Compound Name	Main Peak Area	Amount
1	C10-C12 Sat	0.0	0.000
2	Surrogate H	228.4	0.219
3	C12-C16 Sat	64.4	0.061
4	C16-C21 Sat	294.4	0.311
5	Int. Std. S	184.9	0.250
6	C21-C35 Sat	795.9	1.033
7	C35-C40 Sat	207.6	0.317
Total Peak Area		1775.5	





CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

Superseded Report: 631591

Chromatogram

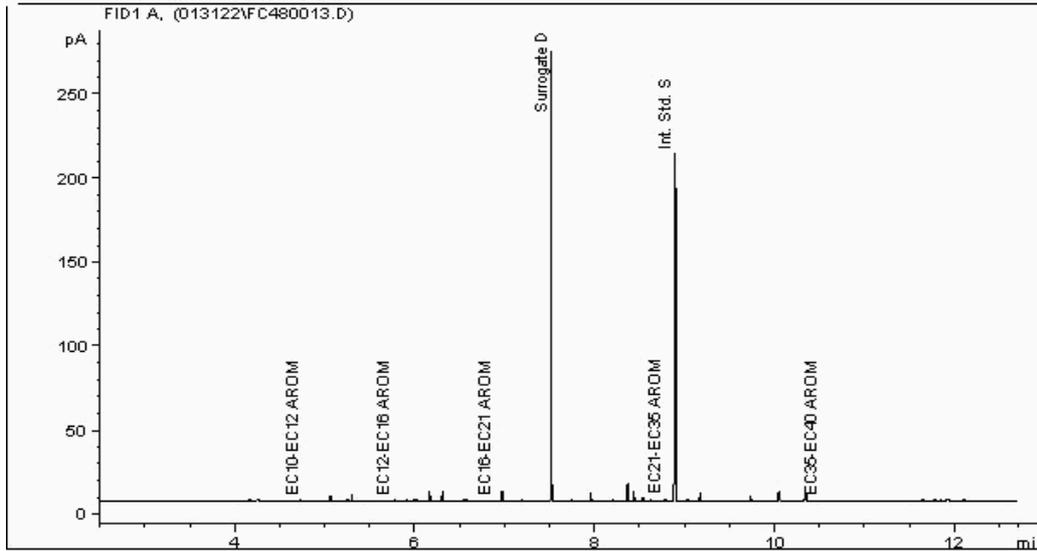
Analysis: EPH CWG (Aromatic) Aqueous GC (W)

Sample No : 25712338
Sample ID : RWI-BH008

Depth : 1.00 - 4.00

Alcontrol/Geochem Analytical Services
Speciated TPH - AROM (C12 - C40)

Sample Identity: 23995755-
Date Acquired : 31/01/2022 21:03:36 PM
Units : ppb
Dilution : SE RWI-BH008[1.00 - 4.00] ->
CF : 1
Multiplier : 0.500





CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

Superseded Report: 631591

Chromatogram

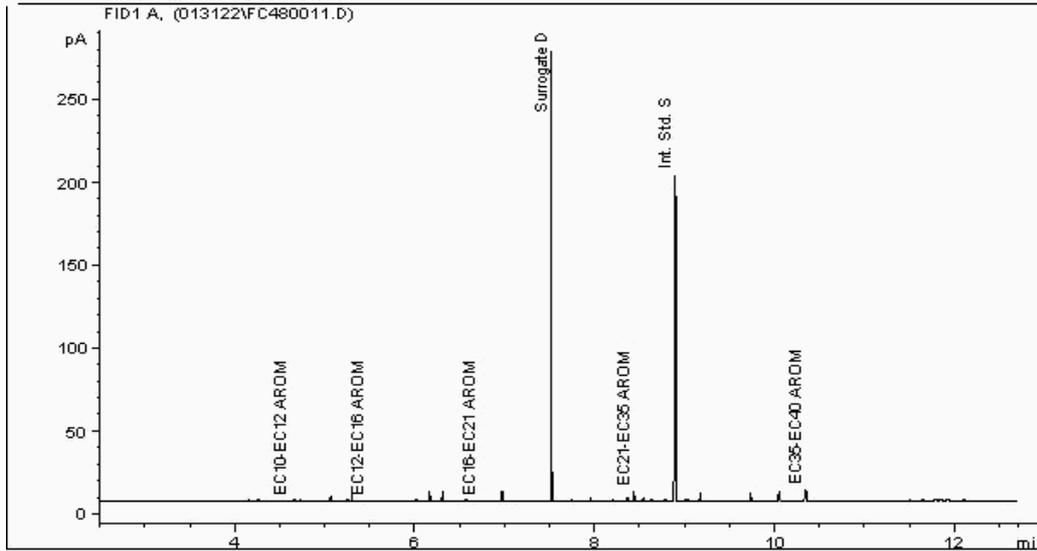
Analysis: EPH CWG (Aromatic) Aqueous GC (W)

Sample No : 25712382
Sample ID : RWI-BH010

Depth : 12.00 - 21.00

Alcontrol/Geochem Analytical Services
Speciated TPH - AROM (C12 - C40)

Sample Identity: 23995778-
Date Acquired : 31/01/2022 20:17:38 PM
Units : ppb
Dilution : SE RWI-BH010[12.00 - 21.00->
CF : 1
Multiplier : 0.025





CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

Superseded Report: 631591

Chromatogram

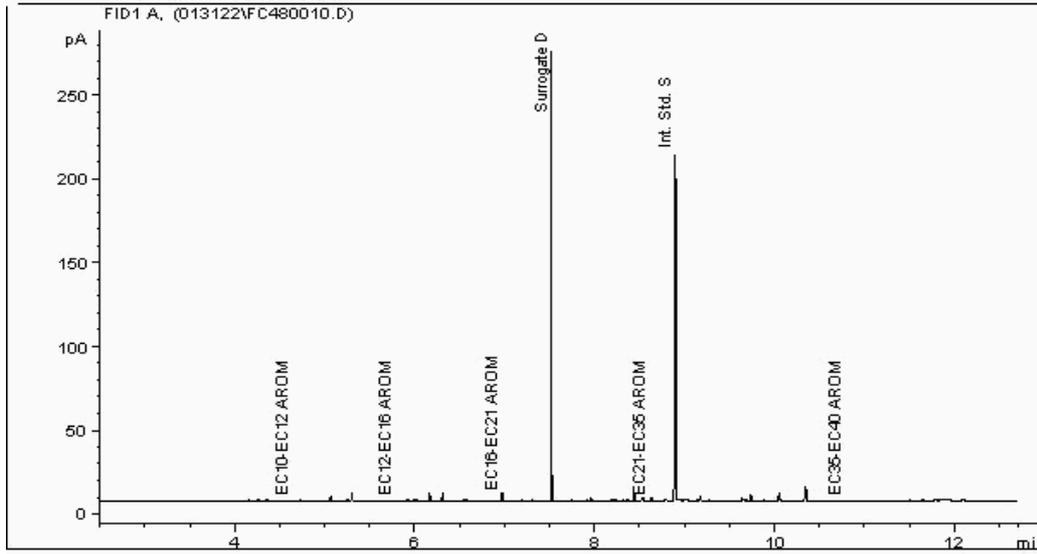
Analysis: EPH CWG (Aromatic) Aqueous GC (W)

Sample No : 25712383
Sample ID : RWI-BH013

Depth : 12.00 - 21.00

Alcontrol/Geochem Analytical Services
Speciated TPH - AROM (C12 - C40)

Sample Identity: 23995801-
Date Acquired : 31/01/2022 19:54:17 PM
Units : ppb
Dilution : SE RWI-BH013[12.00 - 21.00->
CF : 1
Multiplier : 0.025





CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

Superseded Report: 631591

Chromatogram

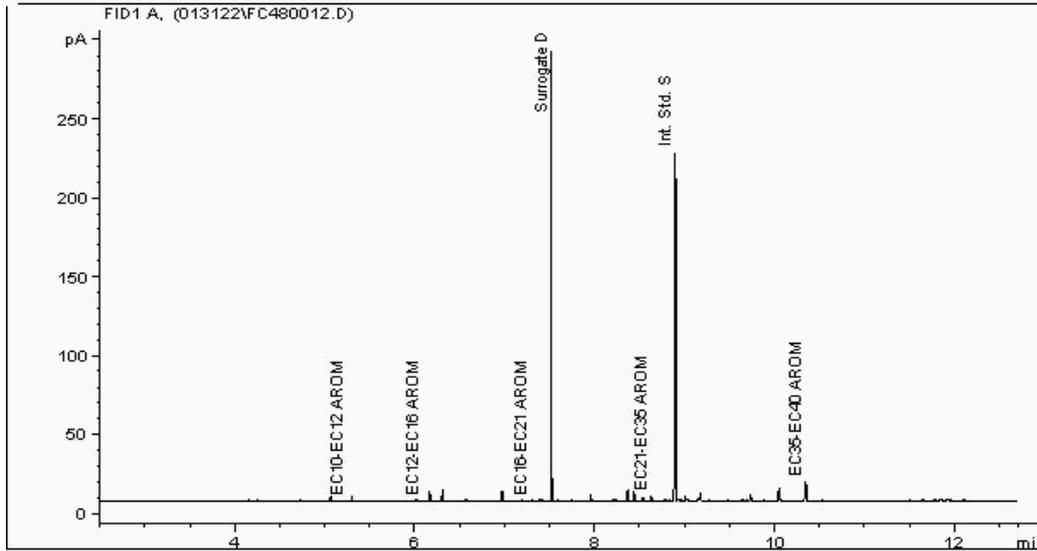
Analysis: EPH CWG (Aromatic) Aqueous GC (W)

Sample No : 25712384
Sample ID : RWI-BH016

Depth : 1.00 - 9.00

Alcontrol/Geochem Analytical Services
Speciated TPH - AROM (C12 - C40)

Sample Identity: 23995823-
Date Acquired : 31/01/2022 20:40:40 PM
Units : ppb
Dilution : SE RWI-BH016[1.00 - 9.00] ->
CF : 1
Multiplier : 0.025





CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

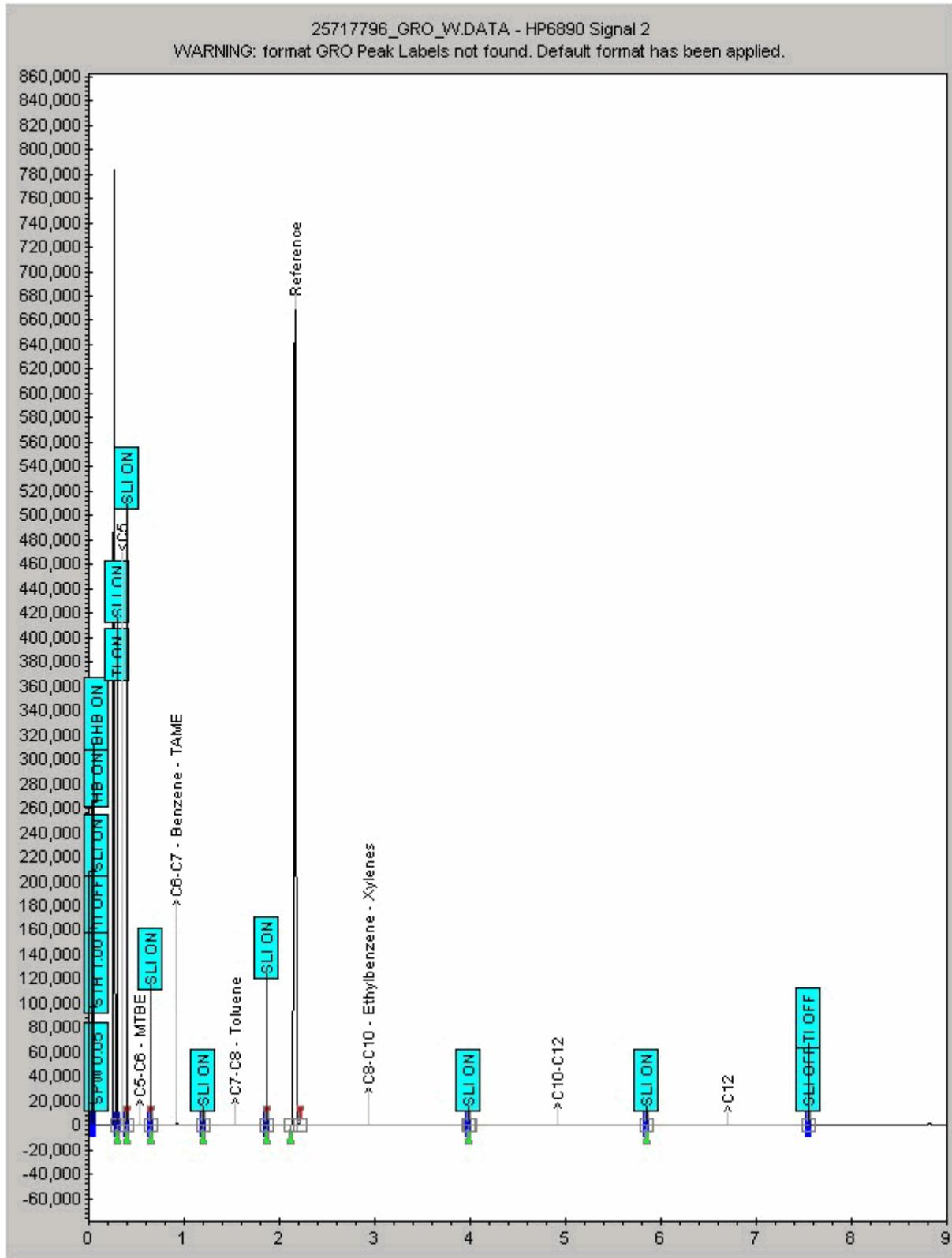
Superseded Report: 631591

Chromatogram

Analysis: GRO by GC-FID (W)

Sample No : 25717796
Sample ID : RWI-BH013

Depth : 12.00 - 21.00





CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

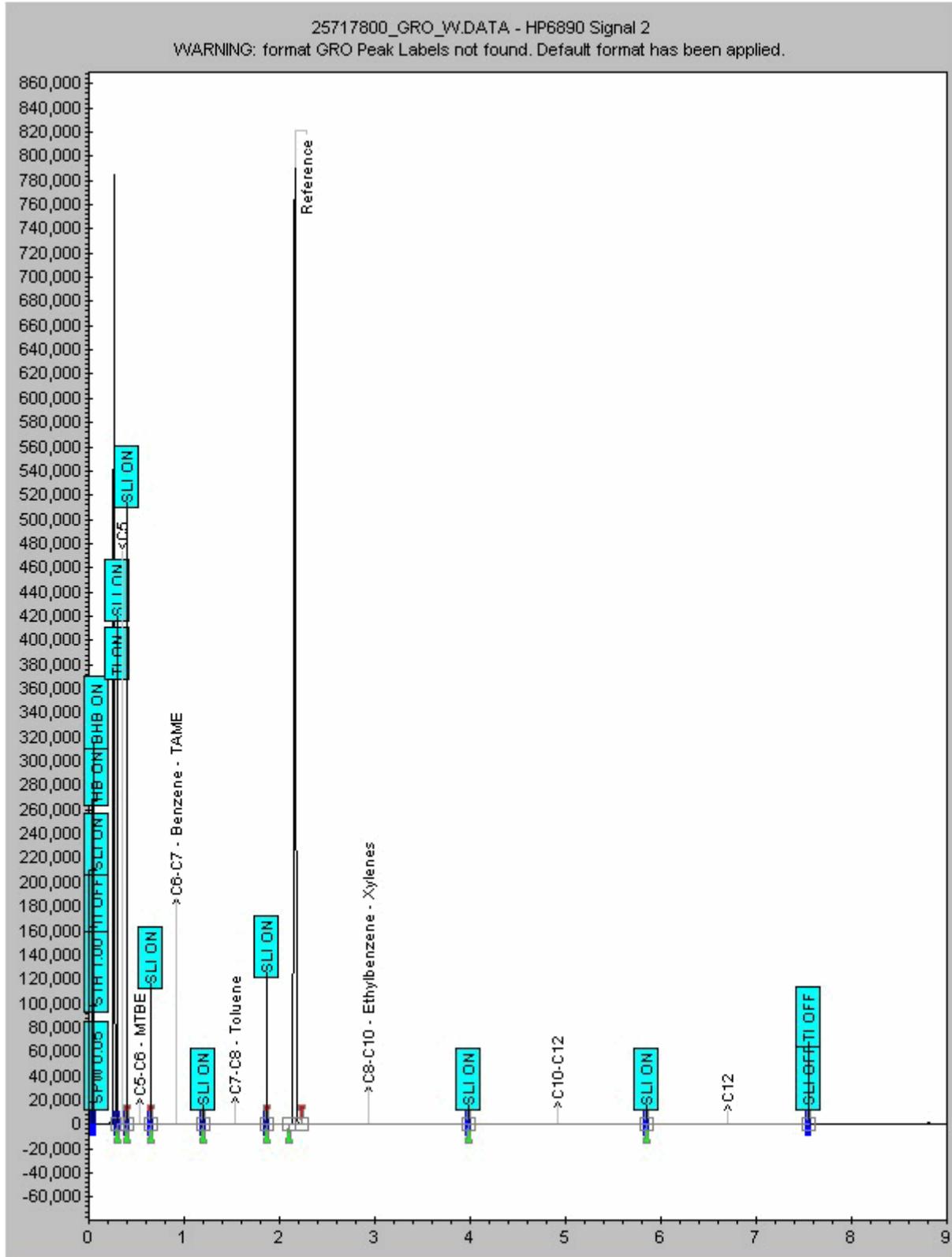
Superseded Report: 631591

Chromatogram

Analysis: GRO by GC-FID (W)

Sample No : 25717800
Sample ID : RWI-BH016

Depth : 1.00 - 9.00





CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

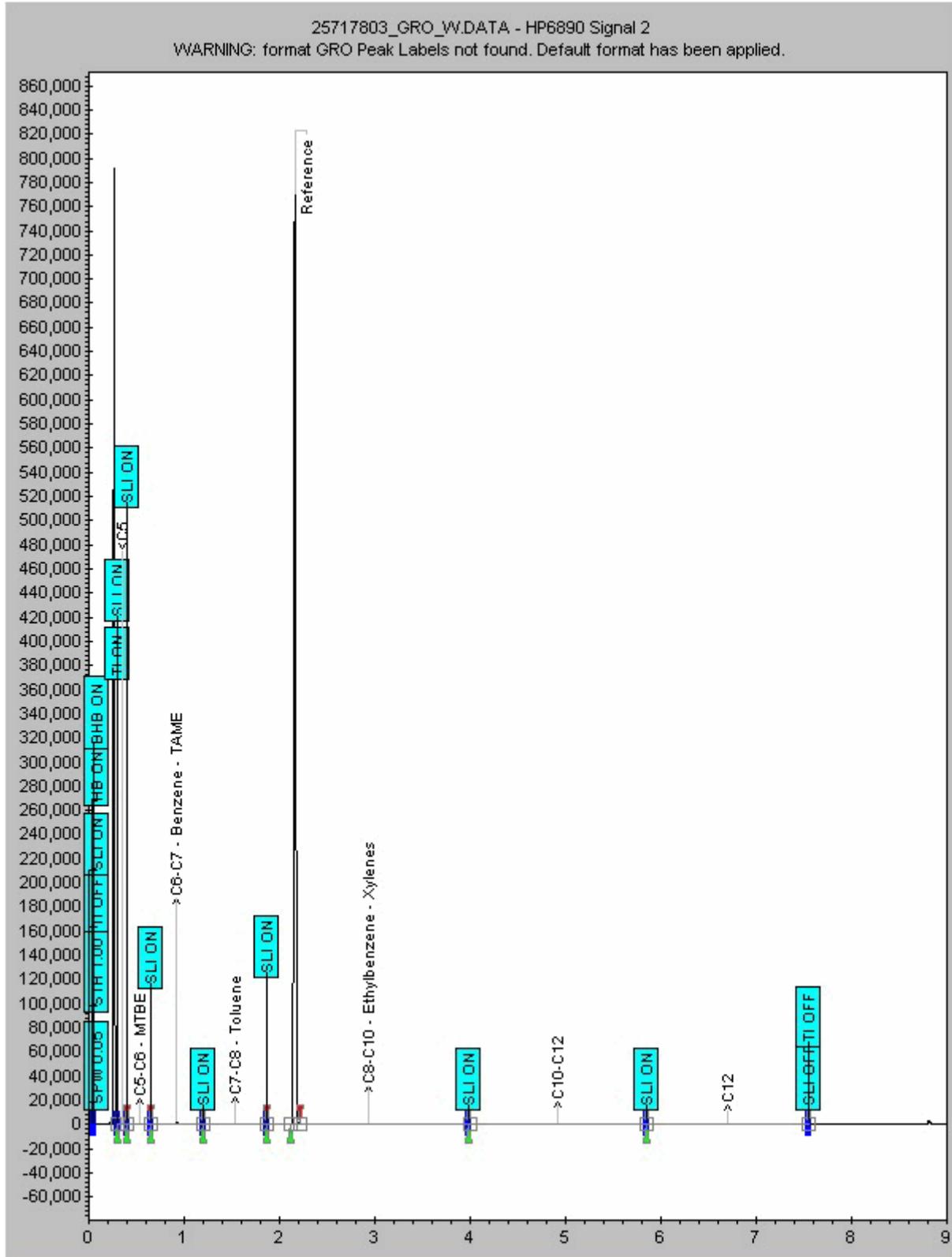
Superseded Report: 631591

Chromatogram

Analysis: GRO by GC-FID (W)

Sample No : 25717803
Sample ID : RWI-BH008

Depth : 1.00 - 4.00





CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

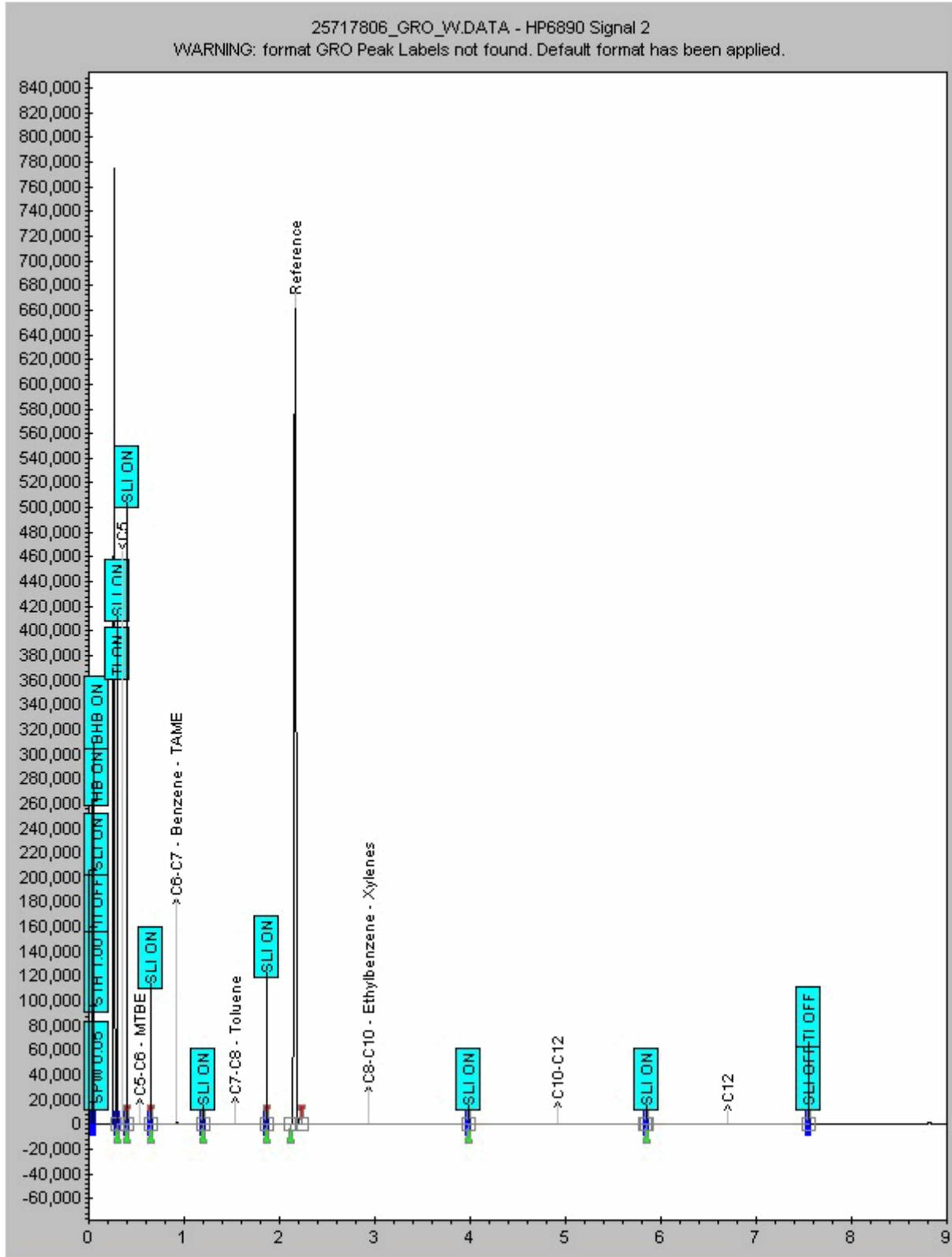
Superseded Report: 631591

Chromatogram

Analysis: GRO by GC-FID (W)

Sample No : 25717806
Sample ID : RWI-BH010

Depth : 12.00 - 21.00





ALS Environmental Ltd
Torrington Avenue
Coventry
CV4 9GU

T: +44 (0)24 7642 1213
F: +44 (0)24 7685 6575
www.alsenvironmental.co.uk

Subcon Results
ALS Life Sciences Limited
Torrington Avenue
Tile Hill CV4 9GU

28 January 2022

Test Report: COV/2263855/2022

Dear Subcon Results

Analysis of your sample(s) received on 27 January 2022 is now complete and we have pleasure in enclosing the appropriate test report(s).

An invoice for the analysis carried out will be sent under separate cover.

Should you have any queries regarding this report(s) or any part of our service, please contact Customer Services on +44 (0)24 7642 1213 who will be happy to discuss your requirements.

If you would like to arrange any further analysis, please contact Customer Services. To arrange container delivery or sample collection, please call the Couriers Department directly on 024 7685 6562.

Thank you for using ALS Environmental Ltd and we look forward to receiving your next samples.

Yours Sincerely,

Signed:

Name:

D. Lewis

Title:

Technical Inorganic Manager



This communication has been sent to you by ALS Environmental Ltd. Registered in England and Wales. Registration No.02148934. Registered Office: ALS Environmental Limited, Torrington Avenue, Coventry, CV4 9GU.

Report Summary

**Hawarden Subcon Results
ALS Life Sciences Limited
Torrington Avenue
Tile Hill
CV4 9GU**



ANALYSED BY



Date of Issue: **28 January 2022**

Report Number: **COV/2263855/2022**

Issue **1**

This issue replaces
all previous issues

Job Description: 2021 Analysis

Number of Samples
included in this report **3**

Job Received: **27 January 2022**

Number of Test Results
included in this report **3**

Analysis Commenced: **27 January 2022**

Signed:

Name: **D. Lewis**

Date: **28 January 2022**

Title: **Technical Inorganic Manager**

ALS Environmental Ltd was not responsible for sampling unless otherwise stated.

Information on the methods of analysis and performance characteristics are available on request.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation. The results relate only to the items tested and where relevant sampled.

Tests marked 'Not UKAS Accredited' in this Report/Certificate are not included in the UKAS Accreditation Schedule for our laboratory.

This test report is not a statement of conformity to any specification or standard.

This communication has been sent to you by ALS Environmental Ltd. Registered in England and Wales. Registration No. 02148934. Registered Office: ALS Environmental Limited, Torrington Avenue, Coventry, CV4 9GU.

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ALS Environmental Ltd

Torrington Avenue, Coventry, CV4 9GU
Tel:+44 (0)24 7642 1213 Fax:+44 (0)24 7685 6575

Page 1 of 7

Certificate of Analysis

ANALYSED BY



Report Number: **COV/2263855/2022**
Laboratory Number: **21282613**
Sample Source: **ALS Life Sciences Limited**
Sample Point Description: **Water Analysis**
Sample Description: **25704609**
Sample Matrix: **Ground Water**
Sample Date/Time: **17 January 2022**
Sample Received: **27 January 2022**
Analysis Complete: **28 January 2022**
SDG: **220124-37**
Sample Reference: **RWI-BH010**

Issue **1**
Sample **1** of **3**

Test Description	Result	Units	Analysis Date	Accreditation	Method
TOC (Filtered)	0.7	mg/l	27/01/2022	Y Cov	WAS005

Analyst Comments for 21282613:

This sample has been analysed for TOC (Filtered) outside recommended stability times. It is therefore possible that the results provided may be compromised.

This issue replaces all previous issues

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.

Analysed at: CHE = Chester(CH5 3US), COV = Coventry(CV4 9GU), OTT = Otterbourne(SO21 2RU), S = Subcontracted, TRB = Subcontracted to Trowbridge(BA14 0XD), WAK = Wakefield(WF5 9TG), F = Data supplied by customer.

For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered.

I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed:

Name: **D. Lewis**

Date: **28 January 2022**

Title: **Technical Inorganic Manager**

ALS Environmental Ltd

Torrington Avenue, Coventry, CV4 9GU
Tel:+44 (0)24 7642 1213 Fax:+44 (0)24 7685 6575

Page 2 of 7

Certificate of Analysis

ANALYSED BY



Report Number: **COV/2263855/2022**
Laboratory Number: **21282614**
Sample Source: **ALS Life Sciences Limited**
Sample Point Description: **Water Analysis**
Sample Description: **25704630**
Sample Matrix: **Ground Water**
Sample Date/Time: **17 January 2022**
Sample Received: **27 January 2022**
Analysis Complete: **28 January 2022**
SDG: **220124-37**
Sample Reference: **RWI-BH013**

Issue **1**
Sample **2** of **3**

Test Description	Result	Units	Analysis Date	Accreditation	Method
TOC (Filtered)	0.9	mg/l	27/01/2022	Y Cov	WAS005

Analyst Comments for 21282614:

This sample has been analysed for TOC (Filtered) outside recommended stability times. It is therefore possible that the results provided may be compromised.

This issue replaces all previous issues

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.

Analysed at: CHE = Chester(CH5 3US), COV = Coventry(CV4 9GU), OTT = Otterbourne(SO21 2RU), S = Subcontracted, TRB = Subcontracted to Trowbridge(BA14 0XD), WAK = Wakefield(WF5 9TG), F = Data supplied by customer.

For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered.

I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed:

Name: **D. Lewis**

Date: **28 January 2022**

Title: **Technical Inorganic Manager**

ALS Environmental Ltd

Torrington Avenue, Coventry, CV4 9GU
Tel:+44 (0)24 7642 1213 Fax:+44 (0)24 7685 6575

Page 3 of 7

Certificate of Analysis

ANALYSED BY



Report Number: **COV/2263855/2022**
Laboratory Number: **21282615**
Sample Source: **ALS Life Sciences Limited**
Sample Point Description: **Water Analysis**
Sample Description: **25704583**
Sample Matrix: **Ground Water**
Sample Date/Time: **17 January 2022**
Sample Received: **27 January 2022**
Analysis Complete: **28 January 2022**
SDG: **220124-37**
Sample Reference: **RWI-BH016**

Issue **1**
Sample **3** of **3**

Test Description	Result	Units	Analysis Date	Accreditation	Method
TOC (Filtered)	50.2	mg/l	27/01/2022	Y Cov	WAS005

Analyst Comments for 21282615:

This sample has been analysed for TOC (Filtered) outside recommended stability times. It is therefore possible that the results provided may be compromised.

This issue replaces all previous issues

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.

Analysed at: CHE = Chester(CH5 3US), COV = Coventry(CV4 9GU), OTT = Otterbourne(SO21 2RU), S = Subcontracted, TRB = Subcontracted to Trowbridge(BA14 0XD), WAK = Wakefield(WF5 9TG), F = Data supplied by customer.

For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered.

I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed:

Name: **D. Lewis**

Date: **28 January 2022**

Title: **Technical Inorganic Manager**

ALS Environmental Ltd

Torrington Avenue, Coventry, CV4 9GU
Tel:+44 (0)24 7642 1213 Fax:+44 (0)24 7685 6575

Page 4 of 7



ANALYST COMMENTS FOR REPORT COV/2263855/2022

Issue 1

This issue replaces all previous issues

Date of Issue: 28 January 2022

Sample No	Analysis Comments
21282613	This sample has been analysed for TOC (Filtered) outside recommended stability times. It is therefore possible that the results provided may be compromised.
21282614	This sample has been analysed for TOC (Filtered) outside recommended stability times. It is therefore possible that the results provided may be compromised.
21282615	This sample has been analysed for TOC (Filtered) outside recommended stability times. It is therefore possible that the results provided may be compromised.

Signed: 

Name: **D. Lewis**

Date: **28 January 2022**

Title: **Technical Inorganic Manager**



DETERMINAND COMMENTS FOR REPORT COV/2263855/2022

ISSUE 1

Date of Issue: 28 January 2022

This issue replaces
all previous issues

Sample No	Description	Determinand	Comments

Signed: 	Name: D. Lewis	Date: 28 January 2022
	Title: Technical Inorganic Manager	

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CERTIFICATE OF ANALYSIS

SDG:	220124-37	Client Reference:	2021T102	Report Number:	632432
Location:	ParteenWeir, WSP Lot1	Order Number:	10791	Superseded Report:	631591

Appendix

General

1. Results are expressed on a dry weight basis (dried at 35°C) 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.

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 and 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

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.



Unit 7-8 Hawarden Business Park
 Manor Road (off Manor Lane)
 Hawarden
 Deeside
 CH5 3US

Tel: (01244) 528777
 email: hawardencustomerservices@alsglobal.com
 Website: www.alsenvironmental.co.uk

Irish Drilling Limited
 Old Galway Road
 Loughrea
 Co. Galway

Attention: Dympna Darcy

CERTIFICATE OF ANALYSIS

Date of report Generation: 17 June 2022
Customer: Irish Drilling Limited
Sample Delivery Group (SDG): 220314-63
Your Reference: 2021T102
Location: ParteenWeir, WSP Lot1
Report No: 651089
Order Number: 10791

This report has been revised and directly supersedes 647238 in its entirety.

We received 31 samples on Monday March 14, 2022 and 31 of these samples were scheduled for analysis which was completed on Thursday March 24, 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

Validated

SDG: 220314-63
Client Ref.: 2021T102

Report Number: 651089
Location: ParteenWeir, WSP Lot1

Superseded Report: 647238

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
25966837	RWI-BH008	CORE1	0.00 - 3.00	09/12/2021
25966846	RWI-BH008	CORE10	10.50 - 12.00	13/12/2021
25966850	RWI-BH008	CORE14	14.00 - 15.50	13/12/2021
25966842	RWI-BH008	CORE5	5.00 - 6.50	09/12/2021
25966786	RWI-BH010	CORE1	1.50 - 3.00	15/12/2021
25966793	RWI-BH010	CORE14	14.00 - 15.60	15/12/2021
25966788	RWI-BH010	CORE5	5.60 - 6.50	15/12/2021
25966791	RWI-BH010	CORE8	8.00 - 9.50	15/12/2021
25966889	RWI-BH013	CORE1	1.50 - 3.00	10/01/2022
25966778	RWI-BH013	CORE11	11.00 - 12.50	10/01/2022
25966783	RWI-BH013	CORE13	13.10 - 14.00	10/01/2022
25966776	RWI-BH013	CORE6	6.50 - 8.00	10/01/2022
25966803	RWI-BH014	CORE1	0.00 - 3.30	06/12/2021
25966854	RWI-BH014	CORE11	11.00 - 12.50	06/12/2021
25966865	RWI-BH014	CORE15	15.50 - 17.00	08/12/2021
25966844	RWI-BH014	CORE9	9.50	06/01/2022
25966772	RWI-BH015	CORE1	0.00 - 3.00	01/12/2021
25966834	RWI-BH015	CORE11	11.00 - 14.00	01/12/2021
25966780	RWI-BH015	CORE5	5.00 - 6.50	01/12/2021
25966816	RWI-BH015	CORE6	6.50 - 8.00	01/12/2021
25966829	RWI-BH015	CORE8	8.00 - 9.30	01/12/2021
25966796	RWI-BH016	CORE1	1.50 - 3.00	05/01/2022
25966806	RWI-BH016	CORE14	14.00 - 15.00	05/01/2022
25966799	RWI-BH016	CORE6	6.50 - 8.00	05/01/2022
25966819	RWI-BH017	CORE11	11.00 - 12.50	20/12/2021
25966826	RWI-BH017	CORE14	14.00 - 17.00	20/12/2021
25966809	RWI-BH017	CORE3	3.00 - 3.50	05/01/2022
25966814	RWI-BH017	CORE6	6.50 - 8.00	05/01/2022
25966883	RWI-BH007A	CORE12	12.10 - 13.60	13/01/2022
25966875	RWI-BH007A	CORE5	5.00 - 6.50	13/01/2022
25966879	RWI-BH007A	CORE8	8.00 - 9.50	13/01/2022

Only received samples which have had analysis scheduled will be shown on the following pages.

25966879	RWI-BH007A	CORE8	8.00 - 9.50	250g Amber Jar (ALE210)	S	X	X	X	X	X	X
25966875	RWI-BH007A	CORE5	5.00 - 6.50	250g Amber Jar (ALE210)	S	X	X	X	X	X	X
25966883	RWI-BH007A	CORE12	12.10 - 13.60	BAG	S	X	X	X	X	X	X
25966814	RWI-BH017	CORE6	6.50 - 8.00	250g Amber Jar (ALE210)	S	X	X	X	X	X	X
25966809	RWI-BH017	CORE3	3.00 - 3.50	250g Amber Jar (ALE210)	S	X	X	X	X	X	X
25966826	RWI-BH017	CORE14	14.00 - 17.00	BAG	S	X	X	X	X	X	X
25966819	RWI-BH017	CORE11	11.00 - 12.50	250g Amber Jar (ALE210)	S	X	X	X	X	X	X
25966799	RWI-BH016	CORE6	6.50 - 8.00	250g Amber Jar (ALE210)	S	X	X	X	X	X	X
25966806	RWI-BH016	CORE14	14.00 - 15.00	250g Amber Jar (ALE210)	S	X	X	X	X	X	X
25966796	RWI-BH016	CORE1	1.50 - 3.00	250g Amber Jar (ALE210)	S	X	X	X	X	X	X
25966829	RWI-BH015	CORE8	8.00 - 9.30	BAG	S	X	X	X	X	X	X
25966816	RWI-BH015	CORE6	6.50 - 8.00	250g Amber Jar (ALE210)	S	X	X	X	X	X	X



CERTIFICATE OF ANALYSIS

Validated

SDG: 220314-63
Client Ref.: 2021T102

Report Number: 651089
Location: ParteenWeir, WSP Lot1

Superseded Report: 647238

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
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Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
25966837	RWI-BH008	0.00 - 3.00	Dark Brown	Sandy Loam	Vegetation	Stones
25966842	RWI-BH008	5.00 - 6.50	Light Brown	Sandy Silt Loam	Stones	Vegetation
25966846	RWI-BH008	10.50 - 12.00	Light Brown	Sandy Silt Loam	Stones	None
25966850	RWI-BH008	14.00 - 15.50	Grey	N/A	None	None
25966786	RWI-BH010	1.50 - 3.00	Dark Brown	Sand	None	Stones
25966788	RWI-BH010	5.60 - 6.50	Dark Brown	Sandy Loam	None	Stones
25966791	RWI-BH010	8.00 - 9.50	Light Brown	Sandy Loam	None	Stones
25966793	RWI-BH010	14.00 - 15.60	Grey	N/A	None	None
25966776	RWI-BH013	6.50 - 8.00	Light Brown	Silty Clay Loam	Stones	None
25966778	RWI-BH013	11.00 - 12.50	Dark Brown	Sand	None	Stones
25966783	RWI-BH013	13.10 - 14.00	Grey	N/A	None	None
25966889	RWI-BH013	1.50 - 3.00	Dark Brown	Sand	None	Stones
25966803	RWI-BH014	0.00 - 3.30	Light Brown	Sand	None	Stones
25966844	RWI-BH014	9.50	Dark Brown	Sandy Clay	None	Stones
25966854	RWI-BH014	11.00 - 12.50	Light Brown	Sandy Silt Loam	Stones	None
25966865	RWI-BH014	15.50 - 17.00	Grey	N/A	None	None
25966772	RWI-BH015	0.00 - 3.00	Dark Brown	Sand	None	Stones
25966780	RWI-BH015	5.00 - 6.50	Light Brown	Sandy Silt Loam	Stones	Vegetation
25966816	RWI-BH015	6.50 - 8.00	Dark Brown	Sand	None	Stones
25966829	RWI-BH015	8.00 - 9.30	Dark Brown	N/A	None	None
25966834	RWI-BH015	11.00 - 14.00	Grey	N/A	None	None
25966796	RWI-BH016	1.50 - 3.00	Dark Brown	Sand	Stones	Vegetation
25966799	RWI-BH016	6.50 - 8.00	Light Brown	Sandy Loam	None	Stones
25966806	RWI-BH016	14.00 - 15.00	Dark Brown	Loamy Sand	None	Stones
25966809	RWI-BH017	3.00 - 3.50	Dark Brown	Sand	None	Stones
25966814	RWI-BH017	6.50 - 8.00	Light Brown	Stone/Soil	Stones	None
25966819	RWI-BH017	11.00 - 12.50	Light Brown	Loamy Sand	None	Stones
25966826	RWI-BH017	14.00 - 17.00	Dark Brown	N/A	None	None
25966875	RWI-BH007A	5.00 - 6.50	Light Brown	Sand	None	Stones
25966879	RWI-BH007A	8.00 - 9.50	Light Brown	Sand	None	Stones
25966883	RWI-BH007A	12.10 - 13.60	Dark Brown	N/A	None	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 occurring 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.



CERTIFICATE OF ANALYSIS

Validated

SDG: 220314-63
Client Ref.: 2021T102

Report Number: 651089
Location: ParteenWeir, WSP Lot1

Superseded Report: 647238

Table of Results - Appendix

Method No	Reference	Description
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
TM019	Modified: US EPA Method 9056	Determination of Anions in Soils using Ion Chromatography
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

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden.



CERTIFICATE OF ANALYSIS

Validated

SDG: 220314-63
Client Ref.: 2021T102

Report Number: 651089
Location: ParteenWeir, WSP Lot1

Superseded Report: 647238

Test Completion Dates

Lab Sample No(s) Customer Sample Ref.	25966837	25966842	25966846	25966850	25966786	25966788	25966791	25966793	25966776	25966778
	RWI-BH008	RWI-BH008	RWI-BH008	RWI-BH008	RWI-BH010	RWI-BH010	RWI-BH010	RWI-BH010	RWI-BH013	RWI-BH013
AGS Ref.	CORE1	CORE5	CORE10	CORE14	CORE1	CORE5	CORE8	CORE14	CORE6	CORE11
Depth	0.00 - 3.00	5.00 - 6.50	10.50 - 12.00	14.00 - 15.50	1.50 - 3.00	5.60 - 6.50	8.00 - 9.50	14.00 - 15.60	6.50 - 8.00	11.00 - 12.50
Type	Soil/Solid (S)									
Anions in soil by IC	18-Mar-2022	18-Mar-2022	18-Mar-2022	18-Mar-2022	22-Mar-2022	18-Mar-2022	18-Mar-2022	22-Mar-2022	22-Mar-2022	18-Mar-2022
pH	24-Mar-2022	24-Mar-2022	24-Mar-2022	23-Mar-2022	24-Mar-2022	24-Mar-2022	24-Mar-2022	23-Mar-2022	24-Mar-2022	24-Mar-2022
Sample description	15-Mar-2022	16-Mar-2022	15-Mar-2022	15-Mar-2022						
Total Sulphate	17-Mar-2022	17-Mar-2022	17-Mar-2022	17-Mar-2022	17-Mar-2022	18-Mar-2022	17-Mar-2022	18-Mar-2022	17-Mar-2022	17-Mar-2022
Total Sulphur	21-Mar-2022									

Lab Sample No(s) Customer Sample Ref.	25966783	25966889	25966803	25966844	25966854	25966865	25966772	25966780	25966816	25966829
	RWI-BH013	RWI-BH013	RWI-BH014	RWI-BH014	RWI-BH014	RWI-BH014	RWI-BH015	RWI-BH015	RWI-BH015	RWI-BH015
AGS Ref.	CORE13	CORE1	CORE1	CORE9	CORE11	CORE15	CORE1	CORE5	CORE6	CORE8
Depth	13.10 - 14.00	1.50 - 3.00	0.00 - 3.30	9.50	11.00 - 12.50	15.50 - 17.00	0.00 - 3.00	5.00 - 6.50	6.50 - 8.00	8.00 - 9.30
Type	Soil/Solid (S)									
Anions in soil by IC	18-Mar-2022	18-Mar-2022	22-Mar-2022	18-Mar-2022	18-Mar-2022	18-Mar-2022	18-Mar-2022	22-Mar-2022	18-Mar-2022	22-Mar-2022
pH	24-Mar-2022	24-Mar-2022	24-Mar-2022	24-Mar-2022	24-Mar-2022	23-Mar-2022	24-Mar-2022	24-Mar-2022	24-Mar-2022	24-Mar-2022
Sample description	15-Mar-2022									
Total Sulphate	17-Mar-2022									
Total Sulphur	23-Mar-2022	21-Mar-2022								

Lab Sample No(s) Customer Sample Ref.	25966834	25966796	25966799	25966806	25966809	25966814	25966819	25966826	25966875	25966879
	RWI-BH015	RWI-BH016	RWI-BH016	RWI-BH016	RWI-BH017	RWI-BH017	RWI-BH017	RWI-BH017	RWI-BH007A	RWI-BH007A
AGS Ref.	CORE11	CORE1	CORE6	CORE14	CORE3	CORE6	CORE11	CORE14	CORE5	CORE8
Depth	11.00 - 14.00	1.50 - 3.00	6.50 - 8.00	14.00 - 15.00	3.00 - 3.50	6.50 - 8.00	11.00 - 12.50	14.00 - 17.00	5.00 - 6.50	8.00 - 9.50
Type	Soil/Solid (S)									
Anions in soil by IC	22-Mar-2022	22-Mar-2022	18-Mar-2022	22-Mar-2022	18-Mar-2022	18-Mar-2022	18-Mar-2022	18-Mar-2022	22-Mar-2022	22-Mar-2022
pH	23-Mar-2022	23-Mar-2022	24-Mar-2022							
Sample description	16-Mar-2022	17-Mar-2022	15-Mar-2022							
Total Sulphate	21-Mar-2022	21-Mar-2022	17-Mar-2022							
Total Sulphur	21-Mar-2022	23-Mar-2022	21-Mar-2022	21-Mar-2022						

Lab Sample No(s) Customer Sample Ref.	25966883
	RWI-BH007A
AGS Ref.	CORE12
Depth	12.10 - 13.60
Type	Soil/Solid (S)
Anions in soil by IC	18-Mar-2022
pH	24-Mar-2022
Sample description	15-Mar-2022
Total Sulphate	17-Mar-2022
Total Sulphur	23-Mar-2022

ALS Environmental, Land	Issue No. 4
	Date: 03/03/2020
	Issued and Authorised by Quality Manager
QF.7.5.1 Data Amendments Form	

SDG	Sample Event	Sample ID	Date Amended	Amendment Reason	Analysis/Component	Authorised (Lab Manager)	Previous Value	New Value	Units	Supersedes Report
220314-63	25966783	RWI-BH013 CORE13 13.10 - 14.00	19/05/2022	Analytical/Quality Issue	Moisture content	M. Rogulis	-0.025	cancelled	%	647238
220314-63	25966793	RWI-BH010 CORE14 14.00 - 15.60	19/05/2022	Analytical/Quality Issue	Moisture content	M. Rogulis	-0.2	cancelled	%	647238
220314-63	25966850	RWI-BH008 CORE14 14.00 - 15.50	19/05/2022	Analytical/Quality Issue	Moisture content	M. Rogulis	-0.34	cancelled	%	647238
220314-63	25966865	RWI-BH014 CORE15 15.50 - 17.00	19/05/2022	Analytical/Quality Issue	Moisture content	M. Rogulis	-0.16	cancelled	%	647238



CERTIFICATE OF ANALYSIS

SDG: 220314-63
Client Ref: 2021T102

Report Number: 651089
Location: ParteenWeir, WSP Lot1

Superseded Report: 647238

Appendix

General

1. Results are expressed on a dry weight basis (dried at 35°C) 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.

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 and 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.



Unit 7-8 Hawarden Business Park
Manor Road (off Manor Lane)
Hawarden
Deeside
CH5 3US

Tel: (01244) 528700

Fax: (01244) 528701

email: hawardencustomerservices@alsglobal.com

Website: www.alsenvironmental.co.uk

Irish Drilling Limited
Old Galway Road
Loughrea
Co. Galway

Attention: Dympna Darcy

CERTIFICATE OF ANALYSIS

Date of report Generation: 06 February 2022
Customer: Irish Drilling Limited
Sample Delivery Group (SDG): 220124-37
Your Reference: 2021T102
Location: ParteenWeir, WSP Lot1
Report No: 632432
Order Number: 10791

This report has been revised and directly supersedes 631591 in its entirety.

We received 4 samples on Monday January 24, 2022 and 4 of these samples were scheduled for analysis which was completed on Sunday February 06, 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 Environmental 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

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

Superseded Report: 631591

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
25696094	RWI-BH008	EW1	1.00 - 4.00	17/01/2022
25696103	RWI-BH010	EW1	12.00 - 21.00	17/01/2022
25696113	RWI-BH013	EW1	12.00 - 21.00	17/01/2022
25696122	RWI-BH016	EW1	1.00 - 9.00	17/01/2022

Only received samples which have had analysis scheduled will be shown on the following pages.



CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

Superseded Report: 631591

Results Legend <div style="display: flex; flex-direction: column; gap: 5px;"> <div style="display: flex; align-items: center;">X Test</div> <div style="display: flex; align-items: center;">N No Determination Possible</div> </div> 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)	Customer Sample Reference	AGS Reference	Depth (m)	Container	Sample Type	
		25696094	RW1-BH008	EW1	1.00 - 4.00	H2SO4 (ALE244) 500ml Plastic (ALE208) 1000ml glass bottle (ALE220)	GW
		25696103	RW1-BH010	EW1	12.00 - 21.00	NaOH (ALE245) HNO3 Unfiltered (ALE204) H2SO4 (ALE244) 500ml Plastic (ALE208) 1000ml glass bottle (ALE220)	GW
		25696113	RW1-BH013	EW1	12.00 - 21.00	NaOH (ALE245) HNO3 Unfiltered (ALE204) H2SO4 (ALE244) 500ml Plastic (ALE208) 1000ml glass bottle (ALE220)	GW
		25696122	RW1-BH016	EW1	1.00 - 9.00	H2SO4 (ALE244) 500ml Plastic (ALE208) 1000ml glass bottle (ALE220)	GW
	TOC (Filtered)*	All	NDPs: 1 Tests: 3	N			
	Total Dissolved Solids	All	NDPs: 0 Tests: 4				
Total Metals by ICP-MS	All	NDPs: 0 Tests: 8					
TPH CWG (W)	All	NDPs: 0 Tests: 4					
VOC MS (W)	All	NDPs: 0 Tests: 4					

25696122	RWI-BH016	EW1	1.00 - 9.00	ZnAc (ALE246)	GW															
				NaOH (ALE245)	GW															
				HNO3 Unfiltered (ALE204)	GW															
				HNO3 Filtered (ALE204) with	GW															



CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

Superseded Report: 631591

Results Legend		Customer Sample Ref.	RWI-BH008	RWI-BH010	RWI-BH013	RWI-BH016		
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sampled Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	1.00 - 4.00 Ground Water (GW)	12.00 - 21.00 Ground Water (GW)	12.00 - 21.00 Ground Water (GW)	1.00 - 9.00 Ground Water (GW)		
M	mCERTS accredited.		17/01/2022	17/01/2022	17/01/2022	17/01/2022		
aq	Aqueous / settled sample.		24/01/2022	24/01/2022	24/01/2022	24/01/2022		
diss.filt	Dissolved / filtered sample.		220124-37	220124-37	220124-37	220124-37		
tot.unfilt	Total / unfiltered sample.		25696094	25696103	25696113	25696122		
*	Subcontracted - refer to subcontractor report for accreditation status.		EW1	EW1	EW1	EW1		
**	% 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					
Dissolved Organic Carbon, as C*	<0.7 mg/l	SUB		0.7	0.9	50.2		
Carbon, Organic (diss.filt)	<3 mg/l	TM090	43.6					
Ammoniacal Nitrogen as N (low level)	<0.01 mg/l	TM099	0.239 #	0.042 #	0.035 #	0.059 #		
Sulphide	<0.01 mg/l	TM101	<0.01 #	<0.01 #	<0.01 #	<0.01 #		
Dissolved solids, Total (meter)	<5 mg/l	TM123	1450 #	336 #	352 #	297 #		
Chromium, Trivalent	<0.03 mg/l	TM152		<0.03	<0.03	<0.03		
Arsenic (diss.filt)	<0.5 µg/l	TM152		1.28 2 #	1.16 #	5.85 #		
Barium (diss.filt)	<0.2 µg/l	TM152		62.5 2 #	83.1 #	166 #		
Beryllium (diss.filt)	<0.1 µg/l	TM152		<0.1 2 #	0.147 #	0.958 #		
Boron (diss.filt)	<10 µg/l	TM152		27.6 2 #	14.7 #	200 #		
Cadmium (diss.filt)	<0.08 µg/l	TM152		<0.08 2 #	0.102 #	0.318 #		
Chromium (diss.filt)	<1 µg/l	TM152		<1 2 #	4.05 #	9.56 #		
Copper (diss.filt)	<0.3 µg/l	TM152		<0.3 2 #	10.2 #	59.3 #		
Lead (diss.filt)	<0.2 µg/l	TM152		<0.2 2 #	9.62 #	36.1 #		
Molybdenum (tot.unfilt)	<9 µg/l	TM152	<9 #	<9 #	<9 #	<9 #		
Manganese (diss.filt)	<3 µg/l	TM152		309 2 #	161 #	990 #		
Molybdenum (diss.filt)	<3 µg/l	TM152			<3 #	<3 #		
Nickel (diss.filt)	<0.4 µg/l	TM152		<0.4 2 #	5.08 #	32.8 #		
Selenium (diss.filt)	<1 µg/l	TM152		<1 2 #	<1 #	3.27 #		
Vanadium (diss.filt)	<1 µg/l	TM152		<1 2 #	3.55 #	26 #		
Zinc (diss.filt)	<1 µg/l	TM152		46.9 2 #	72.5 #	338 #		
Magnesium (Dis.Filt)	<0.036 mg/l	TM152		11.1 2 #	7.99 #	8.31 #		
Iron (Dis.Filt)	<0.019 mg/l	TM152		<0.019 2 #	1.61 #	4.65 #		
Hardness, Total as CaCO3 unfiltered	<0.35 mg/l	TM152	829 2	251 2	328 2	233 2		
Mercury (diss.filt)	<0.01 µg/l	TM183		<0.01 2 #	<0.01 2 #	0.308 #		
Sulphate	<2 mg/l	TM184	434 #	16.8 #	15.2 #	20.9 #		
Chloride	<2 mg/l	TM184	93.4 #	14.8 #	16.8 #	16.1 #		
Nitrate as NO3	<0.3 mg/l	TM184	0.491	<0.3	3.71	<0.3		
Chromium, Hexavalent	<0.03 mg/l	TM241	<0.03 #	<0.03 #	<0.03 #	<0.03 #		
Phenol (low level)	<0.5 µg/l	TM255	<0.5	<0.5	<0.5	<0.5		
Cresols (low level)	<0.5 µg/l	TM255	0.53	<0.5	<0.5	<0.5		
Xylenols (low level)	<0.5 µg/l	TM255	<0.5	<0.5	<0.5	<0.5		



CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

Superseded Report: 631591

TPH CWG (W)

Results Legend		Customer Sample Ref.	RWI-BH008	RWI-BH010	RWI-BH013	RWI-BH016		
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sampled Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	1.00 - 4.00	12.00 - 21.00	12.00 - 21.00	1.00 - 9.00		
M	mCERTS accredited.		Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)		
aq	Aqueous / settled sample.		17/01/2022	17/01/2022	17/01/2022	17/01/2022		
diss.fit	Dissolved / filtered sample.		24/01/2022	24/01/2022	24/01/2022	24/01/2022		
tot.unfit	Total / unfiltered sample.		220124-37	220124-37	220124-37	220124-37		
*	Subcontracted - refer to subcontractor report for accreditation status.		25696094	25696103	25696113	25696122		
**	% 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		EW1	EW1	EW1	EW1		
(F)	Trigger breach confirmed							
1-4*\$@	Sample deviation (see appendix)							
Component	LOD/Units		Method					
GRO Surrogate % recovery**	%	TM245	111	96	95	113		
			2	2	2	2		
GRO >C5-C12	<50 µg/l	TM245	<50	<50	<50	<50		
			2 #	2 #	2 #	2 #		
Aliphatics >C5-C6	<10 µg/l	TM245	<10	<10	<10	<10		
			2	2	2	2		
Aliphatics >C6-C8	<10 µg/l	TM245	<10	<10	<10	<10		
			2	2	2	2		
Aliphatics >C8-C10	<10 µg/l	TM245	<10	<10	<10	<10		
			2	2	2	2		
Aliphatics >C10-C12	<10 µg/l	TM245	<10	<10	<10	<10		
			2	2	2	2		
Aliphatics >C12-C16 (aq)	<10 µg/l	TM174	<200	<10	146	61		
Aliphatics >C16-C21 (aq)	<10 µg/l	TM174	<200	<10	161	311		
Aliphatics >C21-C35 (aq)	<10 µg/l	TM174	<200	<10	565	1030		
Total Aliphatics >C12-C35 (aq)	<10 µg/l	TM174	<200	<10	872	1410		
Aromatics >EC5-EC7	<10 µg/l	TM245	<10	<10	<10	<10		
			2	2	2	2		
Aromatics >EC7-EC8	<10 µg/l	TM245	<10	<10	<10	<10		
			2	2	2	2		
Aromatics >EC8-EC10	<10 µg/l	TM245	<10	<10	<10	<10		
			2	2	2	2		
Aromatics >EC10-EC12	<10 µg/l	TM245	<10	<10	<10	<10		
			2	2	2	2		
Aromatics >EC12-EC16 (aq)	<10 µg/l	TM174	<200	<10	<10	<10		
Aromatics >EC16-EC21 (aq)	<10 µg/l	TM174	<200	<10	<10	<10		
Aromatics >EC21-EC35 (aq)	<10 µg/l	TM174	<200	<10	<10	<10		
Total Aromatics >EC12-EC35 (aq)	<10 µg/l	TM174	<200	<10	<10	<10		
Total Aliphatics & Aromatics >C5-35 (aq)	<10 µg/l	TM174	<10	<10	872	1410		
Aliphatics >C16-C35 Aqueous	<10 µg/l	TM174	<200	<10	726	1340		



CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

Superseded Report: 631591

Notification of NDPs (No determination possible)

Date Received : 24/01/2022 13:31:28

Sample No	Customer Sample Ref.	Depth (m)	Test	Comment
25696094	RWI-BH008 EW1	1.00 - 4.00	TOC (Filtered)*	Sample cannot be filtered
25696094	RWI-BH008 EW1	1.00 - 4.00	Mercury Dissolved	Sample cannot be filtered
25696094	RWI-BH008 EW1	1.00 - 4.00	Dissolved Metals by ICP-MS	Sample cannot be filtered



CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

Superseded Report: 631591

Table of Results - Appendix

Method No	Reference	Description
SUB		Subcontracted Test
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM101	Method 4500B & C, AWWA/APHA, 20th Ed., 1999	Determination of Sulphide in soil and water samples using the Kone Analyser
TM123	BS 2690: Part 121:1981	The Determination of Total Dissolved Solids in Water
TM152	ISO 17294-2:2016 Water quality - Application of inductively coupled plasma mass spectrometry (ICP-MS)	Analysis of Aqueous Samples by ICP-MS
TM174	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Waters by GC-FID
TM178	Modified: US EPA Method 8100	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM208	Modified: US EPA Method 8260b & 624	Determination of Volatile Organic Compounds by Headspace / GC-MS in Waters
TM241	Methods for the Examination of Waters and Associated Materials; Chromium in Raw and Potable Waters and Sewage Effluents 1980.	The Determination of Hexavalent Chromium in Waters and Leachates using the Kone Analyser
TM245	By GC-FID	Determination of GRO by Headspace in waters
TM255		Determination of Low Level Phenols in Waters and Leachates by HPLC
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4, Standard Methods for the examination of waters and wastewaters 20th Edition, PHA, Washington DC, USA. ISBN 0-87553-235-7 and The Determination of Alkalinity and Acidity in water HMSO, 1981, ISBN 0 11 751601 5.	Determination of pH, EC, TDS and Alkalinity in Aqueous samples
TM279		Determination of Low Level Easily Liberatable (Free) Cyanides and Total Cyanides in Waters using the Skalar SANS+ System Segmented Flow Analyser

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).



CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

Superseded Report: 631591

Test Completion Dates

Lab Sample No(s)	25696094	25696103	25696113	25696122
Customer Sample Ref.	RWI-BH008	RWI-BH010	RWI-BH013	RWI-BH016
AGS Ref.	EW1	EW1	EW1	EW1
Depth	1.00 - 4.00	12.00 - 21.00	12.00 - 21.00	1.00 - 9.00
Type	Ground Water	Ground Water	Ground Water	Ground Water
Ammonium Low	31-Jan-2022	31-Jan-2022	31-Jan-2022	31-Jan-2022
Anions by Kone (w)	29-Jan-2022	28-Jan-2022	28-Jan-2022	29-Jan-2022
Chromium III		31-Jan-2022	31-Jan-2022	31-Jan-2022
Dissolved Metals by ICP-MS		31-Jan-2022	31-Jan-2022	31-Jan-2022
Dissolved Organic/Inorganic Carbon	06-Feb-2022			
EPH CWG (Aliphatic) Aqueous GC (W)	01-Feb-2022	01-Feb-2022	01-Feb-2022	01-Feb-2022
EPH CWG (Aromatic) Aqueous GC (W)	01-Feb-2022	01-Feb-2022	01-Feb-2022	01-Feb-2022
GRO by GC-FID (W)	28-Jan-2022	28-Jan-2022	28-Jan-2022	28-Jan-2022
Hexavalent Chromium (w)	28-Jan-2022	28-Jan-2022	28-Jan-2022	28-Jan-2022
Low Level Cyanide (W)	31-Jan-2022	31-Jan-2022	31-Jan-2022	31-Jan-2022
Low Level Phenols by HPLC (W)	31-Jan-2022	31-Jan-2022	31-Jan-2022	31-Jan-2022
Mercury Dissolved		31-Jan-2022	31-Jan-2022	31-Jan-2022
Nitrite by Kone (w)	28-Jan-2022	28-Jan-2022	28-Jan-2022	28-Jan-2022
PAH Spec MS - Aqueous (W)	28-Jan-2022	28-Jan-2022	28-Jan-2022	28-Jan-2022
pH Value	27-Jan-2022	27-Jan-2022	27-Jan-2022	27-Jan-2022
Sulphide	27-Jan-2022	27-Jan-2022	27-Jan-2022	27-Jan-2022
TOC (Filtered)*		28-Jan-2022	28-Jan-2022	28-Jan-2022
Total Dissolved Solids	28-Jan-2022	28-Jan-2022	28-Jan-2022	28-Jan-2022
Total Metals by ICP-MS	03-Feb-2022	31-Jan-2022	31-Jan-2022	31-Jan-2022
TPH CWG (W)	01-Feb-2022	01-Feb-2022	01-Feb-2022	01-Feb-2022
VOC MS (W)	28-Jan-2022	28-Jan-2022	28-Jan-2022	28-Jan-2022



CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

Superseded Report: 631591

Chromatogram

Analysis: EPH CWG (Aliphatic) Aqueous GC (W)

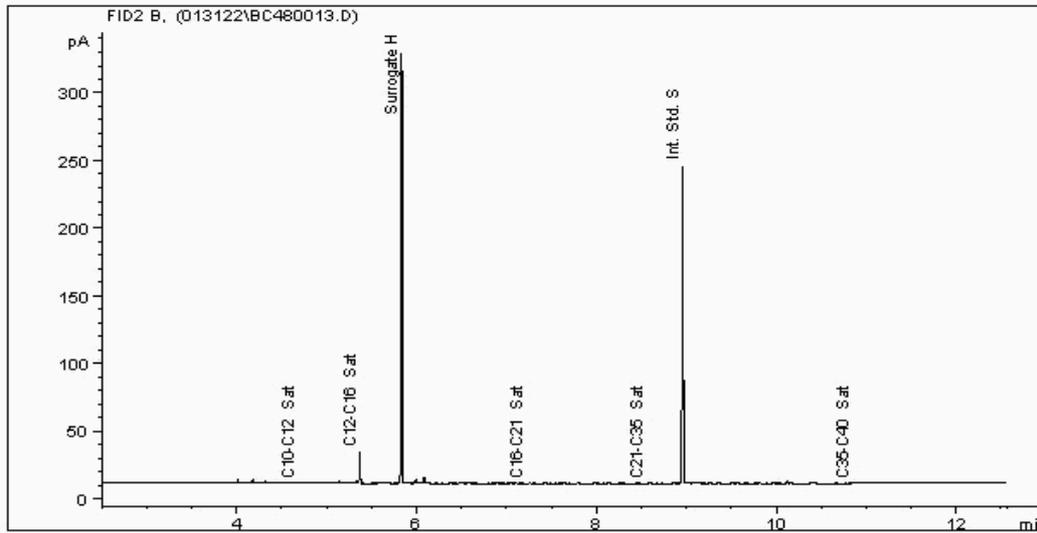
Sample No : 25712338
Sample ID : RWI-BH008

Depth : 1.00 - 4.00

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 23995754-
Date Acquired : 31/01/2022 21:03:36 PM
Units : ppb
Dilution : SE RWI-BH008[1.00 - 4.00] ->
CF : 1
Multiplier : 0.500

#	Compound Name	Main Peak Area	Amount
1	C10-C12 Sat	0.0	0.000
2	C12-C16 Sat	0.0	0.000
3	Surrogate H	233.5	4.552
4	C16-C21 Sat	0.0	0.000
5	C21-C35 Sat	0.0	0.000
6	Int. Std. S	182.2	5.000
7	C35-C40 Sat	0.0	0.000
Total Peak Area		415.7	





CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

Superseded Report: 631591

Chromatogram

Analysis: EPH CWG (Aliphatic) Aqueous GC (W)

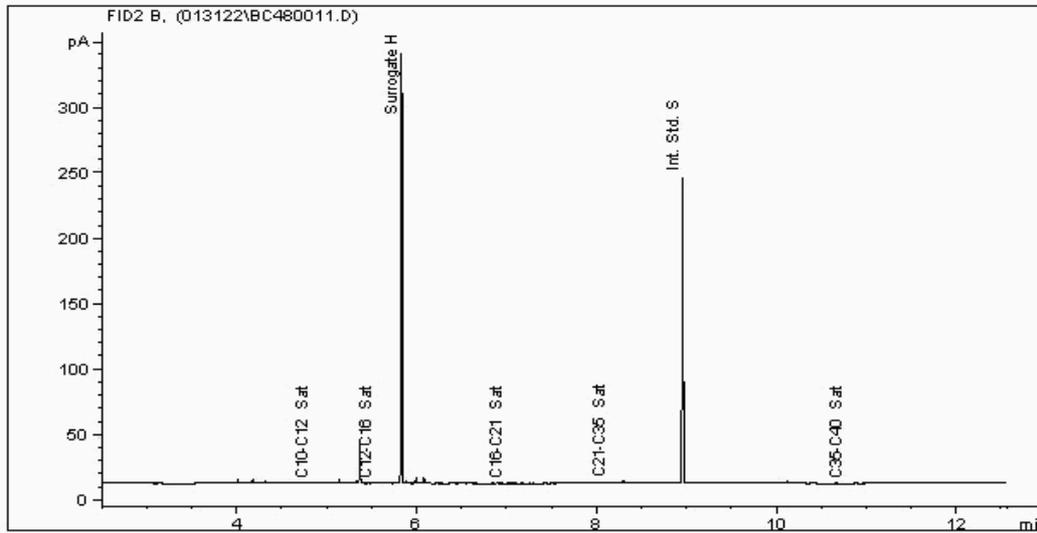
Sample No : 25712382
Sample ID : RWI-BH010

Depth : 12.00 - 21.00

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 23995777-
Date Acquired : 31/01/2022 20:17:38 PM
Units : ppb
Dilution : SE RWI-BH010[12.00 - 21.00->
CF : 1
Multiplier : 0.025

#	Compound Name	Main Peak Area	Amount
1	C10-C12 Sat	0.0	0.000
2	C12-C16 Sat	0.0	0.000
3	Surrogate H	240.3	0.232
4	C16-C21 Sat	0.0	0.000
5	C21-C35 Sat	0.0	0.000
6	Int. Std. S	184.2	0.250
7	C35-C40 Sat	0.0	0.000
Total Peak Area		424.5	





CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

Superseded Report: 631591

Chromatogram

Analysis: EPH CWG (Aliphatic) Aqueous GC (W)

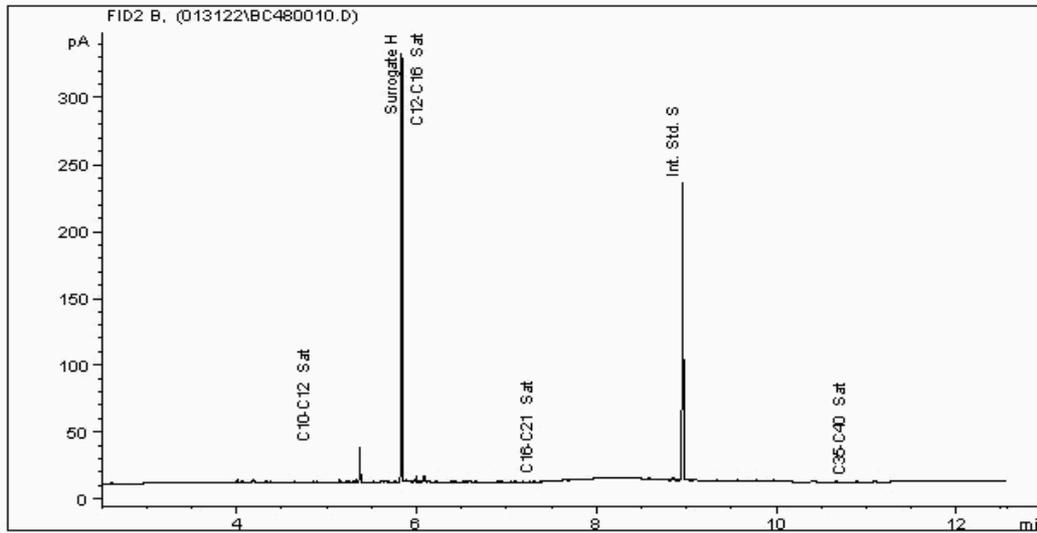
Sample No : 25712383
Sample ID : RWI-BH013

Depth : 12.00 - 21.00

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 23995800-
Date Acquired : 31/01/2022 19:54:17 PM
Units : ppb
Dilution : SE RWI-BH013[12.00 - 21.00->
CF : 1
Multiplier : 0.025

#	Compound Name	Main Peak Area	Amount
1	C10-C12 Sat	143.9	0.123
2	Surrogate H	224.1	0.216
3	C12-C16 Sat	154.1	0.146
4	C16-C21 Sat	152.5	0.161
5	Int. Std. S	184.4	0.250
6	C21-C35 Sat	434.0	0.565
7	C35-C40 Sat	101.4	0.155
Total Peak Area		1394.4	





CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

Superseded Report: 631591

Chromatogram

Analysis: EPH CWG (Aliphatic) Aqueous GC (W)

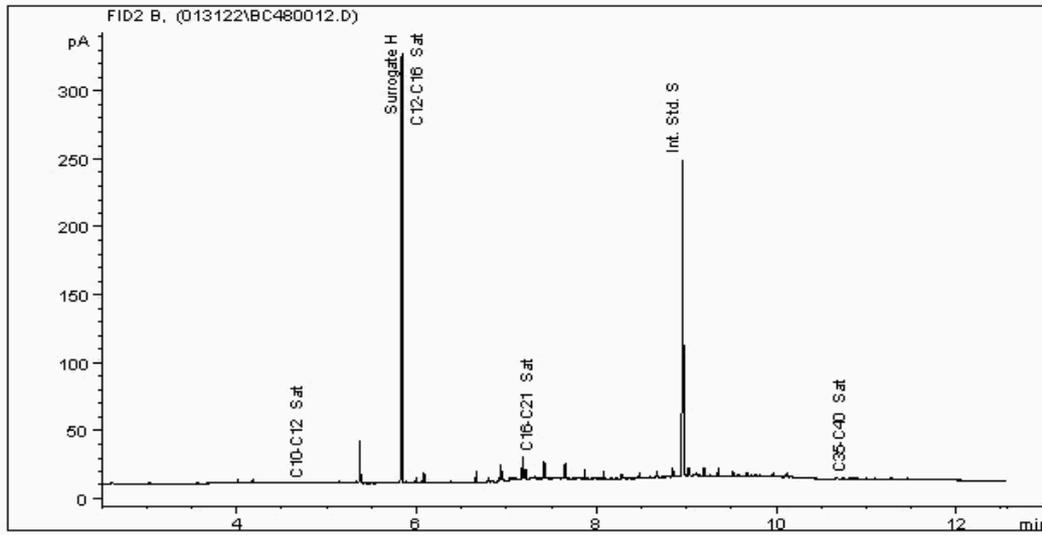
Sample No : 25712384
Sample ID : RWI-BH016

Depth : 1.00 - 9.00

Alcontrol/Geochem Analytical Services
Speciated TPH - SATS (C12 - C40)

Sample Identity: 23995822-
Date Acquired : 31/01/2022 20:40:40 PM
Units : ppb
Dilution : SE RWI-BH016[1.00 - 9.00] ->
CF : 1
Multiplier : 0.025

#	Compound Name	Main Peak Area	Amount
1	C10-C12 Sat	0.0	0.000
2	Surrogate H	228.4	0.219
3	C12-C16 Sat	64.4	0.061
4	C16-C21 Sat	294.4	0.311
5	Int. Std. S	184.9	0.250
6	C21-C35 Sat	795.9	1.033
7	C35-C40 Sat	207.6	0.317
Total Peak Area		1775.5	





CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

Superseded Report: 631591

Chromatogram

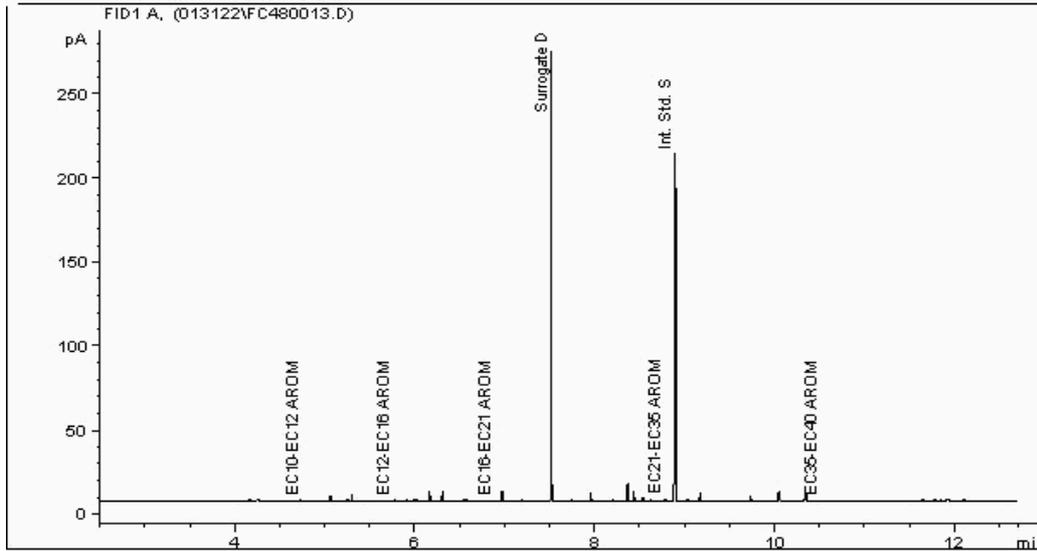
Analysis: EPH CWG (Aromatic) Aqueous GC (W)

Sample No : 25712338
Sample ID : RWI-BH008

Depth : 1.00 - 4.00

Alcontrol/Geochem Analytical Services
Speciated TPH - AROM (C12 - C40)

Sample Identity: 23995755-
Date Acquired : 31/01/2022 21:03:36 PM
Units : ppb
Dilution : SE RWI-BH008[1.00 - 4.00] ->
CF : 1
Multiplier : 0.500





CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

Superseded Report: 631591

Chromatogram

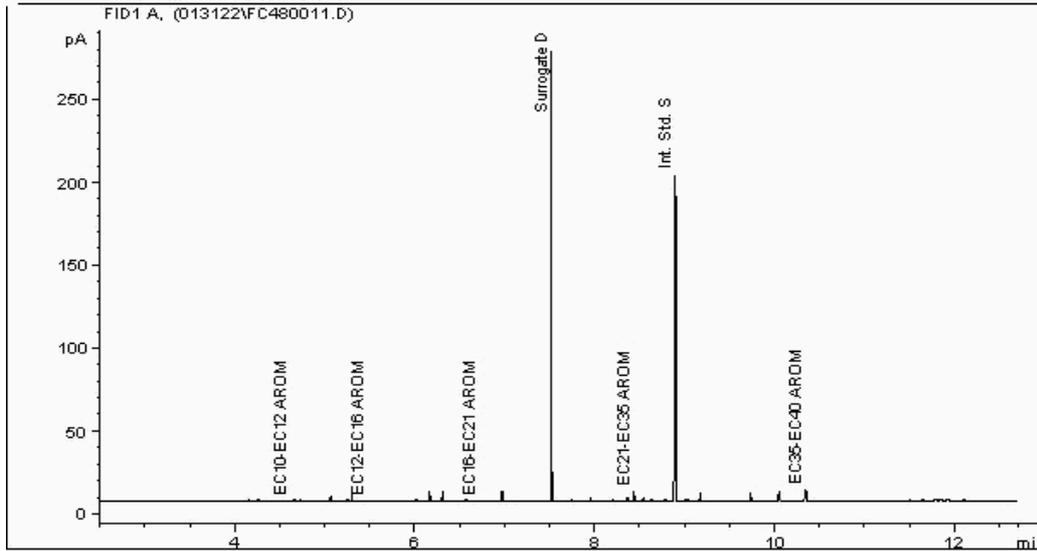
Analysis: EPH CWG (Aromatic) Aqueous GC (W)

Sample No : 25712382
Sample ID : RWI-BH010

Depth : 12.00 - 21.00

Alcontrol/Geochem Analytical Services
Speciated TPH - AROM (C12 - C40)

Sample Identity: 23995778-
Date Acquired : 31/01/2022 20:17:38 PM
Units : ppb
Dilution : SE RWI-BH010[12.00 - 21.00->
CF : 1
Multiplier : 0.025





CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

Superseded Report: 631591

Chromatogram

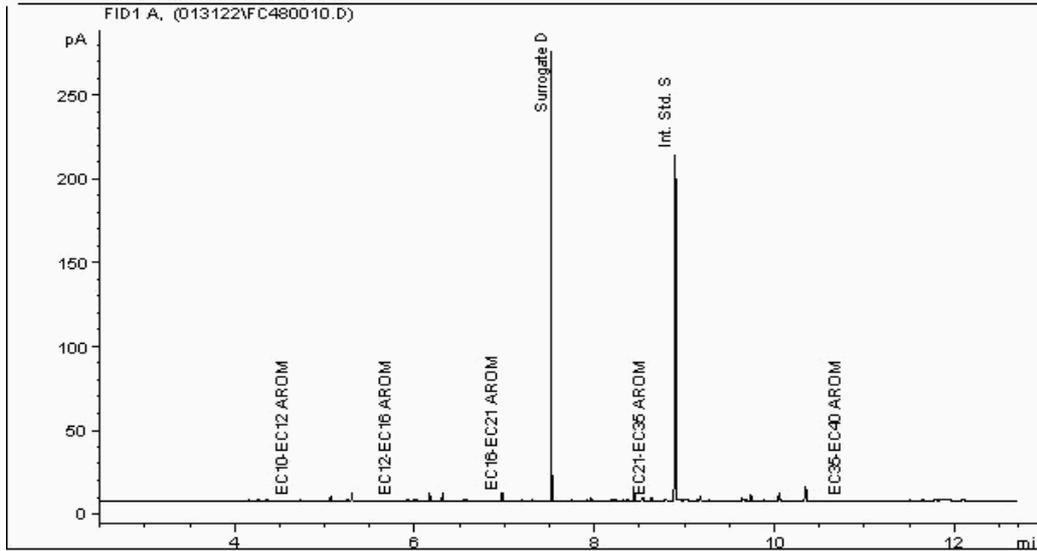
Analysis: EPH CWG (Aromatic) Aqueous GC (W)

Sample No : 25712383
Sample ID : RWI-BH013

Depth : 12.00 - 21.00

Alcontrol/Geochem Analytical Services
Speciated TPH - AROM (C12 - C40)

Sample Identity: 23995801-
Date Acquired : 31/01/2022 19:54:17 PM
Units : ppb
Dilution : SE RWI-BH013[12.00 - 21.00->
CF : 1
Multiplier : 0.025





CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

Superseded Report: 631591

Chromatogram

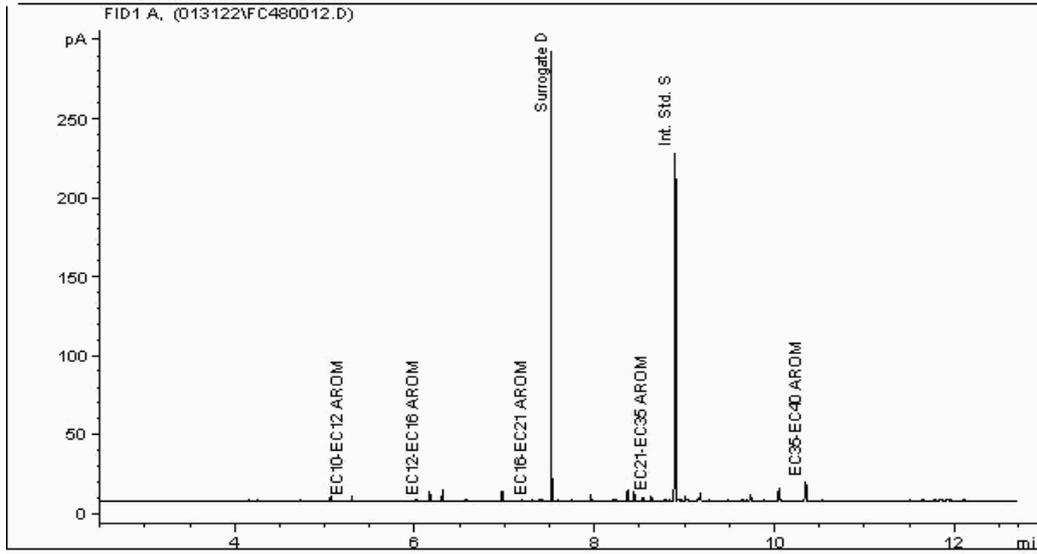
Analysis: EPH CWG (Aromatic) Aqueous GC (W)

Sample No : 25712384
Sample ID : RWI-BH016

Depth : 1.00 - 9.00

Alcontrol/Geochem Analytical Services
Speciated TPH - AROM (C12 - C40)

Sample Identity: 23995823-
Date Acquired : 31/01/2022 20:40:40 PM
Units : ppb
Dilution : SE RWI-BH016[1.00 - 9.00] ->
CF : 1
Multiplier : 0.025





CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

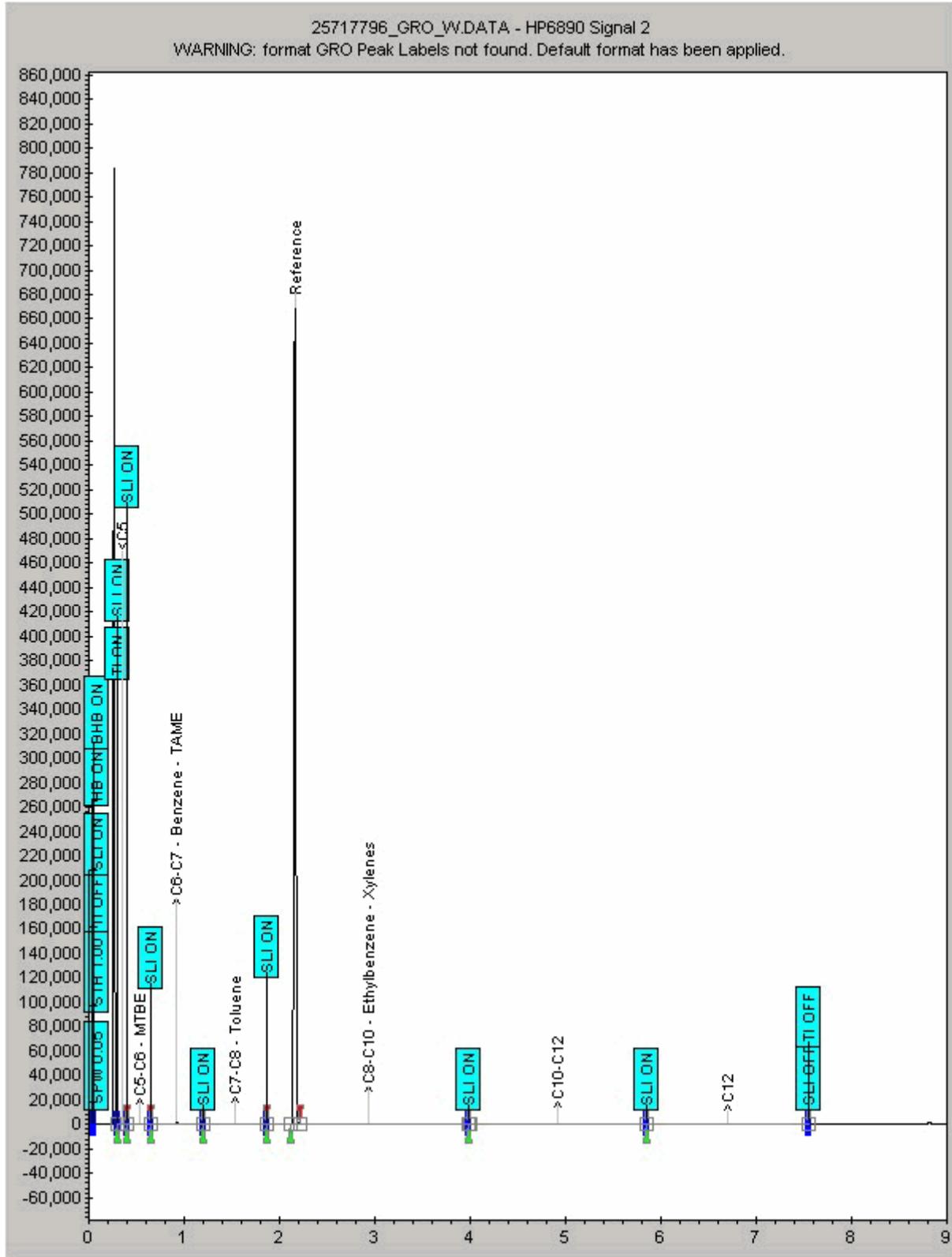
Superseded Report: 631591

Chromatogram

Analysis: GRO by GC-FID (W)

Sample No : 25717796
Sample ID : RWI-BH013

Depth : 12.00 - 21.00





CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

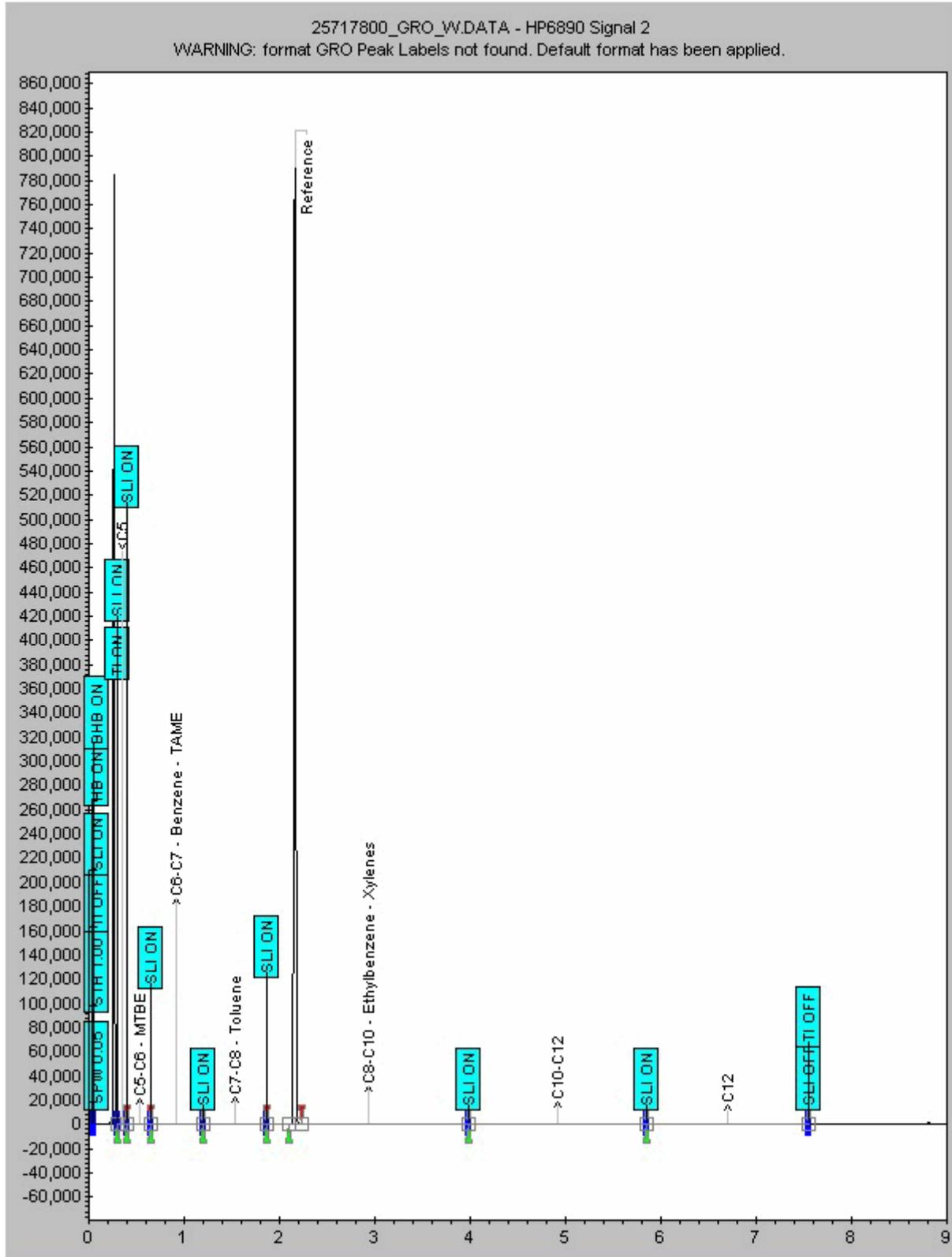
Superseded Report: 631591

Chromatogram

Analysis: GRO by GC-FID (W)

Sample No : 25717800
Sample ID : RWI-BH016

Depth : 1.00 - 9.00





CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

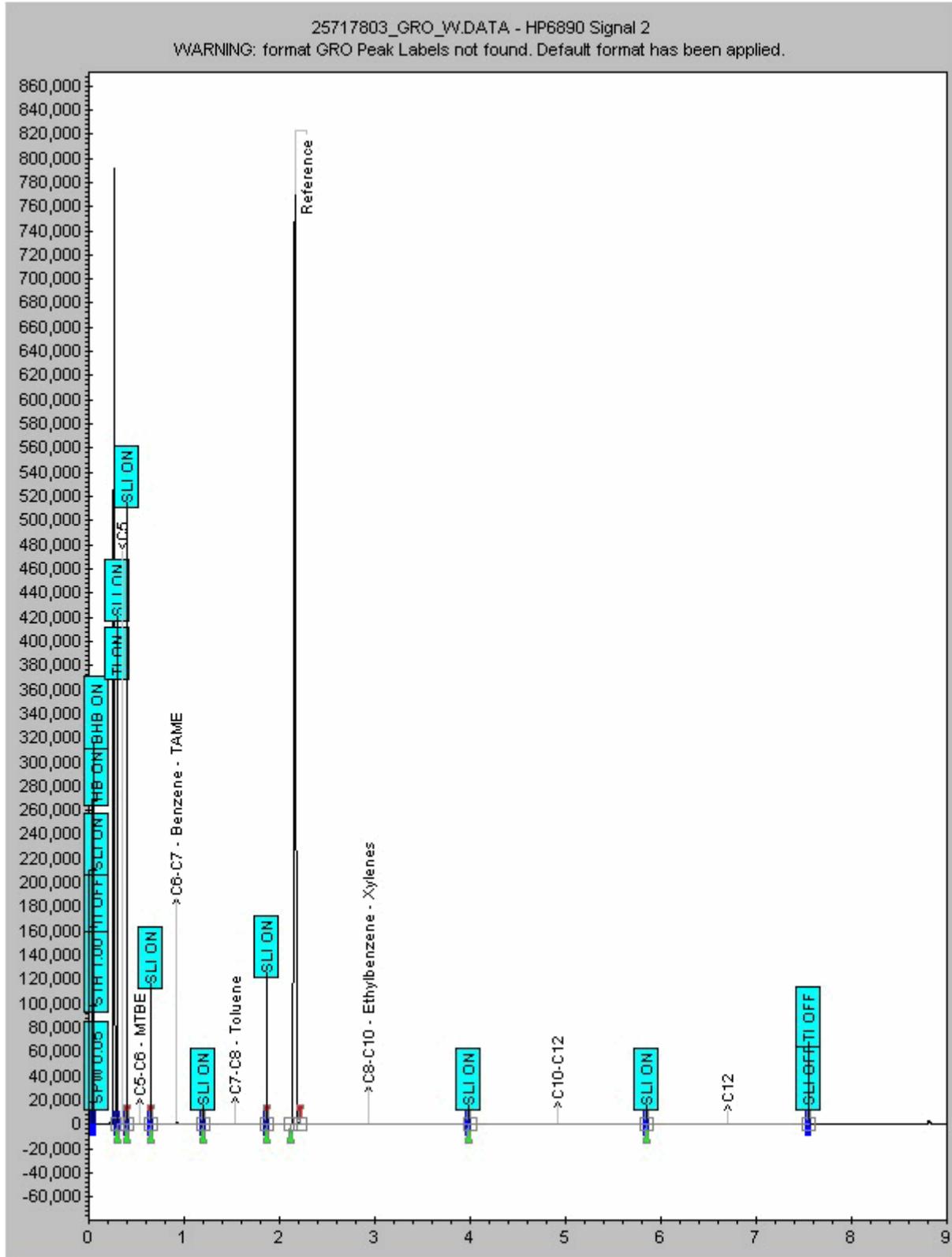
Superseded Report: 631591

Chromatogram

Analysis: GRO by GC-FID (W)

Sample No : 25717803
Sample ID : RWI-BH008

Depth : 1.00 - 4.00





CERTIFICATE OF ANALYSIS

Validated

SDG: 220124-37
Client Ref.: 2021T102

Report Number: 632432
Location: ParteenWeir, WSP Lot1

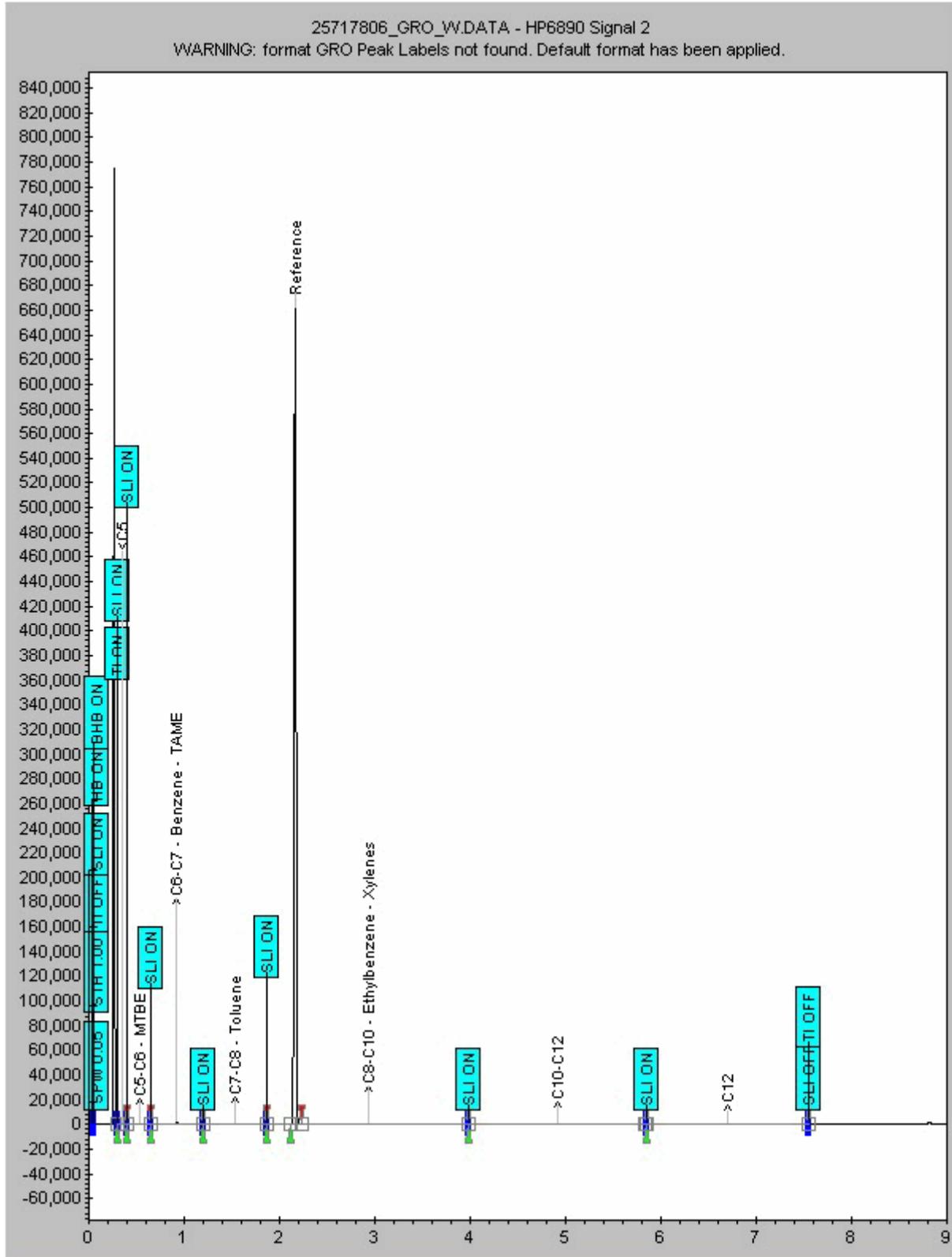
Superseded Report: 631591

Chromatogram

Analysis: GRO by GC-FID (W)

Sample No : 25717806
Sample ID : RWI-BH010

Depth : 12.00 - 21.00





ALS Environmental Ltd
Torrington Avenue
Coventry
CV4 9GU

T: +44 (0)24 7642 1213
F: +44 (0)24 7685 6575
www.alsenvironmental.co.uk

Subcon Results
ALS Life Sciences Limited
Torrington Avenue
Tile Hill CV4 9GU

28 January 2022

Test Report: COV/2263855/2022

Dear Subcon Results

Analysis of your sample(s) received on 27 January 2022 is now complete and we have pleasure in enclosing the appropriate test report(s).

An invoice for the analysis carried out will be sent under separate cover.

Should you have any queries regarding this report(s) or any part of our service, please contact Customer Services on +44 (0)24 7642 1213 who will be happy to discuss your requirements.

If you would like to arrange any further analysis, please contact Customer Services. To arrange container delivery or sample collection, please call the Couriers Department directly on 024 7685 6562.

Thank you for using ALS Environmental Ltd and we look forward to receiving your next samples.

Yours Sincerely,

Signed:

Name:

D. Lewis

Title:

Technical Inorganic Manager



This communication has been sent to you by ALS Environmental Ltd. Registered in England and Wales. Registration No.02148934. Registered Office: ALS Environmental Limited, Torrington Avenue, Coventry, CV4 9GU.

Report Summary

**Hawarden Subcon Results
ALS Life Sciences Limited
Torrington Avenue
Tile Hill
CV4 9GU**



ANALYSED BY



Date of Issue: **28 January 2022**

Report Number: **COV/2263855/2022**

Issue **1**

This issue replaces
all previous issues

Job Description: 2021 Analysis

Number of Samples
included in this report **3**

Job Received: **27 January 2022**

Number of Test Results
included in this report **3**

Analysis Commenced: **27 January 2022**

Signed:

Name: **D. Lewis**

Date: **28 January 2022**

Title: **Technical Inorganic Manager**

ALS Environmental Ltd was not responsible for sampling unless otherwise stated.

Information on the methods of analysis and performance characteristics are available on request.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation. The results relate only to the items tested and where relevant sampled.

Tests marked 'Not UKAS Accredited' in this Report/Certificate are not included in the UKAS Accreditation Schedule for our laboratory.

This test report is not a statement of conformity to any specification or standard.

This communication has been sent to you by ALS Environmental Ltd. Registered in England and Wales. Registration No. 02148934. Registered Office: ALS Environmental Limited, Torrington Avenue, Coventry, CV4 9GU.

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ALS Environmental Ltd

Torrington Avenue, Coventry, CV4 9GU
Tel:+44 (0)24 7642 1213 Fax:+44 (0)24 7685 6575

Page 1 of 7

Certificate of Analysis

ANALYSED BY



Report Number: **COV/2263855/2022**
Laboratory Number: **21282613**
Sample Source: **ALS Life Sciences Limited**
Sample Point Description: **Water Analysis**
Sample Description: **25704609**
Sample Matrix: **Ground Water**
Sample Date/Time: **17 January 2022**
Sample Received: **27 January 2022**
Analysis Complete: **28 January 2022**
SDG: **220124-37**
Sample Reference: **RWI-BH010**

Issue **1**
Sample **1** of **3**

Test Description	Result	Units	Analysis Date	Accreditation	Method
TOC (Filtered)	0.7	mg/l	27/01/2022	Y Cov	WAS005

Analyst Comments for 21282613:

This sample has been analysed for TOC (Filtered) outside recommended stability times. It is therefore possible that the results provided may be compromised.

This issue replaces all previous issues

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.

Analysed at: CHE = Chester(CH5 3US), COV = Coventry(CV4 9GU), OTT = Otterbourne(SO21 2RU), S = Subcontracted, TRB = Subcontracted to Trowbridge(BA14 0XD), WAK = Wakefield(WF5 9TG), F = Data supplied by customer.

For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered.

I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed:

Name: **D. Lewis**

Date: **28 January 2022**

Title: **Technical Inorganic Manager**

ALS Environmental Ltd

Torrington Avenue, Coventry, CV4 9GU
Tel:+44 (0)24 7642 1213 Fax:+44 (0)24 7685 6575

Page 2 of 7

Certificate of Analysis

ANALYSED BY



Report Number: **COV/2263855/2022**
Laboratory Number: **21282614**
Sample Source: **ALS Life Sciences Limited**
Sample Point Description: **Water Analysis**
Sample Description: **25704630**
Sample Matrix: **Ground Water**
Sample Date/Time: **17 January 2022**
Sample Received: **27 January 2022**
Analysis Complete: **28 January 2022**
SDG: **220124-37**
Sample Reference: **RWI-BH013**

Issue **1**
Sample **2** of **3**

Test Description	Result	Units	Analysis Date	Accreditation	Method
TOC (Filtered)	0.9	mg/l	27/01/2022	Y Cov	WAS005

Analyst Comments for 21282614:

This sample has been analysed for TOC (Filtered) outside recommended stability times. It is therefore possible that the results provided may be compromised.

This issue replaces all previous issues

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.

Analysed at: CHE = Chester(CH5 3US), COV = Coventry(CV4 9GU), OTT = Otterbourne(SO21 2RU), S = Subcontracted, TRB = Subcontracted to Trowbridge(BA14 0XD), WAK = Wakefield(WF5 9TG), F = Data supplied by customer.

For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered.

I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed:

Name: **D. Lewis**

Date: **28 January 2022**

Title: **Technical Inorganic Manager**

ALS Environmental Ltd

Torrington Avenue, Coventry, CV4 9GU
Tel:+44 (0)24 7642 1213 Fax:+44 (0)24 7685 6575

Page 3 of 7

Certificate of Analysis

ANALYSED BY



Report Number: **COV/2263855/2022**
Laboratory Number: **21282615**
Sample Source: **ALS Life Sciences Limited**
Sample Point Description: **Water Analysis**
Sample Description: **25704583**
Sample Matrix: **Ground Water**
Sample Date/Time: **17 January 2022**
Sample Received: **27 January 2022**
Analysis Complete: **28 January 2022**
SDG: **220124-37**
Sample Reference: **RWI-BH016**

Issue **1**
Sample **3** of **3**

Test Description	Result	Units	Analysis Date	Accreditation	Method
TOC (Filtered)	50.2	mg/l	27/01/2022	Y Cov	WAS005

Analyst Comments for 21282615:

This sample has been analysed for TOC (Filtered) outside recommended stability times. It is therefore possible that the results provided may be compromised.

This issue replaces all previous issues

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.

Analysed at: CHE = Chester(CH5 3US), COV = Coventry(CV4 9GU), OTT = Otterbourne(SO21 2RU), S = Subcontracted, TRB = Subcontracted to Trowbridge(BA14 0XD), WAK = Wakefield(WF5 9TG), F = Data supplied by customer.

For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered.

I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed:

Name: **D. Lewis**

Date: **28 January 2022**

Title: **Technical Inorganic Manager**

ALS Environmental Ltd

Torrington Avenue, Coventry, CV4 9GU
Tel:+44 (0)24 7642 1213 Fax:+44 (0)24 7685 6575

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ANALYST COMMENTS FOR REPORT COV/2263855/2022

Issue 1

This issue replaces all previous issues

Date of Issue: 28 January 2022

Sample No	Analysis Comments
21282613	This sample has been analysed for TOC (Filtered) outside recommended stability times. It is therefore possible that the results provided may be compromised.
21282614	This sample has been analysed for TOC (Filtered) outside recommended stability times. It is therefore possible that the results provided may be compromised.
21282615	This sample has been analysed for TOC (Filtered) outside recommended stability times. It is therefore possible that the results provided may be compromised.

Signed: 

Name: **D. Lewis**

Date: **28 January 2022**

Title: **Technical Inorganic Manager**



DETERMINAND COMMENTS FOR REPORT COV/2263855/2022

Date of Issue: 28 January 2022

ISSUE 1

This issue replaces
all previous issues

Sample No	Description	Determinand	Comments

Signed: 	Name: D. Lewis	Date: 28 January 2022
	Title: Technical Inorganic Manager	

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CERTIFICATE OF ANALYSIS

SDG:	220124-37	Client Reference:	2021T102	Report Number:	632432
Location:	ParteenWeir, WSP Lot1	Order Number:	10791	Superseded Report:	631591

Appendix

General

1. Results are expressed on a dry weight basis (dried at 35°C) 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.

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 and 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

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.

Appendix 1I

Photographs (Rotary Core)

Irish Drilling Ltd: Core Photos:



Irish Drilling Ltd: Core Photos:



Irish Drilling Ltd: Core Photos:



Irish Drilling Ltd: Core Photos:



Irish Drilling Ltd: Core Photos:



Irish Drilling Ltd: Core Photos:



Irish Drilling Ltd: Core Photos:



Irish Drilling Ltd: Core Photos:

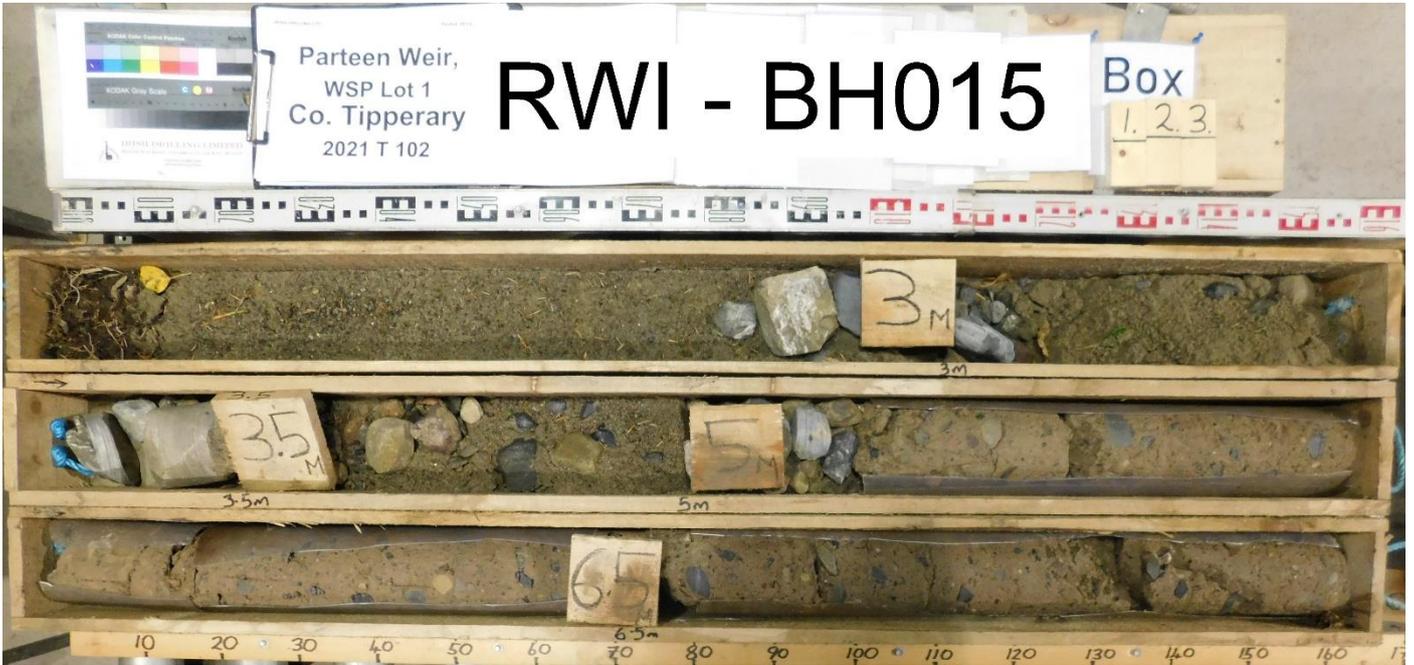


Irish Drilling Ltd: Core Photos:



Irish Drilling Ltd: Core Photos:







Irish Drilling Ltd: Core Photos:



Irish Drilling Ltd: Core Photos:



Irish Drilling Ltd: Core Photos:



Irish Drilling Ltd: Core Photos:



Appendix 1J.1 Groundwater Level Data (Dipmeter)

Groundwater Levels

Contract: WSP Lot 1
 Location: Parteen, Co. Tipperary
 Client: Irish Water
 Engineer: Mott MacDonald

Test carried out by:
 Operators:
 Date:

Irish Drilling Ltd.
 AG / DOR
 18.05.2022



Standpipe Piezometers	10/01/2022 m +/- (gl)	17/01/2022 m +/- (gl)	18/01/2022 m +/- (gl)	05/04/2022 m +/- (gl)	O.D. Ground Level
RWI-BH007A		-0.00m (31.328m O.D.)	-0.11m (31.328m O.D.)	-0.33m (30.998m O.D.)	31.328m
RWI-BH017	-0.00m (32.455m O.D.)	-0.09m (32.365m O.D.)	-0.14m (32.315m O.D.)	-0.45m (32.005m O.D.)	32.455m
Standpipes	10/01/2022 m +/- (gl)	17/01/2022 m +/- (gl)	18/01/2022 m +/- (gl)	05/04/2022 m +/- (gl)	O.D. Ground Level
RWI-BH008	-0.21m (31.133m O.D.)	-0.26m (31.083m O.D.)	-0.28m (31.063m O.D.)	-0.42m (30.923m O.D.)	31.343m
RWI-BH010	-0.15m (31.178m O.D.)	-0.29m (31.252m O.D.)	-0.35m (31.192m O.D.)	-0.36m (31.182m O.D.)	31.542m
RWI-BH013		-0.11m (31.927m O.D.)	-0.11m (31.927m O.D.)	-0.14m (31.897m O.D.)	32.037m
RWI-BH016	-0.18m (32.621m O.D.)	-0.31m (32.491m O.D.)	-0.31m (32.491m O.D.)	-0.68m (32.121m O.D.)	32.801m
Standpipe Piezometers	09/06/2022 m +/- (gl)	06/07/2022 m +/- (gl)			O.D. Ground Level
RWI-BH007A	-0.48m (30.848m O.D.)	-0.25m (31.078m O.D.)			31.328m
RWI-BH017	-0.83m (31.625m O.D.)	-0.54m (31.915m O.D.)			32.455m
Standpipes	09/06/2022 m +/- (gl)	06/07/2022 m +/- (gl)			O.D. Ground Level
RWI-BH008	-0.63m (30.713m O.D.)	-0.44m (30.903m O.D.)			31.343m
RWI-BH010	-0.53m (31.012m O.D.)	-0.37m (31.172m O.D.)			31.542m
RWI-BH013	-0.47m (31.567m O.D.)	-0.22m (31.817m O.D.)			32.037m
RWI-BH016	-1.05m (31.751m O.D.)	-0.73m (32.071m O.D.)			32.801m

Remarks:

Data Loggers installed in standpipes at RWI-BH008, RWI-BH010, RWI-BH013 and RWI-BH016 on April 5th 2022.

Groundwater samples recovered from standpipes on January 17th and 18th 2022 and sent by courier for laboratory testing.

Purging of standpipes carried out as follows:

RWI-BH007A pumped out using Honda Pump and allowed stand for one hour prior to commencement of in-situ permeability test on Jan 13th 2022.

RWI-BH008 pumped out using Honda Pump and allowed stand for one hour prior to commencement of in-situ permeability test on Jan 13th 2022.

RWI-BH010 pumped out using Honda Pump on Dec 16th 2021.

RWI-BH013 pumped out using Honda Pump on Jan 12th 2022.

RWI-BH016 pumped out using Honda Pump and allowed stand for one hour prior to commencement of in-situ permeability test on Jan 14th 2022.

RWI-BH017 pumped out using Honda Pump on Dec 21st 2021.

Appendix 1J.2 Groundwater Level Data (Data Logger)

Manufacturer Heron Instruments
 Device dipper-Log 128+
 Logger ID C31920
 Project WSP RWI
 Deployment BH 008
 Number of Readings 644

No	Date	Depth of water (mH2O)	Temperature (°C)
1	09/06/2022 13:48	-0.6537	11.5
2	09/06/2022 14:48	-0.6558	11.391
3	09/06/2022 15:48	-0.6656	11.359
4	09/06/2022 16:48	-0.6688	11.352
5	09/06/2022 17:48	-0.6688	11.344
6	09/06/2022 18:48	-0.6677	11.344
7	09/06/2022 19:48	-0.6721	11.344
8	09/06/2022 20:48	-0.6678	11.344
9	09/06/2022 21:48	-0.6754	11.344
10	09/06/2022 22:48	-0.6743	11.344
11	09/06/2022 23:48	-0.6765	11.344
12	10/06/2022 00:48	-0.6797	11.344
13	10/06/2022 01:48	-0.6776	11.352
14	10/06/2022 02:48	-0.6797	11.352
15	10/06/2022 03:48	-0.6776	11.352
16	10/06/2022 04:48	-0.6797	11.352
17	10/06/2022 05:48	-0.6798	11.352
18	10/06/2022 06:48	-0.6743	11.352
19	10/06/2022 07:48	-0.6797	11.352
20	10/06/2022 08:48	-0.6776	11.359
21	10/06/2022 09:48	-0.6776	11.352
22	10/06/2022 10:48	-0.6754	11.352
23	10/06/2022 11:48	-0.6786	11.359
24	10/06/2022 12:48	-0.6851	11.359
25	10/06/2022 13:48	-0.6808	11.359
26	10/06/2022 14:48	-0.6765	11.367
27	10/06/2022 15:48	-0.6819	11.359
28	10/06/2022 16:48	-0.6776	11.367
29	10/06/2022 17:48	-0.683	11.367
30	10/06/2022 18:48	-0.683	11.367
31	10/06/2022 19:48	-0.6809	11.367
32	10/06/2022 20:48	-0.6853	11.367
33	10/06/2022 21:48	-0.6907	11.375
34	10/06/2022 22:48	-0.6864	11.375
35	10/06/2022 23:48	-0.6864	11.375
36	11/06/2022 00:48	-0.6897	11.375
37	11/06/2022 01:48	-0.6875	11.375
38	11/06/2022 02:48	-0.6897	11.375
39	11/06/2022 03:48	-0.6886	11.375
40	11/06/2022 04:48	-0.6909	11.383
41	11/06/2022 05:48	-0.6887	11.383
42	11/06/2022 06:48	-0.6941	11.383
43	11/06/2022 07:48	-0.6931	11.391
44	11/06/2022 08:48	-0.6888	11.383
45	11/06/2022 09:48	-0.6877	11.391
46	11/06/2022 10:48	-0.6888	11.391

47	11/06/2022 11:48	-0.69	11.391
48	11/06/2022 12:48	-0.6943	11.391
49	11/06/2022 13:48	-0.6911	11.398
50	11/06/2022 14:48	-0.6922	11.398
51	11/06/2022 15:48	-0.6912	11.406
52	11/06/2022 16:48	-0.6944	11.406
53	11/06/2022 17:48	-0.6934	11.406
54	11/06/2022 18:48	-0.6934	11.406
55	11/06/2022 19:48	-0.6913	11.406
56	11/06/2022 20:48	-0.6925	11.406
57	11/06/2022 21:48	-0.6957	11.414
58	11/06/2022 22:48	-0.6969	11.414
59	11/06/2022 23:48	-0.6969	11.414
60	12/06/2022 00:48	-0.6991	11.422
61	12/06/2022 01:48	-0.698	11.422
62	12/06/2022 02:48	-0.7013	11.422
63	12/06/2022 03:48	-0.7002	11.422
64	12/06/2022 04:48	-0.7035	11.43
65	12/06/2022 05:48	-0.7002	11.43
66	12/06/2022 06:48	-0.7003	11.43
67	12/06/2022 07:48	-0.7025	11.43
68	12/06/2022 08:48	-0.7036	11.43
69	12/06/2022 09:48	-0.6971	11.438
70	12/06/2022 10:48	-0.7057	11.43
71	12/06/2022 11:48	-0.7036	11.438
72	12/06/2022 12:48	-0.7025	11.445
73	12/06/2022 13:48	-0.7004	11.445
74	12/06/2022 14:48	-0.7014	11.445
75	12/06/2022 15:48	-0.7036	11.453
76	12/06/2022 16:48	-0.7058	11.453
77	12/06/2022 17:48	-0.7036	11.445
78	12/06/2022 18:48	-0.7025	11.453
79	12/06/2022 19:48	-0.708	11.453
80	12/06/2022 20:48	-0.7112	11.453
81	12/06/2022 21:48	-0.708	11.453
82	12/06/2022 22:48	-0.708	11.461
83	12/06/2022 23:48	-0.7134	11.461
84	13/06/2022 00:48	-0.7123	11.461
85	13/06/2022 01:48	-0.7069	11.469
86	13/06/2022 02:48	-0.7069	11.477
87	13/06/2022 03:48	-0.7123	11.469
88	13/06/2022 04:48	-0.7123	11.469
89	13/06/2022 05:48	-0.7112	11.477
90	13/06/2022 06:48	-0.7123	11.477
91	13/06/2022 07:48	-0.7134	11.484
92	13/06/2022 08:48	-0.707	11.484
93	13/06/2022 09:48	-0.7091	11.492
94	13/06/2022 10:48	-0.7112	11.484
95	13/06/2022 11:48	-0.7145	11.492
96	13/06/2022 12:48	-0.7123	11.484
97	13/06/2022 13:48	-0.7112	11.484
98	13/06/2022 14:48	-0.7133	11.492
99	13/06/2022 15:48	-0.7111	11.492
100	13/06/2022 16:48	-0.7132	11.492
101	13/06/2022 17:48	-0.7121	11.5
102	13/06/2022 18:48	-0.7132	11.508

103	13/06/2022 19:48	-0.7143	11.5
104	13/06/2022 20:48	-0.7164	11.508
105	13/06/2022 21:48	-0.7175	11.508
106	13/06/2022 22:48	-0.7164	11.508
107	13/06/2022 23:48	-0.7142	11.516
108	14/06/2022 00:48	-0.7196	11.508
109	14/06/2022 01:48	-0.7228	11.516
110	14/06/2022 02:48	-0.7163	11.516
111	14/06/2022 03:48	-0.7206	11.516
112	14/06/2022 04:48	-0.7151	11.516
113	14/06/2022 05:48	-0.7162	11.516
114	14/06/2022 06:48	-0.7194	11.523
115	14/06/2022 07:48	-0.7237	11.523
116	14/06/2022 08:48	-0.7173	11.523
117	14/06/2022 09:48	-0.7172	11.523
118	14/06/2022 10:48	-0.7205	11.531
119	14/06/2022 11:48	-0.7183	11.523
120	14/06/2022 12:48	-0.7193	11.531
121	14/06/2022 13:48	-0.7204	11.531
122	14/06/2022 14:48	-0.7171	11.531
123	14/06/2022 15:48	-0.7203	11.531
124	14/06/2022 16:48	-0.7192	11.531
125	14/06/2022 17:48	-0.7246	11.531
126	14/06/2022 18:48	-0.7224	11.539
127	14/06/2022 19:48	-0.7224	11.539
128	14/06/2022 20:48	-0.7213	11.531
129	14/06/2022 21:48	-0.7257	11.539
130	14/06/2022 22:48	-0.7236	11.539
131	14/06/2022 23:48	-0.73	11.539
132	15/06/2022 00:48	-0.7268	11.539
133	15/06/2022 01:48	-0.7267	11.539
134	15/06/2022 02:48	-0.7343	11.547
135	15/06/2022 03:48	-0.7321	11.547
136	15/06/2022 04:48	-0.7332	11.547
137	15/06/2022 05:48	-0.7257	11.547
138	15/06/2022 06:48	-0.7289	11.547
139	15/06/2022 07:48	-0.7278	11.547
140	15/06/2022 08:48	-0.7267	11.547
141	15/06/2022 09:48	-0.7278	11.547
142	15/06/2022 10:48	-0.7267	11.547
143	15/06/2022 11:48	-0.7235	11.555
144	15/06/2022 12:48	-0.7257	11.555
145	15/06/2022 13:48	-0.7267	11.555
146	15/06/2022 14:48	-0.7278	11.555
147	15/06/2022 15:48	-0.7267	11.555
148	15/06/2022 16:48	-0.7257	11.563
149	15/06/2022 17:48	-0.7332	11.563
150	15/06/2022 18:48	-0.7257	11.563
151	15/06/2022 19:48	-0.7343	11.563
152	15/06/2022 20:48	-0.7365	11.563
153	15/06/2022 21:48	-0.7322	11.563
154	15/06/2022 22:48	-0.7322	11.563
155	15/06/2022 23:48	-0.7387	11.563
156	16/06/2022 00:48	-0.7323	11.563
157	16/06/2022 01:48	-0.7387	11.563
158	16/06/2022 02:48	-0.7398	11.563

159	16/06/2022 03:48	-0.7355	11.563
160	16/06/2022 04:48	-0.7344	11.57
161	16/06/2022 05:48	-0.7333	11.57
162	16/06/2022 06:48	-0.7322	11.57
163	16/06/2022 07:48	-0.7333	11.57
164	16/06/2022 08:48	-0.7289	11.57
165	16/06/2022 09:48	-0.7311	11.57
166	16/06/2022 10:48	-0.7333	11.578
167	16/06/2022 11:48	-0.7344	11.57
168	16/06/2022 12:48	-0.7343	11.578
169	16/06/2022 13:48	-0.7267	11.578
170	16/06/2022 14:48	-0.7364	11.57
171	16/06/2022 15:48	-0.7331	11.57
172	16/06/2022 16:48	-0.7352	11.578
173	16/06/2022 17:48	-0.7385	11.578
174	16/06/2022 18:48	-0.7384	11.578
175	16/06/2022 19:48	-0.7373	11.578
176	16/06/2022 20:48	-0.7372	11.586
177	16/06/2022 21:48	-0.7416	11.586
178	16/06/2022 22:48	-0.7372	11.586
179	16/06/2022 23:48	-0.7404	11.586
180	17/06/2022 00:48	-0.7382	11.586
181	17/06/2022 01:48	-0.7392	11.586
182	17/06/2022 02:48	-0.7468	11.586
183	17/06/2022 03:48	-0.7457	11.586
184	17/06/2022 04:48	-0.7424	11.594
185	17/06/2022 05:48	-0.7414	11.594
186	17/06/2022 06:48	-0.7424	11.586
187	17/06/2022 07:48	-0.7457	11.594
188	17/06/2022 08:48	-0.7447	11.594
189	17/06/2022 09:48	-0.7437	11.594
190	17/06/2022 10:48	-0.7469	11.594
191	17/06/2022 11:48	-0.7427	11.594
192	17/06/2022 12:48	-0.7503	11.594
193	17/06/2022 13:48	-0.7449	11.594
194	17/06/2022 14:48	-0.746	11.602
195	17/06/2022 15:48	-0.7439	11.602
196	17/06/2022 16:48	-0.7494	11.609
197	17/06/2022 17:48	-0.744	11.602
198	17/06/2022 18:48	-0.744	11.609
199	17/06/2022 19:48	-0.7484	11.602
200	17/06/2022 20:48	-0.7452	11.609
201	17/06/2022 21:48	-0.7507	11.609
202	17/06/2022 22:48	-0.754	11.609
203	17/06/2022 23:48	-0.7486	11.617
204	18/06/2022 00:48	-0.7529	11.617
205	18/06/2022 01:48	-0.7562	11.617
206	18/06/2022 02:48	-0.7519	11.617
207	18/06/2022 03:48	-0.754	11.617
208	18/06/2022 04:48	-0.754	11.625
209	18/06/2022 05:48	-0.754	11.625
210	18/06/2022 06:48	-0.7551	11.625
211	18/06/2022 07:48	-0.7552	11.625
212	18/06/2022 08:48	-0.754	11.633
213	18/06/2022 09:48	-0.7519	11.633
214	18/06/2022 10:48	-0.7552	11.633

215	18/06/2022 11:48	-0.7541	11.641
216	18/06/2022 12:48	-0.7508	11.641
217	18/06/2022 13:48	-0.754	11.641
218	18/06/2022 14:48	-0.7508	11.641
219	18/06/2022 15:48	-0.7518	11.648
220	18/06/2022 16:48	-0.7485	11.641
221	18/06/2022 17:48	-0.7571	11.648
222	18/06/2022 18:48	-0.756	11.648
223	18/06/2022 19:48	-0.756	11.656
224	18/06/2022 20:48	-0.7549	11.656
225	18/06/2022 21:48	-0.7571	11.656
226	18/06/2022 22:48	-0.7593	11.664
227	18/06/2022 23:48	-0.7604	11.664
228	19/06/2022 00:48	-0.7582	11.664
229	19/06/2022 01:48	-0.7549	11.664
230	19/06/2022 02:48	-0.7614	11.672
231	19/06/2022 03:48	-0.7624	11.672
232	19/06/2022 04:48	-0.7591	11.68
233	19/06/2022 05:48	-0.7591	11.672
234	19/06/2022 06:48	-0.7634	11.68
235	19/06/2022 07:48	-0.7635	11.68
236	19/06/2022 08:48	-0.7613	11.68
237	19/06/2022 09:48	-0.7591	11.688
238	19/06/2022 10:48	-0.7613	11.688
239	19/06/2022 11:48	-0.7635	11.695
240	19/06/2022 12:48	-0.7635	11.695
241	19/06/2022 13:48	-0.7656	11.695
242	19/06/2022 14:48	-0.7602	11.695
243	19/06/2022 15:48	-0.7645	11.703
244	19/06/2022 16:48	-0.7645	11.703
245	19/06/2022 17:48	-0.7602	11.703
246	19/06/2022 18:48	-0.7623	11.711
247	19/06/2022 19:48	-0.7656	11.711
248	19/06/2022 20:48	-0.7688	11.711
249	19/06/2022 21:48	-0.7678	11.711
250	19/06/2022 22:48	-0.7636	11.719
251	19/06/2022 23:48	-0.769	11.719
252	20/06/2022 00:48	-0.769	11.719
253	20/06/2022 01:48	-0.769	11.727
254	20/06/2022 02:48	-0.7679	11.719
255	20/06/2022 03:48	-0.7679	11.727
256	20/06/2022 04:48	-0.7733	11.727
257	20/06/2022 05:48	-0.7723	11.727
258	20/06/2022 06:48	-0.768	11.727
259	20/06/2022 07:48	-0.7669	11.734
260	20/06/2022 08:48	-0.7712	11.734
261	20/06/2022 09:48	-0.7691	11.734
262	20/06/2022 10:48	-0.7625	11.734
263	20/06/2022 11:48	-0.7593	11.742
264	20/06/2022 12:48	-0.7679	11.742
265	20/06/2022 13:48	-0.7678	11.734
266	20/06/2022 14:48	-0.7699	11.75
267	20/06/2022 15:48	-0.7677	11.75
268	20/06/2022 16:48	-0.7677	11.75
269	20/06/2022 17:48	-0.7677	11.75
270	20/06/2022 18:48	-0.7666	11.75

271	20/06/2022 19:48	-0.7709	11.758
272	20/06/2022 20:48	-0.7709	11.758
273	20/06/2022 21:48	-0.7709	11.758
274	20/06/2022 22:48	-0.773	11.758
275	20/06/2022 23:48	-0.7752	11.758
276	21/06/2022 00:48	-0.7719	11.766
277	21/06/2022 01:48	-0.7697	11.766
278	21/06/2022 02:48	-0.7739	11.766
279	21/06/2022 03:48	-0.7739	11.766
280	21/06/2022 04:48	-0.7759	11.766
281	21/06/2022 05:48	-0.777	11.766
282	21/06/2022 06:48	-0.7695	11.773
283	21/06/2022 07:48	-0.7748	11.766
284	21/06/2022 08:48	-0.7694	11.773
285	21/06/2022 09:48	-0.7683	11.773
286	21/06/2022 10:48	-0.7727	11.773
287	21/06/2022 11:48	-0.7705	11.773
288	21/06/2022 12:48	-0.7716	11.773
289	21/06/2022 13:48	-0.7705	11.781
290	21/06/2022 14:48	-0.777	11.773
291	21/06/2022 15:48	-0.777	11.773
292	21/06/2022 16:48	-0.7802	11.781
293	21/06/2022 17:48	-0.7759	11.781
294	21/06/2022 18:48	-0.778	11.781
295	21/06/2022 19:48	-0.7738	11.789
296	21/06/2022 20:48	-0.7759	11.789
297	21/06/2022 21:48	-0.7792	11.781
298	21/06/2022 22:48	-0.7825	11.781
299	21/06/2022 23:48	-0.7738	11.781
300	22/06/2022 00:48	-0.776	11.789
301	22/06/2022 01:48	-0.7793	11.789
302	22/06/2022 02:48	-0.7782	11.789
303	22/06/2022 03:48	-0.7792	11.789
304	22/06/2022 04:48	-0.7792	11.789
305	22/06/2022 05:48	-0.7781	11.789
306	22/06/2022 06:48	-0.7771	11.797
307	22/06/2022 07:48	-0.7846	11.789
308	22/06/2022 08:48	-0.7792	11.805
309	22/06/2022 09:48	-0.7771	11.797
310	22/06/2022 10:48	-0.7738	11.797
311	22/06/2022 11:48	-0.7792	11.797
312	22/06/2022 12:48	-0.7781	11.805
313	22/06/2022 13:48	-0.7781	11.805
314	22/06/2022 14:48	-0.7791	11.805
315	22/06/2022 15:48	-0.7856	11.805
316	22/06/2022 16:48	-0.7791	11.813
317	22/06/2022 17:48	-0.7769	11.805
318	22/06/2022 18:48	-0.7779	11.805
319	22/06/2022 19:48	-0.7822	11.813
320	22/06/2022 20:48	-0.7801	11.813
321	22/06/2022 21:48	-0.7876	11.813
322	22/06/2022 22:48	-0.7823	11.813
323	22/06/2022 23:48	-0.7801	11.813
324	23/06/2022 00:48	-0.7844	11.82
325	23/06/2022 01:48	-0.7854	11.82
326	23/06/2022 02:48	-0.7864	11.828

327	23/06/2022 03:48	-0.7864	11.828
328	23/06/2022 04:48	-0.7831	11.828
329	23/06/2022 05:48	-0.7853	11.828
330	23/06/2022 06:48	-0.7863	11.828
331	23/06/2022 07:48	-0.7895	11.836
332	23/06/2022 08:48	-0.7927	11.836
333	23/06/2022 09:48	-0.7852	11.836
334	23/06/2022 10:48	-0.7862	11.836
335	23/06/2022 11:48	-0.7872	11.836
336	23/06/2022 12:48	-0.7861	11.844
337	23/06/2022 13:48	-0.7839	11.844
338	23/06/2022 14:48	-0.7893	11.844
339	23/06/2022 15:48	-0.7838	11.844
340	23/06/2022 16:48	-0.7816	11.852
341	23/06/2022 17:48	-0.788	11.852
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343	23/06/2022 19:48	-0.788	11.852
344	23/06/2022 20:48	-0.7933	11.852
345	23/06/2022 21:48	-0.789	11.859
346	23/06/2022 22:48	-0.789	11.859
347	23/06/2022 23:48	-0.79	11.859
348	24/06/2022 00:48	-0.791	11.867
349	24/06/2022 01:48	-0.7888	11.867
350	24/06/2022 02:48	-0.7909	11.867
351	24/06/2022 03:48	-0.794	11.867
352	24/06/2022 04:48	-0.7886	11.875
353	24/06/2022 05:48	-0.795	11.875
354	24/06/2022 06:48	-0.7928	11.875
355	24/06/2022 07:48	-0.7917	11.883
356	24/06/2022 08:48	-0.7884	11.883
357	24/06/2022 09:48	-0.7927	11.883
358	24/06/2022 10:48	-0.7948	11.883
359	24/06/2022 11:48	-0.7915	11.891
360	24/06/2022 12:48	-0.7914	11.898
361	24/06/2022 13:48	-0.7827	11.898
362	24/06/2022 14:48	-0.7697	11.898
363	24/06/2022 15:48	-0.7514	11.898
364	24/06/2022 16:48	-0.7234	11.906
365	24/06/2022 17:48	-0.6728	11.898
366	24/06/2022 18:48	-0.4113	11.906
367	24/06/2022 19:48	-0.3737	11.914
368	24/06/2022 20:48	-0.363	11.906
369	24/06/2022 21:48	-0.363	11.914
370	24/06/2022 22:48	-0.3416	11.914
371	24/06/2022 23:48	-0.2996	11.922
372	25/06/2022 00:48	-0.2943	11.922
373	25/06/2022 01:48	-0.2986	11.922
374	25/06/2022 02:48	-0.2965	11.922
375	25/06/2022 03:48	-0.3008	11.93
376	25/06/2022 04:48	-0.2943	11.93
377	25/06/2022 05:48	-0.2997	11.93
378	25/06/2022 06:48	-0.303	11.938
379	25/06/2022 07:48	-0.3094	11.938
380	25/06/2022 08:48	-0.3137	11.938
381	25/06/2022 09:48	-0.317	11.938
382	25/06/2022 10:48	-0.318	11.945

383	25/06/2022 11:48	-0.3169	11.945
384	25/06/2022 12:48	-0.3201	11.953
385	25/06/2022 13:48	-0.3179	11.945
386	25/06/2022 14:48	-0.3276	11.953
387	25/06/2022 15:48	-0.3298	11.961
388	25/06/2022 16:48	-0.3276	11.961
389	25/06/2022 17:48	-0.3254	11.961
390	25/06/2022 18:48	-0.3243	11.961
391	25/06/2022 19:48	-0.3286	11.969
392	25/06/2022 20:48	-0.3286	11.969
393	25/06/2022 21:48	-0.3307	11.969
394	25/06/2022 22:48	-0.3285	11.977
395	25/06/2022 23:48	-0.3275	11.977
396	26/06/2022 00:48	-0.321	11.977
397	26/06/2022 01:48	-0.32	11.984
398	26/06/2022 02:48	-0.32	11.977
399	26/06/2022 03:48	-0.3211	11.992
400	26/06/2022 04:48	-0.3222	11.992
401	26/06/2022 05:48	-0.3201	11.992
402	26/06/2022 06:48	-0.3202	11.992
403	26/06/2022 07:48	-0.3192	11.992
404	26/06/2022 08:48	-0.3192	12
405	26/06/2022 09:48	-0.3171	12
406	26/06/2022 10:48	-0.3118	12
407	26/06/2022 11:48	-0.3097	12
408	26/06/2022 12:48	-0.3076	12.008
409	26/06/2022 13:48	-0.3131	12.008
410	26/06/2022 14:48	-0.3153	12.008
411	26/06/2022 15:48	-0.3219	12.016
412	26/06/2022 16:48	-0.3252	12.016
413	26/06/2022 17:48	-0.3252	12.016
414	26/06/2022 18:48	-0.3242	12.016
415	26/06/2022 19:48	-0.3329	12.023
416	26/06/2022 20:48	-0.3276	12.023
417	26/06/2022 21:48	-0.332	12.023
418	26/06/2022 22:48	-0.3288	12.023
419	26/06/2022 23:48	-0.3321	12.023
420	27/06/2022 00:48	-0.33	12.023
421	27/06/2022 01:48	-0.3322	12.023
422	27/06/2022 02:48	-0.3333	12.031
423	27/06/2022 03:48	-0.3322	12.039
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425	27/06/2022 05:48	-0.3323	12.031
426	27/06/2022 06:48	-0.341	12.031
427	27/06/2022 07:48	-0.3367	12.039
428	27/06/2022 08:48	-0.3324	12.039
429	27/06/2022 09:48	-0.3335	12.039
430	27/06/2022 10:48	-0.3302	12.039
431	27/06/2022 11:48	-0.3291	12.039
432	27/06/2022 12:48	-0.3302	12.039
433	27/06/2022 13:48	-0.3334	12.039
434	27/06/2022 14:48	-0.3323	12.047
435	27/06/2022 15:48	-0.3355	12.047
436	27/06/2022 16:48	-0.3377	12.039
437	27/06/2022 17:48	-0.329	12.047
438	27/06/2022 18:48	-0.3322	12.047

439	27/06/2022 19:48	-0.3311	12.047
440	27/06/2022 20:48	-0.3342	12.047
441	27/06/2022 21:48	-0.332	12.055
442	27/06/2022 22:48	-0.3374	12.055
443	27/06/2022 23:48	-0.332	12.055
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445	28/06/2022 01:48	-0.3189	12.055
446	28/06/2022 02:48	-0.3177	12.055
447	28/06/2022 03:48	-0.3069	12.055
448	28/06/2022 04:48	-0.3068	12.055
449	28/06/2022 05:48	-0.2992	12.055
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453	28/06/2022 09:48	-0.2959	12.063
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462	28/06/2022 18:48	-0.3273	12.07
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465	28/06/2022 21:48	-0.3328	12.063
466	28/06/2022 22:48	-0.335	12.063
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468	29/06/2022 00:48	-0.3264	12.063
469	29/06/2022 01:48	-0.3329	12.063
470	29/06/2022 02:48	-0.3307	12.063
471	29/06/2022 03:48	-0.3307	12.063
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474	29/06/2022 06:48	-0.3308	12.063
475	29/06/2022 07:48	-0.334	12.063
476	29/06/2022 08:48	-0.3319	12.07
477	29/06/2022 09:48	-0.333	12.063
478	29/06/2022 10:48	-0.3341	12.07
479	29/06/2022 11:48	-0.3341	12.07
480	29/06/2022 12:48	-0.332	12.063
481	29/06/2022 13:48	-0.332	12.07
482	29/06/2022 14:48	-0.3298	12.063
483	29/06/2022 15:48	-0.3341	12.063
484	29/06/2022 16:48	-0.3266	12.063
485	29/06/2022 17:48	-0.3309	12.07
486	29/06/2022 18:48	-0.3331	12.07
487	29/06/2022 19:48	-0.3385	12.063
488	29/06/2022 20:48	-0.3342	12.063
489	29/06/2022 21:48	-0.3397	12.07
490	29/06/2022 22:48	-0.3397	12.07
491	29/06/2022 23:48	-0.3375	12.07
492	30/06/2022 00:48	-0.3397	12.063
493	30/06/2022 01:48	-0.3375	12.07
494	30/06/2022 02:48	-0.3375	12.063

495	30/06/2022 03:48	-0.3397	12.07
496	30/06/2022 04:48	-0.3408	12.063
497	30/06/2022 05:48	-0.3354	12.07
498	30/06/2022 06:48	-0.3387	12.07
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515	30/06/2022 23:48	-0.3443	12.078
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519	01/07/2022 03:48	-0.3454	12.078
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525	01/07/2022 09:48	-0.3463	12.078
526	01/07/2022 10:48	-0.3463	12.078
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528	01/07/2022 12:48	-0.3549	12.078
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538	01/07/2022 22:48	-0.3539	12.086
539	01/07/2022 23:48	-0.3539	12.086
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541	02/07/2022 01:48	-0.3528	12.086
542	02/07/2022 02:48	-0.3571	12.086
543	02/07/2022 03:48	-0.3539	12.094
544	02/07/2022 04:48	-0.3593	12.086
545	02/07/2022 05:48	-0.3583	12.086
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556	02/07/2022 16:48	-0.3595	12.094
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558	02/07/2022 18:48	-0.3563	12.102
559	02/07/2022 19:48	-0.3553	12.102
560	02/07/2022 20:48	-0.3575	12.094
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562	02/07/2022 22:48	-0.3587	12.094
563	02/07/2022 23:48	-0.3652	12.102
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565	03/07/2022 01:48	-0.3609	12.102
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577	03/07/2022 13:48	-0.3633	12.109
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586	03/07/2022 22:48	-0.3752	12.109
587	03/07/2022 23:48	-0.3816	12.109
588	04/07/2022 00:48	-0.3902	12.109
589	04/07/2022 01:48	-0.3891	12.109
590	04/07/2022 02:48	-0.3956	12.109
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592	04/07/2022 04:48	-0.3977	12.109
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597	04/07/2022 09:48	-0.4064	12.109
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599	04/07/2022 11:48	-0.4065	12.117
600	04/07/2022 12:48	-0.4119	12.117
601	04/07/2022 13:48	-0.414	12.117
602	04/07/2022 14:48	-0.4108	12.117
603	04/07/2022 15:48	-0.414	12.117
604	04/07/2022 16:48	-0.4173	12.117
605	04/07/2022 17:48	-0.4205	12.117
606	04/07/2022 18:48	-0.4205	12.117

607	04/07/2022 19:48	-0.4238	12.117
608	04/07/2022 20:48	-0.4292	12.117
609	04/07/2022 21:48	-0.4314	12.125
610	04/07/2022 22:48	-0.4282	12.125
611	04/07/2022 23:48	-0.4346	12.117
612	05/07/2022 00:48	-0.4357	12.117
613	05/07/2022 01:48	-0.4378	12.125
614	05/07/2022 02:48	-0.44	12.125
615	05/07/2022 03:48	-0.44	12.133
616	05/07/2022 04:48	-0.4367	12.125
617	05/07/2022 05:48	-0.4465	12.133
618	05/07/2022 06:48	-0.4454	12.133
619	05/07/2022 07:48	-0.4498	12.133
620	05/07/2022 08:48	-0.4498	12.133
621	05/07/2022 09:48	-0.4553	12.133
622	05/07/2022 10:48	-0.4509	12.133
623	05/07/2022 11:48	-0.4553	12.133
624	05/07/2022 12:48	-0.4596	12.133
625	05/07/2022 13:48	-0.4575	12.133
626	05/07/2022 14:48	-0.4586	12.133
627	05/07/2022 15:48	-0.4618	12.133
628	05/07/2022 16:48	-0.464	12.141
629	05/07/2022 17:48	-0.4651	12.141
630	05/07/2022 18:48	-0.4684	12.133
631	05/07/2022 19:48	-0.4683	12.141
632	05/07/2022 20:48	-0.4738	12.141
633	05/07/2022 21:48	-0.4803	12.133
634	05/07/2022 22:48	-0.4738	12.141
635	05/07/2022 23:48	-0.4814	12.141
636	06/07/2022 00:48	-0.4814	12.141
637	06/07/2022 01:48	-0.4836	12.141
638	06/07/2022 02:48	-0.4911	12.141
639	06/07/2022 03:48	-0.491	12.141
640	06/07/2022 04:48	-0.4878	12.141
641	06/07/2022 05:48	-0.4878	12.148
642	06/07/2022 06:48	-0.491	12.148
643	06/07/2022 07:48	-0.491	12.148
644	06/07/2022 08:48	-0.4943	12.148

Manufacturer Heron Instruments
 Device dipper-Log 128+
 Logger ID C31919
 Project WSP RWI
 Deployment BH 10
 Number of Readings 644

No	Date	Depth to Water (mH2O)	Temperature (°C)
1	09/06/2022 13:52	-0.4233	10.008
2	09/06/2022 14:52	-0.4254	9.992
3	09/06/2022 15:52	-0.4308	9.984
4	09/06/2022 16:52	-0.4427	9.984
5	09/06/2022 17:52	-0.4405	9.984
6	09/06/2022 18:52	-0.4438	9.984
7	09/06/2022 19:52	-0.4503	9.984
8	09/06/2022 20:52	-0.4568	9.984
9	09/06/2022 21:52	-0.4557	9.984
10	09/06/2022 22:52	-0.4633	9.984
11	09/06/2022 23:52	-0.4655	9.984
12	10/06/2022 00:52	-0.4666	9.984
13	10/06/2022 01:52	-0.4666	9.984
14	10/06/2022 02:52	-0.4622	9.984
15	10/06/2022 03:52	-0.4622	9.984
16	10/06/2022 04:52	-0.4622	9.984
17	10/06/2022 05:52	-0.458	9.992
18	10/06/2022 06:52	-0.4568	9.984
19	10/06/2022 07:52	-0.4579	9.984
20	10/06/2022 08:52	-0.4644	9.992
21	10/06/2022 09:52	-0.4622	9.992
22	10/06/2022 10:52	-0.4622	9.992
23	10/06/2022 11:52	-0.4633	9.984
24	10/06/2022 12:52	-0.4698	9.984
25	10/06/2022 13:52	-0.4719	9.984
26	10/06/2022 14:52	-0.4719	9.984
27	10/06/2022 15:52	-0.473	9.992
28	10/06/2022 16:52	-0.4752	9.992
29	10/06/2022 17:52	-0.4871	9.992
30	10/06/2022 18:52	-0.4827	9.992
31	10/06/2022 19:52	-0.4763	9.992
32	10/06/2022 20:52	-0.4828	9.992
33	10/06/2022 21:52	-0.4796	9.992
34	10/06/2022 22:52	-0.4796	9.992
35	10/06/2022 23:52	-0.4818	9.984
36	11/06/2022 00:52	-0.4894	9.992
37	11/06/2022 01:52	-0.4916	9.992
38	11/06/2022 02:52	-0.4873	9.992
39	11/06/2022 03:52	-0.4819	9.992
40	11/06/2022 04:52	-0.4906	10
41	11/06/2022 05:52	-0.4841	9.992
42	11/06/2022 06:52	-0.4852	9.992
43	11/06/2022 07:52	-0.482	9.992
44	11/06/2022 08:52	-0.4842	9.992
45	11/06/2022 09:52	-0.4853	9.992
46	11/06/2022 10:52	-0.4821	9.992
47	11/06/2022 11:52	-0.4897	9.992
48	11/06/2022 12:52	-0.4983	10
49	11/06/2022 13:52	-0.5037	10
50	11/06/2022 14:52	-0.4962	10
51	11/06/2022 15:52	-0.4973	10

52	11/06/2022 16:52	-0.4941	10
53	11/06/2022 17:52	-0.4931	10
54	11/06/2022 18:52	-0.4931	10
55	11/06/2022 19:52	-0.4845	10
56	11/06/2022 20:52	-0.4964	10
57	11/06/2022 21:52	-0.4932	10
58	11/06/2022 22:52	-0.4922	10
59	11/06/2022 23:52	-0.4965	10
60	12/06/2022 00:52	-0.4901	10
61	12/06/2022 01:52	-0.4998	10
62	12/06/2022 02:52	-0.4987	10.008
63	12/06/2022 03:52	-0.4955	10.008
64	12/06/2022 04:52	-0.4988	10
65	12/06/2022 05:52	-0.4999	10
66	12/06/2022 06:52	-0.4956	10.008
67	12/06/2022 07:52	-0.4978	10.008
68	12/06/2022 08:52	-0.501	10.008
69	12/06/2022 09:52	-0.4967	10.008
70	12/06/2022 10:52	-0.501	10.008
71	12/06/2022 11:52	-0.501	10.016
72	12/06/2022 12:52	-0.5086	10.008
73	12/06/2022 13:52	-0.5172	10.008
74	12/06/2022 14:52	-0.5097	10.008
75	12/06/2022 15:52	-0.5075	10.016
76	12/06/2022 16:52	-0.5118	10.016
77	12/06/2022 17:52	-0.5119	10.016
78	12/06/2022 18:52	-0.5086	10.008
79	12/06/2022 19:52	-0.5076	10.016
80	12/06/2022 20:52	-0.5022	10.008
81	12/06/2022 21:52	-0.5033	10.008
82	12/06/2022 22:52	-0.5012	10.008
83	12/06/2022 23:52	-0.5001	10.016
84	13/06/2022 00:52	-0.5033	10.008
85	13/06/2022 01:52	-0.4979	10.016
86	13/06/2022 02:52	-0.5044	10.016
87	13/06/2022 03:52	-0.5098	10.016
88	13/06/2022 04:52	-0.5076	10.016
89	13/06/2022 05:52	-0.5065	10.016
90	13/06/2022 06:52	-0.5098	10.016
91	13/06/2022 07:52	-0.5065	10.016
92	13/06/2022 08:52	-0.5152	10.016
93	13/06/2022 09:52	-0.513	10.016
94	13/06/2022 10:52	-0.5152	10.016
95	13/06/2022 11:52	-0.5206	10.023
96	13/06/2022 12:52	-0.5184	10.016
97	13/06/2022 13:52	-0.5216	10.016
98	13/06/2022 14:52	-0.5259	10.016
99	13/06/2022 15:52	-0.5237	10.016
100	13/06/2022 16:52	-0.5301	10.016
101	13/06/2022 17:52	-0.5247	10.023
102	13/06/2022 18:52	-0.5193	10.016
103	13/06/2022 19:52	-0.5161	10.016
104	13/06/2022 20:52	-0.5096	10.023
105	13/06/2022 21:52	-0.4999	10.016
106	13/06/2022 22:52	-0.5031	10.016
107	13/06/2022 23:52	-0.5031	10.023
108	14/06/2022 00:52	-0.4977	10.016
109	14/06/2022 01:52	-0.5096	10.023
110	14/06/2022 02:52	-0.5074	10.023
111	14/06/2022 03:52	-0.5116	10.016
112	14/06/2022 04:52	-0.5127	10.031

113	14/06/2022 05:52	-0.5137	10.023
114	14/06/2022 06:52	-0.5126	10.023
115	14/06/2022 07:52	-0.5126	10.023
116	14/06/2022 08:52	-0.5083	10.031
117	14/06/2022 09:52	-0.5083	10.023
118	14/06/2022 10:52	-0.5137	10.023
119	14/06/2022 11:52	-0.5158	10.023
120	14/06/2022 12:52	-0.519	10.023
121	14/06/2022 13:52	-0.5265	10.031
122	14/06/2022 14:52	-0.5276	10.023
123	14/06/2022 15:52	-0.5308	10.023
124	14/06/2022 16:52	-0.5297	10.023
125	14/06/2022 17:52	-0.5329	10.031
126	14/06/2022 18:52	-0.5243	10.031
127	14/06/2022 19:52	-0.5264	10.031
128	14/06/2022 20:52	-0.5167	10.031
129	14/06/2022 21:52	-0.5038	10.031
130	14/06/2022 22:52	-0.5039	10.031
131	14/06/2022 23:52	-0.5017	10.031
132	15/06/2022 00:52	-0.5049	10.031
133	15/06/2022 01:52	-0.5006	10.031
134	15/06/2022 02:52	-0.5081	10.031
135	15/06/2022 03:52	-0.5124	10.031
136	15/06/2022 04:52	-0.5157	10.039
137	15/06/2022 05:52	-0.5146	10.031
138	15/06/2022 06:52	-0.52	10.031
139	15/06/2022 07:52	-0.5168	10.039
140	15/06/2022 08:52	-0.5178	10.031
141	15/06/2022 09:52	-0.5189	10.039
142	15/06/2022 10:52	-0.52	10.031
143	15/06/2022 11:52	-0.5189	10.031
144	15/06/2022 12:52	-0.5211	10.039
145	15/06/2022 13:52	-0.5308	10.031
146	15/06/2022 14:52	-0.5404	10.039
147	15/06/2022 15:52	-0.535	10.039
148	15/06/2022 16:52	-0.5469	10.039
149	15/06/2022 17:52	-0.548	10.039
150	15/06/2022 18:52	-0.5469	10.039
151	15/06/2022 19:52	-0.5447	10.039
152	15/06/2022 20:52	-0.5426	10.039
153	15/06/2022 21:52	-0.5341	10.039
154	15/06/2022 22:52	-0.5276	10.047
155	15/06/2022 23:52	-0.5255	10.047
156	16/06/2022 00:52	-0.5212	10.039
157	16/06/2022 01:52	-0.5234	10.039
158	16/06/2022 02:52	-0.5223	10.039
159	16/06/2022 03:52	-0.5287	10.047
160	16/06/2022 04:52	-0.5255	10.039
161	16/06/2022 05:52	-0.5266	10.039
162	16/06/2022 06:52	-0.5319	10.047
163	16/06/2022 07:52	-0.5308	10.047
164	16/06/2022 08:52	-0.5308	10.047
165	16/06/2022 09:52	-0.5308	10.047
166	16/06/2022 10:52	-0.5308	10.047
167	16/06/2022 11:52	-0.5297	10.047
168	16/06/2022 12:52	-0.5319	10.047
169	16/06/2022 13:52	-0.5286	10.047
170	16/06/2022 14:52	-0.5447	10.047
171	16/06/2022 15:52	-0.5501	10.055
172	16/06/2022 16:52	-0.5544	10.047
173	16/06/2022 17:52	-0.5597	10.047

174	16/06/2022 18:52	-0.5618	10.055
175	16/06/2022 19:52	-0.5586	10.055
176	16/06/2022 20:52	-0.5499	10.047
177	16/06/2022 21:52	-0.5456	10.047
178	16/06/2022 22:52	-0.5456	10.047
179	16/06/2022 23:52	-0.5337	10.055
180	17/06/2022 00:52	-0.5229	10.055
181	17/06/2022 01:52	-0.5218	10.055
182	17/06/2022 02:52	-0.5186	10.055
183	17/06/2022 03:52	-0.5218	10.055
184	17/06/2022 04:52	-0.525	10.055
185	17/06/2022 05:52	-0.5304	10.055
186	17/06/2022 06:52	-0.5314	10.055
187	17/06/2022 07:52	-0.5412	10.055
188	17/06/2022 08:52	-0.5401	10.055
189	17/06/2022 09:52	-0.5391	10.055
190	17/06/2022 10:52	-0.5402	10.055
191	17/06/2022 11:52	-0.5403	10.055
192	17/06/2022 12:52	-0.5349	10.055
193	17/06/2022 13:52	-0.536	10.055
194	17/06/2022 14:52	-0.5415	10.055
195	17/06/2022 15:52	-0.5415	10.063
196	17/06/2022 16:52	-0.5448	10.063
197	17/06/2022 17:52	-0.5545	10.063
198	17/06/2022 18:52	-0.561	10.055
199	17/06/2022 19:52	-0.5589	10.055
200	17/06/2022 20:52	-0.5557	10.063
201	17/06/2022 21:52	-0.5547	10.063
202	17/06/2022 22:52	-0.5537	10.063
203	17/06/2022 23:52	-0.5353	10.063
204	18/06/2022 00:52	-0.5375	10.063
205	18/06/2022 01:52	-0.5365	10.063
206	18/06/2022 02:52	-0.5279	10.063
207	18/06/2022 03:52	-0.5278	10.063
208	18/06/2022 04:52	-0.53	10.063
209	18/06/2022 05:52	-0.5365	10.063
210	18/06/2022 06:52	-0.5397	10.063
211	18/06/2022 07:52	-0.5419	10.063
212	18/06/2022 08:52	-0.5408	10.07
213	18/06/2022 09:52	-0.5387	10.07
214	18/06/2022 10:52	-0.5419	10.07
215	18/06/2022 11:52	-0.543	10.063
216	18/06/2022 12:52	-0.544	10.063
217	18/06/2022 13:52	-0.5429	10.07
218	18/06/2022 14:52	-0.5462	10.07
219	18/06/2022 15:52	-0.5515	10.07
220	18/06/2022 16:52	-0.5525	10.07
221	18/06/2022 17:52	-0.5633	10.07
222	18/06/2022 18:52	-0.5687	10.07
223	18/06/2022 19:52	-0.5708	10.07
224	18/06/2022 20:52	-0.5676	10.07
225	18/06/2022 21:52	-0.5719	10.07
226	18/06/2022 22:52	-0.5676	10.07
227	18/06/2022 23:52	-0.5644	10.07
228	19/06/2022 00:52	-0.5557	10.07
229	19/06/2022 01:52	-0.5481	10.07
230	19/06/2022 02:52	-0.5481	10.078
231	19/06/2022 03:52	-0.5428	10.078
232	19/06/2022 04:52	-0.5416	10.078
233	19/06/2022 05:52	-0.5437	10.078
234	19/06/2022 06:52	-0.5438	10.07

235	19/06/2022 07:52	-0.5481	10.078
236	19/06/2022 08:52	-0.5524	10.078
237	19/06/2022 09:52	-0.5502	10.086
238	19/06/2022 10:52	-0.5524	10.086
239	19/06/2022 11:52	-0.5503	10.078
240	19/06/2022 12:52	-0.5524	10.078
241	19/06/2022 13:52	-0.5546	10.078
242	19/06/2022 14:52	-0.547	10.078
243	19/06/2022 15:52	-0.5535	10.078
244	19/06/2022 16:52	-0.5513	10.078
245	19/06/2022 17:52	-0.5599	10.078
246	19/06/2022 18:52	-0.5642	10.078
247	19/06/2022 19:52	-0.5718	10.078
248	19/06/2022 20:52	-0.5686	10.078
249	19/06/2022 21:52	-0.5697	10.086
250	19/06/2022 22:52	-0.5719	10.078
251	19/06/2022 23:52	-0.5709	10.086
252	20/06/2022 00:52	-0.5709	10.086
253	20/06/2022 01:52	-0.5623	10.086
254	20/06/2022 02:52	-0.5568	10.086
255	20/06/2022 03:52	-0.5547	10.078
256	20/06/2022 04:52	-0.5493	10.086
257	20/06/2022 05:52	-0.5548	10.086
258	20/06/2022 06:52	-0.5526	10.086
259	20/06/2022 07:52	-0.5559	10.086
260	20/06/2022 08:52	-0.5645	10.086
261	20/06/2022 09:52	-0.5602	10.094
262	20/06/2022 10:52	-0.5644	10.094
263	20/06/2022 11:52	-0.5611	10.094
264	20/06/2022 12:52	-0.5676	10.094
265	20/06/2022 13:52	-0.5697	10.086
266	20/06/2022 14:52	-0.561	10.086
267	20/06/2022 15:52	-0.5632	10.094
268	20/06/2022 16:52	-0.5718	10.094
269	20/06/2022 17:52	-0.5782	10.094
270	20/06/2022 18:52	-0.575	10.094
271	20/06/2022 19:52	-0.5771	10.086
272	20/06/2022 20:52	-0.5814	10.094
273	20/06/2022 21:52	-0.5878	10.094
274	20/06/2022 22:52	-0.59	10.094
275	20/06/2022 23:52	-0.5878	10.094
276	21/06/2022 00:52	-0.5867	10.094
277	21/06/2022 01:52	-0.5802	10.102
278	21/06/2022 02:52	-0.5758	10.102
279	21/06/2022 03:52	-0.5672	10.102
280	21/06/2022 04:52	-0.565	10.094
281	21/06/2022 05:52	-0.5617	10.102
282	21/06/2022 06:52	-0.5606	10.102
283	21/06/2022 07:52	-0.5639	10.102
284	21/06/2022 08:52	-0.5649	10.102
285	21/06/2022 09:52	-0.566	10.102
286	21/06/2022 10:52	-0.566	10.102
287	21/06/2022 11:52	-0.566	10.102
288	21/06/2022 12:52	-0.5627	10.102
289	21/06/2022 13:52	-0.5574	10.109
290	21/06/2022 14:52	-0.5638	10.102
291	21/06/2022 15:52	-0.5638	10.102
292	21/06/2022 16:52	-0.5627	10.102
293	21/06/2022 17:52	-0.5649	10.102
294	21/06/2022 18:52	-0.5735	10.102
295	21/06/2022 19:52	-0.5757	10.102

296	21/06/2022 20:52	-0.565	10.109
297	21/06/2022 21:52	-0.5769	10.109
298	21/06/2022 22:52	-0.5801	10.109
299	21/06/2022 23:52	-0.5736	10.102
300	22/06/2022 00:52	-0.5693	10.109
301	22/06/2022 01:52	-0.5747	10.109
302	22/06/2022 02:52	-0.5693	10.102
303	22/06/2022 03:52	-0.5682	10.109
304	22/06/2022 04:52	-0.5553	10.109
305	22/06/2022 05:52	-0.5607	10.117
306	22/06/2022 06:52	-0.5596	10.102
307	22/06/2022 07:52	-0.565	10.117
308	22/06/2022 08:52	-0.5618	10.117
309	22/06/2022 09:52	-0.5596	10.117
310	22/06/2022 10:52	-0.5628	10.117
311	22/06/2022 11:52	-0.566	10.117
312	22/06/2022 12:52	-0.5649	10.109
313	22/06/2022 13:52	-0.5693	10.117
314	22/06/2022 14:52	-0.5724	10.117
315	22/06/2022 15:52	-0.566	10.117
316	22/06/2022 16:52	-0.5702	10.117
317	22/06/2022 17:52	-0.5659	10.117
318	22/06/2022 18:52	-0.5756	10.117
319	22/06/2022 19:52	-0.5713	10.117
320	22/06/2022 20:52	-0.5734	10.117
321	22/06/2022 21:52	-0.5767	10.117
322	22/06/2022 22:52	-0.5799	10.117
323	22/06/2022 23:52	-0.5885	10.117
324	23/06/2022 00:52	-0.5885	10.117
325	23/06/2022 01:52	-0.5895	10.117
326	23/06/2022 02:52	-0.5841	10.117
327	23/06/2022 03:52	-0.5798	10.117
328	23/06/2022 04:52	-0.5743	10.117
329	23/06/2022 05:52	-0.5743	10.125
330	23/06/2022 06:52	-0.5754	10.125
331	23/06/2022 07:52	-0.57	10.117
332	23/06/2022 08:52	-0.5732	10.125
333	23/06/2022 09:52	-0.5699	10.133
334	23/06/2022 10:52	-0.5731	10.125
335	23/06/2022 11:52	-0.5741	10.125
336	23/06/2022 12:52	-0.573	10.125
337	23/06/2022 13:52	-0.5709	10.125
338	23/06/2022 14:52	-0.5741	10.125
339	23/06/2022 15:52	-0.5686	10.125
340	23/06/2022 16:52	-0.5642	10.125
341	23/06/2022 17:52	-0.575	10.133
342	23/06/2022 18:52	-0.5771	10.125
343	23/06/2022 19:52	-0.5814	10.125
344	23/06/2022 20:52	-0.5717	10.125
345	23/06/2022 21:52	-0.5781	10.125
346	23/06/2022 22:52	-0.5781	10.125
347	23/06/2022 23:52	-0.577	10.133
348	24/06/2022 00:52	-0.5802	10.133
349	24/06/2022 01:52	-0.5801	10.125
350	24/06/2022 02:52	-0.5779	10.133
351	24/06/2022 03:52	-0.5789	10.133
352	24/06/2022 04:52	-0.5756	10.133
353	24/06/2022 05:52	-0.5734	10.133
354	24/06/2022 06:52	-0.5755	10.141
355	24/06/2022 07:52	-0.5658	10.141
356	24/06/2022 08:52	-0.569	10.133

357	24/06/2022 09:52	-0.569	10.141
358	24/06/2022 10:52	-0.5646	10.141
359	24/06/2022 11:52	-0.5699	10.141
360	24/06/2022 12:52	-0.5613	10.141
361	24/06/2022 13:52	-0.5526	10.141
362	24/06/2022 14:52	-0.5482	10.148
363	24/06/2022 15:52	-0.5234	10.141
364	24/06/2022 16:52	-0.4932	10.148
365	24/06/2022 17:52	-0.4749	10.148
366	24/06/2022 18:52	-0.4566	10.156
367	24/06/2022 19:52	-0.4426	10.156
368	24/06/2022 20:52	-0.4233	10.156
369	24/06/2022 21:52	-0.4319	10.164
370	24/06/2022 22:52	-0.4255	10.164
371	24/06/2022 23:52	-0.4158	10.164
372	25/06/2022 00:52	-0.4105	10.156
373	25/06/2022 01:52	-0.4083	10.164
374	25/06/2022 02:52	-0.3954	10.164
375	25/06/2022 03:52	-0.3911	10.172
376	25/06/2022 04:52	-0.3825	10.164
377	25/06/2022 05:52	-0.375	10.164
378	25/06/2022 06:52	-0.3696	10.164
379	25/06/2022 07:52	-0.3696	10.164
380	25/06/2022 08:52	-0.361	10.172
381	25/06/2022 09:52	-0.3578	10.164
382	25/06/2022 10:52	-0.361	10.172
383	25/06/2022 11:52	-0.3556	10.172
384	25/06/2022 12:52	-0.3566	10.164
385	25/06/2022 13:52	-0.3523	10.172
386	25/06/2022 14:52	-0.3555	10.164
387	25/06/2022 15:52	-0.3577	10.164
388	25/06/2022 16:52	-0.3555	10.172
389	25/06/2022 17:52	-0.3512	10.172
390	25/06/2022 18:52	-0.3414	10.172
391	25/06/2022 19:52	-0.335	10.172
392	25/06/2022 20:52	-0.3328	10.172
393	25/06/2022 21:52	-0.3263	10.172
394	25/06/2022 22:52	-0.3198	10.172
395	25/06/2022 23:52	-0.308	10.172
396	26/06/2022 00:52	-0.3123	10.172
397	26/06/2022 01:52	-0.3113	10.172
398	26/06/2022 02:52	-0.307	10.172
399	26/06/2022 03:52	-0.3059	10.18
400	26/06/2022 04:52	-0.2984	10.18
401	26/06/2022 05:52	-0.2963	10.18
402	26/06/2022 06:52	-0.2964	10.18
403	26/06/2022 07:52	-0.2932	10.18
404	26/06/2022 08:52	-0.2911	10.18
405	26/06/2022 09:52	-0.2847	10.18
406	26/06/2022 10:52	-0.2772	10.18
407	26/06/2022 11:52	-0.2708	10.18
408	26/06/2022 12:52	-0.2665	10.18
409	26/06/2022 13:52	-0.2763	10.18
410	26/06/2022 14:52	-0.2742	10.18
411	26/06/2022 15:52	-0.2743	10.188
412	26/06/2022 16:52	-0.2711	10.18
413	26/06/2022 17:52	-0.2712	10.18
414	26/06/2022 18:52	-0.2723	10.18
415	26/06/2022 19:52	-0.2746	10.18
416	26/06/2022 20:52	-0.2692	10.18
417	26/06/2022 21:52	-0.2628	10.18

418	26/06/2022 22:52	-0.2532	10.18
419	26/06/2022 23:52	-0.2586	10.18
420	27/06/2022 00:52	-0.2544	10.18
421	27/06/2022 01:52	-0.2608	10.18
422	27/06/2022 02:52	-0.2598	10.18
423	27/06/2022 03:52	-0.2609	10.18
424	27/06/2022 04:52	-0.2609	10.18
425	27/06/2022 05:52	-0.2652	10.18
426	27/06/2022 06:52	-0.2631	10.18
427	27/06/2022 07:52	-0.2653	10.188
428	27/06/2022 08:52	-0.261	10.18
429	27/06/2022 09:52	-0.2642	10.18
430	27/06/2022 10:52	-0.2653	10.18
431	27/06/2022 11:52	-0.2707	10.188
432	27/06/2022 12:52	-0.2761	10.188
433	27/06/2022 13:52	-0.2857	10.188
434	27/06/2022 14:52	-0.2911	10.188
435	27/06/2022 15:52	-0.3008	10.188
436	27/06/2022 16:52	-0.2965	10.188
437	27/06/2022 17:52	-0.2921	10.195
438	27/06/2022 18:52	-0.2867	10.195
439	27/06/2022 19:52	-0.2791	10.195
440	27/06/2022 20:52	-0.2715	10.188
441	27/06/2022 21:52	-0.2607	10.188
442	27/06/2022 22:52	-0.2467	10.188
443	27/06/2022 23:52	-0.2391	10.195
444	28/06/2022 00:52	-0.239	10.195
445	28/06/2022 01:52	-0.2346	10.195
446	28/06/2022 02:52	-0.2227	10.195
447	28/06/2022 03:52	-0.2162	10.195
448	28/06/2022 04:52	-0.2097	10.195
449	28/06/2022 05:52	-0.1934	10.195
450	28/06/2022 06:52	-0.1956	10.195
451	28/06/2022 07:52	-0.188	10.195
452	28/06/2022 08:52	-0.1718	10.195
453	28/06/2022 09:52	-0.1815	10.195
454	28/06/2022 10:52	-0.1805	10.195
455	28/06/2022 11:52	-0.1923	10.203
456	28/06/2022 12:52	-0.1999	10.195
457	28/06/2022 13:52	-0.2042	10.203
458	28/06/2022 14:52	-0.2107	10.203
459	28/06/2022 15:52	-0.2204	10.195
460	28/06/2022 16:52	-0.2226	10.195
461	28/06/2022 17:52	-0.2226	10.203
462	28/06/2022 18:52	-0.228	10.195
463	28/06/2022 19:52	-0.2227	10.195
464	28/06/2022 20:52	-0.2238	10.195
465	28/06/2022 21:52	-0.2249	10.195
466	28/06/2022 22:52	-0.2184	10.195
467	28/06/2022 23:52	-0.2045	10.195
468	29/06/2022 00:52	-0.1883	10.195
469	29/06/2022 01:52	-0.1862	10.195
470	29/06/2022 02:52	-0.1883	10.195
471	29/06/2022 03:52	-0.1926	10.195
472	29/06/2022 04:52	-0.1905	10.203
473	29/06/2022 05:52	-0.2013	10.203
474	29/06/2022 06:52	-0.1992	10.195
475	29/06/2022 07:52	-0.2067	10.195
476	29/06/2022 08:52	-0.2089	10.203
477	29/06/2022 09:52	-0.2121	10.203
478	29/06/2022 10:52	-0.2154	10.203

479	29/06/2022 11:52	-0.224	10.203
480	29/06/2022 12:52	-0.2219	10.203
481	29/06/2022 13:52	-0.224	10.203
482	29/06/2022 14:52	-0.224	10.203
483	29/06/2022 15:52	-0.2391	10.203
484	29/06/2022 16:52	-0.2445	10.203
485	29/06/2022 17:52	-0.2466	10.203
486	29/06/2022 18:52	-0.2553	10.211
487	29/06/2022 19:52	-0.2456	10.211
488	29/06/2022 20:52	-0.2521	10.211
489	29/06/2022 21:52	-0.2447	10.203
490	29/06/2022 22:52	-0.2253	10.203
491	29/06/2022 23:52	-0.2124	10.203
492	30/06/2022 00:52	-0.2145	10.203
493	30/06/2022 01:52	-0.2145	10.203
494	30/06/2022 02:52	-0.2102	10.211
495	30/06/2022 03:52	-0.2188	10.203
496	30/06/2022 04:52	-0.2177	10.203
497	30/06/2022 05:52	-0.2188	10.203
498	30/06/2022 06:52	-0.2264	10.211
499	30/06/2022 07:52	-0.2253	10.203
500	30/06/2022 08:52	-0.2286	10.203
501	30/06/2022 09:52	-0.2253	10.203
502	30/06/2022 10:52	-0.22	10.211
503	30/06/2022 11:52	-0.2307	10.211
504	30/06/2022 12:52	-0.2415	10.211
505	30/06/2022 13:52	-0.2458	10.211
506	30/06/2022 14:52	-0.2544	10.211
507	30/06/2022 15:52	-0.2631	10.211
508	30/06/2022 16:52	-0.2717	10.211
509	30/06/2022 17:52	-0.2771	10.211
510	30/06/2022 18:52	-0.2814	10.211
511	30/06/2022 19:52	-0.2858	10.219
512	30/06/2022 20:52	-0.2869	10.211
513	30/06/2022 21:52	-0.2869	10.211
514	30/06/2022 22:52	-0.2697	10.211
515	30/06/2022 23:52	-0.2514	10.211
516	01/07/2022 00:52	-0.2406	10.211
517	01/07/2022 01:52	-0.2449	10.211
518	01/07/2022 02:52	-0.2439	10.211
519	01/07/2022 03:52	-0.2417	10.219
520	01/07/2022 04:52	-0.2417	10.219
521	01/07/2022 05:52	-0.2482	10.211
522	01/07/2022 06:52	-0.2482	10.219
523	01/07/2022 07:52	-0.2492	10.219
524	01/07/2022 08:52	-0.2513	10.219
525	01/07/2022 09:52	-0.2513	10.219
526	01/07/2022 10:52	-0.2534	10.219
527	01/07/2022 11:52	-0.2566	10.219
528	01/07/2022 12:52	-0.262	10.219
529	01/07/2022 13:52	-0.2695	10.219
530	01/07/2022 14:52	-0.2694	10.219
531	01/07/2022 15:52	-0.2824	10.219
532	01/07/2022 16:52	-0.2888	10.219
533	01/07/2022 17:52	-0.2888	10.219
534	01/07/2022 18:52	-0.2899	10.227
535	01/07/2022 19:52	-0.2954	10.227
536	01/07/2022 20:52	-0.2965	10.227
537	01/07/2022 21:52	-0.2944	10.219
538	01/07/2022 22:52	-0.2868	10.227
539	01/07/2022 23:52	-0.261	10.227

540	02/07/2022 00:52	-0.2502	10.227
541	02/07/2022 01:52	-0.2513	10.227
542	02/07/2022 02:52	-0.247	10.227
543	02/07/2022 03:52	-0.2481	10.227
544	02/07/2022 04:52	-0.247	10.234
545	02/07/2022 05:52	-0.2503	10.234
546	02/07/2022 06:52	-0.2503	10.234
547	02/07/2022 07:52	-0.2503	10.234
548	02/07/2022 08:52	-0.2557	10.234
549	02/07/2022 09:52	-0.2503	10.227
550	02/07/2022 10:52	-0.2536	10.234
551	02/07/2022 11:52	-0.2579	10.242
552	02/07/2022 12:52	-0.2633	10.234
553	02/07/2022 13:52	-0.2665	10.242
554	02/07/2022 14:52	-0.274	10.242
555	02/07/2022 15:52	-0.2848	10.242
556	02/07/2022 16:52	-0.2967	10.242
557	02/07/2022 17:52	-0.3043	10.234
558	02/07/2022 18:52	-0.3022	10.234
559	02/07/2022 19:52	-0.286	10.234
560	02/07/2022 20:52	-0.2796	10.234
561	02/07/2022 21:52	-0.2776	10.242
562	02/07/2022 22:52	-0.2787	10.234
563	02/07/2022 23:52	-0.2723	10.242
564	03/07/2022 00:52	-0.268	10.242
565	03/07/2022 01:52	-0.2658	10.242
566	03/07/2022 02:52	-0.2626	10.242
567	03/07/2022 03:52	-0.2616	10.242
568	03/07/2022 04:52	-0.2594	10.25
569	03/07/2022 05:52	-0.2702	10.242
570	03/07/2022 06:52	-0.2659	10.25
571	03/07/2022 07:52	-0.2681	10.25
572	03/07/2022 08:52	-0.2832	10.25
573	03/07/2022 09:52	-0.2897	10.25
574	03/07/2022 10:52	-0.2984	10.25
575	03/07/2022 11:52	-0.3005	10.25
576	03/07/2022 12:52	-0.3016	10.242
577	03/07/2022 13:52	-0.3005	10.242
578	03/07/2022 14:52	-0.3059	10.242
579	03/07/2022 15:52	-0.3059	10.242
580	03/07/2022 16:52	-0.3134	10.242
581	03/07/2022 17:52	-0.3199	10.242
582	03/07/2022 18:52	-0.3145	10.25
583	03/07/2022 19:52	-0.3081	10.242
584	03/07/2022 20:52	-0.3037	10.25
585	03/07/2022 21:52	-0.3048	10.25
586	03/07/2022 22:52	-0.2995	10.25
587	03/07/2022 23:52	-0.2908	10.25
588	04/07/2022 00:52	-0.2865	10.258
589	04/07/2022 01:52	-0.2789	10.25
590	04/07/2022 02:52	-0.2811	10.25
591	04/07/2022 03:52	-0.2789	10.25
592	04/07/2022 04:52	-0.2768	10.258
593	04/07/2022 05:52	-0.28	10.25
594	04/07/2022 06:52	-0.2811	10.258
595	04/07/2022 07:52	-0.2844	10.258
596	04/07/2022 08:52	-0.2844	10.258
597	04/07/2022 09:52	-0.2898	10.258
598	04/07/2022 10:52	-0.2834	10.258
599	04/07/2022 11:52	-0.2985	10.258
600	04/07/2022 12:52	-0.3039	10.266

601	04/07/2022 13:52	-0.3103	10.258
602	04/07/2022 14:52	-0.3136	10.258
603	04/07/2022 15:52	-0.3211	10.258
604	04/07/2022 16:52	-0.333	10.25
605	04/07/2022 17:52	-0.3405	10.258
606	04/07/2022 18:52	-0.347	10.266
607	04/07/2022 19:52	-0.3524	10.266
608	04/07/2022 20:52	-0.3492	10.258
609	04/07/2022 21:52	-0.3384	10.266
610	04/07/2022 22:52	-0.318	10.266
611	04/07/2022 23:52	-0.3158	10.266
612	05/07/2022 00:52	-0.3148	10.258
613	05/07/2022 01:52	-0.3104	10.266
614	05/07/2022 02:52	-0.3018	10.266
615	05/07/2022 03:52	-0.2975	10.273
616	05/07/2022 04:52	-0.2964	10.273
617	05/07/2022 05:52	-0.304	10.266
618	05/07/2022 06:52	-0.3008	10.266
619	05/07/2022 07:52	-0.3073	10.273
620	05/07/2022 08:52	-0.3009	10.273
621	05/07/2022 09:52	-0.3063	10.273
622	05/07/2022 10:52	-0.3063	10.273
623	05/07/2022 11:52	-0.302	10.273
624	05/07/2022 12:52	-0.3085	10.273
625	05/07/2022 13:52	-0.3128	10.273
626	05/07/2022 14:52	-0.3226	10.273
627	05/07/2022 15:52	-0.3344	10.266
628	05/07/2022 16:52	-0.3452	10.266
629	05/07/2022 17:52	-0.342	10.273
630	05/07/2022 18:52	-0.3517	10.273
631	05/07/2022 19:52	-0.3495	10.281
632	05/07/2022 20:52	-0.3528	10.281
633	05/07/2022 21:52	-0.3529	10.281
634	05/07/2022 22:52	-0.3335	10.281
635	05/07/2022 23:52	-0.3368	10.281
636	06/07/2022 00:52	-0.3324	10.273
637	06/07/2022 01:52	-0.326	10.281
638	06/07/2022 02:52	-0.3206	10.281
639	06/07/2022 03:52	-0.3184	10.281
640	06/07/2022 04:52	-0.3195	10.281
641	06/07/2022 05:52	-0.3152	10.289
642	06/07/2022 06:52	-0.3162	10.281
643	06/07/2022 07:52	-0.3206	10.281
644	06/07/2022 08:52	-0.3238	10.289

Manufacturer Heron Instruments
Device dipper-Log 128+
Logger ID C31921
Project WSP RWI
Deployment BH 13
Number of Readings 644

No	Date	Depth to Water (mH2O)	Temperature (°C)
1	09/06/2022 13:51	-0.4991	10.023
2	09/06/2022 14:51	-0.5112	10.016
3	09/06/2022 15:51	-0.5307	10.016
4	09/06/2022 16:51	-0.5338	10.008
5	09/06/2022 17:51	-0.5439	10.008
6	09/06/2022 18:51	-0.5511	10.008
7	09/06/2022 19:51	-0.5535	10.008
8	09/06/2022 20:51	-0.5596	10.008
9	09/06/2022 21:51	-0.5611	10.008
10	09/06/2022 22:51	-0.5623	10.008
11	09/06/2022 23:51	-0.5605	10.008
12	10/06/2022 00:51	-0.5595	10.008
13	10/06/2022 01:51	-0.5595	10.016
14	10/06/2022 02:51	-0.5555	10.008
15	10/06/2022 03:51	-0.5535	10.016
16	10/06/2022 04:51	-0.5474	10.008
17	10/06/2022 05:51	-0.5475	10.008
18	10/06/2022 06:51	-0.5463	10.008
19	10/06/2022 07:51	-0.5454	10.008
20	10/06/2022 08:51	-0.5475	10.016
21	10/06/2022 09:51	-0.5454	10.016
22	10/06/2022 10:51	-0.5494	10.008
23	10/06/2022 11:51	-0.5521	10.008
24	10/06/2022 12:51	-0.5628	10.008
25	10/06/2022 13:51	-0.5647	10.016
26	10/06/2022 14:51	-0.5664	10.016
27	10/06/2022 15:51	-0.5735	10.016
28	10/06/2022 16:51	-0.5779	10.016
29	10/06/2022 17:51	-0.5852	10.008
30	10/06/2022 18:51	-0.5852	10.008
31	10/06/2022 19:51	-0.5897	10.016
32	10/06/2022 20:51	-0.5901	10.016
33	10/06/2022 21:51	-0.5893	10.016
34	10/06/2022 22:51	-0.5833	10.016
35	10/06/2022 23:51	-0.5835	10.016
36	11/06/2022 00:51	-0.5851	10.016
37	11/06/2022 01:51	-0.583	10.008
38	11/06/2022 02:51	-0.583	10.016
39	11/06/2022 03:51	-0.5801	10.016
40	11/06/2022 04:51	-0.5807	10.016

41	11/06/2022 05:51	-0.5766	10.016
42	11/06/2022 06:51	-0.576	10.016
43	11/06/2022 07:51	-0.5792	10.008
44	11/06/2022 08:51	-0.5713	10.016
45	11/06/2022 09:51	-0.5703	10.016
46	11/06/2022 10:51	-0.5758	10.016
47	11/06/2022 11:51	-0.5812	10.016
48	11/06/2022 12:51	-0.5877	10.016
49	11/06/2022 13:51	-0.591	10.016
50	11/06/2022 14:51	-0.5961	10.016
51	11/06/2022 15:51	-0.5975	10.008
52	11/06/2022 16:51	-0.6007	10.023
53	11/06/2022 17:51	-0.602	10.016
54	11/06/2022 18:51	-0.6064	10.016
55	11/06/2022 19:51	-0.6088	10.016
56	11/06/2022 20:51	-0.6083	10.016
57	11/06/2022 21:51	-0.6076	10.016
58	11/06/2022 22:51	-0.609	10.016
59	11/06/2022 23:51	-0.6032	10.023
60	12/06/2022 00:51	-0.6013	10.016
61	12/06/2022 01:51	-0.6026	10.016
62	12/06/2022 02:51	-0.5996	10.016
63	12/06/2022 03:51	-0.5988	10.016
64	12/06/2022 04:51	-0.598	10.016
65	12/06/2022 05:51	-0.5991	10.016
66	12/06/2022 06:51	-0.5972	10.016
67	12/06/2022 07:51	-0.5955	10.016
68	12/06/2022 08:51	-0.5989	10.016
69	12/06/2022 09:51	-0.5946	10.016
70	12/06/2022 10:51	-0.6069	10.016
71	12/06/2022 11:51	-0.609	10.016
72	12/06/2022 12:51	-0.61	10.016
73	12/06/2022 13:51	-0.6182	10.016
74	12/06/2022 14:51	-0.6173	10.016
75	12/06/2022 15:51	-0.6213	10.023
76	12/06/2022 16:51	-0.6255	10.016
77	12/06/2022 17:51	-0.6277	10.016
78	12/06/2022 18:51	-0.6266	10.016
79	12/06/2022 19:51	-0.63	10.016
80	12/06/2022 20:51	-0.6312	10.016
81	12/06/2022 21:51	-0.6304	10.016
82	12/06/2022 22:51	-0.6222	10.016
83	12/06/2022 23:51	-0.6275	10.023
84	13/06/2022 00:51	-0.6264	10.023
85	13/06/2022 01:51	-0.6213	10.023
86	13/06/2022 02:51	-0.6191	10.023
87	13/06/2022 03:51	-0.6161	10.023
88	13/06/2022 04:51	-0.6202	10.016
89	13/06/2022 05:51	-0.6192	10.023
90	13/06/2022 06:51	-0.6203	10.023

91	13/06/2022 07:51	-0.6152	10.016
92	13/06/2022 08:51	-0.6174	10.023
93	13/06/2022 09:51	-0.6132	10.016
94	13/06/2022 10:51	-0.6111	10.016
95	13/06/2022 11:51	-0.6205	10.023
96	13/06/2022 12:51	-0.62	10.023
97	13/06/2022 13:51	-0.6269	10.023
98	13/06/2022 14:51	-0.6225	10.023
99	13/06/2022 15:51	-0.6283	10.016
100	13/06/2022 16:51	-0.6301	10.016
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102	13/06/2022 18:51	-0.6316	10.023
103	13/06/2022 19:51	-0.6388	10.016
104	13/06/2022 20:51	-0.6407	10.023
105	13/06/2022 21:51	-0.6379	10.023
106	13/06/2022 22:51	-0.6327	10.023
107	13/06/2022 23:51	-0.6346	10.023
108	14/06/2022 00:51	-0.6334	10.016
109	14/06/2022 01:51	-0.6365	10.023
110	14/06/2022 02:51	-0.63	10.023
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112	14/06/2022 04:51	-0.6241	10.023
113	14/06/2022 05:51	-0.625	10.023
114	14/06/2022 06:51	-0.6199	10.023
115	14/06/2022 07:51	-0.6159	10.023
116	14/06/2022 08:51	-0.6177	10.023
117	14/06/2022 09:51	-0.6196	10.023
118	14/06/2022 10:51	-0.6226	10.023
119	14/06/2022 11:51	-0.6305	10.023
120	14/06/2022 12:51	-0.6292	10.023
121	14/06/2022 13:51	-0.6382	10.031
122	14/06/2022 14:51	-0.6388	10.023
123	14/06/2022 15:51	-0.6435	10.023
124	14/06/2022 16:51	-0.6465	10.023
125	14/06/2022 17:51	-0.6534	10.023
126	14/06/2022 18:51	-0.6513	10.023
127	14/06/2022 19:51	-0.6512	10.031
128	14/06/2022 20:51	-0.6482	10.023
129	14/06/2022 21:51	-0.6526	10.023
130	14/06/2022 22:51	-0.6589	10.023
131	14/06/2022 23:51	-0.6529	10.031
132	15/06/2022 00:51	-0.6518	10.031
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134	15/06/2022 02:51	-0.6505	10.023
135	15/06/2022 03:51	-0.6485	10.031
136	15/06/2022 04:51	-0.6432	10.023
137	15/06/2022 05:51	-0.6423	10.016
138	15/06/2022 06:51	-0.6454	10.031
139	15/06/2022 07:51	-0.6465	10.023
140	15/06/2022 08:51	-0.6353	10.023

141	15/06/2022 09:51	-0.6342	10.023
142	15/06/2022 10:51	-0.6393	10.031
143	15/06/2022 11:51	-0.6463	10.031
144	15/06/2022 12:51	-0.6566	10.031
145	15/06/2022 13:51	-0.6596	10.031
146	15/06/2022 14:51	-0.6666	10.031
147	15/06/2022 15:51	-0.6675	10.031
148	15/06/2022 16:51	-0.6807	10.023
149	15/06/2022 17:51	-0.6857	10.031
150	15/06/2022 18:51	-0.6828	10.031
151	15/06/2022 19:51	-0.6848	10.023
152	15/06/2022 20:51	-0.6852	10.023
153	15/06/2022 21:51	-0.6877	10.031
154	15/06/2022 22:51	-0.6838	10.031
155	15/06/2022 23:51	-0.6863	10.031
156	16/06/2022 00:51	-0.6821	10.031
157	16/06/2022 01:51	-0.6842	10.023
158	16/06/2022 02:51	-0.6813	10.031
159	16/06/2022 03:51	-0.6811	10.031
160	16/06/2022 04:51	-0.6802	10.031
161	16/06/2022 05:51	-0.6727	10.031
162	16/06/2022 06:51	-0.6695	10.031
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164	16/06/2022 08:51	-0.6701	10.031
165	16/06/2022 09:51	-0.6664	10.031
166	16/06/2022 10:51	-0.6662	10.031
167	16/06/2022 11:51	-0.6673	10.031
168	16/06/2022 12:51	-0.6753	10.031
169	16/06/2022 13:51	-0.6776	10.039
170	16/06/2022 14:51	-0.6888	10.031
171	16/06/2022 15:51	-0.6935	10.031
172	16/06/2022 16:51	-0.6971	10.031
173	16/06/2022 17:51	-0.7021	10.031
174	16/06/2022 18:51	-0.7037	10.031
175	16/06/2022 19:51	-0.7048	10.031
176	16/06/2022 20:51	-0.7041	10.023
177	16/06/2022 21:51	-0.7103	10.039
178	16/06/2022 22:51	-0.7041	10.039
179	16/06/2022 23:51	-0.7008	10.039
180	17/06/2022 00:51	-0.6962	10.031
181	17/06/2022 01:51	-0.6926	10.039
182	17/06/2022 02:51	-0.6939	10.039
183	17/06/2022 03:51	-0.6926	10.039
184	17/06/2022 04:51	-0.6934	10.031
185	17/06/2022 05:51	-0.6925	10.031
186	17/06/2022 06:51	-0.6892	10.031
187	17/06/2022 07:51	-0.6869	10.039
188	17/06/2022 08:51	-0.6901	10.039
189	17/06/2022 09:51	-0.6896	10.039
190	17/06/2022 10:51	-0.695	10.031

191	17/06/2022 11:51	-0.6914	10.031
192	17/06/2022 12:51	-0.6908	10.039
193	17/06/2022 13:51	-0.688	10.031
194	17/06/2022 14:51	-0.6893	10.031
195	17/06/2022 15:51	-0.6938	10.039
196	17/06/2022 16:51	-0.6954	10.039
197	17/06/2022 17:51	-0.6944	10.039
198	17/06/2022 18:51	-0.6927	10.031
199	17/06/2022 19:51	-0.6972	10.031
200	17/06/2022 20:51	-0.6985	10.039
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202	17/06/2022 22:51	-0.7056	10.031
203	17/06/2022 23:51	-0.7047	10.039
204	18/06/2022 00:51	-0.7049	10.039
205	18/06/2022 01:51	-0.7	10.039
206	18/06/2022 02:51	-0.7003	10.039
207	18/06/2022 03:51	-0.7041	10.031
208	18/06/2022 04:51	-0.7022	10.031
209	18/06/2022 05:51	-0.7042	10.031
210	18/06/2022 06:51	-0.7014	10.039
211	18/06/2022 07:51	-0.6995	10.039
212	18/06/2022 08:51	-0.6942	10.031
213	18/06/2022 09:51	-0.6965	10.039
214	18/06/2022 10:51	-0.7017	10.039
215	18/06/2022 11:51	-0.7067	10.039
216	18/06/2022 12:51	-0.7012	10.031
217	18/06/2022 13:51	-0.7038	10.039
218	18/06/2022 14:51	-0.7112	10.039
219	18/06/2022 15:51	-0.7178	10.039
220	18/06/2022 16:51	-0.7164	10.039
221	18/06/2022 17:51	-0.72	10.039
222	18/06/2022 18:51	-0.7272	10.039
223	18/06/2022 19:51	-0.7314	10.039
224	18/06/2022 20:51	-0.7281	10.031
225	18/06/2022 21:51	-0.7342	10.039
226	18/06/2022 22:51	-0.7326	10.031
227	18/06/2022 23:51	-0.7276	10.039
228	19/06/2022 00:51	-0.7273	10.039
229	19/06/2022 01:51	-0.7257	10.047
230	19/06/2022 02:51	-0.7238	10.039
231	19/06/2022 03:51	-0.7207	10.039
232	19/06/2022 04:51	-0.7233	10.039
233	19/06/2022 05:51	-0.7227	10.039
234	19/06/2022 06:51	-0.7212	10.039
235	19/06/2022 07:51	-0.7255	10.039
236	19/06/2022 08:51	-0.7193	10.039
237	19/06/2022 09:51	-0.717	10.039
238	19/06/2022 10:51	-0.7213	10.047
239	19/06/2022 11:51	-0.7233	10.039
240	19/06/2022 12:51	-0.7274	10.039

241	19/06/2022 13:51	-0.7296	10.047
242	19/06/2022 14:51	-0.7324	10.039
243	19/06/2022 15:51	-0.7342	10.039
244	19/06/2022 16:51	-0.7381	10.047
245	19/06/2022 17:51	-0.7422	10.047
246	19/06/2022 18:51	-0.742	10.039
247	19/06/2022 19:51	-0.7475	10.039
248	19/06/2022 20:51	-0.7487	10.039
249	19/06/2022 21:51	-0.7523	10.039
250	19/06/2022 22:51	-0.7507	10.047
251	19/06/2022 23:51	-0.7499	10.039
252	20/06/2022 00:51	-0.7502	10.047
253	20/06/2022 01:51	-0.7481	10.047
254	20/06/2022 02:51	-0.7407	10.047
255	20/06/2022 03:51	-0.7426	10.039
256	20/06/2022 04:51	-0.7377	10.047
257	20/06/2022 05:51	-0.7455	10.039
258	20/06/2022 06:51	-0.7414	10.047
259	20/06/2022 07:51	-0.7406	10.039
260	20/06/2022 08:51	-0.7363	10.047
261	20/06/2022 09:51	-0.7425	10.039
262	20/06/2022 10:51	-0.7419	10.047
263	20/06/2022 11:51	-0.7405	10.047
264	20/06/2022 12:51	-0.7507	10.047
265	20/06/2022 13:51	-0.7523	10.047
266	20/06/2022 14:51	-0.7579	10.047
267	20/06/2022 15:51	-0.7576	10.047
268	20/06/2022 16:51	-0.7655	10.047
269	20/06/2022 17:51	-0.7715	10.047
270	20/06/2022 18:51	-0.7744	10.047
271	20/06/2022 19:51	-0.7763	10.039
272	20/06/2022 20:51	-0.7802	10.047
273	20/06/2022 21:51	-0.7821	10.047
274	20/06/2022 22:51	-0.776	10.047
275	20/06/2022 23:51	-0.7799	10.047
276	21/06/2022 00:51	-0.7683	10.047
277	21/06/2022 01:51	-0.7741	10.047
278	21/06/2022 02:51	-0.7635	10.047
279	21/06/2022 03:51	-0.761	10.047
280	21/06/2022 04:51	-0.7544	10.047
281	21/06/2022 05:51	-0.7575	10.039
282	21/06/2022 06:51	-0.7562	10.047
283	21/06/2022 07:51	-0.7552	10.047
284	21/06/2022 08:51	-0.7477	10.047
285	21/06/2022 09:51	-0.7466	10.047
286	21/06/2022 10:51	-0.7468	10.039
287	21/06/2022 11:51	-0.7446	10.047
288	21/06/2022 12:51	-0.7457	10.055
289	21/06/2022 13:51	-0.7528	10.047
290	21/06/2022 14:51	-0.757	10.047

291	21/06/2022 15:51	-0.7589	10.047
292	21/06/2022 16:51	-0.7619	10.055
293	21/06/2022 17:51	-0.7578	10.055
294	21/06/2022 18:51	-0.7641	10.047
295	21/06/2022 19:51	-0.7643	10.055
296	21/06/2022 20:51	-0.7645	10.047
297	21/06/2022 21:51	-0.7679	10.047
298	21/06/2022 22:51	-0.7609	10.047
299	21/06/2022 23:51	-0.7589	10.055
300	22/06/2022 00:51	-0.7548	10.047
301	22/06/2022 01:51	-0.756	10.047
302	22/06/2022 02:51	-0.7508	10.047
303	22/06/2022 03:51	-0.7536	10.047
304	22/06/2022 04:51	-0.7474	10.047
305	22/06/2022 05:51	-0.7505	10.055
306	22/06/2022 06:51	-0.7475	10.047
307	22/06/2022 07:51	-0.749	10.047
308	22/06/2022 08:51	-0.7458	10.047
309	22/06/2022 09:51	-0.7475	10.047
310	22/06/2022 10:51	-0.7484	10.047
311	22/06/2022 11:51	-0.7492	10.055
312	22/06/2022 12:51	-0.7522	10.055
313	22/06/2022 13:51	-0.7603	10.055
314	22/06/2022 14:51	-0.7609	10.047
315	22/06/2022 15:51	-0.7689	10.055
316	22/06/2022 16:51	-0.7686	10.047
317	22/06/2022 17:51	-0.7724	10.055
318	22/06/2022 18:51	-0.7773	10.047
319	22/06/2022 19:51	-0.7792	10.055
320	22/06/2022 20:51	-0.7811	10.055
321	22/06/2022 21:51	-0.7804	10.063
322	22/06/2022 22:51	-0.7815	10.055
323	22/06/2022 23:51	-0.7814	10.047
324	23/06/2022 00:51	-0.7792	10.055
325	23/06/2022 01:51	-0.7797	10.055
326	23/06/2022 02:51	-0.7744	10.055
327	23/06/2022 03:51	-0.7741	10.055
328	23/06/2022 04:51	-0.7667	10.055
329	23/06/2022 05:51	-0.7726	10.055
330	23/06/2022 06:51	-0.7673	10.047
331	23/06/2022 07:51	-0.7681	10.055
332	23/06/2022 08:51	-0.7631	10.055
333	23/06/2022 09:51	-0.7576	10.055
334	23/06/2022 10:51	-0.7562	10.055
335	23/06/2022 11:51	-0.7548	10.055
336	23/06/2022 12:51	-0.7597	10.055
337	23/06/2022 13:51	-0.7634	10.055
338	23/06/2022 14:51	-0.7703	10.063
339	23/06/2022 15:51	-0.7686	10.055
340	23/06/2022 16:51	-0.7699	10.063

341	23/06/2022 17:51	-0.7799	10.055
342	23/06/2022 18:51	-0.7878	10.055
343	23/06/2022 19:51	-0.7897	10.055
344	23/06/2022 20:51	-0.7905	10.063
345	23/06/2022 21:51	-0.7883	10.055
346	23/06/2022 22:51	-0.7841	10.055
347	23/06/2022 23:51	-0.7907	10.055
348	24/06/2022 00:51	-0.7831	10.055
349	24/06/2022 01:51	-0.7783	10.063
350	24/06/2022 02:51	-0.778	10.063
351	24/06/2022 03:51	-0.7704	10.055
352	24/06/2022 04:51	-0.7689	10.055
353	24/06/2022 05:51	-0.7725	10.063
354	24/06/2022 06:51	-0.766	10.063
355	24/06/2022 07:51	-0.7625	10.055
356	24/06/2022 08:51	-0.7653	10.063
357	24/06/2022 09:51	-0.7609	10.063
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359	24/06/2022 11:51	-0.7549	10.063
360	24/06/2022 12:51	-0.7464	10.055
361	24/06/2022 13:51	-0.7315	10.063
362	24/06/2022 14:51	-0.7146	10.063
363	24/06/2022 15:51	-0.6447	10.063
364	24/06/2022 16:51	-0.5774	10.063
365	24/06/2022 17:51	-0.5581	10.055
366	24/06/2022 18:51	-0.5472	10.063
367	24/06/2022 19:51	-0.5404	10.063
368	24/06/2022 20:51	-0.5427	10.063
369	24/06/2022 21:51	-0.5371	10.07
370	24/06/2022 22:51	-0.5333	10.063
371	24/06/2022 23:51	-0.5021	10.063
372	25/06/2022 00:51	-0.469	10.07
373	25/06/2022 01:51	-0.4552	10.063
374	25/06/2022 02:51	-0.4391	10.063
375	25/06/2022 03:51	-0.4271	10.07
376	25/06/2022 04:51	-0.4129	10.063
377	25/06/2022 05:51	-0.4039	10.063
378	25/06/2022 06:51	-0.397	10.07
379	25/06/2022 07:51	-0.3929	10.063
380	25/06/2022 08:51	-0.3869	10.07
381	25/06/2022 09:51	-0.3817	10.063
382	25/06/2022 10:51	-0.3785	10.07
383	25/06/2022 11:51	-0.3774	10.063
384	25/06/2022 12:51	-0.378	10.07
385	25/06/2022 13:51	-0.3779	10.063
386	25/06/2022 14:51	-0.379	10.07
387	25/06/2022 15:51	-0.377	10.063
388	25/06/2022 16:51	-0.379	10.063
389	25/06/2022 17:51	-0.3785	10.063
390	25/06/2022 18:51	-0.3669	10.063

391	25/06/2022 19:51	-0.3709	10.07
392	25/06/2022 20:51	-0.3626	10.063
393	25/06/2022 21:51	-0.3565	10.07
394	25/06/2022 22:51	-0.3478	10.063
395	25/06/2022 23:51	-0.3331	10.063
396	26/06/2022 00:51	-0.3172	10.063
397	26/06/2022 01:51	-0.3104	10.07
398	26/06/2022 02:51	-0.3003	10.063
399	26/06/2022 03:51	-0.2934	10.07
400	26/06/2022 04:51	-0.2887	10.063
401	26/06/2022 05:51	-0.2771	10.063
402	26/06/2022 06:51	-0.2777	10.063
403	26/06/2022 07:51	-0.271	10.063
404	26/06/2022 08:51	-0.2613	10.07
405	26/06/2022 09:51	-0.2517	10.07
406	26/06/2022 10:51	-0.2449	10.063
407	26/06/2022 11:51	-0.2332	10.07
408	26/06/2022 12:51	-0.2295	10.07
409	26/06/2022 13:51	-0.2232	10.07
410	26/06/2022 14:51	-0.2261	10.07
411	26/06/2022 15:51	-0.2247	10.07
412	26/06/2022 16:51	-0.2344	10.07
413	26/06/2022 17:51	-0.2307	10.07
414	26/06/2022 18:51	-0.2303	10.07
415	26/06/2022 19:51	-0.2352	10.063
416	26/06/2022 20:51	-0.2349	10.07
417	26/06/2022 21:51	-0.2333	10.07
418	26/06/2022 22:51	-0.2369	10.07
419	26/06/2022 23:51	-0.2384	10.07
420	27/06/2022 00:51	-0.2306	10.07
421	27/06/2022 01:51	-0.2349	10.063
422	27/06/2022 02:51	-0.2359	10.07
423	27/06/2022 03:51	-0.233	10.078
424	27/06/2022 04:51	-0.2271	10.07
425	27/06/2022 05:51	-0.2377	10.063
426	27/06/2022 06:51	-0.2322	10.07
427	27/06/2022 07:51	-0.2283	10.07
428	27/06/2022 08:51	-0.2303	10.07
429	27/06/2022 09:51	-0.2273	10.07
430	27/06/2022 10:51	-0.2221	10.07
431	27/06/2022 11:51	-0.223	10.07
432	27/06/2022 12:51	-0.232	10.07
433	27/06/2022 13:51	-0.235	10.07
434	27/06/2022 14:51	-0.238	10.07
435	27/06/2022 15:51	-0.2409	10.07
436	27/06/2022 16:51	-0.2388	10.07
437	27/06/2022 17:51	-0.2298	10.063
438	27/06/2022 18:51	-0.2287	10.07
439	27/06/2022 19:51	-0.2273	10.07
440	27/06/2022 20:51	-0.2239	10.07

441	27/06/2022 21:51	-0.2235	10.07
442	27/06/2022 22:51	-0.2244	10.07
443	27/06/2022 23:51	-0.2188	10.07
444	28/06/2022 00:51	-0.2039	10.07
445	28/06/2022 01:51	-0.1811	10.078
446	28/06/2022 02:51	-0.1634	10.07
447	28/06/2022 03:51	-0.1466	10.07
448	28/06/2022 04:51	-0.1256	10.07
449	28/06/2022 05:51	-0.1098	10.078
450	28/06/2022 06:51	-0.1016	10.07
451	28/06/2022 07:51	-0.0983	10.078
452	28/06/2022 08:51	-0.091	10.078
453	28/06/2022 09:51	-0.0899	10.078
454	28/06/2022 10:51	-0.0849	10.078
455	28/06/2022 11:51	-0.0815	10.078
456	28/06/2022 12:51	-0.0852	10.07
457	28/06/2022 13:51	-0.0897	10.078
458	28/06/2022 14:51	-0.1	10.078
459	28/06/2022 15:51	-0.1014	10.07
460	28/06/2022 16:51	-0.1076	10.078
461	28/06/2022 17:51	-0.1034	10.07
462	28/06/2022 18:51	-0.1087	10.078
463	28/06/2022 19:51	-0.11	10.078
464	28/06/2022 20:51	-0.1155	10.07
465	28/06/2022 21:51	-0.1168	10.07
466	28/06/2022 22:51	-0.1129	10.078
467	28/06/2022 23:51	-0.1101	10.07
468	29/06/2022 00:51	-0.1132	10.078
469	29/06/2022 01:51	-0.1072	10.078
470	29/06/2022 02:51	-0.1112	10.078
471	29/06/2022 03:51	-0.1113	10.078
472	29/06/2022 04:51	-0.1135	10.078
473	29/06/2022 05:51	-0.1116	10.07
474	29/06/2022 06:51	-0.1118	10.07
475	29/06/2022 07:51	-0.113	10.078
476	29/06/2022 08:51	-0.1152	10.078
477	29/06/2022 09:51	-0.1163	10.078
478	29/06/2022 10:51	-0.1197	10.078
479	29/06/2022 11:51	-0.1155	10.078
480	29/06/2022 12:51	-0.1156	10.078
481	29/06/2022 13:51	-0.1198	10.078
482	29/06/2022 14:51	-0.1197	10.078
483	29/06/2022 15:51	-0.1239	10.078
484	29/06/2022 16:51	-0.1309	10.078
485	29/06/2022 17:51	-0.1349	10.078
486	29/06/2022 18:51	-0.1393	10.078
487	29/06/2022 19:51	-0.1404	10.078
488	29/06/2022 20:51	-0.1448	10.078
489	29/06/2022 21:51	-0.1465	10.078
490	29/06/2022 22:51	-0.1487	10.078

491	29/06/2022 23:51	-0.1487	10.086
492	30/06/2022 00:51	-0.1426	10.086
493	30/06/2022 01:51	-0.1386	10.078
494	30/06/2022 02:51	-0.1426	10.078
495	30/06/2022 03:51	-0.1406	10.078
496	30/06/2022 04:51	-0.1396	10.078
497	30/06/2022 05:51	-0.1387	10.078
498	30/06/2022 06:51	-0.144	10.078
499	30/06/2022 07:51	-0.1432	10.086
500	30/06/2022 08:51	-0.1463	10.078
501	30/06/2022 09:51	-0.1412	10.078
502	30/06/2022 10:51	-0.1423	10.086
503	30/06/2022 11:51	-0.1504	10.078
504	30/06/2022 12:51	-0.1545	10.086
505	30/06/2022 13:51	-0.1585	10.078
506	30/06/2022 14:51	-0.1667	10.078
507	30/06/2022 15:51	-0.1729	10.086
508	30/06/2022 16:51	-0.1771	10.078
509	30/06/2022 17:51	-0.1763	10.086
510	30/06/2022 18:51	-0.1785	10.086
511	30/06/2022 19:51	-0.1768	10.086
512	30/06/2022 20:51	-0.1842	10.086
513	30/06/2022 21:51	-0.1783	10.078
514	30/06/2022 22:51	-0.1804	10.086
515	30/06/2022 23:51	-0.1815	10.086
516	01/07/2022 00:51	-0.1797	10.078
517	01/07/2022 01:51	-0.1755	10.086
518	01/07/2022 02:51	-0.1725	10.086
519	01/07/2022 03:51	-0.1744	10.086
520	01/07/2022 04:51	-0.1806	10.086
521	01/07/2022 05:51	-0.1765	10.086
522	01/07/2022 06:51	-0.1786	10.094
523	01/07/2022 07:51	-0.1711	10.086
524	01/07/2022 08:51	-0.1749	10.086
525	01/07/2022 09:51	-0.1682	10.086
526	01/07/2022 10:51	-0.1743	10.086
527	01/07/2022 11:51	-0.181	10.094
528	01/07/2022 12:51	-0.1757	10.086
529	01/07/2022 13:51	-0.1785	10.086
530	01/07/2022 14:51	-0.1781	10.086
531	01/07/2022 15:51	-0.1719	10.086
532	01/07/2022 16:51	-0.178	10.086
533	01/07/2022 17:51	-0.1719	10.086
534	01/07/2022 18:51	-0.1773	10.086
535	01/07/2022 19:51	-0.1827	10.086
536	01/07/2022 20:51	-0.188	10.086
537	01/07/2022 21:51	-0.1864	10.094
538	01/07/2022 22:51	-0.1856	10.086
539	01/07/2022 23:51	-0.1919	10.086
540	02/07/2022 00:51	-0.1838	10.086

541	02/07/2022 01:51	-0.1827	10.086
542	02/07/2022 02:51	-0.1769	10.086
543	02/07/2022 03:51	-0.1718	10.094
544	02/07/2022 04:51	-0.171	10.094
545	02/07/2022 05:51	-0.1721	10.094
546	02/07/2022 06:51	-0.1703	10.094
547	02/07/2022 07:51	-0.1663	10.086
548	02/07/2022 08:51	-0.1694	10.094
549	02/07/2022 09:51	-0.1643	10.094
550	02/07/2022 10:51	-0.1614	10.086
551	02/07/2022 11:51	-0.1635	10.086
552	02/07/2022 12:51	-0.1666	10.094
553	02/07/2022 13:51	-0.1677	10.094
554	02/07/2022 14:51	-0.1747	10.094
555	02/07/2022 15:51	-0.1849	10.094
556	02/07/2022 16:51	-0.1924	10.094
557	02/07/2022 17:51	-0.1978	10.094
558	02/07/2022 18:51	-0.2001	10.094
559	02/07/2022 19:51	-0.2034	10.094
560	02/07/2022 20:51	-0.2019	10.094
561	02/07/2022 21:51	-0.2046	10.086
562	02/07/2022 22:51	-0.2019	10.094
563	02/07/2022 23:51	-0.2043	10.094
564	03/07/2022 00:51	-0.2004	10.094
565	03/07/2022 01:51	-0.2028	10.094
566	03/07/2022 02:51	-0.1937	10.094
567	03/07/2022 03:51	-0.1989	10.094
568	03/07/2022 04:51	-0.201	10.094
569	03/07/2022 05:51	-0.1993	10.094
570	03/07/2022 06:51	-0.1994	10.094
571	03/07/2022 07:51	-0.1997	10.094
572	03/07/2022 08:51	-0.1999	10.094
573	03/07/2022 09:51	-0.2044	10.094
574	03/07/2022 10:51	-0.2065	10.094
575	03/07/2022 11:51	-0.2129	10.094
576	03/07/2022 12:51	-0.216	10.102
577	03/07/2022 13:51	-0.2229	10.102
578	03/07/2022 14:51	-0.2237	10.094
579	03/07/2022 15:51	-0.2279	10.094
580	03/07/2022 16:51	-0.233	10.094
581	03/07/2022 17:51	-0.2329	10.094
582	03/07/2022 18:51	-0.2297	10.094
583	03/07/2022 19:51	-0.2299	10.094
584	03/07/2022 20:51	-0.2319	10.102
585	03/07/2022 21:51	-0.231	10.094
586	03/07/2022 22:51	-0.228	10.102
587	03/07/2022 23:51	-0.2279	10.094
588	04/07/2022 00:51	-0.2237	10.094
589	04/07/2022 01:51	-0.2204	10.102
590	04/07/2022 02:51	-0.2204	10.102

591	04/07/2022 03:51	-0.2184	10.102
592	04/07/2022 04:51	-0.2162	10.102
593	04/07/2022 05:51	-0.2195	10.094
594	04/07/2022 06:51	-0.2229	10.102
595	04/07/2022 07:51	-0.2219	10.102
596	04/07/2022 08:51	-0.2159	10.102
597	04/07/2022 09:51	-0.2232	10.109
598	04/07/2022 10:51	-0.2235	10.102
599	04/07/2022 11:51	-0.2277	10.102
600	04/07/2022 12:51	-0.235	10.094
601	04/07/2022 13:51	-0.2432	10.102
602	04/07/2022 14:51	-0.2462	10.102
603	04/07/2022 15:51	-0.2473	10.094
604	04/07/2022 16:51	-0.2544	10.102
605	04/07/2022 17:51	-0.2575	10.102
606	04/07/2022 18:51	-0.2577	10.094
607	04/07/2022 19:51	-0.2609	10.102
608	04/07/2022 20:51	-0.2623	10.102
609	04/07/2022 21:51	-0.2603	10.109
610	04/07/2022 22:51	-0.2615	10.102
611	04/07/2022 23:51	-0.2573	10.102
612	05/07/2022 00:51	-0.2543	10.102
613	05/07/2022 01:51	-0.252	10.102
614	05/07/2022 02:51	-0.2502	10.102
615	05/07/2022 03:51	-0.2461	10.102
616	05/07/2022 04:51	-0.245	10.102
617	05/07/2022 05:51	-0.2507	10.102
618	05/07/2022 06:51	-0.2518	10.109
619	05/07/2022 07:51	-0.2524	10.102
620	05/07/2022 08:51	-0.2484	10.102
621	05/07/2022 09:51	-0.2519	10.109
622	05/07/2022 10:51	-0.2477	10.102
623	05/07/2022 11:51	-0.2541	10.109
624	05/07/2022 12:51	-0.2583	10.102
625	05/07/2022 13:51	-0.2645	10.102
626	05/07/2022 14:51	-0.2699	10.109
627	05/07/2022 15:51	-0.271	10.102
628	05/07/2022 16:51	-0.2814	10.109
629	05/07/2022 17:51	-0.2824	10.102
630	05/07/2022 18:51	-0.2878	10.102
631	05/07/2022 19:51	-0.2897	10.102
632	05/07/2022 20:51	-0.2931	10.102
633	05/07/2022 21:51	-0.2854	10.109
634	05/07/2022 22:51	-0.2855	10.109
635	05/07/2022 23:51	-0.289	10.109
636	06/07/2022 00:51	-0.2827	10.102
637	06/07/2022 01:51	-0.2787	10.102
638	06/07/2022 02:51	-0.2754	10.109
639	06/07/2022 03:51	-0.2731	10.109
640	06/07/2022 04:51	-0.2722	10.109

641	06/07/2022 05:51	-0.2722	10.102
642	06/07/2022 06:51	-0.2731	10.117
643	06/07/2022 07:51	-0.2692	10.109
644	06/07/2022 08:51	-0.2723	10.109

Manufacturer Heron Instruments
Device dipper-Log 128+
Logger ID C31922
Project WSP RWI
Deployment BH 016
Number of Readings 644

No	Date	Depth to Water (mH2O)	Temperature (°C)
1	09/06/2022 13:46	-1.0505	9.867
2	09/06/2022 14:46	-1.0526	9.844
3	09/06/2022 15:46	-1.0601	9.844
4	09/06/2022 16:46	-1.0697	9.836
5	09/06/2022 17:46	-1.0697	9.836
6	09/06/2022 18:46	-1.0729	9.828
7	09/06/2022 19:46	-1.0794	9.836
8	09/06/2022 20:46	-1.0773	9.836
9	09/06/2022 21:46	-1.087	9.836
10	09/06/2022 22:46	-1.0818	9.836
11	09/06/2022 23:46	-1.0861	9.836
12	10/06/2022 00:46	-1.0829	9.844
13	10/06/2022 01:46	-1.0893	9.836
14	10/06/2022 02:46	-1.085	9.836
15	10/06/2022 03:46	-1.0808	9.836
16	10/06/2022 04:46	-1.0829	9.836
17	10/06/2022 05:46	-1.083	9.836
18	10/06/2022 06:46	-1.0839	9.836
19	10/06/2022 07:46	-1.0808	9.836
20	10/06/2022 08:46	-1.0851	9.844
21	10/06/2022 09:46	-1.0808	9.844
22	10/06/2022 10:46	-1.085	9.844
23	10/06/2022 11:46	-1.0796	9.836
24	10/06/2022 12:46	-1.0862	9.844
25	10/06/2022 13:46	-1.0882	9.844
26	10/06/2022 14:46	-1.0902	9.844
27	10/06/2022 15:46	-1.0913	9.844
28	10/06/2022 16:46	-1.0935	9.844
29	10/06/2022 17:46	-1.0989	9.844
30	10/06/2022 18:46	-1.0989	9.844
31	10/06/2022 19:46	-1.1054	9.844
32	10/06/2022 20:46	-1.1098	9.844
33	10/06/2022 21:46	-1.1088	9.844
34	10/06/2022 22:46	-1.1046	9.844
35	10/06/2022 23:46	-1.1111	9.844
36	11/06/2022 00:46	-1.1081	9.844
37	11/06/2022 01:46	-1.1102	9.852
38	11/06/2022 02:46	-1.1123	9.844
39	11/06/2022 03:46	-1.1071	9.852
40	11/06/2022 04:46	-1.1115	9.844

41	11/06/2022 05:46	-1.1094	9.852
42	11/06/2022 06:46	-1.1127	9.852
43	11/06/2022 07:46	-1.1139	9.852
44	11/06/2022 08:46	-1.1076	9.852
45	11/06/2022 09:46	-1.1087	9.852
46	11/06/2022 10:46	-1.112	9.852
47	11/06/2022 11:46	-1.1132	9.852
48	11/06/2022 12:46	-1.1197	9.859
49	11/06/2022 13:46	-1.1187	9.852
50	11/06/2022 14:46	-1.1219	9.852
51	11/06/2022 15:46	-1.1273	9.852
52	11/06/2022 16:46	-1.1285	9.852
53	11/06/2022 17:46	-1.1254	9.859
54	11/06/2022 18:46	-1.1277	9.859
55	11/06/2022 19:46	-1.1278	9.859
56	11/06/2022 20:46	-1.1333	9.859
57	11/06/2022 21:46	-1.1323	9.852
58	11/06/2022 22:46	-1.1357	9.859
59	11/06/2022 23:46	-1.1337	9.852
60	12/06/2022 00:46	-1.1358	9.859
61	12/06/2022 01:46	-1.1306	9.867
62	12/06/2022 02:46	-1.1338	9.859
63	12/06/2022 03:46	-1.135	9.867
64	12/06/2022 04:46	-1.1382	9.859
65	12/06/2022 05:46	-1.1351	9.867
66	12/06/2022 06:46	-1.133	9.867
67	12/06/2022 07:46	-1.1374	9.867
68	12/06/2022 08:46	-1.1343	9.875
69	12/06/2022 09:46	-1.1321	9.867
70	12/06/2022 10:46	-1.1364	9.867
71	12/06/2022 11:46	-1.1386	9.867
72	12/06/2022 12:46	-1.1396	9.867
73	12/06/2022 13:46	-1.1439	9.867
74	12/06/2022 14:46	-1.1471	9.867
75	12/06/2022 15:46	-1.145	9.867
76	12/06/2022 16:46	-1.1492	9.867
77	12/06/2022 17:46	-1.1514	9.875
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79	12/06/2022 19:46	-1.1536	9.867
80	12/06/2022 20:46	-1.1548	9.867
81	12/06/2022 21:46	-1.1517	9.875
82	12/06/2022 22:46	-1.1559	9.875
83	12/06/2022 23:46	-1.157	9.875
84	13/06/2022 00:46	-1.1559	9.867
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98	13/06/2022 14:46	-1.1545	9.883
99	13/06/2022 15:46	-1.1544	9.883
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103	13/06/2022 19:46	-1.1616	9.883
104	13/06/2022 20:46	-1.1615	9.891
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106	13/06/2022 22:46	-1.1616	9.883
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131	14/06/2022 23:46	-1.1783	9.898
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173	16/06/2022 17:46	-1.218	9.922
174	16/06/2022 18:46	-1.2178	9.914
175	16/06/2022 19:46	-1.2232	9.914
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188	17/06/2022 08:46	-1.2194	9.922
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199	17/06/2022 19:46	-1.2347	9.938
200	17/06/2022 20:46	-1.2359	9.93
201	17/06/2022 21:46	-1.2372	9.93
202	17/06/2022 22:46	-1.2405	9.938
203	17/06/2022 23:46	-1.2437	9.93
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363	24/06/2022 15:46	-1.2686	10.023
364	24/06/2022 16:46	-1.2409	10.031
365	24/06/2022 17:46	-1.2187	10.031
366	24/06/2022 18:46	-1.2093	10.039
367	24/06/2022 19:46	-1.1914	10.055
368	24/06/2022 20:46	-1.183	10.063
369	24/06/2022 21:46	-1.1769	10.063
370	24/06/2022 22:46	-1.1728	10.07
371	24/06/2022 23:46	-1.157	10.086
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374	25/06/2022 02:46	-1.0991	10.125
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377	25/06/2022 05:46	-1.0474	10.188
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390	25/06/2022 18:46	-0.9506	10.258

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430	27/06/2022 10:46	-0.7399	10.352
431	27/06/2022 11:46	-0.741	10.352
432	27/06/2022 12:46	-0.7441	10.352
433	27/06/2022 13:46	-0.743	10.352
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436	27/06/2022 16:46	-0.7429	10.352
437	27/06/2022 17:46	-0.7405	10.359
438	27/06/2022 18:46	-0.7373	10.352
439	27/06/2022 19:46	-0.734	10.352
440	27/06/2022 20:46	-0.7349	10.344

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442	27/06/2022 22:46	-0.7252	10.359
443	27/06/2022 23:46	-0.7281	10.352
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446	28/06/2022 02:46	-0.682	10.375
447	28/06/2022 03:46	-0.667	10.383
448	28/06/2022 04:46	-0.6477	10.391
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452	28/06/2022 08:46	-0.5954	10.406
453	28/06/2022 09:46	-0.5901	10.406
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455	28/06/2022 11:46	-0.5773	10.398
456	28/06/2022 12:46	-0.5849	10.398
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459	28/06/2022 15:46	-0.58	10.398
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461	28/06/2022 17:46	-0.5821	10.391
462	28/06/2022 18:46	-0.5875	10.391
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515	30/06/2022 23:46	-0.6378	10.305
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532	01/07/2022 16:46	-0.64	10.313
533	01/07/2022 17:46	-0.6421	10.32
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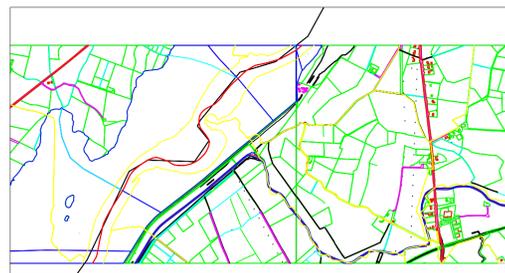
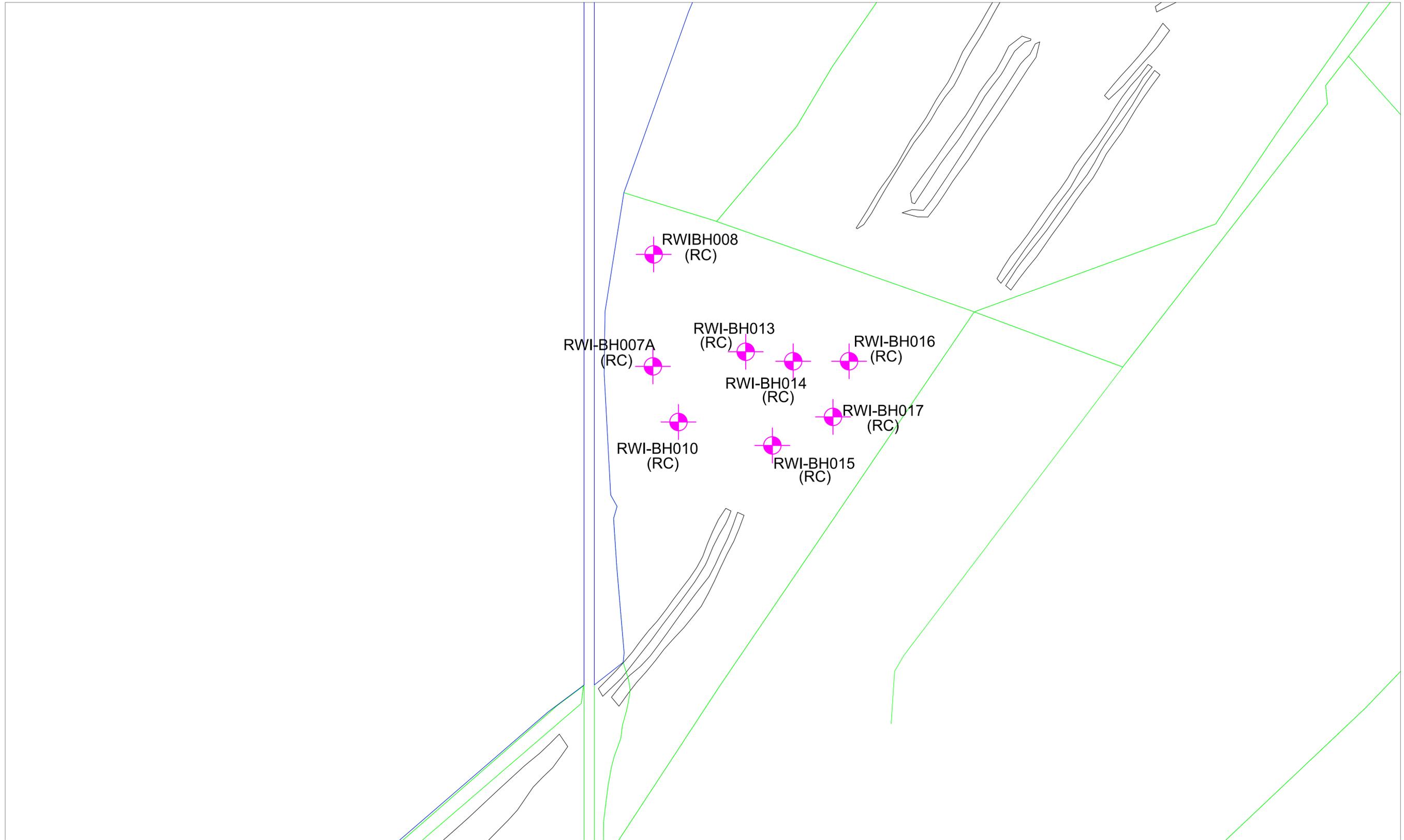
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611	04/07/2022 23:46	-0.7286	10.313
612	05/07/2022 00:46	-0.7318	10.313
613	05/07/2022 01:46	-0.7232	10.32
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623	05/07/2022 11:46	-0.7346	10.313
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627	05/07/2022 15:46	-0.7475	10.305
628	05/07/2022 16:46	-0.754	10.305
629	05/07/2022 17:46	-0.7508	10.313
630	05/07/2022 18:46	-0.7562	10.305
631	05/07/2022 19:46	-0.754	10.305
632	05/07/2022 20:46	-0.7595	10.313
633	05/07/2022 21:46	-0.7617	10.305
634	05/07/2022 22:46	-0.7597	10.313
635	05/07/2022 23:46	-0.7651	10.305
636	06/07/2022 00:46	-0.7629	10.313
637	06/07/2022 01:46	-0.7608	10.305
638	06/07/2022 02:46	-0.7597	10.313
639	06/07/2022 03:46	-0.7575	10.313
640	06/07/2022 04:46	-0.7607	10.32

641	06/07/2022 05:46	-0.7607	10.305
642	06/07/2022 06:46	-0.7596	10.313
643	06/07/2022 07:46	-0.7596	10.313
644	06/07/2022 08:46	-0.7607	10.313



Appendix 1K Drawings



LEGEND

SOILS/ROTARY CORE BOREHOLE
LOCATION
RC= Rotary Core



Client: IRISH WATER				
Title: Eastern and Midlands Water Supply Project(Lot 1)				
1 of 1				
 IRISH DRILLING LIMITED OLD GALWAY ROAD, LOUGHREA, CO. GALWAY Tel. 091 841274. info@irishdrilling.ie				
Dimensions in.	mm			
Scale:	1:500 @ A1			
Drawn By:	MM	20/07/2022		
Checked By:	RK	20/07/2022	Drawing No.	Revision
Approved By:			IDL-WSP-01	2 of 1

REVISION	By	Date	Chkd
IDL1	MM	20/10/22	RK

Appendix 1L

Digital Data